

**MESA VERDE
NATIONAL PARK
Colorado**

MOREFIELD
WATER LINE REPLACEMENT
MEVE
PMIS NO. 317500

**PROJECT SPECIFICATIONS
(Construction Documents)**



NATIONAL PARK SERVICE
MIDWEST REGION
August 2025

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DIVISION 00

PROCUREMENT AND CONTRACTING
REQUIREMENTS



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00 01 07 - SEALS AND SIGNATURES

Owner Name: National Park Service
Facility or Site Name: Mesa Verde National Park
Project Name: Morefield Water Line
Project or Contract Designation: PMIS No. 317500
Engineer: HDR

 Brandon W. Luster, PE License No. 41014	The seal and signature to the left applies to the all Specifications divisions and sections of this project manual.
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Engineer's seal and signature does not apply to the documents that comprise Division 00, Bidding and Contracting Requirements.

It is a violation of applicable laws and regulations governing professional licensing and registration for any person, unless acting under the direction of the licensed and registered design professional(s) indicated above, to alter in any way the Specifications in this project manual.

END OF SEALS AND SIGNATURES

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DIVISION 01

GENERAL REQUIREMENTS



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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. Contractor Use of Site
 - 4. Public Use of Site
 - 5. Conduct of Operations
 - 6. Work Restrictions
 - 7. Special Construction Requirements
 - 8. Soils Investigation Report

1.2 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Location: This project is located at Mesa Verde National Park in Cortez, Colorado. Main project areas include the Morefield housing area/campground.
- B. The Work consists of: This project will include the design and construction of 5 miles of high-pressure water line at the Morefield area. Waterline replacement will be accomplished with a combination of open trench and horizontal directional drilling (HDD) installations. Replacement will include surfacing restoration, site restoration, upgrading air release valves, additional isolation valves, incorporating drains at low points in alignments, tank connections, drainage culvert repairs, drainage crossing upgrades, temporary construction access road improvements.
- C. Project will be constructed under a single prime contract.

1.3 WORK PHASES

- A. The Work shall be conducted in a minimum of 1 phase for work Morefield area. The contractor shall provide a proposed phasing plan to NPS as a submittal. The project will be considered one project in regards to substantial completion with all work in the Morefield area needing to be substantially complete before NPS will consider the project substantially complete.

1.4 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 on drawings. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine constructions operations to Construction limits indicated on the drawings.

- B. Storage of Materials: Confine storage of materials to staging areas shown on the plans and confirmed with NPS.
 - C. Parking: Confine parking to designated locations within the construction limits.
 - D. Stockpiling: Confine stockpiling to staging areas shown on the plans and approved by NPS
 - 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 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. There is a parkwide load restriction on park roads of 20,000 lb/axle.
 - I. Bridge Restrictions: Identify jurisdictions, load restrictions, permit requirements, time and calendar restrictions as outlined.
- 1.5 PUBLIC USE OF SITE
- A. Morefield alignment is mostly out of the publicly used areas of the park. When the boring is occurring for the upper segment the contractor shall have an approved traffic control plan in place prior to beginning work.

1.6 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 **2 business 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.

1.7 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed during normal business working hours of 7 a.m. to 5 p.m., Monday through Friday, except when otherwise indicated.
 - 1. Weekend & Holiday Hours: 7 a.m. to 5 p.m. Contractor must submit a request in writing a minimum of 48 hours in advance of weekend work and request must be approved by the CO prior to working.
 - 2. Early Morning Hours: Confirm any restrictions with the CO prior to construction.
 - 3. Hours for loud construction activities: Confirm requirements with the CO prior to construction.
- 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 two 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: Shutdowns of the Morefield line for cross over connections between the existing and new system shall be coordinated with the park for exact timing and be a maximum of 10 hrs at a time. Off peak (October to April) shutdowns for up to 5 days will be allowed with advance coordination with Park staff.
- D. Nonsmoking Building/Tobacco Use/Vaping: Smoking is not permitted within building or within 25 feet of entrances, operable windows, or outdoor air intakes.

1.8 SPECIAL CONSTRUCTION REQUIREMENTS

- A. Project Website: A project website administered by the Construction Management Representative (CMR) will be used for purposes of managing communication and documents during construction stage.

1.9 SOILS INVESTIGATION REPORT

- A. The report Geotechnical Investigation Report by Lithos Engineering is included with this package.
- B. In case of conflict between report and drawings or specifications, the 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.

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 31 which 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.....	10.00%
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 01 26 01

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.
- C. All Contract line items will be considered as one in determining substantial completion and start of warranty period.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 LIST OF CONTRACT LINE ITEMS

- A. Contract Line Item Number 1 - Replace Morefield Waterline
 - 1. This item consists of construction of the new Morefield water lines using NPS standards. Major components include new water lines with both open trench and horizontal directional drilling (HDD) installations, replacement of valves, roadway resurfacing, erosion control, and drainage improvements.
 - 2. Payment will be made at the contract **lump sum price**.

END OF SECTION 01 27 00

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SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

- A. This 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 SharePoint 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 35 05 "Environmental Protection and Special Controls" for coordinating environmental requirements of the Contract.
 - 3. Section 01 73 40 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 4. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.
 - 5. Section 01 79 00 "Demonstration and Training" for coordinating training requirements for Government staff on new equipment.

1.2 DEFINITIONS

- A. Authority Having Jurisdiction
- B. Construction Permits – Contractor Provided
- C. Government Furnished Permits

1.3 CONSTRUCTION COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the 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 the 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 adequate 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 all 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.
1. Refer to 01 40 00 "Quality Requirements".
 2. Provide Method of Procedure for all outages and coordination with NPS; provide step-by-step procedure, timelines, and critical involvement required by Contractor and NPS.
- 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, the following:
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 the Contract Documents or standard printed data. Include the 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 the 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 the Contracting Officer (CO) for resolution of such conflicts.
 - c. Indicate space requirements for routine maintenance and for 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 other controls.
 - e. Indicate required installation sequences.
 - 2. Sheet Size: At least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
 - 3. Number of Copies: Submit 2 opaque copies of each submittal. Contracting Officer (CO) will return 1 copy.
 - 4. Refer to individual Sections for Coordination Drawing requirements for Work in those Sections.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
- 1. Review: Contracting Officer (CO) will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If CO determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, CO will so inform Contractor, who shall make changes as directed and resubmit.
 - 2. 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 the following requirements:
- 1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings.
 - 2. File Preparation Format: AutoCad.dwg, Version 2018, operating in Microsoft Windows operating system, also provide GIS shapefiles of any proposed work that may affect work limits or boundaries
 - 3. File Submittal Format: Submit or post coordination drawing files using Portable Document Format (PDF) file format.
 - 4. Contracting Officer (CO) will furnish Contractor one set of digital data files (AutoCad.dwg) of Drawings for use in preparing coordination digital data files.
 - a. CO makes no representations as to the 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 01 documents: The following items shall be submitted a minimum of one week prior to the Preconstruction Conference. Contracting Officer (CO) will notify Contractor of tentative date for the Pre-Construction Conference.
- 1. Letter designating Project Superintendent.

2. Construction Schedule.
3. A comprehensive breakdown of the 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. Satisfactory evidence of liability insurance coverage and workman's compensation for the Contactor and all subcontractors.
8. Waste Management Plan.
9. Quality Control Plan.
10. Temporary Storm Water Pollution Prevention Plan (UPPP).
11. Contractors Commissioning Plan.
12. List of Required Construction Permits. Include the following information for each permit:
 - a. Name of Permit.
 - b. The Agency(ies) with Jurisdiction issuing the permit.
 - c. Information required from the Government to complete the permit application.

- E. All items listed must be provided to the CO before the Pre-Construction Conference is held. If all of these documents have not been received one week prior to the scheduled Pre-Construction Conference date, the conference will be cancelled, Notice to Proceed will not be issued, and the CO 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 the Contract Documents, Contractor shall prepare and submit an RFI utilizing the form created on the Project website.
1. CO 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 the RFI: Include a 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 the Contract Time or the Contract Sum, Contractor shall state impact in the 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 the RFI Form on the project website as follows:
 1. Enter the 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 the drop-down of the “Send to” box.
 3. Enter the details of the question and attach related documents.
 4. Select “Submit Form” at the bottom of the page.
- D. Contracting Officer’s Action: CO will review each RFI, determine action required, and respond. CO will determine the critical nature of each RFI and issue a 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 the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of CO's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. CO's action may include a request for additional information, in which case time for response will date from time of receipt of additional information.
 3. CO's action on RFIs may result in the need for a change to the Contract Time or the Contract Sum. All contract changes will be processed following the terms and conditions of the contract.

1.6 PROJECT WEB SITE

- A. Use the Project website for communication throughout the contract period. The Project website will be used for the following functions:
 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 however are not suitable to be shared using the Project website. Documents containing Personal Identifying Information (PII) (i.e. certified payrolls) shall not be shared using the Project website and shall be coordinated with the Project team as appropriate.

1.7 PROJECT MEETINGS

A. Preconstruction Conference: Before start of construction, CO will arrange an on-site meeting with Contractor. The 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 01 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. Project website.
17. Acceptance/rejection of work.
18. Progress meetings.
19. Submittal procedures.
20. Environmental requirements.
21. Permit requirements.
22. As-constructed drawings/operation and maintenance (O&M) manuals.
23. Saturday, Sunday, holiday and night work.
24. Reference materials.
25. Value engineering.
26. Schedule of Values.

B. Progress Meetings: The Contracting Officer will schedule weekly meetings with the 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 at these meetings. All participants at the meeting shall be familiar with the 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. The meeting agenda will include the following:

- 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, 3-phase Inspections, Accessibility, etc.).
 - g. Inspections of work in progress and projected Special inspections.
 - h. Construction Schedule update (provide updated CPM).
 - i. Status of Project Record Drawings and O&M manuals.
 - j. Other business relating to work.
 - k. Permit requirements.
 - l. Review and Mitigation of Project Risks.
- C. Preinstallation Conferences: Conduct a preinstallation conference 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 the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise CO of scheduled meeting dates.
 - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of agency(ies) with jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.

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

1.8 ENVIRONMENTAL COORDINATION

- A. Contractor's Environmental Manager: Designate an on-site party responsible for overseeing the Contractor's conformance to environmental goals for the 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 those of this project; must be 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 the Waste Management Plan (WMP).
 - c. Implementation of the Storm Water Pollution Prevention Plan (SWPPP).
 - d. Present an overview of environmental issues and summarize site specific procedures relating to management plans at the Preconstruction conference.
 - e. Training for Contractor personnel in accordance with their position requirements.
 - f. 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. Noise & Acoustics Management.
 - 4. Temporary Storm Water Pollution Prevention Environmental Management.
 - 5. Construction Waste Management.
- C. Contractor's Environmental Training Program: Contractor shall provide environmental training for workers performing work on the project site. Training shall include the following:
 - 1. Overview of environmental issues related to the building industry.
 - 2. Overview of environmental issues related to the Project.
 - 3. Review of site specific procedures and management plans:
 - a. Construction Waste Management.
 - b. Noise & Acoustics Management.
 - c. Temporary Storm Water Pollution Prevention.

4. Pollution Prevention (P2) practices: Submit evidence of participation in P2 programs illustrating familiarity with P2 practices.
 5. Compliance with environmental regulations: As specified in Regulatory Requirements. Submit Contractor 40 CFR employee training records upon request of CO.
- D. Provide documentation for environmental procedures as specified herein and in accordance with approved WMP, IAQ Management Plan, SWPPP and EA..

1.9 PERMITS

A. General:

1. Permits and Responsibilities: The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State and municipal laws, codes, and regulations applicable to the performance of the work. The Contractor shall also be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence. The Contractor shall also be responsible for all materials delivered and work performed until completion and acceptance of the work.
2. For the purpose of this contract, the Contractor will not be considered an agent of the Government. Therefore, the Contractor will comply with the appropriate Federal, State and local laws.

B. Government Furnished Permits: During the development of the project's design the permits listed below were negotiated and agreed to by the Government. The terms and provisions of these permits shall be adhered to for the duration specified in each permit. Contractor shall comply with terms of permits.

1. Clean Water Act Section 404 with Rivers and Harbors Act Section 10, Structures or Work in or Affecting Navigable Waters permit from the U.S. Army Corps of Engineers

C. Potential Permits: The permits listed below were identified during the design process as likely to be required based on typical means and methods of construction. The list is provided to assist the contractor in determining which permits will be required for the contract's chosen means and methods. The list shall not be considered complete, as it is the responsibility of the contractor to determine means and methods, and obtain the required permits. It is the responsibility of the Contractor to obtain all permits required to legally conduct the work.

1. Over-An-Acre Pollution Prevention Permit – CDPHE Construction Activity General Permit (CGP) for Stormwater with accompanying SWPPP.
2. Oversize/Overweight Transportation Permit – CDOT Oversize/Overweight Permit.
3. Montezuma County – Utility Permit in County ROW

D. Coordination with Agency with Jurisdiction Issuing Permits:

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

E. Administrative Procedures:

1. Coordinate scheduling and timing of required administrative provisions of project permits with Agency with Jurisdiction issuing permits, Construction Manager, and Park to avoid conflicts and to ensure orderly execution of the Work.
2. Supply all needed information to Agency with Jurisdiction issuing permits, pay any fees required and provide all material needed to comply with the permit's conditions and provisions.
3. Upload permits to the project website or other means as directed by the Contracting Officer when the 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. This Section consists of Construction Schedule requirements including but not limited to the following:
 - 1. Schedule of Values
 - 2. Construction Schedule Requirements.
 - 3. Construction Schedule Updates.
 - 4. Time Impact Analysis.
- B. Purpose: The purpose of the Construction Schedule is to ensure adequate planning, coordination, scheduling, and reporting during execution of the work by the Contractor. The Construction Schedule will assist the Contractor and Contracting Officer in monitoring the progress of the work, evaluating proposed changes, and processing the Contractor's monthly progress payment. 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 that can be 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 must 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: The allocation of the Schedule of Values for the 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): Critical path method, which is a 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: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Float: The measure of leeway in starting and completing an activity.
 - 1. Float: Float is not for the exclusive use or benefit of either the Government or the Contractor, but is jointly owned.

2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Resource Loading: The allocation of manpower and equipment necessary for the 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: All schedules and reports submitted shall be posted on the NPS DSC SharePoint project website, provided in the native electronic file format. It is the intent of the Government to limit the number of printed reports to only those reports determined by the project team to be essential.
- B. Schedule of Values: After contract award and before the Pre-Construction conference, submit a schedule of dollar values based on the Contract Price Schedule.
- C. Construction Baseline Schedule: 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. Schedule and Sequencing plans must be submitted by the contractor for approval by the CO a minimum of 2 weeks prior to the Pre-Construction Meeting.
- D. CPM Reports: Concurrent with CPM schedule, submit 3 paper copies of each of the following computer-generated reports. Format for each activity in reports shall contain activity number, activity description, 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 all 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 all 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 all activities sorted in ascending order of total float.
- E. Construction Schedule Updates: On or before the 7th day preceding the progress payment request date, submit estimates of the 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 2 paper copies of a Time Impact Analysis. Each Time Impact Analysis shall include a Fragmentary Network (Fragnet), incorporated into the currently accepted Construction Schedule, demonstrating how the Contractor proposes to incorporate a modification, change, delay, or Contractor request.

1.4 QUALITY ASSURANCE

- A. The Contractor shall meet with the Contracting Officer on the day of the preconstruction conference to go over the following:
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, work stages, area separation and park visitor/mule train management, and helicopter usage.
 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 a protocol for naming and transmitting electronic schedules.
- B. Contractor's Schedule Representative: Before or at the preconstruction conference, designate an authorized representative to be responsible for the preparation and maintenance of the Construction Schedule. A resume outlining the qualifications of the Scheduler shall be submitted to the Contracting Officer for acceptance. The Scheduler shall have prepared and maintained at least 5 previous schedules of similar size and complexity similar to this Contract, demonstrating proficiency in the use of scheduling software. The authorized representative will be responsible for preparing the Baseline Schedule, all required updates, revisions, Time Impact Analyses, and preparation of 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 the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
1. In developing the Construction Baseline Schedule, ensure that the Subcontractor's work at all tiers, as well as the prime Contractor's work, is included and coordinated.
 2. Secure time commitments for performing critical elements of the Work from parties involved.
 3. Coordinate each construction activity in the network with other activities and schedule them 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. The work activities broken out within the schedule of values shall be integrated into and made a logical part of the construction baseline schedule submitted under this specification. The total costs for the component work activities shall equal the contract price for that lump-sum item. The 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. The total cost of all items shall equal the contract price. The Schedule of Values will form the basis for progress payments.
- D. An acceptable Schedule of Values shall be agreed upon by the Contractor and Contracting Officer before the first progress payment is processed.

2.2 CONSTRUCTION SCHEDULE REQUIREMENTS

- A. Construction Baseline Schedule: Prepare Construction Baseline Schedule using a computerized, cost and resource-loaded, time-scaled CPM network analysis diagram for the Work.
 - 1. Develop and finalize Construction Baseline Schedule so it can be accepted for use no later than 15 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 all work within applicable completion dates, regardless of Governments acceptance of the 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 the preliminary CPM network diagram, prepare a skeleton network to identify probable critical paths.
 - 1. Schedule Narrative: Submit a schedule narrative with the baseline schedule submission.
 - 2. Activities: Indicate the estimated duration, sequence requirements, and relationship of each activity in relation to other activities.
 - 3. 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.

4. 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 CPM schedule within the limitations of the Contract Time.
5. The Construction Baseline Schedule as developed shall show the sequence and interdependence of activities required for complete performance of the work. Ensure all work sequences are logical and the Construction Baseline Schedule shows a coordinated plan of the work.
6. Resource loading of each activity shall include all personnel by labor category and equipment type and capacity proposed to complete the activity in the duration shown.
7. Consider seasonal weather conditions in planning and scheduling all work influenced by high and low ambient temperatures, wind, or precipitation to ensure completion of all work within the contract time.
8. Time Frame: Proposed duration assigned to each activity shall be the Contractor's best estimate of time required to complete the activity considering the scope and resources planned for the activity.
 - a. An early finish date may be shown but the late finish date must be the same date as the last day of the contract period. An early completion schedule must contain the following:
 - 1) Insert an activity titled "Project Float" as a successor to the last activity in the 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 the Contract Period.
 - b. Contract completion date shall not be changed by submission of a schedule that shows an early completion date.
 - c. The Contractor shall limit use of lead or lag durations between schedule activities.
 - d. Project Calendars: Develop and incorporate the following calendars:
 - 1) Administrative Calendar: Include a calendar that is based on a 7 day week to be used on any activities that are based on calendar days. Apply this calendar to administrative tasks or any other tasks that are not affected by non-working days (Federal Holidays, weather, etc.).
 - 2) Project Calendar: Include a calendar that is based on the planned work week for the project. Include Federal Holidays, weekends, and any other non-work days indicated in the contract documents. Apply this calendar to activities which are not anticipated to be affected by weather.
 - 3) Weather Calendar: Utilize the Project Calendar and show anticipated normal downtime related to weather as non-working time. Anticipated Weather days shall be based on the National Oceanic and Atmospheric Administration (NOAA):
 - e. Activity Duration: Define activities so no activity is longer than 15 days, except for non-construction activities including mobilization, shop drawings and submittals, fabrication and delivery of materials and equipment.

- f. Submittal Review Time: Include review and re-submittal times indicated. Coordinate submittal review times in Construction Baseline Schedule.
 - g. Substantial Completion: Allow time for Government administrative procedures necessary for certification of Substantial Completion. (For more information, refer to Division 01 Specification 01 77 00 Closeout Procedures.)
- 9. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.
 - a. Phasing: Arrange list of activities on schedule by phase.
 - b. Work under More Than One Contract: Include a separate activity for each contract.
 - c. Work Restrictions: Show the effect of the following items 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.
 - d. Work Stages: Indicate important stages of construction for each major portion of the Work.
 - 1) Subcontract awards.
 - 2) Submittals.
 - 3) Purchases.
 - 4) Fabrication.
 - 5) Sample testing.
 - 6) Deliveries.
 - 7) Utility Interruptions and Pump Outages.
 - 8) Installation.
 - 9) Tests and inspections.
 - 10) Adjusting.
 - 11) Curing.
- 10. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Long Lead Items.

C. Joint Review, Revision, and Acceptance:

- 1. Within seven calendar days of receipt of the Contractor's proposed Construction Baseline Schedule, the Contracting Officer and Contractor shall meet for joint review, correction, or adjustment of the initial Construction Baseline Schedule. Any areas which, in the opinion of the Contracting Officer, conflict with timely completion of the project shall be subject to revision by the Contractor.

2. Within seven calendar days after the joint review between the Contractor and Contracting Officer, the Contractor shall revise and resubmit the Construction Baseline Schedule in accordance with agreements reached during the joint 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 the Contractor or Contracting Officer, shall be corrected by the Contractor within seven calendar days and shall not affect the contract period.
 4. Upon acceptance of the Construction Baseline Schedule by the Contracting Officer, save the schedule as a baseline and update on a monthly basis. The construction schedule update will be used to evaluate the Contractor's monthly applications for payment based upon information developed at the monthly Construction Schedule update meeting.
- D. Recovery Schedule: When periodic schedule update indicates the Work is 14 or more calendar days behind the current accepted schedule, a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule must also be submitted. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- E. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.
1. Use Microsoft Project or Primavera, for Windows operating system.
 2. The Contractor shall provide to the Contracting Officer a licensed copy of the software used to create the Construction Baseline Schedule and a software reference manual. The software and reference manual will be returned to the Contractor at completion of the Contract

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 the look-ahead schedule to facilitate and take notes on discussions held during the progress meeting.
- B. Monthly Schedule Updates:
1. General: Update the Construction Schedule on a monthly basis to reflect actual construction progress and activities throughout the 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: The Contractor shall meet with the Contracting Officer each month at a Construction Schedule update meeting to review actual progress made through the status date of the Construction Schedule update, including dates activities were started and/or completed and the percentage of work completed on each activity started and/or completed.
 3. Reports: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:

- 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: The report shall include a brief description of the actual progress made during the update period; actual and potential delaying activities; any impediments to progress; issues related to inclement weather; progress toward established milestones and project float. The report shall include a brief description of the work anticipated to be performed in the next month. Any minor revisions to the schedule should be identified so they can be evaluated and accepted or rejected.
 5. As the Work progresses, indicate Actual Completion percentage for each activity.
 6. If the schedule update shows a late finish date after the contract completion date, at a minimum, include the following in the narrative with your submission:
 - a. Any known delays.
 - b. Actions that will be taken to get back on schedule.
 - c. Pending modifications.
 - d. Impediments or constraints affecting progress.
 7. Progress Payments: The monthly updating of the currently accepted Construction Schedule shall be an integral part of the process upon which progress payments will be made under this contract. If the Contractor fails to provide schedule updates or revisions, then a portion of the monthly payment may be retained until such 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 the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
- 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 the actual prosecution and progress of the work, the Contracting Officer will request, and the Contractor shall submit, a revision to the Construction Schedule. The Contractor may also request reasonable revisions to the currently accepted Construction Schedule in the event the Contractor's planning for the work is revised. If the Contractor desires to make changes, the Contractor shall notify the Contracting Officer in writing, stating the reason for the proposed revision. Accepted revisions will be incorporated into the currently accepted Construction Schedule for the next monthly schedule update.

2. Procedure: If revision to the currently accepted Construction Schedule is contemplated, the Contractor or Contracting Officer shall so advise the other in writing at least seven calendar days prior to the next monthly schedule update meeting, describing the 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 the following:
 - 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.

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

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

END OF SECTION 01 32 16

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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 15 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
 - b. Re-submittal Review: Allow 10 business days for review of each re-submittal.
 2. Informational submittals
 - a. Review: Allow **10 business** 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
 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. 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.
- J. 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.
- K. 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.
- L. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying manufacturer complies with Contract Documents. Include evidence of manufacturing experience where required.
- M. Product Certificates: Prepare written statements on manufacturer's letterhead certifying product complies with Contract Documents.
- N. Material Certificates: Prepare written statements on manufacturer's letterhead certifying material complies with Contract Documents.
- O. 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.

- P. 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.
- Q. 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.
- R. 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.
- S. 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.
- T. 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.
- U. 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."
- V. 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.
- W. 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.
- X. 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.
- Y. 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

Submittal List with Review Estimate

National Park Service (NPS) - Denver Service Center (DSC) | 1-27-21

SUBMITTAL LIST											ACTION SUBMITTAL REVIEW ESTIMATE								
Park Acronym/Project Management Information System (PMIS) Number:										MEVE/317500		(Complete this portion for Architect / Engineer (A/E) construction service task order negotiation.)							
Project Title:		Replace Morefield Water Lines																	
SUBMITTAL						REQUIREMENTS (Indicate with X)					ARCHITECT / ENGINEER REVIEW TIME (Indicate in whole or partial hours.)								
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	INFORMATIONAL				ACTION				ARCHITECT	CIVIL ENGINEER	STRUCTURAL ENGINEER	MECHANICAL ENGINEER	ELECTRICAL ENGINEER	PROJECT MANAGER COORDINATION	LANDSCAPE ARCHITECT		
			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER									
013100	1.4.A	Coordination Drawings																	
	1.4.D	Preconstruction Conference Submittals																	
		Letter Designating Project Superintendent																	
		Construction Schedule																	
		Schedule of Values																	
		Accident Prevention (Safety) Plan																	
		List of Subcontractors																	
		Subcontractor Certification of Labor Compliance																	
		Insurance documentation																	
		Waste Management Plan																	
		Quality Control Plan																	
		SWPPP																	
		Construction Permits																	
013216	1.3.C	Construction Baseline Schedule																	
	1.3.D	CPM Reports																	
	1.3.E	Construction Schedule Updates																	
	1.3.F	Construction Schedule Revisions and Time Impact Analysis																	
013505	1.3.A	Spill Prevention and Response Plan																	
013513.22	1.3.A	Daily Work Schedule																	
013523	1.2.A	Accident Prevention Plan (APP)																	

SUBMITTAL LIST										ACTION SUBMITTAL REVIEW ESTIMATE								
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			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER								
014000	1.4.A	Quality Control Plan									X							
	1.4.B	Qualification Data									X							
	1.4.C	Contractor's QC Daily Reports									X							
	1.4.D	Test Reports									X							
	1.4.E	Off Site Inspection Reports									X							
015723	1.3.A	SWPPP									X							
	1.3.B,C	Inspection Schedule									X							
	1.3.D	Erosion Control Products									X							
016700	1.3.A	Close Out Submittals									X							
017320	1.3.A	Shop Drawings							X		X							
017329	1.2.A	Cutting and Patching Plan							X		X							
017340	2.2.A	Certificates									X							
	2.2.B	Landfill Receipts									X							
	2.2.C	Quantity Surveys									X							
	2.2.D	Construction Phasing Plan									X							
017419	1.4.A	Waste Management Plan									X							
	1.4.B	Progress Documentation									X							
	1.4.C	Waste Reduction Calculations									X							
	1.4.D	Records of Donations									X							
	1.4.E	Records of Sales									X							
	1.4.F	Recycling and Processing Facility Records									X							
	1.4.G	Landfill and Incinerator Disposal Records									X							
	1.4.H	Qualification Data									X							

SUBMITTAL LIST										ACTION SUBMITTAL REVIEW ESTIMATE							
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			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER							
	1.4.J	Close Out Submittals															
017900	1.3.A	Instruction Program															
	1.3.B	Demonstration and Training Video															
024100	1.4.A.1	Demolition and Removal Plan: Not less than ten days prior to starting demolition Work, submit acceptable plan for demolition and removal Work							X	X	X						
	1.4.A.2	Notification of Intended Demolition Start															
312317	1.4.B	Shop Drawings			X			X									
	1.4.D	Close Out Submittals															
312333	1.4.A	Shop Drawings			X			X			X						
313700	1.3.A	Shop Drawings	X		X			X			X						
321216	1.3.A	Shop Drawings	X		X			X			X						
329113	1.2.A	Project Data: Test reports for contractor furnished topsoil.								X	X						
329200	1.3.A	Product Technical Data	X														
		Certification that each container of seed delivered will be labeled in accordance with Federal and State Seed Laws and equals or exceeds Specification requirements.								X	X						
		Copies of invoices for fertilizer used on Project showing grade furnished, along with certification of quality and warranty.										X					
330507	1.9.C	Qualification Documentation										X					
		Permits										X					
		Accident Prevention Plan and Emergency Response Plan										X					
		Review of HDD Design and request for variances							X		X						
		Working Drawings							X	X							

SUBMITTAL LIST										ACTION SUBMITTAL REVIEW ESTIMATE							
Park Acronym/Project Management Information System (PMIS) Number:						MEVE/317500				(Complete this portion for Architect / Engineer (A/E) construction service task order negotiation.)							
Project Title:		Replace Morefield Water Lines															
SUBMITTAL			REQUIREMENTS (Indicate with X)							ARCHITECT / ENGINEER REVIEW TIME (Indicate in whole or partial hours.)							
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	INFORMATIONAL				ACTION				ARCHITECT	CIVIL ENGINEER	STRUCTURAL ENGINEER	MECHANICAL ENGINEER	ELECTRICAL ENGINEER	PROJECT MANAGER COORDINATION	LANDSCAPE ARCHITECT
			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER							
		Schedule									X						
		Equipment									X						
		Materials									X	X					
		Drilling Fluids									X	X					
		Fuel & Hydraulic Fluid Containment and Spill Plan								X		X					
		Type and Diameter of Swab Pass tooling								X	X	X					
		Contingency Plans								X	X	X					
	1.9.D	Preliminary Pilot Bore as built								X							
		Drill Logs										X					
		Drilling Fluid Logs										X					
	1.9.E	As built plan and profile information								X							
		Variations to plan								X		X					
		Depth and Location of any abandoned drill paths								X		X					
330515	1.3.A	Technical Data									X	X					
		Concrete Mix Design										X					
		Fabrication/Layout Drawings								X							
		Drawings and Calculations								X		X					
		Test Reports	X									X					
331113	1.3.A	Leakage test results	X									X					
	1.3.B	Bacteriological test results	X									X					
	1.3.C	Qualifications for lab performing tests	X									X					
331219	1.3.A	Technical Data										X					
		Close Out Submittals										X					
400500	1.5.A	Technical Data										X					
		Close Out Submittals										X					
		Test Reports	X									X					

SUBMITTAL LIST											ACTION SUBMITTAL REVIEW ESTIMATE							
Park Acronym/Project Management Information System (PMIS) Number:						MEVE/317500					(Complete this portion for Architect / Engineer (A/E) construction service task order negotiation.)							
Project Title:		Replace Morefield Water Lines																
SUBMITTAL						REQUIREMENTS (Indicate with X)					ARCHITECT / ENGINEER REVIEW TIME (Indicate in whole or partial hours.)							
SPECIFICATION SECTION	PARAGRAPH NUMBER	DESCRIPTION	INFORMATIONAL				ACTION					ARCHITECT	CIVIL ENGINEER	STRUCTURAL ENGINEER	MECHANICAL ENGINEER	ELECTRICAL ENGINEER	PROJECT MANAGER COORDINATION	LANDSCAPE ARCHITECT
			CERTIFICATIONS OR LABORATORY TESTS	REPORTS OR CALCULATIONS OR PLAN	MANUFACTURER DATA AND INSTRUCTIONS	OTHER	SAMPLES	SHOP DRAWINGS	MANUFACTURER DATA AND INSTRUCTIONS	OTHER								
400528	1.4.A	Certifications								X								
		Hydrostatic Factory Test	X							X								
400551	1.4.A	Technical Data								X								
		Close Out Submittals								X								
		Test Reports	X							X								
400552	1.3.A	Technical Data								X								
		Close Out Submittals								X								
		Test Reports	X							X								
400561	1.3.A	Technical Data								X								
		Close Out Submittals								X								
		Test Reports	X							X								
Total:											0	0	0	0	0	0	0	0

SECTION 01 35 05 ENVIRONMENTAL PROTECTION AND SPECIAL CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes:
 - 1. Wildlife protection.
 - 2. Other environmental protection measures.

1.2 DEFINITIONS

- A. Contracting Officer: Includes the Government Contracting Officer (CO).

1.3 SUBMITTALS

- A. Spill Prevention and Response Plan: After contract award and before the Pre-Construction conference, submit for informational review, a Spill Prevention and Response Plan. The CO will review the proposed Plan. If the plan requires any revisions or corrections, the Contractor shall resubmit the Plan within 10 days. No progress payments will be made until the Plan is accepted.

PART 2 - PRODUCTS

2.1 SPILL PREVENTION AND RESPONSE PLAN

- A. The Plan shall be written to comply with Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), other federal and local requirements, and project requirements.

PART 3 - EXECUTION

3.1 WILDLIFE PROTECTION REQUIREMENTS

- A. Contractor to identify and adhere to NEPA/MHPA mitigation requirements.
- B. All areas to be disturbed shall have boundaries flagged by the Contractor before beginning the activity, and all disturbance and project activities shall be confined to the flagged areas. Disturbance outside flagged areas is prohibited.
- C. All project vehicles shall be driven at speeds within posted speed limits on existing roads and shall not exceed 20 mph within project boundaries.

- D. Project personnel shall exercise caution when commuting to the project area and obey speed limits to minimize any chance for the inadvertent injury or mortality of species encountered on roads leading to and from the project site.
- E. Project sites shall be cleaned up at the end of each work day (e.g., trash disposed of/secured appropriately and scrap materials picked up) to minimize the likelihood of wildlife visiting the site.
- F. Trash and recycling receptacles and all dumpsters shall be wildlife –proof certified and shall be tightly covered to avoid wildlife access.
- G. Wildlife shall not be fed or approached.

3.2 OTHER ENVIRONMENTAL PROTECTION MEASURES

- A. The contractor shall be responsible for obtaining and complying with all permits necessary to complete the work based on contractor means and methods. Contractor shall pay all permit fees required and provide all materials, labor, and equipment necessary to comply with permit conditions and provisions at no additional expense to the government. Refer to Section 01 31 00 – Project Management and Coordination.
- B. Contractor shall provide all storm water control, erosion control, dust control, air quality control, water quality control, and other pollution control measures necessary to comply with all Federal, State, and municipal laws, codes, rules, regulations, and permits applicable to performance of the work at no additional expense to the government. Contractor shall ensure all construction personnel are aware of all applicable requirements.
- C. Contractor shall develop and adhere to a Spill Prevention and Response Plan to ensure that fuel, oil, lubricants, and other hazardous material spills do not occur. If spills occur, cleanup shall be completed by the contractor at no additional expense to the government.
- D. Equipment Washing and Inspections
 - 1. Equipment washing is required to preclude entry of the seeds of non-native plants and weed species. All equipment shall be thoroughly pressure washed and cleaned outside of the Park Area before entering. Equipment leaving the park for any reason must be re-washed before returning to the job site.

2. The Contractor shall clean equipment that will be used off surfaced roadways, or approved roadways, prior to the equipment entering the Park Area. It is recommended that cleaning be accomplished by pressure washing, using water only. All equipment surfaces shall be cleaned, with special emphasis given to the undercarriage. This includes, but is not limited to: wheel wells, bumpers, radiator grills, springs, shock absorbers, wire harnesses, skid plates, oil pans, axles, frame ledges, buckets, tracks, belly pans, etc. Cleaning shall also include all dirt and debris inside the cab, or operator area. A Shop-Vac or commercial car wash vacuum system may be used for operator compartments, provided the method used effectively removes all visible debris. Equipment cleaning is for the purpose of removing any seed and soil accumulations to prevent the potential spread of non-native plant and weed species from outside the Park to locations inside the Park. Cleaning shall be performed in a manner that will reasonably remove all visible soil, plant and other foreign material. All equipment that requires washing shall be inspected by government personnel, or contractors/partners assigned to this duty, to ensure compliance.
 3. Equipment that requires washing is generally defined as track or rubber-tired machinery intended for use primarily off-road. Examples include backhoes, loaders, earthmovers, graders, rollers, bulldozers, water trucks, etc.; or four wheel drive or passenger vehicles that are driven in off road areas. Equipment may also be stationary, such as a material screening plant, conex storage containers, or a mobile office (mobile offices may be cleaned in the same manner as operator compartments as outlined in 3.3.D.2). The equipment is generally under the direct control of the contractor or sub-contractors, is likely to remain on the construction site for an extended period of time, and may contain adhered soil and seed from other project sites.
 4. Equipment/vehicles that do not require washing are defined as those normally used for highway driving only, and travel primarily on paved surfaces and well maintained service roads and parking areas. Examples include semi-tractor trailers, dump trucks, concrete trucks, pickup trucks, fuel trucks, service trucks, etc. These delivery and passenger vehicles are generally not under the direct control of the contractor, have no earth-moving function, and do not remain on the project site. These vehicles have a low probability of carrying adhered soil and seed from other projects. However, every vehicle and piece of equipment is subject to rejection from entering the Park if there are obvious signs (covered in mud, plant material adhered to it, etc.) that it could be transporting non-native species into the Park.
 5. Post Equipment Washing Inspections: All equipment subject to inspection will be inspected by the Government, or other authorized personnel prior to leaving the paved surface. Equipment determined to be free of soil or mud based on visual examination by government personnel will be cleared to enter the project area or proceed to other areas of the park as appropriate. The Contractor shall arrange for needed inspections by contacting the NPS inspection office no less than 5 working days prior to needing the inspection to accommodate park staff scheduling and travel.
 6. Equipment not passing initial inspection must be rewashed outside the Park at no additional expense to the government.
- E. Upon completion of work, leave area in a clean, natural looking condition as specified in Section 01 57 23 – Temporary Stormwater Pollution Prevention. Remove all signs of temporary construction and activities incidental to construction of required permanent work.

END OF SECTION 01 35 05

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SECTION 01 35 13.22 – ARCHEOLOGICAL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. The work of this section consists of protecting archeological resources contained in soil deposits.

1.2 DEFINITIONS

- A. Archeological Resources: Archeological resources are the physical evidences of past human activity, including evidences of the effects of that activity on the environment. Archeological resources represent both prehistoric and historic time periods. They are found above and below ground and under water.
- B. Archeologically Sensitive Areas: Areas that have the 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 the state historic preservation officer and, if necessary, associated American Indian tribes.
- C. Non-sensitive Areas: Areas with little, if any, potential of containing significant (National Register eligible) archeological resources.
- D. Archeological Monitor: Representative of the Government, and provided by the Government, designated to oversee construction activities that could disturb archeological resources.
- E. Archeological Resources Protection Act (ARPA) of 1979 (P.L. 96-95; 93 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.
- F. National Historic Preservation Act (NHPA) of 1966 (P.L. 89-665): Section 106 requires review of any projects in National Register of Historic Places.

1.3 SUBMITTALS

- A. Daily Work Schedule: Submit a Daily work Schedule detailing construction work in archeologically sensitive areas. Submit to Contracting Officer 30 calendar 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 and equipment and special methods to be used in archeologically sensitive areas. Contractor shall ensure that approved Daily Work Schedule is followed throughout construction.

PART 2 - PRODUCTS

2.1 DAILY WORK SCHEDULE

- A. A Daily Work Schedule is required for all 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 the following:
 - 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 Division 01 50 00 Section “Temporary Facilities And Controls.”

3.2 ARCHEOLOGICAL INVESTIGATION BY NON-NPS PERSONNEL

- A. A permit is required for any archeological investigations (e.g. excavation, shovel testing, coring, pedestrian survey, underwater archeology, rock art documentation, or other types of reconnaissance including the archaeological monitoring of construction) carried out on parklands by non-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 (Rev Sept 2004) OMB No. 1024-0037, approved through 1/31/2008 – the Permit Application form is available in pdf 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.

OBSERVATION

- A. Archeological Monitor will observe all ground-disturbing site work, including construction of temporary facilities, at all 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, and collect geospatial data using high accuracy GPS to record locations of findings.

3.3 DISCOVERY OF RESOURCES

- A. If Archeological Monitor discovers resources, immediate relocation of the work to a non-sensitive area may be required to allow Monitor to identify and document resources and, if necessary, develop an 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.

3.4 WORK STOPPAGE

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

END OF SECTION 01 35 13.22

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SECTION 01 35 23 - SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes establishing an effective accident prevention program and providing a safe working environment for all personnel and visitors.

1.2 SUBMITTALS

- A. Accident Prevention Plan (APP): After contract award and before the Pre-Construction conference, submit for review, an Accident Prevention Plan. The Contracting Officer will review the proposed Plan. If the plan requires any revisions or corrections, the Contractor shall resubmit the Plan within 10 days. No progress payments will be made until the Plan is accepted.
- B. Safety plans must be submitted by the contractor for approval by the CO a minimum of 2 weeks prior to the Pre-Construction Meeting. Safety Plans must include, Material Safety Data and Hazardous Material Plan, compliance with Center for Disease Control and local COVID-19 safety precautions

1.3 QUALITY ASSURANCE

- A. Comply with contract clauses entitled "Accident Prevention" and "Permits and Responsibilities". In case of conflicts between Federal, State, and local safety and health requirements, the most stringent shall apply. Equipment or tools not meeting OSHA requirements will not be allowed on the project sites. Failure to comply with the 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. All employees must be physically and able to perform their assigned duties in a safe manner.
2. Do not allow employees to perform work 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.
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.
4. Operators of vehicles and hoisting equipment shall be able to understand signs, signals, and operating instructions, and be fully capable of operating such equipment. Provide operating instructions for all equipment. Newly hired operators shall be individually tested by an experienced operator or supervisor to determine if they are capable of safely operating equipment. Retain copies of all operators' licenses and/or certifications onsite.

1.4 REFERENCES

- A. Occupational Safety and Health Administration
 1. 29 CFR 1926: Safety and Health Regulations for Construction.
- B. United States Army Corps of Engineers
 1. EM385-1-1 (2014): Safety and Health Requirements.

1.5 ACCIDENT REPORTING

- A. Reportable Accidents (per OSHA 29CFR 1904): A project reportable accident is defined as death, occupational disease, traumatic injury to employees or the public, fires, and property damage by accident in excess of \$100. Notify Contracting Officer immediately in the event of a reportable accident.
- B. Within 7 days of a reportable accident or exposure, fill out and forward to Contracting Officer an Accident/Property Damage Report (Form CM-22). Form may be obtained from the 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. [Coronavirus.gov](https://www.coronavirus.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. The Plan shall be written to comply with OSHA and project requirements (a generic plan is not acceptable) including but not limited to the following:
 1. Name and qualifications of responsible supervisor to carry out the program.
 2. Weekly and monthly safety meetings shall be documented with topic and attendees.
 3. First aid and rescue procedures.
 4. Outline of each phase of the work, the hazards associated with each major phase, and the methods proposed to provide for property protection and safety of the public, National Park Service personnel, and Contractor's employees. Identify the work included under each phase, with an Activity Hazard Analysis (AHA)/Job Safety Analysis (JSA), etc.
 5. Project site specific plans for all definable features of work.
 6. Project site specific training, both prior to commencing work and continuing.
 7. Planning for possible emergency situations, such as cave-ins, earthquake, explosions, fires, floods, power outages, slides, and wind storms. Such planning shall take into consideration the nature of construction, site conditions, and degree of exposure of persons and property.
 8. 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 the number of employees and appropriate to the hazards associated with the types of ongoing construction work at the site.

2.3 PERSONNEL PROTECTIVE EQUIPMENT

- A. Meet requirements of applicable ANSI standards. 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 the work site.

3.3 FIRE AND LIFE SAFETY

- A. Comply with the requirements of NFPA 241 (Standard for Safeguarding Construction, Alteration, and Demolition Operations).
- B. Any required field welding or torch cutting shall be conducted in a safe manner and with necessary precautions to prevent fires. Coordinate hot work permits through NPS/GRCA.

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 29CFR1926 Subpart D requirements. Maintain readily available, on site, MSDS/Safety Data Sheets (SDS) for each chemical.
 1. Immediately report all spills of hazardous materials to the park.
 2. Maintain a spill emergency response kit.

3.5 TRAIN EMPLOYEES HOW TO RESPOND TO A SPILL AND USE THE EMERGENCY RESPONSE KIT.GENERAL DUTY CLAUSE

- A. Furnish a work site that is free from recognized hazards that are likely to cause harm to employees.

- B. Refer to 29 CFR 1926.

3.6 PROTECTIVE EQUIPMENT

- A. Inspect personal protective equipment daily and maintain in a serviceable condition. Clean, sanitize, and repair personal items, as appropriate, before issuing them to another individual.
- B. Inspect, maintain, and document other protective equipment and devices before use to ensure safe operation. Retain inspection documentation onsite.

3.7 SAFETY MEETINGS

- A. As a minimum, conduct one weekly "toolbox" safety meetings at each on-going project work area. These meetings shall be conducted by a foreman or supervisor and attended by all construction personnel at the worksite. Topics need to coincide with work scheduled for the following week. Document and submit meeting minutes to the Contracting Officer within one day after the meeting.
- B. Conduct monthly safety meetings for all levels of supervision. Meetings shall be attended by all contractors and subcontractors performing work on the site. Notify the Contracting Officer of meeting dates and times. These meetings shall be used to review the effectiveness of the Contractor's safety effort, to resolve current health and safety problems, to provide a forum for planning safe construction activities, and for updating the Accident Prevention Plan. The Contracting Officers Representative will attend the meeting and enter the results of the meetings into the daily log.

3.8 PROTECTIVE EQUIPMENT AREAS

- A. All areas where construction, demolition, alteration, building, or similarly related activities take place, all workers shall have appropriate personal protective clothing and equipment as identified by the project reference standards including but not limited to OSHA and USACE requirements.
 - 1. Short sleeve shirt.
 - 2. Long trousers.
 - 3. Steel-toed safety boots.
 - 4. Hard hat.
 - 5. Eye protection
 - 6. Leather gloves
 - 7. Personal water carrier
- B. Eye and face protection equipment shall meet the requirements of ANSI/ American Society of Safety Engineers (ASSE) Z87.1, and bear a legible and permanent "Z87" logo to indicate compliance with the standard. Eye and face protection equipment shall be distinctly marked to facilitate identification of the manufacturer and provides side protection.

- C. Persons involved in activities that subject the hands to injury (for example, cuts, abrasions, punctures, burns, chemical irritants, toxins, vibration, and forces that can restrict blood flow) shall select and use hand protection appropriate for the hazard in accordance with ANSI/International Safety Equipment Association (ISEA) 105. Protective equipment shall be of heat, fire, chemical, and/or electrical-resistive material when conditions require protection against such hazards.

3.9 HAZARDOUS MATERIAL USE

- A. Each hazardous material must receive approval prior to being brought onto the job site or prior to any other use in connection with this contract. Allow a minimum of 10 working days for processing of the request for use of a hazardous material. Any work or storage involving hazardous chemicals or materials must be done in a manner that will not expose Government or Contractor employees to any unsafe or unhealthful conditions.
- B. Adequate protective measures must be taken to prevent Government or Contractor employees from being exposed to any hazardous condition that could result from the work or storage. The Prime Contractor shall keep a complete inventory of hazardous materials brought onto the work-site.
- C. Approval by the Contracting Officer of protective measures and storage area is required prior to the start of the work.

3.10 HAZARDOUS MATERIAL EXCLUSIONS

- A. Notwithstanding any other hazardous material used in this contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with USACE EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint are prohibited.
- B. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials.

3.11 TRAINING

- A. First Aid and Wilderness First Aid Training: Provide adequate training to an adequate number of 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. Hazardous materials are defined as explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful substances that could cause death or injury.

3.12 HOUSEKEEPING

- A. The Contractor shall be responsible for cleaning up. The Contractor shall require its personnel to keep the immediate work site clean of all dirt and debris resulting from work under this contract. Accumulated dirt and debris shall be hauled off and disposed of in accordance with local law and at least once a week by the Contractor. Additionally, all debris in work areas shall be cleaned up daily or more frequently if necessary. Construction debris may be temporarily located in an approved location; however garbage accumulation must be removed each day. Cloths, mops, and brushes containing combustible materials shall be disposed of or stored outside of the buildings in tight covered metal containers. Paints and thinners shall not be poured into inlets of the interior or exterior sewage system. Paint, stains, and other residues on adjacent surfaces or fixtures caused by the Contractor shall be carefully removed and cleaned to original finish. Upon completion of the work, the Contractor shall remove all construction equipment, materials and debris resulting from the work. The entire work site and the area used by Contractor personnel shall be left clean.

3.13 SITE EXCAVATION AND RIGGING SAFETY

- A. Only competent persons shall be allowed to operate excavating equipment.

3.14 DRUG PREVENTION PROGRAM

- A. Contractor is responsible for preventing the possession and use of drugs and drug paraphernalia by any and all employees thereof.
- B. Possession or consumption of alcohol is prohibited within the Park.

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SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This 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 the Contract Document requirements. The quality of all work shall be the 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 the Contract Document requirements.
- C. See Divisions 02 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 that actual products incorporated into the work and completed construction comply with requirements.
- C. Preconstruction Testing: Tests and inspections that are performed specifically for the project before products and materials are incorporated into the work to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are 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 that are performed at the source, i.e., plant, mill, factory, or shop.
- F. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the work and for completed work.
- G. Testing Agency or Laboratory: An 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 that 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 the corresponding generic name.

1.3 CONFLICTING REQUIREMENTS

- A. Reference Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer for a decision before proceeding.
- B. Minimum Quality Levels: The quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Contracting Officer for a decision before proceeding.

1.4 SUBMITTALS

- A. Quality Control Plan:
 - 1. After contract award and before the Pre-Construction conference, submit for approval a written Contractor Quality Control (CQC) plan.
 - 2. If the plan requires any revisions or corrections, the Contractor shall resubmit the plan within 10 days.
 - 3. The Government reserves the right to require changes in the plan during the contract period as necessary to obtain the quality specified.
 - 4. No change in the approved plan may be made without written concurrence by the Contracting Officer.
- B. Qualification Data: For testing agencies specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Contractor's Quality Control Daily Reports: Submit showing all inspections and tests on the first workday following the date covered by the report. Quality Control Supervisor shall utilize the DSC forms available by accessing the DSC Workflows website, <http://www.nps.gov/dscw/publicforms.htm>.
 - 1. Review CMR Dailies and reconcile any differences prior to posting CQC Dailies on the SharePoint Project Website.
- D. Test Reports

1. Test reports shall be completed by the person performing the 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 complete test results no later than one calendar day after the test was performed.
- E. Off-Site Inspection Reports: Submit prior to shipment.
- F. If the CQC plan and Quality Control Daily Reports are not submitted as specified, the Contracting Officer may retain all payments until such time a plan is accepted and implemented, or may retain payments for work completed on days there are no Quality Control Daily Reports.
- G. Permits, Licenses, and Certificates: For 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 the work.

1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Contractor's Quality Control Staff:
1. The Contractor's Quality Control Supervisor may also perform other duties.
 2. The Contractor's designated Quality Control Supervisor shall be on the project site whenever contract work is in progress.
 3. The Contractor's job supervisory staff may be used to assist the Quality Control Supervisor supplemented, as necessary, by additional certified testing technicians.
 4. Quality Control Supervisor must have minimum 10 years of construction experience and previous experience with plumbing and mechanical equipment.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- D. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

- F. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated (including Structural Tests and Special Inspections (STSI)). Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this 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 the activities indicated.
1. Requirement for specialists shall not supersede building codes and regulations governing the work.
- H. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by Contract, is acceptable to the Contracting Officer.
1. Nationally Recognized Testing Laboratory (NRTL): A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. National Voluntary Laboratory Accreditation Program (NVLAP): A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
 3. All measuring devices, laboratory equipment, and instruments shall be calibrated at established intervals against certified standards in accordance with NIST requirements. Upon request, measuring and testing devices shall be made available for use by the Government for verification tests.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Mockups: Before installing portions of the work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Contracting Officer.
 2. Notify Contracting Officer 7 days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Contracting Officer's approval of mockups before starting work, fabrication, or construction.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed work.
 6. Demolish and remove mockups when directed, unless otherwise indicated.

1.6 QUALITY CONTROL

- A. Contractor is responsible for testing and inspections, Inspect and test work as needed to ensure quality of materials, workmanship, construction, finish, and functional performance are in compliance with applicable specifications and drawings.
- B. The Contractor is responsible for all testing and inspections. Inspect and test work as needed to ensure that the quality of materials, workmanship, construction, finish, and functional performance are in compliance with applicable specifications, drawings, and those required by the Building Code.
- C. Engage a qualified testing agency to perform these quality-control services. Entity performing quality-control services must be an independent third party hired directly by the Prime Contractor. Additionally, the entity performing quality-control services must not be an employee of the Contractor or of any sub-contractor performing work to be inspected and tested.
- D. Submit the appropriate report, for each quality-control service.
- E. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
- F. The Contracting Officer may designate test locations.
- G. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- H. 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 that replaced work that failed to comply with the Contract Documents.
- I. Testing Agency Responsibilities: Cooperate with Government 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 the work during performance of its services.
 - 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 - 4. Submit 3 copies of the certified written report of each test, inspection, and similar quality-control service through Contractor.
 - 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the work.
- J. 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 the following:

1. Access to the 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 use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- K. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

PART 2 - PRODUCTS

2.1 QUALITY CONTROL PLAN

- A. The Quality Control Plan shall include:
1. A list of personnel responsible for quality control and assigned duties. Include each person's qualifications. Include alternate(s), if applicable, and qualifications
 2. A copy of a letter of direction to the Contractor's Quality Control Supervisor outlining assigned duties.
 3. Names, qualifications, and descriptions of laboratories to perform sampling and testing, and samples of proposed report forms.
 4. Methods of performing, documenting, and enforcing quality control of all 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 mockups, 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 that are fabricated or assembled off-site shall be inspected for quality control at the place of fabrication.

3.2 ON-SITE CONTROL

A. Notification:

1. Notify the Contracting Officer at least 48 hours in advance of the preparatory phase meeting.
2. Notify the Contracting Officer at least 24 hours in advance of the 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, the Contractor's Quality Control Supervisor and the foreman responsible for the feature of work shall be in attendance.
2. Review all applicable specifications sections and drawings related to the feature of work.
3. Ensure that copies of all referenced standards related to sampling, testing, and execution for the feature of work are available on site.
4. Ensure that provisions have been made for field control testing.
5. Examine the work area to ensure that all preliminary work has been completed.
6. Verify all field dimensions and advise the Contracting Officer of discrepancies with contract documents.
7. Ensure that necessary equipment and materials are at the project site and that they comply with approved shop drawings and submittals.
8. Document all preparatory phase activities and discussions on the Contractor's Quality Control Daily Report.

C. Initial Phase:

1. As soon as work begins, inspect and test a representative portion of a particular feature of work for quality of workmanship.
2. Review control testing procedures to ensure compliance with contract requirements.
3. Document all initial phase activities and discussions on the 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 the same feature of work for the following reasons:

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

3.3 DOCUMENTATION

- A. Maintain Quality Control Daily Reports, Daily Test Report Information Sheets, and Accessibility Inspection Reports (Forms may be downloaded from the DSC Workflows website, <http://www.nps.gov/dscw/publicforms.htm>.) of quality control activities and tests.
- B. Quality Control Daily Reports may not be substituted for other written reports required under clauses of the contract, such as Disputes, Differing Site Conditions, or Changes.

3.4 ENFORCEMENT

- A. The Contractor shall stop work on any item or feature pending satisfactory correction of any deficiency noted by the quality control staff or the 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
- B. Patching. Comply with the Contract Document requirements for Division 01 Section 01 73 20 - Openings and Penetrations in Construction.
- C. Protect construction exposed by or for quality-control service activities.
- D. 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 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.

1.4 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. COORDINATE WITH CO FOR LOCATION OF WATER SUPPLY FOR CONTRACTOR USE.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. Noise and Acoustics Management
 - 3. Environmental Management
 - 4. Construction Waste Management

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. Safety Barrier Fence: Orange plastic fence, minimum height, 4 feet.
- D. Barrier Tape: Yellow tape Imprinted with "CAUTION: CONSTRUCTION AREA," manufactured by Reef Industries, Inc., Houston, Texas, or approved equal.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Contracting Officers Field Office: Field office shall be a separate structure from Contractor's office.
 - 1. Prefabricated, job built, or a mobile unit; excellent condition, structurally sound, non-flammable exterior construction, weather tight, minimum 300 square feet.
 - 2. Operable windows and security screens, adjustable ventilation.
 - 3. Restroom (minimum of lavatory and toilet, with exhaust fan if room is windowless).
 - 4. Air conditioner and heater.
 - 5. Interior partition with lockable door to divide office
 - 6. Paneling or freshly painted walls, acoustical tile or painted ceilings, and resilient flooring.
 - 7. Two exterior doors with dead bolts keyed from outside,
 - 8. Minimum 20-square-foot landing and steps at each exterior door.
- 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.

2.3 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. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to agency(ies) with jurisdiction, and marked for intended use.
- C. Contracting Officers Field Office
 - 1. Outlets: Minimum of two, quad outlets with surge protection.
 - 2. Refrigerator: Under counter, 3.2-cubic-foot volume with 0.8-cubic-foot freezer with dedicated power receptacle.
 - 3. Fire Extinguisher: UL listed and FM (Fire Pump Motors) approved, minimum rating of 2-A:10-B:C, dry chemical.
 - 4. First-Aid Kit: General office/light industrial kit which includes antiseptic wipes, bandages, disposable gloves, tape, instant cold pack, dressing pads, eye pads, scissors, and Tylenol tablets. Provide small size, such as manufactured by Johnson & Johnson, New Brunswick, New Jersey, or approved equal.
 - 5. Two desks with five drawers each and two chairs with casters; two drafting tables (minimum 40 inches wide by 5 feet long) and two stools; drawing rack; two 2-drawer and one 4-drawer legal size locking filing cabinets with keys; 8 feet of 12 inch deep shelving; coat rack; two additional guest chairs; two desk lamps; two drafting table lamps; and a maximum/minimum thermometer.
 - 6. Manufactured computer work station, capable of containing CPU (central processing unit), monitor, keyboard, printer; work station chair.
 - 7. Additional tables necessary for FAX machine and copier.
 - 8. Two 5-gallon trash cans and one 30-gallon trash can with lid.
 - 9. Ceiling mounted general lighting fixtures.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where 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.
 - 4. Toilets: Use of existing toilet facilities will not be permitted.
- E. Electric Power Service: Use of existing electric power service will not be permitted.
 - 1. When temporary connections are removed, restore existing utility services to original condition.
- F. 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 as a temporary service laid on the ground with a temporary meter.
- G. 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.
- H. Telephone Service: No telephone service is available on site for Contractor's use. Make arrangements with Telephone Company and pay 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: Construct and maintain temporary roads adequate for construction operations. Locate temporary roads in same location as permanent roads or within the construction limits shown. Extend temporary roads, within construction limits indicated, as necessary for construction operations.
1. Coordinate elevations of temporary roads and paved areas with permanent roads.
 2. Limits and construction methods for temporary access road in the Morefield area shall be coordinated and approved in advance with CO. Contractor shall make the minimal improvements necessary for construction access and remove any temporary surfacing following completion of the project.
 3. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving."
 4. Recondition base after temporary use, including removing contaminated material, regrading, proof-rolling, compacting, and testing.
 5. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion.
- D. 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.

- E. Parking: Use designated areas of existing shown on drawings parking areas for construction personnel.
- F. 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.
- G. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings. 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.
- H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of agency(ies) with jurisdiction.

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. Barricades, Warning Signs, and Lights: Comply with requirements of Manual on Uniform Traffic Control Devices (MUTCD), part IV, 2003 edition for erecting structurally adequate barricades, including warning signs and lighting.

- G. 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.
- H. 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. 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 historic structures or 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 100 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 23 - TEMPORARY STORM WATER POLLUTION PREVENTION

PART 1 - GENERAL

1.1 SUMMARY

- A. Federal Regulations for controlling discharges of pollutants (including chemicals, erodible material, and trash) from municipal separate storm sewer systems, construction sites, and industrial activities, were brought under the National Pollution Discharge Elimination System (NPDES) permit process by amendments to the Clean Water Act (CWA), and promulgation of federal stormwater regulations issued by the United States Environmental Protection Agency (USEPA). The USEPA uses amount of ground disturbance as a measure of a project potential to generate pollution from erosion. NPDES Phase I regulates discharges from construction sites that disturb 5 acres or more. NPDES Phase II regulations expand existing General Permit requirements under Phase I to include/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. Construction disturbances 1 acre and above typically require a formal NPDES permit and a formal Stormwater Pollution Prevention Plan (SWPPP) must be submitted to Agency(ies) with Jurisdiction for review and approval.
- B. 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](#))
- C. 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.
- D. 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 SWPPP showing SWPPP satisfies Federal and State NPDES permit requirements.
- B. Inspection Schedule: Submit schedule for inspection and monitoring of pollution prevention measures.
- C. Inspection Schedule: Submit schedule for inspection and monitoring of storm water pollution prevention measures.
- D. 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. Pollution Prevention and Erosion Control Manager: Contractor shall designate Pollution Prevention and Erosion Control Manager responsible for implementation, inspection, maintenance, and amendments to approved plan.
 - 1. Pollution Prevention and Erosion Control Manager shall be familiar with temporary storm water pollution prevention procedures and Best Management Practices and ensure emergency procedures and plan are updated as needed and available for inspection.
 - 2. When changes in approved plan are required, Pollution Prevention and Erosion Control Manager shall prepare and certify an amendment and submit to Contracting Officer for review and concurrence.

PART 2 - PRODUCTS

2.1 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

A. Provide SWPPP which satisfies Federal and State NPDES permit requirements and includes:

1. Site description.
2. Identification and contract information for Pollution Prevention and Erosion Control Manager.
3. Expected sequencing of operations and construction schedule.
4. Weather monitoring procedure.
5. Descriptions and details Best Management Practices for of pollution prevention and erosion controls, including dust control.
6. Pollution prevention and erosion control plans.
7. Controls for other potential onsite storm water pollutants.
8. Applicable specifications.
9. Maintenance and inspection procedures and forms.
10. Description of potential non-storm water discharges at site.
11. Notice of Intent (NOI) form.
12. Notice of Termination (NOT) form.
13. Contractor and Sub-contractor Certification forms.
14. Other record keeping forms and procedures.
15. Housekeeping Best Management Practices, including vehicle wash-down areas, protection of equipment storage and maintenance areas, and sweeping of roadways related to hauling activities.

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 REGULATORY REQUIREMENTS

- A. Permits: Contractor shall obtain required NPDES permits resulting in no impacts to scheduled work. Contractor shall account for possibility of significant lead time in scheduling and executing work.
 - 1. Implement requirements of NPDES permit for erosion control due to storm water runoff during construction.
 - 2. Implement good housekeeping practices, inspections and record keeping.
 - 3. Prior to construction, Contractor and Subcontractors shall sign certifications (included in the plan) that they understand requirements of NPDES permit.
 - 4. Subcontractors shall comply with requirements of NPDES under supervision of Contractor.
 - 5. Accepted plan shall comply with terms and conditions of EPA permit.
- B. Notice of Intent (NOI): Contractor shall file a Notice of Intent and formal SWPPP as required to the Agency(ies) with Jurisdiction.
- C. Notice of Termination (NOT): After Substantial Completion of Work, file a Notice of Termination (NOT) with the Agency(ies) with Jurisdiction.
- D. Contracting Officer Notification: Contractor shall notify Contracting Officer in writing and by telephone of these events:
 - 1. Erosion and sediment control meeting/briefing.
 - 2. Following installation of required sediment control structures.
 - 3. Prior to removal of or modification to sediment control structures.
 - 4. Prior to removal of sediment control structures.

3.3 TEMPORARY STORM WATER 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.

- C. SWPPP (including inspection forms) and data used to complete the NOI shall be provided to Contracting Officer after Substantial Completion of project.

3.4 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.

3.5 HOUSEKEEPING AND SITE MANAGEMENT

- A. Store materials onsite in conformance to Federal, state, local, and manufacturer's regulations and specifications. Use Best Management Practices to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.
- B. Manage solid waste in conformance to Federal, state, and local regulations. Best Management Practices should be used to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.
- C. Include a spill prevention and control plan with provisions placed in SWPPP.
- D. Manage hazardous waste (including contaminated soil) in conformance to Federal, state, local and NPS regulations and guidelines.

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

3.7 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.

3.8 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.

3.9 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.

3.10 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

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SECTION 01 67 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This 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 the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "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 that is current as of date of the 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 that is demonstrated and approved through submittal process, or, where indicated as a product substitution, to have the 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. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.
- C. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- D. 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: The amount of biobased carbon in the material or product as a percentage of weight (mass) of the total organic carbon in the material or product.
- E. Chain-of-Custody: Process whereby a product or material is maintained under the physical possession or control during its entire life cycle.

- 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 for more information
<http://www.epa.gov/oppt/epp/>.
- G. Stewardship: Responsible use and management of resources in support of sustainability.
- H. Sustainability: The maintenance of ecosystem components and functions for future generations.
 - 1. 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 with ISO 140001 Standard for the Use of Environmental Marketing Claims.
 - 2. Rapidly Renewable Material: Material made from plants that are typically harvested within a ten-year cycle.
 - 3. Regional Materials: Materials that are manufactured and extracted, harvested, or recovered within a radius of 500 miles from the Project location.

1.3 SUBMITTALS

- A. Record Submittals as specified in – Sustainable Design Close-Out Documentation, submit the following:
 - 1. Affirmative Procurement Reporting Form. Submit on form in Appendix A of this Section, or similar form as approved by Contracting Officer.
 - 2. 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 – 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. Provide written description of the process used in evaluating chemical hazards relative to preparation of the MSDS.
 - l. Section 12: Ecological Information. Include data regarding environmental impacts during raw materials acquisition, manufacture, and use. Include data regarding environmental impacts in the event of an accidental release.
 - m. Section 13: Disposal Considerations. Include data regarding the proper disposal of the chemical. Include information regarding recycling and reuse. Indicate whether or not the product is considered to be "hazardous waste" according the US EPA Hazardous Waste Regulations 40 CFR 261.
 - 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.

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 will 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 to 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 an 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 the Contract Documents and to ensure that products are undamaged and properly protected.
 - 5. Contractor is encouraged to obtain materials in biodegradable or recyclable/reusable packaging which uses the minimum amount of packaging possible.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a 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 a well-drained area on solid surfaces to prevent mixing with foreign matter.

1.6 PACKAGING

- A. Where Contractor has the option to provide one of the 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 the greatest extent possible.
 - 1. To the greatest extent possible, provide products and materials that have 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 the use of ozone depleting compounds during and after construction where alternative environmentally preferable products are available, consistent with either the Montreal Protocol and Title VI or the 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 the total value of the materials in the project.

1.8 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to the Government.
 - 2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for the Government.

- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a 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 the Specifications, prepare a written document using appropriate form properly executed.
 - 3. Refer to Divisions 02 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 that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are 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 that have been produced and used successfully in similar situations on other projects.
 - 3. Government reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - 4. Where products are accompanied by the term "as selected," Contracting Officer will make selection.
 - 5. Where products are accompanied by the term "match sample," sample to be matched is Governments.
 - 6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
- B. Product Selection Procedures:
 - 1. Product: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements or approved equal.
 - 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements or approved equal.
 - 3. Products: Where Specifications include a 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 a 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 a 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 a 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 that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product, system, or approved equal.
8. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the 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 that are based on the product named.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select a 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 the 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 the 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 the 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 the following conditions are not satisfied, Contracting Officer will return requests without action, except to record noncompliance with these requirements:
 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 3. Evidence that 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

PART 1 - 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 w/ recycled content Pre- consumer	Total \$ value w/ recycled content Post- consumer	Total \$ value w/ 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 Sur- faces						
Concrete w/ fly ash						
Concrete w/ slag cement						
Concrete w/ low cement content						
Plastic lumber						
Building Insula- tion						
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						

PART 1 - 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

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SECTION 01 73 20

OPENINGS AND PENETRATIONS IN CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Methods of installing and sealing openings and penetrations in construction.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
 - a. A36, Standard Specification for Carbon Structural Steel.
 - b. A53, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - c. A269, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.
 - d. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - e. A351, Standard Specification for Castings, Austenitic, for Pressure-Containing Parts.
 - f. A554, Standard Specification for Welded Stainless Steel Mechanical Tubing.
 - g. A653, Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - h. A666, Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
 - i. A995, Castings, Austenitic-Ferritic (Duplex) Stainless Steel, for Pressure-Containing Parts.

1.3 SUBMITTALS

A. Shop Drawings:

1. For each structure provide dimensioned or scaled (minimum 1/8 inches = 1 foot) plan view drawings containing the following information:
 - a. Vertical and horizontal location of all required openings and penetrations.
 - b. Size of all openings and penetrations.
 - c. Opening type.
 - d. Seal type.

2. Manufacturer's installation instructions for standard manufactured products.

1.4 PROJECT CONDITIONS

- A. For purposes of this Project, water table level is at or below pipe penetration elevations.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe Sleeves:
 1. All other Areas:
 - a. Steel, Hot-dipped galvanized after fabrication.
 - b. Penetrations 24 inches diameter or less: ASTM A53, Schedule 40.
 - c. Penetrations larger than 24 inches diameter: ASTM A36, Minimum 1/4 inches thickness.
- B. Backing Rod and Sealant: Per manufacturer recommendations.
- C. Modular Mechanical Seals:
 1. Acceptable manufacturers:
 - a. Link-Seal.
 2. 316 stainless steel bolts, nuts and washers.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Factory or shop-coat painted components.

3.2 INSTALLATION AND APPLICATION

- A. Size sleeves, blockouts and cutouts which will receive sealant seal such that free area to receive sealant is minimized and seal integrity may be obtained.
- B. Do not cut into or core drill any beams, joists, or columns.
- C. Do not install sleeves in beams, joists, or columns.
- D. Do not install recesses in beams, joists, columns, or slabs.

E. Field Cutting and Coring:

1. Saw or core drill with non-impact type equipment.
2. Mark opening and drill small 3/4 inches or less holes through structure following opening outline.
3. Sawcut opening outline on both surfaces.
 - a. Knock out within sawcuts using impact type equipment.
 - b. Do not chip or spall face of surface to remain intact.
 - c. Do not allow any overcut with saw kerf.

F. Where alterations are necessary or where new and old work join, restore adjacent surfaces to their condition existing prior to start of work.

G. Modular Mechanical Seals:

1. Utilize one seal for concrete thickness less than 8 inches and two seals for concrete, 8 inches thick or greater.
2. Utilize two seals for piping 16 inches diameter and larger if concrete thickness permits.
3. Install seals such that bolt heads are located on the most accessible side of the penetration.

3.3 SCHEDULES

A. General Schedule of Penetrations through Floors, Roofs, Foundation Base Slabs, Foundation Walls, Foundation Footings, Partitions and Walls for Piping, and Conduit:

1. Provide the following opening and penetration types:
 - a. Type A - Block out 2 inches larger than outside dimensions of duct, pipe, or conduits.
 - b. Type B - Saw cut or line-drill opening. Place new concrete with integrally cast sheet metal or pipe sleeve.
 - c. Type C - Fabricated sheet metal sleeve or pipe sleeve cast-in-place. Provide pipe sleeve with water ring for wet and/or washdown areas.
 - d. Type D - Commercial type casting or fabrication.
 - e. Type E - Saw cut or line-drill opening. Place new concrete with integrally cast pipe, or conduit spools.
 - f. Type F - Integrally cast pipe, or conduit.
 - g. Type G - Saw cut or line-drill and remove area 1 inch larger than outside dimensions of pipe or conduit.
 - h. Type H - Core drill.
 - i. Type I - Block out area. At later date, place new concrete with integrally cast sheet metal or pipe sleeve.
 - j. Type J - Grating Banding for any field cut openings.
2. Provide seals of material and method described as follows.
 - a. Category 1 - Modular Mechanical Seal.

- b. Category 3 - 12 GA sheet metal drip sleeve set in bed of silicon sealant with backing rod and sealant used in sleeve annulus.
 - c. Category 4 - Backer rod and sealant.
 - d. Category 5 - Full depth compressible sealant with escutcheons on both sides of opening.
 - e. Category 7 - Full depth compressible sealant and finish sealant or full depth expanding foam sealant depending on application.
 - f. Category 8 - Banding for all grating openings and banding and cover plate of similar materials for abandoned openings.
- 3. Furnish openings and sealing materials through new floors, roofs, grating, partitions and walls in accordance with Schedule A, Openings and Penetrations for New Construction.
 - 4. Furnish openings and sealing materials through existing floors, grating, roofs, partitions and walls in accordance with Schedule B, Openings and Penetrations for Existing Construction.

**SCHEDULE A. OPENINGS AND PENETRATIONS SCHEDULE
FOR NEW CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through exterior wall below grade above water table			C D F I ⁽¹⁾	1 Not Req Not Req 1	F I ⁽¹⁾	Not Req 7
Through exterior wall above grade			A B D H ⁽²⁾	5 5 Not Req 5	C H ⁽²⁾	5 4

**SCHEDULE B. OPENINGS AND PENETRATIONS SCHEDULE
FOR EXISTING CONSTRUCTION**

APPLICATIONS	DUCTS		PIPING		CONDUIT	
	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY	OPENING TYPE	SEAL CATEGORY
Through exterior wall below grade above water table			B ⁽¹⁾	7	B ^{(1) (3)}	7
			B ⁽³⁾	1	H ⁽²⁾	7
			H ⁽²⁾	7		
Through exterior wall above grade			G ^{(1) (3)}	5	G ^{(1) (3)}	5
			H ⁽²⁾	5	H ⁽²⁾	7

(1) Multiple piping 3 inches and smaller or multiple conduits.

(2) Single pipe 3 inches and smaller or single conduit.

(3) Single pipe or conduit larger than 3 inches.

END OF SECTION

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 SUMMARY

- A. This 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 a Plan describing procedures at least 10 business days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - 1. Extent: Describe cutting and patching, show how they will be 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 the 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 the 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, when installed, will match the visual and functional performance of in-place materials.

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 minimize interruption to occupied areas.

3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their 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; comply with 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 the exposed or finished side into concealed surfaces.
 - 3. Concrete: Cut using a cutting machine, such as 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 requiring 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 that are 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.

- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 73 29

PART 1 - SECTION 01 73 40 - EXECUTION

PART 2 - GENERAL

2.1 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 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.

2.2 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 a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- C. Quantity Surveys: Submit 2 copies showing quantities of work performed and actual construction completed and in place.
- D. Construction Phasing Plan: Submit and maintain a narrative plan describing the sequence of performing features of work. The plan shall identify work durations, activities/support needed from the Park, potential risks and mitigation measures in addition to outages associated with each phase. The plan shall be constructed in a manner which minimizes outages.

2.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 3 - PRODUCTS (NOT USED)

PART 4 - EXECUTION

4.1 EXAMINATION

- A. Existing Conditions: The 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: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
 - 1. Before construction, verify the 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 shall 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. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

4.2 COORDINATION WITH UTILITY SERVICE PROVIDERS

- A. Coordination with Utility Service Providers: Contact the following Utility Service providers, sufficiently in advance to avoid delaying the Work, to coordinate the contractor's portion of the Work, testing requirements, inspections, etc.
 - 1. Water Service Contact: Contact NPS Contracting Officer to coordinate Water service outages.

4.3 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the 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 the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to the Contracting Officer in accordance with Specification 01 31 00 - Project Management and Coordination.

4.4 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the existing benchmarks. If discrepancies are discovered, notify Contracting Officer promptly.
- B. General: Lay out the Work using accepted construction surveying practices.
 - 1. Establish benchmarks and control points to set lines 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 shall comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify the 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. Record Log: Maintain a 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 the log available for reference by NPS.

4.5 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations. Controls that are destroyed by Contractor shall be replaced by the Contractor at their expense.
 - 1. Existing Monuments: All benchmarks, land corners, and triangulation points, established by other surveys, existing within the construction area shall be preserved. If existing monuments interfere with the Work, secure written permission before removing them.
- B. Benchmarks: Establish and maintain benchmark(s) on Project site sufficient to complete contract Work.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

4.6 INSTALLATION

- A. General: Locate the Work and components of the 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.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the 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 the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.
- I. Quantity surveys: Shall be conducted, and the data derived from these surveys shall be used in computing the quantities of work performed and the actual construction completed and in place.
 1. The Contractor shall conduct the original and final surveys and surveys for any periods for which progress payments are requested. All these surveys shall be conducted under the direction of a representative of the Contracting Officer, unless the Contracting Officer waives this requirement in a specific instance. The Government shall make such computations as are necessary to determine the quantities of work performed or finally in place. The Contractor shall make the computations based on the surveys for any periods for which progress payments are requested.
 2. Promptly upon completing a survey, the Contractor shall furnish the originals of all field notes and all other records relating to the survey or to the layout of the work to the Contracting Officer, who shall use them as necessary to determine the amount of progress payments. The Contractor shall retain copies of all such material furnished to the Contracting Officer.

4.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. 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 NFPA 241 for removal of combustible waste materials and debris.
 2. 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 the level of cleanliness necessary for proper execution of the Work.
 1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the 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 that are not hazardous to health or property and that 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 as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site shall not be permitted. Washing waste materials down sewers or into waterways shall not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. 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 the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- K. Final Cleaning: At completion of Work, remove all remaining waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave Project clean and ready for occupancy.
 - 1. Provide final cleaning in accordance with ASTM E1971.

4.8 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.

4.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 73 29 Section "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 their specified condition.

- C. Remove and replace damaged surfaces that are 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.

END OF SECTION 01 73 40

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for the following:
 - 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. 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.
- C. Debris: Non-hazardous solid waste generated during the construction, demolition, or renovation of a structure which exceeds 2.5 inch (60 mm) 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 the mixture is comprised primarily of debris by volume, based on visual inspection.
- D. 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.
- E. 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 the utility of the environment for aesthetic, cultural, or historical purposes.
- F. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.
- G. Hazardous Materials: Any material that is regulated as a hazardous material in accordance with 49 CFR 173, 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.
- H. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

- I. 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. Factors that contribute to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination shall be minimized. A Waste Management Plan shall be developed to ensure that existing site and building materials are reused, salvaged, or recycled. Waste disposal in landfills shall be minimized.
- B. Salvage /Recycle Requirements: Develop waste management plan that results 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, and particle board.
 - 4. Concrete.
 - 5. Asphaltic concrete.
 - 6. Cardboard, paper, packaging, newsprint.
 - 7. Metals (from banding, stud trim, piping, rebar, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze).
 - 8. Non-hazardous paint and paint cans.
 - 9. Beverage containers: Aluminum, glass, and plastic containers.
 - 10. Other mixed construction and demolition waste as appropriate.
- C. If any waste materials encountered during the deconstruction/demolition or construction phase are found to contain lead, asbestos, 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 the deconstruction/demolition phase shall be reused in the 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 the quality standards set forth in these specifications. Contractor shall ensure that the 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 the Contracting Officer 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.

1.4 SUBMITTALS

- A. Waste Management Plan: After award of contract and prior to the scheduled Pre-Construction Conference, Contractor shall submit a draft Waste Management Plan to the Contracting Officer for approval. Submit 3 copies of plan. Revise and resubmit Plan as required by the Contracting Officer. Approval of Contractor's Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.
- B. Progress Documentation: Supplemental to the Waste Management Plan, document solid waste disposal, diversion, and cost/revenue analysis and submit completed worksheet on a monthly basis. Use Appendix A - Project Waste Management Plan Worksheet, and report totals to date for all column headings. Use Appendix B for solid waste volume to weight conversions.
- C. Waste Reduction Calculations: Before request for Substantial Completion, submit 3 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. Qualification Data: For Waste Management Coordinator
- I. Progress payment requirements:
 - 1. With each Application for payment, submit 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.
- J. Closeout Submittals
 - 1. With Closeout Submittals, submit a summary of the Project Waste Management Plan worksheet for solid waste disposal and diversion. Submit on form in Appendix A of this Section.

1.5 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Experienced firm, with a record of successful waste management coordination of projects with similar requirements. The qualified Waste Management Coordinator, as identified in this paragraph shall create and draft the Waste Management Plan. Once the Plan has been accepted by the Contracting Officer, the Contractor's Superintendent shall take over the responsibilities of ensuring compliance with this plan. The Superintendent does not need to meet the qualifications set forth in this paragraph.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Meeting: Conduct separate meeting or cover in the Pre-Construction Conference and comply with requirements in Division 01 31 00 Section "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 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 that will be salvaged and reused in this 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 the following:
1. Landfill tip fees/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 the Contracting Officer. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
- B. Waste Management Coordinator: The Superintendent, or other assigned personnel, as approved by the Contracting Officer, shall be present during all waste generation and management actions to ensure all aspects of the accepted Waste Management Plan are thoroughly complied with and followed.
- 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 3 days of submittal return.
 2. Distribute waste management plan to entities when they first 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 a specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return.
2. Waste and recycling bins are to be placed near each other, and close to the point of waste generation but out of the traffic pattern.
3. Recycling and waste bin areas are to be kept neat and clean and clearly marked in order to avoid co-mingling of materials.
4. Bins shall be protected during non-working hours from off-site contamination.
5. Garbage dumpsters shall be checked periodically to monitor recyclables being thrown away or if there are undocumented materials that could be recycled.

G. Materials handling procedures: Materials to be recycled shall be protected from contamination and shall be handled, stored, and transported in a manner that meets the requirements set by the designated facilities for acceptance. Establish a defined area for the operations of each trade, especially woodcutting so that off-cuts will be kept in one area and can be sorted by dimension for future reuse.

H. Contractor shall record all tipping totals for recycled and/or landfilled materials (solid waste) and provide totals to the Contracting Officer for reporting purposes.

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 a 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 a 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 Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Government.
- C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are 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 the ground and protect from the weather.
 - 5. Remove recyclable waste off Government's property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 4-inch size.
- C. 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.
- D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
- E. 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.
- F. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

3.5 RECYCLING CONSTRUCTION WASTE

- A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a 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 that does not contain painted or treated wood.

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 of them in a landfill or incinerator acceptable to authorities having jurisdiction.
1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Government's 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. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 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 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 the Contracting Officer for inspection at the time of monthly progress payment requests. If project record drawings are not current, the Contracting Officer may retain an appropriate amount of the progress payment.
- C. On completion of the total project, submit complete record drawings. Include shop drawings, sketches, and additional drawings that are to be included in the final set, with clear instructions showing the location of these drawings. Final record drawings shall be submitted electronically.
 - 1. Record drawings are to be completed and submitted by Drawing Volume as provided in the Contract 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. The terms and conditions of the contract still require you to satisfy the requirements of the 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 any other similar forms or certificates.

3. Project Record Documents, operation and maintenance manuals, final completion construction digital images recorded on USB Flash Drive with index and descriptions, and similar final record information.
4. Environmental Record Documents:
 - a. Material Safety Data Sheet (MSDS) Data: As specified in Section 01 67 00 Environmental Requirements for Products.
 - b. Affirmative Procurement Reporting Form: As specified in Section 01 67 00 Environmental Requirements for Products.
 - c. Environmental Product Data: As specified in Section 01 67 00 Environmental Requirements for Products.
 - d. Chain-of-Custody Data: As specified in Section 01 67 00 Environmental Requirements for Products.
 - e. Final Summary of Solid Waste Disposal and Diversion: As specified in Section 01 74 19 Construction Waste Management and Disposal.
 - f. Final Summary of Solid Waste Disposal and Diversion: As specified in Section 01 74 19 - Construction Waste Management and Disposal.
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 the 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. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
8. Instruct NPS personnel in operation, adjustment, and maintenance of products, equipment, and systems.

1.4 FINAL INSPECTION, SUBSTANTIAL COMPLETION AND ACCEPTANCE PROCEDURES

- A. Request a final inspection in writing when a project or designated portion of a project is substantially complete. The Contracting Officer will proceed with the inspection within 10 days of receipt of the written request or will advise the Contractor of items that prevent the project from being substantially complete.
- B. If the work is determined to be substantially complete, following the final inspection. Contracting Officer will prepare a Punch List and issue a Letter of Substantial Completion.

- C. If the work is not determined to be substantially complete following the final inspection, Contracting Officer will notify Contractor in writing. Contractor shall request a new final inspection after completing the work. Re-inspection costs may be charged against the Contractor in accordance with the Inspection of Construction contract clause.
- D. Contractor shall complete the Punch List within 30 calendar days, documented weather permitting.
- E. If Contractor completes all items of work on the Punch List and all contractually required items, Contracting Officer will issue Letter of final acceptance of work.
- F. If the Contractor fails to complete the work within the time frame, the Contracting Officer may correct the work with an appropriate reduction in contract price or charge for re-inspection costs in accordance with the Inspection of Construction contract clause.

1.5 PERMIT CLOSURE AND TRANSFER

- A. When the construction work covered by the permits is complete, create a list of tasks required to close or transfer the permits to the Park. Submit to Contracting Officer for approval.
- B. After substantial completion and the Punch List has been completed, the permits shall be closed and documented by the Agency(ies) with Jurisdiction for the permit.
- C. If responsibility for permits is to be transferred to the Park, the Park shall be informed of the permit provisions completed and responsibilities that will transfer to park staff.

1.6 WARRANTIES

- A. Contractor warranty on materials and workmanship:
 - 1. Period of one year after beneficial occupancy.
 - 2. Provide one contractor warranty inspection during the warranty period to address any warranty issues.
- B. Submittal Time: Submit written warranties on request of Contracting Officer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the 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 paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the 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 file with links enabling navigation to each item. Provide bookmarked table of contents at the beginning of document.
5. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. See Specification Section 01 73 40 - 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 the 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 a 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 a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their 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. Remove labels that are not permanent.

- C. Pest Control: Engage an 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 Division 01 Section 01 74 19 - Construction Waste Management and Disposal.

END OF SECTION 01 77 00

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SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals for materials, appurtenances, and equipment, including the following:

1. Manuals, General.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals
5. Systems and equipment maintenance manuals

1.2 SUBMITTALS

- A. Manual: Submit 2 copies of each manual in draft form at least 15 business days before final inspection. Contracting Officer will return copy with comments within 15 business days of receipt.
- B. Format: Submit operations and maintenance manuals in the following format:
1. PDF electronic file. Assemble each manual into a 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. Correct or modify each manual to comply with Contracting Officers comments. Submit 4 copies of each corrected manual within 15 business days of receipt of Contracting Officers comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain a title page, table of contents, and manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
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 the 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. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
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 paper; with clear plastic window sleeve on front and spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. Cover Sheet: Identify each binder on front and spine, with the 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 the contents of a single tabbed section covers 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. Copies produced by facsimile transmission and sheets with stamps, such as submittal approval stamps, will not be acceptable. 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 the reproductions are clear and legible. If reduced-size drawings are used, identify as "REDUCED SIZE" and provide graphic scales, if applicable.
 - c. Equipment Data Sheet: Data, using form at the end of this section.
 - d. Schedules: Schedules reflecting final, as-installed conditions.
 - e. Data that is poorly reproduced or in any way illegible 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 the 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 a 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, water leak, power failure, and equipment failure.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of 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 this 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 the following:
 - 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. 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 the 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: Include test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training videotape if available, that detail essential maintenance and environmental procedures.
5. 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.
6. 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.
7. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.4 PRODUCT MAINTENANCE MANUAL

- A. Content: Organize manual into a 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 the 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 the following, as applicable:
 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 the Project. Include: product model; manufacturer's name, address, phone, and website; and local technical representative, if any

- a. Verify that plastic products to be incorporated into the 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 the 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 the 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 the recommended maintenance procedures and materials.
 - 3) Where the proposed maintenance procedures incorporate composting of plastics, assess the potential effect of each type of plastic to be included on the composting process in accordance with ASTM D5509 or ASTM D6002.
 - c. Material Safety Data Sheets: Include MSDSs as specified.
2. Develop environmental management programs for the 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. 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 a water monitoring program for surface and ground water on the project site in accordance with ASTM D5851 and consistent with the 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 would 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 information and items that detail 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, if available.
- 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 would affect validity of warranties or bonds.
 - 1. Include procedures to follow 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 an index. Install and index all data in binders within 30 days after delivery of items. As custom written data and test results are produced, add them to the operation and maintenance data file.
- B. A list of Operation and Maintenance requirements is included in the Supporting Documents for Contractor's convenience. The intent is to provide an overall summary of requirements and not a comprehensive list. The terms and conditions of the contract still require the Contractor to satisfy the requirements of the 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 the Contracting Officer for inspection at the time of monthly progress payment requests. If operation and maintenance binders are not current the Contracting Officer may retain an appropriate amount of the progress payment.

3.2 MANUAL PREPARATION

- A. Manual Types
 - 1. Emergency Manual: Assemble a 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 a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
 - 3. Operation and Maintenance Manuals: Assemble a 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 but not limited to:
 - 1. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 2. Equipment Data Sheets: For each item of equipment included in the operation and maintenance data, provide an Equipment Data Sheet using the form at the end of this section. For equipment consisting of a driven machine and a driver (for example, a pump and a motor), the 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 the individual equipment items.
 - 3. 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 all control devices. Show control wires and devices remote from the control panel.
 - b. For each control panel, provide a general arrangement drawing showing location of each control component and terminal block on the panel front and interior. Include a materials list of all 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 the control wiring schematic, provide a power wiring schematic drawing showing the power flow to each motor. Identify each power conductor. Show all over-current protection and motor starting devices.
- C. Closeout and Operation & Maintenance (O&M) Requirements List: A Closeout and O&M Requirements list shall be attached to the end of this Specification Section. The intent is to provide an overall summary of the requirements and not a comprehensive list. The requirements of the individual Specification Sections, terms and conditions of the Contract still apply regardless of what is shown on the A Closeout and O&M Requirements list.

END OF SECTION 01 78 23

EQUIPMENT DATA SHEET

Equipment Item: _____ Designation: _____

Function: _____

Location: _____

Project: _____

Model No.: _____ Serial No.: _____

Manufacturer Address and Phone:

Supplier Address and Phone:

Preventive Maintenance Tasks:

Nameplate Data:

Spare Parts Furnished and Other Information:

Closeout and Operation & Maintenance (O&M) Requirements

National Park Service (NPS) - Denver Service Center (DSC) | 1-27-21

Topic	Specification Section	Requirement	Submittal Date	Completed	Received by Park
Project Record Drawings	017700	Submit Record Drawings for Review and NPS use.			
System Demonstration and Training	017900	Demonstration and Training for waterlines, fittings, end connections, PRVs, Air/Vacuum Valves, etc.			
Tools Spare Parts Equipment					
Extra Stock	40 05 52	One Air Release and Vacuum Valve each for Morefield Pressure Rating (2 valves total)			
	40 05 61	Two 6" Gate Valve for Morefield Pressure Ratings (2 valves total)			
	40 05 61	Two 2" Valves for Morefield Bypass lines meeting Morefield Pressure Ratings			
Reports					
Keys & Keying Schedule					
O&M Data Warranties Guarantees	017700	One Year Warranty on all work, including manufacturer product data and O&M Manuals.			
	017823	Operation and Maintenance Manuals			

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SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing NPS personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment, including environmental considerations.
 - 3. Demonstration and training video.

1.2 GENERAL REQUIREMENTS

- A. A list of System Demonstration and Training requirements is included in Supporting Documents for the Contractor's convenience. The intent is to provide an overall summary of requirements and not a comprehensive list. The terms and conditions of the contract still require the Contractor to satisfy the requirements of the individual specification sections regardless of what is shown on the list.
- B. Training Scheduling Conference:
 - 1. Prior to preparing initial training schedule Submittal, schedule and hold training scheduling conference at the location where progress meetings are held, to review:
 - a. Training requirements indicated in the Contract Documents.
 - b. Work to be completed prior to commencing training.
 - c. Work progress and Progress Schedule relative to startup and training.
 - d. Scheduling constraints for Government personnel, relative to days and times of training sessions.
 - e. Preferred days for training.
 - f. Location where training will be performed and facilities available.
 - g. Required Submittals relative to training.
 - h. Other issues relative to training of operations and maintenance personnel.
 - 2. Attendance is mandatory for the following:
 - a. Contractor's project manager.
 - b. Contractor's Site superintendent.
 - c. Project manager of Subcontractors responsible for furnishing materials and equipment for which training of operations and maintenance personnel is required.
 - d. Suppliers invited by Contractor.
 - e. Contracting Officer Representative (COR).
 - f. Government staff responsible for training coordination, and staff responsible for scheduling operations and maintenance personnel.

3. If additional information must be developed to adequately cover agenda items, reconvene conference as soon as possible.
4. Contractor shall prepare minutes summarizing the discussions of conference, decisions made, and agreements and disagreements, and distribute the minutes to each conference attendee and others as appropriate.

1.3 SUBMITTALS

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
 1. For each training session, the Contractor shall submit for approval a proposed outline of the subjects to be covered. The training shall not be conducted until the outline is approved.
- B. Demonstration and Training Video: Submit 2 copies of each DVD for all training sessions within 7 days of end of each training module.
 1. Label each DVD with the date of demonstration or training, the instructor's name, and provide an index of the contents. The index shall list the start and end time of each subject covered during the training session. The sequence of the training subjects shall follow the sequence listed in the approved training outline or as actually conducted

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 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.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
 1. Equipment systems and controls.

2. Environmental Topics:

- a. Overview of environmental issues related to the building industry.
- b. Overview of environmental issues related to the Project.
- c. Review of site specific procedures and management plans implemented during construction:
 - 1) Regulatory Requirements.
 - 2)
 - 3) Noise & 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 the Operations and Maintenance Manual.
 - 2) Integrated Pest Management (IPM).

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

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: Include 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: Include 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: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
8. Repairs: Include 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 a 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 the Contracting Officer with at least 7 days' advance notice.
 - 2. Conduct training sessions after the equipment or system has been accepted and turned over to the Government. Coordinate with commissioning requirements.
 - 3. Coordinate with Integrated pest management requirements. Refer to the specifications section and the approved IPM plan.
 - 4. Individual sections specify the duration of training required. If no duration is listed, provide training of sufficient duration to adequately cover the subjects.

3.2 DEMONSTRATION AND TRAINING VIDEO

- A. General: Engage a qualified commercial photographer to record demonstration and training video. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
 - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Video Format: Digital Video Disc (DVD).
- C. Video Recording: Record all of the above sessions with high resolution equipment. The instructor's voice shall be clearly audible and understandable on the DVD. Utilize a supplemental microphone worn by the instructor
- D. Narration: Describe scenes on video by audio narration by microphone while video is recorded. Include description of items being viewed. Describe vantage point, indicating location, direction (by compass point), and elevation or story of construction.
 - 1. DVDs with poor video or audio quality will be rejected and the training recorded again.

3.3 PERSONNEL TRAINING FOR TREATMENT EQUIPMENT

- A. See schedule at the end of this Section and individual equipment sections.

- B. Conduct all personnel training after completion of Equipment Start-up for the equipment for which training is being conducted.
1. Personnel training on individual equipment or systems will not be considered completed unless:
 - a. All pre-training deliverables are received and approved before commencement of training on the individual equipment or system.
 - b. No system malfunctions occur during training.
 - c. All provisions of field and classroom training specifications are met.
 2. Training not in compliance with the above will be performed again in its entirety by the manufacturer at no additional cost to the Government.
- C. Field and classroom training requirements:
1. Hold classroom training on-site.
 2. Notify each manufacturer specified for on-site training that the Government reserves the right to video record any or all training sessions.
 - a. Organize each training session in a format compatible with video recording.
 3. Training instructor qualification: Factory trained and familiar with giving both classroom and "hands-on" instructions.
 4. Training instructors:
 - a. Be at classes on time.
 - b. Session beginning and ending times to be coordinated with the CO and indicated on the master schedule.
 - c. Normal time lengths for class periods can vary, but brief rest breaks should be scheduled and taken.
 5. Organize training sessions into maintenance verses operation topics and identify on schedule.
 6. Plan for minimum class attendance of **15** at each session and provide sufficient classroom materials, samples, and handouts for those in attendance.
 7. Instructors to have a typed agenda and well prepared instructional material.
 - a. The use of visual aids, e.g., films, pictures, and slides is recommended for use during the classroom training programs.
 - b. Deliver agendas to the CO a minimum of seven (7) business days prior to the classroom training.
 - c. Provide equipment required for presentation of films, slides, and other visual aids.
 8. In the on-site training sessions, cover the information required in the Operation and Maintenance Manuals submitted according to 01 78 23 "Operation and Maintenance Data" and the following areas as applicable to PCS's.
 - a. Operation of equipment.
 - b. Lubrication of equipment.
 - c. Maintenance and repair of equipment.

- d. Troubleshooting of equipment.
 - e. Preventive maintenance procedures.
 - f. Adjustments to equipment.
 - g. Inventory of spare parts.
 - h. Optimizing equipment performance.
 - i. Capabilities.
 - j. Operational safety.
 - k. Emergency situation response.
 - l. Takedown procedures (disassembly and assembly).
- D. Address above Paragraphs 1), 2), 8), 9), 10), and 11) in the operation sessions. Address above Paragraphs 3), 4), 5), 6), 7), and 12) in the maintenance sessions.
- E. Maintain a log of classroom training provided including: Instructors, topics, dates, time, and attendance.

END OF SECTION 01 79 00



DIVISION 02

EXISTING CONDITIONS



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SECTION 02 41 00 - DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. General provisions applicable to all demolition and removals.
2. Civil/site demolition and removals.
3. Structural demolition and removals.
4. Mechanical demolition and removals.
5. Electrical demolition and removals.
6. Disposal of demolition debris, materials, and equipment.

B. Scope:

1. Contractor shall provide all labor, materials, equipment, tools, and incidentals as shown, specified and required for demolition, removals, and disposal Work.
2. The Work under this Specifications section includes, but is not necessarily limited to:
 - a. Demolition and removal of existing materials and equipment as shown or indicated in the Contract Documents. The Work includes demolition of structural concrete, foundations, walls, attachments, appurtenances, piping, fittings, valves, manholes, valve vaults, electrical and mechanical systems and equipment, pavement, curbs, sidewalks, and similar existing materials, equipment, and items.
 - b. Demolition and removal of all above-grade piping and facilities and Underground Facilities underneath, building(s) and structures shown or indicated for demolition, unless the Underground Facilities or above-grade facilities are shown or indicated as to remain.
 - c. Remove from slabs, foundations, walls, and footings that are to be demolished all utilities and appurtenances embedded in such construction.
3. Demolitions and removals indicated in other Specifications sections shall comply with requirements of this Specifications section.
4. Perform demolition Work within areas shown or indicated.
5. Pay all costs associated with transporting and, as applicable, disposing of materials and equipment resulting from demolition and removals Work.

C. Related Requirements:

1. Section 31 23 17 - Rock Excavation.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Fire Protection Association (NFPA):

a. 241, Safeguarding Construction, Alteration, and Demolition Operations.

B. Regulatory Requirements:

1. Demolition, removals, and disposal Work shall be in accordance with 29 CFR 1926.850 through 29 CFR 1926.860 (Subpart T – Demolition), and all other Laws and Regulations.
2. Comply with requirements of authorities having jurisdiction.

C. Qualifications:

1. Electrical Removals: Entity and personnel performing electrical removals shall be electrician(s) legally qualified to perform electrical construction and electrical work in the jurisdiction where the Site is located.
2. Plumbing Removals: Entity and personnel performing plumbing removals shall be plumber(s) legally qualified to perform plumbing construction and plumbing work in the jurisdiction where the Site is located.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Review procedures under this and other Specifications sections and coordinate the Work that will be performed with or before demolition and removals.

1.4 SUBMITTALS

A. Informational Submittals: Submit the following:

1. Procedure Submittals:
 - a. Demolition and Removal Plan: Not less than ten days prior to starting demolition Work, submit acceptable plan for demolition and removal Work, including:
 - 1) Plan for coordinating shut-offs, capping, temporary services, and continuing utility services.
 - 2) Other proposed procedures as applicable.
 - 3) Equipment proposed for use in demolition operations.
 - 4) Recycling/disposal facility(ies) proposed, including facility owner, facility name, location, and processes. Include copy of appropriate permits and licenses, and compliance status.
 - 5) Planned demolition operating sequences.
 - 6) Detailed schedule of demolition Work in accordance with the Schedule accepted by CO.
2. Notification of Intended Demolition Start: Submit in accordance with Paragraph 3.1.A of this Specifications Section.
3. Qualifications Statements:
 - a. Name and qualifications of entity performing electrical removals, including copy of licenses required by authorities having jurisdiction.

- b. Name and qualifications of entity performing plumbing removals,

1.5 SITE CONDITIONS

- A. Government makes no representation of condition or structural integrity of area(s) to be demolished or where removals are required by the Contract Documents.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

- A. Notification:

1. Not less than 48 hours prior to commencing demolition or removal, advise CO in writing of planned start of demolition Work. Do not start removals without permission of CO.
2. Where demolition or removals has potential to affect adjacent properties, occupants, streets, or other public thoroughfare, transportation facilities, and utilities, furnish required notices to owners and occupants of properties, buildings, and structures that may be affected by the demolition of removal.
3. In accordance with Laws and Regulations, furnish to authorities having jurisdiction, including emergency services as necessary, appropriate notices of planned demolition and removals.
4. Submit to CO copies of notices furnished to adjacent property owners, occupants, and authorities having jurisdiction.

- B. Protection of Adjacent Areas and Facilities:

1. Perform demolition and removal Work in manner that prevents damage and injury to property, structures, occupants, the public, and facilities. Do not interfere with use of, and free and safe access to and from, structures and properties unless allowed by the Contract Documents otherwise allowed in writing by CO.
2. Closing or obstructing of roads, drives, sidewalks, and passageways adjacent to the Work is not allowed unless indicated otherwise in the Contract Documents. Conduct the Work with minimum interference to vehicular and pedestrian traffic.
3. Provide temporary partitions between demolition work areas and (a) areas that will be occupied during demolition and removals, and (b) areas accessible to the public or visitors. Temporary partitions shall be sturdy, braced plywood in good condition, of dimensions sufficient to adequately screen demolition work from view of occupants, public, and visitors. Maintain temporary partitions in place until demolition and removals work in the subject area is complete or until other Work requires removal of temporary partitions.
4. Provide appropriate temporary barriers, lighting, sidewalk sheds, and other necessary protection.
5. Repair damage to facilities that are to remain which such damages results from Contractor's operations.

- C. Existing Utilities: In addition to requirements of the General Conditions, Supplementary Conditions, and Division 01 Specifications, perform the following:
1. Should unforeseen, unknown, or incorrectly shown or indicated Underground Facilities be encountered, Contractor responsibilities shall be in accordance with the General Conditions as may be modified by the Supplementary Conditions. Cooperate with utility owners in keeping adjacent services and facilities in operation.
 2. Storm Water Sewerage: Existing storm water system shall remain in place. Upon completing demolition, cut and cap storm sewerage at locations shown on the Drawings. Remove existing storm water piping and related structures between points of cutting, and backfill, restore to grade, and stabilize the area over the removed facilities in accordance with the Contract Documents.
 3. Water Piping and Related Facilities: Before proceeding with demolition, locate and cap all potable and non-potable waterlines and service laterals serving the building or structure being demolished. Ensure compliance with Laws and Regulations regarding water quality.
 4. Other Utilities: Before proceeding with demolition, locate and cap as required all other utilities, such as fuel and gas; compressed air; heating, ventilating, and air conditioning; electric; and communications; and service laterals serving the building or structure being demolished.
 5. Shutdown of utility services shall be coordinated by Contractor, assisted by CO as required relative to contacting utility owners.

D. Remediation:

1. If unanticipated Hazardous Environmental Condition is believed to be encountered during demolition and removals, comply with requirements of the General Conditions, as may be modified by the Supplementary Conditions.

3.2 DEMOLITION - GENERAL

- A. Locate construction equipment used for demolition Work and remove demolished materials and equipment to avoid imposing excessive loading on supporting and adjacent walls, floors, framing, facilities, and Underground Facilities.
- B. Pollution Controls:
1. Use water sprinkling, temporary enclosures, and other suitable methods to limit emissions of dust and dirt to lowest practical level.
 2. Do not use water when water may create hazardous or objectionable conditions such as icing, flooding, or pollution.
 3. Clean adjacent structures, facilities, properties, and improvements of dust, dirt, and debris caused by demolition Work, in accordance with the General Conditions.
- C. Explosives:
1. Explosives are not allowed at the Site. Do not use explosives for demolition and removal Work.
- D. Comply with Section 01 73 29 - Cutting and Patching and NFPA 241.

E. Building or Structure Demolition and Removals:

1. Demolish concrete and masonry in small sections.
2. Break up and remove foundations, mats, and slabs-on-grade unless otherwise shown or indicated as remaining in place.

F. Salvage and Ownership:

1. Materials and equipment to remain Government's property shall be:
 - a. Carefully removed and appropriately handled by Contractor to avoid damage and invalidation of warranties in effect. Fully remedy to pre-construction condition or replace items damaged during removal or handling by Contractor.
 - b. Removed as functional units, together with all appurtenances required for operation.
 - c. Cleaned, listed, and tagged for storage.
 - d. Protected from damage.
 - e. Delivered to designated storage location at the Site or other site indicated in the Contract Documents, at place designated by CO.
2. Items to be and delivered to Government are as indicated in Table 02 41 00-A.

Table 02 41 00-A – Items to be Salvaged

Equipment Name/ Designation	Equipment Location	Deliver to Owner's Location
Functional Water Valves	Throughout the project	

3. Preparation of Government's existing equipment for storage:

- a. Where appropriate, identify each component with markings or tags to indicate its position in the assembly and the assembly of which it is part.
- b. Place small parts in appropriate, durable boxes and clearly mark contents on the outside of box or container.

G. Finishing of Surfaces Exposed by Removals: Unless otherwise shown or indicated in the Contract Documents, surfaces of walls, floors, ceilings, and other areas exposed by removals, and that will remain as finished surfaces, shall be repaired and re-finished with materials that match existing adjacent surface, or as otherwise approved by CO.

3.3 STRUCTURAL REMOVALS

- A. Remove structures to lines and grades shown or indicated, unless otherwise directed by CO. Where limits are not shown or indicated, limits shall be four inches outside item to be installed. Removals beyond limits shown or indicated shall be at Contractor's risk and expense and such excess removals shall be reconstructed to satisfaction of CO without additional cost to the Government.
- B. Recycling and Reuse of Demolition Materials:
 - 1. All concrete, brick, tile, masonry, roofing materials, reinforcing steel, structural metals, miscellaneous metals, plaster, wire mesh, and other items contained in or upon building or structure to be demolished shall be removed, transported, and disposed of away from the Site, unless otherwise approved by CO.
 - 2. Do not use demolished materials as fill or backfill adjacent to structures, in pipeline trenches, or as subbase under structures or pavement.
- C. After removing concrete and masonry walls or portions thereof, mats, slabs, and similar construction that ties in to the Work or to existing construction, neatly repair the junction point to leave exposed only finished edges and finished surfaces.
- D. Where parts of existing structures are to remain in service following demolition, remove the portions shown or indicated for removal, repair damage, and leave the building or structure in proper condition for the intended use.
 - 1. Remove concrete and masonry to the lines shown or indicated by sawing, drilling, chipping, and other suitable methods. Leave the resulting surfaces true and even, with sharp, straight corners that will result in neat joints with new construction and be satisfactory for the purpose intended.
 - 2. Do not damage reinforcing bars beyond the area of concrete and masonry removal. Do not saw-cut beyond the area to be removed.
 - 3. Reinforcing bars that are exposed at surfaces of removed concrete and masonry that will not be covered with new concrete or masonry shall be removed to 1.5 inches below the final surface. Repair the resulting hole, with repair mortar for concrete and grout for masonry, to be flush with the surface.
 - 4. Where existing reinforcing bars are shown or indicated to extend into new construction, remove existing concrete so that reinforcing bars are clean and undamaged.
- E. Removal of Anchorages and Protruding Metals:
 - 1. Where equipment or material anchored to concrete or masonry are removed and anchors are not to be re-used, and where existing metals (and to be removed) protrude from concrete, remove the anchors and other metal to not less than 1.5 inches beneath surface of concrete or masonry member. Repair the resulting hole, using repair mortar for concrete and grout for masonry, to be flush with the surface.
 - 2. Alternately, when the anchor is stainless steel, the anchor may be cut flush with the surface of the concrete or masonry, when so approved by CO.
- F. Jambs, sills and heads of windows, passageways, doors, or other openings (as applicable) cut-in to the Work or to existing construction shall be dressed with masonry, concrete, or metal to provide smooth, finished appearance.

- G. Where anchoring materials, including bolts, nuts, hangers, welds, and reinforcing steel, are required to attach the Work to existing construction, provide such materials under this Specifications section, unless specified elsewhere in the Contract Documents.

3.4 MECHANICAL REMOVALS

- A. Mechanical demolition and removal Work includes dismantling and removing existing:

1. Piping systems and ductwork systems.
2. Mechanical equipment and appurtenances.
3. Mechanical elements of instrumentation and control systems, such as sensors and transmitters and similar items.
4. Mechanical removals include cutting and capping as required, except that cutting of existing piping and ductwork to make connections is included under Section 01 73 29 - Cutting and Patching; Specifications sections in which requirements for coordination with Government's operations are indicated; and applicable Specifications of Division 21 - Fire Suppression, Division 22 - Plumbing, Division 23 - Heating, Ventilating, and Air Conditioning, Division 40 - Process Interconnections, and others as applicable.
5. Mechanical removals as required herein apply to systems exposed to view, hidden from view, and Underground Facilities. Mechanical removals may require work in spaces that may be classified confined spaces.

- B. Life-Safety Systems:

1. Retain existing life-safety systems, including but not limited to fire suppression systems, in place for as long as possible prior to performing associated demolition and removals.
2. Where demolishing buildings or structures equipped with life-safety systems, remove or deactivate life-safety systems only in the area where active demolition operations are in progress.

- C. Demolition and Removals of Piping, Ductwork, and Similar Items:

1. Scope:
 - a. Safety purge piping and tanks (as applicable) of chemicals, fuel, solids, liquids, and gases (as applicable) and make safe for removal and capping. Discharge contents of existing piping appropriately while avoiding damaging property; restricting access to or use of property; and creating unsafe, unsanitary, nuisances, and noisome conditions.
 - b. To the extent shown or indicated, remove existing piping conveying water (potable and non-potable), waste and vent, fuel (liquids and gases), heating fluids (such as water-glycol solutions), chemicals, solids and slurries, sludge, wastewater, other fluids, and processes gases, and other piping.
 - c. Remove piping to the nearest structurally sound (or "solid") piping support, and provide caps on ends of remaining piping.
 - d. Where piping to be demolished passes through existing walls to remain, cut off and cap pipe on each side of the wall.
2. Caps, Closures, Blind Flanges, and Plugs – General (All Piping and Ducts):

- a. Provide closure pieces, such as blind flanges and caps, where shown or required to complete the Work.
 - b. Where used in this Specifications section, the term “cap” means the appropriate type closure for the piping or ductwork being closed, including caps, blind flanges, and other closures.
 - c. Caps shall be compatible with the piping or ductwork on which the cap is installed, fluid-tight and gastight, and appropriate for the fluid or gas conveyed in the pipe or duct.
 - d. Unless otherwise shown or indicated, caps shall be mechanically fastened, fused, or welded to pipe or duct. Plug piping with means other than specified in this Specifications section only when expressly so shown or indicated in the Contractor Documents or when allowed by CO.
3. Underground Facilities:
- a. When Underground Facilities are altered or removed, properly cut and cap piping left in place, unless otherwise shown or indicated.
4. Waste and Vent Piping; Ductwork:
- a. Remove waste and vent piping, and ductwork to extent shown and cap as required.
 - b. Where demolished vent piping, stacks, and ductwork passes through existing roofing, patch the roof with the same or similar materials as existing, and fully compatible with ensign materials. Completed patch shall be watertight and comply with roofing manufacturer’s recommendations.
5. Potable Water Piping; Plumbing; Fire Suppression Piping and Systems; Heating Piping:
- a. Modifications to potable water piping, fire suppression systems, other plumbing piping, and heating system piping shall comply with Laws and Regulations.
 - b. All portions of potable water systems that have been modified or opened shall be hydrostatically tested and disinfected in accordance with the Contract Documents, and Laws and Regulations. Hydrostatically test other, normally-pressurized, plumbing and fire suppression piping and heating piping systems.
- D. Equipment Demolition and Removals:
- 1. To the extent shown or indicated and as required for the Work, remove existing mechanical equipment, including (but not limited to):
 - a. Plumbing equipment.
 - b. Flow control valves.
 - 2. Where required, disassemble equipment to avoid imposing excessive loading on supporting walls, floors, framing, facilities, and Underground Facilities. Disassemble equipment as required for access through and egress from building or structure. Disassembly and removal shall comply with Laws and Regulations. Provide required means to remove equipment from building or structure.
 - 3. Remove control panels, operator stations, and instruments associated with equipment being removed, unless shown or indicated otherwise.

4. Remove equipment supports as applicable, anchorages, base, grout, and piping. Remove anchorage systems in accordance with the “Structural Removals” Article in this Specifications section.
5. Remove small-diameter piping back to header unless otherwise indicated.
6. Remove access platforms, ladders, and stairs related to equipment being removed, unless otherwise shown or indicated.

3.5 ELECTRICAL REMOVALS

A. Electrical demolition Work includes removing existing:

1. Disconnecting cabling from electrical sources, control panels, control stations, instrumentation and control items, and similar devices and equipment.
2. Conduits, raceways, cable trays, hangers and supports, cabling, and related items.
3. Switches, panelboards, control stations, and similar items.
4. Utility poles, site lighting standards, and overhead cabling.
5. Appurtenances and miscellaneous electrical equipment, as shown, specified, or required.

B. Electrical Removals – General:

1. Comply with Laws and Regulations, including the National Electric Code.
2. Lock Out and Tagging:
 - a. Contractor shall lock out and tag circuit breakers and switches operated by Government and shall verify that affected cabling are de-energized to ground potential before commencing electrical removals Work.
 - b. Upon completion of electrical removals Work, remove the locks and tags and promptly advise Resident Project Representative (RPR) or CO and Government that existing facilities are available for use.
3. Remove existing electrical equipment, fixtures, and systems to avoid damaging systems to remain, to keep existing systems in operation, and to maintain integrity of grounding systems.

C. Removal of Cabling, Conduits, Raceways and Similar Items:

1. Verify the function of each cable before disconnecting and removing.
2. Remove cabling, conduits, hangers and supports, and similar items back to the power source or control panel, unless otherwise shown or indicated.
3. Remove cabling, conduits, and similar items where shown or indicated for removal. Abandoned conduits concealed in floor, ceiling slabs, or in walls shall be cut flush with the slab or wall (as applicable) at point of entrance, suitably capped, and the area repaired in a flush, smooth manner acceptable to CO.
4. Disassemble and remove exposed conduits, junction boxes, other electrical appurtenances, and their supports.
5. Repair all areas of the Work to prevent rusting on exposed surfaces.
6. Underground Electric:
 - a. Conduits in Underground Facilities not scheduled for reuse shall be suitably capped watertight where each enters building or structure to remain.

- b. Where shown or indicated, remove direct-burial cabling. Openings in buildings for entrance of direct-burial cabling shall be patched with repair mortar or other material approved by CO for such purpose, and made watertight.

D. Electrical Service Entrances and Outdoor, Overhead Electrical Utilities:

- 1. Existing poles and overhead cabling shall be removed or abandoned as shown and specified.
- 2. Completely remove from the Site poles not owned by electric utility, including site lighting standards and appurtenances, shown or indicated for removal.

3.6 DEMOLITION OF SITE IMPROVEMENTS

A. Pavement, Sidewalks, Curbs, and Gutters:

- 1. Demolition of asphalt or concrete pavement, sidewalks, curbs, and gutters, as applicable, shall terminate at cut edges. Edges shall be linear and have a vertical cut face.
- 2. To cut pavement, sidewalks, curbs, and gutters, use machinery or tools that provides a smooth-cut edge, appropriate for the required. Where cut edges are not smooth, repair the cut edge to remain to provide a smooth, even appearance.

B. Fencing, Guardrails, and Bollards:

- 1. Remove to the limits shown or indicated on the Drawings.
- 2. Completely remove below-grade posts and concrete.

C. Manholes, Vaults, Chambers, and Handholes:

- 1. Remove to the limits shown or indicated on the Drawings.
- 2. If not shown or indicated on the Drawings, remove to not less than three feet below finished grade indicated on the Drawings.

D. Underground Facilities Other than Manholes, Vaults, Chambers, and Handholes:

- 1. Remove to the extent shown or indicated on the Drawings.
- 2. Unless otherwise shown or indicated, cap ends of piping to remain in place in accordance with the "Mechanical Removals" Article in this Specifications section.

E. Landscaping: Comply with Section 31 10 00 - Site Clearing.

F. Other Site Improvements: When the Contract Documents require removal of other site improvements not addressed above, copy with Contract requirements for removal of buildings or structures.

3.7 DISPOSAL OF DEMOLITION DEBRIS

A. Disposal – General:

1. Promptly remove from the Site all debris, waste, rubbish, material, and equipment resulting from demolition and removal operations. Promptly upon completion of demolition and removal operations, remove from the Site construction equipment used in demolition Work.
2. Do not sell at the Site demolition materials or removed equipment. If materials, equipment or debris will be sold by Contractor, remove the items from the Site and perform the sale or transaction elsewhere, in accordance with Laws and Regulations.
3. Cleaning and Removal of Debris: Comply with the General Conditions, Supplementary Conditions, and –Division 01 Specifications.

B. Transportation and Disposal:

1. Non-Hazardous Materials, Equipment, and Debris: Properly transport and dispose of non-hazardous demolition materials, equipment, and debris at appropriate landfill or other suitable location, in accordance with Laws and Regulations. Non-hazardous material does not contain Constituents of Concern such as (but not limited to) asbestos, PCBs, petroleum, hazardous waste, radioactive material, or other material designated as hazardous in Laws or Regulations.
2. Hazardous Materials, Equipment, and Debris: When handling and disposal of items containing Constituents of Concern is included in the Work, properly transport and dispose of such items in accordance with the Contract Documents and Laws and Regulations.

- C. Submit to CO information required in this Specification Section on proposed facility(ies) where demolition materials, equipment, and debris will be recycled. Upon request, CO or Government, shall be allowed to visit recycling facility(ies) to verify adequacy and compliance status.

END OF SECTION 02 41 00

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DIVISION 31

EARTHWORK



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SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Site clearing Work, including:
 - a. General provisions for site clearing Work.
 - b. Preparation for site clearing Work.
 - c. Clearing and grubbing.
 - d. Tree protection, selective removals, and selective trimming.
 - e. Disposal and cleaning.
 - f. Stripping and stockpiling of topsoil.

B. Related Requirements: Include but are not necessarily limited to:

1. Section 31 23 33 - Trenching, Backfilling, and Compacting for Utilities.

1.2 REFERENCES

A. Terminology:

1. Terms indicated below are not defined terms indicated with initial capital letters but, when used in this Section, have the meanings indicated below:
 - a. "Arborist" means Subcontractor retained to perform Work requiring a specialist in trees, shrubs, brush, other vegetation of the types existing at the Site, and possessing not less than the required qualifications indicated in this Section.
 - b. "Clearing and grubbing" means removing and disposing of all: (1) trees, brush, and other vegetation, logs, and similar items ("clearing"); and (2) stumps, roots, logs, rubbish, and debris on or in the soil ("grubbing") after Clearing. Clearing and grubbing includes grinding and removing of stumps. When clearing and grubbing, topsoil stripping and stockpiling, and required demolition Work is complete, the Site will be ready for grading and other new construction.
 - c. "Demolition" means removal, whether in whole or in part, of existing human-made construction, such as removal of buildings, structures, and building systems; site work (such as pavement, curbs, sidewalks, gutters) and the like; Underground Facilities; and other existing construction.
 - d. "Selective removal" means removal of specific trees, shrubs, brush, and other vegetation, whether as shown or indicated in the Contract Documents or as directed at the Site by CO.

- e. “Selective trimming” means removal of selected parts of trees, shrubs, brush, and other vegetation, performed by arborist, for the purpose of either: (1) allowing installation of new construction adjacent to or through the tree, shrub, brush, or vegetation, or)2) removing damaged or unhealthy growth, to allow balance of the subject tree, shrub, brush, or vegetation to continue normal, healthy growth.
- f. “Site clearing” means all the Work required by this Section and related Drawings.
- g. “Topsoil” means existing material at the Site, visible after clearing and grubbing, to be stripped, when such material is friable, clay loam, surface soil present in depth of not less than four inches. Topsoil shall be free of subsoil, clay lumps, stones, and other objects over two-inch diameter and other objectionable material. Topsoil required for planting and landscaping Work in the Specifications of Division 32 may differ from the meaning indicated in this Section.

B. Reference Standards:

- 1. ASTM International (ASTM):
 - a. D448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction.
- 2. American National Standards Institute (ANSI):.
 - a. A300, Standard for Tree Care Operations – Tree, Shrub, and Other Woody Plant Maintenance – Standard Practices.
- 3. International Society of Arboriculture (ISA):
 - a. Container Rootball Shaving.
 - b. Crown Correction.
 - c. Balled and Burlapped Root Correction.
 - d. Container Root Correction.
 - e. High Branched Crown Observation.
 - f. Low Branched Crown Observation.
 - g. Multiple Low Branches Crown Observation.
 - h. Balled and Burlapped Root Observation.
 - i. Container Root Observation - Tree.
 - j. Protection Maintenance.

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Clearing Conference:

- 1. Prior to commencing site clearing Work, actively participate in conference regarding site clearing Work. Date and time of conference will be mutually established by Contractor and CO.
- 2. Location: Conference location will be determined following contract award by the Contractor and CO.
- 3. Participants:

- a. Required Participants: Contractor's project manager, Contractor's site superintendent, arborist, CO, Resident Project Representative, Government's Site Representative.
 - b. Potential Participants: Government, facility manager (if applicable), and representative of properties (other than Government) affected by site clearing Work,
- 4. Contractor will chair the conference, prepare and distribute an agenda, and prepare and distribute a record of the conference.
- 5. Participants shall be prepared to discuss:
 - a. Project requirements and the Contract requirements for site clearing Work.
 - b. Submittals required for site clearing Work.
 - c. Schedule for site clearing Work and availability of resources.
 - d. Locations and types of site clearing Work, with specific attention to areas of selective removals, selective trimming, and notable species. Limits of clearing and grubbing. Proposed locations for stockpiles and temporary storage of cuttings and debris.
 - e. Environmental and other conditions at the Site.
 - f. Growth, vegetation, and existing construction requiring protection.
 - g. Required observations and field quality control for site clearing Work.
- 6. If additional information affecting site clearing Work subsequently comes to light, reconvene the conference at earliest opportunity.

1.4 QUALITY ASSURANCE

A. Qualifications:

- 1. Arborist:
 - a. Where selective removal, selective trimming, or both are required or necessary, retain the services of, and employ in the Work, accredited arborist, possessing qualifications acceptable to CO.
 - b. Arborist shall be skilled, trained, and possess documented experience in successfully protecting, trimming, and restorative care of trees and shrubs of the types necessary for the Work.
 - c. Certification: Arborist shall be certified by either International Society of Arboriculture (ISA) or American Society of Consulting Arborists (ASCA).
 - d. Arborist shall use in selective removal and selective trimming Work only workers with specific skill and successful experience in this type of Work required. Such workers shall work under the direct, personal supervision of arborist.
 - e. Submit to CO names, employer(s), certifications, other relevant qualifications and record of relevant experience, as indicated below, for not less than three successful projects involving same species of trees, shrubs, and vegetation as involved in the site clearing Work:
 - 1) Names and telephone numbers of site owners, architects or engineers responsible for projects.

- 2) Approximate contract price of the selective removal and selective trimming of trees, shrubs, and vegetation.
- 3) Approximate time of year work was performed on each referenced project.
- 4) Approximate quantity and types of selective removal and selective trimming of performed.
- 5) General indication of species of trees, shrubs, and vegetation involved.

1.5 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Limits of Site Clearing Work: When limits of site clearing Work are not expressly shown on the Drawings, or where Contractor proposes alternative limits of site clearing Work, submit drawings, developed from the Drawings, clearly indicating proposed limits of site clearing Work, with dimensions indicated where appropriate.
- b. Where proposed limits of clearing and grubbing, selective removals, and topsoil stripping are not identical with each other, clearly and expressly indicate limits of each on the Shop Drawings. .

B. Informational Submittals: Submit the following:

1. Permits and Approvals:

- a. Submit copy of each permit required and obtained for site clearing Work, issued by authority having jurisdiction.
- b. Where Government's permission or approval is required for selected site clearing activities, submit copy of Government's written permission or approval for such activity.
- c. When approval of owner of property (other than Government) is required for selected site clearing activity, submit to CO written copy of such approval.

2. Certificates:

- a. Arborist's certification that trees and shrubs shown or indicated to remain were protected during the site clearing Work in accordance with the Contract Documents.
- b. Where trees or shrubs (shown or indicated to remain) were damaged during site clearing Work, submit arborist's certification that such trees and shrubs were promptly and properly treated or, where successful treatment was not feasible, were replaced.

3. Qualifications Statements:

- a. Arborist qualifications.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Tree Wound Dressing:
 - 1. Provide tree wound dressing, waterproof, adhesive and elastic with an antiseptic, free from kerosene, coal tar, creosote, and other material injurious to life of tree or other plant.
- B. Drainage Fill:
 - 1. Selected crushed stone, or crushed or uncrushed gravel, washed.
 - 2. Size 24 (in accordance with ASTM D448), with 90 to 100 percent passing 2.5-inch sieve and not more than 10 percent passing 3/4-inch sieve.
- C. Burlap:
 - 1. Jute, not less than 7.2 ounces per square yard.
- D. For other materials needed for site clearing Work, such as stone, topsoil, or other, comply with requirements of the Contract Documents.

PART 3 - EXECUTION

3.1 SITE CLEARING – GENERAL

- A. Limits of Site Clearing Work:
 - 1. Limits of site clearing Work are shown and indicated on the Drawings.
- B. General Provisions for Site Clearing:
 - 1. Contractor shall provide all labor, materials, equipment, tools, services, and incidentals necessary and required to perform site clearing Work in accordance with the Contract Documents.
 - 2. Perform site clearing Work to avoid creating nuisances, pollution, and preventable adverse effects on the environment.
 - 3. Comply with this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".
 - 4. Requirements of Authorities Having Jurisdiction:
 - a. Perform site clearing Work in accordance with Laws and Regulations.
 - b. Obtain, pay for, and comply with permits required for site clearing Work. Obtain from authorities having jurisdiction and furnish copy of each permit as a Submittal.
 - 5. Traffic Control:
 - a. Where site clearing Work is along or adjacent to travelled ways subject to public traffic, comply with Traffic Control Drawings.

- b. Establish such controls prior to and maintain in place throughout site clearing Work that has potential to affect traffic.
- 6. Site clearing Work shall comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article, unless the Contract Documents indicate more-stringent requirements.
- 7. Demolition Work is indicated in Section 02 41 00 - Demolition, including removal of site improvements and Underground Facilities.

3.2 PREPARATION

A. Permits and Approvals:

- 1. Do not commence site clearing Work until necessary permits and approvals are obtained and copies furnished to CO as Submittals.

B. Delineation of Limits of Site Clearing Work Areas:

- 1. Locate and clearly flag at the Site:
 - a. Limits of site clearing Work.
 - b. Trees, shrubs, vegetation, and other materials to remain within limits of site clearing Work.
 - c. Trees, shrubs, and other vegetation to be selectively trimmed.
 - d. Trees, shrubs, and vegetation to be selectively removed.
 - e. Salvageable trees, shrubs, and vegetation (to be relocated) within limits of site clearing Work.
- 2. Flagging:
 - a. Flagging shall be high-visibility type. Where necessary, provide lath or stakes driven into the ground, with flagging, to clearly delineate limits.
 - b. Provide different-colored flagging for each type of delineation required by this Article.
 - c. Promptly replace lost, moved, or destroyed flagging until CO concurs that flagging is no longer needed.
- 3. Review with CO:
 - a. Before starting site clearing Work, other than flagging, review at the Site with CO.
 - b. Make corrections as necessary.
 - c. Review all trees, 12-inch diameter (measured one foot above ground) and larger, to be removed or selectively trimmed.
 - d. Review with CO at the Site trees and shrubs to be selectively trimmed, to reach mutual agreement on extent of selective trimming required.

- C. Protection: Establish protection of trees, shrubs, and vegetation to remain, in accordance with this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming", and other applicable provisions of the Contract Documents.

D. Temporary Erosion and Sediment Controls:

1. Provide applicable temporary erosion and sediment controls before commencing clearing and grubbing and topsoil stripping Work.
2. Comply with temporary erosion and sediment control drawings.
3. Continue providing temporary erosion and sediment controls as clearing and grubbing and topsoil stripping and stockpiling Work progresses into previously uncleared, ungrubbed areas of the Site.

3.3 CLEARING AND GRUBBING

A. Clearing and Grubbing – General:

1. Remove and dispose of all materials constituting clearing and grubbing Work within limits shown and indicated in the Contract Documents.
2. After grubbing Work is complete, properly fill holes resulting from grubbing before commencing site grading Work.

B. Trees and Shrubs Improperly Destroyed or Damaged:

1. Refer to this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".

C. Trees and Shrubs to Remain:

1. Trees and shrubs to remain shall be protected, and trimmed where necessary or required, in accordance with this Section's Article, "Tree Protection, Selective Removals, and Selective Trimming".

3.4 TREE PROTECTION, SELECTIVE REMOVALS, AND SELECTIVE TRIMMING

A. General Provisions for Tree Protection, Selective Removals, and Selective Trimming:

1. Provide temporary fencing, barricades, or guarding measures, as recommended by arborist, outside drip line of trees and shrubs to remain.
2. Protect root systems from damage caused by noxious materials, storm water runoff, site clearing, planting and landscaping, other Work, and storage of materials and equipment. Protect root systems from flooding, erosion, and excessive wetting resulting from dewatering of excavations, drainage of tanks, and other construction activities.
3. Fires are not allowed under or adjacent to trees, shrubs, and other vegetation to remain.
4. Do not store matter resulting from site clearing or demolition, topsoil, or other excavated material within drip line of trees and shrubs to remain. Vehicles are not allowed within drip line. Restrict foot, vehicle and equipment traffic to prevent compaction of soil over root systems. Where such activities are unavoidable, and only as acceptable to CO, provide temporary, continuous, heavy-duty wood planking effectively fastened together and capable of distributing loads from such activities. Temporary planking shall be underlaid by layer of filter fabric covered with two-inch layer of gravel.
5. Cut branches and roots, when necessary, with sharp pruning instruments; do not break or chop. Fully paint cuts 1/2-inch and larger in size with tree wound dressing.

B. Excavation and Protection of Trees and Shrubs:

1. Excavate within drip line of trees only where shown.
2. Where trenching for utilities is required within drip line, tunnel under or around main lateral feeder roots by drilling, auger boring, pipe jacking, or digging by hand under supervision of arborist. Do not cut main lateral roots or tap roots; cut smaller roots, which interfere with installation of the Work.
3. Where excavation for the Work is required within drip line of trees or shrubs, hand excavate to minimize damage to root systems. Perform excavation under supervision of arborist. Provide temporary shoring or other protective support systems at excavations, to minimize sloping and benching of excavations. Use narrow tine spading forks and comb excavated material to expose roots.
4. Relocate roots in backfill areas wherever possible. If large, main lateral roots are encountered, expose beyond excavation limits as required to bend and relocate without breaking. If encountered immediately adjacent to location of construction and relocation is not practical, cut roots approximately three inches back from construction.
5. Do not allow exposed roots to dry out before permanent backfill is provided; provide temporary earth cover. Water and maintain in moist condition and temporarily support and protect from damage until permanently relocated and covered with earth.

C. Grade Adjustments and Tree Protection:

1. Maintain existing grade within drip line of trees, unless otherwise shown or indicated.
2. Lowering of Preconstruction Grade:
 - a. Where required finish grade is below preconstruction grade around trees and shrubs, grade beyond drip line. Maintain preconstruction grade within drip line of trees and shrubs.
 - b. Prune tree and shrub roots exposed during grade lowering, or provide permanent protections as recommended by arborist. Do not cut main or lateral roots or tap-roots; cut only smaller roots.
 - c. Compensate for loss of roots and prune branches to stimulate root growth.
 - d. Provide extended service through completion of the Contract correction period as recommended by arborist.
3. Minor Fills:
 - a. Where preconstruction grade is six inches or less below elevation of finish grade shown, fill with topsoil complying with quality requirements of Specifications for finish grading and landscaping.
 - b. Place in single layer and do not compact.
 - c. Hand-grade to required finish elevations.

D. Tree and Shrub Pruning (Selective Trimming):

1. Perform pruning and selective trimming under the supervision of arborist.
2. Remove branches from trees and shrubs to remain only after CO's concurrence, only to extent necessary to clear location of permanent construction, using branch removal methods in accordance with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.

3. Extend pruning operation to restore natural shape of entire tree or shrub where pruning is approved by CO and as recommended by arborist.
4. Prune branches to balance loss to root system caused by damage or cutting of root system.
5. Chip branches removed from trees and shrubs. Stockpile and spread chips as directed by CO, with arborist's recommendation.

E. Selective Trimming:

1. In addition to pruning (as required above), perform other selective trimming under direction of arborist.
2. Comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
3. Where shown or indicated, and as directed by CO with arborist's recommendation, carefully remove larger branches, when necessary, using appropriate methods.
4. Repair cut branches in accordance with this Section.
5. During selective trimming, avoid damaging healthy (to remain) elements of trees and shrubs.
6. Dispose of trimmings as indicated in this Section's "Disposal and Cleaning" Article.

F. Selective Removals:

1. Perform selective removals under direction of arborist.
2. Comply with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
3. Fully remove trees and shrubs shown or indicated for selective removal.
4. Remove stumps to not less than one foot below preconstruction ground surface.
5. During selective removals, avoid damaging adjacent trees and shrubs to remain, and other property.
6. Remove larger branches before cutting the trunk of tree or shrub being selectively removed.
7. Dispose of trees and shrubs selectively removed as indicated in this Section's "Disposal and Cleaning" Article.

G. Repair and Replacement of Trees and Shrubs:

1. Perform tree and shrub repair under direction of arborist.
2. Cavity Repair:
 - a. Remove decayed areas to depth that exposes healthy tissue.
 - b. Shape cavities to provide drainage.
 - c. Paint inside of cavity with antiseptic tree wound dressing material.
 - d. Do not fill cavities.
 - e. When cavity's cross-section exceeds 60 percent of cross-section of tree or shrub branch, selectively trim subject branch. When cavity's cross-section exceeds 60 percent of cross-section of trunk of tree or shrub, remove tree or shrub upon CO's authorization. CO will consider arborist's recommendation. Comply with this Section's requirements for selective trimming and selective removals.

3. Repair trees and shrubs damaged by construction operations, or selectively trimmed, within 24 hours of occurrence of such damage or selective trimming. Treat damaged trunks, branches, and roots according to written instructions of arborist, in accordance with ANSI A300 and applicable ISA standards indicated in this Section's "References" Article.
4. Remove and replace trees and shrubs that are (1) dead or destroyed due to construction operations, or (2) damaged beyond reasonable hope of recovery (as determined by arborist) following repairs, or (3) damaged and determined by arborist to be incapable of resuming normal growth pattern after repairs.,
5. Obtain opinion from arborist regarding whether damaged trees, shrubs, and other vegetation is repairable with reasonable chance of success. Submit arborist's certification required in this Section's "Submittals" Article.
6. For each tree or shrub to remain but is destroyed or damaged (beyond repair) by Contractor:
 - a. For trees 8 inches or more in diameter (measured one foot above preconstruction ground surface), provide two replacements of the same species. Each replacement shall be four inches diameter (measured one foot above top of root ball).
 - b. For trees smaller than eight inches diameter, and for shrubs, provide one replacement for each, of same species. Replacements shall be equal in size to original, up to maximum of four inches (measured one foot above root ball).
 - c. Provide replacement at locations at the Site as directed by CO.
 - d. Provide replacements in accordance with the Contract Documents, including Specifications on planting and landscaping.

3.5 DISPOSAL AND CLEANING

A. Disposal – General:

1. Dispose of matter resulting from clearing and grubbing, selective removals, and selective trimming, at appropriate offsite location, unless otherwise expressly allowed by the Contract Documents or mutual agreement of Government and Contractor.
2. Do not use cleared, grubbed, or trimmed material as fill, backfill, or in embankments.
3. Dispose of cleared, grubbed, and trimmed material, and other materials, rubbish, and debris, in accordance with Laws and Regulations.
4. Pay all costs associated with transporting and disposing of materials and debris resulting from site clearing Work.
5. Cleared lumber and trimmings from trees are Contractor's property and, at Contractor's option, may be sold or salvaged offsite.

B. Cleaning:

1. Perform progress cleaning and other cleaning Work, and disposal of resulting materials and debris, in accordance with –Division 01 Specifications.

C. Burning:

1. Burning of trees, shrubs, brush, other vegetation, and other materials at, or adjacent to, the Site, whether in-place or cut, is prohibited.

3.6 TOPSOIL STRIPPING AND STOCKPILING

A. Stripping:

1. Before commencing topsoil stripping:
 - a. Perform clearing and grubbing and selective removals.
 - b. Remove grass and other vegetation that may remain following clearing and grubbing.
 - c. Provide necessary and required temporary erosion and sediment controls.
2. Strip topsoil to depths encountered, in manner that prevents intermingling of topsoil with underlying subsoil and other objectionable material. Remove heavy growths of grass and vegetation and material below topsoil.
3. Before stockpiling, separate objectionable material from topsoil.
4. Do not strip topsoil from within drip line of trees and shrubs to remain as part of the completed Project.

B. Stockpiling:

1. Construct and maintain topsoil stockpiles adjacent to the removal areas for ease of reinstallation.

C. Reuse of Stripped Topsoil:

1. Reuse in the finish grading and landscaping Work topsoil that complies with the Contract Documents for such Work.
2. Where topsoil stripped from the Site does not comply with the Contract Documents relative to quality required for use in finish grading and landscaping Work, provide appropriate soil amendment material, properly and fully mixed into topsoil stripped from the Site, so that amended material complies with quality requirements for topsoil required for finish grading and landscaping Work.

D. Disposal of Excess Topsoil:

1. Topsoil in excess of quantity required for finished Project becomes Contractor's property when CO indicates finish grading and landscaping Work is complete. Properly dispose of excess topsoil offsite. Contractor may sell excess topsoil at offsite location.

END OF SECTION 31 10 00

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SECTION 31 23 17 - ROCK EXCAVATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Earthwork - excavation, grading, disposal of waste and surplus materials, and other Earthwork related work.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 31 23 33 - Trenching, Backfilling and Compacting for Utilities.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. United States Bureau of Mines.
 - a. Report of Investigations 8507/1980, titled "Structure Response and Damage Produced by Ground Vibrations from Surface Mine Blasting."
2. Occupational Safety and Health Administration (OSHA):
 - a. 29 CFR Part 1926, Subpart P – Excavations, Occupational Safety and Health Standards, referred to herein as OSHA Standards.
 - b. 29 CFR Part 1926, Subpart U – Blasting and the Use of Explosives, Occupational Safety and Health Standards, referred to herein as OSHA Standards.

1.3 DEFINITIONS

A. Rock Excavation:

1. Classification of rock excavation shall include solid ledge rock in its natural location that requires systematic quarrying, drilling or hammering for its removal and also boulders that exceed 1/2 cubic yards in volume.

B. Structure: Buildings, foundations, slabs, tanks, curbs, or other man-made stationary features occurring above or below ground surface.

1.4 SUBMITTALS

- A. See Section 01 33 23 for requirements for the mechanics and administration of the submittal process.

B. Shop Drawings:

1. Proposed excavation plans and procedures, including:
 - a. Equipment proposed for excavation, dozer, excavator, rock hammer, etc.

C. Samples.

D. Contract Closeout Information:

1. Operation and Maintenance Data:
 - a. See Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.
2. Certificates.

1.5 PROJECT CONDITIONS

A. Site Information:

1. Data in subsurface investigation reports was used for the basis of the design.
 - a. Conditions are not intended as representations or warranties of accuracy or continuity between soil borings.
 - b. The Contracting Officer will not be responsible for interpretations or conclusions drawn from this data by Contractor.
2. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.
3. Site data provided is not contractual and shall be considered "for information only."

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION

3.1 PROTECTION

A. Erosion Control:

1. Clean paved roadways daily of any spillage of dirt, rocks or debris from vehicles and equipment entering or leaving site.
2. Conduct work to minimize erosion of site. Remove eroded material washed off site.
 - a. If necessary or requested by Contracting Officer, construct stilling areas to settle and detain eroded material.

- B. Protect existing surface and subsurface features on-site and adjacent to site:

3.2 ROCK EXCAVATION

- A. The rock excavation work includes the offsite disposition of all material:
 - 1. That exceed quantities required for earthwork on the project.
 - 2. That the testing firm classifies as unacceptable.
 - 3. That the testing firm classifies as potentially contaminated.
- B. Contract Drawings may indicate both existing grade and rough grade required for construction of Project.
 - 1. Stake all units, structures, piping, roads, parking areas and walks and establish their elevations.
 - 2. Perform other layout work required.
 - 3. Replace property corner markers to original location if disturbed or destroyed.
- C. When rock is encountered:
 - 1. Strip free of earth.
 - 2. Survey the rock areas to determine rock quantities before operations begin.
 - 3. In computing the volumetric content of rock excavation, the removal limits shall be taken as follows:
 - a. For Structures: 3 feet outside the exterior limits of foundation and from rock surface to 6 inches below bottom of foundations.
 - b. For piping and utilities: A width 18-30 inches wider than the outside diameter of the pipe or conduit and from rock surface to 6 inches below bottom exterior surface of the pipe or conduit.
 - c. For rough or finish grading: 2 feet outside the exterior limits of excavation and rock surface to 6 inches below bottom of finish grade surface.

3.3 FIELD QUALITY CONTROL

- A. All excavation, trenching, and related sheeting, bracing, etc. shall comply with the requirements of OSHA standards 29 CFR Part 1929 Subpart P, and state requirements. Where conflict between OSHA and state regulations exists, the more stringent requirements shall apply.
- B. Responsibilities of Testing Agency for Site Excavation and Grading:
 - 1. All testing, observation and work indicated as being performed by the testing agency.

END OF SECTION 31 23 17

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SECTION 31 23 33 - TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Excavation, trenching, backfilling and compacting for all underground utilities.
2. Water piping (potable).
3. Surface drainage conduits and piping.
4. All related utility and process appurtenances.

B. Related Specification Sections include but are not necessarily limited to:

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):

- a. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 feet-LBF/FT³ (600 kN-M/M³)).
- b. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
- c. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.

B. Qualifications: Contractor shall hire an independent soils laboratory to conduct in-place moisture-density tests for backfilling to assure that all work complies with this Specification Section.

1.3 DEFINITIONS

A. Excavation: All excavation will be defined as unclassified.

1.4 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:

- a. Acknowledgement that products submitted meet requirements of standards referenced.
- b. Manufacturer's installation instructions.

2. Submit respective pipe or conduit manufacturer's data regarding bedding methods of installation and general recommendations.
3. Submit sieve analysis reports on all granular materials.

B. Informational Submittals:

1. Trench shield (trench box) certification if employed:
 - a. Specific to Project conditions.
 - b. Re-certified if members become distressed.
 - c. Certification by registered professional structural engineer, registered in the state where the Project is located.
 - d. CO is not responsible to, and will not, review and approve.
2. Submit test reports and fully document each with specific location or stationing information, date, and other pertinent information.

1.5 SITE CONDITIONS

- A. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving.
 1. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to public and adjoining property owners.
- B. Provide full access to public and private premises and fire hydrants, at street crossings, sidewalks and other points as designated by Contracting Officer (CO) to prevent serious interruption of travel.
- C. Protect and maintain bench marks, monuments or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of CO and controlling agency.
- D. Verify location of existing underground utilities
 1. Obtain Global Positioning System (GPS) x/y/z coordinates where exposed and where crossed by Work of this Project.
 - a. Record on Record Documents

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Backfill Material:
 1. As approved by CO.
 - a. Free of rock cobbles, roots, sod or other organic matter, and frozen material.

- b. Moisture content at time of placement: $\pm 3\%$ of optimum moisture content as specified in accordance with ASTM D698.
 - 2. Gravel trench backfill materials:
 - a. Uniformly graded gravel approved by the contracting officer.
- B. Subgrade Stabilization Materials: Provide subgrade stabilization material consisting of 3-6" crushed rock.
- C. Bedding Materials:
 - 1. As approved by the CO.
 - 2. Granular bedding materials:
 - a. Granular material is generally utilized as follows:
 - 1) PVC, FRP, PE, composite pipe, steel pipe and ABS truss embedment.
 - 2) Trench stabilization.
 - b. Two general gradation classifications used for granular bedding are:
 - 1) Uniformly graded
 - 2) Well graded.
 - c. ASTM D2321 Class 1B.
 - 1) Well-graded crushed stone.
 - 3. Flowable fill:
 - a. Description: Flowable fill shall be a mixture of cement, fly ash, fine sand, water, and air having a consistency which will flow under a very low head.
 - b. Material characteristics:
 - 1) The approximate quantities of each component per cubic yard of mixed material shall be as follows:
 - a) Cement (Type I or II): 50 pounds.
 - b) Fly ash: 200 pounds.
 - c) Fine sand: 2,700 pounds.
 - d) Water: 420 pounds.
 - e) Air content: 10%.
 - 2) Actual quantities shall be adjusted to provide a yield of 1 cubic yard with the materials used.
 - 3) Approximate compressive strength should be 85 to 175 psi.
 - 4) Fine sand shall be an evenly graded material having not less than 95% passing the No. 4 sieve and not more than 5% passing the No. 200 sieve.

- 5) Mixing and handling of the material shall be in accordance with supplier recommendations.

PART 3 - EXECUTION

3.1 GENERAL

- A. Remove and dispose of unsuitable materials as directed by CO to site provided by Contractor.

3.2 EXCAVATION

- A. Unclassified Excavation: Remove rock excavation, clay, silt, gravel, hard pan, loose shale, and loose stone as directed by CO.
- B. Excavation for Appurtenances:
 1. 12 inches (minimum) clear distance between outer surface and embankment.
- C. Groundwater Dewatering:
 1. Where groundwater is, or is expected to be, encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade to allow subgrade stabilization, pipe, bedding and backfill material to be placed in the dry, and to maintain a stable trench wall or side slope.
 2. Groundwater shall be drawn down and maintained at least 3 feet below the bottom of any trench or manhole excavation prior to excavation.
 3. Review soils investigation before beginning excavation and determine where groundwater is likely to be encountered during excavation.
 - a. Employ dewatering specialist for selecting and operating dewatering system.
 4. Keep dewatering system in operation until dead load of pipe, structure and backfill exceeds possible buoyant uplift force on pipe or structure.
 5. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction.
 6. Install groundwater monitoring wells as necessary.
 7. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.
- D. Trench Excavation:
 1. Excavate trenches by open cut method to depth shown on Drawings and necessary to accommodate work.
 - a. Support existing utility lines and yard piping where proposed work crosses at a lower elevation.
 - 1) Stabilize excavation to prevent undermining of existing utility and yard piping.

2. Open trench outside buildings, units, and structures:
 - a. No more than the distance between two manholes, structures, units, or 500 LF, whichever is less.
 - b. Field adjust limitations as weather conditions dictate.
3. Any trench or portion of trench, which is opened and remains idle for seven calendar days, or longer, as determined by the CO, may be directed to be immediately refilled, without completion of work, at no additional cost to CO.
 - a. Said trench may not be reopened until CO is satisfied that work associated with trench will be prosecuted with dispatch.
4. Observe following trenching criteria:
 - a. Trench size:
 - 1) Excavate width to accommodate free working space.
 - 2) Maximum trench width at top of pipe or conduit may not exceed outside diameter of utility service by more than the following dimensions:

OVERALL DIAMETER OF UTILITY SERVICE	EXCESS DIMENSION
33 inches and less	26 inches
more than 33 inches	36 inches

- a) The maximum trench widths above are based on a typical four foot cover depth for the new pipe. For segments of the new water line where cover is greater than four feet or where the water line is installed on a radius these maximum trench widths can be adjusted on a case by case basis with a written request from the contractor approved by the CO.
 - 3) Cut trench walls vertically from bottom of trench to 1 foot above top of pipe, conduit, or utility service.
 - 4) Keep trenches free of surface water runoff.
 - a) Include cost in Proposal.
 - b) No separate payment for surface water runoff pumping will be made.

E. Flowable Fill:

1. Flowable fill shall be:
 - a. Discharged from a mixer by any means acceptable to the CO into the area to be filled.
 - b. Placed in 4 feet maximum lifts to the elevations indicated.
 - 1) Allow 12 hour set-up time before placing next lift or as approved by the CO.
 - 2) Place flowable fill lifts in such a manner as to prevent flotation of the pipe.

2. Flowable fill shall not be placed on frozen ground.
3. Subgrade on which flowable fill is placed shall be free of disturbed or softened material and water.
4. Flowable fill batching, mixing, and placing may be started if weather conditions are favorable, and the air temperature is 34 degrees F and rising.
5. At the time of placement, flowable fill must have a temperature of at least 40 degrees F.
6. Mixing and placing shall stop when the air temperature is 38 degrees F or less and falling.
7. Each filling stage shall be as continuous an operation as is practicable.
8. Prevent traffic contact with flowable fill for at least 24 hours after placement or until flowable fill is hard enough to prevent rutting by construction equipment.
9. Flowable fill shall not be placed until water has been controlled or groundwater level has been lowered in conformance with the requirements of the preceding Groundwater Dewatering paragraph in PART 3 of this Specification Section.

3.3 PREPARATION OF FOUNDATION FOR PIPE LAYING

A. Over-Excavation:

1. Backfill and compact to 90% of maximum dry density per ASTM D698.
2. Backfill with granular bedding material as option.

B. Rock Excavation:

1. Excavate minimum of 6 inches below bottom exterior surface of the pipe or conduit.
2. Backfill to grade with suitable earth or granular material.
3. Form bell holes in trench bottom.

C. Subgrade Stabilization:

1. Stabilize the subgrade when directed by the CO.
2. Observe the following requirements when unstable trench bottom materials are encountered.
 - a. Notify CO when unstable materials are encountered.
 - 1) Define by drawing station locations and limits.
 - b. Remove unstable trench bottom caused by Contractor failure to dewater, rainfall, or Contractor operations.
 - 1) Replace with subgrade stabilization with no additional compensation.

3.4 BACKFILLING METHODS

- A. Do not backfill until tests to be performed on system show system is in full compliance with specified requirements.
- B. Carefully Compacted Backfill:

1. Furnish where indicated on Drawings, specified for trench embedment conditions and for compacted backfill conditions up to 12 inches above top of pipe or conduit.
2. Comply with the following:
 - a. Place backfill in lifts not exceeding 8 inches (loose thickness).
 - b. Hand place, shovel slice, and pneumatically tamp all carefully compacted backfill.
 - c. Observe specific manufacturer's recommendations regarding backfilling and compaction.
 - d. Compact each lift to specified requirements.

C. Common Trench Backfill:

1. Perform in accordance with the following:
 - a. Place backfill in lift thicknesses capable of being compacted to densities specified.
 - b. Observe specific manufacturer's recommendations regarding backfilling and compaction.
 - c. Avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion.

D. Water flushing for consolidation is not permitted.

3.5 COMPACTION

A. General:

1. Place and assure bedding, backfill, and fill materials achieve an equal or higher degree of compaction than undisturbed materials adjacent to the work.
2. In no case shall degree of compaction below minimum compactions specified be accepted.

B. Compaction Requirements:

1. Unless noted otherwise on Drawings or more stringently by other Specification Sections, comply with following minimum trench compaction criteria.
 - a. Bedding material:

LOCATION	SOIL TYPE	COMPACTION DENSITY
All locations	Cohesionless soils	95% relative density by ASTM D4253 and ASTM D4254

- b. Carefully compacted backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
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All applicable areas	Cohesive soils	95% of maximum dry density by ASTM D698
	Cohesionless soils	95% relative density by ASTM D4253 and ASTM D4254

c. Toe drain bedding and backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
All locations	Cohesionless soils	60% relative density by ASTM D4253 and ASTM D4254

d. Common trench backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
Under pavements, roadways, surfaces within highway right-of-ways	Cohesive soils	95% of maximum dry density by ASTM D698
	Cohesionless soils	95% of relative density by ASTM D4253 and ASTM D4254
Under turfed, sodded, plant seeded, nontraffic areas	Cohesive soils	85% of maximum dry density by ATM D698
	Cohesionless soils	85% of relative density by ASTM D4253 and ASTM D4254

3.6 FIELD QUALITY CONTROL

A. Testing:

- Contractor shall employ a certified testing firm to complete testing on the project, firm to be approved by the CO.
- Perform in-place moisture-density tests as directed by the CO.
- Perform tests through recognized testing laboratory approved by CO.
- Costs of "Passing" tests paid by Contractor.
- Perform additional tests as directed until compaction meets or exceeds requirements.
- Cost associated with "Failing" tests shall be paid by Contractor.
- Assure CO has immediate access for testing of all soils related work.
- Ensure excavations are safe for testing personnel.

B. Prior to backfilling, obtain Global Positioning System (GPS) x/y/z coordinates at each change of direction and change of elevation for pipelines, conduits and ductbanks constructed for this Project.

- Record on Record Documents.

END OF SECTION 31 23 33

SECTION 31 37 00 - RIPRAP

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stone revetment (riprap) for protection of slopes and drainage ways against erosion.
 - a. Channel protection.
 - b. Embankment protection.
 - c. Culvert outlets.
 - d. Hydraulic structures.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 31 23 33 - Trenching, Backfilling, and Compacting for Utilities.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
 - a. C127, Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate.
 - b. D3744/D3744M, Standard Test Method for Aggregate Durability Index.
 - c. D5312/D5312M, Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions.
 - d. D5313/D5313M, Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions.
 - e. D5519, Standard Test Methods for Particle Size Analysis of Natural and Man-Made Riprap Materials.

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
2. Certifications.
3. Test reports.
4. Submit all tests and certification in a single coordinated submittal.

- a. Partial submittals will not be accepted.
5. Construction Plan.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Riprap shall be made up of durable angular quarry stone.
- B. Individual stones making up the riprap shall be resistant to weathering and shall not contain cracks, non-mineralized defects, shale, unsound sandstone, or organic material.
- C. Neither the width nor thickness of any stone shall be less than one-third of the stone's length.
- D. Gradation of the material:
 - 1. Rip Rap for water line drain outlets and low water crossing outlet shall conform to Colorado DOT requirements and have a D50 of 6".

2.2 MATERIAL QUALITY CONTROL

- A. Aggregate Filter:
 - 1. The material making up the aggregate filter shall not weigh less than 135 pounds/CUFT (saturated surface dry). The material shall be composed of tough durable particles free of organic matter, soft material, and friable particles. The aggregate filter shall have the following gradation:
- B. Riprap:
 - 1. Riprap material quality shall be evaluated using one of the following two methods:
 - a. Specific rock properties:
 - 1) Quarry rock tests completed on rock that is representative of the material to be used on the project may be submitted for review if the testing was completed by a reputable testing company for State or Federal agency certification purposes within the last five years. The material testing requirements are as follows:
 - a) Minimum Specific Gravity 2.5 per (ASTM C127).
 - b) Durability Absorption Ratio less than 10 fails, greater than 23 passes, between 10 and 23 passes only if the Durability Index is greater than 52.
 - (1) $\text{Durability Absorption Ratio} = \text{Durability Index} / (\text{PCT Absorption} + 1)$, Durability Index test ASTM D3744, Absorption test ASTM C127

- c) Maximum of 1% loss due to Wetting and Drying test ASTM D5313/D5313M.
 - d) Maximum of 5% loss due to Freeze Thaw test ASTM D5312/D5312M.
- b. Ability of rock to perform.
 - 1) The Contractor may propose to use material from a source that has a documented track record of acceptable performance for comparable applications and exposure conditions. If requesting approval of materials using this method, provide the following information for the CO to review to determine if the riprap is of acceptable quality:
 - a) As-built plans for a project where riprap has been in place a minimum of 20 years.
 - b) Documentation of the riprap material source.
 - c) Installation performance data.
 - d) Available material testing data.
 - e) Maintenance records for the riprap installation.
 - f) Recent photos of riprap installation.
 - g) Contact information for the CO of the project.
 - 2) The CO shall review the provided information to determine whether the in place material was subjected to conditions expected for the project and if the rock performed satisfactorily as determined by the CO.
 - 3) A minimum of 3 weeks shall be allowed after the information has been submitted by the Contractor for review of data with the CO, a site visit, and material determination.

PART 3 - EXECUTION

3.1 MATERIAL ACCEPTANCE

- A. Final acceptance is determined at the in-place riprap installation which shall consist of a homogenous mass with a distribution of rock sizes that meets the specified gradation. Riprap transport, handling, and placement methods shall not cause breakage of individual rocks or segregation of riprap gradation.
- B. Rock quality shall be determined at the quarry. Stone with a coloration or appearance dissimilar to the accepted material shall be rejected.
- C. A representative gradation sample shall be located adjacent to the stockpile locations at both the quarry and project stockpile area for the duration of the project.
- D. Arriving loads of material not bearing reasonable similarity to the representative gradation sample shall be rejected. The Contractor may arrange for gradation measurements of rejected loads at the project site. If the analysis proves the rejected stone meets the project requirements, then the Contractor shall be reimbursed for the gradation measurements.

- E. The representative gradation sample must be of adequate size to demonstrate compliance with the specified gradation. The Contractor may use test Method A or B as defined in ASTM D5519 to determine the gradation. The minimum sample size shall be 20 times the largest individual stone of the gradation, unless a smaller sample size is approved by the CO.
- F. The gradation test shall be performed by the Contractor or qualified geotechnical testing company, with the CO present, for each class of installed riprap and repeated for every 50,000 tons of placed material.
- G. The riprap gradation shall be produced at the quarry and shall not be accomplished by mixing at the project site.
- H. The representative gradation sample may be incorporated into the project during final placement upon notification and approval by the CO.

3.2 PREPARATION

- A. Submit a construction plan for review and approval by the CO prior to starting grading. The construction plan must demonstrate knowledge of site constraints, design requirements, and permitting restrictions. The following components are required at a minimum:
 - 1. Staging area layout with adequate area for stockpile area.
 - 2. Ground preparation for the staging and stockpile area.
 - 3. Location of worksite stockpile area and acceptance areas.
 - 4. Erosion and sediment control measures.
 - 5. Description of work.
 - 6. Haul pattern.
 - 7. Schedule.
 - 8. Description of restoration plan to preconstruction conditions for staging area, stockpile area, and work site.

3.3 STOCKPILE AREAS

- A. Riprap stockpiles shall be a maximum of 12 feet high and placed so rock does not roll down the slope. The stockpile areas shall have a compacted surface with a minimum 6 inches thick sand-clay-gravel or crushed stone pad to provide for storage of riprap without fines being introduced to the riprap gradation. Any riprap or stone which has become contaminated with topsoil, fines, or debris shall not be used unless the contaminating material has been removed from the riprap prior to placement at no additional cost the CO.

3.4 PLACEMENT

- A. Provide at least 24 hour notice for the CO to review the work in the field including the subgrade, geotextile fabric, and aggregate bedding. Do not place any geotextile fabric, aggregate bedding, or stone material on prepared base prior to the CO's review. Placement of bedding, fabric, or riprap on ice or snow is not permitted.
- B. Subgrade:

1. Compact fill areas to density specified for backfill in accordance with Specification Section 31 23 –33.
2. Grade subgrade to elevations indicated in the plans within plus or minus 0.1 feet in dry areas and ± 0.3 feet in areas that are underwater and do not require dewatering for construction.
3. The subgrade shall be smooth and free of topsoil, organic material, roots, sticks, debris, yielding material or other materials that would prevent meeting the specified subgrade elevation tolerance.
4. The Contractor, at no additional cost to the CO, may decide to not grade the subgrade to the specified tolerance and increase the riprap layer thickness. The lack of subgrade preparation shall not result in a decreased riprap layer thickness or change in the top of riprap elevation unless the change is requested in writing and approved in writing by the CO.

C. Geotextile Fabric:

1. Place geotextile fabric only after inspection of subgrade by CO.
2. Place geotextile fabric in accordance with manufacturer specifications.
3. The ends of the geotextile fabric shall be buried and the placement sequence shall result in overlaps, with the upstream fabric overlapping the downstream fabric.
4. Fabric must be secured using pins or weights to prevent displacement by water, wind, or riprap placement.
5. Place a protective aggregate bedding layer over the geotextile fabric prior to placement of riprap to protect against punctures or tearing of the fabric.

D. Riprap:

1. Place riprap on prepared bedding only after the CO has reviewed the work.
2. Place riprap on prepared foundation per line and grade shown on the plans. The riprap thickness tolerance is +0.5 feet and -0 feet as measured over an area of 200 square feet when placed in the dry, and 400 square feet when placed underwater.
3. Riprap material shall be placed to result in a homogenous mass with a minimum of voids. Rearranging of individual rock may be required to obtain a suitable distribution of rock sizes.
4. Riprap placement methods shall not result in the following: cause breakage of individual rocks, result in segregation of riprap gradation, result in introduction of fines, or impact the filter material.
5. Individual stones making up the riprap shall not be dropped from a height greater than 1 foot above the geotextile, unless it can be demonstrated to the satisfaction of the CO that the geotextile fabric will not be damaged.
6. When placing riprap on a slope, start placement from the bottom of slope and proceed to top of slope.
7. Place rock to full thickness in a single operation to avoid displacing the underlying material.
8. The top of riprap shall match adjoining grades and allow for positive drainage.
9. Maintain the riprap until acceptance at project completion.

END OF SECTION 31 37 00

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DIVISION 32

EXTERIOR IMPROVEMENTS



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SECTION 32 12 16 - ASPHALTIC CONCRETE VEHICULAR PAVING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Asphaltic concrete vehicular paving.
2. Line painting.

B. Related Specification Sections include but are not necessarily limited to:

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. Federal Specifications (FS):
 - a. TT-P-1952F, Paint, Traffic and Airfield Marking, Waterborne.
2. Construction standards: State of Colorado, , Department of Transportation, "2022," Standard Specifications for Road and Bridge Construction, as amended to date.

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Asphalt design mix.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Asphaltic Concrete: Per Colorado DOT Standard Specifications for Road and Bridge Construction Division 400.
- B. Line Paint:
1. Nonreflective.

2. White and Yellow.
3. FS TT-P-1952F.
4. Thermoplastic.

2.2 MIXES

- A. Comply with mix design category Grading S, pre CDOT Standard Specifications for Road and Bridge Construction.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Construct to line, grade and section as shown on Drawings and in accordance with referenced State Specifications.
- B. Install a 6 inches compacted layer of aggregate base course, class 6, in accordance with Section 304 of the referenced State Specifications.
- C. Install one 3" lift and one 2" lift of Grading S asphalt , in accordance with Section 400 of State Specifications.
- D. Tolerance of Finished Grade: +0.10 feet from required elevations.

3.2 LINE PAINTING:

- A. Thoroughly clean surfaces which are to receive paint.
- B. Dry completely before paint is applied.
- C. Do not paint until minimum of five days has elapsed from time surface is completed.
 1. A longer period may be required if directed by CO..
- D. Do not apply paint over wet surfaces, during wet or damp weather, or when temperature is below 40 degrees F.
- E. Lay out markings and striping in accordance with Drawings.
 1. Width of painted lines: 4 inches.

END OF SECTION 32 12 16

SECTION 32 91 13 - TOPSOILING AND FINISHED GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Topsoiling and finished grading.
- B. Related Specification Sections include but are not necessarily limited to:
 - 1. Section 31 10 00 - Site Clearing.
 - 2. Section 31 23 33 – Trenching, Backfilling, and Compacting for Utilities.
 - 3. Section 32 92 00 - Seeding, Sodding and Landscaping.
- C. Location of Work: All areas within limits of grading and all areas outside limits of grading which are disturbed in the course of the work.

1.2 SUBMITTALS

- A. Shop Drawings:
 - 1. Project Data: Test reports for furnished topsoil.

1.3 SITE CONDITIONS

- A. Verify amount of topsoil stockpiled and determine amount of additional topsoil, if necessary to complete work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Topsoil:
 - 1. Original surface soil typical of the area.
 - 2. Existing topsoil stockpiled under Specification Section 31 10 00.
 - 3. Friable, loamy soil capable of supporting native plant growth.

2.2 TOLERANCES

- A. Finish Grading Tolerance: ± 0.1 feet from required elevations.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Correct, adjust and/or repair rough graded areas.
 - 1. Cut off mounds and ridges.
 - 2. Fill gullies and depressions.
 - 3. Perform other necessary repairs.
 - 4. Bring all sub-grades to specified contours, even and properly compacted.
- B. Loosen surface to depth of 2 inches, minimum.
- C. Remove all stones and debris over 2 inches in any dimension.

3.2 ROUGH GRADE REVIEW

- A. Reviewed by CO in Specification Section 31 10 00.

3.3 PLACING TOPSOIL

- A. Do not place when subgrade is wet or frozen enough to cause clodding.
- B. Spread and lightly compact to a depth of 4 inches for all disturbed earth areas.
- C. If topsoil stockpiled is less than amount required for work, furnish additional topsoil at no cost to the Government.
- D. Provide finished surface free of stones, sticks, or other material 1 inches or more in any dimension.
- E. Provide finished surface smooth and true to required grades.
- F. Restore stockpile area to condition of rest of finished work.

3.4 ACCEPTANCE

- A. Upon completion of topsoiling, obtain CO's acceptance of grade and surface.
- B. Make test holes where directed to verify proper placement and thickness of topsoil.

END OF SECTION 32 91 13

SECTION 32 92 00 - SEEDING, SODDING AND LANDSCAPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Seeding, sodding and landscape planting:
 - a. Soil preparation.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 32 91 13 - Topsoiling and Finished Grading.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Nursery and Landscape Association/American National Standards Institute (ANLA/ANSI):
 - a. Z60.1, American Standard for Nursery Stock.
2. AOAC International (AOAC).
3. ASTM International (ASTM):
 - a. D2028, Standard Specification for Cutback Asphalt (Rapid-Curing Type).
 - b. D5276, Standard Test Method for Drop Test of Loaded Containers by Free Fall.

B. Quality Control:

1. Fertilizer:
 - a. If CO determines fertilizer requires sampling and testing to verify quality, testing will be done at Contractor's expense, in accordance with current methods of the AOAC.
 - b. Upon completion of Project, a final check of total quantities of fertilizer used will be made against total area seeded.
 - c. If minimum rates of application have not been met, Contractor will be required to distribute additional quantities to make up minimum application specified.

1.3 SUBMITTALS

A. Shop Drawings:

1. Layout drawings:
 - a. Scaled site plan (scale 1 inch = 20 feet or equal to scale of Project site plan Drawing) on reproducible Drawing to show:
2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Signed copies of vendor's statement for seed mixture required, stating botanical and common name, place of origin, strain, percentage of purity, percentage of germination, and amount of Pure Live Seed (PLS) per bag.
 - d. Type of herbicide to be used during first growing season to contain annual weeds and application rate.
3. Certification that each container of seed delivered will be labeled in accordance with Federal and State Seed Laws and equals or exceeds Specification requirements.

B. Informational Submittals:

1. Copies of invoices for fertilizer used on Project showing grade furnished, along with certification of quality and warranty.

1.4 SEQUENCING AND SCHEDULING

A. Installation Schedule:

1. Provide schedule showing when trees, shrubs, groundcovers and other plant materials are anticipated to be planted.
2. Show schedule of when lawn type and other grass areas are anticipated to be planted.
3. Indicate planting schedules in relation to schedule for irrigation system installation, finish grading and topsoiling.
4. Indicate anticipated dates CO will be required to review installation for initial acceptance and final acceptance.

B. Pre-installation Meeting:

1. Meet with CO and other parties as necessary to discuss schedule and methods, unless otherwise indicated by CO.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND SUPPLIERS

- A. Subject to compliance with the Contract Documents, the manufacturers and suppliers listed in the applicable Articles below are acceptable.

2.2 MATERIALS

- A. Native Grass Seeding: Certified seed of locally adapted strains.
- B. Soil Amendments:
- C. Asphalt Binder: Emulsified asphalt per State specifications.
- D. Water:
 - 1. Water free from substances harmful to grass or sod growth.
 - 2. Provide water from source approved prior to use.

PART 3 - EXECUTION

3.1 SOIL PREPARATION

- A. General:
 - 1. Limit preparation to areas which will be planted soon after.
 - 2. Provide facilities to protect and safeguard all persons on or about premises.
 - 3. Protect existing trees designated to remain.
 - 4. Verify location and existence of all underground utilities.
 - a. Take necessary precaution to protect existing utilities from damage due to construction activity.
 - b. Repair all damages to utility items at sole expense.
 - 5. Provide facilities such as protective fences and/or watchmen to protect work from vandalism.
 - a. Contractor to be responsible for vandalism until acceptance of work in whole or in part.
- B. Native Grass Seeding:
 - 1. Seeding without cover crop:
 - a. Plow areas to be seeded to shallow depth as soon as ground can be worked without clodding.
 - b. Leave ground fallow until weeds germinate, approximately 3 to 4 weeks later.
 - c. Disc entire area again to turn over weeds.
 - d. Disc at least twice prior to planting.
 - e. Cultipack entire area immediately following final disking.
 - 2. Seeding with cover crop:
 - a. Plant cover crop (4 to 8 pounds per acre in rows not exceeding 42 inches width) over all areas to be seeded. (optimum planting time - June 1 through July 15).

- b. Allow cover crop to mature and harvest completely leaving stubble at least 18 inches in field.
 - c. Field is then ready for seeding of native grasses.
- 3. Leave surface (seedbed) hard to discourage weed growth and erosion.
 - a. Ground should be undisturbed and uncultivated.

3.2 INSTALLATION

A. Lawn-Type and Pasture Seeding:

- 1. Do not use seed which is wet, moldy, or otherwise damaged.
- 2. Perform seeding work from April 20 to May 15 for spring planting, and August 1 to September 15 for fall planting, unless otherwise approved by CO.
- 3. Employ satisfactory methods of sowing using mechanical power-driven drills or seeders, or mechanical hand seeders, or other approved equipment.
- 4. Distribute seed evenly over entire area at rate of application not less than 4 pounds (PLS) of seed per 1000 square feet, 50% sown in one direction, remainder at right angles to first sowing.
- 5. Stop work when work extends beyond most favorable planting season for species designated, or when satisfactory results cannot be obtained because of drought, high winds excessive moisture, or other factors.
 - a. Resume work only when favorable conditions develop.
- 6. Lightly rake seed into soil followed by light rolling or cultipacking.
- 7. Immediately protect seeded areas against erosion by mulching.
 - a. Spread mulch in continuous blanket using 1-1/2 tons per acre to a depth of 4 or 5 straws.
- 8. Protect seeded slopes against erosion with erosion netting or other methods approved by CO.
 - a. Protect seeded areas against traffic or other use by erecting barricades and placing warning signs.
- 9. Immediately following spreading mulch, anchor mulch using a rolling coulter or a wheatland land packer having wheels with V-shaped edges to force mulch into soil surface, or apply evenly distributed emulsified asphalt at rate of 10-13 GAL/1000 square feet.
 - a. SS-1 emulsion in accordance with ASTM D5276 or RC-1 cutback asphalt in accordance with ASTM D2028 are acceptable.
 - b. If mulch and asphalt are applied in one treatment, use SS-1 emulsion with penetration test range between 150-200.
 - c. Use appropriate shields to protect adjacent site improvements.

B. Native Grass Seeding:

1. Planting seasons:
 - a. Warm-season grasses: Late spring or early summer; avoid late summer or fall planting.
 - b. Cool-season grasses: Early spring or early fall, before or after hot weather.
2. Seed with a grass drill.
 - a. Operate drill as near to contour as practical (a Nisbet grass drill has been proven to be successful in this operation).
3. Areas of 1 acre or less may be sown by hand-broadcasting, mixing seed with generous amount of damp sand to ensure even distribution.
 - a. Harrow or rake seed into ground following seeding to minimum 1/4 inches and maximum 1 inch depth
4. Seed grasses and forbs at rates prescribed in previous table.
 - a. Minimum seeding rate is 20 PLS/SQFT.
5. If area is seeded without cover crop, protect newly seeded areas from erosion by mulching with weed-free straw in a continuous blanket using 2 tons per acre and anchor to ground with rolling coulter or a wheatland land packer.
6. Provide initial watering after installation as appropriate for planting conditions.

3.3 PLANTING TREES, SHRUBS, AND GROUND COVERS

A. Notification:

1. Notify CO of source of plants and plant materials at least 30 days prior to planting to permit CO's inspection of source qualifications.

B. Preparation:

1. Handle plants so that roots or balls are adequately protected from breakage of balls, from sun or drying winds.
 - a. Ensure tops or roots of plants are not permitted to dry out.
2. During transportation, protect materials from wind and sun to prevent tops and roots from drying out.
3. Protect tops of plants from damage.
 - a. Plants with damaged tops will be rejected.
4. For purpose of inspection and planting identification, attach durable, legible labels to bundle or container of plant material delivered at the planting site.
 - a. State correct plant name and size of each plant in weather-resistant ink on labels.

5. Do not prune trees and shrubs at nursery.

C. Planting Season:

1. Plant deciduous shade trees and shrubs any time the ground is suitable between October 15 and June 1.
2. Plant evergreen material between September 1 and June 1.
3. Plant ground covers between March 15 to June 1.

D. Planting Procedure:

1. Indicate locations of plants for approval by CO before excavating plant locations.
2. In event underground construction, utilities, obstructions, or rock are encountered in excavation of plantings, secure alternate locations from CO.
 - a. Make said changes without additional compensation.
 - b. Where tree locations fall under existing overhead wires, or crowd existing trees, adjust locations as directed by CO.
3. Excavate pits and beds as necessary and in accordance with ANLA/ANSI Z60.1.
 - a. Loosen bottom of pits prior to planting.
 - b. Excavation is unclassified, excavate all materials without additional cost.
4. Tree and shrub pits to be circular in shape with vertical sides at least 1 foot greater in diameter than ball diameter.
 - a. Pit to be of sufficient depth to provide 6 inches of planting soil under ball when set to natural grade.
5. Shrub and ground cover beds:
 - a. Plant shrubs used in mass plantings in individual holes of required size.
 - b. Strip all sod from among mass planting.
 - c. For ground cover beds, remove sod from within limits of bed.
 - d. Add soil amendments as specified and mix or rototill with existing topsoil to a depth of 6 inches.
6. Set plants straight or plumb, in locations when indicated and at such level that after settlement they bear same relationship to finished grade as they did in their former setting.
 - a. Carefully tamp planting soil under and around base of balls to prevent voids.
 - b. Remove burlap, rope and wires from top of balls.
 - c. Do not remove burlap from sides and bottom of balls.
7. Backfill plants with planting soil.
 - a. Tamp to 1/2 depth of pit and thoroughly water and puddle before bringing backfill to proper grade.

- b. After planting has been completed, flood pit again so that backfill is thoroughly saturated and settled.
- 8. After planting is complete, form a level saucer 3 inches high around each tree extending to limit of plant pit for watering purposes.
- 9. Mulch plant pit after saucer has been shaped.
 - a. Mulch to limits of pit and uniformly over ground cover beds to a depth of 3 inches.
 - b. In mass plantings of shrubs, mulch entire area uniformly among shrubs to a depth of 3 inches.
 - c. If mulching is delayed and soil has dried out, water plants thoroughly before spreading mulch.
- 10. Staking: Stake trees immediately after planting as detailed on Drawings or in accordance with Nursery Standards.
- 11. Wrap deciduous trees 2 inches or more in caliper by neatly overlapping wrapping material between ground line and second branch.
 - a. Place ties at top and bottom of wrapping material and not more than 12 inches apart between top and bottom ties.
- 12. Remove dead or damaged branches.
 - a. Thin deciduous material to about two-thirds of initial branching.
 - b. Remove only dead or damaged branches from evergreens.
- 13. Water plants during planting operations.
 - a. Water each plant a minimum of once each week until final acceptance.
 - b. Apply sufficient water to moisten backfill about each plant so that moisture will extend into the surrounding soil.

3.4 MAINTENANCE AND REPLACEMENT

A. General:

- 1. Begin maintenance of planted areas immediately after each portion is planted and continue until final acceptance or for a specific time period as stated below, whichever is the longer.
- 2. Provide and maintain temporary piping, hoses, and watering equipment as required to convey water from water sources and to keep planted areas uniformly moist as required for proper growth.
- 3. Protection of new materials:
 - a. Provide barricades, coverings or other types of protection necessary to prevent damage to existing improvements indicated to remain.
 - b. Repair and pay for all damaged items.
- 4. Replace unacceptable materials with materials and methods identical to the original specifications unless otherwise approved by the CO.

B. Native Grass Seeding:

1. Maintain all seeded areas for two years after planting is complete.
2. Do not mow bed native grass.
3. When weeds are shading out 70% of (minimum 6 inches) native grass seed, shred weeds back to height of seedlings with a rotary shredder.
4. Do not allow weeds to exceed a height of 8 inches.
5. Herbicide (1/2 to 1 pound active ingredient per acre) may be used to control weed growth after the first year.
 - a. Do not apply until weeds are 40% broadleaf, seedlings at least 1 inch high and 2-4 leaf stage.
 - b. If herbicide is used, apply twice.
6. Water according to need to maintain survival of planting.
7. Regrade and replant eroded or bare areas evident at end of two year period.

C. Trees and Shrubs:

1. Maintenance includes but is not limited to watering when necessary, removing dead or dying branches, removing sprouts and suckers; tightening, repairing or replacing tree stakes and wrapping; maintaining mulch to originally specified depth; and weeding plant beds and pits.
2. Remove and replace all new plants supplied, which are impaired, dead, or dying during one year from initial acceptance.
3. CO will review completed planting for acceptability of installation.
 - a. Approval of planting denotes initial acceptance and the beginning of the maintenance period.

END OF SECTION 32 92 00



DIVISION 33

UTILITIES



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SECTION 33 05 07
HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. This section presents requirements for the three Horizontal Directional Drilling (HDD) installations for the National Park Service's Replace Morefield Waterline; Mesa Verde National Park Project. The two HDD installations are approximately 1,500 (HDD 1) and 4,500 (HDD 2) feet in length and will install 6-inch Flex Steel pipe. The Contractor shall perform, but is not limited to the following tasks:
1. Arrange and conduct a project kick-off meeting with the Owner, Engineer, General Contractor, and HDD Subcontractor prior to initiating HDD construction.
 2. Review and confirm the HDD profile and the design input assumptions are within specified tolerances for the selected HDD Contractor's means and methods (Appendix A).
 3. Transport all suitable equipment, labor and materials to and from the job site.
 4. Prepare the site including Mud Circulation Pits as specified herein.
 5. Install the Carrier Pipe using Horizontal Directional Drilling including drilling the Pilot Bore and Reaming a suitable diameter Borehole for the installation of the Carrier Pipe into the Borehole. The selected materials must meet all project requirements and be approved by the Engineer.
 6. Cleanup and perform final restoration of all work areas.

1.2 RELATED SECTIONS:

- A. 01 11 00 – SUMMARY OF WORK
- B. 31 23 17 – ROCK EXCAVATION
- C. 31 23 33 – TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES
- D. 32 91 13 – TOPSOILING AND FINISHED GRADING
- E. 31 11 13 – WATER MAIN CONSTRUCTION
- F. 40 05 00 – PIPE AND PIPE FITTINGS – BASIC REQUIREMENTS

1.3 REFERENCES

- A. ASTM F1962 – Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit under Obstacles, Including River Crossings
- B. AWWA M23 – PVC Pipe – Design and Installation
- C. Geotechnical Investigation Report, Lithos Engineering, Morefield and Wetherill Pipeline Replacement Project, Mesa Verde National Park.
- D. Pipeline Plan and Profile, HDR Engineering, Morefield Pipeline Replacement Project, Mesa Verde National Park.

- E. National Utility Contractors Association (NUCA): NUCA – HDD Installation Guidelines
- F. North American Society for Trenchless Technology (NASTT)
 - 1. HDD Good Practices Guidelines – 2017 (4th Edition)

1.4 DEFINITIONS

- A. BORE OR BOREHOLE: The elongated cavity created through the drilling process. The Borehole is not a void, but rather a hole filled and stabilized with Drilling Fluids mixed with native soil/formation.
- B. CARRIER PIPE: Final product waterline; 6-inch, 2,250 or 3,000 psi pressure class.
- C. CONTRACTOR: Specialty HDD subcontractor in charge of installing the Carrier Pipe using HDD.
- D. DRILL HEAD: Tooling used to facilitate steering and to excavate soil or rock at the face of the Bore.
- E. DIMENSION RATIO (DR): The ratio of Carrier Pipe diameter to wall thickness; $DR = D/t$ where “D” is the outside diameter and “t” is the pipe wall thickness.
- F. DRILLING FLUIDS: Fluids consisting of water, bentonite and any approved additives such as environmentally safe polymers, lubricants, and viscosifiers.
- G. FILTER CAKE: The wall cake that forms from the platelets in bentonite-based Drilling Fluid. Filter Cake is the barrier between the Borehole and the formation that can help protect the Borehole from lost circulation.
- H. HORIZONTAL DIRECTIONAL DRILLING (HDD): A surface-launched trenchless technology for the installation of pipes, conduits, and cables. HDD creates a pilot bore along the design pathway and reams the pilot bore in one or more passes to a diameter suitable for the Carrier Pipe, which is pulled into the prepared bore in the final step of the process.
- I. INADVERTENT FLUID RETURN (IR): When the Drilling Fluid pressure exceeds the strength and confining pressure of the ground and Drilling Fluid leaves the Borehole and reaches the surface, waterway, or underground facilities. Also known as hydrofracture or frac-out.
- J. MAXIMUM ALLOWABLE DOWNHOLE PRESSURE: Drilling Fluids injection pressure at which higher pressures will theoretically cause IR to occur. Estimates of this pressure for a given location within the Borehole use subsurface geotechnical engineering properties, Drilling Fluid properties, HDD means and methods, and HDD alignment geometry.
- K. MUD CIRCULATION PIT: An excavated area used to manage, monitor, control, and recirculate Drilling Fluid.
- L. MUD RECYCLING SYSTEM: A specialized unit designed to separate suspended solids or excavated soil materials from Drilling Fluids during the HDD installation.
- M. NPS: National Park Service.

- N. PILOT BORE: The initial, controlled drilled path used to establish the plan and profile of the HDD, guide Borehole enlargement to the required size, and define the eventual final alignment of the Carrier Pipe.
- O. PITCH: The deviation angle from a horizontal plane is measured as Pitch. When the drill is directed downward, the Pitch is negative. When it is directed toward the surface, the Pitch is positive. Also known as inclination.
- P. PULLBACK: The Carrier Pipe installation process where the Carrier Pipe is connected behind the Reamer using a Swivel and pulling head and the Carrier Pipe is pulled into place.
- Q. REAMER: A tool that connects to drill pipe and is designed to enlarge the Borehole after the Pilot Bore has been established.
- R. REAMING: The enlargement of the initial Pilot Bore in one or more passes to accommodate the desired Carrier Pipe diameter.
- S. SWAB PASS: A proof pass with a barrel or compacting style Reamer of equal to or greater diameter than the Carrier Pipe used check the Borehole is properly conditioned and has been prepared to an appropriate final diameter. The Swab Pass does not cut the Borehole to a larger diameter from the Borehole diameter established during the final Reaming pass. The Swab Pass is also commonly used to lessen mud unit weights within the borehole to aid in Pullback.
- T. SWIVEL: A device that allows the pullhead and Carrier Pipe to be isolated from drill pipe rotation yet transfers tensile forces from the drill pipe to the pullhead.
- U. TRACKING SYSTEM: Equipment and procedures that allow for the positioning of the downhole assembly to be tracked during Pilot Bore drilling. The Borepath is monitored during the Pilot Bore by taking periodic readings of the measured distance, inclination, and azimuth of a sonde located within the downhole assembly. Generally categorized as a walkover, wireline, or gyroscopic tracking system. Readings can be compared to the Drawings to determine the accuracy of the drilled Borepath.
- V. WASH-OVER CASING: A steel casing used to stabilize the borehole. In this case, a Wash-Over casing is required through the rockfall deposit (see Geotechnical Investigation Report) for the HDD 2 and HDD 3 alignments at the higher elevation ends of the alignments.

1.5 GENERAL

- A. Be responsible for the HDD submittal requirements, construction, and performance of the HDD installation of the Carrier Pipe for this project.
- B. This is a performance specification. Minimum design and construction requirements are presented herein and in the Drawings. It is the Contractor's responsibility to review and confirm the design to fulfill the specified design requirements specified by the NPS necessary for completion of the work.
- C. A geotechnical evaluation was completed for the Morefield Alignment and is provided in the Geotechnical Investigation Report by Lithos Engineering.

1.6 REQUIREMENTS

- A. Perform HDD installation in accordance with all Governing Agency(s) and industry standards. In the case of differing industry standards, submit a request for information (RFI) seeking guidance for which standard to follow.
- B. Provide a Tracking System that is capable of tracking the Pilot Bore progress within the specified tolerances herein.
- C. Provide adequate communication between entry and exit locations if work is being performed at both ends of the alignment.
- D. Notify Colorado 811 and NPS a minimum of three complete working days or as required by conflicting utility owners prior to any excavation or drilling and obtain utility clearance for all construction work. This utility clearance shall remain active and be updated for the duration of the project.
- E. Conduct a minimum of one Swab Pass after the final ream pass to sufficiently condition and proof the hole prior to pipe pull in.
- F. Be responsible for containing, collecting, cleanup, and disposal of all Drilling Fluids.
- G. Conduct operations so as not to interfere with, interrupt, damage, destroy, or endanger integrity of surface or subsurface structures or utilities, and national park in immediate or adjacent areas to the installations.
- H. Foot-traffic is permissible along the HDD alignments provided NPS onsite personnel is onsite to evaluate archeological impacts.

1.7 QUALITY ASSURANCE

- A. Prior to beginning any HDD work, establish and mark field survey of the proposed drill path including starting and ending point locations and intermediate marks at a maximum spacing of the length of one drill rod using a Professional Land Surveyor registered in the State of Colorado.

1.8 QUALIFICATIONS

- A. Submit and meet the following qualifications:
 - 1. List of previously completed projects in which the Contractor has completed at least three (3) installations of at least 6-inch nominal diameter plastic pipes (high density polyethylene (HDPE), Fusible PVC, or Flex Steel) with a minimum length of 2,000 feet each within the past 3 years. One of these projects must be at least 4,000 feet in length. One of these projects must include an entry to exit elevation differential of at least 500 feet in which Drilling Fluids were successfully maintained within the Borehole without Inadvertent Returns. Include project name, length, diameter, pipe material, and soil conditions for the drill; and two project references, with project descriptions, and current name and phone number for the references; the project budget; and the project owner. Qualifying projects must have been completed by the Contractor.
 - 2. Names and experience resumes for key field personnel. Key staff shall demonstrate on their resumes that they meet the following qualifications:

- a. Driller: Minimum three years' experience as a horizontal directional driller and have completed at least three crossing projects of similar length, size, similar Carrier Pipe material (high density polyethylene (HDPE), Fusible PVC, or Flex Steel), and subsurface conditions within the past three years. The Driller shall have been involved with at least one project with a minimum 200-foot elevation differential from entry to exit.
 - b. Superintendent: Minimum three years' experience as a superintendent and have a minimum of three similar HDD project experience.
 - c. Name and experience resume for Tracking System personnel. Tracking system personnel shall have a minimum of three years' related experience and have successfully tracked and guided a minimum three similar HDD projects with a tracking system similar to that being used on this project.
 - d. Name and experience resume for Drilling Fluid control personnel ("Mud Engineer"). Drilling Fluid control personnel shall have a minimum of two years' related experience and have successfully controlled fluids for a minimum three similar HDD projects.
 - e. Certifications for qualified fusion technician. The Carrier Pipe fusing technician must have a current certification from the manufacturer of the proposed Carrier Pipe fusing equipment to be used.
- B. All personnel employed by the Contractor in the work shall be experienced and competent in their respective tasks and shall work only under the direct control of a suitably experienced Superintendent specified in this Section.

1.9 SUBMITTALS

- A. Submit the following submittals with sufficient detail to allow the Engineer to determine whether the proposed means and methods, materials, and equipment meet the specified requirements. Engineer acceptance of Contractor submittals shall not relieve the Contractor of their responsibilities under this contract.
- B. Submittals shall be provided for each of the three HDD installations separately.
- C. Preconstruction: Submit to the Engineer the following a minimum of two (2) weeks before the scheduled start of HDD related construction activity:
 - 1. Qualification Documentation, see Paragraph 1.88.
 - 2. An accident prevention program, a site-specific health and safety plan, and an emergency response plan.
 - 3. The Contractor shall review HDD specific design documentation including:
 - a. The HDD plan and profile provided in the Construction Drawings shall be reviewed and confirmation shall be provided that the HDD plan and profile can be reasonably constructed with the Contractor proposed means and methods within the tolerances specified herein.

- b. Appendix A at the end of this specification shall be filled out and submitted to the Engineer for purpose of verifying input parameters utilized in pull stress calculations and inadvertent return calculations.
 - c. If the Contractor wishes to substantially deviate, as determined by the Engineer, from the NPS-supplied HDD profile or assumed HDD calculation input parameters listed in Appendix A, then the Contractor is responsible for having a new HDD profile and alignment drawing, pipe-stress calculations, and IR calculations performed by a Professional Engineer registered in the state of Colorado with at least three years' experience designing HDD installations for similar projects as defined in Section 1.8. The revised design shall be submitted and approved by the Owner and Engineer prior to construction. The Engineer may perform these tasks for the Contractor upon agreement from the Owner and at the Contractors expense. Modifications to the NPS provided HDD alignments are not permissible.
- 4. Working Drawings including the following: work, storage, staging, and Carrier Pipe assembly areas; wireline laydown; access and Mud Circulation Pits; traffic control; layout of excavation and ancillary equipment for the Carrier Pipe installation; and pollution prevention measures.
 - 5. Schedule. A critical path schedule of HDD-related activities and activities for project components interfacing with the HDD installation. At a minimum, the schedule shall include site set up, Pilot Bore installation, ream pass(es), Carrier Pipe fusing, Swab Pass, and Carrier Pipe Pullback. The schedule shall be updated weekly if variations from the original schedule are anticipated.
 - 6. Equipment – Supply full details and manufacturer's technical specifications for the HDD system to be utilized including the following, at minimum: drill rig, Mud Recycling System, mud pump, pit pump, Tracking System components, downhole tooling to include reamer numbers and sizes, and drill pipe loading equipment. All equipment shall meet the requirements of Paragraph 2.1.
 - a. Tracking System (see Section 2.2) submittal shall include the accuracy of the guidance system at the design drill depths and a description of how the Pilot Bore will be tracked during the installation. Include an example as-built plan and profile using the same Tracking System as proposed for this Work.
 - b. Include a visual representation or photo, type, and size of all Pilot Bore drill bits, Reamers, Swivels, and pullheads. Include the tensile rating of each swivel.
 - 7. Materials – Supply manufacturer data sheets and identify the type and size for required materials to complete the project including:
 - a. Wash-Over Casing (see Section 2.2).
 - b. Carrier Pipe (see Section 2.2). Include manufacturer's certificate certifying the Carrier Pipe meets or exceeds specified requirements.
 - c. Tracer Wire (see Section 2.2)
 - 8. Drilling Fluids:

- a. Include the proposed Drilling Fluid mix design based on anticipated subsurface conditions, including percentages of bentonite and additives. Include manufacturers information and purpose of any additives used in the mix design. The Drilling Fluid shall be designed to maintain an adequate Filter Cake and stabilize the Borehole during all phases of HDD installation.
- b. Submit management procedures employed throughout the installation, including:
 - 1) Provide the Drilling Fluid flow rates that will be used during the Pilot Bore and each Reaming pass.
 - 2) Drilling Fluid Management Plan. Plan shall describe means and methods for containment, collecting and disposal of Drilling Fluid during the project, and equipment and materials that will be included in the Drilling Fluid Spill Kit.
 - 3) Drilling Fluid disposal plan listing the equipment to be used and the location that is willing and able to accept Drilling Fluid waste from the project.
9. Fuel and Hydraulic Fluid Containment and Contingency Spill Plan is required. Include means and methods for managing, containing, and cleanup of fuel and oil spills should they occur at the site. Contractor shall dispose of all fuel, oil, or other leakage from equipment including diapers, absorbent material, and other related cleanup and spill control materials. A Fuel and Oil Spill Kit shall be on site and available for use during all drilling operations.
10. Provide the type and diameter of Swab Pass tooling.
11. Contingency plans for the following scenarios are required and shall include, measures that will be taken to minimize probability of the below scenarios, observations that may indicate the presence of the scenario occurring, and possible actions that may be taken in the event the scenario occurs:
 - a. Procedures, Drilling Fluids, or tooling considering the subsurface conditions identified in the Geotechnical Investigation Report including materials ranging from rockfall deposits with large sandstone boulders to shale bedrock.
 - b. Inadvertent Fluid Return (IR). The plan shall specifically address methods and procedures to minimize the possibility of an IR. The plan shall also address how drilling fluids will be contained in the event of an IR.
 - c. Loss of Drilling Fluid circulation
 - d. Obstruction encountered during Pilot Bore drilling or Reaming
 - e. Difficulty removing spoil from lower elevation conductor casing
 - f. Broken drill pipe
 - g. Broken Carrier Pipe during Carrier Pipe positioning or Pullback
 - h. Carrier Pipe stoppage during pipe pull back due to Borehole collapse.
 - i. Utility strike or damage to an existing utility
 - j. Line or grade outside specified tolerances
 - k. Unforeseen subsurface conditions.

- D. Construction: Submit the following to the Engineer during construction, within 24 hours of the day they describe:
1. A preliminary Pilot Bore as-built shall be submitted and accepted prior to proceeding with Reaming.
 2. Drill Logs (minutes per drill pipe, torque (ft-lbs), thrust (lbs), mud injection flow rate (GPM), depth or inclination and measured distance, azimuth and measured distance or distance left/right, and drilling fluid pressure (psi), as a minimum. Drill Logs shall be digital and recorded by the drill rig or Tracking System as appropriate.
 3. Drilling Fluid logs: Include sand content, density, pH, hardness, and viscosity measurements, as well as quantities of additives, bentonite, and water used when mixing Drilling Fluid.
- E. Post construction Submittals:
1. As-built plan and profile information for the Borepath based on electronic guidance system data. At a minimum, a survey data point shall be obtained for the As-Built drill path at a maximum spacing equivalent to one drill pipe.
 2. Identify and describe unexpected variations to subsurface conditions.
 3. Show depth and location of any abandoned drill paths.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Transport, handle, and store Carrier Pipe and fittings as required for the project.
- B. Carrier Pipe and fittings that are damaged before or during installation shall be repaired or replaced, as recommended by the manufacturer or required by the Engineer. The costs of such repair or replacement shall be borne by the Contractor and be accomplished prior to proceeding with the project.
- C. Protect piping system pieces from entry of foreign materials and water by temporary covers, completing sections of work, and isolating parts of completed system.
- D. Accept products on site in manufacturer's original containers or configuration. Inspect for damage.
- E. Store field joint materials per manufacturer's recommendations.

1.11 ENVIRONMENTAL REQUIREMENTS

- A. Comply with all other NPS, Federal, State, and local environmental requirements including, but not limited to, storm water runoff, construction dewatering, disposal of drilling fluid, and hazardous waste management and disposal.
- B. All equipment mobilized to the site shall be free of oil, grease, and invasive plant species.

PART 2 - EQUIPMENT, PRODUCTS, AND MATERIALS

2.1 EQUIPMENT

- A. Provide the equipment necessary for excavation of the Borepath and HDD installation of the waterline and to complete all work associated with this section.

1. The mud pump shall have the ability to pump a minimum of 250 gallons per minute at 6,700 feet elevation with a slurry having a Marsh Funnel viscosity between 70 and 100 seconds and be capable of operating Contractor selected downhole tooling; whichever is greater.
 2. The drill rig shall have a minimum capability of 200,000 lbs. of thrust/pullback.
 3. A downhole pressure monitoring system must be utilized throughout the installation of the pilot bore such that annular pressure in the borehole may be understood. Data from the monitoring system shall be recorded and able to be viewed by the operator during drilling operations.
 4. A Mud Recycling System shall be utilized to reclaim mud during the HDD installation. The Mud Recycling System shall have the capability of separating excavated materials anticipated based on the Geotechnical Investigation Report.
- B. Drilling fluid spill kit shall be adequate to contain, collect, and dispose of drilling fluid that is either spilled on site or surfaced to the ground or waterbody through an IR. A drilling fluid spill kit shall be located at each end of the Borepath during all HDD operations.
- C. Be responsible for type of drill rig, drill pipe, bits, Reamers, other downhole tooling, Drilling Fluid management, and other pertinent equipment required for complete installation of the proposed Carrier Pipe. Be responsible for mobilizing on-site with a full range of drill pipe, bits, and Reaming tools to allow for the anticipated subsurface conditions, based on the boring logs. Drill pipe shall be of proper size and diameter to allow for full thrust and torque capabilities of the drilling rig. The minimum ratio of pilot bore bit diameter to drill steel joint diameter is 1.5 times.
- D. Provide a tracking system that is capable of tracking the drill path progress within the specified tolerances. The system shall be capable of providing horizontal and vertical steering data along the entire drill path for this crossing, up to depths of 1,000-feet. The Tracking System shall be capable of providing horizontal and vertical steering data along the entire drill path for this crossing as shown in the Drawings.

2.2 PRODUCTS AND MATERIALS

A. Carrier Pipe:

1. Carrier Pipe shall be as shown on the Drawings and shall be specifically capable of installation by HDD method. Increase the thickness the Carrier Pipe or grade of pipe material at the Contractors discretion and sole expense. The Carrier Pipe shall be in accordance with the pipe manufacturer's specifications and guidelines for HDD. Adhere to pipe manufacturer's installation guidelines for: 1) handling, 2) positioning into the Borehole, 3) end preparations, mating procedures, and installation, and 4) special applications.
 - a. Carrier Pipe allowed:
 - 1) 6-inch nominal diameter Flex Steel with a minimum pressure rating of 2,250 or 3,000 psi. depending on location.

B. Drilling Fluids:

1. Drilling Fluid design and Drilling Fluid maintenance to design parameters shall be the responsibility of the Contractor. The Drilling Fluid shall be non-toxic and consist of bentonite slurry and additives compatible with the Drilling Fluid approved by the Engineer.
2. A water source for Drilling Fluids will be provided by NPS. The Contractor is required to pay NPS for NPS supplied water. The Contractor shall be responsible for transporting the water from the source to the project site.
3. Borehole seal additives or lost circulation materials must be onsite in the event of Drilling Fluid loss into the formation.
4. Drilling Fluids shall be non-hazardous and suitable for landfill or similar disposal.
5. Remove all Drilling Fluids from the site and dispose of all Drilling Fluids as required by Governing Agency(s) and local codes.

A. Tracking System

1. The survey and tracking instruments shall be pre-approved by the Engineer.
2. The pilot hole shall be drilled within the specified tolerances along the path shown on the plan and profile drawing. The position of the drill string shall be monitored with precise Gyroscopic or Magnetic Wireline Tracking system. If Gyroscopic tooling is used, it shall be verified with secondary survey location equipment such as Drillguide Gyroscopic Steering Tool (GST) and Drillguide GPS Tracker or approved equivalent.
 - a. Specified tolerances are provided in Part 3.4.
 - b. GST Technology shall only be true north seeking with a minimum published accuracy of (+/- 0.04-degrees lateral and +/- 0.02-degrees depth. The GST must be a stand-alone system and used as the primary survey and reporting system.
3. Shall provide immediate information on the tool face position, inclination, and azimuth. The Tracking System shall provide continuous electronic monitoring and recording capabilities.
4. Tracking System data shall be recorded digitally. Handwritten data will not be accepted.
5. Shall be capable of tracking the Pilot Bore progress within the specified tolerances.
6. Tracking information is fully capable of being obtained without use of an energized coil.
 - a. Walkover locating techniques are acceptable only as supplementary to a Gyroscopic or Magnetic Wireline Tracking System.

C. Tracer Wire: Magnetic detectable conductor insulated with high density polyethylene (HDPE) or UF- XHHW in accordance with physical and electrical properties per ASTM D-1248.

1. A minimum of two tracer wires shall be used for redundancy.

2. Tracer wire shall be rated for “Direct Burial”, 30 volts, and be appropriate for installation in HDD applications,
 3. Tracer wire shall be constructed of copper clad hard drawn extra high strength (EHS) tracer wire with a steel core or Engineer approved equal, and
 4. Tracer wire must be appropriately sized and installed to be compatible with the pullback rating of the equipment being used.
- D. Fill materials shall be in accordance with Specification Section 31 23 33 – TRENCHING, BACKFILLING, AND COMPACTING FOR UTILITIES.
- E. Wash-Over Casing:
1. Wash-Over Casings are required for the HDD 2 and HDD 3 alignments at the higher elevations ends of the alignments through the rockfall deposits.
 2. Wash-Over Casings shall conform to ASTM A252 Grade 2 steel and be manufactured specifically for the method of installation.
 3. Adhere to pipe manufacturer’s installation guidelines for handling, mating and welding, and installations.
 4. Wash-Over Casing shall be round with maximum out of roundness tolerance not exceeding 0.25-inches in nominal outside diameter difference.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

- A. Do not begin work until:
1. Required preconstruction submittals listed in Section 1.8A have been accepted by the Engineer and Owner.
 2. Verify connection to existing piping system size, location, and invert elevations are in accordance with the Drawings.
- B. Identify required lines, levels, contours, and datum locations.
- C. Protect benchmarks, survey control points, existing structures, fences, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.
- D. All surface work shall be maintained within identified temporary working areas as shown on the Construction Drawings.
- E. Perform grading and site modifications necessary to control Drilling Fluids and prevent drainage of fluids or contaminated material away from the site. A minimum 1-foot-tall berm shall be constructed, or straw wattles shall be used around the drill rig and convey Drilling Fluid toward the Mud Circulation Pit nearest the drill rig.
- F. Perform Borehole excavation operations in a manner that will minimize loss of ground and minimize settlement of the ground surface, structures, and utilities above and adjacent to the alignment.
- G. Drilling Fluid shall be used during Pilot Bore, Reaming, Swabbing, and Pullback. Drilling Fluid shall be present within the Borehole to the extent possible throughout the HDD operation.

- H. Prior to the Pilot Bore and each Reaming Pass, sufficient Drilling Fluid shall be mixed such that Drilling Fluid pump rates are sufficient to flush cuttings from the hole for the planned excavation rate without requiring a pause in excavation to allow for additional Drilling Fluid to be mixed.
- I. Excavate approach trenches and Mud Circulation Pits in accordance with approved Construction Drawings and as site conditions require. Minimize excavation to the extent reasonable.
- J. Maintain clean working conditions at all times at the job site. All excavated soil, and any other material not required for construction shall be removed from the excavation area in a timely manner.
- K. Safety fencing shall be installed around the perimeter Mud Circulation Pits during nonworking hours.
- L. The Borehole shall be of sufficient size to permit Carrier Pipe installation as specified in the Contract Documents.
- M. Contractor shall assume liability for loss or damage to downhole equipment.
- N. Contractor shall assume liability for inadvertent return clean up, disposal, and restoration.
- O. Install and operate HDD equipment and support utilities as necessary for the proposed construction and the safety of workers in accordance with project requirements and all Federal, State, and local laws, regulations, and codes.
- P. Carrier Pipe shall be laid out and assembled in such a manner as to not obstruct or impact traffic or third parties within the easement limits presented on the Drawings.

3.2 HORIZONTAL DIRECTIONAL DRILLING

- A. Perform HDD in a manner required to install Carrier Pipe as indicated on the Drawings. Furnish all manpower and equipment required to perform the Carrier Pipe installation. The operation shall include all excavation, Pilot Bore, Reaming, Swabbing, conditioning, and Pullback operations, at a minimum. The Contractor shall:
 - 1. Be responsible for mixing the required Drilling Fluids to suit the proposed drilling application and the subsurface materials to be encountered. Drilling Fluids shall be utilized and mixed in full accordance with the Drilling Fluid manufacturer's printed instructions. Subsurface material information has been provided in the Geotechnical Data Memorandum for the project.
 - 2. Be responsible for collecting and disposal of excess Drilling Fluids and cuttings. Materials shall be collected, transported and disposed of at an approved site or facility.
- B. Drilling shall be conducted with controlled Drilling Fluid and advancement rates to minimize Borehole annular pressures and prevent from excavating at a rate not able to be maintained by the mud pump or Mud Recycling System.
- C. Continuously monitor drilling fluid pumping rate and pressure during HDD operations to ensure adequate removal of soil cuttings and stabilization of bore.
 - 1. Theoretical cutting return pressures and IR pressures are provided in the design calculations for reference.

- D. At minimum, monitor sand content, density, make up water pH and hardness, and viscosity of the Drilling Fluid no less than once every two hours during HDD operations.
- E. Pilot Bore
1. The Pilot Bore shall progress from the HDD entry locations to the HDD exit locations as identified on the Construction Drawings.
 2. Guide and monitor the Pilot Bore using the accepted Tracking System.
 3. Drill the Pilot Bore along the vertical and horizontal alignment as indicated on the Drawings, within the tolerances specified herein.
 4. Establish and mark field survey of the installed drill path, including starting and ending point locations and intermediate stakes at a maximum spacing equivalent to one drill pipe.
 5. If the Pilot Bore is sufficiently off line and grade such that the Carrier Pipe will not meet the tolerances specified herein, a new Pilot Bore meeting the line and grade tolerances specified herein shall be drilled at the sole expense of the Contractor.
 6. Maintain the minimum offset between the HDD alignment and geotechnical drill holes and the existing utilities as shown on the Drawings.
- F. Reaming
1. If the Pilot Bore does not enlarge the Borehole to a minimum of 10-inches in diameter, the Borehole shall be enlarged using a minimum of one Reaming pass. Be responsible for conditioning the Borehole as necessary prior to the installation of the Carrier Pipe. Conditioning may include utilizing tooling that provides compactive force on Borehole walls.
 2. The final conditioned Borehole diameter shall be no less than 10-inches, in concert with HDD Good Practices Guidelines, and as detailed in approved Contractor required submittals.
- G. Swab Pass:
1. A minimum of one Swab Pass is required to properly condition the Borehole for Pullback. The Contractor may elect to perform additional Swab Passes if further Borehole conditioning is required. Tooling used for the Swab Pass must be of equal or greater diameter to the Carrier Pipe.
- H. Pullback
1. Do not proceed with Pullback without an accepted submittal of the Pilot Bore as-built profile and alignment.
 2. Pullback operations shall be carried out as soon as possible following the Swab Pass of the Borehole. The Swab Pass shall be completed a maximum of 12 hours prior to Pullback. During Pullback, the Contractor shall continue Pullback operations without interruption regardless of the day of the week or hour of the day.

3. A Pullback head shall be attached to the Carrier Pipe to allow fastening to the Swivel. The head shall be closed to prevent Drilling Fluid from entering the Carrier Pipe during Pullback and be fixed to the Carrier Pipe in accordance with pipe Manufacturer's recommendations.
4. Do not damage the Carrier Pipe during installation.
5. Do not exceed the pipe manufacturer's recommended maximum pullback forces.
6. Use buoyancy control to ballast the Carrier Pipe and reduce pullback stresses on the Carrier Pipe if necessary.
7. Do not bend the Carrier Pipe at a bend radius tighter than the manufacturer's recommendations.
8. Install tracer wires. If tracer wires need to be spliced, splice in accordance with manufacturer recommendations. Tape or insulate trace wires to prevent corrosion and maintain integrity of pipe detection.
9. At completion of Pullback, Carrier Pipe shall extend a minimum of 10 feet past connection locations or as recommended by the manufacturer, whichever is greater.

3.3 QUALITY CONTROL

- A. All existing utilities within the project area shall be marked and/or potholed by the Contractor prior to initiating HDD operations, including Mud Circulation Pit excavations.
 1. Where the drill path is designed to cross within 10 feet of an existing utility, the utility shall be potholed and monitored throughout HDD construction through the open pothole.
- B. Perform all work in the presence of the Engineer, unless the Owner or Engineer has granted prior approval in writing to perform such work in their absence.
- C. Perform all work in accordance with all current applicable regulations and codes of NPS, Federal, State, and local agencies. In the event of conflict, comply with the most restrictive requirements.
- D. Drilling Fluid monitoring continuously by the Contractor during construction.
 1. If a Drilling Fluid circulation volume or Drilling Fluid circulation pressure loss of 25 percent or greater is observed during HDD operations or if drilling fluid is not returning through the borehole to the bore entry or bore exit locations stop drilling, search for an IR, and notify the Engineer.
- E. Intermediate Drilling Fluid management locations, or relief wells, are not allowed and all Drilling Fluids shall be maintained within the Mud Circulation Pits located at the ends of the HDD alignment. The Contractor shall account for managing Drilling Fluids at the two Mud Circulation Pit locations in accepting the provided HDD Plan and Profile and in design of Drilling Fluids.

3.4 TOLERANCES

- A. The Carrier Pipe shall be installed within 10 feet horizontally and 20 feet vertically of the designed alignment shown on the Drawings.

- B. The entry and exit locations of the installed Carrier Pipe shall be within 10 feet radially of the locations shown on the Drawings.
- C. The Contractor shall be responsible for connecting the HDD installed pipeline to the open cut installed pipeline on either end of the HDD installations regardless of whether the HDD installed pipeline is within or outside of tolerances specified herein. Costs for any necessary connection appurtenances, or change or modification to these appurtenances to facilitate pipeline connection, shall be the sole expense of the Contractor.
- D. If the Carrier Pipe is off line and/or grade by more than the specified tolerances, make adjustments, repairs and changes, or replacement as necessary to achieve the specified tolerances as approved by the Engineer and at no cost to Owner.
- E. If the Carrier Pipe is sufficiently far off line and/or grade to require redesign of structures or connections, acquisition of easements, or backfilling and re-excavation, be responsible for necessary additional work at no additional cost to the Owner. If the Carrier Pipe is off line and/or grade by an amount that requires, in the opinion of the Engineer, re-design of any structure, be responsible for all redesign costs.

3.5 SAFETY REQUIREMENTS

- A. Methods of construction shall be such as to ensure the safety of the work, project participants, the public, third parties, and adjacent properties, whether public or private. All work shall conform to the requirements of all Federal, State, and local laws and regulations. Traffic control and minimum separation distances from travel lanes shall conform to the requirements of all NPS, Federal, State, and local laws and regulations. The Contractor is solely responsible for maintaining safe working conditions at the site at all times.
- B. Designate a Safety Officer. The Safety Officer shall administer an accident prevention program and shall prepare a code of safe practices and an emergency plan. Hold safety meetings daily prior to initiating work and provide safety instruction for new employees.
- C. Fire Prevention and Control: All construction shall be performed in accordance with the applicable fire prevention and control requirements of all NPS, Federal, State, and local agencies.

3.6 CLEANUP AND RESTORATION

- A. Remove all equipment, unused materials, Drilling Fluids, and debris from the site at the end of the job. Restoration shall follow construction as the work progresses and shall be completed as soon as possible. Restore and repair any damage resulting from surface settlement caused by the work. Any property or improvements damaged or destroyed, shall be restored to a condition equal to or better than existing prior to construction at no additional cost to the Owner and as approved by the Engineer and NPS. Restoration shall be completed immediately if a third party or the Owner is inconvenienced by the damage, and in no case later than thirty (30) days after the damage is discovered. This provision for restoration shall include all property which was affected by the construction operations.

- B. Dispose of all Drilling Fluids, cuttings, and Mud Circulation Pit spoil after completion of the project at a legal off-site disposal area and provide all permits necessary for such disposal. All fees and costs related to the collection, transport and disposal of fluids and cuttings and any related permit costs shall be the Contractor's responsibility. During transport, all fluids shall be contained in steel tanks or other suitable vessels. Pavement surfaces where Drilling Fluids have been spilled shall be sprayed off with water to achieve pre-construction condition.
- C. Wash-Over Casings may be removed or remain in-place after the installation of HDD 2 and 3. If left in place, survey information regarding their position and elevation (where accessible from the surface) shall be provided on the as-built drawings.

3.7 CONSTRUCTION RECORDS

- A. Maintain Daily Shift Reports for all components and phases of work. The reports shall be signed by the site superintendent or shift foreman, submitted to the Engineer within 24 hours of completed daily work, and shall contain the following:
 - 1. Subcontractors onsite with their personnel and equipment, and the work performed. The reports shall be broken down into work time and down/standby time for each Subcontractor.
 - 2. Work crews and equipment onsite, and the work performed. The reports shall be broken down into work time and down/standby time for each crew and piece of equipment.
 - 3. Progress made for each construction stage.
 - 4. Problems or unusual conditions encountered, and actions taken to address these situations.
 - 5. Record of safety meetings conducted.
 - 6. List of visitors to construction site.
- B. Maintain records of all instrumentation and monitoring of the Borehole excavation including but not limited to the following:
 - 1. The station of the excavation and advance distance with respect to drill pipe count and date and time.
 - 2. The position of the drill path in relation to the design line and grade as measured during the Pilot Bore installation.
 - 3. The date, starting time, and finish time.
 - 4. Drill and Drilling Fluid logs (Section 1.8A).
 - 5. Any unusual conditions, breakdowns, and delays.
- C. Keep and maintain at the construction site a complete set of field drawings for the recording of as-built conditions. It shall be marked or noted thereon all field information, properly dated, recording up-to-date as-built conditions. As-built drawings shall be submitted and accepted by the Engineer prior to recommending final payment. Any survey completed before, during, or after construction shall be at the determination of the Contractor and shall be at no additional cost to the NPS.

D. Submit construction records digitally to the NPS and Engineer.

APPENDIX A – CALCULATION INPUT PARAMETER CHECK

Input Parameter	Value	
	Design Assumed	Contractor Submitted
Mud Unit Weight (lb/gal)	9.5	
Mud Viscosity (cp)	20	
Pilot Bore Mud Flow Rate (gal/min)	250	
Mud Yield Point (lb/100ft ²)	28	
Drill Steel Nominal Diameter (in)	6.625	
Drill Steel Joint Diameter (in)	7	
Pilot Bit Outer Diameter (in)	10.125	
Ream Pass 1 Diameter (in)	12	

Notes:

- 1) Written acceptance of the HDD plan and profile must be provided as part of the pre-construction submittals.
- 2) Contractor shall provide “submitted” values for mud, borehole geometry, and downhole tooling identified above. If any of the submitted values are more than 15 percent different than those provided in the table above, verification of the pull stress and inadvertent return calculations may be required at the discretion of Lithos Engineering. See 1.9.B.4 for requirements.

END OF SECTION

SECTION 33 05 15 - PRECAST CONCRETE UTILITY STRUCTURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Precast concrete utility structures, circular or non-circular in plan, and appurtenant items.
 - a. Valve and meter vaults.
2. Design and fabrication of precast concrete utility structures.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 33 11 13 - Water Main Construction.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):
 - a. A48, Standard Specification for Gray Iron Castings.
 - b. C857, Standard Practice for Minimum Design Loading for Underground Precast Concrete Utility Structures.
 - c. C858, Standard Specification for Underground Precast Concrete Utility Structures.
 - d. C890, Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures.
 - e. C990, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
2. Concrete mix design(s):
 - a. Certification in accordance with ASTM C858, Section 12.

3. Fabrication and/or layout drawings:
 - a. Include detailed diagrams of utility structures showing typical components and dimensions, reinforcement, and other details.
 - b. Itemize, on separate schedule, elevations or sectional breakdown of each utility structure with all components and refer to drawing identification number or notation.
 - c. Indicate required penetration details for all piping entering each structure.
4. Drawings and calculations: All Drawings, including layout drawings, certifications and calculations shall be sealed by a Professional Engineer registered in the state where the project is located.
 - a. Provide certification stating that calculations provided have been prepared specifically for this Project and that they match and pertain to the Shop Drawings provided.
 - b. Provide a summary document as part of the above certification listing the design criteria used for precast design including:
 - 1) Codes and standards.
 - 2) Soil load.
 - 3) Exterior groundwater load.
 - 4) Live loads.
 - 5) Other loads.
5. Test Reports:
 - a. Copies of source quality control tests, including compressive strength and air content, for units provided.

1.4 SITE CONDITIONS

- A. The design groundwater elevation shall be equal to the ground surface elevation at the structure.

PART 2 - PRODUCTS

2.1 PRECAST UTILITY STRUCTURE COMPONENTS

- A. Provide utility structures with interior dimensions as shown on the Drawings.
- B. Provide the following components for each utility structure:
 1. Precast base section with integral or cast in place base slab.
 2. Sump Pit in the base section of all structures.
 - a. If groundwater is encountered a 4" thick concrete floor shall be installed in the bottom of the sump pit with a watertight seal.
 3. Precast wall section(s).

4. Precast flat top.
 - a. Where reinforcement is shown for top slab, furnish slab with reinforcing as designed, but not less than reinforcing shown on Drawings.
- C. Provide openings and appurtenances as shown on Drawings.
 1. Access doors:
 - a. Cast access doors into top slab.
 - b. Where access door frames have drainage channels, cast PVC drain lines in top slab to drain location shown on Drawings. If no drain location is shown, drain frames to outer edge of top slab.
 - c. Protect doors and frames from damage during concrete placement and shipping.
- D. Nonpressure Type Frames and Cover:
 1. Cast iron frame and covers: ASTM A48, Class 35 (minimum).
 2. Ductile iron frame and covers: ASTM A536.
 3. Use only cast iron of best quality, free from imperfections and blow holes.
 4. Furnish frame and cover of heavy-duty construction a minimum total weight of 450 pounds.
 5. Machine all horizontal surfaces.
 6. Furnish unit with solid nonventilated lid with concealed pickholes.
 7. Ensure minimum clear opening of 24 inches diameter.
- E. Manhole Steps:
 1. General:
 - a. Provide maximum distance from surface to first rung is not greater than 16 inches and that maximum spacing on remaining steps is 16 inches on-center.
 - b. Safety tread.
 2. Copolymer polypropylene encapsulated 1/2 inches Grade 60 steel rod
 - a. Minimum step width: 12 inches.
 - b. Distance from face of wall to back of tread: 5-3/4 inches.
 - c. Embedment: 3-3/8 inches.
- F. Concrete:
 1. Conform to requirements of ASTM C858.
 - a. Minimum 28-day compressive strength 4500 psi.
 - b. All portions of precast utility structure are considered to be exposed to freeze-thaw cycles.
- G. Joints:
 1. Joints of precast riser and top sections:

- a. Preformed flexible joint sealants: ASTM C990.
 - b. Exterior joint wrap.
- 2. Pipe and conduit entry for utility structures.
 - a. Resilient rubber boot manufactured from natural or synthetic materials of suitable cross section and size.

2.2 DESIGN

A. General Design Requirements:

- 1. Design precast units and appurtenances in accordance with ASTM C858.
 - a. Notify CO and furnish cast-in-place structures if sizes of precast utility structures shown on Drawings can not be designed or fabricated.

B. Design loads:

- 1. Design precast units for all loads and load cases described in ASTM C857, with the following values and selections:
 - a. Minimum uniform live load for exposed roof slabs shall be 150 PSF.
 - b. Wheel loads shall be considered.
 - 1) Use wheel load designation A-16 (HS20-44) as shown in ASTM C857, Table 1.
 - 2) Wheel loads and uniform live load do not act concurrently.
 - c. Unit weight of soil W shall be taken as no less than 100 LB/CUFT.

PART 3 - EXECUTION

3.1 PRECAST UTILITY STRUCTURE CONSTRUCTION

A. General:

- 1. Prepare subgrade for base.
 - a. For precast base slabs, place and compact 6 inches of Granular Fill or Bedding Material as shown on Drawings.
 - b. For cast-in-place concrete base slabs, support base section and prepare bottom joint with preformed strip-type hydrophilic waterstop.
 - c. Confirm that base is level and fully supported by stable material.
- 2. Ensure accurate vertical placement and leveling prior to placement of interior grout.
 - a. Provide vertical alignment tolerance of maximum 1 inch horizontal to 10 feet vertical.

- B. Build each structure to dimensions shown on plans and at such elevation that pipe sections built into wall of structure will be true line of pipe extensions.
- C. For all horizontal mating surfaces between precast concrete units, apply premolded flexible joint sealant to clean mating surfaces in accordance with sealant manufacturer's written instructions. Apply sufficient pressure to each concrete unit to seat unit in sealant.
- D. Seal all pipe penetrations in manhole.
- E. Set top slab level to elevation shown on Drawings.

3.2 FIELD QUALITY CONTROL

- A. Any proposed repairs of precast components or structures shall be submitted to CO for approval.
- B. Structures shall be observed for signs of leakage during periods of high groundwater.
- C. No leakage that includes visible flow through joints between precast concrete sections or through pipe penetrations shall be permitted.
- D. Damp spots on interior wall surfaces shall be considered leakage and shall not be permitted.
 - 1. Damp spots shall be defined as spots where moisture from a source outside the structure can be picked up on a dry hand.
 - 2. Locate the source of water movement through the wall and permanently seal.
- E. Dampness on the top of the base slab will not be construed as leakage.

END OF SECTION 33 05 15

SECTION 33 11 13 - WATER MAIN CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Coordination and interface with existing facilities and utilities.
2. Connections to existing water mains.
3. Testing, flushing and disinfection.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 32 91 13 - Topsoiling and Finished Grading.
2. Section 33 12 19 - Fire Hydrant.
3. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.
4. Section 40 05 51 - Valves - Basic Requirements.
5. Section 40 05 61 - Gate Valves.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Water Work Association (AWWA):
 - a. B300, Standard for Hypochlorites.
 - b. B301, Standard for Liquid Chlorine.
 - c. C651, Standard for Disinfecting Water Mains.
 - d. C502, Standard for Dry-Barrel Fire Hydrants.
 - e. M17, Installation, Operation and Maintenance of Fire Hydrants.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Division 01 Specifications for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
3. Fabrication and/or layout drawings.
4. Certifications.
5. Test reports.

- B. Submit results of the leakage tests, identifying the specific length of pipe tested, the test pressure, the duration of test and the amount of leakage.
- C. Submit satisfactory bacteriological test reports on disinfection requirements.
- D. Submit qualifications for lab performing disinfection analysis.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Pipe: Refer to Specification Section 40 05 00. Watermain piping shall be Composite Pipe 2250 psi rated for Morefield.
- B. Service Lines: Service lines under 3 IN shall be Copper Tubing Type L per Section 40 05 00 or approved equal. Compression type connections with inserts are required. (No yellow brass allowed. Red brass only). No service line splices will be allowed on any section of the line. Tracer wire shall be installed at each service line and exposed at the tracer wire box. Do not cut the tracer wire when continuing to building. On new construction of service lines to the building a tracer wire is required from the corporation stop to the water meter with a tracer wire box next to the curb stop.
- C. In-Line Valves:
 - 1. Refer to Specification Section 40 05 51, 40 05 52, and 40 05 61.
 - 2. Provide valve vaults per construction drawings and valve boxes as needed.
- D. Fire Hydrants: Refer to Specification Section 33 12 19.
- E. Corporation Stops:
 - 1. Corporation stops are required on all water services up to 2 IN diameter and will be connected to the new water main with a Tee and reducer. Connection to the main and all materials are the responsibility of the Contractor.
 - 2. Corporation stop shall be AWWA/CC taper thread inlet by Quick joint for copper or plastic tubing (CTS) outlet. All corporation stops shall meet the "No Lead" requirements and shall be marked NL or No Lead.
 - 3. It shall be the Contractors responsibility to ensure that tees, reducers, and corporation stops are compatible with the pipe they are to be installed on. If compatibility concerns arise the Contractor shall inform the Contracting Officer and provide a recommended substitution.
- F. Curb Stops and Boxes:
 - 1. Curb stop valves shall be a "ball valve" type with a 300 PSIG working pressure rating. A double O-ring port seal shall be provided in the stem and the O-rings shall be supported in precision-machined grooves. The end pieces shall be O-ring sealed to provide additional protection against leaking. 90 DEG valve operation, with internal movement restraint, is required. Drains are not permitted on valves.

2. Curb stops shall be brass or steel and certified to NSP/ANSI standard 61. Curb Stop shall have a solid one piece tee-head and stem with a hole for attaching the curb box rod. All curb stops shall meet the "No Lead" requirements and shall be marked NL or No Lead. Inserts shall be solid 304 tubular Stainless Steel inserts, conform to AWWA Standard C901, and shall be used. Rod shall be installed to a level 1 foot below finished grade.
3. Curb stops with boxes shall be placed on each new service line as shown on the approved plans.
4. All curb boxes shall be cast iron, adjustable and installed to finish grade. All curb boxes shall have a fully extended length of at least 6 IN more than the required length to ground surface.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install water main to the line and grade on the Drawings.
 1. Water mains to be staked at a minimum 100 feet interval with depth of cuts monitored.
- C. Field verify depth of utilities that will be crossed.
 1. Adjust water main elevation as required during construction.
 2. No separate payment will be made for field verification or adjustment of main depths as required.
- D. Contractor will restore all existing structures or services damaged by Contractor's operations at no cost to Government.

3.2 INTERRUPTION OF SERVICE

- A. Interruption of service to water users shall not exceed 4 hours.
 1. Notify property owners of interruption a minimum of 24 hours in advance.

3.3 UNDERGROUND SERVICES

- A. Notify utility representative prior to construction to obtain available information on location of existing utilities.
 1. Contractor shall be responsible for locating all utilities.
- B. Existing water services are to be connected to the new water mains.
 1. Damage to existing water service to be repaired, using pipe and union the same size and material equal to existing service or other material approved by CO.

3.4 DRIVEWAY REMOVAL AND REPLACEMENT

- A. All Portland cement concrete and asphalt noted for removal and replacement shall be cut prior to removal.
 - 1. Cut by sawing, vertical cut to be 1 inch minimum.
 - 2. The remaining depth of section may be broken out in a manner subject to COs approval.
 - 3. Width of section removed to be either a width not greater than the outside diameter of the water main plus 4 feet-0 inches or broken out to the nearest joint.
- B. Replace Portland cement concrete and asphalt equal to or better than original paving plus 2 inches.
- C. Debris resulting from the above operations shall be removed and hauled as directed by the CO.

3.5 GRAVEL SURFACED DRIVES AND ROADWAYS

- A. Restore all damaged gravel surfaced drives and roadways to a condition equal to or better than original.
 - 1. Replacement gravel gradation.

3.6 PROTECTION OF EXISTING UTILITIES

- A. Contractor to verify the location of all underground utilities.
 - 1. Omission from, or the inclusion of utility locations on the plans is not to be considered as the nonexistence of or a definite location of existing underground utilities.
- B. A representative of the underground utilities shall be notified 24 hours in advance of crossings.

3.7 CONNECTIONS TO EXISTING WATER MAINS

- A. Make connections to existing water mains as shown on Drawings, by attaching to existing or changed fitting.
 - 1. Connections shall include all fittings including flexible couplings, joint restraints, and other appurtenances as needed to make the connection.
- B. Where the connection is made to an existing water main which can be adequately isolated from the distribution system, it shall be termed a "dry connection."
- C. Contractor is responsible for controlling and disposing of water in the trench at no additional cost to the Government.

3.8 SEWER CROSSINGS

- A. Water mains crossing house sewers, storm sewers or sanitary sewers shall be laid to provide a vertical separation of at least 18 inches between the bottom of the water main and the top of the sewer, whenever possible.
 - 1. A water main may be laid closer than 10 feet if the crown of the sewer is at least 18 inches below the water main invert.
 - 2. In the event 18 inches of vertical separation cannot be provided at a sewer crossing, the sewer shall be removed for a distance of 10 feet on each side of the water main and replaced with one 20 feet length of ductile iron pipe of the same size. Or the water main shall be encased with 1' of concrete surrounding the water main for 20' centered on the sanitary sewer.
- B. Concrete collars shall be provided at each end of the ductile iron pipe to connect to the existing sewer pipe as shown on the Drawings.

3.9 TREES

- A. Do not remove trees without written instructions from the CO unless tree removal is shown on drawings.
 - 1. No separate payment will be made for tree removal.

3.10 FENCES, SIGNS, MAILBOXES, ETC.

- A. Restore all damaged fences, signs, mailboxes, etc., to their original conditions.
 - 1. No separate payment will be made for these items.

3.11 FIELD QUALITY CONTROL

- A. Sealing, Flushing, and Disinfection of Potable Water Systems:
 - 1. Maintain interior of all pipes, fittings and other accessories free from dirt and foreign material at all times.
 - a. If, in the opinion of the CO, the pipe contains dirt that will not be removed by flushing, the pipe interior shall be cleaned and swabbed with bactericidal solution.
 - b. At close of day's work or whenever workmen are absent from jobsite, plug, cap or otherwise provide watertight seal from open ends of pipe to prevent ingress of foreign material.
 - c. If water is in trench, seal shall remain in place until trench is pumped dry.
 - 2. After favorable performance of pressure test and prior to final acceptance, thoroughly flush the entire potable water piping system and perform disinfection as prescribed.
 - a. Perform all work including preventative measures during construction in full compliance to AWWA C651.

3. Flush each segment of the system to provide a flushing velocity of not less than 2.5 feet per second.
4. Drain flushing water to location approved by the CO.
5. Perform disinfection using one of the following forms:
 - a. Application of chlorine gas-water mixture by means of solution-feed chlorinating device.
 - 1) Liquid chlorine shall comply with AWWA B301.
 - b. Application of calcium hypochlorite, or sodium hypochlorite.
 - 1) Chlorine compounds shall comply with AWWA B300.
6. Disinfect pipe with chlorinated water as per AWWA C651.
 - a. Method of application of chlorine shall be by continuous feed method or slug method.
 - b. During disinfection procedure, ensure that initial and residual chlorine concentrations meet AWWA C651 requirements by testing by an approved method as directed by the CO.
7. Tag the system during the disinfection procedure.
8. Following disinfection for required contact period, neutralize chlorine residual in water by treating with reducing agent.
 - a. Refer to AWWA C651.
 - b. Flush all treated water from pipeline at its extremities until replacement water throughout pipe, upon test is proved comparable in quality to water in existing system.
 - c. Take two samples to test for bacteriological quality as directed by CO.
 - d. Repeat disinfection procedure until two satisfactory results are obtained.
 - e. Quality of water delivered by the new water main to remain satisfactory for a minimum period of two days.
9. Secure satisfactory bacteriological reports on samples from the system.
 - a. Ensure all sampling and testing procedures are in full compliance to AWWA C651, and applicable requirements of the location the Site is in.
 - 1) No separate payment will be made for this item.
10. The Government will provide the water required to fill the main initially and will pay for the water required to flush the main once.
 - a. Filling and flushing shall be performed during periods of low usage, between the hours of midnight and 4:00 AM.
 - b. Flushing water will be based on a maximum of 8 hours total.
 - c. Any additional refilling or refushing to be at the Contractor's expense at the Supplier's commercial water rates.

END OF SECTION 33 11 13

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SECTION 33 12 19 - FIRE HYDRANT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dry-barrel fire hydrant.

B. Related Sections include but are not necessarily limited to:

1. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Water Works Association (AWWA):
 - a. C502, Standard for Dry-Barrel Fire Hydrants.
 - b. M17, Installation, Operation and Maintenance of Fire Hydrants.

1.3 SUBMITTALS

A. Shop Drawings:

1. Product technical data:
 - a. Acknowledgement that products submitted meet the requirements of the standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Acknowledge and verify dimensions and provide list of integral parts and materials.

B. Contract Closeout Information:

1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 FIRE HYDRANT

A. Design and Fabrication:

1. Conform to AWWA C502.
2. Provide with either compression or gate design.
3. Provide with a 5 inches valve opening, nozzle section consisting of two, 2-1/2 inches hose nozzles and one, 4-1/2 inches steamer.
4. Provide with water passages to permit full flow of water to minimize friction loss.
5. Furnish with multiple weep holes for positive draining to allow water to escape readily from standpipe when hydrant valve is closed.
6. Designed to throttle flow when partially opened.
7. Designed to allow removal of valve and valve stem without digging up hydrant.
8. Suitable for 5 feet of bury.
9. Furnish with mechanical (gland type) joint inlet connections.
10. Design to break off at ground line when struck by a vehicle.
11. Furnish with O-ring packing only.
12. Furnish hose and steamer nozzles with threads conforming to standard threads used by local Fire Department.
13. Furnish with direction of opening as required by local Fire Department with direction of opening cast on dome.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install hydrants at locations indicated in accordance with AWWA M17 and the following:

1. Remove foreign material from barrel of hydrant before placement.
2. Install plumb and at same elevation as connecting pipe and main.
3. Place each hydrant on a slab of concrete not less than 6 inches thick and 18 inches SQ.
4. Block backside of hydrant, opposite pipe connection, with concrete firmly wedged between hydrant and vertical face of undisturbed trench.
5. Place granular bedding material around base of hydrant to the dimensions shown in the Drawings.
6. Firmly tamp carefully compacted backfill around hydrant to surface of ground and to a distance of 5 feet in front of hydrant.

3.2 COATINGS AND FINISHES

A. Provide hydrant with below grade and above grade coatings per AWWA standards.

1. Paint above grade, fire hydrant red color.

END OF SECTION 33 12 19

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DIVISION 40

PROCESS INTERCONNECTIONS



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SECTION 40 05 00 - PIPE AND PIPE FITTINGS - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Utility piping systems.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 31 23 33 - Trenching, Backfilling, and Compacting for Utilities.
2. Section 40 05 51 - Valves - Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Association of State Highway and Transportation Officials (AASHTO):
 - a. M36, Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains (Equivalent ASTM A760).
2. American Iron and Steel Institute (AISI).
3. American Society of Mechanical Engineers (ASME):
 - a. B16.5, Pipe Flanges and Flanged Fittings.
 - b. B16.9, Factory-Made Wrought Steel Butt-Welding Fittings.
 - c. B16.22, Wrought Copper and Bronze Solder - Joint Pressure Fittings.
 - d. B36.19, Stainless Steel Pipe.
4. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. A312, Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes.
 - c. A536, Standard Specification for Ductile Iron Castings.
 - d. A760, Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.
 - e. A774, Standard Specification for As-Welded Wrought Austenitic Stainless Steel Fittings for General Corrosive Service at Low and Moderate Temperatures.
 - f. C443, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
 - g. D1785, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

- h. D2466, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
 - i. D2467, Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
5. American Water Works Association (AWWA):
- a. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 inches through 144 inches.
 - b. C208, Standard for Dimensions for Fabricated Steel Water Pipe Fittings.
 - c. C651, Standard for Disinfecting Water Mains.
 - d. C800, Standard for Underground Service Line Valves and Fittings.
6. American Water Works Association/American National Standards Institute (AWWA/ANSI):
- a. C110/A21.10, Standard for Ductile-Iron and Gray-Iron Fittings.
 - b. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - c. C115/A21.15, Standard for Flanged Ductile-Iron Pipe with Ductile-Iron or Gray-Iron Threaded Flanges.
 - d. C151/A21.51, Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water.
 - e. C153/A21.53, Standard for Ductile-Iron Compact Fittings for Water Service.
7. Chlorine Institute, Inc. (CI):
- a. Pamphlet 6, Piping Systems for Dry Chlorine.
8. International Plumbing Code (IPC).
9. Underwriters Laboratories, Inc. (UL).

B. Coordinate flange dimensions and drillings between piping, valves, and equipment.

1.3 DEFINITIONS

- A. HPIC: High performance industrial coating.
- B. PVDF: Polyvinylidene fluoride.

1.4 SYSTEM DESCRIPTION

- A. Piping Systems Organization and Definition:
 - 1. Piping services are grouped into designated systems according to the chemical and physical properties of the fluid conveyed, system pressure, piping size and system materials of construction.
 - 2. See PIPING SYSTEMS SCHEDULE in PART 3.

1.5 SUBMITTALS

A. Shop Drawings:

1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Copies of manufacturer's written directions regarding material handling, delivery, storage and installation.
 - c. Separate schedule sheet for each piping system scheduled in this Specification Section showing compliance of all system components.
 - 1) Attach technical product data on gaskets, pipe, fittings, and other components.

B. Contract Closeout Information:

1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

C. Informational Submittals:

1. Qualifications of lab performing disinfection analysis on water systems.
2. Test reports:
 - a. Copies of pressure test results on all piping systems.
 - b. Reports defining results of dielectric testing and corrective action taken.
 - c. Disinfection test report.
 - d. Notification of time and date of piping pressure tests.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect pipe coating during handling using methods recommended by manufacturer.

1. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.

B. Prevent damage to pipe during transit.

1. Repair abrasions, scars, and blemishes.
2. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

PART 2 - PRODUCTS

2.1 PIPING SYSTEMS SCHEDULE

- A. Piping system materials, fittings and appurtenances are subject to requirements of specific piping systems schedule located at the end of PART 3 of this Specification Section.

2.2 COMPONENTS AND ACCESSORIES

- A. Protective Coating and Lining:
 - 1. Include pipe, fittings, and appurtenances where coatings, linings, coating, tests and other items are specified.
- B. Valves:
 - 1. See Specification Section 40 05 51.

PART 3 - EXECUTION

3.1 EXTERIOR BURIED PIPING INSTALLATION

- A. Unless otherwise shown on the Drawings, provide a minimum of 4 feet and maximum of 8 feet earth cover over exterior buried piping systems and appurtenances conveying water, fluids, or solutions subject to freezing.
- B. Enter and exit through structure walls, floors, and ceilings by using penetrations and seals specified in Specification Section 01 73 20 and as shown on Drawings.
- C. Install expansion devices as necessary to allow expansion and contraction movement.
- D. Laying Pipe In Trench:
 - 1. Excavate and backfill trench in accordance with Specification Section 31 23 33.
 - 2. Clean each pipe length thoroughly and inspect for compliance to specifications.
 - 3. Grade trench bottom and excavate for pipe bell and lay pipe on trench bottom.
 - 4. Install gasket or joint material according to manufacturer's directions after joints have been thoroughly cleaned and examined.
 - 5. Except for first two joints, before making final connections of joints, install two full sections of pipe with earth tamped alongside of pipe or final with bedding material placed.
 - 6. Lay pipe in only suitable weather with good trench conditions.
 - a. Never lay pipe in water except where approved by CO.
 - 7. Seal open end of line with watertight plug if pipe laying stopped.
 - 8. Remove water in trench before removal of plug.

E. Anchorage and Blocking:

1. Provide reaction blocking, anchors, joint harnesses, or other acceptable means for preventing movement of piping caused by forces in or on buried piping tees, wye branches, plugs, or bends.
2. Place concrete blocking so that it extends from fitting into solid undisturbed earth wall.
 - a. Concrete blocks shall not cover pipe joints.
3. Provide bearing area of concrete in accordance with drawing detail.

3.2 CONNECTIONS WITH EXISTING PIPING

- A. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered.
- B. Perform connections with existing piping at time and under conditions which will least interfere with service to customers affected by such operation.
- C. Undertake connections in fashion which will disturb system as little as possible.
- D. Provide suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
- E. Where connections to existing systems necessitate employment of past installation methods not currently part of trade practice, utilize necessary special piping components.
- F. Where connection involves potable water systems, provide disinfection methods as prescribed in this Specification Section.
- G. Once tie-in to each existing system is initiated, continue work continuously until tie-in is made and tested.

3.3 ACCESS PROVISIONS

- A. Provide access doors or panels in walls, floors, and ceilings to permit access to valves, piping and piping appurtenances requiring service.
- B. Size of access panels to allow inspection and removal of items served, minimum 10 x 14 inches size.
- C. Fabricate door and frame of minimum 14 GA, stretcher leveled stock, cadmium plated or galvanized after fabrication and fitted with screw driver lock of cam type.
- D. Provide with key locks, keyed alike, in public use areas.
- E. Furnish panels with prime coat of HPIC.
- F. Style and type as required for material in which door installed.

- G. Where door is installed in fire-rated construction, provide door bearing UL label required for condition.

3.4 FIELD QUALITY CONTROL

A. Pipe Testing - General:

1. Test piping systems as follows:
 - a. Test exposed, non-insulated piping systems upon completion of system.
 - b. Test concealed interior piping systems prior to concealment and, if system is insulated, prior to application of insulation.
 - c. Test buried piping (insulated and non-insulated) prior to backfilling and, if insulated, prior to application of insulation.
2. Isolate equipment which may be damaged by the specified pressure test conditions.
3. Perform pressure test using calibrated pressure gages and calibrated volumetric measuring equipment to determine leakage rates.
 - a. Select each gage so that the specified test pressure falls within the upper half of the gage's range.
 - b. Notify the CO 24 hours prior to each test.
4. Completely assemble and test new piping systems prior to connection to existing pipe systems.
5. Acknowledge satisfactory performance of tests and inspections in writing to CO prior to final acceptance.
6. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and re-examination.

B. Pressure Testing:

1. Allowable leakage rates:
 - a. All pressure piping systems and all buried, insulated piping systems which are hydrostatically pressure tested shall have zero leakage goal at the specified test pressure throughout the duration of the test.
2. Hydrostatic pressure testing methodology:
 - a. General:
 - 1) All joints, including welds, are to be left exposed for examination during the test.
 - 2) Provide temporary restraints for expansion joints for additional pressure load under test.

- 3) Isolate equipment in piping system with rated pressure lower than pipe test pressure.
- 4) Do not coat or insulate exposed piping until successful performance of pressure test.

3.5 CLEANING, DISINFECTION AND PURGING

A. Cleaning:

1. Clean interior of piping systems thoroughly before installing.
2. Maintain pipe in clean condition during installation.
3. Before jointing piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
4. At completion of work and prior to Final Acceptance, thoroughly clean work installed under these Specifications.
 - a. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes.
 - b. Repair any stoppage or discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to the Government.

B. Disinfection of Potable Water Systems:

1. After favorable performance of pressure test and prior to Final Acceptance, thoroughly flush entire potable water piping system including supply, source and any appurtenant devices and perform disinfection as prescribed.
2. Perform work, including preventative measures during construction, in full compliance with AWWA C651.
3. Perform disinfection using sodium hypochlorite complying with AWWA B300.
4. Flush each segment of system to provide flushing velocity of not less than 2.5 feet per second.
5. Drain flushing water to sanitary sewer.
 - a. Do not drain flushing water to receiving stream.
6. Use continuous feed method of application.
 - a. Tag system during disinfection procedure to prevent use.
7. After required contact period, flush system to remove traces of heavily chlorinated water.
8. After final flushing and before placing water in service, obtain an independent laboratory approved by the CO to collect samples and test for bacteriological quality.
 - a. Repeat entire disinfection procedures until satisfactory results are obtained.
9. Secure and deliver to CO, satisfactory bacteriological reports on samples taken from system.

- a. Ensure sampling and testing procedures are in full compliance to AWWA C651, local water purveyor and applicable requirements of State of Colorado.

3.6 LOCATION OF BURIED OBSTACLES

- A. Furnish exact location and description of buried utilities encountered and thrust block placement.
- B. Reference items to definitive reference point locations such as found property corners, entrances to buildings, existing structure lines, fire hydrants and related fixed structures.
- C. Include such information as location, elevation, coverage, supports and additional pertinent information.
- D. Incorporate information on "As-Recorded" Drawings.

3.7 PIPING SYSTEM SCHEDULES

- A. Piping System 10 – Buried and Exposed Potable Water Piping.
 - 1. General:
 - a. Piping symbol and service:
 - 1) W – Potable Water.
 - b. Test requirements:
 - 1) See Specification Section 40 05 28
 - 2) Test medium: Water.
 - 3) Pressure: 1.25 x pipe pressure classification.
 - 4) Duration: 4 hours.
 - c. Gaskets:
 - 1) Flanged: 304 Stainless Steel Spiral Wound Metal Gasket with PTFE filler.
 - 2. System components:
 - a. Pipe size 4 inches through 6 inches:
 - 1) Exposed and Buried service:
 - a) Materials: Spoolable Composite Pipe, See Section 40 05 28.
 - b) Reference: AWWA/ANSI C151/A21.51.
 - c) Fittings:
 - (1) Stainless steel fittings approved for use by the composite pipe manufacturer.

- d) Joints: Flanged connections with manufacturer's composite pipe transition fitting.
 - 3. Install piping so as to be free to expand with proper loops, anchors and joints without injury to system or structure.
 - 4. Provide approved type vacuum breaker and backflow preventer installations indicated or as required by Code.
- B. Piping System 16 – Buried Corrugated Metal Storm Water Culverts.
- 1. General:
 - a. Piping symbol and service:
 - 1) CMP – Corrugated Metal Pipe Culvert.
 - b. Test requirements:
 - 1) Test medium: Visual.
 - 2) Pressure: None.
 - 3) Duration: None.
 - c. Gaskets:
 - 1) 8 inches wide neoprene gasket under connecting band.
 - 2. System components:
 - a. Pipe size through 120 inches:
 - 1) Buried service.
 - a) Material: Corrugated galvanized metal, 0.079 inches thick sheet.
 - b) Reference: AASHTO M36 (ASTM A760).
 - c) Lining: Bituminous, AASHTO M190, Type A.
 - d) Coating: Bituminous, AASHTO M190, Type A.
 - e) Joints:
 - (1) Bolted connecting band with 1/2-IN bolts.
 - (2) Band to be corrugated galvanized metal, 16 GA.

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SECTION 40 05 28 - PIPE - SPOOLABLE COMPOSITE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Spoolable composite pipe for Morefield Waterline replacement.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American National Standards Institute (ANSI):

- a. B16.5, Pipe Flanges and Flanged Fittings.
- b. 61, Drinking Water System Components – Health Effects

2. Code of Federal Regulations (CFR):

- a. 49 CFR 192.121, Design of Plastic Pipe.
- b. 49 CFR 192.123, Design Limitations for Plastic Pipe.

3. American Society for Testing and Materials (ASTM):

- a. A312, Stainless Steel Pipe Specification Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes

4. American Petroleum Institute (API):

- a. 15S, Spoolable Reinforced Plastic Line Pipe.
- b. 17J, Unbonded Flexible Pipe.

1.3 DEFINITIONS

A. OHTC: Overall Heat Transfer Coefficient.

B. OBC: Operating Bend Radius.

C. HTP: Hydrostatic Test Pressure

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 40 05 00.
2. Certifications:
 - a. Manufacturer installer certification.
 - b. ANSI 61 certification status for all components coming into contact with potable water.
3. Hydrostatic Factory Test:
 - a. 1.3 times the maximum pipe pressure rating for an 8-hour period for each reel of spooled pipe.

PART 2 - PRODUCTS

2.1 PIPING

A. General:

1. For composite pipe in Morefield Project Area
 - a. Provide 2,250 psi pressure rated pipe with fittings and appurtenances to locations shown on Drawings.
 - b. Provide 3,000 psi pressure rated pipe with fittings and appurtenances for the long bore location up the mesa.
 - c. Provide electrical continuity for the entire pipeline length.
 - d. Furnish materials in accordance with API 17J and API 15S in full compliance to the following material specifications:
 - 1) 6" Pipe (2,250 psi):
 - a) OBR: 5.5 FT or less.
 - b) Weight: 18.3 LB/FT or less.
 - c) Temperature: 150°F or less
 - d) OHTC: 3.73 BTU/hr·ft²·°F.
 - e) Max Installation Tension: 30,000 LBS or less for 2,250 psi.
 - f) Liner: ANSI 61 compliant
 - 2) 6" Pipe (3,000 psi):
 - a) OBR: 5.6 FT or less.
 - b) Weight: 22.8 LB/FT or less.
 - c) Temperature: 150°F or less
 - d) OHTC: 3.76 BTU/hr·ft²·°F.
 - e) Max Installation Tension: 45,000 LBS or less for 3,000 psi pipe.
 - f) Liner: ANSI 61 compliant

B. Fittings:

1. ASTM A312 TP 316L.
2. Utilize a swage connection to join end fittings and midline couplings to the pipe material.
3. Pipe end fittings for connection to valves, tees, other pipe material, etc.:
 - a. Morefield Project Area (2,250 & 3,000 psi): Use ANSI B16.5 Class 900 lapped flanges to connect to other pipeline components.
4. Midline coupling for joining two lengths of spoolable composite pipe:
 - a. Manufacturer's standard coupling, appropriate for operating pressure of the pipeline.
 - b. Provide electrical connectivity through midline fitting to allow pipeline locating by conductive current.

C. Factory Testing:

1. Provide hydrostatic testing at 1.3 times the pipe pressure rating for an 8-hour period for each reel of spooled pipe.

PART 3 - EXECUTION

3.1 IDENTIFICATION

A. Identify each length of pipe clearly at intervals of 5 FT or less.

1. Include manufacturer's name and trademark.
2. Nominal size of pipe, appurtenant information regarding polymer cell classification and critical identifications regarding performance specifications, and "NSF" approvals when applicable.

3.2 INSTALLATION

A. See Specification Section 40 05 00 for General Requirements.

B. See Specification Section 33 05 07 for Horizontal Directional Drilling.

C. See Specification Section 33 11 13 for Open Trench Installation.

D. Storage:

1. Pipe is to remain on reels until installation.
2. The storage temperature must remain within the acceptable manufacturer's recommendations.
3. Cover and seal the cut ends of the pipe to protect the steel layer from environmental conditions.

E. Field Quality Control:

1. Install pipe according to the project specifications and manufacturer recommendations.
2. Employ and pay for services of pipeline manufacturer's field service representative(s) to:
 - a. Inspect materials and equipment covered by these Specifications.
 - b. Supervise installation.
 - c. Provide CO with a written statement that piping has been installed properly, tested, and is ready for operation by Government's personnel.
3. Contractor to coordinate field service work with the manufacturer's service representative, Government, and CO prior to initiating such work.
4. Tests:
 - a. Hydrostatic test pressure: 125% of pipe pressure classification.
 - b. Conduct tests in presence of the Government and CO.

F. Fitting Procedures:

1. Prior to installing the fitting, the end of the spoolable pipe is laid out and visually inspected to be clean of debris and inspected for any damage or defects that could compromise a proper seal.
2. Position each reel or coil so that the beginning of the pipe faces the end of the previous pipe, creating an "S" bend.
3. Place the pipe in a straight approach to insert it into the swage machine while maintaining the roundness of the pipe end to properly accept the fitting.
4. The external sleeve of the fitting is swaged down using the swage machine to develop the clamping force and fluid seal.
5. After a fresh cut is made at the end of the pipe, the pipe is deburred, cleaned and continuity wires installed.
6. Welds at end fittings shall be passivated or performed in such a manner as to not create heat tint oxide.

G. Documentation:

1. Fitting installation inspection logs (one per fitting) that certifies that installation was performed in accordance with the procedure is completed and emailed to manufacturer within 48 hours following installation to maintain certification.
2. Technicians to supply daily field tickets.
3. Verification of electrical continuity (line tracing).

H. Hydrostatic Pipe Conditioning/Depressurization:

1. Pre-pressurization: Pressurize pipe 25% of maximum 8 hours prior to hydrostatic testing to account for pipe to expansion and reinforcement shifts.
 - a. Close the valves and pressurize the pipe up to 25% of HTP.
 - b. Pressurization of the pipe shall not exceed a rate increase of 145 psi/minute.
2. Following the 8 hr pre-pressurization, add air if required to bring pressure back up to 25% of the HTP and monitor the pressure drop at least every 15 minutes for a minimum of 1 hour.

3. Pressurize to hydrostatic test pressure and shut-in the pipe again.
4. Monitor the pressure drop from one more hour and compare findings of the previous hour.
 - a. If the pressure drop is less than that of the previous hour, the pipe is expanding rather than leaking.
5. If the rate of pressure drop does not taper off, repressure to near pipe pressure classification and test for two additional cycles.
 - a. Each cycle should last for a minimum of 1 hour.
6. If the results show diminishing pressure drops for each cycle, hydrostatic testing can begin after a minimum of 8 hours to allow the inner lining to expand and the reinforcement to shift.
7. After hydrostatic testing is complete, slowly bleed pressure to depressurize the pipeline in 25% test pressure decrements until the pressure is completely released.
 - a. Depressurization of the pipe shall not exceed a rate of 290 psi/minute to prevent the possibility of a vacuum.

END OF SECTION 40 05 28

SECTION 40 05 51 - VALVES - BASIC REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Valving, actuators, and valving appurtenances.

B. Related Sections include but are not necessarily limited to:

1. Section 40 05 00 - Pipe and Pipe Fittings - Basic Requirements.
2. Section 40 05 52 - Miscellaneous Valves.
3. Section 40 05 61 - Gate Valves.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Society of Mechanical Engineers (ASME):
 - a. B1.20.1, Pipe Threads, General Purpose.
 - b. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
 - c. B16.18, Cast Copper Alloy Solder Joint Pressure Fittings.
2. ASTM International (ASTM):
 - a. A126, Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
 - b. D256, Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - c. D638, Standard Test Method for Tensile Properties of Plastics.
 - d. D648, Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position.
 - e. D695, Standard Test Method for Compressive Properties of Rigid Plastics.
 - f. D2240, Standard Test Method for Rubber Property-Durometer Hardness.
3. American Water Works Association (AWWA):
 - a. C207, Standard for Steel Pipe Flanges for Waterworks Service - Sizes 4 inches through 144 IN.
 - b. C500, Standard for Metal-Seated Gate Valves for Water Supply Service.
 - c. C509, Standard for Resilient-Seated Gate Valves for Water Supply Service.
 - d. C550, Standard for Protective Coatings for Valves and Hydrants.
4. American Water Works Association/American National Standards Institute (AWWA/ANSI):

- a. C111/A21.11, Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

1.3 DEFINITIONS

- A. The following are definitions of abbreviations used in this Specification Section or one of the individual valve sections:

- 1. WWP: Water working pressure.

1.4 SUBMITTALS

- A. Shop Drawings:

- 1. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.
 - b. Manufacturer's installation instructions.
 - c. Valve pressure and temperature rating.
 - d. Valve material of construction.
 - e. Special linings.
 - f. Valve dimensions and weight.
 - g. Valve flow coefficient.
- 2. Test reports.

- B. Contract Closeout Information:

- 1. Operation and Maintenance Data

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, refer to individual valve Specification Sections for acceptable manufacturers.

2.2 MATERIALS

- A. Refer to individual valve Specification Sections.

2.3 VALVE ACTUATORS

- A. Valve Actuators - General:

1. Provide actuators as shown on Drawings or specified.
2. Counter clockwise opening as viewed from the top.
3. Direction of opening and the word OPEN to be cast in handwheel or valve bonnet.
4. Size actuator to produce required torque with a maximum pull of 80 pound at the maximum pressure rating of the valve provided and withstand without damage a pull of 200 pound on handwheel or chainwheel or 300 feet-pounds torque on the operating nut.
5. Unless otherwise specified, actuators for valves to be buried, submerged or installed in vaults or manholes shall be sealed to withstand at least 20 feet of submergence.
6. Extension stem:
 - a. Install where shown or specified.
 - b. Solid steel with actuator key and nut, diameter not less than stem of valve actuator shaft.
 - c. Pin all stem connections.
 - d. Center in valve box or grating opening band with guide bushing.

B. Buried Valve Actuators:

1. Provide screw or slide type adjustable cast iron valve box, 5 inches minimum diameter, 3/16 inches minimum thickness, and identifying cast iron cover rated for traffic load.
2. Box base to enclose buried valve gear box or bonnet.
3. Provide 2 inches standard actuator nuts complying with AWWA C500, Section 3.16.
4. Provide at least two tee handle keys for actuator nuts, with 5 feet extension between key and handle.
5. Extension stem:
 - a. Provide for buried valves greater than 4 feet below finish grade.
 - b. Extend to within 6 inches of finish grade.
6. Provide concrete pad encasement of valve box as shown for all buried valves unless shown otherwise.

C. Plastic Valve Vault:

1. Provide in non-traffic areas only on valve applications 3-1/2 inches and less.
2. Nominal 7-1/2 inches diameter top section.
3. Design unit for screw type extension section having nominal 9 inches diameter bell.
4. Cast iron ring and lid.
5. Constructed of injection molded polyolefin compound with fibrous inorganic component reinforcing and UV stabilization.
6. Armor Access Boxes.

D. Exposed Valve Manual Actuators:

1. Provide for all exposed valves not having electric or cylinder actuators.
2. Provide handwheels for gate and globe valves.
 - a. Size handwheels for valves in accordance with AWWA C500.
3. Gear actuators to be totally enclosed, permanently lubricated and with sealed bearings.
4. Provide cast iron floor stands where shown on Drawings.

- a. Stands to be furnished by valve manufacturer with actuator.
- b. Stands or actuator to include thrust bearings for valve operation and weight of accessories.

2.4 FABRICATION

A. End Connections:

- 1. Provide the type of end connections for valves as required in the Piping Schedules presented in Section 40 05 00 or as shown on the Drawings.
- 2. Comply with the following standards:
 - a. Threaded: ASME B1.20.1.
 - b. Flanged: ASME B16.1, Class 125 unless otherwise noted or AWWA C207.
 - c. Bell and spigot or mechanical (gland) type: AWWA/ANSI C111/A21.11.
 - d. Soldered: ASME B16.18.
 - e. Grooved: Rigid joints per Table 5 of AWWA C606.

B. Refer to individual valve Specification Sections for specifications of each type of valve used on Project.

C. Nuts, Bolts, and Washers:

- 1. Wetted or internal to be bronze or stainless steel.
 - a. Exposed to be zinc or cadmium plated.
- 2. Buried:
 - a. T-Bolts for mechanical joints: Per AWWA/ANSI C111/A21.1
 - b. Other bolts and nuts: ASTM A307.
- 3. Fluoropolymer coatingExposed: Mechanical galvanized ASTM B695, Class 40.
- 4. Heads and dimensions per ASME B1.1.
- 5. Threaded per ASME B1.1.
- 6. Project ends 1/4 to 1/2 inches beyond nuts.

D. Epoxy Interior Coating: Provide epoxy interior coating for all ferrous surfaces in accordance with AWWA C550.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Setting Buried Valves:

- 1. Locate valves installed in pipe trenches where buried pipe indicated on Drawings.

2. Set valves and valve boxes plumb.
 3. Place valve boxes directly over valves with top of box being brought to surface of finished grade.
 4. Install in closed position.
 5. Place valve on firm footing in trench to prevent settling and excessive strain on connection to pipe.
 6. After installation, backfill up to top of box for a minimum distance of 4 feet on each side of box.
- C. Support exposed valves and piping adjacent to valves independently to eliminate pipe loads being transferred to valve and valve loads being transferred to the piping.
- D. Install valves accessible for operation, inspection, and maintenance.

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SECTION 40 05 52 - MISCELLANEOUS VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Air release and vacuum relief valves.
2. Automatic control valves:
 - a. Pressure-reducing valves.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 40 05 51 - Valves - Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. American Society of Mechanical Engineers (ASME):
 - a. B16.1, Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250.
2. American Water Works Association (AWWA):
 - a. C512, Standard for Air-Release, Air-Vacuum, and Combination Air Valves for Waterworks Service.
 - b. C550, Standard for Protective Interior Coatings for Valves and Hydrants.

1.3 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 40 05 51.

B. Contract Closeout Information:

1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.

2.2 AIR RELEASE AND VACUUM RELIEF VALVES

- A. General: Conform to AWWA C512.

- B. Water:

- a. Combination Air Release and Vacuum Valve:

- 1) Materials:

- a) Top and lower flange: 304 stainless steel.
 - b) Barrel: 304L stainless steel.
 - c) Floats: High density polyethylene.
 - d) Float seats and seals: EPDM.
 - e) Nozzle seat: EPDM.
 - f) All wetted internal metal parts: 304 stainless steel.

- 2) Design requirements:

- a) Size: 2 inch.
 - b) Working pressure:
 - (a) Morefield: 750 PSI.
 - c) Valve shall have opening and closing speed control.
 - d) Delrin sleeve to prevent sticking.
 - e) Rising stem looking glass.
 - f) Provide isolation valve, type as shown.

2.3 AUTOMATIC CONTROL VALVES FOR WATER SERVICE

- A. Basic Valve:

- 1. Type:

- a. Diaphragm-actuated hydraulically operated.

- 1) Materials:

- a) Body: Ductile iron.
 - b) Seat insert: Stainless steel.
 - c) Disc: Buna-N.

- d) Diaphragm: Nylon fabric bonded with synthetic rubber.
 - 2) Design requirements: Do not use diaphragm as seating surface.
- 2. Design requirements:
 - a. Pressure reducing control:
 - b. Size: 4 inches.
 - c. Operating pressure:
 - 1) Maximum 550 PSI.
 - a) Utilize two PRVs in series to reduce pressure to 80 psi.
 - d. Flow range:
 - 1) Normal maximum 250 GPM.
 - 2) Normal minimum 10 GPM.
- 3. Design requirements:
 - a. Design requirements: Modulate basic valve to maintain a uniform downstream pressure as set on control pilots.
 - b. Assembles all control features and hardware on basic valve at factory.
 - c. Use corrosion-resistant metal for all exposed portions of the control.
 - d. Include with valve control:
 - 1) Stop valves.
 - 2) Strainer.
 - 3) Valves for opening and closing speed control.
 - 4) Pilot valves.
 - 5) Pressure switches as necessary to provide control function.
 - 6) Anti-cavitation trim.

2.4 ACCESSORIES

- A. Furnish any accessories required to provide a completely operable valve.

2.5 FABRICATION

- A. Completely shop assemble unit including any interconnecting piping, speed control valves, and control isolation valves.
- B. Provide internal epoxy coating suitable for potable water for all iron body valves in accordance with AWWA C550.

2.6 SOURCE QUALITY CONTROL

- A. Shop hydrostatically test to unit test pressure.

2.7 MAINTENANCE MATERIALS

- A. Provide one set of any special tools or wrenches required for operation or maintenance for each type valve.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: See Specification Section 40 05 51.
- B. Air Release, Vacuum Relief, and Pressure Relief Valves:
 - 1. Pipe exhaust to a suitable disposal point.

3.2 FIELD QUALITY CONTROL

- A. Clean, inspect, and operate valve to ensure all parts are operable and valve seats properly.
- B. Check and adjust valves and accessories in accordance with manufacturer's instructions and place into operation.

END OF SECTION 40 05 52

SECTION 40 05 61 - GATE VALVES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Gate valves.

B. Related Specification Sections include but are not necessarily limited to:

1. Section 40 05 51 - Valves - Basic Requirements.

1.2 QUALITY ASSURANCE

A. Referenced Standards:

1. National Science Foundation (NSF):
 - a. NSF/ANSI 61: Drinking Water System Components

1.3 DEFINITIONS

- A. OS&Y: Outside Screw and Yoke.
- B. NRS: Non-rising Stem.
- C. RS: Rising Stem.

1.4 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 40 05 51.

B. Contract Closeout Information:

1. Operation and Maintenance Data:
 - a. See Specification Section 01 78 23 for requirements for the mechanics, administration, and the content of Operation and Maintenance Manual submittals.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with the Contract Documents, the manufacturers listed in the applicable Articles below are acceptable.

2.2 VALVES: POTABLE WATER

- A. Resilient Wedge Gate Valves, 2 to 12 inches (Water Application):
 - 1. Valves shall be NSF61 certified for potable water use.
 - 2. Materials:
 - a. Body, gate: Stainless steel.
 - b. Wedge: Fully encapsulated rubber wedge or steel.
 - 3. Design requirements:
 - a. Minimum pressure.
 - 1) Morefield: 750 PSIG working pressure
 - b. Exposed: OS&Y, stuffing box stem seal, handwheel or 2" square nut as shown on the drawings.
 - c. Counter clockwise open rotation.

2.3 ACCESSORIES

- A. Refer to Drawings and valve schedule for type of actuators.
 - 1. Furnish actuator integral with valve.
- B. Refer to Specification Section 40 05 51 for actuator requirements.

2.4 FABRICATION

- A. General:
 - 1. Provide valves with clear waterways the full diameter of the valve.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. See Specification Section 40 05 51.

- B. Do not install gate valves inverted or with the stems sloped more than 45 degrees from the upright unless the valve was ordered and manufactured specifically for this orientation.

END OF SECTION 40 05 61

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