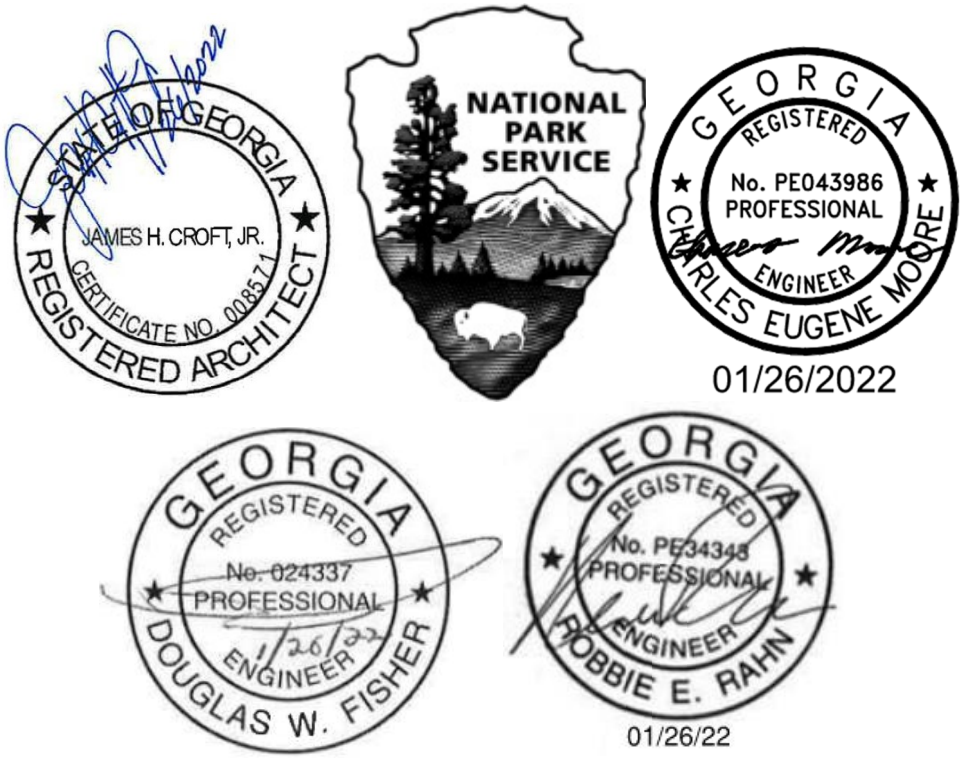
MARTIN LUTHER KING, JR. NATIONAL HISTORICAL PARK
ATLANTA, GA

FIRE PROTECTION SYSTEM DESIGN
MALU
PMIS NO. 160151

PROJECT SPECIFICATIONS
CONSTRUCTION DOCUMENTS
Division 01 & Outline Divisions 02-49



NATIONAL PARK SERVICE (NPS)
INTERIOR REGION 2

SECTION 00 0110 - TABLE OF CONTENTS

PROCUREMENT AND CONTRACTING REQUIREMENTS

1.1 DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS

SPECIFICATIONS

2.1 DIVISION 01 -- GENERAL REQUIREMENTS

2.2 DIVISION 02 -- EXISTING CONDITIONS

2.3 DIVISION 03 -- CONCRETE

SECTION 00 3100 - AVAILABLE PROJECT INFORMATION

PART 1 GENERAL

1.1 EXISTING CONDITIONS

A. Certain information relating to existing surface and subsurface conditions and structures is available to bidders but will not be part of Contract Documents, as follows:

B. Existing Conditions Survey: Entitled Underground Utility Survey, by GeoSurvey Land Surveying, dated 9/2/2021.

1. This survey identifies conditions of existing construction prepared primarily for the use of Contracting Officer in establishing the extent of the new versus existing work.

1.2 PRELIMINARY DATA

A. Certain preliminary investigations and studies made by the Government are available to the bidders but will not be part of Contract Documents, as follows:

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:

1. Work Covered by Contract Documents
2. Work Phases
3. Work Under Other Contracts
4. Government-Furnished Materials
5. Contractor Use of Site
6. Public Use of Site
7. Occupancy Requirements for Buildings
8. Conduct of Operations
9. Work Restrictions
10. Special Construction Requirements
11. Soils Investigation Report
12. Additional Reports

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Location: 497 & 503 AUBURN AVENUE, ATLANTA, GEORGIA. MARTIN LUTHER KING, JR. NATIONAL HISTORICAL PARK

B. The Work consists of:

1. Installation of a dry pipe sprinkler system through the building, including the attic, porch, and under exterior eaves and roof gables.

2. Dry pipe system shall utilize a nitrogen generator system and both the N2 system and the dry pipe valve shall be installed in cabinet assembly manufactured/supplied by the manufacturer of the dry pipe valve.

3. Sprinkler pipe routing, pipe size, and sprinkler locations have been approved by NPS and shall be followed. Any deviations shall be approved by NPS prior to shop drawing approval.

4. Project is designed to comply with Section 01 81 13 "Sustainable Design Requirements."

C. Project will be constructed under a single prime contract.

1.3 WORK PHASES

A. The Work shall be conducted in three (3) phases in the following order, with each phase substantially complete before beginning next phase:

1. Phase 1: This phase includes installing all work at 503 Auburn Avenue prior to beginning work in 497 Auburn Avenue. Work of this phase shall be substantially complete and ready for occupancy within 90 days after the Notice to Proceed.

2. Phase 2: This phase includes all work on the main level of 497 Auburn Avenue (bookstore level). Work of this phase shall be substantially complete and ready for occupancy within 14 calendar days after the commencement of construction of this phase and owner's acceptance of completion of phase 1.

3. Phase 3*:* The remaining Work shall be substantially complete and ready for occupancy at the time of Substantial Completion.

1.4 WORK UNDER OTHER CONTRACTS

A. General: Cooperate with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate Work of this Contract with work performed under separate contracts.

1.5 GOVERNMENT-FURNISHED MATERIALS

A. In case of Government -furnished materials:

1. Government will arrange and pay for delivery of Government-furnished items according to Contractor's Construction Schedule.
2. Contractor is responsible for initial inspection, receiving, unloading, and handling Government-furnished items at Project site.
3. Government will inspect delivered items for damage after delivery. Contractor shall be present for and assist in Government's inspection.
4. Government will arrange for replacement if Government-furnished items are damaged, defective, or missing.
5. Contractor is responsible for protecting Government-furnished items from damage during storage and handling, including damage from exposure to the elements.
6. If Government-furnished items are damaged as a result of Contractor's operations, Contractor shall repair or replace them.
7. Contractor shall install and otherwise incorporate Government-furnished items into Work.

1.6 CONTRACTOR USE OF SITE

A. General: Contractor shall have limited use of site for construction operations. Limit use of premises to areas within the Construction limits indicated below and on drawings. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Limits: Confine constructions operations to crawl space, first floor area, second floor area, attic, exterior walls and driveways.
2. Limit site disturbance, including earthwork and clearing of vegetation, to 10 feet beyond building perimeter; 5 feet beyond surface walkways, patios, surface parking, and utilities less than 12 inches in diameter; 10 feet beyond primary roadway curbs and main utility

branch trenches; and 5 feet beyond constructed areas with permeable surfaces (such as pervious paving areas, storm water detention facilities, and fields) that require additional staging areas in order to limit compaction in the constructed area.

B. Storage of Materials: Confine storage of materials to staging areas indicated on plans**.**

C. Parking: Confine parking to parking lot at Martin Luther King, Jr. National Historical Park Visitor's Center or as agreed to by Contracting Officer.

D. Stockpiling: Confine stockpiling to storage areas as indicated in drawings.

E. Preservation of Natural Features:

1. Prevent damage to natural surroundings. Restore damaged areas, repairing or replacing damaged trees and plants, at no additional expense to the Government.
2. Provide temporary barriers to protect existing trees and plants and root zones.
3. Do not remove, injure, or destroy trees or other plants without prior approval. Consult with Contracting Officer (CO) and remove agreed-on roots and branches that interfere with construction.
4. Do not fasten ropes, cables, or guys to existing trees.
5. Carefully supervise excavating, grading, filling, and other construction operations near trees to prevent damage.

F. Driveways and Entrances: Keep driveways, sidewalks, hardscape, landscape and entrances serving premises clear and available to Government employees, and emergency vehicles at all times. Do not use for parking or storage of materials.

1. Schedule deliveries to minimize use of driveways and entrances.
2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

G. Construction Camp: Establishment of a camp within park will not be permitted.

H. Hauling Restrictions: Comply with legal load restrictions in hauling of materials. Load restrictions on park roads are identical to state load restrictions with such additional regulations as may be imposed by the Park Superintendent. Information regarding rules and regulations for vehicular traffic on park roads may be obtained from the Office of the Park Superintendent. A special permit will not relieve Contractor of liability for damage which may result from moving of equipment.

I. Bridge Restrictions: Identify jurisdictions, load restrictions, permit requirements, time and calendar restrictions as outlined.

1.7 PUBLIC USE OF SITE

A. Contractor shall conduct his operations to ensure the least inconvenience to public. Building and/or Road closures may be permitted, when required, upon specific approval of Contracting Officer for a maximum of 12 hours per period requested.

B. Contractor shall be permitted to utilize landscaped and hardscaped areas only as required to access exterior wall conditions for work being done on exterior, however, work must be done carefully to not damage both the historic landscape and historic structure. Special attention and/or means and methods may be required to protect both the public and/or the historic landscape and historic structure.

1.8 OCCUPANCY REQUIRMENTS FOR BUILIDINGS

A. Existing Buildings

1. Full Government Occupancy: Government will occupy buildings under construction during the entire contract period. Cooperate with Government during construction operations to minimize conflicts and facilitate Government usage. Perform Work so as not to interfere with Government's day-to-day operations. Maintain existing exits, unless otherwise indicated.

a. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Contracting Officer.
b. Maintain existing building in weather tight condition throughout construction period. Repair damage caused by construction operations. Protect building and occupants during construction period.

1.9 CONDUCT OF OPERATIONS

A. Contractor shall conduct his operations in conformance with rules and regulations promulgated by the Secretary of the Interior for the National Park Service, and applicable park rules and regulations prescribed by Park Superintendent.

B. Work on Saturdays, Sundays, Federal holidays or at night may not be performed unless stated in the Work Restrictions below or without prior consent from the Contracting Officer. Submit requests 3 business/calendar days in advance of the work to the Contracting Officer for approval.

C. No signs or advertisements (except those specified herein) shall be displayed on the construction site or within the park unless approved by the Contracting Officer.

1.10 WORK RESTRICTIONS

A. On-Site Work Hours: Work shall be generally performed during normal business working hours of 8:00 a.m. to 5:00 p.m., Monday through Friday, except when otherwise indicated.

1. Weekend Hours: Contractor must coordinate with Contracting Officer to arrange park staff to be present for any work completed over the weekend and must comply with City of Atlanta Noise Ordinance per City of Atlanta Article IV. Noise Control**.**
2. Early Morning Hours: Construction may begin at 7:00 a.m. and comply with City of Atlanta Noise Ordinance per City of Atlanta Article IV. Noise Control.

a. All work in bookstore must be completed between the hours of 9:00 a.m. and 5:00 p.m.

3. Hours for Core Drilling and Heavy Equipment: Between 7:00 a.m. and 9:00 p.m. and as coordinated with Contracting Officer.

B. Existing Utilities

1. Existing Utilities: Notify Contracting Officer and utility companies of proposed locations and times for excavation.
2. Contractor shall be responsible for locating and preventing damage to known utilities. If damage occurs, repair utility at no additional expense to the Government.
3. If damage occurs to an unknown utility, repair utility. An equitable adjustment will be made in accordance with the Changes clause of the contract.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Government or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Contracting Officer not less than three business days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Contracting Officer's written permission.
3. Hours and length of Utility Shutdowns: Contractor shall shut down utilities for a maximum of one hour, upon specific approval of Contracting Officer.

D. Nonsmoking Building/Tobacco Use/Vaping: Smoking is not permitted within building or within 25 feet of entrances, operable windows, or outdoor air intakes. Tobacco use and vaping is restricted to public right of way.

1.11 SPECIAL CONSTRUCTION REQUIREMENTS

A. Project Website: A project website administered by NPS will be used for purposes of managing communication and documents during construction stage.

1. See Section 01 31 00 "Project Management and Coordination" for requirements on using Project Website.

B. Contractor will have limited access. Coordinate with Contracting Officer on any special requirements for access due to park activities, limited access periods, and government furnished permit requirements, etc.

1.12 ADDITIONAL REPORTS

A. The report Utilities Survey, dated September 2, 2021 prepared by Geo Survey - Land Surveying is an appendix with this package.

B. In case of conflict between report and drawings or specifications, drawings and specifications govern.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 11 00

SECTION 01 26 01 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section consists of administrative and procedural requirements for contract modifications.

1.2 DEFINITIONS AND ALLOWANCES

A. Home Office Overhead: Costs incurred in support of all of a contractor's projects and not attributable to a specific job. The cost for home office overhead is only allowed as a percentage of all direct work excluding profit. The following items represent allowable home office overhead costs identified in Part 31 of the Federal Acquisition Regulation (FAR):

1. Rent
2. Utilities
3. Furnishings
4. Office equipment
5. Executive and management staff not exclusively assigned to the project
6. Support, accounting, and administrative staff
7. Preparation of cost proposals, estimating, and schedule analyses connected with Modifications
8. Estimating and preconstruction services
9. Mortgage costs
10. Real estate and corporate taxes
11. Automobile maintenance and travel costs for home office personnel
12. Home office insurances i.e. structure, automotive, umbrella, flood, etc.
13. Depreciation of equipment and other assets
14. Home office supplies (paper, staples, etc.)
15. Legal services
16. Accounting and data processing
17. Professional fees/registration

B. General Conditions (Field Office Overhead): Management and administrative costs incurred on site for the designated project. Costs associated with preparation of modifications will not be allowed. Costs for these items are to be included only in the general conditions of the modification estimate. Only in the case of a contract time extension are additional general conditions included in modifications. The following items, if applicable, are considered allowable costs for calculating General Conditions:

1. Project Manager (PM), Assistant Project Manager
2. Superintendent, Assistant Superintendent
3. Quality Control, Safety Officer, Environmental Manager, etc.
4. Engineers
5. Travel, lodging, and per diem (as established by Federal Travel Regulations)
6. Scheduling

7. Field Office Trailers and associated temporary utilities
8. Field office supplies

    a. Mailing and couriers
    b. Reproduction costs
    c. Storage
    d. Phones
    e. Computers
    f. Copiers

9. Personal vehicles i.e. Superintendent Pickup trucks

C. General Requirements: Costs directly associated with the project and are necessary to perform the actual work of the modification. These costs shall be shown as direct costs in the estimate. The following items, if applicable, are considered allowable costs for calculating General Requirements:

1. Hoisting
2. Material handling
3. Temporary fencing
4. Port-a-lets
5. Trash removal, dumpsters
6. Barricades
7. Small tools
8. Safety supplies
9. Scaffolding
10. Daily cleaning
11. Traffic control
12. Temporary signage
13. Temporary heating and power

D. Personnel Costs: Costs included in the modification must only be for General Conditions staff and workers actually present and working on project site. Modification costs for salaried workers are only allowed within the structure of a 40-hour week and no overtime or holiday pay will be allowed.

1. Worker Hourly Rates are costs directly associated with the individual worker and consist of the following:

    a. Base Rate: The hourly rate paid directly to the worker
    b. Labor Burden: Employer payments of all applicable burdens; includes insurance and taxes the business must pay on behalf of the worker to government entities and educational forums, such as:

        1) Social Security
        2) Medicare
        3) Workers Compensation – Policy and company calculation to be made available.
        4) Federal Unemployment Tax Act (FUTA) - Cap Rate and percentage to be proportionally allocated over one year.
        5) State Unemployment Tax Act (SUTA) - Cap Rate and percentage to be proportionally allocated over one year.

6) Union agreement costs - Other costs required under an enforceable collective bargaining agreement.

c. Fringe Benefits: Various non-wage compensations provided to employees such as:

1) Health Care Insurance Premiums
2) Cell Phone
3) Clothing
4) 401K and Pensions
5) Vehicle allowances
6) Gas allowance
7) Life insurance premiums
8) Disability insurance
9) Other Fringe Benefits required under an enforceable collective bargaining agreement

E. Bonuses or Deferred Compensation: No Bonus or Deferred Compensation will be allowed within any components of pricing including Home Office Overhead, General Conditions, General Requirements, Hourly Worker Rates, or the direct costs of work.

F. General Liability Insurance: An insurance policy that protects Contractor from claims resulting from bodily injury or property damage to a third party. Include as a separate line item within all modification proposals and provide a current insurance quote upon request.

G. Performance and Payment Bonds: A performance bond is a surety bond issued by an insurance company or bank to guarantee satisfactory completion of a project. The Payment Bond guarantees the Contractor will pay the labor and material costs incurred. Banks and Insurance companies charge a premium for individual project based on a sliding scale related to the size of the project. Include as a separate line item in modification proposals and provide current company bonding rates upon request.

H. Builder's Risk Insurance: Covers the contractor's loss due to fire, high winds, or other natural forces. Not reimbursed by the National Park Service (NPS) and shall not be included in modification proposals.

1.3 MODIFICATION PROPOSAL PRICING REQUIREMENTS

A. General:

1. Proposal be received in the format and within the time frame specified in the Request for Proposal (RFP) letter. Costs or delays resulting from failure of contractor to submit within the time frame specified will not be compensable.
2. Proposal shall be detailed with itemized lists of equipment, materials, labor, production rates, overhead, profit, and bond markup for each item. Labor costs must be itemized by craft and hourly rate, including Fringe Benefits and Labor Burden. If the costs of Fringe Benefits and Labor Burden are not itemized, it is assumed they are included in the hourly rate shown, or contractor is not requesting reimbursement. Contractor may utilize the government provided Contractor Estimate Form, or their own form, provided that it contains the same information and level of detail as the Government's form.

3. Requests for extensions of contract time as a result of change must be justified with a Time Impact Analysis (TIA). Refer to Section 01 32 16 "Construction Schedule", for time impact analysis requirements. TIA and associated costs shall be received with the proposal by the date shown within the Request for Proposal letter. Contractor's failure to submit within the specified time frame will be construed as the Contractor waiving right for additional time and no time extension will be allowed.
4. All supporting documentation used to justify the proposed modification will be made available to the Contracting Officer (CO) upon request.
5. Contractor shall review and approve all subcontractor/supplier pricing in detail for proper format, scope, production rates, and pricing prior to submission to NPS. All delay costs associated with not reviewing and approving subcontractor/supplier pricing will be borne by the Contractor.
6. All pricing and production rates within the estimate must be based on fair and reasonable pricing and cannot include built-in contingency.

B. Labor:

1. Contractor shall estimate cost of labor by itemizing each craft involved, indicating worker hourly rate (base rate + labor burden + fringe benefits) for each and itemizing hours required for each craft directly engaged in modification work. Any work proposed requiring overtime work or premium pay shall be itemized separately. Rates shall be in accordance with the Davis-Bacon Act as incorporated herein. Labor Burden may include payroll taxes, Social Security, unemployment insurances, workers compensation insurance, Federal Insurance Contributions Act (FICA), FUTA, and other direct costs resulting from Federal, State or local laws.
2. Itemize labor costs for equipment operators separate from equipment costs.
3. Labor cost for foremen shall only be costs for related work required for the modification.

C. Materials:

1. Estimated cost for materials shall include quotes from multiple sources. Material prices shall include applicable fees and credits, including but not limited to, sales tax, freight and delivery charges, and tax rebates.
2. No markup shall be applied to any material provided by NPS.

D. Equipment:

1. Equipment used for the project must be appropriately sized for work being performed.
2. Do not include costs for "miscellaneous tools and equipment", in your proposal for a replacement value of $500 or less. Costs shown in excess of $500 shall be broken out separately.
3. Regardless of ownership, rates to be used in determining equipment rental costs shall be the lowest cost from one of the following sources:

    a. United States (U.S.) Army Corps of Engineers, Ownership and Operating Expense Schedule (use latest edition and applicable region)
    b. Construction Blue Book
    c. Local equipment rental rates, documented by actual invoice charges, or itemized vendor quotes.

4. Estimated equipment rates shall include operating costs of all fuel, oil, lubrication, supplies, small tools, necessary attachments, ground engaging components, tires and tracks, routine repairs and maintenance (cost of major repair and overhaul is not allowed per Federal Acquisition Regulation (FAR) 31.105(d)(2)), depreciation, storage, insurance, and all incidentals. Mobilization, if applicable, may be included for equipment solely used on the modification work but must be listed separately.
5. Estimate full rate for equipment only for duration that equipment will be utilized to accomplish work of the modification.
6. Standby unit rates used in accordance with paragraph 1.3, D, 2, above. If the U.S. Army Corp of Engineers is utilized then their standby rates prevail. If Bluebook or local equipment pricing is accepted, then 1/2 of equipment costs minus any operating costs, major repair and overhaul will be accepted.
7. If equipment is in standby mode due solely to a documented NPS delay, established standby rate shall apply from the first day of the delay.
8. Equipment not used and on job site for up to five consecutive days may be classified at standby rates, provided the equipment is or has been used solely to perform work on the modification and will be necessary to complete additional modification work. Equipment still on the jobsite but not in use after five consecutive days will not be considered in the modification pricing.
9. Requests for compensation for equipment stand by time must be justified, documented and itemized separately.
10. The estimated timeframe (daily, weekly, monthly) for use of the equipment must reflect the lowest cost to the Government.

E. Establishment and Application of Overhead and Profit Percentages:

1. Home Office Overhead and Profit (OH&P) shall be applied to direct costs only. Profit shall not be applied to overhead amounts; and overhead shall not be applied to profit. Home office overhead shall contain only allowable, allocable, and reasonable costs per the contract documents and FAR Part 31. Profit percentages are based on risk factors found in FAR Part 31which have been applied to the specific type of work included in this project. Negotiated rates shall not exceed the following percentages for OH&P for contractor self-performed work:

   Overhead……10%
   Profit…… **10%**

2. Total aggregate limit of markup (OH&P) for Contractor and Subcontractors on modification work shall not exceed 25%. The NPS will not be responsible for allocation of percentages between contractor and subcontractors at any tier.
3. If Contractors form a partnership, partnership may only receive home office overhead and profit in same amount as an individual Contractor (refer to paragraph 1.3,E,1 above). It is the responsibility of the partners to decide on division of revenue.
4. Combined Increases and Decreases: On proposals involving both increases and decreases in the Contract Price, overhead and profit mark-ups are required on net increases and deducted on net decreases.
5. At no time can profit be calculated on Overhead or itself, it must be calculated on direct costs of work only.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 012601

SECTION 01 27 00 – DEFINITION OF CONTRACT LINE ITEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section explains in general, what is and is not included in a contract line item, and limits or cut-off points where one item ends and another begins.

B. If no contract line item exists for a portion of work, include costs in a related item.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF CONTRACT LINE ITEMS

A. Contract Line Item No. 0001: 497 Auburn Avenue House.

1. This item consists of Installing fire sprinkler system at 497 Auburn Avenue for two stories of heated space, unheated attic and crawl space as well at exterior walls.
2. Measurement for payment will be based upon construction progress.
3. Payment will be made on the contract lump sum price.

B. Contract Line Item No. 0002: 503 Auburn Avenue House

1. This item consists of Installing fire sprinkler system at 497 Auburn Avenue for two stories of heated space, unheated attic and crawl space as well at exterior walls.
2. Measurement for payment will be based upon construction progress.
3. Payment will be made on the contract lump sum price.

END OF SECTION 01 27 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. Definitions
2. Construction Coordination
3. Submittals
4. Coordination Drawings
5. Requests for Information (RFIs)
6. NPS/DSC Project Website
7. Project Meetings
8. Environmental Coordination
9. Permits

B. Related Requirements:

1. Section 01 32 16 "Construction Schedule" for preparing and submitting Contractor's construction schedule.
2. Section 01 73 40 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.
4. Section 01 91 14 "Total Building Commissioning" for coordinating the work with Owner's Commissioning Authority.

1.2 DEFINITIONS

A. Agency with Jurisdiction
B. Construction Permits – Contractor Provided
C. Government Furnished Permits

1.3 CONSTRUCTION COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, which depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other Contractors to ensure maximum accessibility for required maintenance, service, and repair.

3. Make provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of components, including mechanical and electrical.
5. Properly plan construction operations to include permit requirements. Allow enough time to execute permit provisions to maintain work schedule, site visits, inspections, and reporting deadlines.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to:

1. Preparation of Contractor's Construction Schedule
2. Preparation of the Schedule of Values
3. Installation and removal of temporary facilities and controls
4. Delivery and processing of submittals
5. Progress meetings
6. Permit requirements
7. Pre-installation conferences
8. Project closeout activities
9. Commissioning activities

1.4 SUBMITTALS

A. Coordination Drawings: Prepare Coordination Drawings if limited space availability necessitates maximum utilization of space for efficient installation of different components or if coordination is required for installation of products and materials fabricated by separate entities.

1. Content: Project-specific information, drawn accurately to scale. Do not base Coordination Drawings on reproductions of Contract Documents or standard printed data. Include following information, as applicable:

   a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
   b. Indicate dimensions shown on Contract Drawings and make specific note of dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Contracting Officer (CO) for resolution of such conflicts.
   c. Indicate space requirements for routine maintenance and anticipated replacement of components during the life of the installation.
   d. Show location and size of access doors required for access to concealed dampers, valves, and controls.
   e. Indicate required installation sequences.

2. Sheet Size: At least 8-1/2 by 11 inches (215 by 280 millimeters) but no larger than 30 by 40 inches (750 by 1000 millimeters).

3. Number of Copies: Submit two opaque copies of each submittal. Contracting Officer will return one copy.
4. Refer to individual Sections for Coordination Drawing requirements for Work in those Section

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans and Reflected Ceiling Plans: Show architectural, structural, mechanical, plumbing, fire-protection, fire-alarm, and electrical elements. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

7. Electrical Work:

    a. Runs of vertical and horizontal conduit 1-1/4 inches (32 millimeters) in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

8. Fire-Protection System:

    a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.

9. Review: Contracting Officer will review coordination drawings to confirm Work is being coordinated; details of coordination are Contractor's responsibility. If Contracting Officer determines coordination drawings are not prepared in scope or detail, or are otherwise deficient, Contracting Officer will inform Contractor, who shall make changes and resubmit.

10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 23 "Submittal Procedures."

C. Coordination Digital Data Files: Prepare coordination digital data files according to:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.

2. File Preparation Format: AutoCad.dwg, Version 2010, operating in Microsoft Windows operating system.

3. File Submittal Format: Submit or post coordination drawing files using Portable Document Format (PDF) file format.
4. Contracting Officer will furnish Contractor one set of digital data files (AutoCad.dwg) of Drawings for use in preparing coordination digital data files.

    a. Contracting Officer makes no representations as to accuracy or completeness of digital data files as they relate to Drawings.
    b. Digital Data Software Program: Drawings are available in AutoCad.dwg.

D. Division 1 documents: The following items shall be submitted a minimum of one week prior to Preconstruction Conference. Contracting Officer will notify Contractor of tentative date for Pre-Construction Conference.

1. Letter designating Project Superintendent
2. Construction Schedule
3. A Comprehensive Schedule of Values
4. Accident Prevention Plan
5. A List of Subcontractors for this project
6. Written statements from Subcontractors certifying compliance with applicable labor standard clauses.
7. Certificates of Insurance (liability insurance coverage, workman's compensation and auto liability insurance) or SF1413 for Contactor and all Subcontractors
8. Waste Management Plan
9. Quality Control Plan
10. Temporary Storm Water Pollution Prevention Plan (SWPP or UPPP)
11. Indoor Air Quality (IAQ) Management Plan
12. Contractors Commissioning Plan
13. Historic Preservation Treatment Plan (HPTP)
14. List of Required Construction Permits. Include the following information for each permit:
    a. Name of Permit
    b. Agency(ies) with Jurisdiction issuing the permit
    c. Information required from Government to complete permit application

E. Provide items listed to Contracting Officer before Pre-Construction Conference. If all documents have not been received one week prior to scheduled Pre-Construction Conference date, conference may be cancelled, Notice to Proceed may not be issued, and Contracting Officer will consider other contractual remedies. Work shall not commence until written Notice to Proceed has been issued.

1.5 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of Contract Documents, Contractor shall prepare and submit an RFI utilizing form created on NPS/DSC management software-website.

1. Contracting Officer will not respond to RFIs submitted by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in the work.

B. Content of RFI: Include detailed, legible description of item needing information or interpretation and the following:

1. RFI number, numbered sequentially
2. Date
3. RFI subject
4. Specification Section number and title and related paragraphs, as appropriate.
5. Drawing number and detail references, as appropriate.
6. Field dimensions and conditions, as appropriate.
7. Contractor's suggested resolution: If Contractor's suggested resolution impacts Contract Time or Contract Sum, Contractor shall state impact in RFI.
8. Contractor's signature
9. Requested date for response
10. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Form: Complete RFI Form on NPS/DSC Project Website as follows:

1. Enter general information at the top of the form.
2. Under the "Action" section at the bottom of the form, select "Question" then select "CMR" in drop-down of "Send to" box.
3. Enter details of question and attach related documents.
4. Select "Submit Form" at bottom of page.

D. Contracting Officer’s Action: Contracting Officer will review each RFI, determine action required, and respond. Contracting Officer will determine critical nature of each RFI and issue response accordingly.

1. The following are not considered to be RFIs and will receive no action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in Contract Documents.
    e. Requests for adjustments in Contract Time or Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Contracting Officer's action may include a request for additional information; time for response will date from time of receipt of additional information.
3. Contracting Officer's action on RFIs may result in need for a change to Contract Time or Contract Sum. All contract changes will be processed following terms and conditions of contract.

1.6 PROJECT WEB SITE

A. Use NPS/DSC management software website for communication throughout contract period on:

1. Project directory
2. Project correspondence
3. Meeting agendas and minutes
4. Contract modifications forms and logs
5. RFI form and processing
6. Task and issue management
7. Photo documentation
8. Baseline schedule, schedule updates and calendar management
9. Submittal form and processing
10. Payment coordination documentation
11. Drawing and specification document hosting, viewing, and updating
12. Online document collaboration
13. Reminder and tracking functions
14. Archiving functions
15. Notification of submittal and RFI statuses and current responsible party
16. Permits and addendums

B. Some documents are not suitable to be shared using the NPS/DSC management software website. Documents containing Personal Identifying Information (PII) (i.e. certified payrolls) shall not be shared using NPS/DSC management software website and shall be coordinated with Project team as appropriate.

C. Submit to Contracting Officer a list of employees who will need access to the website. Users will receive an invitation to register from Department of Interior (DOI). Once registered on DOI website, user will be given access to NPS/DSC management software website.

D. All users will be required to have the following software packages:

1. Internet Explorer version 7 or later.
2. Adobe Acrobat Professional (Pro) version 9 or later.

1.7 PROJECT MEETINGS

A. Preconstruction Conference: Before start of construction, Contracting Officer will arrange an on-site meeting with Contractor. Meeting agenda will include the following as a minimum:

1. Roles & Responsibilities / Lines of Authority
2. Park rules and regulations
3. Jobsite Safety

4. Resolution of comments on required Division 1 documents
5. Coordination of Subcontractors
6. Labor law application
7. Modifications
8. Payments to Contractor
9. Payroll reports
10. Contract time
11. Liquidated damages
12. Contractor Performance Evaluation
13. Display of Hotline posters
14. Notice to proceed
15. Correspondence procedures
16. NPS/DSC Project website
17. Acceptance/rejection of work
18. Progress meetings
19. Submittal procedures
20. NPS Final Accessibility Inspection
21. Environmental requirements
22. Permit requirements
23. As-constructed drawings/operation and maintenance (O&M) manuals.
24. Saturday, Sunday, holiday and night work.
25. Reference materials
26. Value engineering
27. Schedule of Values

B. Progress Meetings: Contracting Officer will schedule weekly meetings with Contractor.

1. Attendees: In addition to Government Representatives, each Contractor, Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented. Participants at meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Meeting agenda will include:

    a. Approval of minutes of previous meetings
    b. Submittal status
    c. Review of off-site fabrication and delivery schedules.
    d. Requests for information (RFI) and other issues.
    e. Modifications
    f. Work in progress and projected.
        1) Status of required inspections (Special Inspections, Accessibility, etc.)
    g. Inspections of work in progress and projected (Special inspections, Accessibility, etc.)
    h. Construction Schedule update (provide updated Critical Path Method (CPM)).
    i. Status of Project Record Drawings and O&M manuals.
    j. Other business relating to work.
    k. Permit requirements

C. Preinstallation Conferences: Conduct at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend meeting. Advise Contracting Officer of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for particular activity under consideration, including requirements for:

    a. Contract Documents
    b. Options
    c. Related RFIs
    d. Related Change Orders
    e. Purchases
    f. Deliveries
    g. Submittals
    h. Sustainable design requirements.
    i. Review of mockups
    j. Possible conflicts
    k. Compatibility requirements
    l. Time schedules
    m. Weather limitations
    n. Manufacturer's written instructions
    o. Warranty requirements
    p. Compatibility of materials
    q. Acceptability of substrates
    r. Temporary facilities and controls
    s. Space and access limitations
    t. Regulations of agency(ies) with jurisdiction
    u. Testing and inspecting requirements
    v. Installation procedures
    w. Coordination with other work
    x. Required performance results
    y. Protection of adjacent work
    z. Protection of construction and personnel

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene conference at earliest feasible date.

1.8 ENVIRONMENTAL COORDINATION

A. Contractor’s Environmental Manager: Designate on-site party responsible for overseeing Contractor’s conformance to environmental goals for project and implementing procedures for environmental protection.

1. Qualifications: Minimum 3 years Construction experience on projects of similar size and scope; with environmental procedures similar to this project; familiar with environmental regulations applicable to construction operations.
2. Responsibilities: Responsibilities shall include:

    a. Compliance with applicable Federal, State, and local environmental regulations, including maintaining required documentation.
    b. Implementation of Waste Management Plan (WMP).
    c. Implementation of Indoor Air Quality (IAQ) Management Plan.
    d. Implementation of Storm Water Pollution Prevention Plan (SWPPP).
    e. Present overview of environmental issues and summarize site specific procedures relating to management plans at Preconstruction conference.
    f. Training for Contractor personnel in accordance with position requirements.
    g. Monitoring and documentation of environmental procedures.

B. Perform project quality control in accordance with requirements specified in Related Sections, including:

1. Quality Requirements
2. Regulatory Requirements
3. Indoor Air Quality (IAQ) Management
4. Noise and Acoustics Management
5. Temporary Storm Water Pollution Prevention Environmental Management
6. Construction Waste Management

C. Contractor's Environmental Training Program: Contractor shall provide environmental training for workers performing work on project site. Training shall include:

1. Overview of environmental issues related to building industry.
2. Overview of environmental issues related to Project.
3. Review of site-specific procedures and management plans:

    a. Construction Waste Management
    b. Indoor Air Quality (IAQ) Management
    c. Noise and Acoustics Management
    d. Temporary Storm Water Pollution Prevention

4. Pollution Prevention (P2) practices: Submit evidence of familiarity with P2 practices.
5. Compliance with environmental regulations: As specified in Regulatory Requirements. Submit Contractor 40 CFR (Code of Federal Regulations) employee training records upon request of Contracting Officer.

1.9 PERMITS

A. General:

1. Permits and Responsibilities: Contractor shall, without additional expense to the Government, be responsible for obtaining necessary licenses and permits, and for complying with Federal, State and municipal laws, codes, and regulations applicable to the performance of the work. Contractor shall also be responsible for damages to persons or

property that occur as a result of Contractor's fault or negligence; and for materials delivered and work performed until completion and acceptance of the work.

2. For the purpose of this contract, Contractor will not be considered an agent of the Government. Contractor shall comply with appropriate Federal, State and local laws.
3. New Water Meter - **City of Atlanta Water Department**
4. Street Closure - **City of Atlanta Department of Public Works and Transportation**

B. Coordination with Agency(ies) with Jurisdiction Issuing Permits

1. Coordination: Contact the Agency(ies) with Jurisdiction as needed and sufficiently in advance to avoid delaying work: Coordinate meetings, reporting requirements, inspections, and other requirements.

C. Administrative Procedures:

1. Coordinate scheduling and timing of required administrative provisions of project permits with Agency(ies) with Jurisdiction, Construction Manager, and Park to avoid conflicts.
2. Supply needed information to Agency(ies) with Jurisdiction issuing permits, pay fees required and provide material needed to comply with permit's conditions and provisions.
3. Upload permits to NPS/DSC management software website when permits are obtained.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 16 – CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Section consists of Construction Schedule requirements including:

1. Schedule of Values
2. Construction Schedule Requirements.
3. Construction Schedule Updates.
4. Time Impact Analysis.

B. Purpose: The Construction Schedule ensures adequate planning, coordination, scheduling, and reporting during execution of the work by the Contractor. It shall assist the Contractor and Contracting Officer (CO) in monitoring the progress of the work, evaluating proposed changes, and processing Contractor's monthly progress payments. It shall include the dates in the contract, phases, milestones, occupancies, holidays, weather consideration, a critical path, and the requirements of this section.

1.2 DEFINITIONS

A. Activity: A discrete part of a project identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical activities are activities on the critical path. They start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: Allocation of the Schedule of Values for completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum, unless otherwise approved by the Contracting Officer.

C. Critical Path Method (CPM): Method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: Longest connected chain of interdependent activities through the network schedule that establishes minimum overall Project duration and contains no float.

E. Float: Measure of leeway in starting and completing an activity.

1. Float: Not for the exclusive use or benefit of the Government or Contractor but is jointly owned.
2. Free Float: Amount of time an activity can be delayed without adversely affecting the early start of the successor activity.

3. Total Float: Measure of leeway in starting or completing an activity without adversely affecting planned Project completion date.

F. Resource Loading: Allocation of manpower and equipment necessary for completion of an activity as scheduled.

G. Fragnet: A partial or fragmentary network that breaks down activities into smaller activities for greater detail.

1.3 SUBMITTALS

A. Electronic Copies: Schedules and reports submitted shall be posted on the NPS/DSC management software website in native electronic file formats. The intent of the Government is to limit the number of printed reports to those determined by the project team as essential.

B. Schedule of Values: After contract award and before Pre-Construction conference, submit schedule of dollar values based on Contract Price Schedule.

C. Construction Baseline Schedule: After contract award and before Pre-Construction conference, submit **two** paper copies of baseline schedule, large enough to show entire schedule for entire construction period. Utilize Schedule of Values in preparation of Construction Baseline Schedule.

D. Critical Path Method (CPM) Reports: Concurrent with CPM schedule, submit three paper copies of the following computer-generated reports. For each activity, include activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of predecessor and successor tasks for activities sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of activities sorted in ascending order of total float.

E. Construction Schedule Updates: On or before 7th day preceding progress payment request date, submit estimates of percent completion of each schedule activity and necessary supporting data. Provide two paper copies.

F. Construction Schedule Revisions and Time Impact Analysis: For each Construction Schedule revision, submit **two** paper copies of a Time Impact Analysis. Incorporate a Fragmentary Network (Fragnet) into currently accepted Construction Schedule that demonstrating how Contractor proposes to incorporate a modification, change, delay, or Contractor request.

1.4 QUALITY ASSURANCE

A. Contractor shall meet with Contracting Officer on day of the preconstruction conference to go over:

1. Review software limitations, content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.

3. Discuss constraints, including phasing, area separations, interim milestones and partial Government occupancy/substantial completions.
4. Review delivery dates for Government-furnished products.
5. Review schedule for work of separate Government contracts.
6. Review time required for review of submittals and re-submittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review time required for obtaining and activating permits.
10. Review and finalize list of construction activities to be included in schedule.
11. Review baseline schedule comments, resolve issues and progress on incorporating them
12. Review procedures for updating schedule.
13. Discuss reporting requirements and establish protocol for naming and transmitting electronic schedules.

B. Contractor's Schedule Representative: Before the preconstruction conference, designate an authorized representative to be responsible for preparing and maintaining the Construction Schedule. Submit resume outlining qualifications of Scheduler to Contracting Officer for acceptance. Scheduler shall have prepared and maintained at least 5 previous schedules of similar size and complexity similar to this Contract, demonstrating proficiency of using scheduling software. Authorized representative will be responsible for preparing the Baseline Schedule, required updates, revisions, Time Impact Analyses, and reports.

1.5 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate Contractors.

B. Coordinate Construction Baseline Schedule with Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

1. In developing Construction Baseline Schedule, ensure Subcontractor’s work at all tiers, and prime Contractor’s work, is included and coordinated.
2. Secure time commitments for performing critical elements of work from parties involved.
3. Coordinate each construction activity in network with other activities and schedule in proper sequence.

PART 2 - PRODUCTS

2.1 SCHEDULE OF VALUES

A. Breakdown each lump-sum item into component work activities used in the schedule for which progress payments may be requested. Work activities broken out within schedule of values shall be integrated into and made a logical part of the construction baseline schedule. Total costs for the component work activities shall equal contract price for that lump-sum item. Contracting Officer may request data to verify accuracy of dollar values. Include mobilization, general condition costs, overhead and profit in the total dollar value of unit price items and in the

component work activities for each lump-sum item. Do not include mobilization, general condition costs, overhead or profit as a separate item.

B. Do not break down unit price items. Use only the contract price for unit price items.

C. Total cost of all items shall equal the contract price. The Schedule of Values will form the basis for progress payments and the Construction Schedule.

2.2 CONSTRUCTION SCHEDULE REQUIREMENTS

A. Construction Baseline Schedule: Prepare Construction Baseline Schedule using a computerized, cost and resource-based**,** time-scaled Critical Path Method network analysis diagram for the Work.

1. Develop and finalize Construction Baseline Schedule so it can be accepted for use no later than 30 days after date established for the Notice of Award.

    a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing work within applicable completion dates, regardless of Governments acceptance of schedule.

2. Establish procedures for monitoring and updating Construction Baseline Schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.

B. Construction Baseline Schedule Preparation: Prepare a list of all activities required to complete the Work. Using preliminary Critical Path Method network diagram, prepare a skeleton network to identify probable critical paths.

1. Activities: Indicate estimated duration, sequence requirements, and relationship of each activity in relation to other activities.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the Critical Path Method schedule within the limitations of the Contract Time.
4. Show sequence and interdependence of activities required for completion of work. Ensure work sequences are logical and Construction Baseline Schedule shows a coordinated plan of the work.
5. Resource loading of each activity shall include personnel by labor category and equipment type and capacity proposed to complete the activity in duration shown.
6. Consider seasonal weather conditions in planning and scheduling work influenced by high and low ambient temperatures, wind, or precipitation to ensure completion of work within contract time.
7. Time Frame: Proposed duration assigned to each activity shall be Contractor's best estimate of time required to complete activity considering the scope and resources planned for activity.

a. An early finish date may be shown but the late finish date shall be same date as last day of contract period. An early completion schedule shall contain:

1) Insert an activity titled "Project Float" as a successor to last activity in early project completion schedule network.
2) Add a milestone titled "Contract End Date" as a successor to the activity "Project Float".
3) Add duration to the activity "Project Float" as required so the milestone "Contract End Date" equals the last day of Contract Period.

b. Contract completion date shall not be changed by submission of a schedule that shows an early completion date.
c. Contractor shall limit use of lead or lag duration's between schedule activities.
d. Project Calendars: Develop and incorporate the following calendars:

1) Administrative Calendar: Include calendar based on a 7-day week to be used on activities based on calendar days. Apply this calendar to administrative tasks or other tasks not affected by non-working days (Federal Holidays, weather, etc.).
2) Project Calendar: Include calendar based on planned work week for the project. Include Federal Holidays, weekends, and non-workdays indicated in contract documents. Apply this calendar to activities not anticipated to be affected by weather. Be clear when identifying number of work days in work week.
3) Weather Calendar: Utilize Project Calendar and show anticipated normal downtime related to weather as non-working time. Weather days shall be based on data for local area from a reliable source like the National Oceanic and Atmospheric Administration (NOAA), National Park Service records, or source acceptable to Contracting Officer. Apply this calendar to activities anticipated to be affected by weather.

e. Activity Duration: Define so no activity is longer than **14** days, except for non-construction activities including mobilization, shop drawings and submittals, fabrication and delivery of materials and equipment.
f. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in the schedule. Procurement cycle activities can include submittals, approvals, purchasing, fabrication, and delivery.

1) Integrated Dry Pipe System with Nitrogen Generating System

g. Submittal Review Time: Include review and re-submittal times indicated. Coordinate submittal review times in Construction Baseline Schedule.
h. Startup and Testing Time: Include not less than 15 days for startup and testing and commissioning activities.
i. Substantial Completion: Allow time for Government administrative procedures necessary for certification of Substantial Completion. (For more information, refer to Specification 01 77 00 "Closeout Procedures.")

8. Constraints: Include constraints and work restrictions indicated in Contract Documents and as follows in schedule and show how the sequence of Work is affected.

a. Phasing: Arrange list of activities on schedule by phase.
b. Work Restrictions: Show effect of the following on the schedule:

1) Coordination with existing construction
2) Limitations of continued occupancies
3) Uninterruptible services
4) Use of premises restrictions
5) Provisions for future construction
6) Seasonal variations
7) Environmental control
8) Permit provisions

c. Work Stages: Indicate important stages of construction for each major portion of the Work.

1) Subcontract awards
2) Submittals
3) Purchases
4) Mockups
5) Fabrication
6) Sample testing
7) Deliveries
8) Installation
9) Tests and inspections
10) Adjusting
11) Curing
12) Building flush-out.
13) Building commissioning activities.

9. Milestones: Include milestones indicated in Contract Documents in schedule, including, but not limited to, Notice to Proceed, Substantial Completion**.**

C. Joint Review, Revision, and Acceptance:

1. Within seven calendar days of receiving Contractor's proposed Construction Baseline Schedule, Contracting Officer shall review initial Construction Baseline Schedule.
2. Within seven calendar days after review, Contractor shall revise and resubmit Construction Baseline Schedule in accordance with comments presented from review.
3. In the event the Contractor fails to define any element of work, activity, or logic, and the Contracting Officer review does not detect this omission or error, such omission or error, when discovered by Contractor or Contracting Officer, shall be corrected by Contractor within seven calendar days and shall not affect contract period.
4. Upon acceptance of the Construction Baseline Schedule, Contracting Officer saves schedule as a baseline and updates on a monthly basis. Construction schedule update will be used to evaluate Contractor's monthly applications for payment based upon information developed at monthly Construction Schedule update meeting.

D. Cost Correlation: In the heading of the schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of Work performed as of dates used to prepare payment requests.

1. Contractor shall assign cost to construction activities on Construction Baseline Schedule. Costs shall not be assigned to submittal activities unless specified otherwise but may, with Contracting Officer's approval, be assigned to fabrication and delivery activities. Costs shall be included for testing and commissioning activities, operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training (if applicable).
2. Each activity cost shall reflect an accurate value based on the Contract Price Schedule.
3. Total cost assigned to activities shall equal total Contract Price.

E. Recovery Schedule: When periodic schedule update indicates Work is 14 or more calendar days behind current accepted schedule, a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule shall also be submitted. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery shall be accomplished.

F. Computer Software: Prepare schedules using a program developed specifically to manage construction schedules.

1. Use Microsoft Project or Primavera, for Windows operating system (Windows 7 and newer.)

PART 3 - EXECUTION

3.1 CONSTRUCTION SCHEDULE UPDATES

A. Progress Meeting Updates: Provide a 2 week look-ahead schedule, derived from the currently accepted schedule, before each weekly progress meeting. Utilize look-ahead schedule to facilitate and take notes on discussions held during progress meeting.

B. Monthly Schedule Updates:

1. General: Update Construction Schedule on monthly basis to reflect construction progress and activities throughout entire contract period and until project substantial completion. The status date of each schedule update shall be the 7th day preceding the progress payment request date.
2. Procedure: Contractor shall meet with Contracting Officer each month at Construction Schedule update meeting to review progress made through the status date of the Construction Schedule update, including dates activities were started or completed and percentage of work completed on each activity started or completed.
3. Reports: Concurrent schedule revisions, prepare tabulated reports showing:

a. Identification of activities that have changed
b. Changes in early and late start dates
c. Changes in early and late finish dates
d. Changes in activity durations in workdays
e. Changes in the critical path
f. Changes in total float or slack time
g. Changes in the Contract Time

4. Narrative: Report shall include a brief description of actual progress made during update period; actual and potential delaying activities; impediments to progress; issues related to inclement weather; progress toward established milestones and project float. Report shall include a brief description of work anticipated to be performed in the next month. Minor revisions to the schedule should be identified for evaluation and acceptance or rejection.
5. As Work progresses, indicate Actual Completion percentage for each activity.
6. If schedule update shows a late finish date after contract completion date, include:

    a. Known delays
    b. Actions to get back on schedule
    c. Pending modifications
    d. Impediments or constraints affecting progress

7. Progress Payments: Monthly updating of the currently accepted Construction Schedule shall be an integral part of the process upon which progress payments will be made. If Contractor fails to provide schedule updates or revisions, a portion of the monthly payment may be retained until corrections have been made.

C. Distribution: Distribute copies of accepted schedule to Contracting Officer, Contracting Officers Representative, Construction Management Representative, Subcontractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to same parties and post in same locations. Delete parties from distribution when they have completed their assigned portion of the Work.

D. Construction Schedule Revisions:

1. Required Revisions: If, as a result of the monthly schedule update, it appears the currently accepted Construction Schedule no longer represents actual prosecution and progress of the work, Contracting Officer will request, and Contractor shall submit, a revision to the Construction Schedule. Contractor may also request reasonable revisions to currently accepted Construction Schedule in event the Contractor's planning for the work is revised. If Contractor desires to make changes, Contractor shall notify Contracting Officer in writing, stating reason for proposed revision. Accepted revisions shall be incorporated into currently accepted Construction Schedule for next monthly schedule update.
2. Procedure: If revision to currently accepted Construction Schedule is contemplated, Contractor or Contracting Officer shall advise the other in writing at least seven calendar days prior to next monthly schedule update meeting, describing revision and reasons for the revision. Government-requested revisions will be presented in writing to the Contractor, who shall respond in writing within seven calendar days.
3. Reports: Concurrent with making revisions to schedule, prepare tabulated reports showing:

    a. Identification of activities changed
    b. Changes in early and late start dates
    c. Changes in early and late finish dates
    d. Changes in activity durations in workdays
    e. Changes in critical path
    f. Changes in total float or slack time

3.2 TIME IMPACT ANALYSIS FOR CONTRACT MODIFICATIONS CHANGES DELAYS AND CONTRACTOR REQUESTS:

1. Requirements: When contract modifications or changes are initiated, delays experienced, or Contractor desires to revise currently accepted Construction Schedule, Contractor shall submit to Contracting Officer a written time impact analysis illustrating the influence of modification, change, delay, or Contractor request on contract time.
2. Time Extensions: Activity delays, resulting in a late completion date projection, shall not automatically mean an extension of contract time is warranted or due to Contractor. It is possible a modification, change, or delay will not affect existing critical path activities or cause non-critical activities to become critical. A modification, change, or delay may result in absorbing a part of available total float that may exist within an activity chain of the Schedule, not causing any effect on contract time. Time extensions will be granted in accordance with terms of contract.
3. Extension of contract time will be granted only to the extent the equitable time adjustments to activity or activities affected by modification, change, or delay exceeds total (positive or zero) float available on a particular activity.
4. Procedure: Each time impact analysis shall be submitted within time period stated in a request for proposal, or time period designated under the clauses entitled Changes or Default. In cases where Contractor does not submit a written request for extension of time and a time impact analysis within the designated time, it is mutually agreed that the particular modification, change, delay, or Contractor request does not require an extension of the contract time. Upon acceptance, time impact analysis shall be incorporated into currently accepted Construction Schedule at next monthly schedule update.
5. Contract Modifications: Prepare time-impact analysis using fragnets to demonstrate effect of proposed change on overall Construction Schedule for each proposed contract modification concurrent with submission.

END OF SECTION 01 32 16

SECTION 01 32 33 – PHOTO DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for:

1. Existing condition images
2. Periodic construction images

B. See Section 01 77 00 "Closeout Procedures" for a complete listing of closeout documents.

C. See Section 01 79 00 "Demonstration and Training" for submitting videotapes of demonstration of equipment and training of National Park Service (NPS) personnel.

1.2 SUBMITTALS

A. Construction Images: Submit images electronically within seven days of taking the image. Include:

1. Date, time and number (sequentially number all images) in filename.
2. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
3. Submit digital images exactly as originally recorded in digital camera, without alteration, or modifications using image-editing software.

B. Closeout: Submit complete set of digital image electronic files as a Project Record Document**.** Submit on Digital Video Disc (DVD).

1. Provide index as separate file on Disc. List each image as a file name with number, date, and time. Include description and or vantage point image was taken.
2. Submit images that have the same aspect ratio as the sensor, un-cropped.

PART 2 - PRODUCTS

2.1 FORMAT REQUIREMENTS

A. Media: DVD-R Archival Gold

B. Media Labels: Archival DVD labeling markers, archival labels, or direct print.

C. Images: Provide sRGB (standard Red Green Blue) color images in JPEG (Joint Photographic Experts Group) format. Minimum sensor size of 8 megapixels, and at image resolution of not less than 3200 by 2400, and 300 dpi (dots per inch).

PART 3 - EXECUTION

3.1 CONSTRUCTION IMAGES

A. General: Take digital images using the maximum range of depth of field, in-focus, to clearly show the Work. No blurry or out-of-focus areas accepted.

1. Maintain index with each set of Construction images and identify the number, date, time, and description for each.
2. Maintain one set of images accessible in field office at Project site available for reference.

B. Existing Condition Images: Before commencement of excavation and commencement of demolition. take color digital images of Project site and surrounding properties, including existing items to remain during construction, from different vantage points.

1. Flag and paint excavation areas before recording construction images.
2. Take twelve separate images to show existing conditions adjacent to each property before starting Work.
3. Take twelve separate images of each existing building either on or adjoining property to accurately record physical conditions at start of construction.

C. Periodic Construction Images: Take 12 color, digital images weekly, with timing each month adjusted to coincide with cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last images were taken.

D. Additional Images: Contracting Officer may issue requests for additional images.

1. Three days advance, where feasible.
2. In emergency situations, take additional images within 24 hours of request.
3. Additional images include, but are not limited to:

a. Immediate follow-up when on-site events result in construction damage or losses.
b. Fabrication locations away from Project site.
c. Substantial Completion of a major phase or component of Work.
d. Extra record images at time of final acceptance.

END OF SECTION 01 32 33

SECTION 01 33 23 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

A. Action Submittals: Written, graphic information, and physical samples that require Government's responsive action.

B. Informational Submittals: Written information that does not require Government's responsive action. Submittals may be rejected for not complying with requirements.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.3 GENERAL SUBMITTAL PROCEDURES

A. General: Prepare and submit submittals required by individual Specification Sections and in some cases as requested in drawings. Types of submittals are indicated in individual specific sections.

1. Contracting Officer (CO) reserves right to require submittals in addition to those called for in individual sections.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Review for legibility, accuracy, completeness, and compliance with Contract Documents.

1. Coordinate submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Coordinate transmittal of different types of submittals for related parts of Work so processing will not be delayed because of need for concurrent review coordination.

a. Contracting Officer reserves right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Submittal List: Submittal list is attached to the end of this Specification Section. The intent is to provide an overall summary of submittal requirements. The requirements of individual Specification Sections and terms and conditions of the Contract still apply regardless of what is shown on submittal list.

D. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence when e-mail notification is received by Contracting Officer (or designee) indicating submittal has been posted on NPS management software website and is ready for review. When Contracting Officer has completed review, e-mail notification will be sent to Contractor indicating submittal has been processed. No extension of Contract Time will be authorized because of failure to transmit submittals in advance of Work to permit processing, including re-submittals.

1. Action Submittals

    a. Initial Review: Allow 30 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
    b. Re-submittal Review: Allow 10 days for review of each re-submittal.

2. Informational submittals

    a. Review: Allow 10 days for review of each submittal.

E. Approved Equals:

1. For each item proposed as an "approved equal," submit supporting data, including:

    a. Drawings and samples as appropriate.
    b. Comparison of the characteristics of the proposed item with that specified.
    c. Changes required in other elements of the work because of the substitution.
    d. Name, address, and telephone number of vendor.
    e. Manufacturer’s literature regarding installation, operation, and maintenance, including schematics for electrical and hydraulic systems, lubrication requirements, and parts lists. Describe availability of maintenance service, and state source of replacement materials.

2. A request for approval constitutes a representation that Contractor:

    a. Has investigated the proposed item and determined that it is equal or superior in all respects to that specified.
    b. Will provide the same warranties for the proposed item as for the item specified.
    c. Has determined that the proposed item is compatible with interfacing items.
    d. Will coordinate installation of an approved item and make changes required in other elements of the work because of the substitution.
    e. Waives claims for additional expenses that may be incurred as a result of the substitution.

F. Electronic Submittals**:** Identify and incorporate information in each electronic submittal file as follows:

1. Transmittal Form (CM-16): All submittals shall be transmitted using National Park Service Transmittal Form (CM-16). The form can be downloaded from the DSC Workflows website's Submittal Review page and completed on the NPS/DSC management software website. No action will be taken on a submittal item unless accompanied by this Transmittal Form.

    a. Complete the general information at the top of form.
    b. Provide all required information based on submittal type
    c. Attach all related documents.
    d. Sign the Contractor section at bottom of the Transmittal Form (CM-16).

2. Physical samples: Complete Transmittal Form (CM-16) on the NPS/DSC management software website as described above. Deliver physical sample to the Contracting Officer (or designee) on site for processing. All comments and actions will be documented on the Transmittal Form (CM-16) on the NPS/DSC management software website.

G. Identification: Submittal number or other unique identifier, including revision identifier.

1. Submittal number shall use a sequential number (e.g. .001). Re-submittals shall include alphabetic suffix after another decimal point (e.g. .001.A).

H. Re-submittals: Make re-submittals using same process used with initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in the title block on the Transmittal Form (CM-16) and clearly indicate extent of revision.
3. Re-submit submittals until they are marked "Approved" or "Approved with notations".

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, and others as necessary for performance of construction activities.

J. Use for Construction: Use only final submittals with mark indicating "Approved" or "Approved with notations". Ensure notations have been incorporated and, at a minimum, keep one copy of final approved submittal on site for use during construction.

1.4 CONTRACTOR'S USE OF CAD/BIM FILES

A. General: At Contractor's written request, copies of CAD (Computer Aided Design)/BIM (Building Information Modeling) files will be provided to Contractor for Contractor's use in connection with Project, subject to:

1. Files provided as is; no format or other changes to files or changes to objects in the drawing will be done by the Government.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each submittal to show which products and options are applicable.
3. As applicable, include:

a. Manufacturer's product specifications.
b. Manufacturer's installation instructions: When Contract Documents require compliance with manufacturer's printed instructions, provide one complete set of instructions to Contracting Officer and keep another complete set of instructions at the project site until substantial completion.
c. Manufacturer's catalog cuts: Submit only pertinent pages; mark each page of standard printed data to identify specific products proposed for use.
d. Wiring diagrams showing factory-installed wiring.
e. Printed performance curves.
f. Operational range diagrams.
g. Compliance with specified referenced standards.
h. Testing by recognized testing agency.

4. Submit product data in PDF (portable document format) file format before or concurrent with samples.

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in Contract Documents. As applicable, include:

a. Dimensions
b. Identification of products
c. Fabrication and installation drawings
d. Roughing-in and setting diagrams
e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring
f. Shopwork manufacturing instructions
g. Templates and patterns
h. Schedules
i. Notation of coordination requirements
j. Notation of dimensions established by field measurement
k. Relationship to adjoining construction clearly indicated
l. Seal and signature of professional engineer if specified
m. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring

2. Submit shop drawings as PDF electronic file

C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Complete and post the Transmittal Form (CM-16) on the NPS/DSC management software website for processing and documentation of action on submitted samples.
3. Identification: Attach label on unexposed side of Samples that includes:

    a. Generic description of Sample
    b. Product name and name of manufacturer
    c. Sample source
    d. Submittal Number and title of appropriate Specification Section

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing full range of colors, textures, and patterns available.

    a. Number of Samples: Submit two full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Contracting Officer will return with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit four sets of Samples. Contracting Officer will retain three Sample sets; remainder will be returned.

D. Construction Materials: Contractor is encouraged to submit products made out of recycled or environmentally responsible material. Every effort will be made by National Park Service to approve these materials.

2.2 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by individual Specification Sections.

1. Post informational submittals as PDF electronic files directly to the NPS management software website.
2. Certificates and Certifications: Provide a notarized statement with signature of entity responsible for preparing certification. Certificates and certifications shall be signed by officer or other individual authorized to sign documents on behalf of that entity.

3. Informational submittals that do not comply with requirements specified in Contract Documents will be rejected and one copy will be returned.

B. Coordination Drawings: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."

C. Contractors Construction Schedule: Comply with requirements specified in Section 01 32 16 "Construction Schedule."

D. Accident Prevention Plan: Comply with requirements specified in Section 01 35 23 "Safety Requirements."

E. Schedule of Values: Comply with requirements specified in Section 01 32 16 "Construction Schedule."

F. Waste Recycling Plan: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."

G. Quality Control Plan: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

H. Storm Water Pollution Prevention Plan: Comply with requirements specified in Section 01 57 23 "Temporary Storm Water Pollution Prevention" and storm water permit requirements identified in Section 01 31 00 "Project Management and Coordination."

I. Indoor Air Quality Management Plan: Comply with requirements specified in Section 01 57 19.11 "Indoor Air Quality Management."

J. Leadership in Energy and Environmental Design (LEED™) Submittals: Comply with requirements specified in Section 01 81 13.13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations," Section 01 81 13.16 "Sustainable Design Requirements - LEED for Commercial Interiors," Section 01 81 13.19 "Sustainable Design Requirements - LEED for Core and Shell Development," and Section 01 81 13.23 "Sustainable Design Requirements - LEED for Schools."

K. Qualification Data: Prepare written information demonstrating capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

L. Welding Certificates: Prepare written certification that welding procedures and personnel comply with Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on American Welding Society (AWS) forms. Include names of firms and personnel certified.

M. Installer Certificates: Prepare written statements on manufacturer’s letterhead certifying Installer complies with Contract Documents and, where required, is authorized by manufacturer for this specific Project.

N. Manufacturer Certificates: Prepare written statements on manufacturer’s letterhead certifying manufacturer complies with Contract Documents. Include evidence of manufacturing experience where required.

O. Product Certificates: Prepare written statements on manufacturer's letterhead certifying product complies with Contract Documents.

P. Material Certificates: Prepare written statements on manufacturer's letterhead certifying material complies with Contract Documents.

Q. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in Contract Documents.

R. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

S. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

T. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in Contract Documents.

U. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

V. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in Contract Documents.

W. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."

X. Design Data: Prepare written and graphic information, including: performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

Y. Manufacturer's Instructions: Prepare written or published information documenting manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer.

Z. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. As applicable, include:

1. Statement on condition of substrates and their acceptability for installation of product.

2. Summary of installation procedures being followed, compliance with requirements and, if not, what corrective action was taken.
3. Results of operational and other tests and a statement of whether observed performance complies with the requirements.

AA. Permit Compliance Products: Prepare required information for compliance with permit provisions. Products include written notification of project startup, suspension, and completion of work; photo documentation of site conditions; reports; and drawings.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Review each submittal and check for coordination with other Work of Contract and for compliance with Contract Documents. Note corrections and field dimensions.

3.2 CONTRACTING OFFICER'S ACTION

A. General: Submittals will be disapproved without technical review if identification information is missing, not filled in, or if placed on back of submittal; an incorrect format of submittals is provided; transmittal form is incorrectly filled out; submittals are not coordinated; or submittals do not show evidence of Contractor's approval.

1. Any work done or orders for materials or services placed before approval shall be at Contractor's own risk.

B. Action Submittals: Contracting Officer will review each submittal, generate comments on corrections or modifications required, and indicate appropriate action on the Transmittal Form (CM-16). Submittal will be marked as defined below:

1. APPROVED: Acceptable with no corrections.
2. APPROVED WITH NOTATIONS: Minor corrections or clarifications required. Comments are clear and no further review is required. Contractor shall address review comments when proceeding with the work.
3. DISAPPROVED - RESUBMIT: Rejected as not in accordance with the contract or as requiring major corrections or clarifications. Contracting Officer will identify reasons for disapproval. Contractor shall revise and resubmit with changes clearly identified.

C. Informational Submittals: Contracting Officer will review each submittal and will either accept or reject it.

D. Partial submittals are not acceptable, will be considered non-responsive, and will be returned without review.

END OF SECTION 01 33 23

SECTION 01 35 13.22 – ARCHEOLOGICAL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section consists of protecting archeological resources contained in soil deposits.

1.2 DEFINITIONS

A. Archeological Resources: Archeological resources are physical evidences of past human activity, including evidences of effects of that activity on the environment. Archeological resources represent both prehistoric and historic time periods, found above and below ground and under water.

B. Archeologically Sensitive Areas: Areas having potential to contain significant (National Register eligible) archeological resources. If National Register eligible or listed archeological resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with state historic preservation officer and, if necessary, associated American Indian tribes.

C. Non-sensitive Areas: Areas with little potential of containing significant (National Register eligible) archeological resources.

D. Archeological Monitor: Representative of Government designated to oversee construction activities that could disturb archeological resources.

E. Archeological Resources Protection Act (ARPA) of 1979 (Public Law (P.L.) 96-95; 93 United States Statues at Large (Stat.) 712): defines archeological resources as any material remains of past human life or activities that are of archeological interest and at least 100 years old; Section 4 of the statute describes the requirements that must be met before Federal authorities can issue a permit to excavate or remove any archeological resource on Federal or Indian lands; the curatorial requirements of artifacts, and other materials excavated or removed.

1.3 SUBMITTALS

A. Daily Work Schedule: Detail construction work in archeologically sensitive areas. Submit to Contracting Officer (CO) 30 days before start of ground disturbing site work.

1.4 QUALITY ASSURANCE

A. At least one week before on-site work begins, Contractor shall meet with Contracting Officer and Archeological Monitor to discuss Daily Work Schedule, equipment, and special methods used in archeologically sensitive areas. Contractor shall ensure approved Daily Work Schedule is followed throughout construction.

PART 2 - PRODUCTS

2.1 DAILY WORK SCHEDULE

A. Daily Work Schedule is required for work occurring within archeologically sensitive areas. Include all work that is to occur within the area and key the schedule to the drawings to include:

1. Starting and ending dates of ground-disturbing construction.
2. Locations of temporary facilities, such as barriers, field offices, staging areas, sanitary facilities, borrow pits, and haul and access roads.
3. Types of construction, such as clearing, topsoil stripping, structure or trench excavation, landscaping, and post construction clean-up.
4. Methods and equipment used for each type of construction.
5. Plan for relocating work in the event of temporary work stoppages at each archeologically sensitive area

PART 3 - EXECUTION

3.1 BARRICADES

A. Comply with requirements specified in Section 01 50 00 "Temporary Facilities and Controls."

3.2 ARCHEOLOGICAL INVESTIGATION BY NON-NPS PERSONNEL

A. A permit is required for archeological investigations (e.g. excavation, shovel testing, coring, pedestrian survey, underwater archeology, rock art documentation, or other types of reconnaissance including archaeological monitoring of construction) carried out on parklands by non-National Park Service (NPS) personnel, unless carried out under a contract or a cooperative agreement specifically written for archeological investigations. Permits are issued under the Archaeological Resources Protection Act of 1979 (ARPA). The NPS does not issue a permit for archeological investigations carried out by NPS archeologists, or to archeologists working on NPS archeological projects under a contract or cooperative agreement.

B. Applicants should submit a Permit Application (DI Form 1926 (Revision September 2004) Office of Management and Budget (OMB) Number (No.) 1024-0037, approved through 1/31/2008. Permit Application form is available, in PDF (portable document file) format, to the manager of the park in which they propose to work; or to the regional director, with a copy to the park manager.

C.

3.3 OBSERVATION

A. Archeological Monitor will observe ground-disturbing site work, including construction of temporary facilities, at archeologically sensitive areas, from a safe location mutually agreed on by Contractor and Monitor. As new ground is broken, Monitor will examine excavated materials,

using construction layout centerline and perimeter staking as a reference point to record locations of findings.

3.4 DISCOVERY OF RESOURCES

A. If Archeological Monitor discovers resources, immediate relocation of work to a non-sensitive area may be required for Monitor to identify and document resources and, if necessary, develop appropriate mitigation plan. While Archeological Monitor is documenting resources in sensitive areas, Contractor shall relocate work to non-sensitive areas where monitoring is not normally required.

B. If resources are discovered while Archeological Monitor is absent, stop work immediately and report the discovery to the Contracting Officer.

3.5 WORK STOPPAGE

A. Contractor shall plan, schedule, and execute work to prevent stoppages at one area from stopping all work at construction site.

END OF SECTION 01 35 13.22

SECTION 01 35 23 - SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes establishing an effective accident prevention program and providing a safe working environment for personnel and visitors.

1.2 CONDITIONS PRESENT FOR PROJECT

A. Trenching – near existing building and foundation.
B. Trenching – while working in trenches.
C. Water – working with pressurized water lines.
D. Electrocution – working around live wires (below and above ground)
E. Equipment – working with large excavation equipment.
F. Fall Protection – working on elevated surfaces, ladders and/or scaffolding.
G. Crane and Lifting – hoisting large and/or heavy materials or equipment.

1.3 SUBMITTALS

A. Accident Prevention Plan (APP): Submit APP after contract award and before Pre-Construction conference. Contracting Officer (CO) will review proposed APP. If APP requires any revisions or corrections, Contractor shall resubmit Plan within 10 days. No progress payments will be made until the APP is accepted.

1.4 QUALITY ASSURANCE

A. Comply with contract clauses "Accident Prevention" and "Permits and Responsibilities." In case of conflicts between Federal, State, and local safety and health requirements, the most stringent shall apply. Onsite equipment shall meet 29 CFR 1926 (Code of Federal Regulations) (Occupational Safety and Health Administration (OSHA)) requirements. Failure to comply with requirements of this section and related sections may result in suspension of work.

B. Site Safety Supervisor:

1. Designate authorized onsite representative for preparation and maintenance of the APP.
2. Shall be responsible for:

a. Implementation and enforcement of the APP
b. Daily safety inspections
c. Conducting and documenting weekly and monthly safety meetings
d. Review of safety requirements at progress meetings
e. Compilation and maintenance of Safety Data Sheets (SDS) and safety reference materials
f. Tracking and resolution of safety violations

g. Site personnel and visitor compliance with site safety and health requirements and APP
h. Investigation and reporting of accidents and injuries

C. Qualifications of Employees:

1. Physically and able to perform their assigned duties in a safe manner.
2. Do not allow employees whose ability or alertness is impaired because of prescription or illegal drug use, fatigue, illness, intoxication, or other conditions that may expose themselves or others to injury to perform work.
3. Provide operating instructions for equipment. Operators of vehicles, hoisting equipment, and hazardous plant equipment shall be able to understand signs, signals, operating instructions, and be fully capable of operating such equipment. Retain copies of operator licenses and certifications onsite.

1.5 ACCIDENT REPORTING

A. Reportable Accidents: Defined as: death, occupational disease, and/or traumatic injury to employees or the public; fires; and/or property damage by accident in excess of $100.

1. Notify Contracting Officer immediately in the event of a reportable accident.
2. Fill out and forward an Accident/Property Damage Report Form (CM-22) to Contracting Officer within 7 days of a reportable accident. Obtain form from Contracting Officer.

1.6 RESOURCES

A. COVID-19 (Coronavirus Disease 2019) information provided below is not intended to provide a complete analysis of requirements for Contractor and is provided as a courtesy.
1. Coronoavirus.gov
2. Occupational Safety and Health Administration (United States Department of Labor) - COVID-19
3. Center for Disease Control (CDC)
   a. Get the Facts About Coronavirus
   b. What Construction Workers Need to Know about COVID-19
4. Federal Emergency Management Agency (FEMA) - Coronavirus (COVID-19) Response
5. National Park Service (NPS) - NPS Public Health Update

PART 2 - PRODUCTS

2.1 ACCIDENT PREVENTION PLAN (APP)

A. APP shall be written to comply with OSHA and project requirements (generic plan is not acceptable) including but not limited to:

1. Name and qualifications of supervisor responsible to carry out program.
2. Weekly and monthly safety meetings shall be documented with topics and attendees.
3. First aid and rescue procedures.

4. Job Hazard Analysis (JHA) for each major phase. List of hazards associated and methods proposed to provide for property protection and safety of the public, National Park Service personnel, and Contractor's employees. Include initial and continuing training.
5. Planning for possible emergency situations, as detailed in Article 1.2. Such planning shall take nature of construction, site conditions, and degree of exposure of persons and property into consideration.
6. Infectious Disease Preparedness:

    a. Contractors are responsible for their employees' safety and the safety of job site visitors during the performance of this contract. We encourage Contractors to follow guidance from the Department of Labor (DOL), Occupational Safety and Health Administration (OSHA), the Centers for Disease Control and Prevention (CDC), and all other applicable local, city, and state mandates. We encourage Contractors to develop policies for infection prevention and an Infectious Disease Preparedness and Response Plan.
    b. To the extent appropriate, Contractors should include the protective health and safety measures they intend to implement in any accident prevention or safety submittals required under this contract. These plans should contain preventive measures the Contractor intends to follow while performing work on government property as well as responsive and corrective actions to be taken if an employee exhibits symptoms or tests positive for contagion.
    c. Upon contract award, Contractors should communicate with Contracting Officer regarding Contractor decisions and actions to protect the health and safety of workers for the duration of contract performance under which pandemic conditions exist.

2.2 FIRST AID FACILITIES

A. Provide adequate facilities for number of employees and appropriate to construction hazards.

2.3 PERSONNEL PROTECTIVE EQUIPMENT (PPE)

A. Selection shall conform to OSHA Subpart E.

PART 3 - EXECUTION

3.1 DAILY SAFETY INSPECTIONS

A. Conduct daily safety inspections and maintain daily safety reports which include:
    1. Area/operation inspected
    2. Date of inspection
    3. Identified hazards
    4. Corrective actions taken

3.2 EMERGENCY INSTRUCTIONS

A. Post telephone numbers and reporting instructions for ambulance, physician, hospital, fire department, and police in conspicuous locations at work site.

3.3 FIRE AND LIFE SAFETY

A. Comply with requirements of National Fire Protection Association (NFPA) 241 (Standard for Safeguarding Construction, Alteration, and Demolition Operations).

3.4 HAZARDOUS MATERIALS

A. Hazardous materials: Explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful substances that could cause death or injury.

B. Store hazardous materials in accordance with manufacturer's and OSHA Subpart D requirements. Maintain Safety Data Sheets (SDS) for each chemical readily available on site.

1. Immediately report spills of hazardous materials to the Park.
2. Maintain a spill emergency response kit.
3. Train employees how to respond to a spill and use emergency response kit.

3.5 PROTECTIVE EQUIPMENT

A. Inspect personal protective equipment daily and maintain in a serviceable condition. Clean, sanitize, and repair personal items as appropriate before issuing to another individual.

3.6 SAFETY MEETINGS

A. As a minimum, conduct one weekly 15-minute "toolbox" safety meeting conducted by a foreman or supervisor and attended by construction personnel at worksite. Topics shall coincide with work scheduled for following week. Document and submit meeting minutes to Contracting Officer within one day after meeting.

B. Conduct monthly safety meetings for personnel, contractors, and subcontractors performing work on the site. Notify Contracting Officer of meeting dates and times. Meetings shall be used to: review effectiveness of Contractor's safety effort; resolve current health and safety problems; provide a forum for planning safe construction activities, and for updating Accident Prevention Plan. Contracting Officers Representative will attend meetings and enter results of meetings into the daily log.

3.7 HARD HATS AND PROTECTIVE EQUIPMENT AREAS

A. A hard hat use area shall be designated by Contractor. Hard hat area shall be posted by Contractor in a manner satisfactory to Contracting Officer.

B. It is Contractor's responsibility to require persons working on or visiting site to wear hard hats and PPE in good repair at all times. As a minimum, maintain six hard hats and other APP required equipment.

3.8 TRAINING

A. First Aid: Provide training to personnel to ensure prompt and efficient first aid.

B. Hazardous Material: Train and instruct each employee exposed to hazardous material in safe and approved methods of handling and storage.

END OF SECTION 01 35 23

SECTION 01 35 91 - HISTORIC PRESERVATION TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes special procedures for historic treatment on Project including, but not limited to:

1. Definitions
2. Submittals
3. Quality Assurance
4. Storage and protection of existing historic materials
5. Project site conditions
6. Historic Preservation Treatment Plan
7. Protection, General
8. Protection during application of chemicals
9. Protection during use of heat-generating equipment
10. Historic preservation treatment procedures

1.2 DEFINITIONS

A. "Preservation" - To apply measures necessary to sustain existing form, integrity, and materials of historic property. Work may include preliminary measures to protect and stabilize the property.

B. "Rehabilitation" - To make possible a compatible use for property through repair, alterations, and additions while preserving those portions or features that convey its historical, cultural, or architectural values.

C. "Restoration" - To accurately return form, features, and character of a property to its appearance at a particular period of time by means of removal of features from other periods in its history and repair and reconstruction of missing and deteriorated features from the restoration period.

D. "Reconstruction" - To reproduce in exact form and detail, a building, structure, or artifact as it appeared at a specific period in time. Reconstructed elements do not possess historic integrity in their own right since they are-not original fabric.

E. "Stabilize" - To apply measures designed to reestablish a weather-resistant enclosure and structural reinforcement of an item or portion of the building while maintaining essential form as it exists at present. This level of intervention is aimed at retarding or arresting adverse impacts to structures.

F. "Protect and Maintain" - To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.

G. "Repair" - To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible

substitute materials for deteriorated or missing parts of features when there are surviving prototypes.

H. "Replace" - To duplicate in its entirety, a historic element or feature by matching its historic pattern, detail and appearance. Replacement is justified when original or historic elements are damaged beyond repair or are missing. Replacement conditions and methods include:

1. Replacement with Original or Historic Fabric: Includes fabric salvaged from other locations or projects having identical architectural qualities. Duplication of appearance using identical material possessing historical significance.
2. Replacement with New Materials: Includes replacement with new material of like kind (custom fabricated of manufactured). Duplication of appearance using like material.
3. Replacement with Substitute Materials: Includes replacement with a compatible substitute that is frequently contemporary and unlike the historic fabric. Duplication of appearance using modern (non-traditional) material Use of substitute materials is not approved unless matching materials are not available.

I. "Remove" - To demolish or detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

J. "Remove and Salvage" - To detach items from existing construction and deliver them ready for reuse to Contracting Officer (CO) or designee.

K. "Remove and Reinstall" - To detach items from existing construction, repair and prepare for reuse, and reinstall where indicated.

L. "Existing to Remain" or "Retain" - Existing items of construction not to be removed and not otherwise indicated to be removed and salvaged or removed and reinstalled.

M. "Material in Kind" - Material that closely matches existing materials through comparison of architectural qualities and salient characteristic such as species, cut, color, grain, dimension, profile, thickness, and finish.

1.3 SUBMITTALS

A. Historic Preservation Treatment Plan:

1. After contract award and before Pre-Construction conference, submit for approval a written Historic Preservation Treatment Plan (HPTP).
2. If the plan requires revisions or corrections, Contractor shall resubmit plan within 10 days.
3. No change in approved plan may be made without written concurrence by Contracting Officer.

B. Alternative Methods and Materials: If alternative methods and materials to those indicated are proposed for any phase of work, provide a written description including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this Project.

C. Photographs or Videotape: In accordance with Section 01 32 33 "Photographic Documentation," show existing conditions of adjoining construction and site improvements including finish

surfaces that might be misconstrued as damage caused by historic treatment operations. Submit before work begins.

1.4 QUALITY ASSURANCE

A. Historic Preservation Treatment Specialist Qualifications: Experienced firm with required certifications and training able to demonstrate through past performance they are qualified to perform this work.

1.5 STORAGE AND PROTECTION OF HISTORIC MATERIALS

A. Removed and Salvaged Historic Materials:

1. Clean salvaged historic items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in secure area until delivery to Contracting Officer.
4. Transport items to storage area as designated by Contracting Officer.
5. Protect items from damage during transport and storage.
6. Do not dispose of items removed from existing construction without prior written consent of Contracting Officer.

B. Removed and Reinstalled Historic Materials:

1. Clean and repair historic items to functional condition adequate for intended reuse.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use as designed.

C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling during historic treatment. When permitted by Contracting Officer, items may be removed to suitable, protected storage location during historic treatment and reinstalled in their original locations after historic treatment operations are complete.

D. Storage and Protection: When removed from existing location, store historic materials within weather-tight enclosure protected from wetting by rain, snow, or ground water, and temperature variations. Secure stored materials to protect from theft.

1. Identify removed items with an inconspicuous mark indicating original location.
2. Develop key plan when many similar items are scheduled for removal and reinstallation.

1.6 PROJECT-SITE CONDITIONS

A. Exterior Cleaning and Repairing:

1. Proceed with work only when forecasted weather conditions are favorable.

a. Wet Weather: Do not attempt repairs during rainy or foggy weather. Do not apply primer, paint, putty, or epoxy when relative humidity is above 80 percent. Do not remove exterior elements of structures when rain is forecast or in progress.
b. Do not perform exterior wet work when air temperature is below 40 degrees Fahrenheit (5 degrees Celsius).
c. Do not begin cleaning, patching, or repairing given likelihood of frost or freezing.
d. Do not begin cleaning when either air or surface temperature is below 45 degrees Fahrenheit (7 degrees Celsius) unless approved means are provided for maintaining 45 degrees Fahrenheit (7 degrees Celsius) temperature of air and materials during, and for 48 hours subsequent to, cleaning.

2. Perform cleaning and rinsing of the exterior only during daylight hours.

B. National Park Service will occupy portions of building immediately adjacent to historic treatment area. Conduct historic treatment so National Park Service operations will not be disrupted. Provide 72 hours' notice to Contracting Officer of activities that will affect National Park Service operations.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 HISTORIC PRESERVATION TREATMENT PLAN

A. Prepare written plan for preservation work covering preservation components of project. Plan shall verify construction strategy and intent is compatible with Department of the Interior's (DOI) standards for Treatment of Historic Properties, guidelines for Treatment of Cultural Landscapes, and National Park Service management policies for cultural resources. Plan shall satisfy both project scope and resource protection requirements. Plan shall include:

1. Organized list of preservation components of project, systems, and tasks
2. Staging and sequence of work
3. Disassembly and reassembly techniques and steps
4. Equipment and tools required
5. Supplies and materials with manufacturer or supplier identified
6. Skilled trades and crafts required
7. Anticipated testing and analysis of fabric
8. Additional investigations for extents or magnitude of treatments needed
9. Protective measures
10. Seasonal limitations on work
11. Alternative means if primary treatment method is unfeasible
12. Work conducted off-site (Approval from Contracting Officer required prior to taking resources off-site).

3.2 PROTECTION, GENERAL

A. Comply with manufacturer's written instructions for precautions and effects of products and procedures on adjacent building materials, components, and vegetation.

B. Ensure supervisory personnel are present when work begins and during progress.

C. Temporary Protection of Historic Materials during Construction:

1. Protect existing materials during installation of temporary protections and construction. Do not deface or remove existing materials.
2. Attachments of temporary protection to existing construction shall be approved by Contracting Officer prior to installation.

D. Protect landscape work adjacent to or within work areas as follows:

1. Provide barriers to protect tree trunks.
2. Bind spreading shrubs.
3. Coverings shall allow plants to breathe. Remove coverings at end of day. Do not cover plant material with waterproof membrane more than 8 hours at a time.
4. Set scaffolding and ladder legs away from plants.

E. Existing Drains: Prior to start of work or cleaning operations, test drains and other water removal systems to ensure drains and systems function properly. Notify Contracting Officer immediately of stopped or blocked drains or systems. Do not begin Work of this Section until drains are in working order.

1. Provide method to prevent solids including stone or mortar residue from entering drains or drain lines. Clean out drains and drain lines blocked or filled because of work performed under this Contract.
2. Protect storm drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemical cleaners and paint removers.

B. Comply with requirements in Section 01 50 00 "Temporary Facilities and Controls."

C. Cover adjacent surfaces with materials proven to resist chemical cleaners selected for Project unless chemicals being used will not damage adjacent surfaces. Use covering materials containing only waterproof, UV (ultraviolet)-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. Promptly remove masking to prevent adhesive staining on completion.

D. Do not clean surfaces during winds of sufficient force to spread cleaning solutions to unprotected surfaces.

E. Neutralize and collect alkaline and acid wastes and dispose of outside park boundaries.

F. Dispose of runoff from chemical operations by legal means and in a manner preventing soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

3.4 PROTECTION DURING USE OF HEAT-GENERATING EQUIPMENT

A. Comply with following procedures while performing work with heat-generating equipment, including welding, cutting, soldering, brazing, paint removal with heat, and other operations where open flames or implements utilizing heat are used:

1. Obtain Contracting Officer's approval for operations involving use of open-flame or welding equipment.

    a. Notification shall be given for each occurrence and location of work with heat-generating equipment.
    b. Obtain appropriate permit from the park as required.

2. As far as practical, use heat-generating equipment in shop areas or outside building.
3. Before work with heat-generating equipment commences, furnish fire watch (or watches) for location(s) where work is to be performed.
4. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use combustible gas indicator test to ensure area is safe.
5. Remove and keep area free of combustibles, including, rubbish, paper, waste, etc., within area of operations.

    a. If combustible material cannot be removed, provide fireproof blankets to cover such materials.

6. Where possible, furnish and use baffles of metal or gypsum board to prevent spraying of sparks or hot slag into surrounding combustible material.
7. Prevent extension of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
8. Inspect each location of day's work not sooner than 30 minutes after completion of operations to detect hidden or smoldering fires; ensure proper housekeeping is maintained.

B. Where sprinkler protection exists and is functional, maintain without interruption while operations are performed. If operations are performed near automatic sprinkler heads, shield individual heads temporarily with guards.

3.5 HISTORIC PRESERVATION TREATMENT PROCEDURES

The principal aim of preservation work is to halt the process of deterioration and stabilize the item's condition to sustain the integrity of the historic element, feature or structure being preserved. Cyclic maintenance is often required as well as repair work. Repair is required where specifically indicated. The following procedures shall be followed:

1. Retain as much existing material as possible; repair and consolidate rather than replace.
2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
3. Use reversible processes wherever possible.
4. Use traditional replacement materials and techniques if possible. New work shall be distinguishable from old work and original materials and techniques.
5. Record repair work during construction with periodic construction photos and daily inspection reporting. Photo documentation is specified in Section 013233 "Photographic Documentation."

B. Prohibit smoking by personnel performing work on or near historic structures.

C. Notify Contracting Officer of visible changes in integrity of material or components due to environmental causes including biological attack, UV degradation, freezing, or thawing, or due to structural defects including cracks, movement, or distortion.

1. Do not proceed with work in question until directed by Contracting Officer.

D. Where Work requires existing features to be removed, cleaned, and reinstalled, perform operations without damage to material itself, to adjacent materials, or to substrate.

E. Identify new or replacement materials and features with inconspicuous, permanent marks to distinguish from original materials. Record legend of identification marks and locations of these marks on Record Drawings.

F. When cleaning, match samples of existing materials that have been cleaned and identified for acceptable cleaning levels. Avoid over-cleaning to prevent damage. Use gentlest methods available. Initiate cleaning using hand cleaning methods before introducing power cleaning methods and equipment.

END OF SECTION 01 35 91

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements. Quality of work shall be responsibility of the Contractor.

1. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and control procedures that facilitate compliance with Contract Document requirements.

C. See Divisions 2 through 49 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the work to evaluate actual products incorporated into the work and completed construction comply with requirements.

C. Preconstruction Testing: Tests and inspections performed specifically for project before products and materials are incorporated into work to verify performance or compliance with specified criteria.

D. Product Testing: Tests and inspections performed by a Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing, to establish product performance and compliance with industry standards.

E. Source Quality Control Testing: Tests and inspections performed at the source, i.e., plant, mill, factory, or shop.

F. Field Quality Control Testing: Tests and inspections performed on-site for installation of work and for completed work.

G. Testing Agency or Laboratory: Entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Using a term such as "carpentry" does not imply certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of corresponding generic name.

1.3 CONFLICTING REQUIREMENTS

A. Reference Standards: If compliance with two or more standards is specified and standards establish different or conflicting requirements for minimum quality levels, comply with most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer before proceeding.

B. Minimum Quality Levels: Quality level shown or specified shall be minimum provided or performed. Actual installation may comply exactly with minimum quality specified, or it may exceed minimum within reasonable limits. To comply with requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Contracting Officer before proceeding.

1.4 SUBMITTALS

A. Quality Control Plan:

1. After contract award and before Pre-Construction conference, submit a written Contractor Quality Control (CQC) plan.
2. If plan requires revisions or corrections, Contractor shall resubmit plan within 10 days.
3. Government reserves the right to require changes in plan during contract period as necessary to obtain the quality specified.
4. No change in the approved plan may be made without written concurrence by Contracting Officer.

B. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in form of a recent report on inspection of testing agency by a recognized authority.

C. Contractor Quality Control (CQC) Daily Reports: Submit showing inspections and tests on first workday following date covered by report. Quality Control Supervisor shall utilize DSC Forms.

1. Review Construction Management Representative (CMR) Daily report if applicable and reconcile any differences prior to posting.

D. Test Reports

1. Test reports shall be completed by person performing test.
2. Submit Daily Test Information Sheets with Quality Control Daily Reports.
3. Submit failing test results and proposed remedial actions within four hours of noted deficiency.

4. Submit three copies of complete test results no later than one calendar day after test was performed.

E. Accessibility Inspection Report:

1. Fill out applicable sections of the Accessibility Inspection Report and attach to Contractor Quality Control Daily Report.
2. Utilize attached Accessibility Inspection form to document compliance with Architectural Barriers Act Accessibility Standards (ABAAS).
3. Inspect at various stages of construction as needed to ensure finished product meets standards.
4. Submit report no later than one calendar day after inspection was performed.

F. Off-Site Inspection Reports: Submit prior to shipment.

G. If Contractor Quality Control plan and Quality Control Daily Reports are not submitted as specified, Contracting Officer may retain payments until such time plan(s) is/are accepted and implemented, or may retain payments for work completed on days with no Quality Control Daily Reports.

H. Permits, Licenses, and Certificates: For National Park Service (NPS) records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of work.

1.5 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this Article establish minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Contractors Quality Control Staff:

1. Contractor's Quality Control Supervisor may also perform other duties.
2. Contractor's designated Quality Control Supervisor shall be on the project site whenever contract work is in progress.
3. Contractor's job supervisory staff may be used to assist Quality Control Supervisor supplemented, as necessary, by additional certified testing technicians.

C. Installer Qualifications: Firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent indicated for Project, whose work has resulted in construction with a record of successful in-service performance.

D. Manufacturer Qualifications: Firm experienced in manufacturing products or systems similar to those indicated for Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

E. Fabricator Qualifications: Firm experienced in producing products similar to those indicated for Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

F. Professional Engineer Qualifications: Professional engineer legally qualified to practice in jurisdiction where Project is located and is experienced in providing engineering services of kind indicated (including Structural Tests and Special Inspections (STSI)). Engineering services are defined as those performed for installations of system, assembly, or products similar to those indicated for Project in material, design, and extent.

G. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for activities indicated.

1. Requirement for specialists shall not supersede building codes and regulations governing Work.

H. Testing Agency Qualifications: A Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or an independent agency with experience and capability to conduct testing and inspecting indicated, according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by Contract, is acceptable to Contracting Officer.

1. Nationally Recognized Testing Laboratory (NRTL): Nationally recognized testing laboratory according to 29 CFR 1910.7 (Code of Federal Regulations).
2. National Voluntary Laboratory Accreditation Program (NVLAP): Testing agency accredited according to National Institute of Standards and Technology’s (NIST) National Voluntary Laboratory Accreditation Program.
3. Measuring devices, laboratory equipment, and instruments shall be calibrated at established intervals against certified standards in accordance with NIST requirements. Measuring and testing devices shall be made available for use by Government for verification tests.

I. Factory-Authorized Service Representative Qualifications: Authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products similar in material, design, and extent to those indicated for Project.

1.6 QUALITY CONTROL

A. Contractor is responsible for testing and inspections, including Structural Tests and Special Inspections (STSI), as identified in attached STSI. Inspect and test work as needed to ensure quality of materials, workmanship, construction, finish, and functional performance are in compliance with applicable specifications, drawings, and those required by the Building Code.

1. Engage qualified testing agency to perform quality-control services.
2. Submit appropriate report for each quality-control service.
3. Testing and inspecting requested by Contractor and not required by Contract Documents are Contractor's responsibility.
4. Contracting Officer may designate test locations.

B. Manufacturer's Field Services: Where indicated, engage factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.

C. Re-testing/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction of replaced work that failed to comply with Contract Documents.

D. Testing Agency Responsibilities: Cooperate with NPS and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Contracting Officer and Contractor promptly of irregularities or deficiencies observed in work during performance of services.
2. Determine location from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections, State in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit 3 copies of certified written report of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase Contract Document requirements or approve or accept any portion of Work.

E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide:

1. Access to Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for material mixes that require control by testing agency.
7. Security and protection for samples and testing and inspecting equipment at Project site.

F. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with minimum delay and to avoid removing and replacing construction to accommodate testing and inspecting.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 QUALITY CONTROL PLAN

A. Quality Control Plan shall include:

1. List of personnel responsible for quality control and assigned duties. Include each person's qualifications. Include alternate(s) and qualifications.
2. Copy of letter of direction to Contractor's Quality Control Supervisor(s) outlining assigned duties and authorities designated by principal or owner.
3. Names, qualifications / accreditations, and descriptions of laboratories to perform sampling and testing, and samples of proposed report forms from laboratories.

4. Methods of performing, documenting, and enforcing quality control of work including Contractor report forms and acknowledgment of NPS forms.
5. Methods of monitoring and controlling environmental pollution and contamination as required by regulations and laws.
6. Specific discussion regarding off-site visits, receiving inspections, manufacturers representation, startup requirements, and other aspects of performance specific to Project.
7. Provisions for substantial completion(s) and final inspection(s) per Contract.

PART 3 - EXECUTION

3.1 OFF-SITE CONTROL

A. Items fabricated or assembled off-site shall be inspected for quality control at place of fabrication.

3.2 ON-SITE CONTROL

A. Notification:

1. Notify Contracting Officer at least 48 hours in advance of preparatory phase meeting.
2. Notify Contracting Officer at least 24 hours in advance of initial and follow-up phases.

B. Preparatory Phase: Perform before beginning each feature of work.

1. Review control submittal requirements with personnel directly responsible for quality assurance and quantity control of the work. As a minimum, Contractor's Quality Control Supervisor and foreman responsible for feature of work shall be in attendance.
2. Review applicable specifications sections and drawings related to feature of work.
3. Ensure copies of referenced standards related to sampling, testing, and execution for feature of work are available on site.
4. Ensure provisions have been made for field control testing.
5. Examine work area to ensure preliminary work has been completed.
6. Verify field dimensions and advise Contracting Officer of discrepancies with contract documents.
7. Ensure necessary equipment and materials are at project site and they comply with approved shop drawings and submittals.
8. Document preparatory phase activities and discussions on Contractor's Quality Control Daily Report.

C. Initial Phase:

1. As soon as work begins, inspect and test representative portion of particular feature of work for quality of workmanship.
2. Review control testing procedures to ensure compliance with contract requirements.
3. Document initial phase activities and discussions on Contractor's Quality Control Daily Report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

D. Follow-Up Phase: Inspect and test as work progresses to ensure compliance with contract requirements until completion of work.

E. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be required on same feature of work for following reasons:

1. Quality of on-going work is unacceptable.
2. Changes in quality control staff, on-site production supervision, or work crew.
3. Work on particular feature of work is resumed after substantial period of inactivity.

3.3 DOCUMENTATION

A. Maintain Quality Control Daily Reports, Daily Test Report Information Sheets, and Accessibility Inspection Reports of quality control activities and tests. (Download from DSC Workflows website > Forms/Templates/Samples/Guidelines page > Construction Forms section.)

B. Quality Control Daily Reports shall not be substituted for other written reports required under clauses of contract, such as Disputes, Differing Site Conditions, or Changes.

3.4 ENFORCEMENT

A. Contractor shall stop work on any item or feature pending satisfactory correction of deficiency noted by quality control staff or Contracting Officer.

3.5 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams as invisible as possible.
2. Comply with Contract Document requirements for Section 01 73 29 "Cutting and Patching."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 01 42 00 – REFERENCE STANDARDS

PART 1 - GENERAL

1.1 ENVIRONMENTAL DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114 and as specified herein.

B. Biobased Materials: As defined in the Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, "biobased" means a "commercial or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials." Biobased materials also include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000.

1. Biobased content: Amount of biobased carbon in the material or product as a percentage of weight (mass) of total organic carbon in the material or product.

C. Chain-of-Custody: Process whereby a product or material is maintained under physical possession or control during its entire life cycle.

D. Deconstruction: Disassembly of buildings for purpose of recovering materials.

E. DFE (Design for the Environment): A technique that includes elements of resource conservation and pollution prevention as applied in various product sectors. A technique that incorporates approaches which are part of product (or assembly) concept, need and design. Considerations involve material selection, material and energy efficiency, reuse, maintainability and design for disassembly and recyclability. Refer to International Organization for Standardization (ISO) Guide 64 for additional clarification.

F. Environmentally preferable products: Products and services that have a lesser or reduced effect on the environment in comparison to conventional products and services. Refer to EPA's Final Guidance on Environmentally Preferable Purchasing Program.

G. Non-Renewable Resource: A resource that exists in a fixed amount that cannot be replenished on a human time scale. Non-renewable resources have potential for renewal only by geological, physical, and chemical processes taking place over of millions of years. Examples include iron ore, coal, and oil.

H. Perpetual Resource: A resource that is virtually inexhaustible on a human time scale. Examples include solar energy, tidal energy, and wind energy.

I. Recycled Content Materials: Products that contain pre-consumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent Federal Trade Commission (FTC) Guide for Use of Environmental Marketing Claims.

J. Renewable Resource: A resource that is grown, naturally replenished, or cleansed, at a rate which exceeds depletion of the usable supply of that resource. A renewable resource can be exhausted if improperly managed. However, a renewable resource can last indefinitely with proper stewardship. Examples include trees in forests, grasses in grasslands, and fertile soil.

1.2 QUALITY ASSURANCE

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into Contract Documents to the extent referenced. Such standards are made a part of Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: Where compliance with two or more standards is specified, and standards may establish different or conflicting requirements for minimum quantities or quality levels, comply with most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer (CO) for decision before proceeding.

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless Contract Documents include more stringent requirements, applicable construction industry standards have same force and effect as if bound or copied directly into Contract Documents to the extent referenced. Such standards are made a part of Contract Documents by reference.

B. Publication Dates: Comply with standards in effect as of date of Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities found in Section 01 42 00 Sources for Reference Publications, Unified Facilities Guide Specifications (UFGS) (accessible via Masters website > Downloads section > click on UFGS Master (WBDG Website). Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

XX EXAMPLE Association (The)
www.EXAMPLE.org

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in following list. Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

DIN	Deutsches Institut fur Normung e.V. www.din.de	49 30 2601-3003
IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. icc-es.org	(800) 423-6587 (562) 699-0543

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in following list. Names, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

ABA & ABAAS United States Access Board	Architectural Barriers Act (ABA) Architectural Barriers Act Accessibility Standards (ABAAS) www.access-board.gov
CoE	Army Corps of Engineers www.usace.army.mil
CPSC	Consumer Product Safety Commission www.cpsc.gov
DOC	Department of Commerce www.commerce.gov
DOD	Department of Defense www.defense.gov
DOJ	Department of Justice www.justice.gov
DOE	Department of Energy www.energy.gov
EPA	Environmental Protection Agency www.epa.gov

FAA	Federal Aviation Administration www.faa.gov
FCC	Federal Communications Commission www.fcc.gov
FDA	Food and Drug Administration www.fda.gov
GSA	General Services Administration www.gsa.gov
HUD	Department of Housing and Urban Development www.hud.gov
LBL	Lawrence Berkeley National Laboratory www.lbl.gov
NCHRP	National Cooperative Highway Research Program (See TRB (Transportation Resource Board))
NIST	National Institute of Standards and Technology www.nist.gov
OSHA	Occupational Safety & Health Administration www.osha.gov
PHS	U.S. Department of Health and Human Services www.hhs.gov
RUS	Rural Utilities Service (See USDA (Department of Agriculture))
SD	State Department www.state.gov
TRB	Transportation Research Board www.nationalacademies.org/trb/transportation-research-board
USDA	Department of Agriculture www.usda.gov
USP	U.S. Pharmacopeia www.usp.org
USPS	Postal Service www.usps.com

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in

following list. Names, telephone numbers, and websites are subject to change and are believed to be accurate and up-to-date as of date of Contract Documents.

ABAAS	Architectural Barriers Act Accessibility Standards www.access-board.gov
CFR	Code of Federal Regulations Available from Government Printing Office www.govinfo.gov/app/collection/cfr
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point www.dsp.dla.mil/Specs-Standards/
DSCC	Defense Supply Center Columbus (See FS (Federal Specification))
FED-STD	Federal Standard (See FS (Federal Specification))
FS	Federal Specification Available from Department of Defense Single Stock Point www.dsp.dla.mil/Specs-Standards/ Available from General Services Administration www.gsa.gov Available from National Institute of Building Sciences www.nibs.org
FTMS	Federal Test Method Standard (See FS (Federal Specification))
MIL	(See MILSPEC (Military Specification and Standards))
MIL-STD	(See MILSPEC (Military Specification and Standards))
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point www.dsp.dla.mil/Specs-Standards/
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov/guidelines-and-standards/buildings-and-sites/about-the-aba-standards/ufas *(UFAS is **only** for housing projects per Fair Housing Act. See also the Fair Housing Act Design Manual, www.huduser.gov/portal/publications/destech/fairhousing)*

1.5 ENVIRONMENTAL REFERENCE STANDARDS

A. American Forest and Paper Association:

1. Sustainable Forestry Initiative

B. American Society of Heating Refrigerating and Air Conditioning Engineers (ASHRAE):
- **ASHRAE 52.2,** *Method of Testing General Ventilation Air Cleaning Devices for Removal Efficiency by Particle Size*
- **ASHRAE 55,** *Thermal Environmental Conditions for Human Occupancy*
- **ASHRAE 62.1,** *Ventilation for Acceptable Indoor Air Quality*
- **ASHRAE 62.2,** *Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings*
- **ASHRAE/IESNA 90.1,** *Energy Standard for Buildings, Except Low-Rise Residential Buildings*
- **ASHRAE 90.2,** *Energy Efficient Design of Low-Rise Residential Buildings*

C. American Association of State Highway and Transportation Officials (AASHTO):
- M288 Geotextile Specification for Highway Applications
- **MP009-06 Standard Specification for Compost for Erosion/Sediment Control (Filter Berms and Filter Socks)**
- **MP010-03 Standard Specification for Compost for Erosion/Sediment Control (Compost Blankets)**

D. American Society for Testing and Materials International (ASTM):
- A478 Standard Specification for Chromium-Nickel Stainless Steel Weaving and Knitting Wire
- A580/A580M Standard Specification for Stainless Steel Wire
- A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube
- C1240 Standard Specification for Silica Fume Used in Cementitious Mixtures
- C128 Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
- C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C1319 Standard Specification for Concrete Grid Paving Units
- C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings
- C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
- C1371 Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers
- C1386 Standard Specification for Precast Autoclaved AERATED Concrete (PAAC) Wall Construction Units
- C1483 Standard Specification for Exterior Solar Radiation Control Coatings on Buildings
- C1549 Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer
- C1601 Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces
- C289 Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)

- C311 Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
- C33 Standard Specification for Concrete Aggregates
- C593 Standard Specification for Fly Ash and Other Pozzolans for Use With Lime
- C595 Standard Specification for Blended Hydraulic Cements
- C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
- C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
- C739 Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation
- C936 Standard Specification for Interlocking Concrete Paver Units
- C989 Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
- D1435 Standard Practice for Outdoor Weathering of Plastics
- D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 foot pound force per cubic foot (ft-lbf/ft3) (2,700 kilonewton meter per cubic meter (kN-m/m3))
- D1972 Standard Practice for Generic Marking of Plastic Products
- D198 Standard Test Methods of Static Tests of Lumber in Structural Sizes
- D2103 Standard Specification for Polyethylene Film and Sheeting
- D217 Standard Test Methods for Cone Penetration of Lubricating Grease
- D2369 Standard Test Method for Volatile Content of Coatings
- D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
- D3792 Standard Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph
- D3864 Standard Guide for Continual On-Line Monitoring Systems for Water Analysis
- D3960 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
- D4017 Standard Test Method for Water in Paints and Paint Materials by Karl Fischer Method
- D4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
- D4444 Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters
- D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
- D4552 Standard Practice for Classifying Hot-Mix Recycling Agents
- D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- D4716 Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
- D4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Product
- D4840 Standard Guide for Sampling Chain-of-Custody Procedures
- D4887 Standard Test Method for Preparation of Viscosity Blends for Hot Recycled Bituminous Materials
- D5106 Standard Specification for Steel Slag Aggregates for Bituminous Paving Mixtures
- D5116 Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products

- D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
- D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
- D5268 Standard Specification for Topsoil Used for Landscaping Purposes
- D5359 Standard Specification for Glass Cullet Recovered from Waste for Use in Manufacture of Glass Fiber
- D5505 Standard Practice for Classifying Emulsified Recycling Agents
- D5509 Standard Practice for Exposing Plastics to a Simulated Compost Environment
- D5512 Standard Practice for Exposing Plastics to a Simulated Compost Environment Using an Externally Heated Reactor
- D5539 Standard Specification for Seed Starter Mix
- D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations
- D5603 Standard Classification for Rubber Compounding Materials—Recycled Vulcanizate Particulate Rubber
- D5663 Standard Guide for Validating Recycled Content in Packaging Paper and Paperboard
- D5759 Standard Guide for Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses
- D5792 Standard Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives
- D5834 Standard Guide for Source Reduction Reuse, Recycling, and Disposal of Solid and Corrugated Fiberboard (Cardboard)
- D5851 Standard Guide for Planning and Implementing a Water Monitoring Program
- D5852 Standard Test Method for Erodibility Determination of Soil in the Field or in the Laboratory by the Jet Index Method
- D6002 Standard Guide for Assessing the Compostability of Environmentally Degradable Plastics
- D6006 Standard Guide for Assessing Biodegradability of Hydraulic Fluid
- D6007 Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber
- D6046 Standard Classification of Hydraulic Fluids for Environmental Impact
- D6081 Standard Practice for Aquatic Toxicity Testing of Lubricants: Sample Preparation and Results Interpretation
- D6108 Standard Test Method for Compressive Properties of Plastic Lumber and Shapes
- D6109 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastic Lumber
- D6112 Standard Test Methods for Compressive and Flexural creep and Creep-Rupture of Plastic Lumber and Shapes
- D6117 Standard Test Methods for Mechanical Fasteners In Plastic Lumber and Shapes
- D6155 Standard Specification for Nontraditional Coarse Aggregates for Bituminous Paving Mixtures
- D6245 Standard Guide for Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation
- D6261 Standard Specification for Extruded and Compression Molded Basic Shapes Made from Thermoplastic Polyester (TPES)
- D6262 Standard Specification for Extruded, Compression Molded, and Injection Molded Basic Shapes of Poly(aryl ether ketone) (PAEK)
- D6270 Standard Practice for Use of Scrap Tires in Civil Engineering Applications
- D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers

- D6330 Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions
- D6345 Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air
- D6400 Standard Specification for Compostable Plastics
- D6435 Standard Test Method for Shear Properties of Plastic Lumber and Plastic Lumber Shapes
- D6629 Standard Guide for Selection of Methods for Estimating Soil Loss by Erosion
- D6662 Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards
- D6712 Standard Specification for Ultra-High-Molecular-Weight Polyethylene (UHMW-PE) Solid Plastic Shapes
- D6886 Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography
- D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
- D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer
- D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))
- D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair
- E1021 Standard Test Methods for Measuring Spectral Response of Photovoltaic Cells
- E1038 Standard Test Method for Determining Resistance of Photovoltaic Modules to Hail by Impact with Propelled Ice Balls
- E1039 Standard Test Method for Calibration of Silicon Non-Concentrator Photovoltaic Primary Reference Cells Under Global Irradiation
- E1040 Standard Specification for Physical Characteristics of Nonconcentrator Terrestrial Photovoltaic Reference Cells
- E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
- E1171 Standard Test Method for Photovoltaic Modules in Cyclic Temperature and Humidity Environments
- E1333 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Under Defined Test Conditions Using a Large Chamber
- E1362 Standard Test Method for Calibration of Non-Concentrator Photovoltaic Secondary Reference Cells
- E1433 Standard Guide for Selection of Standards on Environmental Acoustics
- E1462 Standard Test Methods for Insulation Integrity and Ground Path Continuity of Photovoltaic Modules
- E1596 Standard Test Methods for Solar Radiation Weathering of Photovoltaic Modules
- E1597 Standard Test Method for Saltwater Pressure Immersion and Temperature Testing of Photovoltaic Modules for Marine Environments
- E1609 Standard Guide for Development and Implementation of a Pollution Prevention Program
- E1686 Standard Guide for Selection of Environmental Noise Measurements and Criteria
- E1690 Standard Test Method for Determination of Ethanol Extractives in Biomass
- E1721 Standard Test Method for Determination of Acid-Insoluble Residue in Biomass

- E1755 Standard Test Method for Ash in Biomass
- E1758 Standard Test Method for Determination of Carbohydrates in Biomass by High Performance Liquid Chromatography
- E1780 Standard Guide for Measuring Outdoor Sound Received from a Nearby Fixed Source
- E1799 Standard Practice for Visual Inspections of Photovoltaic Modules
- E1802 Standard Test Methods for Wet Insulation Integrity Testing of Photovoltaic Modules
- E1821 Standard Test Method for Determination of Carbohydrates in Biomass by Gas Chromatography
- E1827 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
- E1830 Standard Test Methods for Determining Mechanical Integrity of Photovoltaic Modules
- E1861 Standard Guide for Use of Coal Combustion By-Products in Structural Fills
- E1918 Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
- E1971 Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings
- E1980 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
- E1991 Standard Guide for Environmental Life Cycle Assessment of Building Materials/Products
- E2047 Standard Test Method for Wet Insulation Integrity Testing of Photovoltaic Arrays
- E2114 Standard Terminology for Sustainability Relative to the Performance of Buildings
- E2128 Standard Guide for Evaluating Water Leakage of Building Walls
- E2129 Standard Practice for Data Collection for Sustainability Assessment of Building Products
- E2397 Standard Practice for Determination of Dead Loads and Live Loads associated with Green Roof Systems
- E2398 Standard Test Method for Water Capture and Media Retention of Geocomposite Drain Layers for Green Roof Systems
- E2399 Standard Test Method for Maximum Media Density for Dead Load Analysis of Green Roof Systems
- E2400 Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems
- E241 Standard Guide for Limiting Water-Induced Damage to Buildings
- E2432 Standard Guide for General Principles of Sustainability Relative to Buildings
- E408 Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
- E413 Standard Classification for Rating Sound Insulation
- E477 Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers
- E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- E683 Standard Practice for Installation and Service of Solar Space Heating Systems for One- and Two-Family Dwellings
- E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization

- E781 Standard Practice for Evaluating Absorptive Solar Receiver Materials When Exposed to Conditions Simulating Stagnation in Solar Collectors With Cover Plates
- E782 Standard Practice for Exposure of Cover Materials for Solar Collectors to Natural Weathering Under Conditions Simulating Operational Mode
- E823 Standard Practice for Nonoperational Exposure and Inspection of a Solar Collector
- E881 Standard Practice for Exposure of Solar Collector Cover Materials to Natural Weathering Under Conditions Simulating Stagnation Mode
- E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- E903 Standard Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres
- E948 Standard Test Method for Electrical Performance of Photovoltaic Cells Using Reference Cells Under Simulated Sunlight
- F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
- F2034 Standard Specification for Sheet Linoleum Floor Covering
- F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

E. Bat Conservation International:
- Bat Approved Bat Houses

F. Carpet and Rug Institute
- Green Label & Green Label Plus Testing Programs, carpet-rug.org/testing/green-label-plus

G. Center for Resource Solutions
- Green-e program

H. Environmental Protection Agency (EPA):
- **Comprehensive Procurement Guidelines**
- **ENERGY STAR**
- **Environmentally Preferable Purchasing Program Final Guidance**
- **GreenScapes program**
- **Heat Island Initiative**
- **Indoor Air Quality Building Education and Assessment Model (I-BEAM)**
- **National Environmental Performance Track**
- **Pollution Prevention (P2)**
- **Product Stewardship Program**
- **Significant New Alternatives Policy (SNAP) Program**

I. Federal Trade Commission:
- **Guide for the Use of Environmental Marketing Claims**

J. Forest Stewardship Council:
- **Chain-Of-Custody**
- **Forest Management**

K. Green Building Initiative (GBI):

- **Green Globes - US**

L. Green Seal:
- **GC-03 Anti-Corrosive Paints**
- **GC-12 Occupancy Sensors**
- **GC-13 Split-Ductless Air-Source Heat Pumps**
- **GS-05 Compact Fluorescent Lamps**
- **GS-11 Paints**
- **GS-13 Windows**
- **GS-14 Window Films**
- **GS-31 Electric Chillers**
- **GS-32 Photovoltaic Modules**
- **GS-36 Commercial Adhesives**
- **GS-37 Industrial & Institutional Cleaners**

M. International Iron and Steel Institute:
- **CO2 Breakthrough Program**

N. International Organization of Standardization:
- **Guide 64; Guide for Inclusion of Environmental Aspects in Product Standards**
- **9660 Information processing -- Volume and file structure of CD-ROM for information interchange**
- **14001 Environmental management systems – Specification with guidance for use**
- **14004 Environmental Management Systems – General Guidelines on Principles, Systems and Supporting Techniques**
- **14020 Environmental labels and declarations – General principles**
- **14024 Environmental labels and declarations – Type I environmental labelling - Principles and procedures**
- **14040 Environmental management – Life cycle assessment – Principles and framework**

O. National Association of Home Builders:
- **Advanced Framing Techniques: Optimum Value Engineering**

P. National Institute of Building Sciences:
- **MOIST program for transfer of heat and moisture**
- **Whole Building Design Guide**

Q. National Institute of Standards and Technology:
- **BEES (Building for Environmental and Economic Sustainability) Lifecycle Decision Support Tool**

R. Sheet Metal and Air Conditioning Contractors' National Association (SMACNA):
- **IAQ Guidelines for Occupied Buildings Under Construction**

S. Southcoast Air Quality Management District:
- **1168 Adhesive And Sealant Applications**

T. US Composting Council:

- Seal of Testing Assurance Program

U. US Department of Agriculture:
- **Biobased Products – Definitions and Descriptions**

V. US Green Building Council:
- **LEED™ 2009 Green Building Rating System**
- **LEED™ v4 (version 4) Green Building Rating System**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

1.2 DEFINITIONS

A. Permanent Enclosure: As determined by Contracting Officer (CO), permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and openings are closed with permanent construction or substantial temporary closures.

1.3 USE CHARGES

A. General: Cost or use charges for temporary facilities shall be included in Contract Sum as required.

B. Water Service: Potable Water from existing water system is available for use with metering and with payment of use charges. Provide connections and extensions of services as required for construction operations with any additional permit costs.

C. Electric Power Service: Electric power from existing system is available for use with metering and with payment of use charges. Provide connections and extensions of services as required for construction operations with any additional permit costs.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with National Electrical Contractors Association (NECA), National Electrical Manufacturers Association (NEMA), and Underwriter Laboratories (UL) standards and regulations for temporary electric service. Install service to comply with National Fire Protection Association (NFPA) 70.

B. Environmental Protection: Provide environmental protection as required by agency(ies) with jurisdiction and as indicated in Contract Documents. Coordinate with requirements of the following:

1. Regulatory Requirements
2. Indoor Air Quality (IAQ) Management
3. Noise and Acoustics Management
4. Environmental Management
5. Construction Waste Management

C. Accessible Temporary Egress: Comply with applicable provisions in the United States (U.S.) Architectural & Transportation Barriers Compliance Board's Architectural Barriers Act Accessibility Standard (ABAAS) Accessibility Guidelines.

1.5 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before NPS acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Temporary materials may be new or used, but must be adequate in capacity for required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

B. Pavement: Comply with Division 32 Section "Asphalt Paving.".

C. Portable Chain-Link Fencing: Minimum 2 inch (50 millimeters), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 millimeters) high with galvanized steel pipe posts; minimum 2-3/8 inch (60 millimeters) OD line posts and 2-7/8 inch (73 millimeters) OD corner and pull posts, with 1-5/8 inch (42 millimeters) OD top and bottom rails. Provide galvanized steel bases for supporting posts.

D. Safety Barrier Fence: Orange plastic fence, minimum height, 4 feet.

E. Barrier Tape: Yellow tape Imprinted with "CAUTION: CONSTRUCTION AREA," manufactured by Reef Industries, Inc., Houston, Texas, or approved equal.

F. Lumber and Plywood: Comply with requirements in Division 06 Section "Rough Carpentry."

G. Gypsum Board: Minimum 1/2 inch (12.7 millimeters) thick by 48 inches (1219 millimeters) wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.

H. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

I. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10 mil (0.25-millimeter) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.

J. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 millimeters).

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Coordinate with Park for a contractors field office.

B. Storage and Fabrication Sheds: Temporary weather tight sheds or other covered facilities for storage of materials subject to weather damage. Number and size of structures shall be subject to Contracting Officer's approval.

C. Toilets: Sufficiently lighted and ventilated toilet facilities in weatherproof, sight proof, handicap accessible, sturdy enclosures with privacy locks.

1. Provide separate toilet facilities for men and women.

2. Refer to toilet location on Site Logistics Plan.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. Heating, Ventilation, and Air Conditioning (HVAC) Equipment: Unless Contracting Officer authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with Minimum Efficiency Reporting Value (MERV) of **8** at each return air grille in system and remove at end of construction.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where approved by Contracting Officer so that they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, NPS, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services. Acquire necessary permits.

B. Non-potable water for construction is not available within the park boundaries. Contractor shall furnish non-potable water from a source outside park boundary.

C. Potable water is available on site. Make connections to existing facilities as needed. Facilities must be cleaned and maintained in a condition acceptable to NPS. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, and wash facilities for use by construction personnel.

1. Place in approved locations secluded from public observation and convenient to work stations. Relocate as work progress requires.
2. Maintain and clean toilet facilities at least weekly.
3. Completely remove sanitary facilities on completion of work.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

1. Use of permanent heating and cooling system will not be allowed without written authorization from Contracting Officer. When the permanent heating and cooling system is approved for use as temporary heating and cooling, pay costs until final acceptance. Permanent heating and cooling system shall be sufficiently complete, including controls, to permit safe operation
2. Provide and maintain adequate approved facilities, as required for safety and construction requirements, during the work. Provide ample clearance around stoves, heaters, chimney and vent connections to prevent ignition of combustible material
3. Install and maintain temporary filters when air handing equipment is used for temporary heating and cooling. Install new filters before final acceptance in addition to any extra sets of filters required. Clean coils as determined by Contracting Officer.
4. Warranties for equipment used for temporary heating and cooling shall start on date of Final Acceptance.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Use of existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to NPS.

1. When temporary connections are removed, restore existing utility services to original condition.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead, unless otherwise indicated.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service: No telephone service is available on site for Contractor's use. Make arrangements with Telephone Company and pay costs.

1. Make arrangements with the telephone company to install 2 lines for Contracting Officer's use and pay installation costs.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 50 feet of building lines. Comply with NFPA 241.
2. Maintain support facilities until near Substantial Completion. Remove structures, equipment, and furnishings, and terminate services after punch list is 100 percent completed or when directed by Contracting Officer. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Contracting Officer.

B. Contracting Officers Field Office:

1. Provide Heat, lights, power, air conditioning, temporary water pressure and sewage holding tanks.
2. Provide office, furnishings, and utility connections no later than 7 days after date of Notice to Proceed. Exact location will be determined by Contracting Officer.
3. Maintain equipment, furnishings, and structures. Provide equipment replacement elements as needed. Provide weekly cleaning services and trash disposal. Maintain and service water and sewer holding tanks as required.

C. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.

1. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.

D. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."

3. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."

E. Traffic Controls: Erect and maintain barricades, lights, danger signals, and warning signs in accordance with Manual on Uniform Traffic Control Devices (MUTCD), Part IV, latest edition.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
3. Illuminate barricades and obstructions at night; keep safety lights burning from sunset to sunrise.
4. Adequately barricade and post open cuts in or adjacent to thoroughfares.
5. Protect pedestrian traffic by guardrails or fences.
6. When pedestrian traffic is detoured onto a roadway, provide temporary walkways with protection as required at ends and overhead. For walkways, use lumber running parallel to direction of traffic movement and provide ramps at changes of elevation.
7. Cover pipes, hoses, and power lines crossing sidewalks and walkways with troughs using beveled edge boards.
8. Install Barrier Tape where directed by Contracting Officer. Keep a minimum of two rolls on site.

F. Parking: Use designated areas of existing parking for construction personnel.

G. Dewatering Facilities and Drains: Comply with requirements of the agency(ies) with jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations.

H. Project Identification and Temporary Signs: Provide Project identification and other signs. Fence, barricade, or otherwise block off the immediate work area to prevent unauthorized entry.

1. Provide temporary, directional signs for construction personnel and visitors.
2. Maintain and touchup signs so they are legible at all times.
3. Erect and maintain sufficient detour signs at road closures and along detour routes.

I. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of agency(ies) with jurisdiction.

J. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.

1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

K. Temporary Elevator Use: Refer to Division 14 Sections for temporary use of new elevators.

L. Existing Elevator Use: Use of existing elevators will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to Contracting Officer. At Substantial Completion,

restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to shop, make required repairs and refinish entire unit, or provide new units as required.

M. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

N. Existing Stair Usage: Use of existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to Contracting Officer. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

O. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Cleaning of Equipment: Contractor shall ensure prior to moving on to Project Area, equipment, is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds. Ensure equipment has been pressure washed and is free of exotic species. Equipment shall be considered free of soil, seeds, and other debris when visual inspection does not disclose such material. Disassembly of equipment components or specialized inspection tools are not required.

C. Temporary Erosion and Sedimentation Control: Refer to Section 01 57 23 "Temporary Storm Water Pollution Prevention".

D. Tree and Plant Protection: Refer to Section 01 11 00 "Summary of Work".

E. Pest Control: Follow NPS requirements to minimize attraction and harboring of rodents, roaches, and other pests and perform extermination and control procedures at regular intervals so Project will be free of pests and residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

F. Site Enclosure Fence: Before construction operations begin, furnish and install chain link fencing to prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

2. Locate vehicular gates to avoid interference with traffic on public thoroughfares.
3. Locate pedestrian entrance gates as required to provide controlled personnel entry.
4. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Contracting Officer with one set of keys.

G. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.

H. Barricades, Warning Signs, and Lights: Comply with requirements of agency(ies) with jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

I. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

J. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by NPS and tenants from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
2. Construct dustproof partitions with 2 layers of 3-mil (0.07-millimeters) polyethylene sheet on each side. Cover floor with 2 layers of 3-mil (0.07-millimeters) polyethylene sheet, extending sheets 18-inches (460 millimeters) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48-inches (1219 millimeters) between doors. Maintain water-dampened foot mats in vestibule.

3. Insulate partitions to provide noise protection to occupied areas.
4. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
5. Protect air-handling equipment.
6. Weather strip openings.
7. Provide walk-off mats at each entrance through temporary partition.

K. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.

1. Responsible Person: Capable and qualified person shall be placed in charge of fire protection. Responsibilities shall include locating and maintaining fire protective equipment and establishing and maintaining safe torch cutting and welding procedures.
2. Tobacco Use, Smoking, and Vaping: Smoking within buildings or temporary storage sheds is prohibited.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of NPS or Agency(ies) with Jurisdiction. Check with Park; many require "burn permits" for welding.

4. Develop and supervise overall fire-prevention and -protection program for personnel at Project Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
5. Provide temporary standpipes and hoses for fire protection. Hang hoses with warning sign stating hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
6. Hazard Control: Take necessary precautions to prevent fire during construction. Do not store flammable or combustible liquids in existing buildings. Provide adequate ventilation during use of volatile or noxious substances.
7. Spark Arresters: Equip gasoline or diesel powered equipment used during periods of potential fire hazards or in potential forest and grass fire locations with spark arresters approved by United States Department of Agriculture (USDA) Forest Service.

    a. Written determinations of periods and areas of potential fire hazard will be issued by Contracting Officer.

8. Buildings: Furnish a minimum of one extinguisher for each 1,500 square feet of area or major fraction thereof.

    a. Travel distance from any work station to nearest extinguisher shall not exceed 75 feet.

9. Vehicles and Equipment: Provide one extinguisher on each vehicle or piece of equipment.
10. Service and Refueling Areas: Locate areas a minimum of 50 feet from buildings. Shut down equipment before refueling.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on 24-hour basis where required to achieve indicated results and avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor. NPS reserves right to take possession of Project identification signs.
2. At Substantial Completion, clean and renovate permanent facilities used during construction period.

END OF SECTION 01 50 00

SECTION 01 57 19.11 – INDOOR AIR QUALITY MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Special requirements for Indoor Air Quality (IAQ) management during construction operations.

a. Control of emissions during construction.
b. Moisture control during construction.

2. Procedures for testing baseline IAQ. Baseline IAQ requirements, specify maximum indoor pollutant concentrations for acceptance of the facility.

1.2 DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114.

B. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of particulates, dust, fumes, vapors, or gases.

C. Hazardous Materials: Any material regulated as a hazardous material in accordance with 49 CFR 173 (Code of Federal Regulations), requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of a Hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.

1. Hazardous materials include pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).

D. Indoor Air Quality (IAQ): Composition and characteristics of air in an enclosed space that affect occupants of that space. Indoor air quality of a space refers to relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including impact on thermal comfort such as air temperature, relative humidity and air speed.

E. Interior final finishes: Materials and products exposed to interior occupied spaces; including flooring, wall covering, finish carpentry, and ceilings.

F. Packaged dry products: Materials and products installed in dry form delivered in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.

G. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, special coatings, and materials which require curing.

1.3 QUALITY ASSURANCE

A. Inspection and Testing Lab Qualifications: Minimum of 5 years of experience in performing types of testing specified herein.

1.4 SUBMITTALS

A. Indoor Air Quality (IAQ) Management Plan: After award and before Pre-construction conference, prepare and submit IAQ Management Plan, including:

1. Procedures for control of emissions during construction.

    a. Identify schedule for application of interior finishes: Identify each interior finish that generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors. Indicate air handling zone, sequence of application, and curing times.
    b. Identify potential sources of odor and dust.
    c. Identify construction activities likely to produce odor or dust.
    d. Identify areas of project potentially affected, especially occupied areas.
    e. Evaluate potential problems by severity and describe methods of control.
    f. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent Heating HVAC systems, types of filters and schedule for replacement of filters.
    g. Describe cleaning and dust control procedures.
    h. Describe coordination with commissioning procedures.

2. Procedures for moisture control during construction.

    a. Identify porous materials and absorptive materials.
    b. Identify schedule for inspection of stored and installed porous and absorptive materials.

3. Revise and resubmit Plan as required by Contracting Officer (CO).

    a. Approval of Contractor’s Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

B. Product Data:

1. Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
2. Material Safety Data Sheets (MSDS): Submit MSDSs for inclusion in Operation and Maintenance Manual for:

    a. Adhesives
    b. Floor and wall patching/leveling materials
    c. Caulking and sealants

d. Insulating materials
e. Fireproofing and firestopping
f. Carpet
g. Paint
h. Clear finish for wood surfaces
i. Lubricants
j. Cleaning products

C. Inspection and Test Reports:

1. Moisture control inspections
2. Moisture content testing
3. Moisture penetration testing
4. Microbial Growth testing

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 IAQ MANAGEMENT - EMISSIONS CONTROL

A. During construction operations, follow the recommendations in SMACNA IAQ Guidelines for Occupied Buildings under Construction.

B. HVAC Protection:

1. Seal return registers during construction operations.
2. Provide temporary exhaust during construction operations.
3. To greatest extent possible, isolate and/or shut down return side of HVAC system during construction. When ventilation system must be operational during construction activities, provide temporary filters at air inlets (returns) and at locations for filters prescribed in the design.
4. Contractor shall bear cost of cleaning required due to failure to protect ducts and equipment from construction dust.

C. Source Control: Provide low and zero VOC materials as specified.

D. Pathway Interruption: Isolate areas of work to prevent contamination of clean or occupied spaces. Provide pressure differentials and/or physical barriers to protect clean or occupied spaces.

E. Housekeeping: During construction, maintain project and building products and systems to prevent contamination of building spaces.

F. Temporary Ventilation: For materials/products that generally require ventilation for off gassing, provide an ACH (air changes per hour) of **1.5** or more and as follows:

1. Provide minimum 48-hour pre-ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees

Fahrenheit minimum to 90-degree Fahrenheit maximum continuously during ventilation period. Do not ventilate within limits of Work unless otherwise approved by Contracting Officer.

2. Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
3. Provide filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 as determined by ASHRAE 52.2 during construction **and a MERV as described in the construction documents during NPS occupancy**.

G. Scheduling: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.

H. Flush-Out: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total air volume of 14,000 cubic feet. of outdoor air per square feet of floor area while maintaining an internal temperature of at least 60 degrees Fahrenheit and relative humidity no higher than 60%.

1. Obtain Contracting Officers concurrence that construction is complete enough before beginning flush-out.
2. If additional construction involving materials that produce particulates or any of specified contaminants is conducted during or after flush-out, then flush-out process must be restarted.
3. Install new HVAC filtration media in locations identified to have permanent filtration in contract documents after completion of flush-out and before occupancy or further testing.

3.2 IAQ MANAGEMENT - MOISTURE CONTROL

A. Housekeeping:

1. Keep materials dry. Protect stored on-site and installed absorptive materials from moisture damage.
2. Verify installed materials and products are dry prior to sealing and weatherproofing building envelope.
3. Store interior absorptive materials only after building envelope is sealed and weatherproofed.

B. Inspections: Document and report results of inspections; state whether or not inspections indicate satisfactory conditions.

1. Examine materials for dampness as they arrive. If acceptable to Contracting Officer, dry damp materials completely prior to installation; otherwise, reject materials that arrive damp.
2. Examine materials for mold as they arrive and reject materials that arrive contaminated with mold.
3. Inspect stored and installed absorptive materials regularly for dampness and mold growth. Inspect **after each rain event**.

    a. If stored or installed absorptive materials become wet, notify Contracting Officer. Inspect for damage. If acceptable to the Contracting Officer, dry completely prior to

closing in assemblies; otherwise, remove (in accordance with the Waste Management Plan) and replace with new materials.

4. Basement: Monitor basement and crawlspace humidity and dehumidify when relative humidity is greater than 70 percent for more than 2 weeks or at first sign of mold growth.
5. Site drainage: Verify final grades of site work and landscaping drain surface water and ground water away from building.
6. Weatherproofing: Inspect moisture control materials as they are being installed. Include:

    a. Air barrier: Verify air barrier is installed without punctures and/or other damage. Verify air barrier is sealed completely.
    b. Flashing: Verify correct shingling of flashing for roof, walls, windows, doors, and other penetrations.
    c. Vapor Barrier: Verify vapor barrier is installed in accordance with Contract documents.
    d. Insulation layer: Verify insulation is installed without voids.
    e. Roofing: In accordance with ASTM D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair.

7. Plumbing: Verify satisfactory pressure test of pipes and drains is performed before closing in and insulating lines.
8. HVAC: Inspect HVAC system as specified in Section on Commissioning. **And, inspect HVAC to verify:**

    a. condensate pans are sloped and plumbed correctly;
    b. access panels are installed to allow for inspection and cleaning of coils and ductwork downstream of coils;
    c. ductwork and return plenums are air sealed;
    d. duct insulation is installed and sealed; and
    e. chilled water line and refrigerant line insulation are installed and sealed.]

C. Schedule:

1. Schedule work such that absorptive materials, such as porous insulations, paper-faced gypsum board, ceiling tile, and finish flooring, are not installed until they can be protected from rain and construction-related water.
2. Weather-proof as quickly as possible. Schedule installation of moisture-control materials, including but not limited to air barriers, flashing, exterior sealants and roofing, at earliest possible time.

D. Testing for Moisture Content: Test moisture content of porous materials and absorptive materials to ensure they are dry before sealing them into an assembly. Document and report results of testing. Where tests are not satisfactory, dry materials and retest. If satisfactory results cannot be obtained with retest, remove and replace with new materials.

1. Wood: Moisture test as per ASTM D4444 - Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters; unless otherwise indicated acceptable upper limits for wood products are less than 20% at center of piece; less than 15% at surface.

E. Testing for Moisture Penetration:

1. Windows: Test as per ASTM E1105 Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference; unless otherwise indicated, acceptable upper limits are **no leakage for 15 minutes.**
2. Horizontal Waterproofing (not roofing): Test as per ASTM D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations; acceptable upper limits are **no leakage for 15 minutes.**
3. Masonry: Test as per ASTM C1601 Standard Test Method for Field Determination of Water Penetration of Masonry Wall Surfaces; acceptable upper limits are **no leakage for 15 minutes**.
4. Exterior Walls:

    a. Air tightness of the enclosure test: ASTM E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization or ASTM E1827 Standard Test Methods for Determining Air tightness of Buildings Using an Orifice Blower Door; acceptable upper limits are **0.25 CFM/sf or less at 50 Pascal's**.
    b. Water Leakage: Review as per ASTM E2128 Standard Guide for Evaluating Water Leakage of Building Walls.

END OF SECTION 01 57 19.11

SECTION 01 57 19.12 – NOISE AND ACCOUSTICS MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Special requirements for noise and acoustics management during **deconstruction, renovation and construction** operations.

1.2 DEFINITIONS

A. Ambient noise level: The total noise associated with a given environment, being usually a composite of normal or existing sounds from all sources near and far, excluding the noise source at issue.

B. Daytime: The hours from 7 A.M. to 9 P.M. on weekdays and 9 A.M. to 9 P.M. on weekends and holidays.

C. Nighttime: All non-daytime hours.

D. Property line: The real or imaginary line along the ground surface and its vertical extension, which separates real property owned or controlled by one person from contiguous real property owned or controlled by another person or from any public right-of-way or from any public space.

E. Receiving noise area: Any real property where people live or work and where noise is heard, excluding the project or source area.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 NOISE MANGEMENT

A. Noise Control: Perform **deconstruction, renovation and construction** operations to minimize noise. Perform noise-producing work in less sensitive hours of the day or week as directed by the Contracting Officer CO).

B. Repetitive and/or intermittent, high-level noise: Permitted only during Daytime.

1. Do not exceed the following dB(A) limitations at 50 feet:

Sound Level in dB(A)	Time Duration of Impact Noise
70	More than 12 minutes in any hour
80	More than 3 minutes in any hour

2. Maximum permissible construction equipment noise levels at 50 feet:

EARTHMOVING	dB(A)	MATERIALS HANDLING	dB(A)
Front Loaders	75	Concrete Mixers	75
Backhoes	75	Concrete Pumps	75
Dozers	75	Cranes	75
Tractors	75	Derricks Impact	75
Scrapers	80	Pile Drivers	95
Graders	75	Jack Hammers	75
Trucks	75	Rock Drills	80
Pavers, Stationary	80	Pneumatic Tools	80
Pumps	75	Saws	75
Generators	75	Vibrators	75
Compressors	75		

C. Ambient Noise:

1. Maximum noise levels (dB (decibel)) for receiving noise area at property line shall be as follows:

a. Residential receiving area
Daytime: 65 dB
Nighttime: 45 dB

b. Commercial/Industrial receiving area
Daytime: 67 dB
Nighttime: 65 dB

c. In the event the existing local ambient noise level exceeds the maximum allowable receiving noise level (dB), the receiving noise level maximum for construction operations shall be adjusted as follows:

d. Residential receiving area: Maximum 3 additional dB above the local ambient as measured at property line.

e. Commercial/Industrial receiving area: Maximum 5 additional dB above the local ambient as measured at the property line.

3.2 FIELD QUALITY CONTROL

A. Assess potential effects of construction noise on **adjacent neighbors and facility occupants** in accordance with ASTM E1686 and as follows:

1. Ambient noise measurement: Measure at property line at a height of at least four (4) feet above the immediate surrounding surface. Average the ambient noise level over a period of at least 15 minutes.
2. Ambient noise measurement at urban sites: Conduct during morning peak traffic hour between 7 A.M. and 9 A.M. and afternoon peak traffic hour between 4 P.M. and 6 P.M. In addition, conduct a 24-hour measurement at the proposed project site to document the noise pattern throughout the day. Adjust and weight for seasonal and climatic variations.

B. Monitor noise produced from construction operations in accordance with ASTM E1780.

END OF SECTION 01 57 19.12

SECTION 01 57 23 - UNDER-AN-ACRE POLLUTION PREVENTION

PART 1 - GENERAL

1.1 SUMMARY

A. National Park Service (NPS) Standards and Guidelines require water quality be protected to ensure compliance with Organic Act. Contractor shall prepare an Under-An-Acre Pollution Prevention Plan (UPPP) for each project resulting in less than 1 acre of soil disturbance or not otherwise subject to requirements of NPDES program. (UPPP Guideline)

B. The work of this section consists of implementing measures to prevent discharges of pollutants, including temporary storm water pollution during construction activities, either through compliance with NPDES permit program, or in conformance with NPS guidance for UPPPs.

C. Work of this section consists of implementing measures to Temporary Storm Water Pollution during construction activities, either through compliance with NPDES permit program; or in conformance with NPS guidance for UPPPs.

1.2 DEFINITIONS

A. Definitions pertaining to sustainable development: As defined in ASTM E2114.

B. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade utility of the environment for aesthetic, cultural, or historical purposes.

C. National Pollution Discharge Elimination System (NPDES) Phase I: Regulates discharges from construction sites that disturb 5 acres or more.

D. NPDES Phase II: Regulations expand existing General Permit requirements under Phase I to include and regulate discharges from construction sites that disturb land equal to or greater than one (1) acre and less than 5 acres, known as Small Construction Activity.

E. Storm Water Pollution Prevention Plan (SWPPP): Developed and implemented stormwater management measures to protect surface water from pollutants during construction activities disturbing an acre or more in compliance with federal, state, and local requirements for permit approval under NPDES program.

F. UPPP: Developed and implemented pollution prevention plan (including stormwater management measures, if needed) to protect environment from pollutants on construction projects with less than one acre of disturbance in conformance with NPS guidelines.

1.3 SUBMITTALS

A. After contract award and before pre-construction conference, prepare and submit:

1. A UPPP in conformance with NPS guidelines and adherence to applicable construction storm water management practices.

B. Inspection Schedule: Submit schedule for inspection and monitoring of all pollution prevention measures.

C. Erosion Control Products: Submit manufacturer's product information and installation recommendations for silt fence, filter fabric, erosion control blanket, straw bales, and other materials proposed for use on this project.

1.4 QUALITY ASSURANCE

A. Contractor shall prepare and submit a plan to Contracting Officer (CO) for review and concurrence.

B. Orientation Meeting: Contractor shall arrange and conduct an Erosion and Sediment Control meeting/briefing to inform parties, scheduled to be on-site during project, of measures to be implemented for proper erosion and sediment control (may be included as part of Pre-Construction Meeting).

1. Installation of silt fences, storm drain protection, and other forms of erosion and sediment control shall not begin until after this meeting has occurred.

C. Orientation Meeting: Contractor shall be responsible for arranging and conducting Pollution Prevention meeting/briefing to inform parties scheduled to be on-site during project of measures to be implemented for proper pollution prevention and control (may be included as part of Pre-Construction Meeting).

1. Installation of silt fences, storm drain protection, and other forms of pollution prevention controls shall not begin until after this meeting has occurred.

D. Pollution Prevention Manager: Contractor shall designate Pollution Prevention Manager who will be responsible for implementation, inspection, maintenance, and amendments to approved plan.

1. Pollution Prevention Manager shall be familiar with UPPP procedures and Best Management Practices (BMPs) and shall ensure emergency procedures and plan are updated as needed and available for inspection.

2. When changes in approved plan are required, Pollution Prevention Manager shall prepare and certify an amendment and submit to Contracting Officer for review and concurrence.

PART 2 - PRODUCTS

2.1 UNDER-AN-ACRE POLLUTION PREVENTION PLAN

2.2 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

A. Provide UPPP which conforms to NPS requirements (utilize UPPP template) and include:

1. Responsible Parties
2. General Information: Project Scope, Project Details, Site Information, and Spill Prevention
3. Standards and Constraints
4. Project Scheduling
5. Known Data on Soil and Fill
6. Activities with Potential to Generate Sediment
7. Activities and Materials with Potential to Pollute Storm Water
8. Management and Reporting BMPs
9. Waste Management BMPs
10. Non-Storm Water Pollution Control BMPs
11. Soil Stabilization BMPs
12. Sediment Control BMPs
13. Other Pollution Control BMPs
14. References
15. Preparer's Certification
16. Appendices: Contact Information, Pollution Prevention Control Map or Sheet(s), Standard Installation Specifications for each BMP, and Blank forms.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL PROTECTION

A. Protection of Natural Resources: Comply with applicable regulations and these specifications. Preserve natural resources within project boundaries and outside limits of work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by Contracting Officer.

B. Construction Zone: Arrange construction activities to minimize pollution (i.e., erosion, trash, etc.) to maximum practical extent.

1. Clearing, excavation, and grading shall be limited to those areas of project site necessary for construction. Minimize area exposed and unprotected.
2. Clearly mark and delineate limits of work activities.
3. Equipment shall not be allowed to operate outside limits of work or to disturb existing vegetation.
4. Excavation and grading shall be completed during dry season to maximum extent possible.
5. Material shall be stored away from locations where water is present to greatest extent practicable.

3.2 UNDER-AN_ACRE POLLUTION PREVENTION PLAN

A. Review and Acceptance: Contractor and Contracting Officer will jointly review draft Plan and agree to needed revisions. Contractor shall incorporate revisions, sign, and submit final Plan to Contracting Officer. Final Plan will be the document enforced on the project.

1. Accepted Plan will describe and ensure implementation of practices to be used to reduce pollutants in storm water discharges.

2. Contractor shall maintain current copy of Plan and associated records and forms at jobsite throughout duration of project.
3. Plan shall be available for public inspection and inspection and use of Contracting Officer.
4. Approval of Contractor's Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.

B. Implementation: Implement Plan as required throughout construction period and maintain erosion control elements in proper working order.

1. Do not perform clearing and grubbing or earthwork until Plan has been implemented.

3.3 SITE INSPECTIONS AND PLAN REVISIONS

A. Inspections: Contractor and Contracting Officer will perform a weekly inspection onsite.

1. Inspection shall include disturbed areas not completely stabilized, areas used for storage of materials, locations where vehicles enter or exit site, and other erosion and sediment controls included in the Plan.
2. Inspections shall be documented.
3. Inspection forms shall be retained onsite in Plan notebook throughout construction period.

B. Plan Revisions: It may be necessary to revise Plan during construction to make necessary improvements, revisions, or to respond to unforeseen conditions noted during construction or site inspections.

1. Plan shall specify mechanism whereby revisions may be proposed by Contractor or Contracting Officer.
2. Contractor and Contracting Officer will jointly review each revision to Plan before changes incorporated and implemented. Contractor will then provide revised copy of Plan to Contracting Officer.
3. Accepted modifications will be implemented within 7 calendar days following date of inspection when deficiencies or necessary corrections are first noted.

C. Negligence: Provide additional temporary erosion and pollution controls made necessary by Contractor's errors or negligence at no additional cost to Government.

3.4 EROSION CONTROL MEASURES

A. Erosion control measures shall consist of Best Management Practices for storm water discharges, including silt fencing, barrier protectors, straw bales, temporary soil retention blankets, excelsior drainage filters, sediment traps and berms.

B. Berms and excelsior drainage filters shall be used to form sediment traps and control run-on and run-off into other areas, including creeks, streams, marshes, access roads, well areas, and staging areas.

C. Erosion control measures shall be used to contain only direct precipitation in construction zone. Contained water shall be allowed to percolate into ground or drain slowly through drainage filter sediment traps.

D. Earthen sediment traps or holding ponds shall not be used unless accepted by Contracting Officer.

E. Reduce runoff velocity and direct surface runoff around and away from fuel containment, storage, and borrow areas.

F. Divert surface runoff around and away from cut and fill slopes.

G. Place drainage filters around catch basins to create sediment traps to control run-off from construction area.

H. Excess water used for dust control shall be contained within demolition areas by erosion control measures.

I. Contractor shall prevent deposition of materials onto paved areas. Contractor shall inspect paved areas for deposited materials weekly and remove materials immediately.

J. Furnish, install, maintain, and operate necessary control measures and other equipment necessary to prevent erosion as described in approved UPPP.

K. Before work begins, sufficient equipment shall be available on site to assure operation and adequacy of erosion control system can be maintained.

3.5 MAINTENANCE OF TEMPORARY FACILITIES

A. Ensure erosion and sediment control structures remain effective throughout excavation and grading operations. Relocate structures as necessary.

B. Inspect control structures after each significant rainfall. Promptly repair breaches which occur.

C. Contractor shall remove entrapped sediment from behind excelsior drainage filter after each storm.

3.6 REPORTING

A. If a discharge occurs or if project receives written notice or order from regulatory agency, Contractor shall immediately notify Contracting Officer and shall file written report to Agency(ies) with Jurisdiction within 7 days of discharge event, notice, or order. Corrective measures shall be implemented immediately following discharge, notice, or order. The report to the Agency(ies) with Jurisdiction shall contain:

1. Date, time, location, nature of operation, and type of discharge, including cause or nature of notice or order.
2. Best Management Practices deployed before discharge event, or prior to receiving notice or order.
3. Date of deployment and type of Best Management Practices deployed after discharge event, or after receiving notice or order, including additional Best Management Practices installed or planned to reduce or prevent re-occurrence.
4. An implementation and maintenance schedule for affected Best Management Practices.

3.7 SEDIMENT DISPOSAL

A. Sediment excavated from temporary sediment control structures shall be disposed on site with general fill, or with topsoil. Sediment shall be allowed to dry out as required before reuse.

B. Contractor shall place sediment removed from traps and other structures where it will not enter a storm drain or watercourse and where it will not immediately reenter the basin.

3.8 REMOVAL OF TEMPORARY POLLUTION CONTROL MEASURES

3.9 REMOVAL OF TEMPORARY STORM WATER POLLUTION CONTROL MEASURES

A. Temporary control measures shall be removed with permission of Contracting Officer within 20 working days after final acceptance of project, and/or once grading is complete and slopes have stabilized.

END OF SECTION 01 57 23

SECTION 01 67 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and environmental requirements.

1.2 DEFINITIONS

A. Products: Items purchased for incorporating into Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, current as of date of Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product demonstrated and approved through submittal process, or where indicated as a product substitution, to have indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Definitions pertaining to sustainable development: As defined in ASTM E2114.

C. Biobased Materials: As defined in Farm Security and Rural Investment Act, for purposes of Federal procurement of biobased products, "biobased" means a "commercial or industrial product (other than food or feed) composed, in whole or in significant part, of biological products or renewable domestic agricultural materials (including plant, animal, and marine materials) or forestry materials." Biobased materials also include fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by The Biomass Research and Development Act of 2000.

1. Biobased content: Amount of biobased carbon in material or product as a percentage of weight (mass) of total organic carbon in material or product.

D. Chain-of-Custody: Process whereby a product or material is maintained under physical possession or control during its entire life cycle.

E. Environmentally preferable products: Products and services with lesser or reduced effect on the environment in comparison to conventional products and services. Refer to Environmental Protection Agency’s (EPA) Final Guidance on Environmentally Preferable Purchasing for more information.

F. Stewardship: Responsible use and management of resources in support of sustainability.

G. Sustainability: Maintenance of ecosystem components and functions for future generations.

1. Recycled Content Materials: Products containing pre-consumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with International Organization for Standardization (ISO) 140001 Standard for the Use of Environmental Marketing Claims.
2. Rapidly Renewable Material: Material made from plants typically harvested within a ten-year cycle.
3. Regional Materials: Materials manufactured and extracted, harvested, or recovered within a radius of 500 miles from Project location.

1.3 SUBMITTALS

A. Record Submittals as specified in – Sustainable Design Close-Out Documentation, submit:

1. Affirmative Procurement Reporting Form. Submit on form in Appendix A of this Section, or similar form as approved by Contracting Officer (CO).
2. Submit environmental data in accordance with Table 1 of ASTM E2129 for these products:

a. Masonry
b. Finish Carpentry
c. Plastic Fabrications
d. Building Insulation
e. Roofing
f. Joint Sealers
g. Wood & Plastic Doors
h. Windows
i. Skylights
j. Glazed Curtain Wall
k. Gypsum Board
l. Tile
m. Acoustical Ceilings
n. Resilient Flooring
o. Carpet
p. Wall Coverings
q. Paints & Coatings
r. Toilet Compartments
s. Loading Dock Equipment
t. Office Equipment
u. Furnishings & Accessories
v. Renewable Energy Equipment
w. Elevators
x. Plumbing fixtures and equipment.
y. HVAC equipment
z. Lighting equipment

.Material Safety Data Sheets (MSDS): For each product required by OSHA to have a MSDS, submit an MSDS. MSDS shall be prepared **within the previous five years**. Include information for MSDS Sections 1 to 16 in accordance with ANSI Z400.1 and as follows:

a. Section 1: Chemical Product and Company Identification
b. Section 2: Composition/Information on Ingredients
c. Section 3: Hazards Identification
d. Section 4: First Aid Measures
e. Section 5: Fire Fighting Measures
f. Section 6: Accidental Release Measures
g. Section 7: Handling and Storage
h. Section 8: Exposure Controls/Person Protection
i. Section 9: Physical and Chemical Properties
j. Section 10: Stability and Reactivity Data
k. Section 11: Toxicological Information. Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects.
l. Section 12: Ecological Information. Include data regarding environmental impacts during raw materials acquisition, manufacture, and use. Include data regarding environmental impacts in event of accidental release.
m. Section 13: Disposal Considerations. Include data regarding proper disposal of the chemical. Include information regarding recycling and reuse. Indicate whether or not product is considered to be "hazardous waste" according to United States EPA Hazardous Waste Regulations 40 CFR 261 (Code of Federal Regulations).
n. Section 14: Transportation Information. Identify hazard class for shipping.
o. Section 15: Regulatory Information. Identify federal, state, and local regulations applicable to the material.
p. Section 16: Other Information. Include additional information relative to recycled content, biobased content, and other information regarding environmental and health impacts. **Identify the date MSDS was prepared.**

4. Chain of Custody: Submit chain-of-custody documentation for sustainable forestry for these products:

a. Rough Carpentry
b. Finish Carpentry
c. Wood Doors
d. Windows
e. Wood Flooring
f. Furnishings & Accessories

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in undamaged condition; in manufacturer's original sealed container or other packaging system; complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to ensure compliance with Contract Documents. Ensure products are undamaged and properly protected.
5. Obtain materials in biodegradable or recyclable/reusable packaging which uses minimum amount of packaging possible.

C. Storage:

1. Allow for inspection and measurement of quantity or counting of units.
2. Store materials in manner to not endanger Project structure.
3. Store products subject to damage by the elements, under cover in weather tight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store cementitious products and materials on elevated platforms.
5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
7. Protect stored products from damage and liquids from freezing.
8. Store loose granular materials in well-drained area on solid surfaces to prevent mixing with foreign matter.

1.6 PACKAGING

A. Where Contractor has option to provide one of listed products or equal, preference shall be given to products with minimal packaging and easily recyclable packaging as defined in ASTM D5834.

B. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.

C. Provide minimum **45** percent post-consumer recycled content and minimum 100 percent recovered fiber content of industrial paperboard in accordance with EPA’s Comprehensive Procurement Guidelines and ASTM D5663.

D. Provide minimum **10** percent post-consumer recycled content and minimum **10** percent recovered fiber content of carrier board in accordance with EPA’s Comprehensive Procurement Guidelines and ASTM D5663.

E. Provide minimum **5** percent post-consumer recycled content and minimum **5** percent recovered fiber content of brown papers (e.g., wrapping papers and bags) in accordance with EPA’s Comprehensive Procurement Guidelines and ASTM D5663.

1.7 ENVIRONMENTALLY PREFERABLE PRODUCTS

A. Provide environmentally preferable products to greatest extent possible.

1. To greatest extent possible, provide products and materials with a lesser or reduced effect on the environment considering raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and/or disposal of the product.
2. Eliminate use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either Montreal Protocol and Title VI or Clean Air Act Amendments of 1990, or equivalent overall air quality benefits that take into account life cycle impacts.
3. Use products meeting or exceeding EPA's recycled content recommendations for EPA-designated products. Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the pre-consumer content constitutes at least 10% (based on cost) of total value of the materials in project.

1.8 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of Contract Documents.

1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for product specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by or incorporated into Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

B. Special Warranties: Prepare written document containing appropriate terms and identification, ready for execution. Submit draft for approval before final execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with Specifications, prepare written document using appropriate form properly executed.
3. Refer to Divisions 2 through 49 Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products to comply with Contract Documents, undamaged and, unless otherwise indicated, new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types produced and used successfully in similar situations on other projects.
3. Government reserves right to limit selection to products with warranties not in conflict with requirements of Contract Documents.
4. Where products are accompanied by term "as selected," Contracting Officer will make selection.
5. Where products are accompanied by term "match sample," sample to be matched is Governments.
6. Descriptive, performance, and reference standard requirements in Specifications establish "salient characteristics" of products.

B. Product Selection Procedures:

1. Product: Where Specifications name single product and manufacturer, provide named product that complies with requirements or approved equal.
2. Manufacturer/Source: Where Specifications name single manufacturer or source, provide product by named manufacturer or source that complies with requirements or approved equal.
3. Products: Where Specifications include list of names of both products and manufacturers, provide one of the products listed that complies with requirements or approved equal.
4. Manufacturers: Where Specifications include list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements or approved equal.
5. Available Products: Where Specifications include list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide specified product, system, or approved equal.
8. Basis-of-Design Product: Where Specifications name product and include a list of manufacturers, provide specified product or a comparable product by one of the other named manufacturers, or approved equal. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics based on the product named.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select product that complies with requirements and matches Architect's sample. Contracting Officers decision will be final on whether a proposed product matches.

    a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

    a. Standard Range: Where Specifications include phrase "standard range of colors, patterns, textures" or similar phrase, Contracting Officer will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    b. Full Range: Where Specifications include phrase "full range of colors, patterns, textures" or similar phrase, Contracting Officer will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions: Contracting Officer will consider Contractor's request for comparable product when the following conditions are satisfied. If following conditions are not satisfied, Contracting Officer will return requests without action, except to record noncompliance with these requirements:

1. Evidence proposed product does not require revisions to Contract Documents, that it is consistent with Contract Documents and will produce indicated results and is compatible with other portions of Work.
2. Detailed comparison of significant qualities of proposed product with those named in Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION

3.1 PROTECTION AFTER INSTALLATION

A. Provide adequate coverings as necessary to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction. Remove when no longer needed.

END OF SECTION 01 67 00

AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

Project Name: _____ Project Number: _____

Contractor Name: _____ License Number: _____

Contractor Address: _____

Product	Total $ value provided	Total $ value with recycled content Pre-consumer	Total $ value with recycled content Post-consumer	Total $ value with biobased content	Exempted indicate 1,2,3,4	Comments
Hydraulic Mulch (paper based)						
Hydraulic Mulch (wood based)						
Compost						
Parking Stops (Concrete w/ fly ash, slag cement or low cement content)						
Parking Stops (Plastic/Rubber)						
Patio Blocks/Rubber						
Patio Blocks/Plastic						
Playground Surfaces						
Concrete with fly ash						
Concrete with slag cement						
Concrete with low cement content						
Plastic lumber						
Building Insulation						
Rock Wool						
Fiber glass						
Cellulose						
Perlite Comp Board						
Plastic Rigid Foam						
Glass Fiber Reinforced Foam						
Phenolic Rigid Foam						
Ceramic tile						
Resilient flooring						
Floor Tiles/Rubber						
Floor Tiles/Plastic						
Running Tracks						
Carpet (PET)						
Paint						

Reprocessed Latex Paint White & Light Colors						
Reprocessed Latex Dark Colors						
Consolidated Latex Paint						
Toilet/Shower partitions (plastic or steel)						
Other						

CERTIFICATION

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.)

Signature: _____ Date: _____

END OF
AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes procedural requirements for cutting and patching on buildings that do not contain Historic Fabric.

1.2 SUBMITTALS

A. Cutting and Patching Plan: Submit Plan describing procedures at least **10** days before cutting and patching will be performed, requesting approval to proceed. Include:

1. Extent: Describe cutting and patching, show how performed, and indicate why they cannot be avoided.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
3. Products: List products to be used and firms or entities that will perform Work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure. Do not cut and patch structural elements in a manner that could change their load carrying capacity or increase deflection.
7. Contracting Officer’s (CO) Approval: Obtain approval of cutting and patching plan before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

1.3 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.

C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on exterior or in occupied spaces in a manner that would, in Contracting Officer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

1.4 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that will match the visual and functional performance of in-place materials when installed.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed.

1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

D. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to **prevent** interruption to occupied areas.

3.3 PERFORMANCE

A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time. Complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction subsequently. Patch as required to restore surfaces to original condition.

B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer and original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from exposed or finished side into concealed surfaces.
3. **Concrete** and/or **Masonry**: Cut using an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations cutting are complete.

C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another. Patch and repair floor and wall surfaces in new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary~~,~~ to achieve uniform color and appearance.
4. Ceilings: Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weather tight condition.

D. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

SECTION 01 73 40 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general procedural requirements governing execution of Work including:

1. Coordination with utility service providers
2. Construction layout
3. Field engineering and surveying
4. General installation of products
5. Progress cleaning
6. Starting and adjusting
7. Protection of installed construction
8. Correction of the Work

1.2 SUBMITTALS

A. Certificates: Submit certificate signed by **professional engineer** certifying location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit **two** copies signed by **professional engineer**.

D. Quantity Surveys: Submit **2** copies showing quantities of work performed and actual construction completed in place.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: Professional engineer legally qualified to practice in jurisdiction where Project is located and–is experienced in providing land-surveying services of kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: Existence and location of site improvements and other construction indicated as existing are not guaranteed.

1. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.

2. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: Existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify existence and location of underground utilities and other construction affecting Work.

1. Before construction, verify location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 COORDINATION WITH UTILITY SERVICE PROVIDERS

A. Coordination with Utility Service Providers: Contact following Utility Service providers, sufficiently in advance to avoid delaying the work, to coordinate Contractor's portion of Work, testing requirements, inspections, **etc.**

1. Electrical: Service Contact: Contact Electrical Utility as provided by Park Contracting Officer to coordinate Electrical service requirements.

2. Water Service Contact: Contact Contact Water Utility as provided by Park Contracting Officer to coordinate Water service requirements.

3. Telephone Service Contact: Contact Contact Telephone Utility as provided by Park Contracting Officer to coordinate Telephone service requirements.

3.3 PREPARATION

A. Field Measurements: Take field measurements as required to fit Work properly. Recheck measurements before installing each product. Where portions of Work are indicated fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of need for clarification of the Contract Documents caused by differing field conditions outside control of Contractor, submit request for information to Contracting Officer in accordance with Section 01 31 00 "Project Management and Coordination."

3.4 CONSTRUCTION LAYOUT

A. Verification: Verify layout information shown on Drawings, in relation to the existing benchmarks before proceeding to lay out Work. Notify Contracting Officer promptly if discrepancies are discovered.

B. General: Engage a **professional engineer** to lay out Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines **and levels at each story** of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check location, level and plumb, of every major element as Work progresses.
5. Notify Contracting Officer when deviations from required lines and levels exceed allowable tolerances.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make log available for review by National Park Service (NPS).

3.5 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning Work. Preserve and protect permanent benchmarks and control points during construction operations. Controls destroyed by Contractor will be replaced by Contractor at their expense.

1. Existing Monuments: All benchmarks, land corners, and triangulation points, established by other surveys, existing within construction area shall be preserved. If existing monuments interfere with Work, secure written permission before removing them.

B. Benchmarks: Establish and maintain a minimum of **two** permanent benchmarks on Project site, referenced to data established by survey control points. Comply with NPS requirements for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.6 INSTALLATION

A. General: Locate Work and components of Work accurately in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions for best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Contracting Officer.
2. Allow for building movement, thermal expansion, and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors to be embedded in concrete or masonry. Deliver to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials not considered hazardous.

J. Quantity surveys: Shall be conducted, and data derived from these surveys shall be used in computing quantities of work performed and actual construction completed and in place.

1. Contractor shall conduct original and final surveys and surveys for any periods for which progress payments are requested. These surveys shall be conducted under direction of a representative of the Contracting Officer, unless Contracting Officer waives requirement in a specific instance. Government shall make such computations as are necessary to determine quantities of work performed or finally in place. Contractor shall make computations based on surveys for any periods for which progress payments are requested.
2. Promptly upon completing a survey, Contractor shall furnish originals of field notes and other records relating to survey or layout of Work to Contracting Officer. Contractor shall retain copies of all such material furnished to Contracting Officer.

3.7 PROGRESS CLEANING

A. General: Clean Project site, work areas, and common areas daily. Coordinate progress cleaning for joint-use areas where more than one Installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in National Fire Protection Association (NFPA) 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 degrees Fahrenheit (27 degrees Celsius).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to level of cleanliness necessary for proper execution of Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of Work, broom-clean or vacuum entire work area, as appropriate.
3. Contractor shall provide progress cleaning that minimizes sources of food, water, and harborage available to pests.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials not hazardous to health or property and will not damage exposed surfaces.

1. Utilize non-toxic cleaning materials and methods.

a. Comply with Green Seal Standard (GS) 37 for general purpose cleaning and bathroom cleaning.
b. Use natural cleaning materials where feasible. Natural cleaning materials include:

1) Abrasive cleaners: substitute 1/2 lemon dipped in borax.
2) Ammonia: substitute vinegar, salt and water mixture, or baking soda and water.
3) Disinfectants: substitute 1/2 cup borax in gallon water.
4) Drain cleaners: substitute 1/4 cup baking soda and 1/4 cup vinegar in boiling water.
5) Upholstery cleaners: substitute dry cornstarch.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. Clean and protect construction in progress and adjoining materials already in place during handling and installation. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations so that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or deleterious exposure during construction period.

K. Final Cleaning: At completion of Work, remove remaining waste materials, rubbish, tools, equipment, machinery and surplus materials. Clean exposed surfaces and leave Project clean and ready for occupancy.

1. Provide final cleaning in accordance with ASTM E1971.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Section 01 40 00 "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Section 01 73 29 "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to specified condition.

C. Remove and replace damaged surfaces exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 40

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for:

1. Salvaging nonhazardous **demolition and construction** waste.
2. Recycling nonhazardous **demolition and construction** waste.
3. Disposing of nonhazardous **demolition and construction** waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Solid Waste: Garbage, debris, sludge, or other discharged material (except hazardous waste) including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations.

D. Debris: Non-hazardous solid waste generated during construction, demolition, or renovation of a structure which exceeds 2.5 inch (60 millimeter) particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if mixture is comprised primarily of debris by volume, based on visual inspection.

E. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

F. Environmental Pollution and Damage: Presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade utility of environment for aesthetic, cultural, or historical purposes.

G. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

H. Hazardous Materials: Material regulated as a hazardous material in accordance with 49 CFR 173 (Code of Federal Regulations), requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or

disposal meets or has components which meet or have potential to meet the definition of Hazardous Waste in accordance with 40 CFR 261.

I. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

J. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

1.3 PERFORMANCE REQUIREMENTS

A. General: Project shall minimize creation of construction, deconstruction, and demolition waste to protect and restore natural habitat and resources. Minimize factors contributing to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination. A Waste Management Plan shall be developed to ensure that existing site and building materials are reused, salvaged, or recycled. Minimize waste disposal in landfills.

B. Salvage /Recycle Requirements: Develop waste management plan resulting in end-of-Project rates for salvage/recycling of **50** percent by weight of total waste generated by the Work. The following waste categories, at a minimum, shall be diverted from a landfill:

1. Land clearing debris (chipped debris can be used on site for mulch or erosion control)
2. Clean dimensional wood, palettes
3. Plywood, OSB (oriented strand board), and particle board
4. Concrete (can be ground and used for fill on site)
5. Asphaltic concrete (can be ground and used for fill on site)
6. Cardboard, paper, packaging, newsprint
7. Metals (from banding, stud trim, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze)
8. Gypsum drywall - unpainted
9. Non-hazardous paint and paint cans
10. Beverage containers: Aluminum, glass, and plastic containers
11. Insulation
12. Ceiling grid and tiles
13. Ductwork
14. Wiring
15. Other mixed construction and demolition waste as appropriate.

C. If waste materials encountered during deconstruction/demolition or construction phase are found to contain lead, asbestos, polychlorinated biphenyls (PCBs), (such as fluorescent lamp ballasts), or other harmful substances, they are to be handled and removed in accordance with local, state, and federal laws and requirements concerning hazardous waste.

D. Existing items and material to be removed during deconstruction/demolition phase shall be reused in construction phase of the Project. Items that cannot be reused shall be recycled. Items considered for reuse must be in refurbishable condition and must meet quality standards set forth in these specifications. Contractor shall ensure quality of the item(s) in question will meet or exceed accepted industry or trade standards for first quality commercial grade application. During construction, deconstruction, or demolition Contracting Officer (CO) may designate other objects or materials for reuse.

E. Salvage/Recycle Requirements: Government goal is to salvage and recycle as much nonhazardous **demolition and construction** waste as possible including the following materials:

F. Salvage/Recycle Requirements: Government goal is to salvage and recycle as much nonhazardous **demolition and construction** waste as possible. Government has established minimum goals for the following materials:

1.4 SUBMITTALS

A. Waste Management Plan: After award of contract and prior to scheduled Pre-Construction Conference, Contractor shall submit a draft Waste Management Plan to Contracting Officer for approval. Submit [**3**] copies of plan. Revise and resubmit Plan as required by Contracting Officer. Approval of Contractor's Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.

B. Progress Documentation: Supplemental to Waste Management Plan, document solid waste disposal, diversion, and cost/revenue analysis and submit completed worksheet on a monthly basis. See Project Waste Management Plan Worksheet Sample, attached to the end of the Division 1 Specifications, and report totals to date for column headings.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit [**three**] copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. LEED™ Submittal: LEED™ letter template for Credit MR 2.1 [**and 2.2**] (Materials and Resources), signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

I. Qualification Data: For [Waste Management Coordinator] [and] [refrigerant recovery technician].

J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating refrigerant that was present was recovered and recovery was performed according to Environmental Protection Agency (EPA) regulations. Include name and address of technician and date refrigerant was recovered.

K. Progress payment requirements:

1. With each Application for payment, submit an updated Project Waste Management Plan worksheet for solid waste disposal and diversion.
2. With each Application for Payment, submit manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material.

L. Closeout Submittals

1. With Closeout Submittals, submit a summary of a Project Waste Management Plan worksheet for solid waste disposal and diversion.

1.5 QUALITY ASSURANCE

A. Waste Management Coordinator Qualifications: Experienced firm, with record of successful waste management coordination of projects with similar requirements, that employs a LEED™-Accredited Professional, certified by USGBC, as waste management coordinator. [**Waste management coordinator may also serve as LEED™ coordinator**].

B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.

C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Waste Management Meeting: Conduct separate meeting or cover in Pre-Construction Conference and comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including:

1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

PART 2 - PRODUCTS

2.1 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction work plan. [**Include separate sections in plan for demolition and construction waste.**] Indicate quantities by weight or volume but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of [**demolition**], [**site-clearing**] [**and**] [**construction**] waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials salvaged and reused in Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials sold to individuals and organizations, include list of names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials donated to individuals and organizations, include list of names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include:

1. Landfill tip fees per ton.
2. If diverted, tip fee savings from landfill diversion.
3. Costs of recycling, salvage, or reuse.
4. Revenue from recycling, salvage, or reuse.
5. Total cost or savings from diversion. (Calculate by using tip fee savings and subtracting costs of recycling or adding revenue from recycling.)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Contracting Officer. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during entire duration of Contract.

B. Waste Management Coordinator: Engage waste management coordinator responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Contractor shall establish contacts with local recycling and reuse companies to set up lines of responsibility. Contractor shall be responsible for coordination in terms of identifying materials, pickup schedules, and standard quality for recycled materials.

D. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within [**three**] days of submittal return.
2. Distribute waste management plan to entities when they begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

E. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

F. Separation facilities:

1. Contractor shall designate and Contracting Officer shall approve specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return.
2. Place waste and recycling bins near each other, and close to point of waste generation but out of traffic pattern.
3. Keep recycling and waste bin areas neat, clean, and clearly marked in order to avoid co-mingling of materials.
4. Protect bins during non-working hours from off-site contamination.
5. Check garbage dumpsters periodically for recyclables being thrown away and undocumented materials that could be recycled.

G. Materials handling procedures: Material to be recycled shall be protected from contamination and shall be handled, stored, and transported in a manner that meets requirements set by designated facilities for acceptance. Establish defined area for operations of each trade, especially woodcutting so off-cuts are kept in one area and can be sorted by dimension for future reuse.

3.2 SALVAGING DEMOLITION WASTE

A. Salvaged Items for Reuse in the Work:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

B. Salvaged Items for Sale and Donation: Not permitted on Project site.

C. Salvaged Items for Governments Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Allow for inspection if necessary.
4. Store items in secure area until delivery to Government.
5. Transport items to storage area designated by Government.
6. Protect items from damage during transport and storage.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Receivers and Processors: List below is provided for information only; available recycling receivers and processors include:

1. Contractor to coordinate with Contracting Officer for acceptable recycling receivers and processors.

C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall **accrue to Government.**

D. other waste materials, trash, and debris. Separate recyclable waste by type at Project site to maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off ground and protect from weather.
5. Remove recyclable waste off Government property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Grind asphalt to maximum **4-inch (100 millimeter)** size.

B. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

1. Crush asphaltic concrete paving and screen to comply with requirements in Division 31 Section "Earth Moving".

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum **4-inch (100 millimeter)** size.

D. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.

1. Pulverize masonry to maximum **4-inch (100 millimeter)** size.
2. Clean and stack undamaged, whole masonry units on wood pallets.

E. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

F. Metals: Separate metals by type.

1. Structural Steel: Stack members according to size, type of member, and length.
2. Remove and dispose of bolts, nuts, washers, and other rough hardware.

G. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.

H. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.

I. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in dry location.

1. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.

J. Carpet: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.

1. Store clean, dry carpet in closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.

K. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

L. Plumbing Fixtures: Separate by type and size.

M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

N. Lighting Fixtures: Separate lamps by type and protect from breakage.

O. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

P. Conduit: Reduce conduit to straight lengths and store by type and size.

Q. Electronic Products: Ensure non-usable electronic products are reused, donated, sold, or recycled using environmentally sound management practices at end of life.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in dry location.
2. Polystyrene Packaging: Separate and bag materials.

3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust not containing painted or treated wood.

D. Gypsum Board: Stack large clean pieces on wood pallets and store in dry location.

1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose in landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials to accumulate on-site.
2. Remove and transport debris in manner preventing spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Burning: Burning of waste materials allowed only at designated areas on Government property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

D. Disposal: Transport waste materials off Government property and legally dispose of them.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including:

1. Project Record Drawings
2. Closeout Submittals
3. Substantial Completion and Final Inspection
4. Permit Closure and Transfer
5. Final Acceptance of the Work
6. Warranties

1.2 PROJECT RECORD DRAWINGS

A. Maintain one complete full-size set of contract drawings and one full-size set of vendor-supplied drawings. Clearly mark changes, deletions, and additions using National Park Service (NPS) drafting standards to show actual construction conditions. Show additions in red, deletions in green and special instructions in blue.

B. Keep record drawings current. Make record drawings available to Contracting Officer (CO) for inspection at the time of monthly progress payment requests. If project record drawings are not current, Contracting Officer may retain an appropriate amount of progress payment.

C. Submit complete record drawings on completion of total project. Include shop drawings, sketches, and additional drawings to be included in final set, with clear instructions showing the location of these drawings.

1.3 CLOSEOUT SUBMITTALS

A. A list of closeout requirements has been attached at the end of the Division 1 Specifications for your convenience. The intent is to provide an overall summary of requirements and not a comprehensive list. Terms and conditions of the contract require satisfaction of requirements of individual specification sections regardless of what is shown on the list. Submit the following before requesting final inspection:

1. Specific warranties, guarantees, workmanship bonds, final certifications, and similar documents.
2. NPS required forms for occupancy, Fire Sprinkler/Alarm acceptance, and other similar forms or certificates.
3. Project Record Documents, operation and maintenance manuals, final completion construction digital images recorded on CD-R (compact disc-recordable) or DVD-R (digital video disc-recordable) with index and descriptions, and similar final record information.
4. Environmental Record Documents: As specified as follows:

a. IAQ Management Plan: As specified in Section **015719.11** Indoor Air Quality (IAQ) Management.
b. Product Data for filtration media: As specified in Section **015719.11** Indoor Air Quality (IAQ) Management.
c. Moisture Control inspections and reports: As specified in Section **015719.11** Indoor Air Quality (IAQ) Management.
d. Material Safety Data Sheet (MSDS) Data: As specified in Section **015719.11** Indoor Air Quality (IAQ) Management and Section **016700 Product Requirements**
e. Environmental Product Data: As specified in Section **016700 Product Requirements**
f. Life-Cycle Assessment (LCA) Data: As specified in Section **016700 Product Requirements.**
g. Chain-of-Custody Data: As specified in Section **016700 Product Requirements.**
h. Final Summary of Solid Waste Disposal and Diversion: As specified in Section **017419** Construction Waste Management.
i. Commissioning Report: As specified in Section **019114 Total Building Commissioning**.

5. Posted Operating Instructions: As specified in individual sections. Furnish operating instructions attached to or posted adjacent to equipment. Include wiring diagrams, control diagrams, control sequence, start-up, adjustment, operation, lubrication, shut-down, safety precautions, procedures in the event of equipment failure, and other items of instruction recommended by manufacturer.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Contracting Officer. Label with manufacturer's name and model number where applicable.

    a. Special Tools: One set of special tools required to operate, adjust, dismantle, or repair equipment. Special tools are those not normally found in possession of mechanics or maintenance personnel.

7. Keys and Keying Schedule: Submit keys including duplicates. Wire keys for each lock securely together. Tag and plainly mark with lock number, equipment identification, or panel or switch number, and indicate location, building, and room name or number.
8. Make final changeover of permanent locks and deliver keys to Contracting Officer. Advise Park personnel of changeover in security provisions.
9. Approved pre-functional checklists and functional performance testing reports from commissioning documentation.

    a. Equipment start-up requires coordination with commissioning process. Equipment shall not be "temporarily" started for commissioning.

10. Test and balance report.
11. Terminate and remove temporary facilities, mockups, construction tools, and similar elements from Project site, complete final cleaning requirements, including touchup painting.
12. Touch up and repair and restore marred exposed finishes to eliminate visual defects.
13. Instruct NPS personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videos.

1.4 FINAL INSPECTION, SUBSTANTIAL COMPLETION AND ACCEPTANCE PROCEDURES

A. Request final inspection in writing when project or designated portion of project is substantially complete. Contracting Officer will proceed with inspection within 10 days of receipt of written request or will advise Contractor of items that prevent project from being substantially complete.

B. If work is determined substantially complete, following final inspection, Contracting Officer will prepare Punch List and issue a Letter of Substantial Completion.

C. If work is not determined substantially complete following final inspection, Contracting Officer will notify Contractor in writing. Contractor shall request new final inspection after completing work. Re-inspection costs may be charged against Contractor in accordance with Inspection of Construction contract clause.

D. Contractor shall complete Punch List within 30 calendar days, documented weather permitting.
   1. Prior to requesting final inspection:
      a. Complete commissioning requirements of Section 019114 – Commissioning, unless approved in writing by Contracting Officer.

E. If Contractor completes items of work on Punch List and contractually required items, Contracting Officer will issue Letter of final acceptance of work.

F. If Contractor fails to complete work within the time frame, Contracting Officer may correct work with an appropriate reduction in contract price or charge for re-inspection costs in accordance with Inspection of Construction contract clause.

1.5 PERMIT CLOSURE AND TRANSFER

A. When work covered by the permits is complete, create list of tasks required to close or transfer permits to Park. Submit to Contracting Officer for approval.

B. After substantial completion and Punch List completion, permits shall be closed and documented by Agency(ies) with Jurisdiction for the permit.

C. If responsibility for permits is to be transferred to Park, Park shall be informed of permit provisions completed and responsibilities transferring to Park staff.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Contracting Officer for designated portions of Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 by 11 inch (215 by 280 millimeters) paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify product or installation. Provide typed description of product or installation, including name of product and name, address, and telephone number of Installer.
3. Identify each binder on front and spine with typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF (portable document format) file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. See Division 1 Specification Section "Execution" for information on cleaning agents.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Conduct final cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

    a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    c. Rake grounds that are neither planted nor paved to smooth, even-textured surface.
    d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    e. Remove snow and ice to provide safe access to building.
    f. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition, free of stains, films, and foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to original condition.

g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo, soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and vision-obscuring materials. Replace chipped or broken glass and transparent materials. Polish mirrors and glass.
k. Remove labels that are not permanent.
l. Touch up, repair, and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    1) Do not paint over "UL" (Underwriters Laboratories) and similar labels, including mechanical and electrical nameplates.

m. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
n. Replace parts subject to unusual operating conditions.
o. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out and noticeably dimmed bulbs, and defective or noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
r. Leave Project clean and ready for occupancy.

C. Pest Control: Engage experienced, licensed exterminator to make a final inspection and rid project of rodents, insects, and other pests. Provide Government with report.

D. Waste Disposal: Comply with requirements of Section 01 74 19 "Construction Waste Management and Disposal."

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including:

1. Manuals, general
2. Emergency manuals
3. Operation manuals for systems, subsystems, and equipment
4. Maintenance manuals for care and maintenance of **products, materials, finishes** and **systems and equipment**.

B. See Divisions 2 through 49 Sections for additional operation and maintenance manual requirements for Work in those Sections.

1.2 SUBMITTALS

A. Manual: Submit [**two**] copies of each manual in draft form or **one** electronic copy at least **15** days before final inspection. Contracting Officer (CO) will return copy or edit version with comments within **15** days of receipt.

B. Format: Submit operations and maintenance manuals in following format:

1. PDF (portable document format) electronic file. Assemble each manual into composite electronically indexed file. Submit on digital media acceptable to Contracting Officer.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. Hard copy manual: In accordance with Part 2 of this Section.

3. Correct or modify each manual to comply with Contracting Officers comments. Submit [**4**] copies of each corrected manual within [**15**] days of receipt of Contracting Officers comments.

1.3 QUALITY ASSURANCE

A. Coordinate with Section 01 91 14 "Total Building Commissioning." Commissioning Agent shall review Operation and Maintenance Manuals for commissioned systems.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system. Manual shall contain title page, table of contents, and manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include:

1. Project Title
2. Location
3. Park
4. Contract Number
5. Prime Contractors Name and Address
6. Date of Substantial Completion
7. Binder Volume Number

C. Table of Contents: List each product included in manual, identified by product name, indexed to content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. Assemble instructions for subsystems, equipment, and components of one system into a single binder if needed.

1. Binders: White, commercial quality, hard back, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11 inch (215 by 280 millimeter) paper; with clear plastic window sleeve on front and spine to hold label describing contents and pockets inside covers to hold folded oversize sheets.

a. Cover Sheet: Identify binders on front and spine, with project title, location, park, contract number, prime contractor's name and address, date of substantial completion, and binder volume number. Insert cover sheet into clear plastic view pocket on front of binder. Insert sheet into clear plastic view pocket on spine with title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Data: Fill binders to no more than 75 percent of capacity. Punch holes shall not obscure any data. When contents of a single tabbed section cover more than one item, provide colored paper sheets to separate the data for each item.

a. Manufacturers' Data: Provide originals for color or copyrighted data. Black and white data may be originals or clean, good quality reproductions. No copies produced by facsimile transmission and sheets with stamps, such as submittal approval stamps. Include only sheets that apply to items installed; cross out inapplicable data.
b. Vendor Furnished As-Built Drawings: Maximum 24 inch by 36 inch sheets with minimum character or lettering size of 1/8 inch. Reduced-size reproductions may be provided instead of full-size drawings if reproductions are clear and legible. If

reduced-size drawings are used, identify as "REDUCED SIZE" and provide graphic scales, if applicable.

c. Custom Data: Data supplemented by drawings and schematics necessary to describe systems adequately.
d. Equipment Data Sheet: Data, using form at end of this section.
e. Schedules: Schedules reflecting final, as-installed conditions.
f. Poorly reproduced or illegible data will be rejected.

3. Dividers: Divider sheets with Mylar reinforced edges and pre-printed numbered tabs aligned with numbers and title lines on index sheet. Include typed list of products and major components of equipment included in section on each divider, cross-referenced to Specification Section number and title of Project Manual.
4. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into separate section for type of emergency, emergency instructions, and emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for **fire, flood, gas lea**k, **water leak**, **power failure**, **water outage**, **equipment failure and chemical release or spill**.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of National Park Service (NPS) operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

2.3 OPERATION AND MAINTENANCE MANUALS

A. Operation Requirements

1. Content: In addition to requirements in Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.

2. Descriptions: Include:

    a. Product name and model number
    b. Manufacturer's name
    c. Equipment identification with serial number of each component
    d. Equipment function
    e. Operating characteristics
    f. Limiting conditions
    g. Performance curves
    h. Engineering data and tests
    i. Complete nomenclature and number of replacement parts

3. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.
4. Systems and Equipment Controls: Describe sequence of operation, and diagram controls as installed.
5. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

B. Maintenance Requirements for Systems and Equipment

1. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, and equipment data sheets as described below.
2. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
3. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:
4. Maintenance Procedures: Test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training, detailing essential maintenance and environmental procedures.
5. Maintenance and Service Schedules: Service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
6. Spare Parts List and Source Information: Lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
7. Warranties and Bonds: Copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include:

1. Product name and model number
2. Manufacturer's name
3. Color, pattern, and texture
4. Material and chemical composition
5. Reordering information for specially manufactured products

D. Environmental Requirements

1. Identify environmentally preferable products incorporated into Project. Include: product model; manufacturer’s name, address, phone, and website; and local technical representative.

a. Verify plastic products to be incorporated into Project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in Operation and Maintenance Manual.

1) Type 1: Polyethylene Terephthalate (PET, PETE)
2) Type 2: High Density Polyethylene (HDPE)
3) Type 3: Vinyl (Polyvinyl Chloride or PVC)
4) Type 4: Low Density Polyethylene (LDPE)
5) Type 5: Polypropylene (PP)
6) Type 6: Polystyrene (PS)
7) Type 7: Other. Use of this code indicates that package in question is made with a resin other than the six listed above or is made of more than one resin listed above and used in a multi-layer combination.

b. Describe maintenance procedures associated with environmentally preferable materials and systems. Provide cleaning recommendations in accordance with ASTM E1971 and approved Integrated Pest Management (IPM) plan.

1) Include potential environmental impacts of recommended maintenance procedures and materials.
2) Include potential indoor air quality impacts of recommended maintenance procedures and materials.
3) Where proposed maintenance procedures incorporate composting of plastics, assess potential effect of each type of plastic to be included in composting process in accordance with ASTM D5509 or ASTM D6002

c. Material Safety Data Sheets (MSDS): Include MSDSs as specified.

2. Develop environmental management programs for facility as follows:

a. Waste management program: Develop in accordance with ASTM E1609. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.
b. Indoor Air Quality (IAQ) management program: Provide for evaluation of indoor Carbon Dioxide concentrations in accordance with ASTM D6245. Provide for evaluation of VOCs (volatile organic compounds) in indoor air in accordance with ASTM D6345.
c. Water management program: Develop water monitoring program for surface and ground water on project site in accordance with ASTM D5851 and consistent with water management program utilized during construction operations.

E. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following and items detailing essential maintenance procedures:

1. Test and inspection instructions
2. Troubleshooting guide
3. Precautions against improper maintenance
4. Disassembly; component removal, repair, and replacement; and reassembly instructions
5. Aligning, adjusting, and checking instructions
6. Demonstration and training video recording

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

1. Include procedures and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 GENERAL

A. At start of project, begin accumulating operation and maintenance data and initiate index. Install and index data in binders within 30 days after delivery of items. As custom written data and test results are produced, add to operation and maintenance data file.

B. List of Operation and Maintenance requirements has been attached at end of the Division 1 Specifications for your convenience. Intent is to provide an overall summary of requirements and not a comprehensive list. Terms and conditions of the contract require satisfaction of requirements of individual specification sections regardless of what is shown on the list.

C. Keep operation and maintenance data current. Make operation and maintenance binders available to Contracting Officer for inspection at time of monthly progress payment requests. If operation and maintenance binders are not current, Contracting Officer may retain an appropriate amount of the progress payment.

3.2 MANUAL PREPARATION

A. Manual Types

1. Emergency Manual: Assemble complete set of emergency information indicating procedures for use by emergency personnel and by NPS operating personnel for types of emergencies indicated.
2. Product Maintenance Manual: Assemble complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into Work.
3. Operation and Maintenance Manuals: Assemble complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manual Contents: Including:

1. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark sheet to identify product or component incorporated into Work. If data include more than one item in a tabular format, identify each item using appropriate references from Contract Documents. Identify data applicable to Work and delete references to information not applicable.
2. Custom Written Data: For data not in manufacturer's standard literature, provide text, drawings, and schematics specifically applicable to installed systems. Include step-by-step descriptions of operating procedures; identification of individual components and their functions; descriptions of how system components relate to one another and operate together to accomplish a common process or function; and sequence of operation for system control circuits. For seasonally operated systems, provide start-up and shutdown instructions.
3. Equipment Data Sheets: For each item of equipment included in operation and maintenance data, provide Equipment Data Sheet using form at the end of this section. For equipment consisting of a driven machine and a driver (for example, a pump and a motor), equipment data shall cover both the driven machine and the driver. For similar type equipment (for example, multiple exhaust fans of the same model and type), provide a single equipment data sheet with an attached schedule listing individual equipment items.
4. Vendor Furnished As-Built Drawings: Provide for each electrical and each mechanical control system.

    a. For each control system, provide control circuit schematic drawings. Identify each wire and terminal block number. Show terminal numbers on control devices. Show control wires and devices remote from control panel.
    b. For each control panel, provide general arrangement drawing showing location of each control component and terminal block on the panel front and interior. Include materials list of panel-mounted control components as well as field-installed control components remote from the panel, identifying components, manufacturer, model number, and initial set points or sensing ranges of devices where applicable.
    c. For packaged equipment systems, provide general arrangement drawings showing interrelationships of the various items of equipment and components.
    d. In addition to control wiring schematic, provide power wiring schematic drawing showing power flow to each motor. Identify each power conductor. Show over-current protection and motor starting devices.

C. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

EQUIPMENT DATA SHEET	
Equipment Item: _____ Designation: _____ Function: _____ Location: _____ Project: _____ Model Number: _____ Serial Number: _____	
Manufacturer Address and Phone:	Supplier Address and Phone:
Preventive Maintenance Tasks:	
Nameplate Data:	
Spare Parts Furnished and Other Information:	

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing National Park Service (NPS) personnel, including:

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment, including environmental considerations.

B. See Divisions 2 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 GENERAL REQUIRMENTS

A. List of System Demonstration and Training requirements has been attached at end of Division 1 Specifications for your convenience. Intent is to provide overall summary of requirements and not a comprehensive list. Terms and conditions of contract still require satisfaction of requirements of individual specification sections regardless of what is shown on list.

1.3 SUBMITTALS

A. Instruction Program: Submit **two** copies of outline of instructional program for demonstration and training, including schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. For each training session, Contractor shall submit for approval a proposed outline of subjects to be covered. Training shall not be conducted until outline is approved.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: Firm or individual experienced in training or educating maintenance personnel in training program similar in content and extent for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: Factory-authorized service representative, complying with requirements in Section 01 40 00 "Quality Requirements," experienced in operation and maintenance procedures and training.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Contracting Officer (CO).

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and:

1. **Dry Type Fire Suppression System (including Nitrogen Compressor)**
2. Environmental Topics

a. Overview of environmental issues related to building industry.
b. Overview of environmental issues related to Project.
c. Review of site-specific procedures and management plans implemented during construction:

1) Regulatory Requirements
2) Indoor Air Quality (IAQ) Management
3) Noise and Acoustics Management
4) Environmental Management
5) Construction Waste Management

d. Review of site-specific procedures and management plans to be implemented during operation and maintenance.

1) Include review of environmentally related aspects of Operations and Maintenance Manual.
2) Integrated Pest Management (IPM)

B. Training Modules: Develop a learning objective and teaching outline for each module. Include description of specific skills and knowledge that participant is expected to master. For each module, include instruction for:

1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
3. Emergencies: Instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
4. Operations: Startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
5. Adjustments: Alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Diagnostic instructions and test and inspection procedures.
7. Maintenance: Inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.

8. Repairs: Diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 INSTRUCTION

A. Facilitator: Engage qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Contracting Officer for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct NPS personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with NPS through Contracting Officer with at least [**seven**] days' advance notice.
2. Conduct training sessions after equipment or system has been accepted and turned over to Government. Coordinate with commissioning requirements.
3. Coordinate with Integrated pest management requirements. Refer to specifications section and approved IPM plan.
4. Individual sections specify duration of training required. If no duration is listed, provide training of sufficient duration to adequately cover subjects.

END OF SECTION 01 79 00

SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS FOR NON-LEED™ PROJECTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements and procedures for compliance with Federal Sustainability requirements. This project is not seeking Leadership in Energy & Environmental Design (LEED™) certification but shall comply with applicable Federal Sustainability requirements. Requirements include laws (Executive Orders (EO) and regulations), management policies, building codes and standards, Federal directives, and National Park Service (NPS) guidelines.

B. Many Federal requirements can be achieved only through intelligent and integrated design of the project and are beyond control of the Contractor. Certain requirements relate to the products and procedures used for construction, therefore, full cooperation of the Contractor and Subcontractors is essential to successful compliance with Federal requirements.

C. Contractors shall familiarize themselves with relevant requirements and provide necessary information and instruction to subcontractors and installers.

1. Some requirements involve quantifying percentages by weight; these require careful recordkeeping and reporting by Contractor.
2. See Denver Service Center (DSC) Workflows Sustainability Standards for a list of Federal Sustainability requirements. Applicable Federal Sustainability requirements are also summarized on the project's NPS Project Sustainability Checklist. Contractor is responsible for ensuring the elements in the NPS Project Sustainability Checklist, identified by the Architect/Engineer (A/E) team, are incorporated into the construction of the project.

D. Related Sections:

1. See Divisions 1 through 49 Sections for sustainability requirements specific to work of each of these Sections.

1.2 DEFINITIONS

A. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying wood used to make products was obtained from forests certified by a Forest Stewardship Council (FSC)-accredited certification body to comply with FSC Standard STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence manufacturer is certified for chain of custody by an FSC-accredited certification body.

B. LEED™: Leadership in Energy & Environmental Design. Sustainability rating system developed by United States Green Building Council (USGBC).

C. Rapidly Renewable Materials: Materials made from plants typically harvested within 10-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.

D. Recycled Content: Recycled content value of a material assembly shall be determined by weight.

1. "Post-consumer" material: Waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of product, which can no longer be used for intended purpose.
2. "Pre-consumer" material: Material diverted from waste stream during manufacturing process. Reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it is excluded.

E. Biopreferred Products: Commercial or industrial products (other than food or feed) composed in whole, or in significant part, of biological products, renewable agricultural materials (including plant, animal, and marine materials), or forestry materials and includes biobased intermediate ingredients or feedstocks.

1.3 FEDERAL SUSTAINABILITY DOCUMENTATION SUBMITTALS

A. Most of Federal sustainability documentation submittals are aggregations of submittals already required in relevant technical specifications. They are mentioned here to ensure they are collected and organized together to efficiently document compliance with sustainability requirements.

B. Provide preliminary submittals to NPS indicating how the following Federal requirements will be met:

1. Recycled Content: List of specified/proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.

2. Certified Wood: Product data and/or chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.

3. Construction Indoor Air Quality (IAQ) Management Plan – During Construction:

a. Construction indoor-air-quality management plan.
b. Product data for temporary filtration media.
c. Product data for filtration media used during occupancy.
d. Construction Documentation: Six photographs at three different times during construction period, along with brief description of the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) approach employed, documenting implementation of indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.

4. Construction IAQ Management Plan – Before Occupancy:

a. Signed statement describing building air flush-out procedures including dates when flush-out was started and completed and statement filtration media was replaced after flush-out.

b. Product data for filtration media used during flush-out and during occupancy.

5. Low Emitting Materials - Adhesives and Sealants: Product data for adhesives and sealants used inside weatherproofing system indicating Volatile Organic Compound (VOC) content of each product used. Indicate VOC content in g/L (grams per liter) calculated according to 40 CFR 59 Subpart D (Code of Federal Regulations).
6. Low Emitting Materials - Paints and Coatings: Product data for paints and coatings used inside weatherproofing system indicating [**chemical composition and**] VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59 Subpart D.
7. Low Emitting Materials - Flooring: Product data for products containing composite wood or agrifiber products or wood glues indicating they do not contain urea-formaldehyde resin.
8. Biopreferred Products: Provide list of bio-based products used on project.

PART 2 - PRODUCTS

2.1 RECYCLED CONTENT OF MATERIALS

A. Recycled Content: Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of **10** percent of cost of materials used for Project.

1. Determine cost of post-consumer recycled content by dividing weight of post-consumer recycled content in item by total weight of item and multiplying by cost of item.
2. Determine cost of pre-consumer recycled content of an item by dividing weight of pre-consumer recycled content in item by total weight of item and multiplying by cost of item.
3. Do not include **furniture**, mechanical and electrical components, and specialty items such as elevators and equipment in calculation.

2.2 BIOPREFERRED PRODUCTS

A. Use bio-based products found on United States Department of Agriculture (USDA) Biopreferred Products list where applicable on project.

2.3 LOW-EMITTING MATERIALS

A. For applications inside the weatherproofing system, use adhesives and sealants that comply with VOC content limits in Specification Divisions 2 through 49.

B. For field applications inside the weatherproofing system, use paints and coatings that comply with VOC content limits in Specification Divisions 2 through 49.

C. Do not use composite wood or agrifiber products or adhesives that contain urea-formaldehyde resin.

PART 3 - EXECUTION

3.1 **CLEAN-AGENT FIRE-EXTINGUISHING-AGENT** REMOVAL

A. Remove clean-agent fire-extinguishing agents that contain Hydrochlorofluorocarbons (HCFCs) or halons and replace with agent that does not contain HCFCs or halons. See Division 21 Section "Clean-Agent Fire Extinguishing Systems" for additional requirements.

3.2 MEASUREMENT AND VERIFICATION

A. Coordinate with Divisions 2 through 49 for project requirements regarding installation of building level metering equipment to measure energy, water, and electric usage.

3.3 INDOOR-AIR-QUALITY MANAGEMENT

A. Coordinate with Section 01 57 19.11 "Indoor Air Quality Management" for managing indoor air quality during construction and prior to occupancy.

END OF SECTION 01 81 13

SECTION 01 91 14 – COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General requirements for coordinating and scheduling commissioning.
2. Commissioning meetings
3. Commissioning reports
4. Use of test equipment, instrumentation, and tools for commissioning.
5. Construction checklists, including, but not limited to, installation checks, startup, and performance tests.
6. Commissioning tests
7. Adjusting, verifying, and documenting identified systems and assemblies.

Work included under this section includes a complete and thorough investigation of equipment and systems indicated in Part 3 of section. In order to ensure proper installation and operation of components and systems. Contractor shall perform commissioning as described herein to accomplish the tasks, and goals of commissioning. Systems to be evaluated include but are not limited to:

8. Building Automation System (BAS): Control hardware and software, sequence of operations, and integration of factory controls with BAS.
9. Life Safety Systems (Fire Alarm & Suppression)

B. Building commissioning activities and documentation are described in the following reference material: United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED™) rating program, American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Guideline 0-2005, The Commissioning Process, and National Institute of Building Sciences (NIBS) Guidelines.

C. National Park Service (NPS) personnel, Green Consultant, and Architect/Engineer, are not responsible for construction means, methods, job safety, or management function related to commissioning on job site.

D. Related Sections:

1. 01 31 00 - Project Management and Coordination
2. 01 33 23 - Submittal Procedures
3. 01 40 00 - Quality Requirements
4. 01 57 19.11 - Indoor Air Quality (IAQ) Management
5. 01 57 19.12 - Noise and Acoustics Management
6. 01 77 00 - Closeout Procedures
7. 01 78 23 - Operation and Maintenance Data
8. 01 79 00 - Demonstration and Training
9. 01 81 13 - Sustainable Design Requirements

1.2 DEFINITIONS

A. Acceptance Criteria: Threshold of acceptable work quality or performance specified for a commissioning activity.

B. Basis-of-Design Document: Document prepared by Designer that records concepts, calculations, decisions, and product selections used to comply with Owner's Project Requirements and to suit applicable regulatory requirements, standards, and guidelines.

C. Total Building Commissioning (TBC): Quality-focused process for verifying and documenting that facility, systems and assemblies are planned, designed, installed, and tested to comply with Owner's Project Requirements. Requirements specified here are limited to construction phase commissioning activities.

D. Construction Checklist: Form used by Contractor to verify appropriate components are on site, ready for installation, correctly installed and functional.

E. Contractor's Commissioning Representative: (CCxR) Contractor's designated individual to coordinate, manage, and execute commissioning processes of the contracting organizations.

F. Commissioning Plan (CCxP): Plan that provides structure, schedule and coordination planning for commissioning process proposed specifically for this project. CCxP includes Personnel, activities, and a description of Infrastructure, and list of instruments and logging devices that will be used during Commissioning.

G. Deficiency: Condition in the installation or function of a component, piece of equipment or system not in compliance with Contract Documents, does not perform properly or is not complying with Basis of Design.

H. Functional Performance Test (FPT): Test of dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional performance testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The CCxR develops the sequentially written functional test procedure forms, and oversees and documents the actual testing, which is performed by the installing contractor or vendor. The CCxR creates worksheets from these forms which include procedures required to accommodate actual equipment, means and methods used in the project. Functional Performance Tests are performed after pre-functional checklists and startup is complete.

I. Manual Test: Using hand-held instruments, control system readouts or direct observation to verify performance (contrasted to analyzing electronically monitored data taken over time to make the "observation").

J. Monitoring: Recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.

K. Owner's Project Requirements: Document originated by Designer that details functional requirements of project and expectations of use and operation, including project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information. Document is updated, with input from Contracting Officer (CO) as required as project is finished.

L. Pre-functional Checklist: List of items to inspect and elementary component tests to conduct to verify proper installation of equipment. Pre-functional checklists are primarily static inspections and procedures to prepare equipment or system for initial operation (e.g., belt tension, oil levels ok, labels affixed, gages in place, sensors calibrated, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring voltage imbalance on a three-phase pump motor of a chiller system). Pre-functional" refers to "before" functional testing. Pre-functional checklists augment and are combined with the equipment manufacturer's start-up checklist.

M. Seasonal Performance Tests: Functional Performance Tests deferred until system(s) will experience seasonal conditions closer to their design conditions.

N. Systems Manual: System focused composite document that includes operational manual, maintenance manual, and additional information of use to Government during Occupancy and Operation Phase.

1.3 COMMISSIONING TEAM

A. Members Appointed by Contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action.

1. CCxR (Contractor's Commissioning Representative): CCxR shall be approved by Contracting Officer and satisfy as many of the following requirements as possible:

    a. Certified in Commissioning by nationally accredited organization (i.e. Associated Air Balance Council (AABC), Association of Energy Engineers (AEE), Building Commissioning Association (BCA), and National Environmental Balancing Bureau (NEBB))
    b. Acted as principal Commissioning Authority where total building commissioning approach was used for at least three projects of comparable size, type, and scope.
    c. Technical training in Electrical, and/or fire protection engineering.
    d. Past commissioning experience.
    e. Knowledge of national codes.
    f. Specific experience with specialty systems relative to particular facility type (i.e.fire protection systems, fire alarm systems, etc.).

2. Contractor Quality Control (CQC) Supervisor
3. Other Representatives may include Project superintendents, installers, suppliers, and specialists.

B. Members Appointed by Contracting Officer:

1. Representatives of facility user and operation and maintenance personnel.
2. Architect and engineering design professionals.

1.4 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall assign representatives with expertise and authority to act on its behalf to participate in and perform commissioning process activities including:

1. Perform commissioning tests, as required by technical specifications. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
2. Record and resolve commissioning issues.
3. Attend commissioning team meetings held on variable basis.
4. Integrate and coordinate commissioning process activities with overall project schedule.
5. Review Construction Checklist attached at end of specification section.
6. Complete electronic construction checklists as contract work is completed and provide to Contracting Officer on a weekly basis.
7. Complete commissioning process test procedures.
8. Provide maintenance orientation and inspection for systems, assemblies, equipment, and components based on contract requirements.
9. Provide Commissioning Plan and documentation for final commissioning documentation.
10. Provide measuring instruments and logging devices to record test data and provide data acquisition equipment to record data for complete range of testing for required test period.

1.5 COMMISSIONING DOCUMENTATION

A. Provide the following information:

1. Review of systems manual, submittals, documents, and other commissioning reports
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase
3. Commissioning Plan including Process activities and schedule for completing construction checklists and manufacturer's pre-start and startup checklists for systems, assemblies, equipment, and components to be verified and tested
4. Certificate of readiness certifying systems, subsystems, equipment, and associated controls are ready for testing
5. Test and inspection reports and certificates
6. Corrective action documents
7. Testing, adjusting, and balancing reports

1.6 SUBMITTALS

A. Two-week look-ahead schedules: Schedule showing the next two weeks of commissioning related construction activity to include completion dates for each element of commissioning documentation for each major system or subsystem as identified in 1.1.B.

B. Certificates of readiness.

C. Contractor's Commissioning Representative Qualifications.

D. Commissioning Plan: Submit within 30 calendar days of authorization to proceed.

1. Update as necessary during the work to reflect progress on components and systems.

E. Pre functional checklists.

F. Owner's project requirements.

G. Functional performance test forms: Submit minimum 30 calendar days prior to testing

H. List of test instrumentation, equipment, and monitoring devices. Include:

1. Make, model, serial number, and application for each instrument, equipment, and monitoring device.
2. Brief description of intended use.
3. Calibration record showing:

a. Calibration agency, including name and contact information
b. Last date of calibration
c. Range of values for which calibration is valid
d. Certification of accuracy
e. National Institute of Standards and Technology (NIST) traceability certification for calibration equipment.
f. Due date of the next calibration.

I. Deficiency Report and Resolution Record: Document items of non-compliance in materials, installation or operation. Document results from start-up/pre-functional checklists, functional performance testing, and short-term diagnostic monitoring. Include details of components or systems found to be non-compliant with drawings and specifications. Identify adjustments and alterations required to correct system operation and identify who is responsible for making corrective changes.

1. Update as necessary during work to reflect progress on components and systems. Submit updated versions monthly.

J. Closeout Documentation

1. Closeout documents for commissioned equipment and systems shall be submitted prior to functional performance testing. These include:

a. Record Documents and Drawings
b. Start-up certificates for commissioned equipment with start-up requirements
c. Systems Manual
d. Include TAB, startup, and Control System check-out reports.
e. Other documents required by Section.

2. Operation and Maintenance (O&M) Submittals (refer to requirements of technical specifications):

a. Training plan: Include for each training session:

1) Dates, start and finish times, and locations
2) Outline of the information to be presented
3) Names and qualifications of presenters
4) List of texts and materials required to support training

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

A. Instrumentation shall:

1. Be of sufficient quality and accuracy to test and measure system performance within tolerances required to determine adequate performance.
2. Be calibrated on manufacturer's recommended intervals calibration tags permanently affixed to instrument being used.
3. Be maintained in good repair and operation condition throughout duration of use on this project.

B. Standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by Contractor for equipment being tested.

C. Required commissioning equipment (sensors, transducers, data loggers, etc.) not integral to the systems or equipment installed shall be provided by Contractors Commissioning Representative and shall not become property of the Government.

2.2 PRE-FUNCTIONAL CHECKLIST:

A. Prepare pre functional checklists for equipment and systems to be commissioned.

B. Pre-functional checklists shall be complementary to Commissioning Plan and Commissioning Schedule.

2.3 FUNCTIONAL TEST PROCEDURE FORMS: Prepare functional test procedure forms for each piece of equipment and each system to be commissioned.

2.4 FUNCTIONAL PERFORMANCE WORKSHEETS:

A. Prepare Functional Performance worksheets, consisting of test procedures and expected results of testing.

2.5 REPORT FORMAT AND ORGANIZATION

A. General Format and Organization:

1. Bind report in three-ring binders.
2. Label front cover and spine of each binder with report title, volume number, project name, Contractor's name, and date of report.
3. Record report on compact disk.
4. Electronic Data: Portable document format (PDF); a single file with outline-organized bookmarks for major and minor tabs and tab contents itemized for specific reports.

B. Commissioning Report:

1. Include table of contents and an index to each test.
2. Include major tabs for each Specification Section.
3. Include minor tabs for each test.
4. Within each minor tab, include:

    a. Test specification.
    b. Pre-startup reports.
    c. Approved test procedures.
    d. Test data forms, completed and signed.
    e. Commissioning issue reports, showing resolution of issues, and documentation related to resolution of issues pertaining to a single test. Group data forms, commissioning issue reports showing resolution of issues, and documentation related to resolution of issues for each test repetition together within minor tab, in reverse chronological order (most recent on top).

PART 3 - EXECUTION

3.1 COMMISSIONING PROCESS

A. Following activities outline general commissioning tasks (requiring development, execution, etc.) and order in which they occur. Specific Commissioning requirements are found in technical specification Section(s).

1. Commissioning Scoping Meeting
2. Finalize Owner’s Project Requirements
3. Commissioning Plan
4. Prepare pre-functional checklists.
5. Prepare functional performance worksheets.
6. Perform Start-Up/Pre-Functional Checks in accordance with manufacturer’s recommendations and pre-functional checklists.
7. Functional Performance Testing in accordance with functional performance worksheets
8. Deficiency Report and Resolution Record
9. Operation and Maintenance Documentation
10. Operations and Maintenance Training
11. Deferred Testing

3.2 TOTAL BUILDING COMMISSIONING (TBC) REQUIREMENTS

A. TBC during construction, acceptance, and warranty phases is intended to achieve following specific objectives:

1. Verify that systems and equipment meet Owner's Project Requirements.
2. Verify equipment is what was submitted and approved.
3. Verify and document equipment is installed and started per manufacturer's recommendations, industry accepted minimum standards, and Contract Documents.
4. Verify and document equipment and systems receive complete operational checkout by installing contractors.
5. Verify and document equipment capacity and system efficiency.
6. Verify performance of building envelope. Document testing and conformance to Contract Documents.
7. Verify completeness of operations and maintenance materials.
8. Ensure Governments operating personnel are adequately trained on operation and maintenance of building equipment.

3.3 COMMISSIONING SCOPING MEETING

A. Commissioning Scoping Meeting:

1. Schedule, coordinate, and facilitate a scoping meeting.
2. Review each building system to be commissioned, including intended operation, commissioning requirements, and completion and start-up schedules.
3. Establish scope of work, tasks, schedules, deliverables, and responsibilities for implementation of Commissioning Plan.
4. Attendance: Commissioning Team members.

3.4 COMMISSIONING PLAN

A. Commissioning Plan: Develop commissioning plan to identify how commissioning activities will be integrated into general construction and trade activities. Commissioning plan shall identify how commissioning responsibilities are distributed. Intent of plan is to evoke questions, expose issues, and resolve issues with input from entire commissioning team early in construction.

1. Identify who will be responsible for producing various procedures, reports, Contracting Officer notifications and forms.
2. Include commissioning tasks and activities in overall project schedule. Tag individual activities so they can be filtered at later date.
3. List and describe each test/acceptance procedure, including acceptance criteria.

3.5 START-UP/PRE-FUNCTIONAL CHECKLISTS

A. Start-Up/Pre-Functional Checklists: Complete pre-functional checklists prior to start up. Checklist shall help verify that systems are complete and operational, so functional performance testing can be scheduled.

1. Verify equipment installed is what was approved on Submittal.
2. Manufacturer's start-up checklists and other technical documentation guidelines may be used as basis for pre-functional checklists.

3.6 FUNCTIONAL PERFORMANCE TESTING

A. Functional Performance Testing: Test procedures fully describe system configuration and steps required for each test.

1. Test Methods: Functional performance testing and verification may be achieved by direct manipulation of system inputs (i.e. heating or cooling sensors), manipulation of system inputs with building automation system (i.e. software override of sensor inputs), trend logs of system inputs and outputs using building automation system, or short-term monitoring of system inputs and outputs using standalone data loggers. A combination of methods may be required to completely test complete sequence of operations. CCxR shall determine which method or combination of methods is most appropriate.
2. Setup: Each test procedure shall be performed under conditions that simulate normal operating conditions as closely as possible. Where equipment requires integral safety devices to stop/prevent equipment operation unless minimum safety standards or conditions are met, functional performance test procedures shall demonstrate actual performance of safety shutoffs in real or closely simulated conditions of failure.
3. Sampling: Multiple identical pieces of non-life-safety or non-critical equipment may be functionally tested using a sampling strategy. If, after three attempts at testing the specified sample percentage, failures are still present, remaining units shall be tested at Contractors' expense.

B. Prepare functional performance test procedure forms to accommodate actual installed equipment and systems.

C. Coordinate, execute, and record results of functional performance testing.

1. Coordinate retesting as necessary until satisfactory performance is verified.
2. Verify intended operation of individual components and system interactions under various conditions and modes of operation.

3.7 DEFICIENCY REPORT AND RESOLUTION RECORD

A. Deficiency Report and Resolution Record: Document items of non-compliance in materials, installation or operation.

B. Non-Conformance. Non-conformance and deficiencies observed shall be addressed immediately. Notify responsible parties and provide recommended actions to correct deficiencies.

1. Corrections of minor deficiencies identified may be made during tests at discretion of CCxR. In such cases the deficiency and resolution shall be documented on procedure form.
2. For identified deficiencies:

    a. If no dispute on deficiency and responsibility to correct it:

1) CCxR documents deficiency and adjustments or alterations required to correct it. Contractor corrects deficiency and notifies CCxR that equipment is ready to be retested.
2) CCxR reschedules test and test is repeated until satisfactory performance is achieved.

b. If there is a dispute about a deficiency or who is responsible:

1) Deficiency is documented CCxR on non-compliance form.
2) Resolutions are made at lowest management level possible. Additional parties are brought into discussions as needed. Contractor shall have responsibility for resolving construction deficiencies. If a design revision is deemed necessary and approved by Contracting Officer, Architect/Engineer (A/E) shall have responsibility for providing design revision. CCxR documents resolution process.
3) Once interpretation and resolution have been decided, appropriate party corrects deficiency and notifies CCxR that equipment is ready to be retested. CCxR reschedules test and test is repeated until satisfactory performance is achieved.

3. Cost of Retesting: Costs for retesting shall be charged to Contractor.

3.8 OPERATIONS AND MAINTENANCE TRAINING

A. Training: Develop Training Plan. Coordinate and execute training programs with CxA.

1. Stress and enhance importance of system interactions, troubleshooting, and long-term preventive maintenance and operation programs.

3.9 DEFERRED TESTING

A. Unforeseen Deferred Tests: If test cannot be completed due to building structure, required occupancy condition, or other deficiency, functional testing may be delayed upon recommendation of CCxR and approval of Contracting Officer. These tests are conducted in same manner as the seasonal tests, as soon as possible.

B. Seasonal Testing

1. Schedule, coordinate, execute, and document additional testing for seasonal variation in operations and control strategies during appropriate season to verify performance of HVAC system and controls. Complete testing during warranty period to fully test sequences of operation.
2. Update O&M manuals and Project Record Drawings as necessary due to testing.

3.10 EQUIPMENT & SYSTEM SCHEDULE

A. Commissioned Equipment and Systems List: Following is a list of systems and equipment to be commissioned organized by system. It includes the percentage of each category that will undergo

testing. The intent is to provide an overall summary of commissioned equipment and systems, and not a comprehensive list. Refer to applicable specification sections for more information.

COMMISSIONED EQUIPMENT AND SYSTEMS LIST			
SYSTEM	**EQUIPMENT**	**CC** (Commissioning Coordinator)	**FPT** (Functional Performance Test)
Fire Protection	**Dry Pipe Sprinkler Riser**	X	X
Fire Protection	**Fire Suppression Controller**	X	X

END OF SECTION 01 91 14

SECTION 02 4100 - DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Selective demolition of building elements for alteration purposes.

C. Abandonment and removal of existing utilities and utility structures.

1.2 RELATED REQUIREMENTS

A. Section 01 1000 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01 1000 - Summary: Sequencing and staging requirements.

C. Section 01 1000 - Summary: Description of items to be removed by Government.

D. Section 01 1000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.

E. Section 01 5000 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

F. Section 01 5719.11 Indoor Air Quality Management

G. Section 01 5719.12 Noise and Acoustics Management

H. Section 01 6000 - Product Requirements: Handling and storage of items removed for salvage and relocation.

I. Section 01 7000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

J. Section 01 7419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

K. Section 07 0150.19 - Preparation for Re-Roofing: Removal of existing roofing, roof insulation, flashing, trim, and accessories.

L. Section 31 0001 - Site Preparation and General Site Work: Vegetation and existing debris removal.

M. Section 31 2200 - Grading: Topsoil removal.

N. Section 31 2200 - Earthwork: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

O. Section 31 2323 - Fill: Fill material for filling holes, pits, and excavations generated as a result of removal operations.

1.3 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations 2019.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:

1. Vegetation to be protected.
2. Areas for temporary construction and field offices.
3. Areas for temporary and permanent placement of removed materials.

C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.

1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
2. Identify demolition firm and submit qualifications.

D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.5 QUALITY ASSURANCE

A. Demolition Firm Qualifications: Company specializing in the type of work required.

1. Minimum of 5 years of documented experience.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fill Material: As Specified in Section 31 2200 - Earthwork.

PART 3 EXECUTION

3.1 SCOPE

A. Remove paving and curbs as required to accomplish new work.

B. Remove other items indicated, for salvage, relocation, recycling, and [_____].

C. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 2200.

3.2 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Obtain required permits.
2. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
3. Provide, erect, and maintain temporary barriers and security devices.
4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
6. Do not close or obstruct roadways or sidewalks without permit.
7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Government.

C. Do not begin removal until built elements to be salvaged or relocated have been removed.

D. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.

E. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.
2. Prevent movement or settlement of adjacent structures.
3. Stop work immediately if adjacent structures appear to be in danger.

F. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

G. If hazardous materials are discovered during removal operations, stop work and notify Contracting Officer and Government; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

H. Perform demolition in a manner that maximizes salvage and recycling of materials.

1. Dismantle existing construction and separate materials.
2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

I. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.3 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Government.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Government.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.4 SELECTIVE DEMOLITION FOR ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as indicated.
2. Report discrepancies to Contracting Officer before disturbing existing installation.
3. Beginning of demolition work constitutes acceptance of existing conditions that would be apparent upon examination prior to starting demolition.

B. Separate areas in which demolition is being conducted from other areas that are still occupied.

1. Provide, erect, and maintain temporary dustproof partitions of construction specified in Section 01 5000 in locations indicated on drawings.

2. Provide sound retardant partitions of construction indicated on drawings in locations indicated on drawings.

C. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

D. Remove existing work as indicated and as required to accomplish new work.

1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
2. Remove items indicated on drawings.

E. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and [_____]): Remove existing systems and equipment as indicated.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components.
2. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
3. See Section 01 1000 for other limitations on outages and required notifications.
4. Verify that abandoned services serve only abandoned facilities before removal.
5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification.

F. Protect existing work to remain.

1. Prevent movement of structure; provide shoring and bracing if necessary.
2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
3. Repair adjacent construction and finishes damaged during removal work.
4. Patch as specified for patching new work.

3.5 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Remove from site all materials not to be reused on site; comply with requirements of Section 01 7419 - Waste Management.

C. Leave site in clean condition, ready for subsequent work.

D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 1000 - CONCRETE FORMING AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing and anchorage.

B. Form accessories.

C. Form stripping.

1.2 RELATED REQUIREMENTS

A. Section 03 2000 - Concrete Reinforcing.

B. Section 03 3000 - Cast-in-Place Concrete.

1.3 REFERENCE STANDARDS

A. ACI 301 - Specifications for Structural Concrete 2016.

1.4 SUBMITTALS

A. See Section 01 3323 - Submittal Procedures, for submittal procedures.

B. Product Data: Provide data on void form materials and installation requirements.

1.5 QUALITY ASSURANCE

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver prefabricated forms and installation instructions in manufacturer's packaging.

B. Store prefabricated forms off ground in ventilated and protected manner to prevent deterioration from moisture.

PART 2 PRODUCTS

2.1 FORMWORK - GENERAL

A. Provide concrete forms, accessories, shoring, and bracing as required to accomplish cast-in-place concrete work.

B. Design and construct concrete that complies with design with respect to shape, lines, and dimensions.

C. Comply with applicable state and local codes with respect to design, fabrication, erection, and removal of formwork.

2.2 WOOD FORM MATERIALS

A. Form Materials: At the discretion of the Contractor.

2.3 REMOVABLE PREFABRICATED FORMS

A. Void Forms: Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete mix until initial set; 2 inches thick.

2.4 FORMWORK ACCESSORIES

A. Form Ties: Removable type, galvanized metal, fixed length, cone type, with waterproofing washer, [____] inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete surface. Provide [_____] manufactured by [_____] .

B. Form Release Agent: Capable of releasing forms from hardened concrete without staining or discoloring concrete or forming bugholes and other surface defects, compatible with concrete and form materials, and not requiring removal for satisfactory bonding of coatings to be applied.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.2 EARTH FORMS

A. Hand trim sides and bottom of earth forms. Remove loose soil prior to placing concrete.

3.3 ERECTION - FORMWORK

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.

C. Install void forms in accordance with manufacturer's recommendations. Protect forms from moisture or crushing.

3.4 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

3.5 FORMWORK TOLERANCES

3.6 FORM REMOVAL

A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.

END OF SECTION

SECTION 03 2000 - CONCRETE REINFORCING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel for cast-in-place concrete.

B. Supports and accessories for steel reinforcement.

1.2 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forming and Accessories.

B. Section 03 3000 - Cast-in-Place Concrete.

1.3 PRICE AND PAYMENT PROCEDURES

A. See Section 01 2200 - Unit Prices, for additional unit price requirements.

1.4 REFERENCE STANDARDS

A. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.

1.5 SUBMITTALS

A. See Section 01 3323 - Submittal Procedures, for submittal procedures.

1.6 QUALITY ASSURANCE

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Continuously Galvanized Reinforcing Steel:

1. AZZ, Inc; Galvabar; [_____]: www.azz.com/#sle.
2. Sika USA; www.usa.sika.com.
3. Nucor; www.nucor.com.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.2 REINFORCEMENT

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).

B. Stirrup Steel: ASTM A1064/A1064M steel wire, unfinished.

C. Steel Welded Wire Reinforcement (WWR): Galvanized, deformed type; ASTM A1064/A1064M.

1. Form: Flat Sheets.

D. Reinforcement Accessories:

2.3 FABRICATION

PART 3 EXECUTION

3.1 PLACEMENT

A. Place, support and secure reinforcement against displacement. Do not deviate from required position.

END OF SECTION

SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete formwork.

B. Floors and slabs on grade.

C. Concrete reinforcement.

D. Joint devices associated with concrete work.

E. Miscellaneous concrete elements, including flagpole bases, thrust blocks, and manholes.

F. Concrete curing.

1.2 RELATED REQUIREMENTS

A. Section 03 3511 - Concrete Floor Finishes: Densifiers, hardeners, applied coatings, and polishing.

B. Section 07 9200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

C. Section 32 1313 - Concrete Paving: Sidewalks, curbs and gutters.

1.3 PRICE AND PAYMENT PROCEDURES

A. Cast-in-place concrete work will be paid for by the unit price method.

B. Concrete - Slab-on-Fill or Slab-on-Grade: Includes formwork, reinforcement, concrete, placement accessories, consolidating and leveling, troweling, and curing. Measurement by:

1. Square foot.

1.4 REFERENCE STANDARDS

A. ACI 117 - Specifications for Tolerances for Concrete Construction and Materials 2010 (Reapproved 2015).

B. ACI 211.1 - Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete 1991 (Reapproved 2009).

C. ACI 301 - Specifications for Structural Concrete 2016.

D. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.

E. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).

F. ACI 308R - Guide to External Curing of Concrete 2016.

G. ACI 318 - Building Code Requirements for Structural Concrete 2019, with Errata (2021).

H. ACI 347R - Guide to Formwork for Concrete 2014, with Errata (2017).

I. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.

J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2018a.

K. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.

L. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2021b.

M. ASTM C150/C150M - Standard Specification for Portland Cement 2021.

N. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2017.

O. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) 2018.

P. ASTM D3963/D3963M - Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars 2021.

1.5 SUBMITTALS

A. See Section 01 3323 - Submittal Procedures, for submittal procedures.

B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.

C. Mix Design: Submit proposed concrete mix design.

1. Indicate proposed mix design complies with requirements of ACI 301, Section 4 - Concrete Mixtures.
2. Indicate proposed mix design complies with requirements of ACI 318, Chapter 5 - Concrete Quality, Mixing and Placing.

D. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

E. Warranty: Submit manufacturer warranty and ensure forms have been completed in Government's name and registered with manufacturer.

1.6 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI 301 and ACI 318.

1.7 WARRANTY

A. See Section 01 7700 - Closeout Procedures, for additional warranty requirements.

PART 2 PRODUCTS

2.1 FORMWORK

A. Formwork Design and Construction: Comply with guidelines of ACI 347R to provide formwork that will produce concrete complying with tolerances of ACI 117.

B. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.

2.2 REINFORCEMENT MATERIALS

A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).

1. Type: Deformed billet-steel bars.
2. Finish: Galvanized in accordance with ASTM A767/A767M, Class I, unless otherwise indicated.

B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.

1. Form: Flat Sheets.
2. WWR Style: 6 x 6-W1.4 x W1.4.

C. Reinforcement Accessories:

1. Tie Wire: Annealed, minimum 16 gage, 0.0508 inch.
2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150/C150M, Type I - Normal Portland type.

1. Acquire cement for entire project from same source.

B. Fine and Coarse Aggregates: ASTM C33/C33M.

1. Acquire aggregates for entire project from same source.

C. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

2.4 ACCESSORY MATERIALS

2.5 BONDING AND JOINTING PRODUCTS

A. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

1. Material: ASTM D1751, cellulose fiber.

2.6 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Normal Weight Concrete:

1. Water-Cement Ratio: Maximum 40 percent by weight.
2. Maximum Aggregate Size: 5/8 inch.

2.7 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C94/C94M.

C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

3.2 PREPARATION

A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.

B. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in according to bonding agent manufacturer's instructions.

3.3 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS

A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.

B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with concrete placement.

3.4 PLACING CONCRETE

A. Place concrete in accordance with ACI 304R.

B. Place concrete for floor slabs in accordance with ACI 302.1R.

C. Notify Contracting Officer not less than 24 hours prior to commencement of placement operations.

D. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.

E. Ensure reinforcement, inserts, waterstops, embedded parts, and formed construction joint devices will not be disturbed during concrete placement.

F. Place concrete continuously without construction (cold) joints wherever possible; where construction joints are necessary, before next placement prepare joint surface by removing laitance and exposing the sand and sound surface mortar, by sandblasting or high-pressure water jetting.

G. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

3.5 SLAB JOINTING

A. Locate joints as indicated on drawings.

B. Anchor joint fillers and devices to prevent movement during concrete placement.

C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

3.6 FLOOR FLATNESS AND LEVELNESS TOLERANCES

A. Maximum Variation of Surface Flatness:

1. Exposed Concrete Floors: 1/4 inch in 10 feet.
2. Under Seamless Resilient Flooring: 1/4 inch in 10 feet.
3. Under Carpeting: 1/4 inch in 10 feet.

B. Correct the slab surface if tolerances are less than specified.

C. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

3.7 CONCRETE FINISHING

A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:

1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

3.8 CURING AND PROTECTION

A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

C. Surfaces Not in Contact with Forms:

1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
2. Final Curing: Begin after initial curing but before surface is dry.

3.9 DEFECTIVE CONCRETE

A. Repair or replacement of defective concrete will be determined by the Contracting Officer. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

B. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of Contracting Officer for each individual area.

3.10 PROTECTION

A. Do not permit traffic over unprotected concrete floor surface until fully cured.

END OF SECTION

SECTION 06 1000 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

B. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing 2003 (Reapproved 2017).

C. ASTM D3498 - Standard Specification for Adhesives for Field-Gluing Wood Structural Panels (Plywood or Oriented Strand Board) to Wood Based Floor System Framing 2019a.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

E. AWPA U1 - Use Category System: User Specification for Treated Wood 2018.

F. PS 1 - Structural Plywood 2009.

G. PS 20 - American Softwood Lumber Standard 2020.

1.2 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on wood preservative materials and application instructions.

1.3 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

1. Species: Spruce-Pine-Fir (South), unless otherwise indicated.
2. If no species is specified, provide any species graded by the agency specified; if no grading agency is specified, provide lumber graded by any grading agency meeting the specified requirements.
3. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
4. Lumber of other species or grades is acceptable provided structural and appearance characteristics are equivalent to or better than products specified.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

1. Lumber: S4S, No. 2 or Standard Grade.
2. Boards: Standard or No. 3.

2.3 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.4 ACCESSORIES

A. Fasteners and Anchors:

1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.

B. Construction Adhesives: Adhesives complying with ASTM C557 or ASTM D3498.

2.5 FACTORY WOOD TREATMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

1. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.
2. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

B. Fire Retardant Treatment:

1. Manufacturers:
   a. Lonza Group: www.wolmanizedwood.com.
   b. Hoover Treated Wood Products, Inc: www.frtw.com.
   c. Koppers, Inc: www.koppersperformancechemicals.com.
   d. Viance, LLC: www.treatedwood.com.
   e. Substitutions: See Section 01 6000 - Product Requirements.
2. Interior Type A: AWPA U1, Use Category UCFA, Commodity Specification H, low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread index of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
   a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
   b. Treat rough carpentry items as indicated .
   c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:

1. Manufacturers:
   a. Lonza Group: www.wolmanizedwood.com.
   b. Koppers Performance Chemicals, Inc: www.koppersperformancechemicals.com.

c. Viance, LLC: www.treatedwood.com.
d. Substitutions: See Section 01 6000 - Product Requirements.

2. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.
   a. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
   b. Treat lumber exposed to weather.
   c. Treat lumber in contact with roofing, flashing, or waterproofing.
   d. Treat lumber in contact with masonry or concrete.
3. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA U1, Use Category UC4A, Commodity Specification A using waterborne preservative.
   a. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
   b. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

PART 3 EXECUTION

3.1 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.2 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.

D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

F. Provide the following specific non-structural framing and blocking:

1. Cabinets and shelf supports.
2. Wall brackets.
3. Handrails.
4. Grab bars.
5. Towel and bath accessories.
6. Wall-mounted door stops.
7. Chalkboards and marker boards.
8. Wall paneling and trim.

9. Joints of rigid wall coverings that occur between studs.

3.3 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

3.4 INSTALLATION OF CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.

1. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.
2. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.
3. Install adjacent boards without gaps.
4. Size: 48 by 96 inches, installed horizontally at ceiling height.

3.5 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

3.6 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.7 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.

1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 07 2100 - THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Batt insulation in exterior wall, ceiling, and roof construction.

B. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.2 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Supporting construction for batt insulation.

1.3 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

C. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C 2019a.

1.4 SUBMITTALS

A. See Section 01 3323 - Submitall Procedures, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

1.5 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.1 APPLICATIONS

A. Insulation in Wood Framed Walls: Batt insulation with integral vapor retarder.

B. Insulation in Wood Framed Ceiling Structure: Batt insulation with integral vapor retarder.

2.2 BATT INSULATION MATERIALS

A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.

B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.

1. Flame Spread Index: 75 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
3. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
4. Thermal Resistance: See drawings for R-value.
5. Facing: Aluminum foil, flame spread 25 rated; one side.
6. Manufacturers:
   a. CertainTeed Corporation: www.certainteed.com.
   b. Johns Manville: www.jm.com.

c. Owens Corning Corporation: www.ocbuildingspec.com.

C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.

1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
3. Thermal Resistance: See drawings for R-value.
4. Manufacturers:
   a. Johns Manville: www.jm.com.
   b. Knauf Insulation: www.knaufinsulation.com.
   c. ROCKWOOL (ROXUL, Inc): www.rockwool.com.
   d. Thermafiber, Inc: www.thermafiber.com.

2.3 ACCESSORIES

A. Tape joints of rigid insulation in accordance with insulation manufacturers' instructions.

B. Protection Board for Below Grade Insulation: Cementitious, 1/4 inch thick.

C. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.2 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install in exterior wall spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

3.3 PROTECTION

A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION

SECTION 07 9200 - JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

D. Government-provided field quality control.

1.2 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping: Firestopping sealants.

B. Section 09 3000 - Tiling: Sealant between tile and plumbing fixtures and at junctions with other materials and changes in plane.

1.3 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer 2015.

B. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants 2018.

C. ASTM C834 - Standard Specification for Latex Sealants 2017.

D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.

E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems 2016.

F. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.

G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2018.

H. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.

I. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints 2019 (Reapproved 2020).

J. SCAQMD 1168 - Adhesive and Sealant Applications 1989 (Amended 2017).

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.

1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
2. List of backing materials approved for use with the specific product.
3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
4. Substrates the product should not be used on.
5. Substrates for which use of primer is required.
6. Substrates for which laboratory adhesion and/or compatibility testing is required.

C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

D. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

E. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

F. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

G. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

H. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.

1. Adhesion Testing: In accordance with ASTM C794.
2. Compatibility Testing: In accordance with ASTM C1087.
3. Allow sufficient time for testing to avoid delaying the work.
4. Deliver to manufacturer sufficient samples for testing.
5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

E. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.

1. Identification of testing agency.
2. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
   a. Test date.
   b. Location on project.
   c. Sealant used.
   d. Stated movement capability of sealant.
   e. Test method used.
   f. Date of installation of field sample to be tested.
   g. Date of test.

h. Copy of test method documents.
i. Age of sealant upon date of testing.
j. Test results, modeled after the sample form in the test method document.
k. Indicate use of photographic record of test.

F. Government will employ an independent testing agency to perform the field quality control inspection and testing as referenced in PART 3 of this section and as follows, to prepare and submit the field quality control plan and log, and to provide recommendations of remedies in the case of failure.

1. Contractor shall cooperate with testing agency and repair failures discovered and destructive test location damage.

G. Field Quality Control Plan:

1. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

H. Field Adhesion Test Procedures:

1. Allow sealants to fully cure as recommended by manufacturer before testing.
2. Have a copy of the test method document available during tests.
3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
4. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
5. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Government.
6. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Contracting Officer.

I. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.

1. Sample: At least 18 inches long.
2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.

1.6 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.

1. Dow Chemical Company; [_____]: consumer.dow.com/en-us/industry/ind-building-construction.html.
2. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us.
3. Momentive Performance Materials, Inc (formerly GE Silicones) : www.momentive.com.
4. Pecora Corporation: www.pecora.com.
5. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com.

B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.

1. Master Builders Solutions by BASF: www.master-builders-solutions.basf.us/en-us.
2. Pecora Corporation: www.pecora.com.
3. Tremco Commercial Sealants & Waterproofing: www.tremcosealants.com.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.2 JOINT SEALANT APPLICATIONS

A. Scope:

1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
   a. Wall expansion and control joints.
   b. Joints between door, window, and other frames and adjacent construction.
   c. Joints between different exposed materials.
   d. Openings below ledge angles in masonry.
   e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
   a. Joints between door, window, and other frames and adjacent construction.
   b. Other joints indicated below.
3. Do not seal the following types of joints.
   a. Intentional weepholes in masonry.
   b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
   c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
   d. Joints where installation of sealant is specified in another section.
   e. Joints between suspended panel ceilings/grid and walls.

B. Interior Wet Areas: Bathrooms, restrooms, and kitchens; fixtures in wet areas include plumbing fixtures, countertops, and cabinets. Use mildew-resistant silicone sealant, unless otherwise indicated.

C. Joints between exterior sheathing panels: Use multi-part, non-sag polyurethane sealant, unless otherwise indicated.

D. Exterior joints in masonry, including expansion/control joints: Use low modulus silicone sealant, unless otherwise indicated.

E. Exterior and interior joints at perimeter of windows/storefront: Medium modulus silicone sealant, unless otherwise indicated.

F. Joints at perimeter of hollow metal framing: Medium modulus silicone sealant, unless otherwise indicated.

G. Exterior joints between wall finish and conduit & pipe penetrations, base plates of light fixtures, signage supports and other items applied to exterior wall surface: Medium modulus silicone sealant, unless otherwise indicated.

H. Interior concealed bedding joints and thresholds: Acrylic sealant, unless otherwise indicated.

I. Exterior and interior horizontal traffic-bearing joints, excluding tile floor joints: Two-part polyurethane sealant, unless otherwise indicated.

J. Tile expansion and control joint sealant: Refer to Tiling section.

K. Firestopped joints: Firestop sealant as specified in Firestopping section.

2.3 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.

2.4 NONSAG JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 50 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Hardness Range: 15 to 40, Shore A, when tested in accordance with ASTM C661.
5. Color: To be selected by Contracting Officer from manufacturer's standard range.
6. Manufacturers:
   a. Dow Chemical Company; DOWSIL 756 SMS Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html; Medium modulus silicone sealant for use at natural stone.
   b. Dow Chemical Company; DOWSIL 790 Silicone Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html; Low modulus silicone sealant.
   c. Dow Chemical Company; DOWSIL 795 Silicone Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html; Medium modulus silicone sealant.
   d. Pecora Corporation; Pecora 890 NST (Non-Staining Technology): www.pecora.com; Low modulus silicone sealant.
   e. Pecora Corporation; Pecora 895 NST (Non-Staining Technology): www.pecora.com; Medium modulus silicone sealant.
   f. Tremco Commercial Sealants & Waterproofing; Spectrem 1: www.tremcosealants.com; Low modulus silicone sealant.

g. Tremco Commercial Sealants & Waterproofing; Spectrem 2: www.tremcosealants.com; Medium modulus silicone sealant.
h. Tremco Commercial Sealants & Waterproofing; Spectrem 3: www.tremcosealants.com; Medium modulus silicone sealant for use at natural stone.

B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.

1. Color: To be selected by Architect from manufacturer's standard range.
2. Manufacturers:
   a. Dow Chemical Company; DOWSIL 786 Silicone Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html.
   b. Momentive Performance Materials, Inc.; GE Construction Sealants; GE SCS1700 Sanitary: www.siliconefor building.com.
   c. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com.

C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; multi-component; not expected to withstand continuous water immersion or traffic.

1. Movement Capability: Plus and minus 50 percent, minimum.
2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Contracting Officer from manufacturer's standard range.
4. Service Temperature Range: Minus 40 to 180 degrees F.
5. Manufacturers:
   a. Master Builders Solutions by BASF; MasterSeal NP-2: www.master-builders-solutions.basf.us/en-us.
   b. Pecora Corporation; DynaTrol II: www.pecora.com.
   c. Tremco Commercial Sealants & Waterproofing; Dymeric 240 FC : www.tremcosealants.com.

D. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; paintable; not intended for exterior use.

1. Color: To be selected by Contracting Officer from manufacturer's standard range.
2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).
3. Manufacturers:
   a. Master Builders Solutions by BASF; MasterSeal NP 520: www.master-builders-solutions.basf.us/en-us.
   b. Pecora Corporation; AC-20 +Silicone: www.pecora.com.
   c. Pecora Corporation; AVW-920: www.pecora.com.
   d. Tremco Commercial Sealants & Waterproofing; Tremflex 834 : www.tremcosealants.com.

2.5 SELF-LEVELING SEALANTS

A. Self-Leveling Polyurethane Sealant for Horizontal Expansion Joints: ASTM C920, Grade P, Uses T, M and O; multi-component; explicitly approved by manufacturer for horizontal expansion joints.

1. Movement Capability: Plus and minus 25 percent, minimum.
2. Hardness Range: 30 to 35, Shore A, when tested in accordance with ASTM C661.

3. Color: To be selected by Contracting Officer from manufacturer's standard range.
4. Manufacturers:
   a. Master Builders Solutions by BASF; MasterSeal SL2: www.master-builders-solutions.basf.us/en-us.
   b. Pecora Corporation; Urexpan NR-200: www.pecora.com.
   c. Tremco Commercial Sealants & Waterproofing; THC-901: www.tremcosealants.com.

2.6 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
   1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
   2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
   3. Open Cell: 40 to 50 percent larger in diameter than joint width.
   4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Contracting Officer of date and time that tests will be performed, at least seven days in advance.
   3. Record each test on Preinstallation Adhesion Test Log as indicated.
   4. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Contracting Officer.
   5. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.2 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.3 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer.

D. Install bond breaker backing tape where backer rod cannot be used.

E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.4 FIELD QUALITY CONTROL

A. Government will employ an independent testing agency to perform field quality control inspection and testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

END OF SECTION

SECTION 08 3100 - ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall and ceiling mounted access units.

1.2 RELATED REQUIREMENTS

A. Section 09 9113 - Exterior Painting: Field paint finish.

B. Section 09 9123 - Interior Painting: Field paint finish.

1.3 REFERENCE STANDARDS

A. ITS (DIR) - Directory of Listed Products current edition.

B. UL (FRD) - Fire Resistance Directory Current Edition.

1.4 SUBMITTALS

A. See Section 01 3323 Submittal Procedures, for submittal procedures.

B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of each access door and/or panel unit and it's relationship to the adjoining work.

D. Manufacturer's Installation Instructions: Indicate installation requirements.

E. Project Record Documents: Record actual locations of each access unit.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS ASSEMBLIES

A. Wall-Mounted Units:

1. Location: As required with locations approved by Contracting Officer.
2. Panel Material: Steel.
3. Size: 12 by 12 inches.
4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
5. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.

B. Ceiling-Mounted Units:

1. Location: As indicated on drawings.
2. Panel Material: Aluminum extrusion with gypsum board inlay.
3. Size - Lay-In Grid Ceilings: To match module of ceiling grid.
4. Size - Other Ceilings: 12 by 12 inches.

5. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.

2.2 WALL AND CEILING MOUNTED ACCESS UNITS

A. Manufacturers:

1. Activar Construction Products Group, Inc. - JL Industries; [_____]: www.activarcpg.com/#sle.
   a. Concealed-Frame Access Panel: Activar/JL Industries CT.
2. ACUDOR Products Inc: www.acudor.com.
   a. Wall and Ceiling Mounted Units: ACUDOR DW-5058.
3. Bauco Access Panel Solutions Inc: www.accesspanelsolutions.com/#sle.
   a. Concealed Hardware and Gypsum Board Inlay: Bauco Plus II - Access Panels.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.

1. Style: Exposed frame with door surface flush with frame surface.
   a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
2. Door Style: Single thickness with rolled or turned in edges.
3. Heavy Duty Frames: 14 gauge, 0.0747 inch, minimum thickness.
4. Heavy Duty Single Steel Sheet Door Panels: 14 gauge, 0.0747 inch, minimum thickness.
5. Door Panels to Receive Wall/Ceiling Finish: Surface recessed 5/8 inch back from wall face.
6. Steel Finish: Primed.
7. Primed and Factory Finish: Polyester powder coat; [_____] .
8. Hardware:
   a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
   b. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings are correctly sized and located.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to proceeding with this work.

B. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.3 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION

SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Performance criteria for gypsum board assemblies.

B. Metal stud wall framing.

C. Metal channel ceiling framing.

D. Acoustic insulation.

E. Gypsum sheathing.

F. Cementitious backing board.

G. Gypsum wallboard.

H. Joint treatment and accessories.

1.2 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 06 1000 - Rough Carpentry: Building framing and sheathing.

C. Section 06 1000 - Rough Carpentry: Wood blocking product and execution requirements.

D. Section 07 2100 - Thermal Insulation: Acoustic insulation.

E. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.

F. Section 07 9200 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

1.3 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units 2018.

B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units 1999 (Reaffirmed 2016).

C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017.

D. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.

E. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.

F. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2019b.

G. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness 2018.

H. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2018.

I. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base 2019.

J. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing 2017.

K. ASTM C1278/C1278M - Standard Specification for Fiber-Reinforced Gypsum Panel 2017.

L. ASTM C1280 - Standard Specification for Application of Exterior Gypsum Panel Products for Use as Sheathing 2018.

M. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units 2019.

N. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.

O. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels 2019.

P. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2016.

Q. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi 2015.

R. GA-216 - Application and Finishing of Gypsum Panel Products 2016.

S. UL (FRD) - Fire Resistance Directory Current Edition.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate special details associated with acoustic seals and [_____].

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

E. Test Reports: For stud framing products that do not comply with ASTM C645 or ASTM C754, provide independent laboratory reports showing maximum stud heights at required spacings and deflections.

F. Installer's Qualification Statement.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of experience.

PART 2 PRODUCTS

2.1 GYPSUM BOARD ASSEMBLIES

A. Provide completed assemblies complying with ASTM C840 and GA-216.

1. See PART 3 for finishing requirements.

B. Fire Rated Assemblies: Provide completed assemblies complying with applicable code.

1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.2 METAL FRAMING MATERIALS

A. Manufacturers - Metal Framing, Connectors, and Accessories:

1. ClarkDietrich: www.clarkdietrich.co.

2. Marino: www.marinoware.com.
3. Phillips Manufacturing Co: www.phillipsmfg.com.
4. Substitutions: See Section 01 6000 - Product Requirements.

B. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.

1. Studs: C-shaped with knurled or embossed faces.
2. Runners: U shaped, sized to match studs.
3. Ceiling Channels: C-shaped.
4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.

C. Non-structural Framing Accessories:

2.3 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:

1. American Gypsum Company: www.americangypsum.com.
2. CertainTeed Corporation: www.certainteed.com/#sle.
3. Continental Building Products: www.continental-bp.com.
4. Georgia-Pacific Gypsum: www.gpgypsum.com.
5. National Gypsum Company: www.nationalgypsum.com.
6. PABCO Gypsum; [____]: www.pabcogypsum.com/#sle.
7. USG Corporation: www.usg.com.
8. Substitutions: See Section 01 6000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
2. Glass mat faced gypsum panels, as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
3. Unfaced fiber-reinforced gypsum panels as defined in ASTM C1278/C1278M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
4. Lightweight gypsum panels meeting ASTM C1396/C1396M with a weight of 1.8lb./sq.ft., may be substituted for standard weight paper-faced board.
5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   a. Mold resistant board is required at all locations.
6. Thickness:
   a. Vertical Surfaces: 5/8 inch, V.I.F.
   b. Ceilings: 5/8 inch, V.I.F.
   c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.

C. Backing Board For Wet Areas: One of the following products:

1. Application: Surfaces behind tile in wet areas including tub and shower surrounds, shower ceilings, and wet walls in restrooms.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.

a. Thickness: 1/2 inch.
b. Manufacturers:
1) Custom Building Products: www.custombuildingproducts.com.
2) National Gypsum Company: www.nationalgypsum.com.
3) USG Corporation: www.usg.com.
4) Substitutions: See Section 01 6000 - Product Requirements.

D. Backing Board For Non-Wet Areas: Water-resistant gypsum backing board as defined in ASTM C1396/C1396M; sizes to minimum joints in place; ends square cut.

1. Application: Vertical surfaces behind thinset tile, except in wet areas.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. At Assemblies Indicated with Fire-Resistance Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
4. Type: Regular and Type X, in locations indicated.
5. Type X Thickness: 5/8 inch.
6. Regular Board Thickness: 5/8 inch.
7. Edges: Tapered.
8. Products:
a. American Gypsum Company; M-Bloc: www.americangypsum.com/#sle.
b. American Gypsum Company; M-Bloc Type X: www.americangypsum.com/#sle.
c. Georgia-Pacific Gypsum; ToughRock Mold-Guard Gypsum Board: www.gpgypsum.com/#sle.
d. Georgia-Pacific Gypsum; DensArmor Plus: www.gpgypsum.com/#sle.
e. National Gypsum Company; Gold Bond XP Gypsum Board: www.nationalgypsum.com/#sle.
f. Substitutions: See Section 01 6000 - Product Requirements.

E. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.

1. Application: Ceilings, unless otherwise indicated.
2. Thickness: 1/2 inch.
3. Edges: Tapered.

F. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.

1. Application: Exterior sheathing, unless otherwise indicated.
2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
3. Fungal Resistance: No fungal growth when tested in accordance with ASTM G21.
4. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
5. Type X Thickness: 5/8 inch.
6. Edges: Square.

2.4 GYPSUM WALLBOARD ACCESSORIES

A. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.

B. Water-Resistive Barrier: As specified in Section 07 2500.

C. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless noted otherwise.

1. Types: Match appearance of adjoinging work.
2. Products:
   a. Same manufacturer as framing materials.
   b. Phillips Manufacturing Co: www.phillipsmfg.com.
   c. Trim-tex, Inc: www.trim-tex.com.
   d. Substitutions: See Section 01 6000 - Product Requirements.

D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.

1. Fiberglass Tape: 2 inch wide, coated glass fiber tape for joints and corners, except as otherwise indicated.
2. Joint Compound: Setting type, field-mixed.

E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.

F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion-resistant.

G. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

3.2 FRAMING INSTALLATION

A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.

B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.

1. Level ceiling system to a tolerance of 1/1200.
2. Laterally brace entire suspension system.

C. Studs: Space studs at 16 inches on center.

1. Extend partition framing to structure where indicated and to ceiling in other locations.
2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 24 inches on center.

1. Orientation: Horizontal.
2. Spacing: As indicated.

F. Blocking: Install wood blocking for support of:

1. Wall-mounted cabinets.
2. Toilet partitions.
3. Toilet accessories.

3.3 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.4 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Nonrated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.

1. Seal joints, cut edges, and holes with water-resistant sealant.

D. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

E. Installation on Metal Framing: Use screws for attachment of gypsum board.

3.5 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.

1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
2. At exterior soffits, not more than 30 feet apart in both directions.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

3.6 JOINT TREATMENT

A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:

1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
3. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
4. Level 1: Fire-resistance-rated wall areas above finished ceilings, whether or not accessible in the completed construction.

B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

1. Feather coats of joint compound so that camber is maximum 1/32 inch.

C. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

D. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.7 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 9113 - EXTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and as noted on drawings .

D. Do Not Paint or Finish the Following Items:

1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
5. Non-metallic roofing and flashing.
6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
7. Marble, granite, slate, and other natural stones.
8. Floors, unless specifically indicated.
9. Ceramic and other types of tiles.
10. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
11. Exterior insulation and finish system (EIFS).
12. Glass.
13. Concealed pipes, ducts, and conduits.

1.2 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.3 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
4. Manufacturer's installation instructions.

B. Samples: Submit two painted samples, illustrating selected colors and textures for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 8 1/2 x 11 inch in size.

C. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

D. Maintenance Materials: Furnish the following for Government's use in maintenance of project.

1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
2. Label each container with color in addition to the manufacturer's label.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.6 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:

1. Benjamin Moore & Co.: www.benjaminmoore.com.
2. PPG Paints: www.ppgpaints.com.
3. Sherwin-Williams Company: www.sherwin-williams.com.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.

1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.

3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
5. Supply each paint material in quantity required to complete entire project's work from a single production run.
6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:

1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
      1) Opaque, Flat: 50 g/L, maximum.
      2) Opaque, Nonflat: 150 g/L, maximum.
      3) Opaque, High Gloss: 250 g/L, maximum.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Contracting Officer from the manufacturer's full line.

E. Colors: As indicated on drawings.

1. Extend colors to surface edges; colors may change at any edge as directed by Contracting Officer.

2.3 PAINT SYSTEMS - EXTERIOR

A. Exterior Surfaces to be Painted, Unless Otherwise Indicated: Including primed metal and bare steel.

1. Two top coats and one coat primer.
2. Top Coat(s): Exterior Latex; MPI #10, 11, 15, 119, or 214.
3. Top Coat Sheen:
   a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.

PART 3 EXECUTION

3.1 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

3.2 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance.

D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

END OF SECTION

SECTION 09 9123 - INTERIOR PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.

D. Do Not Paint or Finish the Following Items:

1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
2. Items indicated to receive other finishes.
3. Items indicated to remain unfinished.
4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
6. Floors, unless specifically indicated.
7. Glass.
8. Concealed pipes, ducts, and conduits.

1.2 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency current edition.

B. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials 2020.

C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association Current Edition.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual Current Edition.

1.3 SUBMITTALS

A. Product Data: Provide complete list of products to be used, with the following information for each:

1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
2. MPI product number (e.g. MPI #47).
3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
4. Manufacturer's installation instructions.

B. Samples: Submit two painted samples, illustrating selected colors for each color and system selected with specified coats cascaded. Submit on tempered hardboard, 8 1/2 x 11 inch in size.

C. Manufacturer's Instructions: Indicate special surface preparation procedures.

D. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

E. Maintenance Materials: Furnish the following for Government's use in maintenance of project.

1. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
2. Label each container with color in addition to the manufacturer's label.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum three years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum three years experience and approved by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.6 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:

1. Benjamin Moore & Co.; www.benjaminmoore.com.
2. PPG Paints: www.ppgpaints.com.
3. Sherwin-Williams Company: www.sherwin-williams.com.

C. Primer Sealers: Same manufacturer as top coats.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.2 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.

1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
5. Supply each paint material in quantity required to complete entire project's work from a single production run.
6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:

1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
   a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
   b. Ozone Transport Commission (OTC) Model Rule, Architectural, Industrial, and Maintenance Coatings; www.otcair.org; specifically:
      1) Opaque, Flat: 50 g/L, maximum.
      2) Opaque, Nonflat: 150 g/L, maximum.
      3) Opaque, High Gloss: 250 g/L, maximum.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Contracting Officer from the manufacturer's full line.

E. Colors: To be selected from manufacturer's full range of available colors.

1. Selection to be made by Contracting Officer after award of contract.
2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Government.
3. Extend colors to surface edges; colors may change at any edge as directed by Contracting Officer.

2.3 PAINT SYSTEMS - INTERIOR

A. Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete masonry units, and wood.

1. Two top coats and one coat primer.
2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
3. Top Coat Sheen:
   a. Eggshell: MPI gloss level 3; use this sheen at all locations.

4. Primer: As recommended by top coat manufacturer for specific substrate.

B. Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including metals:

1. Medium duty applications include door frames.
2. Two top coats and one coat primer.
3. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
4. Top Coat Sheen:
   a. Semi-Gloss: MPI gloss level 5; use this sheen at all locations.
5. Primer: As recommended by top coat manufacturer for specific substrate.

2.4 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:

1. Gypsum Wallboard: 12 percent.
2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.

3.2 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

D. Seal surfaces that might cause bleed through or staining of topcoat.

E. Masonry:

1. Prepare surface as recommended by top coat manufacturer.

F. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

G. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

3.3 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

E. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

F. Sand wood and metal surfaces lightly between coats to achieve required finish.

G. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

H. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.4 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.5 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION

SECTION 21 1317 – DRY PIPE SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

A. The publications listed below form a part of this specification section to the extent referenced. The publications are referred to within the text by the basic designation only. Use the latest edition, unless noted otherwise.

B. AMERICAN SOCIETY OF SANITARY ENGINEERING (ASSE)

1. ASSE 1015, Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies

C. AMERICAN WATER WORKS ASSOCIATION (AWWA)

1. AWWA C104/A21.4, American National Standard for Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
2. AWWA C110/A21.10, American National Standard for Ductile-Iron and Gray-Iron Fittings for Water
3. AWWA C111/A21.11, American National Standard for Rubber Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings
4. AWWA C201, Standard for Coal Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot Applied
5. AWWA M14, Backflow Prevention and Cross Connection Control: Recommended Practices

D. ASME INTERNATIONAL (ASME)

1. ASME B16.1, Gray Iron Pipe Flanges and Flanged Fittings; Classes 25, 125, and 250
2. ASME B16.3, Malleable Iron Threaded Fittings, Classes 150 and 300
3. ASME B16.4, Standard for Gray Iron Threaded Fittings, Classes 125 and 250
4. ASME B16.9, Standard for Factory-Made Wrought Steel Buttwelding Fittings
5. ASME B16.11, Forged Fittings, Socket-Welding and Threaded
6. ASME B16.21, Nonmetallic Flat Gaskets for Pipe Flanges

E. ASTM INTERNATIONAL (ASTM)

1. ASTM A135, Standard Specification for Electric-Resistance-Welded Steel Pipe
2. ASTM A153, Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware
3. ASTM A183, Standard Specification for Carbon Steel Track Bolts and Nuts
4. ASTM A193, Standard Specification for Alloy Steel and Stainless Steel Bolting Materials for High-Temperature Service and Other Special Purpose Applications
5. ASTM A449, Standard Specification for Hex Cap Screws, Bolts, and Studs, Steel Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
6. ASTM A47, Standard Specification for Ferritic Malleable Iron Castings
7. ASTM A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
8. ASTM A536, Standard Specification for Ductile-Iron Castings
9. ASTM A795, Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use

F. FM GLOBAL (FM)

1. FM App Guide, Approval Guide http://www.approvalguide.com/

G. MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

1. MSS SP-71, Gray-Iron Swing Check Valves, Flanged and Threaded Ends

H. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

1. NFPA 13, (2019) Standard for the Installation of Sprinkler Systems
2. NFPA 170, (2018) Standard for Fire Safety and Emergency Symbols
3. NFPA 1963, (2019) Standard for Fire Hose Connections

I. NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES (NICET)

1. NICET 1014-7, Program Detail Manual for Certification in the Field of Fire Protection Engineering Technology (Field Code 003) Subfield of Automatic Sprinkler System Layout

J. UNDERWRITERS LABORATORIES (UL)

1. UL 199, Automatic Sprinklers for Fire-Protection Service
2. UL 203, Pipe Hanger Equipment for Fire Protection Service
3. UL 206, Standard for Dry Pipe and Deluge Valves for Fire-Protection Service
4. UL 213, Standard for Rubber Gasketed Fittings for Fire-Protection Service
5. UL 262, Standard for Gate Valves for Fire-Protection Service
6. UL 312, Check Valves for Fire-Protection Service
7. UL 393, Standard for Indicating Pressure Gauges for Fire-Protection Service
8. UL 405, Fire Department Connection Devices
9. UL 668, Hose Valves for Fire-Protection Service
10. UL Fire Prot Dir, http://productspec.ul.com/index.php

1.2 NOTICE TO BIDDERS

A. Before submittal of bid, examine all drawings, specification, addenda, alternatives, special conditions, and all other bidding documents of all sections of this project, verifying all governing conditions at the site, and become fully informed as to the extent and character of the work required, as well as its relation to other work in the building. Submittal of a bid is an agreement to all requirements of the contract documents and no consideration will be granted for any claimed misunderstanding thereof.

B. Submittal of a bid is deemed a representation by the bidder that he is qualified in all respects to properly perform the work for which he is bidding and has experience with similar work. Bidders are deemed to be aware, based on their background and experience, of materials which may be required in the discharge of their responsibilities, even though unspecified.

1.3 SYSTEM DESCRIPTION

A. Provide new dry pipe sprinkler system in areas indicated on the drawings. Except as modified herein, the system must be designed and installed in accordance with NFPA 13. Dry pipe systems must utilize nitrogen. The contractor must design any portions of the sprinkler system that are not indicated on the drawings or specified herein, including locating and sizing sprinklers, piping, and equipment. The design of the sprinkler system must be based on hydraulic calculations, and the other provisions specified herein.

B. Hydraulic Design: The system must be hydraulically designed to discharge a minimum density as indicated on the drawings. Hydraulic calculations must be in accordance with NFPA 13.

C. Basis for Calculations: A waterflow test was performed on July 27, 2021 at 502 Auburn Avenue by City of Atlanta and resulted in a static pressure of 65 psi (hydrant #655) with a residual pressure of 56 psi while flowing 1,090 gpm (hydrant #24306). The fire sprinkler subcontractor must perform an additional fire hydrant flow test within 6 months prior to shop drawings submittal. The results must be included with the hydraulic calculations. The hydraulic calculations must be based on the lower residual pressure at the design flow. Hydraulic calculations must be based upon the Hazen-Williams formula with a "C" value of 120 for wet steel piping, 100 for dry steel piping, 100 for underground unlined cast-iron or ductile-iron piping, and 150 for underground plastic piping. When nitrogen is utilized in a dry pipe system, a "C" value of 120 is permitted to be used in hydraulic calculations for dry system piping.

D. Sprinkler Coverage: Sprinklers must be uniformly spaced on branch lines. Coverage per sprinkler must be in accordance with NFPA 13. Provide sprinklers below fixed obstructions over 4 feet 0 inches wide and as required due to obstructions located within 18 inches of sprinklers.

E. System Volume Limitations: Where the volume of any individual system piping exceeds 500 gallons, provide the dry pipe valve with a quick-opening device. The maximum system capacity controlled by one dry pipe valve must not exceed 750 gallons, unless it complies with the dry pipe system water delivery calculations noted in NFPA 13.

1.4 SUBMITTALS

A. Submit three copies and electronic copy in pdf format of the following, no later than 21 days prior to the start of system installation, in accordance with the General Conditions of the Contract. Drawings, unless noted otherwise, must be no smaller than the Contract Drawings.

1. Shop Drawings: Detail drawings conforming to the requirements prescribed in NFPA 13 and NFPA 170. Drawings must include plan and elevation views which establish that the equipment will fit the allotted spaces with clearance for installation and maintenance. Each set of drawings must include the following:
    a. A descriptive index with drawings listed in sequence by number. A legend sheet identifying device symbols, nomenclature, and conventions used in the package.
    b. CAD-developed floor plans drawn to a scale not less than 1/8-inch equals 1-foot clearly showing locations of sprinklers, piping, risers, hangers, hydraulic nodes, and other details required to clearly describe the proposed arrangement.
    c. Riser layout drawings drawn to a scale of not less than 1/2-inch equals 1-foot to show details of each system component, clearances between each other and from other equipment, and construction of the room.
    d. Details of each type of pipe hanger and related components.
    e. Indicate the calculated volume of each system.
    f. Indicate the model of the dry pipe valve assembly and "set" pressure.
    g. Shop drawings and calculations must be prepared by a qualified NICET Level III (or IV) technician.
2. Hydraulic calculations must be as outlined in NFPA 13 except that calculations must be performed by computer using software intended specifically for fire protection

system design using the design data shown on the drawings. Calculations must be based on the water supply data provided in the specification section or the contractor's test results, whichever is more restrictive. Calculations must substantiate that the design area used in the calculations is the most demanding hydraulically. Water supply curves and system requirements must be plotted on semi-logarithmic graph paper so as to present a summary of the complete hydraulic calculation. A summary sheet listing sprinklers in the design area and their respective hydraulic reference points, elevations, calculated discharge pressures and calculated flows must be provided. Elevations of hydraulic reference points (nodes) must be indicated. Documentation must identify each pipe individually and the noted connected thereto. The diameter, length, flow, velocity, friction loss, number and type of fittings, total friction loss in the pipe, equivalent pipe length, and Hazen-Williams coefficient must be indicated for each pipe.

3. Product Data: Annotate catalog data showing manufacturer's name model, and catalog number for all equipment and components, with data highlighted to indicate model, size, options, etc. proposed for installation. In addition, a complete equipment list with equipment description, model number, and quantity must be provided. This must include the following:
   a. Pipe, fittings, and mechanical couplings
   b. Valves, including gate, check, butterfly, and globe
   c. Dry pipe valves
   d. Relief valves
   e. Pipe hangers and supports
   f. Nitrogen generation system
   g. Waterflow and tamper switches
   h. Sprinklers
   i. Fire department connection
   j. Backflow prevention devices
   k. Miscellaneous equipment (such as spare sprinkler cabinet, signs, etc.)
4. Installer's Qualifications: Qualifications must be approved prior to submittal of any other data or drawings, to substantiate that the proposed installer is regularly engaged in the installation of the type and complexity of fire protection system included in this project. Submit documentation to identify the location of three systems recently installed by the proposed installer which are comparable to the system specified. Contractor must certify that each system has performed satisfactorily, in the manner intended, for a period of not less than 6 months. Submit a copy of license to perform work in the local jurisdiction and submit certification for the personnel working on the project as detailed in 1.5 QUALITY ASSURANCE.
5. Test Reports: "Contractor's Material and Test Certificate for Underground Piping" and "Contractor's Material and Test Certificate for Aboveground Piping" as outlined in NFPA 13.
6. As-Built Drawings: Furnish three and one set of CD or DVD discs containing CAD based drawings, in the latest version of AutoCAD and DXF format, and pdf of as-built drawings and schematics. A separate set of approved submittal drawings of the overall system, marked up to indicate as-built conditions, must be maintained on-site. These drawings must be maintained in a current condition at all times and be made available for review immediately upon request during normal working hours. Variations from the approved drawings, for whatever reason, including those

occasioned by modifications, change orders, optional materials, and/or required for coordination between trades must be indicated in sufficient detail to accurately reflect the as-built conditions. These drawings must be submitted within 14 calendar days after the final acceptance test of the system.

7. Operation and Maintenance Data: Furnish three and one set of CD or DVD discs of manuals in loose-leaf binder format and grouped by technical sections consisting of manufacture's brochures, schematics, printed instructions, general operating procedures, and safety precautions. Manuals must be submitted and approved prior to final testing. The manual must include the following documents and information at a minimum:
   a. A general description of the design and operation of the system(s)
   b. Comply with "Records" section of NFPA 25.
   c. A copy of the as-built design drawings in 11 x 17-inch format, folded neatly within the binder.
   d. All applicable product installation sheets annotated as necessary.
   e. Step-by-step procedures required for system startup, operation, and shutdown, including the sequence or sequences of operation of the overall fire protection system and a separate description for each major subsystem.
   f. The manufacturer's name, model number, service manual, parts list, and complete description for each major subsystem.
   g. Maintenance manual listing routine maintenance procedures, possible breakdowns and repairs, troubleshooting guide, and system warranty information.
   h. Routine maintenance checklist. The routine maintenance checklist must be arranged in columnar format. The first column must list all installed devices, the second column must state the maintenance activity or state no maintenance required, the third column must state the frequency of the maintenance activity, and the fourth column for additional comments or reference.
8. Training Documentation: Provide in manual format, operating instructions, maintenance procedures, and training data for the training courses. The operations training must familiarize the Owner's designated personnel with the proper operation of the installed system. The maintenance training course must provide the Owner's designated personnel adequate knowledge required to diagnose, repair, maintain, and expand functions inherent to the system.

1.5 QUALITY ASSURANCE

A. Qualifications - Contractor: The contractor must be a licensed contractor in possession of a valid sprinkler contractor's license. The contractor must have a minimum of 3 years of experience in the installation of special hazard systems in similar facilities.

B. Qualifications - Design Services: Shop (working) drawings and calculations must be prepared under the directions of and signed by a qualified registered professional engineer or a NICET Level III (minimum) in water-based systems. For the purposes of meeting this requirement, a qualified engineer is defined as an individual meeting one of the following conditions:

   1. A registered professional engineer having passed the NCEES examination in fire protection engineering.
   2. Registered professional engineer with verification of experience and at least 5 years of current experience in the design of fire protection and detection systems.

C. Qualifications - Supervisor: A NICET Level III (minimum) in water-based systems must supervise the installation of the fire sprinkler system.

D. Qualifications - Installer: Fire sprinkler installer with a minimum of 2 years of experience is permitted to assist in the installation of fire sprinkler systems.

E. Qualifications - Test Personnel: Fire sprinkler technicians with a minimum of 8 years of experience must be utilized to test and certify the installation of the fire sprinkler system. The fire sprinkler technicians testing the equipment must be factory-trained in the installation, adjustment, testing, and operation of the equipment specified herein and on the drawings.

F. Nitrogen Generation Commissioning Technician: Commissioning technician of nitrogen generation system must be carried out by technician employed by and certified by the nitrogen system manufacturer. In lieu of manufacturer's commissioning technician, the fire sprinkler contractor must provide proof their commissioning technician has manufacturer's certified training for the equipment being installed and proof of at least five previous installations of manufacturer's equipment where the contractor's commissioning technician has successfully conducted commissioning under the direct supervision of the manufacturer's commissioning representative. Commissioning carried out prior to factory training, or without supervision of the manufacturer's technician or commissioning of other manufacturer's equipment does not qualify as applicable experience. Conducting preliminary inspections and testing does not qualify as applicable experience.

1.6 REGULATORY REQUIREMENTS

A. All system components must be listed or approved for their intended use and must be compatible with the system and its components. Where the terms "listed" or "approved" appear in this specification section, they mean UL-listed (UL Fire Prot Dir), FM-approved (FM App Guide), or listed by a nationally recognized testing laboratory (NRTL). The omission of these terms under the description of any item of equipment described must not be construed as waiving the requirement for listing or approval. All listings or approvals must be based on an existing ANSI or UL published standard.

B. Compliance with referenced standards is mandatory. In the event of a conflict between specific provisions of this specification section and applicable standards, this specification section must govern.

C. The fire protection installer and contractor must comply fully with all city, county, and state laws and ordinances and regulations applicable to fire protection installations.

D. Should any change in plans or specification be required to comply with governmental regulations, the contractor must notify the Engineer at the time of submitting his bid.

E. Secure and pay for necessary approvals, permits, inspections, etc., and deliver the official records of granting the permits to the Owner's Representative without additional cost to the Owner.

1.7 VERIFYING ACTUAL FIELD CONDITIONS

A. Before commencing work, examine all adjoining work on which the contractor's work is in any way dependent for perfect workmanship according to the intent of this specification section, and report to the Owner's Representative any condition which prevents performance of first class work. No "waiver of responsibility" for incomplete, inadequate, or defective adjoining work will be considered unless notice has been filed before submittal of a proposal.

B. The contractor must become familiar with all details of the work, verify all dimensions in the field, and must advise the Owner's Representative of any discrepancy before performing the work.

1.8 COORDINATION OF TRADES

A. The contract documents are not intended to serve as coordinated construction drawings showing all minor adjustments in locations required for a fully coordinated installation that respects the work of all trades.

B. Pipe offsets, fittings, and any other accessories required must be furnished as required to provide a complete installation and to eliminate interference with other construction. Sprinklers must be installed over and under piping and platforms when such equipment can negatively affect or disrupt the sprinkler discharge pattern and coverage.

C. Wherever the contractor's work interconnects with work of other contractors, the contractor must coordinate his work with other contractors to ensure that all contractors have the information necessary so that they may properly install all necessary connections and equipment.

D. Provide required supports and hangers for piping, conduit, and equipment, so that loading will not exceed allowable loadings of structure. Submittal of a bid must be a deemed representation that the contractor submitting such bid has ascertained allowable loadings and has included in his estimates the costs associated in furnishing required supports.

E. Field drilling and cutting of holes in structural decks, roofs, walls, etc., required for work under this specification section Is not permitted.

F. Due to the type of installation, a fixed sequence of construction is required to properly install the complete systems. It must be the responsibility of the contractor to coordinate, protect, and schedule his work with other trades in accordance with the construction sequence.

G. Cooperate with all other contractors and subcontractors to facilitate the completion of the work as a whole, subject to the direction of the Owner's Representative.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Protect equipment delivered and placed in storage from the weather, excessive humidity, temperature variation, dirt and dust, and other contaminants in accordance with manufacturer's instructions.

B. All pipes must either be capped or plugged until installation.

C. Coordinate the storage arrangement and location with the Owner's Representative.

D. Delivery and store products in shipping containers/boxes, with labeling in place.

E. Provide temporary weather protection for cast-iron and steel valves and fittings.

1.10 WASTE REMOVAL

A. At the conclusion of each day's work, clean up and stockpile on-site all waste, debris, and trash, which may have accumulated during the day as a result of work by the contractor and his presence on the job.

B. Sidewalks and street adjoining the property must be kept broom clean and free of waste, debris, trash and obstructions of any kind caused by work of the contractor, which will affect the condition and safety of streets, walks, utilities, and property.

1.11 SPARE PARTS

A. Repair Service/Replacement Parts: During warranty period, the service technician must be on-site within 24 hours after notification. All repairs must be completed within 24 hours of arrival on-site.

B. The contractor must provide spare sprinklers, sprinkler wrench, and sprinkler cabinet in accordance with NFPA 13.

PART 2 - PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Material and equipment must be the standard products of a single manufacturer, where possible, and not a combination of manufacturers for any particular classification of materials. Materials and equipment must be standard products of a manufacturer regularly engaged in the manufacture of such products and must essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. All materials and equipment supplied must be new, first quality and the manufacturer's best type and latest model capable of complying with all requirements of this specification section and must have been in continuous production and in continuous service in commercial application for at least one-year. Obsolete equipment must not be used.

B. All equipment must have a nameplate that identifies the manufacturer's name, address, type or style, model or serial number, and catalog number. Nameplates must be etched metal or plastic, permanently attached by screws to equipment or adjacent walls.

2.2 ABOVEGROUND PIPING SYSTEMS

A. Steel Pipe: Pipe must be black steel, standard weight conforming to ASTM A795, ASTM A53, or ASTM A135. Galvanized piping is not permitted. Piping less than 2-inch in diameter must be minimum schedule 40 and joined by threaded fittings. Piping 2 inches and greater must be minimum schedule 40 and joined by threaded or cut grooved, no roll grooved. Piping in which threads or grooves are cut most have a corrosion resistance ratio (CRR) of 1.00 or greater after threads or grooves are cut. Pipe must be marked as to the brand or name of the manufacturer, kind of pipe, and the ASTM designation in accordance with the "Product Marking" provisions of the ASTM standards.

B. Grooved Fittings and Couplings: Grooved fittings, couplings and bolts must be provided by the same manufacturer. Fittings and couplings must be malleable iron complying with ASTM A47 or ductile-iron complying with ASTM A536. Couplings must be of the rigid type except that flexible type will be provided where flexible joints are specifically required by NFPA 13. Couplings and gaskets for fittings must be by the fitting manufacturer. Coupling gaskets must be Grade E (EPDM) approved for dry pipe systems. Gaskets must be the flush type that fills the entire cavity between the coupling and the pipe. Nuts and bolts must be heat-treated steel conforming to ASTM A183 and must be cadmium plated or zinc electroplated. Plain-end fittings with mechanical couplings, fittings which require drilling a hole in the pipe, and fittings which use steel gripping devices to bite into the pipe, must not be used. Comply with UL 213.

C. Non-Grooved Fittings: Non-grooved fittings must be threaded or flanged. Threaded fittings must be cast-iron conforming to ASME B16.4, malleable iron conforming to ASME B16.3, or ductile-iron conforming to ASTM A536. Fittings into which sprinklers, drop nipples, or riser nipples (sprigs) are screwed must be threaded type. Plain-end fittings with

mechanical couplings, fittings which require drilling a hole in the pipe, and fittings which use steel gripping devices to bite into the pipe, must not be used.

D. Flanges and Gaskets: Flanges must conform to NFPA 13 and ASME B16.1. Flanges must be the type that are welded or threaded to the pipe. Flanges which are bolted to grooved pipe must not be permitted. Gaskets must be full face type EPDM or other approved material.

E. Pipe Hangers: Hangers must be listed or approved and be of the type suitable for the application, construction, and size pipe involved. Comply with UL 203.

F. Control Valve: Manually operated sprinkler control valve and gate valve must be outside stem and yoke (OS&Y) type or butterfly type and must be listed or approved.

G. Check Valve: Check valves must comply with UL 312. Check valve 2 inches and larger must be listed or approved. Check valves 4 inches and larger must be of the swing type with flanged cast-iron body and flanged inspection plate, must have a clear waterway, and must meet the requirements of MSS SP-71, for Type 3 or 4.

H. Hose Valve: Valve must comply with UL 668 and must have a minimum rating of 300 pounds per square inch. Valve must be non-rising stem, all bronze, with 2 1/2-inch American National Standard Fire Hose Screw Thread (NH) male outlet in accordance with NFPA 1963. Hose valves must be equipped with lugged cap with drip drain, cap gasket and chain. Valve finish must be polished brass.

2.3 DRY PIPE VALVE ASSEMBLY

A. The dry pipe valve must be a listed, latching differential type complete with trim piping, valves, fittings, pressure gauges, priming water fill cup, velocity drip check, drip cup, and other ancillary components as required for proper operation. The valve must be externally resettable. The assembly must include a quick-opening device by the same manufacturer as the dry pipe valve for systems over 500 gallons in capacity and in all cases when needed to achieve the timed test requirements in Part 3 of this specification section. Comply with UL 2016.

2.4 NITROGEN SYSTEM

A. Provide a nitrogen supply system in accordance with NFPA 13. The connection pipe from the nitrogen generator must not be less than 1/2-inch in diameter and must enter the system above the priming water level of the dry pipe valve. Install a check valve in the system supply nitrogen piping from the generator. A shutoff valve of the renewable disc type must be installed upstream of this check valve.

1. Nitrogen Generation System: The nitrogen generation system (NGS) must be installed with a compressor sized appropriately for the application and capable of achieving system pressure within 30 minutes in accordance with the requirements of NFPA 13. The NGS must be designed to achieve a nitrogen concentration of 98 percent or greater and maintain that concentration within the fire sprinkler system continuously. The output nitrogen quality must be confirmed by using a gas stream analyzer. Nitrogen generation system requires a dedicated, hardwired 120V AC power supply.
2. Design of Nitrogen Generation System: Design the system so all equipment is installed within the confines of the riser room with the exception of a connection for a manual or automatic gas analyzer. Provide a system that is capable of delivering a minimum of 98 percent nitrogen composition throughout all of the system piping within 14 days from the commencement of the inerting process. Provide membrane

type nitrogen generators that provide "instant on-instant off" nitrogen gas production without the need for nitrogen storage tanks. The complete nitrogen generator system must be self-contained and skid mounted with "drop-in" operability with a simple one step direct connection of the nitrogen gas supply line to each zone/riser. Provide an automatic "fill and purge" breathing process. This must be done while the sprinkler system is fully functional and must not alter the design performance of the sprinkler system. A process that involves continuous venting of the piping network is not permitted. Any air maintenance device used in conjunction with the nitrogen generation system must be listed for use on sprinkler systems. At the riser and at the end of each zone, provide a connection for a manual gas analyzer.

3. Nitrogen Air Compressor: Any air compressor to be used in conjunction with the nitrogen generator must be capable of the following:
   a. Capable of producing a continuous stream of compressed air at 100+ psig.
   b. Capable of automatic cut in and cut out.
   c. Equipped with an on-board after cooler.
   d. Equipped with an on-board automatic water blow down system
   e. Equipped with vibration dampening system.
   f. Equipped with an air storage tank to provide continuous delivery of compressed air to the nitrogen generator.
   g. Rated for continuous duty service.
   h. Oil-less compressors must be such that the manufacturer has designed the oil-less compressor to provide 5000 hours of continuous duty service before requiring a gasket and seal rebuild.
4. Nitrogen Venting Device: The functional component of the nitrogen venting device for use in the "fill and purge" breathing process must:
   a. Be NRTL listed for use on sprinkler systems.
   b. Not require plumbing to drain.
   c. Close automatically at the completion of the nitrogen inerting process without manual intervention.
   d. Be installed on each zone in the riser room.
5. Supervision of Nitrogen Generator: Nitrogen generator must be able to provide the following monitoring options:
   a. Power supply "on" for nitrogen generators.
   b. Power supply "on" for compressor.
   c. Amp draw for compressor.
   d. Line pressure (psig).
   e. Nitrogen purity at discharge (sample port for use with manual gas analyzer).

B. Nitrogen Pressure Maintenance Device: Device must be a pressure regulator that automatically reduces supply nitrogen pressure to the minimum pressure required to be maintained in the piping system. The device must have a cast bronze body and valve housing complete with diaphragm assembly, spring, filter, ball check to prevent backflow, 1/16-inch restriction to prevent rapid pressurization of the system, and adjustment screw. The device must be capable of reducing maximum inlet pressure of 100 psi to a fixed outlet pressure adjustable to 10 psi.

2.5 ALARM INITIATING AND SUPERVISORY DEVICES

A. Sprinkler Waterflow Indicator Switch, Pressure-Type: Switch must include a metal housing with a neoprene diaphragm, SPDT snap action switches and a 1/2-inch NPT male pipe

thread. The switch must have a maximum service pressure rating of 175 psi. There must be two SPDT (Form C) contacts factory adjusted to operate at 4 to 8 psi. The switch must be capable of being mounted in any position in the alarm line trim piping of the dry pipe valve.

B. High/Low-Nitrogen Pressure Supervisory Switch: Each dry pipe valve must be provided with a pressure switch connected to the control unit. The pressure switch must supervise the nitrogen pressure in the system and must be set to activate at 10 psi above the dry pipe valve trip point pressure (low) and 10 psi above normal nitrogen pressure (high). The switch must have an adjustable range between 5 and 80 psi. The switch must have screw terminal connection and be capable of being wired for normally open or normally closed circuit.

C. Valve Supervisory (Tamper) Switch: Switch must be suitable for mounting to the type of control valve to be supervised open. The switch must be tamper-resistant and contain two sets of SPDT (Form C) contacts arranged to transfer upon removal of the housing cover or closure of the valve of more than two rotations of the valve stem.

2.6 SPRINKLERS

A. Sprinklers must comply with UL 199 and NFPA 13. Sprinklers with internal O-rings must not be used. Sprinklers in high heat areas including attic spaces or in close proximity to unit heaters must have temperature classification in accordance with NFPA 13.

B. Areas without Finished Ceilings: Upright or sidewall sprinkler, standard-response, glass bulb, brass finish, ordinary temperature, minimum k-factor of 5.6.

C. Corrosion-Resistant Sprinkler: Upright type installed in locations as indicated. Corrosion-resistant coatings must be factory-applied by the sprinkler manufacturer.

D. Dry Sprinkler Assembly: Pendent type as indicated. Assembly must include an integral escutcheon. Maximum length must not exceed maximum indicated in their listing. Sprinklers must have a brass finish.

E. Sprinklers must be of the same manufacture and same temperature characteristics throughout any single room or area, but not necessarily throughout the entire building.

2.7 BACKFLOW PREVENTION ASSEMBLY

A. Double-check valve assembly backflow preventer complying with ASSE 1015 and AWWA M14. Each check valve must have a drain. Backflow prevention assemblies must have current "Certificate of Approval from the Foundation for Cross-Connection Control and Hydraulic Research, FCCCHR List" and be listed for fire protection use. Listing of the specific make, model, design, and size in the FCCCHR must be acceptable as the required documentation.

B. Backflow Preventer Test Connection: Test connection must consist of a series of listed hose valves with 2 1/2-inch National Standard male hose threads with cap and chain. Provide one valve for each 250 gpm of system demand, and provide enough valves to flow the total system design demand, including interior hose stream allowances, during the test. Provide a permanent sign that reads 'TEST VALVES" immediately adjacent to these valves on the wall.

2.8 FIRE DEPARTMENT CONNECTION

A. Fire department connection must be flush type with cast brass body matching wall escutcheon lettered "Auto Spkr” with a polished brass finish. The connection must have individual self-closing clappers, caps with drip drains and chains. Female inlets must have

2 1/2-inch diameter American National Fire Hose Connection Screw Threads (NH) per NFPA 1963. Comply with UL 405.

2.9 ACCESSORIES

A. Sprinkler Cabinet: Spare sprinklers must be provided in accordance with NFPA 13 and must be packed in suitable metal or plastic cabinet. Spare sprinklers must be representative of, and in proportion to, the number of each type and temperature rating of the sprinklers installed. At least one wrench of each type required must be provided. A list of the required spare sprinklers must be provided in the cabinet.

B. Pipe Escutcheon: Escutcheons must be polished chromium-plated alloy, or polished chromium-plated copper alloy. Escutcheons must be either one-piece or split-pattern, held in place by internal spring tension or set screw.

C. Sprinkler Escutcheon: Escutcheons must be brass finish unless otherwise noted. Escutcheons must be either one-piece or split-pattern, held in place by internal spring tension or set screw.

D. Sprinkler Guard: Guards must be a steel wire cage designed to encase the sprinkler and protect it from mechanical damage and must be listed for use with the sprinkler model.

E. Identification Sign:

1. Furnish and install properly lettered and approved metal or plastic signs to each control valve, alarm device, inspector's test valve, drain vale, and alarm bypass valve. Each sign must indicate the normal valve position as well as the portion of the system that the valve serves. Valve identification signs must be minimum 6 inches wide x 2 inches high with enamel baked finish on minimum 18 gage steel or 0.024-inch aluminum with red letters on a white background or white letters on a red background. Wording of sign must include, but not be limited to "main drain", "auxiliary drain", "inspector's test", "alarm test", "alarm line", and similar working as required to identify operational components. Where there is more than one sprinkler system, signage must include specific details as to the respective system.
2. Permanently affix metallic hydraulic design date nameplates complying with NFPA 13 to the riser of each system. Hydraulic information must be permanently engraved on the nameplate. The use of permanent marker is not acceptable.
3. Provide a laminated 8.5-inch by 11-inch diagram, hung on each riser, showing the floor area protected by that riser.

2.10 SPECIALTY SPRINKLER FITTINGS

A. Drop-Nipple Fittings: Adjustable drop nipples are not permitted.

B. Sprinkler, Drain and Alarm/Inspector's Test Fittings: Cast-iron or ductile-iron body; with threaded inlet and outlet, test valve, and orifice and site glass.

C. Sprinkler, Branch Line Fittings: Brass body; with threaded inlet and capped drain outlet and threaded outlet for sprinkler.

2.11 PRESSURE GAUGES

A. Pressure gauges must comply with UL 393 and be liquid-filled, 3 1/2-inch to 4 1/2-inch diameter dial with dial range of 0 to 250 pounds per square inch gauge.

PART 3 - EXECUTION

3.1 ABOVEGROUND PIPING INSTALLATION

A. Piping: Group piping at common elevations where practical. Route piping in an orderly manner, plumb and parallel to the building structure where practical and as indicated on the approved drawings. Piping must be pitched in accordance with NFPA 13.

B. Piping in Exposed Areas: Exposed piping must be installed so as not to diminish exit access widths, corridors, or equipment access. Exposed horizontal piping, including drain piping, must be installed to provide maximum headroom.

C. Fittings: Use approved fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes. Install unions adjacent to each valve in pipes 2 inches and smaller. Unions are not required on flanged devices or in piping installations using grooved fittings. Install flanges or flange adapters on non-grooved valves, apparatus, and equipment having 2 1/2-inch and larger connections.

D. Upright Sprinklers: Riser nipples or "sprigs" to upright sprinklers must contain no fittings between the branch line tee and the reducing coupling at the sprinkler. Riser nipples exceeding 30 inches in length must be individually supported.

E. Install specialty sprinkler fittings according to manufacturer's written instructions.

F. Pipe Joints: Pipe joints must conform to NFPA 13, except as modified herein. Not more than four threads must show after joint is made up. Welded joints must be permitted, only if welding operations are performed as required by NFPA 13 at the contractor's fabrication shop, not at the project construction site. Flanged joints must be provided where indicated or required by NFPA 13. Grooved pipe and fittings must be prepared in accordance with the manufacturer's latest published specification according to pipe material, wall thickness and size. Grooved couplings, fittings, and grooving tools must be products of the same manufacturer. For copper tubing, pipe and groove dimensions must comply with the tolerances specified by the coupling manufacture. The diameter of grooves made in the field must be measured using a "go/no-go" gauge, vernier or dial caliper, narrow-land micrometer, or other method specifically approved by the coupling manufacturer for the intended application. Groove width and dimension of groove from end of pipe must be measured and recorded for each change in grooving tool setup to verify compliance with coupling manufacturer's tolerances.

G. Reducers: Reductions in pipe sizes must be made with one-piece tapered reducing fittings. The use of grooved-end or rubber-gasketed reducing couplings will not be permitted. When standard fittings of the required size are not manufactured, single bushings of the face type will be permitted. Where used, face bushings must be installed with the outer face flush with the face of the fitting opening being reduced. Bushings must not be used in elbow fittings, in more than one outlet of a tee, in more than two outlets of a cross, or where the reduction in size is less than 1/2-inch.

H. Pipe Penetrations: Cutting structural members for pipe-hanger fastenings will not be permitted. Pipes that must penetrate concrete or masonry walls or concrete floors must be core-drilled or provided with pipe sleeves. Each sleeve must be schedule 40 galvanized steel, ductile-iron, or cast-iron and must extend through its respective wall or floor and be cut flush with each wall surface. Sleeves or holes must provide minimum 2-inch clearance between the pipe and the sleeve/hole for pipe 4 inches and larger. The space between the

sleeve and the pipe must be firmly packed with mineral wool insulation. In penetrations that are not fire-rated or not a floor penetration, the space between the sleeve and the pipe must be sealed at both ends with plastic waterproof cement that will dry to a firm but pliable mass or with a mechanically adjustable segmented elastomer seal.

I. Escutcheons: Escutcheons must be provided for pipe penetrations of ceilings and walls. Escutcheons must be securely fastened to the pipe at surfaces through which piping passes.

J. Inspector's Test Connection: Test connection must consist of 1-inch pipe connected to the end of the physically most remote branch line; a test valve located approximately 7 feet above the floor; a sight glass assembly; a smooth bore brass outlet equivalent to the smallest orifice sprinkler used in the system; and painted metal identification sign affixed to the valve with the words "Inspector's Test". The discharge orifice must be located outside the building wall, no more than 18 inches above the finished grade and directed so as not to cause damage to adjacent construction or landscaping or cross egress paths during full flow discharge. Concrete splash blocks must be provided at all drains not terminating on a concrete surface.

K. Drains: Main drain piping must be provided to discharge at a safe point outside the building, no more than 18 inches above finished grade and directed so as not to cause damage to adjacent construction or landscaping or cross egress paths during full flow discharge. Auxiliary drains must be provided as required by NFPA 13 and must consist of a drum-drip assembly. Concrete splash blocks must be provided at all drains not terminating on a concrete surface.

L. Backflow Preventer: Locate within the building. Install horizontal backflow preventers so that the bottom of the assembly is no greater than 24 inches above the finished floor/grade. Control valve handles must be minimum 6 inches above grade/finished floor.

M. Test Connection: Provide downstream of the backflow prevention assembly; UL 668 hose valves with 2.5-inch National Standard male hose threads with cap and chain. Provide one valve for each 250 gpm of system demand or fraction thereof. Provide a permanent sign in accordance with paragraph entitled "Identification Signs" which reads "Test Valve". Indicate location of test header. If an exterior connection, provide a valve inside a heated mechanical room to prevent freezing. The piping between the backflow preventer test header control valve and the exterior test header must be provided with an automatic drip arranged to drain to the outside.

N. Fire Department Connection: Mount on exterior wall approximately 3 feet above finished grade on the sprinkler system side of the backflow preventer. The piping between the connection and the check valve must be provided with an automatic drip in accordance with NFPA 13 and arranged to drain outside.

O. Hangers and Supports: Comply with NFPA 13 for installation.

P. Identification Signs: Signs must be affixed to each control valve, inspector test valve, main drain, auxiliary drain, test valve, and similar valves as appropriate or as required by NFPA 13. Hydraulic design data nameplates must be permanently marked and permanently affixed to each sprinkler riser as specified in NFPA 13.

Q. Sprinkler guards must be provided on all sprinklers subject to mechanical damage or located with their deflector 7 feet above the finished floor or lower.

3.2 LABELING AND IDENTIFICATION

A. Manufacturer's pipe labeling must be visible.

3.3 ELECTRICAL WORK

A. Alarm signal wiring connections to the building fire alarm control system must be made by the fire alarm subcontractor.

3.4 PROTECTIVE PAINTING

A. Provide protective painting as herein specified.

1. Metal surfaces must first be thoroughly wire brushed and cleaned of all dirt, rust, grease, or other foreign matter before priming coat is applied.
2. Paint all sprinkler piping, except for stainless-steel piping, red.

B. Clean up all equipment and leave in condition for finish painting before acceptance.

3.5 PRELIMINARY TESTS

A. The system including the underground water mains and the aboveground piping and system components, must be tested to ensure that equipment and components function as intended. The underground and aboveground interior piping systems and attached appurtenances subjected to system working pressure must be tested in accordance with NFPA 13 and NFPA 24. Upon completion of specified tests, complete certificates as specified in paragraph SUBMITTALS.

B. Aboveground Piping.

1. Hydrostatic Test: Aboveground piping must be hydrostatically tested in accordance with NFPA 13 at not less than 200 psi or 50 psi in excess of maximum system operating pressure and must maintain that pressure without loss for 2 hours. There must be no drop in gauge pressure or visible leakage when the system is subjected to the hydrostatic test. The test pressure must be read from a gauge located at the low elevation point of the system or portion being tested.
2. Air Pressure Test: As specified in NFPA 13, an air pressure leakage test at 50 psi must be conducted for 24 hours. There must be no drop in gauge pressure in excess of 1.5 psi for 24 hours. This air pressure test is in addition to the required hydrostatic test.
3. Backflow Preventer Full Forward Flow Test: Each backflow prevention assembly must be tested at system flow demand, as specified in NFPA 13. Provide all equipment and instruments necessary to conduct a complete forward flow test, including 2.5-inch diameter hoses, playpipe nozzles (or similar), calibrated pressure gauges, pitot tube gauge, plus all necessary supports to safely secure hoses and nozzles during the test. At the system demand flow, the pressure readings and pressure drop (friction) across the assembly must be recorded. Provide a metal placard on the backflow prevention assembly that lists the pressure readings both upstream and downstream of the assembly, total pressure drop, and the system test flow rate. The pressure must be compared to the manufacturer's data.]
4. Alarm Devices: Each alarm switch must be tested by flowing water through the inspector's test connection. Each water operated alarm device must be tested to verify proper operation.
5. Trip Test of Dry Pipe Valves: Each dry pipe valve must be trip tested by reducing normal system nitrogen pressure through operation of the inspector's test connection. Systems equipped with quick-opening devices must be first tested without the operation of the quick-opening device and then with it in operation. Test results will be witnessed and recorded. Test results must include the number of seconds elapsed

between the time the test valve is opened and tripping of the dry valve; trip-point air pressure of the dry pipe valve; water pressure prior to valve tripping; and number of seconds elapsed between time the inspector's test valve is opened and water reaches the orifice. The delivery of water from the dry pipe valve to the system test connection must be a maximum of 60 seconds, regardless of system size. Water delivery times must be measured starting at the normal nitrogen pressure on the system.

6. Main Drain Flow Test: Following flushing of the underground piping, a main drain test must be made to verify the adequacy of the water supply. Static and residual pressures must be recorded on the certificate specified in paragraph SUBMITTALS. In addition, a main drain test must be conducted each time after a main control valve is shut and opened.
7. Test of Supervisory Nitrogen System: System supervisory nitrogen pressure must be reduced from the normal system pressure to the point at which a low-pressure alarm is sounded. Nitrogen pressure must be restored to verify trouble signal restoration. Automatic stop/start features of nitrogen generator must be tested.

3.6 FINAL TESTS

A. The system will be considered ready for acceptance testing only after the following have been accomplished:

1. Preliminary tests have been made and deficiencies corrected.
2. Testing reports have been submitted and approved.

B. Final acceptance testing must be coordinated and performed by the contractor, in the presence of the Owner's Representative. In order to assure attendance of the necessary representatives, each representative scheduled to witness the test must be provided with a minimum of 5 working days' notification of the proposed test date by the contractor. The test must not be conducted until all parties agree on the scheduled test date. The contractor must provide all necessary personnel and equipment to conduct the tests.

C. The final acceptance test must be a repeat of preliminary tests and must include operation of control valves and flowing of the inspector's test connections to verify operation of associated waterflow alarm switches. After operation of control valves has been completed, the main drain test must be repeated to assure that control valves are in the open position. In addition, the contractor must have available copies of as-built drawings and certificates of tests previously conducted. The installation must not be considered accepted until identified discrepancies have been corrected and test documentation is properly completed and received. The contractor must correct system failures and other deficiencies identified during testing and must retest portions of the system affected by the required corrections.

D. Upon satisfactory completion of the tests, the contractor must leave the system in proper working order.

E. Warranty: Except as otherwise expressly provided in the contract documents, the contractor guarantees all work to be absolutely free of all defects of workmanship and materials for a period of 1-year after final acceptance of the work by the Owner's Representative. Include service directory with telephone numbers for 24-hour emergency service.

3.7 TRAINING

A. Instructor: Include in the project the services of an instructor, who has received specific training from the manufacturer for the training of other persons regarding the inspection,

testing, and maintenance of the system provided. The instructor must train the employees designated by the Owner, in the care, adjustment, maintenance, and operation of the fire sprinkler system. Each instructor must be thoroughly familiar with all parts of this installation. The instructor must be trained in operating theory as well as in practical O&M work. Submit the instructor's information and qualifications including training history to the Owner's Representative prior to training.

B. Required Instruction Time: Provide 4 hours of instruction after final acceptance of the system. The instruction must be given during regular working hours on such dates and times as selected by the Owner's Representative. The instruction may be divided into two or more periods at the discretion of the Owner's Representative. The training must allow for rescheduling for unforeseen maintenance and/or fire department responses.

END OF SECTION

SECTION 26 0519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Single conductor building wire.

B. Wiring connectors.

C. Electrical tape.

D. Wire pulling lubricant.

1.2 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

G. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.

H. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.

I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.

K. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.

L. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.

M. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.

N. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.4 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

2.2 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:

1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
3. Tinned Copper Conductors: Comply with ASTM B33.

H. Minimum Conductor Size:

I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

J. Conductor Color Coding:

1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
2. Color Coding Method: Integrally colored insulation.
3. Color Code:
   a. 240/120 V, 1 Phase, 3 Wire System:
      1) Phase A: Black.
      2) Phase B: Red.
      3) Neutral/Grounded: White.
   b. Equipment Ground, All Systems: Green.

2.3 SINGLE CONDUCTOR BUILDING WIRE

A. Description: Single conductor insulated wire.

B. Conductor Stranding:

1. Feeders and Branch Circuits:

C. Insulation Voltage Rating: 600 V.

D. Insulation:

1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2.

2.4 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

2.5 ACCESSORIES

A. Electrical Tape:

1. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.

B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Installation in Raceway:

1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
2. Pull all conductors and cables together into raceway at same time.

3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

D. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

E. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

F. Install conductors with a minimum of 12 inches of slack at each outlet.

G. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

H. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

I. Make wiring connections using specified wiring connectors.

1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
3. Do not remove conductor strands to facilitate insertion into connector.
4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.

J. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

K. Insulate ends of spare conductors using vinyl insulating electrical tape.

L. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

M. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.

C. Correct deficiencies and replace damaged or defective conductors and cables.

END OF SECTION

SECTION 26 0526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

1.2 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

1.4 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
    a. Provide continuous grounding electrode conductors without splice or joint.
    b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
    a. Ground Bar Size: 1/4 by 2 by 12 inches unless otherwise indicated or required.

E. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

F. Communications Systems Grounding and Bonding:

1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.

2.2 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.
2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 0526:

1. Use insulated copper conductors unless otherwise indicated.
    a. Exceptions:
        1) Use bare copper conductors where installed underground in direct contact with earth.

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Bars:

1. Description: Copper rectangular ground bars with mounting brackets and insulators.
2. Size: As indicated.
3. Holes for Connections: As indicated or as required for connections to be made.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 26 0553.

3.2 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.13.

C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 0529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.2 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

D. MFMA-4 - Metal Framing Standards Publication 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

1.4 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be

supported. Include consideration for vibration, equipment operation, and shock loads where applicable.

4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
   a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
   b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

1. Comply with MFMA-4.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Contracting Officer, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Contracting Officer, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

3.2 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

END OF SECTION

SECTION 26 0533.13 - CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. Electrical metallic tubing (EMT).

C. Rigid polyvinyl chloride (PVC) conduit.

D. Conduit fittings.

1.2 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 26 0526 - Grounding and Bonding for Electrical Systems.

C. Section 26 0529 - Hangers and Supports for Electrical Systems.

1.3 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2013.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.

G. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.

H. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.

I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

J. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.

K. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.

L. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.

M. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.5 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:

1. Exterior, Direct-Buried: Use rigid PVC conduit.
2. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.

D. Concealed Within Masonry Walls: Use electrical metallic tubing (EMT).

E. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).

F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

G. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

H. Exposed, Exterior: Use galvanized steel rigid metal conduit.

2.2 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.3 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:

1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.4 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use compression (gland) or set-screw type.
   a. Do not use indenter type connectors and couplings.

2.5 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:

1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

E. Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

F. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

G. Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

H. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.

I. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

J. Provide grounding and bonding in accordance with Section 26 0526.

3.2 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

C. Correct deficiencies and replace damaged or defective conduits.

END OF SECTION

SECTION 26 0533.16 - BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.

1.2 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

F. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

G. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

1.4 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.1 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.

4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use suitable concrete type boxes where flush-mounted in concrete.
4. Use suitable masonry type boxes where flush-mounted in masonry walls.
5. Use raised covers suitable for the type of wall construction and device configuration where required.
6. Use shallow boxes where required by the type of wall construction.
7. Do not use "through-wall" boxes designed for access from both sides of wall.
8. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
9. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:

1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated.
3. Junction and Pull Boxes Larger Than 100 cubic inches:
   a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Box Supports:

1. Secure and support boxes in accordance with NFPA 70 and Section 26 0529 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

E. Install boxes plumb and level.

F. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.

G. Install boxes as required to preserve insulation integrity.

H. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

I. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.

J. Close unused box openings.

K. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

L. Provide grounding and bonding in accordance with Section 26 0526.

M. Identify boxes in accordance with Section 26 0553.

END OF SECTION

SECTION 26 0553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Underground warning tape.

D. Warning signs and labels.

1.2 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

1.4 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

1.5 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.1 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
   a. Switchboards:
      1) Identify ampere rating.
      2) Identify voltage and phase.
      3) Identify power source and circuit number. Include location when not within sight of equipment.
      4) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
   b. Panelboards:
      1) Identify ampere rating.
      2) Identify voltage and phase.
      3) Identify power source and circuit number. Include location when not within sight of equipment.
      4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.

5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

c. Transformers:
1) Identify kVA rating.
2) Identify voltage and phase for primary and secondary.

d. Enclosed switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
2) Identify power source and circuit number. Include location when not within sight of equipment.

e. Transfer Switches:
1) Identify voltage and phase.
2) Identify short circuit current rating based on the specific overcurrent protective device type and settings protecting the transfer switch.

2. Service Equipment:
a. Use identification nameplate to identify each service disconnecting means.

3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.
a. Service equipment.
b. Industrial control panels.
c. Motor control centers.
d. Elevator control panels.
e. Industrial machinery.

4. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.

B. Identification for Conductors and Cables:

1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 0519.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

2.2 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Materials:
a. Indoor Clean, Dry Locations: Use plastic nameplates.
b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.

4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

2.3 UNDERGROUND WARNING TAPE

A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.

C. Legend: Type of service, continuously repeated over full length of tape.

2.4 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:

1. Materials:
2. Minimum Size: 7 by 10 inches unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
3. Minimum Size: 2 by 4 inches unless otherwise indicated.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:

1. Surface-Mounted Equipment: Enclosure front.
2. Flush-Mounted Equipment: Inside of equipment door.
3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
4. Elevated Equipment: Legible from the floor or working platform.
5. Branch Devices: Adjacent to device.
6. Interior Components: Legible from the point of access.
7. Conductors and Cables: Legible from the point of access.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.

G. Mark all handwritten text, where permitted, to be neat and legible.

3.2 FIELD QUALITY CONTROL

A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

END OF SECTION

SECTION 26 0583 - WIRING CONNECTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Electrical connections to equipment.

1.2 REFERENCE STANDARDS

A. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).

B. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2016.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide wiring device manufacturer’s catalog information showing dimensions, configurations, and construction.

1.4 QUALITY ASSURANCE

A. Comply with requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.1 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.

1. Colors: Comply with NEMA WD 1.
2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

PART 3 EXECUTION

3.1 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

END OF SECTION

SECTION 31 00 01 – SITE PREPARATION AND GENERAL SITE WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Site work layout and construction survey.
2. Protecting existing vegetation to remain.
3. Protecting existing site improvements to remain.
4. Utility locates.
5. Disposition of utilities.
6. Maintain existing utility services.
7. Temporary Traffic Control
8. Spill prevention.
9. Recycling and waste management for site materials.
10. Final Cleanup

B. Related Sections:

1. 31 00 02 “SITE DEMOLITION” for removal of site improvements including utilities.

1.2 REFERENCE SPECIFICATIONS AND DOCUMENTS

A. American Society of Civil Engineers (ASCE)

1. ASCE CI 38-2: Standard Guideline for the Collection and Depiction of Existing Subsurface Utility Data.

1.3 SUBMITTALS

A. Record Drawings: Record active, inactive, relocated, and abandoned utilities encountered.

1. Survey the horizontal and vertical positions, and depths to ground surface, for utilities capped, utilities uncovered during project operations and for utilities relocated. Survey shall be from established project control.

1.4 QUALITY ASSURANCE

A. Qualifications: The person in responsible charge of construction survey and survey of asbuilt/record drawing items shall be a registered professional or person familiar with construction layout work.

1.5 SITE CONDITIONS

A. Safety: Provide all safety fence barricades guards, lights and other installations required to protect persons and property during the work. This is in addition to such protection required elsewhere in the Contract documents. At a minimum, secure all work areas and staging/storage areas with temporary construction safety fencing. Maintain such safety fencing to assure a complete boundary throughout construction.

B. Locate storage sheds, temporary office, and stockpiled material to best advance the progress of work, as approved by the Contracting Officer or in areas otherwise designated for Contractor's use.

C. Existing conditions are shown on the drawings. Contractor shall visit the site, familiarize himself/herself with existing conditions in the field.

D. Contractor shall strictly adhere to the Erosion and Sedimentation Control Plan. Only upon completion of applicable items in the sequence, shall the contractor expand clearing and grubbing operations to the entire site.

E. Items of historic or archaeological value discovered during construction operations shall remain the property of the Contracting Officer. Notify Contracting Officer immediately of any such type finding for instructions.

1.6 RECYCLING AND REFUSE COLLECTION CENTERS (WASTE MATERIALS)

A. The contractor shall provide appropriate refuse collection centers, which allow for glass, paper, and plastic separation. Said refuse collection centers shall be maintained on a weekly basis and transferred to a Contracting Officer-approved recycling and refuse center. The contractor shall also provide appropriate refuse containers for construction debris. Construction debris shall be recycled as possible and practical, especially in demolition and renovation situations (i.e., copper pipe, steel, concrete, glass, etc.). Illegal disposal of said materials (including littering) is subject to fines and penalties. The Contractor shall establish construction site policy and educate all construction personnel.

B. All waste materials shall be collected and stored in a securely lidded, metal dumpster. The dumpster shall be rented from and emptied by a licensed solid waste management company. The dumpster shall meet all County and State Solid Waste Management regulations and ordinances. The dumpster shall be emptied as necessary, and the material shall be hauled to a State licensed landfill. No construction debris shall be buried on the construction site. All personnel shall be informed and instructed regarding the correct procedure for waste disposal. Notices stating these procedures shall be posted in the construction office and the construction superintendent shall be responsible for ensuring that these procedures shall be followed.

1.7 HAZARDOUS WASTE

A. All hazardous waste materials shall be disposed of in a manner satisfying all regulations of the authority having jurisdiction. All personnel shall be informed and instructed regarding the correct procedure for waste disposal. Notices stating these procedures shall be posted in the construction office and the construction superintendent shall be responsible for ensuring that these procedures shall be followed.

1.8 SANITARY WASTE

A. All sanitary waste shall be collected from the portable units, as necessary, by a licensed sanitary waste management contractor, or as required by local regulations.

1.9 TEMPORARY FUELING TANK AREA

A. Temporary fueling tanks shall have an E.P.D. approved secondary containment (liner system) basin to prevent and/or minimize site contamination. Temporary fueling tank locations shall be

located remotely from drainage ways, drainage systems, and state waters (streams, springheads, etc.).

1.10 EQUIPMENT MAINTENANCE AREA

A. Equipment maintenance areas shall be clearly identified with signage. Said signage shall read as follows:

> **Equipment Maintenance Area**
> Discharge of new or used oil, fuel, lubricants, etc. is prohibited. Utilize containment/capture systems. Recycle used oils, contaminated fuels and lubricants. Illegal discharges are subject to fines and penalties.

B. Sign shall be weatherproof and have a minimum size of 36” X 36”.

C. Equipment Maintenance Area(s) shall be located remotely from drainage ways, drainage systems, and state waters (streams, springheads, etc.).

PART 2 - PRODUCTS

2.1 CONSTRUCTION SURVEY AND LAYOUT EQUIPMENT

A. Surveyor's transit and measuring devices properly calibrated to accurately layout the work shall be used.

B. Provide stakes and batter boards of size and quality commensurate with function. Use wire or non-stretching cord to establish reference lines for site clearing and grading.

2.2 PROTECTION MATERIALS

A. Materials for protection of existing work remaining shall be of the size, strength, and extent to provide adequate protection of existing work remaining.

2.3 REPAIR MATERIALS

A. Repair materials shall be of the same or better quality and performance as materials that are to be restored. Where possible, reuse existing materials that are removed.

PART 3 - EXECUTION

3.1 SITE WORK LAYOUT AND CONSTRUCTION SURVEY

A. Bench Marks and Monuments: Before commencing work verify bench marks and all reference points. If found at variance with the drawings, notify the Contracting Officer immediately and prior to continuing with construction activities in that area.

B. Plainly mark all bench marks, and property corners and property lines as follows:

1. Mark all project bench marks and mark all property corners within 100 feet of construction limits by driving a 4 foot lath with appropriate offset (not to exceed 5 feet) from property pin or monument. Paint at least the upper 8” of the lath a bright yellow and clearly label the label the lath with the bench mark number and elevation, or label “property corner” as applicable.

2. Install 2’ lath, label “property line”, and tie a red ribbon to the lath every 50’ along property lines when project work coincides within 50 feet of property boundaries.

C. Carefully maintain all benchmarks, monuments and other reference points. If disturbed or destroyed, replace as directed, at no additional cost to the owner. Establish and maintain stakes as required for drives, parking, walks, underground vaults and structures, and other site improvements.

D. Flag or stake limits of construction and tree protection areas and install tree protection fencing to protect existing trees to remain.

E. As work progresses provide construction staking for grading (including subgrade, gravel courses, finish grade), points of curvature, points of tangency, grade changes, and for structures and miscellaneous site elements. If discrepancies between actual lines, grades, and elevations exist, notify Contracting Officer before proceeding with layout of structure.

3.2 PROTECTING EXISTING VEGETATION TO REMAIN

A. All trees and vegetation marked to be saved or relocated shall be protected by temporary barricades, be watered and maintained where necessary, and replaced if damaged by construction. Root systems cut or damaged within work area during construction shall be pruned and protected from additional damage and covered with soil as soon as possible.

B. Under no circumstance, do not remove vegetation shown on the drawings to be saved, or marked by the Contracting Officer to be saved.

3.3 PROTECTING EXISTING SITE IMPROVEMENTS TO REMAIN.

A. Protect all existing curbs, sidewalks, buildings, utilities, and paving to remain.

B. If existing site improvements are damaged in performance of this work, restore such improvements without extra cost to the Contracting Officer.

3.4 UTILITY LOCATES

A. Utilities Protection Law (Dig Law): Comply with Local Utilities Protection Law. Notice must be given to the Utilities Protection Center; at least 48 hours but no more than 10 days preceding the day mechanized digging is to begin. This notice shall contain County (where project is located), City (or closest City or Town), location (street address), type of work to be done, name of Contractor, company name and address, telephone number, which company/individual the work is being done for, date and time the Contractor is planning to dig. Locates are valid for 30 days. Renew or call for re-mark as necessary.

3.5 DISPOSITION OF UTILITIES

A. Follow rules and regulations of authorities having jurisdiction for the respective utilities in executing work under this section.

B. Carefully locate existing underground utilities by hand excavation, potholing, vacuum excavation, or other methods. If utilities are to remain in place, provide protection from damage during construction operations.

C. Active Utilities Shown on Drawings or that are Visible Onsite: Protect from damage and remove or relocate as indicated or specified. All utilities (including but not limited to: existing

utility poles, guy wires, hydrants, meters, valve boxes) within the construction area that are evident from a visual inspection of the site shall be protected or relocated as necessary.

D. Active Utilities Not Shown on Drawings or Evident from Visual Inspection: Protect or relocate in accordance with written instructions of the Contracting Officer. Contract Sum may be adjusted for additional work in accordance with Contract Conditions.

E. Inactive and Abandoned Utilities:

1. Fully remove inactive and abandoned utilities only as shown.
2. Plug, cap, abandon in place utilities as shown. In absence of specific requirements, plug or cap such utility lines at least 4 feet outside of existing building walls, excavation limits, or as required by local regulations.

F. Repair damaged utilities to satisfaction of utility owner.

G. Accurately record locations of active and inactive utilities encountered during construction operations on record drawings.

3.6 MAINTAIN EXISTING UTILITY SERVICES

A. Cooperate with Contracting Officer and utility companies in keeping respective services and facilities in operation. Do not interrupt existing utility service facilities occupied and used by Contracting Officer or others, unless written permission is given by the Contracting Officer and then only after temporary utility services have been provided. Provide temporary services during interruptions to existing utilities, as acceptable to Contracting Officer and to governing authorities.

B. Provide not less than 72 hours' notice to Contracting Officer if shutdown of service is required during a changeover.

1. Arrange to shut off indicated utilities with utility companies.
2. Where utility services are required to be removed, relocated, or abandoned, provide bypass connections to maintain continuity of service to other parts of the building before proceeding with selective demolition.
3. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe or conduit after bypassing.

3.7 TEMPORARY TRAFFIC CONTROL

A. Schedule and conduct work in a manner, which will minimize inconvenience to vehicular and pedestrian traffic. Provide flaggers, barricades, warning signs, warning lights, and other warning means as appropriate, the minimum measures shown on the plans, and those measures required by local jurisdictions. Maintain traffic on all roads and streets, which must be crossed by utility lines. All traffic controls during construction must conform to Part VI of the Manual on Uniform Traffic Control Devices, ANSI D 6.1e.

3.8 DUST CONTROL

A. Keep airborne dust to a minimum by using water sprinkling or tossing and/or other suitable means to limit dust and dirt from rising and scattering in the air. Water all disturbed earth no later than 5 days from last rain or last watering.

3.9 POLLUTION AND SPILL PREVENTION

A. Control both air and water pollution. No tires, oils, asphalt, paint or coated metals are permitted in combustible waste piles. Pollutants such as fuels, lubricants, bitumens, raw sewage and other harmful materials will not be discharged into or near rivers, streams or man-made channels. Equipment maintenance shall be performed with containment and capture of used oi. Do not pour or drain used lubricants or other necessary mechanical fluids onto the ground. Remove from site and deliver to a recycling center. Utilize a concrete washout area and remove washed out concrete from the site.

B. Material Management Practices

1. The following material management practices shall be used to reduce the risk of spills or other accidental exposure of materials and substances to storm water runoff. Follow good housekeeping practices onsite during the construction project.

a. An effort shall be made to store only enough product required to do the job.

b. All materials stored onsite shall be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.

c. Products shall be kept in their original containers with the original manufacturer's label.

d. Substances shall not be mixed with one another unless recommended by the manufacturer.

e. Whenever possible, all of a product shall be used up before disposing of the container.

f. Manufacturer's recommendations for proper use and disposal shall be followed.

g. The site superintendent shall inspect daily to ensure proper use and disposal of materials onsite.

C. Hazardous Products

1. The Contractor shall use the following practices to reduce the risks associated with hazardous materials:

a. Products shall be kept in original containers unless they are not resealable.

b. Original labels and material safety data shall be retained with the product by the General Contractor. They contain important product information.

c. Surplus products shall be disposed of following and in conformance with local and State recommended methods, NPDES permit requirements, and Federal Environmental Regulations.

D. Product Specific Practices

1. The following product specific practices shall be followed for products stored on-site:

a. Petroleum Products:

1) All on-site vehicles shall be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers that shall be clearly labeled and stored in a

clearly identified area. Any asphalt substances used on-site shall be applied according to the manufacturer's recommendations.

b. Fertilizers:

1) Fertilizers used shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked into the soil to limit the exposure to storm water. Any fertilizers that are to be stored on-site shall be stored in a protected, securable enclosure. The contents of any partially used bags of fertilizers shall be transferred to a clearly labeled sealable plastic container to avoid spills.

c. Paints:

1) All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged to the storm sewer system but shall be properly disposed of according to local and State regulations.

d. Concrete:

1) Concrete trucks shall be allowed to wash out, discharge, and drum wash only at the identified equipment maintenance area(s). Maintenance areas shall be equipped with a discharge containment area (e.g., earth berms surrounding area). The containment area shall be cleaned up and removed from the site upon completion of concrete installation work.

E. Spill Prevention and Cleanup

1. The following practices shall be followed for spill prevention and cleanup:

a. Local, State, NPDES, Federal Environmental, and Manufacturer's recommended methods for spill cleanup shall be clearly posted and site personnel shall be made aware of the procedures and the location of the information and cleanup supplies.

b. Materials and equipment necessary for spill cleanup shall be kept in the material storage area on-site. Equipment and materials shall include but not be limited to brooms, dustpans, mops, rags, gloves, goggles, respirators, cat litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

c. All spills shall be cleaned up immediately upon discovery.

d. The spill area shall be kept well ventilated and personnel shall wear the appropriate protective clothing to prevent injury from contact with a hazardous substance.

e. Spills of toxic or hazardous material shall be reported to the appropriate local or State government agency, regardless of size.

f. A spill prevention plan shall be implemented or adjusted to include measures to prevent this type of spill from reoccurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures shall also be included.

g. The General Contractor shall be responsible for assigning personnel to be responsible for spill prevention and cleanup coordination. The General Contractor shall designate, at a minimum, three site personnel to receive spill prevention and cleanup

training. These individuals shall each become responsible for a particular phase of prevention and cleanup. The names of responsible spill personnel shall be posted in the material storage area and in the on-site construction office.

3.10 WASTE MANAGEMENT

A. Clean and remove trash and debris on entire site, including trash and debris deposited from previous operations.

B. During construction, maintain a clean and orderly worksite. Do not dump or store debris on any part of the property unless authorized in writing by the Owner and Contracting Officer. Debris may include but is not limited to trash, construction material, cleared vegetative matter, and boulders.

3.11 FINAL CLEAN UP

A. Remove Contractors office trailer, storage shelters, stockpiled materials, and equipment from the site.

B. Remove all remaining debris, or any other extraneous material deposited during construction from the site including all graded areas, and other undisturbed areas. All debris is the property of the Contractor and shall be hauled away from the site and disposed of lawfully.

C. Clean, sweep and wash the entire site, including areas outside of the “limits of disturbance” for final inspection. Provide required lawn maintenance to provide complete and finished appearance. Leave the site in a neat and orderly fashion for use by the Contracting Officer.

END OF SECTION 31 00 01

SECTION 31 22 00 – EARTHWORK

GENERAL

1.1 SUMMARY

A. Section Includes:

1. Temporary grading or ditching to protect the site and adjoining property from water and silt damage.
2. Topsoil Stripping.
3. Grading, excavating, rock excavating, and filling to prepare subgrades for foundations (buildings and structures), walks, pavements, grass areas, landscape areas, and general areas.
4. Excavating and backfilling trenches for utilities and pits for buried utility structures.

B. Related Sections:

1. 31 00 01 “SITE PREPARATION AND GENERAL SITE WORK” for layout, protection of existing facilities, protection of vegetation, utility locates, and utility protection.
2. 32 05 00 “COMMON WORKS FOR EXTERIOR IMPROVEMENTS” for import fill, import backfill, geotextile specifications.

1.2 REFERENCE SPECIFICATIONS AND DOCUMENTS

A. American Society for Testing Materials (ASTM)

1. ASTM D422 - Particle Size Analysis of Soils.
2. ASTM D423 - Test for Liquid Limit of Soils.
3. ASTM D424 - Test for Plastic Limit and Plasticity Index of Soils.
4. ASTM D1556 - Test for Density of Soil In Place Sand Cone Method.
5. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification).
6. ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).
7. ASTM D698 - Standard Test Methods For Moisture-Density Relations of Soil Using Standard Effort.
8. ASTM D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort.

1.3 DEFINITIONS

A. Backfill is defined as fill immediately behind foundation elements or retaining walls.

B. Excavation: Removal of material encountered above subgrade elevations, and to lines and dimensions indicated, or as directed. Excavation may be classified as earth excavation, rock excavation, or subexcavation, or it may be *unclassified* as described below.

1. Unclassified Excavation: Excavation of all material, including rock, regardless of its nature or the manner in which it is removed. All excavation shall be unclassified unless explicitly and otherwise shown on the Drawings, or if unit pay items are provided for Rock Excavation, Earth Excavation, or Subexcavation.
2. Earth excavation or simply “Excavation”: Excavation of all material is except for active utilities and rock.
3. Rock excavation: Excavation of all hard, compacted, or cemented materials that require the use of drilling, blasting or wedging equipment to remove. It shall consist of un-decomposed stone hard enough to ring under a hammer, and the amount of solid stone shall not be less than one (1) cubic yard in volume. If applicable, rock is further defined as follows:
    a. General Excavation (Mass): Any material occupying an original volume of more than one cubic yard which cannot be excavated with a single-tooth ripper drawn by a crawler tractor having a minimum draw bar pull rated at not less than 80,000 pounds (Caterpillar D-8 or larger).
    b. Trench Excavation: Any material occupying an original volume of more than one cubic yard which cannot be excavated with a hydraulic excavator having a minimum flywheel power rating of 123 kW (165 hp); equipped with a short tip radius bucket not wider than 30 inches.
4. Subexcavation: Authorized additional excavation below subgrade elevations or beyond indicated lines and dimensions as directed by Contracting Officer or Testing Agency in writing.

C. Fills: Suitable materials placed to raise existing grades.
    1. General area fill: all fill in the general grading area covering banks, hollows, drain ditches, etc.
    2. Pavement fill zone: The zone occupied by materials supporting asphalt or concrete paving supporting vehicular traffic or parking and extending for a distance of 4 feet on each side paving area measured at the finished grade (including gutter pans), thereafter tapering away at a 45° angle. Pavement fill zone for asphalt or concrete pedestrian areas are 2 feet on each side of paving area measured at finish grade and tapering down at a 45° angle.
    3. Structural fill zone: The zone occupied by materials supporting floor slabs, building foundations or other structures and extending for a distance of 10 feet on each side of said structure measured at the finished grade, thereafter tapering away at a 45° angle.
D. Neat line: The shown, directed or described line or plane defining the limits of work. Work beyond neat line(s) is not subject to payment when included in a unit pay item.
E. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
F. Trenches:
    1. Foundation: The area beneath the bedding.

2. Bedding: The area above the foundation and below the bottom of the pipe.
3. Haunching: The area above the bottom of the barrel of the pipe up to a specified height above the bottom of the barrel of the pipe.
4. Initial backfill: The area above the haunching material and below a plane 18 inches above the top of the pipe.
5. Final backfill: The area above a plane 18-inches above the top of the barrel of the pipe.

G. Conserved Topsoil: Excavated soil material, with organics, conserved from grading areas that is suitable for growth of grass, cover crops, or planting areas. Identification and use of all conserved topsoil is subject to approval by the Testing Lab or Contracting Officer. Refer to 32 05 00 "COMMON WORKS FOR EXTERIOR IMPROVMENTS" for definition of Furnished Topsoil.

H. Unsuitable Soils:

1. Existing undisturbed soils which are determined by the Testing Laboratory or Contracting Officer to be unsuitable for use as fill in a particular application for reasons other than moisture or water content.
   a. Water saturated soils, regardless of the source of the water (rainfall, storm runoff, ground water or other sources) shall not be considered as unsuitable.
   b. Dewater or dry out water saturated soils to the extent necessary to satisfy the requirements for fill.
   c. The Contractor is solely responsible for the scheduling and sequencing of the work. If necessary, to maintain the Contractor's schedule, wet soils shall be removed and replaced with suitable fill to replace water saturated soils. The removal and replacement of water saturated soils shall be performed at the Contractor's expense.
2. In general, existing undisturbed soils that are highly organic or highly plastic may be classified as unsuitable depending on application.
3. Fill material placed on site by the Contractor, regardless of whether fill is on-site or off-site borrow, cannot by its nature, be classified as unsuitable soils.
   a. Materials placed as fill shall not be classified as unsuitable soils regardless of conditions encountered, since only suitable soils shall be used as fill.
   b. Fill shall be placed, compacted and tested as required by the Contract documents.
   c. The Contractor shall be responsible for maintaining compacted fill, in condition and at compaction levels required, until improvements (site and/or building) are placed on fill.
   d. Should compacted soil be disturbed or become water saturated the Contractor shall be responsible for conducting whatever work is necessary to restore to the soils to the specified criteria at no cost to the Contracting Officer.
4. Water Saturated Soils: Should soils become saturated the Contractor shall, as part of the scope of this Contract, perform activities necessary to mediate and / or replace water

saturated soils as required to obtain suitable fill as required by the Testing Agency or Contracting Officer.

1.4 SUBMITTALS

A. Product data for materials, including but not limited to: geotextiles, utility line markers, import fill material, control density backfill.

B. Quantities of stripped and stockpiled topsoil. Provide report within 48 hours of stockpiling.

C. Shoring, bracing and shielding plans and calculations by a Professional Engineer registered in the US Virgin Islands.

D. Field and laboratory test or quality control results including, but not limited to, the following:

1. Subgrade proctor, compaction, moisture content.
2. Gradation, proctor, compaction, moisture content for fill or backfill material.
3. Proof rolling and other qualitative inspection reports.

1.5 QUALITY ASSURANCE

A. Earthwork Testing and Inspection Services: Engage a qualified independent Testing/Inspection Agency to perform Earthwork Testing as described in this Section.

1.6 SITE CONDITIONS

A. Protection:

1. Limit grading and filling operations to within the defined clearing limits, work zones, or limits of disturbance. Do not disturb the existing terrain or trees outside these lines.
2. Fill material placed against drainage structures or back-filled around utility pipes shall be placed and compacted by methods which will not cause any damage. Any damage which does occur shall be repaired or replaced by the Contractor at the Contractor’s expense.
3. Graded Areas: Any settlement or washing that occurs prior to acceptance of the work shall be repaired and grades re-established to the required elevations and slopes. Fill to required subgrade levels any areas where settlement occurs.

B. Hazardous Materials:

1. No soil found on site or transported to the site which is contaminated with material containing asbestos, PCB's, radon, gasoline, fuel oil, or other fossil fuels, shall be used for fill, backfill or landscape topsoil.
2. Notify Contracting Officer of any contaminated soil found on site. Any contaminated soil found on site shall be removed and disposed of in a lawful manner.

1.7 COORIDINATION AND SCHEDULING

A. Notify the Contracting Officer a minimum of 48 hours prior to the beginning of any excavation, filling, or grading.

B. The Contractor is solely responsible for the scheduling and sequencing of the work. If necessary, to maintain the contractor’s schedule, removed wet soils dewater and dry out sufficiently for its application, or remove and replace with suitable fill. The dewatering or

removal and replacement of water saturated soils shall be performed at the contractor's expense.

PART 2 - PRODUCTS

2.1 FILL OR BACKFILL MATERIALS

A. The soil used for fill or backfill material shall be free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

B. Fill or backfill for paving areas or supporting buildings shall have a maximum dry density exceeding 90 pounds per cubic foot (pcf).

C. Where specified use Graded Aggregate Base (GAB) as backfill or structural fill: Refer to 32 05 00 "Common Works for Exterior Improvements" for material properties.

1. Structural fill material exhibiting a wide variation in consistency and or moisture content shall be blended and/or aerated to stabilize and upgrade the material.

D. Permeable Backfill: Unless shown otherwise, provide a minimum of 2 horizontal feet of permeable backfill material behind retaining structures consisting of gravel, crushed rock, natural sands, manufactured sands, or combinations of these materials conforming to the following gradation:

Sieve Size	Percent Passing
3/4 inch	100
3/8 inch	0-100
No. 100	0-8
No. 200	0 -3

Those portions of fill material passing a No. 4 sieve shall provide a sand equivalent of at least 60.

E. General Fill: Includes soils suitable for structural fill as well as other onsite non organic and non expansive soils that are approved by the Contracting Officer or Testing Agency that will form a stable and dense mass with or without confinement.

2.2 UTILITY EARTHWORK MATERIALS

A. Utility bedding and backfill: Unless otherwise shown bed pipes from trench bottom to one foot above pipe.

1. Unless otherwise shown pipe bedding and backfill shall consist of: sand, gravel, crushed aggregate, or native free draining granular material providing a sand equivalent of at least 30 or a coefficient of permeability greater than 1.4 inches per hour.

2. Cement sand slurry shall be provided with 1 sack of concrete per cubic yard of mixture.

3. Imported Fill Material: Imported fill material shall be a granular material with sufficient binder to form a firm and stable unyielding subgrade and shall not have more than 60

percent of fines passing a 200 mesh sieve. Material shall provide a coefficient of expansion of not more than 2 percent from air dry to optimum moisture content and not more than 6 percent from air dry to saturation. Imported materials shall be clean and free of rubbish, debris, and toxic or hazardous contaminants. Adobe or clay soils are not permitted.

2.3 LINE MARKERS

A. 2" width minimum, 5 mil tape thickness with non-ferrous detectable aluminum backing and shall be printed with the description that the relevant utility is "buried below". Line marker colors according to APWA corresponding to the utility type as follows:

1. Gas lines- yellow
2. Power – red
3. Communications - orange
4. Sanitary – green
5. Water - blue

2.4 GEOSYTHETICS

A. Refer to 32 05 00 "Common Works for Exterior Improvements" for material properties of geotextiles for separation and stabilization.

PART 3 - EXECUTION

3.1 PREPARATION

A. Construction Survey: Refer to 31 00 01 "Site Preparation and General Site Work" for layout and survey requirements. Provide construction staking as required for drives, parking, walks and other site improvements. Protect benchmarks, monuments and other reference points.

B. Clear and grub the area of vegetation and obstructions.

3.2 EROSION CONTROL AND SEDIMENT CONTAINMENT SYSTEMS:

A. Temporary Grading and Drainage: Provide effective drainage for the entire site at all times. Divert watersheds by ditching or embankments to prevent encroachment of surface water in excavations. No impoundment of water will be permitted except as provided. The Contractor is fully responsible for all water damage to the site and to the installed work.

3.3 CONSERVED TOPSOIL

A. After all demolition, clearing and disposal is completed, strip from the top of the existing ground all topsoil from all areas to be graded.

B. Prior to stockpiling of topsoil, screen topsoil via a mobile mechanical screening machine with a 1/2inch size sieve.

C. Stockpile topsoil in designated or approved locations with proper drainage and where it will not interfere with the work. After topsoil has been stockpiled, quantify the stockpiled volumes. Report quantities to the Contracting Officer within 2 days of completing stockpiles.

D. Excess topsoil hauled: After completion of topsoil application in lawn areas, planting areas and other areas shown on the Drawings, any excess topsoil becomes the property of the Contractor and shall be hauled off site.

3.4 GENERAL GRADING REQUIREMENTS

A. Perform exterior grading to provide smooth transitions to and between the proposed contours and spot elevations shown on Drawings.

B. In all cases, grade to a sufficient pitch to drain water.

C. Perform earthwork as required to establish finished grades as indicated on drawings. Grades not otherwise indicated shall be uniform levels of slopes between points where elevations are given or between such points and existing finished grades.

D. Balancing Earthwork: Contractor may adjust grades within construction limits as shown on the drawings as necessary to balance earthwork on site.

E. Excess Cut Material: If quantity of grading material is in excess of quantities necessary to provide finish grade elevations indicated on drawings or if excavated material is deemed unsatisfactory for use as compacted fill, excess material is hauled off site and disposed of legally. Hauling and disposal of excess cut material is performed at the Contractor's expense.

F. Insufficient Fill Material: If quantity of grading material is insufficient to achieve subgrade elevations, Contractor shall obtain additional fill material of specified quality from an off-site source. Obtaining and hauling of additional fill material is performed at the Contractor's expense.

G. Import Fill Material for Areas Determined to be Unsuitable: If the Contracting Officer or Testing Agency determines that onsite excavated or grading materials are unsuitable for use as compacted fill for a given application, then import fill material is obtained from an off-site source. Import fill material shall conform to specifications for the given application. Disposing of unsuitable material, and providing, hauling of import fill material shall be performed by change order based on the unit prices included within the contract.

H. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface of subgrade, or layer of soil material, to prevent free water appearing on surface during or subsequent to compaction operations. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density. Soil material that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing until moisture content is reduced to a satisfactory value. All moisture conditioning necessary to permit compaction to the specified density is performed at the Contractors expense.

I. Slope subgrade to provide positive drainage within all underdrain systems. Unless shown otherwise on the Drawings, subgrade minimum slope to underdrain collection systems is 0.5%.

J. Subgrade Elevation Tolerance: Cut, place, compact fill and rough grade entire project area to within 0.10 feet above or below design subgrade elevations.

3.5 EXCAVATION AND EMBANKMENT SAFETY

A. Comply with all Federal, State, and Local safety laws and regulations pertaining to trenching, excavation, bracing and shoring that includes but is not limited to:

1. OSHA Excavation Standards, 29 Code of Federal Regulations (CFR) Part 1926, Subpart P- Excavations.

B. If conflict exists between safety laws, regulations, and contract requirements including these specifications, apply the most stringent requirements or standards.

C. Protect all excavations and embankments against collapse. Where possible, excavations over 4 feet high shall be made at a slope not steeper than 1.5H:1V or where the soil is very sandy or wet the slope should be no steeper than 2H:1V.

D. Barricade trenches, ditches, pits, sumps and similar Work outside the barricaded working area with chain link fence and in accordance with OSHA standards and requirements.

E. Where it is not possible to provide a safe slope, temporarily support all banks and excavations and maintain secure until permanent support has been provided.

F. Where ditches or trenches that are over 4 feet deep, provide cross bracing and shoring to prevent collapse.

G. Provide bracing, shoring, or shielding systems designed by a Professional Engineer experienced in such designs. The design drawings shall show the work and sequence in its entirety and be submitted to the Contracting Officer prior to commencing the work.

H. Remove shoring upon completion of Work, or when no longer need, unless otherwise required by authorities having jurisdiction over the Work.

3.6 DEWATERING

A. Prevent surface water and subsurface or groundwater from flowing into excavations and from flooding project site and surrounding area.

B. Establish and maintain temporary drainage ditches and other diversions outside excavation limits to convey rainwater and water removed from excavations to collecting or run-off areas. Do not use trench excavations as temporary drainage ditches.

C. Maintain groundwater a minimum of 2 feet below the bottom of any excavation associated with a foundation. Maintain all excavations free of standing water at all times.

D. Remove all mud caused by standing water from any excavation before the placing of permanent material.

E. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations. Do not allow water to accumulate in excavations. Remove water to prevent softening of foundation bottoms, undercutting footings, and soil changes detrimental to stability of subgrades and foundations.

F. No untreated sediment laden water from dewatering operations shall be allowed to enter surface water or a storm drainage system or a permanent stormwater pond.

3.7 TRENCH EARTHWORK

A. General:

1. Conform with the most stringent requirements of these specifications, the Plans, of Utility providers, and of local agency permitting authorities. Requirements may include, but are not limited to: depth of cover, minimum trench width, bedding material, pipe zone backfill, and compaction requirements.
2. Detection wire: Bury continuous and unbroken wire directly above non-metallic piping at a distance not to exceed 12 inches above top of pipe. Terminate wire in junctions (manholes, vaults, boxes) with a minimum of 3 feet of wire coiled, remaining accessible in each manhole.
3. Line Markers: During back filling of utility lines, furnish and install continuous underground-type plastic line marker, located directly over buried utility lines at 12" below finished grade. Under pavements and slabs, bury tape 6" below top of subgrade.
4. Do not exceed 100 feet of open trench in advance of pipe laying, unless approved otherwise by the Contracting Officer.

B. General Trench Excavation:

1. Saw cut concrete or bituminous paving for trench excavation.
2. Where indicated and/or required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns
3. Excavate trenches to the required depth or elevation allowing for placement of the pipe and bedding to the dimensions shown on the Drawings.
4. Grade bottom of trenches, no larger than necessary, to accommodate bell holes and other joints and junctions to provide uniform bearing along the pipe.
5. At the direction of the Contracting Officer or Testing Agency remove unstable or unsuitable material shall be removed from the bottom of the trench and backfilled in accordance with Article – "SUBEXCAVATION".
6. When rock is encountered, excavate to allow a minimum of 6 inches of clearance between rock and any part of the pipe barrel or structure (manhole, vault) and backfill with granular bedding material.
7. Do not excavate trenches parallel to footings closer than 18 inches from the face of the footing or below a plane having a downward slope of 2 horizontal to one vertical, from a line 9 inches above bottom of footings.
8. Unless otherwise indicated on Drawings, depth of excavations outside the buildings shall allow for a minimum coverage above top of pipe, tank, or conduit measured from the lowest adjoining finished grade, as follows:

Pipe material / use	Cover depth (below finish grade)
Steel Pipe	24 inches

Copper Water Tube	18 inches
Cast-Iron Pressure Pipe	36 inches
Plastic Pipe (other than waste)	30 inches
Tanks or other structures	36 inches
Soil, Sewer & Storm Drain	18 inches (min.) and as required for proper pitch and traffic load. Plastic pipe shall have a min. 18" cover.
Irrigation Pipe	12 inches (Non-pressure) 18 inches (Pressure)

C. Utility Trenches (except sanitary and storm sewer):

1. Excavate to a width as necessary for sheeting and bracing and proper performance of the Work.
2. Unless indicated otherwise, excavate trenches to the required depths for utilities, such as pipes, conduit and tanks, with minimum allowances of 6 inches at the bottom and 6 inches at the sides for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.
3. Provide a minimum clear dimension of 2 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and/or tanks.
4. Do not install backfill until required inspections and testing is completed.
5. Bed and provide initial backfill in accordance with the Drawings, and authorities having jurisdiction.
6. Install and compact sand bedding to provide a uniform full length bearing under piping and conduits.

D. Sanitary and Storm Sewer Trenches:

1. The maximum trench width below a plane 6 inches above the top of pipe is:
   a. 24 inches for pipe diameters of 12 inches or less.
   b. Equal to the sum of the outside diameter of the pipe plus 2 feet for pipe diameters greater than 12 inches.
2. Excavate the trench width to allow for the proper compaction of haunching and initial backfill material.
3. Excavate the width of trench above a plane 6 inches above the top of pipe as necessary for proper performance of the work including any sheeting, bracing, or shielding.
4. Bed bottom of pipe on suitable undisturbed soil or as otherwise shown on the Plans.
5. In haunch areas of plastic pipe, install granular fill bedding material up to the springline of the pipe.
6. Install initial backfill in lifts not to exceed 6 inches loose, compacted to 95% of modified proctor and to a minimum depth of 12 inches above the top of pipe. Unless otherwise

specified or required by authorities having jurisdiction, immediate backfill material is as follows:

a. Class 1- Granular fill.

b. Class 2- Suitable existing earth material (default).

E. Final Fill

1. Once outside of the initial backfill area, continue backfilling to reach subgrade elevation as follows:

a. For utility trenches in paving and building areas: Provide structural backfill in 6-8" loose lifts, compacted to 95% of standard proctor, and within +- 3% of optimum moisture. Except that for structural backfill within 12 inches of subgrade, provide in 4" loose lifts and compact to 98%.

b. Where required, backfill trenches with a cement-sand slurry mix. Install backfill to an elevation of the existing undisturbed grade plus one inch.

c. For utility trenches in general fill areas or grading areas: Provide general fill in 8" loose lifts, compacted to 90% of standard proctor and within +-3 % of optimum moisture to reach subgrade elevation.

2. Where portions of existing structures, walks, paving, or other improvements are removed or cut for piping or conduit installation, replace the material with equal quality, finished to match adjoining existing improvements. Repair pavement as specified in Division 32 "FLEXIBLE AND RIGID PAVING REPAIR".

3.8 EXCAVATION

A. Excavate to lines, elevations, dimensions, and depth as indicated on the drawings.

B. Form sides of footings, pads, grade beams, and slab foundations, unless otherwise indicated. Provide excavations of sufficient size to permit installation and removal of forms and other Work as required. Excavation bottoms shall be level and free from loose material.

C. Machine drill excavation for round footings to size and depth indicated. Provide a collar, casing, or other adequate protection to exclude dirt and debris. Protect excavations with plank covers until concrete is placed.

D. Excess Excavation: If excavations for foundations or footings of any kind are carried by the Contractor, without proper authorization, below the indicated or specified levels they shall be backfilled at the expense of the Contractor as follows:

1. In the areas of excess excavation in rock or under structure footings, the excess excavation shall be back filled with control density fill.

2. In the areas of excess excavation in other areas, backfill with approved structural or fill material and constructed in accordance with the fill articles in this Specification.

E. Earth Excavation:

1. **Surface Preparation in excavated areas for foundations:** scarify and uniformly recompact the upper 24 inches of soils intended to support building foundations and floor

slabs to 98% of Standard Proctor (ASTM D 698). In confined areas such as utility trenches, utilize portable compaction equipment and lifts of 3 to 4 inches to achieve the required compaction.

2. **Surface Preparation in excavated areas for paving areas:** scarify and uniformly recompact the upper 12 inches of soils to 95% of Standard Proctor (ASTM D 698). In confined areas such as utility trenches, utilize portable compaction equipment and lifts of 3 to 4 inches to achieve the required compaction.
3. **Surface Preparation in infiltration areas, planting bed areas**: unless otherwise shown, scarify and uniformly recompact the upper 12 inches of soils intended for planting areas or infiltration to 75-80% of Standard Proctor (ASTM D 698) to prevent settlement but still allow for infiltration and plant growth.
4. Do not excavate to full depth when freezing temperature may be expected. Protect excavation bottom from frost if placing of concrete or gravel is delayed. All footing excavations shall be free of pin roots.

F. Rock Excavation:

1. When potential rock is encountered, remove overburden soils and notify the Testing Lab or Contracting Officer prior to **any** rock excavation. The Testing Lab or Contracting Officer shall approve and classify all rock excavation. Once classified, survey grading sections of existing rock surface. When rock is completely removed, survey new grading sections to determine the quantity of rock removed within neat line limits**.**
2. Perform all blasting in accordance with local ordinances, and obtain necessary permits where required.
3. Rock that is excavated is the property of the Contractor and shall be removed from the site. Except that, as allowed by the Contract Documents or as approved in writing by the Testing Agency or Contracting Officer, rock may be incorporated into the Work if it is processed appropriately or meets material specifications.
4. Decomposed rock and similar material removable by tractor drawn ripper or power machinery smaller than defined for rock excavation is classified as earth excavation.

3.9 PROOFROLLING

A. Proof roll surfaces when specified to check for pockets of soft material in areas associated with buildings and pavements.

B. Proof rolling subgrades within +- 3 % of optimum moisture or as approved by the Contracting Officer. In all cases, proof roll subgrades free of surface water which may promote degradation of an otherwise acceptable subgrade.

C. Proof roll with a loaded 20-ton dump truck, or other pneumatic-tired vehicle of similar size and weight, operated at 2 to 3 mph. For large areas such as parking lots, proof roll with 2 complete coverages in each of two perpendicular directions.

D. Perform proof rolling under the observation of the Testing Agency or Contracting Officer. Provide notification 48 hours in advance of all proof rolling operations. Undercut (or

subexcavate) Any areas which "pump" or permanently rut under the wheels of the loaded truck and undercut (subexcavate) to a depth and extent directed or confirmed by the Contracting Officer or Testing Agency.

3.10 SUBEXCAVATION

A. Perform subexcavation below existing ground elevations or subgrade elevations as and when directed by the Contracting Officer or Testing Agency to correct areas with unsuitable bearing capacity or materials.

1. Remove and dispose of unsuitable soils to the extents and depth as directed by the Design Professional or Testing Agency.
2. Level and clear the bottom of the sub excavation of loose material.
3. Place separation geotextile with all seams overlapped at least 2 feet.
4. In paving and foundation areas, backfill with GAB (Graded Aggregate Base) in 8 inch loose layers and compact to at least 95% of Modified Proctor.

3.11 FILLING AND BACKFILLING

A. STRUCTURAL FILL –BUILDING AND RETAINING WALLS

1. Construct structural fills in areas supporting buildings and retaining walls to establish design subgrades.
2. Provide fill materials as specified in Part 2- Products. If excavated materials from the project site are not of required quality or sufficient quantity, import additional materials as necessary.
3. Schedule construction of structural fill as early as possible in order to allow settlements of underlying soils to occur before building and retaining wall construction commences.
4. Surface Preparation for fill: Bench areas to receive fill to a minimum of 12 ft width, remove all loose material, and proof roll prior to beginning fill operations.
5. Place structural fill material in 6 to 8 inch loose lifts at a moisture content at the time of compaction within 3% of the optimum moisture content. Unless otherwise shown, compact to a minimum of 98 percent of Standard Proctor (ASTM D 698). Compact the upper 24 inches to 100 percent of Standard Proctor.

B. STRUCTURAL –BACKFILLING

1. After concrete has been placed, forms removed and concrete work inspected, backfill excavations to indicated or required grades. Backfill simultaneously on each side of walls or grade beams. Remove rubbish debris or other waste material from excavations prior to backfill placement.
2. Before placing any backfill, adequately cure concrete and provide bracing to stabilize structures. Protect waterproofing or damp proofing against damage during backfilling operations with required protection board. Remove bracing as backfill operations progress.

3. Install each layer of material not to exceed thickness of 6 inches, unless otherwise required.
4. Rigidly control the amount of water to be installed to provide optimum moisture content for type of fill material furnished.
5. Carefully backfill walls. Do not utilize heavy equipment within 10 feet of any retaining wall. Use hand tampers to compact within the 10 foot backfill zone.
6. Install wall backfill before installing railings and fences on walls.
7. Install weep hole drainage at the backside of walls so the backing completely covers the weep holes, is horizontally centered and extends at least 12 inches above the bottom of the weep hole opening. Provide an 8 inch square section of galvanized or aluminum screen with a minimum wire diameter of 0.03 inch and install at the backside of each weep hole before installing the backfill material.
8. If a reviewed, approved drainage matting system is provided in lieu of permeable backfill for retaining structures, install in accordance with the manufacturer recommendations.

C. STRUCTURAL FILL – PAVED DRIVE, WALKS, AND PARKING AREAS

1. Load, haul, place, grade, and compact all necessary structural fill to establish design grades as shown.
2. Surface Preparation for fill: Bench to a minimum of 12 ft widths, all loose material removed, and proof roll prior to beginning fill operations.
3. Place structural fill material in 6 to 8 inch loose measure lifts with moisture content at the time of compaction within 3% of optimum. Compact to a minimum of 95% of Standard Proctor (ASTM D 698). Compact the upper 12 inches to at least 98% of Standard Proctor.
4. Proof roll completed subgrade when within 0.1 feet of final subgrade elevation.

D. GENERAL AREA FILL

1. Load, haul, place, grade, and compact all necessary general area fill in general grading area, covering banks, hollows, drain ditches, etc.
2. Place fill material in 6 to 8 inch loose lifts, compacted to a minimum of **90%** of Standard Proctor (ASTM D 698) and within +- 3% of optimum moisture. Except that in landscaping, planting bed areas, and infiltration areas unless otherwise specified or shown, compact the upper 12 inches of soil to 75 to 80% of standard proctor.

3.12 TESTING

A. All failing tests or retests are the responsibility of the Contractor.

B. Minimal testing requirements are summarized below. Contractor may elect to collect additional samples and perform additional tests or prepare additional specimens for testing at its sole discretion in accordance with their own quality control program.

1. Observe fill and subgrades during proof-rolling to evaluate suitability of surface material to receive fill or base course. Verify soil bearing capacity assumptions. Provide recommendations to the Contracting Officer regarding suitability or unsuitability of areas

where proof-rolling was observed. Where unsuitable results are observed, witness excavation of unsuitable material and recommend to Contracting Officer extent of removal and replacement of unsuitable materials and observe proof-rolling of replaced areas until satisfactory results are obtained.

2. Provide characterization and classification, testing of all general fill, and subgrade materials as follows:
    a. Classification: 1 per material type/source
    b. Atterberg Limits: 1 per material type/source
    c. Grain size distribution
    d. Moisture – Density (ASTM D698 Standard Proctor for fine grained material, ASTM D1557Modified for coarse grained): 1 per material type/Source (except structural fill).
3. Characterization and classification of import structural, import pavement area fill, and import trench backfill shall be sampled and tested at their designated sources a rate of 1 test per 250 CY of import if total quantity is greater than 1000 CY. If less than 1000 CY, sample and test a rate of 1 test per 100 CY. Perform field density and moisture tests (ASTM D6938). Other test methods based on material type may be proposed and are subject to approval by the Contracting Officer. Perform and report field density tests at the minimum frequencies listed below.
    a. Building Slab: 1 test for each type of soil type on excavated surfaces. 1 test per compacted fill layer each 2500 sq.ft. of area.
    b. Footings- Foundation: 1 test for each layer or type of soil present. In compacted fill layers, perform one test per 100 feet of footing length.
    c. Paving Area Fill: 1 test per layer for every 2 feet of fill each 5,000 sq.ft. of area.
    d. General Area Fill: 1 test per every 2 feet of fill for each 10,000 sq.ft. of area.
    e. Utility trench spread footing or retaining wall: 1 test per 2 feet of fill per 50 linear feet of trench.
4. For import and export of materials, submit bills of lading or equivalent documentation to the Contracting Officer on a daily basis.

3.13 MAINTENANCE AND PROTECTION

A. Maintain subgrade, in condition and at compaction levels required, until improvements (site and/or building) are completed.
    1. Should subgrade or fill materials be disturbed or become water saturated, restore to the specified criteria as verified by the Contracting Officer.
B. Provide additional fill material, remove excess material, or redistribute material, should grades be changed from erosion or construction activities.

3.14 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION 31 22 00

SECTION 32 01 15 – FLEXIBILE AND RIGID PAVING REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Bituminous (Flexible) Surfacing Repair: areas removed for utility trenches, heaved by tree roots, cracked areas, depressed areas, holes and areas around new structures and raveled bituminous pavement.
2. Concrete (Rigid) Pavement Repair: areas heaved by tree roots, cracked areas, holes and trenches, and areas around new structures.

B. Related Sections:

1. 31 22 00 “EARTHWORK” for excavating, backfilling and compacting.
2. 32 05 00 “COMON WORKS FOR EXTERIOR IMPROVEMENTS” for graded aggregate base (GAB) as base course.

1.2 SUBMITTALS

A. Product data for materials, including but not limited to: forms, bases, pavements, crack sealing material, seal coating material.

B. Shop Drawings indicating extents of areas to be repaired.

1.3 QUALITY ASSURANCE

A. Comply with all applicable codes and ordinances of the public works authority(s) having jurisdiction.

PART 2 - PRODUCTS

2.1 REFER TO RELATED SECTIONS FOR MATERIALS FOR:

A. Base Course, Flexible Pavements, Site Concrete work.

2.2 HEADER AND STAKES

A. Headers: Redwood, Construction Heart Grade, size 2 x 6, unless otherwise indicated on Drawings.

B. Stakes: 2 x 4 redwood or 2 x 3 Douglas fir, Construction Grade.

C. Nails: Common, galvanized, 12d minimum.

2.3 SLURRY

A. Cement-Sand Slurry: minimum one sack (94 lbs) of cement per cubic yard of mixture.

PART 3 - EXECUTION

3.1 PAVEMENT REMOVAL

A. Remove bituminous and concrete pavement in accordance with applicable provisions of the local public works authority.

B. Pavement Heaved by Roots: Remove pavement to limits of distortion and expose roots. Trim roots to provide at least 12 inches clearance to pavement.

C. Remove protruding bituminous surfaces flush with the surrounding grade using a suitable tool or equipment so that adjacent finishes are not blackened.

D. Remove raveled and depressed bituminous pavement to limits indicated or required.

E. Saw cut existing improvements, trim holes and trenches in bituminous and concrete pavement to permit mechanical hand tampers to compact the fill.

F. Remove broken concrete by saw cutting. If the required cut line is within 30 inches of a score or joint line or edge, cut and remove to the score, joint line, or edge.

3.2 EXCAVATING, BACKFILLING AND COMPACTING

A. Conform to requirements in Division 31 “EARTHWORK” for excavating, backfilling and compacting for pavements, structures and utilities as required.

B. Where subgrade or base is deemed to be unstable or otherwise unsuitable, excavate such materials to firm earth, and replace with a required material. Install and compact fill materials in accordance with the requirements of related Specification sections.

3.3 HEADERS

A. Install headers along edge of bituminous surfacing abutting turf, earth, or planting area, unless indicated otherwise.

B. Install headers so the bottom surface has continuous bearing on solid grade. Where excavation for headers is undercut, thoroughly tamp soil under the header. Compact backfill on both sides of header to the density of the adjacent undisturbed grade.

C. Fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid earth a minimum of 12 inches. Stakes shall be of sound material, neatly pointed, driven vertically, and securely nailed to headers. Space stakes, not to exceed 4 feet on centers with top of stakes set one inch below top of header. Provide a minimum of 2-12d galvanized- common nails through each stake.

D. Remove existing headers where new surfacing is installed adjacent to existing surfacing.

E. Install temporary headers at transverse joints of paving where continuous paving operations are not maintained.

F. Provide additional stakes and devices as required to fasten headers.

3.4 BASE COURSE

A. Unless otherwise indicated, place, compact, and maintain aggregate bases in accordance with Division 32 “COMMON WORKS FOR EXTERIOR IMPROVEMENTS”.

B. Unless otherwise indicated, base course shall be graded aggregate base (GAB), 3 inches thick or equal to thickness of the existing base, whichever is greater.

3.5 RESURFACING

A. Holes and Trenches: Remove loose dirt and backfill with cement-sand slurry allowing for surfacing one inch thicker than existing. Unless otherwise indicated on Drawings, resurface flush with existing adjoining pavement installing the same type of materials and section provided in existing improvements.

B. Other Areas: Other surface improvements damaged or removed shall be cut to a neat even line and excavated one inch below the bottom of the existing pavement. Resurface by following the original grades and installing the same type of materials provided in existing improvements.

C. Where bituminous surfacing abuts concrete, masonry, walks or paving, tamp joint smooth, if necessary, as described above to obtain a uniformly even joint, true to line and grade. Tamp and smooth materials before asphalt cools.

3.6 REPAIRING AND RESEALING EXISTING SURFACES

A. Preparation of Surfaces: Prior to filling cracks, clean existing bituminous surfacing of loose and foreign materials and coat with a film of asphalt emulsion.

B. Repair of Existing Surfacing:

1. Fill cracks 1/2-inch-wide and less with RS-1 emulsion and silica sand or other required material. Cracks larger than 1 /2-inch-wide shall be filled with Type C2 Asphalt Concrete as specified. Cracks shall be filled to the level of adjacent surfacing.

2. Where low areas, holes, or depressions occur in existing surfacing, repair with emulsified asphalt. Install material, strike off the emulsified asphalt with a straightedge flush with adjoining surfacing. Finish with a steel trowel, and after dehydration, compact by rolling or tamping.

C. Testing: Flood test entire area in presence of the Contracting Officer. Entire area tested shall be free of standing water or puddles.

D. Surface Seal: After surface has been repaired and tested, install seal coat over entire area indicated.

3.7 CLEANING

A. Remove all stains on the Project site and adjacent properties caused by or attributed to the Work of this section.

B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.8 MAINTENANCE OF PAVEMENT REPAIR AREAS

A. Protect the Work of this section throughout construction and until Substantial Completion.

END OF SECTION 32 01 15

SECTION 32 05 00 – COMMON WORKS FOR EXTERIOR IMPROVEMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Furnished Topsoil.
2. Water
3. Soil Amendments.
4. Mulch.
5. Compost
6. Graded Aggregate Base (GAB).
7. Coarse Sand
8. Coarse Aggregates.
9. Drain Rock.
10. Geotextiles.

1.2 REFERENCE SPECIFICATIONS AND DOCUMENTS

A. American Society for Testing Materials (ASTM)

1. ASTM D1557- laboratory compaction characteristics of soil using Modified Effort.

1.3 SUBMITTALS

A. Product data for all material proposed for the work, including but not limited to:

1. Compost
2. Nutrient grade compost.

B. Copies of all soil testing results for landscape planting areas, including but not limited to the following data:

1. Include the recommended ratio and amounts (lbs per 1000 sq-ft) of fertilizing.
2. Amendments of lime, organic matter.

1.4 SITE CONDITIONS

A. Store materials only in areas designated for Contractor's use.

PART 2 - PRODUCTS

2.1 FURNISHED (IMPORT) TOPSOIL

A. Furnished Topsoil is adapted to the sustenance of plant life and harvested from fields or development sites. Manufactured topsoil where components such as sand, organic matter, and chemicals are added to mineral soil are not acceptable. Furnished topsoil shall achieve the following characteristics:

1. Texture – USDA loam, sandy clay loam, or sandy loam with clay between 15 and 25% and combined clay and silt content no more than 55%.
2. Organic Material – 2.0 to 20% by mass
3. pH - between 5 and 7.
4. Uniform quality and free from foreign material such as hard clods, sod, stiff clay, hard pan, stones larger than 1 inch diameter, lime cement, ashes, slag, concrete, tar residues, tarred paper, boards, chips, sticks, or other undesirable materials. It shall also be reasonably free from weeds and objectionable plant material.

B. All sources of Furnished (Import) Topsoil shall be approved by the Contracting Officer prior to delivery to site. Test proposed topsoil and submit test results for approval, along with a minimum 1 gallon labeled soil sample.

C. Stockpiled existing topsoil at the site meeting the above criteria may be acceptable.

D. Furnished Topsoil shall not have been screened.

2.2 WATER

A. Furnish water used in this work. Furnish watering trucks, hoses and other temporary watering equipment (sprinklers, stands. etc.) required for work.

B. When used for plant irrigation, water shall be suitable and free from ingredients harmful to plant life.

2.3 SOIL APPURTENANCES (AMMENDMENTS)

A. Mulches and Composts: See separate Articles this specification.

B. Ground Limestone: Lime shall be ground limestone (Dolomite) containing not less than 85 percent of total carbonates and ground to such a fineness that 50 percent will pass through a 200-mesh sieve and 90 percent will pass through a 20-mesh sieve. Coarser material will be acceptable, provided the specified rates of application are increased proportionately on the basis of quantities passing through the 100-mesh sieve.

C. Sand: Clean, washed sand, free of toxic materials.

D. Sawdust: Rotted sawdust, free of chips, stones, sticks, soil or toxic substances and with 7.5 lbs nitrogen fertilizer uniformly mixed into each cubic yard of sawdust.

E. Peat Moss: granulated sphagnum free of woody substances, brown in color, free of stones and mineral matter, air dry condition.

F. Peat Humus: When shown provide a domestic product of peat humus consisting of partially decomposed vegetable matter of natural occurrence. It shall be brown, clean, low in content of mineral and woody material, mildly acid, and granulated or shredded.

G. Commercial Fertilizer: Fertilizer formula complying with Federal fertilizer laws. Deliver fertilizer to the site in original, unopened containers bearing the manufacturer's certificate of compliance covering analysis and primary nutrient (N, P, K) concentrations. To protect public health and waterways, do not over apply any fertilizer. Unless otherwise shown on the plans or specified in other Sections, fertilizer application is as follows:

1. Trees and shrubs (planting beds): Provide in the ratios and quantities (lbs per 1000 sq-ft, or lbs per cubic yard of soil) in accordance with results of soil tests.

H. Ammonium Nitrate: Use where specified or where a fast release nitrogen fertilizer is required. Commercial product in dry granular form of recent manufacture (within last 6 months) and delivered in the original, unopened containers each bearing the manufacturer's guaranteed statement of analysis, containing not less than 33.0% percent Nitrogen.

2.4 COMPOST

A. Use compost that meets the following:

1. Composed of decomposed organic material.
2. Organic material is disinfected through composting (minimum 9 months) or similar technologies.
3. Stabilized so it is beneficial to plant growth.
4. Mature, dark brown or black in color and have an earthy odor.
5. Contain no human pathogens.
6. pH range of 5 to 8.
7. Contains not more than 25% by volume wood shavings, sawdust or refuse.

B. Submit all ingredient in the compost mix, and their relative proportions.

2.5 NUTRIENT GRADE COMPOST

A. Provide nutrient grade compost manufactured from a composter enrolled in the Untied State Compost Council Seal of Testing Assurance (STA) Program. When shown provide product that meets the following parameters as tested by an STA approved lab:

Plant Nutrient	% dry weight basis	TMECC Method
Nitrogen	>1.2	4.02D
Phosphorus	>.50	Calc.
Potassium	>.50	Calc.
Calcium	>.90	4.05
Magnesium	>.20	4.05
Organic Matter Content	>50%	5.07-A
Soluble Salts dS/m (mmhos/cm)	<4.0	4.08-A
Particle Size % under 9.5 mm	95% or greater	2.02-B
Stability Indicator (respirometry) C02 Evolution mg C02-C/g OM/day	<2	5.08-F777
Maturity Indicator (bioassay) Percent Emergence	85% or greater	5.05A

Select Pathogens (pass/fail per US EPA Class A standard, 40 CFR 8503.32 (a)) Method 9221E	Pass	Standard

2.6 GRADED AGGREGATE BASE (GAB)

A. GAB material shall be composed of well graded crushed stone consisting of hard, durable rock fragments free from clay and reasonably free from flat, elongated or soft pieces of organic matter.

B. GAB shall achieve the following gradation:

Sieve Size	**Percent Passing by Weight**
2 in	100
1-1/2 in	97-100
3/4 in	60-95
No. 10	25-50
No. 60	10-35
No. 200	7-15

2.7 COARSE SAND

A. Clean, washed, sand free of toxic materials free of limestone, shale and slate particles, complying with ASTM C-33 fine aggregate for concrete.

B. Coarse sand shall achieve the following gradation :

Sieve Size	**Percent Passing by Weight**
3/8 in	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	2-5

2.8 COARSE AGGREGATES

A. Gradation shall comply with the table below:

Size NO	**Nominal Size Square Opening ***	**Amounts finer than each laboratory sieve (square openings) % by weight**										
		2½”	2”	1½”	1”	¾”	½”	⅜”	No. 4	No. 8	No. 16	No. 50
3	2” - 1”	100	90-100	35-70	0-15	-	0-5	-	-	-	-	-

4	1½ - ¾"	100	95-100	-	35-70	-	10-30	-	0-5	-	-	-
5	1 – ½"	-	-	100	90-100	20-55	0-10	0-5	-	-	-	-
57	1" – No.4	-	-	100	95-100	-	25-60	-	0-10	0-5	-	-
6	¾ - ⅜"	-	-	-	100	90-100	20-55	0-15	0-5	-	-	-

2.9 GEOSYTHETICS

A. Separation fabric:

1. Woven polypropylene fabric, high modulus type with good separation capabilities conforming to the following:

Property	Test Method	Requirement
Grab Tensile Strength	ASTM D 4632	200 lbs min.
Grab Tensile Elongation	ASTM D 4632	30% max.
Mullen Burst Strength	ASTM D 3786	400 psi min.
Trapezoid Tear Strength	ASTM D 4533	75 lbs min.
Puncture Strength	ASTM D 3787	75 lbs min.
CBR Puncture	ASTM D 6241	
Apparent Opening Size (AOS)	ASTM D 4751-99a	20 to 50 US Sieve

PART 3 - EXECUTION

3.1 AGGREGATE BASES

A. Placement

1. Maximum single layer compacted course is 8 inches.
2. If total thickness of base exceeds 8 inches, construct in 2 or more courses of equal thickness.

B. Compaction

1. Ensure moisture content is uniformly distributed and sufficient to achieve optimum moisture.
2. Uniformly roll the base to line, grade, and section and to the required percentage of maximum dry density.
3. For multiple courses, add water as necessary to achieve optimum moisture content.
4. In areas inaccessible to roller, obtain the required compaction with mechanical tampers approved by the Testing Agency or Contracting Officer.

C. Maintenance

1. Maintain the base until it is sufficiently ready for paving courses. Repair defects by additional watering, rolling, and blading as necessary.

END OF SECTION 320500

SECTION 33 1100

WATER UTILITY DISTRIBUTION PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Water distribution system (domestic and fire protection) pipes, fittings, and appurtenances.
2. Coordination with local authorities and utility providers.
3. Pressure testing and sterilization.

B. Related Sections:

1. 31 22 00 “EARTHWORK” for trench excavation, backfill, and compaction.

1.2 REFERENCE SPECIFICATIONS AND DOCUMENTS

A. Comply with requirements of all regulatory agencies: Comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, state or federal authorities having jurisdiction.

B. Water distribution systems shall meet all requirements of the local governing authority water system and shall be subject to review by system inspectors.

1.3 SUBMITTALS

A. Product data: For each type of piping material, prefabricated structure, and casting. Indicate product descriptions and installation procedures.

B. As-builts: Provide the Owner with one (1) copy of a reproducible "as-built" plan of all underground utilities showing the location of each with dimensions shown to the building and/or curb line from each underground utility.

C. Certification(s) of pressure testing.

D. Certification(s) of disinfection of all potable water piping.

1.4 QUALITY ASSURANCE

A. Underground piping which is used for fire protection shall be installed by a Contractor which holds a current Certificate of Competency for Automatic Fire Sprinkler Systems.

1.5 SITE CONDITIONS

A. Consult with the local governing authority prior to formulating bid to coordinate timing of on-site water improvements with off-site water line improvements.

B. Obtain all necessary permits for work within public right-of-way.

C. It is the Contractor's responsibility to determine all requirements of the local Water Department regarding new utility service to the site. The installation shall be in complete accordance with those requirements. Notify the local authority prior to backfilling any buried or concealed plumbing and allow inspection and observation of all Work.

D. Comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, and federal authorities having jurisdiction.

E. Coordinate water distribution system installation with grading and paving and other site operations.

F. Install water mains when subgrade is within 6 inches of final grade, and prior to paving base installation.

1.6 WARRANTY

A. Contractor shall warranty the construction and workmanship of water distribution system(s) for a period of one (1) year from the date of project Acceptance.

PART 2 - PRODUCTS

2.1 DOMESTIC PIPING MATERIAL

A. Pipe material, unless otherwise provided shall conform to the following:

1. 3” and smaller domestic water service pipe installed underground shall be Type "K" hard drawn copper tubing with wrought copper solder joint fittings conforming to ASTM B-88-72. Minimum depth of cover is 36" or as required by local authorities or utility provider.
2. 4” and larger domestic water pipe installed underground shall be cement lined ductile iron pipe conforming to ANSI A21.51. Minimum depth of cover is 36".
3. Install warning tapes with metallic cores 12" above all underground piping. Unless otherwise provided, warning tape shall be Brady 91603(blue) for water lines, 91604(green) for sanitary sewer lines and 91600(yellow) for gas lines or approved equal by Seton or T&B Westline. Warning tape shall rise out of the ground and be accessible at the building wall or other outside location.

B. Pipe joints, unless otherwise provided shall conform to the following:

1. Joints in copper pipe shall be made with lead free solder containing tin-copper-silver or 95-5 tin antimony.
2. In lieu of soldered fittings in copper pipe, the contractor may substitute Victaulic or Grinnell Gruvlok grooved mechanical couplings or T-Drill mechanically formed fittings with brazed connections. Each of these systems shall be used in accordance with the manufacturer’s published instructions.
3. Joints in ductile iron water and sewer pipe shall be Tyton joints except that joints at fittings in water lines shall be bolted mechanical joints.
4. Connections of copper pipe to ferrous pipe and/or equipment shall be made with dielectric unions, Watts series 3000, Victaulic or Gruvlok Clearflow or approved equal.

C. Valves, unless otherwise provided shall conform to the following:

1. Unless specifically indicated otherwise, the valves shall be designed for not less than 125 pounds working pressure. The valves shall be suitable for the service for which they are installed.

2. Gate valves for copper water lines shall be Milwaukee Fig. 115 bronze valve with non-rising stem (nut and valve key) and sweat ends or approved equal by Crane, Hammond, Mueller, Nibco, Stockham or Watts.

3. Gate valves for ductile iron water lines shall be Watts model 406-NRS-RW flanged gate valve with non rising stem (nut and valve key) or approved equal by Crane, Hammond, Kitz, Milwaukee, Mueller, Nibco, or Stockham.

4. Double check valves shall be Watts No. 709-RW or 007-QT as indicated, epoxy coated double check valve with two gate valves and four test cocks. The valve assembly shall be U. L. listed. Approved equal valves by Ames, Febco, Hersey or Wilkins are acceptable.

2.2 FIRE PROTECTION PIPING MATERIAL

A. Valves

1. OS & Y valves, post indicator valves and check valves shall be listed by U. L. for use in fire mains. Gate valves: Iron-Body Bronze - Mounted Gate Valves, Sizes 3" - 12", inclusive: Order Specification: Double-Disc, Parallel Seats, Non-rising stem (IS), Rated at 200-psi WWP, O-ring seals, Std 2" square wrench nut, and conforming to AWWA Specifications C500 in all respects. Check with Water Department for direction of opening.

2. Post indicator valve: include a compatible supervisory control switch with tamper proof cover per manufacturer recommendations. Route all necessary conductors in approved conduit.

B. Underground Piping – Ductile Iron

1. Underground piping shall be cement lined ductile iron pipe manufactured in accordance with ANSI 21.51.

2. Joints in ductile iron water pipe shall be Tyton joints except that joints at fittings shall be bolted mechanical joints.

C. Fittings And Couplings (Underground Piping)

1. Fitting for underground piping shall be ductile iron manufactured in accordance with ANSI A21-10. All ductile iron pipe fittings shall be in accordance with AWWA C151/ANSI A21.51.

D. Backflow Prevention Valves

1. Double check detector valve assembly shall be Watts 709 DCDA double check valve with detector CFM meter, two OS & Y gate valves and four test cocks.

2. Valves shall have epoxy coated cast iron bodies. The valve assembly shall be U. L. listed.

3. Valves shall be as manufactured by Watts or approved equal by Ames, Febco or Hersey.

E. Fire Hydrants

1. Fire hydrants shall be an AWWA listed type having two 2-1/2" hose outlets and a 4-1/2" pumper outlet with threads compatible with Local Fire Department equipment.

PART 3 - EXECUTION

3.1 GENERAL

A. Permits: Obtain the necessary permits from local governing authorities having jurisdiction and from related utility providers prior to performing any water work on site.

B. Line and Grade: Layout water systems to the required lines and grades; with fittings, valves and hydrants at the required locations; and with joints centered and spigots home; and with all valve and hydrant stems plumb.

C. Protecting underground and surface structures: Provide temporary support, adequate protection and maintenance of all underground and surface utility structures, drains, sewers and other obstructions encountered in the progress of the work.

D. Sub-surface exploration: Examine all available records and make explorations and excavations necessary to determine the location of existing pipes, valves, or other underground structures.

E. Detectable wire: Install tracing wire with all non-metallic piping.

3.2 LAYING PIPE

A. Install underground fire protection piping in accordance with NFPA 24-8-1 through 8-7. Anchor all tees, plugs, caps and bends with clamps, tie rods and concrete thrust blocks in accordance with NFPA 24-8-6. Underground fire protection piping shall have a minimum of 48 inches of cover above the top of the pipe.

B. General: Before lowering pipe into trenches, grade the bottom of the ditch so that will have a bearing for its entire length. Carefully examine the pipe for defects and clean the inside. After placing pipe in ditch, clean the bell gasket, and spigot of all dirt, sand and foreign material. Apply a thin film of lubricant to the gasket and spigot. Insert the plain ends of the pipe into the socket after until it makes contact with the bottom of the socket.

C. Trench water: Close the open end of pipe by approved means at all times when pipe laying is not in progress such that no trench water is permitted to enter the pipe.

D. Cutting pipe: Cut pipe in a neat and workmanlike manner for inserting valves, fittings or closure pieces.

E. Direction of laying: Unless otherwise recommended by the manufacturer or local authorities having jurisdiction, lay pipe with bell ends facing in the direction of laying. For lines on an appreciable slope, bells shall face upgrade.

F. Permissible deflection: Wherever necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions, to plumb stems, or where long radius curves are permitted, the degree of deflection is the lesser as recommended by the manufacturer of the pipe and the maximum allowed by local authorities having jurisdiction.

G. Unsuitable conditions: Do not lay pipe in water or when the trench conditions or weather is unsuitable for such work, except by written permission of the Contracting Officer.

3.3 DUCTILE IRON PIPE - PUSH ON JOINTS

A. Joints shall be made by means of a compression-type, push-on resilient gasket. Lubricate gaskets before installation using as recommended by the pipe manufacturer. Identify the seated joint by the visible mark on the spigot of the installed pipe section. When the temperature is above 60 degrees F., force the spigot end of each cast iron pipe lead tightly on the bell of the preceding pipe. When the temperature is below 60 degrees F., maintain 1/16 inch clearance from the spigot end of pipe to face of the bell for expansion.

B. Assemble, handle and install flexible joint pipe in accordance with the printed manufacturer recommendations.

3.4 SETTING APPURTENANCES

A. Valves and fittings: Set and join gate valves and pipe fittings to new pipe in the manner previously specified for cleaning, laying and jointing pipe and as recommended by the manufacturer.

B. Valve boxes: Firmly support cast iron valve boxes, positioned centered and plumb over the wrench nut of the gate valve, with box cover flush with the surface of the finished pavement or at such other level as may be directed.

3.5 SETTING HYDRANTS

A. General locations: locate hydrants to provide complete accessibility and minimize possibility of damage from vehicles or injury to pedestrians.

B. Cleaning: Thoroughly clean hydrants of dirt or foreign matter before setting.

C. Position of nozzles: Install hydrants plumb with nozzles at an angle of 45 degrees with respect to the curb with nozzles at least 18 inches above the ground.

D. Drainage at hydrant: Wherever hydrants are set in impervious soil, excavate a drainage pit below each hydrant and filled and compacted with coarse gravel or broken stone mixed with coarse sand, under and around the bowel of the hydrant and to a level 6 inches above the waste opening.

3.6 ANCHORAGE OF BENDS, TEES, AND PLUGS

A. Limiting pipe diameter and degree of bend: Apply reaction or thrust blocking/backing on all pipe lines at all tees, plugs caps and at bends deflecting eleven degrees or more. If approved, in lieu of blocking, movement may be prevented by attaching suitable metal rods or straps.

B. Reaction backing: Reaction, or thrust backing shall be of concrete. Place between solid, unexcavated ground and the fitting to be anchored; the area of bearing on pipe and on ground in each instance shall be as shown on the drawings. Place the backing, unless otherwise shown, so that the pipe and fittings' joints will be accessible for repairs.

3.7 TESTING- QUALITY ACCEPTANCE

A. FLUSHING OF SYSTEM

1. Thoroughly flush underground piping in accordance with NFPA 24-8-8 prior to the connection of inside piping.

B. HYDROSTATIC TESTS

1. Pressure during test: After the pipe has been laid and partially backfilled as specified, all newly laid pipe, or any valved section of it, shall, unless otherwise specified, be subjected to hydrostatic pressure of 200 psi for at least 3 hours in accordance with NFPA 24-9.2.

2. Procedure: Test shall conform with AWWA C600. Fill each section of pipe slowly with water. Apply the specified test pressure, measured at the lowest point of elevation, by means of a pump connected to the pipe in a satisfactory manner. The pump, pipe connection gauges and all necessary apparatus shall be furnished by the Contractor. Perform the test separately to each valved section in order to check leakage through all valves. Contractor shall notify and request Fire Marshal to monitor all pressure test and leakage test procedures.

3. Expelling air before test: Before applying the specified test pressure, expel all air from the pipe. To accomplish this, tap if necessary, at points of highest elevation, and afterwards plug tightly.

4. Leakage defined: Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section of it, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and air expelled. Fire Marshal to monitor leakage test.

5. Permissible leakage: Suitable means shall be provided by the Contractor for determining the quantity of water lost by leakage under normal operating pressure. No pipe installation will be accepted until or unless this leakage is less than 10 U.S. Gal. per 24 hours per mile per inch nominal diameter. In calculating leakage, the Fire Marshal will make allowance for added joints in the pipeline above those incidental to normal unit lengths of pipe.

6. Variation from permissible leakage: Should any test of combined sections of pipe laid disclosed leakage per mile of pipe greater than that specified, or if individual sections show leakage greater than the specified limit, the Contractor shall, at his own expense, locate and repair the defective joints until the leakage is within the specified allowance.

7. Time for making test: Pipe may be subjected to hydrostatic pressure, inspected, and tested for leakage at any convenient time to Contractor, Contracting Officer and Fire Marshal after partial completion of backfill. Provide water as necessary to make the tests when each section is ready.

8. Certification: Complete and submit the joint Owner-Contractor inspection and test certificates in accordance with NFPA –24-A-9-2.1 to the Fire Marshall, Owner, Contracting Officer, and water system authority.

C. STERILIZATION

1. Before being placed in service, chlorinate all new water main pipe lines and accessories. Furnish all chlorinating equipment and materials, labor and supplies. Prior to chlorination, remove all dirt and foreign matter by a thorough flushing through the hydrants or by other approved means. Flush each valved section of new laid pipe independently prior to the pressure test and before the trench has been backfilled. All flushing, chlorinating and testing of water main pipe lines shall be in strict compliance with the Utility Owner.

2. Sterilize in accordance with AWWA C601. Sterilize by applying clear water containing a minimum of 50 ppm of available chlorine. The chlorine bearing water shall remain in contact with the surfaces being sterilized for a period of not less than 24 hours. At the end of the contact period, the chlorine residual in all units and at extremities of pipelines shall be at least 25 ppm. The Contractor to coordinate and schedule the testing of treated water through the Contracting Officer and Water Utility.

3. Chlorinating valves and hydrants: Operate all valves or other appurtenances while the pipeline is filled with the chlorinated agent.

4. Final flushing and test: Following chlorination, thoroughly flush all treated water from the newly laid pipeline at its extremities until the replacement water throughout its length shall, upon test, be approved by the water utility owner.

5. Repetition of procedure: Should the initial treatment prove ineffective, repeat the chlorination procedure until confirmed tests shown that water sample conforms to the requirements previously stated.

END OF SECTION 33 11 00