NATIONAL MALL AND MEMORIAL PARKS
WASHINGTON, D.C.

REHABILITATE WATER SYSTEMS
FOR EMERGENCY AND POTABLE WATER
SUPPLY IN WEST POTOMAC PARK

NAMA - 151059D

PROJECT SPECIFICATIONS

NATIONAL PARK SERVICE
DENVER SERVICE CENTER
JUNE 2017
DIVISION 01 - GENERAL REQUIREMENTS

01 11 00 Summary of Work ................................................................. 1-6
01 26 01 Contract Modification Procedures ........................................... 1-6
01 27 00 Definition of Contract Line Items ............................................ 1-11
01 31 00 Project Management and Coordination ................................ 1-9
01 32 16 Construction Schedule ........................................................ 1-9
01 32 33 Photo Documentation for Historic Preservation Projects ...... 1-2
01 33 23 Submittal Procedures ......................................................... 1-8

Supplement:
Submittal List

01 35 13.22 Archeological Protection .................................................. 1-3
01 35 23 Safety Requirements ........................................................... 1-4
01 35 91 Historic Preservation Treatment Procedures ....................... 1-7
01 40 00 Quality Requirements .......................................................... 1-7
01 42 00 References ................................................................. 1-25
01 50 00 Temporary Facilities and Controls ........................................ 1-8
01 56 39 Temporary Tree and Plant Protection ................................. 1-7
01 57 23 Storm Water Pollution Prevention Plan ............................ 1-7
01 67 00 Product Requirements ....................................................... 1-7

Affirmative Procurement Reporting Form

01 73 29 Cutting and Patching .............................................................. 1-4
01 73 40 Execution ................................................................. 1-6
01 74 19 Construction Waste Management and Disposal ................ 1-8
01 74 19A Appendix A, Project Waste Management Plan Worksheet
01 74 19B Appendix B, Standard Solid Waste Conversions
01 77 00 Closeout Procedures .......................................................... 1-4

Supplement:
Closeout and Operation and Maintenance Requirements

01 78 23 Operation and Maintenance Data ..................................... 1-9

Supplement:
Equipment Data Sheet

DIVISION 2 – EXISTING CONDITIONS

02 41 19 Selective Demolition ............................................................. 1-5

DIVISION 3 – CONCRETE

03 30 00 Cast-In-Place Concrete ........................................................ 1-10

DIVISION 4 – DIVISION 30

Not Applicable
## DIVISION 31 – EARTHWORK

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 23 16</td>
<td>Excavation</td>
<td>1-2</td>
</tr>
<tr>
<td>31 23 19.01</td>
<td>Dewatering</td>
<td>1-2</td>
</tr>
<tr>
<td>31 23 23.15</td>
<td>Trench Backfill</td>
<td>1-6</td>
</tr>
<tr>
<td>31 41 00</td>
<td>Shoring</td>
<td>1-2</td>
</tr>
<tr>
<td>31 90 00</td>
<td>Geotechnical Instrumentation</td>
<td>1-6</td>
</tr>
</tbody>
</table>

## DIVISION 32 – EXTERIOR IMPROVEMENTS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>32 11 23</td>
<td>Aggregate Base Courses</td>
<td>1-5</td>
</tr>
<tr>
<td>32 12 16</td>
<td>Asphalt Paving</td>
<td>1-6</td>
</tr>
<tr>
<td>32 13 13</td>
<td>Concrete Paving</td>
<td>1-12</td>
</tr>
<tr>
<td>32 16 00</td>
<td>Curbs and Gutters</td>
<td>1-4</td>
</tr>
<tr>
<td>32 17 23</td>
<td>Pavement Markings</td>
<td>1-3</td>
</tr>
<tr>
<td>32 91 13</td>
<td>Soil Preparation</td>
<td>1-4</td>
</tr>
<tr>
<td>32 92 00</td>
<td>Turf and Grasses</td>
<td>1-8</td>
</tr>
</tbody>
</table>

## DIVISION 33 – UTILITIES

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>33 05 01.02</td>
<td>Ductile Iron Pipe and Fittings</td>
<td>1-8</td>
</tr>
<tr>
<td>33 05 01.10</td>
<td>High-Density Polyethylene (HDPE) Pressure Pipe and Fittings</td>
<td>1-8</td>
</tr>
<tr>
<td>33 05 16.13</td>
<td>Precast Concrete Utility Structure</td>
<td>1-4</td>
</tr>
<tr>
<td>33 05 23.13</td>
<td>Utility Horizontal Directional Drilling</td>
<td>1-14</td>
</tr>
<tr>
<td>33 12 13</td>
<td>Water Service Connections</td>
<td>1-7</td>
</tr>
<tr>
<td>33 12 16</td>
<td>Water Utility Distribution Valves</td>
<td>1-4</td>
</tr>
<tr>
<td>33 12 16.29</td>
<td>Air Release Valve Assemblies</td>
<td>1-4</td>
</tr>
<tr>
<td>33 12 19</td>
<td>Water Utility Distribution Fire Hydrant</td>
<td>1-4</td>
</tr>
<tr>
<td>33 13 00</td>
<td>Disinfection of Water Utility Distribution Facilities</td>
<td>1-4</td>
</tr>
</tbody>
</table>

## DIVISION 34 – DIVISION 49

Not Applicable

## END OF SECTION
SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Work covered by the Contract Documents.
2. Work phases.
3. Work under other contracts.
5. Contractor use of premises.
6. Public use of site.
7. Work Restrictions.
8. Special Construction Requirements.
9. Sub-surface Utility Locates

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Location:

1. National Mall in Washington, DC, extending from the Lincoln Memorial to the Washington Monument, and from Constitution Avenue to Independence Avenue.
2. The Work is subject to National Park operations in many ways that may not be avoided. The possible impacts may include high pedestrian (tourist) activities, national holidays, and many special events, both scheduled and unscheduled. This may result in the need for rapid changes to the Work schedule.

B. The Work consists of the following:

1. The Work includes the replacement of old existing water mains with new pipelines, valves, water meters, and new service connections to various existing irrigation systems, concessions, public bathrooms, fire hydrants, and water fountains.
2. Refurbish two existing old master water meter vaults with new piping and set new master water meters to be furnished by DC Water.
3. Provide a new vault to contain a double check backflow preventer.
4. New pipeline work will generally be performed using a “trench-less” technology to minimize disruption to National Park operations and environmental impacts to Park lands.

C. Project will be constructed under a single prime contract.
1.3 WORK UNDER OTHER CONTRACTS

A. General: Cooperate fully with Government so work may be carried out smoothly, without interfering with or delaying work under this contract or work by Government. Coordinate the Work of this Contract with work performed by Government.

B. Concurrent Work: Government will award a separate contract for the following construction operations affecting the Project site. Those operations will be conducted simultaneously with work under this Contract.

1. Washington Monument Visitor Screening Facility Upgrade Project, NAMA 151073: A separate contract will be awarded at approximately the same time as this contract. The work will include upgrades to the Washington Monument Visitor Screening Facility and includes substantial upgrades to supporting utilities. It will be necessary for the contractor to coordinate pipe installation activities with the Screening Facility contractor to minimize impacts to each contractor's respective project. Once initiated, the waterline work in this area shall be completed within a 3-week period.

1.4 WORK PHASES

A. The Work shall be conducted in phases and as to allow continued water service at all times to all structures on the National Mall.

B. All work shall be complete and ready for occupancy within 365 days from notice to proceed.

C. A detailed phasing plan will be developed by the contractor and approved by the park. The phasing plan will demonstrate a sequencing of events that 1) minimizes impact to the visitor experience at the park; 2) minimizes service interruptions to the park facilities; 3) details startup of the newly installed waterlines.

D. All work performed within the project area is subject to seasonal and holiday restrictions. Coordinate with the Contracting Officer and the Park for all scheduled events and activities that take place in project area, and suspend work activities or demobilize from specific project areas as required.

1.5 CONTRACTOR USE OF SITE

A. General: All monuments will remain open during the construction project. Vehicle and pedestrian traffic must be detoured around defined work areas. Contractor shall have full use of defined, pre-approved and fenced-in work areas for construction operations during the construction period. Contractor’s use of the preapproved work areas is limited by the Government’s right to direct timing and duration of operations which affect pedestrian and traffic access by visitors to nearby features. These short duration detours of sidewalks require advance approval by Government, and installation of appropriate barriers and detour signage, similar to depictions on the drawings.
B. Driveways and Entrances: Keep driveways, sidewalks, and entrances serving premises clear and available to Government, Government's employees, and emergency vehicles at all times. Do not use these areas 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.
3. Minimize temporary layout of fused pipe crossing driveways and sidewalks.

C. Contractor shall at all times conduct his operations to ensure the least inconvenience to the public. Limited building and sidewalk closures will be permitted, when required, upon specific approval of Contracting Officer for a maximum of 5 working days. Closures will not be allowed for any roads, concessions, nor any national monuments.

D. Storage of Materials: Confine storage of materials to the designated staging areas shown on the drawings.

E. Preservation of Natural Features:

1. Prevent damage to natural surroundings. Restore damaged areas, repairing or replacing damaged trees and plants, at no additional expense to the Government.
2. Provide temporary barriers to protect existing trees and plants and root zones.
3. Do not remove, injure, or destroy trees or other plants without prior approval. Consult with Contracting Officer 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. Tree and Shrub Work: Where tree and shrubs must be removed or trimmed to perform work, develop a plan for work and submit to the Contracting Officer for approval. Trees with a diameter larger than 44 inches also require a special tree removal permit from the District of Columbia.

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

H. Hauling Restrictions: Comply with all legal load restrictions in the hauling of materials. Load restrictions on park roads are identical to the 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.

1.6 CONDUCT OF OPERATIONS

A. At all times the contractor shall conduct his operations in conformance with the rules and regulations promulgated by the Secretary of the Interior for the National Park Service, and applicable park rules and regulations prescribed by the Park Superintendent.
B. Work on Saturdays, Sundays, Federal holidays or at night may not be performed without prior consent from the Contracting Officer. Submit requests 3 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 7:00 a.m. to 5:00 p.m., Monday through Friday, except when otherwise indicated. Work requests for work needed to be performed outside of normal business hours will be submitted at least 3 business days prior to the Contracting Officer for approval.

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: Work will be done in accordance with subarticle 1.3 in this section in order to minimize utility interruptions. Interruptions of service to facilities occupied by Government or others is prohibited unless permitted and then only after arranging to provide temporary utility services according to requirements indicated:

1. Notify Contracting Officer not less than 7 days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Contracting Officer’s written permission.
3. Hours for Utility Shutdowns: Utility shutdowns will be scheduled to minimize impact on park operations.

D. Water Supply Outages:

1. Perform work in accordance with subarticle 1.3 in this section, and as indicated below.
2. Potable Water Main Lines:
   a. Existing water mains within the project area are arranged in a looped network with multiple interconnections.
   b. Construct new water mains as shown in parallel with existing lines remaining in full operation.
   c. Completely test and disinfect new water main segments, then make connection to the main system by disconnection of the existing main at one point and establishing service to both lines. Water supply outage of main lines is prohibited.
   d. When approved by the CO, make service connections to all existing facilities until none remain on the old, existing line. Then shut down, disconnect, and abandon the old, existing line.
   e. Finally, make the connection from the new main line to the existing main system to reestablish the looped water network.
3. Service Connections and Lines:
a. Many services lines will be encountered within the project area. These are not completely known, but expected to include service outage restrictions as follows:
b. Private Concessions: No outage during normal working hours.
c. Monument Fire Supply Lines: 24 hours.
d. Fire Hydrants: 8 hours.
e. Irrigation Systems: 8 hours (between April 15 and October 15).
f. Monument Water Features: 72 hours (Reflection Pool, WWII, FDR, memorial fountains).
g. Public Restrooms: 72 hours (weekdays only).

E. Nonsmoking Building: Smoking is not permitted within the building or within 50 feet of entrances, operable windows, or outdoor air intakes.

1.8 SPECIAL CONSTRUCTION REQUIREMENTS

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

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

B. Limited Access: Coordinate work with park operations for seasonal shutdown, park activities, and public events.

C. Secure Areas: A portion of the work is required within the secure areas which surround some of the national monuments. These include the Lincoln Memorial, Washington Monument, and the Jefferson Memorial. Special construction requirements apply which may include the following:
   1. Coordinate with Park Police for access and security screening of all vehicles.
   2. Vehicle screening may be performed by Park Police K-9. Limited availability of screening animals may cause delay.
   3. Perimeter barriers may limit the size of vehicles which can access these areas.
   4. Contractor will submit a specific work plan for all activities within secure areas.

1.9 SUBSURFACE UTILITY LOCATES

A. Perform sub-surface locates to verify existing utilities and identify Park owned utilities within the project limits.

1. The contract plans are prepared from multiple sources and represent the best information available, but is known to contact inaccurate data.
2. This work requires an “elevated level” of effort beyond simple verification of records. This shall include:
   a. Broadening investigative areas to locate utilities shown on documents in acknowledgement that some record documents have been proven inaccurate.
   b. Closely examine local surface features for indications of buried utilities may be present. Features may include surface depressions, pavement cuts/irregularities, pedestals, valves, visible services entrances to buildings, and other similar.
3. Park owned utilities include communications/data cables/ductbanks, street lighting cables, water main pipes, irrigation and service lines, storm and sanitary sewers, steam tunnels, and other underground structures.

B. Prepare and submit accurate utility location plans for approval prior to commencing work.

1.10 SUBSURFACE INVESTIGATION REPORT

A. General soils investigation information is available in the following reports:

4. Subsurface Utility Location and Data Reports:
   a. Test Hole Certification Form, Utility Quality Level A Data; So-Deep Inc., April 19, 2017, Manassas Park, VA.

B. A copy of the report is available to all plan holders with this package.

C. If conflicts occur between the 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
PART 1 - GENERAL

1.1 SUMMARY

A. The work of this section consists of administrative and procedural requirements for contract modifications.

1.2 DEFINITIONS AND ALLOWANCES

A. Home Office Overhead: Those 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 the preparation of modifications will not be allowed. The 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, 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: These are 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 the 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: This is the hourly rate paid directly to the worker
      b. Labor Burden: Employer payments of all applicable burdens, this includes insurance and taxes that 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) FUTA– Cap Rate and percentage to be proportionally allocated over one year.
         5) 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 the contractor from claims resulting from bodily injury or property damage to a third party. Include this 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 that the contractor will pay the labor and material costs they have incurred. Banks and Insurance companies charge a premium for each individual project based on a sliding scale which relates to the size of the project. Include this as a separate line item in modification proposals and provide current company bonding rates upon request.

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

1.3 MODIFICATION PROPOSAL PRICING REQUIREMENTS

A. General:

1. Your proposal must be received in the format and within the time frame specified in the Request for Proposal letter. Costs or delays resulting from failure of contractor to submit within the time frame specified will not be compensable.

2. The proposal must 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 that 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 Gov’t provided form.
3. Requests for extensions of contract time as a result of this change must be justified with a Time Impact Analysis (TIA). Refer to Division 01 Specification, “Construction Schedule”, for time impact analysis requirements. TIA and associated costs must 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 the 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 upon request.

5. Contractor must review and approve all subcontractor/supplier pricing in detail for proper format, scope, production rates, and pricing prior to submission to the 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 the cost of labor by itemizing each craft involved, indicating worker hourly rate (base rate + labor burden + fringe benefits) for each and itemizing the hours required for each craft that will be directly engaged in modification work. Any work proposed that will require overtime work or premium pay shall be itemized separately. All 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, 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. The labor cost for foremen shall only be costs for related work required for the modification.

C. Materials:

1. The estimated cost for materials shall include quotes from multiple sources. Material prices must include all 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 the NPS.

D. Equipment:

1. Equipment used for the project must be appropriately sized for the 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 must be broken out separately.

3. Regardless of ownership, the rates to be used in determining equipment rental costs shall be the lowest cost from one of the following sources:

   a. 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. The estimated equipment rates shall include the operating costs of all fuel, oil, lubrication, supplies, small tools, necessary attachments, ground engaging components, tires & tracks, routine repairs and maintenance (cost of major repair and overhaul is not allowed per 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 the full rate for equipment only for the duration that the equipment will be utilized to accomplish the work of the modification.

6. Standby unit rates used are to be in accordance with paragraph 1.3, D, 2, above. If the US Army Corp of Engineers is utilized then their standby rates prevail. If Bluebook or local equipment pricing is accepted, then ½ of the 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, the established standby rate shall apply from the first day of the delay.

8. Equipment that is not used and on the jobsite for up to five consecutive days may be classified as standby rates, provided that the equipment is or has been used solely to perform work on the modification and will be necessary to complete additional modification work. Equipment that is 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………………..…9.50%

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, than the partnership may only receive home office overhead and profit in the same amount as an individual contractor (refer to par 1.3,E,1 above). It is the responsibility of the partners to decide on the division of revenue.

4. Combined Increases and Decreases: On proposals involving both increases and decreases in the Contract Price, the overhead and profit mark-ups are required on the 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 (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012601
SECTION 01 27 00 – DEFINITION OF CONTRACT LINE ITEMS

PART 1 - GENERAL

1.1 SUMMARY

A. The intent of this section is to explain, in general, what is and what is not included in a contract line item, and the limits or cut-off points where one item ends and another begins.

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

C. Options Description: The Base Project includes all work shown complete and ready for use, except for two (2) additive pricing options as shown on the contract plans and described below as follows:
   1. Option No. 1: Work related to Lincoln Memorial Service Line.
   2. Option No. 2: Work related to Line “L”.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF CONTRACT LINE ITEMS, BASE BID

A. Contract Line Item No. 0001, General Requirements
   1. This item is as specified in Division 01, including but not limited to permitting and associated fees, temporary facilities and equipment, pressure testing, disinfection, flushing and disposal. Excluded are mobilization/demobilization and erosion control.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

B. Contract Line Item No. 0002, Mobilization/Demobilization
   1. This item consists of mobilization, demobilization, and cleanup.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

C. Contract Line Item No. 0003, Erosion Control
   1. This item consists of furnishing, installing, maintaining, and removing erosion control measures in accordance with permit requirements, including but not limited to temporary tree protection, silt fencing, seeding, mulching, inlet protection, and cleanup.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.
D. Contract Line Item No. 0004, Maintenance of Traffic
   1. This item will provide temporary maintenance of traffic for all work areas in accordance
      with permit requirements, including but not limited to flagmen, lane controls, temporary
      steel plates, jersey barriers, and temporary signage.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

E. Contract Line Item No. 0005, Surface Restoration
   1. This item will restore all surface areas to original condition, including but not limited to
      concrete sidewalk demolition and replacement, asphalt pavement demolition and
      replacement, top soil and seeding.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

F. Contract Line Item No. 0006, Water Service Line, 1" Diameter
   1. This item consists of furnishing and installing 1" high density polyethylene (HDPE) tubing
      at various depths by horizontal directional drilling (HDD), including incidental open cut,
      with HDPE adapters, fittings, and required appurtenances for a complete and properly
      installed system. This item includes excavation, excavation support, backfill, and
      compaction of entrance and exit pits.
   2. Measurement for payment will be based on linear feet.
   3. Payment will be made at the contract price per linear foot.

G. Contract Line Item No. 0007, Water Service Line, 2" Diameter
   1. This item consists of furnishing and installing 2" HDPE tubing at various depths by HDD,
      including incidental open cut, with HDPE adapters, fittings, and required appurtenances
      for a complete and properly installed system. This item includes excavation, excavation
      support, backfill, and compaction of entrance and exit pits.
   2. Measurement for payment will be based on linear feet.
   3. Payment will be made at the contract price per linear foot.

H. Contract Line Item No. 0008, Pipe, High Density Polyethylene (HDPE), 8" Diameter, HDD
   1. This item consists of furnishing and installing 8" HDPE pipe at various depths by HDD
      with HDPE adapters, fittings, and required appurtenances for a complete and properly
      installed system. This item includes excavation, excavation support, and compaction of
      entrance and exit pits.
   2. Measurement for payment will be based on linear feet.
   3. Payment will be made at the contract price per linear foot.

I. Contract Line Item No. 0009, Pipe, High Density Polyethylene (HDPE), 12" Diameter, HDD
   1. This item consists of furnishing and installing 12" HDPE pipe at various depths by HDD
      with HDPE adapters, fittings, and required appurtenances for a complete and properly
installed system. This item includes excavation, excavation support, backfill, and compaction of entrance and exit pits.

2. Measurement for payment will be based on linear feet.
3. Payment will be made at the contract price per linear foot.

J. Contract Line Item No. 0010, Pipe, High Density Polyethylene (HDPE), 6" Diameter, Open Cut

1. This item consists of furnishing and installing 6" HDPE pipe at various depths by open cut, with fittings, couplers, thrust blocks/pads, marking tape, and required appurtenances for a complete and properly installed system. This item includes trenching, bedding, backfill, and compaction.
2. Measurement for payment will be based on linear feet.
3. Payment will be made at the contract price per linear foot.

K. Contract Line Item No. 0011, Pipe, High Density Polyethylene (HDPE), 8" Diameter, Open Cut

1. This item consists of furnishing and installing 8" HDPE pipe at various depths by open cut, with fittings, couplers, thrust blocks/pads, marking tape, and required appurtenances for a complete and properly installed system. This item includes trenching, bedding, backfill, and compaction.
2. Measurement for payment will be based on linear feet.
3. Payment will be made at the contract price per linear foot.

L. Contract Line Item No. 0012, Pipe, High Density Polyethylene (HDPE), 12" Diameter, Open Cut

1. This item consists of furnishing and installing 12" HDPE pipe at various depths by open cut, with fittings, couplers, thrust blocks/pads, marking tape, and required appurtenances for a complete and properly installed system. This item includes trenching, bedding, backfill, and compaction.
2. Measurement for payment will be based on linear feet.
3. Payment will be made at the contract price per linear foot.

M. Contract Line Item No. 0013, Gate Valve with Box, 8"

1. This item consists of furnishing and installing buried 8" gate valve with box at grade level, transitions to HDPE, and required appurtenances for a complete and properly installed system.
2. Measurement for payment will be for each.
3. Payment will be made at the contract price per each.

N. Contract Line Item No. 0014, Gate Valve with Box, 12"

1. This item consists of furnishing and installing buried 12" gate valve with box at grade level, transitions to HDPE, and required appurtenances for a complete and properly installed system.
2. Measurement for payment will be for each.
3. Payment will be made at the contract price per each.
O. Contract Line Item No. 0015, Air Release Valve Assembly
   1. This item consists of furnishing and installing air release valve assembly, concrete vault, connection to main pipe, fittings, and required appurtenances for a complete and properly installed system. This item includes trenching, bedding, backfill, and compaction.
   2. Measurement for payment will be for each.
   3. Payment will be made at the contract price per each.

P. Contract Line Item No. 0016, Fire Hydrant Assembly
   1. This item consists of furnishing and installing fire hydrant assembly with 6" diameter pressure class 350 ductile iron lateral piping, thrust blocks/pads, shutoff valve, fittings, and required appurtenances for a complete and properly installed system. This item includes trenching, bedding, backfill, and compaction.
   2. Measurement for payment will be for each.
   3. Payment will be made at the contract price per each.

Q. Contract Line Item No. 0017, Backflow Preventer
   1. This item consists of furnishing and installing backflow preventer assembly, concrete vault, isolation valves, fittings, couplers, and required appurtenances for a complete and properly installed system. This item includes trenching, bedding, backfill, and compaction.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

R. Contract Line Item No. 0018, DC Water Meter Fee
   1. This item consists of obtaining and paying fee for DC Water Meter permit and inspections as required. The amount shown in the Contract Price Schedule is assumed and shall be used as the basis for this Contract Line Item. Once DC Water issues the invoice for the actual permit and inspection fees, the assumed amount shall be reconciled against the actual invoice amount.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

S. Contract Line Item No. 0019, Refurbish Master Water Meter Vaults
   1. This item consists of work necessary to completely refurbish two (2) existing, old, 6-inch, master water meter vaults on Jefferson Street, along 14th Street, S.W. The work includes the following items:
      a. Perform a field survey of the interior of each of two master meter vaults and submit detail plans of the existing and proposed piping, valves, and appurtenances.
      b. Obtain construction permits for each meter. Payment of all related permit fees shall be included in CLIN 0018, DC Water Meter Fee.
      c. Shut down each master meter as approved and in coordination with DC Water and NPS. Coordinate with DC Water for removal of the existing water meter.
      d. Remove and replace completely all existing mechanical piping, valves, fittings and other appurtenances as necessary. Exclude embedded wall pipe.
      e. Include hauling and disposal of all demolition materials.
      f. Perform all testing and disinfection as required.
      g. Perform concrete patching as necessary to repair any holes and/or spalled concrete.
Obtain DC Water inspection and approval as necessary for the new 6-inch water meter. The water meters shall be furnished by DC Water and installed by the contractor.

Place new master meters (2) into service in coordination with DC Water and NPS.

Measurement for payment will be based on percent completion agreed upon.

Payment will be made at the contract lump sum price.

T. Contract Line Item No. 0020, Miscellaneous Work

This item consists of any work required but not included in the contract line items above, including but not limited to the following items:

- Miscellaneous demolition of water lines and fire hydrants.
- Water fountains.
- Service connections on water mains, including tapping sleeves.
- Miscellaneous cut and capping of existing water lines.
- Service connections to existing valves, fountains, and small meters at existing facilities.

Measurement for payment will be based on percent completion agreed upon.

Payment will be made at the contract lump sum price.

3.2 LIST OF CONTRACT LINE ITEMS, OPTION NO. 1—LINCOLN MEMORIAL SERVICE LINE

A. Contract Line Item No. 0001, General Requirements

This item is as specified in Division 01, including but not limited to permitting and associated fees, temporary facilities and equipment, pressure testing, disinfection, flushing, and disposal. Excluded are mobilization/demobilization and erosion control.

Measurement for payment will be based on percent completion agreed upon.

Payment will be made at the contract lump sum price.

B. Contract Line Item No. 0002, Erosion Control

This item consists of furnishing, installing, maintaining, and removing erosion control measures in accordance with permit requirements, including but not limited to temporary tree protection, silt fencing, seeding, mulching, inlet protection, and cleanup.

Measurement for payment will be based on percent completion agreed upon.

Payment will be made at the contract lump sum price.

C. Contract Line Item No. 0003, Surface Restoration

This item will restore all surface areas to original condition, including but not limited to concrete sidewalk demolition and replacement, asphalt pavement demolition and replacement, top soil and seeding.

Measurement for payment will be based on percent completion agreed upon.

Payment will be made at the contract lump sum price.
D. Contract Line Item No. 0004, Pipe, High Density Polyethylene (HDPE), 8" Diameter, HDD
   1. This item consists of furnishing and installing 8" HDPE pipe at various depths by HDD with HDPE adapters, fittings, and required appurtenances for a complete and properly installed system. This item includes excavation, excavation support, and compaction of entrance and exit pits.
   2. Measurement for payment will be based on linear feet.
   3. Payment will be made at the contract price per linear foot.

3.3 LIST OF CONTRACT LINE ITEMS, OPTION NO. 2—LINE "L"

A. Contract Line Item No. 0001, General Requirements
   1. This item is as specified in Division 01, including but not limited to permitting and associated fees, temporary facilities and equipment, pressure testing, disinfection, flushing, and disposal. Excluded are mobilization/demobilization and erosion control.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

B. Contract Line Item No. 0002, Erosion Control
   1. This item consists of furnishing, installing, maintaining, and removing erosion control measures in accordance with permit requirements, including but not limited to temporary tree protection, silt fencing, seeding, mulching, inlet protection, and cleanup.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

C. Contract Line Item No. 0003, Surface Restoration
   1. This item will restore all surface areas to original condition, including but not limited to concrete sidewalk demolition and replacement, asphalt pavement demolition and replacement, top soil and seeding.
   2. Measurement for payment will be based on percent completion agreed upon.
   3. Payment will be made at the contract lump sum price.

D. Contract Line Item No. 0004, Pipe, High Density Polyethylene (HDPE), 8" Diameter, HDD
   1. This item consists of furnishing and installing 8" HDPE pipe at various depths by HDD with HDPE adapters, fittings, and required appurtenances for a complete and properly installed system. This item includes excavation, excavation support, and compaction of entrance and exit pits.
   2. Measurement for payment will be based on linear feet.
   3. Payment will be made at the contract price per linear foot.

E. Contract Line Item No. 0005, Fire Hydrant Assembly
   1. This item consists of furnishing and installing fire hydrant assembly with 6" diameter pressure class 350 ductile iron lateral piping, thrust blocks/pads, shutoff valve, fittings, and
required appurtenances for a complete and properly installed system. This item includes
trenching, bedding, backfill, and compaction.
2. Measurement for payment will be for each.
3. Payment will be made at the contract price per each.

END OF SECTION 01 27 00
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.
4. Coordination Drawings.
5. Requests for Information (RFIs).
6. NPS/DSC SharePoint Project Website.
7. Project meetings.
8. Environmental Coordination.

B. Related Requirements:

1. Section 01 11 00 “Summary of Work” for work under other contracts and concurrent work at Project site.
2. Section 01 32 16 “Construction Schedule” for preparing and submitting Contractor’s construction schedule.
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.

1.2 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.

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 and status.
7. Pre-installation conferences.
8. Project closeout activities.

1.3 SUBMITTALS

A. Division 01 documents: The following items shall be submitted a minimum of one week prior to the Preconstruction Conference. Contracting Officer 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.
10. Temporary Storm Water Pollution Prevention Plan (SWPP or UPPP).
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.

B. All items listed must be provided to the Contracting Officer 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 Contracting Officer will consider other contractual remedies. Work shall not commence until written Notice to Proceed has been issued.

1.4 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 NPS/DSC SharePoint 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 NPS/DSC SharePoint 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 Architect’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.

1.5 PROJECT WEB SITE

A. Use the NPS/DSC SharePoint Project website for communication throughout the contract period. The NPS/DSC SharePoint Project website will be used for the following functions:

1. Project directory.
2. Project correspondence.
3. Meeting agendas and minutes.
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.
13. Reminder and tracking 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 NPS/DSC SharePoint Project website. Documents containing Personal Identifying Information (PII) (i.e., certified payrolls) shall not be shared using the NPS/DSC SharePoint Project website and shall be coordinated with the SharePoint Project team as appropriate.

C. Submit to the CO a list of all employees who will need access to the website. The users will receive an invitation to register from the Department of Interior (DOI). Once the user is registered on the DOI website, they will be given access to the NPS/DSC SharePoint Project website. For login procedures and other SharePoint information, refer to the Workflows website at http://www.nps.gov/dscw/precon_spproj.htm.

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

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

A. Preconstruction Conference: Before start of construction, Contracting Officer 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.
4. Resolution of comments on required Division 01 documents.
5. Coordination of Subcontractors.
7. Modifications.
8. Payments to Contractor.
9. Schedule of values.
10. Payroll reports.
12. Liquidated damages.
15. Notice to proceed.
16. Correspondence procedures.
17. NPS/DSC SharePoint Project website.
18. Acceptance/rejection of work.
19. Progress meetings.
20. Submittal procedures.
21. NPS Final Accessibility Inspection.
22. Environmental requirements.
23. Permit requirements.
24. As-constructed drawings/operation and maintenance (O&M) manuals.
25. Saturday, Sunday, holiday and night work.
27. Value engineering.

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, Accessibility, etc.).
g. Inspections of work in progress and projected (Special inspections, etc.).
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.

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:
   b. Options.
   c. Related RFI's.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Possible conflicts.
   i. Compatibility requirements.
   j. Time schedules.
   k. Schedule of values.
   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. Permit Requirements and Conditions.
   u. Testing and inspecting requirements.
   v. Installation procedures.
   w. Coordination with other work.
   x. Required performance results.
   y. Protection of adjacent work.
   z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of 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.
1.7 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.
   d. Implementation of the Storm Water Pollution Prevention Plan (SWPPP).
   e. Present an overview of environmental issues and summarize site specific procedures relating to management plans at the Preconstruction conference.
   f. Training for Contractor personnel in accordance with their position requirements.
   g. Monitoring and documentation of environmental procedures, including non-compliance.

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

1. Quality Requirements.
2. Regulatory Requirements.
3. Temporary Storm Water Pollution Prevention Environmental 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:
   b. Temporary Storm Water Pollution Prevention.
   c. Turf and Soil Management.
4. Pollution Prevention (P2) practices: Submit evidence of P2 training.
5. Compliance with environmental regulations: As specified in Regulatory Requirements. Submit Contractor 40 CFR employee training records upon request of Contracting Officer.

D. Provide documentation for environmental procedures as specified herein and in accordance with approved Waste Management Plan, IAQ Management Plan, and Storm Water Pollution Prevention Plan.
1.8 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. 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. DC Water & Sewer Availability Certificate: Issued by DC Water and required for all projects that entail a connection to the water system. This is required for tapping existing water main on 14th SW and to obtain a new master meter for water service.

2. DC Water & Sewer Temporary Discharge Authorization Permit from the Department of Wastewater Treatment, Pretreatment Program for discharge of construction-related wastewater.

3. NPDES E&SC Permit: Issued by the DC Department of Energy and Environment, is required for land disturbance. The Government will provide a draft Stormwater Pollution Prevention Plan (SWPPP) to the Contractor to complete and submit for DC approval.

4. NPS Construction Permit(s): Necessary for construction on Park Lands.
   a. Haul Permit.
   b. Street Permit for partial closure of Jefferson Street necessary for work related to refurbishing existing master water meters.

5. Local Utilities:
   a. PEPCO: Approval may be required for construction crossing or close to lines.
   b. Telecommunications: Approval may be required for construction crossing or close to lines.

6. District department of Transportation (DDOT): Coordination and possible permit for maintenance of traffic on Jefferson Street for work related to existing master water meters.

7. District of Columbia, Public Space Permit: May be necessary along Jefferson Street for work related to existing master water meters, and for the waterline connection which will temporarily close half of West Basin Drive, south of the intersection with Independence Avenue.

8. USACE-USC 408 Permit for Alteration of Civil Works: Issued by U.S. Army Corps of Engineers, Baltimore District. May be required for pipeline construction work within jurisdiction limits of DC floodwall and/or levee along 17th Street, N.W. and near Lincoln Memorial.
C. Coordination with Agency(ies) with Jurisdiction Issuing Permits:

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

D. Administrative Procedures:

1. Coordinate scheduling and timing of required administrative provisions of project permits with Agency(ies) with Jurisdiction, Construction Manager, and Park to avoid conflicts and to ensure orderly execution of the Work.
2. Supply all needed information to Agency(ies) 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 NPS/DSC SharePoint project website 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.

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.

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. 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: After contract award and before the Pre-Construction conference, submit two paper copies of baseline schedule, large enough to show entire schedule for entire construction period.

D. CPM Reports: Concurrent with CPM schedule, submit three 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 two 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 and interim milestones.
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.
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


1. Develop and finalize Construction Baseline Schedule so it can be accepted for use no later than 20 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 Government's 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. Activities: Indicate the estimated duration, sequence requirements, and relationship of each activity in relation to other activities.

2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.

3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
4. 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.

5. 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.

6. 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.

7. 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 duration’s 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. Weather days shall be based on data for the local area from a reliable source like the National Oceanic and Atmospheric Administration (NOAA), National Park Service records, or source acceptable to the Contracting Officer. Apply this calendar to activities that are anticipated to be affected by weather.

   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. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in the schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
g. Submittal Review Time: Include review and re-submittal times indicated. Coordinate submittal review times in Construction Baseline Schedule.
h. Startup and Testing Time: Include not less than 3 days for startup and testing.
i. 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.)

8. 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) Partial occupancy before Substantial Completion.
   5) Use of premises restrictions.
   6) Provisions for future construction.
   7) Seasonal variations.
   8) Environmental control.
   9) 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) Mockups.
   5) Fabrication.
   6) Sample testing.
   7) Deliveries.
   8) Installation.
   9) Tests and inspections.
  10) Adjusting.
  11) Curing.
  12) Building flush-out.
  13) Building commissioning activities.

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

a. Road Lane Closures
b. Utility Outages
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 current Windows operating system.

PART 3 - EXECUTION

3.1 CONSTRUCTION SCHEDULE UPDATES

A. Progress Meeting Updates: Provide a 2week 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.
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
SECTION 01 32 33 – PHOTO DOCUMENTATION FOR HISTORIC PRESERVATION PROJECTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes administrative and procedural requirements for the following:
   1. Existing Condition images.
   2. Periodic construction images.

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

1.2 SUBMITTALS

A. Construction Images: Images will be taken prior to the start of work activities. Submit images electronically within seven days of taking the image. Include the following for each:
   1. Include Date, time and number (sequentially number all images) in filename.
   2. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
   3. Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

B. Closeout: Submit a complete set of digital image electronic files as a Project Record Document. Submit on either a Compact Disc (CD) or Digital Video Disc (DVD).
   1. Provide an index as a separate file on the Disc. List each image as a file name with number, date, and time. Include description and or vantage point image was taken.
   2. Submit images that have the same aspect ratio as the sensor, un-cropped.

PART 2 - PRODUCTS

2.1 FORMAT REQUIREMENTS

A. Media: CD-R Archival Gold or DVD-R Archival Gold

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

C. Images: Provide sRGB color images in JPEG format. Minimum sensor size of 8 pixels, and at an image resolution of not less than 1600 by 1200 pixels.
PART 3 - EXECUTION

3.1 CONSTRUCTION IMAGES

A. General: Take digital images using the maximum range of depth of field, and that are in focus, to clearly show the Work. Images with blurry or out-of-focus areas will not be accepted.

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

B. Existing Condition Images: Before starting construction, take color digital images of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Contracting Officer.

1. Flag construction limits before recording construction images.
2. Take eight separate images to show existing conditions adjacent to property before starting the Work.
3. Take eight separate images of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

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

D. Additional Images: Contracting Officer may issue requests for additional images, in addition to periodic Construction images specified.

1. Three days notice will be given, where feasible.
2. In emergency situations, take additional images within 24 hours of request.
3. Circumstances that could require additional images include, but are not limited to, the following:

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

END OF SECTION 01 32 33
SECTION 01 33 23 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This 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 the 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.


1.3 GENERAL SUBMITTAL PROCEDURES

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

1. Contracting Officer reserves the 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 them for legibility, accuracy, completeness, and compliance with Contract Documents.

1. Coordinate each 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 the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

a. Contracting Officer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
C. Submittal List: A submittal list has been attached to the end of this Specification Section. The intent is to provide an overall summary of submittal 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 submittal list.

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

1. Action Submittals
   a. Initial Review: Allow 30 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
   b. Re-submittal Review: Allow 15 days for review of each re-submittal.

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

E. Approved Equals:

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

2. A request for approval constitutes a representation that Contractor:
   a. Has investigated the proposed item and determined that it is equal or superior in all respects to that specified.
   b. Will provide the same warranties for the proposed item as for the item specified.
   c. Has determined that the proposed item is compatible with interfacing items.
   d. Will coordinate the installation of an approved item and make all changes required in other elements of the work because of the substitution.
   e. Waives all 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. CM-SPE Transmittal Form: All submittals shall be transmitted using National Park Service form CM-SPE form. The form is accessed and completed on the NPS/DSC SharePoint Project website. No action will be taken on a submittal item unless accompanied by the CM-SPE transmittal form.
   a. Complete the general information at the top of the form.
   b. Provide all required information based on the submittal type
   c. Attach all related documents.

2. Sign the CM-SPE form in the contractor section at the bottom of the form, and select “submit” when complete. Physical samples: Complete the CM-SPE on the NPS/DSC SharePoint Project website as described above. Deliver the physical sample to the CO (or designee) on site for processing. All comments and actions will be documented on the CM-SPE form on the NPS/DSC SharePoint Project 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 an alphabetic suffix after another decimal point (e.g., .001.A).

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

1. Note date and content of previous submittal.
2. Note date and content of revision in the title block on the CM-SPE and clearly indicate the 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 all notations have been incorporated and, at a minimum, keep one copy of the final approved submittal on site for use during construction.

1.4 CONTRACTOR’S USE OF CAD FILES

A. General: At Contractor’s written request, copies of CAD files will be provided to Contractor for Contractor’s use in connection with Project, subject to the following conditions:

1. Files will be provided as is; no format or other changes to files or changes to the 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. Include the following information, as applicable:
   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 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 unless submittal of CAD Drawings is otherwise permitted.

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

2. Submit shop drawings as a 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 CM-SPE on the NPS SharePoint website for processing and documentation of action on submitted samples.
3. Identification: Attach label on unexposed side of Samples that includes the following:
   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 the 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 the 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 submittal 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, but are not limited to, the following: 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. Retain Sample set as a Project Record Sample.

D. Construction Materials: The Contractor is encouraged to submit for approval products made out of recycled or environmentally responsible material. Every effort will be made by the 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 SharePoint website.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

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

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

C. Contractors Construction Schedule: Comply with the requirements specified in Section 01 32 16 “Construction Schedule.”

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

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

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

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

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

I. Tree removal and tree trimming plan: Submit to Contracting Officer for review and comment. Identify location, diameter of truck at 4.5 feet above ground. Provide photo of tree in current conditions.

J. Qualification Data: Prepare written information that demonstrates 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.

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

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

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

N. Product Certificates: Prepare written statements on manufacturer’s letterhead certifying that product complies with the requirements in the Contract Documents.
O. Material Certificates: Prepare written statements on manufacturer’s letterhead certifying that material complies with the requirements in the Contract Documents.

P. 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 the requirements in the Contract Documents.

Q. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with the requirements in the 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.

R. 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.

S. 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 the Contract Documents.

T. 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.

U. 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 the requirements in the Contract Documents.

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

W. Design Data: Prepare written and graphic information, including, but not limited to, 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.

X. Manufacturer’s Instructions: Prepare written or published information that documents 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.

Y. Manufacturer’s Field Reports: Prepare written information documenting factory-authorized service representative’s tests and inspections. Include the following, as applicable:

2. Summary of installation procedures being followed, whether they comply with the 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.

Z. 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 the Contract and for compliance with the 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 the back of the submittal; an incorrect format of submittals is provided; the 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 the Contractor’s own risk.

B. Action Submittals: Contracting Officer will review each submittal, generate comments on corrections or modifications required, and indicate the appropriate action on the CM-SPE Transmittal Form. The submittal will be marked in one of three ways as defined below:

1. APPROVED: Acceptable with no corrections.
2. APPROVED WITH NOTATIONS: Minor corrections or clarifications required. All comments are clear and no further review is required. The Contractor shall address all 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. The Contracting Officer will identify the reasons for disapproval. The 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
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Note: See tab below for Samples and Instructions. Attach to end of Specification Section 01 33 23 when complete.
## SUBMITTAL LIST

Note: See tab below for Samples and Instructions. Attach to end of Specification Section 01 33 23 when complete.

### NAMA/PMIS 151059D/Rehabilitate Water Systems for Emergency and Potable Water Supply in West Potomac Park

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## SUBMITTAL LIST

*Nose: See tab below for Samples and Instructions. Attach to end of Specification Section 01 33 23 when complete.*

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## SUBMITTAL LIST

*Note: See tab below for Samples and Instructions. Attach to end of Specification Section 01 33 23 when complete.*

### NAMA/PMIS 151059D/Rehabilitate Water Systems for Emergency and Potable Water Supply in West Potomac Park

<table>
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<th>Spec. Sec.</th>
<th>Par. No.</th>
<th>Description</th>
<th>REQUIREMENTS (indicate with an &quot;X&quot;)</th>
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#### NAMA/PMIS 151059D/Rehabilitate Water Systems for Emergency and Potable Water Supply in West Potomac Park

<table>
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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 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.

1.3 SUBMITTALS

A. Daily Work Schedule; Submit a Daily work Schedule detailing construction work in archeologically sensitive areas. Submit to Contracting Officer 30 days before start of ground disturbing site work.

1.4 QUALITY ASSURANCE

A. At least one week before on-site work begins, Contractor shall meet with Contracting Officer and Archeological Monitor to discuss Daily Work Schedule 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 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.

3.3 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 to record locations of findings.
3.4 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.

3.5 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
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.

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. 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. Operators of vehicles, hoisting equipment, and hazardous plant 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 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. Within 7 days of a reportable accident, fill out and forward to Contracting Officer an Accident/Property Damage Report (Form CM-22). Form may be obtained from the Contracting Officer.
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 a Job Hazard Analysis (JHA)/Job Safety Analysis (JSA), etc.
5. Training, both initial and continuing.
6. 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.

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 29CFR 1926.95 Subpart E.

PART 3 - EXECUTION

3.1 EMERGENCY INSTRUCTIONS

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

3.2 FIRE AND LIFE SAFETY

A. Comply with the requirements of NFPA 241 (Standard for Safeguarding Construction, Alteration, and Demolition Operations).
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. Train employees how to respond to a spill and use the emergency response kit.

3.3 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 and on a periodic basis to ensure safe operation. Retain inspection documentation onsite.

3.4 SAFETY MEETINGS

A. As a minimum, conduct one weekly 15-minute "toolbox" safety meetings. 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.

3.5 HARD HATS AND PROTECTIVE EQUIPMENT AREAS

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

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

3.6 TRAINING

A. First Aid: 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.

END OF SECTION 01 35 23
SECTION 01 35 91 - HISTORIC PRESERVATION TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1. Definitions.
2. Submittals.
4. Storage and protection of existing historic materials.
5. Project site conditions.
6. Historic Preservation Treatment Plan
8. Protection during application of chemicals.

1.2 DEFINITIONS

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

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

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

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

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

F. "Protect and Maintain": To remove deteriorating corrosion, reapply protective coatings, and install protective measures such as temporary guards; to provide the least degree of intervention.
G. "Repair": To stabilize, consolidate, or conserve; to retain existing materials and features while employing as little new material as possible. Repair includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials. Within restoration, repair also includes limited replacement in kind, rehabilitation, and reconstruction, with compatible substitute materials for deteriorated or missing parts of features when there are surviving prototypes.

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

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

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

J. "Remove and Salvage": To detach items from existing construction and deliver them to the NPS.

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

L. "Existing to Remain" or "Retain": Existing items of construction that are not to be removed and that are not otherwise indicated to be removed and salvaged, or removed and reinstalled.

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

1.3 SUBMITTALS

A. Historic Preservation Treatment Plan:

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

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

C. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by historic treatment operations. Submit before work begins.

1.4 QUALITY ASSURANCE

A. Historic Preservation Treatment Specialist Qualifications: An experienced firm with the required certifications and training that can demonstrate through past performance that they are qualified to perform this work.

1.5 STORAGE AND PROTECTION OF HISTORIC MATERIALS

A. Removed and Salvaged Historic Materials:

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

B. Removed and Reinstalled Historic Materials:

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

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

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

1. Identify removed items with an inconspicuous mark indicating their original location.
2. Develop a key plan when many similar items are scheduled for removal and reinstallation.
1.6 PROJECT-SITE CONDITIONS

A. Exterior Cleaning and Repairing:

1. Proceed with the work only when forecasted weather conditions are favorable.
   
   a. Wet Weather: Do not attempt repairs during rainy or foggy weather. Do not apply primer, paint, putty, or epoxy when the relative humidity is above 80 percent. Do not remove exterior elements of structures when rain is forecast or in progress.
   
   b. Do not perform exterior wet work when the air temperature is below 40 degrees F (5 degrees C).
   
   c. Do not begin cleaning, patching, or repairing when there is any likelihood of frost or freezing.
   
   d. Do not begin cleaning when either the air or the surface temperature is below 45 degrees F (7 degrees C) unless approved means are provided for maintaining a 45 degrees F (7 degrees C) temperature of the air and materials during, and for 48 hours subsequent to, cleaning.
   
2. Perform cleaning and rinsing of the exterior only during daylight hours.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 HISTORIC PRESERVATION TREATMENT PLAN

A. Prepare a written technical plan for preservation work covering all preservation components of the project. The plan must verify that the construction strategy and the intent is compatible with the Department Of Interior’s standards for the Treatment of Historic Properties, guidelines for the Treatment of Cultural Landscapes, and National Park Service management policies for cultural resources. The plan must satisfy both the project scope and resource protection requirements. The plan shall include the following:

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

3.2 PROTECTION, GENERAL

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

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

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

D. Protect landscape work adjacent to or within work areas as follows:
   1. Provide barriers to protect tree trunks.
   2. Bind spreading shrubs.
   3. Use coverings that allow plants to breathe and remove coverings at the end of each day. Do not cover plant material with a waterproof membrane for more than 8 hours at a time.
   4. Set scaffolding and ladder legs away from plants.

E. Existing Drains: Prior to the start of work or any cleaning operations, test drains and other water removal systems to ensure that drains and systems are functioning properly. Notify Contracting Officer immediately of drains or systems that are stopped or blocked. Do not begin Work of this Section until the drains are in working order.
   1. Provide a method to prevent solids including stone or mortar residue from entering the drains or drain lines. Clean out drains and drain lines that become blocked or filled by sand or any other solids because of work performed under this Contract.
   2. Protect storm drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

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

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

C. Cover adjacent surfaces with materials that are proven to resist chemical cleaners selected for Project unless chemicals being used will not damage adjacent surfaces. Use covering materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
D. Do not clean surfaces during winds of sufficient force to spread cleaning solutions to unprotected surfaces.

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

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

3.4 PROTECTION DURING USE OF HEAT-GENERATING EQUIPMENT

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

1. Obtain Contracting Officer’s approval for operations involving use of open-flame or welding equipment.
   a. Notification shall be given for each occurrence and location of work with heat-generating equipment.
   b. Obtain the appropriate permit from the park as required.

2. As far as practical, use heat-generating equipment in shop areas or outside the building.

3. Before work with heat-generating equipment commences, furnish personnel to serve as a fire watch (or watches) for location(s) where work is to be performed.

4. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.

5. Remove and keep the area free of combustibles, including, rubbish, paper, waste, etc., within area of operations.
   a. If combustible material cannot be removed, provide fireproof blankets to cover such materials.

6. Where possible, furnish and use baffles of metal or gypsum board to prevent the spraying of sparks or hot slag into surrounding combustible material.

7. Prevent the extension of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.

8. Inspect each location of the day's work not sooner than 30 minutes after completion of operations to detect hidden or smoldering fires and to ensure that proper housekeeping is maintained.

B. Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to automatic sprinkler heads, shield the individual heads temporarily with guards.
3.5 HISTORIC PRESERVATION TREATMENT PROCEDURES

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

1. Retain as much existing material as possible; repair and consolidate rather than replace.
2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
3. Use reversible processes wherever possible.
4. Use traditional replacement materials and techniques if possible. New work shall be distinguishable from old work and original materials and techniques.
5. Record the existing condition before commencing with repair work; document with preconstruction photos, sketches and field notes. Record repair work during construction with periodic construction photos and daily inspection reporting. Photo documentation is specified in Division 01 Section "Photo Documentation For Historic Preservation Projects".

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

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

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

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

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

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

END OF SECTION 01 35 91
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 three copies of complete test results no later than one calendar day after the test was performed.

E. Accessibility Inspection Report:
1. Fill out the applicable sections of the Accessibility Inspection Report and attach to the Quality Control Daily Report.
2. Utilize the attached Accessibility Inspection form to document compliance with the Architectural Barriers Act Accessibility Standards (ABAAS).
3. Inspect at various stages of construction as needed to insure the finished product meets the standards.
4. Submit report not later than one calendar day after the inspection was performed.

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

G. 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.

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

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. 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. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. 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.

H. 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.

1.6 QUALITY CONTROL

A. The Contractor is responsible for all testing and inspections, including Structural Tests and Special Inspections (STSI), as identified in the attached STSI. 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.

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

B. 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.

C. Re-testing/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced work that failed to comply with the Contract Documents.
D. Testing Agency Responsibilities: Cooperate with NPS and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Contracting Officer and Contractor promptly of irregularities or deficiencies observed in 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.

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

F. 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.
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.
5. Methods of monitoring and controlling environmental pollution and contamination as required by regulations and laws.

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.

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. Comply with the Contract Document requirements for Division 01 Section “Cutting and Patching.”

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

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

END OF SECTION 01 40 00
PART 1 - GENERAL

1.1 ENVIRONMENTAL DEFINITIONS

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

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

1. Biobased content: 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.

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

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

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

F. Environmentally preferable products: Products and services that have a lesser or reduced effect on the environment in comparison to conventional products and services. Refer to EPA’s Final Guidance on Environmentally Preferable Purchasing at http://www.epa.gov/oppt/epp/.

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

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

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

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

1.2 QUALITY ASSURANCE

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

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

C. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards may establish different or conflicting requirements for minimum quantities or 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.

1.3 INDUSTRY STANDARDS

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

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

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

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

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.
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<td>AA Aluminum Association (The)</td>
<td><a href="http://www.aluminum.org">www.aluminum.org</a></td>
<td>(703) 358-2960</td>
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<tr>
<td>AABC Associated Air Balance</td>
<td>Council</td>
<td>(202) 737-0202</td>
<td><a href="http://www.aabehq.com">www.aabehq.com</a></td>
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<td>AAMA American Architectural</td>
<td>Manufacturers Association</td>
<td>(847) 303-5664</td>
<td><a href="http://www.aamanet.org">www.aamanet.org</a></td>
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<tr>
<td>AASHTO American Association</td>
<td>of State Highway and Transportation Officials</td>
<td>(202) 624-5800</td>
<td><a href="http://www.transportation.org">www.transportation.org</a></td>
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<tr>
<td>AATCC American Association of</td>
<td>Textile Chemists and Colorists</td>
<td>(919) 549-8141</td>
<td><a href="http://www.aatcc.org">www.aatcc.org</a></td>
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<tr>
<td>ABAA Air Barrier Association</td>
<td>of America</td>
<td>(866) 956-5888</td>
<td><a href="http://www.airbarrier.org">www.airbarrier.org</a></td>
</tr>
<tr>
<td>ABMA American Bearing</td>
<td>Manufacturers Association</td>
<td>(202) 367-1155</td>
<td><a href="http://www.abma-dc.org">www.abma-dc.org</a></td>
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<tr>
<td>ACI American Concrete Institute</td>
<td></td>
<td>(248) 848-3700</td>
<td><a href="http://www.concrete.org">www.concrete.org</a></td>
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<tr>
<td>ACPA American Concrete Pipe</td>
<td>Association</td>
<td>(972) 506-7216</td>
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<td>AEIC Association of Edison</td>
<td>Illuminating Companies, Inc. (The)</td>
<td>(205) 257-2530</td>
<td><a href="http://www.aeic.org">www.aeic.org</a></td>
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<tr>
<td>AF&amp;PA American Forest &amp; Paper</td>
<td>Association</td>
<td>(800) 878-8878</td>
<td><a href="http://www.afandpa.org">www.afandpa.org</a></td>
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<td>AGA American Gas Association</td>
<td></td>
<td>(202) 824-7000</td>
<td><a href="http://www.aga.org">www.aga.org</a></td>
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<tr>
<td>AHAM Association of Home</td>
<td>Appliance Manufacturers</td>
<td>(202) 872-5955</td>
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<tr>
<td>AI Asphalt Institute</td>
<td></td>
<td>(859) 288-4960</td>
<td><a href="http://www.asphaltinstitute.org">www.asphaltinstitute.org</a></td>
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<tr>
<td>AIA American Institute of</td>
<td>Architects (The)</td>
<td>(800) 242-3837</td>
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<tr>
<td>AISC American Institute of</td>
<td>Steel Construction</td>
<td>(800) 644-2400</td>
<td><a href="http://www.aisc.org">www.aisc.org</a></td>
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03414 REFERENCES
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<td>AISI</td>
<td>American Iron and Steel Institute</td>
<td>(202) 452-7100</td>
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<td>AITC</td>
<td>American Institute of Timber Construction</td>
<td>(303) 792-9559</td>
<td><a href="http://www.ai">www.ai</a> tc-glulam.org</td>
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<tr>
<td>ALSC</td>
<td>American Lumber Standard Committee, Incorporated</td>
<td>(301) 972-1700</td>
<td><a href="http://www.alsc.org">www.alsc.org</a></td>
</tr>
<tr>
<td>ANSI</td>
<td>American National Standards Institute</td>
<td>(202) 293-8020</td>
<td><a href="http://www.ansi.org">www.ansi.org</a></td>
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<tr>
<td>AOSA</td>
<td>Association of Official Seed Analysts, Inc.</td>
<td>(405) 780-7372</td>
<td><a href="http://www.aosaseed.com">www.aosaseed.com</a></td>
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<tr>
<td>APA</td>
<td>APA - The Engineered Wood Association</td>
<td>(253) 565-6600</td>
<td><a href="http://www.apawood.org">www.apawood.org</a></td>
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<tr>
<td>APA</td>
<td>Architectural Precast Association</td>
<td>(239) 454-6989</td>
<td><a href="http://www.archprecast.org">www.archprecast.org</a></td>
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<tr>
<td>API</td>
<td>American Petroleum Institute</td>
<td>(202) 682-8000</td>
<td><a href="http://www.api.org">www.api.org</a></td>
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<td>ARI</td>
<td>Air-Conditioning &amp; Refrigeration Institute</td>
<td>(703) 524-8800</td>
<td><a href="http://www.ari.org">www.ari.org</a></td>
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<tr>
<td>ARMA</td>
<td>Asphalt Roofing Manufacturers Association</td>
<td>(202) 207-0917</td>
<td><a href="http://www.asphaltroofing.org">www.asphaltroofing.org</a></td>
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<tr>
<td>ASCE</td>
<td>American Society of Civil Engineers</td>
<td>(800) 548-2723</td>
<td><a href="http://www.asce.org">www.asce.org</a></td>
</tr>
<tr>
<td>ASCE/SEI</td>
<td>American Society of Civil Engineers/Structural Engineering Institute</td>
<td>(703) 295-6300</td>
<td>(See ASCE)</td>
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<tr>
<td>ASHRAE</td>
<td>American Society of Heating, Refrigerating and Air-Conditioning Engineers</td>
<td>(800) 527-4723</td>
<td><a href="http://www.ashrae.org">www.ashrae.org</a></td>
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<tr>
<td>ASME</td>
<td>ASME International</td>
<td>(800) 843-2763</td>
<td>(American Society of Mechanical Engineers International)</td>
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<td>ASSE</td>
<td>American Society of Sanitary Engineering</td>
<td>(440) 835-3040</td>
<td><a href="http://www.asse-plumbing.org">www.asse-plumbing.org</a></td>
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<td>ASTM</td>
<td>ASTM International (American Society for Testing and Materials International)</td>
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<td>Alliance for Telecommunications Industry Solutions</td>
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<td>AWCMA</td>
<td>American Window Covering Manufacturers Association (Now WCMA)</td>
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<td>AWCI</td>
<td>Association of the Wall and Ceiling Industry</td>
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<td>AWI</td>
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<td>American Wood Protection Association (Formerly: American Wood Preservers' Association)</td>
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<td>AWS</td>
<td>American Welding Society</td>
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<td>BIA</td>
<td>Brick Industry Association (The)</td>
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<td>BICSI</td>
<td>BICSI, Inc.</td>
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<td>Baking Industry Sanitation Standards Committee</td>
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<td>CCC</td>
<td>Carpet Cushion Council</td>
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<td>CDA</td>
<td>Copper Development Association</td>
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<td>CEA - Canadian Electricity Association</td>
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<td><a href="http://www.canelect.ca">www.canelect.ca</a></td>
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<td></td>
<td>(613) 230-9263</td>
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<td>CEA - Consumer Electronics Association</td>
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<td><a href="http://www.ce.org">www.ce.org</a></td>
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<td>(866) 858-1555</td>
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<td>CFFA - Chemical Fabrics &amp; Film Association</td>
<td>Chemical Fabrics &amp; Film Association</td>
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<td><a href="http://www.chemicalfabricsandfilm.com">www.chemicalfabricsandfilm.com</a></td>
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<td></td>
<td>(216) 241-7333</td>
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<td>CGA - Compressed Gas Association</td>
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<td><a href="http://www.ceganet.com">www.ceganet.com</a></td>
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<td>(703) 788-2700</td>
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<td>CIMA - Cellulose Insulation Manufacturers Association</td>
<td>Cellulose Insulation Manufacturers Association</td>
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<td><a href="http://www.cellulose.org">www.cellulose.org</a></td>
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<td>(888) 881-2462</td>
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<td>CISCA - Ceilings &amp; Interior Systems Construction Association</td>
<td>Ceilings &amp; Interior Systems Construction Association</td>
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<td><a href="http://www.cisca.org">www.cisca.org</a></td>
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<td>(630) 584-1919</td>
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<td>CISPI - Cast Iron Soil Pipe Institute</td>
<td>Cast Iron Soil Pipe Institute</td>
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<td><a href="http://www.cispi.org">www.cispi.org</a></td>
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<td>(423) 892-0137</td>
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<td>CLFMI - Chain Link Fence Manufacturers Institute</td>
<td>Chain Link Fence Manufacturers Institute</td>
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<td><a href="http://www.chainlinkinfo.org">www.chainlinkinfo.org</a></td>
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<td>(301) 596-2583</td>
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<td>CPA - Composite Panel Association</td>
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<td><a href="http://www.pbmdf.com">www.pbmdf.com</a></td>
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<td>(703) 724-1128</td>
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<td>CRI - Carpet and Rug Institute (The)</td>
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<td><a href="http://www.carpet-rug.com">www.carpet-rug.com</a></td>
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<td>(800) 882-8846</td>
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<td>(706) 278-3176</td>
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<td>CRRC - Cool Roof Rating Council</td>
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<td><a href="http://www.coolroofs.org">www.coolroofs.org</a></td>
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<td>(866) 465-2523</td>
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<td>(510) 485-7175</td>
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<td>CRSI - Concrete Reinforcing Steel Institute</td>
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<td>(847) 517-1200</td>
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<td>(800) 328-6306</td>
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<td>CSA - Canadian Standards Association</td>
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<td>(800) 463-6727</td>
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<td>(416) 747-4000</td>
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<td>CSA - CSA International</td>
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<td>(Formerly: IAS - International Approval Services)</td>
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<td>(866) 797-4272</td>
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<td>CRI - CSI - Construction Specifications Institute (The)</td>
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<td>(800) 689-2900</td>
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<td>(703) 684-0300</td>
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<td>CSSB - Cedar Shake &amp; Shingle Bureau</td>
<td>Cedar Shake &amp; Shingle Bureau</td>
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<td></td>
<td><a href="http://www.cedarbureau.org">www.cedarbureau.org</a></td>
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<td>(604) 820-7700</td>
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<td>Acronym</td>
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<td>CTI</td>
<td>Cooling Technology Institute (Formerly: Cooling Tower Institute)</td>
<td>(281) 583-4087</td>
<td><a href="http://www.cti.org">www.cti.org</a></td>
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<td>DHI</td>
<td>Door and Hardware Institute</td>
<td>(703) 222-2010</td>
<td><a href="http://www.dhi.org">www.dhi.org</a></td>
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<td>ECA</td>
<td>Electrical Components Association</td>
<td>(703) 907-8024</td>
<td><a href="http://www.ec-central.org">www.ec-central.org</a></td>
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<td>EIA</td>
<td>Electronic Industries Alliance</td>
<td>(703) 907-7500</td>
<td><a href="http://www.eia.org">www.eia.org</a></td>
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<td>EIMA</td>
<td>EIFS Industry Members Association</td>
<td>(800) 294-3462</td>
<td><a href="http://www.eima.com">www.eima.com</a></td>
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<td>EJDC</td>
<td>Engineers Joint Contract Documents Committee</td>
<td>(703) 295-6000</td>
<td><a href="http://content.asce.org/ejcdc/">http://content.asce.org/ejcdc/</a></td>
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<td>EJMA</td>
<td>Expansion Joint Manufacturers Association, Inc.</td>
<td>(914) 332-0040</td>
<td><a href="http://www.ejma.org">www.ejma.org</a></td>
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<td>ESD</td>
<td>ESD Association (Electrostatic Discharge Association)</td>
<td>(315) 339-6937</td>
<td><a href="http://www.esda.org">www.esda.org</a></td>
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<td>ETL SEMCO</td>
<td>Intertek ETL SEMCO (Formerly: ITS - Intertek Testing Service NA)</td>
<td>(800) 967-5352</td>
<td><a href="http://www.intertek-etlsemko.com">www.intertek-etlsemko.com</a></td>
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<tr>
<td>FIBA</td>
<td>Federation Internationale de Basketball (The International Basketball Federation)</td>
<td>41 22 545 00 00</td>
<td><a href="http://www.fiba.com">www.fiba.com</a></td>
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<tr>
<td>FIVB</td>
<td>Federation Internationale de Volleyball (The International Volleyball Federation)</td>
<td>41 21 345 35 35</td>
<td><a href="http://www.fivb.ch">www.fivb.ch</a></td>
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<tr>
<td>FM Approvals</td>
<td>FM Approvals LLC</td>
<td>(781) 762-4300</td>
<td><a href="http://www.fmglobal.com">www.fmglobal.com</a></td>
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<td>FM Global</td>
<td>FM Global (Formerly: FMG - FM Global)</td>
<td>(401) 275-3000</td>
<td><a href="http://www.fmglobal.com">www.fmglobal.com</a></td>
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<td>FRSA</td>
<td>Florida Roofing, Sheet Metal &amp; Air Conditioning Contractors Association, Inc.</td>
<td>(407) 671-3772</td>
<td><a href="http://www.floridaroof.com">www.floridaroof.com</a></td>
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<td>FSA</td>
<td>Fluid Sealing Association</td>
<td><a href="http://www.fluidsealing.com">www.fluidsealing.com</a></td>
<td>(610) 971-4850</td>
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<td>FSC</td>
<td>Forest Stewardship Council</td>
<td><a href="http://www.fsc.org">www.fsc.org</a></td>
<td>49 228 367 66 0</td>
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<td>GA</td>
<td>Gypsum Association</td>
<td><a href="http://www.gypsum.org">www.gypsum.org</a></td>
<td>(301) 277-8686</td>
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<td>GANA</td>
<td>Glass Association of North America</td>
<td><a href="http://www.glasswebsite.com">www.glasswebsite.com</a></td>
<td>(785) 271-0208</td>
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<td>GRI</td>
<td>(Part of GSI)</td>
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<td>GS</td>
<td>Green Seal</td>
<td><a href="http://www.greenseal.org">www.greenseal.org</a></td>
<td>(202) 872-6400</td>
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<td>GSI</td>
<td>Geosynthetic Institute</td>
<td><a href="http://www.geosynthetic-institute.org">www.geosynthetic-institute.org</a></td>
<td>(610) 522-8440</td>
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<td>HI</td>
<td>Hydronics Institute</td>
<td><a href="http://www.gamanet.org">www.gamanet.org</a></td>
<td>(908) 464-8200</td>
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<td>HI/GAMA</td>
<td>Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI)</td>
<td><a href="http://www.ahrinet.org">www.ahrinet.org</a></td>
<td>(908) 464-8200</td>
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<td>HMMA</td>
<td>Hollow Metal Manufacturers Association (Part of NAAMM)</td>
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<td>HPVA</td>
<td>Hardwood Plywood &amp; Veneer Association</td>
<td><a href="http://www.hpva.org">www.hpva.org</a></td>
<td>(703) 435-2900</td>
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<td>HPW</td>
<td>H. P. White Laboratory, Inc.</td>
<td><a href="http://www.hpwhite.com">www.hpwhite.com</a></td>
<td>(410) 838-6550</td>
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<td>IAPSC</td>
<td>International Association of Professional Security Consultants</td>
<td><a href="http://www.iapsc.org">www.iapsc.org</a></td>
<td>(515) 282-8192</td>
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<tr>
<td>ICBO</td>
<td>International Conference of Building Officials</td>
<td><a href="http://www.iccsafe.org">www.iccsafe.org</a></td>
<td>(888) 422-7233</td>
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<td>ICEA</td>
<td>Insulated Cable Engineers Association, Inc.</td>
<td><a href="http://www.ieca.net">www.ieca.net</a></td>
<td>(770) 830-0369</td>
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<td>ICRI</td>
<td>International Concrete Repair Institute, Inc.</td>
<td><a href="http://www.icri.org">www.icri.org</a></td>
<td>(847) 827-0830</td>
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<td>ICPA</td>
<td>International Cast Polymer Association</td>
<td><a href="http://www.icpa-hq.org">www.icpa-hq.org</a></td>
<td>(703) 525-0320</td>
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<td>IEC</td>
<td>International Electrotechnical Commission</td>
<td><a href="http://www.iec.ch">www.iec.ch</a></td>
<td>41 22 919 02 11</td>
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<td>IEEE</td>
<td>Institute of Electrical and Electronics Engineers, Inc. (The)</td>
<td><a href="http://www.ieee.org">www.ieee.org</a></td>
<td>(212) 419-7900</td>
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<td>IES</td>
<td>Illuminating Engineering Society of North America</td>
<td><a href="http://www.iesna.org">www.iesna.org</a></td>
<td>(703) 525-0320</td>
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<td>IEST</td>
<td>Institute of Environmental Sciences and Technology</td>
<td><a href="http://www.iest.org">www.iest.org</a></td>
<td>(847) 255-1561</td>
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<td>IGMA</td>
<td>Insulating Glass Manufacturers Alliance</td>
<td><a href="http://www.igmaonline.org">www.igmaonline.org</a></td>
<td>(613) 233-1510</td>
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<td>ILI</td>
<td>Indiana Limestone Institute of America, Inc.</td>
<td><a href="http://www.iliai.com">www.iliai.com</a></td>
<td>(812) 275-4426</td>
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<td>ISA</td>
<td>Instrumentation, Systems, and Automation Society, The</td>
<td><a href="http://www.isa.org">www.isa.org</a></td>
<td>(919) 549-8411</td>
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<td>ISO</td>
<td>International Organization for Standardization</td>
<td><a href="http://www.iso.ch">www.iso.ch</a></td>
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<td>ISSFA</td>
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<td><a href="http://www.issfa.net">www.issfa.net</a></td>
<td>(877) 464-7732</td>
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<td>ITU</td>
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<td>41 22 730 51 11</td>
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<td>KCMA</td>
<td>Kitchen Cabinet Manufacturers Association</td>
<td><a href="http://www.kema.org">www.kema.org</a></td>
<td>(703) 264-1690</td>
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<td>LGSEA</td>
<td>Light Gauge Steel Engineers Association</td>
<td><a href="http://www.arcat.com">www.arcat.com</a></td>
<td>(202) 263-4488</td>
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<td>LMA</td>
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<td><a href="http://www.lightning.org">www.lightning.org</a></td>
<td>(800) 488-6864</td>
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<td>MBMA</td>
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<td>(216) 241-7333</td>
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<td>MCA</td>
<td>Metal Construction Association</td>
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<td>(847) 375-4718</td>
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<td>(888) 480-9138</td>
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<td>MH</td>
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<td>Material Handling Industry of America</td>
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<td>(800) 345-1815</td>
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<td>MIA</td>
<td>Marble Institute of America</td>
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<td>(440) 250-9222</td>
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<td>MPI</td>
<td>Master Painters Institute</td>
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<td>(888) 674-8937</td>
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<td>MSS</td>
<td>Manufacturers Standardization Society of The Valve and Fittings Industry Inc.</td>
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<td>(703) 281-6613</td>
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<td>NAAMM</td>
<td>National Association of Architectural Metal Manufacturers</td>
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<td>(630) 942-6591</td>
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<td>NACE</td>
<td>NACE International</td>
<td>(National Association of Corrosion Engineers International)</td>
<td>(800) 797-6223</td>
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<td>NADCA</td>
<td>National Air Duct Cleaners Association</td>
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<td>(202) 737-2926</td>
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<td>NBGQA</td>
<td>National Building Granite Quarries Association, Inc.</td>
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<td>(800) 557-2848</td>
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<td>NCAAA</td>
<td>National Collegiate Athletic Association (The)</td>
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<td>(317) 917-6222</td>
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<td>NCMA</td>
<td>National Concrete Masonry Association</td>
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<td>(703) 713-1900</td>
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<td>NCTA</td>
<td>National Cable &amp; Telecommunications Association</td>
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<td>(202) 222-2300</td>
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<td>NEBB</td>
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<td>(301) 977-3698</td>
<td><a href="http://www.nebb.org">www.nebb.org</a></td>
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<td>NECA</td>
<td>National Electrical Contractors Association</td>
<td>(301) 657-3110</td>
<td><a href="http://www.necanet.org">www.necanet.org</a></td>
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<td>NeLMA</td>
<td>Northeastern Lumber Manufacturers' Association</td>
<td>(207) 829-6901</td>
<td><a href="http://www.nelma.org">www.nelma.org</a></td>
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<td>NEMA</td>
<td>National Electrical Manufacturers Association</td>
<td>(703) 841-3200</td>
<td><a href="http://www.nema.org">www.nema.org</a></td>
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<td>NETA</td>
<td>InterNational Electrical Testing Association</td>
<td>(888) 300-6382</td>
<td><a href="http://www.netaworld.org">www.netaworld.org</a></td>
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<td>NFHS</td>
<td>National Federation of State High School Associations</td>
<td>(317) 972-6900</td>
<td><a href="http://www.nfhs.org">www.nfhs.org</a></td>
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<td>NFPA</td>
<td>NFPA (National Fire Protection Association)</td>
<td>(800) 344-3555</td>
<td><a href="http://www.nfpa.org">www.nfpa.org</a></td>
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<td>NFRC</td>
<td>National Fenestration Rating Council</td>
<td>(301) 589-1776</td>
<td><a href="http://www.nfrc.org">www.nfrc.org</a></td>
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<td>NGA</td>
<td>National Glass Association</td>
<td>(866) 342-5642</td>
<td><a href="http://www.glass.org">www.glass.org</a></td>
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<td>NHLA</td>
<td>National Hardwood Lumber Association</td>
<td>(800) 933-0318</td>
<td><a href="http://www.natlhardwood.org">www.natlhardwood.org</a></td>
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<td>NLGA</td>
<td>National Lumber Grades Authority</td>
<td>(901) 377-1818</td>
<td><a href="http://www.nlga.org">www.nlga.org</a></td>
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<td>NOFMA</td>
<td>NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association)</td>
<td>(901) 526-5016</td>
<td><a href="http://www.nofma.org">www.nofma.org</a></td>
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<td>NOMMA</td>
<td>National Ornamental &amp; Miscellaneous Metals Association</td>
<td>(888) 516-8585</td>
<td><a href="http://www.nomma.org">www.nomma.org</a></td>
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<td>NRCA</td>
<td>National Roofing Contractors Association</td>
<td>(800) 323-9545</td>
<td><a href="http://www.nrca.net">www.nrca.net</a></td>
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<td>NRMCA</td>
<td>National Ready Mixed Concrete Association</td>
<td>(888) 846-7622</td>
<td><a href="http://www.nrmca.org">www.nrmca.org</a></td>
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<td>NSF</td>
<td>NSF International (National Sanitation Foundation International)</td>
<td>(800) 673-6275</td>
<td><a href="http://www.nsf.org">www.nsf.org</a></td>
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<td>NSSGA</td>
<td>National Stone, Sand &amp; Gravel Association</td>
<td>(800) 342-1415</td>
<td><a href="http://www.nssga.org">www.nssga.org</a></td>
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<td>NTMA</td>
<td>National Terrazzo &amp; Mosaic Association, Inc. (The)</td>
<td>(800) 323-9736</td>
<td><a href="http://www.ntma.com">www.ntma.com</a></td>
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<td>NWFA</td>
<td>National Wood Flooring Association</td>
<td>(800) 422-4556</td>
<td><a href="http://www.nwfa.org">www.nwfa.org</a></td>
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<td>PCI</td>
<td>Precast/Prestressed Concrete Institute</td>
<td>(312) 786-0300</td>
<td><a href="http://www.pci.org">www.pci.org</a></td>
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<td>PDI</td>
<td>Plumbing &amp; Drainage Institute</td>
<td>(800) 589-8956</td>
<td><a href="http://www.pdionline.org">www.pdionline.org</a></td>
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<td>PGI</td>
<td>PVC Geomembrane Institute</td>
<td>(217) 333-3929</td>
<td><a href="http://pgi-tp.cee.uiuc.edu">http://pgi-tp.cee.uiuc.edu</a></td>
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<td>PTI</td>
<td>Post-Tensioning Institute</td>
<td>(248) 848-3180</td>
<td><a href="http://www.post-tensioning.org">www.post-tensioning.org</a></td>
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<td>RCSC</td>
<td>Research Council on Structural Connections</td>
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<td><a href="http://www.boltcouncil.org">www.boltcouncil.org</a></td>
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<td>RFCI</td>
<td>Resilient Floor Covering Institute</td>
<td>(706) 882-3833</td>
<td><a href="http://www.rfci.com">www.rfci.com</a></td>
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<td>RIS</td>
<td>Redwood Inspection Service</td>
<td>(925) 935-1499</td>
<td><a href="http://www.redwoodinspection.com">www.redwoodinspection.com</a></td>
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<td>SAE</td>
<td>SAE International</td>
<td>(877) 606-7323</td>
<td><a href="http://www.sae.org">www.sae.org</a></td>
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<td>SCAQMD</td>
<td>South Coast Air Quality Management District</td>
<td>(909) 396-2000</td>
<td><a href="http://www.aqmd.com">www.aqmd.com</a></td>
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<td>SCTE</td>
<td>Society of Cable Telecommunications Engineers</td>
<td>(800) 542-5040</td>
<td><a href="http://www.scte.org">www.scte.org</a></td>
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<td>SDI</td>
<td>Steel Deck Institute</td>
<td>(847) 458-4647</td>
<td><a href="http://www.sdi.org">www.sdi.org</a></td>
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<td>SDI</td>
<td>Steel Door Institute</td>
<td>(440) 899-0010</td>
<td><a href="http://www.steeldoor.org">www.steeldoor.org</a></td>
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<td>SEFA</td>
<td>Scientific Equipment and Furniture Association</td>
<td>(877) 294-5424</td>
<td><a href="http://www.sefalabs.com">www.sefalabs.com</a></td>
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<td>SEI/ASCE</td>
<td>Structural Engineering Institute/American Society of Civil Engineers (See ASCE)</td>
<td>(703) 683-2075</td>
<td><a href="http://www.asce.org">www.asce.org</a></td>
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<td>SIA</td>
<td>Security Industry Association</td>
<td>(866) 817-8888</td>
<td><a href="http://www.siaonline.org">www.siaonline.org</a></td>
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<td>SJI</td>
<td>Steel Joist Institute</td>
<td>(843) 626-1995</td>
<td><a href="http://www.steeljoist.org">www.steeljoist.org</a></td>
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<td>SMA</td>
<td>Screen Manufacturers Association</td>
<td>(561) 533-0991</td>
<td><a href="http://www.smacentral.org">www.smacentral.org</a></td>
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<td>SMACNA</td>
<td>Sheet Metal and Air Conditioning Contractors' National Association</td>
<td>(703) 803-2980</td>
<td><a href="http://www.smacna.org">www.smacna.org</a></td>
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<td>SMPTE</td>
<td>Society of Motion Picture and Television Engineers</td>
<td>(914) 761-1100</td>
<td><a href="http://www.smpte.org">www.smpte.org</a></td>
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<td>SPFA</td>
<td>Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division)</td>
<td>(800) 523-6154</td>
<td><a href="http://www.sprayfoam.org">www.sprayfoam.org</a></td>
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<td>SPIB</td>
<td>Southern Pine Inspection Bureau (The)</td>
<td>(850) 434-2611</td>
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<td>SPRI</td>
<td>Single Ply Roofing Industry</td>
<td>(781) 647-7026</td>
<td><a href="http://www.spri.org">www.spri.org</a></td>
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<td>SSINA</td>
<td>Specialty Steel Industry of North America</td>
<td>(800) 982-0355</td>
<td><a href="http://www.ssina.com">www.ssina.com</a></td>
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<td>SSPC</td>
<td>SSPC: The Society for Protective Coatings</td>
<td>(877) 281-7772</td>
<td><a href="http://www.sspc.org">www.sspc.org</a></td>
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<td>STI</td>
<td>Steel Tank Institute</td>
<td>(412) 281-2331</td>
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<td>SWI</td>
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<td>(847) 438-8265</td>
<td><a href="http://www.steelwindows.com">www.steelwindows.com</a></td>
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<td>SWPA</td>
<td>Submersible Wastewater Pump Association</td>
<td>(847) 681-1868</td>
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<td>TCA</td>
<td>Tilt-Up Concrete Association</td>
<td>(319) 895-6911</td>
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<td>TCNA</td>
<td>Tile Council of North America, Inc.</td>
<td>(864) 646-8453</td>
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<td>TEMA</td>
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<td>(914) 332-0040</td>
<td><a href="http://www.tema.org">www.tema.org</a></td>
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<td>TIA/EIA</td>
<td>Telecommunications Industry Association/Electronic Industries Alliance</td>
<td>(703) 907-7700</td>
<td><a href="http://www.tiaonline.org">www.tiaonline.org</a></td>
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<td>TMS</td>
<td>The Masonry Society</td>
<td>(303) 939-9700</td>
<td><a href="http://www.masonrysociety.org">www.masonrysociety.org</a></td>
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<td>TPI</td>
<td>Truss Plate Institute, Inc.</td>
<td>(703) 683-1010</td>
<td><a href="http://www.tpinst.org">www.tpinst.org</a></td>
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<td>TPI</td>
<td>Turfgrass Producers International</td>
<td>(800) 405-8873</td>
<td><a href="http://www.turfgrass.com">www.turfgrass.com</a></td>
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<td>TRI</td>
<td>Tile Roofing Institute</td>
<td>(312) 670-4177</td>
<td><a href="http://www.tileroofing.org">www.tileroofing.org</a></td>
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<td>UL</td>
<td>Underwriters Laboratories Inc.</td>
<td>(877) 854-3577</td>
<td><a href="http://www.ul.com">www.ul.com</a></td>
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<td>UNI</td>
<td>Uni-Bell PVC Pipe Association</td>
<td>(972) 243-3902</td>
<td><a href="http://www.uni-bell.org">www.uni-bell.org</a></td>
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<td>USAV</td>
<td>USA Volleyball</td>
<td>(888) 786-5539</td>
<td><a href="http://www.usavolleyball.org">www.usavolleyball.org</a></td>
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<td>USGBC</td>
<td>U.S. Green Building Council</td>
<td>(800) 795-1747</td>
<td><a href="http://www.usgbc.org">www.usgbc.org</a></td>
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<td>USITT</td>
<td>United States Institute for Theatre Technology, Inc.</td>
<td>(800) 938-7488</td>
<td><a href="http://www.usitt.org">www.usitt.org</a></td>
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<td>WASTEC</td>
<td>Waste Equipment Technology Association</td>
<td>(800) 424-2869</td>
<td><a href="http://www.wastec.org">www.wastec.org</a></td>
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<td>WCLIB</td>
<td>West Coast Lumber Inspection Bureau</td>
<td>(800) 283-1486</td>
<td><a href="http://www.wclib.org">www.wclib.org</a></td>
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<td>WCMA</td>
<td>Window Covering Manufacturers Association</td>
<td>(212) 297-2122</td>
<td><a href="http://www.wcmanet.org">www.wcmanet.org</a></td>
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<td>WDMA</td>
<td>Window &amp; Door Manufacturers Association</td>
<td>(800) 223-2301</td>
<td><a href="http://www.wdma.com">www.wdma.com</a></td>
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<td></td>
<td>(Formerly: NWWDA - National Wood Window and Door Association)</td>
<td>(312) 321-6802</td>
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<td>Woodwork Institute (Formerly: WIC - Woodwork Institute of California)</td>
<td><a href="www.wicnet.org">Website</a>  (916) 372-9943</td>
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<td>WMMPA</td>
<td>Wood Moulding &amp; Millwork Producers Association</td>
<td><a href="www.wmmpa.com">Website</a>  (800) 550-7889 (530) 661-9591</td>
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<td>WSRCA</td>
<td>Western States Roofing Contractors Association</td>
<td><a href="www.wsrca.com">Website</a>  (800) 725-0333 (650) 570-5441</td>
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<td>WWPA</td>
<td>Western Wood Products Association</td>
<td><a href="www.wwpa.org">Website</a>  (503) 224-3930</td>
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C. **Code Agencies:** Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

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<td>DIN</td>
<td>Deutsches Institut fur Normung e.V.</td>
<td>49 30 2601-0 <a href="www.din.de">Website</a></td>
</tr>
<tr>
<td>IAPMO</td>
<td>International Association of Plumbing and Mechanical Officials</td>
<td><a href="www.iapmo.org">Website</a>  (909) 472-4100</td>
</tr>
<tr>
<td>ICC</td>
<td>International Code Council</td>
<td><a href="www.iccsafe.org">Website</a>  (888) 422-7233</td>
</tr>
<tr>
<td>ICC-ES</td>
<td>ICC Evaluation Service, Inc.</td>
<td><a href="www.icc-es.org">Website</a>  (800) 423-6587 (562) 699-0543</td>
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D. **Federal Government Agencies:** Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

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<th>Agency</th>
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<tr>
<td>ADAAG</td>
<td>Americans with Disabilities Act (ADA)</td>
<td>(800) 872-2253 (202) 272-0080</td>
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<td></td>
<td>Architectural Barriers Act (ABA)</td>
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<td></td>
<td>Accessibility Guidelines for Buildings and Facilities</td>
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<td></td>
<td>Available from U.S. Access Board</td>
<td><a href="www.access-board.gov">Website</a></td>
</tr>
<tr>
<td>COE</td>
<td>Army Corps of Engineers</td>
<td>(202) 761-0011 <a href="www.usace.army.mil">Website</a></td>
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<tr>
<td>CPSC</td>
<td>Consumer Product Safety Commission</td>
<td>(800) 638-2772 (301) 504-7923 <a href="www.cpsc.gov">Website</a></td>
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<tr>
<td>DOC</td>
<td>Department of Commerce</td>
<td>(202) 482-2000 <a href="www.commerce.gov">Website</a></td>
</tr>
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<td>Acronym</td>
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<td>DOD</td>
<td>Department of Defense</td>
<td>(215) 697-6257</td>
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<tr>
<td>DOJ</td>
<td>Department of Justice</td>
<td>(202) 514-2000</td>
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<tr>
<td>DOE</td>
<td>Department of Energy</td>
<td>(202) 586-9220</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
<td>(202) 272-0167</td>
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<td>FAA</td>
<td>Federal Aviation Administration</td>
<td>(866) 835-5322</td>
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<td>FCC</td>
<td>Federal Communications Commission</td>
<td>(888) 225-5322</td>
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<td>FDA</td>
<td>Food and Drug Administration</td>
<td>(888) 463-6332</td>
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<td>GSA</td>
<td>General Services Administration</td>
<td>(800) 488-3111</td>
</tr>
<tr>
<td>HUD</td>
<td>Department of Housing and Urban Development</td>
<td>(202) 708-1112</td>
</tr>
<tr>
<td>LBL</td>
<td>Lawrence Berkeley National Laboratory</td>
<td>(510) 486-4000</td>
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<tr>
<td>NCHRP</td>
<td>National Cooperative Highway Research Program (See TRB)</td>
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<tr>
<td>NIST</td>
<td>National Institute of Standards and Technology</td>
<td>(301) 975-6478</td>
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<tr>
<td>OSHA</td>
<td>Occupational Safety &amp; Health Administration</td>
<td>(800) 321-6742 (202) 693-1999</td>
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<td>PBS</td>
<td>Public Buildings Service (See GSA)</td>
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<tr>
<td>RUS</td>
<td>Rural Utilities Service (See USDA)</td>
<td>(202) 720-9540</td>
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<tr>
<td>SD</td>
<td>State Department</td>
<td>(202) 647-4000</td>
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<tr>
<td>Abbreviation</td>
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<td>TRB</td>
<td>Transportation Research Board</td>
<td>(202) 334-2934</td>
</tr>
<tr>
<td>USDA</td>
<td>Department of Agriculture</td>
<td>(202) 720-2791</td>
</tr>
<tr>
<td>USP</td>
<td>U.S. Pharmacopeia</td>
<td>(800) 227-8772</td>
</tr>
<tr>
<td>USPS</td>
<td>Postal Service</td>
<td>(202) 268-2000</td>
</tr>
</tbody>
</table>

### E. Standards and Regulations:
Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

<table>
<thead>
<tr>
<th>Abbreviation</th>
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<tr>
<td>ADAABAAG</td>
<td>Americans with Disabilities Act, Architectural Barriers Act, Accessibility Guidelines</td>
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<td><a href="http://www.access-board.gov">www.access-board.gov</a></td>
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<tr>
<td>DOD</td>
<td>Department of Defense Military Specifications and Standards</td>
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<td>DSCC</td>
<td>Defense Supply Center Columbus</td>
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<td>FED-STD</td>
<td>Federal Standard</td>
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<td>FS</td>
<td>Federal Specification</td>
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<tr>
<td>Available from Defense Standardization Program</td>
<td><a href="http://www.dsp.dla.mil">www.dsp.dla.mil</a></td>
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<tr>
<td>Available from General Services Administration</td>
<td>(202) 619-8925</td>
</tr>
<tr>
<td><a href="http://www.gsa.gov">www.gsa.gov</a></td>
<td></td>
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<tr>
<td>Available from National Institute of Building Sciences</td>
<td>(202) 289-7800</td>
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<tr>
<td><a href="http://www.wbdg.org/ccb">www.wbdg.org/ccb</a></td>
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<td>FTMS</td>
<td>Federal Test Method Standard</td>
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1.5 ENVIRONMENTAL REFERENCE STANDARDS

A. American Forest and Paper Association:
   1. Sustainable Forestry Initiative

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

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

   A478 Standard Specification for Chromium-Nickel Stainless Steel Weaving and Knitting
   Wire
   A580/A580M Standard Specification for Stainless Steel Wire
   A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-
   Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
   B813 Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and
   Copper Alloy Tube
   C1240 Standard Specification for Silica Fume Used in Cementitious Mixtures
   C128 Standard Test Method for Density, Relative Density (Specific Gravity), and Ab-
   sorption of Fine Aggregate
   C131 Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggre-
   gate by Abrasion and Impact in the Los Angeles Machine
   C1319 Standard Specification for Concrete Grid Paving Units
   C1338 Standard Test Method for Determining Fungi Resistance of Insulation Materials
   and Facings
   C136 Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
   C1371 Standard Test Method for Determination of Emittance of Materials Near Room
   Temperature Using Portable Emissometers
   C1386 Standard Specification for Precast Autoclaved AERATED Concrete (PAAC) Wall
   Construction Units
   C1549 Standard Test Method for Determination of Solar Reflectance Near Ambient
   Temperature Using a Portable Solar Reflectometer
   C1601 Standard Test Method for Field Determination of Water Penetration of Masonry
   Wall Surfaces
   C289 Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical
   Method)
   C311 Test Methods for Sampling and Testing Fly Ash or Natural Possolans for Use as a
   Mineral Admixture in Portland-Cement Concrete
   C33 Standard Specification for Concrete Aggregates
   C593 Standard Specification for Fly Ash and Other Pozzolans for Use With Lime
   C595 Standard Specification for Blended Hydraulic Cements
   C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for
   Use as a Mineral Admixture in Concrete
   C739 Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insu-
   lation
   C936 Standard Specification for Interlocking Concrete Paver Units
C989 Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
D1435 Standard Practice for Outdoor Weathering of Plastics
D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3(2,700 kN-m/m3))
D1972 Standard Practice for Generic Marking of Plastic Products
D198 Standard Test Methods of Static Tests of Lumber in Structural Sizes
D2103 Standard Specification for Polyethylene Film and Sheeting
D217 Standard Test Methods for Cone Penetration of Lubricating Grease
D2369 Standard Test Method for Volatile Content of Coatings
D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
D3792 Standard Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph
D3864 Standard Guide for Continual On-Line Monitoring Systems for Water Analysis
D3960 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
D4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
D4552 Standard Practice for Classifying Hot-Mix Recycling Agents
D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
D4716 Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
D4840 Standard Guide for Sampling Chain-of-Custody Procedures
D4887 Standard Test Method for Preparation of Viscosity Blends for Hot Recycled Bituminous Materials
D5016 Standard Specification for Steel Slag Aggregates for Bituminous Paving Mixtures
D5116 Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products
D5199 Standard Test Method for Measuring the Nominal Thickness of Geosynthetics
D5261 Standard Test Method for Measuring Mass per Unit Area of Geotextiles
D5268 Standard Specification for Topsoil Used for Landscaping Purposes
D5359 Standard Specification for Glass Cullet Recovered from Waste for Use in Manufacture of Glass Fiber
D5505 Standard Practice for Classifying Emulsified Recycling Agents
D5509 Standard Practice for Exposing Plastics to a Simulated Compost Environment
D5512 Standard Practice for Exposing Plastics to a Simulated Compost Environment Using an Externally Heated Reactor
D5539 Standard Specification for Seed Starter Mix
D5957 Standard Guide for Flood Testing Horizontal Waterproofing Installations
D5603 Standard Classification for Rubber Compounding Materials—Recycled Vulcanize Particulate Rubber
D5663 Standard Guide for Validating Recycled Content in Packaging Paper and Paperboard
D5792 Standard Practice for Generation of Environmental Data Related to Waste Management Activities: Development of Data Quality Objectives
D5834 Standard Guide for Source Reduction Reuse, Recycling, and Disposal of Solid and Corrugated Fiberboard (Cardboard)
D5851 Standard Guide for Planning and Implementing a Water Monitoring Program
D5852 Standard Test Method for Erodibility Determination of Soil in the Field or in the Laboratory by the Jet Index Method
D6002 Standard Guide for Assessing the Compostability of Environmentally Degradable Plastics
D6006 Standard Guide for Assessing Biodegradability of Hydraulic Fluid
D6007 Standard Test Method for Determining Formaldehyde Concentration in Air from Wood Products Using a Small Scale Chamber
D6046 Standard Classification of Hydraulic Fluids for Environmental Impact
D6081 Standard Practice for Aquatic Toxicity Testing of Lubricants: Sample Preparation and Results Interpretation
D6108 Standard Test Method for Compressive Properties of Plastic Lumber and Shapes
D6112 Standard Test Methods for Compressive and Flexural creep and Creep-Rupture of Plastic Lumber and Shapes
D6117 Standard Test Methods for Mechanical Fasteners In Plastic Lumber and Shapes
D6155 Standard Specification for Nontraditional Coarse Aggregates for Bituminous Paving Mixtures
D6245 Standard Guide for Using Indoor Carbon Dioxide Concentrations to Evaluate Indoor Air Quality and Ventilation
D6261 Standard Specification for Extruded and Compression Molded Basic Shapes Made from Thermoplastic Polyester (TPES)
D6262 Standard Specification for Extruded, Compression Molded, and Injection Molded Basic Shapes of Poly(aryl ether ketone) (PAEK)
D6270 Standard Practice for Use of Scrap Tires in Civil Engineering Applications
D6329 Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers
D6330 Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions
D6345 Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air
D6400 Standard Specification for Compostable Plastics
D6662 Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards
D6886 Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography
D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer
D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair
E1021 Standard Test Methods for Measuring Spectral Response of Photovoltaic Cells
E1038 Standard Test Method for Determining Resistance of Photovoltaic Modules to Hail by Impact with Propelled Ice Balls
E1040 Standard Specification for Physical Characteristics of Nonconcentrator Terrestrial Photovoltaic Reference Cells
E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
E1171 Standard Test Method for Photovoltaic Modules in Cyclic Temperature and Humidity Environments
E1333 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Under Defined Test Conditions Using a Large Chamber
E1433 Standard Guide for Selection of Standards on Environmental Acoustics
E1462 Standard Test Methods for Insulation Integrity and Ground Path Continuity of Photovoltaic Modules
E1596 Standard Test Methods for Solar Radiation Weathering of Photovoltaic Modules
E1597 Standard Test Method for Saltwater Pressure Immersion and Temperature Testing of Photovoltaic Modules for Marine Environments
E1609 Standard Guide for Development and Implementation of a Pollution Prevention Program
E1686 Standard Guide for Selection of Environmental Noise Measurements and Criteria
E1690 Standard Test Method for Determination of Ethanol Extractives in Biomass
E1721 Standard Test Method for Determination of Acid-Insoluble Residue in Biomass
E1755 Standard Test Method for Ash in Biomass
E1758 Standard Test Method for Determination of Carbohydrates in Biomass by High Performance Liquid Chromatography
E1780 Standard Guide for Measuring Outdoor Sound Received from a Nearby Fixed Source
E1799 Standard Practice for Visual Inspections of Photovoltaic Modules
E1802 Standard Test Methods for Wet Insulation Integrity Testing of Photovoltaic Modules
E1821 Standard Test Method for Determination of Carbohydrates in Biomass by Gas Chromatography
E1827 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
E1830 Standard Test Methods for Determining Mechanical Integrity of Photovoltaic Modules
E1861 Standard Guide for Use of Coal Combustion By-Products in Structural Fills
E1918 Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
E1980 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
E2047 Standard Test Method for Wet Insulation Integrity Testing of Photovoltaic Arrays
E2114 Standard Terminology for Sustainability Relative to the Performance of Buildings
E2128 Standard Guide for Evaluating Water Leakage of Building Walls
E2129 Standard Practice for Data Collection for Sustainability Assessment of Building Products
E2397 Standard Practice for Determination of Dead Loads and Live Loads associated with Green Roof Systems
E2398 Standard Test Method for Water Capture and Media Retention of Geocomposite Drain Layers for Green Roof Systems
E2399 Standard Test Method for Maximum Media Density for Dead Load Analysis of Green Roof Systems
E2400 Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems
E241 Standard Guide for Limiting Water-Induced Damage to Buildings
E2432 Standard Guide for General Principles of Sustainability Relative to Buildings
E408 Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
E413 Standard Classification for Rating Sound Insulation
E683 Standard Practice for Installation and Service of Solar Space Heating Systems for One- and Two-Family Dwellings
E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
E782 Standard Practice for Exposure of Cover Materials for Solar Collectors to Natural Weathering Under Conditions Simulating Operational Mode
E823 Standard Practice for Nonoperational Exposure and Inspection of a Solar Collector
E881 Standard Practice for Exposure of Solar Collector Cover Materials to Natural Weathering Under Conditions Simulating Stagnation Mode
E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2034 Standard Specification for Sheet Linoleum Floor Covering
F2170 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
E. Bat Conservation International:
   Bat Approved Bat Houses

F. Carpet and Rug Institute
   Green Label Testing Programs
   Green Label Plus Testing Programs

G. Center for Resource Solutions
   Green-e program

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

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

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

K. Green Building Initiative (GBI):
   Green Globes - US

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

M. International Iron and Steel Institute:
   CO2 Breakthrough Program

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

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

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

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

R. Sheet Metal and Air Conditioning Contractors’ National Association:
   IAQ Guidelines for Occupied Buildings Under Construction

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

T. US Composting Council:
   Seal of Testing Assurance Program

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

V. US Green Building Council:
   LEED™ 2009 Green Building Rating System

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00
SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

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

1.2 DEFINITIONS
A. Permanent Enclosure: As determined by Contracting Officer, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all 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 the Contract Sum as required.
B. Water Service: Water from existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations without any additional permit costs.
C. Electric Power Service: Electric power from existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations without any additional permit costs.

1.4 QUALITY ASSURANCE
A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
B. Environmental Protection: Provide environmental protection as required by agency(ies) with jurisdiction and as indicated in the Contract Documents. Coordinate with requirements of the following:
   1. Regulatory Requirements.
   5. Tree Removal
C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board’s ABAAS Accessibility Guidelines.
D. Temporary Traffic and Pedestrian Control Plan:

1. Submit traffic control plan to the CO and Park Management within 14 calendar days after Notice to Proceed. Include all signage, fencing, pavement markings, barriers, lane closures, and required layout information required for proper traffic control. Include anticipated duration.
   a. After receiving Park approval, traffic control plans must also be submitted to District Department of Transportation (DDOT) for review and approval, prior to application for Public Space Permit to work in the streets. Work in roadways shall be required to be performed at night, Monday through Thursday 9:30 pm to 4:30 am, with temporary steel plates over trenches to reopen the streets for daytime traffic.
   b. Comply with DDOT requirements for:
      1) Preparation of Incident Management Plan
      2) Pre-staging equipment and material needed to implement Incident Management Plan
      3) Advance notification of lane closures to DDOT Inspector, for coordination with DDOT Traffic Management Center
      4) Night, weekend, and holiday work hours
      5) Public information strategies

2. Submit an action submittal at least 21 days prior to commencement of work for each affected area. Include a site sketch and narrative to show all barriers and detour signage required for the work and to describe the nature of work and duration. Pedestrian detour signage and barriers shall be placed near walkway intersections, such that the detour route can be readily chosen without u-turns. Minimize duration of sidewalk closures. Pipe fusing staging areas shall not block sidewalks. Sidewalks may be closed for a duration of less than a day to pull fused pipe strings through the completed tunnels. In locations near major monuments or high volume walkways, Park Management may require pipe pulls that cannot avoid walkways to be performed at night.

3. Submit an action submittal at least 30 days prior to commencement of work requiring temporary relocation of bicycle commuter path near Jefferson Memorial. Include all signage, fencing, barriers, and required layout information required for proper bicycle traffic control. Include anticipated duration.

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 the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.
B. Pavement: Comply with Section 32 12 16 "Asphalt Paving."

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

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

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

F. Wood Enclosure Fence: Plywood, 6 feet (1.8 m) high, framed with four 2-inch by 4-inch (50-mm by 100-mm) rails, with preservative-treated wood posts spaced not more than 8 feet (2.4 m) apart.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

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

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

1. Provide separate toilet facilities for men and women.

2.3 EQUIPMENT

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

B. 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.
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.
   1. Locate facilities to limit site disturbance and as directed by the Contracting Officer.

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 all necessary permits.

B. Storm Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers as directed by the agency(ies) with jurisdiction.

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

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

E. 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.

F. Electric Power Service: Use of existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to the NPS.
   1. When temporary connections are removed, restore existing utility services to their original condition.

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

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 32, Exterior Improvements.
3. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving."


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 at all times

D. Parking: All contractor parking will be done in the laydown area as designated in the general site notes on the drawings. Due to the quantity of visitors to the park, the contractor and their subcontractors are not permitted to park in public parking lots or spaces.
E. 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 a 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.

F. 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.

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

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

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

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 that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Cleaning of Equipment: The Contractor shall ensure that prior to moving on to the Project Area, all equipment, is free of soil, seeds, vegetative matter, or other debris that could contain or hold seeds. Ensure that all equipment has been pressure washed and is free of exotic species prior to start-up of operations and moving of equipment to Project Area. Equipment shall be considered free of soil, seeds, and other debris when a 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 “Storm Water Pollution Prevention Plan.”

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

E. Pest Control: Follow NPS requirements and practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
F. Site Enclosure Fence: Before excavation begins, furnish and install temporary fencing in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As indicated on Drawings.
2. Locate vehicular gates to avoid interference with traffic on public thoroughfares.
3. Locate pedestrian entrance gates as required to provide controlled personnel entry.

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

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

1. Hazard Control: Take all necessary precautions to prevent fire during construction. Do not store flammable or combustible liquids in existing buildings. Provide adequate ventilation during use of volatile or noxious substances.
2. Spark Arresters: Equip all 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 the USDA Forest Service.
   a. Written determinations of periods and areas of potential fire hazard will be issued by Contracting Officer.
3. 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 the nearest extinguisher shall not exceed 75 feet.
4. Vehicles and Equipment: Provide one extinguisher on each vehicle or piece of equipment.
5. 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. To 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 a 24-hour basis where required to achieve indicated results and to 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
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general protection of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Requirements:
   1. Section 01 50 00 "Temporary Facilities and Controls" for temporary site fencing.

1.3 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at a height 6 inches (150 mm) above the ground for trees up to and including 4-inch (100-mm) size at this height and as measured at a height of 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.

B. Caliper (DBH): Diameter breast height; diameter of a trunk as measured by a diameter tape or the average of the smallest and largest diameters at a height 54 inches (1372 mm) above the ground line for trees with caliper of 8 inches (200 mm) or greater as measured at a height of 12 inches (300 mm) above the ground.

C. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.

D. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and indicated on Drawings.

E. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
a. Tree-service firm's personnel, and equipment needed to make progress and avoid delays.
b. Arborist's responsibilities.
c. Quality-control program.
d. Coordination of Work and equipment movement with the locations of protection zones.
e. Trenching by hand or with air spade within protection zones.
f. Field quality control.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:
   1. Include plans, elevations, sections, and locations of protection-zone fencing and signage, showing relation of equipment movement routes and material storage locations with protection zones.
   2. Detail fabrication and assembly of protection-zone fencing and signage.
   3. Indicate extent of trenching by hand or with air spade within protection zones.

C. Samples: For each type of the following:
   1. Organic Mulch: 1-pint (0.5-L) volume of organic mulch; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch.
   2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.
   3. Protection-Zone Signage: Full-size Samples of each size and text, ready for installation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For arborist and tree service firm.

B. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

C. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.

D. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
   1. Use sufficiently detailed photographs or video recordings.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

E. Quality-control program.
1.7 QUALITY ASSURANCE

A. Arborist Qualifications: Registered Consulting Arborist as designated by ASCA.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Quality-Control Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work without damaging trees and plantings. Include dimensioned diagrams for placement of protection zone fencing and signage, the arborist's and tree-service firm's responsibilities, instructions given to workers on the use and care of protection zones, and enforcement of requirements for protection zones.

1.8 FIELD CONDITIONS

A. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Moving or parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Backfill Soil: Stockpiled soil mixed with planting soil of suitable moisture content and granular texture for placing around tree; free of stones, roots, plants, sod, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth.

   1. Planting Soil: Planting soil as specified in Section 32 91 13 "Soil Preparation."
B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:

1. Type: Shredded hardwood.
2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements:

1. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with 2-inch (50-mm) maximum opening in pattern and weighing a minimum of 0.4 lb/ft. (0.6 kg/m); remaining flexible from minus 60 to plus 200 deg F (minus 16 to plus 93 deg C); inert to most chemicals and acids; minimum tensile yield strength of 2000 psi (13.8 MPa) and ultimate tensile strength of 2680 psi (18.5 MPa); secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than 96 inches (2400 mm) apart.
   a. Height: 48 inches (1200 mm).
   b. Color: High-visibility orange, nonfading.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. Prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remainTie a 1-inch (25-mm) blue vinyl tape around each tree trunk at 54 inches (1372 mm) above the ground.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated. Do not exceed indicated thickness of mulch.

1. Apply 2-inch (50-mm) uniform thickness of organic mulch unless otherwise indicated. Do not place mulch within 6 inches (150 mm) of tree trunks.
3.3 PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected areas. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.

B. Maintain protection zones free of weeds and trash.

C. Maintain protection-zone fencing in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
   1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
   2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Section 31 23 16 "Excavation" unless otherwise indicated.

B. Trenching within Protection Zones: Where utility trenches are required within protection zones, excavate under or around tree roots by hand or with air spade, or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning. If excavating by hand, use narrow-tine spading forks to comb soil and expose roots.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches (75 mm) back from new construction and as required for root pruning.

D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.
3.5 ROOT PRUNING

A. Prune tree roots that are affected by temporary and permanent construction. Prune roots as follows:

1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
2. Cut Ends: Do not paint cut root ends.
3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
4. Cover exposed roots with burlap and water regularly.
5. Backfill as soon as possible according to requirements in Section 31 23 23.15 "Trench Backfill."

B. Root Pruning at Edge of Protection Zone: Prune tree roots 12 inches (300 mm) outside of the protection zone by cleanly cutting all roots to the depth of the required excavation.

3.6 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.7 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or to be relocated that are damaged by construction operations, in a manner approved by NPS.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours according to arborist's written instructions.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by NPS.

B. Trees: Remove and replace trees indicated to remain that are more than 25 percent dead or in an unhealthy condition or are damaged during construction operations that NPS determines are incapable of restoring to normal growth pattern.

1. Small Trees: Provide new trees of same size and species as those being replaced for each tree that measures 4 inches (100 mm) or smaller in caliper size.
2. Large Trees: Provide two new tree(s) of 6-inch (150-mm) caliper size for each tree being replaced that measures more than 6 inches (150 mm) in caliper size.
   a. Species: As selected by NPS.
3. Plant and maintain new trees as specified by NPS.

C. Excess Mulch: Rake mulched area within protection zones, being careful not to injure roots. Rake to loosen and remove mulch that exceeds a 2-inch (50-mm) uniform thickness to remain.
3.8 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, trash, and debris and legally dispose of them off NPS's property.

END OF SECTION 01 56 39
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 U.S. Environmental Protection Agency (USEPA). The USEPA uses the 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 the existing General Permit requirements under Phase I to include regulated 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 the Agency(ies) with Jurisdiction for review and approval.

B. NPS Standards and Guidelines require that water quality be protected at all times to ensure compliance with the Organic Act. The Contractor shall prepare a Storm Water Pollution Prevention Plan (SWPPP) for each project resulting in more than 1 acre of soil disturbance.

C. The work of this section consists of implementing measures to prevent discharges of pollutants, including temporary storm water pollution during construction activities, through compliance with the NPDES permit program.

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 the 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 the 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 and District of Columbia requirements for permit approval under the NPDES program.
1.3 SUBMITTALS

A. After contract award and before the pre-construction conference, prepare and submit:
   1. A SWPPP showing that the SWPPP satisfies all Federal and District of Columbia NPDES permit requirements;

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

C. Inspection Schedule: Submit schedule for inspection and monitoring of all 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 any other materials proposed for use on this project.

1.4 QUALITY ASSURANCE

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

B. Orientation Meeting: The Contractor shall be responsible for arranging and conducting an Erosion and Sediment Control meeting/briefing to inform all parties scheduled to be on-site during the project of the measures to be implemented for proper erosion and sediment control (may be included as part of the Pre-Construction Meeting).
   1. Installation of silt fences, storm drain protection, and all other forms of erosion and sediment control shall not begin until after this meeting has occurred.

C. Orientation Meeting: The Contractor shall be responsible for arranging and conducting a Pollution Prevention meeting/briefing to inform all parties scheduled to be on-site during the project of the measures to be implemented for proper pollution prevention and control (may be included as part of the Pre-Construction Meeting).
   1. Installation of silt fences, storm drain protection, and all other forms of pollution prevention controls shall not begin until after this meeting has occurred.

D. Pollution Prevention Manager: The Contractor shall designate the Pollution Prevention Manager who will be responsible for the implementation, inspection, maintenance, and amendments to the approved plan.
   1. The Pollution Prevention Manager shall be familiar with SWPPP procedures and Best Management Practices (BMPs) and shall ensure that emergency procedures and the plan are updated as needed and available for inspection.
   2. When changes in the approved plan are required, the Pollution Prevention Manager shall prepare and certify an amendment and submit to the CO for review and concurrence.
E. Pollution Prevention and Erosion Control Manager: The Contractor shall designate the Pollution Prevention and Erosion Control Manager who will be responsible for the implementation, inspection, maintenance, and amendments to the approved plan.

1. The Pollution Prevention and Erosion Control Manager shall be familiar with temporary storm water pollution prevention procedures and Best Management Practices (BMPs) and shall ensure that emergency procedures and the plan are updated as needed and available for inspection.

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

PART 2 - PRODUCTS

2.1 STORM WATER POLLUTION PREVENTION PLAN:

A. Provide a SWPPP which satisfies all Federal and District of Columbia NPDES permit requirements and includes the following information and forms:

1. Site description.
2. Identification and contract information for Pollution Prevention and Erosion Control Manager.
3. Expected sequencing of operations and construction schedule.
5. Descriptions and details BMPs for 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 the natural resources within the project boundaries and outside the limits of work.
performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by the CO.

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

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

3.2 REGULATORY REQUIREMENTS

A. Permits: The Contractor shall obtain all required NPDES permits in a manner that results in no impacts to scheduled work. The Contractor shall account for the possibility of significant lead time in scheduling and executing the work.

1. Implement the requirements of the NPDES permit for erosion control due to storm water runoff during construction.
2. Implement all good housekeeping practices, inspections and record keeping.
3. Prior to construction, the Contractor and all subcontractors shall sign certifications (included in the plan) that they understand the requirements of the NPDES permit.
4. All subcontractors shall comply with the requirements of the NPDES under the supervision of the Contractor.
5. The accepted plan must comply with the terms and conditions of the EPA permit.

B. Notice of Intent (NOI): The 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 the construction project, file a Notice of Termination (NOT) with the Agency(ies) with Jurisdiction.

D. CO Notification: The Contractor shall notify the CO in writing and by telephone of the following events:

1. The required 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 all sediment control structures.
3.3 STORM WATER POLLUTION PREVENTION PLAN

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

1. The accepted Plan will describe and ensure implementation of the practices which will be used to reduce the pollutants in storm water discharges.
2. The Contractor shall maintain a current copy of the Plan and all associated records and forms at the jobsite throughout the duration of the project.
3. The Plan shall be available at all times for public inspection and for the inspection and use of the CO.
4. Approval of Contractor’s Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.

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

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

C. The SWPPP (including inspection forms) and all data used to complete the NOI shall be provided to the CO after Substantial Completion of the project.

3.4 SITE INSPECTIONS AND PLAN REVISIONS

A. Inspections: The Contractor and the CO will perform a weekly inspection of the site.

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

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

1. The Plan shall specify the mechanism whereby revisions may be proposed by the Contractor or the CO.
2. The Contractor and the CO will jointly review each revision to the Plan before changes are incorporated and implemented. The Contractor will then provide a revised copy of the Plan to the CO.
3. Accepted modifications will be implemented within 7 calendar days following the date of the 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 the Government.
3.5 HOUSEKEEPING AND SITE MANAGEMENT

A. Materials stored on site should be stored in conformance to federal, district, and manufacture’s regulations and specifications. Additionally, BMPs should be used to minimize the risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.

B. Solid waste should be managed in conformance to federal and district regulations. BMPs should be used to minimize the risk of materials coming into contact with the environmental conditions (i.e. water and wind) that could disperse them.

C. The project should include a spill prevention and control plan with provisions placed in the SWPPP.

D. Hazardous waste (including contaminated soil) should be managed in conformance to federal, district, and NPS regulations and guidelines.

3.6 EROSION CONTROL MEASURES

A. Erosion control measures shall consist of any and all BMPs for storm water discharges, including but not limited to 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 to control run-on and run-off into other areas, including creeks, streams, marshes, access roads, well areas, and the staging areas.

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

D. Earthen sediment traps or holding ponds shall not be used unless accepted by the CO.

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

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

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

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

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

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

L. Before the work begins, sufficient equipment shall be available on the site to assure that the operation and adequacy of the 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. The Contractor shall remove entrapped sediment from behind excelsior drainage filter after each storm.

3.8 REPORTING

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

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

3.9 SEDIMENT DISPOSAL

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

B. Contractor shall place the 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. All temporary control measures shall be removed with permission of the CO within 20 working days after final acceptance of the project, and/or once grading is completed and slopes have stabilized.

END OF SECTION 01 57 23
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, except those products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. 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:
   b. Section 2: Composition/Information on Ingredients.
   c. Section 3: Hazards Identification.
   d. Section 4: First Aid Measures.
   e. Section 5: Fire Fighting Measures.
   g. Section 7: Handling and Storage.
   h. Section 8: Exposure Controls/Person Protection.
   i. Section 9: Physical and Chemical Properties.
   j. Section 10: Stability and Reactivity Data.
   k. Section 11: Toxicological Information. Include data used to determine the hazards cited in Section 3. Identify acute data, carcinogenicity, reproductive effects, and target organ effects.
   l. Section 12: Ecological Information. Include data regarding environmental impacts during raw materials acquisition, manufacture, and use. Include data regarding environmental impacts in 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 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 NPS.

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 NPS.
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 Division 01 Section "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.

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, and 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, 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 - 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 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: 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 prevent 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 & Masonry: 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.
3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
4. **Ceilings:** Patch, repair, or re-hang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. **Exterior Building Enclosure:** Patch components in a manner that restores enclosure to a weather tight condition.

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

END OF SECTION 01 73 29
SECTION 01 73 40 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. 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.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.
8. Correction of the Work.

1.2 SUBMITTALS

A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

B. Quantity Surveys: Submit 2 copies showing quantities of work performed and actual construction completed and in place.

1.3 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 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. 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 must be performed by public utilities serving Project site.

3.2 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, and inspections.

1. All utility coordination will be done through Miss Utility, 7223 Parkway Drive, Suite 100, Hanover, MD 21076.

2. Locate Requests will be made by calling 800.257.7777

3.3 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 Division 01 Specification 01 31 00 “Project Management and Coordination”.

3.4 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: Engage a land surveyor to lay out the Work using accepted 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 must 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.

3.5 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 will 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 a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with NPS requirements for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

3.6 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions 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.

3.7 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.


2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to 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 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 will not be permitted. Washing waste materials down sewers or into waterways will 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.

3.8 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.
3.9 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 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.

END OF SECTION 01 73 40
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. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Solid Waste: Garbage, debris, sludge, or other discharged material (except hazardous waste) including solid, liquid, semisolid, or contained gaseous materials resulting from domestic, industrial, commercial, mining, or agricultural operations.

D. Debris: Non-hazardous solid waste generated during 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.

E. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

F. Environmental Pollution and Damage: 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.

G. Garbage: Refuse and scraps resulting from preparation, cooking, dispensing, and consumption of food.

H. 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.
I. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

J. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

1.3 PERFORMANCE REQUIREMENTS

A. General: Project shall minimize creation of construction, deconstruction, and demolition waste to protect and restore natural habitat and resources. 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 (can be ground and used for fill on site)
5. Asphalitic concrete (can be ground and used for fill on site)
6. Cardboard, paper, packaging, newsprint
7. Metals (from banding, stud trim, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze)
8. Gypsum drywall—unpainted
9. Non-hazardous paint and paint cans
10. Beverage containers: Aluminum, glass, and plastic containers
11. Insulation
12. Ceiling grid and tiles
13. Ductwork
14. Wiring
15. Other mixed construction and demolition waste as appropriate

C. If 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 including the following materials:

1. Asphalt
2. Concrete
3. Ductile Iron

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. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Waste Management Meeting: Conduct separate meeting or cover in the Pre-Construction Conference and comply with requirements in Division 01 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. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.


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: Engage a waste management coordinator responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.

C. Contractor shall establish contacts with local recycling and reuse companies to set up lines of responsibility. Contractor shall be responsible for coordination in terms of identifying materials, pickup schedules, and standard quality for recycled materials.

D. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

1. Distribute waste management plan to everyone concerned within three days of submittal return.
2. Distribute waste management plan to entities when they 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 should 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.

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 Contractor.
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 Governments property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Asphaltic Concrete Paving: Grind asphalt to maximum size allowed by the recycling facility.

B. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.

C. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
   1. Pulverize concrete to maximum size allowed by the recycling facility.

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. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.

G. Plumbing Fixtures: Separate by type and size.

H. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.

I. Conduit: Reduce conduit to straight lengths and store 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.
   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 a location determined by the Government.

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 Governments property and legally dispose of them.

END OF SECTION 01 74 19
017419 - Appendix A

Project Waste Management Plan Worksheet

<table>
<thead>
<tr>
<th>Material</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
<th>J</th>
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</thead>
<tbody>
<tr>
<td>Material</td>
<td>Quantity Recycled (in tons)</td>
<td>Quantity Salvaged or Reused (in tons)</td>
<td>A + B = Total Quantity Diverted from Landfill</td>
<td>C + D = Total Quantity Generated (in tons)</td>
<td>Tip Fee/Ton at Landfill</td>
<td>C x F = Tip Fee Savings resulting from Landfill Diversion</td>
<td>Cost of Recycling (R), Salvage (S), or Reuse (Re)</td>
<td>Revenue from Recycling, Salvage, or Reuse</td>
<td>G - H + I = Total Cost (-) or Savings (+) from Diversion</td>
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<td>Asphalt/Concrete</td>
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<td>Brick/Masonry/Tile</td>
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<td>Building Materials (doors, windows, fixtures, shingles, lumber, insulation, sheetgoods, etc.)</td>
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<td>Carpet Padding, Foam Only</td>
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<td>Ceiling Tile</td>
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<td>Copper</td>
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<td>Unpainted Wood &amp; Pallets</td>
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<td>Yard Trimmings, Brush, Trees, Stumps, etc.</td>
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<td>Garbage/Trash</td>
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<tr>
<td><strong>Column Totals</strong></td>
<td>Total Quantity Recycled</td>
<td>Total Quantity Reused or Salvaged</td>
<td>Total Quantity Diverted from Landfill</td>
<td>Total Quantity Generated</td>
<td>Tip Fee Savings from Diversion</td>
<td>Total Cost of Recycling, Salvage, or Reuse</td>
<td>Revenue from Recycling, Salvage, or Reuse</td>
<td>Total Cost (-) or Savings (+) from Diversion</td>
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</tbody>
</table>

Percentage Diverted = (C divided by E from Column Totals) Should meet specified diversion requirement.
The following sections provide conversions for solid waste and recyclable materials. Section 1 provides formulas to convert solid waste volume (cubic yards) into tons. Section 2 includes conversion factors to estimate the volume and weight of a number of solid waste and recyclable materials.

1. To convert cubic yards to tons:

   A: For un-compacted trash, to convert the units of cubic yards into tons, using the standard density of trash value of 250 pounds per cubic yard:

   Using “X” cubic yards, multiply by 250 pounds per cubic yard, divide by 2000 pounds per ton, to obtain value in tons.

   \[
   \text{“X” cubic yards} \times \frac{250 \text{ pounds}}{\text{cubic yard}} \div \frac{1 \text{ ton}}{2000 \text{ pounds}} = \text{_____ tons}
   \]

   This equals:

   \[
   \text{“X” cubic yards} \times \frac{0.125 \text{ tons}}{\text{cubic yard}} = \text{_____ tons}
   \]

   In this case, 8 cubic yards = one ton.

   B: To determine your own density value for un-compacted trash (instead of using the standard value of 250 pounds per cubic yard), using a 32 gallon trash can:

   (1) Weigh the trash can both filled and empty (use a full 32 gallon trash can filled with trash roughly level to the top);
   (2) Subtract the empty weight from the filled weight to get the weight of trash (filled weight – empty weight = weight of trash);
   (3) Use the formula, using “Y” your weight of trash (pounds), divided by 0.15 cubic yards per 32 gallon trash can, to obtain your value in pounds per cubic yard; which equals:

   \[
   \frac{\text{“Y” pounds}}{0.15 \text{ cubic yards}} = \text{_____ pounds cubic yard}
   \]

   (4) Substitute this value for the 250 pounds per cubic yard value in Method A above.

   This would be the more accurate measure of your park’s specific waste.

   C: For compacted trash, to convert cubic yards into tons:

   To use a compaction ratio, multiply the appropriate ratio times the un-compacted trash weight in Formula A to obtain the compacted trash weight.

   \[
   \text{“X” cubic yards} \times \frac{3}{1} \text{ (compaction ratio)} \times \frac{250 \text{ pounds}}{\text{cubic yard}} \times \frac{1 \text{ ton}}{2000 \text{ pounds}} = \text{_____ tons}
   \]
Typical compaction ratios for trash:
  3:1 (typical)
  4:1 (higher-compaction vehicles)

If you or your hauler don’t know the compacting ratio, the typical values for compacted trash are 500 to 1000 lbs./cubic yard, average 700 lbs./cubic yard. Use 700 lbs. per cubic yard if you don’t have more accurate records.

For compacted trash, 0.4 is used instead of 0.125 in Formula A:

\[
\text{“X” cubic yards} \times 0.4 \frac{\text{tons}}{\text{cubic yard}} = \frac{\text{tons}}{\text{cubic yard}}
\]

D: To convert container size to cubic yards for un-compacted waste:

If you don't have size and weight information on your specific containers, then these typical values can be used:

- 1 cubic yard = 202 gallons
- 32 gallon can = 0.15 cubic yards
- 60 gallon tote = 0.30 cubic yards
- 90 gallon tote = 0.45 cubic yards

### 2. EPA’s Standard Volume-to-Weight Conversion Factors

<table>
<thead>
<tr>
<th>Category</th>
<th>Recyclable Materials (u/c = uncompacted/ compacted &amp; baled)</th>
<th>Volume</th>
<th>Estimated Waste (in pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOOD SCRAPSA</td>
<td>Food scraps, solid and liquid fats</td>
<td>55-gal drum</td>
<td>412</td>
</tr>
</tbody>
</table>
| GLASS             | BottlesB
|                   | Whole Bottles                                              |                |                            |
|                   | A. Semicrushed Crushed (mechanically)                      | 1 yd³          | 500-700                    |
|                   | Uncrushed to manually broken                               | 1 yd³          | 1,000-1,800                |
|                   | Refillable Whole BottlesC
|                   | Refillable beer bottles                                    | 1 case = 24 bottles | 10-14                    |
|                   | Refillable soft drink bottles                              | 1 case = 24 bottles | 12-22                    |
|                   | 8 oz glass container                                        | 1 case = 24 bottles | 12                        |
| LEAD-ACID         | CarD
<p>| BATTERIES         |                                                           |                |                            |
|                   | TruckE                                                      | 1 battery      | 39.4 lb                    |
|                   | MotorcycleE                                                 | 1 battery      | 53.3 lb lead and plastic   |
|                   |                                                            |                | 9.5 lb lead and plastic    |</p>
<table>
<thead>
<tr>
<th>Category</th>
<th>Recyclable Materials (u/c = uncompacted/ compacted &amp; baled)</th>
<th>Volume</th>
<th>Estimated Waste (in pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>METALS</td>
<td>Aluminum Cans&lt;sup&gt;F&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Whole</td>
<td>1 yd³</td>
<td>50-75</td>
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<tr>
<td></td>
<td>Compacted (manually)</td>
<td>1 yd³</td>
<td>250-430</td>
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<td></td>
<td>Uncompacted</td>
<td>1 full grocery bag</td>
<td>1.5</td>
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<td>1 case = 24 cans</td>
<td>0.9</td>
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<td>Ferrous (tin coated steel cans)&lt;sup&gt;G&lt;/sup&gt;</td>
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<td>Whole</td>
<td>1 yd³</td>
<td>150</td>
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<td>Flattened</td>
<td>1 yd³</td>
<td>850</td>
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<td></td>
<td>Whole</td>
<td>1 case = 6 cans</td>
<td>22</td>
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<td></td>
<td>Major Appliances&lt;sup&gt;E&lt;/sup&gt;</td>
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<td>Air conditioners (room)</td>
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<td>Freezers</td>
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<td>Microwave ovens</td>
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<td>Ranges</td>
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<td>Washers (clothes)</td>
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<td>177</td>
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<td>Water heaters</td>
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<td>Newspaper&lt;sup&gt;D&lt;/sup&gt;</td>
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<tr>
<td></td>
<td>Uncompacted</td>
<td>1 yd³</td>
<td>360-505</td>
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<td>Compacted/baled</td>
<td>1 yd³</td>
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<td>12 in. stack</td>
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<td>Old Corrugated Containers&lt;sup&gt;F&lt;/sup&gt;</td>
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<td>1 yd³</td>
<td>50-150 (300)&lt;sup&gt;ⅱ&lt;/sup&gt;</td>
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<td>Computer Paper&lt;sup&gt;Ⅲ&lt;/sup&gt;</td>
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<tr>
<td></td>
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<td>Stacked (u/c)</td>
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<td>375-465/755-925</td>
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<td>1 ream = 500 sheets</td>
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<td></td>
<td>Tab Cards&lt;sup&gt;G&lt;/sup&gt;</td>
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<td>605</td>
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<td>Miscellaneous Paper</td>
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<td>Yellow legal pads&lt;sup&gt;F&lt;/sup&gt;</td>
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<td>Colored message pads&lt;sup&gt;F&lt;/sup&gt;</td>
<td>1 carton = 144 pads</td>
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<td></td>
<td>Telephone directories&lt;sup&gt;H&lt;/sup&gt;</td>
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<td>Category</td>
<td>Recyclable Materials (u/c = uncompacted/compacted &amp; baled)</td>
<td>Volume</td>
<td>Estimated Waste (in pounds)</td>
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<td>PET (Soda Bottles)</td>
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<td>Whole bottles (uncompacted)</td>
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<td>Whole bottles (compacted)</td>
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<td>Whole bottles (uncompacted)</td>
<td>gaylord</td>
<td>40-53</td>
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<td>Baled</td>
<td>30” x 62”</td>
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<td>semiload</td>
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<td>700-750</td>
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<td></td>
<td>8 bottles (2 L size)</td>
<td>16 L</td>
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<td></td>
<td>HDPE (Dairy)</td>
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<td>Whole (uncompacted)</td>
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<td>Whole (compacted)</td>
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<td>32” x 60”</td>
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<td>HDPE (Mixed)</td>
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<td>32” x 60”</td>
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<td>Other Plastic</td>
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<td>Compacted/baled</td>
<td>1 yd³</td>
<td>400-700</td>
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<tr>
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<td>Mixed PET and HDPE (Dairy)</td>
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<tr>
<td></td>
<td>Whole</td>
<td>1 yd³</td>
<td>32</td>
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<tr>
<td></td>
<td>Film</td>
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<td></td>
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<td></td>
<td>Baled</td>
<td>semiload</td>
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<td>Baled</td>
<td>30” x 42” x 48”</td>
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<td>Crumb rubber[^]{K}</td>
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<td>Whole tire[^]{E}</td>
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<td>Crumb rubber[^]{K}</td>
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<td>WOOD</td>
<td>Wood chips[^]{L}</td>
<td>1 yd³</td>
<td>725</td>
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<td>Pallets[^]{F}</td>
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<td>30-100 (40 avg)</td>
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<td>Grass Clippings</td>
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<td></td>
<td>Uncompacted</td>
<td>1 yd³</td>
<td>350-450</td>
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<td></td>
<td>Compacted</td>
<td>1 yd³</td>
<td>550-1,500</td>
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<tr>
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<td>Leaves</td>
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<tr>
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<td>Uncompacted</td>
<td>1 yd³</td>
<td>200-250</td>
</tr>
<tr>
<td></td>
<td>Compacted</td>
<td>1 yd³</td>
<td>300-450</td>
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<td></td>
<td>Vacuumed</td>
<td>1 yd³</td>
<td>350</td>
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<td>MUNICIPAL SOLID WASTE[^]{M}</td>
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<td>(uncompacted at curb)</td>
<td>1 yd³</td>
<td>150-300</td>
</tr>
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<td>Commercial-industrial waste</td>
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</tr>
<tr>
<td></td>
<td>(uncompacted)</td>
<td>1 yd³</td>
<td>300-600</td>
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<tr>
<td></td>
<td>MSW (compacted in truck)</td>
<td>1 yd³</td>
<td>500-1,000</td>
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<td></td>
<td>MSW (landfill density)</td>
<td>1 yd³</td>
<td>750-1,250</td>
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</table>
A. Information obtained from Washington State.
C. Personal communication with a representative from Allwaste. November 6, 1995.
H. Information obtained from Massachusetts State.
I. Information obtained from New Jersey and New York States.
N. Information obtained from New Jersey and New York States.
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.

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 CD-R or DVD-R with index and descriptions, and similar final record information.
4. 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.

5. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

6. Restore all landscape, including turf, to pre-construction conditions. This will include planting shrubbery, flowers and trees that may have been removed or disturbed.

7. Complete final cleaning requirements, including touchup painting.

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. 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.

B. 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 (215-by-280-mm) 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.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. See Division 01 Specification Section “Execution” for information on cleaning agents.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Conduct final cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete 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. Sweep concrete floors broom clean in unoccupied spaces.
   i. Remove labels that are not permanent.
   j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

      1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
   k. Replace parts subject to unusual operating conditions.

C. Waste Disposal: Comply with requirements of Division 01 section, “Construction Waste Management and Disposal.”

END OF SECTION 01 77 00
## Closeout and Operation & Maintenance Requirements

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<th>Specification Section</th>
<th>Requirement</th>
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<td><strong>Tools Spare Parts Equipment</strong></td>
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<td>331300</td>
<td>Results of Disinfection and Testing of Water System</td>
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<td>Notice of Termination</td>
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<td>Certification of System Disinfection</td>
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<td><strong>Environmental Record Documents</strong></td>
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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, including the following:

1. Manuals, General.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Maintenance manuals for the care and maintenance of systems and equipment.

B. See Divisions 02 through 49 Sections for additional operation and maintenance manual requirements for the Work in those Sections.

1.2 SUBMITTALS

A. Manual: Submit two copies of each manual in draft form at least 15 days before final inspection. Contracting Officer will return copy with comments within 15 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 2 copies of each corrected manual within 15 days of receipt of Contracting Officers comments.

1.3 QUALITY ASSURANCE

A. Coordinate with division 01 section on Commissioning. The Commissioning Agent shall review the Operation and Maintenance Manuals for systems that were commissioned.
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.
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 (215-by-280-mm) 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. Equipment Data Sheet: Data, using form at the end of this section.

   c. Schedules: Schedules reflecting final, as-installed conditions.

   d. 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 flood, water leak, power failure, water outage, 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. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.

4. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.


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.


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.
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:


   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 has been attached at the end of the Division 01 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.

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.

C. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23
## EQUIPMENT DATA SHEET

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
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<tr>
<td>Spare Parts Furnished and Other Information:</td>
<td>___________</td>
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</tbody>
</table>
SECTION 02 41 19 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected site elements.

B. Related Requirements:

1. Section 01 11 00 "Summary of Work" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
2. Section 01 56 39 "Temporary Tree and Plant Protection" for temporary protection of existing trees and plants that are affected by selective demolition.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

C. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to NPS that may be uncovered during demolition remain the property of NPS.

1. Carefully salvage in a manner to prevent damage and promptly return to NPS.
1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   3. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure NPS's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.

C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, which might be misconstrued as damage caused by demolition operations. Comply with Section 01 32 33 "Photo Documentation for Historic Preservation Projects." Submit before Work begins.

1.7 FIELD CONDITIONS

A. Conduct selective demolition so NPS's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by NPS as far as practical.

C. Notify CO of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic areas, including temporary protection, by 12 inches (300 mm) or more.

F. Storage or sale of removed items or materials on-site is not permitted.
G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.8 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with NPS's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services.

1. NPS will arrange to shut off indicated services/systems when requested by Contractor.
2. Arrange to shut off utilities with utility companies.
3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services.
3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area.
B. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations:
B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
C. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete Paving, and Asphalt Paving: Demolish in sections. Cut full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove between saw cuts.
B. Granite Curb: Dismantle curb at joints. Store removed curb sections for reinstallation. Damaged segments of granite curb shall be replaced with new granite curb.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
B. Burning: Do not burn demolished materials.
3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 41 19
PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:
   1. Section 32 13 13 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: fly ash, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.
   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials.
      a. Special concrete finish Subcontractor.
   2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, steel reinforcement installation, concrete repair procedures, and concrete protection.
1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Place Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Curing compounds.
7. Semirigid joint filler.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Field quality-control reports.

E. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
B. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.10 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301 (ACI 301M).
2. ACI 117 (ACI 117M).

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Form-Release Agent: Ready-to-use, non-emulsified soy bean oil and canola oil based release agent, bio-degradable, non-flammable.


2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

2. Fly Ash: ASTM C 618, Class F.
C. Normal-Weight Aggregates: ASTM C 33/C 33M, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.


2.6 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

2.7 RELATED MATERIALS


2.8 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
2.10 VAULT ACCESS DOORS

A. Load Capacity: 300 psf with maximum deflection of 1/150th of span. Provide H-20 highway loading capacity where indicated on drawings.

B. Component Fabrication:

1. Access Door Leaf(s): 1/4-inch aluminum diamond pattern plate. Provide stainless steel safety chain and attachments for end of double-leaf door assembly when open.
2. Channel Frame: 1/4-inch-thick extruded aluminum trough frame with continuous anchor flange around perimeter. Weld 1-1/2-inch diameter drain coupling to frame trough at front right corner, unless indicated otherwise on Drawings.
3. Gasket: EPDM mechanically attached to the frame.
4. Safety Grate: Aluminum grating with 300 psf live load capacity, 5-inch by 5-inch grate openings, permanent hinging system that locks grate in 90-degree position, and opening arm with vinyl grip handle and locking device. Provide at all sidewalk doors.

C. Door Hardware:

1. Hinges: Heavy-duty forged stainless steel with 1/4 –inch Type 316 stainless steel pins through-bolted to cover plate with tamper-proof Type 316 stainless steel bolts flush with top of cover and to outside leg of channel frame with Type 316 stainless steel bolts and locknuts.
2. Lifting Mechanism: Stainless steel compression lift springs enclosed in a Type 316 stainless steel telescoping vertical housing. Provide formed gusseted support plate for lower spring housing attachment.
3. Hold-Open Arm:
   a. Locks automatically in open position.
   b. Disengages with slight pull on vinyl grip with one hand.
   c. Door can be easily closed with one hand by pulling forward and down on vinyl grip.
4. Snap Lock:
   a. Type 316 stainless steel snap lock mounted on bottom of door leaf with removable topside key wrench and inside fixed letter handle.
   b. Threaded plug for flush outside surface with key wrench removed.

D. Aluminum shall be mill finished with protective bituminous coating applied to surface to be in contact with concrete.

E. Manufacturer and Product:

1. Bilco, New haven, CT; J Series.
2. Or equal.
PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION
A. Construct forms tight enough to prevent loss of concrete mortar.
B. Construct forms for easy removal without hammering or prying against concrete surfaces.
C. Chamfer exterior corners and edges of permanently exposed concrete.
D. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
E. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
F. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 STEEL REINFORCEMENT INSTALLATION
A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.3 JOINTS
A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by CO.

3.4 CONCRETE PLACEMENT
A. Before placing concrete, verify that installation of formwork, and reinforcement is complete and that required inspections are completed.
B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by CO.
C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301 (ACI 301M).

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

3.5 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.6 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 (ACI 301M) for hot-weather protection during curing.

3.7 FIELD QUALITY CONTROL

A. Special Inspections: Contractor will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports in accordance with Section 01 40 00, Quality Requirements.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Concrete placement, including conveying and depositing.
3. Curing procedures and maintenance of curing temperature.
4. Verification of concrete strength.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
   a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
8. Test results shall be reported in writing to CO, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by CO. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by CO.
10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 03 30 00
SECTION 31 23 16 - EXCAVATION

PART 1 GENERAL

1.1 QUALITY ASSURANCE
   A. Provide adequate survey control to avoid unauthorized overexcavation.
   B. Locate and protect existing utilities to remain.

1.2 WEATHER LIMITATIONS
   A. Material excavated when frozen or when air temperature is less than 32 degrees F shall not be used as fill or backfill until material completely thaws.
   B. Material excavated during inclement weather shall not be used as fill or backfill until after material drains and dries sufficiently for proper compaction.

1.3 SEQUENCING AND SCHEDULING
   A. Demolition: Complete applicable Work specified in Section 02 41 19, Selective Demolition, prior to excavating.
   B. Dewatering: Conform to applicable requirements of Section 31 23 19.01, Dewatering, prior to initiating excavation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL
   A. Excavate to lines, grades, and dimensions shown and as necessary to accomplish Work. Excavate to within tolerance of plus or minus 0.1 foot, except where dimensions or grades are shown or specified as maximum or minimum. Allow for forms, working space, granular base, topsoil, and similar items, wherever applicable. Trim to neat lines where concrete is to be deposited against earth.
   B. Do not overexcavate without written authorization of CO.
   C. Remove or protect obstructions as shown and as specified in Section 01 50 00, Temporary Facilities and Controls, Article Protection of Work and Property.

3.2 UNCLASSIFIED EXCAVATION
   A. Excavation is unclassified. Complete all excavation regardless of the type, nature, or condition of the materials encountered.
3.3 TRENCH WIDTH

A. Minimum Width of Trenches:

1. Single Pipes, Conduits, Direct-Buried Cables, and Duct Banks:
   a. Less than 4-inch Outside Diameter or Width: 18 inches.
   b. Greater than 4-inch Outside Diameter or Width: 18 inches greater than
      outside diameter or width of pipe, conduit, direct-buried cable, or duct
      bank.

2. Multiple Pipes, Conduits, Cables, or Duct Banks in Single Trench: 18 inches
   greater than aggregate width of pipes, conduits, cables, duct banks, plus space
   between.

3. Increase trench widths by thicknesses of sheeting.

B. Maximum Trench Width: Contractor work plan shall include explanation of
   constructability benefits, if trenches of more than double minimum width are proposed.

3.4 STOCKPILING EXCAVATED MATERIAL

A. Stockpile excavated material that is suitable for use as fill or backfill until material is
   needed.

B. Confine stockpiles to within approved work and/or staging areas. Do not obstruct roads
   or streets.

C. Do not stockpile excavated material adjacent to trenches and other excavations, unless
   excavation side slopes and excavation support systems are designed, constructed, and
   maintained for stockpile loads.

D. Do not stockpile excavated materials near or over existing facilities, adjacent property, or
   completed Work, if weight of stockpiled material could induce excessive settlement.

3.5 DISPOSAL OF SPOIL

A. Dispose of excavated materials, which are unsuitable or exceed quantity needed for fill or
   backfill, offsite.

B. Dispose of debris resulting from removal of underground facilities as specified in
   Section 02 41 19, Selective Demolition, for demolition debris.

END OF SECTION 31 23 16
PART 1 GENERAL

1.1 SUBMITTALS
   A. Informational Submittals:
      1. Water control plan.
      2. Discharge permits.

1.2 WATER CONTROL PLAN
   A. As a minimum, include:
      1. Descriptions of proposed groundwater and surface water control facilities
         including, but not limited to, equipment; methods; standby equipment and power
         supply, pollution control facilities, discharge locations to be utilized, and
         provisions for immediate temporary water supply as required by this section.
      2. Drawings showing locations, dimensions, and relationships of elements of each
         system.
      3. Design calculations demonstrating adequacy of proposed dewatering systems and
         components.
   B. If system is modified during installation or operation revise or amend and resubmit Water
      Control Plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL
   A. Continuously control water during course of construction, including weekends and
      holidays and during periods of work stoppages, and provide adequate backup systems to
      maintain control of water.
   B. Remove and control water during periods when necessary to properly accomplish Work.

3.2 SURFACE WATER CONTROL
   A. See Section 01 50 00, Temporary Facilities and Controls, Article Temporary Controls.
   B. Remove surface runoff controls when no longer needed.
3.3 DEWATERING SYSTEMS

A. Provide, operate, and maintain dewatering systems of sufficient size and capacity to permit excavation and subsequent construction in dry and to lower and maintain groundwater level a minimum of 2 feet below the lowest point of excavation. Continuously maintain excavations free of water, regardless of source, and until backfilled to final grade.

B. Design and Operate Dewatering Systems:
   1. To prevent loss of ground as water is removed.
   2. To avoid inducing settlement or damage to existing facilities, completed Work, or adjacent property.
   3. To relieve artesian pressures and resultant uplift of excavation bottom.

3.4 DISPOSAL OF WATER

A. Obtain discharge permit for water disposal from authorities having jurisdiction.

B. Treat water collected by dewatering operations, as required by regulatory agencies, prior to discharge.

C. Discharge water as required by discharge permit and in manner that will not cause erosion or flooding, or otherwise damage existing facilities, completed Work, or adjacent property.

D. Remove solids from treatment facilities and perform other maintenance of treatment facilities as necessary to maintain their efficiency.

3.5 PROTECTION OF PROPERTY

A. Make assessment of potential for dewatering induced settlement. Provide and operate devices or systems, including but not limited to reinjection wells, infiltration trenches and cutoff walls, necessary to prevent damage to existing facilities, completed Work, and adjacent property.

B. Securely support existing facilities, completed Work, and adjacent property vulnerable to settlement due to dewatering operations. Support shall include, but not be limited to, bracing, underpinning, or compaction grouting.

END OF SECTION 31 23 19.01
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

2. ASTM International (ASTM):
   b. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³)).
   c. D2487, Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).
   d. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.

1.2 DEFINITIONS

A. Bedding Material: Granular material upon which pipes are placed.
B. Imported Material: Material obtained by Contractor from source(s) offsite.
C. Lift: Loose (uncompacted) layer of material.
D. Pipe Zone: Backfill zone that includes full trench width and extends from prepared trench bottom to an upper limit above top outside surface of pipe.
E. Prepared Trench Bottom: Graded trench bottom after excavation and installation of stabilization material, if required, but before installation of bedding material.
F. Relative Compaction: The ratio, in percent, of the as-compacted field dry density to the laboratory maximum dry density as determined by ASTM D1557. Corrections for oversize material may be applied to either as-compacted field dry density or maximum dry density, as determined by CO.
G. Relative Density: As defined by ASTM D4253 and ASTM D4254.
H. Selected Backfill Material: Material available onsite that CO determines to be suitable for a specific use.
I. Well-Graded: A mixture of particle sizes that has no specific concentration or lack thereof of one or more sizes producing a material type that, when compacted, produces a strong and relatively
incompressible soil mass free from detrimental voids. Satisfying both of the following requirements, as defined in ASTM D2487:

1. Coefficient of Curvature: Greater than or equal to 1 and less than or equal to 3.
2. Coefficient of Uniformity: Greater than or equal to 4 for materials classified as gravel, and greater than or equal to 6 for materials classified as sand.

1.3 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Manufacturer’s descriptive literature for marking tapes.
2. Samples:
   a. Trench stabilization material.
   b. Granular backfill.

B. Informational Submittals:

1. Catalog and manufacturer’s data sheets for compaction equipment.
2. Certified Gradation Analysis: Submit not less than 30 days prior to delivery for imported materials or anticipated use for excavated materials, except for trench stabilization material that will be submitted prior to material delivery to Site.

PART 2 PRODUCTS

2.1 MARKING TAPE

A. Nondetectable:

1. Inert polyethylene, impervious to known alkalis, acids, chemical reagents, and solvents likely to be encountered in soil.
2. Thickness: Minimum 5 mils.
3. Width: 3 inches.
4. Identifying Lettering: Minimum 1-inch high, permanent black lettering imprinted continuously over entire length.
5. Manufacturers and Products:
   a. Reef Industries; Terra Tape.
   b. Mutual Industries; Non-detectable Tape.
   c. Presco; Non-detectable Tape.
B. Color: In accordance with APWA Uniform Color Code.

<table>
<thead>
<tr>
<th>Color*</th>
<th>Facility</th>
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</thead>
<tbody>
<tr>
<td>Red</td>
<td>Electric power lines, cables, conduit, and lightning cables</td>
</tr>
<tr>
<td>Orange</td>
<td>Communicating alarm or signal lines, cables, or conduit</td>
</tr>
<tr>
<td>Yellow</td>
<td>Gas, oil, steam, petroleum, or gaseous materials</td>
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<tr>
<td>Green</td>
<td>Sewers and drain lines</td>
</tr>
<tr>
<td>Blue</td>
<td>Potable water</td>
</tr>
<tr>
<td>Purple</td>
<td>Reclaimed water, irrigation, and slurry lines</td>
</tr>
</tbody>
</table>

*As specified in NEMA Z535.1, Safety Color Code.

2.2 TRENCH STABILIZATION MATERIAL

A. Base Rock:

1. Clean, hard, durable 3-inch minus crushed rock or gravel, or pit run, free from clay balls, other organic materials, or debris.

B. Granular Backfill:

1. Clean gravel or crushed rock, reasonably well-graded from coarse to fine.

2.3 BEDDING MATERIAL AND PIPE ZONE MATERIAL

A. Unfrozen, friable, and no clay balls, roots, or other organic material.

2.4 EARTH BACKFILL

A. Soil, loam, or other excavated material suitable for use as backfill.

B. Free from roots or organic matter, refuse, boulders and material larger than 3 inches, or other deleterious materials.

2.5 GRAVEL SURFACING ROCK

A. As specified in Section 32 11 23, Aggregate Base Courses.

2.6 TOPSOIL

A. As specified in Section 32 91 13, Soil Preparation.
2.7 SOURCE QUALITY CONTROL

A. Perform gradation analysis in accordance with ASTM C136 for:
   1. Trench stabilization material.

PART 3 EXECUTION

3.1 TRENCH PREPARATION

A. Water Control:
   1. As specified in Section 31 23 19.01, Dewatering.
   2. Remove water in a manner that minimizes soil erosion from trench sides and bottom.
   3. Provide continuous water control until trench backfill is complete.

B. Remove foreign material and backfill contaminated with foreign material that falls into trench.

3.2 TRENCH BOTTOM

A. Firm Subgrade: Grade with hand tools, remove loose and disturbed material, and trim off high areas and ridges left by excavating bucket teeth. Allow space for bedding material if shown or specified.

B. Soft Subgrade: If subgrade is encountered that may require removal to prevent pipe settlement, notify CO. CO will determine depth of overexcavation, if any required.

3.3 TRENCH STABILIZATION MATERIAL INSTALLATION

A. Rebuild trench bottom with trench stabilization material.

B. Place material over full width of trench in 6-inch lifts to required grade, providing allowance for bedding thickness.

C. Compact each lift so as to provide a firm, unyielding support for the bedding material prior to placing succeeding lifts.

3.4 BEDDING

A. Furnish imported bedding material where, in the opinion of CO, excavated material is unsuitable for bedding or insufficient in quantity.

B. Place over full width of prepared trench bottom in two equal lifts when required depth exceeds 8 inches.

C. Hand grade and compact each lift to provide a firm, unyielding surface.

D. Minimum Thickness: 4 inches.
E. Check grade and correct irregularities in bedding material. Loosen top 1 inch to 2 inches of compacted bedding material with a rake or by other means to provide a cushion before laying each section of pipe.

F. Install to form continuous and uniform support except at bell holes, if applicable, or minor disturbances resulting from removal of lifting tackle.

G. Bell or Coupling Holes: Excavate in bedding at each joint to permit proper assembly and inspection of joint and to provide uniform bearing along barrel of pipe or conduit.

3.5 BACKFILL PIPE ZONE

A. Upper limit of pipe zone shall not be less than following:
   1. Pipe: 12 inches, unless shown otherwise.

B. Restrain pipe as necessary to prevent movement during backfill operations.

C. Place material simultaneously in lifts on both sides of pipe.
   1. Pipe 10-Inch and Smaller Diameter: First lift less than or equal to 1/2 pipe diameter.
   2. Pipe Over 10-Inch Diameter: Maximum 6-inch lifts.

D. Thoroughly tamp each lift, including area under haunches, with handheld tamping bars supplemented by “walking in” and slicing material under haunches with a shovel to ensure voids are completely filled before placing each succeeding lift.

E. Each lift shall be compacted with a minimum of two passes by either a vibratory plate compactor or a power-driven impact compactor. Take care to avoid damaging pipe and pipe coating.

3.6 MARKING TAPE INSTALLATION

A. Continuously install marking tape along centerline of buried piping, as shown on Drawings. Coordinate with piping installation drawings.
   1. Nondetectable Marking Tape: Install with metallic piping.

3.7 BACKFILL ABOVE PIPE ZONE

A. General:
   1. Process excavated material to meet specified gradation requirements.
   2. Adjust moisture content as necessary to obtain specified compaction.
   3. Do not allow backfill to free fall into trench or allow heavy, sharp pieces of material to be placed as backfill until after at least 2 feet of backfill has been provided over top of pipe.
   4. Backfill to grade with proper allowances for topsoil, crushed rock surfacing, and pavement thicknesses, wherever applicable.
   5. Backfill around structures with same class backfill as specified for adjacent trench, unless otherwise shown or specified.
B. Backfill in Non-Paved Areas:
   1. Place in lifts not exceeding a loose thickness of 8 inches.
   2. Mechanically compact each lift to a minimum of 95 percent relative compaction prior to placing succeeding lifts.

C. Backfill in Paved Areas:
   1. Backfill trench above pipe zone with granular backfill to subgrade elevation of existing pavement section.
   2. Fill remainder of trench with aggregate base course, as specified, over entire trench width.
   3. Compact aggregate base course, as specified.
   4. Install permanent paving, as specified, to match existing pavement section and match existing grades.

3.8 REPLACEMENT OF TOPSOIL

A. Replace topsoil in top 6 inches of backfilled trench.

B. Maintain finished grade of topsoil even with adjacent area and grade as necessary to restore drainage.

3.9 MAINTENANCE OF TRENCH BACKFILL

A. After each section of trench is backfilled, maintain surface of backfilled trench even with adjacent ground surface until final surface restoration is completed.

B. Topsoil: Add topsoil where applicable and as necessary to maintain surface of backfilled trench level with adjacent ground surface.

C. Concrete Pavement: Replace concrete pavement as specified in Section 32 13 13, Concrete Paving.

D. Asphalitic Pavement: Replace settled areas or fill with asphalt as specified in Section 32 12 16, Asphalitic Paving.

E. Other Areas: Add excavated material where applicable and keep surface of backfilled trench level with adjacent ground surface.

3.10 SETTLEMENT OF BACKFILL

A. Settlement of trench backfill, or of fill, or facilities constructed over trench backfill will be considered a result of defective compaction of trench backfill.

END OF SECTION 31 23 23.15
SECTION 31 41 00 - SHORING

PART 1 GENERAL

1.1 SUBMITTALS

A. Informational Submittals:
   1. Trench excavation plan.

1.2 QUALITY ASSURANCE

A. Provide surveys to monitor movements of critical facilities.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 GENERAL

A. Design, provide, and maintain shoring, sheeting, and bracing as necessary to support the sides of excavations and to prevent detrimental settlement and lateral movement of existing facilities, adjacent property, and completed Work.

3.2 TRENCH EXCAVATION PLAN

A. Prepare trench excavation plan addressing following topics:
   1. Details of shoring, bracing, sloping, or other provisions for worker protection from hazards of caving ground.
   2. Design assumptions and calculations.
   3. Methods and sequencing of installing excavation support.
   4. Proposed locations of stockpiled excavated material.
   5. Minimum lateral distance from the crest of slopes for vehicles and stockpiled excavated materials.
   6. Anticipated difficulties and proposed resolutions.

3.3 MOVEMENT MONITORING PLAN

A. Prepare movement monitoring plan addressing following topics:
   1. Survey control.
   2. Location of monitoring points.
   3. Plots of data trends.
   4. Interval between surveys.
3.4 REMOVAL OF EXCAVATION SUPPORT

A. Remove excavation support in a manner that will maintain support as excavation is backfilled.

B. Do not begin to remove excavation support until support can be removed without damage to existing facilities, completed Work, or adjacent property.

C. Remove excavation support in a manner that does not leave voids in the backfill.

3.5 TRENCHES

A. For trench excavation exceeding 5 feet in depth, provide adequate safety system meeting requirements of applicable state and local construction safety orders, and federal requirements.

END OF SECTION 31 41 00
PART 1 - GENERAL

1.1 WORK INCLUDED

A. The purpose of geotechnical instrumentation is to provide data to the Contractor to control operations, and to permit the CO to monitor the Contractor's general compliance with the requirements of the Contract regarding ground movement in the vicinity of excavations, along the proposed trenchless alignments, and protection of adjacent property. The instrumentation program specified herein and shown on the Plans is not intended to be used to ensure the safety of the work.

B. The Contractor shall be responsible for monitoring ground conditions as necessary to conform to the requirements of the Contract. The instrumentation program required by this Section does not relieve the Contractor of responsibility for providing additional instrumentation and monitoring if, in the Contractor's opinion, such additional instrumentation and monitoring are necessary to accomplish the work.

C. The Work specified in this Section includes, but is not limited to, requirements for furnishing, installing, and maintaining geotechnical instrumentation to monitor ground associated with the trenchless alignment. This Section also includes the settlement monitoring the Contractor is required to perform.

D. At a minimum, the Contractor shall install the instrumentation as specified and shown in the Contractor's work plan, as approved by the CO. Additionally, the Contractor shall install instrumentation as necessary to control operations, monitor ground conditions, and ground response to achieve specified project requirements and to prevent damage to existing structures and facilities.

E. The Contractor shall install the instruments as specified. The Contractor will survey and monitor all settlement markers and furnish the CO with results daily.

F. The Contractor shall complete an as-installed position survey to determine the horizontal and vertical positions of settlement and utility markers in accordance with the requirements herein and furnish the CO with a copy of the results within 24 hours of field data acquisition.

G. Unless otherwise noted or instructed by the CO, the Contractor shall abandon all instruments upon completion of the work.
1.2 SUBMITTALS

A. In accordance with Section 01 33 23, Submittal Procedures.

B. Geotechnical Instrumentation:

1. Submittals listed below shall be prepared by Contractor and delivered to the CO at least 14 days prior to specific activity.
   a. Instrumentation shop drawings detailing locations, depths based on general information shown on the Drawings, type, details, and other pertinent information showing the installation details for each type of instrumentation required.
   b. Drawing that indicates the locations of control points and benchmarks associated with surveys for monitoring geotechnical instrumentation.
   c. Description of methods for installing and protecting all instruments.
   d. Schedule of instrument installation related to significant activities or milestones in the overall project.
   e. Following installation of the instruments and prior to the start of underground construction, submit as-built shop drawings showing the exact installed location, the instrument identification number, the instrument type, the installation date and time, and installed locations of control points and benchmarks associated with surveys for monitoring geotechnical instrumentation. Include details of installed instruments and protective measures.

2. Reports and Records:
   a. Submit three copies of initial/baseline readings specified herein to the CO, on forms approved by the CO at least 15 days prior to the start of any construction activity within 100 feet of the trenchless alignment centerline.
   b. Submit three copies of the instrumentation data to the CO, on forms approved by the CO within 24 hours after the observation has been made.
   c. As applicable, submit reduced data and updated data plots in ground movements within 2 working days after observations have been made.
   d. Inform CO immediately when Action Limits or Displacement Limit is reached for any instrument.

C. Movement/settlement and support system monitoring:

1. Submit a single monitoring plan that covers all excavations and trenchless installations that includes the required frequency of monitoring (minimum frequency in Part 3 of this Section) to ensure settlement or heave is controlled. Monitoring shall include:
   a. Position (survey) measurement of geotechnical instrumentation, to be performed by the Contractor.
   b. Review of position measurements to assess ground movement, to be performed by the Contractor.

2. The Contractor shall provide a District of Columbia licensed surveyor to take position measurements of the instrumentation described in this Specification Section at the frequency indicated in the article “Movement/Settlement Monitoring” in Part 3 of this Section.
1.3 DEFINITIONS

A. Ground Surface Settlement Marker (GM): GMs are stakes, rods, or nails installed in unpaved or paved areas at predetermined locations to measure vertical (elevation) changes of the ground surface.

B. Open Ground: Ground without any above or belowgrade facilities, paved or unpaved roads, and utilities within a 25-foot horizontal radius.

1.4 QUALITY ASSURANCE

A. The Contractor shall notify the CO at least 24 hours prior to all instrumentation installation operations so that the CO may monitor the installation work.

B. Each instrument specified herein shall be the product of an acceptable manufacturer currently engaged in manufacturing geotechnical instrumentation hardware of the specified types.

1.5 TOLERANCES

A. GMs shall be installed within 12 inches of the horizontal locations indicated on approved shop drawings.

B. Should actual field conditions prohibit installation at the locations and elevations indicated on the Drawings, prior acceptance shall be obtained from the CO for new instrument locations and elevations.

1.6 PROJECT CONDITIONS

A. Obtain necessary permits for the installation of monitoring systems.

B. Provide the CO and the NPS access to the instruments at all times.

PART 2 - PRODUCTS

2.1 GROUND SURFACE SETTLEMENT MARKERS

A. Ground surface settlement markers (GM) in unpaved areas shall consist of a 2-inch by 2-inch by 12-inch long hardwood stake or a 12-inch long, 1-inch diameter (No. 8) reinforcing bar driven approximately 10 inches below grade as shown in the Plans. In paved areas GMs shall be hardened surveyor “PK” nails that are securely fastened by driving or epoxy grouting within a properly sized hole, flush with the pavement.
PART 3 - EXECUTION

3.1 GENERAL

A. Instrumentation shall be installed at the locations indicated on the Plans or approved shop drawings, and as approved by the CO.

B. CO shall have access to instrument locations and Contractor's cooperation is required in obtaining monitoring data, including the provision of assistance, as required.

C. All instruments shall be clearly marked, permanently labeled, and protected to avoid being obstructed or otherwise damaged by construction operations or the general public.

D. Geotechnical instrumentation shall be installed and baseline surveys or initial readings completed before commencing any excavation work.

E. Location Surveying: Promptly following installation, the Contractor shall survey and provide horizontal coordinates and vertical elevations of the ground surface and top of all instruments.

F. Initial Reading: Following instrument installation and prior to the start of any construction activity within 100-feet of the trenchless alignment centerline. The Contractor’s surveyor, shall take a minimum of two sets of initial readings to provide baseline readings and to demonstrate the adequacy of the completed installation.

1. Installation of the instrumentation by the Contractor does not preclude the CO, through an independent contractor, from installing instrumentation in, on, near, or adjacent to the construction work.

2. Elevations shall be recorded to a precision of 0.01 of a foot. Horizontal survey accuracy shall be at least 0.1 feet.

3. The Contractor shall take additional survey(s) as requested by the CO if in the opinion of the CO the two sets of initial readings do not adequately establish the baseline level. After initial readings are approved by the CO, the average of the two sets of initial readings shall be used to establish the baseline level of the instrument, unless otherwise directed by the CO.

3.2 GROUND SURFACE SETTLEMENT MARKERS

A. GMs shall be installed where indicated on the drawings, and approved submittals. Markers shall be installed firmly to prevent loosening and in a manner and location that allows survey rods to be consistently placed on the high point of the marker head or point being measured.

B. GMs shall be installed at the required locations as shown on the Plans. The method of installation shall be the Contractor's option; however, the marker shall be rigidly affixed so as not to move relative to the surface to which it is attached.

3.3 INSTRUMENT PROTECTION, MAINTENANCE, AND REPAIR

A. Flag and protect all locations. Exercise care during construction so as to avoid damage to instrumentation. Repair or replace instrumentation that is damaged as a result of the Contractor's
operation at his expense. The CO will determine whether repair or replacement is required. Complete the repair or replacement as soon as practical after notification by the CO as to whether a repair or replacement is required.

B. Instruments shall be maintained by draining any accumulated water, removing any debris from under protective covers and keeping covers locked and sealed at all times.

3.4 PROTECTION OF PROPERTY AND GROUND MOVEMENT LIMITS

A. The Contractor shall use whatever means and methods are necessary to limit ground movements, settlements and damage of utilities, structures and other facilities. These means and methods include, but are not limited to ground support systems, tunneling methods, underpinning of vulnerable facilities, grouting and other forms of ground improvement.

B. The ground movement limits for all instruments are established as follows:

<table>
<thead>
<tr>
<th>Location</th>
<th>Action Limit (inch)</th>
<th>Displacement Limit (inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above and below grade utilities, street and general roadway pavement, general facilities</td>
<td>0.25</td>
<td>0.50</td>
</tr>
<tr>
<td>Open Ground</td>
<td>0.50</td>
<td>0.75</td>
</tr>
</tbody>
</table>

C. If settlement of a settlement marker reaches an Action Limit, the likely cause of the settlement shall be reported to the CO and actions shall be promptly taken to limit further settlements and to prevent Settlement Limits from being exceeded. Actions to be taken in response to measured settlements shall be reported to the CO before being taken, except in emergency situations. The cost of actions required to comply with settlement limits and to repair any damage to adjacent facilities shall be borne by the Contractor with no cost to the NPS.

3.5 MOVEMENT/SETTLEMENT MONITORING

A. The Contractor shall develop and implement a settlement control plan to protect existing facilities, utilities, structures, roads, streets, and other improvements from damage due to settlement or heave resulting from trenchless construction. The plan shall include the specific trenchless methods that will be used to minimize loss of ground, procedures for monitoring for loss of ground or heave as specified herein, and ground improvement plans.

B. If necessary, obtain the permission of CO, in advance, to work outside of the work hours established for the project. Monitor force mains at existing crossings and repair immediately if damaged due to trenchless installation. The Contractor shall be responsible for making any necessary changes in construction methods to control loss of ground and minimize settlement or heave to prevent damage to adjacent facilities, existing utilities, and adjacent structures.
C. For trenchless installations, monitor all instruments located within, around and above the alignment as follows:

1. Monitor at least once every 5 hours, but not less than twice per day beginning when reaming head approaches within 100 feet of the station of the instrument location. Continue monitoring at the same frequency until the pull back is completed.
2. Upon completion of the trenchless installation, monitoring daily for 1 week. Continue to monitor weekly until directed by the CO to end monitoring.

D. Actions to Mitigate Excessive Ground Movements:

1. If displacement limit of a settlement marker reaches an action limit, the likely cause of the displacement shall be promptly discussed with the CO. The CO may increase the monitoring frequency for all settlement markers and inclinometers within 100-feet of the location where the displacement action limit was exceeded. Actions to be taken in response to action limits being exceeded shall be reported to the CO before being taken, except in emergency situations.
2. If displacement of a settlement marker reaches a displacement limit, cease excavation or other construction operations that result in further displacement until additional operational changes are made to reduce ground loss or heave. The likely cause of the displacement shall be immediately discussed with the CO. The CO may further increase the monitoring frequency for all settlement markers within 100-feet of the location where the displacement limit was exceeded and may add additional settlement markers. Actions to be taken in response to displacement limits being exceeded shall be discussed with and approved by the CO before being taken, except in emergency situations.
3. The cost of actions required for complying with displacement limits and to repair any damage to adjacent facilities shall be borne by the Contractor with no additional cost to the NPS.

3.6 DISCLOSURE OF DATA

A. The Contractor shall not disclose any instrumentation data to third parties and shall not publish data without prior approval and written consent of the NPS.

3.7 ABANDONMENT OF INSTRUMENTS

A. Settlement Markers: All GMs shall be removed by the Contractor during the cleanup and restoration work, or sooner as allowed or required by the CO.
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO):
   b. T27, Standard Method of Test for Sieve Analysis of Fine and Coarse Aggregates.
   f. T99, Standard Specification for the Moisture-Density Relations of Soils Using a 2.5 kg (5.5 pound) Rammer and a 305 mm (12 in) Drop.
   g. T180, Standard Specification for Moisture-Density Relations of Soils Using a 4.54 kg (10-lb) Rammer and a 457 mm (18-in) Drop.
   i. T265, Standard Method of Test for Laboratory Determination of Moisture Content of Soils.
   j. T310, Standard Specification for In-Place Density and Moisture Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

2. ASTM International (ASTM):
   a. C88, Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
   b. D1883, Test Method for CBR (California Bearing Ratio) of Laboratory Compacted Soils.
   d. D4791, Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate.

1.2 DEFINITIONS

A. Completed Course: Compacted, unyielding, free from irregularities, with smooth, tight, even surface, true to grade, line, and cross-section.

B. Completed Lift: Compacted with uniform cross-section thickness.
1.3 SUBMITTALS

A. Action Submittals:

1. Samples: Submit for specified materials 20 days prior to delivery to Site.

B. Informational Submittals:

1. Certified Test Results on Source Materials: Submit copies from commercial testing laboratory 20 days prior to delivery of materials to Project showing materials meeting the physical qualities specified.
2. Certified results of in-place density tests from independent testing agency.

PART 2 PRODUCTS

2.1 BASE COURSE

A. Clean, hard durable, pit run gravel or crushed stone graded from coarse to fine containing enough fines to bind material when compacted.

B. Physical Qualities:

1. Abrasion, AASHTO T96: 35 percent maximum wear.
2. Fractured Face: 75 percent minimum particles.
3. Liquid Limit, AASHTO T89: Maximum 30 percent.
5. Sand Equivalency, ASTM D2419: 35 percent, minimum.
6. Resistance (R) Value, AASHTO T190: 75, minimum.
7. CBR Value, ASTM D1883: 100 percent, minimum.
8. Soundness, ASTM C88: 12 percent, maximum.
9. Flat and Elongated Particles, ASTM D4791: 8 percent, maximum.

C. Gradation, AASHTO T27, Based on U.S. Standard Sieves:

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Gradation Percent Passing by Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sieve Designation</td>
<td>Material</td>
</tr>
<tr>
<td>(Square Opening)</td>
<td>Aggregate Base Course</td>
</tr>
<tr>
<td>2&quot;</td>
<td>100</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>95-100</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>70-92</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>50-70</td>
</tr>
<tr>
<td>No. 4</td>
<td>35-55</td>
</tr>
<tr>
<td>No. 30</td>
<td>12-25</td>
</tr>
<tr>
<td>No. 200</td>
<td>0-8</td>
</tr>
</tbody>
</table>
2.2 SOURCE QUALITY CONTROL

A. Perform tests necessary to locate acceptable source of materials meeting specified requirements.

B. Final approval of aggregate material will be based on test results of installed materials.

C. Should separation of coarse from fine materials occur during processing or stockpiling, immediately change methods of handling materials to correct uniformity in grading.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

A. As specified in Section 31 23.15 of the Standard Specifications.

B. Obtain CO’s acceptance of subgrade before placing base course or surfacing material.

C. Do not place base course or surfacing materials in snow or on soft, muddy, or frozen subgrade.

3.2 EQUIPMENT

A. Compaction Equipment: Adequate in design and number to provide compaction and to obtain specified density for each layer.

3.3 HAULING AND SPREADING

A. Hauling Materials:

1. Do not haul over surfacing in process of construction.
2. Loads: Of uniform capacity.
3. Maintain consistent gradation of material delivered; loads of widely varying gradations will be cause for rejection.

B. Spreading Materials:

1. Distribute material to provide required density, depth, grade, and dimensions with allowance for subsequent lifts.
2. Produce even distribution of material upon roadway or prepared surface without segregation.
3. Should segregation of coarse from fine materials occur during placing, immediately change methods of handling materials to correct uniformity in grading.
3.4 CONSTRUCTION OF COURSES

A. Untreated Aggregate Base Course:
   1. Maximum Completed Lift Thickness: 6 inches.
   2. Completed Course Total Thickness: As shown on Drawings.
   3. Spread lift on preceding course to required cross-section.
   4. Lightly blade and roll surface until thoroughly compacted.
   5. Add keystone to achieve compaction and as required when aggregate does not compact readily due to lack of fines or natural cementing properties, as follows:
      a. Use leveling course or surfacing material as keystone.
      b. Spread evenly on top of base course, using spreader boxes or chip spreaders.
      c. Roll surface until keystone is worked into interstices of base course without excessive displacement.
      d. Continue operation until course has become thoroughly keyed, compacted, and will not creep or move under roller.
   6. Blade or broom surface to maintain true line, grade, and cross-section.

3.5 ROLLING AND COMPACTION

A. Commence compaction of each layer of base after spreading operations and continue until density of 100 percent of maximum density has been achieved as determined by AASHTO T99.
B. Roll each layer of material until material does not creep under roller before succeeding layer is applied.
C. Commence rolling at outer edges and continue toward center; do not roll center of road first.
D. Apply water as needed to obtain specified densities.
E. Place and compact each lift to required density before succeeding lift is placed.
F. Surface Defects: Remedy by loosening and rerolling. Reroll entire area, including surrounding surface, until thoroughly compacted.
G. Finished surface shall be true to grade and crown before proceeding with surfacing.

3.6 SURFACE TOLERANCES

A. Blade or otherwise work surfacing as necessary to maintain grade and cross-section at all times, and to keep surface smooth and thoroughly compacted.
B. Finished Surface of Untreated Aggregate Base Course: Within plus or minus 0.04 foot of grade shown at any individual point.
C. Overall Average: Within plus or minus 0.01 foot from crown and grade specified.
3.7 FIELD QUALITY CONTROL

A. In-Place Density Tests:

1. Provide testing laboratory at least 2 hours advance notification prior to testing.
2. Show proof that areas meet specified requirements before identifying density test locations.
3. Refer to Table 2 for minimum sampling and testing requirements for aggregate base course and surfacing.

<table>
<thead>
<tr>
<th>Property</th>
<th>Test Method</th>
<th>Frequency</th>
<th>Sampling Point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gradation</td>
<td>AASHTO T11 and AASHTO T27</td>
<td>One sample every 500 tons but at least every 4 hours of production</td>
<td>Roadbed after processing</td>
</tr>
<tr>
<td>Moisture Density (Maximum Density)</td>
<td>AASHTO T99, Method D</td>
<td>One test for every aggregate grading produced</td>
<td>Production output or stockpile</td>
</tr>
<tr>
<td>In-Place Density and Moisture Content</td>
<td>AASHTO T310, and AASHTO T265 for moisture content</td>
<td>One for each 500 ton but at least every 10,000 sq ft of area</td>
<td>In-place completed, compacted area</td>
</tr>
</tbody>
</table>

3.8 CLEANING

A. Remove excess material from the Work area. Clean stockpile and staging areas of all excess aggregate.

END OF SECTION 32 11 23
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO):
   a. M82, Standard Specification for Cut-Back Asphalt (Medium Curing Type).

2. ASTM International (ASTM):


1.2 DEFINITIONS

A. Combined Aggregate: All mineral constituents of asphalt concrete mix, including mineral filler and separately sized aggregates.


1.3 SUBMITTALS

A. Informational Submittals.

1. Asphalt Concrete Mix Formula:
   a. Submit minimum of 30 days prior to start of production.
   b. Submittal to include the following information:
      1) Provide certification that the proposed mix designs are in conformance with the referenced Standard Specifications. Certification shall be signed by a certified asphalt technician.

2. Statement of qualification for independent testing laboratory.

3. Test Results:
   a. Field density.
   b. Quality control reports.
1.4 QUALITY ASSURANCE

A. Qualifications:
   1. Independent Testing Laboratory: In accordance with ASTM E329.

1.5 ENVIRONMENTAL REQUIREMENTS

A. Temperature: Do not apply asphalt materials or place asphalt mixes when ground temperature is lower than 10 degrees C (50 degrees F) or air temperature is lower than 4 degrees C (40 degrees F). Measure ground and air temperature in shaded areas away from heat sources or wet surfaces.

B. Moisture: Do not apply asphalt materials or place asphalt mixes when application surface is wet.

PART 2 PRODUCTS

2.1 MATERIALS

A. Prime Coat: Cut-back asphalt, Grade MC-70 conforming to AASHTO M82.

B. Tack Coat: Emulsified asphalt, Grade SS-1, SS-1h conforming to AASHTO M140.

C. Sand (Blotter Material): Clean, dry, with 100 percent passing 4.75-millimeter (No. 4) sieve, and a maximum of 10 percent passing 75 µm (No. 200) sieve.

2.2 ASPHALT CONCRETE MIX

A. General:
   1. Mix formula shall not be modified except with written approval of CO.
   2. Source Changes:
      a. Should material source(s) change, establish new asphalt concrete mix formula before new material(s) is used.
      b. Perform check tests of properties of plant-mix bituminous materials on first day of production and as requested by CO to confirm that properties are in compliance with design criteria.
      c. Make adjustments in gradation or asphalt content as necessary to meet design criteria.
B. Asphalt Concrete: as specified in Section 413 of the Standard Specifications.

C. Asphalt Cement: Paving Grade 70-22 as specified in Section 413 of the Standard Specifications.

PART 3 EXECUTION

3.1 GENERAL

A. Traffic Control:
   1. In accordance with Section 01 50 00, Temporary Facilities and Controls.
   2. Minimize inconvenience to traffic, but keep vehicles off freshly treated or paved surfaces to avoid pickup and tracking of asphalt.

B. Driveways: Repave driveways from which pavement was removed. Leave driveways in as good or better condition than before start of construction.

3.2 LINE AND GRADE

A. Provide and maintain intermediate control of line and grade, independent of underlying base, to meet finish surface grades and minimum thickness.

B. Shoulders: Construct to line, grade, and cross-section shown.

3.3 APPLICATION EQUIPMENT

A. In accordance with Division 900 of the Standard Specifications.

3.4 PREPARATION

A. Prepare subgrade as specified in Section 31 23 23.15, Trench Backfill.

B. Thoroughly coat edges of contact surfaces (curbs, manhole frames) with emulsified asphalt or asphalt cement prior to laying new pavement. Prevent staining of adjacent surfaces.

3.5 PAVEMENT APPLICATION

A. General: Place asphalt concrete mixture on approved, prepared base in conformance with Section 413 of the Standard Specifications.

B. Prime Coat:
   1. Heat cut-back asphalt prior to application.
   2. Apply uniformly to clean, dry surfaces avoiding overlapping of applications.
3. Do not apply when moisture content of upper 75 millimeters (3 inches) of base exceeds optimum moisture content of base, or if free moisture is present.
4. Application Rate: Minimum 70 (0.68) to maximum 2.28 liters per square meter of surface area (0.15 to 0.50 gallons per square yard).
5. Remove or redistribute excess material.
6. Allow a minimum of 5 full days for curing of primed surface before placing asphalt concrete.

C. Tack Coat:

1. Prepare material, as specified in Section 403 of the Standard Specifications, prior to application.
2. Apply uniformly to clean, dry surfaces avoiding overlapping of applications.
3. Do not apply more tack coat than necessary for the day’s paving operation.
4. Touch up missed or lightly coated surfaces and remove excess material.
5. Application Rate: Minimum 0.25 liter to maximum 0.70 liter of asphalt (residual if diluted emulsified asphalt) per square meter (0.05 to 0.15 gallon per square yard) of surface area.

D. Pavement Mix:

1. Prior to Paving:
   a. Sweep primed surface free of dirt, dust, or other foreign matter.
   b. Patch holes in primed surface with asphalt concrete pavement mix.
   c. Blot excess prime material with sand.
2. Place asphalt concrete pavement mix in one single lift.
3. Compacted Lift Thickness:
   a. Minimum: Twice maximum aggregate size, but in no case less than 25 millimeters (1 inch).
   b. Maximum: 100 millimeters (4 inches).
4. Total Compacted Thickness: Match existing pavement section as shown on Drawings.
5. Apply such that meet lines are straight and edges are vertical.
6. Collect and dispose of segregated aggregate from raking process. Do not scatter material over finished surface.
7. After placement of pavement, seal meet line by painting a minimum of 150 millimeters (6 inches) on each side of joint with cut-back or emulsified asphalt. Cover immediately with sand.

E. Compaction: Roll until roller marks are eliminated and minimum percent compaction as stated in the Standard Specifications.

F. Tolerances:

1. General: Conduct measurements for conformity with crown and grade immediately after initial compression. Correct variations immediately by removal or addition of materials and by continuous rolling.
2. Completed Surface or Wearing Layer Smoothness:
   a. Uniform texture, smooth, and uniform to crown and grade.
   b. Maximum Deviation: 3 millimeters (1/8 inch) from lower edge of a 3.6-meter (12-foot) straightedge, measured continuously parallel and at right angle to centerline.
   c. If surface of completed pavement deviates by more than twice specified tolerances, remove and replace wearing surface.

3. Transverse Slope Maximum Deviation: 6 millimeters (1/4 inch) in 3.6 meters (12 feet) from rate of slope shown.

4. Finished Grade:
   a. Perform field differential level survey on maximum 15-meter (50-foot) meter grid and along grade breaks.
   b. Maximum Deviation: 6 millimeters (0.02 foot) from grade shown.

G. Seal Coat:

1. General: Apply seal coat of paving grade or emulsified asphalt to finished surface at longitudinal and transverse joints, joints at abutting pavements, areas where asphalt concrete was placed by hand, patched surfaces, and other areas as directed by CO.

2. Preparation:
   a. Surfaces that are to be sealed shall be maintained free of holes, dry, and clean of dust and loose material.
   b. Seal in dry weather and when temperature is above 2 degrees C (35 degrees F).

3. Application:
   a. Fill cracks over 1.5 millimeters (1/16 inch) in width with asphalt-sand slurry or approved crack sealer prior to sealing.
   b. When sealing patched surfaces and joints with existing pavements, extend minimum 150 millimeters (6 inches) beyond edges of patches.

3.6 PATCHING

A. Preparation:
   1. Remove damaged, broken, or unsound asphalt concrete adjacent to patches. Trim to straight lines exposing smooth, sound, vertical edges.

B. Application:
   1. Patch Thickness: 75 millimeters (3 inches) or thickness of adjacent asphalt concrete, whichever is greater.
   2. Place asphalt concrete mix across full width of patch in layers of equal thickness.
   3. Spread and grade asphalt concrete with hand tools or mechanical spreader, depending on size of area to be patched.
C. Compaction:
   1. Roll patches with power rollers capable of providing compression of 350 to 525 Newtons per linear centimeter (200 to 300 pounds per linear inch). Use hand tampers where rolling is impractical.
   2. Begin rolling top course at edges of patches, lapping adjacent asphalt surface at least 1/2 the roller width. Progress toward center of patch overlapping each preceding track by at least 1/2 width of roller.
   3. Make sufficient passes over entire area to remove roller marks and to produce desired finished surface.

D. Tolerances:
   1. Finished surface shall be flush with and match grade, slope, and crown of adjacent surface.
   2. Tolerance: Surface smoothness shall not deviate more than plus 6 millimeters (1/4 inch) or minus 0 millimeter when straightedge is laid across patched area between edges of new pavement and surface of old surfacing.

3.7 FIELD QUALITY CONTROL

A. General: Provide services of approved certified independent testing laboratory to conduct tests.

B. Field Density Tests:
   1. Measure with properly operating and calibrated nuclear density gauge in accordance with ASTM D2950.
   2. Maximum Density: In accordance with ASTM D2041, using sample of mix taken prior to compaction from same location as density test sample.

C. Testing Frequency:
   1. Quality Control Tests:
      a. Asphalt Content, Aggregate Gradation: Once per every 4 hours, whichever is greater.
      b. Mix Design Properties, Measured Maximum (Rice’s) Specific Gravity: Once every 8 hours, whichever is greater.
   2. Density Tests: Once every 450 mg (500 tons) of mix or once every 4 hours, whichever is greater.

END OF SECTION 32 12 16
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO).

2. American Concrete Institute (ACI):
   a. 305R, Hot Weather Concreting.
   b. 306R, Cold Weather Concreting.
   c. 308, Standard Practice for Curing Concrete.
   d. 318/318R, Building Code Requirements for Structural Concrete and Commentary.
   e. 325.9R, Guide for Construction of Concrete Pavements and Concrete Bases.

3. ASTM International (ASTM):
   a. A615/A615M, Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
   b. C31/C31M, Standard Practice for Making and Curing Concrete Test Specimens in the Field.
   c. C33, Specification for Concrete Aggregates.
   e. C78, Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
   f. C88, Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
   i. C150, Specification for Portland Cement.
   j. C172, Standard Practice for Sampling Freshly Mixed Concrete.
   k. C231, Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
   m. C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

1.2 DEFINITIONS


1.3 SUBMITTALS

A. Provide as required in Section 03 30 00, Cast-in-Place Concrete.

1.4 QUALITY ASSURANCE

A. Provide as required in Section 03 30 00, Cast-in-Place Concrete.

1. Testing or Inspection Agency: In conformance with ASTM E329.
2. Batch Plant: Currently certified by the National Ready Mixed Concrete Association.

B. Preparing Conference:

1. Held between Contractor, Subcontractor involved in concrete paving, and CO.
2. To be conducted a minimum of 14 days prior to commencing paving.
3. Conference cannot be held until mix design and admixture Submittals have been received by CO.
4. Items to discuss shall include, but not be limited to:

   a. Mix design.
   b. Method of placement.
   c. Curing.
   d. Finishing schedule.
   e. Traffic control.
   f. Protection of work.
C. Hot Weather Concreting: Conform to ACI 305R.
D. Cold Weather Concreting: Conform to ACI 306R.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Transporting of ready-mix concrete shall be in accordance with ASTM C94/C94M.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

A. Cement:
   1. Furnish cement for Project from one source.
   2. Portland cement shall be Type II.
   3. In accordance with ASTM C150.

B. Aggregates:
   1. General:
      a. As specified in Section 803 of the Standard Specification
      b. Material: Natural aggregates, free from deleterious coatings.
      c. Aggregates shall not be potentially reactive as defined in ASTM C33.
      d. Aggregates not in compliance with soundness and durability requirements of
         ASTM C33 may be used with prior approval of CO; provided it can be shown by
         special testing or record of past performance that these aggregates produce
         concrete of adequate strength and durability. Aggregate soundness testing for fine
         and coarse aggregates shall be in accordance with ASTM C33 and ASTM C88.
   2. Fine Aggregates:
      a. Meeting requirements of Section 803.01 of the Standard Specifications.
      b. Sand: Equivalent of not less than 68.
      c. Materials finer than 200 sieve shall not exceed 4 percent.
      d. Sources near or exposed to saltwater shall be washed, unless it can be shown that
         chloride content does not exceed 0.15 percent by weight of cement.
   3. Coarse Aggregate:
      a. Meeting requirements of Section 803.02 of the Standard Specifications.

C. Physical Properties: In accordance with Section 803.02 of the Standard Specifications.

D. Water: ASTM C94/C94M.
E. Admixtures:

1. Add admixtures to mix at batch plant.
3. Water Reducing:
   a. ASTM C494/C494M, Type A, normal, containing no chlorides and compatible with air-entraining admixtures.
   b. Do not use calcium chloride, salt, or antifreeze agents.

2.2 ANCILLARY MATERIALS

A. Tie Bars: Grade 40 deformed steel bars conforming to ASTM A615/A615M.

B. Dowels: Conform to requirements of AASHTO M227/M227M, Grade 70.

C. Joint Filler:
   1. Preformed expansion joint filler conforming to AASHTO M153 or AASHTO M213.
   2. Fillers furnished under AASHTO M213 shall be tested in accordance with ASTM D1751.

D. Joint Sealant:
   1. Preformed elastomeric joint seal conforming to AASHTO M220.
   2. Cold-applied single component joint sealant conforming to ASTM D5893.
   3. Elastomeric joint sealant conforming to ASTM C920.

E. Backer Rod:
   1. Backer material conforming to ASTM D5249.
   2. Cylindrical sealant backing conforming to ASTM C1330.

F. Curing Compound: ASTM C309, Type 1, Class A, suitable for spray application.

G. Curing Membranes:
   1. White polyethylene sheeting.
   2. Waterproof paper.
   3. Cotton or jute mats.

H. Evaporation Retardant: Confilm as manufactured by Master Builders Company.

2.3 EQUIPMENT

A. Ready-Mix Concrete Batch Plants: Certified by NRMCA.

B. Batch Plants: Conform to requirements of Section 905 of the Standard Specifications.
C. Ready-Mix Concrete Trucks: As specified in Section 905 of the Standard Specifications.

D. Hauling Equipment: As specified in Section 905 of the Standard Specifications.

E. Paving Equipment: As specified in Section 905 of the Standard Specifications.

F. Concrete Saws:
   1. Provide power driven concrete saws for sawing joints or finishing concrete, adequate in number of units and power to complete sawing at required rate.
   2. Saws and related equipment shall be of proven adequacy and design to perform efficiently and shall be subject to immediate replacement, if specified results are not obtained.
   3. Standby saw shall be available at Site.

G. Smoothness Testing Equipment: Supply two 12-foot straightedges for determining smoothness.

2.4 CONCRETE MIX DESIGN

A. As specified in Section 03 30 00, Cast-in-Place Concrete, with a minimum flexural strength of 650 psi.

B. Concrete target strengths shall be in accordance with ACI 318/318R.

C. If Contractor proposes to use a current mix design that meets these Specifications, has been used on previous DDOT projects, and less than 1 year has elapsed since it was last used; Contractor shall submit documentation of production of concrete produced from that mix design to CO for review. If review verifies concrete produced meets these Specifications and strength requirements, and establishes a correlation between compressive strength and flexural strength, no trial batches for proposed mix design will be required.

PART 3 EXECUTION

3.1 WEATHER LIMITATIONS

A. Concrete shall not be placed:
   1. Until the air temperature in the shade is 35 degrees F and rising and is forecast to remain above 35 degrees F.
   2. On frozen ground.
   3. During periods of rain or snow.

B. Concrete placement shall not continue when air temperature drops below 40 degrees F.

C. Protect concrete pavement from inclement weather for 7 days after it has been placed, when rain is imminent, and when air temperature drops or is forecast to drop below 35 degrees F.
3.2 PREPARATION

A. Prepare base as specified in Section 32 11 23, Aggregate Base Courses.

B. Dampen base thoroughly prior to concrete placement; standing water will not be permitted.

C. Formwork shall be complete prior to placement of concrete. Area in which concrete is to be placed, shall be smooth and free of ruts, projections, debris, spilled concrete, mud, sloughed soil, standing water, organic and other objectionable materials.

D. Construction Joints: Inspect prior to placement of concrete.

E. Prior to placing paving equipment in position, full width and length of the area on which the tracks of the paving equipment is to operate shall be brought to density and surface tolerances required.

F. Protect existing exposed surfaces such as grates, catch basins, air valves, manholes, and cleanout lids from splattered and spilled concrete during concrete placement by use of durable waterproof paper.

G. Furnish operable backup vibrator on Site prior to concrete placement.

3.3 SLIP FORM PAVING

A. Deliver from hauling vehicles to paving machine hopper.

B. Contractor’s equipment hauling portland cement concrete or reinforcement will not be permitted on subgrade, but will be allowed on base, with turns or other maneuvering kept to a minimum. Damage to subgrade or base shall be corrected to satisfaction of CO.

C. Place in final position uniformly in one layer, so a minimum of finishing will be necessary to provide a dense, homogenous pavement conforming to true grade and cross section.

1. Spreader shall receive portland cement concrete mixture in its hopper and uniformly spread and strike it off at proper thickness for full width of area being paved.

2. Paver shall vibrate, consolidate, and finish slab to proper grade and cross section.

D. Paver:

1. Operated with as continuous forward movement as possible.

2. Coordinate mixing, delivering, and spreading portland cement concrete to provide uniform progress.

3. Stopping and starting paver shall be held to a minimum. If, for any reason, it is necessary to stop forward motion of paver, vibratory and tamping elements shall also be stopped immediately.

4. No external force shall be applied to paver, except with approval of CO.

E. While placing portland cement concrete, provision shall be made for constructing joints, placing dowels, tie bars, and other devices as called for by Drawings and as provided in Article Joints.
F. Portland cement concrete shall be rejected if it:

1. Is not in place within 1 hour after being mixed.
2. Has begun to take an initial set prior to placement.
3. Has been retempered with water.

G. If necessary, supplemental hand spreading and distributing shall be with shovels. Rakes will not be permitted.

H. Portland cement concrete shall not be fouled with foreign matter.

I. Use vibrators to consolidate portland cement concrete pavement at least 6 feet each side of construction joints and expansion joints.

3.4 STATIONARY SIDE FORM CONSTRUCTION

A. Where width of pavement is narrow, tapering, or of irregular pattern not lending itself to being constructed by prescribed machine methods, Contractor shall be permitted to place concrete as specified in Section 03 30 00, Cast-in-Place Concrete.

1. As concrete is being placed, striking off and consolidating portland cement concrete shall be done without causing segregation of material and shall include thorough uniform vibration throughout the mass until it is uniformly compacted.
2. Portland cement concrete shall be struck off by means of templates or screeds designed and manipulated to shape portland cement concrete to specified cross section between forms, carrying a slight excess of portland cement concrete in front of leading edge of templates or screeds at all times. Tamp portland cement concrete to reduce voids to a minimum.
3. Floating shall follow vibrating, striking off, and tamping operations and shall include transverse floating or other smoothing and finishing action. This shall provide a surface and evenness within a 12-foot straightedge tolerance of 0.01 foot. Test hardened surface in presence of CO. Surface shall be free from laitance, soupy mortar, marks, or irregularities.

B. Defects:

1. Fill areas of minor honeycomb or other minor defect in composition of portland cement concrete along exposed edges of portland cement concrete with a stiff mortar of cement and fine aggregate. Apply to moistened portland cement concrete to satisfaction of CO.
2. Area showing serious defects in composition of concrete shall be removed and replaced with pavement of specified quality for full width of strip between longitudinal joints or edges and for a length not less than between the nearest transverse joints.
3.5 JOINTS

A. General:

1. Referred to as contraction or construction, either of which may be transverse or longitudinal, as called for by Drawings or as approved by CO.
2. Joints, backer material, joint filler and joint sealants shall extend to pavement edges or to each other, as the case may be, and shall be constructed perpendicular to surface of pavement.
3. Joints shall not vary from specified or indicated line by more than 1/4 inch.
4. Contractor shall submit jointing plan and details to CO for approval. Take into consideration placement of joints in curb and gutter, at catch basins, and position of manholes and other large structures, as well as other limitations herein mentioned.
5. Place manhole or similar large structure in line of joint, or if impractical, isolate structure from pavement with premolded joint filler, 1/2-inch wide, conforming to AASHTO M213 and ASTM D1751.

B. Contraction Joints:

1. Sawed Type with Poured Filler:
   a. Sawing shall be to a depth as shown on Drawings with a maximum width of 1/4 inch and a minimum width of 1/8 inch, in straight lines as shown or as approved by CO.
   b. Perform saw cuts as soon as portland cement concrete has set enough to permit sawing without tearing or raveling, before uncontrolled cracking results, and within 24 hours of placing portland cement concrete.
   c. Saws may be single or tandem, as Contractor may elect, and shall be controlled by guides to true line.
   d. Clean joints thoroughly of foreign matter before pouring approved rubber asphalt filler.
   e. Tops of joint filler shall be true to pavement cross section within 1/8 inch and shall be protected from damage by portland cement concrete operations.
   f. Areas containing uncontrolled cracks shall be removed and replaced.
   g. Restore curing agents broken or damaged by sawing operations.

2. Space longitudinal joints as shown on Drawings at the interface between lanes, normally at intervals between 12 feet to 16 feet.
3. Transverse joints shall be as shown on Drawings or as approved by CO, with intervals of 12 feet to 16 feet.

C. Construction Joints:

1. Construct when there is an interruption of longer 45 minutes in portland cement concrete placing operations or where specified.
2. Place parallel with intended contraction joint.
3. Tool both free edges of joints with 1/8 inch radius rounder to remove laitance and mortar resulting from finishing operations and to provide clean rounded edge. Tooling shall not form ridges on surface of concrete.
4. New portland cement concrete placed contiguous to joint shall conform to proportions and consistency of previously placed concrete.

5. Transverse Construction Joint:
   a. As shown on Drawings.
   b. If sufficient portland cement concrete has not been mixed at the time of interruption to place a construction joint at least 3 feet from a planned contraction joint, remove excess portland cement concrete back to a position to satisfactorily meet these criteria and to satisfaction of CO.
   c. Fill joint which has opened to a width of 1/8 inch or greater during construction or maintenance periods with poured filler.
   d. Do not construct within 3 feet of a transverse contraction joint.

6. Longitudinal Construction Joint:
   a. Tied type using No. 5 by 36-inch deformed tie bars at 12-inch centers.
   b. Tie Bars:
      1) Not required at construction joint between portland cement concrete pavement and gutter, except where shown on Drawings and mentioned above.
      2) Placement:
         a) Plastic Portland Cement Concrete: Insert before vibrating and finishing portland cement concrete; or
         b) Hardened Concrete:
            (1) Drill hole, insert, and grout tie bars into place.
            (2) Drill holes large and deep enough to allow tie bars to be inserted with grout.
            (3) Perform any time after portland cement concrete has attained enough strength to resist any damage caused by drilling.
            (4) Tie bars shall be grouted a maximum of 3 hours prior to placement of adjacent portland cement concrete.
      3) Replace loose tie bars by drilling and grouting as described.

D. Scored Joints:
   1. Configuration: 1/4-inch wide by 1/4-inch deep at locations indicated on Drawings formed by tooling of concrete while it is still fresh.
   2. Do not fill or seal.
   3. Layout of joints shall be straight and true and shall not vary from indicated line by more than 1/4 inch.
3.6 SURFACE FINISHING

A. Use temporary screeds. Wet screeding and jitterbugging shall not be permitted.

B. Pavement shall have surface tolerance of 1/4 inch in 10 feet in accordance with ACI 325.9R.

C. Salting, spreading of cement or cement and sand mixture to speed up hardening shall not be permitted.

D. Exposed pavement edges shall be edged to a 1/2-inch radius and construction joints shall be edged to 1/8-inch radius after finishing. Edging shall not form ridges on pavement surface.

E. Pavement shall be treated and protected by use of evaporation retardant applied in accordance with manufacturer’s written instructions. Flat surfaces shall be treated immediately after screeding and floating or if time period greater than 15 minutes occurs between finishing operations.

F. Pavement shall be screeded, floated, and given heavy nylon bristle-broomed skid-resistant surface.

1. Broomed surface with hand broom or mechanical broom device to produce 1/16-inch to 1/8-inch deep striations oriented perpendicular to the direction of travel.

3.7 CURING OF PORTLAND CEMENT CONCRETE

A. Immediately after the final floating, surface finishing, and edging has been completed, and while portland cement concrete surface is still moist, cover and cure entire exposed surface for at least 72 hours in accordance with one of the following provisions:

1. Liquid Membrane-Forming Compounds: Apply compound uniformly to portland cement concrete by pressure spray methods at a rate which will form an impervious membrane, but at least at a rate of 1 gallon per 150 square feet.

2. Other Membranes:
   a. Apply to damp portland cement concrete as soon as it can be placed without marring surface.
   b. Place in contact with surface, extend beyond sides or edges of slabs or forms, and fasten down to hold it in position as a waterproof and moistureproof covering.
   c. Laps shall be sufficient to maintain tightness equivalent to sheeting.
   d. Transverse laps for waterproof paper shall be at least 18 inches, and longitudinal seams shall be cemented.
   e. Cotton or jute mats shall be saturated with water prior to placing and kept fully wetted during curing period.

B. Concrete shall be cured by use of curing compound, for minimum of 7 days after concrete placement, in accordance with ACI 308. Curing compounds shall be applied in accordance with manufacturer’s written instructions.
C. Exposed surfaces shall be sprayed with curing compound immediately after free surface water has disappeared from finished surface.

D. Concrete temperature shall be maintained in accordance with ACI 306R.

E. Curing compounds shall not come in contact with hardened concrete that is to be concreted against.

3.8 FIELD QUALITY CONTROL

A. Retain independent testing or inspection agency to perform inspection, sampling, and testing.

B. Concrete Sampling: In accordance with ASTM C172. Take sample not less than every 5,000 square feet or fraction thereof of concrete placed each day.

C. Perform following tests on each sampling:
   1. Slump: ASTM C143/C143M.
   2. Air Content: ASTM C231.
   3. Compressive Strength: ASTM C39/C39M.
   4. Flexural Strength: ASTM C78.

D. Strength Tests:
   1. Make and cure cylinders in accordance with ASTM C31/C31M.
   2. Cylinders: Make four, standard 6-inch diameter by 12 inches high. Cure one in field and three in laboratory.
   3. Compressive: Test one field-cured cylinder at 7 days and two laboratory-cured cylinders at 28 days. Test last cylinder at 56 days if 28-day cylinder is below specified strength.

E. Acceptance of concrete shall be in accordance with ACI 318/318R.

3.9 CLEANING

A. Clean concrete splatter from exposed surfaces.

B. Thoroughly broom and wash concrete surfaces before opening to traffic.

3.10 PROTECTION OF CONCRETE

A. Do not operate construction equipment or allow traffic on newly placed portland cement concrete until the following requirements are met:
   1. Concrete has attained a compressive strength of at least 4,000 pounds per square inch.
B. Protect new concrete from construction operations, mechanical disturbances, water flow, and soiling until open for traffic.

C. Erect and maintain suitable barriers to protect concrete from traffic or other detrimental trespass until pavement is opened to traffic.

D. Maintain watchmen after normal working hours for at least a 24-hour period to ensure barriers are not removed or destroyed, and that trespass and vandalism upon pavement does not occur.

E. Wherever it is necessary that traffic, including Contractor’s vehicles and equipment, be carried from one side of pavement to the other, construct suitable bridges over pavement, and maintain them in good condition as long as they may be required. Leaving gaps in pavement to facilitate movement of traffic will not be allowed, unless prior written permission is obtained from CO.

F. Protect new concrete from dirt, asphalt, and other deleterious substances that may be tracked onto new pavement from construction activities.

G. Pavement damaged by traffic or damaged from any other cause, prior to its official acceptance, shall be repaired or replaced to the satisfaction of CO.

END OF SECTION 32 13 13
SECTION 32 16 00 - CURBS AND GUTTERS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):
   c. D994, Standard Specification for Preformed Expansion Joint Filler for Concrete (Bituminous Type).


1.2 SUBMITTALS

A. Action Submittals:

1. Form Material: Information on metal forms, if used, including type, condition, surface finish, and intended function.
2. Complete data on concrete mix, including aggregate gradations and admixtures in accordance with requirements of ASTM C94.

B. Informational Submittals:

1. Curing Compound: Manufacturer’s Certificate of Compliance, in accordance with Section 01 67 00, Product Requirements, and application instructions.
2. Ready-mix delivery ticket for each truck in accordance with ASTM C94.

1.3 QUALITY ASSURANCE


PART 2 PRODUCTS

2.1 MATERIALS

A. Conform to the requirements of the referenced Standard Specification.
2.2 EXPANSION JOINT FILLER
   A. Preformed asphalt-impregnated, expansion joint material meeting ASTM D994, 1/2-inch thick.

2.3 CONCRETE
   A. Ready-mixed meeting ASTM C94, Option A, with compressive strength of 4,000 psi at 28 days.
   B. Maximum Aggregate Size: 1-1/2 inch.
   C. Slump: 2 inches to 4 inches.

2.4 CURING COMPOUND
   A. Liquid membrane forming, clear or translucent, suitable for spray application and meeting ASTM C309, Type 1.

PART 3 EXECUTION

3.1 INSTALLATION
   A. Perform Work in accordance with the referenced Standard Specification.

3.2 FORMWORK
   A. Lumber Materials:
      1. 2-inch dressed dimension lumber, or metal of equal strength, straight, free from defects that would impair appearance or structural quality of completed curb and sidewalk.
      2. 1-inch dressed lumber or plywood may be used where short-radius forms are required.
   B. Metals: Steel in new undamaged condition.
   C. Setting Forms:
      1. Construct forms to shape, lines, grades, and dimensions.
      2. Stake securely in place.
   D. Bracing:
      1. Brace forms to prevent change of shape or movement resulting from placement.
      2. Construct short-radius curved forms to exact radius.
E. Tolerances:
   1. Do not vary tops of forms from gradeline more than 1/8 inch when checked with 10-foot straightedge.
   2. Do not vary alignment of straight sections more than 1/8 inch in 10 feet.

3.3 PLACING CONCRETE

A. Prior to placing concrete, remove water from excavation and debris and foreign material from forms.

B. Place concrete as soon as possible, and within 1-1/2 hours after adding cement to mix without segregation or loss of ingredients, and without splashing.

C. Place, process, finish, and cure concrete in accordance with applicable requirements of ACI 304, and this section. Wherever requirements differ, the more stringent shall govern.

D. To compact, vibrate until concrete becomes uniformly plastic.

3.4 CURB CONSTRUCTION

A. Construct ramps at pedestrian crossings.

B. Expansion Joints: Place at maximum 45-foot intervals and at the beginning and end of curved portions of curb, and at connections to existing curbs. Install expansion joint filler at each joint.

C. Curb Facing: Do not allow horizontal joints within 7 inches from top of curb.

D. Contraction Joints:
   1. Maximum 15-foot intervals in curb.
   2. Provide open joint type by inserting thin, oiled steel sheet vertically in fresh concrete to force coarse aggregate away from joint.
   3. Insert steel sheet to full depth of curb.
   4. Remove steel sheet with sawing motion after initial set has occurred in concrete and prior to removing front curb form.
   5. Finish top of curb with steel trowel and finish edges with steel edging tool.

E. Front Face:
   1. Remove front form and finish exposed surfaces when concrete has set sufficiently to support its own weight.
   2. Finish formed face by rubbing with burlap sack or similar device to produce uniformly textured surface, free of form marks, honeycomb, and other defects.
   3. Remove and replace defective concrete.
   4. Apply curing compound to exposed surfaces of curb upon completion of finishing.
   5. Continue curing for minimum of 5 days.
F. Backfill curb with earth upon completion of curing period, but not before 7 days has elapsed since placing concrete.
   1. Backfill shall be free from rocks 2 inches and larger and other foreign material.
   2. Compact backfill firmly.

3.5 SIDEWALK CONSTRUCTION

A. Thickness:
   1. 4 inches in walk areas.
   2. 6 inches in driveway areas.

B. Connection to Existing Sidewalk:
   1. Remove old concrete back to an existing contraction joint.
   2. Clean the surface.
   3. Apply a neat cement paste immediately prior to placing new sidewalk.

C. Expansion Joints: Place in adjacent curb, where sidewalk ends at curb, and around posts, poles, or other objects penetrating sidewalk. Install expansion joint filler at each joint.

D. Contraction Joints:
   1. Provide transversely to walks at locations opposite contraction joints in curb.
   3. Construct straight and at right angles to surface of walk.

E. Finish:
   1. Broom surface with fine-hair broom at right angles to length of walk and tool at edges, joints, and markings.
   2. Mark walks transversely at 5-foot intervals with jointing tool; finish edges with rounded steel edging tool.
   3. Apply curing compound to exposed surfaces upon completion of finishing.
   4. Protect sidewalk from damage and allow to cure for at least 7 days.

END OF SECTION 32 16 00
SECTION 32 17 23 - PAVEMENT MARKINGS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Association of State Highway and Transportation Officials (AASHTO):


1.2 DEFINITIONS


1.3 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
   a. Product Data:
      1) Paint.
      2) Thermoplastic material.
      3) Reflective markers.
      4) Epoxies, resins, and primers to be used.

B. Informational Submittals:

1. Description of proposed methods for removal of drips, overspray, improper markings, paint and thermoplastic material tracked by traffic, and existing markings.
2. Manufacturer’s Certificate of Compliance, in accordance with Section 01 67 00, Product Requirements, for products specified in this section.
3. Equipment List: Proposed equipment to be used, including descriptive data.
4. Manufacturer’s Instructions:
   a. Application of preformed tape.
   b. Application of portland cement concrete primer.
c. Application of glass beads.
d. Application of epoxy resin.
e. Installation of reflective markers.

PART 2 PRODUCTS

2.1 GENERAL

A. All products shall be in accordance with Section 821 of the Standard Specifications.

2.2 PAINT

A. Color: White or yellow.

B. Traffic paint in accordance with Section 821 of the Standard Specifications.

C. Homogeneous, easily stirred to smooth consistency, with no hard settlement or other objectionable characteristics during storage period of 6 months.

2.3 THERMOPLASTIC MARKING

A. Color: White or yellow.

B. AASHTO M249.

2.4 RAISED REFLECTIVE MARKERS

A. Meeting Requirements of Section 822 of the Standard Specifications.

B. Metallic or nonmetallic, or prismatic reflector type, of permanent colors retaining color and brightness under action of traffic.

C. Rounded surfaces presenting a smooth contour to traffic.

D. Color: White or yellow.

E. Marker in accordance with ASTM D4280.

F. Epoxy in accordance with AASHTO M237.

2.5 GLASS BEADS

A. In accordance with Section 821 of the Standard Specifications.
PART 3 EXECUTION

3.1 GENERAL

A. Surface Preparation, Application, and Protection: In accordance with Section 612, of the Standard Specifications.

END OF SECTION 32 17 23
SECTION 32 91 13 - SOIL PREPARATION

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. ASTM International (ASTM):

1.2 SUBMITTALS

A. Informational Submittals:

   1. Certified Topsoil Analysis Reports:
      a. Indicate quantities of materials necessary to bring onsite topsoil into compliance with textural/gradation requirements.
      b. Indicate quantity of lime, quantity and analysis of fertilizer, and quantity and type of soil additive.

1.3 SEQUENCING AND SCHEDULING

A. Rough grade areas to be planted or seeded prior to performing Work specified under this section.

1.4 DEFINITIONS


PART 2 PRODUCTS

2.1 TOPSOIL

A. Shall be a screened, natural, surface soil, in a friable condition and contain less than 3 percent subsoil. The topsoil shall be free of hardpan material, stones and clods larger than 1/2 inch in diameter, sticks, tree or shrub roots, debris, toxic substances (i.e., residual herbicides) and other material detrimental to plant growth. The area and the topsoil shall be free of undesirable plants or plant parts such as, but not limited to, bermudagrass, nut sedge,
mugwort, johnson grass, quack grass, Canada thistle or noxious weeds as set forth in the Federal Seed Act.

B. Provide grow tests for seed mix in representative soil samples.

C. Contractor shall notify NPS of location of all sources of the topsoil and furnish the NPS a certified report from the agricultural experiment station or approved agricultural laboratory of an analysis performed not more than 60 days prior to the date of submission. The topsoil shall be certified to meet the following requirements:

1. Soil Analysis: For each Imported Topsoil and Planting Soil, furnish soil analysis and a written report by a qualified soil-testing laboratory stating the following:
   a. Shall be a natural, original surface soil of a sandy loam texture with a mechanical analysis of 60 to 65% sand, 15 to 25% silt and 10 to 15% clay.
   b. Shall have at least 2%, but not more than 4%, organic matter.
   c. Soil pH shall be 5.5 to pH 6.5 inclusive unless otherwise specified.
   d. Soil salinity by electrical conductivity measurement shall not exceed 600 parts per million (ppm) as determined by Black, Editor "Method of Soil Analysis", Part 2, published by the American Society of Agronomy, 1965.
   e. The soil nutrient level shall be between 70 to 265 pounds/acre of magnesium, 65 to 205 pounds/acre of phosphorous (P2O5), and 85 to 320 pounds/acre of potassium (K2O).
   f. Soluble salt by electrical conductivity of a 1:1 soil water sample measured in dS/m. d. Planting soil only: Nutrient levels by parts per million including, Bray 1 extractable phosphorus; other nutrients as determined by Mehlich 3, potassium, calcium, magnesium, manganese, iron, copper, and zinc. Nutrient test shall include the testing laboratory recommendations for supplemental additions of nutrients to the planting soil per 1,000 square feet of Planting Soil.

D. All tests, except as noted, shall be performed in accordance with the current standards of the American Society of Testing and Materials and/or the "Methods of Soil Analysis Part 1-3 as published by the Soil Scientist Society of America.

E. Textural Amendments: Amend as necessary to conform to required composition by incorporating sand, peat, manure, or sawdust.

F. Source: Stockpile material onsite. Import from certified offsite sources, if onsite material is insufficient in quantity.

2.2 LIME

A. Composition: Ground limestone with not less than 85 percent total carbonates, ASTM C602.

B. Gradation:
   1. Minimum 50 percent passing No. 100 sieve.
   2. Minimum 90 percent passing No. 20 sieve.
   3. Coarser material acceptable provided rates of application are increased proportionately on basis of quantities passing No. 100 sieve.
2.3 SOIL ADDITIVES

A. Sawdust or Ground Bark:
   1. Nontoxic, of uniform texture, and subject to slow decomposition when mixed with soil.
   2. Nitrogen-treated, or if untreated mix with minimum 0.15 pound of ammonium nitrate or 0.25 pound of ammonium sulfate per cubic foot of loose material.

B. Peat:
   1. Composition: Natural residue formed by decomposition of reeds, sedges, or mosses in a freshwater environment, free from lumps, roots, and stones.
      a. Organic Matter: Not less than 90 percent on a dry weight basis as determined by ASTM D2974.
      b. Moisture Content: Maximum 65 percent by weight at time of delivery.

C. Fertilizer:
   1. Natural:
      a. Manure:
         1) Well-rotted, stable or cattle manure, free from weed seed and refuse.
         2) Maximum 50 percent sawdust or shavings by volume.
         3) Age: Minimum 4 months; maximum 2 years.
   2. Commercial:
      a. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose.
      b. Contain the following minimum percentage of plant food by weight:
         1) Summer Mix:
            a) Nitrogen: 20 percent.
            b) Phosphoric Acid: 10 percent.
            c) Potash: 10 percent.
         2) Winter Mix:
            a) Nitrogen: 16 percent.
            b) Phosphoric Acid: 8 percent.
            c) Potash: 0 percent.

D. Sand: Fine Aggregate: Clean, coarse, well-graded, ASTM C33/C33M.
2.4 SOURCE QUALITY CONTROL

A. Topsoil Analysis/Testing: Performed by soil testing service or approved certified independent testing laboratory.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

A. Apply lime at the rate of 50 pounds per 1,000 square feet to subgrade before tilling.

B. Scarify subgrade to minimum depth of 6 inches where topsoil is to be placed.

C. Remove stones over 2-1/2 inches in any dimension, sticks, roots, rubbish, and other extraneous material.

D. Limit preparation to areas which will receive topsoil within 2 days after preparation.

3.2 TOPSOIL PLACEMENT

A. Do not place topsoil when subsoil or topsoil is frozen, excessively wet, or otherwise detrimental to the Work.

B. Mix soil amendments, lime, and other soil additives, identified in analysis reports with topsoil before placement or spread on topsoil surface and mix thoroughly into entire depth of topsoil before planting or seeding. Delay mixing of fertilizer if planting or seeding will not occur within 3 days.

C. Place one-half of the total depth of topsoil and work into top 4 inches of subgrade soil to create a transition layer. Place remainder of topsoil to depth of 6 inches where seeding and planting are scheduled.

D. Uniformly distribute to within 1/2 inch of final grades. Fine grade topsoil eliminating rough or low areas and maintaining levels, profiles, and contours of subgrade.

E. Remove stones exceeding 1-1/2-inch diameter, roots, sticks, debris, and foreign matter during and after topsoil placement.

F. Remove surplus subsoil and topsoil from Site. Grade stockpile area as necessary and place in condition acceptable for planting or seeding.

END OF SECTION 32 91 13
PART 1 GENERAL

1.1 DEFINITIONS

A. Maintenance Period: Begin maintenance immediately after each area is planted (seed, sod, or sprig) and continue for a period of 8 weeks after all planting under this section is completed.

B. Satisfactory Stand: Lawn or section of lawn that has:

1. No bare spots larger than 3 square feet.
2. Not more than 10 percent of total area with bare spots larger than 1 square foot.
3. Not more than 15 percent of total area with bare spots larger than 6 square inches.


1.2 SUBMITTALS

A. Action Submittals: Product labels/data sheets.

B. Informational Submittals:

1. Seed: Certification of seed analysis, germination rate, and inoculation:

   a. Certify that each lot of seed has been tested by a testing laboratory certified in seed testing, within 6 months of date of delivery. Include with certification:

      1) Name and address of laboratory.
      2) Date of test.
      3) Lot number for each seed specified.
      4) Test Results: (i) name, (ii) percentages of purity and of germination, and (iii) weed content for each kind of seed furnished.

   b. Mixtures: Proportions of each kind of seed.

2. Seed Inoculant Certification: Bacteria prepared specifically for legume species to be inoculated.

3. Description of required maintenance activities and activity frequency.
1.3 DELIVERY, STORAGE, AND PROTECTION

A. Seed:

1. Furnish in standard containers with seed name, lot number, net weight, percentages of purity, germination, and hard seed and maximum weed seed content, clearly marked for each container of seed.
2. Keep dry during storage.

1.4 WEATHER RESTRICTIONS

A. Perform Work under favorable weather and soil moisture conditions as determined by accepted local practice.

1.5 SEQUENCING AND SCHEDULING

A. Complete Work, and prepare topsoil as specified in Section 32 91 13, Soil Preparation, before starting Work of this section.

B. Complete Work under this section within 2 days following completion of soil preparation.

C. Notify CO at least 3 days in advance of:

1. Each material delivery.
2. Start of planting activity.

D. Planting Season: March 1 – April 30 and August 15 – October 31.

1.6 MAINTENANCE SERVICE

A. Contractor: Perform maintenance operations during maintenance period to include:

1. Watering: Keep surface moist.
2. Washouts: Repair by filling with topsoil, liming, fertilizing, seeding, and mulching.
3. Mulch: Replace wherever and whenever washed or blown away.
4. Mowing: Mow to 2 inches after grass height reaches 3 inches, and mow to maintain grass height from exceeding 3-1/2 inches.
5. Fence: Repair and maintain until satisfactory stand of grass is established.
6. Reseed unsatisfactory areas or portions thereof immediately at the end of the maintenance period if a satisfactory stand has not been produced.
7. Reseed/replant during next planting season if scheduled end of maintenance period falls after September 15.
8. Reseed/replant entire area if satisfactory stand does not develop by July 1 of the following year.
PART 2 PRODUCTS

2.1 FERTILIZER

A. Commercial, uniform in composition, free-flowing, suitable for application with equipment designed for that purpose. Minimum percentage of plant food by weight.

B. Application Rates: Determined by soil analysis results.

C. Mix:

2. Phosphoric Acid: 10.
4. Bonemeal: Commercial, raw, finely ground, with minimum analysis of 4 percent nitrogen and 20 percent phosphoric acid.

D. Top Dress Type: As recommended by local authority.

2.2 SEED

A. Materials and Equipment

B. For seeding operations with seed to be supplied by contractor:

1. All varieties or cultivars shall be on the current University of Maryland Turfgrass Technical Update or the current Virginia Turfgrass Variety Recommendation List as published by Virginia Polytechnic Institute and State University.

2. Contractor to provide seed varieties requested by Contracting Officer (CO).

3. All seed shall have: a minimum purity of 98 percent, a minimum germination of 85 percent, and be certified free of Poa trivialis, timothy, bentgrass, Canada bluegrass, tall fescue, dock, cheat, chess, chickweed, plantain, crabgrass, Bermuda-grass and black medic. Fluorescence for perennial ryegrass shall not exceed 3 percent.

4. Certification for each seed type shall be conducted by an approved testing laboratory prior to the mixing of seed. The results of the seed certification shall be submitted to the CO for approval prior to delivery of seed to the site.

5. Seed shall be delivered in original containers showing analysis of seed mixture, percentage of pure seed, year of production, net weight, date of packaging and location of packaging. Damaged packages are not acceptable.

6. Seed shall be stored in a manner to prevent wetting and deterioration in rodent proof containers until placement in the seeder. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be accepted.

7. Seed shall be one of the following mixes or equal as determined by the CO:

   a. Turf Type Tall Fescue Mixture: Shall be a 90 percent certified mixture of certified Turf-type Tall Fescue (Festuca arundinacea) consisting of 3 varieties of which no variety exceeds 40 percent or is less than 20 percent, and 10 percent Kentucky Bluegrass (Poa pratensis).
1) Seeding Dates:
   a) 3/15 to 9/30 if area is irrigated.
   b) 3/15 to 5/15, 8/15 to 9/30 if area is unirrigated.
2) Varieties:
   a) Tall Fescue: Wolfpack II, Firenza, 3rd Millenium, Rebel IV, Spyder LS, Turbo or equal as determined by CO.
   b) Bluegrass: Thermal Blue, Bluenote, Cabernet, Barvette HGT, Reveille or equal as determined by CO.
   b. Bermuda Grass: Shall be a certified cultivar of Bermuda grass (Cynodon dactylon) including at least three of the following: Riviera, Princess 77, Veracruz, Yukon or equal as determined by CO.
   1) Seeding Dates: 5/15 to 8/15, unirrigated areas.
   c. Annual Ryegrass: Shall be a certified cultivar of Turf Type Annual Ryegrass (Lolium multiflorum) such as Pantera Overseeding Ryegrass or approved equal.
   1) Seeding Dates: 3/1 to 12/15.
   2) Cool Season Shade Mix: Shall be a 100 percent certified mixture of slender creeping red and hard fescue.
   3) Varieties:
      a) Hard Fescue: Beacon, Bighorn.
      b) Creeping Red: Spartan II, Chantilly, Navigator II.

C. Seeder:

1. Broadcast Seeder: Shall be a tractor mounted, 3-point hitch single disc spinner spreader with a minimum spread width of 10 feet and capable of being calibrated to dispense seed and/or fertilizer at controlled rates such as a Lely H/11250/L1500/L2010, Lesco, ScottsR8A or an approved equal.
2. Power Seeder: Shall be a Slit-Seeder capable of calibrating and dispensing grass seed mixtures at controlled depths through existing or dead vegetation to ensure good soil seed contact such as a Turfco Triwave or Redexim overseeder 2075 or an approved equal (i.e.: slices through existing or dead vegetation with minimal damage, seed boxes with fluted or agitating dispensers for precise metering of seed, and rollers that covers/presses seed to ensure good seed soil contact. Note: If approved by the CO, the AERA-vator equipped with seeder, roller, rake and brush attachments can be used as a power seeder. Drop box, centrifugal force (spinners), and hydro seeders are not acceptable substitutes for a power seeder.
3. Tractor(s): Shall be a medium sized (minimum power take off of 40 horsepower), hydraulically equipped tractor with turf tires to preclude compaction.

2.3 STRAW MULCH

A. Threshed straw of oats, wheat, barley, or rye, free from (i) seed of noxious weeds or (ii) clean salt hay.

2.4 FENCE

A. 2-inch by 2-inch posts 4 feet high, spaced 10 feet on center, and strung with single strand of No. 12 gauge wire marked with cloth strips at 3-foot intervals.
PART 3 EXECUTION

3.1 PREPARATION

A. Grade areas to smooth, even surface with loose, uniformly fine texture.
   1. Roll and rake, remove ridges, fill depressions to meet finish grades.
   2. Limit such Work to areas to be planted within immediate future.
   3. Remove debris, and stones larger than 1-1/2-inch diameter, and other objects that
      may interfere with planting and maintenance operations.

B. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface
   to dry off before seeding. Do not create muddy soil.

C. Restore prepared areas to specified condition if eroded or otherwise disturbed after
   preparation and before planting.

3.2 FERTILIZER

A. Apply evenly over area in accordance with manufacturer’s instructions. Mix into top
   2 inches of topsoil, when applied by broad cast method.

B. Application Rate: 23 pounds per 1,000 square feet (1,000 pounds per acre).

3.3 SEEDING

A. General: No seeding shall take place during drought, high winds, when ground is frozen,
   temperatures lower than 32 degrees Fahrenheit, excessive moisture or other conditions as
   determined by the CO which are likely to damage the seed.

B. Power Slit-Seeding:
   1. Calibration: Prior to seeding, each seed box shall be calibrated to control the
      seed mixing and ensure seeding at 1/2 of the seeding rate at a controlled depth.
      Calibration rates and controlled depths shall be approved by the CO before
      seeding. Seed shall be sown at the following rates unless indicated otherwise by
      the designated park representative:
   2. Turf Type Tall Fescue Blend: 350 pounds/acre.
   4. Perennial Ryegrass Blend: 300 pounds/acre.
   5. Shade Mix: 200 pounds/acre.
   6. Annual Ryegrass: As directed by CO.

C. Seeding: Slit-seed the entire area. Upon completion, the remaining 1/2 of seed shall be
   seeded at a 90-degree angle to the first seeding.
D. Hand Seeding: Areas not accessible to a slit seeder (adjacent to paved surfaces, narrow areas) shall be sown by hand after being scarified using a hand rake to ensure good soil/seed contact.

E. Interseeding: Leave existing turf while loosening soil in between. Apply seed evenly.
   1. Bare soil.
   2. Loosen soil with a steel garden rake.
   3. Grade area for surface drainage and to match existing elevations.
   4. Remove rocks and debris larger than 3/8 inch.
   5. Evenly apply seed at approved rate.
   6. Lightly rake after seeding with spring rake to ensure seed to soil contact.
   7. Apply CO specified erosion control mulch.

F. Bare Soil Seeding (Large Area):
   1. The specified seed blend shall be sown with a Brillion type slit seeder designed for seeding turf grass areas.
   2. Seeder shall be Brillion Turfmaker Seeder as manufactured by Brillion Farm Equipment, Brillion, WI 54110, phone 800 409 9749, email: biwfesales@brillionfarmeq.com, or approved equal. Submit manufactures product literature and equipment specification for approval.
   3. Seed the specified seed blend evenly at specified rate.
   4. Plant seed in two directions, one perpendicular to the first.
   5. Hydro seeding option: In the event that soil conditions at the time of seeding are too wet to operate the Brillion Seeder, the CO may approve the use of hydroseeding equipment and methods to allow the seed to be installed at the optimum time. Submit a written request to hydro seed to the CO, for approval, stating the reason hydroseeding is required, the types of equipment to be used, the methods to be employed, and rates of seed distribution (pounds per 1,000 square feet).
   6. Broadcast Seeding
   7. Calibration: Before seeding, the spreader shall be calibrated during a calibration and characterization trial to apply the seed at the specified rate. Setting shall be approved by the CO before seeding. All seeding shall be in accordance with the settings and established during this trial.

G. Drop seeder shall be used for Bermuda grass seed and in windy conditions with all seed.

H. A walk behind broadcast seeder can be used with seed large enough to be thrown evenly (Tall Fescue, Annual Rye, etc.).

I. A tractor mounted broadcast spreader can be used for maintenance overseeding, and in conjunction with hydro seeding.

J. Seeding: Seed shall be evenly spread over the target areas so that bands do not overlap.

K. Seed applied to non target areas (i.e.: paved walks and roadways) shall be blown into adjacent grass areas.
L. Seed Cover (Hydromulching):

1. Wood Cellulose Fiber Mulch:
   a. Wood fiber mulch to cover hydro seeded areas shall be biodegradable, dyed, wood cellulous-fiber mulch. It shall be non-toxic and free of plant-growth or germination inhibitors, with a maximum moisture content of 12 percent and a pH range of 4.5 to 7.5.
   b. Fiber mulch shall have the following characteristics:
      1) It shall be dyed dark green color for easy metering and confirmation by CO.
      2) It shall be formulated to allow machinery to efficiently without clogging or clumping at the nozzle.
      3) When mixed with water it shall be dispersed into a uniform slurry at an accelerated rate to maintain construction schedules.
      4) Capable of staying in suspension of uniform consistency for the duration of the application.
   c. Full application rate shall be 2,500 pounds per acre.
   d. Reduced application rate for scalped areas of existing turf: as determined by the Contractor and reviewed by the CO, the reduced application rate shall allow for new seedling protection while allowing existing grass plants to reestablish.
   e. Fiber Mulch for Hydro Seeding shall be Terra-Mulch as manufactured by Profile Products LLC Buffalo Grove, IL or approved equal.

2. Hydraulically Applied Bonded Fiber Matrix:
   a. Mulch to cover hydroseeded areas with slopes 5H:1V or steeper shall be Bonded Fiber Matrix.
   b. Bonded Fiber Matrix (BFM) product shall be composed of thermally refined wood fibers and cross-linked hydrocolloidal tackifiers (10 percent by weight) and shall be 100 percent biodegradable. BFM product shall be designed to provide erosion protection 12 months and provide erosion control and vegetative establishment on slopes longer than 30 feet of highly erosive soils.
   c. The BFM product shall have a cure time of approximately 24 to 48 hours with a manufacturer's specified application rate from 3,000 to 4,000 pounds per acre based on slope length and inclination. BFM product shall be greater than 90 percent effective at reducing erosion when subjected to a 5-inches-per-hour rain event for durations of 60 minutes.
   d. BFM product shall conform to Testing Protocols and Procedures as developed by the Erosion Control Technology Council (ECTC), www.etc.org.
   e. The primary goal for selecting and using the hydraulically applied BFM product shall be erosion control during extended period of inclement weather. The additional benefit of establishing permanent turf shall also be weighed in selecting and approving the recommended product, especially in light of the schedule of site stabilization and schedule of completion.

3. Tackifier: Tackifier shall be a non-asphaltic colloidal tackifier as recommended by the approved fiber-mulch manufacturer. It shall be suitable for slurry application; nontoxic and free of plant-growth or germination inhibitors.
M. Start within 2 days of preparation completion.

N. Mechanical: Broadcast seed in two different directions; compact seeded area with cultipacter or roller.
   1. Sow seed at uniform rate of 23 pounds per 1,000 square feet.
   2. Use Brillion type seeder.
   3. Broadcasting will be allowed only in areas too small to use Brillion type seeder. Where seed is broadcast, increase seeding rate 20 percent.
   4. Roll with ring roller to cover seed, and water with fine spray.

O. Mulching: Apply uniform cover of straw mulch at a rate of 2 tons per acre.

P. Water: Apply with fine spray after mulching to saturate top 4 inches of soil.

Q. Hydromulching:
   1. Mix specified fiber hydromulch, fertilizer, and tackifier in water, using equipment specifically designed for Hydromulching application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application. Mix slurry with fiber hydromulch manufacturer's recommended (per above spec) tackifier.
   2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply mulch typically at a minimum rate of 2,500 pounds/acre dry weight, but follow manufacturer’s directions.
   3. Spray equipment vehicles shall operate from outside the limits of the Planting Soil.

3.4 FIELD QUALITY CONTROL
A. 8 weeks after seeding is complete and on written notice from Contractor, CO will, within 15 days of receipt, determine if a satisfactory stand has been established.

B. If a satisfactory stand has not been established, CO will make another determination after written notice from Contractor following the next growing season.

3.5 PROTECTION
A. Protect from pedestrian traffic by erecting temporary fence around each newly seeded area.

END OF SECTION 32 92 00
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American Society of Mechanical Engineers (ASME):
   a. B16.21, Nonmetallic Flat Gaskets for Pipe Flanges.

2. American Water Works Association (AWWA):
   h. C600, Installation of Ductile-Iron Water Mains and Their Appurtenances.
   i. C606, Grooved and Shouldered Joints.

3. ASTM International (ASTM):
   d. D2000, Standard Classification System for Rubber Products in Automotive Applications.


1.2 SUBMITTALS

A. Action Submittals:

1. Shop Drawings: Marking plan and details of standard pipe section showing dimensions, pipe joints, fitting and special fitting pressure rating and thickness, size, coating and lining data.

B. Informational Submittals:

1. Manufacturer shall furnish sworn certificates that pipe and fittings have been manufactured, tested, and inspected in accordance with this and all applicable Specifications.
2. Field Hydrostatic Testing Plan: Submit at least 15 days prior to testing and at minimum, include the following:
   a. Testing dates.
   b. Piping systems and section(s) to be tested.
   c. Method of isolation.
   d. Method of conveying water from source to system being tested.
   e. Calculation of maximum allowable leakage for piping section(s) to be tested.

3. Certifications of Calibration: Approved testing laboratory certificate if pressure gauge for hydrostatic test has been previously used. If pressure gauge is new, no certificate is required.

4. Test documentation form and results.

1.3 QUALITY ASSURANCE

A. Pipe manufacturer shall be ISO 9001 registered or provide the services of an independent inspection agency.

B. Prior to start of manufacturing, manufacturer not meeting or having ISO registration requirements shall submit name of at least two independent inspection agencies for approval.

1. Independent inspection agency shall be responsible, on a daily basis, for sample monitoring of chemical and mechanical tests, sample visual inspection of quality assurance tests performed on in-process pipe and fittings, and sample visual and dimensional inspection on finished products.

PART 2 PRODUCTS

2.1 MATERIALS

A. General:

1. Ductile iron fittings shall be manufactured, lined, coated, and tested domestically or for fittings produced outside of the United States of America they shall bear the name of the domestic manufacturer supplying the pipe.

2. Pipe manufacturer shall certify source manufacturing facility has been producing ductile iron pipe of the specified diameters, pressure, dimensions and standards for a period of not less than 10 years.

3. Ductile iron pipe and fitting shall be supplied by a single manufacturer.

   a. Mixing of components and sources is not permitted.
   b. Fitting from outside the United States of America shall be produced in a facility with a minimum of 5 years’ documented experience manufacturing, coating, testing, and delivery of size and type specified to projects in the United States of America.
B. Pipe:

1. General:
   a. Pipe shall be new and recently manufactured. Refurbished pipe shall not be provided.
   b. Lined and coated as specified.


3. Centrifugally cast, grade 60-42-10 iron.

4. Pressure rating of pipe shall be 350 psi.

C. Joints:

1. Push-On Joint: Rated at minimum working pressure equal to pipe material design.

2. Restrained Joint:
   a. Manufactured proprietary joint that mechanically restrains pipe to adjoining pipe.
   b. Manufacturers and Products:
      1) American Cast Iron Pipe; Flex-Ring, Field Flex-Ring, and Lok-Ring.
      2) Pacific States Pipe; Thrust-Lock.
      3) U.S. Pipe; TR Flex and HP Lok.

3. Mechanical Wedge Action Type Joint:
   a. Use only in areas where adjoining to fixed points where laying length is determined in field.
   b. Prior to purchase and installation, type and application of this joint shall be approved by CO.

4. Use of set screws for restraint or field-lock gaskets shall not be allowed.

D. Fittings:

1. Fittings shall be new and recently manufactured. Refurbished fittings will not be accepted.

2. Mechanical, Push-On, or Restrained Joint: In accordance with the following table:

<table>
<thead>
<tr>
<th>Diameter (inches)</th>
<th>Rubber Gasket Joints (Push-on, Mechanical, Restrained) (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 24</td>
<td>350</td>
</tr>
</tbody>
</table>
Minimum Pressure Ratings for AWWA C153/A21.53 Ductile Iron Fittings

<table>
<thead>
<tr>
<th>Diameter (inches)</th>
<th>Rubber Gasket Joints (Push-on, Mechanical, Restrained) (psi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 to 24</td>
<td>350</td>
</tr>
</tbody>
</table>


E. Lining: Pipe and fittings for clean water applications shall be cement-lined and asphaltic seal coated in accordance with AWWA C104/A21.4.

F. Bolting:
   1. Flanged Connection Bolts: Carbon steel, ASTM A307, Grade A hex bolts and ASTM A563, Grade A hex head nuts.
   2. Grooved End Connections Bolts: Manufacturer’s standard.

G. Gaskets:
   1. Flat Faced Flange Gaskets:
      a. Pipe Smaller Than 54 Inches: Rated for working pressure 150 psi to 250 psi, 1/8 inch thick, red rubber (SBR), hardness 80 (Shore A), rated to 200 degrees F, conforming to ASME B16.21, AWWA C207, and ASTM D1330, Grade 1 and Grade 2.

2.2 SOURCE QUALITY CONTROL

A. Factory Tests:
   1. General:
      a. Tests shall be performed on pipe with metal thickness equal to that specified.
      b. Only pipe that passes leak test shall be shipped.
   2. Hydrostatic Proof Test:
      a. All Pipe: Perform at 500 psi for a minimum duration of 10 seconds.
      b. Record each test cycle on a strip chart.
      c. Inspect each pipe during testing for leaks.
      d. Pipe which shows evidence of leaks shall be scrapped.
      e. Repair welding of leaks is not permitted.
3. Pipe ends (spigot end, bell and socket) shall be gauged with suitable gauges at sufficiently frequent intervals to ensure compliance to standard dimensions of AWWA C151/A21.51.
   a. In addition, each socket and spigot shall be inspected in a well lighted area for injurious defects which could affect the joint performance.
   b. Remove defects by cutting of pipe ends.
   c. Pipe with injurious defects in the bell shall be scrapped.

4. Submit a certified inspection report from the independent agency of witnessed tests within 10 days of the inspection.
   a. Test results shall show restrained joints in the sizes specified have been successfully tested to at least twice the specified pressure rating of the joint without leakage or failure.

PART 3 EXECUTION

3.1 EXAMINATION
   A. Inspect pipe and fittings to ensure no cracked, broken, or otherwise defective materials are being used.

3.2 PREPARATION
   A. Trench Grade:
      1. When specified, grade bottom of trench by hand to specified line and grade with proper allowance for pipe thickness and pipe base. Trench bottom shall form a continuous and uniform bearing and support for pipe between bell holes.
      2. Before laying each section of pipe, check grade and correct irregularities found. Grade may be disturbed for removal of lifting tackle.
   B. Bell (Joint) Holes: At each joint, dig bell holes of ample dimensions in bottom of trench, and at sides where necessary, to permit joint to be made properly and to permit easy visual inspection of entire joint.

3.3 INSTALLATION
   A. General:
      1. Provide and use proper implements, tools, and facilities for safe and proper prosecution of the Work.
      2. Lower pipe, fittings, and appurtenances into trench, piece by piece, by means of a crane, slings, or other suitable tools and equipment, in such a manner as to prevent damage to pipe materials, protective coatings and linings.
      3. Do not drop or dump pipe materials into trench.
B. Cleaning Pipe and Fittings:

1. Remove lumps, blisters, and excess coal tar coating from bell and spigot ends of each pipe. Wire brush outside of spigot and inside of bell and wipe clean, dry, and free from oil and grease before pipe is laid.
2. Wipe ends of mechanical joint pipe and fittings and of rubber gasket joint pipe and fittings clean of dirt, grease, and foreign matter.

C. Laying Pipe:

1. Direction of Laying: Lay pipe with bell end facing in direction of laying. For lines on an appreciable slope, face bells upgrade at discretion of CO.
2. Mechanical Joint, Push-On Joint, and Restrained Joint Pipe: After first length of pipe is installed in trench, secure pipe in place with approved backfill material tamped under and along sides to prevent movement. Keep ends clear of backfill. After each section is jointed, place backfill as specified to prevent movement.
3. Take precautions necessary to prevent floating of pipe prior to completion of backfill operation.
4. When using movable trench shield, take necessary precautions to prevent pipe joints from pulling apart when moving shield ahead.
5. Do not allow foreign material to enter pipe while it is being placed in trench.
6. Close and block open end of last laid section of pipe to prevent entry of foreign material or creep of gasketed joints when laying operations are not in progress, at close of day’s work, or whenever workers are absent from job.

D. Joining Push-On Joint Pipe and Mechanical Joint Fittings:

1. Join pipe with push-on joints and mechanical joint fittings in accordance with manufacturer’s recommendations.
2. Provide special tools and devices, such as, special jacks, chokers, and similar items required for installation.
3. Lubricate pipe gaskets using lubricant furnished by pipe manufacturer. No substitutes will be permitted.
4. Clean ends of fittings of dirt, mud, and foreign matter by washing with water and scrubbing with a wire brush, after which, slip gland and gasket on plain end of pipe. If necessary, lubricate end of pipe to facilitate sliding gasket in place, then guide fitting onto spigot of pipe previously laid.

E. Cutting Pipe:

1. General: Cut pipe for inserting valves, fittings, or closure pieces in a neat and workmanlike manner without damaging pipe or lining and so as to leave a smooth end, at right angles to axis of pipe.
2. Pipe: Cut pipe with milling type cutter or saw. Do not flame cut.
3. Dressing Cut Ends: Dress cut end of mechanical joint pipe to remove sharp edges or projections, which may damage rubber gasket. Dress cut ends of push-on joint pipe by beveling, as recommended by manufacturer.
F. Field Welding:

1. Use of field welded outlets will not be allowed. Welding for outlets shall be performed only in pipe manufacturer’s shop.
2. Field welding of bars for restrained joint systems will not be allowed. Welding shall be performed in pipe manufacturer’s shop.

G. Line and Grade:

1. Minimum Pipe Cover: 3 feet, unless otherwise indicated.
2. No high points will be allowed between air valves.
3. Maintain pipe grade between invert elevations to provide minimum clearance at air valve locations of 4 feet from existing ground surface to top of pipe.
4. Install air valves as shown and field verify intervening low points. When field conditions warrant, exceptions may be made upon approval of CO.
5. Deviations exceeding 6 inches from specified line or 1 inch from specified grade will not be allowed without express approval of CO.
6. Pipeline sections that are not installed to elevations shown or installed as approved by CO shall be reinstalled to proper elevation.

H. Thrust Restraint: Primary method of restraint shall be through use of restrained joint pipe. Thrust blocking shall be used where detailed on Drawings and as approved by CO.

I. Polyethylene Encasement:

1. Encase pipe, fittings, and valves in accordance with AWWA C105/A21.5, Method A.
2. Cut polyethylene tube approximately 2 feet longer than pipe length.
3. Slip tube around pipe, centering to provide 1-foot overlap on each adjacent section.
4. Pull encasement to take out slack and wrap snug around pipe.
5. Secure overlap in place and fold at quarter points of pipe length.
6. Wrap and tape encasement snug around fittings and valves.
7. Encasement to be V-Bio™ Enhanced Polywrap or equivalent.

3.4 HYDROSTATIC TESTING

A. Pipeline Hydrostatic Test:

1. General:
   a. Notify CO in writing 5 days in advance of testing. Perform testing in presence of CO.
   b. Test newly installed pipelines. Using water as test medium, pipes shall successfully pass a leakage test prior to acceptance.
   c. Furnish testing equipment and perform tests in manner satisfactory to CO. Testing equipment shall provide observable and accurate measurements of leakage under specified conditions.
   d. Isolate new pipelines that are connected to existing pipelines.
   e. Conduct tests on entire pipeline after trench has been backfilled. Testing may be done prior to placement of asphaltic concrete or roadway structural section.
f. Contractor may, if field conditions permit and as determined by CO, partially
backfill trench and leave joints open for inspection and conduct an initial service
leak test. Hydrostatic test shall not, however, be conducted until backfilling has been
completed.
g. Supply of temporary water shall be as stated in Section 01 50 00, Temporary
Facilities and Controls.
h. Dispose of water used in testing.

2. Procedure:
   a. Maximum filling velocity shall not exceed 0.25 foot per second, calculated based on
   the full area of pipe.
   b. Expel air from pipe system during filling. Expel air through air release valve or
   through corporation stop installed at high points and other strategic points.
   c. Test pressure shall be 100 psi above system operating pressure.
   d. Apply and maintain specified test pressure with hydraulic force pump. Valve off
   piping system when test pressure is reached.
   e. Maintain hydrostatic test pressure continuously for 2 hours minimum, adding
   additional make-up water only as necessary to restore test pressure.
   f. Determine actual leakage by measuring quantity of water necessary to maintain
   specified test pressure for duration of test.
   g. If measured leakage exceeds allowable leakage or if leaks are visible, repair
   defective pipe section and repeat hydrostatic test.

3. Allowable Leakage: Maximum allowable leakage shall not exceed amount stated in
AWWA C600.

END OF SECTION 33 05 01.02
SECTION 33 05 01.10 - HIGH-DENSITY POLYETHYLENE (HDPE) PRESSURE PIPE
AND FITTINGS

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards that may be referenced in this section:

1. American Society of Mechanical Engineer’s (ASME):
   a. B18.2.2, Square and Hex Nuts (Inch Series).

2. American Water Works Association (AWWA):
   a. C906, Polyethylene (PE) Pressure Piping and Fittings, 4 in. through 63 in., for Water Distribution and Transmission.

3. ASTM International (ASTM):
   a. A193/A193M, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications.
   b. A194/A194M, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service, or Both.
   g. F2620, Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings.


6. Plastics Pipe Institute (PPI):
   a. Technical Note 38, Bolt Torque for Polyethylene Flanged Joints.
   b. TR-33, Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe.

1.2 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
   a. Catalog information confirming pipe, fittings, and other materials conform to requirements of this section.
   b. Drawings of specific connection details.
B. Informational Submittals:

1. Manufacturer’s Certificate of Compliance, in accordance with Section 01 67 00 Product Requirements.
2. Infrared temperature gun product data.
3. Certificates of qualification for persons to be fusing HDPE pipe. Experience and training record of persons to be fusing HDPE pipe.
4. Testing Plan: Submit at least 15 days prior to testing and include the following as a minimum:
   a. Testing dates.
   b. Piping systems and section(s) to be tested.
   c. Method of isolation.
   d. Method of conveying water from source to system being tested.
   e. Method and location of test water disposal.
5. Certifications of Calibration: Approved testing laboratory certificate if pressure gauge for hydrostatic test has been previously used. If pressure gauge is new, no certificate is required.
6. Test report documentation.
7. Fusion parameters including recommended limits of criteria recorded by data logger.
8. Fusion report for each joint, including information listed under Article Field Quality Control.

1.3 QUALITY ASSURANCE

A. Qualifications:

2. Persons fusing HDPE pipe shall be certified under 49 CFR § 192.285 have minimum of 1 year(s) of experience with fusing HDPE pipe and shall have received a minimum of 20 hours of training for fusing HDPE pipe from pipe supplier or fusing equipment supplier.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Shipping: Do not cut, kink, or otherwise damage pipe during transportation.

B. Storage:

1. Limit stacking of pipe to a height that will not cause excessive deformation of bottom layers of pipes under anticipated temperature conditions.
2. Where necessary, because of ground conditions, store pipe on wooden sleepers, spaced suitably and of such widths as not to allow deformation of pipe at point of contact with sleeper or between supports.
3. Keep pipe shaded from direct sunlight prior to installation in trench.
1.5 CONNECTIONS TO EXISTING PIPE

A. Fusing to Existing Pipe: Comply with manufacturer’s or distributor’s recommendations based on Site conditions and PPI TR-33.

PART 2 PRODUCTS

2.1 MATERIALS

A. Pipe and Fittings:

1. Conform to requirements of AWWA C906.
2. In compliance with NSF 61.
3. Resin: Polyethylene resin shall meet or exceed requirements of ASTM D3350 for PE 4710 material with cell classification of 445474C, or better. Pressure rating shall be based on hydrostatic design stress of 1,000 psi at 73.4 degrees F.
   a. Pipe segment for carrier pipe shall be 8-inch SDR 9 to be inserted into existing 12-inch cast iron pipe through the existing floodwall east of 17th Street.
5. Outside Diameter Basis: IPS.
6. Pipe lengths, fittings, and flanged connections to be joined by thermal butt-fusion shall be of a compatible resin mix for the fusion process.
7. Fittings:
   a. Sizes 6 Inches and Smaller: Molded and fabricated from polyethylene pipe.
   b. Sizes 8 Inches and Larger: Use thermal butt-fusion, or factory molded and fabricated.
   c. Polyethylene fittings shall have same or higher pressure rating as pipe.

B. Backup Rings:

1. Convoluted for mechanical joint connections:
   a. ASTM A536, ductile iron.
   b. Complete with one-piece, molded polyethylene adapters, with stainless steel stiffener.
   c. Adapter Connections: Same or greater pressure rating as pipe.
2. Ductile Iron: shop coated with two-part epoxy material in accordance with AWWA C550. Dry film thickness shall be 10 mils minimum.

C. Gaskets: Material, size, and thickness shall be as recommended by pipe or flange manufacturer, and in accordance with PPI Technical Note 38.

D. HDPE Joints: Thermal butt-fusion or electrofusion, except in specific locations as shown on Drawings.
E. Bolts, Nuts, Washers:
   1. Type 316 stainless steel, ASTM A193/A193M, Grade B8 hex head bolts; and
      ASTM A194/A194M, Grade 8 hex head nuts.
   2. Bolts: Fabricated in accordance with ASME B18.2.2 and provided with washers
      of same material as bolts.

F. Wall Anchor:
   1. Material: Same as HDPE pipe.
   2. Internal Diameter: Equal to adjacent pipe.
   3. Shear Strength: Equal to or greater than tensile strength of adjacent pipe.
   4. Fabrication: Butt fusion. Extrusion bead welding is not allowed.

G. Electrofusion Flex Restraint:
   1. Material: HDPE.
   3. Designed for restraining movement of HDPE pipe.
   4. Manufacturers:
      a. Central Plastics Company.
      b. ISCO Industries.

H. Concrete Thrust Blocks: See Section 03 30 00, Cast-In-Place Concrete.

I. Products that restrain HDPE pipe with wedges, machined serrations, or clamps are not
   acceptable.

J. Mechanical Joint Adapter:
   1. Conform to requirements of ASTM D3261 and AWWA C901.
   3. Manufacturers:
      a. Performance Pipe LP.
      b. ISCO Industries.

K. Tracer Wire:
   1. Wire Type: Copper clad steel, 1,000 pounds minimum rated break load, 30-volt.
      a. Copperhead SoloShot EHS.
      b. Pro-Trace HDD CCS PE 45.
   3. Jacket Coating: High density polyethylene (HDPE) or high molecular weight
      polyethylene (HMWPE) 45 mil.
   4. Connections: Copperhead SnakeBite or Pro-Trace TW Connector.
   5. Test station: Copperhead SnakePit Roadway, or equal.
PART 3 EXECUTION

3.1 INSTALLATION

A. General:
1. Install polyethylene pipe in conformance with AWWA M55, PPI TR-33, ASTM F2620, and pipe manufacturer’s recommendations.
2. Joining: Butt-fuse pipes and fittings in accordance with pipe manufacturer’s recommendations. Depending on Site conditions, perform butt-fusion joining in or outside of excavation.
3. If HDPE pipe surface temperature is above pipe manufacturer’s recommendations as measured with infrared temperature gun, allow pipe to cool prior to making any connections to flanges, existing pipeline systems, or structures.
4. Connect HDPE pipe to auxiliary equipment such as valves, pumps, tanks, and other piping systems with mechanical joint connections as follows:
   a. Mechanical joint adapter kit shall meet AWWA requirements for potable water pipe.
   b. Polyethylene adapter, thermally butt-fused to end of pipe.
   c. Bolt and nut of sufficient length to show a minimum of three complete threads when joint is made and tightened to manufacturer’s standard.
   d. Follow requirements of PPI Technical Note 38 including mandatory 4-hour bolt re-torquing.
5. Special Precautions at Dissimilar Material Joints: Support polyethylene pipe connected to heavy fittings, manholes, and rigid structures in such a manner that no subsequent relative movement between polyethylene pipe at adapter mechanical joint and rigid structures or fittings is possible.
6. Minimum Long-Term Field Bending Radius: Restricted to limits recommended by AWWA M55, Table 8-2.
7. Tape tracer wire to outside of pipe prior to pull through tunnel. Connect tracer wire to test stations and grounding anodes at the end of each pipe run. Connect tracer wire at tees.

B. Installation of proposed carrier pipe at the 17th Street east floodwall.
1. Isolate segment of existing 12-inch cast iron pipe to become casing pipe.
2. Excavate and cut existing pipe to separate portion to remain from portion to be demolished and removed.
3. Clean and ream inside of 12-inch cast iron pipe to restore sufficient inside diameter to accommodate pull-through of the proposed 8-inch SDR 9 HDPE carrier pipe.
4. Attach runners to casing pipe. Apply lubrication.
5. Pull carrier pipe through existing 12-inch cast iron pipe.
6. Connect with mechanical joints to existing meter vault on the north, and proposed gate valve on the south of the sleeved pipe segment.
7. Carrier pipe shall meet all performance and commissioning requirements of this specification.
3.2 FIELD QUALITY CONTROL

A. Joint Fusion:

1. Measure and log each joint fusion by an electronic monitoring device (data logger) affixed to fusion machine, and shall be capable of being retrieved electronically. Data to be logged shall include the following:
   a. Pipe size and dimensions.
   c. Operator identification.
   d. Job identification number.
   e. Weld number.
   f. Fusion, heating, and drag pressure settings.
   g. Heater plate temperature.
   h. Time stamp showing when weld was performed.
   i. Heating and curing time of weld.
   j. Curing temperature readings and time stamps of readings.
   k. Error messages and warnings for out of range temperature or pressure settings.

2. In addition to logged items above, the following shall be logged or annotated on report:
   a. Location of joint being fused by pipeline station or by reference to pipe Shop Drawing.
   b. Ambient temperature and humidity.
   c. If internal bead was removed.

B. Joint Weld Testing:

2. Specimens: Cut pipe 12 inches on each side of field made joint. Rejoin ends and proceed with Work.
3. Test Frequency:
   a. First 1,000 Linear Feet: Two joints selected at random by Contracting Officer (CO).
   b. Each Additional 5,000 Linear Feet: One joint selected at random by CO.
   c. Each Test Failure: Two additional joints selected at random by CO.

C. Pipeline Hydrostatic Test:

1. General:
   a. Notify Contracting Officer (CO) in writing 5 days in advance of testing. Perform testing in presence of CO.
   b. Furnish testing equipment and perform tests in manner satisfactory to CO. Testing equipment shall provide observable and accurate measurements of initial service leak and allowable make-up water volume under specified conditions.
   c. Test newly installed pipelines.
   d. Isolate new pipelines that are connected to existing pipelines.
Using water as test medium, pipes shall successfully pass a hydrostatic test prior to acceptance.

Conduct field hydrostatic test on buried piping after trench has been completely backfilled. Testing may, as approved by CO, be done prior to placement of asphaltic concrete or roadway structural section.

Contractor may, if field conditions permit and as determined by CO, partially backfill trench and leave joints open for inspection and conduct initial service leak test. Final field hydrostatic test shall not be conducted until backfilling has been completed as specified above.

Supply of temporary water shall be as stated in Section 01 50 00, Temporary Facilities and Controls.

Dispose of water used in testing in accordance with federal, state, and local requirements.

Submit hydrostatic test report documentation.

## Preparation:

a. Install temporary thrust blocking or other restraint as necessary to prevent movement of pipe and protect adjacent piping or equipment. Make necessary taps in piping prior to testing.

b. Wait 5 days minimum after concrete thrust blocking or designed thrust collars are installed to perform pressure tests. If high-early strength cement is used for thrust blocking, wait may be reduced to 2 days.

c. Prior to test, remove or suitably isolate appurtenant instruments or devices that could be damaged by pressure testing.

d. New Piping Connected to Existing Piping: Isolate new piping with grooved-end pipe caps, blind flanges, or other means as acceptable to CO.

## Procedure:

a. Test pressure shall be 150 percent of system operating pressure based on pressure as measured at lowest point in pipeline.

b. Maximum filling velocity shall not exceed 0.25 feet per second, calculated based on full area of the pipe.

c. Expel air from pipe system during filling.

d. Test procedure shall be in accordance with ASTM F2164.
   1) Initial Expansion Phase: Add water as required to maintain test pressure for 4 hours.
   2) Test Phase: Reduce pressure by 10 psi and start pressure test.
   3) Test is successful if pressure stays within 5 percent of initial value for 1 hour.

e. If test is not completed because of leakage, equipment failure, or other reasons, depressurize test section and allow it to relax for at least 8 hours before retesting.

f. If there is leakage, repair defective pipe section and repeat hydrostatic test.
3.3 MANUFACTURER’S SERVICES

A. Provide pipe manufacturer’s representative at Site for assistance during pipe joining operations and pipe installation.

END OF SECTION 33 05 01.10
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards that may be referenced in this section:


2. ASTM International (ASTM):
   b. A615/A615M, Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

3. Occupational Safety and Health Administration (OSHA):

1.2 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
   a. Detailed drawings showing complete information for fabrication including, but not limited to:
      1) Member dimensions and cross sections; location, size, and type of reinforcement, including additional reinforcement.
      2) Layout dimensions and identification of each precast unit.
      3) Welded connections indicated by AWS standard symbols.
      4) Details of connections, joints, accessories, and openings or inserts.
      5) Watertight joint details.
      6) Location and details of anchorage devices.
      7) Access door details.
      8) Details of ladder and pull-up extension or polypropylene steps.
   b. Product Data:
      1) Precast concrete items; show materials of construction by ASTM reference and grade.
      2) Joint sealants.
B. Informational Submittals:

1. Manufacturer’s data for lifting devices for handling and erection.
2. Manufacturer’s certification that vault design and manufacture comply with referenced
   ASTM(s) (for example, ASTM C857 and ASTM C858).

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store each unit in a manner that will prevent cracking, distortion, warping, straining and other
   physical damage, and in a manner to keep marking visible.

B. Lift and support each unit only at designated lifting points and supporting points as shown on
   Shop Drawings.

PART 2 PRODUCTS

2.1 VAULT MANUFACTURERS

A. Materials, equipment, and accessories specified in this section shall be products of:

1. Oldcastle Precast.
2. Jensen Precast.
3. Hanson Pipe and Precast.
5. Local precast suppliers providing equivalent products as specified herein.

2.2 PRECAST CONCRETE VAULTS

A. Design Requirements:

1. In the event of a conflict between or among standards, the more stringent standard shall
   govern.
2. Comply with ASTM C858, except as modified herein.
3. Reinforcing Steel:
   a. Deformed Bars: ASTM A615/A615M, Grade 60.
   b. Welded Wire Fabric: ASTM A497/A497M.
4. Nominal Dimensions: As shown on Drawings.
5. Construction: Rigid type and behave monolithically.
7. Design shall accommodate additional stresses or loads that may be imposed during factory
   precasting, transporting, erection, and placement.
8. Blockouts for penetrations shall be as shown on Drawings.
9. Sealant:
   a. Nonswelling preformed joint sealants to provide a lasting, watertight bond.
   b. Manufacturer and Product: Henry Company; RAM-NEK.
10. Mortar: Comply with ASTM C387/C387M, Type S or use Type I grout as specified in
    Section 03 62 00, Nonshrink Grouting.
B. Mark each member or element to indicate location in the structure, top surface, and date of fabrication.

2.3 ACCESSORIES

A. Ladder:
   1. Provide vault with galvanized steel ladder. Provide with pull-up extension.

B. Polypropylene Steps:
   1. Fabricate from minimum 1/2-inch, Grade 60, steel bar meeting ASTM A615/A615M.
   2. Polypropylene Encasement: Conform to ASTM D4101.
   4. Embedment: 3-1/2 inches minimum and 4-1/2-inch minimum projection from face of concrete at point of embedment to center of step.
   5. Cast in vault sections by manufacturer.

C. Sidewalk Doors and Hatches: Manufacturer’s standard, HS-20 load rated, spring-assisted, lockable, galvanized steel access door, size as indicated on Drawings. Provide doors and hatches with anti-slip coating.

D. Pipe Connections to Vault: Modular mechanical seal conforming to requirements of Section 33 05 01.02, Ductile Iron Pipe and Fittings.

PART 3 EXECUTION

3.1 GENERAL

A. Possible Settlement: If subgrade is encountered that may require removal to prevent structure settlement, notify CO. CO will determine depth of over excavation and means of stabilizing subgrade prior to structure installation.

B. Place 6-inch minimum thickness of imported crushed aggregate material on undisturbed earth or modified subgrade; thoroughly compact with a mechanical vibrating or power tamper. Meet requirements of Article Excavation and Backfill.

3.2 EXCAVATION AND BACKFILL

A. Remove and keep water clear from excavation during construction.

B. Excavation: As specified in Section 31 23 16, Excavation.

C. Backfill: As specified in Section 31 23 23, Fill and Backfill, and Section 31 23 23.15, Trench Backfill.
3.3 INSTALLATION

A. Concrete Base:
   1. Place on prepared subgrade.
   2. Properly locate, ensure firm bearing throughout, and plumb first section.

B. Sections:
   1. Carefully inspect precast sections to be joined.
   2. Thoroughly clean ends of sections to be joined.
   3. Do not use sections with chips or cracks.

C. Joints:
   1. Fill joints between precast sections per manufacturer’s recommendation.
   2. Joints shall be watertight to prevent entrance of groundwater.

D. Setting Precast Vault: Finish grade of structure top shall be even with surrounding finish grade surface, unless noted otherwise on Drawings.

E. Watertight construction below grade with no open cracks or spalls. Repair cracking and defective areas of concrete per requirements of Section 03 30 00, Cast-in-Place Concrete.

3.4 PIPE CONNECTION TO VAULT

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

END OF SECTION 33 05 01.10
SECTION 33 05 23.13 – UTILITY HORIZONTAL DIRECTIONAL DRILLING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section specifies horizontal directional drilling and installation of product pipe for water supply line, furnishing all labor, materials, equipment and incidentals and all other related work necessary for horizontal directional drilling and installation of product pipe, complete.

B. Horizontal direction drilling shall be used for trenchless installation of the 1, 2, 6, 8 and 12-inch HDPE waterline located in West Potomac Park as shown in the Drawings.

1.2 REFERENCES

A. American Petroleum Institute (API):

2. RP 13B-1 - Standard Procedure for Field Testing Water-Based Drilling Fluids.

B. Occupational Safety and Health Administration (OSHA):

1. Code of Federal Regulations; Title 29 - Labor; Chapter XVII -Occupational Safety and Health Administration; Department of Labor (Parts 1900-1999), "Revised Excavation Standards" (29 CFR 1926.650 Subpart P).
2. Code of Federal Regulations; Title 29, Labor; Chapter XX -Occupational Safety and Health Administration; Department of Labor (Parts 2200-2499).

1.3 Definitions

A. Horizontal Directional Drilling: A trenchless, steerable installation method of using multi-axis drilling machine to bore a small diameter pilot hole. The pilot hole is bored by either controlled fluid jetting or fluid assisted mechanical cutting or combinations thereof. The pilot hole is reamed, as necessary, to accommodate the product pipe. The product pipe is pulled back into the reamed hole by the drilling machine. The installed product pipe is cleaned and prepared for testing and operation.

B. Frac-out: Release of drilling fluid to ground surface, water ways or utilities as a result of drilling fluid pressure in excess of that pressure required to fracture or permeate the ground, which generally occurs at the weakest soil condition and cover combination.

C. Spill: Release of drilling fluid to ground surface from entry or exit pits of from mixing, handling or hauling equipment.
1.4 SUBMITTALS

A. Submit items B through P below at least 21 days before the start of construction.

B. Detailed schedule of work including: pipe fabrication, delivery; pipe string connection and testing; drill mobilization and setup; pilot hole drilling/boring and reaming; pipe pulling, final pipe inspection and testing; record drawing preparation; demobilization and restoration, and disposal of excess drilling fluids and drill/bore cuttings.

C. Working plans showing the general arrangement of the Contractor’s work areas, storage areas, staging and pipe stringing areas, including maintenance of traffic and site access during pipe jointing, and laydown areas showing locations of drill entry and exit points, slurry plants, drilling equipment, and pollution prevention measures among other features. The working plans shall show the layout profile and supports for any pits, workshafts, trenches, conductor casings, or other excavations required to drill and install the pipe.

D. Detailed working plans shall be submitted for pipe installation, including a plan/profile along the pipe drill path plotted at scale no smaller than 1 inch equals 30 feet horizontal and 1 inch equals 3 feet vertical. Provide entry and exit locations and angles, bending radii, lengths and depths, and clearance from existing piles, pipelines, encasements and structures.

E. Design calculations consisting of the following pipe installation 6-inches and above:
   1. Predicted and allowable pulling loads and bending stress, and the minimum allowable bending radius. Provide an estimate of the pulling loads and bending stress at characteristic points along the drill path when the curvature of the drill path changes.
   2. Provide calculations for safety factors against ring collapse of the pipe during pullback and an estimate of ring deflection.
   3. Provide an estimate of factor of safety against frac-outs and locations along the alignment where the factor of safety is 1 or less.
   4. The Contractor shall be responsible for proper design of the directional bore.
   5. The calculations shall be prepared and stamped by a licensed professional engineer in the District of Columbia and accompanied by written approval from the pipe manufacturer verifying that the maximum calculated pulling force will not exceed the manufacturer’s pipe material and welded/fused joints.

F. Descriptions of drill rod and drill head and methods for steering pilot hole drill and monitoring the position and inclination of bore head. Include the type, operating range, and degree of accuracy of the tracking equipment. Surface (walkover) locating systems using sondes and wireline (with or without auxiliary surface grid) or magnetic steering tools are acceptable as appropriate to site conditions.

G. Provide a schedule for target maximum drilling fluid pressure at bore stations of 10 feet or less and submit calculations showing a factor of safety of 1.5 or more against frac-out or heave. Describe how drill fluid viscosity, density and pressure will be monitored. Submit the proposed minimum overcut (half of difference between excavated diameter cut by pilot bit and rod outside diameter).

H. Reaming head descriptions, cutters and size.
I. Composition of drilling fluids and additives. Planned density and viscosity ranges. Drilling fluids shall be nonhazardous materials that comply with local, state, and federal laws and regulations.

J. Drilling fluids management plan. Identify the source of fresh water for mixing drilling mud. Submit a method of slurry containment, including sketches and systems and fluid seal at entry pit conductor casing if used. Include a method of cutting removal and recycling drilling fluid during hole boring and reaming. Describe the method of transporting drilling fluids and spoils offsite, including anticipated total volume. Identify the approved disposal site for drilling mud and spoils. Estimate the anticipated daily volume to be held overnight.

K. Product pipe assembly including procedures for fabricating, handling, transporting, and storing pipe segments, welding/fusing, lay down, pull guides and rollers.

L. Pipe catalog information confirming that pipe, fittings, joints, and other materials confirm to the requirements of this Section.

M. Contingency plan for the following potential situations:
   1. Loss of drilling fluid circulation.
   2. Hydrofracture (frac-out) spill cleanup method with plans for standby equipment and cleanup materials.
   4. Collapsed or buckled product pipe.
   5. HDD fails to advance or fails to respond to steering actions.
   6. Failure to maintain grade and when alignment derivations are more than allowable limits.
   7. Installation (pull back) forces reach 80 percent of the maximum allowable forces including manufacturer’s recommended allowable factor of safety (at least 2.0).

N. Certificates: Submit HDD Contractor qualifications statement, pipe manufacturer’s field representative qualifications and surveyor qualifications.

O. Drawings of specific connection details at the ends of each directional drill.

P. Quality assurance plan for monitoring of surface movement.

Q. Daily Drilling Logs: Contractor will be responsible for maintaining drilling logs that provide drill bit location at least every 30 feet along the drill path. Record observations of drilling conditions and periodic field tests. In addition, daily logs shall be submitted that record, at a minimum, the following on an hourly basis and at every noticeable change in materials throughout each drill pass, back ream pass, and pipe installation pass:
   1. Drilling fluid batch quantities and mix proportions.
   2. Drilling fluid flow rate, both fresh and recirculated fluids.
   3. Drilling fluid pressure, including maximum and average values.
   4. Drilling of fluid density calculations.
   5. Drill thrust.
   6. Drill pullback force, including maximum and average values.
   7. Head torque and rate of rotation.
   8. Spoil material quantities.
   9. Description of spoil material and drilling conditions.
10. Any damage to the product pipes.
11. Locator/tracking system data including: position, roll and tilt angles, depth, temperature of the data transmitter and remaining batter life.

R. Record Information: Upon completion of the installation, the Record Drawing Submittal package shall contain the following components:

1. Tool Information: A description of the tools actually used on the installation if they differ from what was contained in the approved submittal.
2. Field Operators Records: Provide the tool operators records including predrilling field calibration, raw data record (head position, fluid data) and the location of any anomalies or frac-outs.
3. Record Drawings: Including interpretation analysis of raw data, plan and profile and any deviations to the original installation plan. The Contractor will provide field survey at the ends of each installation and provide the datum for establishing location of the installations.

1.5 QUALITY ASSURANCE

A. Perform all work in conformance with requirements of authorities having jurisdiction.

B. Contractor Experience Requirements: Provide key personnel with at least 5 years’ experience in directional drilling and associated pipe installation, including pipe at least as large as 12-inches in diameter. Key personnel include field supervisor and operators of directional drilling equipment, including position monitoring and steering equipment; and pipe fusion welder.

C. HDD Contractor Qualifications Statement: Submit qualifications statement with information including, but not limited to the following:

1. The name and address of the on-the-job superintendent qualified and proposed to perform the horizontal directional drilling work.
2. Data to substantiate compliance with the project experience requirements for key personnel of sub-article 1.05.B, "Contractor Experience Requirements" as follows:
   a. Owner, contact person and phone number.
   b. Location of installation.
   c. Date and type of Installation.
   d. Type, size and length of pipe.
3. Name and address and experience of the contractor/subcontractors, providing staging, pipe positioning, pull back, and all other HDD related support. Include data to substantiate the contractor/subcontractors’ capability to support all aspects of the HDD and pipe installation operations.

D. Drill Path Location System:

1. Contractor shall provide a plan for accurately locating the drill path during drilling operations at least 30 calendar days prior to any horizontal directional drilling. The measurement frequency and accuracy of the proposed guidance system as stated by the manufacturer of the system shall be provided to the Contracting Officer (CO).
2. The guidance system shall have been in use for at least five similar HDD applications within the last 5 years. Submit evidence and names of contacts.
E. Pipe manufacturer’s fused jointing and testing instructions and certificates of qualification for
persons fusing HDPE pipe. Persons fusing pipe shall have a minimum of 1 year experience fusing
HDPE pipe and shall have received training on the equipment to be utilized. Submit evidence
showing qualification requirements have been met.

F. Existing utilities are shown as based on available record information, field survey, and subsurface
verification. The Contractor shall be responsible for selecting steering and guidance tools suitable
to the situation taking into account the potential for signal loss and potential interferences.

G. For each pipe material, use only pipe from a single manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

A. The Contractor shall handle the pipe during loading, transportation, and unloading so as to prevent
injury to or abrasion of pipe. Pipe shall not be dropped from vehicles, nor allow pipe to roll down
skids or slopes without proper restraining ropes. Suitable pads, strips, skids or blocks shall be
used for each pipe during transportation and while awaiting installation.

B. The Contractor shall not use and shall remove from construction site, pipe with physical damage
such as cuts, gashes, nicks or abrasions which may have occurred during shipping, storage, or
handling, which are deeper than 10 percent of wall thickness.

C. Pipe and fittings shall be handled by wide belly band slings as recommended by the pipe
manufacturer to avoid damage to the pipe. Bare chains shall not be used in contact with pipe.

D. The pipe shall be stored at the storage area designated on the Drawings or other areas that might
be approved by the CO. Stored pipe shall be protected by the Contractor.

1.7 SITE CONDITIONS

A. It is the Contractor's responsibility to review the Drawings, Specifications, and existing site
conditions prior to bidding.

B. Inspect the locations where horizontal directional drilling operations will be conducted and the
pipe is to be installed, verify the conditions under which the work will be performed, and provide
all necessary details, whether shown or not, for the orderly prosecution of the work.

C. Request and obtain written authorization prior to working overtime, nights, or weekends.

D. Furnish special insurance, traffic control, flaggers and any other requirements imposed by the
owner of the right(s)-of-way in which the work occurs.

E. Inspect existing storm sewer inlet and outlets prior to directional drilling operations. If material
from frac-outs is present during drilling, repair storm sewer and clean up material.
1.8 SEQUENCING AND SCHEDULING

A. In conformance with the requirements of Section 01 33 23, Submittal Procedures, and Section 01 11 00, Summary of Work:

1. Coordinate sequence and schedule with owners of roadway, walkway, or easement, or other public access and overlying right-of-way or real estate.
2. Coordinate any required closings with owners of overlying roadway, walkway, easement or other public or private access.

1.9 SAFETY

A. The Contractor shall exercise appropriate care and caution during all phases of construction to ensure the safety of the nearby operations and park staff/visitors and avoid causing damage to adjacent properties and other facilities.

B. Horizontal directional drilling machine safety requirements shall include a common grounding system to prevent electrical shock in the event of a high voltage underground cable strike. The grounding system shall connect all pieces of interconnecting machinery including the drill, mud mixing system, drill power unit, drill rod trailer, operators booth, worker grounding mats, and any other interconnected equipment to a common ground. The drill shall be equipped with an "electrical strike" audible and visual warning system that will notify the system operators of an electrical strike.

C. Operators of the drill shall conform to all OSHA, CO’s, and utility owner(s) and facility safety regulations and shall wear electrical shock protection equipment and operate from common grounded mats as required.

D. Around the perimeter of all open trenches and HDD pits, Contractor shall install at a minimum, a 5-foot-high safety fence with barriers and warning signs during nonworking hours.

PART 2 - PRODUCTS

2.1 HDD EQUIPMENT

A. The HDD equipment shall be sized properly to complete the installation of the proposed alignment with due considerations of the ground conditions, downhole tools, drilling fluid additives, drilling technologies, size of final product pipe, and length of bore. HDD shall be sized with a pull back capacity not exceeding the pipe tensile strength for this project. The Contractor shall be able to retrieve its equipment without leaving the drill rod in the hole.

B. Provide a mixing tank with sufficient volume to supply at least 30 minutes of full pumping capacity. The HDD equipment shall maintain a minimum pumping capacity to provide sufficient quantity of drilling fluids exceeding the targeted flow volume for all phases of the operation. Provide an in-line flow meter to determine the drilling fluid discharge.
C. HDD machine safety requirements shall include electrical safety provisions as stated in Article 1.9, Safety, of this Section.

D. A swivel shall be used to connect the pull section to the drill steel to minimize torsional stress imposed on the pulled pipe. The pull section shall be supported as it proceeds during the pull back so that it moves freely and the pipe and coating are not damaged.

2.2 HDPE PIPE

A. As specified in Section 33 05 01.10, High-Density Polyethylene Pressure Pipe and Fittings.

PART 3 - EXECUTION

3.1 GENERAL

A. Do not commence directional drilling until all required submittals have been provided, reviewed and approved by the CO.

B. Do not begin drilling until all pipe and special items for drilling have been delivered.

C. During performance of work, Contractor shall keep a reasonable degree of order by housekeeping at all work sites. The jobsite is to be free of trash and unsightly debris for the duration of the work.

D. Provide freshwater, free of hazardous or toxic substances, for drilling and grouting purposes.

E. The CO shall be provided access at all times to observe HDD operations and instrumentation.

3.2 EXISTING UTILITIES

A. The Contractor shall be responsible to field locate existing underground utilities in the areas of Work.

B. Contractor shall be responsible for any damage to piping or utilities shown on the Drawings and/or field located prior to construction.

C. Should not shown or incorrectly shown piping or utilities be encountered during the work, consult piping or utility owner immediately for instructions. Contractor shall cooperate with the CO and utility companies in keeping respective services and facilities in operation.

D. Do not interrupt existing utilities serving facilities occupied and used by others, except when permitted in writing by the CO and then only after acceptable temporary utility services have been provided.

E. Coordinate with the CO and utility companies for shut-off of services, if required.
F. Use of Explosives: Do not bring explosives onto site or use in the Work. Use of explosive materials is strictly prohibited.

G. Protection of Utilities: Verify and protect all existing utilities within 20 feet of the HDD alignment and construction zone. There shall be at least 18 inches vertical clearance when the directional drill path crosses under existing utility line.

3.3 PREPARATIONS

A. Locate positions of entry and exit pits, establish elevation and horizontal datum for bore head control, and lay out pipe assembly area. Entry and exit locations shall be surveyed by experienced survey personnel licensed in the District of Columbia prior to the start of directional drilling.

B. Locate any other features that need to be precisely located as required for the Contractor’s use.

C. The survey results shall be plotted on a Drawing with a scale no smaller than that used for the Enlarged Plan and Profile Drawings in the Contract Document, and submitted to the CO for approval.

D. Any Contractor proposed changes to the alignment or profile shall be clearly shown.

E. Lay out and assemble pipe in manner that does not obstruct adjacent roads and walkways adjacent to construction work areas. Walkways may be blocked for short durations to pull fused pipe into position in reamed tunnels, provided that detour barriers and signage is in place, following the pattern shown on Drawings, and the CO has been notified a minimum of 3 days in advance.

3.4 DRILLING PILOT HOLE

A. Install conductor casing (if used) and drill pilot hole from entrance point to exit point following vertical and horizontal alignment shown on the Drawings. Contractor is responsible for selection and proper use of the steering tools and guidance system based on the known conditions at the site. Loss of control due to interference from known structures and utilities will be corrected at no cost to the CO.

B. Control drilling fluid viscosity, density and pressure to prevent frac-outs and excessive ground movements as specified herein.

C. The steering tool/guidance system shall have orientation sensors to monitor and record pitch, roll, and left/right deviation.

1. As pilot hole is advanced, plot actual horizontal and vertical alignment of pilot hole at intervals not exceeding 30 feet.
2. Provide CO with position or inclination of pilot bore upon request and at the completion of the installation.
3. The Contractor assumes all liability for loss or damage to all down-hole equipment.
D. Alignment Requirements:

1. Pilot hole exit point shall be within 10 feet horizontally of exit point location shown unless such tolerance places product pipe outside of work areas previously approved by CO as submitted on Contractor’s work plan.
2. Throughout its alignment, pilot hole shall be within 3 feet of horizontal alignment shown, but where a utility exists, pilot hole shall be closer to the horizontal alignment shown, as necessary to avoid damaging existing utilities and/or to satisfy permit or utility owner’s requirements.
3. Pilot hole shall maintain at least 7 feet of soil cover at the point of the lowest ground surface elevation along the alignment.
4. The Contractor will not receive compensation for longer or deeper pipeline profile or other deviation from the Drawings.
5. Alignment shall have no intermediate high points that might trap air in pipe after installation.
6. Curvature of completed pilot hole shall not exceed that which after pipe installation will result in pipe wall stresses greater than 0.50 of yield stress.
7. Should the directional drill pipeline alignment differ from the Drawings such that additional pipe and/or different fittings are necessary to join the excavated pipe, the Contractor is responsible for notifying the CO of the changes immediately, so additional pipe and/or different fittings can be provided by the NPS (at his option) on a timely basis without delaying the construction.

E. Acceptance: If pilot hole alignment fails to conform to specified requirements, drill new pilot hole with alignment meeting specified requirements.

1. If the hole is lost or damaged during the performance of the Work, the loss and damage shall be borne by the Contractor.
2. If the hole is not carried to the contract length or to within exit point tolerance, the Contractor shall withdraw partially or fully and drill a modified or new crossing. The requirement to drill a substitute crossing shall be recurring until the hole is acceptable and at no additional cost to the CO.
3. The CO reserves the right to hire an independent inspector to verify the location of the installed pipeline and to recover the cost of the inspection from Contractor if inspection reveals the pipeline to be out of specification.

3.5 PREREAMING, REAMING PILOT HOLE AND PULLING PIPE

A. Prereaming operations shall be conducted at the discretion of the Contractor. All provisions of this Specification relating to simultaneous reaming and pulling back operations shall also pertain to prereaming operations.

B. Obtain CO’s approval to proceed before enlarging pilot hole and pulling pipe into position.

C. Prior to pulling pipe, enlarge pilot hole ahead of pipe to diameter sufficient for pulling pipe into position and complete a swab pass if necessary. The pilot hole shall be reamed to a diameter, which is, at minimum, 25 percent greater than the outside diameter of the pipe being installed for straight pulls and 50 percent greater for curved or radius pulls using the appropriate tools.
D. The Contractor shall not attempt to ream at a rate greater than the drilling equipment and mud system are designed to safely handle.

E. Monitor drill fluid viscosity, density and pressure to prevent frac-outs. Ream and swab as required for proper hole diameter prior to casing pull.

F. Once pullback operations have commenced, the operation shall continue without interruption until the pipe is completely pulled into the borehole. Except for drilling rod removal, pullback shall not cease, until the pipe is completely pulled into its permanent position.

G. While pulling pipe, monitor pulling force and handle pipe in manner that does not overstress pipe. Limit radius of curvature along length of pipe during installation to minimum radius of 300 feet. A swivel shall be used to connect the pipe pull section to the reaming assembly to minimize torsional stress imposed on the section. If pipe buckles or is otherwise damaged, remove damaged section and replace it with new pipe.

H. Protect exterior of the pipe from damage. The pull section shall be supported as it proceeds during pull back so that it moves freely and the pipe is not damaged.

I. After pullback, the pipe may take several hours or days to recover from axial strain. When pulled from the reamed bore hole, the pull-nose shall be pulled out a distance longer than the total length of the pull to avoid having the pull-nose retract back below the bore hole exit level due to stretch recovery and thermal contraction to equilibrium temperature. No connections shall be made until the stretch recovery and thermal contraction cycles are complete.

J. Pull pipe so that minimum of 10 feet of pipe is exposed at both ends of bore.

K. Open ends of the installed pipeline string shall be effectively closed or plugged with metal or plastic cover during nonworking hours, or as otherwise required to prevent water or soil from entering the pipeline.

L. The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the borehole. The pipe shall be guided into the borehole to avoid deformation of, or damage to, the pipe. Under no circumstances shall the pipe be dragged over an asphalt or concrete surface; above ground rollers or other similar devices shall be used to support the pipe while it is being moved across such surfaces. The rollers shall be comprised of a non-abrasive material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback.

M. During pullback operations, the Contractor shall monitor roller operation and use sidebooms if required to assist movement of the pipe.

N. The CO shall be notified immediately if pullback pressures exceed the maximum allowable value.

3.6 MONITORING OF SURFACE MOVEMENT

A. Perform a preconstruction survey of road surface and all structures or facilities within 25 feet of horizontal directional drilling alignment.

B. Record horizontal coordinates and elevations.
C. Mark location of where measurements were taken.

D. Monitor movement of road surface and other structures on a daily basis and provide results to CO.

E. Stop operations if movement exceeds 1/2 inch and immediately notify CO.

F. If movement of 1.0 inch or greater occurs, or if nearby structures or facilities are damaged from HDD installation, Contractor shall repair to like-new condition at Contractor’s own expense.

G. Copies of the results of the Contractor’s monitoring program shall be submitted to the CO daily.

3.7 DRILLING FLUIDS

A. All drilling fluids, muds or chemical additives used by Contractor shall be composed and used in compliance with applicable, local, state, and Federal environmental regulations. Oil-based drilling fluids or fluids containing additives that can contaminate the soil or groundwater are not acceptable.

B. Sample and test drilling fluid pH, chloride, salinity, Marsh viscosity, mud density and gel strength, during pilot bore to verify conformance with design per API 13A and API RP 13B-1. During pullback, Contractor shall sample drilling fluids and measure pH and Marsh viscosity at least twice per working shift. Record results on daily drilling logs. Other mud design parameters shall be tested if evidence of significant variation exists, or if drilling contingency actions are required.

C. Contractor shall accurately and continuously measure the drilling fluid pressure, flow rate of recirculation fluids, and flow rate of added fresh fluids. Contractor shall calibrate or field verify estimated pump and drill system fluid head loss by recording observed drilling fluid pressure upon exit of pilot bore while continuing to temporarily pump planned mud at planned maximum pump rate; or by other reasonable means.

D. Inadvertent Returns (Frac-Outs): Contractor shall be responsible for avoiding any impact to existing utilities, structures, facilities, waterways and public areas in the Project area during the drilling operation. If the drilling fluid starts leaking to the surface (other than at the entry and exit points), or if fluid loss results in surface movement, Contractor shall cease drilling until his fluid loss volumes can be brought under control to minimize any inadvertent returns in the Project area. In such event, the CO shall be notified immediately. The Contractor shall clean up any locations where drilling fluids surfaces. Contractor shall pay particular attention to the potential of inadvertent returns washing out along existing utility crossings, and shall have preventive measures in place to prevent these occurrences from happening. Contractor shall be fully responsible for all damages caused by the pipeline installation operations.

E. Recirculation: Contractor shall maximize recirculation of drilling fluid surface returns. Contractor shall design and construct any necessary facilities to recirculate fluids. Contractor shall be responsible for securing a way of constructing the pipeline with the recirculating fluids. Contractor shall be responsible for similarly removing the temporary recirculation line if used. Contractor shall provide solids control and fluids cleaning equipment of a configuration and capacity that will process surface returns and produce drilling fluid suitable for reuse.
F. Density Calculations: The drilling fluid density in terms of mud weight in specific gravity shall be measured a minimum of once each working hour when drilling fluid is pumped into the hole. Contractor shall ensure that the unit weight of the drilling fluid does not cause excessive differential pressure stresses on the pipe string at any time. Density calculations shall be recorded in the daily drilling log.

G. Disposal of drilling fluids and drill cuttings is the responsibility of the Contractor. Excess drilling fluids and drill cuttings shall be disposed of in approved offsite locations in accordance with local, state and Federal laws and regulations. No additives which would prevent offsite/nonhazardous disposal of drilling mud will be allowed.

3.8 CLEANING PIPE ENDS
A. After pulling pipe, clean exposed ends for installation of fittings.

3.9 HANDLING AND DISPOSAL OF DRILLING MUD AND CUTTINGS
A. Make adequate provisions for handling and containing muddy water, drilling mud, and cuttings during drilling operations. Do not discharge these contaminants into waterways.

B. Construct mud pits at entry and exit points in manner that completely contains mud and prevents its escape.

C. When onsite provisions for storing muddy water, drilling mud, or cuttings onsite are exceeded, haul contaminants away to suitable legal disposal site.

D. Dispose of all excess drilling fluid and cuttings at licensed landfills or otherwise approved disposal sites.

3.10 JOINING PIPE SECTIONS
A. Pipes shall be joined to one another, to the polyethylene fittings, and to the flange connections by means of thermal butt fusion. Polyethylene pipe lengths, fittings, and flanged connections to be joined by thermal butt fusion shall be of the same type, grade, and class of polyethylene compound and supplied from the same raw material supplier.

B. Butt Fusion Joining: Butt fusion of pipes and fittings shall be performed in accordance with the pipe manufacturer’s recommendations as to equipment and technique. The manufacturer’s representative must be onsite to certify the results are satisfactory. Depending on site conditions, Butt fusion joining shall be performed in or outside of the excavation at the Contractor’s option.

C. Special Precautions at Flanges: Polyethylene pipe connected at flange to flange connections, to heavy fittings manholes, and rigid structure shall be supported in such a manner that no subsequent relative movement between the polyethylene pipe at the flanged joint and the rigid structure is possible. Inside edge of flange in contact with the HDPE flange to be beveled and not in contact with the weld bead.
3.11 OPERATIONS WITHIN PIPE STAGING AREA

A. Conduct operations in a manner that minimizes disturbance to public or private properties boarding staging area or where construction easements have been obtained by CO.

B. Areas where drilling fluids are in use shall be bordered by appropriate silt fences and hay bales.

C. Easement limits for exit point as well as pipe staging shall be bordered by ultraviolet stabilized polyethylene or polypropylene safety fence.

D. At the completion of construction, all areas shall be restored to original conditions. This shall include, but not be limited to, the restoration of all damaged or disturbed road or walkway surfaces, grassed or vegetated areas, replacement of trees or plantings damages.

3.12 END FITTINGS

A. Fabricate and install mitered fittings at ends of pipe for attachment of adjacent sections of pipe. Fitting angles shall correspond to field conditions and shall be as approved by CO. Coat and line fittings as specified for pipe.

3.13 PRESSURE AND LEAKAGE TESTING

A. After pulling pipe into position and grouting, but before attachment of adjacent sections of pipe, pressure test pipe as specified in Section 33 05 01.10, High Density Polyethylene (HDPE) Pressure Pipe and Fittings.

3.14 OBSTRUCTIONS AND PIPE ABANDONMENT

A. Boreholes, installed and/or partially installed that fail to meet the requirements of these Specifications shall be abandoned and backfilled with grout as specified herein.

B. Where the abandonment is the result of the Contractor’s failure to drill/bore the borehole to within the required tolerances, or failure to maintain the borehole open for insertion of the product pipe, or failure to install the product pipe properly without damage, collapse, parting the joints, or the installed product pipe fails to meet the requirements specified in this Section, the Contractor shall, at Contractor’s own expense, abandon the borehole or product pipe or both, backfill the borehole or product pipe or both with grout as specified herein, and drill/bore a new borehole along an alignment approved by the CO and install a new product pipe.

C. Abandoned boreholes and product pipes shall be completely grouted with a sand-cement grout mix conforming to the following requirements and approved by the CO:

1. Grout shall consist of a mixture of water and Portland cement, with mineral fillers or admixtures as necessary to achieve a nonshrink, nonbleed, flowable grout. The grout shall have a minimum 28-day compressive strength of 50 psi.

2. Sand for grout shall be clean natural silica sand, graded such that 100 percent of the material passes the No. 20 sieve and not more than 20 percent passes the No. 200 sieve.
D. Grout shall be injected into the borehole and product pipe to be abandoned through drill rods or pipes extending to the end of the borehole or product pipe. Grout shall be injected at a pressure sufficient to overcome the hydrostatic pressure of the drilling fluid, but not high enough to cause heave or damage to the overlying or adjacent structures. Grout shall be injected until the borehole or product pipe is flushed of all drilling fluid and the return flow at the collar of the boring or product pipe shows undiluted grout. The boring or product pipe shall then be plugged to maintain the grout in the boring or product pipe until the grout has set. Additional grout shall be injected as necessary to fill any voids left as a result of shrinkage or bleeding of the grout.

3.15 ENVIRONMENTAL DAMAGE

A. The Contractor shall be responsible for any environmental damage that Contractor may incur as a result of the pipeline installation operations.

3.16 SURFACE RESTORATION

A. As specified in Section 32 12 16, Asphalt Paving.

B. Promptly replace damaged pavement. Restore pavement around entry and exit pits as soon as the Work specified in this section is completed, even if pavement will later be removed by other work.

C. Restore non paved areas to preconstruction condition.

END OF SECTION 33 05 23.13
SECTION 33 12 13 - WATER SERVICE CONNECTIONS

PART 1 GENERAL

1.1 APPLICABILITY

A. This section is for service connections to ductile iron pipe. For service connections to HDPE pipe, see Section 33 05 01.10, High-Density Polyethylene Pressure Pipe and Fittings.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this section:

2. ASTM International (ASTM):
3. NSF International (NSF):
   a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
   b. NSF/ANSI 372, Drinking Water System Components - Lead Content.

1.3 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
   a. Product Data:
      1) Pipe material data.
      2) Materials of construction for corporation stops, curb stops, and meter stops.
      3) Fitting types.
   b. Details with dimensions and fabricating tolerances for component ends.
   c. Drawing showing how components of water service connection will fit together.
   d. Operating pressure and allowable test pressure for components making up the service connection.
   e. Allowable test pressure for connected components.
   f. Proposed thrust restraint data for restraining joints including drawing details, materials, assembly ratings, and pipe attachment methods.
   g. Factory test results of components.
B. Informational Submittals:

1. Manufacturer’s Certificate of Compliance, in accordance with AWWA C800.
2. Manufacturer’s Certificate of Compliance, in accordance with NSF/ANSI 61.
3. Statement of Qualifications:
   a. Piping manufacturer.
   b. Fitting and specials manufacturer.
4. Procedure for field testing water mains and service connections, including disinfection.

PART 2 PRODUCTS

2.1 GENERAL

A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited.

2.2 SERVICE CONNECTION

A. Furnish components same size as nominal designation of service pipe. For example, 1-inch connection consists of:

1. 1-inch service saddle.
2. 1-inch tapping valve.
3. 1-inch HDPE threaded connector.

B. Refer to Standard Details in Drawings and coordinate product names and requirements with these Specifications.

2.3 SERVICE SADDLES

A. Provide in accordance with the following:

<table>
<thead>
<tr>
<th>Mainline Material</th>
<th>Saddle Characteristics</th>
<th>Tap Size</th>
<th>Manufacturer*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE</td>
<td>Electrofusion saddle for tapping valve assembly</td>
<td>3/4&quot; - 4&quot;</td>
<td>ISCO Industries, Plastitalia Spa or equivalent</td>
</tr>
</tbody>
</table>

*Model number for each manufacturer will depend on pipe material saddle is attached to and whether the native soils are aggressive or relatively neutral.
2.4 TAPPING VALVE

A. Material: HDPE.


C. Drilling: Using built-in internal puncher.

D. Manufacturers:
   1. ISCO Industries.
   2. Plastitalia Spa.
   3. Or equivalent.

2.5 CORPORATION STOPS

A. Characteristics:
   1. Accommodate piping being connected.
   2. Meet criteria promulgated by NPS.
   3. Resistant to soil corrosivity.
   4. Service Size: 1/2-inch through 2-1/2-inch.
   5. Connecting Piping: Copper.

2.6 COUPLINGS

A. Characteristics:
   1. Accommodate piping being connected.
   2. For use in water service connections.
   3. Same nominal size as service.
   4. Meet criteria promulgated by the NPS.
   5. Resistant to soil corrosivity.
   7. Connecting Piping: Copper.
   8. Soil Corrosivity: Yes.

2.7 UNIONS

A. Characteristics:
   1. Copper-to-copper union.
   2. Accommodate pipe being connected.
   3. Meet criteria promulgated by the NPS.
   4. For use on water service connections.
   5. Same nominal size as service.
7. Connecting Piping: Copper.
8. Soil Corrosivity: Yes.

2.8 MISCELLANEOUS FITTINGS

A. Characteristics: Miscellaneous fittings, reducers, and adapters.
   1. Service Size: 1/2-inch through 2-1/2-inch.
   2. Connecting Piping: Copper.

2.9 CURB STOPS

A. Characteristics:
   1. Size to match associated service.
   2. Connections to match adjacent piping.
   3. Materials to resist soil corrosivity (if any).
   4. Meet criteria promulgated by governing agency.
   5. Service Size: 1/2-inch through 2-1/2-inch
   6. Connecting Piping: Copper.
   7. Soil Corrosivity: Yes.

2.10 CURB BOXES

A. Characteristics:
   1. Furnish with lids and/or plugs as required by the utility.
   2. Length to match application, extension type.
   3. Arch pattern base.
   4. Size to match curb stop.
   5. Service Size: 1/2-inch through 2-1/2-inch.
   6.Connecting Piping: Copper.
   7. Soil Corrosivity: Yes.

2.11 METER STOP

A. Characteristics:
   1. Inlet compatible with inlet service piping.
   2. Outlet compatible with meter inlet configuration.
   3. Service Size: 1/2-inch through 2-1/2-inch.
   4. Connecting Piping: Copper.
   5. Soil Corrosivity: Yes.
2.12 METER BOXES, VAULTS, AND COVERS
   A. Meter vaults to be DC Water standard as show on Drawings.

2.13 METER YOKES
   A. Characteristics:
      1. Size to match associated service.
      2. Connections to match adjacent piping.
      3. Materials to resist soil corrosivity (if any).
      4. Meet criteria promulgated by governing agency.
      5. Rated for working pressure of adjacent piping.
      7. Connecting Piping: Copper.
      8. Soil Corrosivity: Yes.

2.14 METERS
   A. Meters to be DC Water standard as shown on Drawings.

2.15 COPPER TUBING
   A. Characteristics:
      1. Size: Matching that of service connection and meter.
      2. Type K, soft, seamless.
      4. Commercially pure wrought copper solder joint fittings.
      5. Joints:
         a. 95-5 coreless wire solder.
         b. Conform to ASTM B32, Grade 95 TA.
2.16 Wet Tapping Sleeves: Tapping sleeves for ferrous metal piping shall be JCM Industries; or equal. Tapping sleeves shall be capable of 150 psi internal pressure without leakage or over stressing. The run diameter shall be compatible with the outside diameter of the pipe on which the saddle is installed. Tapping sleeve body shall be ASTM 283 Grade C steel, Class 125 drilled flanged branch connection, and Buna-N blend compounded gasket. Tapping sleeve body shall be coated with fusion epoxy coating. Bolt shall be 1808 Type 304 stainless steel.

PART 3 EXECUTION

3.1 GENERAL
   A. Install service connections, excluding meters, during or after construction of the main.
   B. Depth of cover over the pipe shall be minimum 18 inches.
   C. Install service connection in accordance with Standard Details in Drawings.

3.2 TRENCH EXCAVATION AND BACKFILL
   A. In accordance with Sections 31 23 16, Excavation and Section 31 23 23.15, Trench Backfill.

3.3 CONNECTION TO MAIN
   A. Clean exterior of main of dirt and other foreign matter that may impair the quality of the completed connection.
   B. Place service clamp (saddle) at desired location.
   C. Clamp by tightening alternate nuts progressively.
   D. Do not place service clamp within 1 foot of pipe joint, or another clamp.
   E. Make taps with adapters for the size main being tapped.

3.4 COPPER TUBING
   A. Cut square ends, ream clean, and flare and make up tightly.
   B. Prevent the tube from kinking or buckling on short radius bends. If tube should kink or buckle, cut out kinked or buckled sections and splice with brass fitting.
3.5 METER BOXES AND METERS

A. Installation:
   1. Construct enclosures plumb, and flush with existing ground surface unless shown otherwise.
   2. Use standard extension sections to adjust to grade.
   3. Place lightly compacted earth backfill inside meter box to depth shown.
   4. Backfill around meter vaults as specified in Section 31 23 23.15, Trench Backfill.
   5. Install meter in horizontal position with dial at required depth below cover.

3.6 WET TAPPING SLEEVE

A. Install in accordance with manufacturer’s written instructions.

3.7 TESTING

A. Inspect service connections for leakage under normal system pressure. Joints shall be watertight before acceptance.

B. Test Duration: At least 15 minutes.

C. Inspect for leaks and repair before backfilling.

3.8 DISINFECTION OF SERVICE CONNECTIONS

A. Make connection to the main, which has been pressure tested and disinfected as specified in Section 33 13 00, Disinfecting of Water Utility Distribution Facilities.

END OF SECTION 33 12 13
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Water Works Association (AWWA):
   b. C550, Protective Interior Coatings for Valves and Hydrants.

2. NSF International (NSF):
   a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
   b. NSF/ANSI 372, Drinking Water System Components - Lead Content.

1.2 SUBMITTALS

A. Action Submittals:

1. Shop Drawings:
   a. Product data sheets for each make and model. Indicate valve type number.
   b. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
   c. Product data sheets for coating and lining products.
   d. Certification for compliance to NSF 61 for valves used for drinking water service.

B. Informational Submittals:

1. Manufacturer’s Certificate of Compliance, in accordance with Section 01 67 00, Product Requirements.
   a. Resilient-seated gate valves, full compliance with AWWA C509.

3. Tests and inspection results.

PART 2 PRODUCTS

2.1 GENERAL

A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization.
recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited.

2.2 GENERAL

A. Valve same size as adjoining pipe, unless otherwise indicated.

B. Valve ends to suit adjacent piping.

C. Valves shall have no leakage (drip tight) in either direction at valve rated design pressure, unless otherwise allowed for in this section or in referenced valve standard.

D. Valve to open by turning counterclockwise, unless otherwise specified.

E. Valve materials in contact with or intended for drinking water service shall comply with requirements of NSF 61 and other applicable federal, state, and local requirements.

2.3 BACKFLOW PREVENTERS

A. General:

1. All backflow preventers shall comply with standards established by the District of Columbia Plumbing Code and the standards listed in this Section.
2. Backflow prevention assemblies shall include all parts necessary to isolate the assembly and perform testing. This includes but is not limited to isolation valves, test ports, test port adaptors, and test cocks.
3. Backflow prevention assemblies 3 inches and larger in size shall have flanged joints.

B. Double-Check Backflow Preventer: Double-check backflow preventer shall be ASSE listed 1012 and comply with DC Water standards and specifications.

2.4 GATE VALVES

A. General:

1. AWWA gate valves to be in compliance with referenced AWWA standard.
2. Provide 2-inch operating nut for buried valves.
3. Mark AWWA gate valves with manufacturer’s name or mark, year of valve casting, valve size, and working water pressure.
4. Repaired AWWA gate valves will not be allowed.

B. Resilient-Seated Ductile Iron Gate Valve 3 Inches to 36 Inches:

1. Ductile-iron body, resilient seat, bronze stem and stem nut, mechanical joint ends, non-rising stem, full port in accordance with AWWA C509.
3. Manufacturers:
   a. M&H Valve; AWWA C509.
   b. U.S. Pipe.

C. Factory Finishing of Gate Valve:

1. Lining and Coating:
   a. Interior Lining:
      1) Manufacturer’s standard.
      2) In accordance with AWWA C550.
      3) Formulated from materials deemed acceptable to NSF 61.
   b. Exterior Coating:
      1) If valve and operator will not be subsequently field-coated, factory-applied coating shall be either two-part liquid material or heat-activated (fusion) material.
      2) In accordance with AWWA C550.
      3) Dry Film Thickness: Minimum 10 mils.

PART 3 EXECUTION

3.1 INSTALLATION
   A. Mount buried valves such that operating nut is accessible and operable from above.
   B. Install in accordance with manufacturer’s written instructions.

3.2 DISINFECTION
   A. Valves used for potable water service shall be disinfected in accordance with Section 33 13 00, Disinfecting of Water Utility Distribution Facilities.

3.3 FUNCTIONAL AND HYDROSTATIC TESTING
   A. Functional Test:
      1. Test that valves open and close smoothly under operating pressure conditions.
      2. Test that two-way valves open and close smoothly under operating pressure conditions from both directions.
      3. Count and record number of turns to open and close valve; account for discrepancies with manufacturer’s data.
B. Hydrostatic Testing:

1. Valve may be tested while testing pipeline or as a separate step after pipeline has been tested.
2. Apply test pressure to one side of valve and measure the pressure on the opposite side to determine if there is an increase in pressure caused by leakage. Then apply test pressure to the other side, and measure the pressure on the opposite side.

END OF SECTION 33 12 16
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Society of Mechanical Engineers (ASME):
2. American Water Works Association (AWWA):
   b. C550, Protective Interior Coatings for Valves and Hydrants.
   c. C800, Underground Service Line Valves and Fittings.
3. ASTM International (ASTM):
5. NSF International (NSF):
   a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
   b. NSF/ANSI 372, Drinking Water System Components - Lead Content.

1.2 SUBMITTALS

A. Action Submittals:

1. Product data sheets for make and model.
2. Complete catalog information, descriptive literature, specifications, and identification of materials of construction.
3. Maximum recommended test pressure; maximum and minimum recommended working pressures of air valves, isolation valves, flanges, connecting piping, and fittings.
4. Recommended seating materials for specified operating pressures.

B. Informational Submittals:

1. Manufacturers’ Instructions:
   a. Installation and testing of products specified.
   b. Pipeline tapping and service saddle installation.
2. Operation and maintenance data.
3. Affidavit of Compliance in accordance with AWWA C512 stating valve and all materials used conform to applicable requirements of AWWA C512 and these Specifications, and tests specified have been performed and all requirements have been met.
4. Affidavit of Compliance that materials comply with the requirements of the EPA Safe Drinking Water Act and other federal, state, and local requirements.

PART 2 PRODUCTS

2.1 GENERAL

A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

1. Use or reuse of components and materials without a traceable certification is prohibited.

2.2 AIR VALVES

A. General:

1. Air release and combination air valves shall conform to AWWA C512.
2. Interior of air valves shall be coated in accordance with AWWA C550.
3. Air valves shall be factory tested in accordance with AWWA C512.
4. Suitable for operating pressures between 50 and 125 psi.

B. Air Release Valve, Water Service, 1/2 Inch to 16 Inches:

1. Suitable for water service.
2. Automatically exhausts air during system filling and allows air to re-enter during draining or when vacuum occurs.
3. Air/water Inlet: NPT.
4. Air Outlet: NPT.
5. Rated 300 psi working pressure, cast iron, ductile iron, or steel body, cover with stainless steel float and trim.
2.3 CONNECTION TO MAINLINE

A. Service Saddle:

1. Provide in accordance with the following:

<table>
<thead>
<tr>
<th>Mainline Material</th>
<th>Saddle Characteristics</th>
<th>Tap Size</th>
<th>Manufacturer*</th>
</tr>
</thead>
<tbody>
<tr>
<td>HDPE</td>
<td>Electrofusion saddle for tapping valve assembly</td>
<td>3/4” - 4”</td>
<td>ISCO Industries, Plastitalia Spa or equivalent</td>
</tr>
</tbody>
</table>

*Model number for each manufacturer will depend on pipe material saddle is attached to and whether the native soils are aggressive or relatively neutral.

B. Tapping Valve:

1. Material: HDPE.
4. Manufacturers:
   a. ISCO Industries.
   b. Plastitalia Spa.
   c. Or equivalent.

2.4 PIPING BETWEEN MAINLINE AND AIR VALVE AND PIPING FOR AIR VENT

A. HDPE or Brass pipe conforming to ASTM B43.

2.5 VALVE VAULT

A. Precast concrete manhole in accordance with DC Water Standard Detail W-20.01. Frame and cover shall be designed for H-20 loading.

PART 3 EXECUTION

3.1 INSTALLATION

A. Valves:

1. In accordance with manufacturer’s printed instructions.
2. Orient valve in vault with easy access to operator.
3. Replace valves that drip or do not function properly.

B. Service Saddle:

1. Tap and install in accordance with manufacturer’s printed instructions.
2. Use adapters for size of line being tapped.
C. Valve Vault:
   1. Place as shown on Drawings for access to operators.
   2. Install so finished grade of top of vault conforms to slope and elevation of adjacent ground.

D. Pipe Support: Install in accordance with details as shown on Drawings.

3.2 TESTING AND INSPECTION

A. Air Valve:
   1. May be either tested while testing pipelines, or as a separate step.
   2. Isolation valves shall be in open position during pipeline test.

B. Isolation Valves: Test that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the other.

C. Air Valves: Inspect valves as pipe is being filled to verify venting and seating is fully functional.

D. Verify leak-free performance during testing.

END OF SECTION 33 12 16.29
SECTION 33 12 19 - WATER UTILITY DISTRIBUTION FIRE HYDRANT

PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Water Works Association (AWWA):
   a. C502, Dry-Barrel Fire Hydrants.
   b. C600, Standard for Installation of Ductile-Iron Water Mains and Their Appurtenances.


3. NSF International (NSF):
   a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
   b. NSF/ANSI 372, Drinking Water System Components - Lead Content.

1.2 SUBMITTALS

A. Action Submittals: Catalog cuts of system components.

B. Informational Submittal: Certificate of Compliance: Upon completion of the system installation, verify all fire department hose connections, and check all fire safety devices to ensure their readiness for emergency connection and operation.

PART 2 PRODUCTS

2.1 GENERAL

A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

   1. Use or reuse of components and materials without a traceable certification is prohibited.

2.2 LOW PRESSURE HYDRANTS

A. Hydrant:

   1. Break flange or safety top type.
   2. Nominal 4-1/2 or 5-1/4-inch main valve opening with 6-inch bottom connections.
   3. Conform to AWWA C502.
4. Two 2-1/2-inch hose nozzles.
5. One 4-1/2-inch pumper nozzle.
7. Mechanical joint inlet connection.
8. Red aboveground line.

B. Main Valve:
   1. Depth of Bury: as shown on Drawings.
   2. Equip with O-ring seals.
   3. Valve opens on counterclockwise rotation.

2.3 PRECAST CONCRETE PIER BLOCK
   A. Nominal dimensions of 8-inch thickness by 16-inch square base.
   B. Compressive Strength: 3,000 psi at 28 days.

2.4 GRAVEL FOR DRAINAGE
   A. Washed 3/4-inch drainage gravel. Free of organic matter, sand, loam, clay, and other small particles that will restrict water flow through gravel.

2.5 FOUNDATION STABILIZATION MATERIAL
   A. Furnish when existing trench material or imported pipe base material will not support soft or flooded spots in excavated trench.
   B. Maximum 3-inch hard rock free from excessive clay material, but enough fines to bind larger fragments.

2.6 CONCRETE FOR THRUST BLOCKING
   B. Compressive Strength: 3,000 psi at 28 days.
   C. Aggregate Size: 1-1/2 inches.
   D. Slump: 2 to 4 inches.

2.7 THRUST TIES
   A. 3/4-inch diameter steel rods.
   B. Duc-Lugs Manufacturer: The Stellar Corp., Columbus, OH.
PART 3 EXECUTION

3.1 GENERAL

A. Install hydrants in accordance with Sections 3.7 and 3.8 of AWWA C600, unless specified otherwise.

3.2 EXCAVATION

A. Excavate to subgrade. Fill over excavated areas with foundation stabilization material. Tamp to provide firm foundation.

3.3 BASE BLOCK

A. Place on firm, level subgrade to ensure uniform support.

3.4 INSTALLATION OF HYDRANTS

A. Locate hydrants to provide accessibility and to minimize potential damage from vehicles.

1. Relocate improperly set hydrants.
2. Hydrant Located behind Curbs: Set barrel so pumper nozzle or hose nozzle caps are a minimum of 18 inches from gutter face of curb.
3. Hydrant Located in Space between Curb and Sidewalk: Not less than 8 inches, clear from sidewalks.
5. Set hydrants so safety flange is a minimum of 2 inches above finished ground or sidewalk level.

B. Place hydrant on base block carefully to prevent the base block from breaking.

C. Joints shall conform to Section 3.4 of AWWA C600 when cast or ductile iron pipe is used.

D. Maintain hydrant in a plumb position during subsequent Work.

3.5 GRAVEL FOR DRAINAGE

A. Place gravel around base block and hydrant bottom in accordance with Section 3.7 of AWWA C600.

3.6 CONCRETE THRUST BLOCKING

A. Place blocking after hydrant is set in final position and join to pipe.

B. Concrete thrust block shall have a minimum of 4 square feet of bearing area against undisturbed earth.
3.7 THRUST TIES

A. Install thrust ties in lieu of concrete thrust blocking when ground surface behind hydrant is less than 2 feet above top of hydrant base.

1. Install two tie rods between main valve and hydrant, water main tee and main valve.
2. Install mechanical joint glands with lugs in joints between hydrant, main valve and main line tee.

END OF SECTION 33 12 19
PART 1 GENERAL

1.1 REFERENCES

A. The following is a list of standards which may be referenced in this section:

1. American Water Works Association (AWWA):
   a. C651, Disinfecting Water Mains.

2. NSF International (NSF):
   a. NSF/ANSI 61, Drinking Water System Components - Health Effects.
   b. NSF/ANSI 372, Drinking Water System Components - Lead Content.


1.2 SUBMITTALS

A. Informational Submittals:

1. Plan describing and illustrating conformance to appropriate AWWA standards and this Specification.
2. Procedure and plan for cleaning system.
3. Procedures and plans for disinfection and testing.
4. Proposed locations within system where Samples will be taken.
5. Type of disinfecting solution and method of preparation.
6. Certification that employees working with concentrated chlorine solutions or gas have received appropriate safety training.
7. Method of disposal for highly chlorinated disinfecting water.
8. Independent Testing Agency: Certification that testing agency is qualified to perform chlorine concentration testing and bacteriological testing in accordance with AWWA standards, agency requirements, and this Specification.
9. Certified Bacteriological Test Results:
   a. Facility tested is free from coliform bacteria contamination.
   b. Forward results directly to Contracting Officer (CO).

1.3 QUALITY ASSURANCE

A. Independent Testing Agency: Certified in the District of Columbia with 10 years’ experience in field of water sampling and testing. Agency shall use calibrated testing instruments and equipment, and documented standard procedures for performing specified testing.
1.4 SEQUENCING

A. Commence initial disinfection after completion of following:
   1. Hydrostatic and pneumatic testing, pressure testing, functional and performance testing and acceptance of pipelines, pumping systems, structures, and equipment.

PART 2 PRODUCTS

2.1 GENERAL

A. Components and Materials in Contact with Water for Human Consumption: Comply with the requirements of the Safe Drinking Water Act and other applicable federal, state, and local requirements. Provide certification by manufacturer or an accredited certification organization recognized by the Authority Having Jurisdiction that components and materials comply with the maximum lead content standard in accordance with NSF/ANSI 61 and NSF/ANSI 372.

   1. Use or reuse of components and materials without a traceable certification is prohibited.

2.2 WATER FOR DISINFECTION AND TESTING

A. Clean, uncontaminated, and potable.

PART 3 EXECUTION

3.1 GENERAL

A. Conform to AWWA C651 for pipes and pipelines, except as modified in these Specifications.

B. Contractor’s Equipment:
   1. Furnish chemicals and equipment, such as pumps and hoses, to accomplish disinfection.
   2. Water used to fill pipeline may be supplied using a temporary connection to existing distribution system. Provide protection against cross-connections as required by AWWA C651.

C. Disinfect the following items installed or modified under this Project, intended to hold, transport, or otherwise contact potable water:
   1. Pipelines: Disinfect new pipelines that connect to existing pipelines up to point of connection.
   2. Disinfect surfaces of materials that will contact finished water, both during and following construction, using one of the methods described in AWWA C652 and AWWA C653. Disinfect prior to contact with finished water. Take care to avoid recontamination following disinfection.
D. Prior to application of disinfectants, clean pipelines of loose and suspended material.

E. Allow freshwater and disinfectant solution to flow into pipe or vessel at a measured rate so chlorine-water solution is at specified strength. Do not place concentrated liquid commercial disinfectant in pipeline or other facilities to be disinfected before it is filled with water.

3.2 TURBIDITY

A. Cleaning of equipment and facilities shall include removal of materials that result in a turbidity exceeding limits stated in Article Testing.

3.3 PIPING AND PIPELINES

A. Cleaning:
   1. Before disinfecting, clean foreign matter from pipe in accordance with AWWA C651.
   2. If continuous feed method or slug method of disinfection, as described in AWWA C651, are used flush pipelines with potable water until clear of suspended solids and color. Provide hoses, temporary pipes, ditches, and other conduits as needed to dispose of flushing water without damage to adjacent properties.
   3. Flush service connections and hydrants. Flush distribution lines prior to flushing hydrants and service connections. Operate valves during flushing process at least twice during each flush.

B. Disinfecting Procedure: In accordance with AWWA C651, unless herein modified.

3.4 DISPOSAL OF CHLORINATED WATER

A. Do not allow flow into a waterway without neutralizing disinfectant residual.

B. See appendix of AWWA C651 for acceptable neutralization methods.

3.5 TESTING

A. Collection of Samples:
   1. Coordinate activities to allow Samples to be taken in accordance with this Specification.
   2. Provide valves at sampling points.
   3. Provide access to sampling points.

B. Test Equipment:
   1. Clean containers and equipment used in sampling and make sure they are free of contamination.
   2. Obtain sampling bottles with instructions for handling from an independent testing laboratory.
C. Chlorine Concentration Sampling and Analysis: Collect and analyze Samples in accordance with AWWA 651.

D. After pipelines have been cleaned, disinfected, and refilled with potable water, an independent laboratory will take water Samples and have them analyzed for conformance to bacterial limitations for public drinking water supplies.

1. Collect Samples in accordance with applicable AWWA Standard.
2. Analyze Samples for coliform concentrations in accordance with latest edition of Standard Methods for the Examination of Water and Wastewater.

E. Turbidity Sampling and Analysis:

1. After pipelines have been cleaned, disinfected, and refilled with potable water, an independent laboratory will take water Samples and have them analyzed for conformance to turbidity limitations for public drinking water supplies. Turbidity shall not exceed 0.3 NTU.
2. If turbidity is in excess of the limit, dispose of the water in accordance with this Specification and applicable regulations, take action to remove source of turbidity, refill system, and retest.

F. If minimum Samples required above are bacterially positive, disinfecting procedures and bacteriological testing shall be repeated until bacterial limits are met.

END OF SECTION 33 13 00