

# LEWIS AND CLARK NATIONAL HISTORICAL PARK

## REHABILITATE VISITOR CENTER WASTEWATER SYSTEM

Contract No. 140P8519D0002  
Task Order No. 140P8519F0097

LEWI PMIS No. 216583

### FINAL CONSTRUCTION DOCUMENTS



NATIONAL PARK SERVICE  
PACIFIC WEST REGION  
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## TABLE OF CONTENTS

### **DIVISION 01 – GENERAL REQUIREMENTS** NO. OF PAGES

01 11 00	Summary of Work.....	3
01 11 40	Work Restrictions .....	4
01 27 00	Definition of Contract Price Items .....	4
01 31 00	Project Management & Coordination .....	2
01 32 16	Construction Schedule .....	2
01 33 23	Submittal Procedures .....	1
01 35 13.22	Archeological Protection.....	3
01 35 23	Safety Requirements .....	3
01 40 00	Quality Requirements.....	10
01 50 00	Temporary Facilities & Controls .....	1
01 56 00	Temporary Barriers .....	3
01 57 23	Temporary Storm Water Pollution Prevention.....	7
01 73 40	Execution .....	3
01 74 19	Construction Waste Management & Disposal .....	1
01 77 00	Closeout Procedures.....	4
Appendix A	Submittal List .....	2
Appendix B	List of Closeout Requirements.....	1

### **DIVISION 02 – EXISTING CONDITIONS**

02 05 00	General Site Construction Requirements .....	2
02 41 00	Demolition & Abandonment.....	4

### **DIVISION 03 – CONCRETE**

03 30 00	Cast-In-Place Concrete.....	2
03 31 00	Normal Weight Structural Concrete.....	6

### **DIVISION 04 – MASONRY** (Section not used)

### **DIVISION 05 – METALS** (Section not used)

### **DIVISION 06 – WOOD, PLASTICS & COMPONENTS** (Section not used)

**DIVISION 07 – THERMAL & MOISTURE PROTECTION** (Section not used)

**DIVISION 08 – OPENINGS** (Section not used)

**DIVISION 09 – FINISHES** (Section not used)

**DIVISION 10 – SPECIALTIES** (Section not used)

**DIVISION 11 – EQUIPMENT** (Section not used)

**DIVISION 12 – FURNISHINGS** (Section not used)

**DIVISION 13 – SPECIAL CONSTRUCTION** (Section not used)

**DIVISION 14 – CONVEYING EQUIPMENT** (Section not used)

**DIVISION 21 – FIRE SUPPRESSION** (Section not used)

**DIVISION 22 – PLUMBING** (Section not used)

22 05 05	Plumbing Provisions .....	6
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**DIVISION 23 – HEATING, VENTILATING & AIR CONDITIONING** (Section not used)

**DIVISION 25 – INTEGRATED AUTOMATION** (Section not used)

**DIVISION 26 – ELECTRICAL**

26 00 10	Basic Electrical Requirements .....	21
26 90 00	Integration & Controls .....	4

**DIVISION 27 – COMMUNICATIONS** (Section not used)

**DIVISION 28 – ELECTRONIC SAFETY & SECURITY** (Section not used)

**DIVISION 31 – EARTHWORK**

31 05 16	Aggregates for Earthwork .....	5
31 10 00	Site Clearing.....	2
31 23 33	Utility Excavation & Backfill .....	6
31 23 33.10	Restoration of Surfaces .....	2
31 25 00	Soil Erosion & Sedimentation Control.....	2
31 25 00.10	Watering.....	1

**DIVISION 32 – EXTERIOR IMPROVEMENTS** (Section not used)

**DIVISION 33 – UTILITIES**

33 00 00	Pipe & Pipe Fittings: General Statement .....	7
33 05 26	Utility Line Identification Marking.....	2
33 31 13	Sanitary Sewer Pipe .....	3
33 34 00	Onsite Wastewater Disposal .....	3

**DIVISION 34 – TRANSPORTATION** (Section not used)

**DIVISION 35 – WATERWAY & MARINE CONSTRUCTION** (Section not used)

**DIVISION 40 – PROCESS INTEGRATION** (Section not used)

**DIVISION 41 – MATERIAL PROCESSING & HANDLING EQUIPMENT** (Section not used)

**DIVISION 42 – PROCESS HEATING, COOLING & DRYING EQUIPMENT** (Section not used)

**DIVISION 43 – PROCESS GAS & LIQUID HANDLING, PURIFICATION & STORAGE EQUIPMENT** (Section not used)

**DIVISION 44 – POLLUTION CONTROL EQUIPMENT** (Section not used)

**DIVISION 45 – INDUSTRY-SPECIFIC MANUFACTURING EQUIPMENT** (Section not used)

**DIVISION 46 – WATER & WASTEWATER EQUIPMENT**

46 07 53	Packaged Wastewater Treatment Equipment.....	8
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**DIVISION 48 – ELECTRICAL POWER GENERATION** (Section not used)

END OF SECTION

**DIVISION 01**

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**GENERAL REQUIREMENTS**

## SECTION 01 11 00

### SUMMARY OF WORK

#### PART 1 – GENERAL

##### 1.1 WORK COVERED BY CONTRACT DOCUMENTS

- A. Project Location: Lewis and Clark National Historical Park. Project area is within the Fort Clatsop National Memorial site adjacent to the existing visitor center in Astoria, Oregon.
- B. The Work includes the following:
  - 1. The Work includes construction of a new 5,000 gallon per day wastewater collection, treatment and disposal system to serve the Fort Clatsop visitor center and administration building. This will include the installation of a new 15,000-gallon septic tank and effluent pump system, the installation of a 5,000 gallon per day package treatment plant, including associated pumps and controls and the installation of a pressure dosed sub-surface wastewater disposal field. Work also includes installation of all associated gravity and pressurized collection and conveyance piping and associated appurtenances including all necessary electrical systems, control panels and connections to existing power systems.

##### 1.2 GOVERNMENT-FURNISHED ITEMS

- A. The Government may furnish products and materials for incorporation into the work.
  - 1. The government will arrange and pay for delivery of government furnished items to the project site based on the contractor's approved construction schedule.
  - 2. After delivery, the government will inspect delivered items for damage. If items are damaged, defective, or missing, the government will arrange for replacement.
  - 3. The contractor is responsible for receiving, unloading, and handling government furnished items at project site for use in the work.
  - 4. The contractor is responsible for protecting government furnished items during storage, handling, and the work, including damage from exposure to the elements.
  - 5. If government furnished items are damaged as a result of the contractor's operations, the contractor shall repair or replace the items in-kind.

##### 1.3 PUBLIC USE OF SITE

- A. General: The project site will be open to the public during construction. The contractor shall at all times conduct his operations to ensure the least inconvenience to the public. Temporary closures may be permitted upon specific written approval of the contracting officer.

#### 1.4 CONTRACTOR USE OF SITE

- A. General: Limit use of the site during the construction period to the project area limits as outlined on the project plans. Do not disturb portions of the site beyond the project area limits.
- B. Site Access: The contractor shall access the project site via the primary site access drive. Do not drive vehicles off road or access non-project areas without permission from the contracting officer or park superintendent.
- C. Park Regulations: Ensure all personnel (contractors, subcontractors, and vendors) entering or working in the park are familiar with and obey all park regulations. Park staff will intervene if they perceive any unsafe or unlawful activity.
- D. Working Hours: Regular work hours shall be limited to daylight hours from 7:00 a.m. until 5:00 p.m. Monday through Friday, excluding government holidays. Work outside regular hours requires approval from the contracting officer.
- E. No Smoking Policy: Smoking is prohibited inside or outside within 25 feet of any buildings in the park. This applies to existing buildings, buildings under construction, and buildings under renovation. Discarding of tobacco products or debris anywhere other than into designated tobacco receptacles is considered littering and subject to fines.
- F. Staging and Storage: Confine storage of equipment and materials to the staging / lay-down / storage areas identified on the project plans or as established at the preconstruction meeting.
- G. Parking: The contractor shall park vehicles and heavy equipment in designated areas for contractor use or as established at the preconstruction meeting. Vehicles are not permitted within long-term or overnight parking along roads or in associated overlooks / pull-outs.
- H. Driveways and Entrances: The contractor shall keep driveways and entrances serving the premises clear and available to the government, government employees, and emergency vehicles at all times.
- I. Preservation of Natural Features: Prevent damage to natural surroundings. Restored damaged areas and replace damaged trees, vegetation, and grass at no expense to the government.
- J. Refer also to Section 01 11 40 Work Restrictions and Section 01 50 00 Temporary Facilities & Controls.

## 1.5 REFERENCE DOCUMENTS / REPORTS

- A. General: The following reference documents / reports are available upon request to supplement the information specified in the contract documents: Not Applicable.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

## SECTION 01 11 40

### WORK RESTRICTIONS

#### PART 1 – GENERAL

##### 1.1 PARK REGULATIONS

A. General: The Contractor must comply with the following rules and conditions:

1. Ensure personnel (contractors or subcontractors) working in the park become familiar with and obey all park regulations, wear hard hats in designated areas, and do not enter any restricted areas unless required to do so and until cleared for such entry.
2. Ensure equipment is conspicuously marked for identification.
3. The Contractor shall restrict employees / representatives to the work site and control travel directly to and from the work site.
4. Restore all traffic / parking / security signs and markings, including space numbers, designations, and lines, to their original form if such signs / markings are defaced or deleted during construction / repair.
5. Control and provide security of Contractor-owned equipment and materials at the work site. Report immediately missing / lost / stolen property.
6. Vehicles / Heavy Equipment:
  - a. Rules of the Road: All vehicles and heavy equipment will comply with posted traffic regulations, including speed limits and double-yellow center lane markings. Vehicles and heavy equipment shall take every safe opportunity to use paved roadside pullouts in order to allow faster moving traffic to pass. Failure to comply with traffic regulations will result in a citation being issued to the driver.
  - b. Vehicle Parking: Vehicles are not permitted within long-term or overnight parking along park roads or in associated overlooks / pullouts. Vehicles and heavy equipment will be permitted at designated parking areas only.
  - c. Vehicle Exhaust: All vehicles will be properly maintained to ensure that the exhaust produced is within legal limits. Effects of excessive vehicle exhaust may be subject to enforcement of State and Federal laws regarding emissions as well as those regarding threatened and endangered species.
  - d. Spills: Contractor shall be responsible for any cleanup efforts required in accordance with 40 CFR and all applicable state environmental quality laws regarding disposal and cleanup of hazardous / industrial wastes. Contractor must immediately notify the Contracting Officer of spills.

- e. Commercial Vehicle Safety Inspections: The Contractor, employees, contractors, and subcontractors shall fully cooperate regarding safety inspections of commercial vehicles within the Park. Commercial vehicle safety inspections are conducted unannounced for employee and visitor safety. Vehicles are checked for safety and mechanical deficiencies and for compliance with current state and federal laws and regulations. Driver licenses and medical certificates are also checked.
  - f. DOT Compliance: All vehicles are to be compliant with all DOT requirements including but not limited to driver with appropriate license class, medical examiner card as appropriate with license class, carrying three (3) triangles or three (3) flares, mounted fire extinguisher, and valid DOT safety sticker.
  - g. Oversized Vehicles: Oversized vehicles are defined as vehicles where the width of the vehicle or load exceeds one lane (i.e., beyond the center line of the paved road). Oversized vehicles must not exceed the clearances along the Park road corridor. Oversized vehicles will require an escort and drivers must avoid driving on the edges of the Park road. The Contractor is to notify the Contracting Officer of oversized vehicles, scheduled dates and estimated arrival times at the park entrance, and the identity of who is escorting the vehicle (e.g., police, contractor, etc.). Vehicles that are oversized are requested to enter the Park AFTER 2:00 p.m. and exit the Park BEFORE sunset.
  - h. Road Work: Contractor shall provide adequate traffic control, including flaggers on either side of any work performed on the road. Any workers on or near the road must wear highly visible, bright clothing. (See Section 01 50 00 for additional details).
  - k. Road & Weight Restrictions: All vehicle load, weight and size limitations, as established by State law, apply to vehicles operated on Park roads (36 CFR § 4.11).
7. Emergency Medical and Accident Reporting:
- a. The Contractor or subcontractor is required to report ANY personal injury and / or property damage incident occurring within the park. This report must be made at the first available opportunity before leaving the park.

## 1.2 RESOURCE PROTECTION

- A. General: The park is committed protecting natural and cultural resources found within the park and adjacent lands. The Contractor must comply with the following rules and conditions:
  - 1. Invasive Species: The introduction of non-native invasive species can threaten rare and endangered species or can create new populations of non-native species not traditionally found in the park. The contractor is required to inform personnel, subcontractors, and vendors to thoroughly clean all vehicles, equipment, tools, supplies, and materials prior to packing / loading. The park requires, and will perform, inspections to ensure non-transport of non-native species PRIOR to arriving at the park entrance. Contact the

resource staff directly at least (3) three days in advance of park entry to arrange for inspection(s) at an agreed upon location outside of the park.

2. Endangered Species: Endangered species are protected by Federal law. Obey all park regulations. Drivers must obey all traffic laws and keep an eye out for animals on or alongside road. Contact park immediately if animal is hit or injured or will not move off of the road.
3. Archaeological Resources: Archaeological resources are physical evidences of past human activity, including evidences of the effects of that activity on the environment. Archaeological resources are found above and below ground and underwater. The contractor shall appoint an archaeological monitor during all ground-disturbing activities in archaeological sensitive areas. If the monitor discovers resources, the contractor shall stop work or relocate work to a non-sensitive area and contact the contracting officer immediately. Archaeological resources typically found in the park or at the project site will be discussed further at the preconstruction meeting.
4. Soundscape / Noise: The contractor shall minimize noise levels at the project site to protect the soundscape of the park. Perform noise-producing work in less sensitive hours of the day or week or as directed by the contracting officer.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

## SECTION 01 27 00

### DEFINITION OF CONTRACT LINE ITEMS

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. The intent of this section is to set a schedule of values and to explain, in general, what is and what is not included in the contract and for determining whether the price set forth is fair and reasonable.

#### PART 2 – PRODUCTS (not used)

#### PART 3 – EXECUTION

##### 3.1 LIST OF CONTRACT LINE ITEMS (BASE BID)

- A. Contract Price Item No. 1 – Mobilization & Demobilization

- 1. This price item consists of mobilization, demobilization and includes providing all required traffic control and temporary stormwater pollution prevention necessary for the completion of the project in accordance with the project plans and specifications. The government shall consider that mobilization is sixty (60) percent and demobilization is forty (40) percent of the total cost and effort for Mobilization and Demobilization.
- 2. No separate measurement will be made.
- 3. Payment will be made at the contract lump sum price.

- B. Contract Price Item No. 2 – Site Demolition

- 1. This price item consists of providing all labor, materials and equipment required to complete the specified site demolition work required for the wastewater system improvements in accordance with the project plans and specifications. This includes but is not limited to the completion of all required excavation, the completion of all required piping and tank demolition/abandonment, the removal and disposal of any extraneous materials, the supply and installation of any required backfill, the completion of any necessary compaction and any surface restoration required to return the site to pre-project conditions.
- 2. No separate measurement will be made.
- 3. Payment will be made at the contract lump sum price.

- C. Contract Price Item No. 3 – Sanitary Sewer Pipe (Gravity)

- 1. This price item consists of providing all labor, materials and equipment required to install the specified Sanitary Sewer gravity collection system to a fully functional

condition. This includes, but is not limited to, completing all required excavation, providing and installing all required bedding material, providing and installing the specified pipe and all required fittings and structures (including manholes), providing and installing all required trench backfill material, completing all required compaction, providing and installing the specified locate tape, completion of all required testing, completion of connections to existing building lateral including connection appurtenances, and completion of surface restoration in accordance with the project plans and specifications.

2. No separate measurement will be made.
3. Payment will be made at the contract lump sum price.

D. Contract Price Item No. 4 – Sanitary Sewer Pipe (Pressure)

1. This price item consists of providing all labor, materials and equipment required to install the specified Sanitary Sewer effluent force main system, regardless of sized, to a fully functional condition. This includes, but is not limited to, completing all required excavation, providing and installing all required bedding material, providing and installing the specified pipe and all required fittings, providing and installing all required trench backfill material, completing all required compaction, providing and installing the specified locate tape, completion of all required testing, completion of connections to existing building effluent pump system, and completion of surface restoration in accordance with the project plans and specifications.

2. No separate measurement will be made.
3. Payment will be made at the contract lump sum price.

E. Contract Price Item No. 5 – 15,000 Gallon Septic Tank

1. This price item consists of providing all labor, materials and equipment required to construct the complete wastewater septic tank and effluent pump system in accordance with the project plans and specifications. This includes, but is not limited to, completing all required excavation and shoring, providing and installing all required tank anchoring and bedding material, installation of all required septic tank system components including tankage, connective piping and effluent pumping system, including controls and providing all required connections to existing site electrical system, including completion of any necessary upgrades, completion of all required tank testing, installation of all required backfill material, including geotextile fabric, and completion of all required compaction and site restoration in accordance with the project plans and specifications.

2. No separate measurement will be made.
3. Payment will be made at the contract lump sum price.

F. Contract Price Item No. 6 – Admin Effluent Pump System

1. This price item consists of providing all labor, materials and equipment required to construct the complete administration building effluent pumping system in accordance with the project plans and specifications. This includes, but is not limited to, completing all required excavation and shoring, providing and installing all required tankage and pumping system components, including controls, providing all required connections to

existing site electrical system, including completion of any necessary upgrades, installing all required effluent force main piping (1”) from the pumping system to the primary effluent force main (2”) providing and installing all required fittings, providing and installing all required trench backfill material, completing all required compaction, providing and installing the specified locate tape, completion of all required testing, completion of connections to existing building septic system, and completion of surface restoration in accordance with the project plans and specifications.

2. No separate measurement will be made.
3. Payment will be made at the contract lump sum price.

G. Contract Price Item No. 7 – Wastewater Treatment System

1. This price item consists of providing all labor, materials and equipment required to construct the complete wastewater treatment system in accordance with the project plans, specifications and manufacturer’s recommendations. This includes, but is not limited to, completing all required excavation and shoring, providing and installing all required tankage and pumping system components, including controls, providing all required connections to existing site electrical system, including completion of any necessary upgrades, installing all required connective piping and fittings, providing and installing all required backfill material, completing all required compaction, completion of all required system testing and fine-tuning and completion of surface restoration in accordance with the project plans and specifications.
2. No separate measurement will be made.
3. Payment will be made at the contract lump sum price.

H. Contract Price Item No. 8 – Onsite Wastewater System

1. This price item consists of providing all labor, materials and equipment required to construction the new 5,000 gallon per day wastewater disposal drainfield, including all required drainfield laterals and associated piping, valving, alternative media (gravelless chambers), backfill/compactions and any surface restoration required in accordance with the project plans and specifications.
2. No separate measurement will be made.
3. Payment will be made at the contract lump sum price.

3.2 LIST OF CONTRACT LINE ITEMS (BID OPTION A – VISITOR CENTER PLUMBING DESIGN/BUILD MODIFICATIONS)

A. Contract Price Item No. 1 – VISITOR CENTER PLUMBING DESIGN/BUILD MODIFICATIONS

1. This price item consists of providing all labor, materials and equipment required to design and build modifications to select portions of the existing plumbing system serving the Visitor Center. Currently, a portion of the plumbed fixtures on the first floor and plumbed fixtures within the basement, including floor drains, gravity flow to an existing pump station located in the buildings basement. This pump station discharges waste to the existing septic system via a 3” force main. NPS would like to review options for improving this portion of the plumbing system to optimize discharge to the new septic

system whether via gravity flow or an improved pump system. This price item includes the preparation of plumbing system modification options for NPS review. Following NPS review and approval it shall be the contractors responsibility to obtain all required permits and provide all required labor, materials and equipment for the complete installation of the approved plumbing modifications and for the connection of that modified system to the new septic system upstream of the new septic tank.

2. No separate measurement will be made.
3. Payment will be made at the contract lump sum price.

END OF SECTION

## SECTION 01 31 00

### PROJECT MANAGEMENT & COORDINATION

#### PART 1 – GENERAL

##### 1.1 SUBMITTALS

- A. Division 01 documents: The following items shall be submitted a minimum of one week prior to the Preconstruction Conference. Contracting Officer will notify Contractor of tentative date for the Pre-Construction Conference.
1. Letter designating Project Superintendent.
  2. Construction Schedule.
  3. A comprehensive breakdown of the Schedule of Values.
  4. Accident Prevention Plan.
  5. A list of Subcontractors for this project.
  6. Written statements from subcontractors certifying compliance with applicable labor standard clauses.
  7. Satisfactory evidence of liability insurance coverage and workman's compensation for the Contactor and all subcontractors.
- B. All items listed must be provided to the Contracting Officer before the Pre-Construction Conference is held. If all of these documents have not been received one week prior to the scheduled Pre-Construction Conference date, the conference will be cancelled, Notice to Proceed will not be issued, and the Contracting Officer will consider other contractual remedies. Work shall not commence until written Notice to Proceed has been issued.

##### 1.2 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI utilizing the form as directed by the Contracting Officer.
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 the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. RFI number, numbered sequentially.
  2. Date.
  3. RFI subject.
  4. Specification Section number and title and related paragraphs, as appropriate.
  5. Drawing number and detail references, as appropriate.
  6. Field dimensions and conditions, as appropriate.

7. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  8. Contractor's signature.
  9. Requested date for response.
  10. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. Contracting Officer's Action: Contracting Officer will review each RFI, determine action required, and respond. Contracting Officer will determine the critical nature of each RFI and issue a response accordingly.
1. The following are not considered to be RFIs and will receive no action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for approval of Contractor's means and methods.
    - d. Requests for coordination information already indicated in the Contract Documents.
    - e. Requests for adjustments in the Contract Time or the Contract Sum.
    - f. Requests for interpretation of Architect's actions on submittals.
    - g. Incomplete RFIs or inaccurately prepared RFIs.
  2. Contracting Officer's action may include a request for additional information, in which case time for response will date from time of receipt of additional information.
  3. Contracting Officer's action on RFIs may result in the need for a change to the Contract Time or the Contract Sum. All contract changes will be processed following the terms and conditions of the contract.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

## SECTION 01 32 16

### CONSTRUCTION SCHEDULE

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. This Section includes Construction Schedule requirements including but not limited to the following:
  - 1. Schedule of Values
  - 2. Construction Schedule Requirements.
  - 3. Construction Schedule Updates.
- B. Purpose: The purpose of the Construction Schedule is to ensure adequate planning, coordination, scheduling, and reporting during execution of the work by the Contractor. The Construction Schedule will assist the Contractor and Contracting Officer in monitoring the progress of the work, evaluating proposed changes, and processing the Contractor's monthly progress payment.

##### 1.2 SUBMITTALS

- A. Schedule of Values: After contract award and before the Pre-Construction conference submit a schedule of dollar values based on the Contract Price Schedule.
- B. Construction Baseline Schedule: After contract award and before the Pre-Construction conference, submit a baseline schedule, large enough to show entire schedule for entire construction period.
- C. Construction Schedule Updates: Prior to progress payment request date, submit estimates of the percent completion of each schedule activity and necessary supporting data.

##### 1.3 COORDINATION

- A. Coordinate Construction Baseline Schedule with the Schedule of Values, list of subcontractors, payment request, and other required schedules and reports.

#### PART 2 – PRODUCTS

##### 2.1 SCHEDULE OF VALUES

- A. Breakdown each lump-sum item into component work activities used in the schedule, for which progress payments may be requested. The work activities broken out within the schedule of values shall be integrated into and made a logical part of the construction baseline schedule submitted under this specification. The total costs for the component work activities shall equal

- the contract price for that lump-sum item. The Contracting Officer may request data to verify accuracy of dollar values. Include mobilization, general condition costs, overhead and profit in the total dollar value of unit price items and in the component work activities for each lump-sum item. Do not include mobilization, general condition costs, overhead or profit as a separate item.
- B. Do not break down unit price items. Use only the contract price for unit price items.
  - C. The total cost of all items shall equal the contract price. The Schedule of Values will form the basis for progress payments.
  - D. An acceptable Schedule of Values shall be agreed upon by the Contractor and Contracting Officer before the first progress payment is processed.

## 2.2 CONSTRUCTION SCHEDULE REQUIREMENTS

- A. Construction Baseline Schedule: Prepare Construction Baseline Schedule using a computerized scheduling software.
  - 1. Construction Baseline Schedule shall show submittal review, construction start date, work activities / staff resources, activity durations, major milestones, inspection dates, closeout activities, and project end date.
  - 2. Establish procedures for updating Construction Baseline Schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  - 3. Contracting Officer may request an updated Construction Schedule at any time to confirm progress of the work.

PART 3 –EXECUTION (not used)

END OF SECTION

SECTION 01 33 23

SUBMITTAL PROCEDURES

PART 1 – GENERAL

1.1 GENERAL SUBMITTAL PROCEDURES

- A. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. CM-16 Transmittal Form: All submittals shall be transmitted using National Park Service Form CM-16 which is attached to the end of this specification section. No action will be taken on a submittal item unless accompanied by the CM-16 transmittal form. Complete the general information at the top of the form.
    - a. Provide all required information based on the submittal type.
    - b. Attach all related documents.
    - c. Sign the CM-16 form in the contractor section at the bottom of the form.
  2. Physical Samples: Complete the CM-16 form as outlined above, and deliver the physical sample to the CO (or designee) on site for processing. All comments and actions will be documented on the CM-16 form.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION



## SECTION 01 35 13.22

### ARCHEOLOGICAL PROTECTION

#### PART 1 – GENERAL

##### 1.1 SUMMARY

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

##### 1.2 DEFINITIONS

- A. Archeological Resources: Archeological resources are the physical evidences of past human activity, including evidences of the effects of that activity on the environment. Archeological resources represent both prehistoric and historic time periods. They are found above and below ground and under water.
- B. Archeologically Sensitive Areas: Areas that have the potential to contain significant (National Register eligible) archeological resources. If National Register eligible or listed archeological resources could not be avoided, an appropriate mitigation strategy would be developed in consultation with the state historic preservation officer and, if necessary, associated American Indian tribes.
- C. Non-sensitive Areas: Areas with little, if any, potential of containing significant (National Register eligible) archeological resources.
- D. Archeological Monitor: Representative of the Government designated to oversee construction activities that could disturb archeological resources.
- E. Archeological Resources Protection Act (ARPA) of 1979 (P.L. 96-95; 93 Stat. 712): defines archeological resources as any material remains of past human life or activities that are of archeological interest and at least one hundred (100) years old; Section 4 of the statute describes the requirements that must be met before Federal authorities can issue a permit to excavate or remove any archeological resource on Federal or Indian lands; the curatorial requirements of artifacts, and other materials excavated or removed.

##### 1.3 SUBMITTALS

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

## 1.4 QUALITY ASSURANCE

- A. At least one (1) week before on-site work begins, Contractor shall meet with Contracting Officer and Archeological Monitor to discuss Daily Work Schedule and equipment and special methods to be used in archeologically sensitive areas. Contractor shall ensure that approved Daily Work Schedule is followed throughout construction.

## PART 2 – PRODUCTS

### 2.1 DAILY WORK SCHEDULE

- A. A Daily Work Schedule is required for all work occurring within archeologically sensitive areas. Include all work that is to occur within the area and key the schedule to the drawings to include the following:
  - 1. Starting and ending dates of ground-disturbing construction.
  - 2. Locations of temporary facilities, such as barriers, field offices, staging areas, sanitary facilities, borrow pits, and haul and access roads.
  - 3. Types of construction, such as clearing, topsoil stripping, structure or trench excavation, landscaping, and post construction clean-up.
  - 4. Methods and equipment used for each type of construction.
  - 5. Plan for relocating work in the event of temporary work stoppages at each archeologically sensitive area.

## PART 3 – EXECUTION

### 3.1 OBSERVATION

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

### 3.2 DISCOVERY OF RESOURCES

- A. If Archeological Monitor discovers resources, immediate relocation of the work to a non-sensitive area may be required to allow Monitor to identify and document resources and, if necessary, develop an appropriate mitigation plan. While Archeological Monitor is documenting resources in sensitive areas, Contractor shall relocate work to non-sensitive areas where monitoring is not normally required.
- B. If resources are discovered while Archeological Monitor is absent, stop work immediately and report the discovery to the Contracting Officer.

### 3.3 WORK STOPPAGE

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

END OF SECTION

## SECTION 01 35 23

### SAFETY REQUIREMENTS

#### PART 1 – GENERAL

##### 1.1 SUMMARY

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

##### 1.2 SUBMITTALS

- A. Accident Prevention Plan: After contract award and before the Pre-Construction conference, submit for review, an Accident Prevention Plan. The Contracting Officer will review the proposed Plan. If the plan requires any revisions or corrections, the Contractor shall resubmit the Plan within ten (10) days. No progress payments will be made until the Plan is accepted.

##### 1.3 QUALITY ASSURANCE

- A. Comply with contract clauses entitled "Accident Prevention" and "Permits and Responsibilities". In case of conflicts between Federal, State, and local safety and health requirements, the most stringent shall apply. Equipment or tools not meeting OSHA requirements will not be allowed on the project sites. Failure to comply with the requirements of this section and related sections may result in suspension of work.
- B. Qualifications of Employees:
  - 1. All employees must be physically qualified and able to perform their assigned duties in a safe manner.
  - 2. Do not allow employees to perform work whose ability or alertness is impaired because of prescription or illegal drug use, fatigue, illness, intoxication, or other conditions that may expose themselves or others to injury.
  - 3. Operators of vehicles, hoisting equipment, and hazardous plant equipment shall be able to understand signs, signals, and operating instructions, and be fully capable of operating such equipment. Provide operating instructions for all equipment. Newly hired operators shall be individually tested by an experienced operator or supervisor to determine if they are capable of safely operating equipment.

##### 1.4 ACCIDENT REPORTING

- A. Reportable Accidents: A project reportable accident is defined as death, occupational disease, traumatic injury to employees or the public, fires, and property damage by accident in excess of one hundred dollars (\$100). Notify Contracting Officer immediately in the event of a reportable accident. Within 7 days of a reportable accident, fill out and forward to Contracting

Officer an Accident/Property Damage Report (Form CM-22). Form may be obtained from the Contracting Officer.

## PART 2 – PRODUCTS

### 2.1 ACCIDENT PREVENTION PLAN

- A. The Plan shall be written to comply with OSHA and project requirements (a generic plan is not acceptable) including but not limited to the following:
  - 1. Name of responsible supervisor to carry out the program.
  - 2. Weekly and monthly safety meetings.
  - 3. First aid procedures.
  - 4. Outline of each phase of the work, the hazards associated with each major phase, and the methods proposed to provide for property protection and safety of the public, National Park Service personnel, and Contractor's employees. Identify the work included under each phase.
  - 5. Training, both initial and continuing.
  - 6. Planning for possible emergency situations, such as floods, fires, cave-ins, slides, explosions, power outages, and wind storms. Such planning shall take into consideration the nature of construction, site conditions, and degree of exposure of persons and property.

### 2.2 FIRST AID FACILITIES

- A. Provide adequate facilities for the number of employees and the hazards associated with the types of ongoing construction work at the site.

### 2.3 PERSONNEL PROTECTIVE EQUIPMENT

- A. Meet requirements of applicable ANSI standards.

## PART 3 – EXECUTION

### 3.1 EMERGENCY INSTRUCTIONS

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

### 3.2 FIRE AND LIFE SAFETY

- A. Comply with the requirements of NFPA 241 (Standard for Safeguarding Construction, Alteration, and Demolition Operations).
- B. Store hazardous materials in accordance with manufacturer's and OSHA recommendations. Maintain readily available, on site, MSDS for each chemical.

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

### 3.3 PROTECTIVE EQUIPMENT

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

### 3.4 SAFETY MEETINGS

- A. As a minimum, conduct weekly fifteen (15) minute "toolbox" safety meetings. These meetings shall be conducted by a foreman or supervisor and attended by all construction personnel at the worksite. Topics need to coincide with work scheduled for the following week. Document and submit meeting minutes to the Contracting Officer within one day after the meeting.
- B. Conduct monthly safety meetings for all levels of supervision. Meetings shall be attended by all contractors and subcontractors performing work on the site. Notify the Contracting Officer of meeting dates and times. These meetings shall be used to review the effectiveness of the Contractor's safety effort, to resolve current health and safety problems, to provide a forum for planning safe construction activities, and for updating the Accident Prevention Plan. The Contracting Officers Representative will attend the meeting and enter the results of the meetings into the daily log.

### 3.5 HARD HATS AND PROTECTIVE EQUIPMENT AREAS

- A. A hard hat area shall be designated by the Contractor. The hard hat area shall be posted by the Contractor in a manner satisfactory to the Contracting Officer.
- B. It is the Contractor's responsibility to require all those working on or visiting the site to wear hard hats and other necessary personal protective equipment at all times. As a minimum, provide six (6) hard hats for use by visitors.

### 3.6 TRAINING

- A. First Aid: Provide adequate training to an adequate number of personnel to ensure prompt and efficient first aid.
- B. Hazardous Material: Train and instruct each employee exposed to hazardous material in safe and approved methods of handling and storage. Hazardous materials are defined as explosive, flammable, poisonous, corrosive, oxidizing, irritating, or otherwise harmful substances that could cause death or injury.

END OF SECTION

## SECTION 01 40 00

### QUALITY REQUIREMENTS

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements. The quality of all work shall be the responsibility of the Contractor.
  - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and control procedures that facilitate compliance with the Contract Document requirements.
- C. See Divisions 02 through 48 Sections for specific test and inspection requirements.

##### 1.2 DEFINITIONS

- A. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the work to evaluate that actual products incorporated into the work and completed construction comply with requirements.
- C. Preconstruction Testing: Tests and inspections that are performed specifically for the project before products and materials are incorporated into the work to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by a Nationally Recognized Testing Laboratory (NRTL), a National Voluntary Laboratory Accreditation Program (NVLAP), or a testing agency qualified to conduct product testing, to establish product performance and compliance with industry standards.
- E. Source Quality Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- F. Field Quality Control Testing: Tests and inspections that are performed on-site for installation of the work and for completed work.

- G. Testing Agency or Laboratory: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Using a term such as “carpentry” does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as “carpenter.” It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.

### 1.3 CONFLICTING REQUIREMENTS

- A. Reference Standards: If compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Contracting Officer for a decision before proceeding.
- B. Minimum Quality Levels: The quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Contracting Officer for a decision before proceeding.

### 1.4 SUBMITTALS

- A. Quality Control Plan:
  - 1. After contract award and before the Pre-Construction conference, submit for approval a written Contractor Quality Control (CQC) plan.
  - 2. If the plan requires any revisions or corrections, the Contractor shall resubmit the plan within ten (10) days.
  - 3. The Government reserves the right to require changes in the plan during the contract period as necessary to obtain the quality specified.
  - 4. No change in the approved plan may be made without written concurrence by the Contracting Officer.
- B. Qualification Data: For testing agencies specified in “Quality Assurance” Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- C. Contractor's Quality Control Daily Reports: Submit showing all inspections and tests on the first workday following the date covered by the report. Quality Control Supervisor shall utilize the forms attached at the end of this Section.

- D. Test Reports
  - 1. Test reports shall be completed by the person performing the test.
  - 2. Submit Daily Test Information Sheets with Quality Control Daily Reports.
  - 3. Submit failing test results and proposed remedial actions within four (4) hours of noted deficiency.
  - 4. Submit three (3) copies of complete test results no later than one (1) calendar day after the test was performed.
- E. Off-Site Inspection Reports: Submit prior to shipment.
- F. If the CQC plan and Quality Control Daily Reports are not submitted as specified, the Contracting Officer may retain all payments until such time a plan is accepted and implemented, or may retain payments for work completed on days there are no Quality Control Daily Reports.
- G. Permits, Licenses, and Certificates: For NPS records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the work.
  - 1. License Requirements: In accordance with OAR 340-071-0600 A person may not perform sewage disposal services or advertise or represent himself as being in the business of performing such services without a valid license issued by the Oregon Department of Environmental Quality to perform those services. A separate license is required for each business, organization, or other person conducting sewage disposal service.
  - 2. Installer License: An installer license is required for any person to construct or install onsite systems or parts of onsite systems or to perform the grading, excavating, or earth-moving work associated with constructing or installing on-site systems.
  - 3. Certification Requirement: Each business with an installer must identify at least one person certified under OAR 340-071-0650 who will supervise installation of onsite systems for the license.

## 1.5 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Contractors Quality Control Staff:
  - 1. The Contractor's Quality Control Supervisor shall be assigned no other duties.
  - 2. The Contractor's designated Quality Control Supervisor shall be on the project site whenever contract work is in progress.
  - 3. The Contractor's job supervisory staff may be used to assist the Quality Control Supervisor supplemented, as necessary, by additional certified testing technicians.
- C. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

- D. **Manufacturer Qualifications:** A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. **Fabricator Qualifications:** A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- F. **Testing Agency Qualifications:** An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by Contract, is acceptable to the Contracting Officer.
  - 1. **NRTL:** A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. **NVLAP:** A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
  - 3. All measuring devices, laboratory equipment, and instruments shall be calibrated at established intervals against certified standards in accordance with NIST requirements. Upon request, measuring and testing devices shall be made available for use by the Government for verification tests.
- G. **Factory-Authorized Service Representative Qualifications:** An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

## 1.6 QUALITY CONTROL

- A. The Contractor is responsible for all testing and inspections, including Structural Tests and Special Inspections (STSI), as identified in the Statement of Structural Tests and Special Inspections (STSI) (see attached). Inspect and test work as needed to ensure that the quality of materials, workmanship, construction, finish, and functional performance are in compliance with applicable specifications, drawings, and those required by the Building Code.
  - 1. Engage a qualified testing agency to perform these quality-control services.
  - 2. Submit the appropriate report, for each quality-control service.
  - 3. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 4. The Contracting Officer may designate test locations.
- B. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing.
- C. **Re-testing/Re-inspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced work that failed to comply with the Contract Documents.

- D. Testing Agency Responsibilities: Cooperate with NPS and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Contracting Officer and Contractor promptly of irregularities or deficiencies observed in the work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit three (3) copies of the certified written report of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the work.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

## PART 2 – PRODUCTS

### 2.1 QUALITY CONTROL PLAN

- A. The Quality Control Plan shall include:
1. A list of personnel responsible for quality control and assigned duties. Include each person's qualifications.
  2. A copy of a letter of direction to the Contractor's Quality Control Supervisor outlining assigned duties.
  3. Names, qualifications, and descriptions of laboratories to perform sampling and testing, and samples of proposed report forms.
  4. Methods of performing, documenting, and enforcing quality control of all work.

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

## PART 3 – EXECUTION

### 3.1 OFF-SITE CONTROL

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

### 3.2 ON-SITE CONTROL

- A. Notification:
  1. Notify the Contracting Officer at least forty eight (48) hours in advance of the preparatory phase meeting.
  2. Notify the Contracting Officer at least twenty four (24) hours in advance of the initial and follow-up phases.
- B. Preparatory Phase: Perform before beginning each feature of work.
  1. Review control submittal requirements with personnel directly responsible for quality assurance and quantity control of the work. As a minimum, the Contractor's Quality Control Supervisor and the foreman responsible for the feature of work shall be in attendance.
  2. Review all applicable specifications sections and drawings related to the feature of work.
  3. Ensure that copies of all referenced standards related to sampling, testing, and execution for the feature of work are available on site.
  4. Ensure that provisions have been made for field control testing.
  5. Examine the work area to ensure that all preliminary work has been completed.
  6. Verify all field dimensions and advise the Contracting Officer of discrepancies with contract documents.
  7. Ensure that necessary equipment and materials are at the project site and that they comply with approved shop drawings and submittals.
  8. Document all preparatory phase activities and discussions on the Contractor's Quality Control Daily Report.
- C. Initial Phase:
  1. As soon as work begins, inspect and test a representative portion of a particular feature of work for quality of workmanship.
  2. Review control testing procedures to ensure compliance with contract requirements.
  3. Document all initial phase activities and discussions on the Contractor's Quality Control Daily Report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.
- D. Follow-Up Phase: Inspect and test as work progresses to ensure compliance with contract requirements until completion of work.

- E. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be required on the same feature of work for the following reasons:
  - 1. Quality of on-going work is unacceptable.
  - 2. Changes occur in the applicable quality control staff, on-site production supervision, or work crew.
  - 3. Work on a particular feature of work is resumed after a substantial period of inactivity.

### 3.3 DOCUMENTATION

- A. Maintain Quality Control Daily Reports, Daily Test Report Information Sheets, and Accessibility Inspection Reports (attached) of quality control activities and tests.
- B. Quality Control Daily Reports may not be substituted for other written reports required under clauses of the contract, such as Disputes, Differing Site Conditions, or Changes.

### 3.4 ENFORCEMENT

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

### 3.5 REPAIR AND PROTECTION

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

# CONTRACTOR'S QUALITY CONTROL DAILY REPORT

REPORT NO. \_\_\_\_\_ SHEET 1 OF \_\_\_\_\_

PROJECT			CONTRACT NO.		DATE		
PARK			CONTRACTOR'S REPRESENTATIVE ON THE JOB				
WEATHER (Rain, Snow, Cloudy, Windy, etc.)	RAINFALL Inches	TEMPERATURE		GROUND CONDITIONS (Dry, Damp, Wet, Frozen, etc.)			
		MAX.	MIN.				
<b>1. PRIME CONTRACTOR</b>							
NO. EMPLOYEES BY JOB CATEGORIES		Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
					YES	NO	Comments
WORK PERFORMED BY PRIME CONTRACTOR:							
MATERIALS DELIVERED				OFFICIAL VISITORS TO SITE			
2A. SUBCONTRACTOR, _____: (If more than one subcontractor use copies of following page.)							
NO. EMPLOYEES BY JOB CATEGORIES		Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
					YES	NO	Comments
WORK PERFORMED BY SUBCONTRACTOR:							
3. SPECIFIC INSPECTIONS: (Inspections performed, results, and corrective actions)							
4. TESTING: <input type="checkbox"/> 1 Check if any testing was performed today. (Complete and attach Test Report Information Sheets.) Type and Location of Testing: _____							
5. VERBAL INSTRUCTION RECEIVED FROM GOVERNMENT ON CONSTRUCTION DEFICIENCIES OR RE-TESTING REQUIRED:							
6. REMARKS:							
7. CERTIFICATION:							
I certify that the above report is complete and correct and that I, or my authorized representative, have inspected all work performed this day by the prime contractor and each subcontractor and determined that all materials, equipment, and workmanship are in strict compliance with the plans and specifications except as may be noted above.							
						_____ Contractor's Quality Control Representative	

SUBCONTRACTOR WORK CONTINUED:			CONTRACT NO.		REPORT NO. _____ SHEET ____ OF ____	
2. SUBCONTRACTOR,						
NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments
WORK PERFORMED BY SUBCONTRACTOR:						
2. SUBCONTRACTOR,						
NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments
WORK PERFORMED BY SUBCONTRACTOR:						
2. SUBCONTRACTOR,						
NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	Comments
WORK PERFORMED BY SUBCONTRACTOR:						
2. SUBCONTRACTOR,						
NO. EMPLOYEES BY JOB CATEGORIES	Hours	HEAVY EQUIPMENT ON JOB	NO. UNITS	HRS. WORKING		
				YES	NO	COMMENTS
WORK PERFORMED BY SUBCONTRACTOR:						

# DAILY TEST REPORT INFORMATION SHEET

CONTRACT NO. \_\_\_\_\_ REPORT NO. \_\_\_\_\_

SHEET \_\_\_\_ OF \_\_\_\_\_

1. Individual Making Inspection or Test:	
2. Testing Laboratory; Name:	Phone #:
Address: _____	
3. Description of Work and Test Method: _____ _____ _____	
4. Location of Samples and Tests or Inspections: _____ _____	
5. Specification Section:	
6. Inspection or Test Data: _____ _____ _____	
7. Test Results and Interpretations of Test Results: _____ _____ _____ _____	
8. Comments or Professional Opinion About Compliance of Inspected Work or Tested Work with contract Document Requirements: _____ _____	
9. Recommendations: _____ _____ _____	
10. Corrective Actions Taken: _____ _____ _____	
CERTIFICATION: I certify that the above testing report is complete and correct and that all testing performed this day for this contract is in strict compliance with the plans and specifications except as noted above.	
_____ Signature of Inspector	

## SECTION 01 50 00

### TEMPORARY FACILITIES & CONTROLS

#### PART 1 – GENERAL

##### 1.1 TEMPORARY FACILITIES AND CONTROLS

- A. General: The contractor will be allowed to set up temporary facilities and controls as outlined. All temporary facilities and controls shall be removed from the site before final acceptance of the work.
1. Temporary Utilities: The following utilities are available for use as the project site:
    - a. Electrical Power Service: Electrical power is not available at the site for the contractors use. The contractor shall use battery powered tools or furnish portable generators with proper fuel containment and emergency spill kits.
    - b. Water Service: Potable water service is not available at the site. The contractor shall supply all necessary potable water.
    - c. Sanitary Facilities: Restrooms are not available at the site. The contractor shall supply properly ventilated, weather-proof, lockable, portable toilets both for their own staff during the course of construction and for NPS staff and visitors during periods when the existing on-site wastewater systems are impacted by construction activities. The contractor shall properly pump / empty these toilets on a regular basis, and keep toilets clean so as not to attract insects / animals. The number of temporary toilet facilities required for NPS staff and visitors during periods of wastewater system outage shall be six (6) at a minimum.
  2. Temporary Sheds or Field Offices: The construction of temporary sheds, field offices, or structures will not be allowed at the project site. If the contractor requires a temporary office space with a phone connection, the government will attempt to make these accommodations without charge.
  3. Site Enclosure Fence: For uncontrolled sites, the contractor shall construct an enclosure fence, barrier, or partition to prevent people and animals from entering the site except by gates / doors.
  4. Traffic Controls: The contractor shall erect and maintain barricades, danger signals, and warning signs in accordance with the Manual on Uniform Traffic Control Devices (MUTCD), 2009 edition. The contractor shall provide adequate traffic control, including flaggers or either side of any work performed in the road. Any workers on or near the road must wear highly visible, bright clothing.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01 56 00  
TEMPORARY BARRIERS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work of this Section consists of furnishing, installing, and maintaining barriers to protect existing facilities as well as to protect the public and Park staff from construction operations.

1.2 SUBMITTALS

- A. As specified in Submittals – Section 01330.
- B. Shop drawings:
  - 1. Barricade ties and signage
  - 2. Proposed locations.
  - 3. Plating (if used)

PART 2 - PRODUCTS

2.1 GENERAL

- A. Material may be new or used, but shall be suitable for intended purpose. Fences and barriers shall be structurally adequate and neat in appearance.

2.2 FENCING

- A. Safety Barrier Fence: Steel chain link panels or alternative reusable fencing or barrier system approved by the Contracting Officer's representative.

2.3 BARRICADES AND SIGNS

- A. Manual on Uniform Traffic Control Devices (MUTCD), Part VI, 2003 edition.

2.4 LUMBER

- A. Free of nails, large knot holes and splinters.

## 2.5 BARRIER TAPE

- A. Banner Guard, imprinted with "CAUTION: CONSTRUCTION AREA", manufactured by Reef Industries, Inc., Houston, Texas, or approved equal.

## PART 3 EXECUTION

### 3.1 PROTECTION OF PUBLIC

- A. Fence, barricade, or otherwise block off the immediate work area to prevent unauthorized entry.
- B. Erect and maintain barricades, lights, danger signals, and warning signs in accordance with MUTCD (per latest edition).
- C. Illuminate barricades and obstructions at night; keep safety lights burning from sunset to sunrise.
- D. Adequately barricade and post open cuts in or adjacent to thoroughfares.
- E. Protect pedestrian traffic by guardrails or fences.
- F. When pedestrian traffic is detoured onto a roadway, provide temporary walkways with protection as required at ends and overhead. For walkways, use lumber running parallel to direction of traffic movement and provide ramps at changes of elevation.
- G. Cover pipes, hoses, and power lines crossing sidewalks and walkways with troughs using beveled edge boards.
- H. Erect and maintain sufficient detour signs at road closures and along detour routes.
- I. Trenching:
  - 1. Trenches shall be backfilled in public areas over weekends, holidays, and periods when Contractor is not working. Contractor shall coordinate backfill of trenches with the Contract Officer.
  - 2. Contractor may use plating in pre-approved circumstances where an excavation needs to remain accessible, but use is returned to the roadway. If plating is used by the contractor, a plan shall be submitted by the contractor for approval by the Contract Officer. At a minimum, plating thickness shall be adequate to support anticipated roadway axle loadings. Plating plan shall include dimensions of open trench and the proposed plates.
- J. Construction Fencing:
  - 1. Construction fencing shall be supported securely to steel posts, five (5) feet on center and driven into the ground. Install as directed by Contract Officer.

K. Temporary Barriers:

1. Temporary barricade shall be supported securely to steel posts and driven into the ground a minimum of eight (8) feet apart.

3.2 BARRIER TAPE

- A. Install where directed by Contract Officer. Keep a minimum of two (2) rolls on site at all times.

3.3 REMOVAL

- A. Completely remove barriers no longer needed when approved by Contract Officer.

END OF SECTION

## 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 U.S. Environmental Protection Agency (USEPA). The USEPA uses the amount of ground disturbance as a measure of a project potential to generate pollution from erosion. NPDES Phase I regulates discharges from construction sites that disturb five (5) acres or more. NPDES Phase II regulations expand the existing General Permit requirements under Phase I to include/regulate discharges from construction sites that disturb land equal to or greater than one (1) acre and less than five (5) acres, known as Small Construction Activity. Construction disturbances one (1) acre and above typically require a formal NPDES permit and a formal Stormwater Pollution Prevention Plan (SWPPP) must be submitted to the Authority Having Jurisdiction (AHJ) for review and approval. In this case the AHJ is the State of Oregon Department of Environmental Quality (ODEQ).
- B. NPS Standards and Guidelines require that water quality be protected at all times to ensure compliance with the Organic Act. Initial estimates of the projects land disturbance indicate a disturbance area less than one (1) acre. Regardless, it shall be the Contractors sole responsibility to comply with NPDES/ODEQ Construction Stormwater Permit requirements for land disturbances and for payment of all required permit fees.
- 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 the NPDES permit program; Or in conformance with NPS guidance for UPPPs.
- D. All erosion control measures shall meet the requirements provided in the 2009 CASQA Construction BMP Handbook and the NPS GGNRA 2010 BMP Handbook.

##### 1.2 DEFINITIONS

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- B. Environmental Pollution and Damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.

- C. National Pollution Discharge Elimination System (NPDES) Phase I: Regulates discharges from construction sites that disturb five (5) acres or more.
- D. NPDES Phase II: Regulations expand the existing General Permit requirements under Phase I to include and regulate discharges from construction sites that disturb land equal to or greater than one (1) acre and less than five (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 the NPDES program.
- F. Under-An-Acre Pollution Prevention Plan (UPPP): Developed and implemented pollution prevention plan (including stormwater management measures, if needed) to protect the 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 the pre-construction conference, prepare and submit:
- B. A SWPPP, or UPPP where appropriate, showing that the plan satisfies all Federal and State NPDES permit requirements. The plan shall be prepared by the project QSD;
- C. Inspection Schedule: Submit schedule for inspection and monitoring of all storm water and pollution prevention measures.
- D. BMP Selection: Submit list of stormwater BMPs proposed for use. BMPs shall meet the requirements of the 2009 CASQA Construction BMP Handbook and the NPS GGNRA 2010 BMP Handbook.
- E. Erosion Control Products: Submit manufacturer's product information and installation recommendations for silt fence, filter fabric, erosion control blanket, straw bales, and any other materials proposed for use on this project. Erosion control products with plastic netting are prohibited on park lands due to natural resource concerns.
- F. QSD and QSP: The names and copies of the project QSD and QSP current certifications shall be submitted for each project which the CO has determined that a SWPPP is required.

### 1.4 QUALITY ASSURANCE

- A. The Contractor shall prepare and submit a plan to the Contracting Officer (CO) for review and concurrence.
- B. Orientation Meeting: The Contractor shall be responsible for arranging and conducting an Erosion and Sediment Control meeting/briefing to inform all parties scheduled to be on-site during the project of the measures to be implemented for proper erosion and sediment control (may be included as part of the Pre-Construction Meeting).

1. Installation of silt fences, storm drain protection, and all other forms of erosion and sediment control shall not begin until after this meeting has occurred.
- C. Orientation Meeting: The Contractor shall be responsible for arranging and conducting a Pollution Prevention meeting/briefing to inform all parties scheduled to be on-site during the project of the measures to be implemented for proper pollution prevention and control (may be included as part of the Pre-Construction Meeting).
1. Installation of silt fences, storm drain protection, and all other forms of pollution prevention controls shall not begin until after this meeting has occurred.
- D. Pollution Prevention and Erosion Control Manager: The Contractor shall designate the Pollution Prevention and Erosion Control Manager who will be responsible for the implementation, inspection, maintenance, and amendments to the approved plan.
1. The Pollution Prevention and Erosion Control Manager shall be familiar with temporary storm water pollution prevention procedures and Best Management Practices (BMPs) and shall ensure that emergency procedures and the plan are updated as needed and available for inspection.
  2. When changes in the approved plan are required, the Pollution Prevention and Erosion Control Manager shall prepare and certify an amendment and submit to the CO for review and concurrence.
  3. The Pollution Prevention and Erosion Control Manager shall be certified as a QSD in the State of Oregon.

## PART 2 - PRODUCTS

### 2.1 TEMPORARY STORM WATER POLLUTION PREVENTION PLAN

- A. For projects where the land disturbance area requires that a SWPPP is required, the contractor shall provide a SWPPP which satisfies all Federal and State NPDES permit requirements and includes the following information and forms:
1. Site description.
  2. Identification and contract information for Pollution Prevention and Erosion Control Manager.
  3. Expected sequencing of operations and construction schedule.
  4. Weather monitoring procedure.
  5. Descriptions and details BMPs 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.
- B. For projects where the land disturbance requires that a UPPP is required, the contractor shall provide a UPPP which conforms to all NPS requirements (utilize UPPP template) and include the following information and forms:
1. Responsible Parties
  2. General Information: Project Scope, Project Details, Site Information, and Spill Prevention.
  3. Standards and Constraints
  4. Project Scheduling
  5. Known Data on Soil and Fill
  6. Activities with the Potential to Generate Sediment
  7. Activities and Materials with the Potential to Pollute Storm Water
  8. Management and Reporting BMPs
  9. Waste Management BMPs
  10. Non-Storm Water Pollution Control BMPs
  11. Soil Stabilization BMPs
  12. Sediment Control BMPs
  13. Other Pollution Control BMPs
  14. References
  15. Preparer's Certification
  16. Appendices: Contact Information, Pollution Prevention Control Map or Sheet(s), Standard Installation Specifications for each BMP, and Blank forms.

## PART 3 – EXECUTION

### 3.1 ENVIRONMENTAL PROTECTION

- A. Protection of Natural Resources: Comply with applicable regulations and these specifications. Preserve the natural resources within the project boundaries and outside the limits of work performed under this Contract in their existing condition or restore to an equivalent or improved condition as approved by the CO.
- B. Construction Zone: Arrange construction activities to minimize pollution (i.e., erosion, trash, etc.) to the maximum practical extent.
1. Clearing, excavation, and grading shall be limited to those areas of the project site necessary for construction. Minimize the area exposed and unprotected.
  2. Clearly mark and delineate the limits of work activities.
  3. Equipment shall not be allowed to operate outside the limits of work or to disturb existing vegetation.
  4. Excavation and grading shall be completed during the dry season to the maximum extent possible
  5. Material should be stored away from locations where water is present to the greatest extent practicable.

### 3.2 UNDER-AN-ACRE POLLUTION PREVENTION PLAN

- A. Review and Acceptance: The Contractor and the CO will jointly review the draft Plan and agree to any needed revisions. The Contractor shall incorporate all revisions, sign, and submit the final Plan to the CO. The final Plan will be the document enforced on the project.
  - 1. The accepted Plan will describe and ensure implementation of the practices which will be used to reduce the pollutants in storm water discharges.
  - 2. The Contractor shall maintain a current copy of the Plan and all associated records and forms at the jobsite throughout the duration of the project.
  - 3. The Plan shall be available at all times for public inspection and for the inspection and use of the CO.
  - 4. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.
- B. Implementation: Implement the Plan as required throughout the construction period and maintain all erosion control elements in proper working order.
  - 1. Do not perform clearing and grubbing or earthwork until the Plan has been implemented.

### 3.3 SITE INSPECTIONS AND PLAN REVISIONS

- A. Inspections: The Contractor and the CO will perform a weekly inspection of the site.
  - 1. The inspection shall include disturbed areas that have not been completely stabilized, areas used for storage of materials, locations where vehicles enter or exit the site, and all other erosion and sediment controls that are included in the Plan.
  - 2. Inspections shall be documented.
  - 3. The inspection forms shall be retained onsite in the Plan notebook throughout the construction period.
- B. Plan Revisions: It may be necessary to revise the Plan during construction to make necessary improvements, revisions, or to respond to unforeseen conditions noted during construction or site inspections.
  - 1. The Plan shall specify the mechanism whereby revisions may be proposed by the Contractor or the CO.
  - 2. The Contractor and the CO will jointly review each revision to the Plan before changes are incorporated and implemented. The Contractor will then provide a revised copy of the Plan to the CO.
  - 3. Accepted modifications will be implemented within 7 calendar days following the date of the inspection when deficiencies or necessary corrections are first noted.
- C. Negligence: Provide additional temporary erosion and pollution controls made necessary by Contractor's errors or negligence at no additional cost to the Government.

### 3.4 EROSION CONTROL MEASURES

- A. Erosion control measures shall consist of any and all BMPs for storm water discharges, including but not limited to silt fencing, barrier protectors, straw bales, temporary soil retention blankets, excelsior drainage filters, sediment traps and berms.
- B. Berms and excelsior drainage filters shall be used to form sediment traps and to control run-on and run-off into other areas, including creeks, streams, marshes, access roads, well areas, and the staging areas.
- C. Erosion control measures shall be used to contain only direct precipitation in the construction zone. The contained water shall be allowed to percolate into the ground or drain slowly through the drainage filter sediment traps.
- D. Earthen sediment traps or holding ponds shall not be used unless accepted by the CO.
- E. Reduce runoff velocity as well as direct surface runoff around and away from all fuel containment, storage, and borrow areas.
- F. Divert surface runoff around and away from cut and fill slopes.
- G. Place drainage filters around all catch basins to create sediment traps to control run-off from the construction area.
- H. Excess water used for dust control shall be contained within the demolition areas by the erosion control measures.
- I. The Contractor shall prevent the deposition of materials onto paved areas. The Contractor shall inspect the paved areas for deposited materials weekly and remove the materials immediately.
- J. Furnish, install, maintain, and operate necessary control measures and other equipment necessary to prevent erosion as described in the approved UPPP.
- K. Before the work begins, sufficient equipment shall be available on the site to assure that the operation and adequacy of the erosion control system can be maintained.

### 3.5 MAINTENANCE OF TEMPORARY FACILITIES

- A. Ensure erosion and sediment control structures remain effective throughout excavation and grading operations. Relocate structures as necessary.
- B. Inspect control structures after each significant rainfall. Promptly repair breaches which occur.
- C. The Contractor shall remove entrapped sediment from behind excelsior drainage filter after each storm.

### 3.6 REPORTING

- A. If a discharge occurs or if the project receives a written notice or order from any regulatory agency, the Contractor will immediately notify the CO and will file a written report to the Agency(ies) with Jurisdiction within 7 days of the discharge event, notice, or order. Corrective measures shall be implemented immediately following the discharge, notice, or order. The report to the Agency(ies) with Jurisdiction shall contain the following items at a minimum:
  - 1. The date, time, location, nature of operation, and type of discharge, including the cause or nature of the notice or order.
  - 2. The BMPs deployed before the discharge event, or prior to receiving the notice or order.
  - 3. The date of deployment and type of BMPs deployed after the discharge event, or after receiving the notice or order, including additional BMPs installed or planned to reduce or prevent re-occurrence.
  - 4. An implementation and maintenance schedule for any affected BMPs.

### 3.7 SEDIMENT DISPOSAL

- A. Sediment excavated from temporary sediment control structures shall be disposed on the site with general fill, or with topsoil. Sediment shall be allowed to dry out as required before reuse.
- B. Contractor shall place the sediment removed from traps and other structures where it will not enter a storm drain or watercourse and where it will not immediately reenter the basin.

### 3.8 REMOVAL OF TEMPORARY POLLUTION CONTROL MEASURES

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

END OF SECTION

## SECTION 01 73 40

### EXECUTION

#### PART 1 – GENERAL

##### 1.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed.
  - 1. Before beginning work, investigate and verify the existence and location of systems, utilities, and other construction affecting the Work.
  - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.

##### 1.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to the Contracting Officer in accordance with Division 01 Specification 01 31 00 “Project Management and Coordination”.

##### 1.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
  - 1. Make vertical work plumb and make horizontal work level.
  - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  - 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 that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
- G. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- H. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

#### 1.4 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  - 1. Remove liquid spills promptly.
  - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
  - 3. Contractor shall provide progress cleaning that minimizes sources of food, water, and harborage available to pests.
- D. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- E. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- F. Limiting Exposures: Supervise construction operations to assure that no part of the construction completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- G. Final Cleaning: At completion of Work, remove all remaining waste materials, rubbish, tools, equipment, machinery and surplus materials, and clean all exposed surfaces; leave Project clean and ready for occupancy.

## 1.5 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT & DISPOSAL

PART 1 – GENERAL

1.1 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
  - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Government's property and legally dispose of them.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

## SECTION 01 77 00

### CLOSEOUT PROCEDURES

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Project Record Drawings.
  - 2. Closeout Submittals.
  - 3. Substantial Completion and Final Inspection.
  - 4. Final Acceptance of the Work.
  - 5. Warranties.
  - 6. Final Acceptance of the work.

##### 1.2 PROJECT RECORD DRAWINGS

- A. Maintain one complete full-size set of contract drawings and one full-size set of vendor-supplied drawings. Clearly mark changes, deletions, and additions using National Park Service drafting standards to show actual construction conditions. Show additions in red, deletions in green and special instructions in blue.
- B. Keep record drawings current. Make record drawings available to the Contracting Officer for inspection at the time of monthly progress payment requests. If project record drawings are not current, the Contracting Officer may retain an appropriate amount of the progress payment.
- C. On completion of the total project, submit complete record drawings. Include all shop drawings, sketches, and additional drawings that are to be included in the final set, with clear instructions showing the location of these drawings.

##### 1.3 CLOSEOUT SUBMITTALS

- A. A list of closeout requirements has been attached at the end of the Division 01 Specifications for your convenience. The intent is to provide an overall summary of requirements and not a comprehensive list. The terms and conditions of the contract still require you to satisfy the requirements of the individual specification sections regardless of what is shown on the list. Submit the following before requesting final inspection:
  - 1. Submit specific warranties, guarantees, workmanship bonds, final certifications, and similar documents.
  - 2. Submit NPS required forms and certificates.
  - 3. Submit Project Record Documents, operation and maintenance manuals, final completion construction digital images recorded on thumb drive or conveyed via a secure share drive compatible with NPS firewall protections with index and descriptions, and similar final record information.

4. Environmental Record Documents: As specified in Division 01 and as follows:
  - a. MSDS Data: As specified in Section 01 67 00 "Product Requirements."
  - b. Environmental Product Data: As specified in Section 01 31 00 "Project Management and Coordination," Section 01 40 00 "Quality Requirements," Section 01 50 00 "Temporary Facilities and Controls," Section "01 67 00 "Product Requirements," and Section 01 74 19 "Construction Waste Management & Disposal."
  - c. Chain-of-Custody Data: As specified in Section 01 67 00 "Product Requirements."
  - d. Final Summary of Solid Waste Disposal and Diversion: As specified in Section 01 74 19 "Construction Waste Management."
5. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
6. Complete final cleaning requirements, including touchup painting.
7. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

#### 1.4 SUBSTANTIAL COMPLETION AND FINAL INSPECTION

- A. It shall be the Contractors responsibility to coordinate with ODEQ for all necessary inspections and reporting requirements during construction.
- B. When project, or designated portion of project, is substantially complete, request in writing a final inspection. Upon receipt of written request that project is substantially complete, the Contracting Officer will proceed with inspection within ten (10) days of receipt of request or will advise the Contractor of items that prevent the project from being designated as substantially complete.
- C. If, following final inspection, the work is determined to be substantially complete, Contracting Officer will prepare a Punch List to be corrected before final acceptance and issue a Letter of Substantial Completion. Contractor shall complete the work described on the Punch List within fifteen (15) calendar days, as weather permits. If the Contractor fails to complete the work within this time frame, the Contracting Officer may either replace or correct the work with an appropriate reduction in the contract price or charge for re-inspection costs in accordance with the Inspection of Construction clause of the contract.
- D. If, following final inspection, the work is not determined to be substantially complete; Contracting Officer will notify Contractor in writing. After completing work, Contractor shall request a new final inspection. All re-inspection costs may be charged against the Contractor in accordance with the Inspection of Construction clause of the contract.

#### 1.5 FINAL ACCEPTANCE OF THE WORK

- A. Prior to requesting inspection for verification of completion of all outstanding items.
- B. After all deficiencies have been corrected, a Letter of Final Acceptance will be issued.

#### 1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Contracting Officer for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8½-by-11-inch (215-by-280-mm) paper.
  - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  - 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at the beginning of document.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 – PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
  - 1. 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.
  - 2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
  - 3. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
  - 4. Remove tools, construction equipment, machinery, and surplus material from Project site.

5. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

6. Remove excess mortar droppings, and other foreign substances.
  7. Leave Project clean and ready for occupancy.
- C. Waste Disposal: Comply with requirements of Division 01 section, "Construction Waste Management & Disposal."

END OF SECTION

Submittal List (PMS 216583)						
Line Item	SPEC. SECTION & PAGE	SUBMITTAL TYPE	WHEN REQUIRED	Submittal Date	Resubmittal Date	Approval Date
1	013100-1	1.1.A.1 - Letter designating project superintendent	One week prior to preconstruction conference			
2	013100-1	1.1.A.2 - Construction schedule	One week prior to preconstruction conference			
3	013100-1	1.1.A.3 - Comprehensive breakdown of the Schedule of Values	One week prior to preconstruction conference			
4	013100-1	1.1.A.4 - Accident prevention plan	One week prior to preconstruction conference			
5	013100-1	1.1.A.5 - List of Subcontractors	One week prior to preconstruction conference			
6	013100-1	1.1.A.6 - Written statement from subcontractors certifying compliance with labor standards	One week prior to preconstruction conference			
7	013100-1	1.1.A.7. Satisfactory evidence of liability insurance coverage and workman's compensation for the Contactor and all subcontractors	One week prior to preconstruction conference			
8	013216-1	1.2.A - Schedule of Values	One week prior to preconstruction conference			
9	013216-1	1.2.B - Construction Baseline Schedule	One week prior to preconstruction conference			
10	013216-1	1.3.C - Construction Schedule Updates	One week prior to preconstruction conference			
11	013323-3	1.4.A - CAD and Electronic File Transfer Terms and Conditions Form	One week prior to preconstruction conference			
12	013513.22-1	1.3.A - Daily Work Schedule	30 days prior to start of ground disturbing site work.			
13	013523-1	1.2.A - Accident Prevention Plan	After contract award and before the Pre-Construction conference			
14	014000-2	1.4.A.1 - Contractor Quality Control Plan	Prior to the preconstruction conference			
15	014000-2	1.4.A.2 - Quality Control Plan Revisions or Corrections	Within 10 Days			
16	014000-2	1.4.B - Qualification Data	Within 10 Days			
17	014000-2	1.4.C - Contractor's Quality Control Daily Reports	First workday following report			
18	014000-3	1.4.D.2 - Daily test data	Submit with Quality Control Daily Reports			
19	014000-3	1.4.D.3 - Failed test reports	Within 4 hours of noted deficiency			
20	014000-3	1.4.E - Off-Site Reports	Prior to Shipment			
21	014000-3	1.4.G - Permit, Licenses, and Certificates	Upon Contracting Officer's request			
22	015600-1	1.2.B - Shop Drawings	At Preconstruction Meeting			
23	015723-2	1.3.B - SWPPP	Prior to the preconstruction conference			
24	015723-2	1.3.C - Inspection Schedule	Prior to the preconstruction conference			
25	015723-2	1.3.E - Erosion control products	Prior to the preconstruction conference			
26	015723-2	1.3.F - QSD and QSP Certifications	Prior to the preconstruction conference			
27	017700-1	1.2.C - Complete record drawings	Upon project completion			
28	017700-1	1.3.A.1 - Warranties, Guarantees, Workmanship Bonds, Final Certifications and Similar Documents	At Final Inspection			
29	017700-1	1.3.A.2 - NPS Required Forms	At Final Inspection			
30	017700-1	1.3.A.3 - Project Record Documents	At Final Inspection			
31	017700-2	1.3.A.4 - Environmental Record Documents	At Final Inspection			
32	017700-2	1.4.A Written request for final inspection	Prior to Substantial Completion			

Submittal List (PMIS 216583)						
Line Item	SPEC. SECTION & PAGE	SUBMITTAL TYPE	WHEN REQUIRED	Submittal Date	Resubmittal Date	Approval Date
33	024100-1	1.2.B.1 - Permits for transport and disposal of debris	Prior to beginning demolition activities			
34	024100-1	1.2.B.2 - Demolition and salvage plan and schedule	Prior to beginning demolition activities			
35	024100-1	1.2.B.3 - Pre-Demolition Photos or Video	Prior to beginning demolition activities			
36	033100-2	1.4.A.1 - Concrete mix design	10 days prior to placement			
37	033100-2	1.4.A.2 - Concrete delivery tickets	With delivery of concrete			
38	260010-3	1.6 - Submittals (General Requirements)	As specified			
39	269000-1	1.4 - Submittals (Product Data)	At Preconstruction Meeting			
40	310516-1	1.3.B - Samples	Before delivery of materials to the job site			
41	310516-2	1.3.C - Quality Control	Upon Contracting Officer's request			
42	312300-2	1.4.D - Samples and Test Results	Upon Contracting Officer's request			
43	312333-2	1.4.B - Written Procedures for Trench Dewatering and Disposal of Fluidized Material	At Preconstruction Meeting			
44	312333-2	1.4.C - Written Description of barricading, shoring, cribbing, bracing, and sloping precautions	At Preconstruction Meeting			
45	312500-1	1.5.A - Erosion and Sediment Control Plan	At Preconstruction Meeting			
44	330526-1	1.2.B - Samples	At Preconstruction Meeting			
45	330526-1	1.2.C- Material Certifications	At Preconstruction Meeting			
46	333113-1	1.2.A - Material Certifications	At Preconstruction Meeting			
47	333400-1	1.4.A - Product Data	At Preconstruction Meeting			
48	333400-1	1.4.B - Manufacturers Installation Instructions	At Preconstruction Meeting			
49	333400-1	1.4.C - Project Record Documents	Upon Project Completion			
50	333413-2	1.4.B - Product Data	At Preconstruction Meeting			
51	333413-2	1.4.C - Manufacturers Installation Instructions	At Preconstruction Meeting			
52	333413-2	1.4.D - Project Record Documents	Upon Project Completion			
53	460753-1	1.2.B - Product Data	At Preconstruction Meeting			
54	460753-1	1.2.C - Manufacturers Installation Instructions	At Preconstruction Meeting			
55	460753-1	1.4.E - Project Record Documents	Upon Project Completion			

END OF SECTION

Close-out List (PMIS 216583)						
<u>Line Item</u>	<u>SPEC. SECTION &amp; PAGE</u>	<u>CLOSE-OUT SUBMITTAL TYPE</u>	<u>WHEN REQUIRED</u>	<u>Submittal Date</u>	<u>Completed</u>	<u>Received by Park</u>
1	017700-1	1.2.C - Complete record drawings	Upon project completion			
2	017700-1	1.3.A.1 - Warranties, Guarantees, Workmanship Bonds, Final Certifications and Similar Documents	At Final Inspection			
3	017700-1	1.3.A.2 - NPS Required Forms	At Final Inspection			
4	017700-1	1.3.A.3 - Project Record Documents	At Final Inspection			
5	017700-2	1.3.A.4 - Environmental Record Documents	At Final Inspection			
6	017700-2	1.4.A Written request for final inspection	Prior to Substantial Completion			
7	017700-2	1.4.B - Punch List (if required)	Within 30 days of final Inspection			

END OF SECTION

**DIVISION 02**

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**EXISTING CONDITIONS**

## SECTION 02 05 10

### GENERAL SITE CONSTRUCTION REQUIREMENTS

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The work of this Section includes the general procedures and requirements for Site Work.

#### PART 2 – PRODUCTS (not used)

#### PART 3 - EXECUTION

##### 3.1 EXAMINATION

A. Site Verification of Conditions

1. Contractor shall perform necessary potholing or locating of underground utilities and services. Perform minor, investigative excavations to verify location of various existing underground facilities at sufficient locations to assure that no conflict with the proposed work exists and sufficient clearance is available to avoid damage to existing facilities.
2. Upon discovery of conflicts or problems with existing facilities or construction documents, notify Contracting Officer within twenty four (24) hours.
3. Existing mapping may be used to approximate locations of existing utilities. Contractor is responsible for determining actual locations of all utilities.

##### 3.2 PREPARATION

A. Protection

1. Spillage:
  - a. Avoid spillage by covering and securing loads when hauling on or adjacent to public streets or highways.
  - b. Remove spillage and sweep, wash, or otherwise clean project, streets, and highways.
2. Dust Control: See “Soil Erosion & Sedimentation Control” – Section 31 25 00.
3. Sediment and Erosion Control: See “Soil Erosion & Sedimentation Control” – Section 31 25 00.
4. Existing Plants and Features: Do not damage tops, trunks, and roots of existing trees, shrubs or other vegetation on site which are intended to remain. Do not use heavy equipment within branch spread. Interfering branches may be removed only with permission of Contracting Officer. Do not damage other plants and features which are to remain.

3.3 REPAIR / RESTORATION (not used)

3.4 FIELD QUALITY CONTROL

- A. Notify Contracting Officer forty eight (48) hours before performing excavation or fill work.
- B. If work has been interrupted by weather, scheduling, or other reason, notify Contracting Officer twenty four (24) hours minimum prior to intended resumption of grading or compacting.
- C. NPS reserves right to require additional testing to re-affirm suitability of completed work including compacted soils which have been exposed to adverse weather conditions.

END OF SECTION

## SECTION 02 41 00

### DEMOLITION & ABANDONMENT

#### PART 1 - GENERAL

##### 1.1 DESCRIPTIONS

- A. The work of this Section includes all demolition, removal, salvage and disposal of existing structures, piping, and materials.

##### 1.2 SUBMITTALS

- A. As specified in Submittals – Section 01 33 23
- B. Certifications and Testing consistent with Submittals – Section 01 33 23 and including:
  - 1. Permit for transport and disposal of debris.
  - 2. Proposed method of demolition, proposed schedule, sequence of work, and proposed method and schedule for removing, maintaining, and reestablishing facilities and utilities.
- C. Pre-demolition Photographs or Video: Submit before work begins.

##### 1.3 CLOSEOUT SUBMITTALS

- A. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

##### 1.4 SITE CONDITIONS

- A. Protection
  - 1. Erect barriers, fences, guardrails, enclosures, chutes, and shoring around all construction activities to protect personnel, structures, and utilities remaining intact.
  - 2. Protect designated trees and plants from damage.
- B. Maintaining Traffic
  - 1. Assure minimum interference with roads, streets, driveways, sidewalks, and adjacent facilities.
- C. Utility Lines and Services
  - 1. Obtain permission to disrupt any utilities or services temporarily or permanently.

2. Prior to demolishing a utility or facility, notify the Contracting Officer three (3) days in advance, and plan the demolition such that the demolition will not create an unsafe condition or interfere with ongoing operations.
3. Where demolition must occur in such a sequence that a portion of the utility must remain operational, coordinate this aspect with the Contracting Officer.
4. Do not burn waste material. All organic material removed from the construction area must be properly recycled or removed from the Park and properly disposed.
5. Provide adequate fire protection. Keep area clear of hazardous substances and debris.
6. Maintain access to exits at all time.
7. Explosives are not permitted.

## PART 2 - PRODUCTS

### 2.1 BACKFILL MATERIALS

- A. See Section 31 05 16 – Aggregates for Earthwork; Subsection 2.2.B Trench Backfill Class A.
- B. See Section 01 11 00 – Summary of Work; Subsection 1.4.C Preservation of Natural Features Item 4.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that areas to be demolished are not in use.
- B. Do not commence work until conditions are acceptable to Contracting Officer.

### 3.2 PREPARATION

- A. Arrange for and verify termination of utility services to include capping lines.

### 3.3 DEMOLITION/ABANDONMENT

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

1. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - a. Arrange to shut off indicated utilities with utility companies.
  - b. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - c. Disconnect, demolish, and remove utility systems, and components indicated to be removed.
    1. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    2. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material. Fill pipe with slurry concrete.
- B. All debris from demolition and abandonment shall be removed from the Park and disposed of in a legal manner. Any material which the Contracting Officer may wish to save or reuse shall be stored per the Contracting Officer's direction.

#### 3.4 GENERAL

- A. Dampen debris and use temporary enclosures as necessary to control dust.
- B. Do not use water to the extent it causes flooding, contaminated runoff, or icing.
- C. Break concrete and masonry into sections less than three (3) feet in any dimension and dispose of off-site.
- D. Repair damage to adjacent structures.
- E. Make neat saw cuts around areas of concrete to be removed, where remaining concrete is to be incorporated into new work.
- F. Remove existing exposed piping to the extent shown on the Drawings.
- G. Remove buried piping to the extent shown on the Drawings.
- H. All equipment to be removed or replaced shall be done so in a safe manner and such that the equipment and any associated piping or wiring is not damaged.
- I. All debris from demolition and abandonment shall be removed from the Park and disposed of in a legal manner. Any material which the Contracting Officer may wish to salvage shall be cleaned and stored per the Contracting Officer's direction and requirements of this specification.

### 3.5 HAZARDOUS MATERIALS

- A. If suspected hazardous materials are encountered during demolition of existing facilities, all work is to be stopped immediately and the Contracting Officer is to be immediately notified.

### 3.6 DISPOSAL

- A. Place demolition debris in debris boxes onsite for weekly removal.
- B. Dispose of unsuitable and excess material off-site. Contractor shall recycle all recyclable demolished materials. Contractor shall submit names and contact information for proposed recyclers to the Contracting Officer prior to beginning demolition. Only materials not suitable for recycling shall be disposed of in a land fill.
- C. Disposal of demolition material shall be in accordance with all EPA, OSHA, and Oregon requirements for materials disposal.

END OF SECTION

**DIVISION 03**  
**CONCRETE**

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## SECTION 03 30 00

### CAST-IN-PLACE CONCRETE

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The work of this Section includes furnishing and placement of cast-in-place concrete for the following:
  - 1. Thrust blocks.
  - 2. Sewer main abandonment “plugs”

##### 1.2 REFERENCES

- A. “GREENBOOK” Standard Specifications for Public Works Construction – 2015 Edition, BNI Publications, Inc.

##### 1.3 SUBMITTALS

- A. Concrete Mix Design

#### PART 2 – PRODUCTS

##### 2.1 COMPONENTS

- A. Forms - wood, metal, or plastic as arranged by Contractor. Forming material shall be reusable and compatible with specified form release agents and with finish requirements for concrete to be left exposed or to receive decorative finish.

##### 2.2 MATERIALS (Per Section 03 31 00 “Normal Weight Structural Concrete”)

##### 2.3 MIXES (Per Section 03 31 00 “Normal Weight Structural Concrete”)

#### PART 3 – EXECUTION

##### 3.1 PREPARATION

- A. Sub-Base
  - 1. Compact sub-base as specified in Normal Weight Structural Concrete – Section 03 31 00.

### 3.2 INSTALLATION

- A. Place concrete thrust blocking and abandonment “plugs” at locations specified on the plans and in accordance with the thrust blocking and abandon sanitary sewer force main details included in the plans.

### 3.3 FIELD QUALITY CONTROL

- A. Inspection
  - 1. Notify the Contracting Officer three (3) days minimum before placing concrete for specified concrete site elements.

END OF SECTION

## SECTION 03 31 00

### NORMAL WEIGHT STRUCTURAL CONCRETE

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The work in this Section includes furnishing and installing Project concrete work as described in Contract Documents, item includes but is not limited to:
  - 1. Concrete thrust blocking and sewer force main abandonment “plugs”

##### 1.2 REFERENCES

- A. American Society For Testing And Materials
  - 1. ASTM C 33/C33M-13, 'Standard Specification for Concrete Aggregates'
  - 2. ASTM C 94/C94M-14, 'Standard Specification for Ready-Mixed Concrete'
  - 3. ASTM C 150/C150M-12, 'Standard Specification for Portland Cement'
  - 4. ASTM C 260/C260M-10a, 'Standard Specification for Air-Entraining Admixtures for Concrete'
  - 5. ASTM C 494/C494M-13, 'Standard Specification for Chemical Admixtures for Concrete'
  - 6. ASTM C 618-12a, 'Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete'
  - 7. ASTM E 1155-96 (2008), 'Standard Test Method for Determining FF Floor Flatness and FL Floor Levelness Numbers'
- B. “GREENBOOK” Standard Specifications for Public Works Construction – 2015 Edition, BNI, Inc. Publisher.

##### 1.3 SYSTEM DESCRIPTION

- A. Performance Requirements
  - 1. Conform to requirements of ASTM C 94 unless specified otherwise.
  - 2. For testing purposes, following concrete strengths are required -
    - a. At seven (7) days - sixty (60) percent minimum of twenty-eight (28) day strengths.
    - b. At twenty-eight (28) days -
      - 1) Mix Type Class (560-C-3250) - three thousand-two hundred fifty (3250) psi.
      - 2) Alternate Mix Type Class (532-CFW-3250) - three thousand-two hundred fifty (3250) psi.

## 1.4 SUBMITTALS

### A. Quality Assurance / Control

1. Concrete mix design.
2. Delivery Tickets - Require mix plant to furnish delivery ticket for each batch of concrete. Keep delivery tickets at job-site for use by Contracting Officer or the Government. Tickets shall show following:
  - a. Name of ready-mix batch plant
  - b. Serial number of ticket
  - c. Date and truck number
  - d. Name of Contractor
  - e. Name and location of Project
  - f. Specific class or designation of concrete in conformance with that employed in Project specification
  - g. Amount of concrete
  - h. Time loaded
  - i. Type, name and amount of admixtures used
  - j. Amount and type of cement
  - k. Total water content
  - l. Sizes and weights of sand and aggregate

## 1.5 PROJECT CONDITIONS

### A. Project Environmental Requirements

1. Cold Weather Concreting Procedures -
  - a. No frozen materials shall be used.
  - b. Forms, reinforcement, and fillers shall be free from frost. Place no concrete on frozen ground.
  - c. For temperatures below forty (40) degrees F, maintain concrete at between sixty (60) and eighty (80) degrees F when placing, and fifty (50) degrees F minimum for five (5) days if regular concrete, or at fifty (50) degrees F for three (3) days if high early strength concrete, or longer if determined necessary by the Contracting Officer .
2. Hot Weather Concreting Procedures -
  - a. Maximum concrete temperature allowed is ninety (90) degrees F in hot weather.
  - b. Cool aggregate and sub-grades by sprinkling.
  - c. Avoid cement over one hundred-forty (140) degrees F
  - d. Use cold mixing water or ice.
  - e. Use fog spray or evaporation retardant to lessen rapid evaporation from concrete surface.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Portland Cement - Meet requirements of ASTM C 150, Type II.

B. Aggregates

1. Combined Aggregate Grading - Grading C
  - a. Meet requirements of SSPWC Section 201-1.3.2 Combined Aggregate Gradings which by test or actual service produces concrete of required strength and conforms to local governing codes.
  - b. Aggregate shall be uniformly graded as follows -
    - 1) All Work

Sieve Size	Percent Passing
1-1/2 inch	100
1 inch	95 - 100
3/4 inch	77 - 93
3/8 inch	50 - 70
No. 4	39 - 51
No. 8	31 - 41
No. 16	22 - 32
No. 30	12 - 22
No. 50	3 - 15
No. 100	0 - 5
No. 200	0 - 2

C. Water - Clear, apparently clean, and potable.

D. Admixtures and Miscellaneous

1. Mineral -
  - a. Fly Ash Pozzolan - Meet requirements of ASTM C 618, Class F or C and with loss on ignition (LOI) of four (4) and two (2) percent maximum respectively.
2. Chemical -
  - a. No admixture shall contain calcium chloride nor shall calcium chloride be used as an admixture. All chemical admixtures used shall be from same manufacturer and compatible with each other.
  - b. Air Entraining Admixture -
    - 1) Meet requirements of ASTM C 260.
    - 2) Approved Products -
      - i) Air Mix 200 or AEA-92 by Euclid
      - ii) Air plus or Super Air Plus by Fritz-Pak
      - iii) MB-VR or MB-AE by Master Builders
      - iv) Sika Air by Sika
      - v) Daravair or Darex II AEA by W R Grace.
  - c. Water Reducing Admixture -
    - 1) Meet requirements of C 494, Type A and containing not more than 0.05 percent chloride ions.

- 2) Approved Products -
  - i) Eucon WR 75 or Eucon 91 by Euclid
  - ii) FR-2 or FR-3 by Fritz-Pak
  - iii) Pozzolith Normal by Master Builders
  - iv) Plastocrete 160 by Sika
  - v) Daracem 50/55, WRDA-64, or WRDA-82 by W R Grace.
- d. Water Reducing, Retarding Admixture -
  - 1) Meet requirements of ASTM C 494, Type D and contain not more than 0.05 percent chloride ions.
  - 2) Approved Products -
    - i) Eucon Retarder 75 by Euclid
    - ii) FR-1 or Modified FR-1 by Fritz-PakPozzolith Retarder by Master Builders
    - iii) Plastiment by Sika
    - iv) Daratard-17 or Daratard-40 by W R Grace.
- e. High Range Water Reducing Admixture (Superplasticizer) -
  - 1) Meet requirements of ASTM C 494, Type F or G and containing not more than 0.05 percent chloride ions.
  - 2) Approved Products -
    - i) Eucon 37 or Eucon 537 by Euclid
    - ii) Supercizer 1 through 7 by Fritz-Pak
    - iii) Rheobuild 1000 by Master Builders
    - iv) Sikament 300 by Sika
    - v) Darachem-100 or WRDA-19 by W R Grace.
- f. Non-Chloride, Non-Corrosive Accelerating Admixture -
  - 1) Meet requirements of ASTM C 494, Type C or E and not contain more chloride ions than are present in municipal drinking water.
  - 2) Approved Products -
    - i) Accelguard 80 by Euclid
    - ii) Daraset or Polarset by W R Grace.
- 3. Evaporation Retardant -
  - a. Approved Products -
    - 1) Sure Film J-74 by Dayton Superior
    - 2) Euco-Bar By Euclid Chemical Co
    - 3) E-Con by L & M Construction Chemicals
    - 4) Confilm by Master Builders
- 4. Bonding Agents -
  - a. Approved Products -
    - 1) Day Chem Ad Bond (J-40) by Dayton Superior
    - 2) Flex-Con by Euclid Chemical Co
    - 3) Larsen Weldcrete by Larsen Products Corp
    - 4) Everbond by L & M Construction Chemicals
    - 5) Acryl Set by Master Builders
    - 6) Sonocrete by Sonneborn
    - 7) Tamms Bond by TAMMS Industries
    - 8) Acrylic Additive by W R Bonsal
    - 9) Intralok by W R Meadows

## 2.2 MIXES

- A. Submit mix designs to meet following requirements (two options):
1. Proportions
    - a. Mix Type Class (560-C-3250) -
      - 1) Minimum weight cement per cubic yard concrete: Five hundred-sixty (560) pounds
      - 2) Air Entrainment: Four (4) percent, plus or minus one (1) percent
      - 3) Water / Cement Ratio: 0.50 maximum by weight
  2. Admixtures – Option 1
    - a. Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without the Contracting Officer's written approval.
    - b. Mineral - For Class (560-C-3250) no fly ash shall be used and or substituted for cement.
    - c. Chemical -
      - 1) Five (5) inch slump maximum before addition of high range water reducer.
      - 2) Eight (8) inch slump maximum with use of high range water reducer (HRWR).
      - 3) Specified accelerator or retarder may be used if necessary to meet environmental conditions.
  3. Proportions – Alternate Mix
    - a. Mix Type Class (532-CFW-3250) -
      - 1) Minimum weight cement per cubic yard concrete five hundred-thirty two (532) pounds. Fly ash 15 percent by weight -
      - 2) Air Entrainment – four (4) percent, plus or minus one (1) percent
      - 3) Water / Cement Ratio – 0.50 maximum by weight
  4. Admixtures – Option 2
    - d. Mix design shall show proposed admixture, amount, usage instructions, and justification for proposed use. Do not use any admixture without the Contracting Officer's written approval.
    - e. Mineral - For Class (532-CFW-3250) an amount of specified fly ash equal to fifteen (15) percent of weight of cement shall be substituted for cement. Substitution shall consider fly ash with cement in determining amount of water necessary to provide specified water / cement ratio.
    - f. Chemical -
      - 1) Five (5) inch slump maximum before addition of high range water reducer.
      - 2) Eight (8) inch slump maximum with use of high range water reducer (HRWR).
      - 3) Specified accelerator or retarder may be used if necessary to meet environmental conditions.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Remove water and debris from space to be placed.

## 3.2 INSTALLATION

### A. Site Tolerances

1. ACI Standards shall govern concrete work except where specified differently.

### B. Concrete Types

1. Use specified concrete mix types in following Project elements.
  - a. Mix Type 1 Class – (560-C-3250P)
    - 1) All concrete elements
  - b. Alternate Mix Type 1 Class - (532-CFW-3250)
    - 1) All concrete elements

### C. Placing

1. Place as soon after mixing as possible. Deposit as nearly as possible in final position. Placing of concrete shall be continuous until a panel or section is complete.
2. Do not use contaminated, deteriorated, or re-tempered concrete.
3. Avoid accumulation of hardened concrete.

END OF SECTION

**DIVISION 22**  
**PLUMBING**

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## SECTION 22 05 05

### PLUMBING PROVISIONS

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. The work under this Division includes furnishing all materials, equipment, labor, supervision, tools and items necessary for the construction, installation, connection, testing and operation of all plumbing work for this project, as shown schematically on the Drawings and defined in this Division.

##### 1.2 QUALITY ASSURANCE

- A. Substitutions: Conform to requirements of Division 1.
  - 1. Whenever any material or equipment is specified by patent or proprietary name or by the name of the manufacturer, such specification establishes the standard of quality in that particular field of manufacture.
  - 2. When approved substitute equipment or material necessitates revisions to the plans or involves other trades, include drawings and details showing all such changes, and coordinate and assume any liability from the affected trades.
  - 3. Acceptance: The acceptance of a manufacturer's name or product does not relieve the Contractor of the responsibility for providing materials and equipment which comply in all details with the requirements of the contract documents.
- B. Tests: Demonstrate that all equipment operates as indicated as specified, and in accordance with the manufacturer's recommendations. Perform tests in the presence of the Inspector. Provide all instruments and personnel required to conduct the tests.
- C. Qualifications: Use sufficient journeyman and competent supervisors in the execution of the work to ensure proper and adequate installation throughout. In the acceptance of installed work, no allowance will be made for lack of skill on the part of the workmen.

##### 1.3 CODES, PERMITS, INSPECTION AND FEES

- A. Comply with requirements of Division 1.
- B. Obtain permits and inspections and pay fees required by National, State and Local authorities. Make arrangements for inspections by the Government or other authority as required. Submit 3 copies of certificates of compliance.
- C. Work and materials shall be in accordance with requirements of all applicable codes, regulations, and ordinances.

- D. Codes shall be construed as establishing a minimum or base level, of requirements. Where provisions of the various codes standards conflict with each other, the more stringent provisions shall govern.
- E. Nothing in Drawings and specifications shall be construed to permit work not in conformance with these rules and regulations.
- F. Where Drawings or specifications call for material or construction of a better quality or larger sizes than required by the above-mentioned rules and regulations, the provisions of the Drawings or specifications shall take precedence over requirements of the rules and regulations.
- G. Utilities: Comply with all rules and requirements of local utility companies; coordinate and pay for all connections.

#### 1.4 EQUIPMENT APPROVALS

- A. Whenever UL listed standards exist for equipment with electrical components, provide UL listed equipment. Otherwise provide equipment certified by the manufacturer as complying with UL standards for similar items.
- B. All materials, equipment, and processes requiring approval of the Department of Labor and Industries or other nationally-recognized testing agency shall be labeled as so approved in accordance with the provisions of the Code.

#### 1.5 INTENT OF DRAWINGS

- A. Drawings are diagrammatic and show only approximate locations of piping, ducts, fixtures, and equipment. Take measurements from building or site and verify Drawings. Because of the small scale of the Drawings, it is not possible to indicate all offsets, fittings, and accessories that may be required. Carefully investigate the plumbing work to be performed and arrange such work accordingly, furnishing required materials to meet such conditions. No additional payment shall be made for failure to investigate existing conditions.
- B. It is the responsibility of the Contractor to provide equipment that fits into the space allotted and allows adequate acceptable clearances for installation, replacement, entry, servicing, and maintenance. When equipment furnished is larger than sizes indicated, provide any required changes as may be necessary and related work at no additional cost.
- C. Report any conflict to COR prior to proceeding with the work. Failure to follow this instruction is considered sufficient cause to alter the work, at no cost to the Government, as directed by the COR.
- D. Plans generally do not show all work involved. Contractor shall review intent of improvements and provide recommendations based on existing conditions for completion of work.

## 1.6 DETAIL DRAWINGS BY CONTRACTOR

- A. Wherever the work is of sufficient complexity to warrant additional detailing, prepare additional detail drawings to scale 1/4 inch = 1 foot. All such detailing work shall be clearly identified on the drawings as to the area to which it applies.
- B. submit these drawings to the COR for approval prior to proceeding with work.

## 1.7 SUBMITTALS

- A. Comply with requirements of Division 1 and below.
- B. Submit complete, at one time. Partial submittals will not be considered.
- C. List of Manufacturers: Submit within 30 days after award of Contract a Bill of Materials containing items to be used on this project, listing manufacturer's name and catalog numbers (where applicable) and referenced to the applicable specification paragraph.
- D. Catalog sheets shall be complete and the item of model to be used shall be clearly marked.
- E. Submit shop drawings, coordination drawings, descriptive bulletins, data sheets, diagrams, catalog cuts, samples and mock-ups, test reports and certifications, operation and maintenance manuals, warranties/guarantees, seismic calculations or other additional information as required for the items specified hereinafter in other sections.
- F. Acceptance: The acceptance of a manufacturer's name or product by the Architect does not relieve the Contractor of the responsibility for providing materials and equipment which comply in all details with the requirements of the contract documents.

## 1.8 MATERIAL AND WORKMANSHIP

- A. Comply with requirements of Division 1 and the following:
- B. Quality: Materials, products, and equipment in strict accordance with governing codes and ordinances.
- C. Quantity: Equipment and items of any one classification which are used in quantity, such as accessories, valves, specialties, cleanouts, drains, fittings, etc., shall be products of one manufacturer and shall be used only for services recommended by the manufacturer.
- D. All materials and apparatus required for the work shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail, and shall be so selected and arranged as to fit properly into the building spaces. Where no specific kind or quality of material is given, a first-class standard article as approved by the COR shall be furnished.
- E. All equipment and materials shall be installed in accordance with the manufacturer's recommendations and best trade practices.

- F. The Contractor shall furnish the services of an experienced superintendent, who shall be constantly in charge of the installation of the work, together with all skilled workmen, fitters, metal workers, welders, helpers and labor required to unload, transfer, erect, connect-up, adjust, start, operate, and test each system.
- G. Unless otherwise specifically indicated on the Drawings or specifications, all equipment and materials shall be installed with the approval of the COR in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.
- H. As required by requirements of the Plumbing Specifications, other portions of the Specifications, and Standards to which reference is made in the Specifications, or where prohibited by Codes, Regulations and Ordinances, no materials shall be installed which exceed the allowable limits of flame-spread or smoke-developed indexes, or which do not meet the requirements for Approved Plastic Materials as defined in the International Building Code.

#### 1.9 OPERATION AND MAINTENANCE MANUALS

- A. Following installation of the plumbing systems, but prior to acceptance of the work, Contractor shall submit to COR one loose-leaf volume with information systematically segregated and indexed for easy reference to be reviewed by the COR. This submittal copy will be returned to the Contractor, and the material can be used in preparation of final volumes. After approval of preliminary copy, but prior to project completion, submit 3 finished copies.
- B. Supply Operation and Maintenance Manuals. Label the front cover of the manuals with the following information: The name of the project, the General Contractor, the Plumbing Contractor, and the date of construction.
- C. Submit a preliminary complete copy to the COR for approval at least 2 weeks prior to the final inspection.
- D. Deliver three approved bound copies of final Operation and Maintenance Manuals to the COR prior to closing of the contract.
- E. Furnish manuals in 8-1/2" x 11" size in hard cover, loose leaf, 3-ring binder. Accordion fold drawings to 8-1/2" x 11" size.
  - 1. Provide an index and tabs for listing contents.
  - 2. Arrange contents in order of their appearance in the specifications.
- F. Include the following information as part of the maintenance manuals:
  - 1. Manufactures approved cut sheets and shop drawings in PDF format. If show drawings are done in AutoCAD format provide these drawings in electronic form, DWG format as well as hard copy.
  - 2. Required Data: As-built shop drawings, diagrams, catalog data, parts lists, all approved submittal data, manufacturer's installation, operating and maintenance instruction manuals for all equipment and fixtures.

3. Include all installation instructions shipped with all equipment in manual.
  4. List major equipment with the names, addresses and telephone numbers of the equipment representative providing factory trained service personnel.
  5. As-Built Drawings.
- G. Keep one full size copy of record drawings, other than working drawings, on the site at all times during construction, and note all changes and corrections made during the construction period.

#### 1.10 RECORD DRAWINGS

- A. Furnish record drawings in conformance with the requirements of Division 1.
- B. Record drawings shall show all piping with dimensions given to permanent, easily identified building features.
- C. Record drawings shall indicate locations of all valves, piping and other accessories.

#### 1.11 SITE CONDITIONS AND METHODS

- A. Measurements: Verify space availability by field measurement prior to submitting shop drawings for approval.
- B. Roughing-In Dimensions: Obtain roughing-in dimensions for equipment from approved shop drawings or actual equipment measurements.
- C. Manufacturer's Installation Instructions: Follow manufacturer's written instructions where furnished. If the details are in conflict with design drawings, notify COR for resolution.
- D. Accessibility: Install products which require periodic servicing or repair so that products are readily accessible. Otherwise, obtain COR'S approval of location.
- E. Rejected Materials: Remove damaged or rejected materials from the site.
- F. Operation of Equipment and Systems: Contractor is responsible during all periods of balancing and testing.
- G. Delivery, Storage, and Handling: Conform to requirements of Division 1 and the following:
  - 1.1 Handle, store, and protect equipment and materials to prevent damage before and during installation in accordance with the manufacturer's recommendations and as approved by the Architect. Replace damaged or defective items.
  - 1.2 Equipment with damaged factory applied finishes shall be refinished as required to bring the equipment to a like-new condition in accordance with manufacturer's recommendations.

#### 1.12 TESTING AND DEMONSTRATION

- A. Submit a start-up procedure for COR to review and approve. Coordinate all testing procedures and schedules with COR. All testing shall be documented with test procedures, results and initials of witnessing personnel.
- B. Perform all hydrostatic tests required in codes and ordinances.
- C. Systems Operation Demonstration: Subject systems to such operating tests as are required to demonstrate that the equipment installed will operate within the specified limits through normal ranges and sequences including simulation of possible abnormal conditions. Operate every device manually and automatically, in accordance with its purpose.
- D. Operation of Equipment and Systems: Contractor is responsible during all periods of balancing and testing.
- E. Provide all equipment, instruments, personnel and supplies required to conduct all tests.

#### 1.13 GUARANTEES AND WARRANTIES

- A. Submit written copies of all guarantees and warranties prior to requesting final payment.

#### 1.14 PROTECTION

- A. The Contractor shall protect all work and material from damage by his work or workmen, and shall be liable for all damage thus caused.

PART 2 – PRODUCTS (not used)

PART 3 – EXECUTION (not used)

END OF SECTION

**DIVISION 26**  
**ELECTRICAL**

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## SECTION 26 00 10

### BASIC ELECTRICAL REQUIREMENTS

#### PART 4 – GENERAL

##### 1.14 SUMMARY

- A. The requirements of this Section and the other Division 26 Sections apply to all the electrical work.
- B. Coordinate electrical work with related work shown and specified elsewhere.
- C. Work Included: The Contractor shall perform all the Work required (including the furnishing of all supervision, labor, services, tools, materials and equipment and the performance of all operations and incidentals necessary) for a complete, safe and reliable electrical installation, adjusted, tested and ready for operation. The electrical work is generally described as follows:
  - 1. Grounding
  - 2. Wiring devices.
  - 3. Integration and Controls, including the following:
    - a. Control Panel and all components, wiring, programming, etc., (e.g. power monitor, etc.)
    - b. Instrumentation field equipment, devices, materials, supports, etc. (e.g. floats, pressure switches, etc.)
    - c. Interface and coordination with controls provided by other contractors (e.g. pumps, pressure switches, etc.) and existing equipment.
    - d. Calibration, testing and training.
  - 4. Branch circuit wiring system for equipment, etc.
  - 5. Control and instrumentation circuit wiring systems.
  - 6. Supports.
  - 7. Pull strings and ropes.
  - 8. Testing and completing.
  - 9. Obtaining and paying for all required licenses, permits, inspections, and any other fees.

##### 1.15 EXISTING CONDITIONS

- A. Before submitting bid, examine existing site and equipment conditions to determine effect on execution of the electrical work and include costs in bid.
- B. Utilities (electrical, water, etc.) are known to exist in the area of construction. The location of existing utilities shown on the drawings is approximate only and is not guaranteed to be an indication of all utilities in the area. The contractor is responsible for contacting the COR and all utility companies and for field location of all utilities prior to construction. The one-call number for underground utility location services is 1-800-424-5555. The Contractor shall promptly notify the COR of any conflicts between the contract documents and field location

of existing utilities. The Contractor is responsible for maintaining the integrity of all existing utilities during construction.

- C. Damaged electrical and telecommunications (telephone, computer/data, television, fiber, copper, etc.) cables shall be replaced in their entirety. Splicing will not be allowed.

#### 1.16 PLAN REVIEW AND PERMITS

- A. The Contractor shall arrange for inspections and pay for all required licenses, permits, inspections, plan review fees and any other fees.

#### 1.17 DEFINITIONS

- A. The term "Contractor" used throughout Division 26 of these specifications and on the drawings shall be understood to mean the Electrical Contractor. All other work shall be called out by name.
- B. "Approved" means approved by the COR. "For approval" means for the COR's approval.
- C. "Provide" means furnish and install.
- D. "Remove" means to remove the existing item indicated and all associated conduit, boxes, cables, etc. to their point of origin and/or destination; except, concealed conduits and flush boxes may be abandoned in place and/or re-used in the new installation. Cables shall be removed and/or replaced.
- E. "Replace" means to remove the existing and add in lieu the new as indicated.
- F. "As directed" means as directed by the COR.
- G. "Concealed" means hidden from sight in trenches, walls, chases, ceilings, etc.
- H. "Exposed" means within sight; that is, not concealed as defined above, and installed on the surface of walls, ceilings, etc.
- I. "C.O." means conduit only; that is, without cable (except, provide pull string or rope).
- J. "F.O.I.C." means Furnished by Others (e.g. general contractor, other subcontractors, equipment suppliers, Government, systems contractors working directly with the Government, etc.), Installed by Contractor.
- K. Definitions of all other terms, etc. are in accordance with AIA, ANSI, IEEE, IES, NEMA, etc. standard definitions.

#### 1.18 DRAWINGS AND SPECIFICATIONS

- A. The plan drawings are general in form and do not attempt to show complete details or list every item of the electrical systems or the various equipment (new or existing); however, the locations of equipment, devices, fixtures, etc. represent the desired finished arrangement; except, as governed by structural or mechanical conditions or obstructions.
- B. Specifications are, in some cases, written in an abbreviated form. Words such as shall, shall be, the Contractor shall, and similar mandatory phrases are supplied by inference.
- C. Investigate the structural and finish conditions affecting the work. Refer to the civil drawings, supplier shop drawings and submittals, etc. for additional details, equipment ratings, dimensions, location and swing of doors, location and size of partitions, cabinets, etc. and similar features. Verify all dimensions, equipment ratings, etc. with the actual before installation. Arrange the work accordingly.
- D. The intent of the drawings and specifications is to include all items necessary for the proper execution and completion of the Work; however, any item or detail not specifically mentioned in the specifications or shown on the drawings, but which is necessary to produce the intended results shall be included
- E. The Contractor shall bring to the COR's attention any discrepancies, inconsistencies, conflicts, errors, or omissions within the Contract Documents, between the Contract Documents and field conditions, and any design and layout changes required due to specific equipment selection, etc. prior to equipment and material purchasing and installation. If Contractor purchases any equipment or materials and performs any construction activity, and it knows or reasonably should have known that the documents contain a discrepancy, inconsistency, conflict, error or omissions, corrective work shall be at the Contractor's expense
- F. Verify all equipment and device locations with the COR prior to rough-in.

#### 1.19 SUBMITTALS

- A. The Submittal format: Hard Copy or PDF. The contractor shall supply submittals in either hard copy form as described below or as original manufacturers PDF cut sheets on all material and equipment.
- B. The hard copy submittal shall be supplied with printouts from the manufacturers PDF files where available.
- C. Mark each product on the PDF cut sheet with the specific item and all accessories to be supplied. Cut sheet not marked to show items will be rejected.
- D. Obtain written approval for the above submittals prior to construction, assembly, and delivery.
- E. Furnish complete material submittals where possible. Partial submittals will be considered only to allow timely ordering of equipment.

- F. Submit catalog cuts, shop drawings, diagrams and manufacturing installation, operating and maintenance instructions bound with a loose-leaf cover, indexed in the order they appear in the specifications by section and item number. Put the specification items number on each cut sheet.
- G. Shop drawings shall be 11"x17" folded to 8-1/2" x 11" sheet size.
- H. Submittals shall have sufficient detail to determine if ratings, characteristics, and physical construction are equivalent to those specified.
- I. Where manufacturer's catalog sheets are used, indicate the specific items to be supplied in ink either by arrow, encircled on the sheet, or the inapplicable portion blocked out. List manufacturer's name, contract, section and drawing sheet reference number on each catalog sheet. Identify where equipment is to be used, if not obvious.
- J. Submittals shall show any changes to be made resulting from substitution of equipment or materials for those that are specified.
- K. Make complete submittals of all equipment within 60 calendar days of notice to proceed.
- L. The COR will review each submittal, mark to indicate action taken, and return. Compliance with specified characteristics is the Contractor's responsibility. Approval of submittals does not release the Contractor from a proper installation, compliance with the drawings, specifications, codes, standards, etc. or coordination of the work.

#### 1.20 RECORD DOCUMENTS

- A. Submit record documents at completion of the project in accordance with the specific submittal requirements listed elsewhere in these documents.
- B. Provide "as-built" drawings in both full size reproducible form or in software form as AutoCAD .dwg type files.
- C. All record documents in software form shall be provided on a single CD-ROM. Include the necessary program(s) to read test results. Separate submittals for the various disciplines will not be accepted.

#### 1.21 "AS BUILT" DRAWINGS

- A. The Contractor shall continuously maintain a marked job set of as built drawings as the work progresses, to indicate deviations from the original design, including change orders. Maintain records of all concealed wiring and of actual equipment, device, etc. locations. Provide dimensions from accepted reference lines as needed. The as-built drawings shall be kept on site and available for inspection by the COR and DEQ.
- B. Include any detailed equipment, wiring, etc. diagrams and layouts prepared by Contractor or his subcontractors, suppliers, etc.

- C. At substantial completion, Contractor shall modify one complete set of reproducible copies, with all "as built" information and submit these drawings to the COR for approval. Each sheet shall be marked "CORRECTED TO AS BUILT"; or, if there are no changes, drawings shall be marked "NO CHANGES, INSTALLATION PER PLAN".
- D. "As-built" drawings for all portions of the work shall be combined into a single set matching the contract documents. Separate submittals for the various disciplines will not be accepted.

## 1.22 OPERATION AND MAINTENANCE MANUALS

- H. Following installation of the electrical systems, but prior to acceptance of the work, Contractor shall submit to COR one loose-leaf volume with information systematically segregated and indexed for easy reference to be reviewed by the COR. This submittal copy will be returned to the Contractor, and the material can be used in preparation of final volumes. After approval of preliminary copy, but prior to project completion, submit 3 finished copies.
- I. Supply Electrical Operation and Maintenance Manuals. Label the front cover of the manuals with the following information: The name of the project, the General Contractor, the Electrical Contractor, and the date of construction.
- J. Submit a preliminary complete copy to the COR for approval at least 2 weeks prior to the final inspection.
- K. Deliver three approved bound copies of final Operation and Maintenance Manuals to the COR prior to closing of the contract.
- L. Furnish manuals in 8-1/2" x 11" size in hard cover, loose leaf, 3-ring binder. Accordion fold drawings to 8-1/2" x 11" size.
  - 3. Provide an index and tabs for listing contents.
  - 4. Arrange contents in order of their appearance in the specifications.
- M. Include the following information as part of the maintenance manuals:
  - 6. Manufactures approved cut sheets and shop drawings in PDF format. If show drawings are done in AutoCAD format provide these drawings in electronic form, DWG format as well as hard copy.
  - 7. Required Data: As-built shop drawings, diagrams, catalog data, parts lists, all approved submittal data, manufacturer's installation, operating and maintenance instruction manuals for all equipment and fixtures.
  - 8. Include all installation instructions shipped with all equipment in manual.
  - 9. List major equipment with the names, addresses and telephone numbers of the equipment representative providing factory trained service personnel.
  - 10. As-Built Drawings.
- N. Keep one full size copy of record drawings, other than working drawings, on the site at all times during construction, and note all changes and corrections made during the construction period.

### 1.23 WARRANTY

- A. The complete installation shall be guaranteed for a period of one (1) year after date of project completion. For warranty purposes, the date of project completion shall be considered the date of final acceptance of the installation by the COR certified in writing, and after COR has received all project close out requirements. All corrective work, if needed and requested by the COR, shall be provided without cost to the Government during the guarantee period.
- B. All corrective work performed by the Contractor in remedying defective work during the guarantee period following the COR's acceptance of the project shall be subject to the same guarantee requirements of the original work for a period as specified from the date of completion of the corrective work.
- C. Corrective work shall include on-site service by the Contractor, subcontractor or supplier, and/or nearest technical service representative of the equipment manufacturer. Service shall be provided within 24 hours from the time of request for warranty service by the COR.

### 1.24 TRAINING/INSTRUCTION AND ASSISTANCE

- A. After the installation is complete and operating, and prior to acceptance of the work, conduct a training/instruction period at the site for each type of system to point out locations of service and maintenance and instruct the system operator in the operation of all systems and equipment.
- B. The person(s) who conduct these instructions and demonstrations shall be a qualified representative(s) of the manufacturer with substantial training and operating experience on this equipment and project, and shall be versed in the operating theory as well as practical operation and maintenance work. Instructor(s) shall have the necessary educational and interpersonal skills, as well as proven ability to effectively perform the training.
- C. Each period shall include preliminary discussion and presentation of information using the actual maintenance manuals required for this project. Contractor shall notify COR at least 48 hours in advance of readiness to conduct the instruction period. The actual time and date of instruction period shall be acceptable to the COR.
- D. All training material shall be furnished and supplied by the Contractor.

### 1.25 QUALITY ASSURANCE

- A. Contractor and Contractor's personnel shall be experienced, thoroughly trained and completely familiar with the systems, equipment, devices, fixtures, materials, etc. and the required methods of installation.
- B. Contractor shall provide proof, upon request, that all personnel are licensed according to Oregon State requirements.

- C. All materials, equipment and workmanship shall be properly inspected by the Contractor and shall at all times be subject to inspection by the COR. Contractor shall provide all samples, data and documents necessary for such inspection. The COR shall be afforded full and free access at the jobsite and the shops and places of business of the Contractor for such inspection and to determine the status of the work. If Contractor covers all or any part of the work prior to any inspection or test specifically requested by COR, the cost of any necessary uncovering and replacing shall be borne by the Contractor.
- D. Neither the failure to make inspections or tests, nor to discover defective workmanship, materials or equipment, shall prejudice the rights of the COR thereafter to reject the work and/or require its correction.
- E. The completed installation shall comply with the more stringent of the requirements of the drawings and specifications, the authorities having jurisdiction, and all laws, ordinances, rules, regulations and requirements in effect at the site, including current editions of the following:
1. NEC - National Electrical Code.
  2. National Electrical Safety Code.
  3. OSHA - Occupational Safety and Health Act (and its Idaho State equivalent).
  4. ADA - Americans with Disabilities Act (and its Idaho State equivalent).
  5. UFC - Uniform Fire Code (and its Idaho State equivalent).
  6. Oregon Building and Energy Codes
  7. Nez Perce County Standards and Ordinances.
- F. The following standards establish the minimum requirements for the equipment and installation, unless exceeded by the requirements of the drawings or specifications:
1. Manufactures approved cut sheets and shop drawings in PDF format. If show drawings are done in AutoCAD format provide these drawings in electronic form, DWG format as well as hard copy.
  2. ANSI - American National Standards Institute.
  3. BICSI – Building Industry Consulting Service International
  4. ICEA - Insulated Cable Engineers Association.
  5. IEEE - Institute of Electrical and Electronics Engineers.
  6. NEMA - National Electrical Manufacturers Association.
  7. NEIS – National Electrical Installation Standards
  8. NFPA - National Fire Protection Association.
  9. NECA – National Electrical Contractors Association
  10. EIA - Electronic Industries Association.
  11. TIA - Telecommunications Industry Association.
  12. As-Built Drawings.
- G. Nothing in the drawings or specifications shall be construed to direct or permit work not conforming to applicable laws, ordinances, rules, regulations, requirements or standards. Discrepancies or conflicts shall be brought to the attention of the COR promptly for resolution.
- H. Inspections: Arrange for all inspections of the work by the local or state authority having jurisdiction over the construction. Final inspection and acceptance of the work will be made

only after all certificates of inspections, including final certificate of acceptance of the work by the inspection authority have been forwarded to the COR.

- I. The COR shall be advised whenever an inspection is requested. Any materials, equipment or workmanship that is not (in the opinion of the COR or Inspector) as it should be, shall be taken out and replaced without cost to the Government.

## 1.26 INSPECTIONS AND TESTS

- A. At the final inspection, conduct tests to determine that a complete workable electrical system has been installed conforming to the drawings, applicable codes, and specifications.

## PART 5 – PRODUCTS

### 2.1 GENERAL

- A. Coordinate the features of materials and equipment so they form an integrated system.
- B. Contractor shall make certain that all materials selected by him/her, their subcontractors or suppliers, conform exactly to requirements of the drawings and specifications. Transmittal of such specifications and drawing information to subcontractors, person manufacturing and/or supplying materials to the project, and rigid adherence thereto, is the Contractor's responsibility.
- C. All equipment, devices, fixtures, materials, etc. shall be UL (Underwriter's Laboratories, Inc.) listed, labeled and approved for the service intended where UL standards have been established. If no UL label is available, the label of a testing agency or conformance to national standards recognized and approved by the electrical inspector having jurisdiction is required.
- D. All equipment, devices, fixtures, materials, etc. shall be new and installed only if in first class condition.
- E. All equipment, devices, etc. and their components shall be designed for continuous duty without degradation of function or performance.
- F. In the event that any item is not available exactly as specified, the Contractor shall so notify the COR in writing prior to bidding as early as possible to allow ample time for an alternate item to be selected without delay to the project.

### 2.2 EQUIPMENT MANUFACTURERS

- A. Unless specifically noted otherwise, all references to manufacturer's or supplier's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality.

- B. All equipment, devices, materials, etc. shall be of a type manufactured by reputable recognized vendors. Each type or groups of items, system components, etc. having the same or similar function shall be the same manufacturer, make and quality throughout the facility.
- C. Approval of a manufacturer's name and/or type does not release the Contractor of the responsibility for providing materials which comply in all details with requirements in the contract documents.

### 2.3 SPARE CAPACITY

- A. Unless sizes and/or quantities are specifically indicated, provide at least 20% spare wiring capacity in all cabinets, panels, cable trays and raceways.

### 2.4 ENCLOSURES

- A. Unless noted otherwise, equipment, etc. located outdoors shall have weatherproof (NEMA 3R) enclosures, fabricated from code gauge or heavier galvanized steel. Surface finish shall be a rust inhibiting primer followed by an epoxy or polyurethane polyester top coat.
- B. Equipment, devices, boxes, raceways, etc. located within a Classified (Hazardous) location shall be suitable for the particular classification.
- C. Provide gaskets, seals, etc. as required to prevent the entrance of moisture, debris, insects, etc.
- D. Include all necessary mounting, etc. accessories.

### 2.5 SUPPORT CHANNEL

- A. Channel, framing members, etc. shall be 12 gauge stainless steel, 15/8 inch channel width with all necessary accessories; except support channel.
- B. Threaded rod shall be steel, minimum 3/8 inch diameter.
- C. All steel parts within the Pump Station wells, and the enclosure adjacent to the well shall be stainless steel.

### 2.6 ANCHORS AND FASTENERS

- A. Anchors and fasteners used shall be of a type designed for use in the base material to which the item is to be attached. Attach to wood with wood or lag screws, to metal with machine screws or bolts and to concrete with carbon steel wedge or sleeve type expansion anchors or self drilling metal anchors and machine screws or bolts.
- B. Pad and floor mounted equipment shall be secured with suitable hot dipped galvanized steel anchor bolts, washers, hex nuts, etc.
- C. Powder actuated fasteners, plastic expansion type anchors, nails and toggle bolts are not permitted.
- D. Anchors shall be non-corrosive or have suitable corrosion resistant coatings or treatment.

- E. Bolts, nuts, screws and other threaded devices shall have standard threads and heads, unless required for tamper-proof installation.
- F. All outside fasteners shall be stainless steel.

## PART 6 – EXECUTION

### 3.1 GENERAL

- A. The installation and demolition shall be done in a neat and workmanlike manner and shall be suitable for the location. Conduit stub-ups, sleeves and ends left open for future connection, unused hubs in fittings and unused holes in boxes shall be plugged or capped to prevent the entrance of moisture and debris.
- B. For the actual fabrication, installations, and testing, use only persons thoroughly trained, experienced and completely familiar with the items required and with the manufacturers' recommended methods of installation. In acceptance or rejection of the work, no allowance will be made for lack of skill or experience.
- C. The Contractor shall personally, or through a competent superintendent, constantly supervise the work and check all materials prior to installation for conformance with the Contract Documents.
- D. Circuits shall be run from equipment to equipment, device to device, etc. shall be run exactly as shown on the drawings or as recommended by the manufacturer unless permission is obtained from the COR to alter the arrangement.
- E. Changes in location of up to 20 feet (e.g. equipment, devices, trenches, etc.) made before installation and deviations to avoid interferences shall be made without increase in Contract Sum.
- F. The Contractor shall conduct operations in a manner to avoid the risk of bodily harm to persons or damage to any property. Construction equipment and tools shall be in good operating condition and be designed to perform the work required. The Contractor shall continuously inspect all work to discover any unsafe conditions and be solely responsible for their correction.
- G. Use all means necessary to protect the equipment and materials and the work, materials, etc. of the other trades before, during and after installation. Do all cutting carefully to prevent damage to the work. Correct lifting, jacking and/or moving methods shall be used. In the event of damage, immediately make all repairs and replacements necessary to the approval of the COR without increase in Contract Sum.
- H. The Contractor shall provide all cutting, patching, core drilling, etc. as required for the work. Use only journeymen skilled in the necessary cutting or patching operation. Patching shall match adjacent work. Structural members shall not be cut without approval of the COR. Where penetrations in structural members for conduits, etc. are allowed, the holes shall be no larger than absolutely necessary.

- I. The premises shall be kept free from the accumulation of rubbish and debris caused by the work.
- J. The Contractor shall provide all hangers, supports, chases, anchor bolts, inserts, sleeves and other openings in the construction required for the electrical work.
- K. Wall, ceiling and floor penetrations by raceways (both inside and outside the raceway), cables, etc. shall be sealed to maintain the original moisture, dust and fire resistance to the approval of the COR.

### 3.2 PROTECTION OF PERSONS, FACILITIES AND UTILITIES

- A. Provide all traffic control, flagging, barricades, barriers, guards, warnings, notifications, etc. at equipment, materials, open excavations, open trenches, etc.
- B. Provide devices and methods and proceed with sufficient caution to preclude damaging any facilities, utilities (e.g. power, water, sewer, natural gas, telecommunications, etc.) or similar, above ground or underground, concealed or exposed, known or unknown, located or not located. In the event unidentified utilities are encountered, notify the utility, and COR.
- C. Unless otherwise provided by the drawings or specifications, do not cut or alter any existing utility or similar without authorization of the COR. The Contractor shall pay all costs, as determined by the COR, of remedial work necessitated by unauthorized or accidental cutting, patching, trenching, excavating, backfilling, etc. which damages and/or impairs the performance of existing utilities or similar (e.g. power, water, sewer, natural gas, telecommunications, etc.), above ground or underground, concealed or exposed, known or unknown, located or not located.
- D. All such work shall be verified with the COR before execution of replacement, re-routing, relocation, repair or termination commences.
- E. Notify Regulating Agencies, Locator Service, Utility Companies, COR and Project Manager a minimum of a minimum of fourteen (14) days in advance and re-confirmed a minimum of 48 hours in advance, or as mutually agreed upon with the COR, prior to commencement of any such work. Submit procedures to assure safe and continuous operation of the utilities for approval.
- F. Provide a spotter at all times when excavation occurs by use of a backhoe or other mechanical equipment.
- G. Provide adequate means of support and protection during earthwork operations.
- H. Cooperate with the COR and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of the COR and utility, without increase in Contract Sum.
- I. Damaged electrical cables shall be replaced in their entirety. Splicing will not be allowed.

### 3.3 COORDINATION AND SCHEDULING

- A. The Contractor shall coordinate the work and cooperate with the COR and other trades to have the work completed to the best advantage, insure there are no interferences, provide reasonable opportunity for the other trades and Contractors to complete their work and to not delay the work.
- B. Any and all costs incurred for non-standard hours, double-shifts, overtime, etc. or any other costs associated with completing the project within the completion times required shall be included without increase in contract sum.

### 3.4 DELIVERY, STORAGE AND HANDLING

- A. All equipment and materials shall be stored neatly and out of the way. Conduit, fittings, cable, etc. shall be stored off the ground, protected from the weather in racks or bins or on shelves. Equipment, panelboards, fixtures, devices, etc. shall be stored indoors in a dry, warm area, free of dust and one in which condensation will not occur.
- B. Ship equipment in its original package to prevent damage or entrance of foreign matter. Perform all handling and shipping in accordance with manufacturer's recommendations and packing label instructions. Provide protective coverings during construction.
- C. Following installation, protect materials and equipment from corrosion, condensation, physical damage, and the effects of moisture. Keep openings in boxes or equipment closed when work is not being done in them during construction.
- D. Identify materials and equipment delivered to the site and storage organized to permit checking against approved material lists and submittals.

### 3.5 LOCATIONS

- A. Locations and mounting heights of equipment, devices, etc. shall be consistent, and in accordance with the requirements of NFPA, ADA and the authority having jurisdiction.
- B. Prior to rough-in, the Contractor shall mark or otherwise show the location of all equipment and devices, and the proposed routing of raceways. Obtain specific approval for the location of each from the COR before rough-in.
- C. Changes in location (e.g. equipment and devices up to 20 feet, trench and conduit routing, etc.) made before installation and deviations to avoid interferences shall be made without increase in Contract Sum.

### 3.6 EQUIPMENT AND DEVICES

- A. Equipment, devices, etc. shall be installed plumb and true, and shall be square with the adjacent roads, buildings and other equipment; in a horizontal or vertical position as intended. The location of similar items shall be consistent.
- B. Equipment, cabinets, boxes, fixtures, devices, etc. shall be accurately mounted and leveled and be firmly supported in accordance with manufacturer's instructions, or as directed. Supports shall be neatly placed and properly fastened.
- C. The correct lifting, jacking and/or moving gear which will prevent damage shall be used.
- D. All bolts, nuts, screws and other fastenings shall be tightened in accordance with manufacturers or listing instructions and all covers replaced on equipment and boxes. All electrical connections, particularly those on bus work in panelboards, etc. shall be checked to ensure tightness and electrical conductivity.
- E. Follow manufacturer's installation details wherever available. Provide supports, boxes, mountings, wiring, fittings, etc. as required, standard or special. Wherever any conflict arises between manufacturer's instructions, codes and regulations, and these Contract Documents, follow the COR's decision.
- F. Following installation, protect materials and equipment from corrosion, condensation, physical damage, and the effects of moisture. Keep openings in boxes or equipment closed when work is not being done in them during construction.
- G. Provide gaskets, seals, etc. as required to prevent the entrance of moisture, debris, insects, etc. Check for proper fit.

### 3.7 SUPPORTS

- A. Provide all necessary supports, anchors, fasteners, and backing for all raceways, boxes, enclosures and equipment.
- B. Hangers and supports shall be made from standard structural shapes and hardware or systems of shapes, fittings and hardware designed for the purpose.
- C. Equipment or materials to be supported shall be securely fastened to the supporting means. Use size and number of attachments as required for a safety factor of at least four. In addition to the weight of the material, consideration shall be given to the weight of the support itself, the weight of materials within, vibration, external operational forces, shock load, etc.
- D. Brace all equipment, etc. as required to meet the requirements of seismic zone 2B.
- E. Attach to wood with wood or lag screws, to metal with machine screws or bolts and to concrete with carbon steel wedge or sleeve type expansion anchors or self-drilling metal anchors and machine screws or bolts.
- F. Pad and floor mounted equipment shall be secured with suitable hot dipped galvanized steel anchor bolts, washers, hex nuts, etc.

### 3.8 CORROSION PROTECTION

- A. Maintain the integrity of factory provided corrosion protection. Repair damaged corrosion protection and touch-up paint all scratched, marred or damaged factory finish on equipment, devices, enclosures, etc.; per manufacturer's instructions where available.
- B. Paint field cuts with a suitable cold galvanizing compound.

### 3.9 MOISTURE PROOFING

- A. Conduit terminations at equipment, etc. shall be suitably sealed and/or plugged at both ends to prevent the entrance of moisture.
- B. Underground conduits extending into buildings and at transformers, switchgear, etc. shall be suitably sealed or plugged at both ends. Underground conduits between vaults shall be suitably sealed or plugged at the high end. Sealant shall be removable. Ductseal is not acceptable.
- C. Conduit penetrations through walls shall be suitably sealed and/or grouted to prevent the entrance of moisture.
- D. PVC conduit shall be solvent welded to prevent the entrance of moisture.
- E. Vault lids, conduit and cable entrances, etc. shall be suitably sealed and/or grouted to prevent the entrance of moisture.

### 3.10 APPROVALS

- A. Prior to rough-in, the Contractor shall mark or otherwise show the location of all equipment and devices, and the proposed routing of raceways, cables, etc. Obtain specific approval for the location of each from the COR before rough-in.
- B. Prior to beginning installation of cables, obtain approval of the raceway installation from the COR.

### 3.11 CLEANING

- A. Remove trash, combustible material, and other debris from areas around equipment.
- B. Remove shipping materials, supports, spacers, etc. from equipment, devices, etc.
- C. Remove all debris from equipment, devices, etc. including all scraps of wire, plaster, dust, and other foreign material. Vacuum cabinet clean and wipe down with a clean, dry, lint-free cloth or soft bristled brush.
- D. Clean screens, louvers, baffles, etc. covering ventilation openings to ensure they are clear.

- E. Remove paint splatters and other spots, dirt, and debris.
- F. Touch up scratches to match original finish.
- G. Remove all traces of soil, dirt, dust, smudges, fingerprints and other foreign matter from visible surfaces of equipment, devices, etc. Pay close attention to highly finished surfaces such as polished metals.
- H. Follow manufacturer's instructions. Failure to follow manufacturer's recommendations when cleaning equipment can result in damage from the use of improper cleaning methods or agents.

### 3.12 VISUAL AND MECHANICAL INSPECTION

- A. Verify that all equipment and their components are sized properly for the load and the types, sizes, etc. are in accordance with the contract documents, approved submittals, etc.
- B. Visually inspect equipment for physical damage. Repair physical damage, if practical and approved by the manufacturer. Consult the COR and manufacturer for recommendations for suitable protective barriers to prevent future damage.
- C. Inspect molded and formed equipment and components (e.g. circuit breaker cases, fuses, starters, relays, insulators, supports, etc.) for cracks or other defects.
- D. Check all bolts, connections, cable terminations, etc. for tightness using a calibrated torque wrench or screwdriver. Refer to manufacturer's instructions and markings for proper torque values.
- E. Visually check the equipment, its components and associated raceways, conductors, etc. for proper grounding and bonding. Ensure that grounding and bonding terminal bars, bus bars, straps, and conductors are properly connected.
- F. Verify that cables do not contact live parts and that cables are properly secured to withstand the effects of fault currents
- G. Check equipment anchorage, mounting, clearances, alignment and fit of components.
- H. Check that phase barriers are in place, if applicable.
- I. Visually check disconnect switch blade alignment, blade penetration, travel stops, and mechanical operation.
- J. Inspect each fuse holder to determine whether it seems to be adequately supporting the fuse and that the fuse holders are securely attached to the mounting base. Verify fuses are set tightly in the clips provided.
- K. Operate equipment and components (e.g. disconnect switches, circuit breakers, etc.) to insure smooth operation.

- L. Motor bearings shall be checked for proper lubrication and the shaft turned to ensure it is free to rotate.
- M. Compare all circuits (internal and external) with wiring and/or control diagrams to verify they are installed correctly.
- N. Confirm correct operation and sequencing of electrical and mechanical interlock systems, if so equipped. Attempt closure on locked-open devices. Attempt to open locked-closed devices.
- O. Confirm that equipment nameplates and safety labels are provided.

### 3.13 TESTING

- A. General: Perform the tests as described below. Notify the COR in writing five days in advance of all tests in this and other sections of this specification. Perform all tests in the presence of the COR. Upon completion of all tests, submit written test results in duplicate for approval by the COR prior to acceptance.
- B. Test Report Forms:
  - 1. Submit a copy for approval of the proposed tabular data sheet to be used for each required test. Type column and heading titles on sheets. Submit data sheets for approval a minimum of 30 days before each test. Divide sheets into columns and rows with appropriate rulings and titles. Enter test data on tabular forms during tests by hand; do not recopy.
  - 2. Furnish data in tabular form listing required test data, name of tested device, location, serial number, type and name of measurement instrument with scale settings.
- C. Preliminary Tests (distribution panels and motor control panels)
  - 1. Install all mechanical and electrical equipment before any preliminary electrical tests are made and final connections are made.
  - 2. Test all control and power conductors including neutrals and isolated grounds for insulation resistance and continuity as described below (before connection of conductors to control panels, controlled and pilot devices).
  - 3. Connect all power and control conductors to distribution panels and control panel terminals after all preliminary tests have been done as described above.
- D. Ground System Tests: Immediately after installation, before connection, test driven grounds and foundation ground. Test driven ground rods individually. The combined resistance of all grounded-together electrodes in a group shall not exceed 15 ohms at the main point of connection. Submit the results, date of test and soil conditions to the COR in writing immediately after testing. Tests shall be made with a 3-point probe tester (Associated Research Vibro Ground Tester or equivalent). A standard ohmmeter will not work for this test. Splice vault ground rod resistance shall be 25 ohms maximum.

E. Insulation Resistance: Test insulation resistance under normal climatic conditions. Conform to the following:

1. Measure resistance between all insulated conductors (including neutral and isolated ground) and ground as well as each other. Coordinate testing with COR so that tests can be witnessed if desired.
2. For circuits with 600 V rated insulation, make insulation resistance measurements on each power distribution and control panel, main feeder and each branch circuit and all control circuits. Make all measurements with loads disconnected and after all wiring is in place. Perform tests with Megohm meter having a minimum 10,000 megohm scale range and apply 2000 VDC. Minimum resistance shall be 200 megohms.
3. For circuits with less than 600 V rated insulation, other than control circuits, conductor insulation resistance as installed shall not be less than 200 megohms to ground. This does not apply to telephone or control cable. Perform tests with Megohm meter and apply DC voltage that does not exceed limit set by cable manufacturer.

F. Insulation Resistance Testing Procedure 600V rated wiring

1. Object of test: Measure the resistance of all insulated conductors to ground and to each other. This includes each control panel, main feeder and each branch circuit and all control circuits.
2. Perform testing after all wiring is in place, with loads disconnected. All electronic devices must be disconnected to avoid damage. This includes electronic switches and outlets (GFI's). GFI breakers in branch panels must be removed, with the phase and neutral wires connected to an adjacent breaker for testing.
3. Open the main service switchgear disconnect switch.
4. Close the branch panel main switch and all branch circuit breakers.
5. Connect Megohm meter to phase, neutral, ground and isolated ground busses in the combinations shown in the following table. The neutral and isolated ground must be disconnected from ground at the main service switchgear in order to test the feeders.
6. The following table can be used to record readings:

TEST LOCATION \_\_\_\_\_

	A	B	C	N	G	IG
A	n/a					
B	n/a	n/a				
C	n/a	n/a	n/a			
N	n/a	n/a	n/a	n/a		
G	n/a	n/a	n/a	n/a	n/a	

(Minimum of 10 readings w/o isolated ground) (Minimum of 15 readings with isolated ground)

1. Apply voltage to circuit:

- a) Wires with 600 V rated insulation: Apply 2000 VDC. A minimum value of 200 megohm is required.
    - 1) Exception. Outlets may arc at less than 2000 VDC. If this happens, reduce the voltage to a lesser value and record the megohm value.
  - b) Wires with less than 600 V rated insulation: Apply voltage which does not exceed manufacturer's recommendations. A minimum value of 200 megohm is required.
2. If the megohm value is less than 200 megohms, isolate the problem circuit by opening breakers one at a time.
- G. Continuity Test (Control Panels Only): Perform at each control panel continuity tests on power and control circuits after connection of external controlled and pilot devices and sensors before connecting to power and control panels. Actuate all pilot devices (float switches, etc.) manually to check proper operation and electrical continuity.

### 3.14 FINAL TESTS

- A. Final Test: Start final tests after complete preliminary tests have been made. System performance shall conform to the following criteria. Note any deviations on the test reports with indication of corrective action taken or proposed.
- B. Motor and other Load Current: Actual motor and all other equipment load current on each ungrounded conductor at maximum load conditions equal to or less than nameplate rated full load motor current at a service factor of 1.0.
- C. Motor Control Panels Submit the following information:
  - 1. No load and full load voltage, phase-to-phase, to ground in each panel main feeder at maximum system load conditions.
  - 2. Full load current on each branch circuit or motor circuit in each panel at maximum system load conditions. (Show staged current as described above)
  - 3. Full load current on each main supply conductor to each panel and all feeders at maximum system load conditions.
  - 4. Unbalanced neutral current in each panel. The above measurements are for worst case maximum load for each phase.
  - 5. Demonstration of trip action on each GFI breaker by connection of a 15,000 ohm + 5% resistor between the "hot" line and ground on each receptacle connected to GFI breaker.
- D. Final Control System Tests (Control Panels for Motor Control, Special purpose systems):
  - 1. Final operational preliminary tests of the control systems will be performed in the presence of the COR. Supply all labor and material required for testing.
  - 2. Provide two weeks notice to the COR that the control panels are operational with all equipment checked out, before final tests described below:
  - 3. Normal Operation Test: Test each control panel to demonstrate normal operation of the system including all pilot devices and sensors, (level flow, float and pressure switches, all instrumentation and monitoring), level probes, time delays, lights, indicator gages, controllers, etc., for correct operating sequence. All controlled devices (motors, solenoids, etc.) will be connected and operating under normal load for tests.

Final adjustment of all operating set points and other adjustments shall be permanently marked by etching a mark on control adjustment device and marking with red paint.

4. Motor test report forms.
- E. Provide complete operational sequence checkout to verify all modes of operation both normal and alarm for each system.
- F. Test all control systems that interact with each other as a complete system to demonstrate that all interconnections and interactions are correct and that all interwiring is functional.
- G. Calibration of Equipment: Calibrate all equipment requiring calibration such as such as power supplies, instrumentation transmitters, pressure switches, pressure gauges, and all sensors. Provide all calibrators and instruments for this calibration. Provide each sensor with the appropriate input over its full operating range to test sensor output, such as, pressure, level, temperature, etc. to demonstrate the sensors output (4-20 mA) for example is linear and corresponds to the physical variable measured. Provide certified, calibrated test instruments that read these variables measuring the same media as the sensor.
- H. Failure and Alarm Tests: Test all safety protection devices and circuits, indicator lights, etc., to demonstrate each separate type of failure and proper circuit operation for each condition.
- I. Show actual operation of all protective and normal operation sensors. Shorting around or opening of circuits to simulate activation will not be allowed on either normal operation tests above or failure tests.
- J. Test each motor thermal overload relay by temporarily inserting a heater element in its overload relay sized to trip within 5 minutes or 67% of the actual measured running current of each motor or adjusting the solid state overload relay until the motor starter trips. Control panel manufacturer will supply heater elements for tests.
- K. Demonstrate that the motor thermal overload trip, and breaker alarm trip will energize the alarm circuit, de-energize the motor, and perform other required control functions within the time limit specified above or by the overload trip time characteristic curve.
- L. Replace the proper thermal overload element in each starter or adjust the solid state overload relay to the correct setting or heater size after each test. Provide the COR the catalog numbers of the overload heaters and manufacturer's tables with trip ratings to verify that the heater elements have been properly sized according to the nameplate current, service factor, and any temperature derating factors.
- M. Provide a Motor test report and motor nameplate data in a tabular list of nameplate rated currents, motor service factors, temperature derating multipliers, service factor derating multipliers and measured current for all motors to verify against overload trip ratings. The control panel manufacturer will supply overload heaters if different ones are required.
- N. Test Switch and Control Loop Operation: Use each test switch to simulate opening, shorting around and automatic operation of all pilot devices. Provide a current, voltage or other simulator to simulate all ranges of sensor inputs to test all controllers and signal loops from 0 - 100% of range for all control and alarm points. Demonstrate the normal operational

sequence using the test switches, and all failure conditions which can be simulated with the test switches.

- O. Test Failure: Failure of any phase of the operation tests shall constitute failure of the system. Correct failures and retest system. Repeat until the system is operating to required specifications.
- P. Test Reports
  - 1. Submit dated "Electrical System Test Reports" indicating all tests performed and demonstrating conformance with the required system performance criteria in tabular form as described above. Include all voltage, current, and resistance test data of the electrical service, main feeders, panelboards, motor control panels, control system tests and ground systems as applicable. Submit test reports prior to final inspection.
- Q. Final Corrections:
  - 1. Correct promptly any failure or defects revealed by these tests and repeat tests on these corrected items. Make any final adjustments for optimum operation of all equipment.

### 3.15 ENERGIZING

- A. Energize equipment in accordance with manufacturer's recommendations.
- B. The COR and other affected personal shall be notified one week prior to energizing so that the energizing may be witnessed.
- C. Energize equipment, feeders, circuits, etc. from the source end and working to the load. Close main devices, feeder devices, motor/branch circuit devices, etc. in sequence.
- D. Verify all temporary grounding, etc. connections are removed prior to energizing.
- E. Verify that all load disconnecting, etc. devices are open, padlocked and tagged prior to energizing.
- F. Motors shall be started uncoupled to verify proper rotation. Reverse if required.
- G. After energization, equipment shall be observed for unusual conditions such as vibration, noise, excessive temperature rise, etc.

### 3.16 CONTRACT CLOSE-OUT

- A. Upon completion of the work, and prior to final acceptance, the Contractor shall thoroughly check the installation. Checking shall consist of visual inspection and manual adjustment to confirm correct installation and arrangement and to assure the intended function, response and operability. Checking shall include, as a minimum, the following:
  - 1. Check that equipment, devices, etc. are of the correct type and rating.

2. Check that all raceways, fittings, devices, boxes, enclosures, etc. are secure and that all conduit connections are tight.
  3. Check that all electrical connections are correctly tightened.
  4. Check that equipment, devices, panelboard circuit directories, etc. are correctly labeled.
  5. Check that equipment, fixtures, devices, etc. are clean with all unnecessary labels removed.
- B. Upon completion of the work, and before final acceptance and payment, the Contractor shall:
1. Remove from the site and dispose of all surplus and discarded equipment, materials, rubbish, and debris which may have accumulated during the execution of the work.
  2. Submit approved "As Built" Drawings, Record Documents, Test Records, Manuals, etc.
  3. Submit written warranty statements for equipment, materials and installation.
  4. Conduct system tests.
  5. Obtain final inspections from the authorities having jurisdiction.
- C. Subsequent to final completion and testing operations, instruct COR's authorized representatives as required in operation, adjustment and maintenance of equipment and systems.

END OF SECTION

## SECTION 26 90 00

### INTEGRATION & CONTROLS

#### PART 1 – GENERAL

##### 1.1 APPLICABLE PROVISIONS

- A. The General, Supplementary and other Conditions of the Contract, modifications to the General Conditions, the Drawings, and the applicable provisions of the other Divisions are hereby made a part of this Division and all its sections.

##### 1.2 SUMMARY

- A. The requirements of this Section and the other Division 26 Sections apply to all the electrical work.
- B. Coordinate integration and controls work with related work shown and specified elsewhere.
- C. Provide all materials necessary for the proper execution and completion of the work as herein specified or called for on the drawings. Required items not specifically mentioned in the specifications or indicated on the drawings shall be provided as necessary to produce the intended results. This includes connection of all proposed electrical/control systems necessary for the complete operation of the systems proposed to existing site power including any modifications needed to those existing power sources as necessary to fully operate the proposed systems.
- D. Provide all testing and training.
- E. In the event that any item is not available exactly as specified, the Contractor shall so notify the Contracting Officer in writing as early as possible to allow ample time for an alternate item to be selected without delay to the project.

##### 1.3 QUALITY ASSURANCE

- A. Provide all documentation necessary to verify that components, construction methods and circuits conform to applicable standards.

##### 1.4 SUBMITTALS

- A. Provide submittals for the following:
  - 1. Control panels
  - 2. Level floats
  - 3. Conduit
  - 4. Wiring

## PART 2 - PRODUCTS

### 2.1 EQUIPMENT MANUFACTURERS

- A. Unless specifically noted otherwise, all references to manufacturer's or supplier's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality.

### 2.2 CONTROL PANEL

- A. Programmable Logic Unit – 120 V programmable logic unit with built-in LCD screen and programming keys.
- B. Motor-Start Contactor –
  - 1. 120V, 16 FLA, 1 hp, 60 hz; 2.5 million cycles at FLA (10 million at 50% of FLA)
  - 2. 240V, 16 FLA, 3 hp, 60 hz; 2.5 million cycles at FLA (10 million at 50% of FLA)
- C. Toggle Switch – Single-pole, double-throw HOA switch. 20 A, 1 hp
- D. Controls Circuit Breaker – 10 A, OFF/ON switch. Single-pole 120 V. DIN rail mounting with thermal magnetic tripping characteristics
- E. Pump Circuit Breaker – 20 A, OFF/ON switch. Single-pole 120 V or double-pole 240 V. DIN rail mounting with thermal magnetic tripping characteristics
- F. Audible Alarm – 95 dB at 24 in, warble-tone sound
- G. Visual Alarm – 7/8-in diameter red lens, “Push-to-silence” UL Type 4X rated, 1 W LED light, 120 V
- H. Panel Enclosure – UL Type 4X rated. Constructed of UV-resistant fiberglass; Stainless steel hinges and latch system w/conduit couplings provided
- I. Dual-Mode Operation – Programable for timed and demand dosing

### 2.3 LEVEL FLOAT SWITCHES

- A. Level Float Switch shall be suitable for use in raw wastewater environment.
- B. Must be wired to work in either normally open or normally closed applications (Single Pole, Double Throw).
- C. Mechanically-activated, snap action contacts.
- D. High impact, corrosion resistant, polypropylene float housing.
- E. Not sensitive to rotation.

- F. Control differential of 1.5 inches (4 cm) above or below horizontal.
- G. Green colored cap for easy identification of SPDT control switch.
- H. UL Listed for use in water and sewage.
- I. CSA Certified.
- J. Three-year limited warranty.
- K. Provide an external weight on cord for switch to be suspended from bracket above water level.

## 2.4 SCHEDULE 40 PVC CONDUIT

- A. Electrical conduit shall be PVC Schedule 40 pipe rated for use with 90° C conductors, ETL Listed to UL 651 or approved equal. Material shall comply with NEMA Specification TC-2 (Conduit), TC-3 (Fittings) and UL 651 (Conduit) and 514b (Fittings).
- B. Conduit and fittings shall carry a ETL label or printline (Conduit – on each 10 foot length; Fittings – stamped or molded on each fitting).
- C. Conduit and fittings shall be identified for type and manufacturer and shall be traceable to location of plant and date of manufacture. The markings shall be legible and permanent.
- D. The Conduit shall be made from polyvinyl chloride compound (recognized by ETL) which includes inert modifiers to improve weatherability and heat distortion. Clean rework material, generated by the manufacturer's own conduit production, may be used by the same manufacturer, provided the end products meet the requirements of this specification.
- E. The conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections which could mar conductors or cables.
- F. Conduit shall be gray in color, unless otherwise agreed upon by both parties and any regulatory or inspection agency involved.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Contractor and their personnel shall be experienced, thoroughly trained and completely familiar with control systems equipment, devices, materials, etc. and the required methods of installation.
- B. The installation shall be done in a neat and workmanlike manner and shall be suitable for the location, in accordance with the requirements listed elsewhere in these documents.

### 3.2 EQUIPMENT AND DEVICES

- A. Follow manufacturer's installation details wherever available. Provide mountings, wiring or fittings required, standard or special.
- B. The Contractor shall touch-up paint all scratched, marred or damaged factory finish on equipment, devices, enclosures, etc.

### 3.3 SUPPORTS

- A. Provide all necessary supports, anchors, fasteners, and backing for all components, equipment and devices.

### 3.4 START-UP

- A. The Contractor shall start up and test all equipment for functional operation, including all intended.

### 3.5 CALIBRATION

- A. The CO's decisions shall be final regarding the acceptability and completeness of the installation and associated calibration.

### 3.6 FIELD TESTS

- A. Normal Operation Test
  - 1. Test the control system to demonstrate normal operation.

END OF SECTION

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**DIVISION 31**  
**EARTHWORK**

## SECTION 31 05 16

### AGGREGATES FOR EARTHWORK

#### PART 1 – GENERAL

##### 1.1 SUMMARY

- A. Scope: Provide and install aggregate materials of the types and sizes noted in this section where required by applicable codes, good standard engineering practice, and the approved site design.
- B. Section Includes:
  - 1. Coarse aggregate materials and fine aggregate materials for use throughout the site as indicated on plans.
- C. Related Sections:
  - 1. Section 31 23 33 – Utility Excavation & Backfill.

##### 1.2 REFERENCES

- A. American Society for Testing and Materials:
  - 1. ASTM C 88-13 - A Standard Test method for soundness of aggregates by use of sodium sulfate or magnesium sulfate.
  - 2. ASTM D422-63(2007) - A Standard Test method used for gradation analysis.
  - 3. ASTM D4318-10e1 – A Standard Test method used for determination of plasticity index.

##### 1.3 SUBMITTALS

- A. Submittals shall meet the requirements under Section 01 33 23 – “Submittal Procedures.”
- B. Samples to be visually confirmed by Contracting Officer prior to verification testing.
  - 1. Pipe Zone Material (Bedding): Fifty to sixty pounds (50 – 60 lb) (Two Samples).
  - 2. Trench Backfill Class B: Fifty to sixty pounds (50 – 60 lb) (Two Samples).
  - 3. Structure Backfill: Fifty to sixty pounds (50 – 60 lb) (Two Samples).

C. Quality Control Submittals:

1. Pipe Zone Material (Bedding): Name and location of source, stockpile number, and sieve test results.
2. Trench Backfill: Name and location of source, stockpile number, and sieve test results.
3. Structural Backfill: Name and location of source, stockpile number, and sieve test results.
4. Other Aggregates: Name and location of source, stockpile number, and applicable test results.
5. Excavation Procedure: Submit a lay out drawing or detailed outline of intended excavation procedure for Contracting Officer's information. This submittal will not relieve the Contractor of responsibility for the successful performance of intended excavation methods.

1.4 QUALITY ASSURANCE

- A. Furnish each aggregate material from single source throughout the Work.

PART 2 - PRODUCTS

2.1 GENERAL

- A. All aggregate and backfill material shall be approved and certified weed free, before use and be free of cinders, ashes, ice, frozen soil, large hard clods, organic debris, or other deleterious items.

2.2 AGGREGATE MATERIALS (FLEXIBLE PIPE)

- A. Pipe Zone Material (Bedding): Pipe Zone Material (Bedding) shall be crushed rock including sand. Material shall be uniformly graded from coarse to fine. The material must comply with the grading requirements for the sieve sizes shown in the following table:

Pipe Zone Material Grading

Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	55-75
1/4"	40-60
No. 10	*

\*of the fraction passing the 1/4" sieve, 40 – 60 percent shall pass the No. 10 sieve

- B. Trench Backfill Class A: Native or common material that, in the opinion of the Contracting Officer, meets the characteristics required for the specific surface loading or other criteria of the backfill Zone.

- C. Trench Backfill Class B: Granular material consisting of gravel or crushed rock meeting the requirements for the sieve sizes shown in the following table:

Aggregate Grading

Sieve size	Percentage passing	
	Class B	
	1"	3/4"
1-1/2"	100	-
1"	90-100	100
3/4"	-	90-100
1/2"	55-75	-
3/8"	-	55-75
1/4"	40-55	40-60
No. 10	*	*

\*of the fraction passing the 1/4" sieve, 40 – 60 percent shall pass the No. 10 sieve

### 2.3 AGGREGATE MATERIALS (SEPTIC TANK)

- A. Bedding: Bedding material shall be primarily sand and gravel, having a plasticity index less than 6. Gradation shall limit the amount passing the No. 200 sieve to 10 percent maximum. Bedding material must comply with the grading requirements for the sieve sizes shown in the following table:

Bedding Grading

Sieve Size	Percent Passing
1 1/2"	99-100
1"	75-100
5/8"	50-100
No. 4	20-80
No. 40	3-4
No. 200	10 Max
Sand Equivalent	35 Min

- B. Primary Backfill: Primary backfill must be clean, free flowing, and free of dirt, sand, large rocks, roots, organic materials, debris, ice and snow and consist of one of the following:
1. Course aggregate – Rounded Stone
  2. Course aggregate – Crushed Stone

Aggregate must comply with the grading requirements for the sieve sizes shown in the following table:

Rounded Stone			
ASTM C 33 Size #	#6 Stone	#67 Stone	#7 Stone
1" (25 mm)	100	100	-
3/4" (19 mm)	90-100	90-100	100
1/2" (12.5 mm)	10 - 55	-	90 - 100
3/8" (9.5 mm)	0 - 15	20 - 55	40 - 70
No. 4 .0187" (4.75 mm)	0 - 5	0 - 10	0 - 15
No. 8 .094" (2.36 mm)	-	0 - 5	0 - 5

Crushed Stone		
ASTM C 33 Size #	#7 Stone	#8 Stone
1" (25 mm)	-	-
3/4" (19 mm)	100	-
1/2" (12.5 mm)	90 - 100	100
3/8" (9.5 mm)	40 - 70	85 - 100
No. 4 .0187" (4.75 mm)	0 - 15	10 - 30
No. 8 .094" (2.36 mm)	0 - 5	0 - 10

- C. Secondary Backfill: Secondary Backfill shall consist of granular material, either naturally occurring or processed (native material shall be used as available and appropriate prior to importing material), and shall be free draining and meet the following requirements for grading and quality:

Sieve Size	Percent Passing
6"	75 - 100
3"	100
No. 40	50 max
No. 200	10 max
Sand Equivalent	30 min

## 2.4 SOURCE QUALITY CONTROL

- A. All Aggregates shall be from a borrow pit approved by the Contracting Officer.

## PART 3 - EXECUTION

### 3.1 EXCAVATION

- A. Stockpile excavated material meeting requirements for aggregate materials.
- B. Remove excess excavated materials not intended for reuse from site.
- C. Place aggregate at locations as described on the contact plans.

### 3.2 STOCKPILING

- A. Stockpile materials at locations designated by Contracting Officer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

### 3.3 STOCKPILE CLEANUP

- A. Remove stockpile; leave area in clean and neat condition. Grade site surface to prevent Free-standing surface water.

END OF SECTION

## SECTION 31 10 00

### SITE CLEARING

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The work of this Section includes clearing and grubbing, topsoil removal, and storage.

##### 1.2 SUBMITTALS

- A. Certifications and Testing consistent with Submittals – Section 01 33 23.

#### PART 2 PRODUCTS (not used)

#### PART 3 - EXECUTION

##### 3.1 PREPARATION

###### A. Protection

1. Provide barricades, coverings, and other protection necessary to prevent damage to existing improvements.
2. Protect improvements on Park property.
3. Protect existing trees.
  - a. Do not smother trees by stockpiling construction materials or excavated materials within drip line.
  - b. Avoid foot or vehicular traffic or Parking of vehicles within drip line.
  - c. Provide temporary protection as required to prevent damage to trees.
  - d. Do not remove, injure, or destroy trees or other plants without prior approval from Contracting Officer.
4. Provide earth cover as soon as possible.
5. Repair or replace vegetation damaged by construction operations.
  - a. Repair to be performed by a qualified arborist.
6. Repairs or replacements are to be completed in a manner acceptable to Contracting Officer at no additional expense to Government.

###### B. Clearing and Grubbing

1. Do not clear and grub without prior approval from Contracting Officer.
2. Clear from surface of existing ground all trees, shrubs and other plant life marked for removal.
3. Grub (remove) all debris encountered within limits of construction.

4. In cut areas, totally grub.
    - a. In fill areas, where fill is less than three (3) feet totally grub ground.
    - b. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated. Place fill material in horizontal layers not exceeding six (6) inches loose depth, and thoroughly compact to a density equal to adjacent original ground.
  5. Timber Harvest
    - a. Trees removed during the clearing process shall be salvaged and hauled to burn road within park for storage. Contractor shall consult with COR for haul routing and storage location.
- C. Soil
1. Carefully strip native topsoil to whatever depths encountered, in manner to prevent intermingling with underlying subsoil or objectionable material.
- D. Disposal of waste materials
1. Burning materials on-site is prohibited.
  2. Remove all waste materials from site.

END OF SECTION

## SECTION 31 23 33

### UTILITY EXCAVATION & BACKFILL

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The work of this section includes trenching, excavation and backfill for the construction and installation of utility lines, buried tanks and pressurized distribution drainfield. All utility line installation shall be open cut.

##### 1.2 REFERENCES

- A. ANSI D6.1-94 - Manual on Uniform Traffic Control Devices for Streets and Highways.
- B. ASTM D422-63 - Standard Test Method for Particle-Size Analysis of Soils.
- C. ASTM D698-91 - Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft).
- D. ASTM D1556-90e1 - Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
- E. ASTM D2922-96e1 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
- F. ASTM D3017-96e1 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- G. ASTM D4253-93 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table.
- H. ASTM D4254-91 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density.
- A. ASTM D4318 - Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
- J. ASTM D4533 - Standard Test Method for Trapezoidal Tearing Strength of Geotextiles.
- K. ASTM D4632 - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles.
- L. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile.
- M. 29 CFR 1910 - OSHA, Occupational Safety and Health Standards.

N. 29 CFR 1926 - OSHA, Safety and Health Regulations for Construction.

### 1.3 SUBMITTALS

- A. As specified in Section 01 33 23 “Submittal Procedures”.
- B. Written procedure for trench/excavation dewatering and disposal of fluidized materials removed.
- C. Written description of barricading, shoring, cribbing, bracing, and sloping precautions.
- D. Provide results of analysis for bedding and select backfill gradation and plasticity index prior to use of these materials on the project. This initial submittal will not preclude requirement for in- place tests.

### 1.4 PROJECT CONDITIONS

- A. Arrange construction sequences to provide the shortest practical time that the trenches will be open to avoid hazard to the public, and to minimize the possibility of trench collapse.

### 1.5 EXCAVATION CLASSIFICATION

- A. Regardless of the nature of material excavated, all excavation will be considered unclassified.

### 1.6 PRESERVATION OF NATURAL FEATURES

- A. Section 02 05 00 “General Site Construction Requirements”

### 1.7 HAND EXCAVATION

- A. Contracting Officer will direct the performance of hand excavation if any, within areas that are considered as sensitive by the NPS.

### 1.8 GROUNDWATER

- A. Based on site soil excavation/observations, groundwater may be encountered on this project. However, the Contractor shall be responsible for the control, removal, and disposal of any groundwater that may be encountered in the course of excavating and backfilling trenches, placing pipe, or constructing any other improvements associated with this project.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. All backfill material shall be approved and certified weed free, before use and be free of cinders, ashes, ice, frozen soil, large hard clods, organic debris, or other deleterious items. Trench excavation materials may be used as approved.

## 2.2 BACKFILL MATERIAL

- A. Bedding material shall comply with Section 31 05 16 “Aggregates for Earthwork,” subsection 2.2.A, Pipe Zone Material (Bedding).
- B. Excavated trench material may be used as trench backfill when approved by Contracting Officer. Where native material is deemed unsuitable, import backfill material shall comply with Section 31 05 16 “Aggregates for Earthwork,” subsection 2.2.C, Trench Backfill Class B. In areas where the utility trench is located within the existing roadway corridor, final trench restoration shall be completed in accordance with the project plans.
- C. Furnish required bedding and backfill materials as indicated in the Drawings and provided in other sub-sections to which this work relates.

## 2.3 UTILITY LINE MARKING

- A. All utilities shall be marked for location and identified by marking tapes, as specified in Section 33 05 26 “Utility Line Identification Marking.”

## PART 3 - EXECUTION

### 3.1 EXISTING UTILITIES

- A. Care is to be taken while excavating adjacent to existing utilities. Hand excavation work is required for making connections to existing utilities.

### 3.2 FIELD QUALITY CONTROL

- A. Testing required to determine compliance for the work of this section shall be the responsibility of the Contractor, at no additional expense to the Government.
- B. ASTM D698-91 shall be used to determine maximum density and ASTM D1556-90 or ASTM D2922-96 shall be used to determine in-place density.
- C. The Contractor shall perform at least two (2) tests on placed backfill material. Additional testing may be required at the discretion of the Contracting Officer.

### 3.3 TRENCH EXCAVATION

- A. Excavation for pipe shall be in open cut. The trench shall be as wide as necessary for sheeting and bracing and the proper performance of the work up to the maximum width permitted by

the typical cross-sections shown on the Drawings. The sides of the trenches shall be near vertical. The bottom of the trench shall be constructed to the grades and shapes indicated on the Drawings. Should the Contractor desire to use other equivalent methods, he shall submit his method of construction to the Contracting Officer for approval prior to its use.

- B. Take care not to over excavate. Accurately grade the bottom of the trenches to provide uniform bearing and support for each section of the pipe at every point along its entire length, except for the portion of the pipe sections where it is necessary to excavate for bell holes and for the proper sealing of pipe joints, and as hereinafter specified. Dig bell holes and depressions for joints after the trench bottom has been graded, and, in order that the pipe rest on the bedding for as nearly its full length as practicable, bell holes and depressions shall be only of such length, depth and width as required for properly making the joint. Remove stones as necessary to avoid point bearing.
  - 1. Rocky Trench Bottom: Where ledge rock, hard pan, boulders, or sharp-edged materials are encountered, over-excavate a minimum depth of six (6) inches below the bottom of the utility exterior wall to permit adequate bedding preparation. The installed utility shall have at least 6 inches of clearance from any rock protrusion.
- C. Backfill and compact over excavations to ninety five (95) percent relative compaction with bedding material. There shall be no additional payment to the Contractor for over excavations not directed by the Contracting Officer. Remove unsatisfactory material encountered below the grades shown as directed by the Contracting Officer and replace with bedding material. Payment for removal and replacement of such unsatisfactory material directed by the Contracting Officer shall be made in accordance with the provisions of the General Conditions.
- D. Grade trenches so that they are uniformly sloped between the pipe elevations shown on the Drawings. Comply with the minimum and maximum trench widths shown on the Drawings. Notify the Contracting Officer if the trench width exceeds the maximum allowable width for any reason.
- E. Open Trench Limitations: The Contracting Officer shall have the authority to limit the amount of trench to be opened or left open at any one time. An open trench shall be defined as any trench which has not been completely backfilled and satisfactorily compacted.
- F. Provide ladders for access to the trench by construction and inspection personnel.

### 3.4 SHORING AND SHEETING

- A. Construct and maintain all shoring, sheeting, and slope lay-back necessary to protect the excavation, as needed for the safety of the employees and as required by applicable State and Federal laws.
- B. For trenches over five (5) feet deep, provide suitable barricades for worker protection. When work area is left open and unattended by Contractor, provide suitable barricades for public safety, regardless of trench depth.
- C. For trenches over four (4) feet deep, provide suitable exit means in accordance with applicable provisions of OSHA.

- D. Do not remove timber or sheeting if it is in a compacted zone. Instead, trim it off at a safe level above that zone.
- E. As directed, remove all other sheeting and shoring when safe to do so.

### 3.5 BACKFILLING

- A. Compaction:
  - 1. Use vibratory compactors for sand and gravel (non-cohesive soils).
  - 2. Use mechanical tampers for sand and gravel containing a significant portion of fine-grained material, such as silt and clay (cohesive soils).
  - 3. Hand tamp around pipe or cable to protect the lines until adequate cushion is attained.
  - 4. Puddling or water flooding for consolidation of backfill or compaction by wheel rolling with construction equipment will not be permitted.
- B. Bedding: Compact the Bedding material to ninety five (95) percent of maximum density, at a moisture content determined to be suitable for such density. See part D below for additional details.
- C. Utility Installation: Shape the trench bottom to ensure uniform contact with the full length of the installed line and remove any sharp-edged materials that might damage the line. Compaction shall be maintained beneath the line.
- D. Trench Backfill Class B: Fill by hand placement around the utility to just over half depth, and compact in a manner to ensure against lateral or vertical displacement. Place backfill to six (6) inches above the utility line by hand placement in not more than six (6) inch layers. Compact each layer to ninety-five (95) percent of maximum density, at a moisture content determined to be suitable for such density.
- E. Backfill: Place and compact the specified material as follows:
  - 1. Vehicular Traffic Areas: Fill and compact in six (6) inch maximum loose layers to ninety five (95) percent of maximum density, at moisture content determined to be suitable for such density.
  - 2. Pedestrian Natural Terrain Areas: Fill and compact in six (6) inch maximum layers to ninety five (95) percent of maximum density, at moisture content determined to be suitable for such density.
  - 3. If the Contracting Officer determines that the nature of the ground in which the trench lies precludes compaction of the backfill to the specified density, the backfill shall be compacted to the maximum practicable density.

### 3.6 SURFACE FINISH WORK

- A. Open and Seeded Areas: Grade all disturbed areas to a finish ordinarily obtained from a blade grader, with no abrupt changes in grade or irregularities that will hold water.
- B. Drainage Ditches: Restore drainage ditches to appropriate line and grade, using approved surface erosion prevention techniques.

- C. Concrete, Pavement and Gravel Areas: Restore areas to as good or better condition. Provide cutback for trenches.
- D. Clean-Up: Prior to final inspection and acceptance, remove all rubbish and excess material for disposal as approved, and leave area in a neat, satisfactory condition.

END OF SECTION

## SECTION 31 23 33.10

### RESTORATION OF SURFACES

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The work covered by this Section includes restoration to all types of surfaces disturbed, damaged or destroyed during the performance of the work under or as a result of the operations of the contract.

##### 1.2 RELATED SECTIONS

- A. Utility Excavation & Backfill – Section 31 23 33

##### 1.3 SCHEDULE OF RESTORATION

- A. A schedule of restoration operations shall be submitted by the Contractor for review.
  - 1. After an accepted schedule has been agreed upon it shall be adhered to unless otherwise revised with the approval of the Contracting Officer.
- B. The replacement of surfaces at any time, as scheduled or as directed, shall not relieve the Contractor of responsibility to repair damages by settlement or other failures.

#### PART 2 - PRODUCTS - NOT USED.

#### PART 3 - EXECUTION

##### 3.1 GENERAL

- A. The quality of materials and the performance of work used in the restoration shall produce a surface or feature equal to or better than the condition of each before the work began.

##### 3.2 NATIVE UNDEVELOPED AREAS

- A. All native undeveloped areas disturbed shall be replaced with material to match the existing surface unless otherwise specified.
  - 1. The depth of the soil, stone or gravel shall be at least equal to the existing.
  - 2. After compaction the surface shall conform to the slope and grade of the area being replaced.

### 3.3 OTHER TYPES OF RESTORATION

- A. Watercourses shall be reshaped to the original grade and cross-section and all debris removed. Where required to prevent erosion, the bottom and sides of the watercourse shall be protected.
- B. Flow lines indicated on the topographical survey shall not be altered by construction activity. The Contractor is responsible for re-establishing flow lines that have been affected by construction equipment or personnel under the supervision of the Contractor.
- C. Trails and slopes shall be restored to their original condition upon completion of construction activity at a given area. The Contractor must ensure that no new channel flow lines or watercourses have been created as a result of construction activity.
- D. Gravel/paved oadways shall be shaped to the original grade and cross-section and all debris removed. Utility trench sections within the existing roadway corridor shall be repaired in accordance with the project plans and applicable specifications.

END OF SECTION

## SECTION 31 25 00.10

### WATERING

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The work of this Section includes furnishing, hauling, and applying water required for compaction of embankments, backfills, subgrade, base course, dust control, and other construction operations.

##### 1.2 RELATED REQUIREMENTS

- A. Water availability: Temporary Services – Section 01 50 00 “Temporary Facilities & Controls.”

#### PART 2 - PRODUCTS

##### 2.1 WATER

- A. Free of debris, organic matter, and other objectionable substances.

#### PART 3 - EXECUTION

##### 3.1 WATER TRUCK

- A. At least one thousand (1,000) gallon capacity.
- B. Keep at least one water truck on site at all times, unless Contracting Officer approves removal of the truck from the site before final completion.

##### 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 shall not cause erosion of surrounding natural terrain surfaces adjacent to work during watering operations.
- D. The Contractor may water excavation areas before excavating. Drill full depth of excavation to make moisture determinations.
- E. If over watering occurs, de-water at no additional expense to the Government.

END OF SECTION

**DIVISION 33**  
**UTILITIES**

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## SECTION 33 00 00

### PIPE & PIPE FITTINGS: GENERAL STATEMENT

#### PART 1 - GENERAL

##### 1.1 DESCRIPTION

- A. The work in this Section includes utility piping systems, plumbing piping systems, pipe pressure testing, and pipe cleaning.

##### 1.2 RELATED SECTIONS

- A. Sanitary Sewer Pipe - Section 33 31 00

##### 1.3 REFERENCES

- A. American National Standards Institute (ANSI)
  - 1. B16.5, Pipe Flanges and Flanged Fittings
- B. American Society for Testing and Materials (ASTM)
  - 1. C76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
  - 2. C361, Standard Specification for Reinforced Concrete Low Head Pressure Pipe
  - 3. C443, Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets
  - 4. C564, Rubber Gaskets for Cast Iron Soil Pipe and Fittings
  - 5. D1248, Polyethylene Plastics Molding and Extension Materials
  - 6. D1785, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120
  - 7. D2241, Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
  - 8. D2466, Socket Type PVC Plastic Pipe Fittings, Schedule 40
  - 9. D2467, Standard Specification for Socket-Type Poly (Vinyl Chloride)
  - 10. D2997, Standard Specification for Centrifugally Cast Thermosetting Plastic Pipe
  - 11. D3034, Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
  - 12. D3350–Continuous Outdoor Use (UV)
  - 13. D4101, Polypropylene Plastic Injection and Extrusion Materials
  - 14. F1417, Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air
  - 15. F438, Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
  - 16. F439, Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedule 80
  - 17. F441, Standard Specification for Chlorinated Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40 and 80
  - 18. F679, Standard Specifications for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings

19. F794, Standard Specification for Poly (Vinyl Chloride) (PVC) Rubber Gravity Sewer Pipe and Fittings based on Controlled Inside Diameter
  20. F1417, Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low Pressure Air
  21. F2164, Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure.
  22. F2206 -- Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock
- C. American Water Works Association (AWWA)
1. C104, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
  2. C110, Ductile Iron and Gray Iron Fittings, three (3) inch through forty-eight (48) inch for Water and Other Liquids.
  3. C111, Rubber Gasket Joints for Ductile Iron and Gray Iron Pressure Pipe and Fitting
  4. C115, Flanged Ductile Iron Pipe with Threaded Flanges
  5. C151, Ductile Iron Pipe, Centrifugally Cast, in Metal Molds or Sand-Lined Molds for Water or Other Liquids
  6. C153/A21.53 -- American National Standard for Ductile-Iron Compact Fittings, three (3) inch through twenty-four (24) inch and fifty-four (54) inch through sixty-four (64) inch, for Water Service.
  7. C205, Cement Mortar Lining and Coating for Steel Water Pipe four (4) inch and Larger, Shop Applied
  8. C207, Steel Pipe Flanges for Waterworks Service – Sizes four (4) inch through one hundred forty-four (144) inch
  9. C208, Dimensions for Fabricated Steel Water Pipe Fittings
  10. C210, Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines
  11. C600-99, Installation of Ductile-Iron Water Mains and Their Appurtenances
  12. C605-94, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
  13. C606, Grooved and Shouldered Joints
  14. C651, Disinfection of Water Mains
  15. C900, Polyvinyl Chloride (PVC) Pressure Pipe four (4) inch through twelve (12) inch for Water
  16. C905, Polyvinyl Chloride (PVC) Water Transmission Pipe, Nominal Diameters fourteen (14) inch through thirty-six (36) inch
  17. C906 – Polyethelene (PE) Pressure Pipes and Fitting (Revised to Incorporate PE4710)
- D. Plastic Pipe Institute – Handbook of PE Pipe, 2<sup>nd</sup> Edition.
1. To include Technical Reports and Technical Notes  
[http://www.plasticpipe.org/publications/pe\\_handbook.html](http://www.plasticpipe.org/publications/pe_handbook.html)
    - i. Technical Notes #46, “Guidance for Field Hydrostatic Testing of High Density Polyethylene Pressure Pipelines: Owner’s Considerations, Planning, Procedures, and Checklists TN-46/2013”.
- E. National Electric Manufacturer’s Association (NEMA)
1. ICS6, Enclosures for Industrial Controls and Systems

F. National Fire Protection Association (NFPA)

1. 54, National Fuel Gas Code

1.4 SUBMITTALS

A. Shop Drawings consistent with Submittals – Section 01 33 23 and including:

1. Schedule showing pipe type, size, schedule of pipe, appurtenances, type of linings and coatings, cathodic protection.
2. Copies of any manufacturer's written directions regarding material handling, delivery, storage and installation
3. Technical product data on piping appurtenances

B. Certifications and Testing consistent with Contractor Quality Control – Section 01 40 00 and including:

1. Certification that products used meet standards referenced
2. Notification of time and date of piping pressure tests
3. Copies of pressure test results on all piping systems, using the forms at the end of this Section

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect pipe coating during handling using methods recommended by manufacturer. Use of bare cables, chains, hooks, metal bars or narrow skids in contact with coated pipe is not permitted.
- B. Prevent damage to pipe during transit. Repair abrasions, scars, and blemishes. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Furnish piping, fittings and appurtenances in accordance with the Contract Documents.
- B. Pipe sizes indicated are nominal inside diameter.
- C. Use straight, round pipe.
- D. For temporary piping not specifically addressed in Piping Schedule, utilize materials, joints and fittings equal to those specified for similar applications of permanent construction.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Prior to installation, inspect and verify condition of piping and appurtenances. Installation constitutes installer's acceptance of product condition for satisfactory installation.

### 3.2 PREPARATION

- A. Correct defects or conditions which may interfere with or prevent a satisfactory installation.

### 3.3 EXTERIOR PIPING ERECTION/INSTALLATION/APPLICATION

- A. Unless otherwise shown on the Drawings, provide a minimum of thirty (30) inches earth cover over exterior buried piping systems and appurtenances conveying water, fluids, or solutions subject to freezing.
- B. Laying Pipe in Trench
  1. Excavate and backfill trench in accordance with Utility Excavation & Backfill – Section 31 23 33.
  2. Clean each pipe length thoroughly and inspect for compliance to Specifications.
  3. Grade trench bottom and excavate for pipe bell and lay pipe on trench bottom or bedding material.
  4. Provide gasket or joint material according to manufacturer's directions after joints have been thoroughly cleaned and examined.
  5. Except for first two (2) joints, before making final connections of joints, two (2) full sections of pipe shall have been previously installed with earth tamped alongside of pipe of final bedding material placed.
  6. Lay pipe in only suitable weather with good trench conditions. Never lay pipe in water except where approved by Contracting Officer.
- C. Lining-up Push-on Joint Piping
  1. Lay piping on route lines shown on Drawings.
  2. Deflect from straight alignments or grades by vertical or horizontal curves.
  3. Maximum offset between extended centerlines of any two (2) adjacent pipe lengths is in strict accordance with the pipe manufacturers published literature on deflections and offsets.
  4. Provide special bends when specified or where required alignment exceeds allowable deflections stipulated.
  5. Provide shorter lengths of pipe in such length and number that angular deflection of any joint, as represented by specified maximum deflection, is not exceeded.
- D. Anchorage and Blocking
  1. Provide reaction blocking, anchors, joint harnesses, or other acceptable means for preventing movement of piping caused by forces at buried or exposed piping tees, wye branches, plugs, or bends.

2. Size thrust block as detailed on the Drawings.
3. Place concrete blocking so that it extends from fitting into solid undisturbed earth wall. Concrete blocks shall not cover pipe joints.
4. Provide bearing area of concrete in accordance with details on Drawings.
5. Provide insulating components where dissimilar metals are joined together.

### 3.4 CONNECTIONS WITH EXISTING PIPING

- A. Where connection between new work and existing work is made, use suitable and proper fittings to suit conditions encountered.
- B. Perform connections with existing piping at time and under conditions which will least interfere with service to those affected by such operation.
- C. Undertake connections in fashion which will disturb existing system as little as possible.
- D. Utilize suitable equipment and facilities to dewater, drain, and dispose of liquid removed without damage to adjacent property.
- E. Where connections to existing systems necessitate employment of past installation methods not currently part of trade practice, utilize necessary special piping components.

### 3.5 FIELD QUALITY CONTROL

#### A. General

1. Utilize pressures, media, and pressure test durations as specified on Piping Schedules and provided under project specifications for applicable pipe material.
2. Isolate equipment which may be damaged by the specified pressure test conditions.
3. Perform pressure test using calibrated pressure gauges and calibrated volumetric measuring equipment to determine leakage rates. Select each gauge so that the specified test pressure falls within the upper half of the gauge's range. Notify Contracting Officer twenty-four (24) hours prior to each test.
4. Completely assemble and test new piping systems prior to connection to existing pipe systems.
5. Acknowledge satisfactory performance of test and inspections in writing to Contracting Officer prior to final acceptance.
6. Provide all necessary equipment and perform all work required in connection with the test and inspections.
7. Bear the cost of all testing and inspecting, locating and remedying of leaks and any necessary retesting and reexamination.

### 3.6 CLEANING AND DISINFECTION

#### A. Cleaning

1. Clean interior of piping systems thoroughly before installing.
2. Maintain pipe in clean condition during installation.

3. Before joining piping, thoroughly clean and wipe joint contact surfaces and then properly dress and make joint.
4. Immediately prior to pressure testing, clean and remove grease, metal cuttings, dirt, or other foreign materials which may have entered the system.
5. At completion of work and prior to final acceptance, thoroughly clean work installed under these specifications. Clean equipment, fixtures, pipe, valves, and fittings of grease, metal cuttings, and sludge which may have accumulated by operation of system, from testing, or from other causes. Repair any stoppage of discoloration or other damage to parts of building, its finish, or furnishings, due to failure to properly clean piping system, without cost to the Government.

END OF SECTION

## SECTION 33 05 26

### UTILITY LINE IDENTIFICATION MARKING

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The work of this Section includes furnishing and installing utility line marking tape in the sanitary sewer utility trench.

##### 1.2 SUBMITTALS

- A. As specified in Submittals “Section 01 33 23.”
- B. Samples: twenty-four inch (24”) strips of tape.
- C. Certification that the materials used in the tape fabrication meet the requirements of this Section.

#### PART 2 - PRODUCTS

##### 2.1 MARKING TAPE

- A. Capable of being inductively detected electronically.
- B. Construction: Two (2) layers of impervious plastic film not less than four inches (4”) wide. Total thickness of tape shall not be less than 0.005 inch (five (5) millimeters) plus or minus ten percent (10%) manufacturing tolerances.
  - 1. Film: Inert plastic. Each film layer shall be not less than 0.0005 inch thick (one half (0.5) millimeters).
  - 2. Adhesive: Compatible with foil and film.
- C. Imprint: One inch (1”) or larger bold black letters.
- D. Legend: Identify buried utility line tape with imprint such as “CAUTION: SANITARY SEWER LINE BELOW.” Repeat identification at approximately twenty-four inch (24”) intervals.

E. Background Color: APWA color code and as specified below:

Color	Utility
Safety Red	Electric
High Visibility Safety Yellow	Gas, Oil, Steam, Dangerous Materials
Safety Alert Orange	Telephone, Communications, Cable Television
Safety Precaution Blue	Water System, Irrigation
Safety Green	Sanitary Sewer, Storm Sewer
Safety Brown	Force Mains, Reclaimed Water, and Effluent Lines

F. Manufacturer: Lineguard, Inc., Wheaton, Illinois; Reef Industries, Inc., Houston, Texas; Thor Enterprises, Inc., Sun Prairie, Wisconsin; or approved equal.

### PART 3- EXECUTION

#### 3.1 MARKING TAPE

A. Install tape in backfill directly over each buried utility line as shown. Place tape during final backfilling. Bury tape approximately twelve (12) inches above the crown of the pipe.

END OF SECTION

## SECTION 33 31 13

### SANITARY SEWER PIPE

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing PVC sanitary sewer pipe, in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the CONTRACTING OFFICER.
- B. This WORK includes furnishings and installing connecting bands, branch connections, elbows or other fittings, and all appurtenances required to complete the sanitary sewer.

##### 1.2 SUBMITTALS

- A. Sanitary Sewer Pipe: Material certifications stating conformance with the requirements of this Section.

#### PART 2 - PRODUCTS

##### 2.1 PVC PRESSURE PIPE (FORCE MAIN)

- A. PVC pressure pipe shall conform to the applicable requirements of Oregon Administrative Rules (OAR) 340-073-0060. PVC pressure transport pipe, pressure manifolds and pressure laterals and fittings must meet or exceed the current requirements for Class 160 PVC 1120 pressure pipe as identified in ASTM Specification D 2241. The pipe and fittings must be marked as required by ASTM Specification D 2241. For pipe diameters of 1 inch or less, the minimum pressure rating is 200 pounds per square inch (psi). For pipe diameters greater than 1 inch, the minimum pressure rating is 160 psi.

##### 2.2 PVC GRAVITY PIPE AND FITTINGS

- A. Pipe and fittings shall be manufactured from virgin rigid PVC (polyvinyl chloride) vinyl compounds with a cell classification of 12364 as identified in ASTM D 1784.

PVC SDR 35 pipe shall conform to ASTM D 3034 for gasket or solvent-weld pipe with a minimum pipe stiffness of 46. Gaskets shall conform to ASTM F 477.

#### PART 3- EXECUTION

##### 3.1 CONSTRUCTION

- A. Bedding and backfill shall conform to the requirements of Utility Trenching and Backfill.
- B. Sheeting and bracing required for trenches shall meet OSHA requirements.
- C. Before lowering into the trench; the pipe shall be inspected for defects. All cracked, chipped, or broken pipe shall be discarded. The ends and interior of the pipe shall be clean. Belled ends shall be laid upgrade. Handling of the pipe shall be accomplished in a manner that will not damage the pipe. The joint shall be made in the manner recommended by the manufacturer. Care shall be taken not to buckle or disturb previously laid pipe.
- D. Pipe shall be laid accurately to the line and grade.
- E. Pipe shall be cleaned of all foreign matter, and water shall be kept out of trenches until joints have been completed. When WORK is not in progress, open ends of pipe and fittings shall be securely closed to keep foreign matter and animals from entering.
- F. Each joint shall be inspected to ensure that it is properly made before backfilling is done. Care shall be taken to prevent any dirt or foreign matter from entering the open end of the pipe. Where it is necessary to cut pipe, such cuts shall be neatly made in an approved manner. The laid pipe shall be true to line and grade and, when completed, the sewer shall have a smooth and uniform invert. No section of gravity sewer, including service connections shall have an adverse grade which would pond water in the invert of the sewer.
- G. Pressure test gravity pipe using a low-pressure air test in accordance with ASTM F1417.
- H. Pressure test pressure rated pipe to 200 psi. Repair leaks and re-test
  - 1. Coordinate all pipe installation and testing with ODEQ to ensure all inspection and testing requirements are met.
  - 2. After completion of pipeline installation, including backfill, but prior to final connection to existing system, conduct hydrostatic pressure and leakage test in accordance with AWWA C600.
  - 3. Provide equipment required to perform leakage and hydrostatic pressure tests.
  - 4. No pipeline will be approved when pressure test varies by more than 5 psi at completion of hydrostatic pressure test.
  - 5. Before applying test pressure, completely expel air from section of piping under test. Provide corporation cocks so air can be expelled as pipeline is filled with water. After air has been expelled, close corporation cocks and apply test pressure. At conclusion of tests, remove corporation cocks and plug resulting piping openings.
  - 6. No pipeline installation will be approved when leakage is greater than that determined by the following formula:
    - $L = (SD\sqrt{P})/133,200$  where:
    - L = Allowable leakage in gallons per hour
    - S = Length of pipe tested in inches
    - D = Nominal diameter of pipe in inches
    - P = Average test pressure in pounds per square inch (gauge)
- I. Connections to existing sewer mains shall be made so that no projections or rough surfaces occur within the pipe.

- J. All sewer mains shall be installed to the criteria for the separation of water mains and sanitary sewers set forth in the Oregon Administrative Rules. Any deviations from such requirements must be approved by the National Park Service.

END OF SECTION

## SECTION 33 34 00

### ONSITE WASTEWATER DISPOSAL

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing the proposed wastewater drainfield systems in accordance with the plans. This includes all associated system components, pump and control systems, basins, interconnecting piping and valving, and the complete pressurized distribution drainfield system in accordance with these Specifications and in reasonably close conformity with the lines and grades shown on the Drawings or established by the CONTRACTING OFFICER.

##### 1.2 RELATED SECTIONS

- A. Section 31 05 16 “Aggregates for Earthwork”.
- B. Section 31 10 00 “Site Clearing”.
- C. Section 31 23 33 “Utility Excavation & Backfill”.
- D. Section 31 25 00 “Soil Erosion & Sedimentation Control”.
- E. Section 33 00 00 “Pipe & Pipe Fittings, General Statement”.
- F. Section 33 05 26 “Utility Line Identification Marking”.

##### 1.3 REFERENCES

- A. State of Oregon Department of Environmental Quality Onsite Wastewater Treatment Systems manual.
- B. ASTM D 1784: Rigid Vinyl Compounds
- C. ASTM D 2564: Solvent Cement for PVC Pipe and Fittings
- D. ASTM F 1668: Procedures for Buried Plastic Pipe

##### 1.4 SUBMITTALS

- A. Product Data: Submit data on wastewater treatment system, piping and valving, pumps and controls and drainfield components including piping and alternative media (gravelless chambers).

- B. Manufacturer's Installation Instructions: Submit special procedures for alternative media (gravelless chamber) installation.
- C. Project Record Documents: Accurately record actual locations and inverts of distribution boxes, buried pipe and drainfield components.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- E. Protect flow splitter basins, interconnecting piping and valves and drainfield components during handling using methods recommended by manufacturer.
- F. Prevent damage to pipe and gravelless chambers during transit. Repair abrasions, scars, and blemishes. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

### PART 2 - PRODUCTS

#### 2.1 PVC GRAVITY PIPE AND FITTINGS

- A. Pipe and fittings shall meet the requirement of 33 31 13 Sanitary Sewer Pipe.

#### 2.2 ALTERNATIVE MEDIA - GRAVELLESS DRAINFIELD CHAMBER

- A. Gravelless drainfield chamber units shall be Quick4 Plus Standard chambers as manufactured by Infiltrator Water Technologies.

### PART 3- EXECUTION

#### 3.1 CONSTRUCTION

- A. Bedding and backfill shall conform to the requirements of Utility Trenching and Backfill.
- B. Before lowering into the trench; the pipe shall be inspected for defects. All cracked, chipped, or broken pipe shall be discarded. The ends and interior of the pipe shall be clean. Belled ends shall be laid upgrade. Handling of the pipe shall be accomplished in a manner that will not damage the pipe. The joint shall be made in the manner recommended by the manufacturer. Care shall be taken not to buckle or disturb previously laid pipe.
- C. Pipe shall be laid accurately to the line and grade.
- D. Pipe shall be cleaned of all foreign matter, and water shall be kept out of trenches until joints have been completed. When WORK is not in progress, open ends of pipe and fittings shall be securely closed to keep foreign matter and animals from entering.
- E. Each joint shall be inspected to ensure that it is properly made before backfilling is done. Care shall be taken to prevent any dirt or foreign matter from entering the open end of the pipe. Where it is necessary to cut pipe, such cuts shall be neatly made in an approved manner. The laid pipe shall be true to line and grade and, when completed, the sewer shall

have a smooth and uniform invert. No section of gravity sewer shall have an adverse grade which would pond water in the invert of the sewer.

F. Gravelless Drainfield Chambers

1. Stake out location of drainfield trenches. Set the elevation of the bed bottom.
2. Install sedimentation and erosion control measures as necessary.
3. Excavate and level the designated area.
4. Remove any debris from the bed walls. Rake the bottom and sides if smearing has occurred while excavating. Verify the bottom of the bed is level using a transit, laser or level.
5. Install and backfill the chambers in accordance with the manufacturer's recommendations.

END OF SECTION

## SECTION 33 34 13

### SEPTIC TANKS

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing the proposed septic tank system as depicted in the project plans and in reasonably close conformity with the lines and grades shown or established by the CONTRACTING OFFICER.
- B. The CONTRACTOR shall provide a fiberglass reinforced plastic (FRP) wastewater storage tank as shown on the drawings. The onsite wastewater tank shall be manufactured according to applicable American National Standards Institute (ANSI) and American Water Works Association (AWWA) standards. The tank size, fittings and accessories shall be as shown on the drawings.
- C. The FRP shall be designed for underground installation and shall be constructed in compliance with OAR chapter 340, division 073.

##### 1.2 RELATED SECTIONS

- A. Section 31 05 16 “Aggregates for Earthwork”.
- B. Section 31 10 00 “Site Clearing”.
- C. Section 31 23 33 “Utility Excavation & Backfill”.
- D. Section 31 25 00 “Soil Erosion & Sedimentation Control”.
- E. Section 33 00 00 “Pipe & Pipe Fittings, General Statement”.
- F. Section 33 05 26 “Utility Line Identification Marking”.
- G. Section 33 31 13 “Sanitary Sewer Pipe”.

##### 1.3 REFERENCES

- A. ANSI/AWWA D120-09; Thermosetting fiberglass-reinforced plastic tanks.
- B. American Concrete Institute (ACI) Standard ACI 318-11, Building Code requirements for structural concrete

##### 1.4 SUBMITTALS

- A. Section 01 01 00 – Submittal Procedures: Requirements for Submittals.
- B. Product Data: Submit data on tank(s), including scaled drawings, piping, effluent filter and tank accessories.
- C. Manufacturer’s Installation Instructions: Submit special procedures for septic tank installation.
- D. Section 01 01 00 – Execution and Closeout Requirements: Requirements for Submittals
- E. Project Record Documents: Accurately record actual locations and inverts of piping and septic tank.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect existing wastewater facilities from damage while delivering, storing and handling the tank(s).
- B. Prevent damage to septic tank during transit to the site. Handle and store the tank in accordance with manufacturers recommendations. Repair abrasions, scars, and blemishes. If repair of satisfactory quality cannot be achieved, replace damaged material immediately.

### PART 2 - PRODUCTS

#### 2.1 SINGLE-WALL AND DOUBLE-WALL FIBERGLASS REINFORCED PLASTIC (FRP) UNDERGROUND ONSITE WASTEWATER TANKS

- A. Loading Conditions: Tank(s) shall meet the following design criteria:
  - 1. Internal Load – Tank(s) shall be designed to withstand a 5-PSIG air-pressure test with a 5:1 safety factor.
  - 2. Surface Loads – Tank shall be designed to withstand surface H-20 and HS-20 axle loads when properly installed according to manufacturer’s current installation manual and operation guidelines.
  - 3. External Hydrostatic Pressure For Underground Tanks – Tank shall be designed for 7 feet of overburden over the top of the tank, the hole fully flooded, and a safety factor of 5:1 against general buckling.
- B. MATERIALS
  - 1. Tank(s) shall be manufactured with a laminate consisting of resin and glass fiber reinforcement. No sand/silica fillers or resin extenders shall be used.
  - 2. All internal mounting hardware shall be manufactured of rustproof materials.
- C. DESIGN
  - 1. The tank(s) shall be designed as a single-wall or double-wall vessel as specified and shown in the drawings.

2. Tank(s) shall be manufactured with structural ribs which are fabricated as an integral part of the tank wall.
3. Capacity and Dimensions:
  - a. Tank shall have a nominal capacity of 15,000 gallons.
  - b. Tanks shall have a nominal outside diameter of 10 feet.

## 2.2 ACCESSORIES

### A. Access Openings:

1. All access openings shall have a diameter of 30 inches, complete with riser, lid and necessary hardware.
2. Size and location(s) as shown on tank drawing.

### B. Pipe and Fittings:

1. Tank(s) shall be equipped with factory-installed threaded fittings, or pipe stubs.
2. PVC pipe shall at a minimum meet the requirements of ANSI Schedule 40.
3. All flanged nozzles shall be flanged and flat-faced, and conform to Class 150 bolting patterns as specified in ANSI/ASME/B16.5-2009.
4. Steel NPT fittings shall withstand a minimum of 150 foot-pounds of torque and 1,000 foot-pounds of bending, both with a 2:1 safety factor.
5. Location of fittings and piping shall be as shown on tank drawings.

### C. Attached Access Risers:

1. Attached access risers shall be PVC or FRP as supplied by tank manufacturer.
2. Attached access risers shall be 30 inch diameter.
3. Access risers shall be attached to access openings during installation utilizing adhesive or FRP bonding kits supplied by the tank manufacturer.

### D. Anchoring:

1. Anchor straps shall be FRP anchor straps supplied by tank manufacturer.
2. Number and location of straps shall be as shown on drawings or as recommended by manufacturer.
3. Prefabricated concrete deadmen, which are designed to ACI standard 318-11, shall be supplied by tank manufacturer.

## 2.3 BEDDING AND BACKFILL MATERIAL

- A. Aggregate Bedding and backfill Material shall be as specified in Section 31 05 16 or as specifically recommended by the tank manufacturer.
- B. Geotextile Fabric: The geotextile fabric specified for backfill separation shall be Mirafi 180N Filter Fabric or approved equal.

## PART 3- EXECUTION

### 3.1 EXAMINATION

- G. Section 01 01 00 – General Requirements: Verification of existing conditions before starting work.
- H. Verify upstream and downstream sanitary sewer connections, size, location and depth.

### 3.2 PREPARATION

- A. Ream pipe ends and remove burrs.
- B. Remove scale and dirt from components before assembly.
- C. Establish invert elevations for each component in the system.
- D. Hand trim excavation to suit septic tank and pipe connections.

### 3.3 TANK AND TANK BEDDING

- A. Excavate in accordance with plans and actual field conditions.
- B. Place bedding material level in on continuous layer not exceeding 6 inches compacted depth. Compact to 95%.
- C. Install septic tank and backfill in accordance with manufacturer's recommendations.
- D. Test tank in accordance with manufacturer's recommendations and in accordance with OAR 340-073-0025 to verify water tightness. Coordinate all testing/inspection activity with ODEQ prior to commencement.

### 3.4 CONNECTING PIPING

- A. Install piping connections between new septic tank and upstream conveyance system in accordance with Section 33 31 13.

END OF SECTION

**DIVISION 46**

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**WATER & WASTEWATER EQUIPMENT**

## SECTION 46 07 53

### PACKAGED WASTEWATER TREATMENT EQUIPMENT

#### PART 1 – GENERAL

##### 1.1 DESCRIPTION

- A. The WORK under this Section includes providing all labor, materials, tools and equipment necessary for furnishing and installing a complete advanced treatment package, consisting of all required pumps, discharge assemblies, ball valves, check valves, splice boxes, treatment system(s), and controls in reasonably close conformity with the location shown on the plans or as established in the field by the CONTRACTING OFFICER (CO) or their representative.

##### 1.2 SUBMITTALS

- A. Section 01 33 23 – Submittal Procedures: Requirements for Submittals.
- B. Product Data: The Contractor shall furnish shop drawings and technical data sheets for the proposed wastewater treatment system. The submittals shall clearly specify the materials of construction, equipment compatibility, along with drawings for each unique package and related equipment being supplied.
- C. Manufacturer’s Installation Instructions: Submit special procedures for treatment system installation.
- D. Section 01 77 00 – Closeout Procedures: Requirements for Closeout Submittals
- E. Project Record Documents: Accurately record actual locations and inverts of tank, piping and associated appurtenances.

##### 1.3 OR-EQUAL EVALUATIONS

- A. The term “approved equal” shall mean equal in the judgment of the CO. Should the Contractor seek approval of a product other than the brand or brands named in the specifications, it shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. It will not be the responsibility of the manufacturer specified within these specifications to provide research, documentation, or data supporting the difference between the “or equal” and the specified product. This will be the sole responsibility of the Contractor seeking the approval.
- B. Where the specified requirements involve conformance to recognized codes or standards, the Contractor shall furnish evidence of such conformance in the form of test or inspection reports, prepared by a recognized agency, and bearing an authorized signature. Manufacturer’s standard data and catalog cut sheets will not be considered sufficient in themselves, and the CO will not be responsible for seeking further data from the manufacturer, or for otherwise

researching the product. Failure to provide complete data will be cause for rejection of the product.

- C. Product/System submittals, including, but not limited to;
1. The number of years the manufacturer has been in business of manufacturing relevant products/systems
    - a. Product specifications and a detailed description of how each product or component is “equal” to the specified product, system, or component. A side-by-side comparison is required.
      - 1) Equipment/system warranty along with exclusions
      - 2) Performance claims, including, but not limited to;
        - a) Treatment design
          - Surface area
          - Maintenance frequency
        - b) Pump motor description
          - Manufacturer and origin
          - Length of service
          - Number of units in operation
          - Life-cycle cost (repair and replacement frequency)
          - Warranty
        - c) Pump liquid end description
          - Manufacturer and origin
          - Length of service
          - Number of units in operation
          - Life-cycle cost (repair and replacement frequency and cost). Note liquid ends must be remove-able and repairable and cleanable.
          - Warranty
        - d) Corrosion resistance
        - e) Pump Lead description
          - Lead must be SOOW, extra heavy duty cord (600V) CSA approved.
        - f) Control panel components
          - Manufacturer and origin
          - Length of service
          - Number of units in operation
          - Warranty
          - Enclosure description
      - b. Evidence of successfully obtaining approval for a system with similar permit requirements with the regulating authority
      - c. Summary of product/system track record and history, including, but not limited to;
        - 1) Number of similarly sized systems
        - 2) Detailed summary of, at minimum, ten (10) similarly sized systems, at least five (5) years old, including, but not limited to;
          - a) Project name, location, and application
          - b) Years in operation
          - c) Current average daily flows and design flows
          - d) Operator name and contact information
    2. Contractor shall specify and furnish documentation related to manufacturer (or representative) support services, including, but not limited to;

- a. Installation training program and support material
- b. Installation oversight program and support material
- c. Operator training program and support material
- d. Startup services program and support material

#### 1.4 EXPERIENCE

- A. The equipment furnished shall be manufactured and supplied by a company experienced in the design and manufacture of advanced treatment systems. Manufacturer shall have a minimum ten (10) years experience in the design and manufacture of advanced treatment systems of similar size and equipment specified. Manufacturer shall have at minimum of twenty-five (25) successful installations of advanced treatment systems.

#### 1.5 WARRANTY

- A. The advanced treatment system manufacture shall provide a three (3) year warranty for the entire treatment system, including, but not limited to the pumps, pump vaults, hoses and valve assemblies, control panel, and splice boxes. Warranty term shall ensue after acceptance and system startup procedures are complete. The manufacturer shall submit detailed exclusions from the warranty or additional cost items required to maintain the equipment in warrantable condition. The warranty shall be documented in product literature.

#### 1.6 SERVICABILITY

- A. The advanced treatment system components shall be completely serviceable, with easy access to the pump(s), effluent screen, treatment system, and floats. The pump shall be designed for removal without removing the effluent screen and floats.

#### 1.7 PUMPS

- A. The pump must be approved for use in the treatment unit as described in these specifications. Pump shall be 3/4 to 2.0 hp, 230 VAC, single phase, 60 Hz, two-wire motor, with 30 foot long extra heavy duty (SOOW) electrical cord with ground. The pumps must be submersible High-Head Effluent pumps. Pumps shall be UL and CSA listed for use with effluent. The pumps must have a minimum 24-hour run dry capability without water lubrication. The pumps shall have a 1/8-inch bypass orifice to ensure flow circulation for motor cooling and to prevent air bind. The pump shall have a floating impeller design to protect against up thrust and increase pump life. The pumps liquid ends must be repairable (by replacing impellers and/or diffusers) for better long-term cost of ownership. The motor must be rated for continuous use and frequent cycling, at least 100 cycles per day. The motor cable must be suitable for Class 1, Division 1 and 2 applications. The pumps shall be lightweight for easy removal and maintenance. The pump intake screen must be 1/8-inch mesh polypropylene. The pump shall have internal thermal overload protection and internal lightning protection. All pumps shall undergo 3-point (Dead head, Design Flow, and Design Flow + 30%) wet testing at the factory to confirm performance.

## PART 2 - PRODUCTS

### 2.1 PUMPS/OPERATING CONDITIONS

#### A. PF300512 – Pre-Anoxic Return (Rnox) Pump

Pump shall comply with general requirements set forth in section I (above). Orenco Systems®, Inc., Model PF300512 series or engineer-approved equal 1/2Hp, 230 VAC, single phase, 60 Hz, two-wire motor, with 10 - 30 foot long extra heavy duty (SO) electrical cord with ground. Pump shall be UL and CSA listed as an effluent pump.

#### B. PF500712 – Recirculation Pumps

All pumps shall comply with general requirements set forth in section I (above). Orenco Systems®, Inc., Model PF3007 series or engineer-approved equal 3/4Hp, 230 VAC, single phase, 60 Hz, two-wire motor, with 10 - 30 foot long extra heavy duty (SO) electrical cord with ground. Pump shall be UL and CSA listed as an effluent pump.

#### C. PF200512 – Discharge Pumps

All pumps shall comply with general requirements set forth in section I (above). Orenco Systems®, Inc., Model PF5005 series or engineer-approved equal 3/4Hp, 230 VAC, single phase, 60 Hz, two-wire motor, with 10 - 30 foot long extra heavy duty (SO) electrical cord with ground. Pump shall be UL and CSA listed as an effluent pump.

### 2.2 AX MAX TREATMENT SYSTEM

A. The treatment system shall be an Orenco Systems®, Inc. AdvanTex® AX-MAX treatment unit. The treatment unit shall be a complete, fully plumbed wastewater treatment system for receiving and processing septic tank effluent.

#### 1. Stage 1 & Stage 2

- a. AX-MAX125/75 Unit shall have an overall length of 28 ft, a width of 7.5 ft, and a height of 8ft. The structure shall be constructed of fiberglass-reinforced plastic with a thickness of 4 inches. The unit shall include a piping network that recirculates water from the recirculation tank atop the hanging textile media. The media shall be hanging textile media with a specific area of over 125 square feet for the first stage and a specific area of over 75 square feet for the second stage.

### 2.3 AX MAX VENTILATION SYSTEM

#### A. Individual Unit Fans

An Orenco Systems®, Inc. ventilation system shall be provided in the AX-MAX Series Treatment Facility or approved equal. The fan shall be UL recognized, 0.8 Hp, 115/230VAC, 1.4A/0.7A, 3400 RPM, and provide up to 245 CFM at 0" H2O. The exhaust from the ventilation fan shall be forced through an enclosure with an adequate amount of activated carbon to remove any odors for a period of over one (1) year.

B. Combined Ventilation

Ventilation fan shall be Cincinnati Fan Model LMF-6 or approved equal. Housing shall be constructed of commercial grade 319-cast aluminum for increased strength and AMCA Type C spark-resistance. Fan shall be rated for continuous duty with an RPM of 3450 and capable of delivering a minimum of 100 CFM per AX-Max unit.

2.4 SPLICE BOX CONDUIT SEALS AND SEALANTS

A. As part of the treatment package, all AX-Max units will include re-installed splice boxes and UL listed waterproof butt splice connectors. The use of a UL-approved conduit seal kit accessible above ground shall be required to prevent the passage of gases, vapors, or flames through the conduit to the control panel. An additional UL classified sealant shall be added to the splice box coupling to prevent condensation accumulation in the splice box. The following UL approved sealants shall be used:

1. UL classified moisture-cure polyurethane quick drying foam or approved equal with an R-5 rating for each inch of foam.
2. UL classified silicone sealant or approved equal consisting of a neutral cure silicone, non-acetic, non-corrosive silicone able to withstand temperatures to 450° F.

2.5 CONTROLS

A. Controls and alarms shall be listed per UL 508. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly.

B. A dedicated phone line, Ethernet cable, or cellular modem, model IG601 shall be installed. Panel is required to allow real-time connectivity with the telemetry control panel and alarm communication. Phone dialers shall not be considered as an equivalent.

C. Panel shall be Orenco Systems<sup>®</sup>, Inc. TCOM<sup>™</sup> control panel or approved equal, meeting the following:

1. Data Collection and Utilization: Logs data for system conditions and events such as daily flows, pump run time, pump cycles, and alarm conditions. Logs shall store data for at least a year.
2. Downloadable Logs: Download logs into a \*.dif or ASCII format for simple conversion to common spreadsheet or word processor programs.
3. Multi-Level Password Security: Only qualified personnel can remotely access site.
4. Program Logic Rules: Simple "If ... then" declarations.
5. Rules can be written based on several operands, including the following:
6. Input/output status
7. Point status
8. Date: mm/dd/yy format
9. Time of day: 24 hour clock
10. Timers
11. Historical data (allows for control optimization or detection of trends)

12. Schedule functions to control digital "Points" based on date or day of week/time.
  13. Automatic daylight savings time adjustment.
  14. Automatic call-out to pagers during alarm conditions when panel detects trends that could lead to system failure.
- D. In addition, the unit shall have the capability of real-time direct connection to the panel via laptop serial port, to allow the operator real-time access to detailed logged data and the ability to change point values.
1. Standard Components
    - a. Motor-Start Contactor: 17 FLA, 1-2 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% of FLA for 230VAC).
    - b. HOA 3- Way Toggle Switch: Single-pole switch, Hands (manual) Off, Auto ON. 20 amps, 1 hp.
    - c. Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 120 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
    - d. Pump Circuit Breaker: 20 amps, OFF/ON switch. Single-pole for 120 VAC or double-pole for 230 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
    - e. Audio Alarm: 80 dB at 24", warble-tone sound.
    - f. 120VAC Ground Fault Interrupter (GFI)
    - g. Current Sensor: 120 VAC with adjustable high & low alarm set points.
    - h. Visual Alarm: 7/8" diameter red lens, "push-to-silence." NEMA 4, 1-watt bulb, 115 VAC.
    - i. Panel Enclosure: NEMA 4X rated, constructed of UV-resistant fiberglass or NEMA 4, constructed of steel; hinges and latch are stainless steel. Conduit couplings provided.
    - j. Remote Telemetry Unit: ATRTU-Net; self powered 24 VDC at 10 mA max, 8 digital inputs, 8 analog inputs expandable to 16 with expansion board. On-board modem (9600 baud), Ethernet port (10 base T, RJ45jack) and Modbus port (RS422/485 terminals).
    - k. Touch Screen Display: interface module with 5.7 color touch screen.
    - l. Flow Meter – Siemens, electromagnetic flow meter model MAG 3100, with 5000/6000 series transmitter. In addition to logging daily flows, flow meter shall log flows on an hourly basis.
  2. Optional Components
    - a. Pump Run Light: 7/8" green lens. NEMA 4, 1-watt bulb, 120 VAC.
    - b. Flashing Light: Lexan lens, flanged base, red, UL-recognized.
    - c. Heater: Anti-condensation heater. Self-adjusting, radiates additional wattage as temperature drops.
    - d. Surge Arrestor: AG2401 120/230V, three 18" leads, rated for a maximum of 32,000amps, UL/CSA listed.
    - e. 3- Way (main, auto, off) manual transfer/disconnect switch
    - f. Event Counter: 120 VAC, 6-digit, non-resettable.
    - g. Elapsed Time Meter: 120 VAC, 7-digit, non-resettable. Limit of 99,999 hours; accurate to 0.01 hours

## 2.6 INSTALLATION

- A. All treatment, pumping system, and electrical components shall be installed in accordance with the Manufacturer's recommendations, the project plans, and all state and local regulations.

## 2.7 LOCATION

- A. The pump control panel shall be mounted on the building nearest the tank and pump. Consult with the COR and the Chief of Facility Management to determine the final control panel location. The panel, when possible, should be mounted in the shade and protected from the weather. The panel should be located at a convenient height (usually about five feet above the ground) and where it will be accessible for maintenance.

## PART 3- EXECUTION

### 3.1 PRECONSTRUCTION CONFERENCE

- A. Before any work at the site is started, a conference attended by the Government, Contractor, Manufacturer and Operator and others as appropriate will be held to establish a working understanding among the parties as to the work involved for installing each component of the treatment system. At this conference a specific individual will be designated to act as inspector for the installation of the treatment system. Any cost or fees associated with inspections services during construction will be the responsibility of the Government.

### 3.2 INSTALLATION AND FIELD TESTING TRAINING

- A. The Manufacturer shall provide the services of a trained representative to instruct the installing Contractor's crew and Inspector regarding the proper installation and field testing of each component per the Manufacturer's recommendations and requirements. The MANUFACTURER shall have a trained representative provide installation and field testing training services for a minimum of one (1) visit of a minimum of one (1) eight-hour day at the beginning of construction.

### 3.3 QUALITY CONTROL

- A. To ensure quality control, the Inspector shall inspect and certify that an initial installation of the treatment system is in compliance with the Manufacturer's recommendations and requirements.
- B. Upon completion of the inspection, the Inspector, in coordination with the Government, shall perform or direct the Contractor to perform any required adjustments to the equipment to ensure that the system is meeting the treatment standards designated for the project which in accordance with DEQ site evaluation findings is Treatment Standard 1 (Treatment Standard 1, as defined by OAR 340-071-0100, means a 30-day average of less than 20 mg/L of BOD5 and 20 mg/L of TSS). All equipment and materials required to perform the testing shall be the responsibility of the Contractor. A letter of completion shall be signed by the Inspector and

copies faxed, emailed, or mailed to the Government and Manufacturer within one (1) week of the system being installed and prior to System Commissioning.

- C. The Manufacturer shall provide the services of a trained representative for a minimum of one (1) visit of a minimum of one (1) eight-hour day for the purpose of quality control during construction.

### 3.4 SYSTEM COMMISSIONING

- A. The Manufacturer shall provide the services of a trained representative for training the Government's service provider, and inspecting the treatment system installation. The inspection will include items covered from the installation training. Upon system commissioning, the Manufacturer's trained representative shall provide the Government a written report of findings. The Contractor shall then perform any required adjustments to the equipment and place into operation. All equipment and materials required to perform additional testing shall be the responsibility of the Contractor. The Manufacturer shall submit to the ENGINEER and OWNER, a detailed start-up checklist, according to the manufacturer's inspection and startup procedures.
- B. The Manufacturer shall provide the services of a trained representative for a minimum of one (1) visit of a minimum of one (1) eight-hour day for the purpose of system commissioning.

### 3.5 OPERATION AND MAINTENANCE

- A. Operation and Maintenance Manuals - The Manufacturer shall provide five (5) operation and maintenance manuals.
- B. Spare Parts - The Manufacturer shall provide a spare nozzles, spare pump, and spare control panel parts.
- C. Operation and Maintenance Tools – The Manufacturer shall provide all treatment system specific tools required to fully operate and maintain the treatment system.

END OF SECTION