ZION NATIONAL PARK

CRAWFORD DAM REMOVAL AND DIVERSION HEADGATE REPLACEMENT PROJECT SPECIFICATIONS

MARCH 2026

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Crawford Dam Specifications

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SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following:

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

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Location: Zion National Park, 37.2191° N, 112.9741° W, near junction of Zion Canyon Scenic Drive and Zion-Mt. Carmel Highway, Springdale, Utah.

B. The Work consists of:

1. The Work includes but is not limited to partial removal and disposal of an existing concrete dam and headgate structure comprised of concrete, rock, rebar, regrading of the North Fork Virgin River for a distance of approximately 300 feet, construction of a new intake structure including a fish screen, removal and disposal of approximately 275' of existing CMP pipe and concrete manhole, installation of approximately 285' of 18"Ø ADS N-12 pipe (approximately 40' to be placed within 24"Ø CMP pipe), removal of a concrete turnout box, reseating of an existing 12" flume, approximately 150 feet of boulder embankment rip rap and installation of approximately 350' of Smart Ditch or Contracting Officer approved equivalent.

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

D. Period of Performance – Work shall be completed within 180 calendar days of the start date provided on the Notice to Proceed.

1. Clarification: The Notice to Proceed will be issued with a period of performance that is all inclusive of supply lead times, material deliveries, decommissioning, installation, anticipated average weather days for location, final commissioning, and acceptance of completed work. The contractor will be expected to provide a project schedule with adequate critical path details to ensure all work is completed within the stated calendar days from issuance of the Notice to Proceed. If weather impacts project beyond typical average weather patterns, contractor shall provide documentation in request for additional

days.

2. No in-water work shall be completed between April 1 though July 31 to protect fish during their reproductive cycle.

3. Work must be completed prior to April 1, 2027.

1.3 WORK UNDER OTHER CONTRACTS

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

1.4 GOVERNMENT-FURNISHED MATERIALS

A. In case of Government -furnished materials:

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

B. Government-Furnished Materials:

1. All seed for revegetation will be provided and planted by Zion National Park Revegetation Staff. Contractor will be responsible for preparing the soil for revegetation.

2. Archeological Monitor and Biological Monitor will be provided by the NPS and will monitor certain excavation activities per construction schedule.

1.5 CONTRACTOR USE OF SITE

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

B. Storage of Materials: Confine storage of materials to within staging area as shown on the drawings.

C. Parking and equipment staging: Confine parking and equipment staging to staging areas as described on the design drawings or areas as approved by the CO.

D. Stockpiling: Confine stockpiling to staging area as defined on the design drawings or areas as approved by CO.

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. Do not remove, injure, or destroy trees or other plants without prior approval. Consult with Contracting Officer (CO) and remove agreed-on roots and branches that interfere with construction.
3. Do not fasten ropes, cables, or guys to existing trees.
4. Carefully supervise excavating, grading, filling, and other construction operations near trees to prevent damage.

F. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Government employees, and emergency vehicles at all times.

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

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

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

I. Restrictions: Contractor to confirm adequate space at fee station lanes for equipment prior to bringing equipment through Springdale. Contractor shall abide by restrictions when traveling through the Zion-Mt. Carmel Tunnel including restrictions on vehicles over thirteen feet and one inch tall, semi-trucks, vehicles carrying hazardous materials, vehicles weighing more than 50,000 pounds, single vehicles over 40 feet long, and vehicles and trailers with combined length over 50 feet. Vehicles over 50,000 pounds are not allowed to drive across the Canyon Junction Bridge or Pine Creek Bridge on the Zion-Mt. Carmel Highway.

1.6 PUBLIC USE OF SITE

A. Contractor shall at all times conduct operations to ensure the least inconvenience to the public. Lane closures will be permitted, when required, upon specific approval of the Contracting Officer.

1.8 CONDUCT OF OPERATIONS

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

B. Work on Saturdays, Sundays, Federal holidays or at night may not be performed unless stated in the Work Restrictions below or without prior consent from the Contracting Officer. Submit requests 72 hours 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.

1.9 WORK RESTRICTIONS

A. On-Site Work Hours: See schedule in section 013218 - 2.2 A 1 b.

B. Existing Utilities
1. Contractor shall be responsible for locating and preventing damage to known utilities. If damage occurs, repair utility at no additional expense to the Government.
2. If damage occurs to an unknown utility, repair utility. An equitable adjustment will be

made in accordance with the Changes clause of the contract.

3. The Contractor shall plan to supply their own water for construction.
4. The Contractor shall plan to supply their own power for construction.

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

1. Notify Contracting Officer not less than two business days in advance of proposed utility interruptions.
2. Do not proceed with utility interruptions without Contracting Officer's written permission.

D. Nonsmoking Building/Tobacco Use/Vaping: Smoking is not permitted within buildings or within 25 feet of entrances, operable windows, or outdoor air intakes. Smoking is not permitted within 25 feet of public use areas such as trails.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 11 00

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SECTION 01 26 01 – CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS AND ALLOWANCES

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

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

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

1. Project Manager (PM), Assistant Project Manager
2. Superintendent, Assistant Superintendent
3. Quality Control, Safety Officer, Environmental Manager, etc.

4. Engineers
5. Travel, lodging, and per diem (as established by Federal Travel Regulations)
6. Scheduling
7. Field Office Trailers and associated temporary utilities
8. Field office supplies

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

9. Personal vehicles i.e. Superintendent Pickup trucks

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

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

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

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

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

        1) Social Security
        2) Medicare
        3) Workers Compensation – Policy and company calculation to be made available.

4) Federal Unemployment Tax Act (FUTA) - Cap Rate and percentage to be proportionally allocated over one year.
5) State Unemployment Tax Act (SUTA) - Cap Rate and percentage to be proportionally allocated over one year.
6) Union agreement costs - Other costs required under an enforceable collective bargaining agreement.

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

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

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

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

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

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

1.3 MODIFICATION PROPOSAL PRICING REQUIREMENTS

A. General:

1. Proposal be received in the format and within the time frame specified in the Request for Proposal (RFP) letter. Costs or delays resulting from failure of contractor to submit within the time frame specified will not be compensable.
2. Proposal shall be detailed with itemized lists of equipment, materials, labor, production rates, overhead, profit, and bond markup for each item. Labor costs must be itemized

by craft and hourly rate, including Fringe Benefits and Labor Burden. If the costs of Fringe Benefits and Labor Burden are not itemized, it is assumed they are included in the hourly rate shown, or contractor is not requesting reimbursement. Contractor may utilize the government provided Contractor Estimate Form, or their own form, provided that it contains the same information and level of detail as the Government's form.

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

B. Labor:

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

C. Materials:

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

D. Equipment:

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

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

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

E. Establishment and Application of Overhead and Profit Percentages:

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

   Overhead… 10%
   Profit… 8.00%

2. Total aggregate limit of markup (OH&P) for Contractor and Subcontractors on modification work shall not exceed 25%. The NPS will not be responsible for allocation of percentages between contractor and subcontractors at any tier.
3. If Contractors form a partnership, partnership may only receive home office overhead and profit in same amount as an individual Contractor (refer to paragraph 1.3,E,1 above). It is the responsibility of the partners to decide on division of revenue.

4. Combined Increases and Decreases: On proposals involving both increases and decreases in the Contract Price, overhead and profit mark-ups are required on net increases and deducted on net decreases.
5. At no time can profit be calculated on Overhead or itself, it must be calculated on direct costs of work only.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION

(Not Used)

END OF SECTION 01 26 01

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SECTION 01 27 00 – DEFINITION OF CONTRACT LINE ITEMS

PART 1 - GENERAL

1.1 SUMMARY

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

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

C. General items related to the construction, including but not limited to construction fencing, erosion control measures, temporary diversion, staging, construction signage, construction trailers, temporary utilities, temporary facilities and controls, reporting, construction survey staking, overhead and profit etc. will not be measured separately but shall be included in the work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF CONTRACT LINE ITEMS

A. Contract Line Item Number 1 **Mobilization and Temporary Access Road Construction**

1. This item consists of furnishing all materials, equipment, operations and labor necessary for moving equipment and materials to the site and building temporary access roads, staging areas, signage, required pre- and post-mobilization documentation and permits as depicted in the drawings and specifications.
2. No measurement will be made for separate items related to this work.
3. Payment will be made at a **lump sum price**.

B. Contract Line Item Number 2 **Construction Staking and Surveying**

1. This item consists of furnishing all materials, equipment, operations and labor necessary for performing surveying and staking for the delineation of the project components.
2. No measurement will be made for separate items related to this work.
3. Payment will be made at a **lump sum price**.

C. Contract Line Item Number 3 **Erosion Control**

1. This item consists of furnishing all materials, equipment, operations and labor necessary for installing and maintaining erosion control measures throughout the project. All work to install and maintain erosion control measures per the drawings and specifications or as directed by the CO.
2. No measurement will be made for separate items related to this work.
3. Payment will be made at a **lump sum price**.

D. Contract Line Item Number 4 **Clearing and Grubbing**

1. This item consists of furnishing all materials, equipment, operations and labor necessary for clearing and grubbing throughout the project. All work to complete clearing and grubbing per the drawings and specifications or as directed by the CO.
2. No measurement will be made for separate items related to this work.
3. Payment will be made at a **per acre price**.

E. Contract Line Item 5 **Temporary Fencing**

1. This item consists of furnishing all materials, equipment, operations and labor necessary for installing, maintaining and removal at the conclusion of work of temporary fencing throughout the project. All work to complete and maintain temporary fencing per the drawings and specifications or as directed by the CO.
2. No measurement will be made for separate items related to this work.
3. Payment will be made at a **linear foot price**.

F. Contract Line Item 6 **Traffic Control**

1. This item consists of furnishing all materials, equipment, operations and labor necessary for traffic control throughout the project. All work to complete the installation of traffic control per the drawings and specifications or as directed by the CO.
2. No measurement will be made for separate items related to this work.
3. Payment will be made at a **lump sum price**.

G. Contract Line Item Number 7 **Site Dewatering and Diversion**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary for installing, maintaining and removing at the conclusion of in-stream work river diversion. All work to complete the installation of dewatering and diversion per the drawings and specifications or as directed by the CO.
2. No measurement will be made for separate items related to this work.
3. Payment will be made at the contract at a **lump sum price**.

H. Contract Line Item Number 8 **Existing Structure Removal (Dam, Headgate, Manhole, Turnout Box)**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to remove and dispose of the existing concrete dam structure including indicated portions of the headgate structure, turnout box and associated dam materials including but not limited to concrete, pipe, metal rebar, and rock. This item includes but is not limited to demolition of existing dam for removal purposes, removal of all indicated portions of concrete dam, and off-site disposal of material. All work to complete the dam removal per the drawings and specifications or as directed by the CO.
2. No measurement will be made for separate items related to this work. All work to complete the existing dam removal per the drawings and specifications shall be included.
3. Payment will be made at the contract at a **per cubic yard price**.

I. Contract Line Item Number 9 **CMP Pipe Removal and Restoration**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to install the new diversion pipe. This item includes but is not limited to excavation, removal of existing pipe and manhole and regrading, soil placement and compaction as per

the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the diversion pipe per the drawings and specifications shall be included.

3. Payment will be made at the contract at a **linear foot price**.

J. Contract Line Item Number 10 **Diversion Pipe Installation**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to install the new diversion pipe. This item includes but is not limited to pipe bedding material, soil material, approximately 285' of 18"Ø ADS N-12 pipe with approximately 40' of 24"Ø CMP pipe casing placement, soil placement and compaction as per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the diversion pipe per the drawings and specifications shall be included.

3. Payment will be made at the contract at a **linear foot price**.

K. Contract Line Item Number 11 **New Concrete Headgate and Fish Screen Structure Construction**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to construct the headgate and fish screen on the construction drawings. This item includes but is not limited to excavation and subgrade preparation; concrete forming and pouring, metal fabrication, screen placement, multiple head gate installations and trash rack installation as per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the headgate and fish screen structure per the drawings and specifications shall be included.

3. Payment will be made at the contract at a **lump sum price**.

L. Contract Line Item Number 12 **Channel Grading (Excavation and Fill)**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to regrade the river channel through excavation and placement of fill as necessary in preparation for other project components. This item includes but is not limited to salvaging material, stockpiling material as appropriate for use in other channel grading sections, bringing in fill to supplement existing material to achieve design grade and all other features as per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the channel regrading (excavation and fill) per the drawings and specifications shall be included.

3. No measurement will be made for subgrade prep, compaction, or other items required to complete the work.

4. Payment will be made at the contract at a **cubic yard price for channel grading.**

M. Contract Line Item Number 13 **Rock Ramp Construction (Size D15 through D85 – Material Furnishing and Installing)**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to construct a rock ramp through the placement of a filter layer and then a rock layer of

the size D15 through D85 as indicated per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the rock ramp per the drawings and specifications shall be included.

3. No measurement will be made for subgrade prep, compaction, or other items required to complete the work.

4. Payment will be made at the contract at a **cubic yard price for rock ramp construction.**

N. Contract Line Item Number 14 **Rock Ramp Construction (Size D15 through D85 – Harvested on Site and Installing)**

1. This item consists of materials harvested from on site, equipment, operations, and labor necessary to construct a rock ramp through the placement of a filter layer and then a rock layer of the size D15 through D85 as indicated per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the rock ramp per the drawings and specifications shall be included.

3. No measurement will be made for subgrade prep, compaction, or other items required to complete the work.

4. Payment will be made at the contract at a **cubic yard price for rock ramp construction.**

O. Contract Line Item Number 15 **Rock Ramp Construction (Size D100 – Special Placement Habitat Boulders)**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to construct a rock ramp through the placement of D100 Habitat Boulders as indicated per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the rock ramp per the drawings and specifications shall be included.

3. No measurement will be made for subgrade prep, compaction, or other items required to complete the work.

4. Payment will be made at the contract at a **cubic yard price for rock ramp construction.**

P. Contract Line Item Number 16 **Riprap Embankment Stabilization**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to construct the riprap. This item includes but is not limited to riprap material, soil material, placement and compaction as per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the buried riprap per the drawings and specifications shall be included.

3. Payment will be made at the contract at a **cubic yard of riprap price**.

Q. Contract Line Item Number 17 **Site Restoration**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary

to restore the site after construction. This item includes but is not limited to removal of the access road and scarification of the surface as per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the buried riprap per the drawings and specifications shall be included.

3. Payment will be made at the contract at a **per acre price**.

R. Contract Line Item Number 18 **Smart Ditch Irrigation Ditch Liner or Contracting Officer Approved Equivalent Installation**

1. This item consists of furnishing all materials, equipment, operations, and labor necessary to install the Smart Ditch irrigation ditch liner or Contracting Officer Approved Equivalent. This item includes but is not limited to cleaning out the existing ditch including excavation, if necessary, reseating the existing flume to the appropriate elevation, installation of transition areas and inlet/outlet, grading, backfill and compaction as per the construction drawings and specifications or as directed by the CO.

2. No measurement will be made for separate items related to this work. All work to complete the installation per the drawings and specifications shall be included.

3. Payment will be made at the contract at a **linear foot of Smart Ditch or Contracting Officer Approved Equivalent installation price**.

END OF SECTION 01 27 00

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SECTION 01 28 00 -CONSTRUCTION SURVEYING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: The General Contract Conditions, Drawings and other Division-1 Specification sections apply to work of this section.

1.2 DESCRIPTION: Section includes general requirements and procedures for construction surveying.

1.3 RELATED SECTIONS:

A. Construction facilities and temporary controls
B. Earthwork
C. 01 73 40 Execution

1.4 EXISTING UTILITIES:

A. The existence and location of all underground utilities and construction indicated as existing are not guaranteed.

B. Before starting any work disturbing, moving or penetrating the ground, the Contractor must have all existing utilities located, staked, and depth identified by the Contractor.

1.5 QUALITY ASSURANCE:

A. If there are discrepancies in the existing survey info and actual existing surface features, the Contractor will notify the CO immediately. It is the requirement of the government that the Contractor will work with the CO to make adjustments in the field as needed to get to acceptable final grades with no additional cost to the government.

PART 2 - PRODUCTS

PART 3 - EXECUTION

1.1 CONSTRUCTION LAYOUT AND SURVEYING:

A. General: The work shall consist of the construction surveying, calculating, and staking necessary for the construction of all elements of the project. Layout of site elements will be accomplished by means of coordinates.

B. The work shall be done under the supervision of a Professional Engineer (P.E.) or Professional Land Surveyor (P.L.S.) who is experienced and competent in site construction surveying and registered in the State of Utah. The P.E. or P.L.S. shall be available to review work, resolve problems and make decisions in a timely manner.

C. The Contractor shall furnish all personnel, materials and traffic control necessary to perform the required construction surveying. All surveying equipment, including Electronic Distance Meters, tapes, tribrachs, theodolites, total stations, GPS receivers and levels shall be calibrated prior to the start of work. EDM's, total stations, and GPS receivers shall be checked on a National Oceanic and Atmospheric Administration (NOAA) calibrated baseline. Equipment calibration accuracy and adjustments made to meet requirements specified in the Utah Department of Transportation (UDOT) Survey Manual shall be documented in the Survey Records.

D. Contractor shall establish horizontal and vertical control for the project. A Pre-survey Conference shall be held prior to performing any surveying work. The CO, Contractor's Superintendent, and Contractor's Surveyor (P.E. or P.L.S.) shall attend. A surveying work schedule shall be submitted to the CO for review prior to the conference.

E. Contractor shall check all Government-established control points, and verify and document their accuracy, prior to using them for construction surveying control.

F. Contractor shall perform all construction surveying and staking that is necessary for construction of the project.

1. The Contractor shall pay the cost of all construction surveying for line and grade.
2. Working from lines and levels established by the benchmarks, establish and maintain project benchmarks and other dependable markers to set the lines and levels for the work and elsewhere on the site as needed to properly locate every element of the Work.
3. As construction proceeds, check every major element for line, level and plumb.
4. Calculate and measure required dimensions as shown within recognized tolerances. Do not scale the Drawings to determine dimensions. Advise entities engaged in construction activities of the marked lines and levels provided for use.
5. The Contractor is to establish all necessary benchmarks on site for layout and grading based on the control points provided by the Government from the original survey.
6. Grades noted on the plans as "MG" (match grade) shall require the contractor to survey those points and provide the existing elevations at those points back to the CO for verification of grades and proposed elevations. Allow 14 calendar days for the government to refine the grading sheet and elevations to match with the existing elevations at those points. All elevations given referencing MG are used to show relative height differences (i.e. height of curb, height of wall) not exact elevations.
7. All survey points on the ground shall match the numbering system of the coordinate points shown on the drawings.

G. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility line gradients and invert elevations by instrumentation and similar appropriate means.

H. Layout Procedures:

1. Verify layout information shown on the Drawings in relation to the control points and existing benchmarks, before proceeding with the layout of the actual work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.
2. Do not change or relocate benchmarks or control points without prior written approval. Promptly report lost or destroyed reference points, or requirements to relocate reference points because of necessary changes in grades or locations.
3. Promptly replace lost or destroyed project control points. Base replacements on the original survey control points.
4. Establish and maintain a minimum of two temporary benchmarks on the site, reference to data established by survey control points.

I. Staking: Acceptable staking placement intervals for the various construction survey control operations shall be approved by the CO prior to the beginning of work. Stationing shall be established in the field on centerline or an approved offset. The Contractor shall maintain staking throughout the duration of the project or until construction is complete for individual bid items. Restaking will be as needed or as directed by the CO. The Contractor shall alert the CO immediately if any irregularities are detected in the survey work.

J. Accuracy and Tolerances: Accuracy of surveys and survey tolerances shall be as specified in the Contract or the UDOT Survey Manual. If a discrepancy should occur, the higher degree of accuracy or the more restrictive tolerance shall apply.

K. Responsibility and Inspection: Supervision and coordination of construction surveying is the Contractor's responsibility. The CO may inspect the Contractor's surveying; however, such inspection will not relieve the Contractor of any responsibility for accuracy or completeness of work. The Contractor shall check the work to verify the accuracy and include documentation of this check in the Survey Records. All Contractor surveying inaccuracies, errors or omissions shall be corrected at the Contractor's expense. The CO's inspection or the Contractor's corrections shall not entitle the Contractor to additional payment or contract time extension.

L. Changes: All changes in lines and grades required by field conditions and all discrepancies in grades, alignment, location or dimensions detected by the Contractor shall be immediately submitted to the CO in writing. No changes in given data or plans will be allowed unless approved by the CO in writing. All changes shall be documented in the survey records.

END OF SECTION 01 28 00

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SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

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

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

B. Related Requirements:

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

1.2 DEFINITIONS

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

1.3 CONSTRUCTION COORDINATION

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

1. Schedule construction operations in sequence required to obtain best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
2. Coordinate installation of different components with other Contractors to ensure maximum accessibility for required maintenance, service, and repair.
3. Make provisions to accommodate items scheduled for later installation.
4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of components, including mechanical and electrical.
5. Properly plan construction operations to include permit requirements. Allow enough time to execute permit provisions to maintain work schedule, site visits, inspections, and reporting deadlines.

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

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

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

1.4 SUBMITTALS

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

1. Letter designating Project Superintendent
2. Construction Schedule
3. A Comprehensive Schedule of Values
4. Accident Prevention Plan
5. A List of Subcontractors for this project
6. Written statements from Subcontractors certifying compliance with applicable labor standard clauses.
7. Certificates of Insurance or SF1413 for Contactor and all Subcontractors
8. Waste Management Plan
9. Quality Control Plan
10. Utility Bypass Plans
11. Temporary Storm Water Pollution Prevention Plan (SWPP or UPPP)
12. Contractors Commissioning Plan
13. List of Required Construction Permits. Include the following information for each permit:

a. Name of Permit
b. Agency(ies) with Jurisdiction issuing the permit
c. Information required from Government to complete permit application

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

1.5 REQUESTS FOR INFORMATION (RFIs)

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

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

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

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

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

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

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

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

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

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

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

1.6 PROJECT MEETINGS

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

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

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

1. Attendees: In addition to Government Representatives, each Contractor, Subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented. Participants at

meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Meeting agenda will include:

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

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

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

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

x. Protection of adjacent work
y. Protection of construction and personnel

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

1.7 ENVIRONMENTAL COORDINATION

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

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

a. Compliance with applicable Federal, State, and local environmental regulations, including maintaining required documentation.
b. Implementation of Waste Management Plan (WMP).
c. Implementation of Storm Water Pollution Prevention Plan (SWPPP).
d. Present overview of environmental issues and summarize site specific procedures relating to management plans at Preconstruction conference.
e. Training for Contractor personnel in accordance with position requirements.
f. Monitoring and documentation of environmental procedures.
g. Monitoring for sensitive species - If a condor occurs at the project site, construction will cease until it leaves on its own or until techniques are employed by NPS staff which results in the individual condor leaving the area.
h. Monitoring for sensitive species - Care shall be taken to not disturb any wildlife species (reptiles, migratory birds, raptors, or bats) found nesting, hibernating, estivating, or otherwise living in, or immediately nearby, worksites. Notify CO of any encounters with wildlife that must be relocated and wildlife will be promptly relocated by NPS staff.
i. For any actions involving trenching or digging holes, provisions (generally in the form of ramps with a slope < 45º) shall be made every 20-50 ft. to allow for the escape of animals that may fall into these recesses, and/or they shall be covered in such a way as to prevent animals (vertebrates) from falling in them.
j. Zion National Park Resource Management personnel shall be notified/consulted when any wildlife must be disturbed or handled. Notify the CO when wildlife needs to be handled. They will be available to assist with moving/relocating snakes or any other wildlife, when necessary; and/or to make recommendations for relocating any disturbed animals.
k. Site-specific mitigations shall be developed by the contractor for approval by the CO to prevent trash ingestion of wildlife, specifically condors at dumpster areas. Installing wildlife-proof dumpsters/trash bins and food storage containers during construction shall be required. Contractor to coordinate with CO.
1) Compliance with food storage and waste disposal must be achieved at all times. The project site will be cleaned up at the end of each work day to

reduce attraction of wildlife.

l. Notify the Contracting Officer and the Park Environmental Protection Specialist of the beginning and ending dates of the project construction. Also include notification of any unexpected problems or any modifications to project implementation. Any decisions made in the field that result in greater impacts than anticipated by the proposed action must undergo additional environmental analysis.

m. Update the Contracting Officer and the Park Environmental Protection Specialist as Project Milestones are met including documents related to construction. Forward all documents related to site visits/field notes, meeting notes, and/or agendas, design and/or construction schedules, signed project agreements, approved plan sheet and/or concept designs and As-Builts.

n. Monitor, Regulate and Implement Required Mitigations (RM 46) listed below:

1) Litter and construction debris shall be contained daily. Construction and/or worker generated debris/garbage shall be contained on site in properly covered containers. Daily cleanup shall be performed to prevent materials from entering the river.

2) All construction equipment shall be inspected daily for hydraulic and fuel leaks and repaired as necessary.

3) When not in use, idle equipment, petrochemicals, and toxic/hazardous materials shall be locked and shall not be stored in the 100-year floodplain or be near any drainage ways, ditches, or streams.

4) Discharge of petroleum products, cement washings, or other construction materials into the river shall not be permitted. No wastewater shall be discharged into the river.

5) All fueling operations, lubricating, hydraulic topping off, fuel tank purging, and equipment maintenance/repairs shall be performed at an upland site outside of the 100-year floodplain. These activities shall take place on a pad approved by the C.O. with spill control/collection devices in place.

6) The use of canola oil or other biodegradable fuels and fluids is recommended when working in sensitive riverine environments.

7) Appropriate oil spill kits shall be maintained on site and readily accessible at all times during construction and each operator shall be trained in their use.

8) The use of a floating oil boom located immediately downstream of construction activities when equipment will be operated in the wet.

9) Prior to moving construction equipment into the project area, the contractor shall take reasonable measures to ensure that each piece of equipment is free of soil, seeds, vegetative matter, or other debris that may contain seeds of non-native invasive species. (Consider including aquatic if equipment will be used in-stream.)

10) All tools, equipment, barricades, signs, surplus materials, and rubbish from the project work limits shall be removed upon project completion. All construction debris and litter shall be completely removed off site and disposed of properly upon completion of the project.

11) Disposal of any material or waste in wetlands, floodplains, or within 1,000 feet of the North Fork of the Virgin River is prohibited.

3. Required Environmental Analyses by Contractor prior to construction includes:

a. A Fugitive Dust Control Plan may be required. Coordinate with the CO. Additional information can be found here (https://deq.utah.gov/air-quality/fugitive-dust-control-requirements-for-non-attainment-areas-stationary-source-compliance) and here (https://appengine.egov.com/apps/ut/dust).

b. The contractor shall provide technical specification for any proposed exterior

lighting to the CO and Zion Environmental Protection Specialist (EPS) prior to installation to ensure compliance with all federal, state, local, NPS, and park regulations such as Night Skies and International Dark Sky Park Designation.

c. Prior to any remodel, renovation, demolition, or abatement activity, the contractor shall review hazardous material testing (e.g., asbestos and lead) previously conducted. Findings report from hazardous material testing to be provided to CO, ZION EPS, & ZION Safety Officer. All hazardous material removal shall be carried out in accordance with OSHA standards and shall be disposed of properly.

d. The contractor shall submit a Safety Plan and Traffic Management Plan for approval by the CO and Zion Safety Officer prior to commencing construction activities. The Traffic Management Plan shall restrict visitors access into the construction site and re-route visitor routes to ensure visitor and employee safety. Traffic management plan shall be planned prior to project implementation to address the location of warning signs, type of signs, placement of flaggers, placement of cones/fencing, barricades, duration of anticipated delays, use of pilot cars, etc.

e. Tree felling shall occur only in October and November to avoid disturbance during migratory bird nesting season, as well as potential impact to protected bats. Vegetation clearing and grubbing should occur November through February to avoid the migratory bird nesting season and monarch butterfly active season. If this is not possible, visual inspection of vegetation marked for removal is required each day prior to tree removal. The government shall provide biological monitoring and reporting by a qualified environmental professional as needed. The contractor shall notify the CO no less than two weeks prior to when monitoring is needed.

4. Required by Contractor post construction:

a. As part of the project close-out activities, the contractor shall provide as-built file information to the CO, Zion Environmental Protection Specialist and Zion Curator.

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

1. Quality Requirements
2. Regulatory Requirements
3. Noise and Acoustics Management
4. Temporary Storm Water Pollution Prevention Environmental Management
5. Construction Waste Management

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

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

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

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

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

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

1. A permit will be acquired for the State of Utah (Utah Code 73-3-29) and United States Army Corps of Engineers (Section 404 of Clean Water Act) Programmatic General Permit 10 - Utah Stream Alteration Permit by September 30, 2026 - with identification number 26-81-XXSA. The agencies with Jurisdiction for this permit are the State of Utah and the United States Army Corps of Engineers.

C. Potential Permits: 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 Contractor in determining which permits will be required for contract's chosen means and methods. The list shall not be considered complete; it is the Contractors' responsibility to determine means and methods and obtain required permits. Contractor shall obtain all permits required to legally conduct work.

1. Street Closure - **Zion National** Park (No permit fee.)
2. New Stationary Air Pollution Source – **NA**
3. Street Closure - **Zion National Park** (No permit fee.)
4. UPDES/Stormwater Pollution Prevention Plan and CGP Permit – **Utah DEQ** ($150/year permit fee or current rate during project construction.)
5. Dewatering Permit – **NA**
6. Hot Works Permit – **Zion National Park** – for welding and similar activities (No permit fee.)
7. New Potable Water Line Permit – **NA**

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

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

E. Administrative Procedures:

1. Coordinate scheduling and timing of required administrative provisions of project permits

with Agency(ies) with Jurisdiction, Construction Manager, and Park to avoid conflicts.

2. Supply needed information to Agency(ies) with Jurisdiction issuing permits, pay fees required and provide material needed to comply with permit's conditions and provisions.
3. Upload permits to NPS/DSC management software website when permits are obtained.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

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SECTION 01 32 16 – CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 SUMMARY

A. Section consists of Construction Schedule requirements including:

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

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

1.2 DEFINITIONS

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

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

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

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

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

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

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

affecting planned Project completion date.

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

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

1.3 SUBMITTALS

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

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

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

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

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

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

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

1.4 QUALITY ASSURANCE

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

1. Review software limitations, content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Review General Phasing Plans: G6.1, G6.2
4. Review delivery dates for Government-furnished products.
5. Review schedule for work of separate Government contracts.

6. Review time required for review of submittals and re-submittals.
7. Review requirements for tests and inspections by independent testing and inspecting agencies.
8. Review time required for completion and startup procedures.
9. Review time required for obtaining and activating permits.
10. Review and finalize list of construction activities to be included in schedule.
11. Review baseline schedule comments, resolve issues and progress on incorporating them
12. Review procedures for updating schedule.
13. Discuss reporting requirements and establish protocol for naming and transmitting electronic schedules.

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

1.5 COORDINATION

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

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

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

PART 2 - PRODUCTS

2.1 SCHEDULE OF VALUES

A. Breakdown each lump-sum item into component work activities used in the schedule for which progress payments may be requested. Work activities broken out within schedule of values shall be integrated into and made a logical part of the construction baseline schedule. Total costs for the component work activities shall equal contract price for that lump-sum item. Contracting Officer may request data to verify accuracy of dollar values. Include mobilization, general condition costs, overhead and profit in the total dollar value of unit price items and in the component work activities for each lump-sum item. Do not include mobilization, general condition costs, overhead or profit as a separate item.

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

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

D. An acceptable Schedule of Values shall be agreed upon by the Contractor and Contracting Officer before the first progress payment is processed.

2.2 CONSTRUCTION SCHEDULE REQUIREMENTS

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

1. Develop and finalize Construction Baseline Schedule so it can be accepted for use no later than 14 days after date established for the Notice of Award.

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

   b. Include in the construction schedule hours of operation. All construction activities shall comply with the Zion National Park Lighting Management Plan. Hours of outdoor construction shall be limited to the hours between sunrise and sunset. No artificial lighting shall be allowed. Hours of operation of motorized equipment shall be limited to 8 AM to 6 PM (summer) and 8 AM to dusk (winter) to protect dawn, dusk, and nighttime quiet. If Contractor requests in writing to CO to work outside these hours, CO must obtain Park Superintendent approval prior to construction activities.

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

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

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

7. Time Frame: Proposed duration assigned to each activity shall be Contractor's best estimate of time required to complete activity considering the scope and resources planned for activity.

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

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

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

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

   e. Activity Duration: Define so no activity is longer than [**14**] days, except for non-construction activities including mobilization, shop drawings and submittals, fabrication and delivery of materials and equipment.

   f. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 calendar days, as separate activities in the schedule. Procurement cycle activities can include submittals, approvals, purchasing, fabrication, and delivery.

   g. Submittal Review Time: Include review and re-submittal times indicated. Coordinate submittal review times in Construction Baseline Schedule.
   h. Substantial Completion: Allow time for Government administrative procedures necessary for certification of Substantial Completion. (For more information, refer to Specification 01 77 00 "Closeout Procedures.")

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

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

1) Coordination with existing construction
2) Seasonal variations
3) Environmental control
4) Permit provisions

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

1) Subcontract awards
2) Submittals
3) Purchases
4) Mockups
5) Fabrication
6) Sample testing
7) Deliveries
8) Installation
9) Tests and inspections
10) Adjusting
11) Curing

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

C. Joint Review, Revision, and Acceptance:

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

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

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

3. Total cost assigned to activities shall equal total Contract Price.

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

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

1. Use Microsoft Project or Primavera for Windows 11 and newer.

PART 3 - EXECUTION

3.1 CONSTRUCTION SCHEDULE UPDATES

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

B. Monthly Schedule Updates:

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

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

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

   a. Known delays
   b. Actions to get back on schedule

c. Pending modifications
d. Impediments or constraints affecting progress

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

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

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

D. Construction Schedule Revisions:

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

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

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

1. Requirements: When contract modifications or changes are initiated, delays experienced, or Contractor desires to revise currently accepted Construction Schedule, Contractor shall submit to Contracting Officer a written time impact analysis illustrating the influence of modification, change, delay, or Contractor request on contract time.
2. Time Extensions: Activity delays, resulting in a late completion date projection, shall not automatically mean an extension of contract time is warranted or due to Contractor. It is possible a modification, change, or delay will not affect existing critical path activities or cause non-critical activities to become critical. A modification, change, or delay may result

in absorbing a part of available total float that may exist within an activity chain of the Schedule, not causing any effect on contract time. Time extensions will be granted in accordance with terms of contract.

3. Extension of contract time will be granted only to the extent the equitable time adjustments to activity or activities affected by modification, change, or delay exceeds total (positive or zero) float available on a particular activity.
4. Procedure: Each time impact analysis shall be submitted within time period stated in a request for proposal, or time period designated under the clauses entitled Changes or Default. In cases where Contractor does not submit a written request for extension of time and a time impact analysis within the designated time, it is mutually agreed that the particular modification, change, delay, or Contractor request does not require an extension of the contract time. Upon acceptance, time impact analysis shall be incorporated into currently accepted Construction Schedule at next monthly schedule update.
5. Contract Modifications: Prepare time-impact analysis using fragnets to demonstrate effect of proposed change on overall Construction Schedule for each proposed contract modification concurrent with submission.

END OF SECTION 01 32 16

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SECTION 01 32 33 – PHOTO DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for:

1. Existing condition images
2. Periodic construction images

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

1.2 SUBMITTALS

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

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

B. Closeout: Submit complete set of digital image electronic files as a Project Record Document**.** Submit two printed sets of the project redlines and one electronic copy to the contracting officer.

1. Submit images that relate to project work.

PART 2 - PRODUCTS

2.1 FORMAT REQUIREMENTS

A. Images: Provide sRGB (standard Red Green Blue) color images in JPEG (Joint Photographic Experts Group) format. Minimum sensor size of [**8**] megapixels, and at image resolution of not less than [**3200 by 2400**] [**1600 by 1200**], and 300 dpi (dots per inch).

PART 3 - EXECUTION

3.1 CONSTRUCTION IMAGES

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

1. Maintain index with each set of Construction images and identify the number, date, time,

and description for each.

2. Maintain one set of images accessible in field office at Project site available for reference.

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

1. Flag **construction limits** before recording construction images.
2. Take separate images to show existing conditions adjacent to property before starting Work. Coordinate existing photo coverage with CO prior to completion.
3. Take a minimum of 8 separate images of existing buildings including all sides either on or adjoining property to accurately record physical conditions at start of construction.

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

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

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

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

END OF SECTION 01 32 33

TRANSMITTAL - NATIONAL PARK SERVICE

Transmittal No.:
Sheet: 1 of:

Park: Zion National Park	Project:	Contract No.:	PMIS No.:	Date:

Contractor:	Subcontractor/Supplier:

Item No.	Specification Section No.	Paragraph No.	Description of Item (Size, Type, Name, Manufacturer, Use, Etc.)	No. of Copies Submitted	NPS ACTION: No. of Copies Returned	Approved	Approved with Notations	Disapproved - Resubmit

Contractor Signature	Recommended by	
Title, Date	Title	Date
I hereby certify that this submittal has been reviewed for accuracy, completeness, and compliance with contract requirements (FAR 52.236-21)		
Review Comments	Action By	Date
	Contracting Officer's Representative	
	Approval of this submittal is subject to the provisions of the contract drawings and specifications. This action is for general concurrence only and the Government is not responsible for errors or omission.	

SUBMITTAL LOG DATES: From contractor [_____], To reviewer [_____], From reviewer [_____], To Contractor [_____]
Distribution: ( ) Contractor ( ) DSC File ( ) COR ( ) A/E ( ) DSC Interim ( ) COR Interim ( ) Contractor Interim

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TRANSMITTAL CONTINUATION - NATIONAL PARK SERVICE

Transmittal No.:
Sheet: 1 of:

Park: Zion National Park	Project:	Contract No.:	PMIS No.:	Date:
Contractor:	Subcontractor/Supplier:			

Item No.	Specification Section No.	Paragraph No.	Description of Item (Size, Type, Name, Manufacturer, Use, Etc.)	No. of Copies Submitted	NPS ACTION: No. of Copies Returned	Approved	Approved with Notations	Disapproved - Resubmit

Review Comments

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SECTION 01 33 23 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

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

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

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

1.3 GENERAL SUBMITTAL PROCEDURES

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

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

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

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

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

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

D. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence when e-mail notification is received by Contracting Officer indicating submittal has sent and is ready for review. When Contracting Officer has completed review, e-mail notification will be sent to Contractor indicating submittal has been processed. No

extension of Contract Time will be authorized because of failure to transmit submittals in advance of Work to permit processing, including re-submittals.

1. Action Submittals

   a. Initial Review: Allow [**30]** days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
   b. Re-submittal Review: Allow [**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 installation of an approved item and make changes required in other elements of the work because of the substitution.
   e. Waives claims for additional expenses that may be incurred as a result of the substitution.

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

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

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

2. Physical samples: Complete Transmittal Form (CM-16) on the NPS/DSC management software website as described above. Deliver physical sample to the Contracting Officer

(or designee) on site for processing. All comments and actions will be documented on the Transmittal Form (CM-16) on the NPS/DSC management software website.

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

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

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

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

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

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

1.4 CONTRACTOR'S USE OF CAD/BIM FILES

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

1. **Files provided as is; no format or other changes to files or changes to objects in the drawing will be done by the Government. PDF's or CAD files may be requested.**

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

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

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

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

f. Operational range diagrams.
g. Compliance with specified referenced standards.
h. Testing by recognized testing agency.

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

B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data [**, unless submittal of CAD/BIM Drawings is otherwise permitted**].

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

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

2. Submit shop drawings as PDF electronic file
3. The Government may request additional shop drawings as needed, for no additional cost.

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

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

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

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

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

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

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

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

2.2 INFORMATIONAL SUBMITTALS

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

1. Post informational submittals as PDF electronic files directly to the NPS management software website.
2. Certificates and Certifications: Provide a notarized statement with signature of entity responsible for preparing certification. Certificates and certifications shall be signed by officer or other individual authorized to sign documents on behalf of that entity.
3. Informational submittals that do not comply with requirements specified in Contract Documents will be rejected and one copy will be returned.

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

C. Care of Water/Diversion Plan: Comply with requirements specified in Section 02 40 01.

1. Contractor must show past performance of Contractor or Sub-contractor on at least one project in the past 20 years involving in-stream work.

2. Care of Water/Diversion Plan meeting minimum requirements in Section 02 40 01 Stream Diversion.

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

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

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

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

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

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

J. Qualification Data: Prepare written information demonstrating capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified. Welding Certificates: Prepare written certification that welding procedures and personnel comply with Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on American Welding Society (AWS) forms. Include names of firms and personnel certified.

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

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

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

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

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

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

3.2 CONTRACTING OFFICER'S ACTION

A. General: Submittals will be disapproved without technical review if identification information is missing, not filled in, or if placed on back of submittal; an incorrect format of submittals is

provided; transmittal form is incorrectly filled out; submittals are not coordinated; or submittals do not show evidence of Contractor's approval.

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

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

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

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

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

END OF SECTION 01 33 23

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SECTION 01 35 13.22 – ARCHEOLOGICAL PROTECTION

PART 1 - GENERAL

1. SUMMARY

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

2. DEFINITIONS

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

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

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

D. Archeological Monitor: Qualified professional, provided by Government, to oversee construction activities that could disturb archeological resources. Park Contact: Courtney Mackay courtney_mackay@nps.govmailto:cmackay@nps.gov; Office 435-772-0214.

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

3. SUBMITTALS

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

4. QUALITY ASSURANCE

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

B. Archeological resources near the proposed project area shall be identified for avoidance prior to the implementation of construction activities. Construction and staging areas shall be restricted to ensure no fill or materials disturb known archeological resources. Site selection shall be coordinated with the ZION Cultural Program Manager prior to construction. Contractor to confirm sensitive areas with the Contracting Officer prior to construction.

PART 2 - PRODUCTS

2. DAILY WORK SCHEDULE

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

1. Starting and ending dates of ground-disturbing construction.

2. Locations of temporary facilities, such as barriers, field offices, staging areas, sanitary facilities, borrow pits, and haul and access roads.

3. Types of construction, such as clearing, topsoil stripping, structure or trench excavation, landscaping, and post construction clean-up.

4. Methods and equipment used for each type of construction.

5. Plan for relocating work in the event of temporary work stoppages at each archeologically sensitive areas.

PART 3 - EXECUTION

3. BARRICADES

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

4. ARCHEOLOGICAL INVESTIGATION BY NON-NPS PERSONNEL

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

B. Applicants should submit a Permit Application (DI Form 1926 (Revision 11/2020) Office of Management and Budget (OMB) Number (No.) 1024-0037. Permit Application form is available, in PDF (portable document file) format, to the manager of the park in which they propose to work; or to the regional director, with a copy to the park manager.

5. OBSERVATION

A. Archeological Monitor provided by the NPS is required to be on site when working in Archeologically Sensitive Areas. Archeological Monitor will observe ground-disturbing site work, including construction of temporary facilities, at archeologically sensitive areas, from a safe location mutually agreed on by Contractor and Monitor. As new ground is broken, Monitor will examine excavated materials, using construction layout centerline and perimeter staking as a reference point to record locations of findings.

6. DISCOVERY OF RESOURCES

A. If previously unknown archeological resources are discovered during construction, all work in the immediate vicinity (600 feet) of the discovery shall be halted until the resources are identified and documented and an appropriate mitigation strategy developed, if necessary, in accordance with pertinent laws and regulations, including the stipulations of the 2008 Programmatic Agreement Among the National Park Service (U.S. Department of the Interior), the Advisory Council on Historic Preservation, and the National Conference of State Historic Preservation Officers.

B. In the event of the discovery of human remains, all work on the project must stop and the park archaeologist contacted immediately. As required by law, NPS Law Enforcement will be notified first. All provisions outlined in the Native American Graves Protection and Repatriation Act (1990) shall be followed.

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

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

E. All workers will be informed of the criminal penalties for illegally collecting artifacts or intentionally damaging any archeological or historic property. Workers will also be informed of the correct procedures should previously unknown resources be uncovered during construction activities. Data recovery excavations will be carried out under NPS guidance to mitigate adverse effects as outlined in the section on environmental consequences

7. WORK STOPPAGE

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

B. The Archeological Monitor shall be empowered to temporarily pause construction activities in areas where continuing excavation may cause damage to sensitive resources which are identified by the Monitor, however approval to stop work entirely is reserved for the contracting officer (CO) only. Should the Monitor identify an immediate threat to a sensitive resource which may require a temporary stop of all construction across the work site for more than 1 hour, they must document the time the stoppage began and when it ended and immediately communicate with the park POC. The park POC shall immediately notify the CO and coordinate a phone or video conference call to discuss a potential stop in work. During the call the archeologist, contractor and NPS shall determine if a temporary stop work order is necessary or if project work can continue at other sections of the project area while the sensitive materials are assessed. If a decided temporary stop work order is in the best interest of ensuring the protection of sensitive resources verbal and written approval to do so must come from the CO only.

C. Throughout the course of monitoring, it is likely that work will have to be stopped temporarily in a section of the work site so that cultural materials can be assessed. In cases where stoppage of work occurs for a period of less than 1 hour, then the NPS archeological monitor have the authority to pause work in the immediate area. If stoppage will exceed 1 hour and an alternative construction area cannot be accessed, the CO will be immediately contacted.

D. Additional tasks associated with archeological treatment, recovery, or mitigation of archeological deposits or features that cannot be avoided during the performance of the archeological investigations are not covered under this scope of services.

END OF SECTION 01 35 13.22

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SECTION 01 35 23 - SAFETY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 CONDITIONS PRESENT FOR PROJECT

The site is adjacent to and within the North Fork Virgin River, is surrounded by high use pedestrian areas, has wildlife interface, and is subject to extreme weather.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

B. Site Safety Supervisor:

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

a. Implementation and enforcement of the APP
b. Daily safety inspections
c. Conducting and documenting weekly and monthly safety meetings
d. Review of safety requirements at progress meetings
e. Compilation and maintenance of Safety Data Sheets (SDS) and safety reference materials
f. Tracking and resolution of safety violations
g. Site personnel and visitor compliance with site safety and health requirements and APP
h. Investigation and reporting of accidents and injuries

C. Qualifications of Employees:

1. Physically and able to perform their assigned duties in a safe manner.

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

1.5 ACCIDENT REPORTING

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

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

PART 2 - PRODUCTS

2.1 ACCIDENT PREVENTION PLAN (APP)

A. The contractor shall submit a site-specific plan to the NPS Contracting Officer. This safety plan will be shared with the Park Safety Manager. Within two weeks, the Safety Manager will accept or reject the plan (with feedback for the contractor). The Plan shall be written to comply with OSHA, other applicable laws, and project requirements (generic plan is not acceptable) including but not limited to:

1. Name and qualifications of supervisor responsible to carry out program.
2. Weekly and monthly safety meetings shall be documented with topics and attendees.
3. First aid and rescue procedures.
4. Job Hazard Analysis (JHA) for each major phase. List of hazards associated and methods proposed to provide for property protection and safety of the public, National Park Service personnel, and Contractor's employees. Include initial and continuing training.
5. Planning for possible emergency situations, as detailed in Article 1.2. Such planning shall take nature of construction, site conditions, and degree of exposure of persons and property into consideration.
6. Infectious Disease Preparedness:

   a. Contractors are responsible for their employees' safety and the safety of job site visitors during the performance of this contract. We encourage Contractors to follow guidance from the Department of Labor (DOL), Occupational Safety and Health Administration (OSHA), the Centers for Disease Control and Prevention (CDC), and all other applicable local, city, and state mandates. We encourage Contractors to develop policies for infection prevention and an Infectious Disease Preparedness and Response Plan.
   b. To the extent appropriate, Contractors should include the protective health and safety measures they intend to implement in any accident prevention or safety submittals required under this contract. These plans should contain preventive measures the Contractor intends to follow while performing work on government property as well

as responsive and corrective actions to be taken if an employee exhibits symptoms or tests positive for contagion.

c. Upon contract award, Contractors should communicate with Contracting Officer regarding Contractor decisions and actions to protect the health and safety of workers for the duration of contract performance under which pandemic conditions exist.

7. The Plan shall also include an emergency response plan.
8. A hierarchy of hazard control shall be identified in the Plan and implemented during construction.
9. A safety plan and traffic management plan shall be submitted by the contractor for approval by the CO and ZION Safety Officer prior to construction activities. The plans shall be made available to the ZION Environmental Protection Specialist upon approval.

2.2 FIRST AID FACILITIES

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

2.3 PERSONNEL PROTECTIVE EQUIPMENT (PPE)

A. Selection shall conform to OSHA Subpart E.

PART 3 - EXECUTION

3.1 DAILY SAFETY INSPECTIONS

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

3.2 EMERGENCY INSTRUCTIONS

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

3.3 FIRE AND LIFE SAFETY

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

3.4 HAZARDOUS MATERIALS

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

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

1. Immediately report spills of hazardous materials to the Park.
2. Maintain a spill emergency response kit.
3. Train employees how to respond to a spill and use emergency response kit.
4. Spill containment kits and fire extinguishers shall be available on site at all times.

C. In developed areas, the presence of underground utilities must be determined and flagged prior to excavation using heaving machinery, handheld tools, or equipment.

D. Before any remodel, renovation, demolition or abatement activity – read and comply with instructions for Lead and Asbestos removal. Previous testing and plans for disposal have been developed by Smith Engineering and are provided as appendices to these specifications. Provide work plan to the Contracting Officer and Park Safety Manager for approval prior to commencing any of this work. Any hazardous material shall be disposed of properly.

3.5 PROTECTIVE EQUIPMENT

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

3.6 SAFETY MEETINGS

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

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

C. Any safety violations shall be corrected immediately. If the violation is not corrected immediately, the project shall be postponed until such corrections are made.

3.7 HARD HATS AND PROTECTIVE EQUIPMENT AREAS

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

B. It is Contractor's responsibility to require persons working on or visiting site to wear hard hats and PPE in good repair at all times. As a minimum, maintain [**3**] hard hats and other APP required

equipment.

1. All people on the construction site (including but not limited to contractors, NPS staff, volunteers, interns, etc.) shall follow all NPS and Zion National Park safety and health policies and programs.

2. Personal protective equipment is the last line of defense. Hard hats, safety vests, eye protection, and other personal protective gear as needed shall be worn at all times with in the construction zone.

3.8 TRAINING

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

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

3.9 OTHER REQUIREMENTS

A. Copies of the Safety Data Sheets (SDS) shall be available on site at all times.

END OF SECTION 01 35 23

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SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

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

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

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

1.2 DEFINITIONS

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

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

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

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

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

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

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

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

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

1.3 CONFLICTING REQUIREMENTS

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

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

1.4 SUBMITTALS

A. Quality Control Plan:

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

B. Care of Water/Diversion Plan meeting minimum requirements in Section 00 31 52 Stream Diversion must be submitted.

C. Care of Water/Diversion Plan meeting minimum requirements in Section 00 31 52 Stream Diversion must be submitted to the Contracting Officer at least 15 calendar days prior to installation of in-stream diversion.

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

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

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

F. Test Reports

1. Test reports shall be completed by person performing test.

2. Submit Daily Test Information Sheets with Quality Control Daily Reports.
3. Submit failing test results and proposed remedial actions within four hours of noted deficiency.
4. Submit three copies of complete test results no later than one calendar day after test was performed.

G. Accessibility Inspection Report:

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

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

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

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

1.5 QUALITY ASSURANCE

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

B. Contractors Quality Control Staff:

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

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

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

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

capacity to produce required units.

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

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

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

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

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

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

J. The Contractor is responsible for testing and inspections.

1.6 QUALITY CONTROL

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

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

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

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

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

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

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

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

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

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

PART 2 - PRODUCTS

2.1 QUALITY CONTROL PLAN

A. Quality Control Plan shall include:

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

Contractor report forms and acknowledgment of NPS forms.

5. Methods of monitoring and controlling environmental pollution and contamination as required by regulations and laws.
6. Specific discussion regarding mockups, off-site visits, receiving inspections, manufacturers representation, startup requirements, and other aspects of performance specific to Project.
7. Provisions for substantial completion(s) and final inspection(s) per Contract.

PART 3 - EXECUTION

3.1 OFF-SITE CONTROL

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

3.2 ON-SITE CONTROL

A. Notification:

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

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

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

C. Initial Phase:

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

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

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

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

3.3 DOCUMENTATION

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

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

3.4 ENFORCEMENT

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

3.5 REPAIR AND PROTECTION

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

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

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

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

END OF SECTION 01 40 00

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SECTION 01 42 00 – REFERENCE STANDARDS

PART 1 - GENERAL

1.1 ENVIRONMENTAL DEFINITIONS

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

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

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

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

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

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

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

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

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

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

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

1.2 QUALITY ASSURANCE

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

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

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

1.3 INDUSTRY STANDARDS

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

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

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

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

1.4 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities found in Section 01 42 00 Sources for Reference Publications, Unified Facilities Guide Specifications (UFGS) (accessible via Masters website > Downloads section > click on UFGS Master (WBDG Website).

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

XX	EXAMPLE Association (The) www.EXAMPLE.org	

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

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

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

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

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

USPS	Postal Service www.usps.com

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

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

1.5 ENVIRONMENTAL REFERENCE STANDARDS

A. American Forest and Paper Association:

1. Sustainable Forestry Initiative

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

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

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

- C289 Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method)
- C311 Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete
- C33 Standard Specification for Concrete Aggregates
- C593 Standard Specification for Fly Ash and Other Pozzolans for Use With Lime
- C595 Standard Specification for Blended Hydraulic Cements
- C618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete
- C67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
- C739 Standard Specification for Cellulosic Fiber (Wood-Base) Loose-Fill Thermal Insulation
- C936 Standard Specification for Interlocking Concrete Paver Units
- C989 Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
- D1435 Standard Practice for Outdoor Weathering of Plastics
- D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 foot pound force per cubic foot (ft-lbf/ft3) (2,700 kilonewton meter per cubic meter (kN-m/m3))
- D1972 Standard Practice for Generic Marking of Plastic Products
- D198 Standard Test Methods of Static Tests of Lumber in Structural Sizes
- D2103 Standard Specification for Polyethylene Film and Sheeting
- D217 Standard Test Methods for Cone Penetration of Lubricating Grease
- D2369 Standard Test Method for Volatile Content of Coatings
- D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- D3786 Standard Test Method for Hydraulic Bursting Strength of Textile Fabrics-Diaphragm Bursting Strength Tester Method
- D3792 Standard Test Method for Water Content of Coatings by Direct Injection Into a Gas Chromatograph
- D3864 Standard Guide for Continual On-Line Monitoring Systems for Water Analysis
- D3960 Standard Practice for Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings
- D4017 Standard Test Method for Water in Paints and Paint Materials by Karl Fischer Method
- D4263 Standard Test Method for Indicating Moisture in Concrete by the Plastic Sheet Method
- D4444 Standard Test Methods for Use and Calibration of Hand-Held Moisture Meters
- D4491 Standard Test Methods for Water Permeability of Geotextiles by Permittivity
- D4552 Standard Practice for Classifying Hot-Mix Recycling Agents
- D4632 Standard Test Method for Grab Breaking Load and Elongation of Geotextiles
- D4716 Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
- D4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Product
- D4840 Standard Guide for Sampling Chain-of-Custody Procedures
- D4887 Standard Test Method for Preparation of Viscosity Blends for Hot Recycled Bituminous Materials
- D5106 Standard Specification for Steel Slag Aggregates for Bituminous Paving Mixtures
- D5116 Standard Guide for Small-Scale Environmental Chamber Determinations of

Organic Emissions from Indoor Materials/Products

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

- D6330 Standard Practice for Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels Using Small Environmental Chambers Under Defined Test Conditions
- D6345 Standard Guide for Selection of Methods for Active, Integrative Sampling of Volatile Organic Compounds in Air
- D6400 Standard Specification for Compostable Plastics
- D6435 Standard Test Method for Shear Properties of Plastic Lumber and Plastic Lumber Shapes
- D6629 Standard Guide for Selection of Methods for Estimating Soil Loss by Erosion
- D6662 Standard Specification for Polyolefin-Based Plastic Lumber Decking Boards
- D6712 Standard Specification for Ultra-High-Molecular-Weight Polyethylene (UHMW-PE) Solid Plastic Shapes
- D6886 Standard Test Method for Speciation of the Volatile Organic Compounds (VOCs) in Low VOC Content Waterborne Air-Dry Coatings by Gas Chromatography
- D692 Standard Specification for Coarse Aggregate for Bituminous Paving Mixtures
- D696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer
- D698 Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3))
- D7186 Standard Practice for Quality Assurance Observation of Roof Construction and Repair
- E1021 Standard Test Methods for Measuring Spectral Response of Photovoltaic Cells
- E1038 Standard Test Method for Determining Resistance of Photovoltaic Modules to Hail by Impact with Propelled Ice Balls
- E1039 Standard Test Method for Calibration of Silicon Non-Concentrator Photovoltaic Primary Reference Cells Under Global Irradiation
- E1040 Standard Specification for Physical Characteristics of Nonconcentrator Terrestrial Photovoltaic Reference Cells
- E1105 Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform or Cyclic Static Air Pressure Difference
- E1171 Standard Test Method for Photovoltaic Modules in Cyclic Temperature and Humidity Environments
- E1333 Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Under Defined Test Conditions Using a Large Chamber
- E1362 Standard Test Method for Calibration of Non-Concentrator Photovoltaic Secondary Reference Cells
- E1433 Standard Guide for Selection of Standards on Environmental Acoustics
- E1462 Standard Test Methods for Insulation Integrity and Ground Path Continuity of Photovoltaic Modules
- E1596 Standard Test Methods for Solar Radiation Weathering of Photovoltaic Modules
- E1597 Standard Test Method for Saltwater Pressure Immersion and Temperature Testing of Photovoltaic Modules for Marine Environments
- E1609 Standard Guide for Development and Implementation of a Pollution Prevention Program
- E1686 Standard Guide for Selection of Environmental Noise Measurements and Criteria
- E1690 Standard Test Method for Determination of Ethanol Extractives in Biomass
- E1721 Standard Test Method for Determination of Acid-Insoluble Residue in Biomass
- E1755 Standard Test Method for Ash in Biomass

- E1758 Standard Test Method for Determination of Carbohydrates in Biomass by High Performance Liquid Chromatography
- E1780 Standard Guide for Measuring Outdoor Sound Received from a Nearby Fixed Source
- E1799 Standard Practice for Visual Inspections of Photovoltaic Modules
- E1802 Standard Test Methods for Wet Insulation Integrity Testing of Photovoltaic Modules
- E1821 Standard Test Method for Determination of Carbohydrates in Biomass by Gas Chromatography
- E1827 Standard Test Methods for Determining Airtightness of Buildings Using an Orifice Blower Door
- E1830 Standard Test Methods for Determining Mechanical Integrity of Photovoltaic Modules
- E1861 Standard Guide for Use of Coal Combustion By-Products in Structural Fills
- E1918 Standard Test Method for Measuring Solar Reflectance of Horizontal and Low-Sloped Surfaces in the Field
- E1971 Standard Guide for Stewardship for the Cleaning of Commercial and Institutional Buildings
- E1980 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
- E1991 Standard Guide for Environmental Life Cycle Assessment of Building Materials/Products
- E2047 Standard Test Method for Wet Insulation Integrity Testing of Photovoltaic Arrays
- E2114 Standard Terminology for Sustainability Relative to the Performance of Buildings
- E2128 Standard Guide for Evaluating Water Leakage of Building Walls
- E2129 Standard Practice for Data Collection for Sustainability Assessment of Building Products
- E2397 Standard Practice for Determination of Dead Loads and Live Loads associated with Green Roof Systems
- E2398 Standard Test Method for Water Capture and Media Retention of Geocomposite Drain Layers for Green Roof Systems
- E2399 Standard Test Method for Maximum Media Density for Dead Load Analysis of Green Roof Systems
- E2400 Standard Guide for Selection, Installation, and Maintenance of Plants for Green Roof Systems
- E241 Standard Guide for Limiting Water-Induced Damage to Buildings
- E2432 Standard Guide for General Principles of Sustainability Relative to Buildings
- E408 Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques
- E413 Standard Classification for Rating Sound Insulation
- E477 Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers
- E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- E683 Standard Practice for Installation and Service of Solar Space Heating Systems for One- and Two-Family Dwellings
- E779 Standard Test Method for Determining Air Leakage Rate by Fan Pressurization
- E781 Standard Practice for Evaluating Absorptive Solar Receiver Materials When Exposed to Conditions Simulating Stagnation in Solar Collectors With Cover Plates
- E782 Standard Practice for Exposure of Cover Materials for Solar Collectors to Natural

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

E. Bat Conservation International:
- Bat Approved Bat Houses

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

G. Center for Resource Solutions
- Green-e program

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

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

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

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

L. Green Seal:
- **GC-03 Anti-Corrosive Paints**
- **GC-12 Occupancy Sensors**

- **GC-13 Split-Ductless Air-Source Heat Pumps**
- **GS-05 Compact Fluorescent Lamps**
- **GS-11 Paints**
- **GS-13 Windows**
- **GS-14 Window Films**
- **GS-31 Electric Chillers**
- **GS-32 Photovoltaic Modules**
- **GS-36 Commercial Adhesives**
- **GS-37 Industrial & Institutional Cleaners**

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

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

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

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

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

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

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

T. US Composting Council:
- Seal of Testing Assurance Program

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

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

- **LEED™ v4 (version 4) Green Building Rating System**

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

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SECTION 01 50 00 - TEMPORARY FACILITIES, CONTROLS AND CONSTRUCTION SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 USE CHARGES

A. General: Cost or use charges for temporary facilities, facility controls and construction signage shall be included in Contract Sum as required.

B. Water Service: Water from existing system is not available for use. The Contractor shall plan to supply their own water for construction.

C. Electric Power Service: Electric power from existing system is not available for use. The Contractor shall plan to supply their own power for construction.

1.3 QUALITY ASSURANCE

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

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

1. Regulatory Requirements
2. Noise and Acoustics Management
3. Environmental Management
4. Construction Waste Management

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

D. Construction Signage: comply with OSHA construction safety and directional signage requirements.

1.4 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

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

B. 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 or galvanized steel bases for supporting posts.

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

D. Construction Signage: provide necessary construction safety and directional signage.

2.2 TEMPORARY FACILITIES

A. 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.

B. Portable Toilet: No restroom facilities are located at the job site area. At least one portable toilet must be supplied and maintained by the contractor at the job site area. Portable toilets may only be placed in the staging area as designated on the Design Drawings.

C. The contractor shall not be permitted to stay in the Park for housing during project construction.

2.3 EQUIPMENT

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

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.

3.2 TEMPORARY UTILITY INSTALLATION

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

1. Place in approved locations within staging areas only. Relocate as work progress requires.
2. Maintain and clean toilet facilities at least weekly.
3. Completely remove sanitary facilities on completion of work.

B. Electric Power Service: No electrical power service is available at this site. If electrical power is needed, contractor must provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead or underground, as approved by C.O.

C. Lighting: If temporary lighting is needed, contractor must 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.

2. Construction lighting management plan shall include lighting zone boundaries and be approved by the CO.

D. Telephone Service: **Reliable cell service is not available at the site**.

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.
3. To minimize the amount of ground disturbance, staging and stockpiling areas shall be located in previously disturbed sites, away from visitor use areas to the greatest extent possible. All staging and stockpiling areas shall be returned to pre-construction conditions following construction.
   a. Soil and fill material must be weed-free and from a source approved by the National Park Service. Visible fill, rock, or other earth materials shall be of a compatible color to the surrounding landscape.

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

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

2. Recondition base after temporary use, including removing contaminated material, regrading, and scarification for seed preparation.

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

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Adequately barricade and post open cuts in or adjacent to thoroughfares.
3. Protect pedestrian traffic by or fences.
4. Erect minimum 6 foot tall temporary chain-link fencing as outlined in the Design Drawings.
5. Fence closures must be secured in the closed position when opening is not actively being used.
6. Cover pipes, hoses, and power lines crossing sidewalks and walkways with troughs using beveled edge boards.
7. Install Barrier Tape where directed by Contracting Officer. Keep a minimum of two rolls on site.
8. Traffic management shall be planned prior to project implementation/construction to address the location of warning signs, types of signs, placement of flaggers, placement of cones/fencing, barricades, duration of anticipated delays, use of pilot cars, etc. This plan shall address vehicular and pedestrian traffic within the construction zone.
9. All motor vehicles and equipment shall have mufflers conforming to the original manufacturer's specifications that are in good working order and are in constant operation to prevent excessive or unusual noise.
10. The Traffic Management Plan shall restrict visitors access into the construction site and re-route visitor routes to ensure visitor and employee safety.
11. Noise generated from operating equipment and/or vehicles may temporarily disrupt the natural soundscape throughout the duration of construction at the project site. The contractor shall specify in the Traffic Management Plan the types of equipment and anticipated time of year for their operation for review/approval by the CO.

D. Parking: Use designated areas on site approved by CO for construction personnel.

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

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

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

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

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.

1. Compliance with food storage and waste disposal shall be achieved at all times. The project site shall be cleaned up at the end of each work period DAILY to reduce the attraction to wildlife.

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

1. Dust containment, in accordance with NPS, State, and local regulations, shall be achieved. This shall include but is not limited to physical barrier containment and/or water sprinkling dust controls.
   a. Operation of heavy equipment and ground disturbance have the potential to increases fugitive dust and vehicle emissions in and around the proposed project area throughout the proposal implementation period and until native vegetation can be re-established, specifically during site preparation, construction, and vegetation restoration. The contractor shall provide a Fugitive Dust Control Plan if required – refer to Fugitive Dust Control Requirements UT DEQ (Fugitive Dust Control Requirements for Non-Attainment Areas: Stationary Source Compliance - Utah Department of Environmental Quality).
2. If the ~~project area is located within the 100-year or 500-year floodplain and/or~~ in an area susceptible to geologic hazards, follow these protocols. (Precipitation may increase the risk of geologic hazards.) In the event of flooding or other geologic hazards, NPS staff and/or contractors shall be prepared to move personnel and equipment out of the hazard area immediately.
3. Avoid use of heavy equipment where soils are wet or extensive compaction could occur.
   a. Construction activities shall be restricted during saturated soil conditions or severe weather conditions to avoid damage to soils and vegetation.
   b. Limit vehicle and equipment operations to paved areas whenever possible. Ensure all vehicles use the same entry, egress, and turn around areas. Delineate travel corridors prior to construction.
   c. Restrict the number of vehicles and frequency of equipment accessing the project area to the minimum amount required to successfully complete operations.
   d. Scarify surface soils that have been compacted to slow runoff and promote revegetation. Recontouring and soil decompaction of disturbed areas shall take place immediately following construction such that the project area is readied for revegetation efforts.
4. All equipment working within a waterway such as a river or tributary shall be inspected and cleared of aquatic invasive species prior to entry on the work site. Supplemental guidance may be located in the Utah Aquatic Invasive Species Management Plan and the Guide to Preventing Aquatic Invasive Species Transport by Wildland Fire Operations.
5. Vegetation Environmental Protection
   a. Ground disturbance and vegetation removal have the potential to introduce or promote the occurrence of non-native or invasive species and alter the vegetation community within the proposed project area.
   b. All vehicles, equipment, and tools shall be cleaned completely prior to entering the work zone to prevent the spreading of non-native plant seeds.
   c. Daily inspections shall occur to identify and prevent any fluids from leaking.
   d. Wherever possible, vehicles and equipment shall not be driven within the drip lines of trees and shrubs to minimize soil compaction in the main root zones. Also, wherever possible, construction activities, including irrigation and utility line installation, shall be minimized to avoid damaging tree roots.

6. Wildlife Environmental Protection
   a. The contractor and Contracting Officer shall contact the ZION Wildlife Program Manager a minimum of two weeks in advance to schedule monitoring activities.
   b. Care shall be taken to not disturb any wildlife species (reptiles, migratory birds, raptors, or bats) found nesting, hibernating, estivating, or otherwise living in, or immediately nearby, worksites.
   c. Zion National Park Resource Management personnel shall be notified/consulted when any wildlife must be disturbed or handled. They will be available to assist with moving/relocating snakes or any other wildlife, when necessary; and/or to make recommendations for relocating any disturbed animals.
   d. If a condor occurs at the project site, construction shall cease until it leaves on its own or until techniques are employed by permitted personnel which results in the individual condor leaving the area.
   e. The project area occurs within potential habitat for various sensitive and state-listed species outlined below.
      1) Monarch butterfly
      2) Red-spotted toad
      3) Townsend's big-eared bat
      4) Big free-tailed bat
      5) Fringed myotis bat
      6) Smith's black-headed snake
      7) Western banded gecko

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

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

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

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

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

   1. Extent of Fence: As indicated on Drawings or as directed by C.O.
   2. Locate vehicular gates to avoid interference with traffic on public thoroughfares.
   3. Locate pedestrian entrance gates as required to provide controlled personnel entry.
   4. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Contracting Officer with one set of keys.

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

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

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

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

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

1. Responsible Person: Capable and qualified person shall be placed in charge of fire protection. Responsibilities shall include locating and maintaining fire protective equipment and establishing and maintaining safe torch cutting and welding procedures.
2. Tobacco Use, Smoking, and Vaping: Smoking within buildings or temporary storage sheds is prohibited.
3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of NPS and Agency(ies) with Jurisdiction. Check with Park; many require "burn permits" for welding.
4. Develop and supervise overall fire-prevention and -protection program for personnel at Project Site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
5. Provide temporary standpipes and hoses for fire protection. Hang hoses with warning sign stating hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
6. Hazard Control: Take necessary precautions to prevent fire during construction. Do not store flammable or combustible liquids in existing buildings. Provide adequate ventilation during use of volatile or noxious substances.
7. Spark Arresters: Equip gasoline or diesel powered equipment used during periods of potential fire hazards or in potential forest and grass fire locations with spark arresters approved by United States Department of Agriculture (USDA) Forest Service.

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

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

3.5 OPERATION, TERMINATION, AND REMOVAL

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

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

1. Maintain operation of temporary enclosures, heating, cooling, humidity control,

ventilation, and similar facilities on 24-hour basis where required to achieve indicated results and avoid possibility of damage.

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

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

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

E. The use of pesticides is not allowed unless approval has been given by the Zion Wildlife Biologist.

END OF SECTION 01 50 00

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SECTION 01 55 26 - TRAFFIC CONTROL

PART 1 – GENERAL

1.1 SUMMARY

A. The work shall consist of establishing traffic control and maintaining safe, convenient use of public roads and rights-of-way.

B The Contractor's operations shall cause no unnecessary inconvenience to the public. The public rights-of-way shall be maintained at all times unless interruption is authorized by proper local authority. Safe and adequate access shall be provided and maintained to all public protection devices and to all critical utility control locations. Facility access shall be continuous and unobstructed unless otherwise approved.

PART 2 – MATERIALS

2.1 TRAFFIC CONTROL PLAN REQUIREMENTS

A. Traffic Control plans may be created using the following sources:

- Current Utah Department of Transportation (UDOT) Traffic Control Plans.
- Current UDOT Traffic Control Specifications
- Current Manual on Uniform Traffic Control Devices (MUTCD), Part VI.
- OSHA Construction Industry Standards (29 CFR Part 1926), Subpart G, *Signs, Signals, and Barricades*.

B. Include the following documents as part of the traffic control plans:

- Drawing showing phasing (if required for clarity)
- Listing of all standard UDOT and MUTCD traffic control drawings which will be used
- Drawings showing any traffic control which does not fit a standard drawing,

PART 3 – CONSTRUCTION REQUIREMENTS

3.1 TRAVEL LANES

A. The maximum traffic delay shall not exceed 10 minutes.

3.2 STORAGE OF EQUIPMENT AND MATERIAL

Construction materials and equipment shall not be stored or parked on public streets, roads, or highways. During any material or equipment loading or unloading activities that may temporarily interfere with traffic, an acceptable detour shall be provided for the duration of the activity. Any associated expense for this activity is the responsibility of the Contractor.

3.3 STREET CLOSURES, DETOURS, AND BARRICADES

A. The Contractor shall comply with the requirements of all applicable responsible units of

government for closure of any street, road, or highway. The Contractor shall provide the required barriers, guards, lights, signs, temporary bridges, and flaggers together with informing the public of any detours and construction hazards by the most suitable means available, such as local newspapers or radio stations. The Contractor is also responsible for compliance with additional public safety requirements that may arise during construction. The Contractor shall furnish, install, and, upon completion of the work, promptly remove all signs, warning devices, and other materials used in the performance of this work.

B. Unless otherwise specified, the Contractor shall notify, in writing, the fire chief, police chief, county sheriff, state patrol, schools that operate school buses, or any other government official as may be appropriate no less than 7 days before closing, partly closing, or reopening any street, road, or highway.

C. Unless otherwise specified, the Contractor shall furnish to the Contracting Officer a written plan showing the proposed method of signing, barricading for traffic control, and safety for street detours and closures.

D. All temporary detours will be maintained to ensure use of public rights-of-way is provided in a safe manner. This may include dust control, grading, and graveling as required.

END OF SECTION 01 55 26

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SECTION 01 56 39 – TREE RETENTION AND PROTECTION

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. The work of this section consists of retention and protection of trees and understory vegetation during the construction of the project.

1.3 GENERAL REQUIREMENTS

A. There should be daily supervision of field crews by the Contracting Officer or Appointee during the critical phases of the project. For example, establishment of access road, root pruning, trimming and removal of fallen trees within limits of construction.

B. If it appears that the completion of the construction may cause damage to the branches, trunk, or roots of any tree, the Contractor shall contact the Contracting Officer's Office. The Contracting Officer will make a determination as to whether such damage is imminent.

1.4 DEFINITIONS

A. Tree Protection Area: The tree protection area should consist of the ground encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and drip line, or one linear foot away from the trunk base for every inch diameter of the trunk, whichever is greater (see definition of drip line, below). Areas of ground covered by pavement, buildings, or other permanent structures where the presence of roots is minimal or negligible are excluded. The area under or within the tree's drip line is also referred to as the "Critical Root Zone" (see definition of critical root zone, below).

1. With groups of trees or where an array effect is present, there may be discontinuous (non-overlapping) perimeters of tree protection areas, which result in difficult to maintain or ineffective tree protection fencing. In these cases, even though tree protection areas do not overlap, they should be treated as though they do if the distance between the perimeters of such areas is less than 30-feet. In effect, this will artificially enlarge the area of tree protection, but will result in a more clearly defined, manageable area.

B. Drip Line: The outermost edge of the tree's canopy or branch spread. The area within a tree's drip line is all the ground under the total branch spread.

C. Critical Root Zone: Shall be defined as the tree protection area encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and drip line, or one linear foot away from the trunk base for every inch diameter of the trunk, whichever is greater.

D. Diameter (Caliper): The size (in inches) of a tree's trunk is measured at:

Trunk Size	Where Measured
< 4"	6" above grade
4" – 8"	12" above grade
> 8"	54" above grade

Note: All measurements should be rounded up to the nearest inch.

E. High Value Tree: Any specimen tree with an appraised value of one-hundred dollars ($100.00) or more.

F. Project Consulting Arborist: An independent consultant with a degree in a horticulture, arboriculture, and/or ISA Certified Arborist, and at least five years field experience in tree preservation or on-site monitoring of public works or construction projects involving tree retention and protection. The Consultant should be an active member in the American Society of Consulting Arborists and/or International Society of Arboriculture.

1.5 REFERENCE STANDARDS AND GUIDELINES

A. Contractor shall comply with applicable requirements and recommendations of the most current versions of the following standards and guidelines. Where these conflict with other specified requirements, the more restrictive requirements shall govern.
   1. ANSI Z133.1-2006: American National Standard for Tree Care Operations.
   2. ANSI A300: Tree, Shrub, and Other Woody Plant Management – Standard Practices.
   3. Guide for Plant Appraisal – Current Edition: Authored by the Council of Tree and Landscape Appraisers; published by the International Society of Arboriculture.

1.6 PROJECT CONDITIONS

A. Final work schedule will be coordinated with and approved by Contracting Officer.

B. Do not perform work when climate and existing site conditions will not provide satisfactory results (e.g. wet, freezing). The Contracting Officer reserves the right to deny tree retention and protection procedures on days that are deemed to be unfavorable for installation. Proceed with tree retention and protection only when existing and forecasted weather conditions permit tree retention and protection to be performed when beneficial and optimum results may be obtained.

C. See Division 01 Section 01 31 00 Project Management and Coordination for details on timing of tree-felling and vegetation clearing and grubbing. Tree felling shall occur only in October and November to avoid disturbance during migratory bird nesting season, as well as potential impact to protected bats. Vegetation clearing and grubbing should occur November through February to avoid the migratory bird nesting season and monarch butterfly active season. If this is not possible, visual inspection of vegetation marked for removal is required each day prior to tree removal. The government shall provide biological monitoring and reporting by a qualified environmental professional as needed. The contractor shall coordinate with the Park's biological monitor no less than two weeks prior to when monitoring is needed.

D. See Division 01 Section 01 11 00 "Summary of Work" for contractor use of site, including but not limited to, access restrictions and vehicle and equipment restrictions by specific areas.

E. Contractor shall have full use of the approved designated fenced or flagged in project area for specific construction operations during the construction period, as per Division 01 vehicle and equipment restrictions. Contractor's use of the site is limited to minimizing site disturbance to the extent possible and by the Government's right to perform work or to retain other contractors on portions of Project. There will be no visitor access within the designated fenced in approved project areas.

F. Although attempts have been made to locate and evaluate archaeological sites and/or components prior to construction activities, there is a potential that previously unidentified archeological sites and/or components will be identified during construction activities. In the event that construction activities inadvertently discover a previously unidentified archeological sites and/or component the contractor will work cease in the immediate area and notify the

Contracting Officer. Any willful destruction of the archeological site and/or component can result in the prosecution of individuals under the Archeological Resource Protection Act of 1979 (16 U.S.C. 470), and other statutes that protect the Park's cultural resources. Reference Section 01 35 13.22 "Archeological Protection" for protection and discovery of resources procedures.

1. Any uncovered archeological resources must be protected. If archaeological resources are encountered during work, contractor shall stop work at that location immediately and notify the Contracting Officer. Any artifacts recovered are property of the Park.

G. Contractor's operations shall be conducted reasonably to prevent rutting or other soil damage. Skidding of logs will not be permitted. No work shall be allowed for at least a 24-hour period following a rain accumulation of one (1) inch or more during the proceeding 24-hour period. After any work stoppage, it will be the responsibility of the Contracting Officer to determine when work may re-commence.

H. All vehicles should be equipped with absorptive pads while on park property in order to quickly contain any spills of oil or hydraulic fluid. Any such spills must be reported to the Contracting Officer as soon as is safely possible.

I. Damage to natural areas, existing grades, vegetation, pavements, underground utilities, and other improvements and areas of protection, caused during work under this section, shall be repaired to original condition or better at no additional cost to the National Park Service.

J. Vehicular accessibility on site shall be as directed by Contracting Officer. Repair damage to existing surfaces, caused by vehicular access and movement during work under this section, to original condition at no additional cost to the National Park Service.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION REQUIREMENTS

A. This section provides standards and guidelines for the retention and protection of high-value trees and shrubs for any proposed construction project.

3.2 DEMOLITION OF EXISTING TREES

A. An estimated six trees will be required to be removed in order to build the temporary access road. These trees will be marked by the NPS. Any additional tree removals will require approval from the Contracting Officer. Contractor shall place all downed trees adjacent to the road to be used a wildlife habitat.

B.. Keep all materials and equipment within the street bounded by existing curbs, where feasible.

C. Protect exposed roots from contamination by stabilization materials.

D. After proper pruning, as needed, cover exposed roots within 30 minutes to minimize desiccation. Roots may be covered with soil, mulch, or moistened burlap (7 ounce or equivalent), and shall be kept moist during the period until the final grade is established.

E. Grading within the critical root zone shall consist of the ground encompassing from 1.5 (minimum) to 2.0 times the distance between the trunk and drip line, or one linear foot away

from the trunk base for every inch diameter of the trunk, whichever is greater. Grading within the critical root zone is not anticipated. Any fill material that needs to be placed in the critical root zone shall be limited to a maximum of 1-inch of fill material over the critical root zone area. Fill should consist of sandy loam topsoil. Clay soils shall not be used as fill. When using fill soil, the existing surface to receive fill should be scarified by hand to a maximum depth of 1-inch from the finished grade prior to placing fill material, to ensure proper incorporation of fill material. Any filling operation should not occur during water saturated soil conditions.

F. Existing Trees: The Contracting Officer shall be notified prior to any excavation known or suspected to disturb more than 10% of the critical root zone.

3.3 ROOT PRUNING

A. Tree roots shall not be pruned or cut unless their removal is unavoidable or absolutely necessary. The Contracting Officer shall be notified prior to any operation known or suspected to involve cutting of more than:

1. The Contracting Officer or Project Consulting Arborist shall be notified immediately in the event that roots in excess of one-half the diameter of the tree, as measured per Paragraph 1.4.D, are cut, torn, ripped, or otherwise injured.

B. Upon approval by the Contracting Officer, prior to any excavation or other activity that will result in removal of soil and tree roots, all tree roots within a designated area will be pruned to a depth of 14-inches. Pruning shall occur with a Dosko Root Pruner, or equivalent, in accessible areas.

C. Removal of roots greater than one-half the diameter of the tree, as measured per Paragraph 1.4.D, or parts of roots that are injured or diseased should be performed as follows:

1. Preserve the root bark ridge (similar in structure and function to a branch bark ridge). Directional root pruning technique shall be used during excavation around tree roots. Roots are similar to branches in their response to pruning practices. With directional root pruning, objectionable and severely injured roots are properly cut to a lateral root 1/3 the size of the root being cut, if possible, that is growing downward or in a favorable direction.

2. All roots needing to be pruned or removed shall be cut cleanly with sharp tools, with oversight by the Contracting Officer or Project Consulting Arborist. No wound dressings shall be used.

3. Recommended root pruning tools:
   a. Scissor-type lopper.
   b. Scissor-type pruner.
   c. Large and small hand saws.
   d. Wound scriber.

D. All roots one-half the diameter of the tree caliper as measured per Paragraph 1.4.D shall be examined by the Contracting Officer or Project Consulting Arborist in terms of their role in anchoring the tree.

1. All roots that contribute significantly to anchorage should be preserved. Remove all other roots in this size range to sound, downward growing lateral roots that are at least 1/3 the size of the root being removed.

2. All roots larger than one-half the diameter of the tree caliper as measured per Paragraph 1.4.D diameter are to be preserved unless their removal is absolutely necessary and approved by the Contracting Officer.

3.5 PROJECT SITE MONITORING

E. As determined by the Contracting Officer for projects of sufficient size to warrant such, a Project Consulting Arborist shall be retained to enforce and monitor the Tree Retention and Protection objectives.
   1. The project site should be monitored a minimum of two times weekly (more frequently at the start of the project) until all procedures and specifications are understood and properly executed by all parties.
   2. Specific monitoring schedules should be developed at preconstruction meetings and modified as deemed necessary by the appropriate parties.
   3. Schedules shall be relayed to the Contracting Officer along with reports of site visits.

3.6 INJURIES TO EXISTING PLANTS - DAMAGE PENALTIES

A. Tree and High-Value Shrub Appraisal: All trees and high-value shrubs will be evaluated and appraised by the Contracting Officer or Parks Appointee, and a list of all tree values for the project will be on file in the Construction Manager's office.
   1. Any tree or other plant requiring retention or protection that is not on the list shall be appraised by the Contracting Officer or Project Consulting Arborist as necessary to comply with this damage penalty.

F. Documentation for appraisals will consist of:
   1. Measurement of plant size.
   2. Identification by common and botanical names.
   3. Current condition (overall health, injuries, overt hazard status, etc.).
   4. Location factors as described in the most current addition of "Guide for Plant Appraisal". Photographs may be taken of certain trees and shrubs to document debilitating condition factors.

G. The threshold level for plants to be appraised shall be one-hundred dollars ($100.00); only those trees and shrubs estimated to have a monetary value greater than one-hundred dollars ($100.00) shall be appraised.

H. Trees and other plants designated as requiring retention or protection shall be identified and located on construction plans. Loss of, or partial injury to, any of these plants due to Contractor neglect or improper construction activities will result in a penalty of up to three times the damages of the assessed value of the tree as determined by the Contracting Officer or Appointee.

I. Trees determined as requiring "general protection" or "special protection" in the construction areas and in other key locations should be clearly identified by the Contracting Officer or Appointee. Loss or partial injury to any of these trees due to Contractor neglect or improper construction activities will result in a penalty of up to triple damages for the assessed value of the trees as determined by the Contracting Officer or Project Consulting Arborist. Injury to a portion of these trees will be assessed by the Contracting Officer or Project Consulting Arborist and a corresponding portion of the liquidated damages will be assessed to the Contractor.

J. A fine as determined by Contracting Officer and/or NPS will be levied against the Contractor for each incident of construction damage (including construction traffic) within designated tree protection areas. Any fine shall be independent of any applicable damages for the assessed value of the tree or tree part.

K. Trees or roots visibly and unnecessarily injured, in the opinion of the Contracting Officer and/or Project Consulting Arborist will cause the Owner to withhold from the Contractor an assessed amount conforming to the requirements stipulated above, for a period of one full

year. After that period the impact of the injury to any tree will be assessed by the Contracting Officer or the Appointee.

3.9 TREE AND OTHER PLANT MAINTENANCE DURING AND AFTER COMPLETION OF CONSTRUCTION

L. Tree Maintenance: Proper maintenance shall include, but be limited to: structural and remedial pruning, watering and remediating soil compaction during construction and through the projects final acceptance period per Section 01 7700 Closeout Procedures.

M. The timing, duration, and frequency of necessary maintenance practices should be determined and approved by the Contracting Officer or Appointee, based on factors associated with the site and affected plants.

N. Submit maintenance schedule to Contracting Officer for approval prior to work beginning.

END OF SECTION 01 56 39

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SECTION 01 57 23 - TEMPORARY STORM WATER POLLUTION PREVENTION

PART 1 - GENERAL

1.1 SUMMARY

A. Federal Regulations for controlling discharges of pollutants (including chemicals, erodible material, and trash) from municipal separate storm sewer systems, construction sites, and industrial activities, were brought under the National Pollution Discharge Elimination System (NPDES) permit process by amendments to the Clean Water Act (CWA), and promulgation of federal stormwater regulations issued by the United States Environmental Protection Agency (USEPA). The USEPA uses amount of ground disturbance as a measure of a project potential to generate pollution from erosion. NPDES Phase I regulates discharges from construction sites that disturb 5 acres or more. NPDES Phase II regulations expand existing General Permit requirements under Phase I to include/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 Agency(ies) with Jurisdiction for review and approval.

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

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

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

1.2 DEFINITIONS

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

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

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

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

E. Storm Water Pollution Prevention Plan (SWPPP): Developed and implemented stormwater

management measures to protect surface water from pollutants during construction activities disturbing an acre or more in compliance with federal, state, and local requirements for permit approval under NPDES program.

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

1.3 SUBMITTALS

A. After contract award and before pre-construction conference, prepare and submit:
   1. A SWPPP showing SWPPP satisfies Federal and State NPDES permit requirements.

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

C. Inspection Schedule: Submit schedule for inspection and monitoring of storm water pollution prevention measures.

D. Erosion Control Products: Submit manufacturer's product information and installation recommendations for silt fence, filter fabric, erosion control blanket, and other materials proposed for use on this project. Refer to the requirements for wildlife safe erosion control products in Section 3.1: B 6 & 7 of this specification. Additionally, to avoid introduction of non-native, invasive plant species into the park, certified seed-free materials only shall be used during construction.

1.4 QUALITY ASSURANCE

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

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

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

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

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

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

   1. Pollution Prevention Manager shall be familiar with UPPP procedures and Best

Management Practices (BMPs) and shall ensure emergency procedures and plan are updated as needed and available for inspection.

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

E. Pollution Prevention and Erosion Control Manager: Contractor shall designate Pollution Prevention and Erosion Control Manager responsible for implementation, inspection, maintenance, and amendments to approved plan.

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

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

PART 2 - PRODUCTS

2.1 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

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

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

PART 3 - EXECUTION

3.1 ENVIRONMENTAL PROTECTION

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

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

1. Clearing, excavation, and grading shall be limited to those areas of project site necessary for construction. Minimize area exposed and unprotected.
2. Clearly mark and delineate limits of work activities.
3. Equipment shall not be allowed to operate outside limits of work or to disturb existing vegetation.
4. Excavation and grading shall be completed during dry season to maximum extent possible.
5. Material shall be stored away from locations where water is present to greatest extent practicable
6. Wildlife-friendly erosion control products and methods shall be used. These may include, but are not limited to, silt fencing, filter fabric, excelsior or fumigated straw filter logs, temporary sediment ponds, check dams of pea gravel-filled burlap bags, or other material, and/or immediate mulching of exposed areas. In order to prevent import of non-native plants, straw bales or non-fumigated products shall not be permitted. Silt protection structures shall be inspected and cleaned out regularly. Zion National Park prefers wattle erosion control features. Contractor to supply a wattle sample and submittal information to the Contracting Officer prior to purchasing and installation. All wattle erosion control shall be wildlife friendly and contain no strings/cords/netting that can cause entanglement.
7. The erosion control materials shall be made out of 100% biodegradable and natural materials (e.g., poly jute) with large diameter netting to prevent the entrapment of wildlife. Erosion control products shall not contain photodegradable or synthetic materials (i.e. netting).

3.2 REGULATORY REQUIREMENTS

A. Permits: Contractor shall obtain required NPDES permits resulting in no impacts to scheduled work. Contractor shall account for possibility of significant lead time in scheduling and executing work.

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

B. Notice of Intent (NOI): Contractor shall file a Notice of Intent and formal SWPPP as required to the Agency(ies) with Jurisdiction.

C. Notice of Termination (NOT): After Substantial Completion of Work, file a Notice of Termination (NOT) with the Agency(ies) with Jurisdiction.

D. Contracting Officer Notification: Contractor shall notify Contracting Officer in writing and by telephone of these events:

1. Erosion and sediment control meeting/briefing.
2. Following installation of required sediment control structures.
3. Prior to removal of or modification to sediment control structures.
4. Prior to removal of sediment control structures.

3.3 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

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

1. Accepted Plan will describe and ensure implementation of practices to be used to reduce pollutants in storm water discharges.
2. Contractor shall maintain current copy of Plan and associated records and forms at jobsite throughout duration of project.
3. Plan shall be available for public inspection and inspection and use of Contracting Officer.
4. Approval of Contractor's Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.
5. Actions occurring within a floodplain, wetland, or greater than 1 acre in size shall include erosion control measures in the Erosion Control Plan. This erosion plan shall be reviewed by the park and approved by the appropriate federal, state, and local review authorities as required
6. The contractor shall provide a UPDES Stormwater Permit.

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

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

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

3.4 SITE INSPECTIONS AND PLAN REVISIONS

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

1. Inspection shall include disturbed areas not completely stabilized, areas used for storage of materials, locations where vehicles enter or exit site, and other erosion and sediment controls included in the Plan.
2. Inspections shall be documented.
3. Inspection forms shall be retained onsite in Plan notebook throughout construction period
4. All erosion and sediment control devices shall be adequately maintained to ensure continued performance of their intended function. Erosion control features that have sustained damage or have reached their capability shall be replaced or have maintenance performed by the contractor.

B. Plan Revisions: It may be necessary to revise Plan during construction to make necessary

improvements, revisions, or to respond to unforeseen conditions noted during construction or site inspections.

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

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

3.5 HOUSEKEEPING AND SITE MANAGEMENT

A. Store materials onsite in conformance to Federal, state, local, and manufacturer's regulations and specifications. Use Best Management Practices to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.

B. Manage solid waste in conformance to Federal, state, and local regulations. Best Management Practices should be used to minimize risk of materials coming into contact with environmental conditions (i.e. water and wind) that could disperse them.

C. Include a spill prevention and control plan with provisions placed in SWPPP.

D. Manage hazardous waste (including contaminated soil) in conformance to Federal, state, local and NPS regulations and guidelines.

3.6 EROSION CONTROL MEASURES

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

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

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

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

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

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

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

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

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

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

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

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

3.7 MAINTENANCE OF TEMPORARY FACILITIES

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

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

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

3.8 REPORTING

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

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

3.9 SEDIMENT DISPOSAL

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

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

3.10 REMOVAL OF TEMPORARY STORM WATER POLLUTION CONTROL MEASURES

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

END OF SECTION 01 57 23

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SECTION 01 67 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 DEFINITIONS

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

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

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

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

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

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

E. Environmentally preferable products: Products and services with lesser or reduced effect on the environment in comparison to conventional products and services. Refer to Environmental

Protection Agency's (EPA) Final Guidance on Environmentally Preferable Purchasing for more information.

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

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

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

1.3 SUBMITTALS

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

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

1.4 QUALITY ASSURANCE

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

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

B. Delivery and Handling:

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

C. Storage:

1. Allow for inspection and measurement of quantity or counting of units.

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

1.6 ENVIRONMENTALLY PREFERABLE PRODUCTS

A. Provide environmentally preferable products to greatest extent possible.

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

1.7 PRODUCT WARRANTIES

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

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

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

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

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

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

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

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

B. Product Selection Procedures:

1. Product: Where Specifications name single product and manufacturer, provide named product that complies with requirements or approved equal.
2. Manufacturer/Source: Where Specifications name single manufacturer or source, provide product by named manufacturer or source that complies with requirements or approved equal.
3. Products: Where Specifications include list of names of both products and manufacturers, provide one of the products listed that complies with requirements or approved equal.
4. Manufacturers: Where Specifications include list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements or approved equal.
5. Available Products: Where Specifications include list of names of both products and manufacturers, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
6. Available Manufacturers: Where Specifications include list of manufacturers, provide a product by one of the manufacturers listed, or an unnamed manufacturer, that complies with requirements. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product.
7. Product Options: Where Specifications indicate sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide specified product, system, or approved equal.
8. Basis-of-Design Product: Where Specifications name product and include a list of manufacturers, provide specified product or a comparable product by one of the other named manufacturers, or approved equal. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics based on the product named.
9. Visual Matching Specification: Where Specifications require matching an established Sample, select product that complies with requirements and matches Architect's sample.

Contracting Officers decision will be final on whether a proposed product matches.

a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.

10. Visual Selection Specification: Where Specifications include phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.

a. Standard Range: Where Specifications include phrase "standard range of colors, patterns, textures" or similar phrase, Contracting Officer will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
b. Full Range: Where Specifications include phrase "full range of colors, patterns, textures" or similar phrase, Contracting Officer will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions: Contracting Officer will consider Contractor's request for comparable product when the following conditions are satisfied. If following conditions are not satisfied, Contracting Officer will return requests without action, except to record noncompliance with these requirements:

1. Evidence proposed product does not require revisions to Contract Documents, that it is consistent with Contract Documents and will produce indicated results and is compatible with other portions of Work.
2. Detailed comparison of significant qualities of proposed product with those named in Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION

3.1 PROTECTION AFTER INSTALLATION

A. Provide adequate coverings as necessary to protect installed materials from damage resulting from natural elements, traffic, and subsequent construction. Remove when no longer needed.

END OF SECTION 01 67 00

AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

Project Name: _____ Project Number: _____

Contractor Name: _____ License Number: _____

Contractor Address: _____

Product	Total $ value provided	Total $ value with recycled content Pre-consumer	Total $ value with recycled content Post-consumer	Total $ value with biobased content	Exempted indicate 1,2,3,4	Comments

CERTIFICATION

I hereby certify the information provided herein is accurate and that the requisition/procurement of all materials listed on this form comply with current EPA standards for recycled/recovered materials content. The following exemptions may apply to the non-procurement of recycled/recovered content materials:

1. The product does not meet appropriate performance standards.
2. The product is not available within a reasonable time frame.
3. The product is not available competitively (from two or more sources).
4. The product is only available at an unreasonable price (compared with a comparable non-recycled content product.)

Signature: _____ Date: _____

END OF
AFFIRMATIVE PROCUREMENT REPORTING FORM
Recycled Content Materials & Biobased Content Materials

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SECTION 01 73 40 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general procedural requirements governing execution of Work including:

1. Coordination with utility service providers
2. Construction layout
3. Field engineering and surveying
4. General installation of products
5. Progress cleaning
6. Starting and adjusting
7. Protection of installed construction
8. Correction of the Work

1.2 SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor or professional engineer certifying that location and elevation of improvements comply with requirements.

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

C. Certified Surveys: Submit 2 copies signed by land surveyor.

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

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor or professional engineer 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.

B. All haul loads will be secured and/or covered within NPS Boundaries and in accordance with state regulations. Equipment and/or vehicles would not be allowed to idle longer than 3 minutes when not in use.

PART 2 - EXECUTION

2.1 EXAMINATION

A. Existing Conditions: Existence and location of site improvements and other construction indicated as existing are not guaranteed.

1. Before beginning work, investigate and verify the existence and location of obstacles.

2. Before construction, verify the location and points of connection of utility services.

B. Existing Utilities: Existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify existence and location of underground utilities and other construction affecting Work.

1. Before construction, verify location and invert elevation at points of connection of water pipes.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

C. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

2.2 COORDINATION WITH UTILITY SERVICE PROVIDERS

A. Coordination with Utility Service Providers: Contact following Utility Service providers, sufficiently in advance to avoid delaying the work, to coordinate Contractor's portion of Work, testing requirements, inspections, etc. All power utility company fees for performing this work shall be paid for by the Contractor.

1. Water Service Contact: Contact **Zion National Park CO** to coordinate Water service requirements.

   a. Construction Contractor Responsibilities: Contractor is responsible **for coordinating with Zion National Park CO on water line closures and new water meter connections prior to construction. See Civil sheets and Division 33 specifications.**

2.3 PREPARATION

A. Field Measurements: Take field measurements as required to fit Work properly. Recheck measurements before installing each product. Where portions of Work are indicated fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of need for clarification of the Contract Documents caused by differing field conditions outside control of

Contractor, submit request for information to Contracting Officer in accordance with Section 01 31 00 "Project Management and Coordination."

2.4 CONSTRUCTION LAYOUT

A. Verification: Verify layout information shown on Drawings, in relation to the existing benchmarks before proceeding to lay out Work. Notify Contracting Officer promptly if discrepancies are discovered.

B. General: Engage a land surveyor or professional engineer to lay out Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
3. Inform installers of lines and levels to which they must comply.
4. Check location, level and plumb, of every major element as Work progresses.
5. Notify Contracting Officer when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the established standard.

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 log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make log available for review by National Park Service (NPS).

2.5 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning Work. Preserve and protect permanent benchmarks and control points during construction operations. Controls destroyed by Contractor will be replaced by Contractor at their expense.

1. Existing Monuments: All benchmarks, land corners, and triangulation points, established by other surveys, existing within construction area shall be preserved. If existing monuments interfere with Work, secure written permission before removing them.

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

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

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations,

angles, and elevations of construction and sitework.

2.6 INSTALLATION

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

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

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

C. Install products at the time and under conditions for best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

F. Templates: Obtain and distribute to parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm adequate provisions are made for locating and installing products to comply with indicated requirements.

G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of Work.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Contracting Officer.
2. Allow for building movement, thermal expansion, and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors to be embedded in concrete or masonry. Deliver to Project site in time for installation.

H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for best visual effect. Fit exposed connections together to form hairline joints.

I. Hazardous Materials: Use products, cleaners, and installation materials not considered hazardous.

J. Quantity surveys: Shall be conducted, and data derived from these surveys shall be used in computing quantities of work performed and actual construction completed and in place.

1. Contractor shall conduct original and final surveys and surveys for any periods for which progress payments are requested. These surveys shall be conducted under direction of a representative of the Contracting Officer, unless Contracting Officer waives requirement in a specific instance. Government shall make such computations as are necessary to determine quantities of work performed or finally in place. Contractor shall make

computations based on surveys for any periods for which progress payments are requested.

2. Promptly upon completing a survey, Contractor shall furnish originals of field notes and other records relating to survey or layout of Work to Contracting Officer. Contractor shall retain copies of all such material furnished to Contracting Officer.

2.7 PROGRESS CLEANING

A. General: Clean Project site, work areas, and common areas daily. Coordinate progress cleaning for joint-use areas where more than one Installer has worked. Enforce requirements strictly. Dispose of materials lawfully. Compliance with food storage and waste disposal shall be achieved at all times by the contractor. The project site shall be cleaned up at the end of each work period DAILY to reduce the attraction of wildlife. All food and scented items must be stored in lockable coolers or within vehicles.

1. Comply with requirements in National Fire Protection Association (NFPA) 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 degrees Fahrenheit (27 degrees Celsius).
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

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

C. Work Areas: Clean areas where work is in progress to level of cleanliness necessary for proper execution of Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of Work, broom-clean or vacuum entire work area, as appropriate.
3. Contractor shall provide progress cleaning that minimizes sources of food, water, and harborage available to pests.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials not hazardous to health or property and will not damage exposed surfaces.

1. Utilize non-toxic cleaning materials and methods.

a. Comply with Green Seal Standard (GS) 37 for general purpose cleaning and bathroom cleaning.
b. Use natural cleaning materials where feasible. Natural cleaning materials include:

1) Abrasive cleaners: substitute 1/2 lemon dipped in borax.
2) Ammonia: substitute vinegar, salt and water mixture, or baking soda and water.
3) Disinfectants: substitute 1/2 cup borax in gallon water.
4) Drain cleaners: substitute 1/4 cup baking soda and 1/4 cup vinegar in boiling water.
5) Upholstery cleaners: substitute dry cornstarch.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. Clean and protect construction in progress and adjoining materials already in place during handling and installation. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations so that no part of construction completed or in progress, is subject to harmful, dangerous, damaging, or deleterious exposure during construction period.

K. Final Cleaning: At completion of Work, remove remaining waste materials, rubbish, tools, equipment, machinery and surplus materials. Clean exposed surfaces and leave Project clean and ready for occupancy.

1. Provide final cleaning in accordance with ASTM E1971.

2.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: If factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Section 01 40 00 "Quality Requirements."

2.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

2.10 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Section 01 73 29 "Cutting and Patching."

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to specified condition.

C. Remove and replace damaged surfaces exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 40

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SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for:

1. Salvaging nonhazardous demolition and construction waste.
2. Recycling nonhazardous demolition and construction waste.
3. Disposing of nonhazardous demolition and construction waste.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

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

D. Debris: Non-hazardous solid waste generated during construction, demolition, or renovation of a structure which exceeds 2.5 inch (60 millimeter) particle size that is: a manufactured object; plant or animal matter; or natural geologic material (e.g. cobbles and boulders). A mixture of debris and other material such as soil or sludge is also subject to regulation as debris if mixture is comprised primarily of debris by volume, based on visual inspection.

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

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

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

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

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

for reuse.

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

1.3 PERFORMANCE REQUIREMENTS

A. General: Project shall minimize creation of construction, deconstruction, and demolition waste to protect and restore natural habitat and resources. Minimize factors contributing to waste such as over packaging, improper storage, ordering error, poor planning, breakage, mishandling, and contamination. A Waste Management Plan shall be developed to ensure that existing site and building materials are reused, salvaged, or recycled. Minimize waste disposal in landfills.

B. Salvage /Recycle Requirements: Develop waste management plan resulting in end-of-Project rates for salvage/recycling of 50 percent by weight of total waste generated by the Work. The following waste categories, at a minimum, shall be diverted from a landfill:

1. Land clearing debris (chipped debris can be used on site for mulch or erosion control)
2. Clean dimensional wood, palettes
3. Plywood, OSB (oriented strand board), and particle board
4. Asphaltic concrete
5. Cardboard, paper, packaging, newsprint
6. Metals (from banding, stud trim, piping, rebar, roofing, other trim, steel, iron, galvanized sheet steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze)
7. Non-hazardous paint and paint cans
8. Beverage containers: Aluminum, glass, and plastic containers
9. Other mixed construction and demolition waste as appropriate.

C. If waste materials encountered during deconstruction/demolition or construction phase are found to contain lead, asbestos, polychlorinated biphenyls (PCBs), (such as fluorescent lamp ballasts), or other harmful substances, they are to be handled and removed in accordance with local, state, and federal laws and requirements concerning hazardous waste.

D. Existing items and material to be removed during deconstruction/demolition phase shall be reused in construction phase of the Project. Items that cannot be reused shall be recycled. Items considered for reuse must be in refurbishable condition and must meet quality standards set forth in these specifications. Contractor shall ensure quality of the item(s) in question will meet or exceed accepted industry or trade standards for first quality commercial grade application. During construction, deconstruction, or demolition Contracting Officer (CO) may designate other objects or materials for reuse.

1.4 SUBMITTALS

A. Waste Management Plan: After award of contract and prior to scheduled Pre-Construction Conference, Contractor shall submit a draft Waste Management Plan to Contracting Officer for approval. Submit 3 copies of plan. Revise and resubmit Plan as required by Contracting Officer. Approval of Contractor's Plan will not relieve Contractor of responsibility for compliance with applicable environmental regulations.

1. Site-specific mitigations shall be developed by the contractor for approval by the CO to prevent trash ingestion of wildlife, specifically condors at dumpster areas. Installing wildlife-proof dumpsters/trash bins and food storage containers during construction shall be required. Contractor to coordinate with CO.
2. Compliance with food storage and waste disposal must be achieved at all times. The project site will be cleaned up at the end of each work day to reduce attraction of wildlife.

B. Progress Documentation: Supplemental to Waste Management Plan, document solid waste disposal, diversion, and cost/revenue analysis and submit completed worksheet on a monthly basis. See Project Waste Management Plan Worksheet Sample, attached to the end of the Division 1 Specifications, and report totals to date for column headings.

C. Waste Reduction Calculations: Before request for Substantial Completion, submit 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. Progress payment requirements:

1. With each Application for payment, submit an updated Project Waste Management Plan worksheet for solid waste disposal and diversion.
2. With each Application for Payment, submit manifests, weight tickets, receipts, and invoices specifically identifying the Project and waste material.

I. Closeout Submittals

1. With Closeout Submittals, submit a summary of a Project Waste Management Plan worksheet for solid waste disposal and diversion.

1.5 QUALITY ASSURANCE

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

B. Waste Management Meeting: Conduct separate meeting or cover in Pre-Construction Conference and comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including:

1. Review and discuss waste management plan including responsibilities of Waste

Management Coordinator.

2. Review requirements for documenting quantities of each type of waste and its disposition.
3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

PART 2 - PRODUCTS

2.1 WASTE MANAGEMENT PLAN

A. General: Develop plan consisting of waste identification and waste reduction work plan. Include separate sections in plan for demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials salvaged and reused in Project, describe methods for preparing salvaged materials before incorporation into the Work.
2. Salvaged Materials for Sale: For materials sold to individuals and organizations, include list of names, addresses, and telephone numbers.
3. Salvaged Materials for Donation: For materials donated to individuals and organizations, include list of names, addresses, and telephone numbers.
4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
6. Handling and Transportation Procedures: Include method used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include:

1. Landfill tip fees per ton.
2. If diverted, tip fee savings from landfill diversion.
3. Costs of recycling, salvage, or reuse.
4. Revenue from recycling, salvage, or reuse.
5. Total cost or savings from diversion. (Calculate by using tip fee savings and subtracting costs of recycling or adding revenue from recycling.)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement waste management plan as approved by Contracting Officer. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during entire duration of Contract.

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

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

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

1. Distribute waste management plan to everyone concerned within [**three**] days of submittal return.
2. Distribute waste management plan to entities when they begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

E. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

F. Separation facilities:

1. Contractor shall designate and Contracting Officer shall approve specific area or areas to facilitate separation of materials for potential reuse, salvage, recycling, and return.
2. Place waste and recycling bins near each other, and close to point of waste generation but out of traffic pattern.
3. Keep recycling and waste bin areas neat, clean, and clearly marked in order to avoid co-mingling of materials.
4. Protect bins during non-working hours from off-site contamination.
5. Check garbage dumpsters periodically for recyclables being thrown away and undocumented materials that could be recycled.

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

3.2 SALVAGING DEMOLITION WASTE

A. Treatment of Salvaged Items for Reuse in the Work:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
6. If salvaged items are in poor condition, those items shall be disposed of properly off-site.

B. Salvaged Items for Reuse in the Work:
1. Clean rock (no non-native material attached)
2. Clean soil (no non-native material attached)

C. Salvaged Items for Governments Use:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Allow for inspection if necessary.
4. Store items in secure area until delivery to Government.
5. Transport items to storage area on-site designated by Government.
6. Protect items from damage during transport and storage.
7. If salvaged items are in poor condition, those items shall be disposed of properly off-site.

3.3 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

A. General: Recycle paper and beverage containers used by on-site workers.

B. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

C. Site-Clearing Wastes: Chip brush, branches, and tree limbs on-site and stockpile as directed by the COR.

D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to maximum extent practical.

1. Provide appropriately marked containers or bins for controlling recyclable waste until removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.

a. Inspect containers and bins for contamination and remove contaminated materials if found.

2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
4. Store components off ground and protect from weather.
5. Remove recyclable waste off Government property and transport to recycling receiver or processor.

3.4 RECYCLING DEMOLITION WASTE

A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.

1. Pulverize concrete to maximum **4 inch** size.

B. 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.
3. Corrugated metal pipe.
4. Cast iron pipe.

3.5 RECYCLING CONSTRUCTION WASTE

A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in dry location.
2. Polystyrene Packaging: Separate and bag materials.
3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

B. Site-Clearing Wastes: Chip brush, branches, and trees from 20% of healthy cottonwoods to be removed on-site. Dispose of all other brush, trees and branches properly off-site.

C. Wood Materials:

1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
2. Clean Sawdust: Bag sawdust not containing painted or treated wood.

3.6 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose in landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials to accumulate on-site.

2. Remove and transport debris in manner preventing spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Burning: Burning of waste materials allowed only at designated areas on Government property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.

D. Disposal: Transport waste materials off Government property and legally dispose of them.

END OF SECTION 01 74 19

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SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including:

1. Project Record Drawings
2. Closeout Submittals
3. Substantial Completion and Final Inspection
4. Permit Closure and Transfer
5. Final Acceptance of the Work
6. Warranties

1.2 PROJECT RECORD DRAWINGS

A. Maintain one complete full-size set of contract drawings and one full-size set of vendor-supplied drawings. Clearly mark changes, deletions, and additions using National Park Service (NPS) drafting standards to show actual construction conditions. Show additions in red, deletions in green and special instructions in blue.

B. Keep record drawings current. Make record drawings available to Contracting Officer (CO) for inspection at the time of monthly progress payment requests. If project record drawings are not current, Contracting Officer may retain an appropriate amount of progress payment.

C. Submit complete record drawings on completion of total project. Include shop drawings, sketches, and additional drawings to be included in final set, with clear instructions showing the location of these drawings.

D. All official and non-official records created from this project (textual, electronic, audiovisual, or visual) shall be accessioned and cataloged in the Parks archives collection. Coordinate with the Contracting Officer and ZION Curator to Close-Out the project and to submit project deliverables to the Archives.

1.3 CLOSEOUT SUBMITTALS

A. A list of closeout requirements has been attached at the end of the Division 1 Specifications for your convenience. The intent is to provide an overall summary of requirements and not a comprehensive list. Terms and conditions of the contract require satisfaction of requirements of individual specification sections regardless of what is shown on the list. Submit the following before requesting final inspection:

1. Specific warranties, guarantees, workmanship bonds, final certifications, and similar documents.
2. Project Record Documents, operation and maintenance manuals, final completion construction digital images recorded on CD-R (compact disc-recordable) or DVD-R (digital video disc-recordable) with index and descriptions, and similar final record information.
3. 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.

4. Keys and Keying Schedule: Submit keys including duplicates. Wire keys for each lock securely together. Tag and plainly mark with lock number, equipment identification, or panel or switch number, and indicate location, building, and room name or number.
5. Make final changeover of permanent locks and deliver keys to Contracting Officer. Advise Park personnel of changeover in security provisions.
6. Approved pre-functional checklists and functional performance testing reports from commissioning documentation.

    a. Equipment start-up requires coordination with commissioning process. Refer to Section 01 9114 “Total Building Commissioning” for requirements. Equipment shall not be "temporarily" started for commissioning.

7. Test and balance report.
8. Terminate and remove temporary facilities, mockups, construction tools, and similar elements from Project site, complete final cleaning requirements, including touchup painting.
9. Touch up and repair and restore marred exposed finishes to eliminate visual defects.
10. Instruct NPS personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videos.

1.4 FINAL INSPECTION, SUBSTANTIAL COMPLETION AND ACCEPTANCE PROCEDURES

A. Request final inspection in writing when project or designated portion of project is substantially complete. Contracting Officer will proceed with inspection within 10 days of receipt of written request or will advise Contractor of items that prevent project from being substantially complete.

B. If work is determined substantially complete, following final inspection, Contracting Officer will prepare Punch List and issue a Letter of Substantial Completion.

C. If work is not determined substantially complete following final inspection, Contracting Officer will notify Contractor in writing. Contractor shall request new final inspection after completing work. Re-inspection costs may be charged against Contractor in accordance with Inspection of Construction contract clause.

D. Contractor shall complete Punch List within 30 calendar days, documented weather permitting.
1. Prior to requesting final inspection:
    a. Complete commissioning requirements, unless approved in writing by Contracting

Officer.

E. If Contractor completes items of work on Punch List and contractually required items, Contracting Officer will issue Letter of final acceptance of work.

F. If Contractor fails to complete work within the time frame, Contracting Officer may correct work with an appropriate reduction in contract price or charge for re-inspection costs in accordance with Inspection of Construction contract clause.

1.5 PERMIT CLOSURE AND TRANSFER

A. Compliance Certification. Contractor to inform CO when work related to NWP 42 is complete. The Park, as the owner, will fill out and submit Compliance Certification documentation to close out permit with USACE.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Contracting Officer for designated portions of Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Organize warranty documents into an orderly sequence based on table of contents of Project Manual.

1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2 by 11 inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify product or installation. Provide typed description of product or installation, including name of product and name, address, and telephone number of Installer.
3. Identify each binder on front and spine with typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF (portable document format) file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. See Division 1 Specification Section "Execution" for information on cleaning agents.

PART 3 - EXECUTION

3.1 FINAL CLEANING

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

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are neither planted nor paved to smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Leave Project clean.

C. Pest Control: Engage experienced, licensed exterminator to make a final inspection and rid project of rodents, insects, and other pests. Provide Government with report.

D. Waste Disposal: Comply with requirements of Section 01 74 19 "Construction Waste Management and Disposal."

1. Trash and construction waste, including rubble, concrete, asphalt, broken irrigation pipe, etc. shall not be left on site or buried, but shall be removed and disposed of in a manner approved by the Contracting Officer.

END OF SECTION 01 77 00

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SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including:

1. Manuals, general
2. Emergency manuals
3. Maintenance manuals for care and maintenance of products, materials, and finishes, systems and equipment.

B. See Divisions 2 through 49 Sections for additional operation and maintenance manual requirements for Work in those Sections.

1.2 SUBMITTALS

A. Manual: Submit two copies of each manual in draft form or one electronic copy at least 15 days before final inspection. Contracting Officer (CO) will return copy or edit version with comments within 15 days of receipt.

B. Format: Submit operations and maintenance manuals in following format:

1. PDF (portable document format) electronic file. Assemble each manual into composite electronically indexed file. Submit on digital media acceptable to Contracting Officer.

a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
b. Enable inserted reviewer comments on draft submittals.

2. Hard copy manual: In accordance with Part 2 of this Section.

3. Correct or modify each manual to comply with Contracting Officers comments. Submit 4 copies of each corrected manual within 15 days of receipt of Contracting Officers comments.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

A. Organization: Unless otherwise indicated, organize manual into separate sections for each system and subsystem, and separate sections for each piece of equipment not part of a system. Manual shall contain title page, table of contents, and manual contents.

B. Title Page: Enclose title page in transparent plastic sleeve. Include:

1. Project Title
2. Location
3. Park
4. Contract Number
5. Prime Contractors Name and Address
6. Date of Substantial Completion
7. Binder Volume Number

C. Table of Contents: List each product included in manual, identified by product name, indexed to content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. Assemble instructions for subsystems, equipment, and components of one system into a single binder if needed.

1. Binders: White, commercial quality, hard back, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2 by 11 inch paper; with clear plastic window sleeve on front and spine to hold label describing contents and pockets inside covers to hold folded oversize sheets.

    a. Cover Sheet: Identify binders on front and spine, with project title, location, park, contract number, prime contractor's name and address, date of substantial completion, and binder volume number. Insert cover sheet into clear plastic view pocket on front of binder. Insert sheet into clear plastic view pocket on spine with title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Data: Fill binders to no more than 75 percent of capacity. Punch holes shall not obscure any data. When contents of a single tabbed section cover more than one item, provide colored paper sheets to separate the data for each item.

    a. Manufacturers' Data: Provide originals for color or copyrighted data. Black and white data may be originals or clean, good quality reproductions. No copies produced by facsimile transmission and sheets with stamps, such as submittal approval stamps. Include only sheets that apply to items installed; cross out inapplicable data.
    b. Vendor Furnished As-Built Drawings: Maximum 24 inch by 36 inch sheets with minimum character or lettering size of 1/8 inch. Reduced-size reproductions may be provided instead of full-size drawings if reproductions are clear and legible. If reduced-size drawings are used, identify as "REDUCED SIZE" and provide graphic scales, if applicable.
    c. Custom Data: Data supplemented by drawings and schematics necessary to describe systems adequately.
    d. Equipment Data Sheet: Data, using form at end of this section.
    e. Schedules: Schedules reflecting final, as-installed conditions.
    f. Poorly reproduced or illegible data will be rejected.

3. Dividers: Divider sheets with Mylar reinforced edges and pre-printed numbered tabs aligned with numbers and title lines on index sheet. Include typed list of products and major components of equipment included in section on each divider, cross-referenced to

Specification Section number and title of Project Manual.

4. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into separate section for type of emergency, emergency instructions, and emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component for fire, flood, gas leak, water leak, power failure, water outage, equipment failure, and chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of National Park Service (NPS) operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include instructions on stopping, shutdown instructions for each type of emergency, operating instructions for conditions outside normal operating limits, and required sequences for electric or electronic systems.

2.3 OPERATION AND MAINTENANCE MANUALS

A. Operation Requirements

1. Content: In addition to requirements in Section, include operation data required in individual Specification Sections and equipment descriptions, operating standards, operating procedures, operating logs, wiring and control diagrams, and license requirements.
2. Descriptions: Include:

    a. Product name and model number
    b. Manufacturer's name
    c. Equipment identification with serial number of each component
    d. Equipment function
    e. Operating characteristics
    f. Limiting conditions
    g. Performance curves
    h. Engineering data and tests
    i. Complete nomenclature and number of replacement parts

3. Operating Procedures: Include start-up, break-in, and control procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; and required sequences for electric or electronic systems.
4. Systems and Equipment Controls: Describe sequence of operation, and diagram controls as installed.
5. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

B. Maintenance Requirements for Systems and Equipment

1. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, and equipment data sheets as described below.
2. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
3. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including maintenance instructions, drawings and diagrams for maintenance, nomenclature of parts and components, and recommended spare parts for each component part or piece of equipment:
4. Maintenance Procedures: Test and inspection instructions, troubleshooting guide, disassembly instructions, and adjusting instructions, and demonstration and training videotape if available, detailing essential maintenance and environmental procedures.
5. Maintenance and Service Schedules: Service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
6. Spare Parts List and Source Information: Lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
7. Warranties and Bonds: Copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

2.4 PRODUCT MAINTENANCE MANUAL

A. Content: Organize manual into separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include:

1. Product name and model number
2. Manufacturer's name
3. Color, pattern, and texture
4. Material and chemical composition

5. Reordering information for specially manufactured products

D. Environmental Requirements

1. Identify environmentally preferable products incorporated into Project. Include: product model; manufacturer's name, address, phone, and website; and local technical representative.

a. Verify plastic products to be incorporated into Project are labeled in accordance with ASTM D1972. Where products are not labeled, provide product data indicating polymeric information in Operation and Maintenance Manual.

1) Type 1: Polyethylene Terephthalate (PET, PETE)
2) Type 2: High Density Polyethylene (HDPE)
3) Type 3: Vinyl (Polyvinyl Chloride or PVC)
4) Type 4: Low Density Polyethylene (LDPE)
5) Type 5: Polypropylene (PP)
6) Type 6: Polystyrene (PS)
7) Type 7: Other. Use of this code indicates that package in question is made with a resin other than the six listed above or is made of more than one resin listed above and used in a multi-layer combination.

b. Describe maintenance procedures associated with environmentally preferable materials and systems. Provide cleaning recommendations in accordance with ASTM E1971 and approved Integrated Pest Management (IPM) plan.

1) Include potential environmental impacts of recommended maintenance procedures and materials.
2) Include potential indoor air quality impacts of recommended maintenance procedures and materials.
3) Where proposed maintenance procedures incorporate composting of plastics, assess potential effect of each type of plastic to be included in composting process in accordance with ASTM D5509 or ASTM D6002

c. Material Safety Data Sheets (MSDS): Include MSDSs as specified.

2. Develop environmental management programs for facility as follows:

a. Waste management program: Develop in accordance with ASTM E1609. Maximize use of source reduction and recycling procedures outlined in ASTM D5834.
b. Water management program: Develop water monitoring program for surface and ground water on project site in accordance with ASTM D5851 and consistent with water management program utilized during construction operations.

E. Maintenance Procedures: Include manufacturer's written recommendations and inspection procedures, types of cleaning agents, methods of cleaning, schedule for cleaning and maintenance, and repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins.
2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following and items detailing essential maintenance procedures:

1. Test and inspection instructions
2. Troubleshooting guide
3. Precautions against improper maintenance
4. Disassembly; component removal, repair, and replacement; and reassembly instructions
5. Aligning, adjusting, and checking instructions
6. Demonstration and training video recording

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that affect validity of warranties or bonds.

1. Include procedures and required notifications for warranty claims.

PART 3 - EXECUTION

3.2 GENERAL

A. At start of project, begin accumulating operation and maintenance data and initiate index. Install and index data in binders within 30 days after delivery of items. As custom written data and test results are produced, add to operation and maintenance data file.

B. List of Operation and Maintenance requirements has been attached at end of the Division 1 Specifications for your convenience. Intent is to provide an overall summary of requirements and not a comprehensive list. Terms and conditions of the contract require satisfaction of requirements of individual specification sections regardless of what is shown on the list.

C. Keep operation and maintenance data current. Make operation and maintenance binders available to Contracting Officer for inspection at time of monthly progress payment requests. If operation and maintenance binders are not current, Contracting Officer may retain an appropriate amount of the progress payment.

3.2 MANUAL PREPARATION

A. Manual Types

1. Emergency Manual: Assemble complete set of emergency information indicating procedures for use by emergency personnel and by NPS operating personnel for types of emergencies indicated.
2. Product Maintenance Manual: Assemble complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into Work.
3. Operation and Maintenance Manuals: Assemble complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

B. Manual Contents: Including:

1. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark sheet to identify product or component incorporated into Work. If data include more than one item in a tabular format, identify each item using appropriate references from Contract Documents. Identify data applicable to Work and delete references to information not applicable.
2. Custom Written Data: For data not in manufacturer's standard literature, provide text, drawings, and schematics specifically applicable to installed systems. Include step-by-step descriptions of operating procedures; identification of individual components and their functions; descriptions of how system components relate to one another and operate together to accomplish a common process or function; and sequence of operation for system control circuits. For seasonally operated systems, provide start-up and shutdown instructions.
3. Equipment Data Sheets: For each item of equipment included in operation and maintenance data, provide Equipment Data Sheet using form at the end of this section. For equipment consisting of a driven machine and a driver (for example, a pump and a motor), equipment

data shall cover both the driven machine and the driver. For similar type equipment (for example, multiple exhaust fans of the same model and type), provide a single equipment data sheet with an attached schedule listing individual equipment items.

4. Vendor Furnished As-Built Drawings: Provide for each electrical and each mechanical control system.

    a. For each control system, provide control circuit schematic drawings. Identify each wire and terminal block number. Show terminal numbers on control devices. Show control wires and devices remote from control panel.
    b. For each control panel, provide general arrangement drawing showing location of each control component and terminal block on the panel front and interior. Include materials list of panel-mounted control components as well as field-installed control components remote from the panel, identifying components, manufacturer, model number, and initial set points or sensing ranges of devices where applicable.
    c. For packaged equipment systems, provide general arrangement drawings showing interrelationships of the various items of equipment and components.
    d. In addition to control wiring schematic, provide power wiring schematic drawing showing power flow to each motor. Identify each power conductor. Show over-current protection and motor starting devices.

C. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 23

EQUIPMENT DATA SHEET	
Equipment Item: _____ Designation: _____ Function: _____ Location: _____ Project: _____ Model Number: _____ Serial Number: _____	
Manufacturer Address and Phone:	Supplier Address and Phone:
Preventive Maintenance Tasks:	
Nameplate Data:	
Spare Parts Furnished and Other Information:	

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SECTION 01 81 13 - SUSTAINABLE DESIGN REQUIREMENTS FOR NON-LEED™ PROJECTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general requirements and procedures for compliance with Federal Sustainability requirements. This project is not seeking Leadership in Energy & Environmental Design (LEED™) certification but shall comply with applicable Federal Sustainability requirements. Requirements include laws (Executive Orders (EO) and regulations), management policies, building codes and standards, Federal directives, and National Park Service (NPS) guidelines.

B. Many Federal requirements can be achieved only through intelligent and integrated design of the project and are beyond control of the Contractor. Certain requirements relate to the products and procedures used for construction, therefore, full cooperation of the Contractor and Subcontractors is essential to successful compliance with Federal requirements.

C. Contractors shall familiarize themselves with relevant requirements and provide necessary information and instruction to subcontractors and installers.

1. Some requirements involve quantifying percentages by weight; these require careful recordkeeping and reporting by Contractor.
2. See Denver Service Center (DSC) Workflows Sustainability Standards for a list of Federal Sustainability requirements. Applicable Federal Sustainability requirements are also summarized on the project's NPS Project Sustainability Checklist. Contractor is responsible for ensuring the elements in the NPS Project Sustainability Checklist, identified by the Architect/Engineer (A/E) team, are incorporated into the construction of the project.

D. Related Sections:

1. See Divisions 1 through 49 Sections for sustainability requirements specific to work of each of these Sections.

1.2 DEFINITIONS

A. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying wood used to make products was obtained from forests certified by a Forest Stewardship Council (FSC)-accredited certification body to comply with FSC Standard STD-01-001, "FSC Principles and Criteria for Forest Stewardship." Certificates shall include evidence manufacturer is certified for chain of custody by an FSC-accredited certification body.

B. LEED™: Leadership in Energy & Environmental Design. Sustainability rating system developed by United States Green Building Council (USGBC).

C. Rapidly Renewable Materials: Materials made from plants typically harvested within 10-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.

D. Recycled Content: Recycled content value of a material assembly shall be determined by weight.

1. "Post-consumer" material: Waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of product, which can no longer be used for intended purpose.
2. "Pre-consumer" material: Material diverted from waste stream during manufacturing process. Reutilization of materials such as rework, regrind, or scrap generated in a process and capable of being reclaimed within the same process that generated it is excluded.

E. Biopreferred Products: Commercial or industrial products (other than food or feed) composed in whole, or in significant part, of biological products, renewable agricultural materials (including plant, animal, and marine materials), or forestry materials and includes biobased intermediate ingredients or feedstocks.

1.3 FEDERAL SUSTAINABILITY DOCUMENTATION SUBMITTALS

A. Most of Federal sustainability documentation submittals are aggregations of submittals already required in relevant technical specifications. They are mentioned here to ensure they are collected and organized together to efficiently document compliance with sustainability requirements.

B. Provide preliminary submittals to NPS indicating how the following Federal requirements will be met:

1. Recycled Content: List of specified/proposed materials with recycled content. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.

2. Certified Wood: Product data and/or chain-of-custody certificates for products containing certified wood. Include statement indicating cost for each certified wood product.

3. Construction Indoor Air Quality (IAQ) Management Plan – During Construction:

a. Construction indoor-air-quality management plan.
b. Product data for temporary filtration media.
c. Product data for filtration media used during occupancy.
d. Construction Documentation: Six photographs at three different times during construction period, along with brief description of the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA) approach employed, documenting implementation of indoor-air-quality management measures, such as protection of ducts and on-site stored or installed absorptive materials.

4. Construction IAQ Management Plan – Before Occupancy:

a. Signed statement describing building air flush-out procedures including dates when flush-out was started and completed and statement filtration media was replaced after flush-out.
b. Product data for filtration media used during flush-out and during occupancy.

5. Low Emitting Materials - Adhesives and Sealants: Product data for adhesives and sealants used inside weatherproofing system indicating Volatile Organic Compound (VOC) content

of each product used. Indicate VOC content in g/L (grams per liter) calculated according to 40 CFR 59 Subpart D (Code of Federal Regulations).

6. Low Emitting Materials - Paints and Coatings: Product data for paints and coatings used inside weatherproofing system indicating chemical composition and VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59 Subpart D.
7. Low Emitting Materials - Flooring: Product data for products containing composite wood or agrifiber products or wood glues indicating they do not contain urea-formaldehyde resin.
8. Biopreferred Products: Provide list of bio-based products used on project.

PART 2 - PRODUCTS

2.1 RECYCLED CONTENT OF MATERIALS

A. Recycled Content: Provide building materials with recycled content such that post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 10 percent of cost of materials used for Project.

A. Determine cost of post-consumer recycled content by dividing weight of post-consumer recycled content in item by total weight of item and multiplying by cost of item.
B. Determine cost of pre-consumer recycled content of an item by dividing weight of pre-consumer recycled content in item by total weight of item and multiplying by cost of item.
C. Do not include furniture**,** mechanical and electrical components, and specialty items such as elevators and equipment in calculation.

2.2 BIOPREFERRED PRODUCTS

A. Use bio-based products found on United States Department of Agriculture (USDA) Biopreferred Products list where applicable on project.

2.3 LOW-EMITTING MATERIALS

A. For applications inside the weatherproofing system, use adhesives and sealants that comply with VOC content limits in Specification Divisions 2 through 49.

B. For field applications inside the weatherproofing system, use paints and coatings that comply with VOC content limits in Specification Divisions 2 through 49.

C. Do not use composite wood or agrifiber products or adhesives that contain urea-formaldehyde resin.

PART 3 - EXECUTION

3.1 CLEAN-AGENT FIRE-EXTINGUISHING-AGENT REMOVAL

A. Remove clean-agent fire-extinguishing agents that contain Hydrochlorofluorocarbons (HCFCs) or halons and replace with agent that does not contain HCFCs or halons. See Division 21 Section "Clean-Agent Fire Extinguishing Systems" for additional requirements.

3.2 MEASUREMENT AND VERIFICATION

A. Coordinate with Divisions 2 through 49 for project requirements regarding installation of building level metering equipment to measure energy, water, and electric usage.

END OF SECTION 01 81 13

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SECTION 02 40 01 – CARE OF WATER

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work included under this section consists of Furnishing all construction plans, labor, equipment, and incidentals necessary for the diversion of North Fork Virgin River flows, dewatering of the project site and the care of the river during construction of the Project. Note that dewatering and care of the river may require a system of temporary coffer dams, channels, liner, pumping plants, pipelines and/or flumes. The work also includes complete removal of all diversion and dewatering equipment and structures from the project site and restoration of the project site following completion of the work.

B. The Contractor shall be responsible for coordination with the CO for any dewatering, diversion, and/or construction activity that may adversely affect the volume of water flowing through the project site, or would have the potential to increase sediment discharge and turbidity.

C. The work shall consist of the installation of a temporary stream diversion as needed to move stream flow through or around the project area to isolate construction activities from contact with stream flow and prevent impacts on water quality from the construction work, as well as properly treating and discharging sediment-laden water.

D. The scope of work shall include building and maintaining the temporary stream diversion (channel, pipe or bypass pump), flow barriers (dams), and temporary erosion and sediment controls, as well as removing all such temporary erosion and sediment controls after they have served their purpose and properly stabilizing the area. The work shall be planned to minimize the length of time the temporary stream diversion will be used.

E. Provide and operate equipment adequate to keep all excavations and trenches free of water. Remove all water a minimum of 3 feet below the lowest point of excavation during periods when concrete is being deposited, when pipe is being laid, during the placing of backfill, and at such other times as required for efficient and safe execution of the work. Avoid settlement or damage to adjacent property. Do not dispose of water directly in the river; dispose of it in an upland location allowing it to infiltrate in a manner that will not damage adjacent property or increase turbidity in the river. If after discussion with the CO, discharge directly into the river is required, the contractor shall acquire and maintain necessary permitting with the State of Utah.

F. Adjacent areas shall be graded so that surface drainage is away from excavations. Any water accumulating within the excavation shall be promptly removed. Pumping from the interior of any enclosed foundation shall be done so the possibility of any portion of the concrete materials being carried away is eliminated. No pumping will be allowed during the placing of concrete and for 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work.

G. Positive dewatering systems shall be furnished and installed as necessary to maintain all excavations and trenches free of water at all times until the structure or facility is completely constructed, so that full dead load is applied, and backfill is in place. If necessary, such systems shall remove ground water from outside the limits of the excavation, and shall maintain the water level sufficiently far below the base of the excavations to prevent buoyancy conditions or softening of the base. The Contractor shall dewater the work area sufficiently to prevent water from seeping through the excavated side slopes. Provisions shall be made for removal of storm runoff and all other water that may enter the excavations. Open-sump pumping from the interior of excavations will be permitted only to dispose of surface runoff, and shall not be used as the primary means of dewatering.

H. The Contractor is responsible to satisfy themselves as to the extent and cost of all necessary diversion and dewatering in accordance with the drawings and this specification.

I. The Contractor has full responsibility for planning, design, installation, and monitoring of diversion systems. Acceptance by the Contracting Officer shall not relieve the Contractor of full responsibility for the adequacy of the systems including responsibility for repairing any damage to adjacent property, foundations, permanent structures, pipelines and utilities, or damage to any part of the Work caused by failure or inadequacy of any part of the system.

J. The data, facilities, and equipment discussed in these specifications are for information only and their use will not relieve the Contractor of full responsibility for the adequacy, safety, and maintenance of the diversion systems and for the repair of any damage occurring to the Work as a result of flooding caused by any and all stream flows.

K. NORTH FORK VIRGIN RIVER STAGE-DISCHARGE RELATIONSHIP

A. The stage-discharge data provided is for use by the contractor in selecting the level of protection/risk.
B. The contractor has full responsibility for selecting the level of protection and is responsible for any damages.
C. The stream diversion system shall carry 80 cfs at a minimum.
D. The stream diversion system shall have the minimum volume capacity of the volume capacity outlined in the Drawings.
E. Stage Discharge Relationship:

Return Period	**Flow (cfs)**
2-Year	658
5-Year	1440
10-Year	2130
25-Year	3170
50-Year	4080
100-Year	5120

1.2 DIVERSION REQUIREMENTS

A. Design diversion and sediment control facilities to divert water around the construction area, or convey through the area in a controlled manner, and to control the quality of water leaving the construction area from diversion, dewatering and Contractor operations.
B. The methods of diverting and controlling stream flows including designs and implementation are fully the responsibility of the Contractor.
C. Design temporary diversions, diversion pipes, temporary diversion channels, and pumping facilities to divert stream flows to minimize seepage and provide adequate slope stability.
D. Construct all diversion and erosion control facilities to protect facilities from erosion or damage.

E. Construct facilities as needed to maintain water quality from diversion, drainage, dewatering and all construction activities in compliance with the Utah Pollutant Discharge Elimination System (UPDES), Construction Dewatering, Stream Alteration and other applicable permits.

F. Approvals: The Contractor's design, including computations, schedule of operation, and Drawings shall be submitted to the Contracting Officer for approval. After the system is in operation, the Contracting Officer will monitor progress of the construction to confirm the timing when the system can be safely removed and will provide written notice to the Contractor that it can be removed.

G. It shall be the Contractor's responsibility to comply with all requirements and regulations of all federal, state or local agencies that govern the work affecting construction in and adjacent to the stream.

1.3 SUBMITTALS

A. A. Submit in accordance with Section 01 33 23 Submittals.

B. Care of Water/Diversion Plan must be submitted to the Contracting Officer at least 15 calendar days prior to constructing stream diversion.

C. The Care of Water/Diversion Plan shall contain, as a minimum, the following information:

1.Design of temporary diversion, showing embankment material description, embankment slopes, crest width, crest elevations, seepage control provisions, embankment fill gradations, and embankment placement procedure.

a. Materials used in the diversion must be free of hazardous materials and must be non-erodible.

3. Design of diversion pipes and pumping, including pipe material and equipment specifications, fittings, excavation plan and sections for the pipe, thrust blocks, and other necessary connections.

4. Design of temporary diversion channels, including location of channel, channel slope and length, channel width, side slopes, and backfill materials and backfilling procedures.

5. Plan for diversion to protect the Work without violating water quality permit requirements.

6. Proposed installation and removal procedures and construction sequence.

7. Name(s), qualifications, resumes, and references of proposed diversion system designer.

8. Contractor must show past performance of Contractor or Sub-contractor on at least one project in the past 20 years involving in-stream work.

A. Approval by the Contracting Officer of the diversion system proposed by the Contractor will only be with respect to the basic principles of the methods and procedures the Contractor intends to employ. Approval by the Contracting Officer does not relieve the Contractor of the full responsibility for the cofferdam system design.

1.4 PROJECT/SITE CONDITIONS

A. Contractor's designated on-site water pollution control specialist shall monitor water quality conditions, including the following:

1. Ensure all water quality protection and erosion control facilities are designed, constructed, and maintained to avoid water quality standards violations.

2. Ensure that any sediment problems including, but not limited to, those associated with borrow excavation, construction of temporary construction roads, and stockpiling, are promptly corrected and their impacts mitigated.

3. Monitor and modify construction practices, as necessary, to protect water quality.

4. The Contractor shall be responsible for compliance with all permit conditions and shall be responsible for any water quality violations, penalties, fines, and work suspensions resulting from construction activities.

1.5 MAINTENANCE

A. Maintain all diversion, water quality protection and erosion control facilities as needed to meet specification and permit requirements.
B. Maintain diversion channels, gates, pipes, sedimentation check dams, sedimentation dikes, drains, pumps, and/or other temporary diversions and protection works to prevent surface water from entering excavations, foundation areas, and other portions of the Work intended to be performed in the dry.
C. Repair any damage resulting from diversion operations at no cost to the Owner.

PART 2 PRODUCTS

2.1 DIVERSION STRUCTURE FILL

A. The Contractor may request Contracting Officer identify borrow sources or other sources for the diversion structures. It is the sole responsibility of the Contractor to justify the suitability of the material to be used for the project through materials testing. The material shall be approved by the Contracting Officer for the Project.
B. The flow barrier shall be made of non-erodible material free from debris, able to withstand the anticipated flows, and shall not contribute unnecessary pollution to the stream or surrounding area. The flow barrier may be constructed of a combination of riprap, sand bags, concrete barriers, sheet piling, or other appropriate materials.

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall furnish all necessary labor, equipment, and incidentals necessary for dewatering of the project site, and diversion and care of the river during the period of construction.
B. The Contractor shall keep the construction area free from water by diversion, pumping, berming, coffer-dams, sheet pile, or by other methods or combination thereof. In accordance with the approved dewatering submittal, any changes or modifications will need prior approval
C. Verification of Conditions: Verify that Work and property upstream, downstream, and adjacent to Work will not be damaged by water quality protection, erosion and sediment control diversion operations and facilities.
D. Divert surface water and inflows without causing damage to Work or property upstream, downstream, and areas of Work.
E. Schedule and construct necessary diversion features consistent with provisions outlined herein and the Contractor's needs.
F. Provide testing and monitoring as required by the Utah Pollutant Discharge Elimination System (UPDES) permit, Construction Dewatering/Hydrostatic Testing (CDHT), Stream Alteration and other permits required by these Specifications.
G. Repair at no expense to the Owner any damage to the foundations, structures, adjacent property, or any part of the diversion or protective works.

3.3 COORDINATION DURING CONSTRUCTION

A. Fish clearance, provided by the NPS, will be required prior to any disturbance of the stream where fish might be present, including, but not limited to, installation of the diversion structure and removal the diversion. Contractor must provide one week notice to CO prior to planned activities that may cause disturbance of the stream where fish may be

present so fish clearance may be scheduled and implemented for the duration of work the contractor has planned. Fish clearance is viable for 48 hours therefore instream work must be completed within 48 hours of the clearance. Multiple clearances can be scheduled for work extending beyond 48 hours. Failure to provide adequate notice may delay the project at the cost of the Contractor.

B. If any adverse effects are observed or reported due to diversion and dewatering related to water quantity or quality they shall be reported immediately to the Owner and Contract officer. No work shall proceed prior to resolution of deficiency and flow past the site is approved by Owner.

3.4 REMOVAL

A. The Contractor shall, when no longer needed, or at the end of construction, completely remove all dewatering and stream diversion equipment from the project site and demolish any cofferdams or other dewatering structures constructed by the Contractor. Constructed cofferdam material must be completely removed from the work area to the pre-existing ground surface and the area reclaimed to pre-existing conditions as approved by the Contract officer.

B. Earthen materials (soil and rock) used for diversion structure construction that came from the site may be incorporated as fill in available areas of site grading that would not detract from the design intent as approved by the Contracting Officer.

C. The diversion and care of the stream will no longer be needed when Project construction has reached substantial completion as determined by the Contract officer.

3.5 PROTECTION

A. At all times the Contractor shall provide sufficient protection to ensure the safety to personnel, equipment, materials, and existing structures, and to the public for activities relating to dewatering, water supply, and diversion and care of the stream.

END OF SECTION 02 40 01

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SECTION 02 41 13 – SELECTIVE SITE DEMOLITION

PART 1 - GENERAL

1.1 DESCRIPTION

1.2 The work of this section consists of demolition as indicated on Drawings. Specific work includes demolition and removal of existing; concrete turnout box located near the flume, manhole, concrete debris located on the right bank, concrete and masonry dam to elevation specified on dam, partial removal of headworks as noted on plans and existing 24”Ø CMP pipe.

1.3 RELATED WORK

Section 01 74 19 – Construction Waste Management & Disposal.

Section 01 57 23 – Temporary Storm Water Pollution Prevention.

Section 01 50 00 – Temporary Facilities and Controls.

Section 31 03 00 – Tree Protection.

Section 31 20 15 – Clearing, Grubbing, and Tree Removal.

1.4 DEFINITIONS

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

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

1.5 MATERIALS OWNERSHIP

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

1.6 CONDITION OF STRUCTURES

A. Owner and Contract officer assume no responsibility for the condition of existing structures.

1.7 PRE-DEMOLITION MEETING

A. Pre-demolition Conference: Conduct conference at Project site.

1. Inspect and discuss condition of construction to be selectively demolished.

2. Review areas where existing construction is to remain and requires protection.

1.8 PROTECTION AND RESTORATION OF PROPERTY

A. Contractor is solely responsible for all methods and operations of demolition. Blasting is not permitted.

B. Promptly repair any damage caused to adjacent facilities and existing structures to the satisfaction of the Contract officer and Owner at no additional cost to Owner and Contract officer.

1.4 SUBMITTALS

A. As specified in Section 01 33 23.

B. Submit schedule showing sequence of work and methods of demolition. Include schedule for shutting off and capping utilities and re-establishing utility services.

1.5 QUALITY ASSURANCE

C. Comply with safety requirements for demolition, ANSI A10 .6-90.

1.6 PROJECT CONDITIONS

D. Keep dust and dirt pollution to a minimum.

E. Ensure safety of persons in demolition area. Provide temporary barricades as required.

F. Provide adequate fire protection. Keep area clear of hazardous substances and debris.

1.7 SCHEDULING

G. Complete demolition that might damage new construction before starting new work.

PART 2 – PRODUCTS Not Used

PART 3 – EXECUTION

3.1 EXAMINATION

A. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

H. Existing structure dimensions and assumed conditions are to be field verified and are the responsibility of the Contractor to verify prior to any demolition. The Contractor shall notify the Contract officer, prior to demolition, of any and all discrepancies which may require significant change in the design and/or construction from that shown on the plans.

I. Survey of Existing Conditions; Record existing conditions by use of pre-construction photographs.

A. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.

3.1 PREPARATION

A. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished. It is the responsibility of the Contractor to provide adequate shoring and protection of the existing structure to maintain areas of existing structure used in the design.

B. Strengthen or add new supports when required during progress of selective demolition.

3.2 CONCRETE DEMOLITION

A. General Concrete Cutting: Demolish and remove existing concrete only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. The Contractor shall check and coordinate all demolition with the drawings. It is the responsibility of the contractor to maintain the existing conditions of areas and/or elements not included in the demolition plan.
2. Cut concrete full width using power-driven saw, then remove concrete.
3. Neatly cut concrete plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping.
4. Remove all pieces of concrete, soil and rock loosened by demolition unless otherwise directed by Contract officer.
5. Dispose of demolished items and materials promptly.

3.3 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Transport demolished materials off Owner's property and legally dispose of them.

3.4 REPAIR OF DAMAGED CONCRETE

A. If any existing concrete structures are damaged during construction of this project, they shall be repaired to match the existing structure, except where modified by this proposed project, at no additional cost to the Owner.

END OF SECTION 02 41 13

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SECTION 12 93 01 - SITE SIGNAGE

PART 1- GENERAL

1.01 SECTION INCLUDES

A. Identification, wayfinding, interpretive, bulletin boards, kiosks, temporary, safety and directional, construction, vehicular regulatory and parking signs.

1.02 RELATED DOCUMENTS

A. Drawings and Division 01 - General Requirements apply to work of this section.

B. The Work of this Section Includes: All labor, materials, transportation, equipment and services necessary to provide signage as specified herein and as designated on Drawings.

1.03 QUALITIY ASSURANCE

A. Identify wood by grade mark of a recognized association or agency, or provide certification for unmarked material.

1.04 STORAGE AND HANDLING

A. Protect site furnishings and signage from damage during transportation. Store all materials, including Government furnished furnishings, off ground under protective covering.

B. Contractor to replace site furnishings and signage damaged during storage and handling at no additional cost to the client.

C. SPECIAL WARRANTY: MANUFACTURER AGREES TO REPAIR OR REPLACE COMPONENTS OF SIGNS THAT FAIL IN MATERIALS OR WORKMANSHIP WITHIN SPECIFIED WARRANTY PERIOD.

1. Failures include, but are not limited to, the following: a. Deterioration of finishes beyond normal weathering. b. Deterioration of embedded graphic image. c. Separation or delamination of sheet materials and components.

2. Warranty Period: Two years from date of Substantial Completion.

1.05 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

B. Accessibility Standard: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for signs.

1.06 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Deterioration of embedded graphic image.
c. Separation or delamination of sheet materials and components.

2. Warranty Period: Two years from date of Substantial Completion.

B. Warranty: Two year warranty is to be included.

PART 2 - PRODUCTS

2.01 WOOD POSTS

A. Wood: WWPA No. 1 Grade or better, S4S, pressure treated. Size as shown on the plans.

1. Breakaway Provision: Before pressure treatment, drill two 1-inch holes for 4x4s, or 4x6s, and 1-3/4-inch holes for 6x6s through post parallel to face of sign, near base of posts. Drill first hole 6 inches above ground line and second hole 12 inches above the first.

PART 3 - EXECUTION

3.01 GENERAL

A. Contractor is responsible for all site closure, traffic control and construction site information signage.

1. One large sign (minimum of a 3 foot by 2 foot) denoting the project name, hours and days of construction (Monday through Friday, 7 am to 6 pm), message “DO NOT ENTER AT ANY TIME”, the name and emergency contact information of the project superintendent, and associated permit numbers (including the SWPP). One large sign should be located be located near the construction site exit/entrance as notes in the design drawings.

2. Every 100 feet along the 6 foot construction fence, post “DANGER – AREA CLOSED FOR YOUR SAFETY”.

3. Post and maintain traffic signage as needed.

B. Install all fixtures and furnishings plumbed, straight and true, properly aligned, in conformance with manufacturer’s installation recommendations.

C. Install all components at locations shown on drawings properly aligned and spaced, plumbed vertically,

complete and ready for use.

D. Install all components in accordance with manufacturer's instructions, unless noted otherwise in the plans or in these specifications.

E. If anchoring or footing details are recommended by manufacturer, submit copies of details to Contracting Officer for review and approval prior to construction.

F. Contractor to replace improper installations at no additional cost to the client.

3.02 CONSTRUCTION METHODS

A. Street, traffic and directional control signs and identification signs. The CO's decision to relocate or install new street, traffic and directional control signs or identification shall be based on the location of the sign with respect to curb line, sidewalk line and the staked grading limits.

B. Signs within the staked grading limits whose existing location does not conform to final plan location tolerance above will be relocated. Signs within the staked grading limits whose existing location (both vertically and horizontally) conform to final plan location within a six-inch tolerance will not be relocated. Signs outside the staked grading limit shall also be relocated to conform to final plan location.

C. The preservation of all signs that are to remain in place shall be the responsibility of the CONTRACTOR while the job is under construction. Should any of the signs need to be moved for the CONTRACTOR's convenience, they shall be removed by the CONTRACTOR, either temporarily reinstalled or stored, and permanently reinstalled when construction is completed. The CONTRACTOR shall be held liable for any damage to these signs caused by neglect on his part and no extra compensation will be allowed for preserving, removing or replacing stop and other traffic control and direction signs designated to remain in place, but rather this work shall be considered as included in the contract unit prices for the various items of the contract.

D. Street, traffic and directional control signs and identification signs designated to be relocated shall be removed and reinstalled in the locations shown in the Plans or designated by the CO. The cost of removing, temporarily reinstalling, storing, and permanently reinstalling these signs, will be compensated for at the unit price bid for relocating such signs.

E. Street signs designated as new shall be installed with new materials conforming to these Specifications at locations designated by the C.O. or shown in the Plans.

F. The following procedures will be followed in removing and relocating both signs removed by the CONTRACTOR for his convenience, and signs, designated by the C.O. for relocation:

1. After it has been determined which signs shall be relocated, the CONTRACTOR will notify the C.O. as to which street, stop and traffic direction signs are to be removed and reinstalled.

2. Upon receiving the CONTRACTOR's notification, C.O. will inspect the signs with the CONTRACTOR to determine the condition of the signs. Signs which require repair will be delivered by the CONTRACTOR to the C.O. Signs not requiring repair will be removed and reinstalled as specified below.

3. Where stop signs and traffic direction or control signs are removed, the CONTRACTOR shall provide temporary traffic control in compliance with the traffic control plan.

4. Street signs may be installed temporarily upon approval by the C.O.

5. Signs not required or used for temporary installation shall be stored.

6. All signs shall be reinstalled in the permanent location shown in the Plans or designated by the C.O. as soon as possible after the construction is completed. Signs which have been damaged after removal shall be replaced with new signs at the CONTRACTOR's expense.

G. All sign locations and provisions for breakaway shall conform to the latest issue of the Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) published by the U.S. Department of Transportation.

H. Failure of the CONTRACTOR to permanently reinstall signs within 48 hours after written notice will result in the C.O. reinstalling the sign, and withholding the cost of the work.

I. CONTRACTOR shall install sign support anchors at the locations specified or as directed by the C.O. The sign anchors will be supplied by the CONTRACTOR along with one post to be used for leveling purposes. All work and concrete materials shall conform to the Standard Details, or as shown in the Plans.

3.03 SIGNS

A. Assemble all signs per manufacturer's instructions, or as indicated on the Construction Drawings and install as shown on Drawings.

3.04 SIGN POSTS

B. Embed posts minimum depth shown. Field brush or dip wood cuts and any holes larger than ¾ inches in diameter with a coating specified for field treating pressure treated wood. Coating to contain at least 1 percent copper naphthenate. Place concrete footing and crown at top to shed water.

3.05 SUITABILITY FOR INTENDED USE

A. All installed fixtures and furnishings shall be fully operational, usable and suitable for desired usage.

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SECTION 03 01 00 – CONCRETE FORMWORK

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This item of work includes the formwork and shoring for cast-in-place concrete and the installation into formwork of items such as anchor bolts and other items to be embedded in concrete (but not including reinforcing steel - see Section 030200, CONCRETE REINFORCEMENT).

1.2 RELATED WORK

A. Submittals: Section 01300.
B. Quality Control: Section 01400.
C. Concrete Reinforcement: Section 03200
D. Concrete: Section 03300.

1.3 QUALITY ASSURANCE

A. Codes and Standards:

1. The Contractor shall design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete work in compliance with the American Concrete Institute Standard ACI 347, "Recommended Practice for Concrete Formwork."
2. ACI 117, “Specifications for Tolerances for Concrete.”
3. ACI 318, “Building Code Requirements for Structural Concrete.”
4. ACI 301, “Specifications for Structural Concrete.”

B. Allowable Tolerances:

1. The Contractor shall construct formwork to provide complete finished cast-in-place concrete work within tolerances in accordance with ACI 117.
2. Before concrete placement, the Contractor must check the lines and levels of erected formwork. The Contractor shall make corrections and adjustments to ensure proper size and locations of concrete members and stability of forming systems.
3. During concrete placement, the Contractor must check formwork and related supports to ensure that forms are not displaced and that completed work will be within the specified tolerances.

1.4 SEQUENCING AND SCHEDULING

A. Schedule work for embedded, buried, or other items of work that affects form layout before completing concrete formwork.

PART 2 – PRODUCTS

2.1 FORMS FOR EXPOSED FINISH CONCRETE

A. Unless otherwise shown, the Contractor shall construct formwork for exposed concrete surfaces with plywood, plywood-faced metal frames, steel or other panel-type materials, in new and undamaged condition, to provide continuous, straight and smooth as-cast surfaces. The Contractor shall furnish the forms in the largest practicable sizes to minimize the number of joints and to conform to the joint system shown on the construction documents. The Contractor shall provide form material with sufficient thickness to withstand the pressure of the newly placed concrete without bow or deflection.

2.2 FORM TIES

A. The Contractor shall provide factory-fabricated, adjustable-length, removable or snap-off metal form ties with conical or spherical type inserts, designed to prevent form deflection and to prevent spalling concrete surfaces upon removal. Do not use wire ties.

B. The Contractor shall provide ties so that portion remaining within the concrete after removal of exterior parts is at least 1 ½ inches from the outer concrete surface except as otherwise specified. Form ties shall be provided which will not leave a hole larger than 1-inch diameter in the concrete surface. The holes shall be filled with non-shrink grout as per Section 03300, CONCRETE.

C. Form ties and wire ties fabricated on the project site are not acceptable. Do not use wire ties of any kind. Ties shall withstand form pressures and limit form deflection to specified tolerances. Flat bar ties for panel forms shall have plastic or rubber inserts with minimum 1-inch depth and sufficient dimensions to permit proper patching of tie hole.

2.3 FORM COATING

A. The Contractor shall provide commercial formulation form-coating compounds that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces requiring bond or adhesion, or impede the wetting of surfaces to be cured with water or curing compounds.

1. Formulate form reuse agent with rust inhibitor for steel form facing materials.

B. Form coating (non-staining form oil) shall be equal to:

1. Nox-Crete Company, Omaha, Nebraska.
2. "Form-Guard", W.R. Grace and Company, Cambridge, Massachusetts.
3. "Rheofinish 211", Master Builders, Inc.
4. "Formcel", Lambert Corporation, Houston, Texas.

2.4 DESIGN OF FORMWORK

A. The design of forms, shores, and bracing is the responsibility of the Contractor.

B. The Contractor shall design, erect, support, brace, and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Formwork shall be constructed so that concrete members and structures are of correct size, shape, alignment, elevation, and position.

C. The Contractor shall provide shores and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof. Trussed supports shall be provided when adequate foundations for shores and struts cannot be secured.

D. The Contractor shall support form facing materials by structural members spaced sufficiently close to minimize deflection. Forms placed in successive units for continuous surfaces shall be fitted to accurate alignment, free from irregularities, and within allowable tolerances.

E. Design joints in forms to remain watertight and withstand placing pressures without bulging outward or creating surface patters. Do not use formwork that leaks mortar.

F. Where poor formwork is used and finish obtained is less than specified, upgrade finish to an acceptable finish at no additional cost to the Owner.

G. Panel Deflections: Limit as required to achieve construction tolerances specified herein.

H. For circular structures, forms shall conform to circular shape of structure. Straight panels may be substituted for circular forms if they do not exceed 2 feet in width and in addition to the requirement each panel does not provide an angular deflection more than 3 ½ degrees per joint, and do not conflict otherwise with these Specifications and/or Drawings.

I. Design shall account for tolerances, form ties, finishes, architectural features, rebar supports, construction joint locations, and other nonstructural formwork requirements specified.

J. Design formwork strong enough to hold high liquid heads without form distortion and to meet tolerances as specified herein. Coordinate form design with admixture company information and concrete slump.

K. Structurally design forms, falsework, shoring, and other structural formwork and meet applicable safety regulations, current OSHA regulations, and other applicable codes. Where noted or where formwork is of a critical nature (in terms of size, complexity, etc.), a licensed engineer officer shall prepare formwork, falsework, and shoring designs to meet these Specifications and to meet all federal and state requirements.

L. Meet applicable portions of ACI 347, ACI 318 current edition, and these Specifications.

2.5 REINFORCING SPACERS AND REBAR SUPPORTS

A. Walls:
1. Provide positive spacers or chairs specifically designed for wall forms to hold forms and reinforcing at correct dimensions and clearances.
2. Remove spacer or chair if not designed to remain in place as concrete is placed, consolidated, and proper support and spacing is achieved.

PART 3 – EXECUTION

3.1 FORM CONSTRUCTION

A. General: The Contractor shall construct forms complying with ACI Standards 301, 318, and 347, to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in finish structures. All necessary detail work, construction aids, and embedded items shall be provided as required.

B. Design, erect, shore, brace and maintain formwork in accordance with ACI 301 to support vertical, lateral, static, and dynamic loads and construction loads that might be applied until concrete structure can support such loads.

C. The Contractor shall fabricate forms for easy removal without hammering or prying against concrete surfaces. Crush plates or wrecking plates shall be provided where stripping may damage cast concrete surfaces. Kerf wood inserts shall be provided for forming key-ways, reglets, recesses, chamfers and the like, to prevent swelling and assure ease of removal.

D. Forms for Exposed Concrete:
1. Construct formwork so concrete members and structures are of the size,

shape, alignment, elevation, and position indicated, all within tolerance limits of ACI 117.

2. Limit concrete surface irregularities designated by ACI 347 as Abrupt or Gradual as follows: Class B, ¼-inch.

3. The Contractor shall drill forms to suit the ties used and to prevent leakage of concrete mortar around the tie holes. The Contractor shall not splinter forms by driving ties through improperly prepared holes.

4. The Contractor shall not use metal cover slates for patching holes or defects in forms.

5. The Contractor shall provide sharp, clean corners at intersecting planes, without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections shall be provided.

6. The Contractor shall use extra studs, walers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Narrow strips of form material which will allow the forms to bow shall not be used.

7. The Contractor shall assemble forms so that they may be readily removed without damage to exposed concrete surfaces.

8. The Contractor shall place carefully and accurately all bracing to prevent sagging or misalignment.

9. All forms shall be new or in good condition free from holes, indentations, or irregular surfaces.

10. The exposed concrete joints shall be formed with special care to assure proper alignment and uniform cross section.

11. The Contractor shall form molding shapes, recesses and projections with smooth-finish materials, and install these in the forms with sealed joints to prevent displacement.

E. Cleaning and Tightening:

1. The Contractor shall thoroughly clean forms and adjacent surfaces to receive concrete. All chips, wood sawdust, dirt, or other debris shall be removed just before concrete is to be placed. All forms shall be retightened immediately after concrete placement as required to eliminate leaks.

3.3 FORM COATINGS

A. The Contractor shall coat the contact surfaces of forms with form-coating compound before steel reinforcement is placed. No form coating shall be allowed on steel reinforcement or on previously cast concrete sections which abut the new concrete pour.

B. The Contractor shall thin form-coating compounds only with the thinning agent of type and in amount and under the conditions recommended by the coating compound manufacturer. Excess form-coating material shall not be allowed to accumulate in the forms or to come into contact with concrete surfaces against which fresh concrete will be placed. All form coatings shall be applied in compliance with the manufacturer's instructions.

C. Steel forms shall be coated with a non-staining, rust-preventative form oil or otherwise to protect against rusting. Rust-stained steel formwork will not be accepted. Coat contact surfaces of forms with a light uniform film (a coverage rate of 1,200 square feet per gallon or higher) of the surface consolidation agent. Apply to steel forms as soon as they are cleaned to prevent discoloration of concrete from rust. Do not get surface consolidation agent on concrete surfaces or reinforcing steel against which fresh concrete will be placed.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached thereto. Securely anchor embedded items to prevent displacement during placement of concrete.

B. Edge Forms and Screed Strips for Slabs:

1. The edge forms or bulkheads and intermediate screed strips for slabs shall be set to obtain the required elevations and contours in the finished slab surface. The Contractor shall provide and secure units to support the types of screeds required.

3.4 REMOVAL OF FORMS

A. General: Formwork not supporting concrete, such as sides of walls, and similar parts of the work, may be removed after cumulatively curing at not less than 50 degrees Fahr¬enheit for 24 hours after placing concrete, provided; (1) concrete strength is sufficient to withstand damage by form removal operation and the forces acting on it, and (2) that curing and protection operations are maintained.

B. Formwork supporting the weight of concrete, such as slabs and other structural elements, may not be removed until the concrete has achieved the following:

1. At least 70 percent of 28-day design compressive strength.
2. Determine compressive strength of in-place concrete by testing representative field- or laboratory-cured test specimens according to ACI 301.
3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

C. Contractor shall assume responsibility for damage resulting from improper and premature removal of forms.

D. Satisfy applicable OSHA requirements with regard to safety of personnel and property.

E. Do not remove supports and reshore prior to obtaining adequate field cured cylinder results.

3.5 SHORES AND RESHORES

A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and re-shoring.

3.6 CONCRETE FINISHES

A. As specified in Section 03300, CONCRETE.

3.7 BACKFILL AGAINST WALLS

A. Do not backfill against walls until concrete has obtained compressive strength equal to specified 28-day compressive strength and all permanent supporting structure is in place.

B. Place backfill simultaneously on both sides of wall where required to prevent differential pressures.

3.8 FIELD TESTS

A. Wall Finish Tolerances: Test for compliance with tolerances as specified.

B. Slab Finish Tolerances and Slope Tolerances:
1. Floor flatness measurements will be made the day after floor is finished and before shoring is removed, to eliminate effect of shrinkage, curling, and deflection.
2. Support 10-foot long straightedge at each end with steel gauge blocks of thicknesses equal to specified tolerance.
3. Compliance with designated limits in four of five consecutive measurements is satisfactory unless obvious faults are observed.
4. A check for adequate slope and drainage will also be made to confirm compliance with these Specifications.

C. Finish Tolerance Failures: Repair or replace concrete as specified in Section 03300, CONCRETE.

3.9 RE-USE OF FORMS

A. All forms to be re-used in following work shall be clean and surfaces repaired to the satisfaction of the Engineer. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable. The Contractor shall apply new form-coating compound material to concrete contact surfaces as specified for new formwork.

B. When forms are extended for successive concrete placement, the Contractor shall thoroughly clean all surfaces, remove fins and laitance, and tighten forms to close all joints. All joints shall be secured and tightened to avoid offsets.

END OF SECTION 03 01 00

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SECTION 03 02 00 – CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This section includes the fabrication and placement of steel reinforcement for cast-in-place concrete structures, including bars, ties, and supports.

1.2 RELATED SECTIONS

A. Submittals: Section 013323.

B. Concrete Formwork: Section 030100

C. Concrete: Section 030300.

1.3 QUALITY ASSURANCE

A. Codes and Standards: The Contractor shall comply with all requirements of the following codes and standards (most recent edition), except as modified herein:
1. American Welding Society, AWS D12.1 "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections in Reinforced Concrete Construction."
2. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
3. American Concrete Institute, ACI 318 "Building Code Requirements for Reinforced Concrete."
4. American Concrete Institute, ACI 301 “Specifications for Structural Concrete.”
5. American Concrete Institute, ACI 315 "Manual of Standard Practice for Detailing Reinforced Concrete Structure."

1.4 SUBMITTALS

A. Concrete Reinforcement - Manufacturer's Data:
1. The Contractor shall submit the Manufacturer's specifications and installation instructions for all proprietary materials and reinforcement accessories.
a. Mechanical Threaded Connections and Metal Sleeve Connectors: Furnish current International Code Conference (ICC) Research Report or equivalent code agency report listing findings to include acceptance, special inspection requirements, and restrictions.

B. Concrete Reinforcement - Shop Drawings:
1. The Contractor shall submit certification of grade, chemical analysis and tensile properties of the steel furnished.

1.5 DELIVERY, HANDLING, AND STORAGE

A. All steel reinforcement delivered to the project site shall be bundled, tagged, and marked. Metal tags shall be used indicating the bar size, lengths, and other information corresponding to markings shown on placement diagrams in accordance with ACI 315.

B. The Contractor shall store concrete reinforcement materials at the site in a manner that will prevent damage and accumulation of dirt or excessive rust. Store to prevent contact with the ground. Protect all reinforcement from any contact with oil, grease, or petroleum based products of any kind.

PART 2 – PRODUCTS

2.1 REINFORCING STEEL GRADE

A. Unless otherwise called for on the Drawings, all reinforcing steel for this project shall conform to ASTM A615 Grade 60. Reinforcing which is welded shall conform to ASTM A706.

2.2 ACCESSORIES

A. Chairs and spacers shall be epoxy or polymer coated metal stock or plastic designed for the purpose intended.

B. All accessories shall comply with CRSI "Recommended Practice for Placing Bar Supports, Specifications and Nomenclature."

C. Wire-bar type supports shall complying with CRSI recommendations. Wood, brick, or other materials will not be accepted.

D. Tie wire shall be 16-gauge, black, soft-annealed wire. Tie wire shall not be closer than 1-inch from surface of wall or slab after tying in place.

2.3 SPLICES AND MECHANICAL CONNECTIONS

A. Metal Sleeve: If used for splice, provide with cast filler metal, capable of developing in tension or compression 125 percent of specified yield strength of the bar, as manufactured by:
1. Erico Products, Inc., Cleveland, OH, Cadweld C-Series.

B. Mechanical Threaded Connections (Rebar Couplers): Metal coupling sleeve with internal threads which engage threaded ends of bars to be spliced, and develops in tension or compression 125 percent of the specified yield strength of the bar, as manufactured by:
1. Erico Products, Inc., Cleveland, OH, Lenton Reinforcing Steel Couplers.
2. Richmond Screw Anchor Co., Inc., Fort Worth, TX, Richmond DB-SAE Dowel Bar Splicers.

PART 3 – EXECUTION

3.1 FABRICATION

A. General: The Contractor shall fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice" and ACI 301. In case of fabricating errors, the heating, rebending or straightening of reinforcement will not be permitted.

3.2 GENERAL

A. Meet requirements in the manual titled, "Placing Reinforcing Bars", published by Concrete

Reinforcing Steel Institute (CRSI).

B. Steel reinforcement shall be protected at all times from injury. When placed in the work, it shall be free from dirt, detrimental scale, paint, oil and other foreign substance. When steel reinforcement has detrimental rust, loose scale and dust which is easily removable, it shall be cleaned by a satisfactory method, if approved.

C. All bars shall be bent cold, unless otherwise permitted. No bars partially embedded in c oncrete shall be field bent except as shown on the Drawings or otherwise permitted.

D. Details of concrete reinforcement and accessories not covered herein or on the Drawings shall be in accordance with ACI 315.

E. Notify Contract officer when reinforcing is ready for inspection and allow sufficient time for this inspection prior to close-up of the forming system or placing concrete.

3.3 INSTALLATION

A. The Contractor shall clean reinforcement to remove all loose rust and mill scale, earth, ice, oil or grease, and other materials which reduce or destroy the bond between the concrete and reinforcing steel.

B. The Contractor shall position, support, and secure all reinforcement to prevent displacement by formwork, construction loadings, or concrete placement operations. Steel reinforcing shall be located and supported by chairs, runners, bolsters, spacers and hangers, as required. The reinforcement shall be placed to obtain the coverage for concrete protection noted on the Drawings. Where the coverage is not shown, the reinforcement shall be placed to obtain at least the minimum coverage specified hereinafter. The Contractor shall arrange, space, and securely tie bars and bar supports together with 16-gauge wire to hold reinforcement accurately and solidly in position during concrete placement operations. Wire ties shall be set so that the twisted ends are directed away from the exposed concrete surfaces. All reinforcement will be tied and secured in the correct position in the forms before placing concrete. Do not stab reinforcing into fresh placed concrete.

C. The Contractor shall provide a sufficient number of supports of adequate strength to carry the reinforcement. Reinforcing bars shall not be placed more than 2 inches beyond the last leg of any continuous bar support. Supports shall not be used as bases for runways for concrete conveying equipment and similar construction loads.

D. Supports or spacers of pebbles, pieces of broken stone, concrete rubble, broken brick or building blocks, metal pipe or wooden blocks will not be permitted.

E. Splices:
1. Standard reinforcement splices shall be done by lapping the ends, placing the bars in contact, and tightly wiring the splice together. The requirements of ACI 318 for minimum lap of spliced bars shall be provided. Use lap splices unless otherwise shown on the Drawings or permitted in writing by the Engineer. Stagger splices in adjacent bars.
2. No field welding or tacking of reinforcement will be permitted.
3. Vertical bars in columns shall be offset at least one bar diameter at lapped splices. To ensure proper placement, templates shall be furnished for all column dowels.

F. Unless otherwise shown on the detail Drawings, the Contractor shall provide cover as shown

in the General Structural Notes in the Drawings.

G. The Contractor shall provide extra reinforcing at all openings in structural walls as shown on the Drawings.

H. The Contractor shall notify the Contract officer when reinforcing is in place so that an inspection of reinforcement placement can be made prior to the close-up of formwork or the placement of concrete. Specifically, no concrete placement can take place until all rebar is in place and the rebar inspection has been completed by the Contract officer (for the formwork area inspection requested by the Contractor).

I. Conform to ACI 301 for all placing tolerances.

J. Bars may be moved to avoid interference with other reinforcing steel, conduits, or embedded items. If moved more than one bar diameter or the stipulated tolerance, the Contractor shall consult with the Contract officer to determine final placement.

K. At construction joints and before constructing concrete form work for next stage of construction, the Contractor shall clean all dowels, reinforcing bars and concrete surfaces. All loose material and foreign objects shall be cleaned out of forming before placement of concrete.

L. Field Bending:
1. Straightening and Rebending: Do not straighten or rebend metal reinforcement. Field bending of reinforcing steel bars is not permitted.
2. Unless permitted by Contract officer, do not cut reinforcing bars in the field.

3.4 MECHANICAL SPLICES AND CONNECTIONS

A. Install as required by manufacturer with threads tightened as required by referenced ICC Report.

B. Carefully inspect each splice and verify that each component meets manufacturer's and ICC requirements.

C. Maintain minimum edge distance and concrete cover.

END OF SECTION 03 02 00

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SECTION 03 03 00 – CONCRETE

PART 1 – GENERAL

1.1 WORK INCLUDED

A. This section shall include constructing the cast-in-place concrete structures consisting of Portland cement, fine and coarse aggregate, water and selected admixtures, combined, mixed, transported, placed, finished, and cured as herein specified.

B. Contractor is responsible to repair all cracks in concrete structures as specified herein. The work shall be done by an experienced and certified applicator as specified herein.

1.2 RELATED WORK

A. Submittals: Section 013323.

B. Quality Control: Section 01400.

C. Concrete Formwork: Section 030100.

D. Concrete Reinforcement: Section 030200.

1.3 QUALITY ASSURANCE

A. The Contractor shall have available on-site a copy of ACI SP-15 "Specifications for Structural Concrete for Buildings with Selected ACI and ASTM References."

B. The Contractor shall comply with all requirements of the latest editions of the following codes and standards, except as modified herein:
1. ACI 301 "Recommended Practice for Concrete Inspection."
2. ACI 318 "Building Code Requirements for Reinforced Concrete."
3. ACI 304 "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete."
4. ACI 305 "Recommended Practice for Hot Weather Concreting."
5. ACI 306 "Recommended Practice for Cold Weather Concreting."
6. ACI 308 "Recommended Practice for Curing Concrete."

C. Other references:
1. ACI 302 - Concrete Floor and Slab Construction.

1.4 SUBMITTALS

A. Concrete Mix Design.
1. The Contractor shall submit copies of the manufacturer's data with the application and installation instructions for proprietary materials and items, including reinforcement and forming accessories, admixtures, bonding and patching compounds, joint systems, curing compounds, floor hardeners, grout, and others as requested by the Contract officer.
2. Concrete Mix Design Proposals: Submit each mix design to the Contract officer for review at least 14 days before first use is planned. Include substantiating test data and mix

design details, including aggregate gradation and source, water/cement ratio, mix proportions, air content, slump, and strength. Substantiating data must include tests by an independent testing laboratory verifying the requirements specified under "Section 2.01 PROPORTIONING AND DESIGN OF MIXES" and "PART 4 TESTING". Submit complete information for each mix design which has different strength, different aggregate size or gradation, different proportions or is to be transported differently. For previously used mix submit copies of at least 10 tests meeting these specifications. Do not use any concrete until the mix design and substantiating data for that concrete has been reviewed.

B. Concrete Load Slips: The Contractor shall furnish copies of the delivery tickets for each load of concrete delivered to the site and other information as specified under ASTM C94, Certification. A specific batched quantity for each load shall be included.

C. Concrete Test Results: To demonstrate their capabilities and experience, provide qualification data for proposed independent testing agency that will provide the testing services specified under PART 4 TESTING. To qualify for acceptance, the independent testing agency must demonstrate, based on the evaluation criteria in ASTM C1093 that it has the experience and capability to satisfactorily conduct the testing indicated.

PART 2 – PRODUCTS

2.1 PROPORTIONING AND DESIGN OF MIXES

A. The following mix properties are required for all concrete placement within forms:

1. Proportion and design concrete mixes shall meet the following requirements:
   Strength @ 7 days 3000 psi
   Strength @ 28 days 4500 psi
   Maximum water/cementitious ratio 0.45 by weight
   Slump @ point of placement
   Without superplasticizer 4 inches maximum
   With superplasticizer 8 inches
   Minimum Cement Content (*) 6 sacks/yard or 470 pounds per cubic yard
   Fly Ash 15-25% of Cementitious Material
   Entrained Air 5-7%
   Maximum Aggregate Size ¾-inch, as defined herein, unless shown otherwise on the Drawings.
   (*) Contractor Note: Fly Ash will affect set times. Make appropriate adjustments.

2. A previously used mix design may be used provided aggregate source is the same, the mixing equipment is the same, and provided at least 10 tests were made by an independent laboratory with results meeting these specifications.
3. If any of the 7-day cylinder tests fail to meet the specified 7-day strength, the mix shall be modified for more strength. Submit modified mix for review before use.
4. Adjustment to Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to the Owner. Test data for revised mix designs and strength results must be submitted and accepted before using the mix adjustments.
5. Entrained Air: Air-entraining admixture shall be used unless otherwise shown or specified. Air-entraining admixture shall be added at the manufacturer's prescribed rate to result in concrete at the point of placement with an air content as specified herein (volume basis).

6. Concrete shall be mixed in conformance with ASTM C94.

B. Entrained air admixtures shall be used according to the manufacturer's prescribed rate. Test in accordance with ASTM C231.

C. The use of an accelerating agent is not permitted unless specifically authorized by the Contract officer.

D. Combined Aggregate Gradings:

1. Aggregate size shall be ¾-inches maximum for all areas or sections, unless otherwise indicated on the Drawings.

2. Grading limits for coarse aggregate shall be as follows:

a.

Sieve Size	Percentage Passing
¾" Max.	
2"	--
1-1/2"	--
1"	-100
3/4"	90-100
1/2"	--
3/8"	40-90
No. 4	5-20
No. 8	0-5

3. Grading limits for fine aggregate shall be as follows:

Sieve Size	Percentage Passing
3/8"	-100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	0-4

3. The combined mixture of fine and coarse aggregate shall be such that not more than 1.5 percent passes the No. 200 sieve.

2.2 PORTLAND CEMENT

A. Meet ASTM C150, Type I or Type II, or Type I-II (sulfate resistant) or Type V.

B. Non-hydraulic Above grade Structures: Use either Type I or Type II cement.

C. Hydraulic and Below grade Structures: Use Type I-II (sulfate resistant) or Type V cement.

2.3 AGGREGATES

A. Fine: Clean, sharp, natural sand, ASTM C 33. Fineness modulus shall not be less than 2.5 nor more than 3.0. Materials passing 200 sieve shall be 4 percent maximum

.

B. Coarse: Crushed stone or gravel, ASTM C 33. Maximum size of coarse aggregate shall be 1 ½-inches as defined hereinbefore, unless otherwise indicated on the Drawings. Materials

passing 200 sieve shall be 0.5 percent maximum.

C. Aggregates shall be natural, free from deleterious coatings, meeting ASTM C 33, nonreactive. Aggregate soundness testing for fine and coarse aggregates shall be in accordance with ASTM C 88 using a sodium sulfate solution. Thoroughly and uniformly wash before use. In accordance with ASTM C33, Appendix XI, paragraph X1.1, evidence of reactive problems on existing structures in the project area will be used to prove sources of aggregates are reactive and are unsuitable for use in the work. Import nonreactive aggregates if local aggregates are reactive.

D. Local aggregates not in compliance with the soundness and durability requirements of this standard shall not be used except with prior written approval of the Contract officer and provided it can be shown by special testing or a record of past performance that these aggregates produce concrete of adequate strength and durability.

2.4 WATER

A. All water for concrete mixtures shall be clean, potable, and free from injurious substances and conforming to ASTM C 94. Water containing 2 percent or more common salt shall not be used and chloride levels shall be less than 500 parts per million.

2.5 AIR ENTRAINING ADMIXTURES

A. Air entraining admixtures shall be used in all concrete exposed to the weather and as specified for quality of concrete used, ASTM C 260, except that admixture shall be non-toxic after 30 days and contain no chlorides or other chemicals causing corrosion:
1. "Aerolith," Sonneborn Building Products, Inc.
2. "MB-VR," Master Builders Company.
3. "Sika-AER," Sika Chemical Corp.
4. "Dara Vair AT 60," W.R. Grace and Company.
5. "Protex," Protex Industries, Inc.

B. Must be compatible with water-reducing admixture. Concrete with air-entrainment admixture added shall maintain air percentage as batched, within 2 percent for minimum 1 ½ hours after addition to concrete mix and through concrete pump-up.

2.6 WATER-REDUCING ADMIXTURES

A. Water-reducing admixtures shall conform to ASTM C 494, Type A or Type D.

B. Complex, multi-component, nonchloride, noncorrosive admixture providing unique performance qualities unobtainable from conventional water-reducing admixtures.

C. Manufacturer and Product:
1. Master Builders, Inc., Cleveland, OH, Pozzolith or Pozzolith Polyheed.
2. W.R. Grace & Co., Cambridge, MA, WRDA-27, or WRDA-64.

D. Must be compatible with air entraining admixture.

2.7 SUPERPLASTICIZERS (HIGH RANGE WATER REDUCERS)

A. Meet ASTM C494 and use only Type F or G, of second or third generation type.

B. Hold slump of 5 inches or greater for the time required for placement into the structure, or 2 hours minimum.

C. Type F Superplasticizer: Batch plant added to extend plasticity time, control temperature of fresh concrete, reduce water 20 to 30 percent, and give higher strengths at all ages.

D. Type G Superplasticizer: Batch plant added to extend plasticity time, maintain setting characteristics similar to normal concrete throughout its recommended dosage range and at varying concrete temperatures, reduce water 30 to 40 percent, and give high-early and ultimate strengths.

E. Superplasticizers for Hot Weather Placements:
1. A synthesized sulfonated complex polymer type superplasticizer containing no chlorides or alkalines.
2. Add to concrete mix at manufacturer's recommended dosage to allow placement with concrete temperatures up to 90 degrees F.

F. Manufacturer and Product:
1. Master Builders, Inc., Cleveland, OH, Rheobuild or Pozzolith Polyheed at a dosage greater than 10 ounces per 100 pounds of cement.
2. W.R. Grace & Co., Cambridge, MA, Daracem 19.
3. Euclid Chemical Co., Cleveland, OH, Eucon Super F or 537G.

2.8 FLY ASH

A. Fly ash shall be used with Cement Type V or Type I-II. Submit complete manufacturer's literature. If used conform to ASTM C618, Type C or F modified to allow $SiO_2+Al_2O_3+FeO_3$ minimum 66 percent and SiO_2 minimum 40 percent and to require a maximum loss on ignition of 2 percent. Do not use to replace more than 25 percent by weight. Maximum water to cement plus fly ash ratio shall not exceed w/c ratio as indicated in the Drawings.

2.9 CALCIUM CHLORIDE

A. Calcium chloride and products containing more than 0.1% chloride ions are not permitted. Provide admixture manufacturer's written certification that chloride ion content complies with specified requirements.

2.10 CONCRETE CURING MATERIALS

A. Do not use curing compound where additional finishes such as hardeners, paintings, and other special coatings are required. Use water curing as specified instead.

B. Absorptive cover shall be provided by burlap cloth made from jute or kenaf, weighing approximately 9 ounces per square yard and complying with AASHTO M 182, Class 2.

C. A moisture retaining cover shall comply with one of the following:
1. Waterproof paper, ASTM C 171.
2. Polyethylene film, ASTM C 171.
3. Curing Compound: Resin based compound conforming to ASTM C 309, with additional requirement that the moisture loss shall not exceed 0.030 gm/square cm/72 hours.

D. Manufacturer's certification shall state that curing compound can be applied in one coat and shall show the quantity or coverage required to meet or exceed that above moisture retention.

E. Provide manufacturer's certification that curing compound is acceptable to the appropriate state agency or health department.

2.11 CRACK REPAIR MATERIALS

A. One hundred percent solids, two-component low viscosity epoxy resin for injection, Sikadur 52 or Sikadur 35 HMLV, by Sika Chemical Corp., Lyndhurst, NJ, or approved equivalent. Epoxy cap seal for sealing cracks and mounting injection ports, Sikadur 31 HMGEL, or approved equivalent.

B. In special applications, an expanding polyurethane chemical hydrophobic grout such as Sika Fix HH by Sika Chemical Corp. may also be considered, as approved by the Contract officer.

2.12 NON-SHRINK GROUT

A. Non-shrink Grout Category I:

1. Non-shrink, nonmetallic, non-gas-liberating grout for use in filling tie holes in concrete, blockouts for gate guides, joints of precast components or members, and grouting baseplates of columns that do not exceed one story in height shall be one of the following:
   a. SIKA Grout 212, Sika Chemical Corp., Lyndhurst, NJ
   b. GP Grout, US. Spec, Denver, CO
   c. EUCO NS grout, Euclid Chemical Co., Cleveland, OH
   d. Five Star Special 100, U.S. Grout Corp., Fairfield, CT
   e. SET non-shrink grout, Master Builders Co., Cleveland, OH
   f. Supreme grout, Gifford Hill & Co., Dallas, TX
   g. UPCON "Super Flow", UPCO Co., Cleveland, OH
2. All grout shall be a fluid consistency in use except that for formwork tie holes the grout shall be dry pack consistency and shall fill the conical section with dense grout hammered in with steel tool and steel hammer.
3. Use Category II grouts for patching defects in walls and slabs after form removal, or structural repair mortars such as Sika Top 123 Plus and Sika Top 122 Plus, by Sika Corporation, or equal.

PART 3 – EXECUTION

3.1 CONCRETE MIXING

A. The materials for concrete shall be mixed at an acceptable concrete batch plant. Meet ACI 304 current edition and other requirements as specified for mix design, testing, and quality control. Each concrete truck delivering concrete to the site shall deliver a copy of the batch ticket to the Contractor and the Contract officer.

B. Ready-mix concrete shall comply with the requirements of ASTM C94 and as herein specified:

1. The addition of water to the mix at project site must be approved by the Contract officer and the maximum water-cement ratio shall not be exceeded. The delivery ticket shall be noted with amount of additional water added and submitted to the Contract officer.

2. Concrete shall be discharged at the job within 1-1/2 hours after water has been added to the cement and aggregates or cement batched with the aggregates, unless a longer time is specifically authorized by the Contract officer.
3. During hot weather or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required:
   a. When the air temperature is between 85 degrees Fahrenheit and 90 degrees Fahrenheit, the mixing and delivery time shall be reduced from a maximum of 1-1/2 hours to 75 minutes and when the air temperature is above 90 degrees Fahrenheit, the mixing and delivery time shall be reduced to no more than 60 minutes.

C. Truck Mixers:
1. Equip with electrically actuated counters to readily verify the number of revolutions of the drum or blades.
2. Counter:
   a. Resettable, recording type, mounted in driver's cab.
   b. Actuated at time of starting mixers at mixing speeds.
3. Performance Requirements:
   a. Truck mixer operation shall provide a concrete batch as discharged within acceptable limits of uniformity with respect to consistency, mix and grading.
   b. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than 1 inch when specified slump is 3 inches or less, or differing by more than 2 inches when specified slump is more than 3 inches, discontinue use of truck mixer unless causing condition is corrected and satisfactory performance is verified by additional slump tests.
   c. Check mechanical details of mixer, such as water measuring, and discharge apparatus, condition of blades, speed of rotation, general mechanical condition of unit, and clearance of drum before attempting to reuse unit.
4. Do not use non-agitating or combination truck and trailer equipment for transporting ready-mixed concrete.

D. Mixing Process:
1. Concrete Volume in Truck:
   a. Limit to 63 percent of total volume capacity per ASTM C94 when truck mixed.
b. Limit to 80 percent of total volume capacity when central mixed.
   2. Mix each batch of concrete in truck mixer for minimum 70 revolutions of drum or blades at rate of rotation designated by equipment manufacturer as mixing speed.
3. Perform additional mixing, if required, at speed designated by equipment manufacturer as agitating speed.
4. Place materials, including mixing water, in mixer drum before actuating the revolution counter for determining the number of mixing revolutions.

3.2 PREPARATION

A. Pre-Placement Inspection:
1. Before placing concrete, the Contractor will inspect and complete the formwork installation, placement of reinforcing steel, and items to be embedded or cast-in. Reinforcing shall not be stabbed into freshly placed concrete.
2. The wood forms shall be wetted immediately before placing the concrete when form

coatings are not used. Dampen subgrade before placing concrete for slabs on grade unless a vapor barrier is used.

3. The installation of joint materials shall be coordinated with the placement of forms and reinforcing steel.
4. Secure reinforcement in position and allow Contract officer to review acceptability before placing concrete.

B. Sleeves, Anchors and Inserts: All sleeves, anchors, and inserts required shall be properly placed, as detailed in the Drawings, in the concrete formwork and securely anchored to prevent displacement during the placing of the concrete.

3.3 CONCRETE PLACEMENT

A. Concrete shall be placed in compliance with the practices and recommendations of ACI Standards 304, 318, and 614, and as herein specified:

1. Concrete shall be placed continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within the section. The placement of concrete shall be done at such a rate that concrete is still workable. Concrete shall be placed as near as practicable to its final location to prevent segregation due to rehandling or flowing. Do not subject concrete to any procedure which will cause segregation.
2. In no case shall concrete be allowed to freely drop more than eight feet, or as specified hereinafter for super plasticized concrete.
3. Screed concrete which is to receive other construction to the proper level to avoid excessive skimming or grouting.
4. Concrete which has become non-plastic and unworkable, or does not meet the required quality control limits, or which has been contaminated by foreign material shall not be used. Do not use retempered concrete. Remove rejected concrete from the project site and dispose of it at an approved location.
5. Concrete discharge time shall be less than 90 minutes after adding cement to water and aggregate.

B. Placing Concrete into Forms:

1. Concrete shall be placed in forms in horizontal layers not deeper than 18 inches and in a manner to avoid inclined or unplanned cold construction joints. Where placement consists of several layers, place each layer while the preceding layer is still workable to avoid cold joints.
2. Temporary spreaders in forms shall be removed when concrete placement has reached the elevation of such spreaders.
3. Concrete placed in forms shall be consolidated by mechanical vibrating equipment supplemented by hand-spading, rodding, and tamping. Use equipment and procedures for consolidation of concrete in accordance with the recommended practices of ACI 309, to suit the type of concrete and project conditions. Vibration of forms and reinforcing will not be permitted.
4. Vibrators shall not be used to transport concrete inside of the forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate the layer of concrete and at least 6 inches into the preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit the duration of the vibration to the time necessary to consolidate the concrete and complete embedment of reinforcement and other embedded items without causing segregation

of the mix. Generally, this will be from 5 to 15 seconds in accordance with ACI 301.

5. Allowable Vertical Free Fall Drop to Final Placement:
   a. 5 feet in forms 8-inch or less wide and 8 feet in forms wider than 8 inches, except as hereinafter specified.
   b. Super plasticized Mixes: Up to 15 feet if slump is over 6 inches.
6. Do not use aluminum pipe or other aluminum conveying devices.
7. Provide sufficient illumination for interior of forms so concrete at places of deposit is visible to permit confirmation of consolidation quality.

C. Conveyor Belts and Chutes:
1. Design and arrange ends of chutes, hopper gates, and other points of concrete discharge throughout conveying, hoisting, and placing system such that concrete passing from them will not become segregated.
2. Do not use chutes longer than 50 feet.
3. Minimum Slopes of Chutes: Angled to allow concrete of specified consistency to readily flow without segregation.
4. Conveyor Belts:
   a. Must be approved by Contract officer.
   b. Wipe clean with a device which does not allow mortar adhering to the belt to be wasted.
   c. Cover conveyor belts and chutes.

D. Retempering: For concrete or mortar in which cement has partially hydrated, retempering is not permitted.

E. Pumping of Concrete:
1. General:
   a. Pumping is the preferred method of placing concrete.
   b. If pumped concrete does not produce satisfactory end results, discontinue pumping operation until the problem is corrected.
   c. At Contractor's option, other approved methods of placement may be used.
2. Equipment:
   a. Provide standby pump, conveyor system, crane and concrete bucket, or other system acceptable to Contract officer, on site during pumping, for adequate redundancy to assure completion of concrete placement without cold joints in case of a primary placing equipment breakdown.
   b. Minimum Pump Hose (Conduit) Diameter: 4 inches.
   c. Replace pumping equipment and hoses (conduits) that are not functioning properly.
   d. Do not use aluminum conduits for conveying concrete.
3. Field Control (For Pumped Concrete): Take concrete samples for air content, for slump (ASTM C143), and for test cylinders (ASTM C31 and C39) at placement (discharge) end of line.

F. Maximum Size of Concrete Placements:
1. Limit size of each pour regardless whether slabs or walls, to allow for strength gain and some volume change due to shrinkage to take place. Size shall be as specified hereinafter.

G. Removal of Water: Remove all water from space to be occupied by concrete.

H. Consolidation and Visual Observation:

1. Consolidate concrete with internal vibrators with minimum frequency of 8,000 vpm and amplitude required to consolidate concrete in section being placed.
2. Provide at least one standby vibrator in operable condition at placement site prior to placing concrete.
3. Consolidation equipment and methods shall meet ACI 309.
4. Provide sufficient windows in the forms or limit form height to allow visual observation of concrete.
5. Vibrator operator shall be required to see concrete being consolidated to ensure good quality workmanship, or an individual shall actually observe the vibration of concrete at all times and advise vibrator operator of any changes needed to ensure complete consolidation.
6. Consolidation and placement locations shall be planned and accomplished so that vibrators shall be inserted in the concrete as it is placed and in locations not to exceed a distance of 5 feet from point of placement.

I. Placing Concrete Slabs on Grade:
1. Prior to concrete placing, any area of subgrade on which concrete is to be placed shall be properly wetted. Concrete slabs shall be placed in a continuous operation, within the limits of construction joints, until the placement of a panel or section is completed. When in-place concrete has sufficiently set up (at least 36 hours), an alternate section shall be placed. All joints between sections shall be properly keyed. The edges of all sections shall be tooled with a minimum radius or chamfer edging tool.
2. Concrete shall be consolidated during placement operations using vibrating equipment, so that the concrete is thoroughly worked around reinforcement and other embedded items and into the corners.
3. Reinforcing steel shall be continuously maintained in the proper position during concrete placement operations.

J. Bonding:
1. Surfaces of set concrete at all joints shall be roughened, except where bonding is obtained by use of an approved concrete bonding agent, and the surfaces shall be cleaned of laitance coating, loose particles, and foreign matter. Surfaces shall be roughened in a manner to expose bonded aggregate uniformly and laitance, loose particles of aggregates, or damaged concrete at the surface shall be removed.
2. Bonding of fresh concrete to new concrete that has set, but is less than 60 days old or is not fully cured shall be done as follows:
   a. At joints between a footing and walls or columns, and between walls or columns and beams or slabs that they support, and elsewhere unless otherwise specified herein, dampen, but do not saturate, the roughened and cleaned surface of set concrete immediately before placing the fresh concrete.
   b. At horizontal joints in exposed work, and at joints designed to contain liquids, dampen, but do not saturate, the roughened and cleaned surface of set concrete immediately before placing the fresh concrete.
c. An approved commercial bonding agent shall be used for water holding structures. The agent shall be applied to cleaned concrete surfaces in accordance with the printed instruction of the bonding agent manufacturer.
3. Epoxy bonding agent shall be applied in accordance with the manufacturer's recommendations for bonding to old concrete (more than 60 days old). Coat contact surfaces with bonding agent after mechanically roughening surface to a clean, rough surface.

K. 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 air temperature has fallen to or is expected to fall below 40 degrees F within 3 days, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 80 degrees F at point of placement.
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 mix designs.

L. Hot Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 degrees F 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. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.4 FINISH OF FORMED SURFACES

A. Rough Form Finish:

1. This finish shall include formed concrete surfaces buried from view by backfill in the finish work or covered by other construction, unless otherwise shown or specified. Any surface which will be exposed to the air or water in the completed structure shall be a smooth form finish.
2. The standard rough form finish shall leave the concrete surface with the texture imparted by the form facing material used, with tie holes and defective areas repaired and patched and all fins and other projections exceeding ¼-inch in height rubbed down or chipped off.
3. Fill snap-tie holes with nonshrink, non-metallic grout as specified herein. Patch honeycomb areas and rock pockets with grout as specified herein. Small air holes do not require patching.

B. Smooth Form Finish (Trowel Finish):

1. This finish includes formed concrete surfaces which will be exposed to the air or water in the completed structure or to be covered with a coating material applied directly to the concrete, or a covering material bonded to the concrete, such as water proofing, damp-proofing, painting, or other similar system.
2. A smooth form finish shall be provided by selecting form materials that will impart a smooth, hard, uniform texture and arranging them orderly and symmetrically with a minimum of seams. All defective areas shall be patched and repaired with all fins or other projections completely removed and smoothed.
3. For smooth form finish walls:
    a. Fill snap-tie holes with approved nonshrink, nonmetallic color matched grout as specified herein.
    b. Grind off projections, fins, and rough spots.

c. Repair other defects such as honeycomb areas, rock pockets, and rough spots resulting from form release agent failure or other reason with color matched nonshrink grout as specified herein.

4. For smooth form trowel finish slabs:
   a. Finish by screeding and floating with straight-edges to bring surface to required finish elevation shown.
   b. While concrete is still green, but sufficiently hardened to bear a person' weight without deep imprint, wood float to true, even plane with no coarse aggregate visible.
   c. Use sufficient pressure on wood floats to bring moisture to surface.
   d. After surface moisture has disappeared, hand trowel concrete to produce smooth, impervious surface, free from trowel marks.
   e. Burnish surface with an additional troweling. Final troweling shall produce a ringing sound from trowel.
   f. Do not use dry cement or additional water during troweling. No excessive troweling will be permitted.

C. Related Unformed Surfaces: At horizontal offsets, and similar unformed surfaces occurring adjacent to formed surfaces, the placed concrete shall be struck off smooth and finished with a texture matching the adjacent formed surfaces. Continue the final surface treatment of the formed surfaces uniformly across the adjacent unformed surfaces, unless otherwise shown on the Drawings.

3.5 CONCRETE CURING AND PROTECTION

A. General:
1. Freshly placed concrete shall be protected from premature drying and excessive cold or hot temperature, and maintained without drying at a relatively constant temperature for the 7 day period of time necessary for the proper hydration of the cement. Concrete damaged by improper curing or placement methods shall be replaced by the Contractor and at no additional expense to the Owner.
2. Curing procedures shall begin immediately after placement of the concrete and continue for at least seven days or until concrete has attained 75 percent of its compressive strength in accordance with ACI 308.

B. Curing Method:
1. Liquid membrane curing shall be provided as follows:
   a. The Contractor shall use a commercially produced liquid membrane forming curing compound for curing concrete which meets the requirements of ASTM C309.
   b. Apply the specified membrane-forming curing compound to damp concrete surfaces as soon as the water film has disappeared. Apply uniformly in a 2-coat continuous operation by power spray equipment in accordance with the manufacturer's directions. Recoat all areas which are subjected to heavy rainfall within 3 hours after initial application. Maintain the continuity of the coating and repair any damage to the coat during the entire 7 day curing period.
   c. Membrane compounds shall not be used on surfaces which are to be covered with a coating material applied directly to the concrete or with a covering material bonded to the concrete, such as other concrete, liquid floor hardener, water-proofing, damp-proofing, flooring, paintings, and other coatings and finish materials.
2. Use approved water curing method where membrane compounds are not allowed.
3. For walls, use one of the following curing methods:
   a. Method 1: Leave concrete forms in place and keep entire exposed surfaces

wet at all times.

b. Method 2: Apply specified curing compound as specified, where allowed, immediately after removal of forms. Apply curing compound in two coats. Each coat shall be applied at the manufacturers recommended rate for one coat application.

c. Method 3: Continuously sprinkle 100 percent of all exposed surfaces.

C. Unformed surfaces shall be cured after finishing operations have been completed and as soon as marring of the concrete will not occur. The curing procedures shall continue for 7 days or until the concrete has attained 70 percent of its compressive strength in accordance with ACI 308.

D. Temperature of Concrete during Curing:

1. When the atmospheric temperature is 40 degrees Fahrenheit and below, the concrete temperature shall be maintained between 50 and 70 degrees Fahrenheit continuously throughout the 7 day curing period. When necessary, the Contractor shall make arrangements before the placement of concrete for heating, covering, insulation or housing as required to maintain the specified temperature and moisture conditions continuously throughout the concrete curing period. Cold weather protections shall comply with the requirements of ACI 306.

a. Where water curing as specified herein for slabs is not possible, use an approved curing compound as herein specified at twice the manufacturer's recommended coverage per gallon.

b. Where specified curing compound cannot be used, special methods using moisture shall be agreed upon prior to pouring the concrete slabs.

c. Protect slabs during cold weather with polyethylene sheeting or other material inside required heated enclosure if foot traffic is permitted on slabs.

2. When the atmospheric temperature is 80 degrees Fahrenheit and above, or during other climatic conditions which will cause a rapid drying of the concrete, the Contractor shall make arrangements before the start of concrete placement for the installation of wind breaks or shading, and for fog spraying, wet sprinkling, or a moisture-retaining covering. The concrete shall be protected continuously for the 7 day concrete-curing period. Hot weather concrete protection shall comply with the requirements of ACI 305.

3. The concrete temperature shall be maintained as uniformly as possible, and protected from rapid atmospheric temperature changes. Temperature changes in concrete which exceed 5 degrees Fahrenheit in any one hour and 50 degrees Fahrenheit in any 24-hour period shall be avoided and protected against.

E. During the curing period the concrete shall be protected from damaging mechanical disturbances including load stresses, excessive vibration and from damage caused by rain or flowing water. All finished concrete surfaces shall be protected from damage by subsequent construction operations. Any damage incurred shall be repaired by the Contractor at no additional expense to the Owner.

3.6 CONCRETE REPAIRS

A. The following section shall be used for repair of damage to the existing concrete structure during the demolition process and for new poured in place concrete structures.

B. Cracks in structures that are determined to have caused excessive leakage on exposed surfaces:

1. Inject all cracks with crack repair materials as specified hereinbefore. Crack repairs

shall be performed by a licensed applicator as specified hereinbefore and in accordance with the crack repair material manufacturer's recommendations, unless approved otherwise. Repair of all cracks shall be by the Contractor at no extra cost to the Owner.

C. Defective surface areas shall be repaired and patched with grout or specialized mortar as specified hereinbefore immediately after removal of forms and as directed by the Contract officer. All repairs shall be made by the Contractor at no extra cost to the Owner.

D. Repair of Formed Surfaces:

1. Formed surfaces which will be exposed-to-view or air in the completed structure and contain defects which adversely affect the appearance of the finish shall be repaired. The concrete with the defective surfaces shall be removed and replaced at no additional expense to the Owner if the defects cannot be repaired to the satisfaction of the Contract officer. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, and holes left by rods and bolts, fins, and other discolorations that cannot be removed by cleaning.
2. Concealed formed concrete surfaces that contain defects that adversely affect the durability of the concrete shall be repaired. If defects cannot be repaired, the defective concrete shall be removed and replaced at no additional expense to the Owner.

E. Repair of Unformed Surfaces:

1. Unformed surfaces such as monolithic slabs may be tested by the Contract officer for smoothness and to verify that the surface planeness meets the tolerances specified for each surface and finish. Any low and high areas shall be repaired by the Contractor at no additional expense to the Owner as specified herein.
2. Unformed surfaces that contain defects which adversely affect the durability of the concrete shall be repaired. Surface defects include crazing, cracks in excess of 0.01-inch in width or which penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycomb, rock pockets, and other objectionable conditions.
3. High areas in unformed surfaces shall be repaired by grinding after the concrete has cured sufficiently so that repairs can be made without any damage to adjacent areas.
4. Low areas in unformed surfaces shall be repaired during, or immediately after, completion of surface finishing operations by cutting out the low areas and replacing with fresh concrete. The repaired areas shall be finished to blend into adjacent concrete. Proprietary patching compounds may be used when approved by the Contract officer.
5. Defective areas, except random cracks and single holes not exceeding 1-inch diameter shall be repaired, by cutting the area out and placing fresh concrete. Defective areas shall be removed to sound concrete with clean, square cuts, and shall expose reinforcing steel with at least 3/4-inch clearance all around. Concrete surfaces in contact with patching concrete shall be dampened and brushed with a neat cement grout coating or approved epoxy adhesive, or a concrete of the same type or class as the original adjacent concrete. Place, compact, and finish as required to blend with the adjacent finished concrete. The repaired area shall be cured in the same manner as adjacent concrete.
6. Isolated random cracks in non-water holding structures and single holes not over 1-inch in diameter shall be repaired by the dry-pack method. Groove the top of cracks, and cut out holes to sound concrete. Clean off all dust, dirt, and loose particles. Dampen all cleaned concrete surfaces and apply by brush a neat grout coating. Place

dry-pack before the cement grout takes its initial set. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact the dry-pack mixture in place and finish to match the adjacent concrete. Keep the patched areas continuously moist for not less than 72 hours.

7. Repair methods not specified above may only be used if approved by the Contract officer.

3.7 REJECTIONS

A. Concrete Strength: Concrete strength shall be considered satisfactory if the average test of the two 28-day specimens exceeds the specified strength and neither specimen test falls below 95% of the specified strength. If the average strength of the two test specimens is less than specified or either specimen test is less than 95% of the specified strength, the concrete represented by the tests is rejected and must be removed and replaced at the Contractor's expense.

B. Alignment: Where concrete slabs or walls do not meet the alignment requirements, the Contractor must grind off irregularities until they comply. However, if such removal leaves less concrete section than indicated, the Contract officer may reject concrete if he feels the remaining section would not be adequate.

C. Appearance: Concrete exposed to view with defects which adversely affect the appearance of the specified finish may be repaired, if possible in accordance with paragraph 3.07. If, in the opinion of the Contract officer, the defects cannot be repaired to equal the specified finish, the concrete shall be rejected.

D. Misplaced Members: Concrete members cast in the wrong location may be rejected if the strength, appearance, or function of the structure is adversely affected or misplaced items interfere with other construction.

E. Rejected Concrete: Rejected concrete shall be removed and replaced. Limits of removal shall be as directed by the Contract officer to accomplish a structure equal in strength, serviceability, and appearance, to that which would have been achieved by acceptable concrete.

F. Expense of Repairs: The cost of all repairs, removal, replacement, etc., required by the provisions of this Article shall be borne by the Contractor.

PART 4 – TESTING

4.1 TESTS OF AGGREGATE

A. Provide tests of aggregate before concreting per ASTM C33. Tests may be waived by Contract officer if aggregates to be used have shown actual use to produce concrete or required strength, durability, water-tightness, fire resistance, and wearing qualities.

4.2 STRENGTH TEST OF CYLINDERS DURING WORK

A. Provide for test purposes, sets of four cylinders each, taken for each portion placed each day. Test one cylinder per set at 7 days, two at 28 days, and retain one for backup.

B. Evaluation will be in accordance with ACI Standard Building Code Requirements for Reinforced Concrete (ACI 318 latest edition), Section 4.7, "Evaluation and Acceptance of Concrete", and these Specifications. Where the term "building official" is used in Section 5.6 of ACI 318, term shall be redefined to "the Owner's representative".

C. Specimens will be made, cured, and tested by the Owner's independent testing firm in accordance with ASTM C31 and ASTM C39. The Contract officer shall determine which concrete trucks are to be tested in any pour and shall direct the independent testing firm. Only the Contract officer or the testing firm may transport specimens or cylinders from the site to the laboratory.

D. Frequency of testing may be increased at discretion of Contract officer.

4.3 SLUMP TESTS

A. Owner’s independent testing firm will take slump tests with each strength test and as directed by the Contract officer in accordance with ASTM C143.

4.4 AIR CONTENT

A. ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day’s pour of each type of air-entrained concrete or one with each strength test. Test by Owner’s independent firm.

4.5 CONCRETE TEMPERATURE

A. ASTM C1064; one test hourly when air temperature is 40 degrees F and below and when 80 degrees F and above, and one test for each set of compressive strength specimens. Test by Owner’s independent testing firm.

4.6 TEST OF HARDENED CONCRETE

A. Acceptance shall be based on concrete cylinder tests in accordance with Paragraph 3.11. Contractor may provide additional test by coring per ASTM C42 or load tests for that portion of job where questionable concrete has been placed. Such additional testing will be accepted in lieu of cylinder tests. Results of rebound hammer tests will not be accepted except in defining problem areas.

4.7 TESTING AGENCY

A. All tests shall be made by an independent testing laboratory approved by the Owner. Contractor is responsible for scheduling all quality control testing described herein and submitting results to the Owner. The Owner may provide additional quality assurance testing as necessary.

4.8 COST OF TESTING

A. The Owner shall bear all costs of testing required by this section including tests of hardened concrete where cylinder strengths indicate high or low strength concrete.

4.9 TEST RESULTS

A. Submit two (2) copies of all tests to Contract officer within 24 hours of testing.

4.10 CURE BOX

A. Provide a cure box at the project site for initial cure of test cylinders. Construct and equip box to provide initial cure in accordance with ASTM C31.

END OF SECTION 03 03 00

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SECTION 05 05 00 – MISCELLANEOUS METAL WORK

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section includes the work necessary to furnish and install, complete, fabricated metalwork as shown or as required to secure various parts together and provide a complete installation.

1.2 GENERAL

A. Like items of materials provided hereunder shall be the end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.

1.3 SUBMITTALS

A. Shop Drawings:

1. Shop drawings, including calculations where required, showing the details of fabrication and installation for miscellaneous metalwork.

1.4 STANDARDS

A. "Code for Welding in Building Construction," American Welding Society.

B. "Fastener Standards," Industrial Fastener Institute.

C. "Code and Specifications" of the American Institute of Steel Construction.

D. “Codes and Standards” of the Aluminum Association current Construction Manual series.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Shipment:

1. To the extent practical, factory assemble items specified herein.

2. Package and clearly tag parts and assemblies that are of necessity shipped unassembled, in a manner that will protect materials from damage, and facilitate identification and field assembly.

1.6 GENERAL FABRICATION

A. Fabrication shall be coordinated with connecting work.

B. The fabrication shall be done in units as large as practicable for finishing, handling, and installation.

C. All welding shall conform to the requirements of the American Welding Society.

D. Connections:

1. Shop connections shall be welded after removing all scale, and ground smooth.

2. Field connections shall be bolted, unless otherwise specified or detailed.

3. Punch or drill holes shall not be cut with a torch.

4. Joints exposed to weather shall be formed so as not to trap water.

5. Butt joints shall use the mill square end and be smoothed.

6. Corners shall use a cope and weld technique.

PART 2 - PRODUCTS

2.1 GENERAL

A. Like Items of materials shall be the end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.

B. Where applicable, the structure and appurtenant facilities have been designed around the first named manufacturer's equipment. Metalwork furnished by all qualified interested manufacturers will be considered, provided that necessary structural, electrical, and mechanical changes required are submitted. The Contractor shall bear all costs for necessary changes for a complete and satisfactory installation.

C. Furnish miscellaneous items:

1. Miscellaneous metalwork and castings as shown, or as required to secure various parts together and provide a complete installation.

2. Items specified herein are not intended to be all inclusive. Provide metalwork and castings shown, specified, or which can reasonably be inferred as necessary to complete the project.

D. Unless otherwise indicated, materials shall meet the latest issue of ASTM Specifications as follows:

Item ASTM Specification

Steel Shapes & Plates: A36 Plates, A992 for “W” shapes

Steel Pipe Columns: A500
Grade B

Structural Steel Tubing: A500

Connection Bolts for Steel:
Members; Use Hardened
Washers also Under Head and Nut: A325-N

Anchor Bolts & Nuts:
Carbon Steel: A307 or A36
Galvanized Steel Bolts and Nuts: A153, Zinc Coating for A307 or A36
Flat Washers (Unhardened) F844, Use A153 for Zinc Coating
Threaded Bars: A36

All steel to be hot-dip galvanized after fabrication unless noted otherwise.

2.2 ANCHOR BOLTS

A. Anchor bolts for equipment and machinery, where permanently anchored into concrete shall be stainless steel, unless otherwise shown. The diameter, length, and any bend dimensions shall be as required by the equipment or machinery manufacturer. Unless otherwise required, use 3/4-inch minimum diameter and other geometry shown on the Drawings. Furnish a minimum of two nuts and a washer of the same material for each bolt. Provide sleeves as required or as shown for location adjustment.

B. Anchor bolts for other uses to anchor fabricated metal work or structural building columns, or other components where the connections will be protected or dry, shall be galvanized steel. Minimum size shall be 3/4-inch diameter by 12-inches long, unless otherwise shown. Furnish two nuts and one washer per bolt of the same material as the bolt, unless otherwise shown.

C. Anchor bolts for other uses to anchor fabricated metal work or structural building components, or structural frame components in areas of wet use, washdown areas, or areas outside heated buildings, shall be stainless steel. Minimum size shall be 3/4-inch diameter by 12-inches long, unless otherwise shown. Furnish two nuts and one washer per bolt of the same material as the bolt, unless otherwise shown.

2.3 ANCHORING SYSTEMS FOR CONCRETE

A. Wedge Anchors:

1. Wedge anchors shall be Type 316 stainless steel, manufactured by ITT Philips Drill Division, Michigan City, IN; Hilti Super Kwik-Bolt, stud type, manufactured by Hilti, Inc., Tulsa, OK; Parabolt Concrete Anchors, manufactured by Molly Division of Emhart Corp., Temple, PA; or equal. Furnish sizes shown on Drawings. Provide ICBO (International Conference of Building Officials) or other similar building code organization recommendations regarding safe allowable design loads.

B. Expansion Anchors:

1. Expansion anchors shall not be used except in dry areas where future corrosion is not a problem. In wet or damp areas, provide wedge anchors as specified, or in submerged conditions, epoxy adhesive anchors as specified.

2. Self-drilling anchors, snap-off type or flush type. Provide anchors for use with hot-dipped galvanized bolts. Nondrilling anchors shall be flush type for use with a bolt or stud type with projecting threaded stud. Provide ICBO or other similar code organizations' recommendation regarding safe allowable design loads. ITT Phillips Drill Division, Michigan City, IN; Hilti HDI Drop-In anchors, Hilti, Inc., Tulsa, OK; or approved equal.

C. Epoxy Adhesive Anchors:

1. Provide for anchoring metal components in structures buried in earth conditions, or in submerged or wet locations (such as the existing influent pump station well or existing oxidation ditch splitter box.

2. Anchor rod shall be Type 316 stainless steel threaded rod free of grease, oil, or other deleterious material with a 45-degree chisel point. Where indicated, use typical reinforcing where attaching to existing concrete.

3. Epoxy Adhesive:

   a. Meet ASTM C881, Type 1, Grade 3, Class A, B, or C.

   b. Two-component, 100 percent solids, nonsag, paste, insensitive to moisture, designed to be used in adverse freeze/thaw environments and gray in color.
   c. Cure Temperature, Pot Life, and Workability: Compatible for intended use and environmental conditions.

4. Mixed Epoxy Adhesive:

   a. Nonsag paste consistency with ability to remain in a 1-inch diameter overhead drilled hole without runout, holding the following properties:

1. Slant Shear Strength, ASTM C881/882, No Failure In Bond Line, Dry/Moist Conditions: 5,000 psi.

2. Compressive Strength, ASTM D695: 14,000 psi minimum.

3. Tensile Strength, ASTM D695: 4,500 psi.

4. Heat Deflection Temperature, ASTM D648: 135 degrees F, minimum.

5. Epoxy Adhesive Packaging:

   a. Disposable, self-contained cartridge system capable of dispensing both epoxy components in the proper mixing ratio, and fit into a manually or pneumatically operated caulking gun.

   b. Dispense components through a mixing nozzle that thoroughly mixes components and places epoxy at base of predrilled hole.

   c. Mixing Nozzles: Disposable, manufactured in several sizes to accommodate sizes of anchor rods.

6. Manufacturers:

   a. Hilti Corporation, P.O. Box 21148, Tulsa, OK, 74121, HIT HY 150 Adhesive Anchoring System.
   b. ITW Ramset/Red Head, P.O. Box 90, Paris, KY 40361, Epcon Ceramic 6 Epoxy Anchor System.

c. Or equal.

2.4 BOLTS AND FASTENERS

A. Bolts and fasteners not permanently embedded in concrete, but located outdoors in areas subject to the weather shall be Type 316 stainless steel as hereinbefore specified.

2.5 SOURCE QUALITY CONTROL

A. Contractor will engage an independent testing and inspecting agency to perform shop inspections and tests and to prepare test reports. Testing agency will conduct and interpret tests and state in each report whether test specimens comply with or deviate from requirements. Provide testing agency with access to places where structural steel work is being fabricated or produced so required inspection and testing can be accomplished.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

D. In addition to visual inspection, shop welded connections will be inspected and tested according to AWS D1.1.

PART 3 - EXECUTION

3.1 GENERAL

A. Workmanship and finish of all metalwork specified under this section shall be the highest grade and equal to the best practice of modern shops for the respective work. Exposed surfaces shall have smooth finish and sharp, well-defined lines. Provide all necessary rabbets, lugs, and brackets so that the work can be assembled in a neat, substantial manner. Conceal fastenings where practical. Drill metalwork and countersink holes as required for attaching hardware or other materials. Fabricate materials as specified. Weld connections, except where bolting is directed. Items requiring special fabrication methods are mentioned herein. Fabrication of all other items shall be of equal quality. Methods of fabrication not otherwise specified or shown shall be adequate for the stresses and as directed by the Contract officer.

B. Grind all exposed edges of welds smooth. All sharp edges shall be rounded to a 1/8-inch minimum radius; all burrs, jagged edges, and surface defects shall be ground smooth.

C. Welds and adjacent areas shall be prepared such that there is (1) no undercutting or reverse ridges on the weld bead, (2) no weld spatter on or adjacent to the weld or any other area to be painted, and (3) no sharp peaks or ridges along the weld bead. All embedded pieces of electrode or wire shall be ground flush with the adjacent surface of the weld bead.

3.2 WELDING

A. The technique of welding employed, appearance, quality of welds made, and the methods of correcting defective work shall conform to codes for Arc and Gas Welding in Building Construction of the AWS and AISC. Surfaces to be welded shall be free from loose scale, rust, grease, paint, and other foreign material, except that mill scale which will withstand vigorous wire brushing may remain. A light film of linseed oil may likewise be disregarded. No welding shall be done when the temperature of the base metal is lower than zero degrees F. Finished members shall be true to line and free from twists.

B. Prepare welds and adjacent areas such that there is no undercutting or reverse ridges on the weld bead, no weld spatter on or adjacent to the weld or any other area to be painted, and no sharp peaks or ridges along the weld bead. Grind embedded pieces of electrode or wire flush with adjacent surface of weld bead.

3.3 INSTALLATION OF FABRICATED METALWORK

A. Install in accordance with the shop drawings, the Drawings and these Specifications. Perform field welding and erection work by skilled mechanics. Install fabricated metalwork plumb or level as applicable. The completed installations shall, in all cases, be rigid, substantial, and neat in appearance. Erect structural steel in accordance with the applicable portions of AISC Code of Standard Practice, except as modified. Install commercially manufactured products in accordance with manufacturer's recommendations as approved.

3.4 ANCHOR BOLTS

A. All anchor bolts shall be accurately located and held in place with templates at the time the concrete is poured.

3.5 CONCRETE ANCHORS

A. Installation shall not begin until the concrete or masonry receiving the anchors has attained its design strength. Anchor shall not be installed closer than six times its diameter to either an edge of the concrete or masonry, or to another anchor, unless specifically detailed otherwise on the Drawings. Install in strict conformance with manufacturers written instructions. Use manufacturer's recommended drills and equipment.

B. Do not install epoxy adhesive anchors when temperature of concrete is below 35 degrees F or above 110 degrees F.

C. The minimum pitch diameter of the threaded portion of all bolts, anchor bars, or studs shall conform to ANSI B1.1, having a Class 2A tolerance before galvanizing. After galvanizing, the pitch diameter of the nuts or other internally threaded parts may be tapped over ANSI B1.1, Class 2B tolerance, by the following maximum amounts:

3/8-inch through 9/16-inch	0.016-inch oversize
5/8-inch through 1-inch	0.023-inch oversize
1-1/8-inch and larger	0.033-inch oversize

3.6 FIELD QUALITY CONTROL

A. Contractor will engage an independent testing and inspecting agency to perform field inspections and tests and to prepare test reports. Testing agency will conduct and interpret tests and state in each report whether tested work complies with or deviates from requirements.

B. Correct deficiencies in or remove and replace structural steel that inspections and test reports indicate do not comply with specified requirements.

C. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

D. Field bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

E. In addition to visual inspection, field welded connections will be inspected and tested according to AWS D1.1.

END OF SECTION 05 05 00

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SECTION 05 05 30 – FABRICATED GRATING

PART 1 - GENERAL

1.1 WORK INCLUDED

A. This section includes furnishing and installing all fabricated grating and grating supports, complete.

1.2 GENERAL

A. Like items of materials provided hereunder shall be the end products of one manufacturer in order to achieve standardization for appearance, maintenance, and replacement.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements: Fabrication, installation, standard clearances, and tolerances shall be in accordance with the Aluminum Association standards.

1.4 SUBMITTALS

A. Product Data:

1. Catalog information and catalog cuts.

2. Manufacturer's specifications, including coatings.

3. Special handling and storage requirements.

4. Installation instructions.

B. Shop Drawings:

1. Grating: Show dimensions, weight, and size, and location of connections to adjacent grating, supports, and other work.

2. Grating supports: Show dimensions, weight, size, location, and anchorage to supporting structure.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Preparation for Shipment:

1. To the extent practical, factory assemble items provided hereunder.

2. Package and clearly tag parts and assemblies that are of necessity shipped unassembled in a manner that will protect the materials from damage, and facilitate identification and final assembly in the field.

B. Storage and Handling: In accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials shall meet the following ASTM Specifications:

1. Stainless Steel:

a. Bolts: A193, Type 316.
b. Nuts: A194, Type 316.

2. Galvanized Steel:

a. Plates, Bars and Shapes ASTM A 36

3. Anchor Bolts and Nuts:

a. Stainless: A193, Type 316.

4. Flat Washers (Unhardened): F844, use A153 for zinc coating.

B. Design and Fabrication:

1. Meet minimum dimensional requirements as shown in Drawings.

2. Field measure areas to receive grating, verify dimensions of new fabricated supports, and fabricate to dimension required.

3. Section Length: Sufficient to prevent section from falling down through clear opening when oriented in the span direction when one end is touching either the concrete or the vertical leg of grating support.

4. Minimum Depth of Grating: As shown in Drawings.

5. Metal Cross Bar Spacing: 2-inch maximum, unless otherwise shown or specified.

6. Cross Bars:

a. Flush with top of main bar and extend downward a minimum of 50 percent of the main bar depth.
b. Swaged Cross Bars:

(1) Within 1/4-inch of top of grating with 1/2-inch minimum vertical dimension after swaging, and minimum before swaging dimension of 5/16-inch square.
(2) Cross Bar Dimension After Swaging: Minimum 1/8-inch wider than the opening at minimum of two corners at each side of each square opening in main bar.
(3) Tightly fit main bars and cross bars allowing no differential movement.

8. Do not use weld type cross bars.

9. Banding:

a. Same material as grating.

10. Metals for Embedment, or Seat Angles for Partial Embedment in Concrete: Type 316 stainless steel, unless otherwise specified.

C. Grating Accessories: Anchor bolts, bolts, inserts, threaded anchor studs, wedge anchors, expansion anchors, adhesive anchors and as necessary for anchorage of grating to supports:

1. Stainless steel Type 316.

2. Fastener Capability: Firmly secure grating section to supports.

3. Fastener Clip(s) and Bolt(s): In accordance with grating manufacturer's recommendations, except minimum of four fasteners per grating section and removable from above grating walkway surface.

4. Provide stainless steel Type 316 threaded anchor studs, as fasteners for grating attachment to metal supports either not embedded or partially embedded in concrete, as manufactured by:

a. Nelson Studs Welding Co., Lorain, OH.
b. Omark Industries, KSM Fastenings Systems Div., Seattle, WA, or Portland, OR.

D. Grating Supports:

1. Seat angles and beams where shown.

2. Galvanized steel ASTM A36.

3. Coordinate dimensions and fabrication with grating to be supported.

2.2 FOOT TRAFFIC GRATING

A. Use galvanized steel grating at all locations, unless shown otherwise on the Drawings. Uniform Service Load: 100 psf minimum, unless otherwise shown.

B. Maximum Deflection: 1/4-inch, unless otherwise shown.

C. Banding: 3/16-inch minimum.

2.3 FABRICATION

A. General:

1. Exposed Surfaces: Smooth finish and sharp, well-defined lines.

2. Provide necessary rabbets, lugs, and brackets so work can be assembled in a neat, substantial manner.

3. Conceal fastenings where practical.
4. Drill metalwork and countersink holes as required for attaching hardware or other materials.

5. Weld Connections: Not permitted on grating except at banding bars.

B. Galvanized Steel:

1. Fabricate as shown and in accordance with manufacturer's recommendations as approved.

2. Grind smooth sheared edges exposed in the finished work.

3. Swage cross bars, if used, with equipment strong enough to deform cross bars as specified herein.

4. Eliminate any loose cross bar intersections on swaged grating.

C. Foot Traffic Grating: Any single grating section, individual plank, or plank assembly shall not be less than 1 foot 6 inches or greater than 3 feet 0 inches in width or weigh more than 150 pounds, unless otherwise shown on approved shop drawings.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Provide equipment for lifting and placing as necessary.

B. Install in accordance with approved shop drawings, and as shown and as specified.

C. Install plumb or level as applicable in locations as shown.

D. Anchor grating securely to supports to prevent displacement from traffic impact.

E. Completed Installation: Rigid and neat in appearance.

F. Commercially Manufactured Products:

1. Install in accordance with manufacturer's recommendations as approved.

2. Secure grating to support members with fasteners.

3. Welding is not permitted.

4. Fasteners: Field locate and install.

5. Permit each grating section or plank style grating assembly to be easily removed and replaced.

G. Clearance Between Ends of Grating Sections and Vertical Surfaces of Supports or Concrete Walls: Not to exceed those hereinbefore specified.

H. Replace grating sections not meeting specified or detailed dimensional requirements

END OF SECTION 05 05 30

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SECTION 15 04 00 – HEADGATES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Slide gates including lifts, stems and accessories, shall be of the size and type shown on the Drawings and specified herein. Where possible, gates shall be installed so that there is a seating head on the gate. Gate, frame, and yoke design shall conform to the following:
   1. AWWA C561 (Stainless).
   2. Carbon Steel

B. All gates supplied to this project shall be manufactured by an approved manufacturer.

C. Contractor shall ensure that all concrete formwork accommodates approved gate installations.

1.2 SUBMITTALS

A. Contractor shall submit to Contract officer copies of all gate manufacturer's shop drawings for gates and installation guidance prior to fabrication.

B. Manufacturer shall provide Owner with Operations and Maintenance Manuals for all gates at time of product delivery.

1.3 FIELD QUALITY CONTROL

A. Field testing shall be performed after installation of the equipment. Testing shall demonstrate the following:
   1. The equipment has been properly installed in accordance with manufacturer's instructions and recommendations.
   2. The equipment has been installed in the specified location and orientation or as shown on the Drawings.
   3. The equipment has been aligned.
   4. There are no mechanical defects in any of the parts.

1.4 TESTS

A. Leak Test for Gates.
   1. Provide water surface on front side of gates to at least top of gate opening and maintain water surface elevation throughout duration of test.
   2. Observe back side of gates or outlet for minimum 30 minutes.
   3. Gates shall prevent any visible or measurable flowing water.

END OF SECTION 15 04 00

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SECTION 31 20 15 – CLEARING, GRUBBING AND TREE REMOVAL

PART 1 – GENERAL

1.1 SUMMARY

This section covers the removal of vegetation, debris, trees and other obstacles from the defined limits of the project area and/or construction work site.

1.2 RELATED WORK

Section 015000 – Temporary Facilities and Controls.

Section 310300 – Tree Protection.

Section 312200 – Site Excavation and Backfill.

Section 312201 – Trench Excavation and Backfill for Utilities.

1.3 SUBMITTALS Not used.

1.4 DEFINITIONS

A. Clearing - consists of removal and disposal of trees, stumps, logs, limbs, sticks, vegetation, rubbish, debris and other material on the natural ground surface.

B. Grubbing - consists of removing and disposing of roots (one-inch and larger diameter), tree stumps, buried logs, debris, and other underground obstructions.

PART 2 – MATERIALS Not used.

PART 3 – CONSTRUCTION REQUIREMENTS

Clear, grub, remove and dispose of all trees, vegetation, unsuitable soil and debris within the staked limits of the roadways, ditches, channels, embankments, structures, and other designated areas. Do not injure or damage trees, shrubs, or other vegetation and objects to remain intact as designated by the Contract Officer. Such items are to be fully protected from injury at the Contractor's expense.

3.1 CLEARING

A. Areas within the limits of excavation and embankment slope stakes shall be cleared.

B. Tree branches extending over the area to be cleared and which hang and obstruct work shall be cut off in a neat and workmanlike manner. When such branch removal is necessary, the Contractor shall remove branches on the tree under the direction of the Contract Officer so as to present a balanced appearance.

C. Suitable topsoil shall be removed, transported, and deposited in designated stockpile areas for re-use into the project where allowed.

3.2 GRUBBING

Grub the area between the limits of the excavation and embankment slope stakes to a depth of one

(1) foot below natural ground level to remove all stumps, roots, buried logs and other underground debris. However, when the roadway embankment already is two feet or more above the natural ground level, stumps cut less than 6 inches above natural ground, together with roots and other non-perishable obstructions, may remain in place.

3.3 BACKFILLING

All stump holes, cuts, depressions and other holes resulting from clearing and grubbing operations within areas designated to receive pipelines, structures, or embankments shall be backfilled and compacted to the density of the surrounding ground.

3.4 DISPOSAL

The Contractor shall dispose of all materials resulting from clearing and grubbing operations as required in the Contract Documents and in accordance with Section 017419 of these Specifications.

3.5 MARKERS, MONUMENTS AND DATA POINTS

Land monuments, property markers or official datum points shall be protected until their removal is approved. When movement of monuments or markers is deemed necessary and approved by the Contract Officer, all such monuments or markers shall be carefully referenced for re- establishment before removing.

END OF SECTION 31 20 15

SECTION 31 21 05 – EARTHWORK AND TRENCHING MATERIALS

PART 1 – GENERAL

1.1 SUMMARY

This section covers obtaining permission, permits, clearances, etc.; as necessary to develop source(s), purchasing or manufacturing, loading, hauling, placing and compacting earthwork materials described herein, as shown on the Drawings and/or required by these Specifications.

1.2 RELATED WORK

Section 31 21 50 – Subgrade Preparation.

Section 31 22 00 – Site Excavation and Backfill.

Section 31 22 01 – Trench Excavation and Backfill for Utilities.

Section 31 23 00 – Watering.

1.3 SUBMITTALS

When the quantities of materials described in this section in excess of 50 cubic yards or 50 tons, or when requested otherwise by the Contract Officer, the Contractor shall provide test results from a certified independent laboratory which has sampled and performed the prescribed test(s) for those materials.

1.4 DEFINITIONS

A. Bedding - Materials placed immediately around and adjacent to pipe installed in trenches.

B. Granular Material - Material for which the sum of plasticity index (AASHTO T-90) and the percent of material passing a No. 200 sieve (AASHTO T-27) shall not exceed 23.

C. Silt - Material which passes the No. 200 (AASHTO T-11) sieve and has a plasticity index not greater than 10.

D. Clay - Material which passes the No. 200 sieve and has a plasticity index greater than 10.

E. Borrow - Material obtained from a source away from the site on which installed and/or excavated and used to supplement insufficient quantities of material required.

PART 2 – MATERIALS

2.1 ON-SITE EMBANKMENT MATERIAL

Free from frozen material, debris, muck, detrimental quantities of organic materials, and other

unsuitable materials.

2.2 IMPORTED BORROW

Clean, readily compactible soils or soil aggregate, with all particles passing a 6-inch square opening and not more than 35 percent passing a No. 200 sieve, as determined by AASHTO T88 81. The portion of the material passing a No. 40 sieve shall have a plasticity index of not more than 10, as determined by AASHTO T90 81. Use all suitable existing embankment material before importing borrow.

2.3 ON-SITE TRENCH OR STRUCTURAL BACKFILL

Use material excavated during trenching or foundation excavation which is free of cinders, ashes, wood, vegetation, frozen or other deleterious material or rocks with a maximum particle size not greater than 6 inches. Material may be required to be processed or transported along the excavation.

2.4 IMPORTED TRENCH OR STRUCTURAL BACKFILL

1. Imported trench or structural backfill consists of granular material obtained from sources indicated on the Drawings, designated in the Special Provisions or approved by the Contract Officer. Borrow materials shall be free of cinders, ashes, wood, vegetative matter, frozen or other deleterious matter with a maximum particle size not greater than 6 inches. Pit Run Borrow may be used as backfill in trenches, excavations for structures, in roadway subgrades, or as otherwise shown on the Plans or called for by the Contract Officer. Material may be processed or may be pit run.

2. Fill material is stockpiled within park for backfill of trenches as needed.

2.5 ON-SITE PIPE BEDDING

On-site pipe bedding consists of material excavated during the trenching operation which is free of cinders, ashes, wood, vegetation, frozen or other deleterious material or rocks with a maximum particle size not greater than that shown below in Table 1. Material may be required to be processed or transported along the trenching operation.

2.6 IMPORTED PIPE BEDDING

Imported pipe bedding consists of granular material excavated from an approved borrow source which is free of cinders, ashes, wood, vegetation, frozen or other deleterious material or rocks with a maximum particle size not greater than that shown in Table 1 below. Material may be processed or may be pit run.

TABLE 1 – MAXIMUM PARTICLE SIZE FOR PIPE BEDDING

PIPE	**SIZE**
Corrugated Metal and Welded Steel	1”
Polyethylene, Galvanized Steel and PVC	3/4” in Utah or 1”in other states
Ductile Iron, Cast Iron, Concrete, and HDPE	2”

2.7 SUBGRADE GRANULAR FILL

Subgrade granular fill consists of well graded granular soils with a maximum of 50 percent passing the No. 4 sieve and a maximum of 20 percent passing the No. 200 sieve and no materials greater than 4-inches in diameter.

2.8 SAND

Sand shall be graded granular material which passes a 3/8-inch sieve, with not more than 10 percent passing the No. 200 sieve (AASHTO T-27) and free from cinders, ashes, wood, vegetation, frozen or other deleterious material.

2.9 DRAIN GRAVEL

Drain gravel consists of washed natural gravel or crushed rock, with a maximum particle size of 1-inch, with not more than 40 percent passing the No. 4 sieve, with 100 percent being retained on the No. 10 sieve, and without any deleterious material.

2.10 RIPRAP

Riprap consists of durable, angular, sound and hard field or quarry stones free from cracks and structural defects. Source of supply shall be approved by the CO. Fifty percent of the stones shall be of sizes between one-half and two-thirds of the riprap layer thickness shown on the Drawings. Not more then 10-percent of the stones by weight shall be of a size less than one-tenth of the riprap layer thickness shown on the Drawings and the specific gravity of the stones must range between 2.5 and 2.82 (AASHTO T-85). Durability of the stones shall be in excess of 40 percent (AASHTO T-210).

2.11 ROCK RAMP

Rock ramp material consists of durable, alluvium, sound and hard field or quarry stones free from cracks and structural defects. Source of supply shall be approved by the CO. Sizes shall match gradation as shown on the Drawings and the specific gravity of the stones must range between 2.5 and 2.82 (AASHTO T-85). Durability of the stones shall be in excess of 40 percent (AASHTO T-210).

2.12 BOULDERS

Boulders consist of durable, angular, sound and hard field or quarry stones free from cracks and structural defects. Source of supply shall be approved by the CO. The specific gravity of the stones must range between 2.5 and 2.82 (AASHTO T-85). Durability of the stones shall be in excess of 40 percent (AASHTO T-210).

2.13 WATER

Section 312300 – Construction Watering.

PART 3 – CONSTRUCTION REQUIREMENTS

3.1 LOCAL GOVERNMENT SPECIFICATIONS

Differences may exist between the requirements of these Specifications for site work materials such as backfill, bedding, untreated base course and bituminous surface course, and those of local government entities. Such differences may affect Contract prices; therefore, when Contract Work falls within the boundaries of any local government, the Contractor shall make himself aware of that entity's specifications for those materials. If differences exist between those specifications and these, unless otherwise approved by the Contract Officer, the more stringent ones shall apply.

3.2 BORROW AND DISPOSAL SITES

The Contractor shall, at its own expense, secure all necessary access and borrow sites for acquisition or removal and to dispose of excess backfill or waste materials, unless otherwise shown on the Drawings.

3.3 ON-SITE MATERIALS

1. Unless otherwise shown on the Drawings or directed by the Contract Officer, on-site pipe bedding and trench backfill will be used for installation of all pipe. In areas where suitable on- site material is not available, other material, which meets these Specifications, will be used when shown on the Drawings, provided for in these Contract Documents or approved by the Contract Officer.

2. If on site backfill material is insufficient in quantity, contractor must furnish any necessary locally-sourced clean (free of non-natural material) fill to match existing grade.

3.4 SCALES

When ton weight is to be used to determine quantities of earthwork materials used, the Contractor shall provide his own scales or access to other scales at his own cost. Scales shall be certified accurate. Include certification in submittals.

END OF SECTION 31 21 05

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SECTION 31 22 00 – SITE EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 – General Requirements Specification Sections, apply to the Work of this Section.

1.2 SUMMARY

A. Provide and perform earthwork as indicated and specified, complete. Contractor shall review Civil Drawings showing existing grades and verify actual site conditions as part of preparing the bid for work under this Contract. Principal items of work include:

1. Excavation and related compacted backfill as required for building rock ramp.

2. Fine grading as required.

3. Transport and removal from site of excess soil and rock from excavations if not needed for backfill, or landscaping.

4. Clean-up and removal of debris as a result of this Work.

1.3 WORK RELATED TO THIS SECTION

Section 31 20 15 – Clearing and Grubbing

Section 31 23 00 – Watering

Section 31 21 05 – Earthwork and Trenching Materials

Section 31 24 00 – Finish Grading

1.4 FINISHED GRADES

A. Finished Grades, as used herein, refers to the required final grade elevations indicated on the drawings. If the finished grades shown by spot elevations conflict with those shown by contours, the spot elevations shall be used. Do all grading necessary to bring to underside of respective surfacing at grades shown on the drawings.

1.5 GENERAL SITE INFORMATION

A. The Contractor shall be held to have examined the site personally to ascertain the state thereof and to understand the conditions and complexities of the Work. This trade will be held to have compared the site with the drawings, and to have satisfied themself as to the conditions of the premises, the actual elevations, existing obstructions, areas of work and other conditions that would affect the completion of the Work. Contractor shall be alert to soil conditions as they affect their work.

1.6 PERMITS AND COMPLIANCE WITH LOCAL CODE AND ORDINANCE

A. This Contractor shall be required to obtain permits (if required) by the National Park. Any fees or costs to be paid by the Contractor.

B. This Contractor shall be responsible to comply to the provisions of all other applicable codes and ordinances controlling all phases of the Work as set forth on the Drawings and in this Specification.

1.7 QUALITY ASSURANCE

A. Density testing will be the responsibility of contractor at the contractor's expense. Correct deficiencies before placing additional embarkment. All test results shall be provided to Contract Officer.

B. AASHTO T99-81 Method D, shall be used to determined density, and AASHTO T191-61, or standard nuclear method, shall be used to determine in-place density. In-place densities specified are minimums and may be exceeded.

PART 2 - PRODUCTS

MATERIALS

Section 312105 – Earthwork and Trenching Materials.

PART 3 - EXECUTION

3.2 EXCAVATION

A. Excavate to dimensions shown on the drawings, plus ample space for construction, allowing for fill where applicable, etc.

B. Soft or loose earth or quicksand in trench excavations shall be reported to the Contract Officer immediately.

3.3 REMOVAL AND REDEPOSITING: All excess earth which is surplus after construction of all backfill and grading shall be loaded and transported out of the park and disposed of properly.

3.4 PROTECTION: This Contractor shall take all necessary precautions to protect public property adjacent to the site. He/She shall provide all barricades, flagmen, signs, warning devices, etc., as required.

3.5 BACKFILL AND FILL

A. Material: All materials will be either imported or on-site non-expansive material free of organic matter and other deleterious substances. Contractor shall screen and mix available stockpile material to make suitable for fill placement.

B. Placing, Spreading, and Compaction: Rock ramp should be constructed in lifts not to exceed 8" of uncompacted depth to field in-place densities. Compaction of fill placed at the site should equal or exceed the following percentages (%) of the maximum dry densities as determined by ASTM D-1557:

AREA	**COMPACTION**
Landscaping (upper 1 foot)	85% - 90%

Landscaping (greater than 1 foot)	95	95%
Rock Ramp		95%

C. Fill placed at the site should be frequently tested to verify proper compaction.

D. Fill should be placed in lift thicknesses which do not exceed the capability of the compaction equipment utilized. Generally, loose lift thicknesses of 6” to 8” are adequate for heavy equipment. Lift thicknesses should be reduced to 4” for light hand compaction equipment.

E. To facilitate compaction of site grading fill, the moisture content should be within 2 (two) percentage points of the optimum moisture content. Soils which are above the optimum moisture content will require drying prior to placement. Soils which are below the optimum moisture content will require wetting prior to placement.

3.6 COMPACTION TESTING

A. Each lift or layer must be tested by soils testing laboratory personnel under the direction of a Utah registered professional engineer. Every lift or layer shall be tested and no additional layer shall be placed upon a compacted layer until the test results are complete and satisfactory. Should the test results indicate inadequate compaction, the further compactive force must be applied and further testing be performed until it is apparent from test results that the densities specified have been obtained.

B. Number of tests may vary at the discretion of the Contract Officer.

C. In certain instances where it is questionable that the gradation of the soil is the same as the soils used in performing the maximum density determination in the field in-place, then additional laboratory maximum density determinations at the existing fill moisture contents shall be made from the samples removed during the field testing. The maximum density determinations will also be reported, along with the other data, as indicated above.

3.7 GRADING AND FINE GRADING: All areas excavated, filled or backfilled or disturbed by construction, all disturbed site soils under base courses etc. shall be graded uniformly in accordance with grades shown on drawings.

END OF SECTION 31 22 00

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SECTION 31 22 01 – TRENCH EXCAVATION AND BACKFILL FOR UTILITIES/SMART DITCH OR CONTRACTING OFFICER APPROVED EQUIVALENT

PART 1 – GENERAL

1.1 SUMMARY

This section covers furnishing equipment, labor, and materials to clear, excavate, backfill and compact trenches for utilities. Excavation and backfill for piping appurtenances such as transition structures, junction structures, vaults, thrust blocks, valve boxes, etc., shall be included, and also shall include restoration of the disturbed ground surface in accordance with the Contract Documents.

1.2 RELATED WORK

Section 31 20 15 – Clearing and Grubbing and Tree Removal.

Section 31 21 05 – Earthwork and Trenching Materials.

Section 31 22 00 – Site Excavation and Backfill.

Section 33 11 10 – Water Distribution.

1.3 SUBMITTALS

A Moisture Density Testing and Gradation Determinations: A documentation system shall be maintained by the Contractor to record results from all moisture/density testing and gradation determinations. Records of these tests shall show the following information as a minimum:

- Date of test.
- Type of test.
- Name of person performing test.
- Location of sample taken.
- Results of test and comparison with specified value required for compliance.

B. Upon completion of each gradation test or moisture/density test, a copy of the record for the respective test shall be delivered to the Contract Officer within one (1) working day following the completion.

C. Compliance Testing: Documentation shall also be made, in field diaries, of all compliance tests performed by the Contractor. Documentation shall be made available to the Contract Officer upon request.

1.4 DEFINITIONS

- Bedding: Materials placed immediately around and adjacent to pipe installed in trenches.
- Trench Width: Shall not be more than 18 inches greater than the outside diameter of the pipe being installed at a point 12 inches above the top of the pipe unless otherwise shown

on the Drawings. The width of the trench above that level shall be the minimum width required for safe working conditions, sheeting, bracing and for proper installation of the work.

- Trench Grade: The vertical elevation of the flow line of the pipe being installed in the trench.
- Open Trench: Shall include trench sections which have been excavated and are awaiting completion of pipe installation, backfill, compaction or installation of a temporary surface.
- Surface Restoration: Shall include the Work required to restore the ground surface disturbed for trench excavation. Replacement of road surfacing, planting and landscaping removed for trench excavation, will not be considered as trench excavation and backfilling.
- Consolidated Backfill: A condition of backfilling for which a specified compaction density is required. Maximum lift, prior to compaction, for consolidated backfill shall be 8 inches unless otherwise approved by the Contract Officer.
- Unconsolidated Backfill: A condition of backfilling for which no compaction density is specified and the required compaction effort is layer placing and then compacting by wheel rolling or use of compacting equipment. Lifts of up to 24 inches are allowed for unconsolidated backfill.
- Unclassified Excavation: A determination for excavating whereby no consideration will be given to different kinds of materials that are encountered.

PART 2 – MATERIALS

Section 312105 – Earthwork and Trenching Materials.

PART 3 – CONSTRUCTION REQUIREMENTS

3.1 CLEARING AND GRUBBING

On areas outside of established roadways, the area to be disturbed by the trenching operation shall be cleared and grubbed prior to beginning the trenching operation in accordance with Section 312015 – Clearing and Grubbing.

3.2 EXCAVATION

A. Unclassified Excavation: All excavation for this project shall be unclassified excavation, unless otherwise determined by the Contract Officer.

B. Staking: Location staking of piping will be provided by the Contractor in accordance with the Contract Documents.

C. Exposure of Underground Features: Before any trench excavation is started, the Contractor shall locate and expose all existing underground utilities, structures, etc., which may interfere with, or conflict with, the trench being excavated. In case of conflicts, the Contractor shall make adjustments in the location of the excavation at the direction of the Contract Officer. Such adjustments shall be made at no additional cost to the Owner.

D. General Excavation: The Contractor shall perform all excavation to the depth specified in the Drawings and/or as required to accomplish the Work. During the excavation operations,

excavated materials which are suitable for use as backfill for trenches or around structures, shall be piled separately at sufficient distance from the edge of the excavation to be out of the way of equipment and to prevent slides and cave-ins from embankment overloading. All excavated materials not suitable for, or not required for, fill or backfill shall be separated and removed promptly from the site of the Work and disposed in an approved site.

E. Public Travel: Materials excavated within roadways, regardless of their disposition, shall be piled in such manner that will cause the minimum of inconvenience to public travel and always allow for emergency vehicle passage.

F. Open Trench: At no time shall the Contractor allow more than 500 cumulative feet of trench to be open for the overall project, unless otherwise approved by the Contract Officer.

G. Shoring: Shoring and/or trench boxes shall be used wherever needed to protect workers and adjacent structures and property of the Work in accordance with OSHA requirements. The arrangement of bracing of shoring shall not be set so as to stress any portion of completed work.

H. Barricading Open Work: Excavations left open at the end of the work day shall be surrounded by barricades and warning tape.

3.3 ROCK EXCAVATION

A. Rock excavation will receive special consideration IF the following applies:

- The Contract Documents contain measurement and payment provisions for "Rock Excavation", and
- Rock excavation is not included in another bid item, and
- Rock has been encountered in the excavation, and
- The Contractor has made ample (as determined by the Contract Officer) attempts to remove the rock using an excavator weighing not less than 74,000 lbs, such as a Cat 330B; then the excavation of such material will be considered as "rock excavation".

  As a general rule, if the specified excavator using a 30" bucket with rock teeth, requires more than two minutes to remove one (1) full bucket of material, the material is considered rock excavation.

B. If the Contractor encounters rock (as described above) at a thickness greater than 12 inches, then the entire trench is considered "rock excavation" and the Contractor will be reimbursed as outlined in the Measurement and Payment sections.

3.4 OVER-EXCAVATION

A. Unauthorized Over-Excavation: Care shall be taken to not excavate below the depth required by the Drawings. Any unauthorized over-excavation shall be refilled and compacted with material meeting the requirements of Section 312105 and approved for use by the Contract Officer at the expense of Contractor.

B. Rock: Whenever rock is encountered in the trench bottom, the trench shall be over-excavated a minimum of 6 inches below the design elevation of the bottom of the pipe. The

over-excavated portion of the trench shall be filled with approved bedding material and the bedding compacted, all at the expense of the Contractor, unless otherwise approved by the Contract Officer and the Owner.

C. Unstable Native Formations: The Contractor shall notify the Contract Officer if soft, spongy, or otherwise unstable native formations, that are not suitable for structure or pipeline foundations, are encountered in excavations. In the event the Contract Officer determines that the existing foundation materials are unacceptable, the Contractor will be directed to over-excavate, remove and replace the unsuitable soil materials. The over-excavation shall be backfilled with approved select materials and compacted in accordance with the requirements described herein. Such a situation will be considered as a changed condition and the Contractor will be compensated in accordance with the General Conditions.

3.5 PIPELINE ACCESSORY INSTALLATION

A. Excavation for Accessories: The Contractor may excavate to place the sides of manholes, vaults, valve boxes, inlet structures, catch basins or other accessory structures directly against the excavated surface, provided that the faces of the excavation are firm and unyielding and are at all points outside the structure lines shown on the plans. If the native material is such that it will not stand without sloughing, the Contractor shall over-excavate to place the structure and this over-excavation shall be backfilled and compacted, using the same material required for the adjoining pipeline trench.

B. Accessory Support: To prevent displacement of valve boxes and other accessory structures, trench backfill shall be compacted to at least 95% of maximum density as determined by AASHTO T-99 for 6 feet along the trench on each side of the box or structure.

3.6 TRENCH BOTTOM PREPARATION

The bottom of the trench shall be accurately graded to provide uniform bearing and support for each section of the pipe. Bell or coupling holes shall be made in accordance with the recommendations of the pipe manufacturer after the trench bottom has been graded. Such depressions shall be of sufficient width to provide clearance for connecting and/or bolting. Holes for depressions shall be excavated only as necessary to permit proper joining of pipe sections.

3.7 SURFACE IMPROVEMENTS

When surface improvements must be removed, or are damaged or disturbed by the Work, their removal and restoration shall be accomplished by the Contractor in accordance with these Specifications.

3.8 PROTECTION OF EXISTING UTILITIES

The Contractor shall protect all existing utilities, either above or below ground.

3.9 IRRIGATION DITCHES, PIPES AND STRUCTURES

The Contractor shall contact the C.O.R. of all historic irrigation facilities to be encountered by the Work and make arrangements for construction clearances and/or facility shutdown schedules. All historic irrigation ditches, dikes, head gates, pipe, valves, culverts, etc. shall not be damaged or removed by the Contractor. If damage occurs, it shall be restored by the Contractor to their original historic condition, or better, at no additional cost to the Government. See Section 013600 Archeological Protection.

3.10 WATER

A. Water Flow: The Contractor's operation shall always ensure the free flow of water in gutters, culverts, and natural watercourses. In irrigated land areas, excavated materials shall be piled on the downhill sides of trenches.

B. Groundwater: Unless provided with geotechnical information by the Owner, the Contractor shall have the responsibility of determining the presence and location of groundwater at the work site.

C. Dewatering: Grading and other protective measures shall be performed as necessary to prevent surface or groundwater from flowing into trenches or other excavations. Any water accumulated therein during construction, from surface or from underground sources, shall be promptly removed by pumping or by other approved methods at the Contractor's expense.

Unless given as a separate item in the Bid Schedule, dewatering shall be performed at the expense of the Contractor. When geotechnical information is given, groundwater must be in excess of ± 2 feet before a change in work will be considered.

D. Installation in Water: No backfill, subgrade materials, concrete or masonry footings, foundations, floors, equipment, or pipe shall be placed or laid in water. Water shall not be allowed to rise over such work for at least 24 hours following the pour or placement of any concrete or mortar used in the work. Water shall not be allowed to rise unequally against structure walls for a period of 14 days following concrete placement or masonry erection.

Groundwater or surface water in piping trenches shall not be allowed to enter and flow through the piping while installation of pipe is in progress.

E. Disposal: The Contractor shall dispose of all water from the work in a suitable manner without damage to adjacent property.

3.11 BEDDING AND PIPELINES

A. Use of On-Site Materials: Unless directed otherwise in these Specifications, on-site materials complying with Section 312105 shall be used for bedding. If an act, or failure to act on the part of the Contractor creates a need to use imported bedding materials, the Contractor shall bear the cost of all additional excavation, transportation and installation for new bedding, and for removal and disposal of unacceptable materials, as required to correct that situation.

B. Insufficient On-Site Materials: When sufficient bedding material cannot be developed from on-site materials, and no provision is contained in the Contract Documents for importing bedding materials, the Contract Officer shall be notified as soon as possible. Alternative measures will be considered and a change can then be negotiated to provide

additional materials in accordance with the General Conditions.

C. Bedding Installation: Pipe bedding shall be installed according to applicable sections of these Specifications for pipeline construction.

3.12 BACKFILL

A. Backfill Materials and Placement: Backfill shall be accomplished using acceptable materials as described in Section 312105 as follows:

- All backfill materials shall be at ± 2% of optimum moisture content when placed in the trench or other excavation.
- Unless provided otherwise on the Drawings, consolidated trench backfill shall be placed in lifts not greater than 8 inches.
- Unsuitable excavated material, or material with incorrect moisture content shall be removed and replaced.
- Soft spongy material that causes areas which "pump" when heavy loads pass over them, shall be removed and replaced with suitable material.
- Dry material that will not "ball" shall be removed and replaced.

  (The two foregoing conditions shall be considered sufficient evidence, without further testing, that the moisture content is incorrect and shall be grounds for removal and replacement of the material. Such replacement, if required, shall be at the sole expense of the Contractor.)
- Placement of backfill against cast-in-place concrete structures shall not be started until the concrete has been cured for the time required by the Contract Documents or prescribed by the Contract Officer.

B. Compaction: Compaction procedures shall be as follows:

- The Contractor shall be responsible for obtaining construction water needed for compaction in accordance with these Specifications.
- Bedding and consolidated backfill material shall be compacted with tamping, vibrating or conventional wheeled compaction equipment. Use care not to damage pipe while compacting bedding materials.
- The use of wheel rolling for compaction shall only be approved for compacting unconsolidated backfill materials.
- For work within state or federal highway rights-of-way, compaction shall meet the requirements of the respective applicable specifications.
- Backfill shall be thoroughly compacted to densities not less than those shown in Table 1:

TABLE 1 – MINIMUM DENSITY REQUIREMENTS
(based on AASHTO-99 and T-91 and on ASTM D-2922 and E-3017)

LOCATION	FROM SURFACE TO 2 FEET BELOW SURFACE	FROM 2 FEET BELOW SURFACE TO TOP OF BEDDING	BEDDIN G
Within 6 feet of any existing or proposed structure, pavement, curb, sidewalk, roadway or similar construction:	100% for granular and 95% for non-granular materials	95% for all materials	95% at all locations
Around any structure outside 6 feet:	90% for all materials	90% for all materials	90% at all locations
Cultivated and landscaped areas:	85% for all materials	85% for all materials	85% at all locations
Undeveloped Land:	Unconsolidated – see definition	Unconsolidated - see definition	85% at all locations

3.13 SETTLING AND SUBSIDENCE

Dips or uneven surfaces caused by subsidence or post-construction settlement of fill or backfill in any trenches, excavations, fills, or embankments within the Work, which become apparent within the warranty period, shall be repaired by the Contractor at no additional cost to the Owner.

3.14 SAMPLING AND TESTING

A. Testing by Independent Laboratory: As directed by the Contract Officer, the Contractor shall provide for all sampling and testing through a qualified, independent testing laboratory at the Contractor's own expense.

B. Scheduling of Sampling and Testing: The following schedule of sampling and testing provides minimum requirements, to assure compliance with all materials and compaction requirements described herein. The number of samples and tests shown shall be considered minimum, and field conditions may necessitate additional sampling and testing to be required by the Contract Officer.

TABLE 2 – GRADATION DETERMINATION
(AASHTO T-27 and T-11)

TRENCH LOCATION	TESTING REQUIRED
Materials imported or manufactured at a site determined by this Contract.	One test per site or source.
On-site excavated materials along trenches.	One test per geographical area where material composition and gradation visually appear consistent.

TABLE 3 – MOISTURE/DENSITY RELATIONSHIP (Proctor)
(AASHTO T-99 or T-180 Method D)

TRENCH LOCATION	TESTING REQUIRED
Materials imported or manufactured at a site determined by this Contract.	One test per site unless the material visually appears to change.
On-site excavated materials along trenches.	One test per geographical area where material composition visually appear consistent.

TABLE 4 – COMPACTION COMPLIANCE TESTING REQUIREMENTS
(AASHTO T-191 or Portable Nuclear Gauges)

TRENCH LOCATION	TESTING REQUIRED
Street crossing with gravel or bituminous surfacing.	One test per lift for each crossing.
Parallel to centerline of bituminous or gravel surfaced streets or roadways.	One test per lift for each 500-feet of trench length.
Along unsurfaced roads or in cultivated or landscaped areas.	One test per lift for each 1,000-feet of trench length with at least one test per area.
Under or adjacent to manholes, wet wells, enclosures, boxes, etc.	None, unless geological conditions are inconsistent and requested by the Contract Officer.

C. The term "test" shall mean a single test with acceptable results, equal to or better than specified minimums. In the event compaction test results fall below the required minimum density; the Contractor shall re-compact and test the material until a test with acceptable results is obtained. Any test failure shall result in additional tests as required by the Contract Officer, at no cost to the Owner, to ensure that overall project quality objectives are met.

END OF SECTION 31 22 01

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SECTION 31 23 00 – WATERING

PART 1 – GENERAL

1.1 SUMMARY

The work of this section consists of furnishing, hauling, and applying water required for compaction of embankments, backfills, subgrade, and base course, and for landscaping, dust control, and other construction operations.

PART 2 – MATERIALS

2.1 WATER: Free of debris, organic matter, and other objectionable substances.

PART 3 – CONSTRUCTION REQUIREMENTS

3.1 WATER TRUCK

At least 1,000-gallon capacity.

3.2 APPLICATION

A. Use pressure type distributors or a pipeline equipped with sprinkler system. Provide approved meter devices near points of discharge.

B. Ensure a uniform application of water for optimum moisture content. Avoid excessive runoff and minimize water waste.

C. The Contractor may water excavation areas before excavating. Drill full depth of excavation to make moisture determinations.

D. If overwatering occurs, de-water at no additional expense to the Government.

END OF SECTION 31 23 00

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SECTION 31 24 00 – FINISH GRADING

PART 1 – GENERAL

1.1 DESCRIPTION

A. The work of this section consists of fine grading all areas of the site disturbed by construction activities and spreading and fine grading of stockpiled topsoil.

1.2 RELATED WORK

Section 31 20 15 – Clearing and Grubbing and Tree Removal.

Section 31 22 00 – Site Excavation and Backfill.

Section 31 22 01 – Trench Excavation and Backfill for Utilities.

Section 01 57 00 – Temporary Controls.

PART 2 – PRODUCTS

2.1 TOPSOIL

A. Excavated upper-surface native friable material obtained from clearing and grubbing, and onsite excavation and grading that has been screened to remove weeds, sod, clods, stones larger than 2 inches, and other deleterious material.

B. Native friable material obtained from a Zion Park location of maximum haul distance of one mile that has been screened to remove frozen material, debris, muck, weeds, sod, clods, stones larger than two inches, and other deleterious material.

PART 3 – EXECUTION

3.1 SITE PREPARATION

A. Prior to starting finish grading, all ground disturbing items of work shall be completed. Compacted areas in the landscape resulting from construction activities and vehicle traffic shall be ripped to a depth of 10 inches and rototilled.

B. Topsoil from on-site and from Zion Park location shall be screened to remove frozen material, debris, muck, weeds, sod, clods, stones larger than two inches and other deleterious material.

3.2 FINISH GRADING

A. Utilize stockpiled topsoil to finish grade all areas in the landscape with a minimum cover of 6 inches of topsoil.

B. Finish grade and rake all surfaces and slopes within the construction limits to blend with the existing contours and hand rake to produce a smooth, uniform surface. Surface drainage contouring shall be determined in the field by the

Contracting Officer.

C. Dispose of debris from the finish grading activities as specified in Section 017419.

END OF SECTION 31 24 00

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SECTION 31 88 00 – ROCK RAMP AND RIP RAP PLACEMENT

PART 1 GENERAL

1.1 GENERAL

A. The work shall consist of providing rock and riprap and the placement of rock and riprap for the rock ramp diversion, and wash section, and special placement rocks in the diversion; including filter, or bedding where specified.

1.2 SUBMITTALS

A. Submittals during construction shall be made in accordance with Division 1, GENERAL REQUIREMENTS. In addition, the following specific information shall be provided:

1. Rock Ramp: The contractor shall designate in writing the source from which rock material will be obtained, and the contractor shall provide information and rock samples satisfactory to the Contract officer that the material meets contract requirements.

2. Riprap: The contractor shall designate in writing the source from which riprap material will be obtained, and the contractor shall provide information satisfactory to the Contract officer that the material meets contract requirements.

PART 2 PRODUCTS

2.1 ROCK FOR ROCK RAMP DIVERSION

A. Rock for rock ramp includes all rock required to construct the rock ramp diversion, except for the rock riprap used on the banks of the North Fork Virgin River. This material includes that used in the construction of special placement rocks. The rock riprap on the banks is described in Section 2.2 of this technical specification.

B. Rock for rock ramp shall comply with the gradation requirements specified on the Drawings. Rock shall be well graded between the specified maximum and minimum nominal rock sizes. Well graded shall mean that a broad range of rock particle sizes are represented and that substantial amounts of each rock particle size are present. ASTM D 5519, Standard Test Method for Particle Size Analysis of Natural and Man-Made Riprap Materials, Test Method A, Size-Mass Grading, shall apply instead of ASTM D 5519, Test Method B.

C. Rock from approved sources shall be excavated, selected, and processed to meet the specified quality and grading requirements at the time the rock is installed.

D. Furnish stone that is hard, durable, and sub-angular in shape, resistant to weathering and water action, free from overburden, spoil, shale, structural defects, and organic material. Do not use shale, mudstone, or stone with shale seams. Rock for rock ramp shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock shall be sub-angular to rounded in shape with the greatest dimension not greater than 2 times the least dimension. Rock shall be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits. Rock hardness shall be such that it will not dent when

struck with the rounded end of a one pound ball peen hammer, or hardness shall be determined by other methods approved by the Contract officer. The stone will be accepted based on visual analysis, inspection of the source rock, and the Contract officer's evaluation of the rock onsite.

E. Stone properties shall be as follows:
1. Riprap shall be of igneous or metamorphic origin.
2. Minimum Apparent Specific Gravity greater than 2.5.
3. Maximum Absorption less than 1.3.
4. Los Angeles Abrasion Maximum Percent Loss 18 percent.

2.2 ROCK RIPRAP FOR RIVER BANKS AND WASH

A. Rock riprap for banks on the North Fork Virgin River and the Wash includes rock riprap required to armor impacted areas and areas shown on the drawings.

B. Rock for rip rap shall comply with the gradation requirements specified on the Drawings. Rock shall be well graded between the specified maximum and minimum nominal rock sizes. Well graded shall mean that a broad range of rock particle sizes are represented and that substantial amounts of each rock particle size are present.

C. Rock from approved sources shall be excavated, selected, and processed to meet the specified quality and grading requirements at the time the rock is installed.

D. Furnish stone that is hard, durable, and angular in shape, resistant to weathering and water action, free from overburden, spoil, shale, structural defects, and organic material. Do not use rounded stone or boulders from a streambed source as riprap. Rock riprap shall be dense, sound and free from cracks, seams and other defects conducive to accelerated weathering. The rock shall be angular to sub-rounded in shape with the greatest dimension not greater than 2 times the least dimension. Rock shall be free from dirt, clay, sand, rock fines, and other material not meeting the required gradation limits. Rock hardness shall be such that it will not dent when struck with the rounded end of a one pound ball peen hammer, or hardness shall be determined by other methods approved by the Contract officer. The stone will be accepted based on visual analysis, inspection of the source rock, and the Contract officer's evaluation of the riprap onsite.

2.3 SPECIAL PLACEMENT ROCKS

A. Special Placement Rocks shall be individually placed by the contractor on the sub-grade as specified in the Drawings. Special Placement Rocks will be individually selected from the rock materials supplied according to Item 2.01, above. Special Placement Rocks shall meet the placement and size requirements described in the Project Drawings and Specifications. Special Placement Rocks will include the following:

1. Rock Ramp Header and Toe: Rocks shall be placed along the header and toe of the Rock Ramp. Rock Ramp Header and Toe rocks shall be no smaller than 42-inches in average diameter. Rock Ramp Header and Toe rocks will need to be imbedded below the sub-grade such that the top of each toe rock matches the finished grade as specified in the drawings.

2. Habitat Boulders: Rocks shall be placed as shown on the drawings and shall be no smaller than along the edge of the Rock Ramp Thalweg as shown in the drawings. c.

The Edge of Rock Ramp Thalweg rocks shall be no smaller than 51-inches in diameter.

2.4 GEOTEXTILE

A. Assure that fibers used in the manufacture of geotextiles, and the threads used in joining geotextiles by sewing, consist of long-chain synthetic polymers, composed of at least 95% by weight polyolefins or polyesters. They must be formed into a network so the filaments on yarns retain dimensional stability relative to each other, including selvedges. Furnish materials meeting the physical requirements for the indicated application as described by the corresponding table(s) of properties in AASHTO M288, Geotextile Specifications for Highway Applications.

1. Geotextile fabric shall be non-woven and have a minimum weight of 8-ounces per square yard.

B. Assure the manufacturer furnishes the purchaser a certificate stating the name of the manufacturer, the chemical composition of the filaments or yarns, and other information fully describing the geotextile. The manufacturer must include in the certificate, a guarantee stating that the geotextile furnished meets specifications. The certificate must be attested to by a person having a legal authority to bind the company. Mismarking, or misrepresentation by the manufacturer is reason to reject the geotextile under these specifications.

C. Label the fabric and its container with the manufacturer's name and fabric type or trade name, lot number, and quantity.

D. During shipment and storage, protect the fabric from direct sunlight, ultra-violet rays, temperatures exceeding 160˚F (71˚C), mud, dust and debris. Keep the fabric in the manufacturer's wrapping until just before use.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

A. Prior to commencing work on rock placement, install water control measures as required to perform work in dry conditions. Water control measures shall be performed per Section 02401 Diversion and Care of Stream & Dewatering to allow for the installation of rock in dry conditions, and to divert surface water away from the work area. The Contractor is responsible for investigating and familiarizing himself with respect to all site conditions that may affect the work. By submitting a bid, the Contractor acknowledges that such investigations have been made, and consideration of such conditions is a part of this bid.

B. The subgrade surface on which the rock riprap, filter, bedding, or geotextile is to be placed shall be cut or filled and graded to the lines and grades shown on the drawings. When fill to subgrade lines is required, it shall consist of approved native gravel fill material. Gravel fill shall be placed in lifts not exceeding 12 inches and vibratory compacted with a minimum of four passes of a compactor to achieve a firm and unyielding base suitable for the placement rock riprap.

C. All loose material, debris, sediment, soil, and organic matter shall be completely removed from the river bottom within the area of the footprint of the rock riprap.

D. Rock riprap, filter, bedding, or geotextile shall not be placed until the foundation preparation is completed, and the subgrade surface has been inspected and approved by Contract officer.

3.2 EQUIPMENT-PLACED ROCK RIPRAP

A. The rock riprap shall be placed by equipment on the surface and to the depth specified. It shall be installed to the full course thickness in one operation and in such a manner as to avoid significant displacement of the underlying material. The rock for riprap shall be delivered and placed in a manner that ensures the riprap in place is reasonably homogeneous with the larger rocks uniformly distributed and firmly in contact one to another with the smaller rocks and spalls filling the voids between the larger rocks. Some hand placing may be required to provide a neat and uniform surface.

B. Rock riprap shall be placed in a manner to prevent damage to structures. Hand placing is required as necessary to prevent damage to any new and existing structures.

C. Rock riprap shall be placed within a vertical tolerance of plus or minus 0.2 feet from the indicated slope, grade, and elevations shown on the Drawings for the rock at the channel thalweg and within the sediment sluiceway. Rock riprap shall be placed in all other areas within a vertical tolerance of plus or minus 0.5 feet.

D. Special Placement Rock shall be placed within a vertical tolerance of plus or minus 0.2 feet from the indicated slope, grade, and elevations shown on the Drawings.

3.3 HAND-PLACED ROCK RIPRAP

A. The rock riprap shall be placed by hand on the surface and to the depth specified. It shall be securely bedded with the larger rocks firmly in contact one to another without bridging. Spaces between the larger rocks shall be filled with smaller rocks and spalls. Smaller rocks shall not be grouped as a substitute for larger rock. Flat slab rock shall be laid on its vertical edge except where it is laid like paving stone and the thickness of the rock equals the specified depth of the riprap course.

B. Rock riprap shall be placed in a manner to prevent damage to structures. Hand placing is required as necessary to prevent damage to any new and existing structures.

C. Rock riprap shall be placed within a vertical tolerance of plus or minus 0.2 feet from the indicated slope, grade, and elevations shown on the drawings for the rock at the channel thalweg and within the sediment sluiceway. Rock riprap shall be placed in all other areas within a vertical tolerance of plus or minus 0.5 feet.

3.4 FILTER OR BEDDING

A. When the contract specifies filter, bedding, or geotextile beneath the rock riprap, the designated material shall be placed on the prepared subgrade surface as specified. Compaction of filter or bedding aggregate is not required, but the surface of such material shall be finished reasonably smooth and free of mounds, dips, or windrows.

END OF SECTION 31 88 00

SECTION 32 80 00 – CANAL LINER PLACEMENT

PART 1 – GENERAL

1.1 WORK INCLUDED

A. Cleaning the existing irrigation canal, removing vegetation within the existing irrigation canal,

B. Regrading the irrigation canal as necessary to match elevation and slope on Design Drawings and creating a cross section to match the canal lining shape.

C. Creating a smooth surface devoid of lumps, debris, sharp rocks and voids.

D. Placement of canal liner as specified on the plans and per manufacturer's requirements.

1.2 RELATED WORK

A. Section 31 22 01 – Trench Excavation and Backfill for Utilities/Smart Ditch or Contracting Officer Approved Equivalent.

1.3 SUBMITTALS

A. Product Data:

1. Product Color Sample.

2. Catalog information.

3. Manufacturer's specifications.

4. Special handling and storage requirements.

5. Installation instructions.

1.4 STORAGE, AND HANDLING

A. Storage and Handling: In accordance with manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 GENERAL

A. The product shall be SmartDitch or a Contracting Officer approved equivalent.

B. Specifications:

1. Liner Segments are manufactured from high molecular weight high density polyethylene. (HDPE)

2. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotrophic agents, etc., when used, shall not detrimentally effect the performance of the product.

3. The liner segments shall be manufactured using thermoforming.

4. Liner color should be dark tan or brown.

5. The Manning's coefficient of friction for the lining system shall be n=0.022 or less for laminar flow.

6. The ditch liner shall have a flared inlet and outlet.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Clear and grub existing canal, including removal of any vegetation and blockages.

B. Regrade existing canal to elevations and slopes as shown on plans in accordance with Section 31 22 01 – Trench Excavation and Backfill for Utilities/Smart Ditch or Contracting Officer Approved Equivalent.

C. Shape canal cross section to match canal liner shape.

D. Smooth canal to remove any sharp rocks, lumps and voids.

E. Canal liner shall not be placed until the canal preparation is completed, and the subgrade surface has been inspected and approved by the Contracting Officer.

F. Install in accordance with manufacturer's recommendations as approved.

G. Completed Installation: Neat in appearance.

END OF SECTION 32 80 00

Visitor Information System Templates

Pedestrian Signage

PDF can be opened in Adobe Illustrator

03/01/2022

NPS Sign Program
Harpers Ferry Center
Harpers Ferry, WV 25425

CAUTION

AREA CLOSED
For Your Safety

Extreme hazards may cause injury or death. Violators will be cited and fined.

DO NOT ENTER

AREA CLOSED
For Your Safety

Extreme hazards may cause injury or death. Violators will be cited and fined.

DANGER

AREA CLOSED
For Your Safety

Extreme hazards may cause injury or death. Violators will be cited and fined.

AREA CLOSED

All area beyond this point closed to public use and travel because of emergency conditions.

*All text on panels should be 30 pt or larger at full size.

Danger/Caution	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		1.0

WARNING

AREA CLOSED
Hazardous Cliffs

AREA CLOSED

HAZARDOUS CLIFFS

DANGER

Do Not Enter

CAUTION

Unstable and undercut cliffs. Approach at your own risk.

CAUTION
STAY ON TRAILS

Beware of steam vents earth cracks

CAUTION
STAY ON TRAILS

DANGER

Volcanic Fumes are hazardous to your heath and may be life theatening

Do not enter this area if you are a person at risk:

- respiratory problems
- heart problems
- pregnant
- infants and children

No Lifeguard On Duty in this Area

For your safety, please swim only in recommended areas.

Danger/Caution	Project Number	Location Number(s)	Description | Notes
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.
Templates	Drawing Date	Scale	
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS	

Page **2.0**

*All text on panels should be 30 pt or larger at full size.

DANGER

AREA CLOSED
For Your Safety

Extreme hazards may cause injury or death. Violators will be cited and fined.

AREA CLOSED

Help Protect Park Resources

Remain on Designated Trail

AREA CLOSED

Help Protect Park Resources

More information on why it is important to protect park resources. Revegetation Project in progress.

AREA CLOSED

All area beyond this point closed to public use

AREA CLOSED

*All text on panels should be 30 pt or larger at full size.

Danger/Regulations	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		3.0

Designated Smoking Area

Please place extinguished cigerettes in container provided

Designated Smoking Area

No Smoking

Regulations

No Drones

More information on why it is important to not have drones in parks. Other and more words if neccessary.

Regulations

Remain on the trails

Pedestrians only, no bikes.

No horses.

No Pets

Shoreline Open to Restricted Pedestrian Access

Leave no footprints behind. Walk in water where footprints wash away.

Pedestrian Access

No Vehicles

No Pets

No Kites

Shoreline Closed

Pedestrians

Vehicles

Pets

*All text on panels should be 30 pt

Regulations	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		4.0

or larger at full size.

Cape Hatteras National Seashore
Soundside Access Point

Beach driving permit required. Drive only on designated routes.

Pets must be on leash.

No campfires.

No camping.

No personal watercrafts.

Regulations

Do Not Feed the Ponies

Please View Ponies From Outside Fence

Beach Regulations

Observe all posted safety and wildlife protection closures.

Pets must be on a six-foot leash at all times.

Beach Fire Permit Required.
Extinguish all fires using water.

No Fires from 10 pm – 6 am

All fireworks prohibited.

No open containers of alcoholic beverages inside motor vehicles, including pick-up truck beds. Spirituous liquors and fortified wine prohibited.

No camping on the beach.

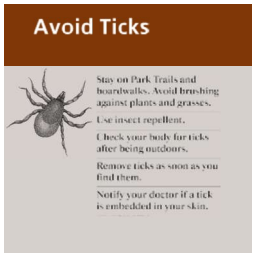
Violators are subject up to $5,000 fine and/or imprisonment of up to 6 months.

In case of emergency, dial 911.
To report a violation, dial 252-473-3444.

*All text on panels should be 30 pt or larger at full size.

Regulations	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		5.0

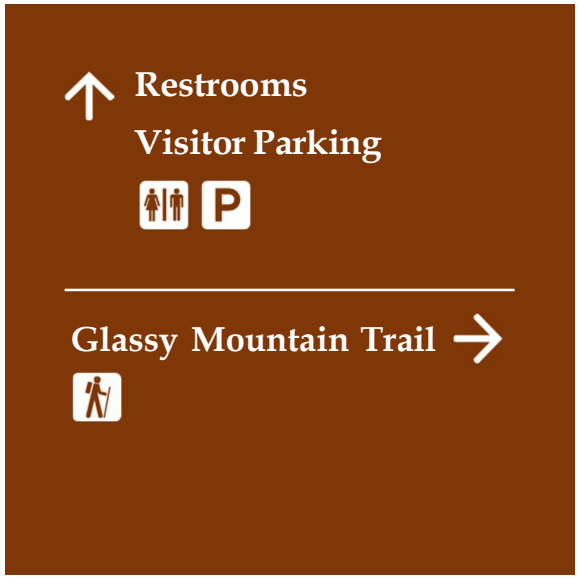
VIS Panel Architecture

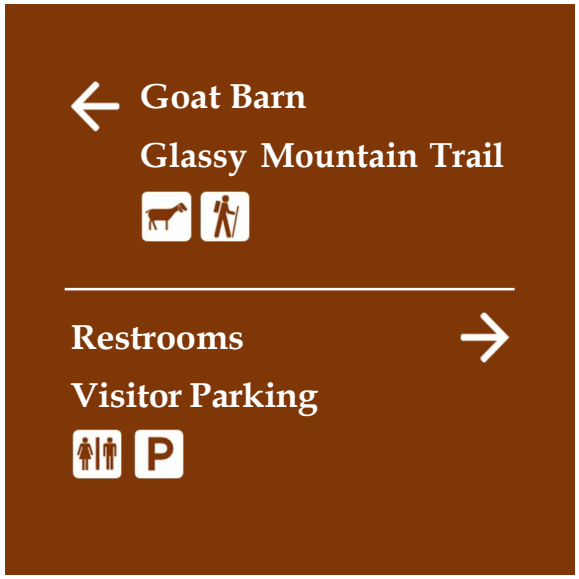


*All text on panels should be 30 pt

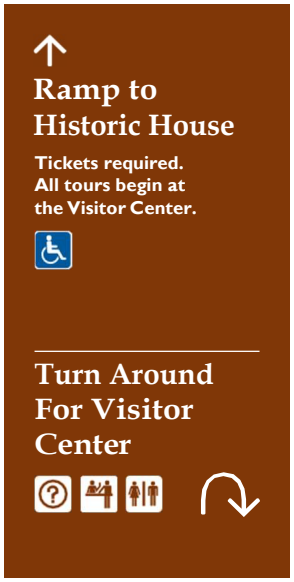
Regulations	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		6.0

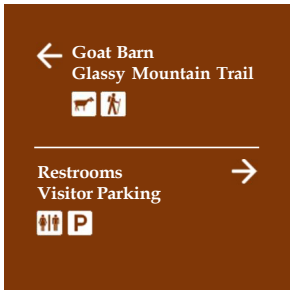
or larger at full size.

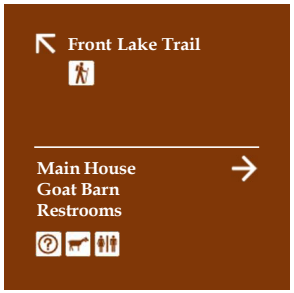




Pedestrian Directionals	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		7.0







Pedestrian Directionals	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		8.0

→ Devastation Trail
To Pu'u Pua'i

← Byron Ledge
Trail

Gallery →
OPEN DAILY

ART

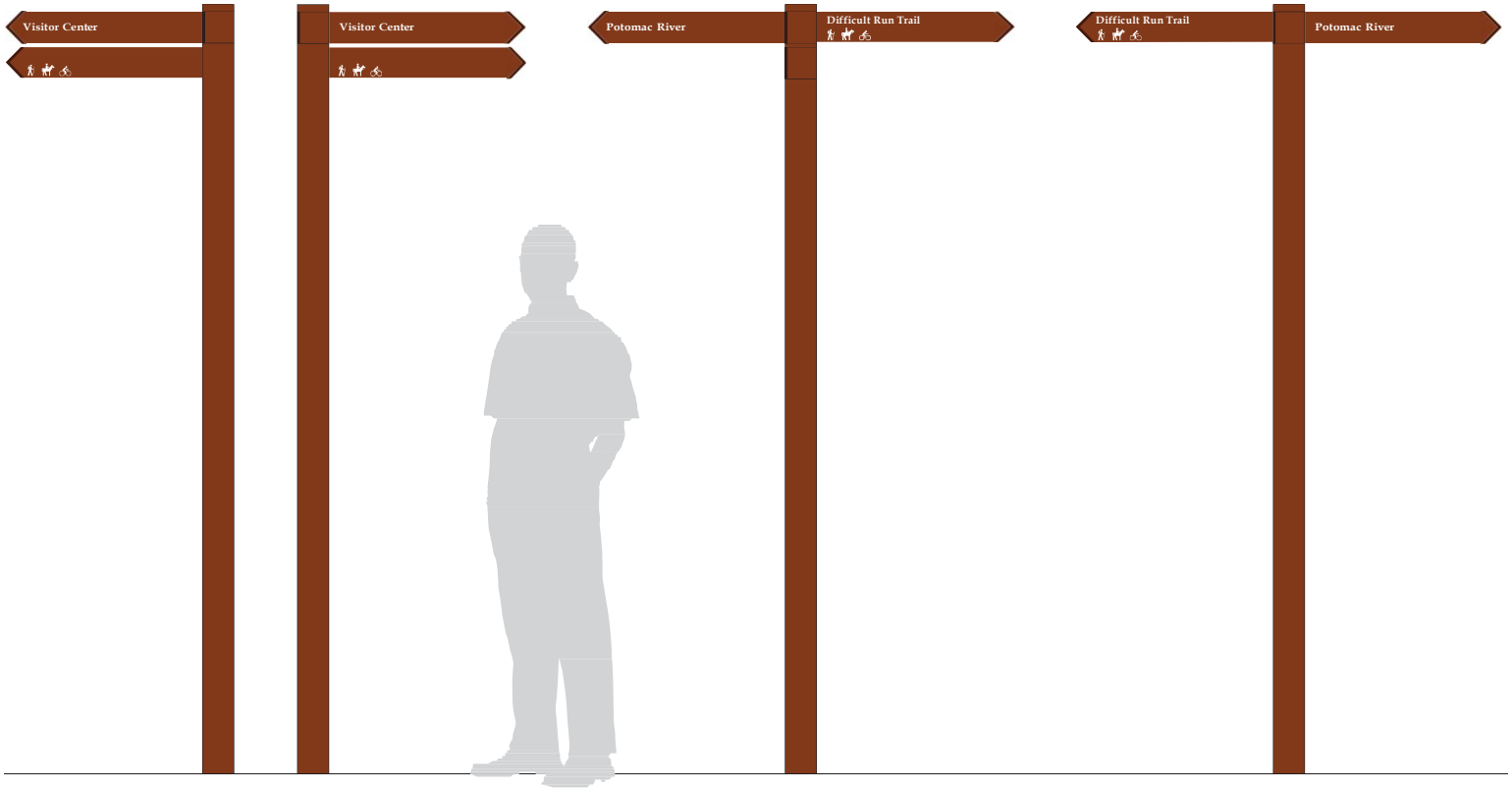
← Trail

↑ Crater Rim Trail
Caldera Overlook 0.1
Waldron Ledge 0.4
Byron Ledge Trail 1

← Backcountry Office 0.4

↑ Visitor Center 0.7
Jaggar Museum 1.8

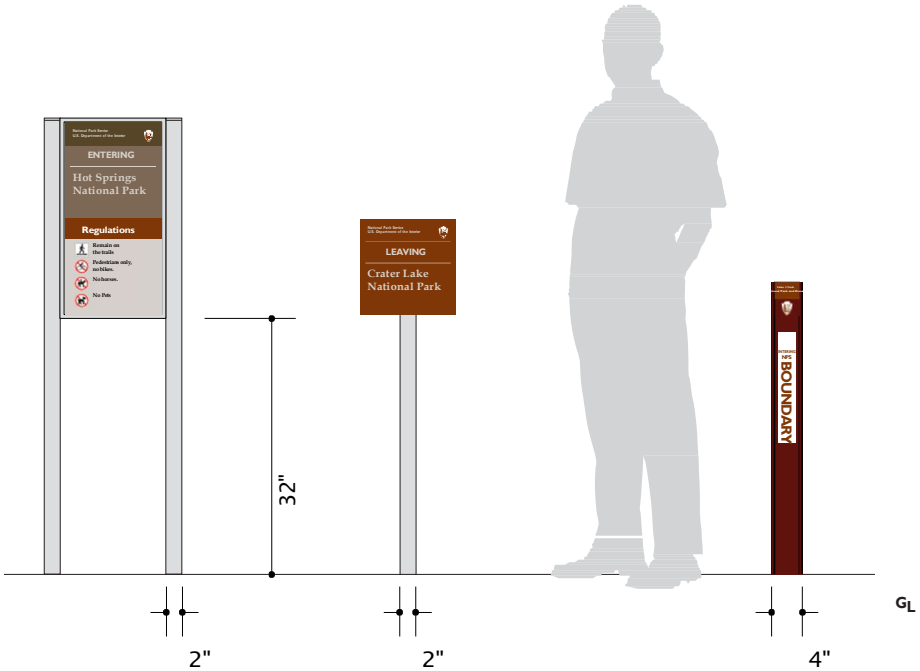
Pedestrian Directionals	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		9.0



Northwest **Southeast** **Northeast** **Southwest**

	Project Number	Location Number(s)	Description | Notes	

Pedestrian Directionals	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		**10.0**



Option A: 12" x 24" and 12" x 12"

Option B: Carsonite post

NPS Boundary Options	Project Number	Location Number(s)	Description | Notes	
		1.0	Panels with Frame: HPL, Direct Print Aluminum, Fiberglass Panels on Post: Direct Print or Printed Adhesive Vinyl on Aluminum Frame or post: Painted Aluminum, Weathering Steal, Galvanized Steel Carsonsite Post with printed Adhesive Vinyl	Page 11.0
VIS - Pedestrian Signs	Drawing Date	Scale		
National Park Service | Harpers Ferry Center | NPS Sign Program		1" = 1' - 0"		

*All text on panels should be 30 pt

or larger at full size.

12" x 12"

12" x 12"

3" x 16"

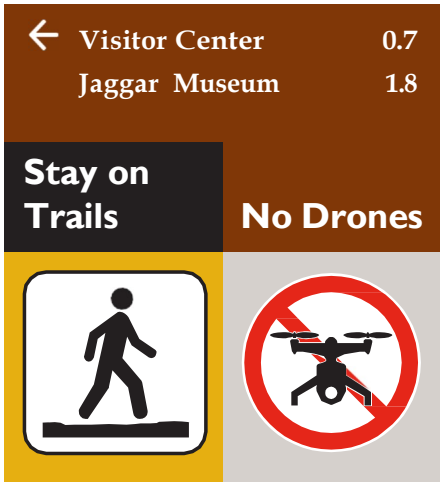
3" x 16"

12" x 12"

12" x 12"

*All text on panels should be 30 pt or larger at full size.

NPS Boundary Options	Project Number	Location Number(s)	Description | Notes	
		1.0	Panels with Frame: HPL, Direct Print Aluminum, Fiberglass Panels on Post: Direct Print or Printed Adhesive Vinyl on Aluminum Frame or post: Painted Aluminum, Weathering Steal, Galvanized Steel Carsonsite Post with printed Adhesive Vinyl	
VIS - Pedestrian Signs	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program		3" = 1' - 0"		12.0



Signs can be grouped together to fit on a single post or frame.

*All text on panels should be 30 pt or larger at full size.

COMBO	Project Number	Location Number(s)	Description | Notes	
	TEMP		Materials TBD. If putting panel in a frame check margins of frame to make sure important information is not covered.	
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		13.0

Pantone Warm Gray 2
Regulation Panels

Pantone 449
Identity Overbar

Pantone 1615
Regulations Overbar
and Directional Panels

Pantone 7531
Identity Panel

Pantone 485
Danger

Pantone Warm Gray 1
Identity Text

Pantone 124
Caution

Pantone Colors	Project Number	Location Number(s)	Description | Notes	
	TEMP			
Templates	Drawing Date	Scale		Page
National Park Service | Harpers Ferry Center | NPS Sign Program	05/03/21	NTS		**14.0**