SPECIFICATIONS
(For Construction Contract)

Step 1 (95% Design)
Solicitation Number W9128F23B0005

Replacement of Left Abutment Collector Pipe System

Missouri River

Big Bend Dam, SD

December 2022

US Army Corps of Engineers ®
Omaha District

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SECTION 01 12 00

CONSTRUCTION GENERAL

PART 1 GENERAL

1.1 SCOPE

The work covered in this section is outlined as a statement of construction requirements common to all the work. Specific requirements for materials and installations are provided under the Technical Sections herewith. No claims for extras shall be made on account of items presumed to have been omitted from this section. The work includes but not limited to the removal and replacement of the existing left abutment collector pipe system located on the downstream left abutment of Big Bend Dam. The left abutment collector pipe system consists of the existing toe drain pipe, toe drain outfall, relief well collector, and relief well casing outfalls. Work to include extending the relief well collector into the relief well channel and backfilled. Six (6) existing wells are to be abandoned (RW-66, RW-66A, RW-67, RW-68, RW-68A, RW-68B) and piezometer (OW20-02) as part of this contract. Abandonment or removal of existing relief well casing outfalls as indicated on the contract drawings. The new left abutment collector pipe system will connect existing wells (RW-66B and RW-67A) and six (6) replacement relief wells (RW-66R, RW-66AR, RW-67R, RW-68R, RW-68AR, RW-68BR). The six (6) replacement relief wells will be installed by USACE prior to Contractor mobilizing to the site. Installation of four new manholes and two risers are a part of this contract. Extension of 24" CMP Culvert A and 24" RCP storm drain. A rip rapped apron will be constructed at the new relief collector pipe outfall location of the left abutment collector pipe system.

1.2 CONSTRUCTION RIGHT-OF-WAY

The Contractor will be assigned working areas or working right-of-way limits for use in the prosecution of work under this contract, subject to the SECTION 00 72 00, GENERAL CONDITIONS (CONTRACT CLAUSES) clause entitled "Operations and Storage Areas."

1.3 SPILLWAY DIKE AND DAY USE AREAS

The Spillway Dike and Day Use recreational areas will be operational during construction, with the exception of excavation and installation of the toe drain outfall. During temporary closure of the Spillway Access Road the public will not be permitted access to the Spillway Dike Road and Day Use Areas.

1.4 PROTECTION OF EXISTING FACILITIES AND WORKS

The Contractor shall be responsible for the protection of the work area from damage and upon completion of the work shall leave existing works in a condition equal to that which existed when the work started. All work, storage of materials, and construction plant shall be kept within the limits of the areas assigned. Prior to construction operations, the Contractor shall confer with the Contracting Officer's representative to determine the proximity of any possible under-ground obstructions, pipe or equipment which could be damaged as a result of construction operations.

Existing utility lines that are shown on the drawings or the locations are otherwise made known to the Contractor shall be protected from damage, and if damaged, shall be repaired by the Contractor at no additional expense to the Government. In the event that the Contractor damages any existing utility lines that are not shown or the locations of which have not been made known to the Contractor, report thereof shall be made immediately to the Contracting Officer. If the Contracting Officer determines that repairs shall be made by the Contractor, such repairs will be ordered under SECTION 00 72 00, GENERAL CONDITIONS (CONTRACT CLAUSES) clause entitled "Changes." The Contractor will be responsible for the protection of structures from any structural damage during the construction operations. Roads and surfaces shall be protected from damage by the work or if damaged shall be repaired with equal materials at no additional expense to the Government. At all times the plant and work areas shall be kept in a condition conducive to safety of workmen and the public and neat in appearance. Waste or surplus materials shall not be allowed to accumulate in the construction areas.

1.4.1 Interruption of Electric Power

If it is necessary to cut off power in transmission lines that pass through construction areas, it shall be the Contractor's responsibility to make the necessary arrangements with the owner of the powerline, and the Contractor shall pay all costs therefore.

There is a 69kV West Central Electric Cooperative, Inc. powerline within the construction area of the relief well collector pipe, as indicated on the project drawings. There is a USACE 13.8kV power line on the Big Bend Dam downstream embankment in the vicinity of the toe drain, as indicated on the drawings. Point of Contacts for the utility owners shall be provided to the Contractor following award.

1.4.2 Herring Bone Subdrain Area

No access is permitted in the Herring Bone Subdrain Area as indicated on drawing Sheet G-101.

1.4.3 Dam Safety Instrumentation and Subdrains

The Contractor shall protect from damage, unless otherwise designated by the COR or contract drawings, all existing dam safety instrumentation consisting of piezometers, relief wells and casings, relief well outfalls, manholes, and risers in the area of work not scheduled for replacement. The location of these features will be identified by the contracting officer and shall be marked by the contracting officer prior to the commencement of work. The herring bone drain system (including risers and outfalls) is located near the limits of the work area. Any damage to these features will be repaired or replaced (to be determined by the COR) by the Contractor at no additional cost to the Government.

1.5 GOVERNMENT SUPPLIED SERVICES AND INSTALLATIONS

1.5.1 Services

Site Access and stockpile area.

1.5.2 Installation of Replacement Relief Wells

Replacement relief Wells RW-66R, RW-66AR, RE-67AR, RW-68R, RW-68AR, and

RW-68BR will be installed by USACE prior to the Contractor mobilizing to the site.

1.5.3 Source of Water

The Government will not supply water for construction. Water may be obtained from Lake Francis Case or groundwater obtained through dewatering, not impacted by TPH-DRO, to be used for dust control, general grading, and other incidental application is support of construction

1.6 DIVERSION AND CARE OF WATER

Full responsibility for the diversion and care of water from whatever source, including direct rainfall, surface runoff and sources outside of the construction area shall be borne by the Contractor until completion of work under this contract. The Contractor shall make his own investigation and determination of existing and anticipated conditions concerning care of water. Plans for diversion and care of water during construction of the left abutment collector pipe system shall be submitted, within 10 calendar days after receipt of Notice to Proceed, for the approval of the Contracting Officer and shall show location, material and method for dewatering the work area and disposal of the water. The Contractor shall provide the materials and equipment and perform all work necessary to facilitate construction and to protect the work from damage by water. A detailed Dewatering Plan will be required and conform to Section 33 26 00, Dewatering. Plans for diversion and care of water are subject to approval by the Contracting Officer prior to construction. Facilities shall be removed upon completion of the work.

1.7 DRAINAGE

The Contractor shall provide and maintain ditches, dikes, and other facilities within and adjacent to the work areas, to divert water from surface and subsurface flow away from work in place or under construction by this and other contracts to prevent damage and interference. The basis for design, location, type and size of drainage facilities are subject to review and approval prior to construction.

1.8 PROJECT SURVEY AND LAYOUT

In addition to the requirements of FAR 52.236-17 Layout of Work, the contractor shall provide a licensed land surveyor (licensed in the State of South Dakota) to check initial project control, survey and mark the corners of the staging area, employee parking lot, work area, non-work area and to provide and set hubs for project construction. At a minimum the non-work area points that are adjacent to work area and staging area should be marked and clearly visible so construction traffic does not enter the area. The contractor shall use (and reference in all as-built data) project stationing as described on the contract drawings. In addition, a licensed land surveyor shall provide final project embankment survey (i.e. to include major breakpoints, downstream dam toe, profile, top of roadway embankment, toe of roadway embankment, breaklines, edge of pavements, edge of rip rap and gravel, edge of water, storm drainage; inverts and coordinates of all pipes, manholes, risers, and instruments (top of pipe elevations of piezometers and relief wells) prior to placement of surfacing for government review and approval. These surveys shall provide and verify both horizontal and vertical project control. This survey shall be used for final as-built embankment profile and cross section and recorded on the as-built condition in accordance with Section,

As-Built Drawings.

The contractor may utilize his own quality control personnel to provide interim surveys for quantity determination for payment in accordance with paragraph entitled Quantity Surveys (Apr 1984).

1.9 DISPOSITION OF CONSTRUCTION FACILITIES

All buildings and facilities constructed by the Contractor shall be maintained in a satisfactory condition with strict observance of the rules of sanitation, safety and order as may be established by the Contracting Officer. Prior to final payment under the contract, all buildings and facilities constructed by the Contractor for his own use shall be removed from the site by the Contractor.

1.10 ACCESS ROADS AND HAUL ROADS

1.10.1 Access Roads

Access roads as required for the prosecution of the work shall be maintained (including sprinkling for dust control, safety personnel, and traffic control) within the work areas assigned to the Contractor. Consideration shall be given to the avoidance of interference with others, safety and frequency of traffic, subject to review and approval prior to construction. Access road areas shall be restored to their original or suitable condition upon completion of this contract. The Contractor shall be responsible for repair of damage to existing roads caused by his operation at no additional cost to the Government.

1.10.2 Haul Roads

The Contractor shall construct haul roads as may be necessary for the conduct of the work without additional cost to the Government. Haul roads located on government property near the work area are shown on the contract drawings. All proposed haul routes must be submitted for approval to the Contracting Officer prior to construction. The Contractor shall arrange the hauling operations so as to cause a minimum interference with traffic and shall develop Temporary Traffic Control (TTC) plan(s) and furnish all necessary traffic control devices and personnel as required to avoid additional hazards to the public. The Contractor shall perform routine day and night inspections of TTC elements as required by FHWA Manual on Uniform Traffic Control Devices (MUTCD) and maintain all furnished traffic control devices at their expense and without additional cost to the Government. Lines, grades and widths for haul roads, shall be selected to fulfill the requirements for safe and efficient hauling operations and shall be approved by the Contracting Officer prior to construction. Haul roads shall have ample grades and width to provide safety. Preference shall be given to one-way haul roads when these are feasible. All roads shall be maintained in original as-built condition during all periods of their use. Improvements will be necessary for the dirt road between the relief well collector channel and the Spillway Dike Road to access the Staging Areas, all improvements will remain following project completion. The Contractor shall construct two permanent gates at the locations shown on the contract drawings and in accordance with SECTION 32 31 13, Vehicle Barrier Gates. Roads shall be sprinkled whenever, in the opinion of the Contracting Officer, control of dust is necessary to insure safe movements of construction traffic at all times. Upon completion of work under this contract, roads shall be disposed of as directed by the Contracting Officer and restored to original grades within

0.1 feet. All traffic control devices, culverts, guards, fences and other improvements on roads constructed for the Contractor's convenience and operations shall be removed from the project site and shall remain property of the Contractor. Use and repair of existing roads and bridges shall be subject to the requirements of local authorities. Prior to start of hauling operations on public roads, the Contractor shall furnish written evidence to the Contracting Officer that an agreement has been consummated with State and County officials on the use of public roads and bridges. Such agreements shall clearly relieve the Government of any responsibility for damage resulting from hauling across or on these roads.

The dirt haul road between the relief well channel and Spillway Dike Road should maintain a minimum of 3 ft of cover above the culverts, and should not allow axle loads in excess of 75 kips. Existing culverts shall be replaced if damaged by activity that is not consistent with these operational guidelines at no additional cost to the Government.

1.10.3 Trucking and Hauling Operations on Public and Private Roads

When the contractor will be performing continuous hauling and trucking operations on public and private roads, the contractor shall develop a Haul Route Plan identifying the routes that will be utilized from the vendor to the project site and identify all potential safety hazards along the route. The Haul Route Plan shall be submitted to the COR for information prior to hauling begins. The contractor shall also provide the Haul Route Plan to all drivers and operators of hauling vehicles that will be delivering materials to the project site.

1.10.4 Joint Use of Transportation Facilities

The Contractor may use jointly with contractors and others, existing access and haul roads constructed by the Government or by others. Unless otherwise specifically authorized in writing, the Contractor will not be granted exclusive use of any access or haul road whether it be an existing road or one constructed by the Contractor. However, the use by others of roads constructed by or assigned to the Contractor primarily for his own use will be limited by the Contracting Officer to the minimum considered consistent with efficient prosecution of the work under this and other contracts in force. Maintenance of jointly used facilities shall be shared in proportion to use. In the event of a disagreement between this Contractor and others as to the use of any road, the decision of the Contracting Officer shall be final. The Contractor shall not obstruct any existing road on the land controlled by the Government.

1.10.5 Ramps

Ramps shall be provided and maintained for access of hauling equipment into excavation and waste areas. Locations, grades and width are subject to review and approval by the Contracting Officer prior to construction.

1.11 PUBLIC ROADS

1.11.1 Road Closure

Replacement of the toe drain outfall pipe between the toe drain and the relief well collector pipe will require temporary closure of the spillway access road. The Contractor will follow all traffic requirements for temporary closing per MUTCD. The Contractor is required to coordinate the road/lane closure with Contracting Officer.

1.11.2 Traffic Control Devices

All traffic control devices (signs, arrow boards, barricades, lighting etc) by the Contractor, must conform with the U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices.

1.11.3 Quality Control of Road Conditions

Prior to starting construction, the Contractor will be required to document the condition of the roads he intends to use, to document the pre-construction condition, the Contractor shall submit a Pre-construction Road Condition Photographs and have pre-construction and post-construction haul route centerline surveys as required in 31 00 00 EARTHWORK. Pre-construction photographs of haul roads must be in the presence of the COR. Contractor will be required to return roads to the pre-construction condition, with the exception of the haul road between the relief well channel and the Spillway Access Dike Road where improvement will remain in place.

1.11.4 Temporary Traffic Control (TTC)

The Contractor shall be responsible for the safe control of traffic on all haul and access roads used primarily for the work under these specifications and at their crossings with roads used by others. The Contractor shall, at the Contractor's own expense, furnish all personnel and traffic control devices necessary for the safe movement of all road users through or around Temporary Traffic Control zone. Temporary traffic control plans shall be designed in accordance with the current MUTCD and the SD DOT Traffic Operations Manual requirements by a license Professional Engineer and shall be submitted for review and approval prior to construction to the COR a minimum 3 weeks prior to road closure.

1.11.5 Operations

When operations are being conducted near a U. S. or State Highway or when construction equipment is being used on or adjacent to such highway, the Contractor shall furnish all necessary traffic control devices and personnel to provide safe and effective movement of all road users through or around Temporary Traffic Control zone as required by MUTCD. All required state and/or local permits shall be obtained at the Contractor's expense in advance and shall be provided to the COR. The highways and streets shall be kept open at all times.

1.11.5.1 Flaggers

The Contractor shall provide flaggers when:

a) Construction equipment and/or vehicles are blocking the roadway making it difficult for vehicles to pass or see or due to terrain.

b) One-way traffic is required thru a construction zone.

c) Trucks are pulling onto and/or off of a roadway or operating at a reduced speed causing a hazardous situation for drivers.

d) Anytime the Contractor feels that drivers are at risk due to Construction activity.

Flaggers shall have all qualifications, high-visibility safety apparel, and appropriate hand-signaling devices in accordance with MUTCD requirements. The flagger shall be properly trained as required by the MUTCD. The Contractor shall furnish all necessary traffic control devices to establish appropriate TTC zone when the Flagger Control is utilized.

1.11.6 Road Closure

At each location designated by the Contracting Officer and where safe operation requires the closing of roads, streets or other travel arteries leading to the work under this contract, the Contractor shall furnish all appropriate traffic control devices to provide safety for motorists, bicyclists, pedestrians, workers, enforcement/emergency officials, and equipment during construction as required by MUTCD. Arrangements for closure of roads, streets or other travel arteries shall be made by the Contractor with local State, County or City officials. The Contractor shall notify the appropriate official in writing at least ten (10) days in advance of the date he desires to close a road to traffic and shall furnish a copy of the agreement to the Contracting Officer prior to closure.

1.11.7 State and Federal Highways

Where the Contractor hauls across or on State or Federal highways, he shall enter into all agreements with the State Highway Commission and shall comply with any restrictions they may impose relative to load limits, care of traffic and cleanup. Such agreements shall clearly relieve the Government of any responsibility for damages resulting from hauling across or on State highways. Copies of such agreements shall be furnished to the Contracting Officer before the Contractor begins hauling on these highways.

1.11.8 State and Local Public Roads

(a) Load Limits:

The South Dakota DOT under the Authority of SDCL 32-22-24, a Highway Maintaining Authority, and local County Road Commissions restrict the load weight of haul vehicles using highways and county road during the spring thaw period. The purpose of the load limits is to protect roads from break-up during the spring thaw. The load restrictions are usually imposed anytime during the period of 15 February through April 30 depending on actual weather conditions. SD Highway 47 crosses the crest of the dam and USACE roads would be subjected to the SD DOT load restrictions. Ensure to conform to the SD DOT load restrictions for hauling, which can be found on the SD DOT website.

(b) Hauling Regulations:

Prior to start of hauling operations on public roads, the Contractor shall furnish evidence to the Contracting Officer that an agreement has been consummated with State and County officials on the use of public roads and bridges. Such agreements shall clearly relieve the Government of any responsibility for damage resulting from hauling across or on these roads.

1.11.9 City Streets

Where the Contractor intends to cross or to use city streets for haul

roads he shall enter into an agreement with the City and shall comply with any restrictions the City may impose relative to load limits, care of traffic and cleanup. Such agreements shall clearly relieve the Government of any responsibility for damage resulting from hauling across or on these highways. A copy of all such agreements shall be furnished to the Contracting Officer before the Contractor begins hauling in city streets.

1.11.10 Utility Lines

It shall be the responsibility and obligation of the Contractor to make all arrangements with the affected companies for the necessary moving and alterations of utility lines and the continuation of service during construction as covered by the plans and specifications.

1.12 COOPERATION WITH OTHER CONTRACTORS

The Contractor shall cooperate and coordinate his work with that of the State and others (public and private) working in the area during the life of this contract. The Contractor shall coordinate his work with others to avoid undue interference and shall conduct his operations, other than approved required access, within the limits of the assigned construction area or construction right-of-way limits. The Contractor shall cooperate with others as necessary in the interest of timely completion of all work and in the event of disagreement the decision of the Contracting Officer shall be final.

1.13 COORDINATION AND OUTAGES

The Contractor's employees shall not open, close or tamper with switches, valves or control devices for existing installed equipment. Only Government operating personnel will be authorized to open or close existing switches, valves and control devices to enable the Contractor to make connections or modifications to existing equipment. Work shall be coordinated and scheduled to reduce the "Outage" time of operating equipment or systems to a minimum. Work in the proximity of exposed energized equipment such as in the switchyard or work involving connections to existing energized or operating equipment or systems shall perform only under the Safe Clearance Procedures. The Contractor will be instructed by the Contracting Officer in the proper procedure for requesting clearances. Only qualified supervisory personnel will be permitted to request clearances. Request for "Outage" shall be made by the Contractor to the Contracting Officer in each instance and in sufficient time to permit adjusting power plant operations, and to coordinate outages with the dispatching agency per 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS paragraph 3.2 and 3.3. Scheduling of "Outage" for the USACE 13.4kV Powerline will be subject to the approval of the Contracting Officer. Scheduling an outage for the 69kV Powerline will be coordinated with the Contractor and West Central Electric Cooperative, Inc., Company at the expense of the Contractor. Point of contacts for USACE and West Central Electric Cooperative, Inc. will be provided after Contract Award.

1.14 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Proposed Methods of Operation; G-AO

Construction Right-of-Way

Right-of-Way Agreements

State and Federal Highways

Agreements for hauling on highways

State and Local Public Roads

Agreements for hauling on roads

Temporary Traffic Control (TTC); G, AO

Pre-Construction Road Condition Photographs; G, AO

Traffic Control; G-AO

Haul Route Plan; G, AO

SD-02 Shop Drawings

Care of Water; G-AO

SD-11 Closeout Submittals

Warranty of Construction

List of warranties with copy of each

1.15 FENCING

Contractor shall provide Fencing along the construction site at all open excavations to control access by unauthorized people.

a. The safety fencing must be a high visibility orange colored, high density polyethylene grid or approved equal, a minimum of 48 inches high and maximum mesh size of 2 inches, supported and tightly secured to steel posts located on maximum 10 foot centers, constructed at the approved location by the COR. Install fencing to be able to restrain a force of at least 250 pounds against it.

b. As soon as practicable, but not later than 15 days after mobilization to the site, furnish and erect temporary project safety fencing at the work site. Maintain the safety fencing during the life of the contract and, upon completion and acceptance of the work, will become the property of the Contractor and be removed from the work sites.

1.16 WARRANTY OF CONSTRUCTION (MAR 1994)

(a) In addition to any other warranties in this contract, the Contractor warrants, except as provided in paragraph (i) of this clause, that work performed under this contract conforms to the contract requirements and is free of any defect in equipment, material, or design furnished, or

workmanship performed by the Contractor or any subcontractor or supplier at any tier.

(b) This warranty shall continue for a period of 1 year from the date of final acceptance of the work. If the Government takes possession of any part of the work before final acceptance, this warranty shall continue for a period of 1 year from the date the Government takes possession.

(c) The Contractor shall remedy at the Contractor's expense any failure to conform, or any defect. In addition, the Contractor shall remedy at the Contractor's expense any damage to Government-owned or controlled real or personal property, when that damage is the result of--

(1) The Contractor's failure to conform to contract requirements; or

(2) Any defect of equipment, material, workmanship, or design furnished.

(d) The Contractor shall restore any work damaged in fulfilling the terms and conditions of this clause. The Contractor's warranty with respect to work repaired or replaced will run for 1 year from the date of repair or replacement.

(e) The Contracting Officer shall notify the Contractor, in writing, within a reasonable time after the discovery of any failure, defect, or damage.

(f) If the Contractor fails to remedy any failure, defect, or damage within a reasonable time after receipt of notice, the Government shall have the right to replace, repair, or otherwise remedy the failure, defect, or damage at the Contractor's expense.

(g) With respect to all warranties, express or implied, from subcontractors, manufacturers, or suppliers for work performed and materials furnished under this contract, the Contractor shall--

(1) Obtain all warranties that would be given in normal commercial practice;

(2) Require all warranties to be executed, in writing, for the benefit of the Government, if directed by the Contracting Officer; and

(3) Enforce all warranties for the benefit of the Government, if directed by the Contracting Officer.

(h) In the event the Contractor's warranty under paragraph (b) of this clause has expired, the Government may bring suit at its expense to enforce a subcontractor's, manufacturer's, or supplier's warranty.

(i) Unless a defect is caused by the negligence of the Contractor or subcontractor or supplier at any tier, the Contractor shall not be liable for the repair of any defects of material or design furnished by the Government nor for the repair of any damage that results from any defect in Government-furnished material or design.

(j) This warranty shall not limit the Government's rights under the Inspection and Acceptance clause of this contract with respect to latent defects, gross mistakes, or fraud. (FAR 52.246-21)

1.17 PORTABLE TOILETS

Government toilet facilities will not be available for Contractor's use. The Contractor shall provide and maintain portable toilets for use by the Contractor's staff and Government staff. Toilet(s) shall be placed at the location directed by the Contracting Officer. To prevent overturning by high winds, all portable toilets shall be anchored down.

1.18 EMPLOYEE PARKING

Park privately owned vehicles in the area designated on the contract drawings. Do not interfere with existing and established parking requirements of the government project staff.

1.19 FEDERAL HOLIDAYS AND WORKING HOURS

The Contractor will have access to the facility for work during normal plant business hours from 0700 to 1700 hrs Monday through Friday, excluding any federally recognized holidays or observance days. The Contractor shall plan all work accordingly. These hours will be strictly adhered to unless the Government determines work outside this time is beneficial to the Government or a bilateral modification for extended working hours is executed. Contractor can submit written request to work beyond normal hours, but must be approved by the COR.

The following Federal legal holidays are observed by this installation:

New Year's Day	1 January
Martin Luther King's Birthday	Third Monday in January
President's Day	Third Monday in February
Memorial Day	Last Monday in May
Juneteenth	19 June
Independence Day	4 July
Labor Day	First Monday in September
Columbus Day	Second Monday in October
Veterans Day	11 November
Thanksgiving Day	Fourth Thursday in November
Christmas Day	25 December

If a wage determination applies the number of holidays specified on it, it has priority over this requirement.

PART 2 NOT USED

PART 3 NOT USED

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DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 22 00

MEASUREMENT AND PAYMENT

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SECTION 01 22 00

MEASUREMENT AND PAYMENT

SCOPE: This section covers the methods and procedures which will be used to measure the Contractor's work and to effect payment.

GENERAL: The general outline of the principal features of each item as listed does not in any way limit the responsibility of the Contractor for making a thorough investigation of the Drawings and Specifications to determine the scope of work under the entire Contract. Payment to the Contractor of the amounts based on the quantities of work as measured in accordance with the specified methods of measurement and the prices stipulated in the accepted proposal will constitute complete compensation for all work shown on the Drawings, provided in the specifications or other Contract Documents and all costs of accepting the general risks, liabilities and obligations expressed or implied. Payment under all items shall include, but not necessarily be limited to, compensation for furnishing all supervision, labor, equipment, and materials and services (including overhead and profit), as well as performing all work required to accomplish and complete the work specified under each item and all other work required.

JOB ITEMS

Quantities: The quantities under Job items will not be measured except for the purpose of determining reasonable interim payments.

Interim Payments (or Progressive Payments): Interim payments will be made in accordance with the estimated value of work done as determined by the Contracting Officer Representative (COR) or as specified in this section, and in accordance with contract clause for payments.

UNIT PRICE ITEMS

Excavation/Removal Items: Excavation and/or removal items and fill items will be measured from existing ground levels to excavation surfaces shown on the Drawings or as directed by the COR.

Fill Items: Fill items will be measured from existing ground levels or excavation surfaces shown on the drawings or as directed by the COR.

Existing Ground Levels: Existing ground levels shall be surveyed prior to any disturbances in accordance with the relevant provisions of these specifications.

Excavation Surfaces Not Shown: In the event excavation surfaces are not clearly shown on the Drawings, the Contractor shall obtain clarification from the COR prior to commencement of excavation and/or removal.

Payments to Contractor: For unit priced items, payments will be made to the Contractor and approved by the COR in accordance with measurements for the unit prices entered in the proposal schedule.

Interim Measurement/Payments: Interim measurements and/or payments maybe adjusted to take account of partially completed work.

BIDDING ITEMS

PART 1 DEWATERING HTRW WATER DISPOSAL- CLIN 0001

1.1 Work Included

The work of this item shall include but not be limited to furnishing all labor and equipment required for containerizing dewatering liquids impacted by TPH-DRO, providing secondary containment on-site, testing, proper transportation and disposal of liquids; materials to handle spills, personal protective equipment (PPE), for construction of a decontamination area and providing the specified equipment and materials to be used in decontamination; personnel and maintenance of decontamination facilities; all record keeping, certificate(s) of disposal facility, closure report, testing reports, site safety controls in potentially impacted area.

1.2 Measurement

Gallons of contaminated liquid removed during dewatering operations that is impacted by TPH-DRO.

1.3 Payment

Applicable unit price times the number of gallons of impacted water impacted by TPH-DRO.

PART 2 EXCAVATION HTRW SOIL DISPOSAL- CLIN 0002

2.1 Work Included

The work of this item shall include but not be limited to furnishing all labor and equipment required for containerizing excavated satisfactory or unsatisfactory soils impacted by TPH-DRO; providing secondary containment on-site; testing; stockpiling, stockpiling liner, contaminated material storage, excavation log, proper disposal of impacted soils; materials to handle spills, personal protective equipment (PPE), for construction of a decontamination area and providing the specified equipment and materials to be used in decontamination; personnel and maintenance of decontamination facilities; all record keeping; certificate(s) of disposal facility; closure report; site safety controls in potentially impacted area.

2.2 Measurement

Measurement for excavation and onsite transportation shall be based on the actual number of cubic yards of contaminated material in-place prior to excavation. Determination of the volume of contaminated material excavated shall be based on cross-sectional volume determination reflecting the differential between the original elevation of the top of the contaminated material and the final elevations after the removal of the contaminated material.

2.3 Payment

Applicable unit price times the number of cubic yards of impacted soil excavated.

PART 3 8-INCH SOLID HDPE PIPE - CLIN 0003

3.1 Work Included

The work of this item shall include but not be limited to labor, materials, equipment, pipe, elbows, couplers, connections to relief wells, installation and removal of trench protective systems, and all other work (excluding bedding, excavation and backfill) incidental to the installation of the 8" diameter HDPE solid pipe system outfall pipes as specified herein and shown on the drawings.

3.2 Measurement

Per linear foot. The length of solid 8" diameter HDPE pipe installed will be measured from exterior of relief well casing to manholes or relief well collector pipe along the final pipe lines and grades placed in accordance with the project drawings and specifications and will include the length along couplers. Measurements will be made to the nearest foot.

3.3 Payment

Payment for this item shall be the unit price per linear foot as indicated on the Bidding Schedule multiplied by the actual length of pipe installed in the accepted work.

PART 4 COARSE AGGREGATE MATERIAL - CLIN 0004

4.1 Work Included

The work of this item shall include but not be limited to labor and equipment necessary for furnishing, stockpiling, transporting, placing, compacting, gradation testing, and all other work incidental to complete placement of the coarse aggregate material as required by drawings and specifications.

4.2 Measurement

Per Ton. Coarse aggregate material will be measured for payment by the number of tons of coarse aggregate material satisfactorily placed as specified. The coarse aggregate material shall be weighed: (1) on public or private scales which have been certified by the State. The Contractor shall furnish the Government Inspector a copy of each printed weigh bill when self printing scales are used, or a copy signed by a public or bonded weigh master as each load is delivered; or (2) coarse aggregate material may be weighed on the Contractor-furnished scales calibrated within 6 months of the start of work and under the supervision of the Government Inspector. Each printed weigh bill shall contain the following: date, unit number, time of gross, tare and net weight, name of project, contractor, contract number and signature of bonded weigh master. All coarse aggregate material shall be weighed to the nearest 20 pounds and the net weight reduced to the nearest hundredth of a ton.

4.3 Payment

Payment for this item shall be the unit price per ton as indicated on the Bidding Schedule multiplied by the actual number of tons placed in the accepted work. Waste associated with material stockpiling will not be included.

PART 5 RIP RAP - CLIN 0005

5.1 Work Included

The work of this item shall include but not be limited to labor, equipment, materials, gradation testing, and performing all operations in connection with furnishing, transporting, and placing riprap as required by drawings and specifications.

5.2 Measurement

Per Ton. Riprap material will be measured for payment by the number of tons satisfactorily placed as specified. The riprap material shall be weighed: (1) on public or private scales which have been certified by the State. The Contractor shall furnish the Government Inspector a copy of each printed weigh bill when self printing scales are used, or a copy signed by a public or bonded weigh master as each load is delivered; or (2) riprap material may be weighed on the Contractor-furnished scales under the supervision of the Government Inspector. Each printed weigh bill shall contain the following: date, unit number, time of gross, tare and net weight, name of project, contractor, contract number and signature of bonded weigh master. All riprap material shall be weighed to the nearest 20 pounds and the net weight reduced to the nearest hundredth of a ton.

5.3 Payment

Payment for "Riprap" shall be based on the unit price per ton as indicated on the Bidding Schedule multiplied by the number of tons needed to complete the required work according to drawings and specifications.

PART 6 SPALLS - CLIN 0006

6.1 Work Included

The work of this item shall include but not be limited to labor and equipment necessary for furnishing, gradation testing, transporting, and placing spalls as required.

6.2 Measurement

Per Ton. Measurement for payment shall be made in the presence of a Government inspector by weighing on approved scale provided by and at the expense of the Contractor. Weight certificates furnished by a public weigh master will be acceptable in lieu of such procedure when authorized by the Contracting Officer or their representative. Each weight slip shall contain the following: date, unit number, gross weight, time of gross weight, tare weight, time of tare weight, name of project, contract number, name of Contractor and signature of weigher.

6.3 Payment

Payment for spalls shall be based on the unit price per ton as indicated on the Bidding Schedule multiplied by the actual number of tons needed to complete the required work according to the plans and specifications.

PART 7 DEWATERING - CLIN 0007

7.1 Work Included

The work of this item shall include but not be limited to furnishing all plant, labor, materials and equipment and performing all operations (listed in no particular order) in connection with the dewatering system to meet the requirements of the contract to include but not be limited site preparation, drilling, testing, abandonment, maintenance and continual operation of the dewatering system and all other work incidental to the design (including additional aquifer performance testing and/or exploration proposed by the contractor), installation, operation, and abandonment of the dewatering system as specified herein and shown on the drawings. All additional analysis, evaluation, and investigations required for the design, submittal of the Dewatering Plan, implementation, operation, and abandonment shall also be considered incidental to this CLIN and the dewatering system as specified herein and shown on the drawings.

7.2 Measurement

Lump Sum (JOB).

7.3 Payment

Payment for this item shall be by lump sum as indicated on the Bidding Schedule.

PART 8 ALL REMAINING WORK - CLIN 0008

8.1 Work Included

The work included in this item shall include, but is not limited to, furnishing all labor, equipment, tools, subcontractors, and material needed to complete all remaining work not covered in Bid Items CLIN 001 through 007. This line item applies to the Prime Contractor and all subcontractors' mobilization and demobilization unless otherwise noted. All remaining work shall include but not be limited to: performance and payment bonds; taxes; permits; geotechnical investigations; field investigations; engineering oversight, Drilling Program Plans; sampling and laboratory testing; geotechnical investigation reports; site preparation; transport and storage of samples, disposal of cuttings, boring abandonment, site restoration related to field investigations; site controls, inspections, and Quality Control/Quality Assurance; all management, supervisory, and specialized personnel; equipment and temporary construction facilities (trailers) to the project site and their subsequent removal; providing, installing, and maintaining all field trailers; providing temporary utilities; contractor staging area, haul roads; preparation and submission of all submittals; preparation, implementation, and updating of all special project procedures; photographs; personal protective equipment (separate from PPE required for HTRW soil or water disposal); medical surveillance program including all required physical examinations; project records and documents; construction scheduling; site maintenance and cleanup; dust control; on-site or off-site scales; temporary construction and safety fence; temporary traffic control; permits for all required surveying; quantity, as-built, and investigation surveys; materials staging; maintaining all site access roads; installation of two new permanent vehicle gates on the haul road; establishing site security; construction of material and

equipment staging and storage areas; stripping of topsoil from areas of excavation, staging areas, and stockpiling area; satisfactory disposal of the vegetation from the relief well channel banks above the water surface in areas to receive fill material; storm drainage control system; equipment and labor necessary for excavation incidental to construction; demolition work and legal disposal off-site of the collector pipe system; disposal of asbestos containing material (ACM) pipes; temporary storage of ACM on site before disposal; all record keeping, and certificate(s) of disposal facilities; asphalt removal and replacement; slotted and solid HDPE pipes; elbows, couplers, and gaskets for collector pipe system; installation of replacement collector pipe system; installation and removal of trench protective systems; transportation and stockpiling of excavated materials; removal and disposal of unsatisfactory uncontaminated excavated materials (excludes storage and disposal of contaminated soils); abandonment of wells and piezometers; replacement relief well casing completions; replacement relief well casing outfall installation and connections to left abutment collector pipe system; installation of piezometers; extension of existing storm drainage culverts (RCP and CMP); flared end for 24" CMP culvert; top soil and seeding; erosion control materials; bedding and backfill materials; watertight joint testing; installing manholes; manhole ladders; manhole and relief well casing covers; flushing of collector pipe system; Post-inspection of left abutment collector pipe system and storm drainage culverts; closeout inspection(s); as-built drawings; and other miscellaneous items required to begin construction and closeout the Contract. The cost of all work specified in Division 1 - General Requirements, unless specifically covered in other bid items, will not be paid separately, but shall be included in the lump sum price bid in the Schedule for All Remaining Work.

8.2 Measurement

Lump Sum (JOB).

8.3 Payment

Payment for "All Remaining Work" shall be made on a progressive basis, based on the amount of work completed.

-- End of Section --

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SECTION 01 30 00.24

OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS

PART 1 GENERAL

1.1 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

In accordance with FAR 31.105(d)(2)(i)(b), for the predetermined schedule of construction equipment use rates, the contractor shall use Engineer Pamphlet (EP) 1110-1-8 (Construction Equipment Ownership and Operating Expense Schedule). Copies of each regional schedule may be obtained through the following internet site:

https://www.publications.usace.army.mil/USACE-Publications/Engineer-Pamphlets/ on pages 10 and 11 of 13.

1.2 CONTRACTOR SUPPLY AND USE OF ELECTRONIC SOFTWARE FOR PROCESSING CONSTRUCTION WAGE RATE REQUIREMENTS STATUTE CERTIFIED LABOR PAYROLLS

a. The Contractor is encouraged to use a commercially-available electronic system to process and submit certified payrolls electronically to the Government. The requirements for preparing, processing and providing certified labor payrolls are established by the Wage Rate Requirements statute.

b.The Contractor is responsible for obtaining and providing for all access, licenses, and other services required to provide for receipt, processing, certifying, electronically transmitting to the Government, and storing weekly payrolls and other data required for the Contractor to comply with the Wage Rate Requirements statute. When the Contractor uses an electronic payroll system, use the electronic payroll service used by the Contractor to prepare, process, and maintain the relevant payrolls and basic records during all work under this construction contract. The electronic payroll service must be capable of preserving these payrolls and related basic records for the required three years after contract completion. The Contractor must obtain and provide electronic system access to the Government, as required to comply with the Wage Rate Requirements over the duration of the construction contract.

(c) The Contractor's provision and use of an electronic payroll processing system must meet the following basic functional criteria:

(1) commercially available;

(2) compliant with appropriate Wage Rate Requirements statute payroll provisions in the FAR;

(3) able to accommodate the required numbers of employees and subcontractors planned to be employed under the contract;

(4) capable of producing an Excel spreadsheet-compatible electronic output of weekly payroll records for export into an Excel spreadsheet to be imported into the contractor's mode of Resident Management System 3.0;

(5) demonstrated security of data and data entry rights;

(6) ability to produce Contractor-certified electronic versions of weekly payroll data;

(7) ability to identify erroneous entries and track the data/time of all versions of the certified Wage Rate Requirements statute payrolls submitted to the government over the life of the contract;

(8) capable of generating a durable record copy in a Compact Disc (CD) or Digital Versatile Disc (DVD) and Portable Document Format (PDF) file record of data from the system database at the end of the contract closeout. This durable record copy of data from the electronic payroll processing system must be provided to the Government during contract closeout.

d. All Contractor-incurred costs related to the Contractor's provision and use of an electronic payroll processing service must be included in the Contractor's price for the overall work under the contract. The costs for compliance with the Wage Rate Requirements statute by using electronic payroll processing services must not be a separately bid or reimbursed item under this contract.

1.3 VETERANS EMPLOYMENT EMPHASIS FOR U.S. ARMY CORPS OF ENGINEERS CONTRACTS

In addition to complying with the requirements outlined in FAR Part 22.13, FAR Provision 52.222-38, FAR Clause 52.222-35, FAR Clause 52.222-37, DFARS 222.13 and Department of Labor regulations, U.S. Army Corps of Engineers (USACE) contractors and subcontractors at all tiers are encouraged to promote the training and employment of U.S. veterans while performing under a USACE contract. While no set-aside, evaluation preference, or incentive applies to the solicitation or performance under the resultant contract, USACE contractors are encouraged to seek out highly qualified veterans to perform services under this contract. The following resources are available to assist USACE contractors in their outreach efforts:

- U.S. Department of Labor Veterans’ Employment and Training Service (VETS): https://www.dol.gov/vets/
- Federal Veteran Employment Information: https://www.fedshirevets.gov/
- Veterans Opportunity to Work (VOW) Program: https://www.benefits.va.gov/vow/
- U.S. Army Warrior Transition Command Employment Index: https://wct.army.mil/modules/employers/index.html
- Hiring Our Heroes: https://www.uschamberfoundation.org/hiring-our-heroes

1.4 COMPLETION OF WORK

See Section 00 73 00 SUPPLEMENTARY CONDITIONS (SPECIAL CONTRACT REQUIREMENTS), FAR 52.211-10 COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK (APR 1984).

1.5 CONTRACTOR PERFORMANCE EVALUATIONS

See Federal Acquisition Regulation (FAR) Subpart 42.1502(e) for the requirements on past performance evaluations for construction contracts. For construction contracts valued at or above $750,000.00, including all modifications, the USACE will evaluate Contractor's performance using the

web-based Contractors Performance Assessment Reporting System (CPARS). After the USACE drafts an evaluation (interim or final), the Contractor will have the opportunity to access, review, comment and either concur or non-concur with the evaluation in the CPARS system for a period of 60 days. Access to the CPARS system requires either specific software called PKI certification (recommended method) or a username and password. The PKI certification is a Department of Defense recommendation and to provide security in electronic transactions. The certification software could cost approximately $110 - $125 per certificate per year and may be purchased from an External Certificate Authorities (ECA) vendor. Current information about the PKI certification process and contacting vendors can be found on the web site: https://www.cpars.gov.

1.6 ANTITERRORISM (AT)/OPERATIONS SECURITY (OPSEC) PROVISIONS

1. General security requirements and guidance: The security requirements described below apply to all contract personnel (including employees of the prime Contractor ("Contractor") and all subcontractor employees) supporting the performance requirements of this contract. The Contractor is responsible for compliance with these security requirements. Questions regarding security matters shall be addressed to the designated Government representative (e.g., Contracting Officer Representative (COR), Requiring Activity (RA) representative, or Contracting Officer (if a COR or other RA representative is not appointed)). Contract personnel are critical to the overall security and safety of US Army Corps of Engineers (USACE) installations, facilities and activities, and security awareness training contributes to those efforts. The Department of Defense (DoD) and Army security training requirements specified below, if applicable, are performance requirements; all applicable contract personnel shall complete initial training within 30 days of contract award or the date new contract personnel begin performance on the contract. Within five business days from the completion of training, the Contractor shall provide written documentation (e.g., email or memorandum) to the Government representative. The documentation shall include the names of contract personnel trained and which training they completed; the Contractor shall maintain training records as part of their contract files and be prepared to provide copies of training certificates to the Government representative. Contractor personnel and vehicles are subject to search when entering federal installations. Additionally, all contract personnel shall comply with Force Protection Condition (FPCON) measures, Random Antiterrorism Measures (commonly referred to as "RAMs"), and Health Protection Condition (HPCON) measures. The Contractor is responsible for meeting performance requirements during elevated FPCON and/or HPCON levels in accordance with applicable RA plans and procedures-this includes identifying mission essential and non-mission essential personnel. In addition to the changes otherwise authorized by the changes clause of this contract, should the FPCON or HPCON levels at any individual facility or installation change, the Government may implement security changes that affect contract personnel. The Contractor shall ensure all contract personnel are aware of their security responsibilities, including any site-specific requirements identified in local policies or procedures.

2. Not Used

3. Physical security and access control requirements: All contract personnel requiring physical access to a federal installation or facility shall comply with the access control procedures of that location. Contract personnel requiring unescorted access to meet contract performance

requirements on a DoD installation in the US shall be vetted by the installation/facility Provost Marshal/Directorate of Emergency Services/Security Office using the National Crime Information Center-Interstate Identification Index (commonly referred to as "NCIC-III") and Terrorist Screening Database (commonly referred to as "TSDB"). Contract personnel shall comply with all personal identity verification requirements specified in installation/facility policies and procedures. Contract personnel who do not meet requirements for unescorted access to USACE facilities shall coordinate escorted access with the Government representative, as needed. Contract personnel who receive keys, access cards, or lock combinations that provide access to government-owned property shall comply with key and lock control procedures of the RA.

3.1 Submit a complete, updated and signed, list of all Contractor and subcontractor personnel, including their titles and intended working hours, who will be working on site prior to start of work. This listing shall be revised and resubmitted when personnel changes occur. (SUBMITTAL FIO)

3.2 Personnel Risk Assessment

A minimum of seven days prior to engaging in work submit, to the COR or Project POC, a Personnel Risk Assessment (PRA) for each employee requiring authorized unescorted access to the Jobsite. The Contractor employee will only be allowed authorized unescorted physical access after the PRA is shown to and approved by the Government.

3.3 Authorized Unescorted Access Requirements

Perform a PRA on all Contractor personnel that require authorized unescorted access to the Jobsite. Costs associated with the execution of the PRA shall be at the expense of the Contractor. The content of the PRA is defined by the requirements as follows: (SUBMITTAL PRA)

a. Criminal Check - Obtain a criminal background check, completed within the last seven years (assuming continuous employment, otherwise a new one must be accomplished), on all Contractor personnel that require authorized unescorted access to the Jobsite. A minimum of a 7-year criminal background check with the state patrol office shall be performed from all states of residence and employment, for the past seven years. The Project Security Officer through the Contracting Officer will approve, disapprove, or revoke authorized unescorted access to the Jobsite as a result of the seven-year background check.

b. Identity Verification - Contractor employees shall provide positive verification of individual identity prior to authorized unescorted access to the Jobsite. Acceptable forms of identity verification are documents issued by a federal Government agency that include: the individual's photograph, name, and date of birth, such as a passport or military identification (ID) card. Additionally, a state issued driver's license or ID card is acceptable for identity verification.

c. The Criminal Check and Identity Verification shall be updated at least every seven years for each employee requiring authorized unescorted access to the Jobsite.

d. Escort Requirements - Contractor personnel not cleared for authorized access to the Jobsite may be escorted by Government or Contractor personnel that have authorized unescorted access to the

Jobsite. All costs related to the escorting of non-cleared personnel shall be at the expense of the Contractor. Additional burden shall not be placed upon the Government to provide these escorts. Prior to access, coordination with the Project Security Officer is required, including but not limited to:

(1) Verification of identity with photo identification
(2) Name of escorting individual and verification of unescorted status
(3) Time of entry into the Jobsite
(4) Time exiting the Jobsite.

4. Not Used

5. Not Used

6. Suspicious Activity Reporting training (e.g. iWATCH, CorpsWatch, or See Something, Say Something):
All contract personnel shall receive initial and annual refresher training from the RA representative on the local suspicious activity reporting program. This locally developed training provides contract personnel with general information on suspicious behavior, and guidance on reporting suspicious activity to the project manager, security representative or law enforcement entity.
This training shall be completed within 10 days prior to mobilization and within 30 calendar days of new employees commencing performance with the results reported to the COR. (submittal: iWATCH and/or CorpsWatch Training Sign In Sheets).
http://www.myarmyonesource.com/cmsresources/Army%20OneSource/Media/Videos/Family%20Programs%20and%20Services/iWatch_Program/iWATCH%2060_4streaming.wmv

7. Not Used

8. Not Used

9. Not Used

10. Not Used

11. Not Used

12. Not Used

13. Not Used

14. Pre-screen candidates using E-Verify Program: Contractors shall comply with the requirements set forth in FAR clause 52.222-54 Employment Eligibility Verification and FAR Subpart 22.18 in using the E-Verify Program at (https://www.e-verify.gov/) (website subject to change) to meet the contract employment eligibility requirements. Contractors are encouraged to cooperate with Federal and State agencies responsible for enforcing labor requirements to include eligibility for employment under United States immigration laws in accordance with FAR 22.102-1(i). An initial list of verified/eligible candidates shall be provided to the COR no later than three business days after the initial contract award. When contracts are with individuals, the individuals will be required to complete a Form I-9, Employment Eligibility Verification, and submit it to the Contracting Officer to become part of the official contract file.

15. Not Used

16. Not Used

1.7 EXCEPTION TO COMPLETION TIME AND LIQUIDATED DAMAGES

In case the Contracting Officer determines that seeding, sodding, and/or planting and/or the specified maintenance thereof is not feasible during the construction period, such work will be exempt from the completion time and liquidated damages. Accomplish this work during the first seeding, sodding, and/or planting period and the specified maintenance period following the completion date.

1.8 COMPUTING COMPLETION DATES FOR NON-WORK PERIOD

No work will be required at the construction site during the period 15 November through 1 April inclusive. The days in this period have been included in computing the calendar days for completion of the work. The Contractor may perform work at the site during all or any part of this period upon giving prior written notice to the Contracting Officer. Working during this non-work period requires approval by the Contracting Officer. No time extensions will be granted for delays during this period.

1.9 CONTRACT DRAWINGS AND SPECIFICATIONS

1.9.1 SETS FURNISHED

Utilize the bid drawings and specifications as amended in the performance of the work until the electronic Adobe Acrobat.pdf conformed specifications and contract drawings (i.e., bid drawings that have been posted with all amendment changes) are sent electronically to the Contractor. The work must conform to the contract drawings, set out in the drawing index, all of which form a part of these specifications. The work must also conform to any of the standard details bound or referenced herein. The Contractor shall be responsible for making copies of all plans and specifications as needed for the duration of the contract.
]

1.9.2 DISTRIBUTION

The Government will provide the Contractor with a CD-ROM or DVD-ROM or sent electronically containing Adobe Acrobat.pdf contract drawings and conformed specification sets and editable CAD file drawings (format defined in Section 01 78 39.00 24 AS-BUILT DRAWINGS. Prepare final record or as-built drawings as defined in Section 01 78 39.00 24 AS-BUILT DRAWINGS.

1.9.3 NOTIFICATION OF DISCREPANCIES

Check all electronically sent drawing files furnished by the government immediately upon their receipt and promptly notify the Contracting Officer of any discrepancies. Follow dimensions marked on drawings in lieu of scale measurements. Enlarged plans and details govern where the same work is shown at smaller scales. All scales shown are based on a standard drawing size of 22" x 34". If any other size drawings are furnished or plotted adjust the scales accordingly. The Contractor must also advise his sub-contractors of the above. The Contractor must compare all drawings and verify the figures before laying out the work and will be

responsible for any errors which might have been avoided thereby.

1.9.4 OMISSIONS

Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or which are customarily performed, does not relieve the Contractor from performing such omitted or misdescribed details of the work but work must be performed as if fully and correctly set forth and described in the drawings and specifications.

1.10 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit items below in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Security Personnel List; G-PO

Security Personnel list as described in Access and General Protection/Security Policy and Procedures see OPSEC paragraphs, subparagraph 3.1.

Personnel Risk Assessment; G-PO

Provide Personnel Risk Assessment for each employee requiring authorized unescorted access to the Jobsite. See OPSEC paragraphs, subparagraph 3.2

iWATCH and/or CorpsWatch Training Sign In Sheets;

Sign In Sheets for all employee training required for iWATCH and/or CorpsWatch Training, see OPSEC paragraphs, subparagraph 6

E-Verify;

Provide E-Verify completion sheets required for OPSEC, see OPSEC paragraphs, subparagraph 14

1.11 PAYMENT

1.11.1 PROMPT PAYMENT ACT

Pay requests authorized in GENERAL CONDITIONS (CONTRACT CLAUSES) clause: "Payments Under Fixed-Price Construction Contracts", will be paid pursuant to the clause, "Prompt Payment for Construction Contracts". Submit pay requests on ENG Form 93 and 93a, "Payment Estimate-Contract Performance" and "Continuation". All information and substantiation required by the identified contract clauses must be submitted with the ENG Form 93, and the required certification included on the last page of the ENG Form 93a, signed by an authorized contractor official and dated when signed. The designated billing office is the Office of the Area Engineer.

1.11.2 PAYMENT FOR MATERIALS DELIVERED OFFSITE

a. Pursuant to Federal Acquisition Regulation (FAR) 52.232-5, Payments

Under Fixed Price Construction Contracts, materials delivered to the contractor at locations other than the site of the work may be taken into consideration in making payments, if included in payment estimates and if all the conditions of the General Provisions are fulfilled. Payment for items delivered to locations other than the work site are limited to:

(1) Materials required by the technical provisions; or

(2) Materials that have been fabricated to the point where they are identifiable to an item of work required under this contract; or

(3) Items specifically listed below in paragraph b.

b. Payment for materials delivered off-site must be made only after receipt of paid invoices listing the value of material and labor incorporated in the items along with a canceled check showing the prime contractor's title to the items delivered off site. Payment for materials delivered off-site must be limited to the following items: none.

1.12 AVAILABILITY AND USE OF UTILITY SERVICES

Use of public and private utilities will be as found available. The Contractor must make his own arrangements for use of public and private utilities.

1.13 QUANTITY SURVEYS

See Section 00 73 00 SUPPLEMENTARY CONDITIONS (SPECIAL CONTRACT REQUIREMENTS) FAR 52.236.16 QUANTITY SURVEYS- Alternate I (APR 1984).

1.14 VARIATIONS IN ESTIMATED QUANTITIES

See Section 00 72 00 GENERAL CONDITIONS.

1.15 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

a. This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the GENERAL CONDITIONS (CONTRACT CLAUSES) clause entitled "Default: (Fixed-Price Construction)." In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(1) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

(2) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

b. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The Contractor's progress schedule must reflect these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

Jan	14
Feb	12
Mar	8
Apr	4
May	4
Jun	5
Jul	3
Aug	3
Sep	3
Oct	3
Nov	5
Dec	13

c. Upon acknowledgment of the Notice to Proceed (NTP) and continuing throughout the contract, the contractor will record on the RMS daily CQC report, any occurrence of adverse weather and resultant impact to normally scheduled work, within 24 hours of the event. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the contractor's scheduled work day. Describe in the RMS daily CQC reports the critical path item that is being affected and provide the critical path activity number(s) from the current schedule. The COR must acknowledge and accept the agreed upon occurrence of each adverse weather delay in RMS for the delays to be considered as adverse weather delays.

At the end of each month, identify the number of actual adverse weather delay days that includes days impacted by actual adverse weather (even if adverse weather occurred in previous month), calculated chronologically from the first to the last day of each month, and recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in paragraph b. above, the Contracting Officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the GENERAL CONDITIONS (CONTRACT CLAUSES) clause entitled "Default (Fixed Price Construction)". (ER 415-1-15)

1.16 CONTRACTOR QUALITY CONTROL (CQC)

See Section 01 45 00.00 10 QUALITY CONTROL.

1.17 NONDOMESTIC CONSTRUCTION MATERIALS

The list of excepted nondomestic construction materials or their components referenced in the Buy American Construction Material Contract Clauses includes the list set forth in paragraph 25.104 of the Federal Acquisition Regulation.

1.18 DAILY WORK SCHEDULES AND WEEKLY COORDINATION MEETINGS

In order to closely coordinate work under this contract, prepare a written agenda/meeting minutes and attend a weekly coordination meeting with the Contracting Officer and Using Service at which time the Contractor must submit for coordination and approval, their proposed daily work schedule for the next two week period. Provide a copy of modifications (MODs), Serial Letters, Requests for Information (RFIs)and any other information that is needed in the minutes of the meeting. Include required temporary utility services, time and duration of interruptions, and protection of adjoining areas with the Contractor's

proposed 2-week work schedule. At this meeting, the Contractor must also submit their schedule of proposed dates and times of all preparatory inspections to be performed during the next 2 weeks. All schedules shall be in developed in accordance with Section 01 32 01.00 10 PROJECT SCHEDULE Coordination action by the Contracting Officer relative to these schedules will be accomplished during these weekly meetings. Daily reports must be completed and given to the Contracting Officer or Representative within 24 hours of work. All official correspondence such as serial letters and RFIs, with attachments are to be provided in one hardcopy original with original signatures and one electronic (Adobe pdf format) copy by email. The Government will consider the correspondence to be received when the official hardcopy or electronic copy is received by the designated office.

1.19 AS-BUILT DRAWINGS

See SECTION 01 78 39.00 24 - AS-BUILT DRAWINGS.

1.20 PROFIT

a. Use the weighted guidelines method of determining profit on any equitable adjustment change order or modification issued under this contract. The profit factors must be as follows:

Factor	Rate	Weight	Value
Degree of Risk	20	See Item	
Relative difficulty of work	15	b. below	
Size of Job	15		
Period of performance	15		
Contractor's investment	5		
Assistance by Government	5		
Subcontracting	25		
	100		

b. Based on the circumstances of each procurement action, each of the above factors must be weighted from .03 to .12 as indicated below. Obtain the value by multiplying the rate by the weight. The value column when totaled indicates the fair and reasonable profit percentage under the circumstances of the particular procurement.

(1) Degree of Risk. Where the work involves no risk or the degree of risk is very small, the weighting should be .03; as the degree of risk increases, the weighting should be increased up to a maximum of .12. Lump sum items will have, generally, a higher weighted value than the unit price items for which quantities are provided. Other things to consider: the portion of the work to be done by subcontractors, nature of work, where work is to be performed, reasonableness of negotiated costs, amount of labor included in costs, and whether the negotiation is before or after performance of work.

(2) Relative Difficulty of Work. If the work is most difficult and complex, the weighting should be .12 and should be proportionately reduced to .03 on the simplest of jobs. This factor is tied in to some extent with the degree of risk. Some things to consider: the nature of the work, by whom it is to be done, where, and what is the time schedule.

(3) Size of Job. All work not in excess of $100,000 shall be weighted at .12. Work estimated between $100,000 and $5,000,000 shall be proportionately weighted from .12 to .05.

(4) Periods of Performance. Jobs in excess of 24 months are to be weighted at .12. Jobs of lesser duration are to be proportionately weighted to a minimum of .03 for jobs not to exceed 30 days. No weight where additional time not required.

(5) Contractor's Investment. To be weighted from .03 to .12 on the basis of below average, average, and above average. Things to consider: amount of subcontracting, mobilization payment item, Government furnished property, equipment and facilities, and expediting assistance.

(6) Assistance by Government. To be weighted from .12 to .03 on the basis of average to above average. Things to consider: use of Government-owned property, equipment and facilities, and expediting assistance.

(7) Subcontracting. To be weighted inversely proportional to the amount of subcontracting. Where 80 percent or more of the work is to be subcontracted, the weighting is to be .03 and such weighting proportionately increased to .12 where all the work is performed by the Contractor's own forces.

1.21 LABOR CONDITIONS APPLICABLE TO TEMPORARY FACILITIES

It is the position of the Department of Defense that the Davis-Bacon Act, 40 U.S.C. 276a is applicable to temporary facilities such as job headquarters, tool yards, batch plants, borrow pits, sandpits, rock quarries, and similar operations, provided they are dedicated exclusively, or nearly so, to performance of the contract or project, and provided they are adjacent or virtually adjacent to the site of the work and are established after receipt of the proposal or bid. Clause "Payrolls and Basic Records" of the GENERAL CONDITIONS (CONTRACT CLAUSES) is applicable to such operations.

1.22 DRAWING SCALES

All scales shown are based on a standard drawing size of 22" x 34". If any other size drawings are furnished or plotted, the contractor adjust the scales accordingly. The Contractor must also advise their sub-contractors of the above.

PART 2 NOT USED

PART 3 NOT USED

-- End of Section --

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PROJECT SCHEDULE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AACE INTERNATIONAL (AACE)

AACE 29R-03	(2011) Forensic Schedule Analysis
AACE 52R-06	(2006) Time Impact Analysis - As Applied in Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11	(1995) Administration -- Progress, Schedules, and Network Analysis Systems

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Project Scheduler Qualifications; G, AO

Preliminary Project Schedule; G, AO

Initial Project Schedule; G, AO

Periodic Schedule Update; G, AO

1.3 PROJECT SCHEDULER QUALIFICATIONS

Designate an authorized representative to be responsible for the preparation of the schedule and all required updating and production of reports. The authorized representative must have a minimum of 2-years experience scheduling construction projects similar in size and nature to this project with scheduling software that meets the requirements of this specification. Representative must have a comprehensive knowledge of CPM scheduling principles and application.

PART 2 PRODUCTS

2.1 SOFTWARE

The scheduling software utilized to produce and update the schedules required herein must be capable of meeting all requirements of this specification.

2.1.1 Government Default Software

The Government default software is Primavera P6.

2.1.2 Contractor Software

Scheduling software used by the contractor must be commercially available from the software vendor for purchase with vendor software support agreements available. The software routine used to create the required sdef file must be created and supported by the software manufacturer.

2.1.2.1 Primavera

If Primavera P6 is selected for use, provide the "xer" export file in a version of P6 importable by the Government system.

2.1.2.2 Other Than Primavera

Use of software other than Primavera P6 must be approved by the Contracting Officer. If a different software system is approved, the Contracting Officer may require the Contractor to provide for the Government's use up to two licenses, two computers, and training for two Government employees in the use of the software. These computers will be stand-alone and not connected to Government network. Computers and licenses will be returned at project completion.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Prepare for approval a Project Schedule, as specified herein, pursuant to FAR Clause 52.236-15 Schedules for Construction Contracts. Show in the schedule the proposed sequence to perform the work and dates contemplated for starting and completing all schedule activities. The scheduling of the entire project is required. The scheduling of construction is the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Subcontractors and suppliers working on the project must also contribute in developing and maintaining an accurate Project Schedule. Provide a schedule that is a forward planning as well as a project monitoring tool. Use the Critical Path Method (CPM) of network calculation to generate all Project Schedules. Prepare each Project Schedule using the Precedence Diagram Method (PDM).

3.2 BASIS FOR PAYMENT AND COST LOADING

The schedule is the basis for determining contract earnings during each update period and therefore the amount of each progress payment. The aggregate value of all activities coded to a contract CLIN must equal the value of the CLIN.

3.2.1 Activity Cost Loading

Activity cost loading must be reasonable and without front-end loading. Provide additional documentation to demonstrate reasonableness if requested by the Contracting Officer.

3.2.2 Withholdings / Payment Rejection

Failure to meet the requirements of this specification may result in the disapproval of the preliminary, initial or periodic schedule updates and subsequent rejection of payment requests until compliance is met.

In the event that the Contracting Officer directs schedule revisions and those revisions have not been included in subsequent Project Schedule revisions or updates, the Contracting Officer may withhold 10 percent of pay request amount from each payment period until such revisions to the project schedule have been made.

3.3 PROJECT SCHEDULE DETAILED REQUIREMENTS

3.3.1 Level of Detail Required

Develop the Project Schedule to the appropriate level of detail to address major milestones and to allow for satisfactory project planning and execution. Failure to develop the Project Schedule to an appropriate level of detail will result in its disapproval. The Contracting Officer will consider, but is not limited to, the following characteristics and requirements to determine appropriate level of detail:

3.3.2 Activity Durations

Reasonable activity durations are those that allow the progress of ongoing activities to be accurately determined between update periods. Less than 2 percent of all non-procurement activities may have Original Durations (OD) greater than 20 work days or 30 calendar days.

3.3.3 Procurement Activities

Include activities associated with the critical submittals and their approvals, procurement, fabrication, and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead procurement activities are those with an anticipated procurement sequence of over 90 calendar days.

3.3.4 Mandatory Tasks

Include the following activities/tasks in the initial project schedule and all updates.

a. Submission, review and acceptance of SD-01 Preconstruction Submittals (individual activity for each).

a.1 Pre-Construction Submittals that impact Project Schedule

Emergency Contingency Plan

- See section 31 23 00.00 20 Excavation and backfilling for Collector Pipe System for requirements
- Submit: no more than 45 days following written notice to proceed and prior to beginning of work.

Geotechnical Investigation Drilling Program Plan

- See section 02 32 13 Subsurface Drilling and Sampling for requirements.
- will take approximately 4-6 weeks to obtain authorization.

Dewatering Drilling Program Plan

- see section 33 26 00 for requirements
- will take approximately 4-6 weeks to obtain authorization

Geotechnical Investigation

- See section 02 32 13 Subsurface Drilling and Sampling and 02 61 13 Excavation and Handling of Contaminated material
- DPP for TPH-DRO Impacted Area must be approved prior to investigation

Field Investigation in Support of Dewatering System Design

- see section 33 26 00 Dewatering for requirements

Dewatering Plan

- See section 33 26 00 Dewatering for requirements
- Submit: no more than 60 days following notice to proceed and prior to beginning of work.
- Include Dewatering Design System Fieldwork Report if elected, see Section 33 26 00 Dewatering

will take approximately 4-6 weeks to obtain authorization prior to installation

Geotechnical Investigation Report

- See section 02 32 13 Subsurface Drilling and Sampling
- Submit: 45 days before start of construction in the TPH-DRO impacted area.

Project Work Plan

- See section 31 00 00 Earthwork for requirements
- Submit: no more than 60 days following written notice to proceed and prior to beginning of work.

Shoring and Sheeting Plan

- See section 31 23 00.00 20 Excavation and backfilling for Collector Pipe System for requirements
- Submit: 60 days prior to beginning of work.

Pipe Production and Connection Detail Plan

- See section 33 46 16 Collector Pipe System for requirements
- Submit: 30 days prior to beginning of work.

Contaminated Media Plan

- See section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS for requirements
- Submit: 30 days prior to beginning of work.

b. Submission of mechanical/electrical/information systems layout drawings.

c. Long procurement activities

d. Submission and approval of O & M manuals.

e. Submission and approval of as-built drawings.

f. Submission and approval of DD1354 data and installed equipment lists.

g. Submission and approval of testing and air balance (TAB).

h. Submission of TAB specialist design review report.

i. Performance Verification testing.

j. Other systems testing, if required.

k. Contractor's pre-final inspection.

l. Correction of punch list from Contractor's pre-final inspection.

m. Government's pre-final inspection.

n. Correction of punch list from Government's pre-final inspection.

o. Final inspection.

3.3.5 Government Activities

Show Government and other agency activities that could impact progress. These activities include, but are not limited to: environmental permit approvals by State regulators, inspections, utility tie-in, Government Furnished Equipment (GFE) and Notice to Proceed (NTP) for phasing requirements.

3.3.6 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11. This exact structure is mandatory. Develop and assign all Activity Codes to activities as detailed herein. A template SDEF compatible schedule backup file is available on the web site: http://rms.usace.army.mil.

The SDEF format is as follows:

Field	Activity Code	Length	Description
1	WRKP	3	Workers per day
2	RESP	4	Responsible party
3	AREA	4	Area of work
4	MODF	6	Modification Number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of work
7	CATW	1	Category of work

Field	Activity Code	Length	Description
8	FOW	20	Feature of work*

*Some systems require that FEATURE OF WORK values be placed in several activity code fields. The notation shown is for Primavera P6. Refer to the specific software guidelines with respect to the FEATURE OF WORK field requirements.

3.3.6.1 Workers Per Day (WRKP)

Assign Workers per Day for all field construction or direct work activities, unless directed otherwise by the Contracting Officer. Workers per day is based on the average number of workers expected each day to perform a task for the duration of that activity.

3.3.6.2 Responsible Party Coding (RESP)

Assign responsibility code for all activities to the Prime Contractor, Subcontractor(s) or Government agency(ies) responsible for performing the activity.

a. Activities coded with a Government Responsibility code include, but are not limited to: Government approvals, Government design reviews, environmental permit approvals by State regulators, Government Furnished Property/Equipment (GFP) and Notice to Proceed (NTP) for phasing requirements.

b. Activities cannot have more than one Responsibility Code. Examples of acceptable activity code values are: DOR (for the designer of record); ELEC (for the electrical subcontractor); MECH (for the mechanical subcontractor); and GOVT (for USACE).

3.3.6.3 Area of Work Coding (AREA)

Assign Work Area code to activities based upon the work area in which the activity occurs. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew from working in more than one work area at a time due to restraints on resources or space. Examples of Work Area Coding include different areas within a floor of a building, different floors within a building, and different buildings within a complex of buildings. Activities cannot have more than one Work Area Code.

Not all activities are required to be Work Area coded. A lack of Work Area coding indicates the activity is not resource or space constrained.

3.3.6.4 Modification Number (MODF)

Assign a Modification Number Code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by Contracting Officer. Key all Code values to the Government's modification numbering system. An activity can have only one Modification Number Code.

3.3.6.5 Bid Item Coding (BIDI)

Assign a Bid Item Code to all activities using the Contract Line Item Schedule (CLIN) to which the activity belongs, even when an activity is not cost loaded. An activity can have only one BIDI Code.

3.3.6.6 Phase of Work Coding (PHAS)

Assign Phase of Work Code to all activities. Examples of phase of work are procurement phase and construction phase. Each activity can have only one Phase of Work code.

a. Code proposed fast track design and construction phases proposed to allow filtering and organizing the schedule by fast track design and construction packages.

b. If the contract specifies phasing with separately defined performance periods, identify a Phase Code to allow filtering and organizing the schedule accordingly.

3.3.6.7 Category of Work Coding (CATW)

Assign a Category of Work Code to all activities. Category of Work Codes include, but are not limited to construction submittal, procurement, fabrication, weather sensitive installation, non-weather sensitive installation, start-up, and testing activities. Each activity can have no more than one Category of Work Code.

3.3.6.8 Feature of Work Coding (FOW)

Assign a Feature of Work Code to appropriate activities based on the Definable Feature of Work to which the activity belongs based on the approved QC plan.

Definable Feature of Work is defined in Section 01 45 00.00 10 QUALITY CONTROL. An activity can have only one Feature of Work Code.

3.3.7 Contract Milestones and Constraints

Milestone activities are to be used for significant project events including, but not limited to, project phasing, project start and end activities, or interim completion dates. The use of artificial float constraints such as "zero free float" or "zero total float" are prohibited.

Mandatory constraints that ignore or effect network logic are prohibited. No constrained dates are allowed in the schedule other than those specified herein. Submit additional constraints to the Contracting Officer for approval on a case by case basis.

3.3.7.1 Project Start Date Milestone and Constraint

The first activity in the project schedule must be a start milestone titled "NTP Acknowledged," which must have a "Start On" constraint date equal to the date that the NTP is acknowledged.

3.3.7.2 End Project Finish Milestone and Constraint

The last activity in the schedule must be a finish milestone titled "End

Project."

Constrain the project schedule to the Contract Completion Date in such a way that if the schedule calculates an early finish, then the float calculation for "End Project" milestone reflects positive float on the longest path. If the project schedule calculates a late finish, then the "End Project" milestone float calculation reflects negative float on the longest path. The Government is under no obligation to accelerate Government activities to support a Contractor's early completion.

3.3.7.3 Interim Completion Dates and Constraints

Constrain contractually specified interim completion dates to show negative float when the calculated late finish date of the last activity in that phase is later than the specified interim completion date.

3.3.7.3.1 Start Phase

Use a start milestone as the first activity for a project phase. Call the start milestone "Start Phase X" where "X" refers to the phase of work.

3.3.7.3.2 End Phase

Use a finish milestone as the last activity for a project phase. Call the finish milestone "End Phase X" where "X" refers to the phase of work.

3.3.8 Calendars

Schedule activities on a Calendar to which the activity logically belongs. Develop calendars to accommodate any contract defined work period such as a 7-day calendar for Government Acceptance activities, concrete cure times, etc. Develop the default Calendar to match the physical work plan with non-work periods identified including weekends and holidays. Develop Seasonal Calendar(s) and assign to seasonally affected activities as applicable.

If an activity is weather sensitive it should be assigned to a calendar showing non-work days on a monthly basis, with the non-work days selected at random across the weeks of the calendar, using the anticipated adverse weather delay work days provided in the Special Contract Clauses . Assign non-work days over a seven-day week as weather records are compiled on seven-day weeks, which may cause some of the weather related non-work days to fall on weekends.

3.3.9 Open Ended Logic

Only two open ended activities are allowed: the first activity "NTP Acknowledged" may have no predecessor logic, and the last activity -"End Project" may have no successor logic.

Predecessor open ended logic may be allowed in a time impact analyses upon the Contracting Officer's approval.

3.3.10 Default Progress Data Disallowed

Actual Start and Finish dates must not automatically update with default mechanisms included in the scheduling software. Updating of the percent complete and the remaining duration of any activity must be independent functions. Disable program features that calculate one of these

parameters from the other. Activity Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided in the Contractor Quality Control Reports. Failure to document the AS and AF dates in the Daily Quality Control report will result in disapproval of the Contractor's schedule.

3.3.11 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the Contracting Officer. Propose logic corrections to eliminate out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated project schedule. Address out of sequence progress or logic changes in the Narrative Report and in the periodic schedule update meetings.

3.3.12 Added and Deleted Activities

Do not delete activities from the project schedule or add new activities to the schedule without approval from the Contracting Officer. Activity ID and description changes are considered new activities and cannot be changed without Contracting Officer approval.

3.3.13 Original Durations

Activity Original Durations (OD) must be reasonable to perform the work item. OD changes are prohibited unless justification is provided and approved by the Contracting Officer.

3.3.14 Leads, Lags, and Start to Finish Relationships

Lags must be reasonable as determined by the Government and not used in place of realistic original durations, must not be in place to artificially absorb float, or to replace proper schedule logic.

a. Leads (negative lags) are prohibited.

b. Start to Finish (SF) relationships are prohibited.

3.3.15 Retained Logic

Schedule calculations must retain the logic between predecessors and successors ("retained logic" mode) even when the successor activity(s) starts and the predecessor activity(s) has not finished (out-of-sequence progress). Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") are not allowed.

3.3.16 Percent Complete

Update the percent complete for each activity started, based on the realistic assessment of earned value. Activities which are complete but for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete to allow for proper schedule management.

3.3.17 Remaining Duration

Update the remaining duration for each activity based on the number of estimated work days it will take to complete the activity. Remaining duration may not mathematically correlate with percentage found under paragraph entitled Percent Complete.

3.3.18 Cost Loading of Closeout Activities

Cost load the "Correction of punch list from Government pre-final inspection" activity(ies) not less than 1 percent of the present contract value. Activity(ies) may be declared 100 percent complete upon the Government's verification of completion and correction of all punch list work identified during Government pre-final inspection(s).

3.3.18.1 As-Built Drawings

If there is no separate contract line item (CLIN) for as-built drawings, cost load the "Submission and approval of as-built drawings" activity not less than $35,000 or 1 percent of the present contract value, whichever is greater, up to $200,000. Activity will be declared 100 percent complete upon the Government's approval.

3.3.18.2 O & M Manuals

Cost load the "Submission and approval of O & M manuals" activity not less than $20,000. Activity will be declared 100 percent complete upon the Government's approval of all O & M manuals.

3.3.19 Early Completion Schedule and the Right to Finish Early

An Early Completion Schedule is an Initial Project Schedule (IPS) that indicates all scope of the required contract work will be completed before the contractually required completion date.

a. No IPS indicating an Early Completion will be accepted without being fully resource-loaded (including crew sizes and manhours) and the Government agreeing that the schedule is reasonable and achievable.

b. The Government is under no obligation to accelerate work items it is responsible for to ensure that the early completion is met nor is it responsible to modify incremental funding (if applicable) for the project to meet the contractor's accelerated work.

3.4 PROJECT SCHEDULE SUBMISSIONS

Provide the submissions as described below. The files, reports, and network diagrams required for each submission are contained in paragraph SUBMISSION REQUIREMENTS. If the Contractor fails or refuses to furnish the information and schedule updates as set forth herein, then the Contractor will be deemed not to have provided an estimate upon which a progress payment can be made.

Review comments made by the Government on the schedule(s) do not relieve the Contractor from compliance with requirements of the Contract Documents.

3.4.1 Preliminary Project Schedule Submission

Within 15 calendar days after the NTP is acknowledged submit the

Preliminary Project Schedule defining the planned operations detailed for the first 90 calendar days for approval. The approved Preliminary Project Schedule will be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Project Schedule to balance the contract award CLINS shown on the Price Schedule. The Preliminary Project Schedule may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as specified. The Preliminary Project Schedule forms the basis for the Initial Project Schedule specified herein and must include all of the required plan and program preparations, submissions and approvals identified in the contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan) as well as design activities, planned submissions of all early design packages, permitting activities, design review conference activities, and other non-construction activities intended to occur within the first 90 calendar days. Government acceptance of the associated design package(s) and all other specified Program and Plan approvals must occur prior to any planned construction activities. Activity code any activities that are summary in nature after the first 90 calendar days with Bid Item (CLIN) code (BIDI), Responsibility Code (RESP) and Feature of Work code (FOW).

3.4.2 Initial Project Schedule Submission

Submit the Initial Project Schedule for approval within 42 calendar days after notice to proceed is issued. The schedule must demonstrate a reasonable and realistic sequence of activities which represent all work through the entire contract performance period. No payment will be made for work items not fully detailed in the Project Schedule.

3.4.3 Periodic Schedule Updates

Update the Project Schedule routinely at an interval approved by the Contracting Officer or designated representative, monthly at a minimum. Provide a draft Periodic Schedule Update for review at the schedule update meetings as prescribed in the paragraph PERIODIC SCHEDULE UPDATE MEETINGS. These updates will enable the Government to assess Contractor's progress.

a. Update information including Actual Start Dates (AS), Actual Finish Dates (AF), Remaining Durations (RD), and Percent Complete is subject to the approval of the Government at the meeting.

b. AS and AF dates must match the date(s) reported on the Contractor's Quality Control Report for an activity start or finish.

3.5 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule Update throughout the life of the project:

3.5.1 Submission

Submit the current project schedule, the narrative report and all required schedule reports electronically using the project submittal/transmittal process or by serialized letter. Each schedule must have a unique file name and use project specific settings.

3.5.2 Narrative Report

Provide a Narrative Report with each schedule submission. The Narrative Report is expected to communicate to the Government the thorough analysis of the schedule output and the plans to compensate for any problems, either current or potential, which are revealed through that analysis. Include the following information as minimum in the Narrative Report:

a. Identify and discuss the work scheduled to start in the next update period.

b. A description of activities along the two most critical paths where the total float is less than or equal to 20 work days.

c. A description of current and anticipated problem areas or delaying factors and their impact and an explanation of corrective actions taken or required to be taken.

d. Identify and explain why activities based on their calculated late dates should have either started or finished during the update period but did not.

e. Identify and discuss all schedule changes by activity ID and activity name including what specifically was changed and why the change was needed. Include at a minimum new and deleted activities, logic changes, duration changes, calendar changes, lag changes, resource changes, and actual start and finish date changes.

f. Identify and discuss out-of-sequence work.

3.5.3 Schedule Reports

The format, filtering, organizing and sorting for each schedule report will be as directed by the Contracting Officer or designated representative. Typically, reports contain Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. Provide the reports electronically in .pdf format. The following reports are required for schedule submission reviews unless directed otherwise by the Contracting Officer.

3.5.3.1 Activity Report

List of all activities sorted according to activity number.

3.5.3.2 Logic Report

List of detailed predecessor and successor activities for every activity in ascending order by activity number.

3.5.3.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

3.5.3.4 Earnings Report by CLIN

A compilation of the Total Earnings on the project from the NTP to the data date, which reflects the earnings of activities based on the agreements made in the schedule update meeting defined herein. Provided a complete schedule update has been furnished, this report serves as the basis of determining progress payments. Group activities by CLIN number and sort by activity number. Provide a total CLIN percent earned value, CLIN percent complete, and project percent complete. The printed report must contain the following for each activity: the Activity Number, Activity Description, Original Budgeted Amount, Earnings to Date, Earnings this period, Total Quantity, Quantity to Date, and Percent Complete (based on cost).

3.5.3.5 Schedule Log

Provide a Scheduling/Leveling Report generated from the current project schedule being submitted.

3.5.3.6 Critical Path

Provide an Adobe .pdf report showing the critical path.

3.5.4 Network Diagram

The Network Diagram is required for the Preliminary, Initial and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The Contracting Officer will use, but is not limited to, the following conditions to review compliance with this paragraph:

3.5.4.1 Continuous Flow

Show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

3.5.4.2 Project Milestone Dates

Show dates on the diagram for start of project, any contract required interim completion dates, and contract completion dates.

3.5.4.3 Critical Path

Show all activities on the critical path. The critical path is defined as the longest path.

3.5.4.4 Banding

Organize activities using the WBS or as otherwise directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by major elements of work, category of work, work area and/or responsibility.

3.5.4.5 Cash Flow / Schedule Variance Control (SVC) Diagram

With each schedule submission, provide an SVC diagram showing 1) Cash Flow S-Curves indicating planned project cost based on projected early and late activity finish dates, and 2) Earned Value to-date.

3.6 PERIODIC SCHEDULE UPDATE

3.6.1 Periodic Schedule Update Meetings

Conduct periodic schedule update meetings for the purpose of reviewing the proposed percent complete, Periodic Schedule Update, Narrative Report, Schedule Reports, and progress payment. Conduct meetings at least monthly and within five days of the proposed schedule data date. The Contractor may be requested to provide a computer with the scheduling software loaded and a projector which allows all meeting participants to view the proposed schedule during the meeting. The Contractor's authorized scheduler must organize, group, sort, filter, perform schedule revisions as needed and review functions as requested by the Contractor and/or Government. The meeting is a working interactive exchange which allows the Government and Contractor the opportunity to review the updated schedule on a real time and interactive basis. The meeting will last no longer than 8 hours. The Contractor's Project Manager and scheduler must attend the meeting with the authorized representative of the Contracting Officer. Superintendents, foremen and major subcontractors must attend the meeting as required to discuss the project schedule and work. Following the periodic schedule update meeting, make updates to the draft submission. Include only those items approved by the Government in the submission. Upon Government approval of the schedule submission, submit an invoice for payment.

3.6.2 Update Submission Following Progress Meeting

Submit the complete Periodic Schedule Update of the Project Schedule containing all approved progress, revisions, and adjustments, pursuant to paragraph SUBMISSION REQUIREMENTS not later than 4 work days after the periodic schedule update meeting.

3.7 WEEKLY PROGRESS MEETINGS

Conduct a weekly meeting with the Government (or as otherwise mutually agreed to) between the meetings described in paragraph entitled PERIODIC SCHEDULE UPDATE MEETINGS for the purpose of jointly reviewing the actual progress of the project as compared to the as planned progress and to review planned activities for the upcoming two weeks. Use the current approved schedule update for the purposes of this meeting and for the production and review of reports. At the weekly progress meeting, address the status of RFIs, RFPs and Submittals.

3.8 REQUESTS FOR TIME EXTENSIONS

Provide a justification of delay to the Contracting Officer in accordance with the contract provisions and clauses for approval within 10 days of a delay occurring. Also prepare a time impact analysis for each Government request for proposal (RFP)/ All time impact analysis must be resource loaded and to the same level of detail as the schedule.

3.8.1 Justification of Delay

Provide a description of the event(s) that caused the delay and/or impact to the work. As part of the description, identify all schedule activities impacted. Show that the event that caused the delay/impact was the responsibility of the Government. Provide a time impact analysis that demonstrates the effects of the delay or impact on the project completion

date or interim completion date(s). Evaluate multiple impacts chronologically; each with its own justification of delay. With multiple impacts consider any concurrency of delay. A time extension and the schedule fragnet becomes part of the project schedule and all future schedule updates upon approval by the Contracting Officer.

3.8.2 Time Impact Analysis (Prospective Analysis)

Prepare a time impact analysis for approval by the Contracting Officer based on industry standard AACE 52R-06. Utilize a copy of the last approved schedule prior to the first day of the impact or delay for the time impact analysis. If Contracting Officer determines the time frame between the last approved schedule and the first day of impact is too great, prepare an interim updated schedule to perform the time impact analysis. Unless approved by the Contracting Officer, no other changes may be incorporated into the schedule being used to justify the time impact.

3.8.3 Forensic Schedule Analysis (Retrospective Analysis)

Prepare an analysis for approval by the Contracting Officer based on industry standard AACE 29R-03.

3.8.4 Fragmentary Network (Fragnet)

Prepare a proposed fragnet for time impact analysis consisting of a sequence of new activities that are proposed to be added to the project schedule to demonstrate the influence of the delay or impact to the project's contractual dates. Clearly show how the proposed fragnet is to be tied into the project schedule including all predecessors and successors to the fragnet activities. The proposed fragnet must be approved by the Contracting Officer prior to incorporation into the project schedule.

3.8.5 Time Extension

The Contracting Officer must approve the Justification of Delay including the time impact analysis before a time extension will be granted. No time extension will be granted unless the delay consumes all available Project Float and extends the projected finish date ("End Project" milestone) beyond the Contract Completion Date. The time extension will be in calendar days.

Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay will not be a cause for an extension to the performance period, completion date, or any interim milestone date.

3.8.6 Impact to Early Completion Schedule

No extended overhead will be paid for delay prior to the original Contract Completion Date for an Early Completion IPS unless the Contractor actually performed work in accordance with that Early Completion Schedule. The Contractor must show that an early completion was achievable had it not been for the impact.

3.9 FAILURE TO ACHIEVE PROGRESS

Should the progress fall behind the approved project schedule for reasons

other than those that are excusable within the terms of the contract, the Contracting Officer may require provision of a written recovery plan for approval. The plan must detail how progress will be made-up to include which activities will be accelerated by adding additional crews, longer work hours, extra work days, etc.

3.9.1 Artificially Improving Progress

Artificially improving progress by means such as, but not limited to, revising the schedule logic, modifying or adding constraints, shortening activity durations, or changing calendars in the project schedule is prohibited. Indicate assumptions made and the basis for any logic, constraint, duration and calendar changes used in the creation of the recovery plan. Any additional resources, manpower, or daily and weekly work hour changes proposed in the recovery plan must be evident at the work site and documented in the daily report along with the Schedule Narrative Report.

3.9.2 Failure to Perform

Failure to perform work and maintain progress in accordance with the supplemental recovery plan may result in an interim and final unsatisfactory performance rating and may result in corrective action directed by the Contracting Officer pursuant to FAR 52.236-15 Schedules for Construction Contracts, FAR 52.249-10 Default (Fixed-Price Construction), and other contract provisions.

3.9.3 Recovery Schedule

Should the Contracting Officer find it necessary, submit a recovery schedule pursuant to FAR 52.236-15 Schedules for Construction Contracts.

3.10 OWNERSHIP OF FLOAT

Except for the provision given in the paragraph IMPACT TO EARLY COMPLETION SCHEDULE, float available in the schedule, at any time, may not be considered for the exclusive use of either the Government or the Contractor including activity and/or project float. Activity float is the number of work days that an activity can be delayed without causing a delay to the "End Project" finish milestone. Project float (if applicable) is the number of work days between the projected early finish and the contract completion date milestone.

3.11 TRANSFER OF SCHEDULE DATA INTO RMS

Once the schedule is approved by the Government via submittal or serialized letter, upload the schedule data (SDEF) into the Resident Management System - Contractor Module (RMS CM) unless directed otherwise by the Contracting Officer. The contractor will then create the invoice and complete the Prompt Payment certificate and submit to the Government. After this is complete, create the invoice, complete the Prompt Payment certificate and submit to the Government. This data is considered to be additional supporting data in a form and detail required by the Contracting Officer pursuant to FAR 52.232-5 Payments under Fixed-Price Construction Contracts and FAR 52.232-27 Prompt Payment for Construction Contracts.

3.12 PRIMAVERA P6 MANDATORY REQUIREMENTS

The following settings are mandatory and required in all schedule submissions to the Government, if Primavera P6 is used:

a. Activity Codes must be Project Level, not Global or EPS level.

b. Calendars must be Project Level, not Global or Resource level.

c. Activity Duration Types must be set to "Fixed Duration & Units".

d. Percent Complete Types must be set to "Physical".

e. Time Period Admin Preferences must remain the default "8.0 hr/day, 40 hr/week, 172 hr/month, 2000 hr/year". Set Calendar Work Hours/Day to 8.0 Hour days.

f. Set Schedule Option for defining Critical Activities to "Longest Path".

g. Set Schedule Option for defining progressed activities to "Retained Logic".

h. Set up cost loading using a single lump sum labor resource. The Price/Unit must be $1/hr, Default Units/Time must be "8h/d", and settings "Auto Compute Actuals" and "Calculate costs from units" selected.

i. Activity ID's must not exceed 10 characters.

j. Activity Names must have the most defining and detailed description within the first 30 characters.

-- End of Section --

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SUBMITTAL PROCEDURES

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SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

1.1.1 Submittal Information

The Contractor is responsible for total management of their work including, but not limited to, approval, scheduling, control, certification of all submittals and compliance with all applicable Buy-American and Trade Agreement clauses. The submittal management system provided in these specifications is intended to be a complete system for the Contractor to use to control the quality of materials, equipment and workmanship provided by manufacturers, fabricators, suppliers and subcontractors. Review each submittal for contract compliance. **Compliance with all applicable Buy American and Trade Agreement Clauses is to be included in this review. The Contractor must provide the country of origin on ENG Form 4025 for each item submitted.** The Submittal Register (ENG Form 4288) will be utilized to log and monitor all submittal activities.

The Contracting Officer may request submittals, in addition to those specified, when deemed necessary to adequately describe the work covered in the respective sections. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.

Units of weights and measures used on all submittals are to be the same as those used in the contract drawings.

1.1.2 Project Type

The Contractor's Quality Control (CQC) System Manager is to check and approve all items before submittal and stamp, sign, and date indicating action taken. Clearly identify proposed deviations from the contract requirements. Include within submittals items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required items.

1.1.3 Submission of Submittals

Schedule and provide submittals requiring Government approval, after notice to proceed (NTP). Provide ample lead time to ensure the submittal's processing by the Government and any lead time needed by the manufacturer upon ordering after approval. Dispose of samples not incorporated into the work in accordance with manufacturer's Safety Data Sheets (SDS) and in compliance with existing laws and regulations.

1.2 DEFINITIONS

1.2.1 Submittal Descriptions (SD)

Submittal requirements are specified in the technical sections. Examples and descriptions of submittals identified by the Submittal Description (SD) numbers and titles follow:

SD-01 Preconstruction Submittals

Submittals that are required prior to or at the start of construction (work) or the next major phase of the construction on a multiphase contract.

Preconstruction Submittals include schedules and a tabular list of locations, features, and other pertinent information regarding products, materials, equipment, or components to be used in the work.

The Government reserves the right to handle pre-construction submittals (listed below) as administrative submittals via a Serial Letter, as directed by the Project, Area or Resident Office. When directed by the Project, Area or Resident Office (as directed), submit administrative submittals for acceptance by the Government. Format for the Serial Letter will be as directed by the Project, Area or Resident Office.

Certificates Of Insurance

Surety Bonds

List Of Proposed Subcontractors

List Of Proposed Products

Baseline Network Analysis Schedule (NAS)

Submittal Register

Schedule Of Prices Or Earned Value Report

Accident Prevention Plan

Work Plan

Quality Control (QC) plan

Permits

Environmental Protection Plan

SD-02 Shop Drawings

Drawings, diagrams and schedules specifically prepared to illustrate some portion of the work.

Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance and other characteristics of materials, systems or equipment for some portion of the work.

Samples of warranty language when the contract requires extended product warranties.

SD-04 Samples

Fabricated or unfabricated physical examples of materials, equipment or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

Field samples and mock-ups constructed on the project site establish standards ensuring work can be judged. Includes assemblies or portions of assemblies that are to be incorporated into the project and those that will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses or other data pertaining to a part of work.

SD-06 Test Reports

Report signed by authorized official of testing laboratory that a material, product or system identical to the material, product or system to be provided has been tested in accord with specified requirements. Unless specified in another section, testing must have been within three years of date of contract award for the project.

Report that includes findings of a test required to be performed on an actual portion of the work or prototype prepared for the project before shipment to job site.

Report that includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

Investigation reports

Daily logs and checklists

Final acceptance test and operational test procedure

SD-07 Certificates

Statements printed on the manufacturer's letterhead and signed by

responsible officials of manufacturer of product, system or material attesting that the product, system, or material meets specification requirements. Must be dated after award of project contract and clearly name the project.

Document required of Contractor, or of a manufacturer, supplier, installer or Subcontractor through Contractor. The document purpose is to further promote the orderly progression of a portion of the work by documenting procedures, acceptability of methods, or personnel qualifications.

Confined space entry permits

Text of posted operating instructions

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system or material, including special notices and (SDS)concerning impedances, hazards and safety precautions.

SD-09 Manufacturer's Field Reports

Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and state the test results; and indicate whether the material, product, or system has passed or failed the test.

Factory test reports.

SD-10 Operation and Maintenance Data

Data provided by the manufacturer, or the system provider, including manufacturer's help and product line documentation, necessary to maintain and install equipment, for operating and maintenance use by facility personnel.

Data required by operating and maintenance personnel for the safe and efficient operation, maintenance and repair of the item.

Data incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

Submittals required for Guiding Principle Validation (GPV) or Third Party Certification (TPC).

Special requirements necessary to properly close out a construction contract. For example, Record Drawings and as-built drawings. Also, submittal requirements necessary to properly close out a major phase of construction on a multi-phase contract.

1.2.2 Approving Authority

Office or designated person authorized to approve the submittal.

1.2.3 Work

As used in this section, on-site and off-site construction required by contract documents, including labor necessary to produce submittals, construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction. In exception, excludes work to produce SD-01 submittals.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having any designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with this section. When directed by the Government, the submittal register may be submitted via Section of 01 45 00.15 10 RESIDENTIAL MANAGMENT SYSTEM CONTRACTOR MODE (RMS-CM) in lieu of the copy attached to this section. SpecsIntact is the software system used by Government to generate the Submittal Register that is loaded into RMS-CM.

SD-01 Preconstruction Submittals

Submittal Register; G-AO

1.3.1 Action Codes

1.3.1.1 Contractor Action Codes

DESIGN BID BUILD SUBMITTALS			
Submittal Classifications shown in UFGS Sections	Submittal Classification	Corresponding SpecsIntact Submittal Register Code which is populated in the SI Submittal Register. Software Limitations: (The software shows one character delineation in the SpecsIntact Submittal Register)	RMS – The following Submittal Classifications are populated in RMS when the SpecsIntact Submittal Data File is pulled into RMS)
G	Submittal requires Government Approval	G	GA

DESIGN BID BUILD SUBMITTALS			
BLANK	Submittal is For Information Only (FIO)	BLANK	FIO

1.3.1.2 Government Reviewer Designations

Following the Submittal Classification designation "G", the following reviewer designations may be included:

RO - Resident Office
AO - Area Office
DO - District Office

Additional information will be provided at the pre-design and/or pre-construction conference.

Corps of Engineers, Omaha District Office for "DO" reviewer designations, submittals will be coordinated through:

Michael Hebert
U.S. Army Corps of Engineers
Omaha District
Attn: CENWO-CDS-T
1616 Capitol Ave
Omaha, NE 68102-4901
E-mail: CENWO.ConstructionSubmittal@usace.army.mil

1.4 SUBMITTAL CLASSIFICATION

1.4.1 Government Approved (G)

Government approval is required for extensions of design, critical materials, variations, equipment whose compatibility with the entire system must be checked, and other items as designated by the Government.

Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, submittals are considered to be "shop drawings."

1.4.2 For Information Only

Submittals not requiring Government approval will be for information only. Within the terms of the Contract Clause SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are not considered to be "shop drawings."

1.5 PREPARATION

1.5.1 Transmittal Form

Use the ENG Form 4025 transmittal form for submitting both Government-approved and information-only submittals. Submit in accordance with the instructions on the reverse side of the form. These forms are included in the RMS CM software that the Contractor is required to use for this contract. Properly complete this form by filling out all the heading blank spaces and identifying each item submitted. If there are multiple Item numbers listed on a particular ENG Form 4025 submittal, combine all submitted items for review into a single Adobe file with bookmarks (for

ease of review). Exercise special care to ensure proper listing of the specification paragraph and sheet number of the contract drawings pertinent to the data submitted for each item.

1.5.2 Submittal Format

1.5.2.1 Format of SD-01 Preconstruction Submittals

When the submittal includes a document that is to be used in the project, or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document.

Provide data in the unit of measure used in the contract documents.

1.5.2.2 Format for SD-02 Shop Drawings

Provide shop drawings not less than 8 1/2 by 11 inches nor more than 30 by 42 inches, except for full-size patterns or templates. Prepare drawings to accurate size, with scale indicated, unless another form is required. Ensure drawings are suitable for reproduction and of a quality to produce clear, distinct lines and letters, with dark lines on a white background.

a. Include the nameplate data, size, and capacity on drawings. Also include applicable federal, military, industry, and technical society publication references.

b. Dimension drawings, except diagrams and schematic drawings. Prepare drawings demonstrating interface with other trades to scale. Use the same unit of measure for shop drawings as indicated on the contract drawings. Identify materials and products for work shown.

Submit an electronic copy of drawings in PDF format.

1.5.2.2.1 Drawing Identification

Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to information required in paragraph IDENTIFYING SUBMITTALS.

Number drawings in a logical sequence. Each drawing is to bear the number of the submittal in a uniform location next to the title block. Place the Government contract number in the margin, immediately below the title block, for each drawing.

1.5.2.3 Format of SD-03 Product Data

Present product data submittals for each section. Include a table of contents, listing the page and catalog item numbers for product data.

Indicate, by prominent notation, each product that is being submitted; indicate the specification section number and paragraph number to which it pertains.

1.5.2.3.1 Product Information

Supplement product data with material prepared for the project to satisfy the submittal requirements where product data does not exist. Identify this material as developed specifically for the project, with information

and format as required for submission of SD-07 Certificates.

Provide product data in units used in the Contract documents. Where product data are included in preprinted catalogs with another unit, submit the dimensions in contract document units, on a separate sheet.

1.5.2.3.2 Standards

Where equipment or materials are specified to conform to industry or technical-society reference standards of such organizations as the American National Standards Institute (ANSI), ASTM International (ASTM), National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), or Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.2.3.3 Data Submission

Collect required data submittals for each specific material, product, unit of work, or system into a single submittal that is marked for choices, options, and portions applicable to the submittal. Mark each copy of the product data identically. Partial submittals will not be accepted for expedition of the construction effort.

Submit the manufacturer's instructions before installation.

1.5.2.4 Format of SD-04 Samples

1.5.2.4.1 Sample Characteristics

Furnish samples in the following sizes, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately the same size as specified:

a. Sample of Equipment or Device: Full size.

b. Sample of Materials Less Than 2 by 3 inches: Built up to 8 1/2 by 11 inches.

c. Sample of Materials Exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.

d. Sample of Linear Devices or Materials: 10 inch length or length to be supplied, if less than 10 inches. Examples of linear devices or materials are conduit and handrails.

e. Sample Volume of Nonsolid Materials: Pint. Examples of nonsolid materials are sand and paint.

f. Color Selection Samples: 2 by 4 inches. Where samples are specified for selection of color, finish, pattern, or texture, submit the full set of available choices for the material or product specified. Sizes

and quantities of samples are to represent their respective standard unit.

g. Sample Panel: 4 by 4 feet.

h. Sample Installation: 100 square feet.

1.5.2.4.2 Sample Incorporation

Reusable Samples: Incorporate returned samples into work only if so specified or indicated. Incorporated samples are to be in undamaged condition at the time of use.

Recording of Sample Installation: Note and preserve the notation of any area constituting a sample installation, but remove the notation at the final clean-up of the project.

1.5.2.4.3 Comparison Sample

Samples Showing Range of Variation: Where variations in color, finish, pattern, or texture are unavoidable due to nature of the materials, submit sets of samples of not less than three units showing extremes and middle of range. Mark each unit to describe its relation to the range of the variation.

When color, texture, or pattern is specified by naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

1.5.2.5 Format of SD-05 Design Data

Provide design data and certificates on 8 1/2 by 11 inch page size.

1.5.2.6 Format of SD-06 Test Reports

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.5.2.7 Format of SD-07 Certificates

Provide design data and certificates on 8 1/2 by 11 inch page size.

1.5.2.8 Format of SD-08 Manufacturer's Instructions

Present manufacturer's instructions submittals for each section. Include the manufacturer's name, trade name, place of manufacture, and catalog model or number on product data. Also include applicable federal, military, industry, and technical-society publication references. If supplemental information is needed to clarify the manufacturer's data, submit it as specified for SD-07 Certificates.

Submit the manufacturer's instructions before installation.

1.5.2.8.1 Standards

Where equipment or materials are specified to conform to industry or technical-society reference standards of such organizations as the American National Standards Institute (ANSI), ASTM International (ASTM),

National Electrical Manufacturer's Association (NEMA), Underwriters Laboratories (UL), or Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. State on the certificate that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.5.2.9 Format of SD-09 Manufacturer's Field Reports

By prominent notation, indicate each report in the submittal. Indicate the specification number and paragraph number to which each report pertains.

1.5.2.10 Format of SD-10 Operation and Maintenance Data (O&M)

Comply with the requirements specified in Section 01 78 23 OPERATION AND MAINTENANCE DATA for O&M Data format.

1.5.2.11 Format of SD-11 Closeout Submittals

When the submittal includes a document that is to be used in the project or is to become part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document itself, but to a separate sheet accompanying the document.

Provide data in the unit of measure used in the contract documents.

1.5.3 Source Drawings for Shop Drawings

1.5.3.1 Source Drawings

The entire set of source drawing files (DWG or DGN) will not be provided to the Contractor. Request the specific Drawing Number for the preparation of shop drawings. Only those drawings requested to prepare shop drawings will be provided. These drawings are provided only after award.

1.5.3.2 Terms and Conditions

Data contained on these electronic files must not be used for any purpose other than as a convenience in the preparation of construction data for the referenced project. Any other use or reuse is at the sole risk of the Contractor and without liability or legal exposure to the Government. The Contractor must make no claim, and waives to the fullest extent permitted by law any claim or cause of action of any nature against the Government, its agents, or its subconsultants that may arise out of or in connection with the use of these electronic files. The Contractor must, to the fullest extent permitted by law, indemnify and hold the Government harmless against all damages, liabilities, or costs, including reasonable attorney's fees and defense costs, arising out of or resulting from the use of these electronic files.

These electronic source drawing files are not construction documents. Differences may exist between the source drawing files and the corresponding construction documents. The Government makes no

representation regarding the accuracy or completeness of the electronic source drawing files, nor does it make representation to the compatibility of these files with the Contractor hardware or software. The Contractor is responsible for determining if any conflict exists. In the event that a conflict arises between the signed and sealed construction documents prepared by the Government and the furnished source drawing files, the signed and sealed construction documents govern. Use of these source drawing files does not relieve the Contractor of the duty to fully comply with the contract documents, including and without limitation the need to check, confirm and coordinate the work of all contractors for the project. If the Contractor uses, duplicates or modifies these electronic source drawing files for use in producing construction data related to this contract, remove all previous indication of ownership (seals, logos, signatures, initials and dates).

1.5.4 Electronic File Format

Provide submittals in electronic format, with the exception of material samples required for SD-04 Samples items. Compile the submittal file as a single, complete document, to include the Transmittal Form described within. Name the electronic submittal file specifically according to its contents, and coordinate the file naming convention with the Contracting Officer. Electronic files must be of sufficient quality that all information is legible. Use PDF as the electronic format, unless otherwise specified or directed by the Contracting Officer. All documents must make use of optical character recognition (OCR) routines to make text searchable and selectable, so that the text can be copied. Index and bookmark files exceeding 30 pages to allow efficient navigation of the file. When required, the electronic file must include a valid electronic signature.

E-mail electronic submittal documents smaller than 10MB to an e-mail address as directed by the Contracting Officer, unless directed otherwise by COR. Provide electronic documents over 10 MB on an optical disc or through an electronic file sharing system, such as secure ftp site or DoD SAFE located at the following website: https://safe.apps.mil/. Use of the Government web application must be initiated by the Government, unless Contractor has a Government CAC card. This Government web application restricts the number of days files are available to download.

1.6 QUANTITY OF SUBMITTALS

Submittals are to be transmitted electronically, unless directed otherwise.

1.6.1 Number of SD-04 Samples

a. Submit two samples, or two sets of samples showing the range of variation, of each required item. One approved sample or set of samples will be retained by the approving authority and one will be returned to the Contractor.

b. Submit one sample panel or provide one sample installation where directed. Include components listed in the technical section or as directed.

c. Submit one sample installation, where directed.

d. Submit one sample of nonsolid materials.

1.7 INFORMATION ONLY SUBMITTALS

Submittals without an action code must be certified by the QC manager and submitted to the Contracting Officer for information-only. Approval of the Contracting Officer is not required on information only submittals. The Contracting Officer will mark "receipt acknowledged" on submittals for information and will return only the transmittal cover sheet to the Contractor. Normally, submittals for information only will not be returned. However, the Government reserves the right to return unsatisfactory submittals and require the Contractor to resubmit any item found not to comply with the contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the Contracting Officer from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.8 PROJECT SUBMITTAL REGISTER

A sample Project Submittal Register showing submittals required by the specifications is attached to this section as "Project Submittal Register."

1.8.1 Submittal Management

Prepare and maintain a submittal register, as the work progresses. Do not change data that is output in columns (c), (d), (e), and (f) as delivered by Government; retain data that is output in columns (a), (g), (h), and (i) as approved. As an attachment, provide a submittal register showing items of equipment and materials for which submittals are required by the specifications. This list may not be all-inclusive and additional submittals may be required. Maintain a submittal register for the project in accordance with Section 01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM). The Government will provide the initial submittal register in electronic format with the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists specification section in which submittal is required.

Column (d): Lists each submittal description (SD Number. and type, e.g., SD-02 Shop Drawings) required in each specification section.

Column (e): Lists one principal paragraph in each specification section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting the project requirements.

Thereafter, the Contractor is to track all submittals by maintaining a complete list, including completion of all data columns and all dates on which submittals are received by and returned by the Government.

1.8.2 Preconstruction Use of Submittal Register

Submit the submittal register as an electronic database, using the submittal management program furnished to Contractor, unless directed otherwise by COR. Include the QC plan and the project schedule. Verify that all submittals required for the project are listed and add missing submittals. Coordinate and complete the following fields on the register database submitted with the QC plan and the project schedule:

Column (a) Activity Number: Activity number from the project schedule.

Column (g) Contractor Submit Date: Scheduled date for the approving authority to receive submittals.

Column (h) Contractor Approval Date: Date that Contractor needs approval of submittal.

Column (i) Contractor Material: Date that Contractor needs material delivered to Contractor control.

1.8.3 Contractor Use of Submittal Register

Update the following fields in the Government-furnished submittal register program or equivalent fields in the program used by the Contractor with each submittal throughout the contract.

Column (b) Transmittal Number: List of consecutive, Contractor-assigned numbers.

Column (j) Action Code (k): Date of action used to record Contractor's review when forwarding submittals to QC.

Column (l) Date submittal transmitted.

Column (q) Date approval was received.

1.8.4 Approving Authority Use of Submittal Register

Update the following fields:

Column (b) Transmittal Number: List of consecutive, Contractor-assigned numbers.

Column (l) Date submittal was received.

Column (m) through (p) Dates of review actions.

Column (q) Date of return to Contractor.

1.8.5 Action Codes

See paragraph Action Codes above.

1.8.6 Delivery of Copies

Submit an updated electronic copy of the submittal register to the Contracting Officer with each invoice request, unless a paper copy is requested by the Contracting Officer. Provide an updated Submittal

Register monthly regardless of whether an invoice is submitted.

1.9 VARIATIONS

Variations from contract requirements require Contracting Officer approval pursuant to contract Clause FAR 52.236-21 Specifications and Drawings for Construction, and will be considered where advantageous to the Government.

1.9.1 Considering Variations

Discussion of variations with the Contracting Officer before submission will help ensure that functional and quality requirements are met and minimize rejections and resubmittals. For variations that include design changes or some material or product substitutions, the Government may require an evaluation and analysis by a licensed professional engineer hired by the contractor. When contemplating a variation that results in lower cost, consider submission of the variation as a Value Engineering Change Proposal (VECP).

Specifically point out variations from contract requirements in transmittal letters. Failure to point out variations may cause the Government to require rejection and removal of such work at no additional cost to the Government.

1.9.2 Proposing Variations

When proposing variations, deliver a written request to the Contracting Officer, with documentation of the nature and features of the variation and why the variation is desirable and beneficial to Government. If lower cost is a benefit, also include an estimate of the cost savings. In addition to documentation required for variation, include the submittals required for the item. Clearly mark the proposed variation in all documentation.

Check the column "variation" of ENG Form 4025 for submittals that include variations proposed by the Contractor. Set forth in writing the reason for any variations and note such variations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted variations.

1.9.3 Warranting that Variations are Compatible

When delivering a variation for approval, the Contractor warrants that this contract has been reviewed to establish that the variation, if incorporated, will be compatible with other elements of work.

1.9.4 Review Schedule Extension

In addition to the normal submittal review period, a period of 14 calendar days will be allowed for the Government to consider submittals with variations.

1.10 SCHEDULING

Schedule and submit concurrently product data and shop drawings covering component items forming a system or items that are interrelated. Submit pertinent certifications at the same time. No delay damages or time extensions will be allowed for time lost in late submittals.

a. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. The Contractor is responsible for additional time required for Government reviews resulting from required resubmittals. The review period for each resubmittal is the same as for the initial submittal.

b. Submittals required by the contract documents are listed on the submittal register. If a submittal is listed in the submittal register but does not pertain to the contract work, the Contractor is to include the submittal in the register and annotate it "N/A" with a brief explanation. Approval by the Contracting Officer does not relieve the Contractor of supplying submittals required by the contract documents but that have been omitted from the register or marked "N/A."

c. Resubmit the submittal register and annotate it monthly with actual submission and approval dates. When all items on the register have been fully approved, no further resubmittal is required.

Contracting Officer review will be completed within 20 calendar days after the date of submission.

The Government review period for each construction submittal does not begin until the submittal is delivered via RMS CM. Contract compliance for all submittals are the Contractor's responsibility. Government acceptance or receipt acknowledged does not remove this responsibility for contract compliance on any construction submittal.

1.11 GOVERNMENT APPROVING AUTHORITY

When the approving authority is the Contracting Officer, the Government will:

a. Note the date on which the submittal was received.

b. Review submittals for approval within the scheduling period specified and only for conformance with project design concepts and compliance with contract documents.

c. Identify returned submittals with one of the actions defined in paragraph REVIEW NOTATIONS and with comments and markings appropriate for the action indicated.

Upon completion of review of submittals requiring Government approval, stamp and date submittals. An electronic copy of the submittal will be retained by the Contracting Officer and an electronic copy of the submittal will be returned to the Contractor. The Government may process submittals in the RMS CM System.

1.11.1 Review Notations

Submittals will be returned to the Contractor with the following notations:

a. Submittals marked "approved" or "accepted" authorize proceeding with the work covered.

b. Submittals marked "approved as noted" or "approved, except as noted, resubmittal not required," authorize proceeding with the work covered

provided that the Contractor takes no exception to the corrections.

c. Submittals marked "not approved," "disapproved," or "revise and resubmit" indicate incomplete submittal or noncompliance with the contract requirements or design concept. Resubmit with appropriate changes. Do not proceed with work for this item until the resubmittal is approved.

d. Submittals marked "not reviewed" indicate that the submittal has been previously reviewed and approved, is not required, does not have evidence of being reviewed and approved by Contractor, or is not complete. A submittal marked "not reviewed" will be returned with an explanation of the reason it is not reviewed. Resubmit submittals returned for lack of review by Contractor or for being incomplete, with appropriate action, coordination, or change.

e. Submittals marked "receipt acknowledged" indicate that submittals have been received by the Government. This applies only to "information-only submittals" as previously defined.

1.12 DISAPPROVED SUBMITTALS

Make corrections required by the Contracting Officer. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the contract drawings or specifications, give notice to the Contracting Officer as required under the FAR clause titled CHANGES. The Contractor is responsible for the dimensions and design of connection details and the construction of work. Failure to point out variations may cause the Government to require rejection and removal of such work at the Contractor's expense.

If changes are necessary to submittals, make such revisions and resubmit in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.13 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.

Approval or acceptance by the Government for a submittal does not relieve the Contractor of the responsibility for meeting the contract requirements or for any error that may exist, because under the Quality Control (QC) requirements of this contract, the Contractor is responsible for ensuring information contained within each submittal accurately conforms with the requirements of the contract documents.

After submittals have been approved or accepted by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.14 APPROVED SAMPLES

Approval of a sample is only for the characteristics or use named in such approval and is not to be construed to change or modify any contract

requirements. Before submitting samples, provide assurance that the materials or equipment will be available in quantities required in the project. No change or substitution will be permitted after a sample has been approved.

Match the approved samples for materials and equipment incorporated in the work. If requested, approved samples, including those that may be damaged in testing, will be returned to the Contractor, at its expense, upon completion of the contract. Unapproved samples will also be returned to the Contractor at its expense, if so requested.

Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this contract, any further samples of the same brand or make as that material. The Government reserves the right to disapprove any material or equipment that has previously proved unsatisfactory in service.

Samples of various materials or equipment delivered on the site or in place may be taken by the Contracting Officer for testing. Samples failing to meet contract requirements will automatically void previous approvals. Replace such materials or equipment to meet contract requirements.

1.15 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

1.16 CERTIFICATION OF SUBMITTAL DATA

Certify the submittal data as follows on Form ENG 4025: "I certify that the above submitted items had been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.

_____NAME OF CONTRACTOR _____ SIGNATURE OF CONTRACTOR

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Replace Left Abutment Collector Pipe System, Big Bend Dam, SD

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		01 12 00	SD-01 Preconstruction Submittals															
			Proposed Methods of Operation		G	AO												
			Construction Right-of-Way	1.2														
			State and Federal Highways	1.11.7														
			State and Local Public Roads	1.11.8														
			Temporary Traffic Control (TTC)	1.11.4	G	AO												
			Pre-Construction Road Condition	1.11.3	G	AO												
			Photographs															
			Traffic Control		G	AO												
			Haul Route Plan	1.10.3	G	AO												
			SD-02 Shop Drawings															
			Care of Water	1.6	G	AO												
			SD-11 Closeout Submittals															
			Warranty of Construction	1.16														
		01 30 00.24	SD-01 Preconstruction Submittals															
			Security Personnel List		G	PO												
			Personnel Risk Assessment		G	PO												
			iWATCH and/or CorpsWatch															
			Training Sign In Sheets															
			E-Verify															
		01 32 01.00 10	SD-01 Preconstruction Submittals															
			Project Scheduler Qualifications	1.3	G	AO												
			Preliminary Project Schedule	3.4.1	G	AO												
			Initial Project Schedule	3.4.2	G	AO												
			Periodic Schedule Update	3.6.2	G	AO												
		01 33 00	SD-01 Preconstruction Submittals															

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		01 33 00	Submittal Register	1.8	G AO													
		01 35 26	SD-01 Preconstruction Submittals															
			ACCIDENT PREVENTION PLAN		G AO													
			Accident Prevention Plan (AAP) -		G AO													
			Construction															
			SD-06 Test Reports															
			Monthly Exposure Reports	1.4														
			Notifications and Reports	1.12														
			Accident Reports	1.12.2	G AO													
			LHE Inspection Reports	1.12.3														
			SD-07 Certificates															
			Crane Operators/Riggers	1.6.1.4														
			Standard Lift Plan	1.7.3.2	G AO													
			Critical Lift Plan	1.7.3.3	G AO													
			Activity Hazard Analysis (AHA)	1.8														
			Confined Space Entry Permit	1.9.1														
			Hot Work Permit	1.9.1														
			Certificate of Compliance															
			License Certificates															
		01 41 26.01 24	SD-01 Preconstruction Submittals															
			Notice of Intent	3.2.1														
			Authorization Letter															
			Storm Water Pollution Prevention	3.2.4														
			Plan															
			Notice of Termination	3.2.7														
			SD-06 Test Reports															

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		01 41 26.01 24	Reports	3.2.5														
		01 45 00.00 10	SD-01 Preconstruction Submittals															
			Contractor Quality Control (CQC)	3.2	G	AO												
			Plan															
			SD-06 Test Reports															
			Verification Statement	3.9														
		01 57 20.00 10	SD-01 Preconstruction Submittals															
			Environmental Protection Plan	1.7	G	-AO												
		01 57 23	SD-07 Certificates															
			Mill Certificate or Affidavit	2.1.3														
		01 78 39.00 24	SD-03 Product Data															
			50 Percent Preliminary As-Built		G	DO												
			Drawings															
			100 Percent Preliminary As-Built	1.7.2	G	DO												
			Drawings															
			SD-11 Closeout Submittals															
			Final As-Built Drawings	1.7.3	G	DO												
			GeoDatabase Files	3.1	G	DO												
		02 32 13	SD-01 Preconstruction Submittals															
			Geotechnical Investigation	1.3.1	G	DO												
			Drilling Program Plan															
			Geotechnical Investigation Report	1.3.1	G	DO												
			SD-02 Shop Drawings															
			Drilling Log	3.14	G	DO												
			SD-03 Product Data															

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		02 32 13	Permits, Certifications, and	1.5														
			Licenses															
			SD-07 Certificates															
			Qualifications	3.11.1	G RO													
		02 41 00	SD-01 Preconstruction Submittals															
			Demolition Plan	1.2.1.1	G DO													
			Existing Conditions															
			SD-07 Certificates															
			Notification	1.6	G RO													
			Disposal Facility	3.3.2	G AO													
			SD-11 Closeout Submittals															
			Receipts															
		02 61 13	SD-01 Preconstruction Submittals															
			Contaminated Media Work Plan	1.2.1	G DO													
			Contaminated Media Work Plan	1.2.1	G DO													
			SD-06 Test Reports															
			Sampling and Analysis															
			Sampling of Stored Material	3.4.1	G AO													
			Sampling Liquid	3.4.2	G AO													
			SD-11 Closeout Submittals															
			Closure Report	3.7	G AO													
		02 81 00	SD-03 Product Data															
			Packaging Notifications	2.1.1														
			Hazardous Waste Management	3.1	G AO													
			Plan															
			SD-06 Test Reports															

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		02 81 00	Record Keeping	3.2	G	AO												
			Record Keeping	3.7	G	AO												
			Exception Report	3.7	G	AO												
			Spill Response	3.8	G	AO												
			SD-07 Certificates															
			Transportation and Disposal	1.4.1	G	AO												
			Coordinator															
			Training	1.4.2	G	AO												
			Transporter Certification	1.4.3														
			Shipping Documents and	3.2.1	G	AO												
			Packagings Certification															
			Shipping Documents and	3.3.3	G	AO												
			Packagings Certification															
			Shipping Documents and	3.3.4	G	AO												
			Packagings Certification															
			Certificates of Disposal	3.3.5	G	DO												
			Waste Minimization	3.6	G	DO												
		02 82 00	SD-03 Product Data															
			Safety Data Sheets (SDS) for All	1.3.8	G	AO												
			Materials															
			Respirators	3.1.2.1	G	AO												
			SD-06 Test Reports															
			Air Sampling Results	1.5.4	G	AO												
			SD-07 Certificates															
			Employee Training	1.3.4	G	AO												
			Employee Training	1.5.2	G	AO												

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		02 82 00	Respiratory Protection Program	1.3.7	G	AO												
			Asbestos Abatement Plan	1.3.9	G	DO												
			Asbestos Abatement Plan	3.2	G	DO												
			Testing Laboratory	1.3.10	G	AO												
			Landfill Approval	1.3.11	G	AO												
			Delivery Tickets	1.3.11	G	AO												
			Waste Shipment Records	1.3.11	G	AO												
			Transporter Certification	1.3.12														
			Medical Certification	1.3.13	G	AO												
			Private Qualified Person	1.5.1	G	RO												
			Documentation															
			Competent Person	1.5.2	G	AO												
			Contractor's License	1.5.3	G	AO												
			Contractor's License	1.5.3	G	AO												
			GG, AO															
			SD-11 Closeout Submittals															
			Permits	1.3.5	G													
			Notifications	1.3.5	G	AO												
			Respirator Program Records	1.3.7.1	G	AO												
		03 42 13.00 10	SD-01 Preconstruction Submittals															
			Quality Control Procedures	1.4.2.2														
			SD-02 Shop Drawings															
			Standard Precast Units	2.1.1														
			GG, DO															
			Custom-Made Precast Units	2.1.2														
			Special Finishes	3.2.4.3														

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		03 42 13.00 10	SD-03 Product Data															
			Standard Precast Units	2.1.1														
			Proprietary Precast Units	2.1.3														
			Embedded Items	3.1.3														
			Accessories	2.2.3														
			SD-05 Design Data															
			Design Calculations	2.1.2														
			GG, RO															
			Concrete Mix Proportions	2.1.5.1														
			SD-06 Test Reports															
			Test Reports	1.4.2.4														
			SD-07 Certificates															
			Quality Control Procedures	1.4.2.2														
			SD-11 Closeout Submittals															
			Recycled content for fly ash and		S													
			pozzolan															
			Recycled content for Ground Iron		S													
			Blast-Furnace Slag															
			Recycled content for Silica Fume		S													
			Recycled content for Synthetic		S													
			Fiber Reinforcement															
			Recycled content for steel		S													
		31 00 00	SD-01 Preconstruction Submittals															
			Project Work Plan	1.4	G	DO												
			Project Work Plan	3.10	G	DO												

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		31 00 00	Pre-Construction Haul Route	3.1	G	AO												
			Survey															
			SD-03 Product Data															
			Utilization of Excavated Materials		G	AO												
			Opening of any Excavation or		G	RO												
			Borrow Pit															
			Compaction Equipment		G	RO												
			SD-06 Test Reports															
			Testing	3.11	G	DO												
			Borrow Site Testing		G	DO												
			SD-07 Certificates															
			Testing	3.11	G	DO												
			SD-11 Closeout Submittals															
			Post-Construction Haul Route	3.1	G	AO												
			Survey															
		31 23 00.00 20	SD-01 Preconstruction Submittals															
			Shoring and Sheeting Plan	1.6.1	G	DO												
			Shoring and Sheeting Plan	3.2.2	G	DO												
			Emergency Contingency Plan		G	DO												
			(ECP)															
			SD-06 Test Reports															
			Borrow Site Testing		G	DO												
			Fill and Backfill		G	DO												
			Density Tests		G	DO												
			Moisture Content Tests		G	AO												
			Material Gradation Tests		G	DO												

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		31 24 50	SD-06 Test Reports															
			Initial Sampling and Testing	1.4.3	G DO													
			Bulk Specific Gravity		G DO													
			Soundness Of Magnesium	1.4.3.2	G DO													
			Sulfate															
			Test Report For Freezing and		G DO													
			Thawing															
			Field Gradation		G AO													
		32 11 23	SD-03 Product Data															
			Plant, Equipment, and Tools	1.4	G AO													
			Waybills and Delivery Tickets															
			SD-06 Test Reports															
			Initial Tests	2.3.1	G AO													
			In-Place Tests	3.12.1	G AO													
		32 12 16.16	SD-03 Product Data															
			Mix Design	2.4	G AO													
			Contractor Quality Control	3.1	G AO													
			SD-04 Samples															
			Asphalt Cement Binder	2.3														
			SD-06 Test Reports															
			Aggregates	2.2	G AO													
			QC Monitoring	3.1.3.9														
			Smoothness Testing Results		G AO													
			SD-07 Certificates															
			Asphalt Cement Binder	2.3	G AO													

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		32 12 16.16	Laboratory Accreditation and	1.3.11														
			Validation															
		32 31 13	SD-02 Shop Drawings															
			Gate Assembly	2.1	G BB													
			Gate Hardware and Accessories	2.2.6	G BB													
			Erection/Installation Drawings	2.1	G BB													
			Erection/Installation Drawings	Part 3	G BB													
			SD-03 Product Data															
			Gate Assembly	2.1	G BB													
			Gate Hardware and Accessories	2.2.6	G BB													
			Zinc Coating	2.3.1	G BB													
			Concrete	2.3.3	G BB													
			Gate Posts	2.2.3	G BB													
			SD-07 Certificates															
			Certificates of Compliance	1.4.1	G BB													
			SD-08 Manufacturer's Instructions															
			Gate Assembly	2.1														
			FIO															
			Hardware Assembly	2.1														
			Accessories	2.1														
		32 92 19	SD-03 Product Data															
			Wood Cellulose Fiber Mulch	2.4.3														
			Fertilizer; G-AO															
			SD-06 Test Reports															
			Topsoil Composition Tests	2.2.3														
			SD-07 Certificates															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Replace Left Abutment Collector Pipe System, Big Bend Dam, SD

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		32 92 19	Seed	2.1														
			SD-08 Manufacturer's Instructions															
			Erosion Control Materials	2.6														
		33 26 00	SD-01 Preconstruction Submittals															
			Dewatering System Design		G	DO												
			Fieldwork Plan															
			Dewatering Drilling Program Plan		G	DO												
			Dewatering Plan	3.1	G	DO												
			Dewatering Personnel		G	DO												
			Qualifications															
			SD-11 Closeout Submittals															
			Dewatering Final Implementation		G	DO												
			and Operation Report															
		33 26 00.00 10	SD-01 Preconstruction Submittals															
			Existing Relief Well	3.4.2	G	DO												
			Abandonment Work Plan															
			Existing Relief Well	3.5.1	G	DO												
			Abandonment Work Plan															
			SD-02 Shop Drawings															
			Relief Well Casing Covers		G	DO												
			SD-03 Product Data															
			Existing Relief Well Casing		G	DO												
			Outfall Pipe Caps															
			SD-04 Samples															
			Relief Well Valve Assembly	2.3	G	DO												
			Relief Well Valve Assembly	3.2.4	G	DO												

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Replace Left Abutment Collector Pipe System, Big Bend Dam, SD

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
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		33 26 00.00 10	SD-06 Test Reports															
			Relief Well Casing Outfall	3.5.2	G	AO												
			Camera Inspection															
			SD-11 Closeout Submittals															
			Relief Well		G	DO												
			Decommissioning/Abandonment															
			Record															
		33 40 00	SD-04 Samples															
			Pipe for Culverts and Storm	2.2														
			Drains															
			Flared End Section	2.2.3	G	RO												
			SD-07 Certificates															
			Resin Certification															
			Oil Resistant Gasket															
			Leakage Test															
			Hydrostatic Test on Watertight															
			Joints															
			Determination of Density															
			Placing Pipe	3.2														
			SD-11 Closeout Submittals															
			Post-Installation Inspection	3.5.2.1.3	G	DO												
			Report															
		33 46 16	SD-01 Preconstruction Submittals															
			Pipe Production and Connection	2.3.2	G	DO												
			Detail Plan															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Replace Left Abutment Collector Pipe System, Big Bend Dam, SD

CONTRACTOR

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		33 46 16	Pipe Production and Connection	2.4	G	DO												
			Detail Plan															
			Pipe Production and Connection	3.3.2	G	DO												
			Detail Plan															
			Pipe Production and Connection	3.3.4	G	DO												
			Detail Plan															
			Pipe Production and Connection	3.3.5.1	G	DO												
			Detail Plan															
			Pipe Production and Connection	3.3.5.3	G	DO												
			Detail Plan															
			SD-02 Shop Drawings															
			Manholes		G	DO												
			SD-03 Product Data															
			Pipe Product Data And	2.1	G	AO												
			Installation Recommendation															
			Manhole Frames And Covers		G	AO												
			Flap Gate	2.6	G	AO												
			SD-04 Samples															
			Pipe and Pipe Fittings	2.1														
			Pipe and Pipe Fittings	2.1														
			Manhole Cover Lifting Handles		G	AO												
			SD-07 Certificates															
			Pipe and Pipe Fittings	2.1														
			Pipe and Pipe Fittings	2.1														
			SD-11 Closeout Submittals															

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Replace Left Abutment Collector Pipe System, Big Bend Dam, SD

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(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		33 46 16	Post-Installation Inspection Report	3.4.3	G	DO												

U.S. Army Corps of Engineers (USACE)

TRANSMITTAL OF SHOP DRAWINGS, EQUIPMENT DATA, MATERIAL SAMPLES, OR MANUFACTURER'S CERTIFICATES OF COMPLIANCE

For use of this form, see ER 415-1-10; the proponent agency is CECW-CE.

DATE	TRANSMITTAL NO.

SECTION I - REQUEST FOR APPROVAL OF THE FOLLOWING ITEMS (*This section will be initiated by the contractor*)

TO:	FROM:	CONTRACT NO.	CHECK ONE: ☐ THIS IS A NEW TRANSMITTAL ☐ THIS IS A RESUBMITTAL OF TRANSMITTAL _____

SPECIFICATION SEC. NO. (*Cover only one section with each transmittal*)	PROJECT TITLE AND LOCATION	THIS TRANSMITTAL IS FOR: (*Check one*) ☐ FIO ☐ GA ☐ DA ☐ CR ☐ DA/CR ☐ DA/GA

ITEM NO. (*See Note 3*)	**DESCRIPTION OF SUBMITTAL ITEM** (*Type size, model number/etc.*)	**SUBMITTAL TYPE CODE** (*See Note 8*)	**NO. OF COPIES**	**CONTRACT DOCUMENT REFERENCE**		**CONTRACTOR REVIEW CODE**	**VARIATION** Enter "Y" if requesting a variation (*See Note 6*)	**USACE ACTION CODE** (*Note 9*)
				SPEC. PARA. NO.	**DRAWING SHEET NO.**			
a.	**b.**	**c.**	**d.**	**e.**	**f.**	**g.**	**h.**	**i.**

REMARKS	I certify that the above submitted items had been reviewed in detail and are correct and in strict conformance with the contract drawings and specifications except as otherwise stated.	
	NAME OF CONTRACTOR	SIGNATURE OF CONTRACTOR

SECTION II - APPROVAL ACTION

ENCLOSURES RETURNED (*List by item No.*)	NAME AND TITLE OF APPROVING AUTHORITY	SIGNATURE OF APPROVING AUTHORITY	DATE

INSTRUCTIONS

1. Section I will be initiated by the Contractor in the required number of copies.

2. Each Transmittal shall be numbered consecutively. The Transmittal Number typically includes two parts separated by a dash (-). The first part is the specification section number. The second part is a sequential number for the submittals under that spec section. If the Transmittal is a resubmittal, then add a decimal point to the end of the original Transmittal Number and begin numbering the resubmittal packages sequentially after the decimal.

3. The "Item No." for each entry on this form will be the same "Item No." as indicated on ENG FORM 4288-R.

4. Submittals requiring expeditious handling will be submitted on a separate ENG Form 4025-R.

5. Items transmitted on each transmittal form will be from the same specification section. Do not combine submittal information from different specification sections in a single transmittal.

6. If the data submitted are intentionally in variance with the contract requirements, indicate a variation in column h, and enter a statement in the Remarks block describing he detailed reason for the variation.

7. ENG Form 4025-R is self-transmitting - a letter of transmittal is not required.

8. When submittal items are transmitted, indicate the "Submittal Type" (*SD-01 through SD-11*) in column c of Section I.
   Submittal types are the following:
   SD-01 - Preconstruction SD-02 - Shop Drawings SD-03 - Product Data SD-04 - Samples SD-05 - Design Data SD-06 - Test Reports
   SD-07 - Certificates SD-08 - Manufacturer's Instructions SD-09 - Manufacturer's Field Reports SD-10 - O&M Data SD-11 - Closeout

9. For each submittal item, the Contractor will assign Submittal Action Codes in column g of Section I. The U.S. Army Corps of Engineers approving authority will assign Submittal Action Codes in column i of Section I. The Submittal Action Codes are:

   A -- Approved as submitted.
   B -- Approved, except as noted on drawings. Resubmission not required.
   C -- Approved, except as noted on drawings. Refer to attached comments. Resubmission required.
   D -- Will be returned by separate correspondence.
   E -- Disapproved. Refer to attached comments.
   F -- Receipt acknowledged.
   X -- Receipt acknowledged, does not comply with contract requirements, as noted.
   G -- Other action required *(Specify)*
   K -- Government concurs with intermediate design. (*For D-B contracts*)
   R -- Design submittal is acceptable for release for construction. (*For D-B contracts*)

10. Approval of items does not relieve the contractor from complying with all the requirements of the contract.

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS

-- End of Section Table of Contents --

SECTION 01 35 26

GOVERNMENTAL SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B30.3	(2020) Tower Cranes
ASME B30.5	(2018) Mobile and Locomotive Cranes
ASME B30.8	(2015) Floating Cranes and Floating Derricks
ASME B30.9	(2018) Slings
ASME B30.20	(2018) Below-the-Hook Lifting Devices
ASME B30.22	(2016) Articulating Boom Cranes
ASME B30.26	(2015; R 2020) Rigging Hardware

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.34	(2001; R 2012) Protection of the Public on or Adjacent to Construction Sites
ASSP A10.44	(2020) Control of Energy Sources (Lockout/Tagout) for Construction and Demolition Operations
ASSP Z244.1	(2016) The Control of Hazardous Energy Lockout, Tagout and Alternative Methods
ASSP Z359.2	(2017) Minimum Requirements for a Comprehensive Managed Fall Protection Program

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2018; ERTA 1-2 2018) Standard for Portable Fire Extinguishers
NFPA 51B	(2019) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2020; ERTA 20-1 2020; ERTA 20-2 2020; TIA 20-1; TIA 20-2; TIA 20-3; TIA 20-4) National Electrical Code

NFPA 70E	(2018; TIA 18-1; TIA 18-2) Standard for Electrical Safety in the Workplace
NFPA 241	(2019) Standard for Safeguarding Construction, Alteration, and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.146	Permit-required Confined Spaces
29 CFR 1910.147	The Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1910.333	Selection and Use of Work Practices
29 CFR 1910.1000	Air Contaminants
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1915.89	Control of Hazardous Energy (Lockout/Tags-Plus)
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.16	Rules of Construction
29 CFR 1926.450	Scaffolds
29 CFR 1926.1400	Cranes and Derricks in Construction
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

1.2 DEFINITIONS

1.2.1 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working conditions that are dangerous to personnel, and who has authorization to take prompt corrective measures with regards to such hazards.

1.2.2 Competent Person, Confined Space

The CP, Confined Space, is a person meeting the competent person

requirements as defined EM 385-1-1 Appendix Q, with thorough knowledge of OSHA's Confined Space Standard, 29 CFR 1910.146, and designated in writing to be responsible for the immediate supervision, implementation and monitoring of the confined space program, who through training, knowledge and experience in confined space entry is capable of identifying, evaluating and addressing existing and potential confined space hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.3 Competent Person, Cranes and Rigging

The CP, Cranes and Rigging, as defined in EM 385-1-1 Appendix Q, is a person meeting the competent person, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the Crane and Rigging Program, who through training, knowledge and experience in crane and rigging is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.4 Competent Person, Excavation/Trenching

A CP, Excavation/Trenching, is a person meeting the competent person requirements as defined in EM 385-1-1 Appendix Q and 29 CFR 1926, who has been designated in writing to be responsible for the immediate supervision, implementation and monitoring of the excavation/trenching program, who through training, knowledge and experience in excavation/trenching is capable of identifying, evaluating and addressing existing and potential hazards and, who has the authority to take prompt corrective measures with regard to such hazards.

1.2.5 Competent Person (CP) Trainer

A competent person trainer as defined in EM 385-1-1 Appendix Q, who is qualified in the training material presented, and who possesses a working knowledge of applicable technical regulations, standards, equipment and systems related to the subject matter on which they are training Competent Persons. A competent person trainer must be familiar with the typical hazards and the equipment used in the industry they are instructing. The training provided by the competent person trainer must be appropriate to that specific industry. The competent person trainer must evaluate the knowledge and skills of the competent persons as part of the training process.

1.2.6 High Risk Activities

High Risk Activities are activities that involve work at heights, crane and rigging, excavations and trenching, scaffolding, electrical work, and confined space entry.

1.2.7 High Visibility Accident

A High Visibility Accident is any mishap which may generate publicity or high visibility.

1.2.8 Load Handling Equipment (LHE)

LHE is a term used to describe cranes, hoists and all other hoisting equipment (hoisting equipment means equipment, including crane, derricks, hoists and power operated equipment used with rigging to raise, lower or

horizontally move a load).

1.2.9 Medical Treatment

Medical Treatment is treatment administered by a physician or by registered professional personnel under the standing orders of a physician. Medical treatment does not include first aid treatment even when provided by a physician or registered personnel.

1.2.10 Near Miss

A Near Miss is a mishap resulting in no personal injury and zero property damage, but given a shift in time or position, damage or injury may have occurred (e.g., a worker falls off a scaffold and is not injured; a crane swings around to move the load and narrowly misses a parked vehicle).

1.2.11 Operating Envelope

The Operating Envelope is the area surrounding any crane or load handling equipment. Inside this "envelope" is the crane, the operator, riggers and crane walkers, other personnel involved in the operation, rigging gear between the hook, the load, the crane's supporting structure (i.e. ground or rail), the load's rigging path, the lift and rigging procedure.

1.2.12 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

1.2.13 Recordable Injuries or Illnesses

Recordable Injuries or Illnesses are any work-related injury or illness that results in:

a. Death, regardless of the time between the injury and death, or the length of the illness;

b. Days away from work (any time lost after day of injury/illness onset);

c. Restricted work;

d. Transfer to another job;

e. Medical treatment beyond first aid;

f. Loss of consciousness; or

g. A significant injury or illness diagnosed by a physician or other licensed health care professional, even if it did not result in (a) through (f) above

1.2.14 Load Handling Equipment (LHE) Accident or Load Handling Equipment Mishap

A LHE accident occurs when any one or more of the eight elements in the operating envelope fails to perform correctly during operation, including

operation during maintenance or testing resulting in personnel injury or death; material or equipment damage; dropped load; derailment; two-blocking; overload; or collision, including unplanned contact between the load, crane, or other objects. A dropped load, derailment, two-blocking, overload and collision are considered accidents, even though no material damage or injury occurs. A component failure (e.g., motor burnout, gear tooth failure, bearing failure) is not considered an accident solely due to material or equipment damage unless the component failure results in damage to other components (e.g., dropped boom, dropped load, or roll over). Document an LHE mishap using the Crane High Hazard working group mishap reporting form (Available at local USACE Safety Office).

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

ACCIDENT PREVENTION PLAN; G, AO

Accident Prevention Plan (AAP) - Construction; G, AO

SD-06 Test Reports

Monthly Exposure Reports

Notifications and Reports

Accident Reports; G, AO

LHE Inspection Reports

SD-07 Certificates

Crane Operators/Riggers

Standard Lift Plan; G, AO

Critical Lift Plan; G, AO

Activity Hazard Analysis (AHA)

Confined Space Entry Permit

Hot Work Permit

Certificate of Compliance

License Certificates

1.4 MONTHLY EXPOSURE REPORTS

Provide a Monthly Exposure Report and attach to the monthly billing request. This report is a compilation of employee-hours worked each month

for all site workers, both Prime and subcontractor. Failure to submit the report may result in retention of up to 10 percent of the voucher.

1.5 REGULATORY REQUIREMENTS

In addition to the detailed requirements included in the provisions of this Contract, comply with the most recent edition of USACE EM 385-1-1, and the following federal, state, and local laws, ordinances, criteria, rules and regulations. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

1.6 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

1.6.1 Personnel Qualifications

1.6.1.1 Site Safety and Health Officer (SSHO)

Provide an SSHO that meets the requirements of EM 385-1-1 Section 1. The SSHO must ensure that the requirements of 29 CFR 1926.16 are met for the project. Provide a Safety oversight team that includes a minimum of one person at each project site to function as the Site Safety and Health Officer (SSHO). The SSHO or an equally-qualified Alternate SSHO must be at the work site at all times to implement and administer the Contractor's safety program and Government-accepted Accident Prevention Plan. The SSHO and Alternate SSHO must have the required training, experience, and qualifications in accordance with EM 385-1-1 Section 01.A.17, and all associated sub-paragraphs.

If the SSHO is off-site for a period longer than 24 hours, an equally-qualified alternate SSHO must be provided and must fulfill the same roles and responsibilities as the primary SSHO. When the SSHO is temporarily (up to 24 hours) off-site, a Designated Representative (DR), as identified in the AHA may be used in lieu of an Alternate SSHO, and must be on the project site at all times when work is being performed. Note that the DR is a collateral duty safety position, with safety duties in addition to their full time occupation.

1.6.1.1.1 Additional Site Safety and Health Officer (SSHO) Requirements and Duties

The SSHO may also serve as the Quality Control Manager. The SSHO may not serve as the Superintendent.

1.6.1.2 Competent Person Qualifications

Provide Competent Persons in accordance with EM 385-1-1, Appendix Q and herein. Competent Persons for high risk activities include confined space, cranes and rigging, excavation/trenching, fall protection, and electrical work. The CP for these activities must be designated in writing, and meet the requirements for the specific activity (i.e. competent person, fall protection).

The Competent Person identified in the Contractor's Safety and Health Program and accepted Accident Prevention Plan, must be on-site at all times when the work that presents the hazards associated with their professional expertise is being performed. Provide the credentials of the

Competent Persons(s) to the Contracting Officer for information in consultation with the Safety Office.

1.6.1.2.1 Competent Person for Confined Space Entry

Provide a Confined Space (CP) Competent Person who meets the requirements of EM 385-1-1, Appendix Q, and herein. The CP for Confined Space Entry must supervise the entry into each confined space in accordance with EM 385-1-1, Section 34.

1.6.1.3 Qualified Trainer Requirements

Individuals qualified to instruct the 40 hour contract safety awareness course, or portions thereof, must meet the definition of a Competent Person Trainer, and, at a minimum, possess a working knowledge of the following subject areas: EM 385-1-1, Electrical Standards, Lockout/Tagout, Fall Protection, Confined Space Entry for Construction; Excavation, Trenching and Soil Mechanics, and Scaffolds in accordance with 29 CFR 1926.450, Subpart L.

Instructors are required to:

a. Prepare class presentations that cover construction-related safety requirements.

b. Ensure that all attendees attend all sessions by using a class roster signed daily by each attendee. Maintain copies of the roster for at least five years. This is a certification class and must be attended 100 percent. In cases of emergency where an attendee cannot make it to a session, the attendee can make it up in another class session for the same subject.

c. Update training course materials whenever an update of the EM 385-1-1 becomes available.

d. Provide a written exam of at least 50 questions. Students are required to answer 80 percent correctly to pass.

e. Request, review and incorporate student feedback into a continuous course improvement program.

1.6.1.4 Crane Operators/Riggers

Provide Operators, Signal Persons, and Riggers meeting the requirements in EM 385-1-1, Section 15.B for Riggers and Section 16.B for Crane Operators and Signal Persons. In addition, for mobile cranes with Original Equipment Manufacturer (OEM) rated capacities of 50,000 pounds or greater, designate crane operators qualified by a source that qualifies crane operators (i.e., union, a Government agency, or an organization that tests and qualifies crane operators). Provide proof of current qualification.

1.6.2 Personnel Duties

1.6.2.1 Duties of the Site Safety and Health Officer (SSHO)

The SSHO must:

a. Conduct daily safety and health inspections and maintain a written log which includes area/operation inspected, date of inspection,

identified hazards, recommended corrective actions, estimated and actual dates of corrections. Attach safety inspection logs to the Contractors' daily production report.

b. Conduct mishap investigations and complete required accident reports. Report mishaps and near misses.

c. Use and maintain OSHA's Form 300 to log work-related injuries and illnesses occurring on the project site for Prime Contractors and subcontractors, and make available to the Contracting Officer upon request. Post and maintain the Form 300A on the site Safety Bulletin Board.

d. Maintain applicable safety reference material on the job site.

e. Attend the pre-construction conference, pre-work meetings including preparatory meetings, and periodic in-progress meetings.

f. Review the APP and AHAs for compliance with EM 385-1-1, and approve, sign, implement and enforce them.

g. Establish a Safety and Occupational Health (SOH) Deficiency Tracking System that lists and monitors outstanding deficiencies until resolution.

h. Ensure subcontractor compliance with safety and health requirements.

i. Maintain a list of hazardous chemicals on site and their material Safety Data Sheets (SDS).

j. Maintain a weekly list of high hazard activities involving energy, equipment, excavation, entry into confined space, and elevation, and be prepared to discuss details during QC Meetings.

k. Provide and keep a record of site safety orientation and indoctrination for Contractor employees, subcontractor employees, and site visitors.

Superintendent, QC Manager, and SSHO are subject to dismissal if the above or any other required duties are not being effectively carried out. If either the Superintendent, QC Manager, or SSHO are dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

1.6.3 Meetings

1.6.3.1 Preconstruction Conference

a. Contractor representatives who have a responsibility or significant role in accident prevention on the project must attend the preconstruction conference. This includes the project superintendent, Site Safety and Occupational Health Officer, quality control manager, or any other assigned safety and health professionals who participated in the development of the APP (including the Activity Hazard Analyses (AHAs) and special plans, program and procedures associated with it).

b. Discuss the details of the submitted APP to include incorporated plans, programs, procedures and a listing of anticipated AHAs that

will be developed and implemented during the performance of the Contract. This list of proposed AHAs will be reviewed and an agreement will be reached between the Contractor and the Contracting Officer as to which phases will require an analysis. In addition, establish a schedule for the preparation, submittal, and Government review of AHAs to preclude project delays.

c. Deficiencies in the submitted APP, identified during the Contracting Officer's review, must be corrected, and the APP re-submitted for review prior to the start of construction. Work is not permitted to begin until an APP is established that is acceptable to the Contracting Officer.

1.6.3.2 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors at the project location. The SSHO, supervisors, foremen, or CDSOs must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Maintain documentation on-site and furnish copies to the Contracting Officer on request. Notify the Contracting Officer of all scheduled meetings 7 calendar days in advance.

1.7 ACCIDENT PREVENTION PLAN (APP)

1.7.1 ACCIDENT PREVENTION PLAN (AAP)

A qualified person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, Appendix A, and as supplemented herein. Cover all paragraph and subparagraph elements in EM 385-1-1, Appendix A. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. The APP must interface with the Contractor's overall safety and health program referenced in the APP in the applicable APP element, and made site-specific. Describe the methods to evaluate past safety performance of potential subcontractors in the selection process. Also, describe innovative methods used to ensure and monitor safe work practices of subcontractors. The Government considers the Prime Contractor to be the "controlling authority" for all work site safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the Contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The APP must be signed by an officer of the firm (Prime Contractor senior person), the individual preparing the APP, the on-site superintendent, the designated SSHO, the Contractor Quality Control Manager, and any designated Certified Safety Professional (CSP) or Certified Health Physicist (CIH). The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

Submit the APP to the Contracting Officer 15 calendar days prior to the

date of the preconstruction conference for acceptance. Work cannot proceed without an accepted APP. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the Contract. Disregarding the provisions of this Contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified. Continuously review and amend the APP, as necessary, throughout the life of the Contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, project superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e. imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ASSP A10.34), and the environment.

1.7.2 Names and Qualifications

Provide plans in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.

b. Qualifications of competent and of qualified persons. As a minimum, designate and submit qualifications of competent persons for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment and clothing to include selection, use and maintenance.

1.7.3 Plans

Provide plans in the APP in accordance with the requirements outlined in Appendix A of EM 385-1-1, including the following:

1.7.3.1 Confined Space Entry Plan

Develop a confined or enclosed space entry plan in accordance with EM 385-1-1, applicable OSHA standards 29 CFR 1910, 29 CFR 1915, and 29 CFR 1926, OSHA Directive CPL 2.100, and any other federal, state and local regulatory requirements identified in this Contract. Identify the qualified person's name and qualifications, training, and experience. Delineate the qualified person's authority to direct work stoppage in the event of hazardous conditions. Include procedure for rescue by Contractor personnel and the coordination with emergency responders. (If there is no confined space work, include a statement that no confined space work exists and none will be created.)

1.7.3.2 Standard Lift Plan (SLP)

Plan lifts to avoid situations where the operator cannot maintain safe

control of the lift. Prepare a written SLP in accordance with EM 385-1-1, Section 16.A.03, using Form 16-2 for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed and accepted by all personnel involved in the lift in conjunction with the associated AHA. Signature on the AHA constitutes acceptance of the plan. Maintain the SLP on the LHE for the current lift(s) being made. Maintain historical SLPs for a minimum of three months.

1.7.3.3 Critical Lift Plan - Crane or Load Handling Equipment

Provide a Critical Lift Plan as required by EM 385-1-1, Section 16.H.01, using Form 16-3. In addition, Critical Lift Plans are required for the following:

a. Lifts over 50 percent of the capacity of barge mounted mobile crane's hoist.

b. When working around energized power lines where the work will get closer than the minimum clearance distance in EM 385-1-1 Table 16-1.

c. For lifts with anticipated binding conditions.

d. When erecting cranes.

1.7.3.3.1 Critical Lift Plan Planning and Schedule

Critical lifts require detailed planning and additional or unusual safety precautions. Develop and submit a critical lift plan to the Contracting Officer 30 calendar days prior to critical lift. Comply with load testing requirements in accordance with EM 385-1-1, Section 16.F.03.

1.7.3.3.2 Lifts of Personnel

In addition to the requirements of EM 385-1-1, Section 16.H.02, for lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1400 and EM 385-1-1, Section 16.T.

1.7.3.4 Multi-Purpose Machines, Material Handling Equipment, and Construction Equipment Lift Plan

Multi-purpose machines, material handling equipment, and construction equipment used to lift loads that are suspended by rigging gear, require proof of authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Written approval from a qualified registered professional engineer, after a safety analysis is performed, is allowed in lieu of the OEM's approval. Demonstrate that the operator is properly trained and that the equipment is properly configured to make such lifts and is equipped with a load chart.

1.7.3.5 Rescue and Evacuation Plan

Provide a Rescue and Evacuation Plan in accordance with EM 385-1-1 Section 21.N and ASSP Z359.2, and include in the FP&P Plan and as part of the APP. Include a detailed discussion of the following: methods of rescue; methods of self-rescue; equipment used; training requirement; specialized training for the rescuers; procedures for requesting rescue and medical assistance; and transportation routes to a medical facility.

1.7.3.6 Hazardous Energy Control Program (HECP)

Develop a HECP in accordance with EM 385-1-1 Section 12, 29 CFR 1910.147, 29 CFR 1910.333, 29 CFR 1915.89, ASSP Z244.1, and ASSP A10.44. Submit this HECP as part of the Accident Prevention Plan (APP). Conduct a preparatory meeting and inspection with all effected personnel to coordinate all HECP activities. Document this meeting and inspection in accordance with EM 385-1-1, Section 12.A.02. Ensure that each employee is familiar with and complies with these procedures.

1.7.3.7 Excavation Plan

Identify the safety and health aspects of excavation, and provide and prepare the plan in accordance with EM 385-1-1, Section 25.A and Section 31 00 00 EARTHWORK.

1.8 ACTIVITY HAZARD ANALYSIS (AHA)

Before beginning each activity, task or Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Format the AHA in accordance with EM 385-1-1, Section 1 or as directed by the Contracting Officer. Submit the AHA for review at least 15 working days prior to the start of each activity task, or DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

1.8.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

1.8.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

1.9 DISPLAY OF SAFETY INFORMATION

1.9.1 Safety Bulletin Board

Prior to commencement of work, erect a safety bulletin board at the job site. Where size, duration, or logistics of project do not facilitate a bulletin board, an alternative method, acceptable to the Contracting Officer, that is accessible and includes all mandatory information for employee and visitor review, may be deemed as meeting the requirement for a bulletin board. Include and maintain information on safety bulletin board as required by EM 385-1-1, Section 01.A.07. Additional items required to be posted include:

a. Confined space entry permit.

b. Hot work permit.

1.9.2 Safety and Occupational Health (SOH) Deficiency Tracking System

Establish a SOH deficiency tracking system that lists and monitors the status of SOH deficiencies in chronological order. Use the tracking system to evaluate the effectiveness of the APP. A monthly evaluation of the data must be discussed in the QC or SOH meeting with everyone on the project. The list must be posted on the project bulletin board and updated daily, and provide the following information:

a. Date deficiency identified;

b. Description of deficiency;

c. Name of person responsible for correcting deficiency;

d. Projected resolution date;

e. Date actually resolved.

1.10 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

1.11 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment in accordance with EM 385-1-1. Government has no responsibility to provide emergency medical treatment.

1.12 NOTIFICATIONS and REPORTS

1.12.1 Mishap Notification

Notify the Contracting Officer as soon as practical, but no more than twenty-four hours, after any mishaps, including recordable accidents, incidents, and near misses, as defined in EM 385-1-1 Appendix Q, any report of injury, illness, or any property damage. For LHE or rigging mishaps, notify the Contracting Officer as soon as practical but not more than four hours after mishap. The Contractor is responsible for obtaining appropriate medical and emergency assistance and for notifying fire, law

enforcement, and regulatory agencies. Immediate reporting is required for electrical mishaps, to include Arc Flash; shock; uncontrolled release of hazardous energy (includes electrical and non-electrical); load handling equipment or rigging; fall from height (any level other than same surface); and underwater diving. These mishaps must be investigated in depth to identify all causes and to recommend hazard control measures.

Within notification include Contractor name; Contract title; type of Contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any mishap.

1.12.2 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. Complete the applicable USACE Accident Report ENG Form 3394, and provide the report to the Contracting Officer within 5 calendar days of the accident. The Contracting Officer will provide copies of any required or special forms.

b. Near Misses: For Army projects, report all "Near Misses" to the GDA, using local mishap reporting procedures, within 24 hrs. The Contracting Officer will provide the Contractor the required forms. Near miss reports are considered positive and proactive Contractor safety management actions.

c. Conduct an accident investigation for any load handling equipment accident (including rigging accidents) to establish the root cause(s) of the accident. Complete the LHE Accident Report (Crane and Rigging Accident Report) form and provide the report to the Contracting Officer within 30 calendar days of the accident. Do not proceed with crane operations until cause is determined and corrective actions have been implemented to the satisfaction of the Contracting Officer. The Contracting Officer will provide a blank copy of the accident report form.

1.12.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.13 HOT WORK

1.13.1 Permit and Personnel Requirements

Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting) or operating other flame-producing/spark producing devices, from the Contracting Officer's representative. Provide at least two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged, and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire

Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of one hour after completion of the task or as specified on the hot work permit.

When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and knowledge of emergency response plan and emergency phone numbers/contacts. REPORT ANY FIRE, NO MATTER HOW SMALL, TO THE RESPONSIBLE FIRE DEPARTMENT OR CONTRACTING OFFICER IMMEDIATELY.

1.13.2 Work Around Flammable Materials

Obtain permit approval from a NFPA Certified Marine Chemist for "HOT WORK" within or around flammable materials (such as fuel systems or welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, or vaults) that have the potential for flammable or explosive atmospheres.

Whenever these materials, except beryllium and chromium (VI), are encountered in indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1, Section 06.H

1.14 CONFINED SPACE ENTRY REQUIREMENTS

Confined space entry must comply with Section 34 of EM 385-1-1, OSHA 29 CFR 1926, OSHA 29 CFR 1910, OSHA 29 CFR 1910.146, and OSHA Directive CPL 2.100. Any potential for a hazard in the confined space requires a permit system to be used.

1.14.1 Entry Procedures

Prohibit entry into a confined space by personnel for any purpose, including hot work, until the qualified person has conducted appropriate tests to ensure the confined or enclosed space is safe for the work intended and that all potential hazards are controlled or eliminated and documented. Comply with EM 385-1-1, Section 34 for entry procedures. Hazards pertaining to the space must be reviewed with each employee during review of the AHA.

1.14.2 Forced Air Ventilation

Forced air ventilation is required for all confined space entry operations and the minimum air exchange requirements must be maintained to ensure exposure to any hazardous atmosphere is kept below its action level.

1.14.3 Sewer Wet Wells

Sewer wet wells require continuous atmosphere monitoring with audible alarm for toxic gas detection.

1.14.4 Rescue Procedures and Coordination with Local Emergency Responders

Develop and implement an on-site rescue and recovery plan and procedures. The rescue plan must not rely on local emergency responders for rescue from a confined space.

1.15 SEVERE STORM PLAN

In the event of a severe storm warning, the Contractor must comply with the applicable Storm Plan and:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be worn or carried/available on each person. Mandatory PPE includes:

a. Hard Hat

b. Long Pants

c. Appropriate Safety Shoes

d. Appropriate Class Reflective Vests

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. Develop an employee check-in/check-out communication procedure to ensure employee safety.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this Contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with

radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

3.1.3 Unforeseen Hazardous Material

Contract documents identify materials such as PCB, lead paint, and friable and non-friable asbestos and other OSHA regulated chemicals (i.e. 29 CFR 1910.1000). If material(s) that may be hazardous to human health upon disturbance are encountered during construction operations, stop that portion of work, notify the Contracting Officer immediately and determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification pursuant to FAR 52.243-4 Changes and FAR 52.236-2 Differing Site Conditions.

3.2 UTILITY OUTAGE REQUIREMENTS

Apply for utility outages per Section 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS. See 01 12 00 CONSTRUCTION GENERAL paragraph 1.13 for owners of overhead powerlines. At a minimum, the written request must include the location of the outage, utilities being affected, duration of outage, any necessary sketches, and a description of the means to fulfill energy isolation requirements in accordance with EM 385-1-1, Section 11.A.02 (Isolation). Some examples of energy isolation devices and procedures are highlighted in EM 385-1-1, Section 12.D. In accordance with EM 385-1-1, Section 12.A.01, where outages involve Government or Utility personnel, coordinate with the Government on all activities involving the control of hazardous energy.

These activities include, but are not limited to, a review of HECP and HEC procedures, as well as applicable Activity Hazard Analyses (AHAs). In accordance with EM 385-1-1, Section 11.A.02 and NFPA 70E, work on energized electrical circuits must not be performed without prior Government authorization. Government permission is considered through the permit process and submission of a detailed AHA. Energized work permits are considered only when de-energizing introduces additional or increased hazard or when de-energizing is infeasible.

3.3 OUTAGE COORDINATION MEETING

After the utility outage request is approved and prior to beginning work on the utility system requiring shut-down, conduct a pre-outage coordination meeting in accordance with EM 385-1-1, Section 12.A. This meeting must include the Prime Contractor, the Prime and subcontractors performing the work, the Contracting Officer, and the Installation representative. All parties must fully coordinate HEC activities with one another. During the coordination meeting, all parties must discuss and coordinate on the scope of work, HEC procedures (specifically, the lock-out/tag-out procedures for worker and utility protection), the AHA, assurance of trade personnel qualifications, identification of competent

persons, and compliance with HECP training in accordance with EM 385-1-1, Section 12.C. Clarify when personal protective equipment is required during switching operations, inspection, and verification.

3.4 CONTROL OF HAZARDOUS ENERGY (LOCKOUT/TAGOUT)

Provide and operate a Hazardous Energy Control Program (HECP) in accordance with EM 385-1-1 Section 12, 29 CFR 1910.333, 29 CFR 1915.89, ASSP A10.44, NFPA 70E, and paragraph HAZARDOUS ENERGY CONTROL PROGRAM (HECP).

3.4.1 Safety Preparatory Inspection Coordination Meeting with the Government or Utility

For electrical distribution equipment that is to be operated by Government or Utility personnel, the Prime Contractor and the subcontractor performing the work must attend the safety preparatory inspection coordination meeting, which will also be attended by the Contracting Officer's Representative, and required by EM 385-1-1, Section 12.A.02. The meeting will occur immediately preceding the start of work and following the completion of the outage coordination meeting. Both the safety preparatory inspection coordination meeting and the outage coordination meeting must occur prior to conducting the outage and commencing with lockout/tagout procedures.

3.4.2 Lockout/Tagout Isolation

Where the Government or Utility performs equipment isolation and lockout/tagout, the Contractor must place their own locks and tags on each energy-isolating device and proceed in accordance with the HECP. Before any work begins, both the Contractor and the Government or Utility must perform energy isolation verification testing while wearing required PPE detailed in the Contractor's AHA and required by EM 385-1-1, Sections 05.I and 11.B. Install personal protective grounds, with tags, to eliminate the potential for induced voltage in accordance with EM 385-1-1, Section 12.E.06.

3.4.3 Lockout/Tagout Removal

Upon completion of work, conduct lockout/tagout removal procedure in accordance with the HECP. In accordance with EM 385-1-1, Section 12.E.08, each lock and tag must be removed from each energy isolating device by the authorized individual or systems operator who applied the device. Provide formal notification to the Government (by completing the Government form if provided by Contracting Officer's Representative), confirming that steps of de-energization and lockout/tagout removal procedure have been conducted and certified through inspection and verification. Government or Utility locks and tags used to support the Contractor's work will not be removed until the authorized Government employee receives the formal notification.

3.5 EQUIPMENT

3.5.1 Material Handling Equipment (MHE)

a. Material handling equipment such as forklifts must not be modified with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions. Material handling equipment fitted with personnel work

platform attachments are prohibited from traveling or positioning while personnel are working on the platform.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions. Material Handling Equipment Operators must be trained in accordance with OSHA 29 CFR 1910, Subpart N.

c. Operators of forklifts or power industrial trucks must be licensed in accordance with OSHA.

3.5.2 Load Handling Equipment (LHE)

The following requirements apply. In exception, these requirements do not apply to commercial truck mounted and articulating boom cranes used solely to deliver material and supplies (not prefabricated components, structural steel, or components of a systems-engineered metal building) where the lift consists of moving materials and supplies from a truck or trailer to the ground; to cranes installed on mechanics trucks that are used solely in the repair of shore-based equipment; to crane that enter the activity but are not used for lifting; nor to other machines not used to lift loads suspended by rigging equipment. However, LHE accidents occurring during such operations must be reported.

a. Equip cranes and derricks as specified in EM 385-1-1, Section 16.

b. Notify the Contracting Officer 15 working days in advance of any LHE entering the activity, in accordance with EM 385-1-1, Section 16.A.02, so that necessary quality assurance spot checks can be coordinated. Contractor's operator must remain with the crane during the spot check. Rigging gear must be in accordance with OSHA, ASME B30.9 Standards and federal, state, and local safety standards.

c. Comply with the LHE manufacturer's specifications and limitations for erection and operation of cranes and hoists used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30.5). Perform all testing in accordance with the manufacturer's recommended procedures.

d. As applicable, comply with ASME B30.5 for mobile and locomotive cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, ASME B30.8 for floating cranes and floating derricks, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices and ASME B30.26 for rigging hardware.

e. As applicable, when operating in the vicinity of overhead transmission lines, operators and riggers must be alert to this special hazard and follow the requirements of EM 385-1-1 Section 11, and ASME B30.5 or ASME B30.22 as applicable.

f. Do not use crane suspended personnel work platforms (baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Do not lift personnel with a line hoist or friction crane. Additionally, submit a specific AHA for this work to the Contracting Officer. Ensure the activity and AHA are thoroughly reviewed by all involved personnel.

g. Inspect, maintain, and recharge portable fire extinguishers as

specified in NFPA 10, Standard for Portable Fire Extinguishers.

h. All employees must keep clear of loads about to be lifted and of suspended loads, except for employees required to handle the load.

i. Use cribbing when performing lifts on outriggers.

j. The crane hook/block must be positioned directly over the load. Side loading of the crane is prohibited.

k. A physical barricade must be positioned to prevent personnel access where accessible areas of the LHE's rotating superstructure poses a risk of striking, pinching or crushing personnel.

l. Maintain inspection records in accordance by EM 385-1-1, Section 16.D, including shift, monthly, and annual inspections, the signature of the person performing the inspection, and the serial number or other identifier of the LHE that was inspected. Records must be available for review by the Contracting Officer.

m. Maintain written reports of operational and load testing in accordance with EM 385-1-1, Section 16.F, listing the load test procedures used along with any repairs or alterations performed on the LHE. Reports must be available for review by the Contracting Officer.

n. Certify that all LHE operators have been trained in proper use of all safety devices (e.g. anti-two block devices).

o. Take steps to ensure that wind speed does not contribute to loss of control of the load during lifting operations. At wind speeds greater than 20 mph, the operator, rigger and lift supervisor must cease all crane operations, evaluate conditions and determine if the lift may proceed. Base the determination to proceed or not on wind calculations per the manufacturer and a reduction in LHE rated capacity if applicable. Include this maximum wind speed determination as part of the activity hazard analysis plan for that operation.

q. Follow FAA guidelines when required based on project location.

3.5.3 Machinery and Mechanized Equipment

a. Proof of qualifications for operator must be kept on the project site for review.

b. Manufacture specifications or owner's manual for the equipment must be on-site and reviewed for additional safety precautions or requirements that are sometimes not identified by OSHA or USACE EM 385-1-1. Incorporate such additional safety precautions or requirements into the AHAs.

3.5.4 Use of Explosives

Explosives must not be used or brought to the project site.

3.6 EXCAVATIONS

Soil classification must be performed by a competent person in accordance with 29 CFR 1926 and EM 385-1-1.

3.6.1 Utility Locations

Provide a third party, independent, private utility locating company to positively identify underground utilities in the work area.

3.6.2 Utility Location Verification

Physically verify all underground utility locations, including utility depth, by potholing using water, air with non-conductive ends and can include hand digging using wood or fiberglass handled tools when any adjacent construction work is expected to come within 3 feet of the underground system.

De-energize the circuit for medium voltage cable or direct buried medium voltage cables prior to performing any construction activities within 3 feet of the circuit. If the circuit is reenergized while still exposed, a barrier with danger signs must be provided to limit the approach boundary to 10 feet. De-energize the circuit prior to reentering the 10 feet boundary.

When the excavation will expose and undermine a concrete encased duct bank, submit a concrete encased duct bank electrical support plan for government acceptance prior to undermining the duct bank.

3.6.3 Utilities Within and Under Concrete, Bituminous Asphalt, and Other Impervious Surfaces

Utilities located within and under concrete slabs or pier structures, bridges, parking areas, and the like, are extremely difficult to identify. Whenever Contract work involves chipping, saw cutting, or core drilling through concrete, bituminous asphalt or other impervious surfaces, the existing utility location must be coordinated with station utility departments in addition to location and depth verification by a third party, independent, private locating company. The third party, independent, private locating company must locate utility depth by use of Ground Penetrating Radar (GPR), X-ray, bore scope, or ultrasound prior to the start of demolition and construction. Outages to isolate utility systems must be used in circumstances where utilities are unable to be positively identified. The use of historical drawings does not alleviate the Contractor from meeting this requirement.

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(SOUTH DAKOTA) NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES

PART 1 GENERAL

"General Permit For Storm Water Discharges Associated With Construction Activities", Permit No. SDR10#### can be found at the following website: https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/stormwater/StormWaterConstructio

1.1 REFERENCES (Not Applicable)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittal

Notice of Intent.

Authorization Letter.

Storm Water Pollution Prevention Plan.

Notice of Termination.

SD-06 Test Reports

Reports.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall be responsible for implementing the terms and requirements of the attached "General Permit For Storm Water Discharges Associated With Construction Activities", Permit No. SDR10####, for storm water discharges from construction sites. The Contractor shall be considered the "permittee". All submissions to the state shall be by certified mail. Copies of the return receipt for each submission shall be included with the submittal to the Contracting Officer's Representative (COR).

3.2 IMPLEMENTATION

3.2.1 Notice of Intent

The Contractor shall complete and submit a Notice of Intent (NOI) in accordance with Permit No. SDR10####. A copy of the submitted NOI shall be furnished to the COR at least 15 days prior to the commencement of construction activities. The Government shall be considered the "Applicant" and shall sign as such on the form after review. The Contractor will complete Attachment C in the Permit No.SDR10####. Attachment C is titled Department of Environment and Natural Resources Contractor Certification Form. Which will be submitted with the NOI.
NOTE: The Contractor is responsible for any Notice of Violations that occur during the NPDES Permit being in effect. The Contractor will be responsible for paying for any violation fines and/or making any corrections necessary.

3.2.2 Authorization Letter

Construction activities regulated under Permit No. SDR10#### shall not begin until an authorization letter from the State granting coverage for the storm water discharges is received by the Contractor. A copy of the authorization letter shall be furnished to the COR at least 2 days prior to the commencement of construction activities.

3.2.3 Posting NOI and Authorization Letter

A copy of the NOI and the authorization letter shall be posted by the Contractor at the construction site in a prominent place for public viewing.

3.2.4 Storm Water Pollution Prevention Plan

The Contractor shall prepare and implement a Storm Water Pollution Prevention Plan (SWPPP) in accordance with Permit No. SDR10####. Any temporary or permanent erosion and sedimentation control measures shown on the drawings shall be incorporated into the Contractor's SWPPP. A copy of the SWPPP shall be submitted to the COR at least 2 days prior to the commencement of construction activities. Copies of all revisions to the SWPPP shall also be submitted.

3.2.5 Inspections and Reporting

The Contractor shall be responsible for all inspections and reporting required under the NPDES Permit No. SDR10####. Copies of all inspection reports shall be furnished to the COR.

3.2.6 Retention of Records

The Contractor shall retain a copy of the SWPPP, reports, and records of all data used to complete the NOI in accordance with Permit No. SDR10####.

3.2.7 Notice of Termination

The Contractor shall complete and submit a Notice of Termination (NOT) in accordance with Permit No. SDR10####. The Government shall be considered the "Facility Operator". A copy of the submitted NOT shall be furnished to the COR for signature prior to submission to the State.

3.2.8 Renotification

If the current permit expires prior to completion of construction, the Contractor shall submit a new NOI in accordance with Permit No. SDR10####. A copy of all submissions to the State shall be furnished to the COR.

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QUALITY CONTROL

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SECTION 01 45 00.00 10

QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D3740	(2019) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2020) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program. Include all associated costs in the applicable Bid Schedule item.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Quality Control (CQC) Plan; G, AO

SD-06 Test Reports

Verification Statement

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Submit Quality Control Personnel experience as required per the requirements of Section 00 22 00 PROPOSAL SUBMISSION REQUIREMENTS,

INSTRUCTIONS AND EVALUATION. If, because of reasons beyond the control of the Contractor, the named individuals are not able to fulfill this obligation, present replacement personnel with equal or better skills and experience for acceptance by the Contracting Officer. Obtain the Contracting Officer's written consent before making any substitution for these designated personnel.

Establish and maintain an effective quality control (QC) system that complies with the Contract Clause titled "Inspection of Construction." QC consist of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system covers all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence. The project superintendent will be held responsible for the quality of work and is subject to removal by the Contracting Officer for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the project superintendent. The project superintendent maintains a physical presence at the site at all times and is responsible for all construction and related activities at the site, except as otherwise acceptable to the Contracting Officer.

3.2 CONTRACTOR QUALITY CONTROL (CQC) PLAN

Submit no later than 10 calendar days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause titled "Inspection of Construction." The Government will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction-operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff will implement the three phase control system for all aspects of the work specified. Include a CQC System Manager that reports to the project superintendent.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities will be issued by the CQC System Manager. Furnish copies of these letters to the Contracting Officer.

d. Procedures for scheduling, reviewing, certifying, and managing

submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities approved by the Contracting Officer are required to be used.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and is identified by different trades or disciplines, or it is work by the same trade in a different environment. Although each section of the specifications can generally be considered as a definable feature of work, there are frequently more than one definable features under a particular section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in the Contractor Quality Control (CQC) Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, meet with the Contracting Officer and discuss the Contractor's quality control system. Submit the CQC Plan a minimum of 10 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Contractor, signed by both the Contractor and the Contracting Officer and will become a part of the contract file. There can be occasions when subsequent

conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which can require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a Safety and Health Manager, CQC System Manager, and sufficient number of additional qualified personnel to ensure safety and Contract compliance. The Safety and Health Manager reports directly to a senior project (or corporate) official independent from the CQC System Manager. The Safety and Health Manager will also serve as a member of the CQC Staff Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly will also be included as part of the CQC organization. The Contractor's CQC staff maintains a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. The CQC staff will be subject to acceptance by the Contracting Officer. Provide adequate office space, filing systems and other resources as necessary to maintain an effective and fully functional CQC organization. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules and all other project documentation to the CQC organization. The CQC organization is responsible to maintain these documents and records at the site at all times, except as otherwise acceptable to the Contracting Officer.

3.4.2 CQC System Manager

Identify as CQC System Manager an individual within the onsite work organization that is responsible for overall management of CQC and has the authority to act in all CQC matters for the Contractor. The CQC System Manager is required to be a construction person with a minimum of 5 years in related work. This CQC System Manager is on the site at all times during construction and is employed by the prime Contractor. The CQC System Manager is assigned as CQC System Manager, but may have duties as SSHO in addition to quality control and meets the qualifications for each position. Identify in the plan an alternate to serve in the event of the CQC System Manager's absence. The requirements for the alternate are the same as the CQC System Manager.

3.4.3 CQC Personnel

ALTERNATE 2: Maintain a staff under the direction of the CQC system manager to perform all QC activities. The staff must be of sufficient size to ensure adequate QC coverage of all work phases, work shifts, and work crews involved in the construction. These personnel may perform other duties, but must be fully qualified by experience and technical training to perform their assigned QC responsibilities and must be allowed sufficient time to carry out these responsibilities. Clearly state the duties and responsibilities of each staff member in the QC Plan. Other technical specifications may specify individuals for maintaining quality control for specific areas of work.

3.4.4 Assignment of CQC System Manager, Project Superintendent, and SSHO Responsibilities

The Site Safety and Health Officer (SSHO) may have other duties such as

CQC System Manager provided that experience requirements for the positions are met. However, the CQC System Manager and Project Superintendent cannot be the same person.

3.4.5 Construction Quality Management Course- COVID-19 Restrictions

In addition to the above experience and education requirements, the Contractor Quality Control (CQC) System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Contractors course.

Contractor personnel who otherwise fulfill all requirements for designation as a CQC Manager, but have not had the opportunity to obtain a CQM certificate due to COVID-19 restrictions, shall be permitted to serve as Quality Control Managers conditioned upon obtaining a CQM-C certificate within 120 days of USACE lifting current in person learning restrictions.

CQC Managers who were in possession of valid CQM certificate (i.e. not delinquent on the 5 year course renewal requirement) as of 01-Mar-2020 will have a grace period for obtaining the CQM renewal training of 6-months from the lifting of COVID-19 restrictions and USACE being able to provide face to face CQM training.

This course is periodically offered at offices indicated at the following web site:

http://www.nwo.usace.army.mil/BusinessWithUs/Contracting/QualityManagement.aspx

The exact date and location for the sessions will be determined approximately 30 calendar days in advance by the trainer (POC). Cost varies by location per student.

The Construction Quality Management Training certificate expires after 5 years. If the CQC System Manager's certificate has expired, retake the course to remain current.

The Government reserves the right to recognize certificates issued as a result of virtual training by a certified instructor as valid.

3.4.6 Construction Quality Management Course - Post-COVID-19 Restrictions

In addition to the above experience and education requirements, the Contractor Quality Control (CQC) System Manager and Alternate CQC System Manager are required to have completed the Construction Quality Management (CQM) for Contractors course. If the CQC System Manager does not have a current certification, obtain the CQM for Contractors course certification within 90 days of award. This course is periodically offered at offices indicated at the following web site:

http://www.nwo.usace.army.mil/BusinessWithUs/Contracting/QualityManagement.aspx

The exact date and location for the sessions will be determined approximately 30 days in advance by the trainer (POC). Cost varies by location per student.

The Construction Quality Management Training certificate expires after 5 years. If the CQC System Manager's certificate has expired, retake the course to remain current.

3.4.7 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS AND DELIVERABLES

Submittals, if needed, have to comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization is responsible for certifying that all submittals and deliverables are in compliance with the contract requirements. When Section 01 91 00.15 TOTAL BUILDING COMMISSIONING are included in the contract, the submittals required by those sections have to be coordinated with Section 01 33 00 SUBMITTAL PROCEDURES to ensure adequate time is allowed for each type of submittal required.

3.6 CONTROL

CQC is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control are required to be conducted by the CQC System Manager for each definable feature of the construction work as follows:

3.6.1 Preparatory Phase

This phase is performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

a. A review of each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

b. Review of the Contract drawings.

c. Check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.

f. Examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. Review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and

workmanship standards for that feature of work.

i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government needs to be notified at least 48 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. Document the results of the preparatory phase actions by separate minutes prepared by the CQC System Manager and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase is accomplished at the beginning of a definable feature of work. Accomplish the following:

a. Check work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing are in compliance with the contract.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government needs to be notified at least 48 hours in advance of beginning the initial phase for definable feature of work. Prepare separate minutes of this phase by the CQC System Manager and attach to the daily CQC report. Indicate the exact location of initial phase for definable feature of work for future reference and comparison with follow-up phases.

g. The initial phase for each definable feature of work is repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. Record the checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. Procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Record results of all tests taken, both passing and failing on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the Contracting Officer, actual test reports are submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the Contracting Officer. Failure to submit timely test reports as stated results in nonpayment for related work performed and disapproval of the test facility for this Contract.

3.7.2 Testing Laboratories

All testing laboratories must be validated by the USACE Material Testing Center (MTC) for the tests to be performed. Information on the USACE MTC with web-links to both a list of validated testing laboratories and for the laboratory inspection request for can be found at:
https://mtc.erdc.dren.mil/

Click on "Lab Validation"
Search for a Validation

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the

contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel is required to meet criteria detailed in ASTM D3740 and ASTM E329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed the actual cost for the recheck to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the Contract amount due the Contractor.

3.7.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Conduct an inspection of the work by the CQC System Manager near the end of the work, or any increment of the work established by a time stated in the CONTRACT CLAUSES , "Commencement, Prosecution, and Completion of Work", or by the specifications. Prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications, as required by paragraph DOCUMENTATION. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. Make a second inspection the CQC System Manager or staff to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.8.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the facility is complete and ready to be occupied. A Government Pre-Final Punch List may be developed as a result of this inspection. Ensure that all items on this list have been corrected before notifying the Government, so that a final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this paragraph need to be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the Contracting Officer's Representative is required to be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands can also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notify the Contracting Officer at least 14

days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the Contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the Contract clause titled "Inspection of Construction".

3.9 DOCUMENTATION

Maintain current records providing factual evidence that required quality control activities and/or tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

a. The name and area of responsibility of the Contractor/Subcontractor.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. Identify the control phase (Preparatory, Initial, Follow-up). List of deficiencies noted, along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals and deliverables reviewed, with Contract reference, by whom, and action taken.

g. Offsite surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions. Include information identified by the "Responsible Individual(s)" for Safety as outlined in Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS.

i. Instructions given/received and conflicts in plans and/or specifications.

k. Verification Statement.

Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Furnish the original and one copy of these records in report form to the Contracting Officer's Representative on the first day following the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. The Government may elect to process these records electronically. Coordinate with the Contracting Officer's

Representative. As a minimum, prepare and submit one report for every 7 days of no work and on the last day of a no work period. All calendar days need to be accounted for throughout the life of the contract. The first report following a day of no work will be for that day only. Reports need to be signed and dated by the Contractor Quality Control (CQC) System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the CQC System Manager Report.

3.10 SAMPLE FORMS

Generate daily quality control reports using the Government-furnished Construction Contractor Module of RMS specified in Section 01 45 00.15 10 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM).

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, will be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer can issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders will be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

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RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

1.2 MEASUREMENT AND PAYMENT

The work of this section is not measured for payment. The Contractor is responsible for the work of this section, without any direct compensation other than the payment received for contract items.

1.3 CONTRACT ADMINISTRATION

The Government will use the Resident Management System (RMS) to assist in its monitoring and administration of this contract. The Government accesses the system using the Government Mode of RMS (RMS GM) and the Contractor accesses the system using the Contractor Mode (RMS CM). The term RMS will be used in the remainder of this section for both RMS GM and RMS CM. The joint Government-Contractor use of RMS facilitates electronic exchange of information and overall management of the contract. The Contractor accesses RMS to record, maintain, input, track, and electronically share information with the Government throughout the contract period in the following areas:

Administration
Finances
Quality Control
Submittal Monitoring
Scheduling
Closeout
Import/Export of Data

1.3.1 Correspondence and Electronic Communications

For ease and speed of communications, exchange correspondence and other documents in electronic format to the maximum extent feasible. Some correspondence, including pay requests and payrolls, are also to be provided in paper format with original signatures. Paper documents will govern, in the event of discrepancy with the electronic version.

1.3.2 Other Factors

Other portions of this document have a direct relationship to the

reporting accomplished through RMS. Particular attention is directed to FAR 52.236-15 Schedules for Construction Contracts; FAR 52.232-27 Prompt Payment for Construction Contracts; FAR 52.232-5 Payments Under Fixed-Priced Construction Contracts; Section 01 32 01.00 10 PROJECT SCHEDULE; Section 01 33 00 SUBMITTAL PROCEDURES; Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS; and Section 01 45 00.00 10 QUALITY CONTROL.

1.4 RMS SOFTWARE

RMS is a web based application. Download, install and be able to utilize the latest version of RMS within 7 calendar days of receipt of the Notice to Proceed. RMS software, user manuals, access and installation instructions, program updates and training information are available from the RMS website (https://rms.usace.army.mil). The Government and the Contractor will have different access authorities to the same contract database through RMS. The common database will be updated automatically each time a user finalizes an entry or change.

1.5 CONTRACT DATABASE - GOVERNMENT

The Government will enter the basic contract award data in RMS prior to granting the Contractor access. The Government entries into RMS will generally be related to submittal reviews, correspondence status, and Quality Assurance (QA)comments, as well as other miscellaneous administrative information.

1.6 CONTRACT DATABASE - CONTRACTOR

Contractor entries into RMS establish, maintain, and update data throughout the duration of the contract. Contractor entries generally include prime and subcontractor information, daily reports, submittals, RFI's, schedule updates and payment requests. RMS includes the ability to import attachments and export reports in many of the modules, including submittals. The Contractor responsibilities for entries in RMS typically include the following items:

1.6.1 Administration

1.6.1.1 Contractor Information

Enter all current Contractor administrative data and information into RMS within 7 calendar days of receiving access to the contract in RMS. This includes, but is not limited to, Contractor's name, address, telephone numbers, management staff, and other required items.

1.6.1.2 Subcontractor Information

Enter all missing subcontractor administrative data and information into RMS CM within 7 calendar days of receiving access to the contract in RMS or within 7 calendar days of the signing of the subcontractor agreement for agreements signed at a later date. This includes name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor is listed separately for each trade to be performed.

1.6.1.3 Correspondence

Identify all Contractor correspondence to the Government with a serial

number. Prefix correspondence initiated by the Contractor's site office with "S". Prefix letters initiated by the Contractor's home (main) office with "H". Letters are numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C" or "RFP".

1.6.1.4 Equipment

Enter and maintain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates.

1.6.1.5 Reports

Track the status of the project utilizing the reports available in RMS. The value of these reports is reflective of the quality of the data input. These reports include the Progress Payment Request worksheet, Quality Control (QC) comments, Submittal Register Status, and Three-Phase Control worksheets.

1.6.1.6 Request For Information (RFI)

Create and track all Requests For Information (RFI) in the RMS Administration Module for Government review and response.

1.6.2 Finances

1.6.2.1 Pay Activity Data

Develop and enter a list of pay activities in conjunction with the project schedule. The sum of pay activities equals the total contract amount, including modifications. Each pay activity must be assigned to a Contract Line Item Number (CLIN). The sum of the activities assigned to a CLIN equals the amount of each CLIN.

1.6.2.2 Payment Requests

Prepare all progress payment requests using RMS. Update the work completed under the contract at least monthly, measured as percent or as specific quantities. After the update, generate a payment request and prompt payment certification using RMS. Submit the signed prompt payment certification and payment request as well as supporting data either electronically or by hard copy. Unless waived by the Contracting Officer, a signed paper copy of the approved payment certification and request is also required and will govern in the event of discrepancy with the electronic version.

1.6.3 Quality Control (QC)

Enter and track implementation of the 3-phase QC Control System, QC testing, transferred and installed property and warranties in RMS. Prepare daily reports, identify and track deficiencies, document progress of work, and support other Contractor QC requirements in RMS. Maintain all data on a daily basis. Ensure that RMS reflects all quality control methods, tests and actions contained within the Contractor Quality Control (CQC) Plan and Government review comments of same within 7 calendar days of Government acceptance of the CQC Plan.

1.6.3.1 Quality Control (QC) Reports

The Contractor's Quality Control (QC) Daily Report in RMS is the official report. The Contractor can use other supplemental formats to record QC data, but information from any supplemental formats is to be consolidated and entered into the RMS QC Daily Report. Any supplemental information may be entered into RMS as an attachment to the report. QC Daily Reports must be finalized and signed in RMS within 24 hours after the date covered by the report. Provide the Government a printed signed copy of the QC Daily Report, unless waived by the Contracting Officer.

1.6.3.2 Deficiency Tracking.

Use the QC Daily Report Module to enter and track deficiencies. Deficiencies identified and entered into RMS by the Contractor or the Government will be sequentially numbered with a QC or QA prefix for tracking purposes. Enter each deficiency into RMS the same day that the deficiency is identified. Monitor, track and resolve all QC and QA entered deficiencies. A deficiency is not considered to be corrected until the Government indicates concurrence in RMS.

1.6.3.3 Three-Phase Control Meetings

Maintain scheduled and actual dates and times of preparatory and initial control meetings in RMS. Worksheets for the three-phase control meetings are generated within RMS.

1.6.3.4 Labor and Equipment Hours

Enter labor and equipment exposure hours on a daily basis. Roll up the labor and equipment exposure data into a monthly exposure report.

1.6.3.5 Accident/Safety Reporting

Both the Contractor and the Government enter safety related comments in RMS as a deficiency. The Contractor must monitor, track and show resolution for safety issues in the QC Daily Report area of the RMS QC Module. In addition, follow all reporting requirements for accidents and incidents as required in EM 385-1-1, Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS and as required by any other applicable Federal, State or local agencies.

1.6.3.6 Definable Features of Work

Enter each feature of work, as defined in the approved CQC Plan, into the RMS QC Module. A feature of work may be associated with a single or multiple pay activities, however a pay activity is only to be linked to a single feature of work.

1.6.3.7 Activity Hazard Analysis

Import activity hazard analysis electronic document files into the RMS QC Module utilizing the document package manager.

1.6.4 Submittal Management

Enter all current submittal register data and information into RMS within 7 calendar days of receiving access to the contract in RMS. The information shown on the submittal register following the specification

Section 01 33 00 SUBMITTAL PROCEDURES will already be entered into the RMS database when access is granted. Group electronic submittal documents into transmittal packages to send to the Government, except very large electronic files, samples, spare parts, mock ups, color boards, or where hard copies are specifically required. Track transmittals and update the submittal register in RMS on a daily basis throughout the duration of the contract. Submit hard copies of all submittals unless waived by the Contracting Officer.

1.6.5 Schedule

Enter and update the contract project schedule in RMS by either manually entering all schedule data or by importing the Standard Data Exchange Format (SDEF) file, based on the requirements in Section 01 32 01.00 10 PROJECT SCHEDULE.

1.6.6 Closeout

Closeout documents, processes and forms are managed and tracked in RMS by both the Contractor and the Government. Ensure that all closeout documents are entered, completed and documented within RMS.

1.7 IMPLEMENTATION

Use of RMS as described in the preceding paragraphs is mandatory. Ensure that sufficient resources are available to maintain contract data within the RMS system. RMS is an integral part of the Contractor's required management of quality control.

1.8 NOTIFICATION OF NONCOMPLIANCE

Take corrective action within 7 calendar days after receipt of notice of RMS non-compliance by the Contracting Officer.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

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ENVIRONMENTAL PROTECTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual
WETLANDS DELINEATION MANUAL	(1987) Corps of Engineers Wetlands Delineation Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

33 CFR 328	Definitions of Waters of the United States
40 CFR 150 - 189	Pesticide Programs
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 279	Standards for the Management of Used Oil
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 355	Emergency Planning and Notification
40 CFR 68	Chemical Accident Prevention Provisions
49 CFR 171 - 178	Hazardous Materials Regulations

1.2 DEFINITIONS

1.2.1 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally and/or historically.

1.2.2 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur to the environment during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.2.3 Contractor Generated Hazardous Waste

Contractor generated hazardous waste means materials that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams would typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene etc.), waste thinners, excess paints, excess solvents, waste solvents, and excess pesticides, and contaminated pesticide equipment rinse water.

1.2.4 Project Pesticide Coordinator

The Project Pesticide Coordinator (PPC) is an individual that resides at a Civil Works Project office and that is responsible for oversight of pesticide application on Project grounds.

1.2.5 Land Application for Discharge Water

The term "Land Application" for discharge water implies that the Contractor must discharge water at a rate which allows the water to percolate into the soil. No sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States" must occur. Land Application must be in compliance with all applicable Federal, State, and local laws and regulations.

1.2.6 Pesticide

Pesticide is defined as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, or intended for use as a plant regulator, defoliant or desiccant.

1.2.7 Pests

The term "pests" means arthropods, birds, rodents, nematodes, fungi, bacteria, viruses, algae, snails, marine borers, snakes, weeds and other organisms (except for human or animal disease-causing organisms) that adversely affect readiness, military operations, or the well-being of personnel and animals; attack or damage real property, supplies, equipment, or vegetation; or are otherwise undesirable.

1.2.8 Surface Discharge

The term "Surface Discharge" implies that the water is discharged with possible sheeting action and subsequent soil erosion may occur. Waters that are surface discharged may terminate in drainage ditches, storm sewers, creeks, and/or "waters of the United States" and would require a permit to discharge water from the governing agency.

1.2.9 Waters of the United States

All waters which are under the jurisdiction of the Clean Water Act, as defined in 33 CFR 328.

1.2.10 Wetlands

Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, and bogs. Official determination of whether or not an area is classified as a wetland must be done in accordance with WETLANDS DELINEATION MANUAL.

1.3 GENERAL REQUIREMENTS

Minimize environmental pollution and damage that may occur as the result of construction operations. The environmental resources within the project boundaries and those affected outside the limits of permanent work must be protected during the entire duration of this contract. Comply with all applicable environmental Federal, State, and local laws and regulations. Any delays resulting from failure to comply with environmental laws and regulations will be the Contractor's responsibility.

1.4 SUBCONTRACTORS

Ensure compliance with this section by subcontractors.

1.5 PAYMENT

No separate payment will be made for work covered under this section. Payment of fees associated with environmental permits, application, and/or notices obtained by the Contractor, and payment of all fines/fees for violation or non-compliance with Federal, State, Regional and local laws and regulations are the Contractor's responsibility. All costs associated with this section must be included in the contract price.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Administrative Submittals

SD-01 Preconstruction Submittals

Environmental Protection Plan; G, -AO

1.7 ENVIRONMENTAL PROTECTION PLAN

Prior to commencing construction activities or delivery of materials to the site, submit an Environmental Protection Plan for review and approval by the Contracting Officer. The purpose of the Environmental Protection Plan is to present a comprehensive overview of known or potential

environmental issues which the Contractor must address during construction. Issues of concern must be defined within the Environmental Protection Plan as outlined in this section. Address each topic at a level of detail commensurate with the environmental issue and required construction task(s). Topics or issues which are not identified in this section, but are considered necessary, must be identified and discussed after those items formally identified in this section. Prior to submittal of the Environmental Protection Plan, meet with the Contracting Officer for the purpose of discussing the implementation of the initial Environmental Protection Plan; possible subsequent additions and revisions to the plan including any reporting requirements; and methods for administration of the Contractor's Environmental Plans. The Environmental Protection Plan must be current and maintained onsite by the Contractor.

1.7.1 Compliance

No requirement in this Section will relieve the Contractor of any applicable Federal, State, and local environmental protection laws and regulations. During Construction, the Contractor will be responsible for identifying, implementing, and submitting for approval any additional requirements to be included in the Environmental Protection Plan.

1.7.2 Contents

Include in the environmental protection plan, but not limit it to, the following:

a. Name(s) of person(s) within the Contractor's organization who is(are) responsible for ensuring adherence to the Environmental Protection Plan.

b. Name(s) and qualifications of person(s) responsible for manifesting hazardous waste to be removed from the site, if applicable.

c. Name(s) and qualifications of person(s) responsible for training the Contractor's environmental protection personnel.

d. Description of the Contractor's environmental protection personnel training program.

e. An erosion and sediment control plan which identifies the type and location of the erosion and sediment controls to be provided. The plan must include monitoring and reporting requirements to assure that the control measures are in compliance with the erosion and sediment control plan, Federal, State, and local laws and regulations. A Storm Water Pollution Prevention Plan (SWPPP) may be substituted for this plan.

f. Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials including methods to control runoff and to contain materials on the site.

g. Traffic control plans including measures to reduce erosion of temporary roadbeds by construction traffic, especially during wet weather. Plan shall include measures to minimize the amount of mud transported onto paved public roads by vehicles or runoff.

h. Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. Plan should include measures for marking the limits of use areas including methods for protection of features to be preserved within authorized work areas.

i. Drawing showing the location of borrow areas.

j. Include in the Spill Control plan the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 68, 40 CFR 302, 40 CFR 355, and/or regulated under State or Local laws and regulations. The Spill Control Plan supplements the requirements of EM 385-1-1. Include in this plan, as a minimum:

(1) The name of the individual who will report any spills or hazardous substance releases and who will follow up with complete documentation. This individual will immediately notify the Contracting Officer and the local Fire Department in addition to the legally required Federal, State, and local reporting channels (including the National Response Center 1-800-424-8802) if a reportable quantity is released to the environment. Include in the plan a list of the required reporting channels and telephone numbers.

(2) The name and qualifications of the individual who will be responsible for implementing and supervising the containment and cleanup.

(3) Training requirements for Contractor's personnel and methods of accomplishing the training.

(4) A list of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified.

(5) The names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup, restoration, and material-placement equipment available in case of an unforeseen spill emergency.

(6) The methods and procedures to be used for expeditious contaminant cleanup.

k. A non-hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris and schedules for disposal.

(1) Identify any subcontractors responsible for the transportation and disposal of solid waste. Submit licenses or permits for solid waste disposal sites that are not a commercial operating facility.

(2) Evidence of the disposal facility's acceptance of the solid waste must be attached to this plan during the construction. Attach a copy of each of the Non-hazardous Solid Waste Diversion Reports to the disposal plan. Submit the report for the previous quarter on the first working day after the first quarter that non-hazardous solid waste has been disposed and/or diverted (e.g. the first working day of January, April, July, and October).

(3) Indicate in the report the total amount of waste generated and total amount of waste diverted in cubic yards or tons along with the percent that was diverted.

(4) A recycling and solid waste minimization plan with a list of measures to reduce consumption of energy and natural resources. Detail in the plan the Contractor's actions to comply with and to participate in Federal, State, Regional, and local government sponsored recycling programs to reduce the volume of solid waste at the source.

l. An air pollution control plan detailing provisions to assure that dust, debris, materials, trash, etc., do not become air borne and travel off the project site.

m. A contaminant prevention plan that: identifies potentially hazardous substances to be used on the job site; identifies the intended actions to prevent introduction of such materials into the air, water, or ground; and details provisions for compliance with Federal, State, and local laws and regulations for storage and handling of these materials. In accordance with EM 385-1-1, a copy of the Material Safety Data Sheets (MSDS) and the maximum quantity of each hazardous material to be onsite at any given time must be included in the contaminant prevention plan. Update the plan as new hazardous materials are brought onsite or removed from the site.

n. A waste water management plan that identifies the methods and procedures for management and/or discharge of waste waters which are directly derived from construction activities, such as concrete curing water, clean-up water, dewatering of ground water, disinfection water, hydrostatic test water, and water used in flushing of lines. If a settling/retention pond is required, the plan must include the design of the pond including drawings, removal plan, and testing requirements for possible pollutants. If land application will be the method of disposal for the waste water, the plan must include a sketch showing the location for land application along with a description of the pretreatment methods to be implemented. If surface discharge will be the method of disposal, include a copy of the permit and associated documents as an attachment prior to discharging the waste water. If disposal is to a sanitary sewer, the plan must include documentation that the Waste Water Treatment Plant Operator has approved the flow rate, volume, and type of discharge.

o. A historical, archaeological, cultural resources biological resources and wetlands plan that defines procedures for identifying and protecting historical, archaeological, cultural resources, biological resources and wetlands known to be on the project site: and/or identifies procedures to be followed if historical archaeological, cultural resources, biological resources and wetlands not previously known to be onsite or in the area are discovered during construction. Include in the plan methods to assure the protection of known or discovered resources, identifying lines of communication between Contractor personnel and the Contracting Officer.

p. Include and update a pesticide treatment plan, as information becomes available. Include in the plan: sequence of treatment, dates, times, locations, pesticide trade name, EPA registration numbers, authorized uses, chemical composition, formulation, original and applied

concentration, application rates of active ingredient (i.e. pounds of active ingredient applied), equipment used for application and calibration of equipment. Federal, State, Regional and Local pest management record keeping and reporting requirements as well as any additional Installation Project Office specific requirements are the Contractor's responsibility.

1.7.3 Appendix

Attach to the Environmental Protection Plan, as an appendix, copies of all environmental permits, permit application packages, approvals to construct, notifications, certifications, reports, and termination documents.

1.8 PROTECTION FEATURES

This paragraph supplements the Contract Clause PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Prior to start of any onsite construction activities, the Contractor and the Contracting Officer will make a joint condition survey. Immediately following the survey, the Contractor will prepare a brief report including a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. This survey report will be signed by both the Contractor and the Contracting Officer upon mutual agreement as to its accuracy and completeness. The Contractor must protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference which their preservation may cause to the work under the contract.

1.9 PERMITS, NOTICES, REVIEWS, AND/OR APPROVALS

The following is a listing of permits, notices, reviews, and/or approvals which **may be** required for this project. This listing and requirements are not to be considered all-inclusive by the Contractor, but is provided as information that may be used in successfully accomplishing the environmental compliances.

1.9.1 NPDES Permit for South Dakota Construction Activities

If construction activities result in disturbance of 1 acre of land or more (sites that may be smaller than 1 acre but are part of common plan of development are considered to be over 1 acre), coverage under the State of South Dakota Department of Environment and Natural Resources' (SDENR), Authorization to Discharge Under the Surface Water Discharge System Permit #SDR100000 is required. If the current permit is revised by the State of South Dakota to requiring the permit for a project disturbing less than 1 acre, the Contractor shall be responsible for the applying for coverage under the permit. The Contractor shall be responsible for implementing the terms and requirements of the permit and shall be considered the "permittee". The Contractor shall complete and submit a Notice of Intent (NOI) and the Notice of Termination (NOT)in accordance with Permit #SDR100000 and shall be considered the "Facility Operator". The Contractor shall not begin construction until an authorization letter from the State granting coverage for the storm water discharges is received. The Contractor shall be responsible for posting a copy of the NOI and the

authorization letter at the construction site in a prominent place for public viewing. The Contractor shall prepare and implement a Storm Water Pollution Prevention Plan, inspections, and reporting in accordance with the SD#100000. Any temporary or permanent erosion and sedimentation control measures shown on the drawings shall be incorporated into the Contractor's Storm Water Pollution Prevention Plan. The Contractor shall be responsible for assuring that their SWPPP is in accordance with Best Management Practices. The Contractor shall retain copies of the storm water pollution prevention plan and all reports in accordance with the permit. All submissions to the State shall be by certified mail. The Contractor shall include copies of all submittals to the State of South Dakota, plans, and reports in the Appendix to the Environmental Protection Plan.

1.10 ENVIRONMENTAL ASSESSMENT OF CONTRACT DEVIATIONS

Any deviations from the drawings, plans and specifications, requested by the Contractor and which may have an environmental impact, will be subject to approval by the Contracting Officer and may require an extended review, processing, and approval time. The Contracting Officer reserves the right to disapprove alternate methods, even if they are more cost effective, if the Contracting Officer determines that the proposed alternate method will have an adverse environmental impact.

1.11 NOTIFICATION

The Contracting Officer will notify the Contractor in writing of any observed noncompliance with Federal, State or local environmental laws or regulations, permits, and other elements of the Contractor's Environmental Protection plan. After receipt of such notice, the Contractor will inform the Contracting Officer of the proposed corrective action and take such action when approved by the Contracting Officer. The Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted or equitable adjustments allowed for any such suspensions. This is in addition to any other actions the Contracting Officer may take under the contract, or in accordance with the Federal Acquisition Regulation or Federal Law.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 LAND RESOURCES

Confine all activities to areas defined by the drawings and specifications. Identify any land resources to be preserved within the work area prior to the beginning of any construction. Do not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and land forms without approval, except in areas indicated on the drawings or specified to be cleared. Ropes, cables, or guys will not be fastened to or attached to any trees for anchorage unless specifically authorized. Provide effective protection for land and vegetation resources at all times, as defined in the following subparagraphs. Remove stone, soil, or other materials displaced into uncleared areas.

3.1.1 Work Area Limits

Mark the areas that need not be disturbed under this contract prior to commencing construction activities. Mark or fence isolated areas within the general work area which are not to be disturbed. Protect monuments and markers before construction operations commence. Where construction operations are to be conducted during darkness, any markers must be visible in the dark. The Contractor's personnel must be knowledgeable of the purpose for marking and/or protecting particular objects.

3.1.2 Landscape

Trees, shrubs, vines, grasses, land forms and other landscape features indicated and defined on the drawings to be preserved must be clearly identified by marking, fencing, or wrapping with boards, or any other approved techniques. Restore landscape features damaged or destroyed during construction operations outside the limits of the approved work area.

3.1.3 Erosion and Sediment Controls

Providing erosion and sediment control measures in accordance with Federal, State, and local laws and regulations is the Contractor's responsibility. Select and maintain the erosion and sediment controls such that water quality standards are not violated as a result of construction activities. The area of bare soil exposed at any one time by construction operations should be kept to a minimum. Construct or install temporary and permanent erosion and sediment control best management practices (BMPs) as specified in Section 01 57 23 TEMPORARY STORM WATER POLLUTION CONTROL. BMPs may include, but not be limited to, vegetation cover, stream bank stabilization, slope stabilization, silt fences, construction of terraces, interceptor channels, sediment traps, inlet and outfall protection, diversion channels, and sedimentation basins. Remove any temporary measures after the area has been stabilized.

3.1.4 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings in areas designated on the drawings or as directed by the Contracting Officer. Temporary movement or relocation of Contractor facilities will be made only when approved. Erosion and sediment controls must be provided for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Temporary excavation and embankments for plant and/or work areas must be controlled to protect adjacent areas.

3.2 WATER RESOURCES

Monitor all water areas affected by construction activities to prevent pollution of surface and ground waters. Do not apply toxic or hazardous chemicals to soil or vegetation unless otherwise indicated. For construction activities immediately adjacent to impaired surface waters, the Contractor must be capable of quantifying sediment or pollutant loading to that surface water when required by State or Federally issued Clean Water Act permits.

3.2.1 Cofferdams, Diversions, and Dewatering Operations

Construction operations for dewatering, removal of cofferdams, tailrace excavation, and tunnel closure will be controlled at all times to maintain

compliance with existing State water quality standards and designated uses of the surface water body.

3.2.2 Stream Crossings

Stream crossings must allow movement of materials or equipment without violating water pollution control standards of the Federal, State, and local governments.

3.2.3 Wetlands

D0 not enter, disturb, destroy, or allow discharge of contaminants into any wetlands.

3.3 AIR RESOURCES

Equipment operation, activities, or processes will be in accordance with all Federal and State air emission and performance laws and standards.

3.3.1 Particulates

Dust particles; aerosols and gaseous by-products from construction activities; and processing and preparation of materials, such as from asphaltic batch plants; must be controlled at all times, including weekends, holidays and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates which would cause the Federal, State, and local air pollution standards to be exceeded or which would cause a hazard or a nuisance. Sprinkling, chemical treatment of an approved type, baghouse, scrubbers, electrostatic precipitators or other methods will be permitted to control particulates in the work area. Sprinkling, to be efficient, must be repeated to keep the disturbed area damp at all times. Provide sufficient, competent equipment available to accomplish these tasks. Perform particulate control as the work proceeds and whenever a particulate nuisance or hazard occurs. Comply with all State and local visibility regulations.

3.3.2 Odors

Odors from construction activities must be controlled at all times. The odors must be in compliance with State regulations and/or local ordinances and may not constitute a health hazard.

3.3.3 Sound Intrusions

Keep construction activities under surveillance and control to minimize environment damage by noise. Comply with the provisions of the State of South Dakota rules.

3.3.4 Burning

Burning is prohibited on the Government premises.

3.4 CHEMICAL MATERIALS MANAGEMENT AND WASTE DISPOSAL

Disposal of wastes will be as directed below, unless otherwise specified in other sections and/or shown on the drawings.

3.4.1 Solid Wastes

Place solid wastes (excluding clearing debris) in containers which are emptied on a regular schedule. Handling, storage, and disposal must be conducted to prevent contamination. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with solid waste. Transport solid waste off Government property and dispose of it in compliance with Federal, State, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill will be the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary permits and licenses to operate.

3.4.2 Chemicals and Chemical Wastes

Dispense chemicals ensuring no spillage to the ground or water. Perform and document periodic inspections of dispensing areas to identify leakage and initiate corrective action. This documentation will be periodically reviewed by the Government. Collect chemical waste in corrosion resistant, compatible containers. Collection drums must be monitored and removed to a staging or storage area when contents are within 6 inches of the top. Wastes will be classified, managed, stored, and disposed of in accordance with Federal, State, and local laws and regulations.

3.4.3 Contractor Generated Hazardous Wastes/Excess Hazardous Materials

Hazardous wastes are defined in 40 CFR 261, or are as defined by applicable State and local regulations. Hazardous materials are defined in 49 CFR 171 - 178. At a minimum, manage and store hazardous waste in compliance with 40 CFR 262 in accordance with the Project Office hazardous waste management plan. Take sufficient measures to prevent spillage of hazardous and toxic materials during dispensing. Segregate hazardous waste from other materials and wastes, protect it from the weather by placing it in a safe covered location, and take precautionary measures such as berming or other appropriate measures against accidental spillage. Storage, describing, packaging, labeling, marking, and placarding of hazardous waste and hazardous material in accordance with 49 CFR 171 - 178, State, and local laws and regulations is the Contractor's responsibility. Transport Contractor generated hazardous waste off Government property within 60 days in accordance with the Environmental Protection Agency and the Department of Transportation laws and regulations. Dispose of hazardous waste in compliance with Federal, State and local laws and regulations. Spills of hazardous or toxic materials must be immediately reported to the Contracting Officer. Cleanup and cleanup costs due to spills are the Contractor's responsibility. The disposition of Contractor generated hazardous waste and excess hazardous materials are the Contractor's responsibility. Coordinate the disposition of hazardous waste with the Project Office's Hazardous Waste Manager and the Contracting Officer.

3.4.4 Fuel and Lubricants

Storage, fueling and lubrication of equipment and motor vehicles must be conducted in a manner that affords the maximum protection against spill and evaporation. Manage and store fuel, lubricants and oil in accordance with all Federal, State, Regional, and local laws and regulations. Used lubricants and used oil to be discarded must be stored in marked corrosion-resistant containers and recycled or disposed in accordance with 40 CFR 279, State, and local laws and regulations. Storage of fuel on the

project site is not allowed. Fuel must be brought to the project site each day that work is performed. Storage of fuel on the project site will be in accordance with all Federal, State, and local laws and regulations.

3.4.5 Waste Water

Disposal of waste water will be as specified below.

a. Waste water from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, forms, etc. will not be allowed to enter water ways or to be discharged prior to being treated to remove pollutants. Dispose of the construction related waste water off-Government property in accordance with all Federal, State, Regional and Local laws and regulations.

b. For discharge of ground water, the Contractor shall obtain a State or Federal permit specific for pumping and discharging ground water prior to surface discharging.

3.5 RECYCLING AND WASTE MINIMIZATION

Participate in State and local government sponsored recycling programs. The Contractor is further encouraged to minimize solid waste generation throughout the duration of the project.

3.6 NON-HAZARDOUS SOLID WASTE DIVERSION REPORT

Maintain an inventory of non-hazardous solid waste diversion and disposal of construction and demolition debris. Submit a report to the Contracting Officer on the first working day after each fiscal year quarter, starting the first quarter that non-hazardous solid waste has been generated. Include the following in the report:

a. Construction and Demolition (C&D) Debris Disposed = _____ in cubic yards or tons, as appropriate.

b. Construction and Demolition (C&D) Debris Recycled = _____ in cubic yards or tons, as appropriate.

c. Total C&D Debris Generated = _____ in cubic yards or tons, as appropriate.

d. Waste Sent to Waste-To-Energy Incineration Plant (This amount should not be included in the recycled amount) = _____ in cubic yards or tons, as appropriate.

3.7 HISTORICAL, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

If during excavation or other construction activities any previously unidentified or unanticipated historical, archaeological, and cultural resources are discovered or found, all activities that may damage or alter such resources will be temporarily suspended. Resources covered by this paragraph include but are not limited to: any human skeletal remains or burials; artifacts; shell, midden, bone, charcoal, or other deposits; rock or coral alignments, pavings, wall, or other constructed features; and any indication of agricultural or other human activities. Upon such discovery or find, immediately notify the Contracting Officer so that the

appropriate authorities may be notified and a determination made as to their significance and what, if any, special disposition of the finds should be made. Cease all activities that may result in impact to or the destruction of these resources. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources.

3.8 BIOLOGICAL RESOURCES

Minimize interference with, disturbance to, and damage to fish, wildlife, and plants including their habitat. The protection of threatened and endangered animal and plant species, including their habitat, is the Contractor's responsibility in accordance with Federal, State, Regional, and local laws and regulations.

3.8.1 Endangered/Threatened Species

The Contractor shall be responsible for the protection of threatened and endangered animal and plant species including their habitat in accordance with Federal, State, Regional, and local laws and regulations. The following are known endangered/threatened species that could possibly be in the project area.

3.8.1 Interior Least Terns and/or Piping Plovers

No Construction shall occur within a quarter of a mile of the areas identified as nesting habitat for the Interior Least Terns and/or Piping Plovers between the dates of April 15 and August 15 of any year.

3.8.2 Bald Eagles

The Contractor shall be responsible for identifying and avoiding disturbing bald eagles which are roosting or nesting in the project area. Bald eagles shall not be disturbed. The Government recommends avoiding roosting bald eagles by eliminating activity within 75 meters of the roosting bald eagle and 0.5 miles of active bald eagle nest. However, this is a general recommendation, and may change dependent upon location, available cover, and concealment. It is the Contractor's responsibility to accurately determine appropriate distances to avoid disturbing the bald eagle. The Contractor shall ensure that his employees are able to identify bald eagles and shall avoid disturbing bald eagles. Bald eagles have been known to nest as early as January, and the chicks are usually fledged by mid-July.

3.8.3 Migratory Birds

Clearing and grubbing shall be scheduled so as to avoid disturbance to any active nests of migratory birds covered by the above Act. Normally, that allows clearing only from 15 September to 31 January. However, subject to the results of a survey by a qualified biologist, the CO may determine that trees in the work area are free of nests, and allow such trees to be cleared outside the stated time window. Adherence to these guidelines will help avoid any unnecessary take of migratory birds and the penalties specified in the Act and associated regulations.

3.9 INTEGRATED PEST MANAGEMENT

In order to minimize impacts to existing fauna and flora, the Contractor through the Contracting Officer, must coordinate with the Project

Pesticide Coordinator (PPC)at the earliest possible time prior to pesticide application. Discuss integrated pest management strategies with the PPC and receive concurrence from the PPC through the COR prior to the application of any pesticide associated with these specifications. Installation Project Office Pest Management personnel will be given the opportunity to be present at all meetings concerning treatment measures for pest or disease control and during application of the pesticide. The use and management of pesticides are regulated under 40 CFR 150 - 189.

3.9.1 Pesticide Delivery and Storage

Deliver pesticides to the site in the original, unopened containers bearing legible labels indicating the EPA registration number and the manufacturer's registered uses. Store pesticides according to manufacturer's instructions and under lock and key when unattended.

3.9.2 Qualifications

For the application of pesticides, use the services of a subcontractor whose principal business is pest control. The subcontractor must be licensed and certified in the state where the work is to be performed.

3.9.3 Pesticide Handling Requirements

Formulate, treat with, and dispose of pesticides and associated containers in accordance with label directions and use the clothing and personal protective equipment specified on the labeling for use during all phases of the application. Furnish Material Safety Data Sheets (MSDS) for all pesticide products.

3.9.4 Application

Apply pesticides using a State Certified Pesticide Applicator in accordance with EPA label restrictions and recommendation. The Certified Applicator must wear clothing and personal protective equipment as specified on the pesticide label. The Contracting Officer will designate locations for water used in formulating. Do not allow the equipment to overflow. All equipment must be inspected for leaks, clogging, wear, or damage and repaired prior to application of pesticide.

3.10 PREVIOUSLY USED EQUIPMENT

Clean all previously used construction equipment prior to bringing it onto the project site. Ensure that the equipment is free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the USDA jurisdictional office for additional cleaning requirements.

3.11 MAINTENANCE OF POLLUTION FACILITIES

Maintain permanent and temporary pollution control facilities and devices for the duration of the contract or for that length of time construction activities create the particular pollutant.

3.12 TRAINING OF CONTRACTOR PERSONNEL

The Contractor's personnel must be trained in all phases of environmental protection and pollution control. Conduct environmental protection/pollution control meetings for all personnel prior to commencing construction activities. Additional meetings must be conducted

for new personnel and when site conditions change. Include in the training and meeting agenda: methods of detecting and avoiding pollution; familiarization with statutory and contractual pollution standards; installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control; anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants; recognition and protection of archaeological sites, artifacts, wetlands, and endangered species and their habitat that are known to be in the area.

3.13 POST CONSTRUCTION CLEANUP

The Contractor will clean up all areas used for construction in accordance with Contract Clause: "Cleaning Up". Unless otherwise instructed in writing by the Contracting Officer, obliterate all signs of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. The disturbed area must be graded, filled and the entire area seeded unless otherwise indicated.

-- End of Section --

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TEMPORARY STORM WATER POLLUTION CONTROL

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SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D448	(2012; R 2017) Standard Classification for Sizes of Aggregate for Road and Bridge Construction
ASTM D4873/D4873M	(2017) Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 288	(2017) Standard Specification for Geosynthetic Specification for Highway Applications

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA FP-14	(2014) FP-14 Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects

1.2 GENERAL

The Contractor shall implement the storm water pollution prevention measures specified in this section in a manner which will meet the requirements of Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION, and the requirements of the National Pollution Discharge Elimination System (NPDES) permit specified in Section 01 41 26.01 24(South Dakota)(NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES and be responsible for selection of appropriate best management practices as specified herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Mill Certificate or Affidavit

1.4 EROSION AND SEDIMENT CONTROLS

The controls and measures required by the Contractor are described in the NPDES PERMIT REQUIREMENTS FOR STORM WATER DISCHARGES FROM CONSTRUCTION SITES and below.

1.4.1 Stabilization Practices

The stabilization practices to be implemented may include temporary seeding, mulching, sod stabilization, vegetative buffer strips, erosion control blankets, protection of trees, preservation of mature vegetation, etc. On his daily CQC Report, the Contractor shall record the dates when the major grading activities occur; when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated.

1.4.1.1 Permanent Seeding

Disturbed areas of the site where construction activities permanently cease shall be stabilized with permanent seeding no more than 14 days after the construction activity ceases, except as follows. When the initiation of permanent seeding is stopped due to snow cover or arid conditions, permanent seeding shall be initiated as soon as practicable.

1.4.1.2 Temporary Seeding and Mulching

Areas where construction activities will temporarily cease for more than one year shall be temporarily seeded and mulched. Disturbed areas of the site where construction activities temporarily cease for more than 21 days and less than one year shall be stabilized with either temporary seeding and mulching or mulching not more than 14 days after construction activity ceases, except as follows. When the initiation of temporary stabilization measures is stopped due to snow cover or arid conditions, stabilization measures shall be initiated as soon as practicable.

1.4.1.3 Erosion Control Blankets

Erosion control blanket may be installed on steep slopes and in drainage swales and ditches to protect finished grades from erosion.

1.4.2 Temporary Structural Practices

Temporary structural practices shall be implemented to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Temporary structural practices shall be implemented in a timely manner during the construction process to minimize erosion and sediment runoff. Temporary structural practices shall include but not be limited to the following devices.

1.4.2.1 Silt Fences

The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation,

embankment, and grading). Silt fence barriers shall be installed along the down slope boundary of all disturbed areas prior to beginning land-dist urbing activities in those areas. Silt fence barriers may be installed across ditches or swales but not where the drainage area is greater than 1 acre. Removal of silt fence barriers shall be approved by the Contracting Officer.

1.4.2.2 Storm Drain Inlet Protection

Storm drain inlet protection shall be installed at each new and existing inlet which receives storm runoff from disturbed areas of 1 acre of less. The protection at each inlet shall be removed once the disturbed area has been finally stabilized.

1.4.2.3 Culvert Inlet Protection

Culvert inlet protection shall be installed at all culverts with a drainage area of 1 acre or less.

1.4.2.4 Rock Check Dams

Rock check dams may be used to reduce erosion of temporary or permanent ditches or swales. Type 1 rock check dams shall be used when the upstream drainage area is less than 2 acres. Type 2 rock check dams shall be used when the upstream area is 2 to 10 acres.

1.4.2.5 Stone Construction Entrance

A stone construction entrance shall be constructed wherever traffic will be leaving the construction site and move directly onto a paved road. Stone construction entrances shall be removed after the site has been finally stabilized.

1.4.2.6 Sediment Trap

Sediment traps may be constructed below disturbed areas where the total contributing drainage area is less than 3 acres. Sediment traps, when used, should be constructed prior to disturbance of upslope areas. Sediment traps must have an initial storage volume of 134 cubic yards per acre of drainage area, half of which shall be in the form of a permanent pool or wet storage to provide a stable settling medium. The remaining half shall be in the form of a drawdown or dry storage which will provide extended settling time during less frequent, larger storm events.

1.4.2.7 Diversion Dikes

Diversion dikes may be constructed to divert runoff from upslope drainage areas away from unprotected disturbed areas and slopes to a stabilized outlet or to divert sediment-laden runoff from a disturbed area to a sediment-trapping facility such as a sediment trap or sediment basin. Diversion dikes shall have a maximum channel slope of 2 percent and shall be adequately compacted to prevent failure. The minimum height measured from the top of the dike to the bottom of the channel shall be 18 inches. The minimum base width shall be 6 feet and the minimum top width shall be 2 feet. The Contractor shall ensure that the diversion dikes are not damaged by construction operations or traffic.

PART 2 PRODUCTS

2.1 COMPONENTS FOR SILT FENCES

2.1.1 Geotextile

The geotextile shall comply with the requirements of AASHTO M 288 for temporary silt fence.

2.1.2 Silt Fence Stakes and Posts

The Contractor may use either wooden stakes or steel posts for fence construction. Wooden stakes utilized for silt fence construction, shall have a minimum cross section of 2 inches by 2 inches when oak is used and 4 inches by 4 inches when pine is used, and shall have a minimum length of 3 feet. Steel posts (standard "U" or "T" section) utilized for silt fence construction, shall have a minimum weight of 1.33 pounds per linear foot and a minimum length of 5 feet.

2.1.3 Mill Certificate or Affidavit

A mill certificate or affidavit shall be provided attesting that the geotextile and factory seams meet chemical, physical, and manufacturing requirements specified above. The mill certificate or affidavit shall specify the actual Minimum Average Roll Values and shall identify the fabric supplied by roll identification numbers. The Contractor shall submit a mill certificate or affidavit signed by a legally authorized official from the company manufacturing the geotextile.

2.1.4 Identification Storage and Handling

Geotextile shall be identified, stored and handled in accordance with ASTM D4873/D4873M.

2.1.5 Support Mesh

Support mesh shall be 14-1/2 gage or heavier steel wire with a mesh spacing of 6 by 6 inch or a prefabricated polymeric mesh of equivalent strength.

2.2 Erosion Control Blankets

Installation staple patterns shall be clearly marked on the erosion control blanket with environmentally safe paint.

2.2.1 Netless Erosion Control Blanket

Erosion control blankets shall be a machine-produced mat with a biodegradable agricultural straw matrix (approximately 0.50 lb/sq yd). The blanket shall have a 12-month typical functional longevity and be designed for use on geotechnically stable slopes with gradients up to 1V:4H and channels with shear stresses up to 0.50 pounds per square foot.

2.2.2 Single-Net Erosion Control Blanket

Erosion control blankets shall be a machine-produced mat with a biodegradable agricultural straw matrix (approximately 0.50 lb/sq yd) and photodegradable netting on the top side. The blanket shall be sewn together with degradable thread. The blanket shall have a 12-month

typical functional longevity and be designed for use on geotechnically stable slopes with gradients up to 1V:3H and channels with shear stresses up to 1.50 pounds per square foot.

2.2.3 Double-Net Erosion Control Blanket

Erosion control blankets shall be a machine-produced mat with a biodegradable agricultural straw matrix (approximately 0.50 lb/sq yd) and photodegradable netting on each side. The blanket shall be sewn together with degradable thread. The blanket shall have a 12-month typical functional longevity and be designed for use on geotechnically stable slopes with gradients up to 1V:2H and channels with shear stresses up to 1.75 pounds per square foot.

2.3 Permanent Turf Reinforcement Mat

Turf reinforcement matting shall conform to FHWA FP-14, Section 713, Type 5.A.

2.4 COMPONENTS FOR SEDIMENT TRAP

Coarse aggregate shall conform to ASTM D448, Size 3, 357, or 5. Minor variations from the gradations specified will be permitted. Stone for riprap shall consist of field stone or rough unhewn quarry stone of approximately rectangular shape. The stone shall be hard and angular and of such quality that it will not disintegrate on exposure to water or weathering. The specific gravity of individual stones shall be at least 2.5. Riprap stones shall weigh between 50 and 150 pounds each, except that approximately 10 percent may weigh 50 pounds or less. At least 60 percent shall weight more than 100 pounds. Geotextile shall conform to paragraph GEOTEXTILES.

2.5 COMPONENTS FOR INLET PROTECTION

Aggregates for gravel filter should be sized to get the greatest amount of filtering action possible (by using smaller-sized stone), while not creating significant ponding problems.

2.6 STONE CONSTRUCTION ENTRANCE

Aggregate for construction entrance shall conform to ASTM D448, Size 1. Minor variations from the gradation specified will be permitted. Geotextile shall conform to paragraph GEOTEXTILES.

2.7 ROCK CHECK DAMS

Coarse aggregate shall conform to ASTM D448 size number 1 or approved equal. Riprap shall consist of field stone or rough unhewn quarry stone of approximately rectangular shape. Riprap shall be hard and angular. The specific gravity of individual stones shall be at least 2.5. Concrete rubble may be used provided it has a density of at least 150 pcf. Individual stones shall have a weight of 50 to 150 lbs except that a maximum of 10 percent of stone may weigh less than 50 lbs. At least 60 percent of stones shall weigh more than 100 lbs.

2.8 GEOTEXTILES

Geotextile for other than silt fence shall comply with the requirements of AASHTO M 288 for a separation geotextile.

PART 3 EXECUTION

3.1 INSTALLATION OF SILT FENCES

Silt fences shall extend a minimum of 16 inches above the ground surface and shall not exceed 34 inches above the ground surface. Geotextile shall be from a continuous roll cut to the length of the barrier to avoid the use of joints. When joints are unavoidable, geotextile shall be spliced together at a support post, with a minimum 6 inch overlap, and securely sealed. Silt fence may be installed using either the trench or soil slicing method. Silt fences shall be removed upon approval by the Contracting Officer.

3.2 EROSION CONTROL BLANKETS

Installation of erosion control blankets shall conform to the manufacturer's recommendations.

3.3 TURF REINFORCEMENT MAT

Installation of turf reinforcement matting shall conform to the manufacturer's recommendations.

3.4 Sediment Trap

The area under the embankment shall be cleared, grubbed, and stripped of any vegetation and root mat. Fill material for the embankment shall be placed in accordance with Section 31 00 00 EARTHWORK. A geotextile shall be placed between the riprap and subgrade.

3.5 Stone Construction Entrance

The area of the entrance shall be cleared of all vegetation, roots, and other objectionable material. The aggregate layer shall have a minimum total thickness of 6 inches. A geotextile shall be placed beneath aggregate for the full width and length of the entrance. A minimum of 3 inches of the aggregate shall be placed in a cut section to provide stability and secure the geotextile. If conditions on the site are such that the majority of the mud is not removed by the vehicles traveling over the stone, then the tires of the vehicles shall be washed before entering the road. Wash water must be carried away from the entrance to an approved settling area to remove sediment. A wash rack may also be installed for washing of vehicles.

3.6 MAINTENANCE

The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition by performing routine inspections to determine condition and effectiveness, by restoration of destroyed vegetative cover, and by repair of erosion and sediment control measures and other protective measures. Maintenance of protective measures shall conform to the requirements in the SWPPP. The following procedures shall be followed to maintain the protective measures.

3.6.1 Silt Fences

Silt fences shall be inspected in accordance with paragraph INSPECTIONS.

Any required repairs shall be made promptly. Close attention shall be paid to the repair of damaged silt fence resulting from end runs and undercutting. Should the fabric on a silt fence decompose or become ineffective, and the barrier is still necessary, the fabric shall be replaced promptly. Sediment deposits shall be removed when deposits reach one-third of the height of the barrier. When a silt fence is no longer required, it shall be removed. The immediate area occupied by the fence and any sediment deposits shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded in accordance with Section 32 92 19 SEEDING.

3.6.2 Storm Drain Inlet Protection

Inlet protection structures shall be inspected after each rainfall and repairs made as needed. Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one half the design depth.

3.6.3 Rock Check Dams

Check dams should be checked for sediment after each runoff-producing sto rm event. Sediment should be removed when it reaches one half the original height of the measure.

3.6.4 Stone Construction Entrance

Stone construction entrances shall be maintained in a condition which will prevent tracking or flow of mud onto paved roads. This may require periodic top dressing with additional stone or the washing and reworking of existing stone as conditions demand and repair and/or cleanout of any structures used to trap sediment. The use of water trucks to remove materials dropped, washed, or tracked onto roadways will not be permitted under any circumstances.

3.6.5 Sediment Traps

Sediment shall be removed and the trap restored to its original dimensions when the sediment has accumulated to one half the design volume of the wet storage. Filter stone shall be regularly checked to ensure that filtration performance is maintained. Stone choked with sediment shall be removed and cleaned or replaced. The structure should be inspected regularly to ensure that it is structurally sound and has not been damaged by erosion or construction equipment. The height of the stone outlet should be inspected to ensure that its center is a least 1 foot below the top of the embankment.

3.6.6 Diversion Dikes

Diversion dikes shall be inspected in accordance with paragraph INSPECTIONS. Close attention shall be paid to the repair of damaged diversion dikes and necessary repairs shall be accomplished promptly. When diversion dikes are no longer required, they shall be shaped to an acceptable grade. The areas disturbed by this shaping shall be seeded in accordance with Section 32 92 19 SEEDING.

3.7 INSPECTIONS

3.7.1 General

The Contractor shall inspect disturbed areas of the construction site, areas used for storage of materials that are exposed to precipitation that have not been finally stabilized, stabilization practices, structural practices, other controls, and area where vehicles exit the site at least once every seven (7) calendar days and within 24 hours of the end of any storm that produces 0.5 inches or more rainfall at the site. Where sites have been finally stabilized, such inspection shall be conducted at least once every month. Inspection of protective measures shall conform to the requirements in the SWPPP.

3.7.2 Inspections Details

Disturbed areas and areas used for material storage that are exposed to precipitation shall be inspected for evidence of, or the potential for, pollutants entering the drainage system. Erosion and sediment control measures shall be observed to ensure that they are operating correctly. Discharge locations or points shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters. Locations where vehicles exit the site shall be inspected for evidence of offsite sediment tracking.

3.7.3 Inspection Reports

For each inspection conducted, the Contractor shall prepare a report summarizing the scope of the inspection, name(s) of personnel making the inspection, the date(s) of the inspection, major observations relating to the implementation of the storm water pollution prevention measures, maintenance performed, and actions taken. The report shall be furnished to the Contracting Officer within 24 hours of the inspection as a part of the Contractor's daily CQC REPORT.

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AS-BUILT DRAWINGS

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SECTION 01 78 39.00 24

AS-BUILT DRAWINGS
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PART 1 GENERAL

Attachments: Modifications and Title Block Examples

1.1 DEFINITIONS

The definitions listed below form a part of this specification.

1.1.1 Red-Line Drawings

Contract drawings marked-up during construction to show actual work performed to include necessary sketches, modification drawings, shop drawings and notes.

1.1.2 As-Built Drawings

Professionally finished bond paper drawings and Electronic CAD files developed from the contract drawings that include all of the information from the redline drawings and suitable for half-size reproduction.

1.1.3 Black-Line Drawings

Paper drawings reproduced from electronic CAD files or high quality reproducible drawings.

1.1.4 Full-Size Drawings

22 inches x 34 inches nominal size drawings with all details visually readable so that half-size plot will fit on 11 inches x 17 inches cut sheets.

1.1.5 Modification Circle

A circle with a horizontal line through the center to identify modification changes on the drawings. The top half will contain the letter "R" with the bottom half containing the Modification number, unless directed otherwise. The lettering standard will be 1/8-inch Arial.ttf.

1.1.6 Electronic CAD Files

Electronic CAD files in Bentley (.dgn) in accordance with appropriate CAD standard. The CAD standard will include level on/off status, special characters, line weights, font, and size requirements.

1.2 REFERENCES

U.S. ARMY CORPS OF ENGINEERS (USACE)

ERDC/ITL TR-19-7 (2019) A/E/C CAD Standard - Release 6.1

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

50 Percent Preliminary As-Built Drawings; G-DO

100 Percent Preliminary As-Built Drawings; G-DO

SD-11 Closeout Submittals

Final As-Built Drawings; G-DO

GeoDatabase Files; G-DO

1.4 GENERAL REQUIREMENTS

1.4.1 As-built Drawings

Upon award of this contract, the Government will provide the Contractor PDFs of the Contract drawings. Once the contractor makes hardcopy distribution of these drawings in accordance with specification section 01 30 00.24 OTHER ADMINISTRATIVE AND SPECIAL REQUIREMENTS, the Government will provide the Contractor the Electronic CAD Files.

Create electronic CAD files in Bentley (.dgn), and full-size Red-Line Drawings showing As-Built conditions. Provide as-built Building BIM model in compliance with USACE Minimum Modeling Matrix (M3) for Level of Detail (LOD) and element Grade for "Record Models". Use the M3 Template located at https://cadbimcenter.erdc.dren.mil/. This project utilizes the ERDC/ITL TR-19-7 USACE A/E/C CAD Standard which are to be used on the As-Built drawings. Obtain the A/E/C Standards in effect at time of Contract award. The A/E/C Standards are available at:

https://cadbimcenter.erdc.dren.mil/

(New users will be required to register. See "New User Registration" at the website indicated above.)

Obtain the required CAD software for Contractor use. **Do not convert electronic drawing files from one software language to another.** The transmittal requirements for the As-built Drawings shall be shown as activities on the Contractor prepared project schedule.

All changes from the contract drawings shall be shown on the as-builts. All changes shall be accurately and neatly recorded on the As-built drawings using the same symbols, terminology, and general quality as the original set of contract drawings. All changes shall be shown on all drawings that are affected by the change. Changes include: actual work performed, deviations resulting from Government responses to Requests for Information or Serial letters, surveys, shop drawings, descriptive changes, sketch changes, and modifications to the contract. Systems designed or enhanced by the Contractor such as HVAC control system, fire alarm system fire sprinkler system, and irrigation sprinkler system, shall

shown on the As-built drawings. Where contract drawings or specifications allow for options, only the option selected and actually constructed shall be shown on the As-Built Drawings.

1.4.2 Red-Line Drawings

Red-Line Drawings shall be updated throughout the construction phase of a contract showing all changes that will be shown on the final as-builts. All as-built conditions shall be on the Red-Line Drawings **within two (2) days** after the work activity is completed or shall be entered on the deficiency tracking system (see Section 01 45 00.00 10, QUALITY CONTROL). If the red-line drawings are not being updated, incomplete, or inaccurate, the Contractor shall be considered to not be making satisfactory progress and funds will be withheld from the progress payments.

The Contractor shall have the option to do red-line drawings in either a hardcopy format or an electronic format unless the COR does not wish to do the As-Built drawings electronically, in which case the Contractor shall do the hardcopy option for the completion of Red-line Drawings.

1.4.2.1 Hardcopy Option

The Contractor shall keep two sets of updated red-line drawings available on the job site at all times. Changes shall be shown through updating details and notes. All changes shall be made accurately, neatly, and legibly as they occur. Mark up the hard copies of the red-line drawings, including details and notes, with the following colored ink:

(1) Deletions - red
(2) Additions - green
(3) Special information - blue

1.4.2.2 Electronic Option

The Contractor shall make electronic drawings available to the COR at all times through a Local Area Network (LAN) or Internet connection. The connection shall have a download transfer rate not less than 10 Megabit/second (~1.250 Megabytes/second) and an upload transfer rate of not less than 1 Megabit/second (~124 kilobytes/second) in order to facilitate the timely access of drawing files. The Contractor shall make backups of all the electronic drawings at the close of business on the final day of work each week on a durable digital media such as removable hard-drive, tape drive, or optical disk. Each weekly file system backup shall be preserved over the course of the project and not overwritten; with file folders or individual media labeled with the date of backup. The weekly backup media shall be stored in a fireproof and waterproof safe in a locked room of the Contractor's trailer. The Contractor must also provide the COR with a DVD containing updated PDF drawings on a monthly basis. All changes to the electronic drawings shall be shown with clouding and in accordance with ERDC/ITL TR-19-7.

1.4.3 GeoDatabase

The Contractor shall provide a DVD containing a SDSFIE/FGDC GeoReferenced personal GeoDatabase, in accordance with the requirements of this section and COE ECB 2012-22, unless otherwise directed by the Contracting Officer.

For all information outside of the building walls, such as contour lines, utility locations, and the actual building location, the Contractor must

provide a personal GeoDatabase in .mdb format using the latest version of Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) as the database structure. Provide a shell database which will define the projection and database structure. The layering standards to be used are the SDSFIE standards. Typically, the development of this database is created with ESRI software, although there is other software that can be used. For all drawings within and including the exterior walls, the Contractor must provide electronic drawings in Bentley (.dgn).

In addition, a short read-me file (Word format) must be added to the DVD explaining the deliverable. This read-me file should include a description of the software used to create the data, projection, and include the attribute tables used.

1.5 PAYMENT

In accordance with the clause "Payment Under Fixed - Price Construction Contracts", $35,000 or 5 percent of the present contract value, whichever is greater, up to $200,000 will be withheld from payment for the creation of As-Built Drawings until Final As-Built Drawings and GeoDatabase Files are delivered to and accepted by the COR.

1.6 CONTRACTOR PERFORMANCE RATING

The Government will evaluate the Contractor's performance in CPARS (Contractor Performance Assessment Reporting System) at intervals of no more than 365 days during the period of performance and complete the final evaluation within 120 days of completion of the project. The timeliness and quality of As-Built drawings submittals, Final As-built Drawings, Red-line drawings and GeoDatabase Files will be an important factor in determining the assigned rating for the Schedule evaluation area. If the Contractor fails to submit complete and accurate Final As-Built Drawings and
GeoDatabase files within sixty (60) calendar days of turning the completed project over to the Using Service, this failure will be noted in the comments under the Schedule evaluation area and may result in a lower rating for this area. Repeated failure to submit correct and accurate As-Built drawings submittals, Final As-built Drawings, Red-line drawings and GeoDatabase Files may also result in lower ratings for the Quality and Management evaluation areas.

1.7 TRANSMITTAL OF AS-BUILT DRAWINGS

1.7.1 Optional As-built Drawings Sample

The Contractor has the option to submit a sample of preliminary as-built drawings to the Omaha District Office that will be reviewed for formatting purposes. This submittal must include five (5) distinct sheets from the project set of drawings. This optional submittal must be sent to the Omaha District Office (ATTN: Michael Hebert, CENWO-CDS-T) and contain the following:

1. One (1) DVD containing the following for each sheet:
    a. Electronic CAD Files
    b. Individual full-size PDF Drawings
    c. One (1) Combined Set of full-size PDF Drawings with bookmarks for each sheet

1.7.2 100 Percent Preliminary As-Built Drawings

The 100 Percent Preliminary As-Built Drawings include all changes to the drawings as specified. The 100 Percent Preliminary As-Built Drawings will be reviewed for technical content and formatting requirements. The 100 Percent Preliminary As-Built Drawings must not be submitted until all Final Surveys have been submitted to the government in accordance with specification 01 80 00 SURVEYS, DIGITAL TERRAIN MODELS AND QUANTITIES. Within thirty (30) days after the final acceptance inspection, the Contractor must submit 100 Percent Preliminary As-Built Drawings indicating all as-built changes with "clouding" on all of the project drawings. All drawings contained in the complete project set of drawings plus any additional drawings must be submitted with the 100 Percent Preliminary As-Built Drawings. Additional drawings must be prepared by the Contractor showing as-built cross-sections cut at 50 foot intervals (including the stations provided in the Contract Award drawings) and must include, but not limited to, all excavations, zoning (including filter and random fill thickness), as-built subdrain invert elevations, and top of filter material A and B elevations. Cross sections must be to the same level of detail as those provided in the Contract Award drawings. The COR may grant the Contractor additional time if the Contractor is making reasonable progress on the as-builts, in the sole judgment of the COR. The Contractor must not submit the Final As-Built Drawings until the 100 Percent Preliminary As-Built Drawings are approved. 100 Percent Preliminary As-Built Drawings must include the following:

1. One (1) DVD to the Omaha District Office (ATTN: Michael Hebert, CENWO-CDS-T) containing the following:
    a. Electronic CAD Files
    b. Individual full-size PDF Drawings
    c. Combined Set of full-size PDF Drawings with bookmarks for each sheet
2. One (1) set of full-size black-line drawings to the COR
3. One (1) set of Red-line drawings to the COR for reviewing purposes (hardcopy option).

1.7.3 Final As-Built Drawings

The Contractor must produce Final As-Built Drawings without "clouding". The Final As-Built Drawings must include all changes shown on the 100 Percent Preliminary As-Built Drawings including any additional required changes. All drawings contained in the complete project set of drawings plus any additional drawings must be submitted with the Final As-Built Drawings. The Final Drawings must be submitted no later than ten days after the 100 Percent Preliminary As-Built Drawing submittal is approved. The COR may grant the Contractor additional time if the Contractor is making reasonable progress on the as-builts. The Contractor must send the following documents to the COR:

1. Three DVDs containing the following:
    a. Electronic CAD Files
    b. Individual full-size PDF Drawings
    c. Combined Set of full-size PDF Drawings with bookmarks for each sheet
2. All remaining Red-Line Drawings (hardcopy option)

The Contractor must also send the following to the Omaha District Office (ATTN: Michael Hebert, CENWO-CDS-T):

1. One DVD containing the following:
    a. Electronic CAD Files
    b. Individual full-size PDF Drawings
    c. Combined Set of full-size PDF Drawings with bookmarks for each sheet

1.8 AS-BUILT DRAWINGS FORMAT REQUIREMENTS

1.8.1 General Formatting

Preparation of As-built Drawings must be in accordance with ERDC/ITL TR-19-7 requirements and/or match the detail shown on the contract drawings. The drawings must include all of the requirements below:

a. The drawing index must be updated when drawings are added.
b. When opened, the view must be zoomed to fit the border.
c. All files must reference a border supplied by the CAD/BIM Technology Center (https://cadbimcenter.erdc.dren.mil/) placed in the layout/sheet model at a scale of 1 at the location (0,0).
d. All unnecessary information outside the border must be deleted.
e. All files must be purged/compressed.
f. All reference files must be included and must be 'Bound' (AutoCAD) or 'Attached' (Microstation) to the CADD files in which the files are referenced.
g. All text must use the Arial.ttf font.
h. An ASCII text file must be provided with the following information: the name and phone number of the person we need to contact if we have problems, and the version of the CAD software used to create and/or work on the drawings.
i. Pen tables for plotting must be supplied.
j. Each sheet/design must have its own file and file name with only one layout/sheet per design file.
k. Half toning must be accomplished by using the color 8 and setting the pen table to plot color 8 to half tone.
l. The file name must be the project code followed by the sheet identification number. The file name must be included in the border on every sheet and must match the name of the file on the DVD. The project code is BB90.
m. The File number must be included in the border on every sheet. The file number is (to be provided by the COR the pre-construction/design kick-off meeting.
n. The cover sheet will have "Contract Award Set" changed to "As-Built Record Set" with month & year completed.
o. All preliminary as-builts and redlines must show drawing changes by "clouding" the affected area in layer G-ANNO-REVS in the drawing file.
p. All submitted Electronic CAD Files and PDF drawings must be under a folder labeled "As-Built" on the submitted DVD.
q. Both the DVD case and DVD must contain the name of the project, location, project code, solicitation number, contract number, and words detailing which submittal it is. The Final As-builts Drawings should be titled "As-Built Record Set".
r. Do not use zipped or compressed folders on any of the As-built submittals.
s. On the cover sheet add or revise text to read "This folio includes all reissued and descriptive amendments, RFIs, and modifications."
t. The Electronic CAD files and PDF drawings must be in separate folders on each DVD.

1.8.2 Title Block

All information in the title block must be filled in and correct. The title block must also include all of the requirements below.

a. "RECORD DRAWING" text must be added below the title block on the right side of the drawing on all sheets.
b. The date to be added in the revision box for modifications is found in Block 3 of Form SF-30.
c. The top line of the revision box must state "REVISED TO SHOW AS-BUILT CONDITIONS" and dated. Use a "-" for the "Mark".
d. The date box must have the month and year as-builts were completed.
f. The approved box must have the initials MH.
e. The contract number and the solicitation number (if available) must be shown on all sheets.
f. Additional word abbreviations, not found on the abbreviation sheet but necessary to describe the work, must be properly identified and incorporated with the other standard word abbreviations.
g. Modifications should be properly noted in the title block in accordance with paragraph "Modification Changes" below.

1.8.3 Modification Changes

All modification changes must be included on the as-built drawings. Modification changes at a minimum must include all revised and reissued sheets, descriptive changes, sketches, etc. Any modification change that also affects other sheets other than the one referenced with the modification must also be changed as appropriate. Typically, modification changes can be done by following the descriptive change included with the modification, but may require additional effort depending on the change and level of detail of the modification change. Modifications must be posted in accordance with the following.

a. Follow directions in the modification for posting all changes.
b. All modifications to the contract must be posted in chronological order.
c. The last modification number completed on the sheet should be shown with the modification circle in the top right corner of the "Project Title" and "Project Location" box.
d. All modifications to all plans, sections, or details, must have a modification number placed in the revision box over column entitled "Mark". The statement "GENERAL REVISIONS" may be used when applicable.
e. The Modification Circle size must be 1/2-inch diameter unless the area where circle is to be placed is crowded. Use smaller size circle for crowded areas.
f. A Modification Circle must be place at the location of each deletion.
g. For all new details or sections that are added to a drawing, place a Modification Circle by the detail or section title.
h. For changes to a drawing, place a Modification Circle by the title of the affected plan, section or detail titles (each location).
i. For changes to schedules on drawings, a Modification Circle must be placed either by the schedule heading or by the change in the schedule.

1.8.4 Legends

Symbols, which conflict with those on the original contract legend sheet, must not be used. Additional symbols, necessary to depict any additional work items, must be properly identified and added to the legend sheet or

supplemental legend. Those projects that do not have legend sheets may use supplemental legends on each sheet where symbol is shown.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.1 GENERAL

The Contractor must make revisions to, and maintain, the red-line and as-built drawings to the same level of detail as shown on the original Contract drawings. The Contractor must provide any additional full-size drawings as required to display all details. In addition, the GeoDatabase Files must be prepared as specified above and submitted in conjunction with the As-Built drawings.

3.2 SITE WORK

3.2.1 Utilities

The as-built drawings must show all utilities whether active or abandoned, and will include all those shown on the original contract drawings or found on-site. The type of utility, location, general direction, size, material make-up and depth must be shown. The location and description of any utility line or other installations of any kind known to exist within the construction area must be shown. The location must include dimensions to permanent features. All new underground utility lines (including electrical power and communications, gas, water, sanitary sewer, storm drains, roof drains and culverts) must be located during installation. The Contractor must survey pipe invert of gas, water, sanitary sewer, storm drains, roof drains and culverts and top of duct bank of electrical power and communications lines and associated fixtures (valves, manholes, test points, meters, cathodic protection points, tanks, ground points, and all point features along the new utility lines). Storm drains and sanitary sewer lines must be surveyed where pipes enter manholes and inlets and at 100-foot maximum intervals along the line. The inverts of all cleanouts and tees must be surveyed. Inverts at each end of culverts must be surveyed. Electrical power, communications, gas and water lines must be surveyed at all manholes, tees, valves, corners, changes in direction and at intervals along the line which will accurately depict the location of the line in both horizontal and vertical directions (50-foot maximum interval). The horizontal and vertical accuracy must be that 100% of the points are + 0.25' of their absolute position. New underground utility lines must be shown as 3-dimensional elements in a Bentley.dgn file.

3.2.2 Structures

Structures above and below ground must be shown. The size, material make-up, location, height, and/or depth must be shown. The as-built must show horizontal information of all collector pipes, toe drain, relief well outfalls, storm drains, risers, manholes and casings, concrete bases, and piezometers in North American Datum 1983 (NAD 83). Elevations of the following in Local Project Datum (LPD): top of piezometers pipe elevation, top of piezometer casing elevation, ground surface elevation adjacent to piezometer and relief wells, bottom of piezometer, top of relief well pipe, top of relief well casing, ground surface adjacent to relief well casing, bottom of casing, bottom of relief well; top of manhole elevation, and ground surface adjacent to manhole, bottom of manhole. Invert in Local

Project Datum (LPD) of storm drains inlet and outlet, relief well casing outfall inlet, relief well casing outfall outlet at collector pipe, relief well casing outfall at manhole; toe drain inlet and outfall at risers and manholes; toe drain outfall pipe invert at inlet and outlet end; collector pipe invert and outlets at manholes, and relief well collector pipe invert outfall.

3.2.3 Grades

Grade or alignment of roads, structures, or utilities must be corrected if any changes were made from the contract drawings. Elevations must be corrected if changes were made in site grading. If any grades are finalized outside of the respective grades tolerances, that new grade must be shown on the as-builts.

3.3 CONTRACTOR SHOP DRAWINGS

Contractor shop drawings, which supersede data on the contract plans and/or additional drawings, prepared by the Contractor, must be incorporated into the As-Built Drawings. Design plans prepared by the Contractor must include the designer's name on the As-Built Drawings.

-- End of Section --

DEFINITIONS OF REVISIONS:

1. LAST ENTRY IN DESCRIPTION BOX SHALL APPLY TO AS-BUILT CONDITIONS
2. REVISIONS BY MODIFICATION. (AFTER AWARD OF CONSTRUCTION CONTRACT).
3. METHOD OF ADDING NEW DRAWING BY MODIFICATION.
4. REVISIONS BY AMENDMENT WHEN WRITTEN "WORD DESCRIPTIVE" AMENDMENT IS ISSUED AND DRAWINGS ARE POSTED FROM WRITTEN DESCRIPTIONS AFTER THE ISSUE DATE.
5. REVISIONS BY AMENDMENT WHEN DRAWING IS TO BE RE-ISSUED.
6. METHOD OF ADDING NEW DRAWING BY AMENDMENT.
   NOTE: DELTA NUMBER MATCHES AM. NUMBER

INSTRUCTIONS FOR NOTING REVISIONS:

1. ADD THE REVISION DESCRIPTION (EITHER CHANGE ORDER, AMENDMENT OR MODIFICATION DESCRIPTION AS APPLICABLE).
2. ADD THE PROPER REVISION SYMBOL TO THE LEFT OF THE REVISION NOTATION.
3. ADD THE PROPER AMENDMENT OR MOD. SYMBOL NEAR EACH REVISED ITEM IN THE BODY OF THE DRAWING.
4. ADD ARCHITECT-ENGINEERS INITIALS IN APPROVED BLOCK WHEN A-E IS RESPONSIBLE FOR AMENDMENT OR MODIFICATION.
5. WHEN ADDING A NEW DRAWING TO SHOW SUPPLEMENTAL DATA, USE SAME DRAWING NUMBERS AS DRAWING WITH SIMILAR SUBJECT MATTER AND ADD AN ALPHABETICAL SUFFIX TO THE SHEET NO. THIS DRAWING SHOULD BE ADDED TO THE INDEX OF DRAWINGS IN ITS PROPER PLACE ACCORDING TO THE SHEET NUMBER.
6. FOR MODIFICATION ONLY:
   ADD A ½ INCH ENCIRCLED (R/X) INSIDE OF TITLE BLOCK SHOWING THE LAST MOD NUMBER COMPLETED.
   ALSO USE THIS NEAR EACH REVISED ITEM IN THE BODY OF THE DRAWING.

REVISION DESCRIPTIONS - FOR AMEDMENTS AND/OR MODIFICATIONS:

CHANGE ORDER #000X	(DRESCRIPTION & REASON FOR CHANGE ARE THE SAME AS AMENDMENTS LISTED BELOW)
AM. #000X REISSUED FOR CLARITY	(DRAWING IS HARD TO READ - BLURRY)
AM. #000X GENERAL REVISIONS	(THIS WOULD BE FOR ANY RE-ISSUED DRAWINGS, TYPICAL CHANGES OR CORRECTIONS)
AM. #000X REVISED AND REDRAWN	(MAJOR OVERHAUL OF THE DRAWING, TOO MANY CHANGES TO INDICATE INDIVIDUALLY)
AM. #000X NEW DRAWING ADDED	(DRAWING THAT WAS NOT ORIGINALLY INCLUDED IN THE ADVERTISED SET)
REVISED IN ACCORDANCE WITH AM. #000X	(THIS IS FOR DESCRIPTIVE CHANGES THAT WENT OUT IN THE AMENDMENT - DRAWING IS NOT RE-ISSUED - AND THE CHANGES ARE THEN LATER POSTED TO THE DRAWINGS AS IT BECOMES A CONTRACT SET)
--- (DASH)	REVISED TO SHOW AS-BUILT CONDITIONS

RECORD DRAWING

SHEET IDENTIFICATION NUMBER

PROJECT TITLE
PROJECT LOCATION
Y
Y

R/5

U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS

DESIGNED BY:		DATE:
DWN BY:	CKD BY:	SOLICITATION NO.:
SUBMITTED BY:		CONTRACT NO.:
FILE NAME:		FILE NUMBER:
SIZE:	PLOT SCALE:	PLOT DATE:

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.
-	REVISED TO SHOW AS-BUILT CONDITIONS	08-14-2012					
R-4	GENERAL REVISIONS	06-17-2012					
R-1	NEW DRAWING ADDED	03-27-2012					
7	REVISED IN ACCORDANCE WITH AM. NO. 0007	03-17-2012					
3	AM. #0003 GENERAL REVISIONS	02-27-2012					
1	AM. #0001 NEW DRAWING ADDED	02-17-2012					
1	CHG. ORDER #0001 GENERAL REVISIONS	02-09-2012					

US ARMY CORPS OF ENGINEERS

SHEET 1 of 2

I:\wrkcadd\oddg\OddgAmendMod.dgn

TITLE BLOCK INFORMATION KEY

SHEET IDENTIFICATION NUMBER:

DISCIPLINE DESIGNATOR
w/ Level 2 Designator
(see A/E/C CADD STANDARD for Level 2 Designator)

SHEET TYPE DESIGNATOR

M - 2 0 1

SHEET SEQUENCE NUMBER

A/E NAME AND LOCATION INFORMATION

ADDITIONAL PROJECT INFORMATION IF NEEDED

DRAWING TITLE

DESIGNED BY: INITIALS OF DESIGNER		**DATE:** CURRENT DATE: MONTH AND YEAR EXAMPLE: JUNE 2012
DWN BY: INITIALS OF CAD TECH. OR DESIGNER	**CKD BY:** INITIALS OF REVIEWER	**SOLICITATION NO.:** THIS NUMBER IS ASSIGNED BY CONTRACTING AND ADDED TO TITLE BLOCK AT THE TIME OF PLOTTING ADVERTISEMENT DRAWINGS
SUBMITTED BY: INITIALS OF REVIEWER/DESCIPLINE SECTION CHIEF		**CONTRACT NO.:** THIS NUMBER IS ASSIGNED BY CONTRACTING AND ADDED TO TITLE BLOCK AT THE TIME OF PLOTTING CONTRACT AWARD DRAWINGS
FILE NAME:* NAME OF CADD FILE: FILE NAMES SHOULD BEGIN WITH THE PROJECT CODE ASSIGNED BY THE CAD MANAGER. SEE A/E/C CADD STANDARDS FOR SHEET FILE NAMING CONVENTION		**FILE NUMBER:**** THIS NUMBER IS ASSIGNED BY PROJECT COORDINATOR AND ADDED TO TITLE BLOCK AT THE BEGINNING OF THE PROJECT
SIZE: AUTO GENERATED INFO. DO NOT EDIT	**PLOT SCALE:** AUTO GENERATED INFORMATION DO NOT EDIT	**PLOT DATE:** AUTO GENERATED INFORMATION DO NOT EDIT

* PROJECT CODE:
FOR A/E DESIGN PROJECTS
THIS DESIGNATION IS FOUND
IN THE SCOPE OF WORK

* PROJECT CODE:
FOR DESIGN BUILD PROJECTS
THIS DESIGNATION IS FOUND IN THE R.F.P.

** FILE NUMBER:
FOR A/E DESIGN PROJECTS THIS NUMBER IS FOUND
IN THE SCOPE OF WORK

** FILE NUMBER:
FOR DESIGN BUILD PROJECTS THIS NUMBER IS
FOUND IN THE R.F.P.

MARK	DESCRIPTION	DATE	APPR.
–	REVISED TO SHOW AS-BUILT CONDITIONS	08-14-2012	
R-5	REVISED AND REDRAWN	07-03-2012	
R-4	GENERAL REVISIONS	06-17-2012	
R-1	NEW DRAWING ADDED	03-27-2012	
7	REVISED IN ACCORDANCE WITH AM. NO. 0007	03-17-2012	
3	AM. #0003 GENERAL REVISIONS	02-27-2012	
1	AM. #0001 NEW DRAWING ADDED	02-17-2012	
1	CHG. ORDER #0001 GENERAL REVISIONS	02-12-2012	R.W.S.

REVISION SYMBOL AND/OR NUMBER:
SEE EXAMPLE ABOVE AND/OR
AMENDMENT/MOD EXAMPLE DRAWING FOR CLEARIFICATION

INDICATES REVISION TYPE AND DECRIPTION:
SEE EXAMPLE ABOVE AND/OR
AMENDMENT/MOD EXAMPLE DRAWING FOR CLEARIFICATION

DATE OF REVISION

INITIALS (IF REQUIRED) BY REVIEWER/DISCIPLINE SECTION CHIEF

RECORD DRAWING

SHEET IDENTIFICATION NUMBER
X

PROJECT TITLE
PROJECT LOCATION
Y
Y
X

U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
X
X
X

DESIGNED BY: X		DATE: X
DWN BY: X	CKD BY: X	SOLICITATION NO.: X
SUBMITTED BY: X		CONTRACT NO.: X
FILE NAME: X		FILE NUMBER: X
SIZE: X	PLOT SCALE: X	PLOT DATE: X

MARK	DESCRIPTION	DATE	APPR.	MARK	DESCRIPTION	DATE	APPR.
X	X	X	X				

US ARMY CORPS
OF ENGINEERS

SHEET 2 of 2

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SECTION TABLE OF CONTENTS

DIVISION 02 - EXISTING CONDITIONS

SECTION 02 32 13

SUBSURFACE DRILLING AND SAMPLING

-- End of Section Table of Contents --

SECTION 02 32 13

SUBSURFACE DRILLING AND SAMPLING

PART 1 GENERAL

This section to be used for the subsurface drilling and sampling in support of the geotechnical investigation in the TPH-DRO impacted area as described in 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS and any additional field investigation elected by the Contractor and/or their Dewatering Engineer in support of dewatering design as described in 33 26 00DEWATERING.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D1586/D1586M	(2018) Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils
ASTM D1587/D1587M	(2015) Thin-Walled Tube Sampling of Soils for Geotechnical Purposes
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D2488	(2017; E 2018) Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)
ASTM D4220/D4220M	(2014) Preserving and Transporting Soil Samples

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 1110-1-1804	(2001) Engineering and Design -- Geotechnical Investigations
ER 1110-1-1807	(2014) Drilling in Earth Embankment Dams and Levees

1.2 DEFINITIONS

1.2.1 Auger Borings and Sampling

An auger boring is any boring made in unconsolidated soils with a conventional manually or power-driven earth auger for the purpose of obtaining samples of subsurface materials. Auger boring and sampling must

be performed in accordance with EM 1110-1-1804 "Geotechnical Investigations", ER 1110-1-1807 "Drilling in Earth Embankment Dams and Levees", and specific guidelines as required in this section.

1.2.2 Drive Sample Borings and Sampling

A drive sample boring is a boring made through unconsolidated or partly consolidated sediments or decomposed rock by means of a mechanically driven sampler ASTM D1586/D1586M. The purpose of these borings is to obtain knowledge of the composition, the thickness, the depth, the sequence, the structure, and the pertinent physical properties of foundation or borrow materials. Drive sample boring and sampling must be performed in accordance with EM 1110-1-1804 "Geotechnical Investigations", ER 1110-1-1807 "Drilling in Earth Embankment Dams and Levees", and specific guidelines as required in this section.

1.2.3 Undisturbed Sample Borings and Sampling

An undisturbed sample boring is a boring made to obtain soil samples which, when tested, will show properties as close to the in situ (in place) properties as any sample which can be obtained. All undisturbed sampling must be accomplished using a 5 inch outside diameter thin-walled galvanized Shelby tube sampler pushed a distance of two feet. Undisturbed samples are to be taken in accordance with ASTM D1587/D1587M "Thin walled sampling Tube Sampling of Soils", EM 1110-1-1804 "Geotechnical Investigations", ER 1110-1-1807 "Drilling in Earth Embankment Dams and Levees", and specific guidelines as required in this section.

1.2.4 National Environmental Laboratory Accreditation Program (NELAP)

Environmental samples of soil and water taken from the potentially contaminated by TPH-DRO area that are selected for testing must be submitted to a National Environmental Laboratory Accreditation Program laboratory for testing. Provide NELAP Accreditation Certificate in the Geotechnical Investigation DPP.

1.3 SYSTEM DESCRIPTION

Total petroleum hydrocarbons (TPH) and diesel range organics (DRO) were detected in two borings, see 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL for more information. A geotechnical investigation will be required to better delineate the extents of TPH-DRO in the soil and water in the potentially contaminated area. The purpose of the borings for the Geotechnical Investigation are to determine the lateral extent and depths of contaminated soil and water that will be impacted by excavation and dewatering. Additional borings drilled in the non-contaminated areas, outside of the areas identified in 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS as part of the field investigation to support dewatering design are intended to provide the data to determine the type, nature, and characteristics of subsurface materials and the extent and conditions of the various materials as they exist in the work area. Investigations are to be accomplished by means of auger borings, drive sample borings, and/or undisturbed sample borings.

1.3.1 Sequencing and Scheduling

Prior to starting work, submit a Geotechnical Investigation Drilling Program Plan (DPP) (and Dewatering Design Field Investigation Plan if elected) for drilling, sampling, testing, and safety (see paragraph

1.3.1.1 and 1.7.2 for additional requirements to plan). The DPP must include, but shall not be limited to, the proposed method of drilling and sampling including a description of the equipment and sampling tools that will be used, a listing of any subcontractors, to include a description of how the subcontractors will be used and a description of all methods and procedures that will be utilized to ensure a safe operation and to protect the environment. No excavation will be permitted in the contaminated work areas until the Geotechnical Investigation DPP, Contaminated Media Plan (see 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL), and the Geotechnical Investigation Report (see paragraph 3.15 for additional requirements) have been reviewed and approved by the Government. Drilling in the relief well channel shall minimize disturbance of the geosynthetic mat to the extent practicable outside the limits of outfall excavation.

1.3.1.1 TPH-DRO Sampling Requirements

At a minimum, the soils investigation in potentially contaminated areas will require the following:

a. Minimum of 2 borings for each outfall (RW-66R, RW-66AR, and RW-67R) using the methods approved in paragraphs 1.2. The borings must be within the proposed limits of excavation and/or dewatering system installation.
b. Minimum 2 borings between existing MH-2 and the existing relief well outfall using the methods approved in paragraphs 1.2. The borings must be within the proposed limits of excavation and/or dewatering system installation.
c. Bottom of borings must be a minimum of 5 feet below the bottom of excavation for outfall and drain installation.
d. A minimum 3 samples of soil and water per boring must be tested for TPH-DRO by a Corps validated commercial testing laboratory.

1.3.1.2 Order of Work

The order in which the work is to be accomplished must be provided in the DPP for review and approval.

1.3.1.2.1 Reporter

Provide a qualified, licensed geologist or geotechnical engineer experienced in subsurface exploration for each drill unit to oversee all drilling, sampling, and field testing operations. The licensed geologist or geotechnical engineer must meet the qualification requirements in ER 1110-1-1807. This individual must be responsible for the preparation of a separate log and/or report for each boring. This individual must also be responsible for the preparation of all soil and water samples for delivery to the designated point.

1.3.1.2.2 Government Oversight

The presence of a Government representative or the keeping of separate drilling records by the Contracting Officer must not relieve the Contractor of the responsibility for the work specified in this specification.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for

information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Geotechnical Investigation Drilling Program Plan; G, DO

Submit a Geotechnical Investigation Drilling Program Plan (DPP) for the potentially contaminated area of Total Petroleum Hydrocarbon (TPH) and Diesel Range Organics (DRO) in accordance with Engineering Regulation ER 1110-1-1807 "Drilling in Earth Embankment Dams and Levees" and Engineering Manual EM 1110-1-1804 "Geotechnical Investigations". Include the NELAP accreditation certificate on the testing laboratory in the DPP. Include hydraulic fracturing calcs as required in ER 1110-1-1807. Consider staged grouting of drill holes if determined necessary following the hydraulic fracturing calculations. Include schedule of drilling, sampling, and testing. The DPP may take 4 to 6 weeks to obtain approval.

Note a separate Dewatering System Design Fieldwork Drilling Program Plan must be submitted as part of the Dewatering System Design Fieldwork Plan should the Contractor and dewatering design engineer elect additional field investigation in support of the dewatering design outside of the contaminated area (see Section 33 26 00 DEWATERING).

Geotechnical Investigation Report; G, DO

Following geotechnical investigation provide a Geotechnical Investigation Report to include, but not limited to, map or locations of borings, coordinates and elevation of borings, boring logs, findings, laboratory testing results, summary of laboratory testing, limits of TPH-DRO, impact of TPH-DRO to the excavations, and recommendations.

A separate Dewatering Design Fieldwork Report must be submitted as part of the Dewatering Plan if the Contractor and their dewatering engineer elects to perform additional investigation to support dewatering design outside of the contaminated area see Section 33 26 00 DEWATERING.

SD-02 Shop Drawings

Drilling Log; G, DO

The drilling log must conform to EM 1110-1-1804.

SD-03 Product Data

Permits, Certifications, and Licenses

SD-07 Certificates

Qualifications; G, RO

Licensed geologist or geotechnical engineer must meet the qualification requirements of ER 1110-1-1807 "Drilling in Earth Embankment Dams and Levees". This submittal must also include a statement of the prior experience, in the type of work described in these specifications, of the person or persons designated to perform the work specified herein.

1.5 QUALITY ASSURANCE

Comply with all Federal, State and local laws, regulations and ordinances relating to the performance of this work. Procure all required permits, certifications and licenses required by Federal, State, and local law for the execution of this work. Submit copies of all permits, certifications, and licenses prior to starting work.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 General

The Contractor is solely responsible for preserving all samples in good condition. Samples must be kept from freezing and from undue exposure to the weather, and must keep all descriptive labels and designations on sample jars and tubes clean and legible until final delivery of samples to the Corps validated commercial testing laboratory for testing. Samples must be delivered within the time limits specified for each type of investigation or in accordance with schedules prepared by the Contracting Officer.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Environmental Requirements

In order to prevent and to provide for abatement and control of any environmental pollution arising from Contractor activities in the performance of this contract, the Contractor and its subcontractors must comply with all applicable Federal, State, and local laws, regulations, and ordinances concerning environmental pollution control and abatement.

a. The Contractor is responsible for keeping informed of all updates and changes in all applicable laws, regulations, and ordinances.

b. Do not pollute lakes, ditches, rivers, springs, canals, waterways, groundwaters, or reservoirs with drill fluids, fuels, oils, bitumens, calcium chloride, insecticides, herbicides, or other materials that may be harmful to the environment or a detriment to outdoor recreation.

1.7.2 Field Measurements

The approximate locations of the replacement relief wells are shown on the contract drawings. USACE will install the replacement relief wells prior to Contractor mobilizing to the site. USACE will provide the coordinates and boring logs of the replacement relief wells to the Contractor following their installation. The elevations of the established replacement relief well locations will also be provided by the Contracting Officer prior to the start of work. The Contractor will propose the number and locations of the borings in the Geotechnical Investigation Drilling Program Plan in accordance with paragraph 1.3.1.1 Schedule of Drilling, Sampling, and Testing. Should the Contractor and

their dewatering engineer elect to perform additional field investigation to support dewatering design the Contractor will propose the number and locations of borings in the Dewatering System Fieldwork Design Drilling Program Plan (see Section 33 26 00 DEWATERING). Provide access to the locations as necessary.

PART 2 PRODUCTS

2.1 CONTAINERS

Furnish jars, tubes, and boxes that meet the following requirements. All such containers will become the property of the Government and the cost thereof will be included in the contract price for the applicable item for which payment is provided.

2.1.1 Sample Jars

2.1.1.1 Contaminated (TPH-DRO)

Suspected soil contaminated with TPH-DRO must be stored in sample jars of 1 pint 4 oz capacity glass jars with moisture-tight screw tops. Groundwater samples suspected to be contaminated with TPH-DRO must be collected in 1-liter amber glass jars.

2.1.1.2 Non-Contaminated Materials

Soil and water not suspected to be contaminated by TPH-DRO can utilize plastic sample jars and bags. The Contractor or subcontractor can propose the type of containers in the DPP, containers must meet requirements in ER 1110-1-1807 and EM 1110-1-1804.

2.1.2 Shipping Boxes

2.1.2.1 Contaminated (TPH-DRO)

Boxes for shipping sample jars must be coolers that have the capacity to hold no more than 12 sample jars and the strength to contain and protect the jars and their contents under ordinary handling and environmental conditions. The samples must be subjected to appropriate preservative methods during holding in the field and during shipment to the laboratory.

2.1.2.2 Non-Contaminated Materials

The Contractor or subcontractor can propose the type of boxes in the DPP, boxes must meet requirements in EM 1110-1-1804 and ASTM D4220/D4220M.

2.1.3 Tubes and Crates

Undisturbed samples must be shipped in thin walled Shelby tubes packed in crates.

2.2 LABELS

2.2.1 Sample Jar Labels

A printed or type-written, fade resistant and waterproof label must be affixed to the outside of each jar and must contain the following information:

For Environmental Samples

PROJECT	BIG BEND REPLACEMENT OF LEFT ABUTMENT COLLECTOR PIPE SYSTEM	LOCATION	(such as RW-## Outfall)
HOLE NO.		STATION	
JAR NO.		of	_____ JARS
TOP ELEVATION OF HOLE		DEPTH OF SAMPLE	
DATE OF COLLECTION		TIME OF COLLECTION	
DESCRIPTION OF MATERIAL	(such as moist, silty, medium sand)		

For Non-Contaminated samples the Contractor or Subcontractor can label samples according to EM 1110-1-1804.

2.2.2 Shipping Box Labels

Each box of jar samples must be identified with weatherproof and wear-proof labels indicating the following:

PROJECT	BIG BEND REPLACEMENT OF LEFT ABUTMENT COLLECTOR PIPE SYSTEM
LOCATION	BIG BEND DAM, SD
JAR SAMPLES FROM HOLE OR HOLES	

2.2.3 Drum Barrel Labels for Contaminated Materials

Drum barrels or any other COR approved storage device must be identified with labels. The information on this label must contain the following:

PROJECT	BIG BEND REPLACEMENT OF LEFT ABUTMENT COLLECTOR PIPE SYSTEM
DRUM NO.	
DATE OF COLLECTION	
DEPTH INTERVALS	
CONTENTS	SOIL
BORING IDS	
POINT OF CONTACT	

2.3 EQUIPMENT AND SUPPLIES

2.3.1 Auger Boring and Sampling

Furnish the hollow stem auger equipment for making auger borings. The augers must be completely equipped with all the accessories necessary for boring and sampling of overburden materials to the depths and diameters indicated in the Drilling Program Plan.

2.3.2 Drive Sample Boring and Sampling

Furnish equipment for making drive sample borings including, but not limited to, standard 2-inch OD split spoon sampler and power-driven drilling machinery of a type or types approved by the Contracting Officer, complete with a drive-hammer of 140-pound weight and all other accessories for taking samples of all types of soils at the locations and to the depths indicated in the Drilling Program Plan. The drive shoe for the split barrel samplers must be of hardened steel and must be replaced or repaired when it becomes dented or distorted. Supplies must include, but not be limited to, all casing, drill stem, drill bits, drill fluid and additives, pumps, and power necessary to accomplish the required boring and sampling.

2.3.3 Undisturbed Sample Boring and Sampling

Furnish equipment for making undisturbed sample borings including, but not limited to, power-driven drilling machinery of an approved type or types complete with the special devices and accessories enumerated and described hereinafter. Drilling machinery must be of the hydraulic feed type. Supplies must include, but not be limited to, all samplers, casing, drill stem, drill bits, drill fluid and additives, pumps, and power necessary to accomplish the required boring and sampling. Drill casing, if used, must be of such minimum inside diameter as to allow use of the selected sampler.

2.3.3.1 Sands and Cohesive Soils

The sampling device used to sample fine to medium grain sands and cohesive soils may be a fixed or stationary piston type that uses a 3-inch diameter thin wall Shelby tube or otherwise indicated in the approved Drilling Program Plan.

2.3.3.2 Stiff and Dense Soils

The sampling device for obtaining samples of stiff and dense soils must be similar or equal to a Denison double tube, swivel head core barrel, or a Pitcher sampler and must be approved by the Contracting Officer prior to use.

PART 3 EXECUTION

3.1 HANDLING MATERIALS CONTAMINATED WITH TPH

Handling of TPH-DRO contaminated materials must conform to the requirements in Specification 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL. Disposable nitrile gloves and other safety equipment such as eye protection must be required when handling soils and groundwater; air monitoring is not required. See paragraph 3.8 CUTTINGS DISPOSAL AND SITE RESTORATION

3.2 MOBILIZATION AND DEMOBILIZATION

3.2.1 Mobilization

Mobilization consists of the delivery to the site of all plant, equipment, materials and supplies to be furnished by the Contractor, the complete assembly in satisfactory working order of all such plant and equipment at the jobsite and the satisfactory storage at the site of all such materials and supplies.

3.2.2 Demobilization

Demobilization consists of the removal from the site of all plant, equipment, materials and supplies after completion of the work and also includes, at the direction of the Contracting Officer, the cleanup and removal of all scrap, waste backfill material, waste drilling fluid, soil contaminated with engine/hydraulic oil, backfilling all sumps or excavations resulting from the operations and, in general, returning the site as close to its original condition as possible.

3.3 IDENTIFYING SAMPLES

Sample jars, shipping boxes, and labels must comply with PART 2, paragraphs SAMPLE JARS, SHIPPING BOXES, and LABELS, respectively. In addition, a moisture proof label containing the project name, hole number and sample number must be placed inside the jar or this information can be written using a waterproof pen or scribed on the jar lid. Take all precautions required to ensure that the shipping boxes are not subjected to rough handling or damaging environmental conditions, and complies with paragraph CARE AND DELIVERY OF SAMPLES.

3.4 SURVEYING

Survey the as-drilled boring location coordinates and ground surface elevations and provide information in the Geotechnical Investigation Report (and Dewatering System Design Fieldwork Report in the Dewatering Plan if a field investigation is elected to support dewatering design, see Section 33 26 00 DEWATERING).

3.5 AUGER BORING AND SAMPLING

3.5.1 Soil Sampling

3.5.1.1 Contaminated (TPH-DRO)

Samples must be labeled in accordance with paragraph IDENTIFYING SAMPLES. Samples must be obtained for each change of overburden material and at maximum vertical intervals of 2.5 feet, or at an interval allowing for a minimum of 3 soil and water samples are required in paragraph 1.3.1.1 Schedule of Drilling, Sampling, and Testing. In order to retain the natural moisture content of the material to the fullest extent possible, all samples must be of sufficient volume to completely fill the sample jars and the samples must be placed in the sample jars as soon as possible after they are taken from the hole. After placing soil in the sample jar the threads of the sample jar must be wiped with a clean paper towel dampened with distilled water to remove any soil that could prevent a proper fitting of the cap. After capping the jar the outside of the jar must be cleaned and label affixed. Samples must be field preserved as required. Holding times for soil samples are 14 days. Borings will

require duplicate (DUP) soil samples and matrix spike (MS) and matrix spike duplicate (MSD) soil sample collections in accordance with EPA SW846 Methods 8015C and 8260B. Identify the proposed number of samples and duplicates in the Drilling Program Plan.

3.5.1.2 Non-Contaminated Materials

Samples must be labeled in accordance with paragraph IDENTIFYING SAMPLES. Samples must be obtained according to EM 1110-1-1804 and the government approved Dewatering System Design Fieldwork DPP if elected to perform drilling to collect soil samples.

3.5.2 Groundwater Sampling

3.5.2.1 Contaminated (TPH-DRO)

Groundwater samples must be collected, using a disposable bailer or other COR approved pumping method that minimizes sample turbidity, from the inside of the augers after drilling to fill a 1-liter amber glass jar obtained from the top portion of the water column in the augers. Turbidity must be minimized to the extent practicable which may require allowing the sediments to settle out of the water column prior to sample collection. After capping, the outside of the jar must be cleaned and label affixed in accordance with paragraph 2.2 LABELS. Samples must be field preserved as required. Holding times for groundwater samples are 7 days. Borings will require duplicate (DUP) groundwater samples and borings will require matrix spike (MS) and matrix spike duplicate (MSD) collections as needed.

3.5.2.2 Non-Contaminated Materials

Contractor shall propose method of groundwater sampling in non-contaminated area in the Field Investigation DPP if elected to be performed, for government approval.

3.6 DRIVE SAMPLE BORING AND SAMPLING NON-CONTAMINATED MATERIALS

Samples must be labeled in accordance with paragraph IDENTIFYING SAMPLES. Drilling for sample collection and logging purposes will be conducted in all borings using a 2-inch-diameter split spoon sampler. Standard penetration tests must be performed by dropping a 140-pound hammer a distance of 30 inches to advance a two-inch-diameter split spoon continuously in the upper 10 feet, then every 2.5 feet to the depth of the boring (if deeper than 10 feet). These penetration tests must be performed in accordance with ASTM D1586/D1586M, "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils. To minimize the compacting effect of casing driving when casing is used to stabilize a boring, the bottom of the casing must be kept as high above the soil sampling zone as conditions permit. If hollow stem auger is used as a casing and/or to advance the boring, a plug assembly must be used to keep soil from entering the inside of the auger. Above the water table, samples must be obtained from a dry hole. Below the water table, water must be maintained within the hole at or above the groundwater level. Where information on the natural water content of soils above the water table is not needed and when approved by the Contacting Officer, boreholes may be drilled without casing by using a suitable drilling fluid to prevent collapse of sidewalls. When a drilling fluid is used, soil sampling must be done by such means that will prevent inclusion of drilling fluid in the samples. The samples must be placed in sample jars as soon as possible after they are taken from the hole and, when possible,

the volume of the sample must be large enough to completely fill the sample jar in order that the natural moisture content of the material may be retained to the fullest extent possible. All samples must be labeled. No sample will remain at the site of boring for more than one week after being taken from the hole.

3.7 UNDISTURBED SAMPLE BORING AND SAMPLING FOR NON-CONTAMINATED SOIL AND WATER

Should the Contractor elect to perform a field investigation in support of dewatering and choose to obtain undisturbed samples the Contractor must submit in the Dewatering System Design Fieldwork DPP (see Section 33 26 00 DEWATERING) and conform to EM 1110-1-1804 and as prescribed in their approved Dewatering System Fieldwork Plan. In general, labeling of undisturbed samples must conform to paragraph IDENTIFYING SAMPLES. Particular care must be taken to indicate the top and bottom of each sample tube. Tubes and crates for undisturbed samples must be labeled "DO NOT JAR OR VIBRATE" and "HANDLE, HAUL, AND SHIP IN A VERTICAL POSITION".

3.7.1 Procedure

The procedure for undisturbed sample boring and sampling must be the same as outlined in paragraph DRIVE SAMPLE BORING AND SAMPLING, except that the sampling device must be advanced downward by one continuous, smooth drive using the drill rig's hydraulic feed system. The hydraulic down pressure must be read and recorded at 6 inch intervals during each sample drive. The sampling device for stiff and dense soils must be advanced by continuous rotation of the outer cutting barrel in conjunction with use of drill fluid circulation. Driving of any undisturbed sampling device by means such as a drop hammer will not be permitted.

3.7.2 Sealing

3.7.2.1 Alternate 1

The soil sample obtained in a thin wall Shelby tube must be retained in the tube and sealed on both ends with a mechanically expandable O-ring sealing disk of the appropriate size.

3.7.2.2 Alternate 2

The soil sample obtained in a thin wall Shelby tube must be extruded from the tube in the field as soon as the tube is removed from the boring by a method approved by the Contracting Officer. The extruded soil sample must immediately be wrapped in thin plastic wrap and placed in the center of a plastic tube that has a diameter of at least 1 inch larger than the diameter of the soil sample, is at least 1-inch longer than the length of the soil sample, and has at least 1/2-inch of congealed 50/50 mixture of paraffin and microcrystalline wax in the bottom. The annular space between the soil sample and the tube must be filled with a 50/50 mixture of paraffin and microcrystalline wax to a distance of at least 1/2-inch above the top of the soil sample.

3.7.2.3 Alternate 3

Both ends of the soil sample tube/liner obtained with a Denison barrel, or its equivalent, must be cleaned out to remove all drill fluid contaminated and/or disturbed soil or to a minimum distance of 2 inches from the ends of the tube/liner. Any material removed that is not contaminated with

drill fluid must be placed in a sample jar and labeled in accordance with paragraph IDENTIFYING SAMPLES. The cleaned out ends of the sample liner tube must then be sealed with a 50/50 mixture of paraffin and microcrystalline wax. A metal or wooden disk, having a diameter just slightly smaller than the inside diameter of the liner tube must be inserted into the wax to a distance of 1/4-inch from the end of the soil sample. The wax plugs must be flush with the ends of the tube and a final seal consisting of a metal cap or tape must be placed over the ends of the tube.

3.8 SUPPLEMENTAL BORINGS

Borings that are abandoned or from which unsatisfactory samples are obtained will be supplemented by other borings adjacent to the original in order that satisfactory samples or the required information will be obtained. Actual locations of any supplemental borings will be approved by the Contracting Officer. Penetration to the depth where the original was abandoned or to the depths where unsatisfactory samples were obtained may be made by any method selected by the Contractor that in the opinion of the Contracting Officer will permit satisfactory completion and sampling below the elevation where the last satisfactory sample was obtained in the abandoned or satisfactory sampling in the reaches where satisfactory samples were not obtained in the original borings. No payment will be made for supplemental borings that are required to be drilled to replace borings that were abandoned or from which satisfactory samples were not obtained because of mechanical failure of drilling and sampling equipment, negligence on the part of the Contractor, or other preventable cause for which the Contractor is responsible except that payment will be made for acceptable portions of these supplementary borings below the depths or outside the reaches for which payment was made for the original borings.

3.9 BACKFILLING

All backfilling operations must be performed in the presence of the Contracting Officer or their representative and, if required by regulation, Federal, State, and local officials. No separate payment will be made for backfilling drill holes. The cost of this work must be included in the drilling costs.

3.9.1 Drill Holes

Unless otherwise noted in these specifications or directed by the Contracting Officer, all drill holes must be backfilled and abandoned in accordance with all Federal, State, and local laws, regulations and ordinances. Materials for backfilling must conform with ER 1110-1-1807 and methods in the approved Drilling Program Plan. Preserve all holes in good condition until final measurement and until the records and samples have been accepted.

3.9.1.1 Located within 10 feet Left Abutment Collector Pipe System

For borings located less than 10 feet laterally or vertically from the left abutment collector pipe system (toe drain, toe drain outfall, relief well collector pipe) and includes RW-67 perforated outfall, the following abandonment procedures are required to prevent grout from plugging the subdrains and outfall pipe. Borings must be backfilled with medium (3/8-inch) Bentonite chips that are placed in the borings as the augers are removed. The number of bags required for each boring must be

calculated prior to backfilling. Care should be taken during backfilling to ensure that bridging does not occur. The chips must be added slowly (no faster than 3 minutes per bag) and the boring depth must be sounded after each bag. The chips must be poured out of the bag onto a coarse mesh screen that is at least 2 to 3 feet in length to remove dust and fine particulates (to prevent bridging at the water table). The screen must be placed at an angle on top of the augers. If bridging is noted, attempts must be made to tamp the chips and removed the blockage. If the blockage cannot be removed, the boring must be drilled out and the chips added again.

3.9.1.2 Located beyond 10 feet Left Abutment Collector Pipe System

For borings located beyond 10 feet laterally or vertically from the collector pipe system including the RW-67 perforated outfall: holes must be tremie grouted from the bottom of the hole to until grout flows undiluted from the top of the hole (unless stage grouting is required based on hydraulic fracturing calculations). The grout must be allowed to settle a minimum of 24 hours and then be topped off as required to ensure grout level is 6 inches from ground surface. The grout mixture must comply with 33 66 00 NEW PIEZOMETER INSTALLATION AND EXISTING PIEZOMETER ABANDONMENT. The remaining ungrouted top 6 inches of the hole must be backfilled with local soil and tamped, topsoiled, and seeded.

3.10 CUTTINGS DISPOSAL AND SITE RESTORATION

3.10.1 Contaminated Area (TPH-DRO)

For all soil cuttings obtained in the potentially identified contaminated area, place all soil cuttings within 2 feet above to 2 feet below the groundwater table in 55-gallon drums. In addition, any soil that shows visual signs or smells of fuel anywhere in the soil column must be drummed. All drums must be properly labeled, see paragraph 2.2.3 Drum Barrel Labels. A drum inventory sheet must also be filled out with each drum numbered and identified. Dispose of drums off-site in accordance with South Dakota Department of Agriculture and Natural Resources requirements. Additional requirements outlined in specification 02 61 13 EXCAVATION AND HANDLING OF CONTRAMINATED MATERIALS must also be followed. The site must be restored to pre-investigation conditions as approved by the COR prior to demobilization. Identify proposed handling, transport, disposal procedures and disposal locations in the Drilling Program Plan.

3.10.2 Non-Contaminated Materials

Non-contaminated soils must be disposed off-site.

3.11 TRANSPORT AND SHIPPING OF SAMPLES

3.11.1 Environmental Samples

Samples must be kept on ice at all times after the collection process. Samples must be overnighted to a Corps certified laboratory. Samples must be carefully placed in coolers packed with double bagged ice before shipping to Corps validated commercial testing laboratory. Submit qualifications (in the DPP or other pertinent planning document) of the Corps validated commercial testing laboratory or the Contractor's validated testing facilities.

Chain-of-Custody documents must be sealed in a one gallon Ziploc bags and

taped under the lid of the cooler prior to taping the lid closed with packing tape. If present the drain plug must be taped shut. Two signed and dated custody seals must be placed on the outside of the cooler across the edges of the lid on the front and back. An overnight shipping label must be attached to the cooler.

3.11.2 Non-Contaminated Samples

Transport of additional soil samples, if elected by the Contractor and Dewatering Engineer, taken from borings drilled outside of the contaminated area must conform to EM 1110-1-1804, ASTM D4220/D4220M and the approved Dewatering Design System Fieldwork DPP.

3.12 DECONTAMINATION PROCEDURES FOR EQUIPMENT CONTAMINATED BY TPH-DRO

Hollow stem augers and all drill rods must be steam cleaned at the boring location at the completion of drilling prior to moving to the next location. Disposable bailers used for groundwater sampling must be disposed of in the trash along with the disposable nitrile gloves and other similar disposable decontamination supplies. Split spoon samplers must be decontaminated with distilled water and Liquinox/Alconox or suitable non-phosphate cleaner. Wastewater must be discharged onto the ground in the area of drilling but shall not be allowed to run off the site or down into any borehole, excavation, or waterway.

3.13 TESTING FACILITIES

Tests on samples suspected to contain TPH-DRO must be performed by a NELAP accredited testing laboratory. Tests on samples in the non-contaminated areas will be performed by a Corps approved commercial testing laboratory. No work requiring testing will be permitted until the facilities have been approved by the Contracting Officer Representative.

3.14 RECORDS

Submit complete, legible copies of DRILLING LOG, ENG FORM 1836 and 1836A, and records to the Contracting Officer within 14 days after a hole is backfilled. Keep accurate driller's logs (DRILLING LOG, ENG FORM 1836, and 1836-A will be provided by the Contacting Officer) and records of all work accomplished under this contract. All such records must be recorded during the actual performance of the work and must be preserved in good condition and order until they are delivered and accepted. The Contracting Officer or his representative has the right to examine and review all such records at any time prior to their delivery and has the right to request changes to the record keeping procedure. The following information must be included on the logs or in the records for each hole:

a. Hole number or designation and elevation of top of hole.

b. Driller's name and Geologist's name.

c. Make, size, and manufacturer's model designation of drilling, sampling, equipment.

d. Type of drilling, sampling, and operation by depth.

e. Hole diameter.

f. Dates and time by depths when drilling, sampling, and operations were

performed.

g. Time required for drilling each run.

h. Drill action, rotation speed, hydraulic pressure, water pressure, tool drops, and any other unusual and non-ordinary experience which could indicate the subsurface conditions encountered.

i. Depths at which samples were recovered or attempts made to sample including top and bottom depth of each run.

j. Classification or description by depths of the materials sampled, using the Unified Soil Classification System (ASTM D2487) and including a description of moisture conditions, consistency, record any observation of an oil sheen or odor, and other appropriate descriptive information described in ASTM D2488. This classification or description must be made immediately after the samples or cores are retrieved.

k. Indication of penetration resistance such as drive-hammer blows given in blows per foot for driving sample spoons and casing and the pressure in psi applied to push thin-wall or piston-type samplers.

l. Weight of drive hammer.

m. Percentage of sample or core recovered per run.

n. Depth at which groundwater is encountered initially and when stabilized.

o. Depths at which drill water is lost and regained and amounts.

p. Depths at which the color of the drill water return changes.

q. Type and weight of drill fluid.

r. Depth of bottom of hole.

3.15 REPORT

Provide a Geotechnical Investigation Report in the potentially impacted TPH-DRO area detailing the investigation, sampling procedure, backfilling procedures, boring logs, laboratory results, and conclusion of findings and impact to the construction of collector pipe system. The Contaminated Media Work Plan as required in 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS must describe how handling of contaminated material from excavations and dewatering will be performed, monitored, tested, stored, and disposed.

If the Contractor and dewatering engineer elects to perform a field investigation in support of dewatering design a Dewatering System Design Fieldwork Report must be included in the Dewatering Plan as an appendix see Section (33 26 00 DEWATERING).

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SECTION TABLE OF CONTENTS

DIVISION 02 - EXISTING CONDITIONS

SECTION 02 41 00

DEMOLITION

-- End of Section Table of Contents --

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

This work will consist of furnishing all labor, materials, and equipment and performing all work necessary for removal and disposal of the left abutment collector pipe system (including specified manholes, risers, and ancillary features) and storm drain flared end section, as identified on the contract drawings and specified herein. It must be noted that the horizontal alignment between new manholes MH-4 and MH-5 does not follow the existing drain alignment as shown on the contract drawings. For abandonment of existing relief wells see Section 33 26 00.00 10 RELIEF WELLS (CASINGS AND ABANDONMENTS) & EXISTING RELIEF WELL CASING OUTFALLS ABANDONMENT and for abandonment of existing piezometers see Section 33 66 00 NEW PIEZOMETER INSTALLATION AND EXISTING PIEZOMETER ABANDONMENT.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.6	(2006) Safety & Health Program Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants

1.2 PROJECT DESCRIPTION

Demolition consists of the removal of the existing left abutment collector pipe system and appurtenant features including (but not limited to) the toe drain, toe drain outfall, relief well collector, risers, manholes, asphalt for toe drain outfall replacement, relief well casings, relief well casing outfalls, and localized relief well channel gravel, fine aggregate filter, and geosynthetic mat. See 02 82 00 ASBESTOS-CONTAINING MATERIALS for special handling of existing corrugated metal pipe (CMP) with asbestos treated bituminous coating.

1.2.1 Definitions

1.2.1.1 Demolition Plan

Demolition Plan is the planned steps and processes for managing demolition activities and identifying the required sequencing activities and disposal mechanisms.

1.2.2 General Requirements

Do not begin demolition until authorization is received from the Contracting Officer. Remove rubbish and debris from the project site; do not allow accumulations inside the work area. The work includes demolition, and removal of resulting rubbish and debris. Remove rubbish and debris from Government property daily, unless otherwise directed. Store materials that cannot be removed daily in areas specified by the Contracting Officer. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government as indicated on the contract drawings. Any damaged items must be repaired or replaced as approved by the Contracting Officer at no additional expense to the Government. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition or removal work. Repairs, reinforcement, or structural replacement requires approval by the Contracting Officer prior to performing such work.

1.3.1 Protection of Adjacent Features and Facilities

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of manholes, risers, and roads to prevent settlement or other movement. Protect electrical services and utilities using bracing, shoring, or lateral support as may be required as a result of any cutting, removal, or demolition work performed under this contract. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical utilities.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted

1.5 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Demolition Plan; G, DO

Prepare a Demolition Plan and submit proposed demolition and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials specified to be demolished and coordination with other work in progress. Also include a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. The plan must include special handling requirements specified in Sections 02 82 00 ASBESTOS-CONTAINING MATERIALS and 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

Existing Conditions

Before beginning any demolition work, perform a project survey in accordance with Section 01 12 00 CONSTRUCTION GENERAL and examine the contract drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the Contracting Officer showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs sized 4-inches will be acceptable as a record of existing conditions.

SD-07 Certificates

Notification; G, RO

Disposal Facility; G, AO

SD-11 Closeout Submittals

Receipts

1.6 QUALITY ASSURANCE

Submit timely notification of demolition projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSP A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

1.6.1 Dust and Debris Control

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. In areas of asbestos removal operations, comply with Section 02 82 00 ASBESTOS-CONTAINING MATERIAL.

1.7 PROTECTION

1.7.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind. Notify the Contracting Officer prior to beginning such work.

1.7.2 Protection of Personnel

Before, during, and after the demolition and disposal work continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the project site. No area, section, or component of collector pipe, risers, manholes, or other structural element will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

PART 2 NOT USED

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

3.1.1 Left Abutment Collector Pipe System

Demolition must not take place until written notice provided by the Contractor's dewatering engineer that suitable dewatered conditions have been attained as shown by field data and measurement evaluation as presented to and accepted by the COR on a daily basis, and other limitations on excavation in Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM have been met. Additionally, no demolition will be permitted from relief well collector stations 6+00 to 9+52 (including abandonment of outfalls for relief wells 66AR, 66R, 67R) in advance of the geotechnical investigation discussed in Sections 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM and 02 32 13 SUBSURFACE DRILLING AND SAMPLING.

Remove the existing collector pipe system in a systematic manner within the limits of the excavation as shown in the contract drawings and within the requirement specified in Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM. Contractor must use care to protect the existing manhole MH-1 that is to remain in place.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the Contracting Officer. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. The 69kV overhead power (West Central Electric Cooperative, Inc.) line and government overhead line may require to be deenergized when working in the vicinity of the utility and foundation poles, do not begin demolition work until written confirmation from West Central Electric Cooperative, Inc. and Contracting

Officer have been made.

3.1.3 Paving and Slabs

Remove sawcut asphaltic concrete paving and slabs including aggregate base as indicated for the toe drain outfall replacement beneath the Spillway Access Road to the depths and elevations shown on the contract drawings. Provide neat sawcuts of the pavement. Pavement must be removed from the site at the Contractor's expense.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition work in areas occupied by structures to be demolished until all demolition in the area has been completed and debris removed.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

All materials and equipment removed and not reused or salvaged will become the property of the Contractor and must be removed from Government property. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Contracting Officer of the Contractor's demolition, deconstruction, and removal procedures, and authorization by the Contracting Officer to begin demolition and deconstruction. The Government will not be responsible for the condition or loss of, or damage to, such property after contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.3.2 Hazardous, Asbestos, and other Unsalvageable/Non-Recyclable Material

Debris, rubbish, scrap, and other unsalvageable or non-recyclable material resulting from removal operations must be disposed of off-site by the Contractor in accordance with all applicable federal, state, and local regulations. Dispose of asbestos-containing material in accordance with section 02 82 00 ASBESTOS-CONTAINING MATERIALS. Refer to Section 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS for disposition of hazardous materials. Dispose of unsatisfactory soil material as directed in 31 00 00 EARTHWORK. Provide Disposal Facility location, contact information, and certificate to COR.

3.4 CLEANUP

Remove debris and rubbish from excavations and work area. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

-- End of Section --

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EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS

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SECTION 02 61 13

EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS

PART 1 GENERAL

Attachment: Big Bend Dam, Fort Thompson, South Dakota, Soil, Groundwater and Investigative Derived Waste Sampling, July 2021 included in the Geotechnical Data Report (USACE 2022 GDR, under separate cover).

In the 1970s and 1980s, kerosene and/or diesel was often added to piezometers at Big Bend Dam that had water near the surface to prevent the water from freezing to permit wintertime readings. This procedure was phased out in the late 1980s. The amount of kerosene/diesel added was typically less than a gallon every year or two.

During recent routine maintenance operations, fuel was still present in two piezometers (J320-Ra and J320-Rb). Project staff have removed as much fuel as possible.

Geotechnical investigation was conducted for this project, borings drilled for soil and groundwater samples were collected and analyzed for total petroleum hydrocarbons (TPH)-diesel range organics (DRO). No free product was observed during this investigation. TPH-DRO was detected in soil and groundwater of Boring BH20-12 and in the soil of boring BH20-11. The soil sample taken for boring BH20-12 (BBSD-12A) was analyzed at 2,830 milligrams/kilogram (mg/kg) and the groundwater grab sample BBSD-12B was analyzed at 27,000 micrograms/Liter (ug/L). The soil sample taken at boring BH20-11 (BBSD-11A) was analyzed at 96.9 mg/kg.

The boring locations with contamination are near existing relief wells RW-66, RW-66A and RW-67, all of which require abandonment, replacement wells, and new relief well casing outfalls to connect to the collector pipe system. There is potential to encounter soils with TPH concentrations greater than 10 mg/kg during the excavation to complete the replacement relief well (RW-66R, RW-66AR, and RW-67R) casings and outfalls. See section 02 32 13 SUBSURFACE DRILLING AND SAMPLING for additional boring and sampling requirements to further delineate the extent of contamination.

Excavated soils with TPH concentrations greater than 10 mg/kg must be disposed of in accordance with South Dakota Department of Agriculture and Natural Resources (SDDANR) Waste Management Program requirements. If soil from the area of contamination is excavated during construction, stockpile it and test for TPH-DRO, BTEX, and naphthalene and dispose in accordance with applicable state requirements and requirements of the selected landfill. In additional, containerize any pumped/collected groundwater from contaminated areas and sample/analyze it for proper treatment and/or disposal.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 302	Designation, Reportable Quantities, and Notification
USACE 2022 GDR	(2022) Geotechnical Data Report, Missouri River, Fort Thompson, South Dakota

South Dakota Department of Agriculture and Natural Resources (SDDANR)

2022 SDDANR	(2022) South Dakota Petroleum Assessment and Cleanup Handbook

1.2 DESCRIPTION OF WORK

Some soils to be excavated as part of this project and associated pumped/collected groundwater may be contaminated with TPH-DRO. See summary in Section 1 GENERAL and attached Soil, Groundwater and Investigative Derived Waste Sampling Report in the USACE 2022 GDR (submitted under separate cover) for additional information. Segregate potentially contaminated soil and test to determine proper disposition. Excavated soils with TPH concentrations greater than 10 mg/kg must be disposed of in accordance with SDDANR Waste Management Program requirements and requirements of the selected landfill. Additionally, pumped/collected groundwater from areas with evidence of contamination must be containerized and sampled/analyzed for proper disposal. Follow the requirements of the 2022 SDDANR Petroleum Assessment and Cleanup Handbook.

Ensure that workers who may be exposed to contamination are protected in accordance with EM 385-1-1 and applicable OSHA regulations. Protocols for protecting potentially exposed workers including recommended exposure monitoring, personal protective equipment, and personnel decontamination must be identified in the project Accident Prevention Plan (APP)as required in specification SECTION 01 35 26, GOVERNMENTAL SAFETY REQUIREMENTS.

1.2.1 Contaminated Media Work Plan

Following subsurface drilling and sampling for contaminated materials, submit a Contaminated Media Work Plan within 30 calendar days after notice to proceed, and allow 30 calendar days in the schedule for the Government's review. No work in potentially contaminated areas (relief well collector stations 6+00 to 9+52 including installation and abandonment of outfalls for relief wells 66A, 66AR, 66, 66R, 67, and 67R), with the exception of site inspections and the project survey, will be permitted until the Drilling Program Plan (see 02 32 13 SUBSURFACE DRILLING AND SAMPLING), Contaminated Media Work Plan, and the Geotechnical Investigation Report (see 02 32 13 SUBSURFACE DRILLING AND SAMPLING) have been reviewed and approved by the Government. The Contaminated Media Work Plan must include all planning for tasks involving removal, storage of any excavated contaminated soil and/or groundwater, sampling and analysis, transportation, and disposal of any contaminated soil and pumped/collected groundwater. Include any proposed plans for on-site treatment of contaminated groundwater and subsequent discharge. At a minimum, the Contaminated Media Work Plan must include:

a. Schedule of activities.

b. Method of excavation and equipment to be used.

c. Dewatering system design/operations to address contaminated groundwater.

d. Storage methods and locations for liquid and solid contaminated material.

e. Decontamination procedures.

f. Spill Contingency Plan

g. Identification of selected laboratory and analytical methods to be used.

h. Any proposals for on-site treatment of contaminated groundwater and subsequent discharge, including discussions of required discharge permits.

i. Waste characterization procedures.

j. Outline of Closure report.

k. Qualification of Environmental testing firm and personnel. At a minimum the firm and personnel must have five years experience performing sampling and testing of petroleum products.

l. Anticipated locations of contaminants based on findings of drilling and sampling.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contaminated Media Work Plan; G, DO

SD-06 Test Reports

Sampling and Analysis

Sampling of Stored Material; G, AO

Sampling Liquid; G, AO

SD-11 Closeout Submittals

Closure Report; G, AO

1.4 REGULATORY REQUIREMENTS

1.4.1 Permits and Licenses

Obtain required federal, state, and local permits for excavation and

storage of contaminated material. Permits must be obtained at no additional cost to the Government.

PART 2 PRODUCTS

2.1 SPILL RESPONSE MATERIALS

Provide appropriate TPH-DRO spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials must be available at all times when contaminated materials/wastes are being handled or transported. Spill response materials must be compatible with the type of materials and contaminants being handled.

PART 3 EXECUTION

3.1 EXISTING STRUCTURES AND UTILITIES

No excavation will be permitted until all utilities in the work area have been field located. Take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the Contractor's operations must be repaired at no additional cost to the Government.

3.2 CONTAMINATED MATERIAL REMOVAL

3.2.1 Excavation

Project work and soil removal must be performed in a manner that will limit spills and the potential for contaminated material to be mixed with uncontaminated material. An excavation log describing visible signs of contamination encountered must be maintained for each area of soil removal. Excavation is required only as necessary to fulfill project needs and the Contractor will not be compensated for overexcavation resulting in additional/excess contaminated soil.

3.2.2 Care of Water

Surface water must be diverted to prevent entry into the excavation and/or the spread of contamination see 01 12 00 CONSTRUCTION GENERAL paragraph 1.6.

3.2.3 Dewatering

The dewatering system shall be capable of isolating discharges in contaminated areas for proper disposal per 33 26 00 DEWATERING.

3.3 CONTAMINATED MATERIAL STORAGE

Material must be placed in temporary storage immediately after excavation at a location approved by the Contracting Officer. The following paragraphs describe acceptable methods of material storage. Storage units must be in good condition and constructed of materials that are compatible with the material or liquid to be stored. If multiple storage units are required, each unit must be clearly labeled with an identification number and a written log must be kept to track the source of contaminated material in each temporary storage unit.

3.3.1 Stockpiles

Stockpiles must be constructed to isolate stored contaminated material from the environment. Stockpiles must be constructed to include:

a. A chemically resistant geomembrane liner free of holes and other damage. Non-reinforced geomembrane liners must have a minimum thickness of 20 mils. Scrim reinforced geomembrane liners must have a minimum weight of 40 lbs/1000 square feet. The ground surface on which the geomembrane is to be placed must be free of rocks greater than 0.5 inches in diameter and any other object which could damage the membrane.

b. Geomembrane cover free of holes or other damage to prevent precipitation from entering the stockpile. Non-reinforced geomembrane covers must have a minimum thickness of 10 mils. Scrim reinforced geomembrane covers must have a minimum weight of 26 lbs/1000 square feet. The cover material must be extended over the berms and anchored or ballasted to prevent it from being removed or damaged by wind.

c. Berms surrounding the stockpile, a minimum of 12 inches in height. Vehicle access points must also be bermed.

d. The liner system must be sloped to allow collection of leachate. Storage and removal of liquid which collects in the stockpile must be in accordance with paragraph 3.3.3 Liquid Storage.

3.3.2 Roll-Off Units

Roll-off units used to temporarily store contaminated material must be water tight. A cover must be placed over the units to prevent precipitation from contacting the stored material. The units must be located as approved by the Contracting Officer. Liquid which collects inside the units must be removed and stored in accordance with paragraph 3.3.3 Liquid Storage.

3.3.3 Liquid Storage

Liquid collected from excavations and stockpiles must be temporarily stored in approved barrels or tanks. Liquid storage containers must be water-tight and must be located as approved by the Contracting Officer.

3.4 SAMPLING

3.4.1 Sampling of Stored Material

The Contractor must identify proposed analytical parameters and frequency of sampling in the Contaminated Media Work Plan for approval. Analytical methods must conform to South Dakota Department of Agriculture and Natural Resources requirements.

Stored material with contaminant levels that exceed the action levels must be treated or disposed offsite as indicated in the approved Contaminated Media Work Plan.

3.4.2 Sampling Liquid

During dewatering system operation, the Contractor must identify proposed analytical parameters and frequency of sampling in the Contaminated Media

Work Plan for approval.

3.5 SPILLS

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), pollutant, contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), notify the Contracting Officer immediately. Immediate containment actions must be taken to minimize the effect of any spill or leak. Cleanup must be in accordance with applicable federal, state, and local regulations. As directed by the Contracting Officer, additional sampling and testing must be performed to verify spills have been cleaned up. Spill cleanup and testing must be done at no additional cost to the Government.

3.6 DISPOSAL REQUIREMENTS

Offsite disposal of contaminated material must be in accordance with South Dakota Department of Agriculture and Natural Resources Requirements.

3.7 CLOSURE REPORT

Submit a Closure Report within 14 calendar days of completing work at the site. The report must be labeled with the contract number, project name, location, date, name of general Contractor, and the Corps of Engineers District contracting for the work. The Closure Report must include the following information as a minimum:

a. A cover letter signed by a responsible company official certifying that all services involved have been performed in accordance with the terms and conditions of the contract documents and regulatory requirements.

b. A narrative report including, but not limited to, the following:

   (1) Site conditions, ground water elevation, and cleanup criteria;

   (2) Excavation logs;

   (3) Field screening readings;

   (4) Quantity of materials removed from each area of contamination;

   (5) Quantity of water/product removed during dewatering;

   (6) Sampling locations and sampling methods;

   (7) Sample collection data such as time of collection and method of preservation;

   (8) Sample chain-of-custody forms; and

   (9) Source of backfill.

c. Copies of all chemical and physical test results.

d. Copies of all certifications of final disposal signed by the responsible disposal facility official.

e. Waste profile sheets.

f. Progress Photographs. Color photographs must be used to document progress of the work. A digital version of all photos shown in the report must be included with the Closure Report.

-- End of Section --

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TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

ATTACHMENTS:

Attachment A

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SECTION 02 81 00

TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

IATA DGR	(2018) Dangerous Goods Regulations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 415-1-266	(2000) Resident Engineer Management Guide (REMG) for Hazardous, Toxic, and Radioactive Waste (HTRW) Projects

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan

40 CFR 302	Designation, Reportable Quantities, and Notification
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Hazardous Material

A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

1.2.2 Hazardous Waste

A waste which meets criteria established in Resource Conservation and Recovery Act (RCRA) or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Packaging Notifications

Hazardous Waste Management Plan; G, AO

SD-06 Test Reports

Record Keeping; G, AO

Exception Report; G, AO

Spill Response; G, AO

SD-07 Certificates

Transportation and Disposal Coordinator; G, AO

Training; G, AO

Transporter Certification

Shipping Documents and Packagings Certification; G, AO

Certificates of Disposal; G, DO

Waste Minimization; G, DO

1.4 QUALITY ASSURANCE

1.4.1 Transportation and Disposal Coordinator

Designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this contract. The TDC must serve as the single point of contact for all environmental regulatory matters and have overall responsibility for total environmental compliance at the site including, but not limited to, accurate identification and classification of hazardous waste and hazardous materials; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, asbestos waste shipment records, PCB manifests, bill of ladings, exception and discrepancy reports; and all other environmental documentation. The TDC must have, at a minimum, one year of specialized experience in the management and transportation of hazardous waste and have been Department of Transportation certified under 49 CFR 172, Subpart H.

1.4.2 Training

Employees transporting hazardous materials or preparing hazardous materials for transportation, including samples, must be trained, tested, and certified in accordance with 49 CFR 172, Subpart H, including security awareness and any applicable security plans. Hazardous material employees must also be trained in accordance with IATA DGR when shipping hazardous materials by air. Employees must be trained, tested, and certified in accordance with 49 CFR 172, Subpart H to determine that shipments do not constitute DOT regulated hazardous materials.

1.4.3 Transporter Certification

The hazardous materials transporter must possess a current certificate of registration issued by the Research and Special Programs Administration (RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G. Submit copies of the certificates or written statements certifying exemption from these requirements.

1.4.4 Laws and Regulations Requirements

Comply with Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and compliance with amendments is required as they become effective. Notify the Contracting Officer immediately if compliance exceeds the scope of work or conflicts with specific requirements of the contract.

PART 2 PRODUCTS

2.1 MATERIALS

Provide all the materials required for the packaging, labeling, marking, placarding, and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation standards and EP 415-1-266. Details in this specification must not be construed as establishing the limits of the Contractor's responsibility.

2.1.1 Packagings

Provide bulk and non-bulk containers for packaging hazardous materials/wastes consistent with the authorizations referenced in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 8. Bulk and non-bulk packaging must meet the corresponding specifications in 49 CFR 173 referenced in the Hazardous Materials Table, 49 CFR 172, Section .101. Packaging must conform to the general packaging requirements of Subpart B of 49 CFR 173, to the requirements of 49 CFR 178 at the specified packing group performance level, to the requirements of special provisions of column 7 of the Hazardous Materials Table in 49 CFR 172, Section .101, and be compatible with the material to be packaged as required by 40 CFR 262. Also provide other packaging related materials such as materials used to cushion or fill voids in overpacked containers. The hazardous materials being packaged must not react dangerously with, decompose, or ignite the sorbent packaging materials. Additionally, sorbents used to treat free liquids to be disposed of in landfills must be non-biodegradable as specified in 40 CFR 264, Section .314. In addition, packaging notifications will be provided to the Government in accordance with 49 CFR 172, Section .178.2(c) regarding type and dimensions of closures, including gaskets, needed to satisfy performance test requirements.

2.1.2 Markings

Provide markings for each hazardous material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D and 40 CFR 61, Section .149(d) (for asbestos). Markings must withstand a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.1.3 Labeling

Provide primary and subsidiary labels for hazardous materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels must meet design specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels must be durable weather resistant and withstanding a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.1.4 Placards

For each offsite shipment of hazardous material/waste, provide primary and subsidiary placards consistent with the requirements of 49 CFR 172, Subpart F. Provide placards for each side and each end of bulk packaging, freight containers, transport vehicles, and rail cars requiring such placarding. Placards may be plastic, metal, or other material capable of

withstanding, without deterioration, a 30 day exposure to open weather conditions and must meet design requirements specified in 49 CFR 172, Subpart F.

2.1.5 Spill Response Materials

Provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective equipment. Spill response materials must be available at all times when hazardous materials/wastes are being handled or transported. Spill response materials must be compatible with the type of material being handled.

2.2 EQUIPMENT AND TOOLS

Provide miscellaneous equipment and tools necessary to handle hazardous materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 HAZARDOUS WASTE MANAGEMENT PLAN

Prepare a Hazardous Waste Management Plan detailing the manner in which hazardous wastes will be managed and describing the types and volumes of hazardous wastes anticipated to be managed. The plan must address both onsite and offsite hazardous waste management. Describe the methods to be used to ensure accurate piece counts or weights of shipments; describe waste minimization methods; identify and describe facilities to be used for treatment, storage, and disposal (TSD); identify areas onsite where hazardous wastes are to be handled; and identify whether transfer facilities are to be used; and if so, how the wastes will be tracked to ultimate disposal. Submit the plan to the Contracting Officer for approval prior to start of work.

3.2 ONSITE HAZARDOUS WASTE MANAGEMENT

Coordinate the onsite management of all hazardous materials and waste with the installation environmental function and the Contracting Officer. These paragraphs apply to Government owned waste only. The Contractor is responsible for ensuring compliance with Federal, state, and local hazardous waste laws and regulations and verifying those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. Identify hazardous wastes using criteria set forth in 40 CFR 261 or applicable state and local laws, regulations, and ordinances. Comply with generator requirements in 40 CFR 262 and applicable state or local law or regulations when accumulating hazardous waste onsite. Onsite accumulation times must be restricted to applicable time frames referenced in 40 CFR 262, Section .34 and applicable state or local law or regulation. Accumulation start dates commence when waste container is transferred into a 90 day accumulation site or permitted storage facility. Only use containers in good condition and compatible with the waste to be stored. Ensure containers are closed except when adding or removing waste, and immediately mark all hazardous waste containers with the words "hazardous waste" and other information required by 40 CFR 262, Section .32 and applicable state or local law or regulation as soon as the waste is containerized. An additional marking must be placed on containers of "unknowns" designating the date sampled, and the suspected hazard. Inspect containers for signs of deterioration and for responding to any spills or leaks. Inspect all hazardous waste areas (should Geotechnical Investigation determine hazardous areas are in the

work area) weekly and provide written documentation of the inspection as part of the Record Keeping. Include date and time of inspection, name of individual conducting the inspection, problems noted, and corrective actions taken on the inspection logs.

3.2.1 Hazardous Waste Classification

Identify, in consultation with the Contracting Officer, all waste codes applicable to each hazardous waste stream based on requirements in 40 CFR 261 or applicable state or local law or regulation. Also identify applicable treatment standards in 40 CFR 268 and state land disposal restrictions and make a determination as to whether or not the waste meets or exceeds the standards. Submit waste profiles, analyses, classification and treatment standards information as part of shipping documents and packagings certification to Contracting Officer for review and approval.

3.3 OFFSITE HAZARDOUS WASTE MANAGEMENT

Coordinate the off site transfer of all hazardous materials and waste with the installation environmental function and the Contracting Officer. Use RCRA Subtitle C permitted facilities which meet the requirements of 40 CFR 264 or facilities operating under interim status which meet the requirements of 40 CFR 265. Do not use offsite treatment, storage, and disposal facilities with significant RCRA violations or compliance problems (such as facilities known to be releasing hazardous constituents into ground water, surface water, soil, or air). Submit Notices of Non-Compliance and Notices of Violation by a Federal, state, or local regulatory agency issued to the Contractor in relation to any work performed under this contract. Immediately provide copies of such notices to the Contracting Officer. Also furnish relevant documents regarding the incident and any information requested by the Contracting Officer, and coordinate its response to the notice with the Contracting Officer or the designated representative prior to submission to the notifying authority. Also furnish a copy to the Contracting Officer of all documents submitted to the regulatory authority, including the final reply to the notice, and all other materials, until the matter is resolved.

3.3.1 Treatment, Storage, and Disposal Facility and Transporter

Provide the Contracting Officer with EPA ID numbers, names, locations, and telephone numbers of TSD facilities and transporters. This information must be contained in the Hazardous Waste Management Plan and be approved by the Contracting Officer prior to waste disposal.

3.3.2 Facility Status Information

Facilities receiving hazardous waste must be permitted in accordance with 40 CFR 270 or operating under interim status in accordance with 40 CFR 265 requirements, or permitted by a state authorized by the Environmental Protection Agency to administer the RCRA permit program. Additionally, prior to using a TSD Facility, contact the EPA Regional Offsite Coordinator specified in 40 CFR 300, Section .440, to determine the facility's status, and document all information necessary to satisfy the requirements of the EPA Offsite policy and submit this information to the Contracting Officer in the Hazardous Waste Management Plan see form in Attachment A.

3.3.3 Shipping Documents and Packagings Certification

Prior to shipment of any hazardous material offsite and a minimum of 14 days prior to anticipated pickup, provide for review written certification to the Contracting Officer that hazardous materials have been properly packaged, labeled, and marked in accordance with Department of Transportation and EPA requirements. Furnish designated disposal facility packaging assurances not later than 35 days after acceptance of the shipment. The Contractor's TDC must also provide written certification regarding waste minimization efforts documenting that efforts have been taken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.3.4 Transportation

Use manifests for transporting hazardous wastes as required by 40 CFR 263 or applicable state or local law or regulation. Transportation must comply with all requirements in the Department of Transportation referenced regulations in the 49 CFR series. Prepare hazardous waste manifests for each shipment of hazardous waste shipped offsite. Complete manifests using instructions in 40 CFR 262, Subpart B and applicable state or local law or regulation. Submit manifests and waste profiles as part of shipping documents and packagings certification to Contracting Officer for review and approval. Prepare land disposal restriction notifications as required by 40 CFR 268 or applicable state or local law or regulation for each shipment of hazardous waste. Submit notifications with the manifest to the Contracting Officer for review and approval.

3.3.5 Treatment and Disposal of Hazardous Wastes

Coordinate any off site shipments of hazardous materials or hazardous wastes with the installation environmental function. Initial, or satellite hazardous waste accumulation is limited to 55 gallons (or 1 quart of acutely hazardous waste). Once a waste stream exceeds 55 gallons, it must be transferred to an on-site 90 day (180 day small quantity generator) accumulation area, or a permitted hazardous waste treatment, storage or disposal facility within three days. Ship hazardous wastes only to facilities which are properly permitted to accept the hazardous waste or operating under interim status. Ensure wastes are treated to meet land disposal treatment standards in 40 CFR 268 prior to land disposal. Propose TSD facilities via submission of the Hazardous Waste Management Plan, subject to the approval of the Contracting Officer. Submit Certificates of Disposal documenting the ultimate disposal, destruction or placement of hazardous wastes and asbestos within 180 days of initial shipment. Receipt of these certificates will be required for final payment.

3.4 MATERIALS MANAGEMENT

Consult with the Contracting Officer to evaluate, prior to shipment of any material offsite, whether the material is regulated as a hazardous waste in addition to being regulated as a radioactive material. Perform the evaluation to determine proper shipping descriptions, marking requirements, and other criteria, as described below.

3.4.1 Identification of Proper Shipping Names

Use 49 CFR 172, Section .101 to identify proper shipping names for each

hazardous material (including hazardous wastes) to be shipped offsite. Submit proper shipping names to the Contracting Officer in the form of draft shipping documents for review and approval.

3.4.2 Packaging, Labeling, and Marking

Package, label, and mark hazardous materials/wastes using the specified materials and in accordance with the referenced authorizations. Mark each container of hazardous waste of 110 gallons or less with the following:

"HAZARDOUS WASTE - Federal Law Prohibits Improper Disposal.
If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
Generator's name _____
Manifest Document Number _____".

3.4.3 Shipping Documents

Ensure that each shipment of hazardous material sent offsite is accompanied by properly completed shipping documents. This includes shipments of samples that may potentially meet the definition of a Department of Transportation regulated hazardous material.

3.4.3.1 Asbestos Waste Shipment Documents

Prepare waste shipment records, as required by 40 CFR 61, for shipments of asbestos. Submit waste shipment records to the Contracting Officer for review and approval. Waste shipment records must be signed by the Contractor.

3.4.3.2 Other Hazardous Material Shipment Documents

Prepare a bill of lading for each shipment of hazardous material which is not accompanied by a hazardous waste manifest or asbestos waste shipment record which fulfills the shipping paper requirements. The bill of lading must satisfy the requirements of 49 CFR 172, Subpart C, and applicable state or local law or regulation, and must be submitted to the Contracting Officer for review and approval. For laboratory samples and treatability study samples, prepare bills of lading and other documentation as necessary to satisfy conditions of the sample exclusions in 40 CFR 261, Section .4(d) and (e) and any applicable state or local law or regulation. Bill of ladings requiring shipper's certifications must be signed by the Government.

3.5 SPECIAL REQUIREMENTS FOR ASBESTOS WASTES

If work involves asbestos containing wastes, manage these wastes in accordance with specification Section 02 82 00 ASBESTOS CONTAINING MATERIALS.

3.6 WASTE MINIMIZATION

Minimize the generation of hazardous waste to the maximum extent practicable and take all necessary precautions to avoid mixing clean and contaminated wastes. Identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 apply to: hazardous wastes recycled in a manner constituting disposal; hazardous waste burned for energy recovery; lead-acid battery recycling; and hazardous wastes with economically recoverable precious metals.

Submit written certification that waste minimization efforts have been undertaken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.7 RECORD KEEPING

Maintain adequate records to support information provided to the Contracting Officer regarding exception reports, annual reports, and biennial reports; maintain asbestos waste shipment records for a minimum of 3 years from the date of shipment or any longer period required by applicable law or regulation or other provision of this contract; and maintain bill of ladings for a minimum of 375 days from the date of shipment or longer period required by applicable law or regulation or other provision of this contract. Submit information necessary to file state annual or EPA biennial reports for hazardous waste transported, treated, stored, or disposed of under this contract. Do not forward these data directly to the regulatory agency but to the Contracting Officer at the specified time. Submit the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter must accompany the data to include the contract number, Contractor name, and project location. In the events that a manifest copy documenting receipt of hazardous waste at the treatment storage and disposal facility is not received within 35 days of shipment initiation, or that a manifest copy documenting receipt of PCB waste at the designated facility is not received within 35 days of shipment initiation, prepare and submit an exception report to the Contracting Officer within 37 days of shipment initiation.

3.8 SPILL RESPONSE

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), notify the Contracting Officer immediately. Direction from the Contracting Officer concerning a spill or release is not considered a change under the contract. If the spill exceeds a reporting threshold, follow the pre-established procedures for immediate reporting to the Contracting Officer. Comply with applicable requirements of Federal, state, or local laws or regulations regarding any spill incident.

3.9 EMERGENCY CONTACTS

Comply with the emergency contact provisions in 49 CFR 172, Section .604. Whenever the Contractor ships hazardous materials, provide a 24 hr emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. Monitor the phone on a 24 hour basis at all times when the hazardous materials are in transportation, including during storage incidental to transportation. Ensure that information regarding this emergency contact and phone number are placed on all hazardous material shipping documents. Designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

a. The name of the emergency coordinator.

b. Phone number through which the emergency coordinator can be contacted

on a 24 hour basis.

c. The telephone number of the local fire department.

d. The location of fire extinguishers and spill control materials.

Attachment A SAMPLE OFF-SITE POLICY CERTIFICATION MEMO	
Project/Contract #:	
Waste Stream:	
Primary TSD Facility, EPA ID # and Location:	
Alter. TSD Facility, EPA ID # and Location:	
EPA Region	Contact
I	888-372-7341
II	212-673-4040
III	800-438-2474 or 215-814-5000
IV	800-241-1754 or 404-562-9900
V	312-353-2000
VI	800-887-6063 or 214-665-2210
VII	800-223-0425
VIII	800-424-8802
IX	415-947-8713
X	800-424-4372 or 206-553-4973
EPA representative contacted:	
EPA representative phone number:	
Date contacted:	
Comment:	
The above EPA representative was contacted on _____. As of that date the above sites were considered acceptable in accordance with the Off-Site Policy in 40 CFR 300.440.	
Date:	Signature:
Phone number:	

-- End of Section --

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SECTION TABLE OF CONTENTS

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ASBESTOS-CONTAINING MATERIALS

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SECTION 02 82 00

ASBESTOS-CONTAINING MATERIALS

PART 1 GENERAL

The original existing corrugate metal pipe (CMP) left abutment collector pipe system including the toe drain; toe drain outfall; relief well collector pipe; relief well casing outfalls for RW-66, RW-67 and RW-68; toe drain risers 1 through 4; relief well RW-66, RW-67, and RW-68 casings; and manholes MH-1 and MH-2 are believed to be coated with asbestos-containing bituminous coating. Assume that both the exterior and the interior of the pipes have this coating. All of the collector pipe system with assumed asbestos coating that is affected by this project work is to be removed by the Contractor to the lines and grades shown on the drawings. The percentage of asbestos in the coating is unknown. The coating is assumed to be non-friable. It is recommended that pipes designated for removal be removed with the coating as intact as possible. All work procedures that disturb the asbestos-containing material on pipes and disposal of any asbestos-containing material generated during the work procedures must be performed in accordance with the requirements of this specification.

For bidding purposes, assume that any coatings contain asbestos.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z87.1	(2015) Occupational and Educational Personal Eye and Face Protection Devices

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90/018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.103	Respiratory Protection
29 CFR 1926.1101	Asbestos
29 CFR 1926.200	Accident Prevention Signs and Tags
29 CFR 1926.59	Hazard Communication
40 CFR 61-SUBPART A	General Provisions

40 CFR 61-SUBPART M	National Emission Standard for Asbestos
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

1.2 DEFINITIONS

1.2.1 ACM

Asbestos Containing Materials.

1.2.2 Amended Water

Water containing a wetting agent or surfactant with a maximum surface tension of 0.00042 psi.

1.2.3 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, and actinolite asbestos and any of these minerals that has been chemically treated or altered. Materials are considered to contain asbestos if the asbestos content of the material is determined to be at least one percent.

1.2.4 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

1.2.5 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

1.2.6 Asbestos Permissible Exposure Limit

0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of worker's health.

1.2.7 Authorized Person

Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

1.2.8 Competent Person (CP)

A person meeting the requirements for competent person as specified in 29 CFR 1926.1101 including a person capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, and is specifically trained in a training course which meet the criteria of EPA's Model Accreditation Plan (40 CFR 763) for project designer or supervisor, or its equivalent. The competent person must have a current State of South Dakota asbestos contractors or supervisors license or certification, as required by the state.

1.2.9 Contractor

The Contractor is that individual, or entity under contract to perform the herein listed work.

1.2.10 Disposal Bag

A 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926.1101, used for transporting asbestos waste from containment to disposal site.

1.2.11 Disturbance

Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM.

1.2.12 Friable Asbestos Material

A term defined in 40 CFR 61-SUBPART M and EPA 340/1-90/018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

1.2.13 HEPA Filter Equipment

High efficiency particulate air (HEPA) filtered vacuum and exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters must retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

1.2.14 Model Accreditation Plan (MAP)

USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763.

1.2.15 NESHAP

National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61-SUBPART M.

1.2.16 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

1.2.17 Permissible Exposure Limits (PELs)

1.2.17.1 PEL-Time Weighted Average (TWA)

Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8-hour time weighted average (TWA).

1.2.18 Personal Sampling

Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

1.2.19 Private Qualified Person (PQP)

That qualified person hired by the Contractor to perform the herein listed tasks.

1.2.20 Qualified Person (QP)

A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and/or Asbestos Project Designer; and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The QP must be appropriately licensed/certified in the State of South Dakota.

1.2.21 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

1.2.22 Worker

Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926.1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation, if required by the OSHA Class of work to be performed or by the state where the work is to be performed. The worker must be appropriately licensed/certified in the State of South Dakota.

1.3 REQUIREMENTS

1.3.1 Description of Work

The work covered by this section includes the handling and control of

asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos containing materials generated by the work. More specific operational procedures must be outlined in the Asbestos Hazard Plan called for elsewhere in this specification. The asbestos work includes the removal of corrugated metal pipe casing of the relief wells and left abutment collector pipe system that is coated with asbestos-containing bituminous coating as described in paragraph 1 GENERAL of this specification.

1.3.2 Unexpected Discovery of Asbestos

Notify the Contracting Officer if any additional work area features are suspected to contain asbestos and will be impacted by the work.

1.3.3 Medical Requirements

Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

1.3.3.1 Medical Examinations

Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent State or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination must be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

1.3.3.2 Medical Records

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 50 years after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

1.3.4 Employee Training

Submit certificates indicating that the employee has received training in the proper handling of materials and wastes that contain asbestos; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as indicated in 29 CFR 1926.1101. Train personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training, OSHA training criteria or applicable State of South Dakota training criteria whichever is more stringent. Document the training by providing: dates of training, training entity, course title, and names of instructors. Furnish each employee with respirator training and fit

testing as required by 29 CFR 1926.1101 and 29 CFR 1926.103. Fully cover engineering and other hazard control techniques and procedures.

1.3.5 Permits and Notifications

Prior to the start of work, obtain necessary permits in conjunction with asbestos removal, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities. Notify the State's Asbestos Coordinator of the Department of Agriculture and Natural Resources and the Contracting Officer in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M and the Administrative Rules of South Dakota 74:36:08. Submit copies of all Notifications to the Contracting Officer.

1.3.6 Environment, Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of EM 385-1-1, 29 CFR 1926.1101, 40 CFR 61-SUBPART A, and 40 CFR 61-SUBPART M. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Government apply. The following laws, rules and regulations regarding asbestos materials apply:

Administrative Rules of South Dakota 74:31

1.3.7 Respiratory Protection Program

Establish and implement a respirator program as required by 29 CFR 1926.1101, and 29 CFR 1926.103. Submit a written description of the program to the Contracting Officer. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

1.3.7.1 Respirator Program Records

Submit records of the respirator program as required by 29 CFR 1926.103, and 29 CFR 1926.1101.

1.3.7.2 Respirator Fit Testing

The Contractor must conduct a qualitative or quantitative fit test conforming to 29 CFR 1926.103 for each worker required to wear a respirator, and any authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test must be performed prior to initially wearing a respirator and every 12 months thereafter. If physical changes develop that will affect the fit, a new fit test must be performed. Functional fit checks must be performed each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.3.7.3 Respirator Selection and Use Requirements

Provide respirators, and ensure that they are used as required by

29 CFR 1926.1101 and in accordance with CGA G-7 and the manufacturer's recommendations. Respirators must be approved by the National Institute for Occupational Safety and Health NIOSH, under the provisions of 42 CFR 84, for use in environments containing airborne asbestos fibers. For air-purifying respirators, the particulate filter must be high-efficiency particulate air (HEPA)/(N-,R-,P-100). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type must be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered.

1.3.8 Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Safety Data Sheets (SDS) for all materials brought to the site.

1.3.9 Asbestos Abatement Plan

Submit a plan describing the safety precautions such as lockout, tagout, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used in the removal of materials containing asbestos. The plan, not to be combined with other hazard plans, must be prepared and signed by the Contractor. The plan must include but not be limited to the precise personal protective equipment to be used, the location of any asbestos control areas, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, planned air monitoring strategies, and a detailed description of the method to be employed in order to control environmental pollution. The plan must also include (both fire and medical emergency) response plans and an Activity Hazard Analyses (AHAs) in accordance with EM 385-1-1. The Asbestos Abatement Plan must be approved in writing prior to starting any asbestos work. The Contractor, Supervisor, and CP must meet with the Contracting Officer prior to beginning work, to discuss in detail the Asbestos Abatement Plan, including work procedures and safety precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan must be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to starting work.

1.3.10 Testing Laboratory

Submit the name, address, and telephone number of each testing laboratory selected for the analysis, and reporting of airborne concentrations of asbestos fibers along with certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis. The testing laboratory firm must be independent of the asbestos contractor and must have no employee or employer relationship which could constitute a conflict of interest.

1.3.11 Landfill Approval

Submit written evidence that the landfill is approved for asbestos disposal by state regulatory agencies. Within three working days after delivery, submit detailed delivery tickets, prepared, signed, and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill. Submit a copy of the waste shipment records within three (3) days of the shipment leaving the project site.

1.3.12 Transporter Certification

Submit written evidence that the transporter is approved to transport asbestos waste in accordance with the DOT requirements of 49 CFR 171, 49 CFR 172 and 49 CFR 173 as well as registration requirements of 49 CFR 107and all other State and local regulatory agency requirements.

1.3.13 Medical Certification

Provide a written certification for each worker and supervisor, signed by a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law. Submit certificates prior to the start of work but after the main abatement submittal.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Safety Data Sheets (SDS) for All Materials; G, AO

Respirators; G, AO

SD-06 Test Reports

Air Sampling Results; G, AO

SD-07 Certificates

Employee Training; G, AO

Respiratory Protection Program; G, AO

Asbestos Abatement Plan; G, DO

Testing Laboratory; G, AO

Landfill Approval; G, AO

Delivery Tickets; G, AO

Waste Shipment Records; G, AO

Transporter Certification;

Medical Certification; G, AO
Private Qualified Person Documentation; G, RO

Competent Person; G, AO

Contractor's License; G, AO

Contractor's License; GG, AOSD-11 Closeout Submittals

Permits; G, AO

Notifications; G, AO

Respirator Program Records; G, AO

1.5 QUALITY ASSURANCE

1.5.1 Private Qualified Person Documentation

Submit the name, address, and telephone number of the Private Qualified Person (PQP) selected to direct air monitoring, and documented evidence that the PQP has successfully completed training in and is accredited and where required is certified as Asbestos Contractor/Supervisor, as described by 40 CFR 763 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The PQP and the asbestos contractor must not have an employee/employer relationship or financial relationship which could constitute a conflict of interest. The PQP must be a first tier subcontractor.

1.5.2 Competent Person Documentation

The Competent Person must be experienced in the administration and supervision of asbestos projects including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, ACM generated waste containment and disposal procedures, site safety and health requirements, and notification of other employees onsite. The Competent Person must be on-site at all times when asbestos abatement activities are underway. Submit South Dakota employee training certification. Submit evidence that the Competent Person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA competent person requirements.

1.5.3 Contractor's License

Submit a copy of the asbestos contractor's license issued by the State of South Dakota.

1.5.4 Air Sampling Results

Complete fiber counting and provide results to the PQP for review within 16 hours of the "time off" of the sample pump. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees where required by law within three working days, signed by the testing laboratory employee performing air

sampling, the employee that analyzed the sample, and the PQP.

1.5.5 Preconstruction Conference

Conduct a safety preconstruction conference to discuss the details of the Asbestos Abatement Plan, and Accident Prevention Plan (APP) including the AHAs required in specification Section 01 35 26 GOVERNMENTAL SAFETY REQUIREMENTS. The safety preconstruction conference must include the Contractor and their Designated Competent Person, Project Supervisor and the Contracting Officer. Deficiencies in the APP will be discussed. Onsite work must not begin until the APP has been accepted.

1.6 SECURITY

Barriers to prevent unauthorized entry must be provided for each asbestos control area. A log book must be kept documenting entry into and out of the control area. Entry into control areas must only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter control areas must be trained and wear the required personal protective equipment.

PART 2 PRODUCTS

2.1 DUCT TAPE

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container.

2.2 DISPOSAL CONTAINERS

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers must be provided for ACM wastes as required by 29 CFR 1926.1101. Disposal containers can be in the form of:

a. Disposal Bags

b. Fiberboard Drums

c. Cardboard Boxes

2.3 SHEET PLASTIC

Where used, sheet plastic must be polyethylene of 6 mil minimum thickness and must be provided in the largest sheet size necessary to minimize seams. Film must conform to ASTM D4397.

PART 3 EXECUTION

3.1 EQUIPMENT

Provide the Contracting Officer or the Contracting Officer's Representative, with at least two sets of personal protective equipment as required for entry to and inspection of the asbestos control area. Provide equivalent training to the Contracting Officer or a designated representative as provided to Contractor employees in the use of the required personal protective equipment.

3.1.1 Air Monitoring Equipment

The Contractor's PQP must approve air monitoring equipment. The equipment must include, but must not be limited to:

a. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps must also be equipped with an automatic flow control unit which must maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.

b. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands for personal air sampling.

c. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

3.1.2 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

3.1.2.1 Respirators for Handling Asbestos

Provide personnel engaged in cleanup, handling, removal of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103.

3.1.3 Exterior Whole Body Protection

3.1.3.1 Outer Protective Clothing

Where required by the approved asbestos abatement plan, provide personnel exposed to asbestos with disposable "non-breathable," or reusable "non-breathable" whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Reusable whole body outer protective clothing must be either disposed of as asbestos contaminated waste upon exiting from the asbestos regulated work area or be properly decontaminated.

3.1.3.2 Decontamination

Provide decontamination areas for the decontamination of employees, material and equipment. Ensure that employees enter and exit the asbestos control area through the decontamination area.

3.1.3.3 Eye Protection

Provide eye protection that complies with ANSI/ISEA Z87.1 when operations present a potential eye injury hazard. Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

3.1.4 Regulated Areas

All Class II, and III asbestos work must be conducted within regulated areas. The regulated area must be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

3.1.5 Warning Signs and Labels

Provide warning signs at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to the requirements are acceptable

3.1.5.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 minimum 20 by 14 inches displaying the following legend in the lower panel:

Legend	Notation
DANGER	one inch Sans Serif Gothic or Block
ASBESTOS	one inch Sans Serif Gothic or Block
MAY CAUSE CANCER	one inch Sans Serif Gothic or Block
CAUSES DAMAGE TO LUNGS	1/4 inch Sans Serif Gothic or Block
AUTHORIZED PERSONNEL ONLY	1/4 inch Sans Serif Gothic or Block

Spacing between lines must be at least equal to the height of the upper of any two lines.

3.1.5.2 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER

CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST AVOID CREATING DUST

3.1.6 Single Stage Decontamination Area

A decontamination area (equipment room/area) must be provided for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment. The equipment room or area must be adjacent to the regulated area for the decontamination of employees, material, and their equipment which could be contaminated with asbestos. The area must be covered by an impermeable drop cloth on the horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

3.2 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein. Use appropriate procedures as listed in the asbestos abatement plan. Wear and utilize protective clothing and equipment as specified herein. No eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics is permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal of asbestos containing material must not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this specification are complied with by the trade personnel. If an asbestos fiber release or spill occurs outside of the asbestos control area, stop work immediately, and correct the condition to the satisfaction of the Contracting Officer prior to resumption of work.

3.2.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Contracting Officer using visual inspection or sample analysis, it must be restored to its original condition or decontaminated by the Contractor at no expense to the Government as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the PQP work may proceed at the discretion of the Contracting Officer.

3.2.2 Methods of Compliance

3.2.2.1 Mandated Practices

The specific work and removal techniques and items identified must be detailed in the Contractor's Asbestos Abatement Plan. Use the following engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters.

b. Wet methods or wetting agents except where it can be demonstrated that the use of wet methods is unfeasible due to the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt clean-up and disposal.

d. Inspection and repair of polyethylene.

e. Cleaning of equipment and surfaces of containers prior to removing them from the equipment room.

3.2.2.2 Unacceptable Practices

The following work practices must not be used:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos containing materials, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean up.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.2.3 Class II Work Procedures

In addition to the requirements of paragraphs MANDATED PRACTICES and CONTROL METHODS, the following engineering controls and work practices must be used:

a. A Competent Person must supervise the work.

b. Use methods of penetrating and cutting the existing relief wells and pipes that will minimize disturbance of the asbestos on the metal. Provide a means of collecting all asbestos-containing debris for proper disposal.

c. The work must be performed using wet methods and, to the extent feasible, using local exhaust. Use impermeable drop cloths or other means of collecting debris and isolate the operation, especially where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of asbestos-containing material. Remove and properly dispose of all asbestos-containing residue or debris.

3.2.4 Air Sampling

Perform sampling of airborne concentrations of asbestos fibers in accordance with 29 CFR 1926.1101, the Contractor's air monitoring plan and as specified herein. Sampling performed in accordance with 29 CFR 1926.1101must be performed by or under the direction of the PQP. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the

Contractor, the Government will determine which results predominate. Results of breathing zone samples must be posted at the job site and made available to the Contracting Officer. Submit all documentation regarding initial exposure assessments, negative exposure assessments, and air-monitoring results.

3.2.4.1 Sampling During Asbestos Work

The PQP must provide personal sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. Breathing zone samples must be taken for at least 25 percent of the workers in each shift, or a minimum of two, whichever is greater. Air sample fiber counting must be completed and results provided within 24-hours (breathing zone samples) after completion of a sampling period. The written results must be signed by testing laboratory analyst, testing laboratory principal and the Contractor's PQP. The air sampling results must be documented on a Contractor's daily air monitoring log.

3.2.5 Site Inspection

While performing asbestos engineering control work, the Contractor must be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by safety or industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the violation must be at the Contractor's expense.

3.3 CLEAN-UP AND DISPOSAL

3.3.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will attest that the area is safe before the signs can be removed. The Contracting Officer will visually inspect all surfaces within the work area for residual material or accumulated dust or debris. The Contractor must re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The Contracting Officer must agree that the area is safe in writing before unrestricted entry will be permitted. The Government must have the option to perform monitoring to determine if the areas are safe before entry is permitted.

3.3.2 Responsibility for Materials

All waste materials, except as specified otherwise, become the responsibility of the Contractor and must be disposed of as specified in applicable local, State, and Federal regulations and herein.

3.3.3 Disposal of Asbestos

3.3.3.1 Procedure for Disposal

Coordinate all waste disposal manifests/bills of lading/waste shipment records with the Contracting Officer. The Contractor must prepare the waste manifest/asbestos shipment record and it will be signed off on by the Project Environmental Compliance Coordinator. Collect asbestos waste, debris, bags, containers, equipment, and any asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 6 mils thick bags with the approved warnings and DOT labeling preprinted on the bag. Clearly indicate on the outside of each container the name of the waste generator and the location at which the waste was generated. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. If needed, an area for interim storage of asbestos waste-containing drums or skids will be assigned by the Contracting Officer or his authorized representative. Comply with 40 CFR 61-SUBPART M, State, regional, and local standards for hauling and disposal. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags must remain in the drum and the entire contaminated drum must be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums must wear appropriate personal protective equipment when handling asbestos materials at the disposal site.

-- End of Section --

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PRECAST CONCRETE MANHOLES AND MANHOLE BASES

PART 1 GENERAL

1.1 SUMMARY

The work covered by this section consists of furnishing all plant, labor, equipment and materials for the construction of precast concrete manholes and manhole bases for the new toe drain, toe drain outfall, and relief well collector system in accordance with these specifications, as shown on the contract drawings, and as directed by the Contracting Officer. Perform all work in accordance with ACI 318.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 211.2	(1998; R 2004) Standard Practice for Selecting Proportions for Structural Lightweight Concrete
ACI 305R	(2020) Guide to Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 318	(2014; Errata 1-2 2014; Errata 3-5 2015; Errata 6 2016; Errata 7-9 2017) Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14)

AMERICAN CONCRETE PIPE ASSOCIATION (ACPA)

ACPA QPC	(202016) QCast Plant Certification Manual

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020) Structural Welding Code - Steel
AWS D1.4/D1.4M	(2011) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon

	Structural Steel
ASTM A153/A153M	(2016a) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A615/A615M	(2020) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A706/A706M	(2016) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A1064/A1064M	(2017) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31/C31M	(2021a) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39/C39M	(2021) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C138/C138M	(2017a) Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C171	(2020) Standard Specification for Sheet Materials for Curing Concrete
ASTM C173/C173M	(2016) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C192/C192M	(2019) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM C231/C231M	(2017a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C309	(2019) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C443	(2020) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C857	(2016) Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

ASTM C858	(2010; E 2012) Standard Specification for Underground Precast Concrete Utility Structures
ASTM C877	(2021) Standard Specification for External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
ASTM C891	(2020) Standard Practice for Installation of Underground Precast Concrete Utility Structures
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants
ASTM C923	(2008; R 2013; E 2016) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM C990	(2009; R 2019) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C1064/C1064M	(2017) Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1116/C1116M	(2010a; R 2015) Standard Specification for Fiber-Reinforced Concrete
ASTM C1244	(2020) Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill
ASTM C1478	(2019) Standard Specification for Storm Drain Resilient Connectors Between Reinforced Concrete Storm Sewer Structures, Pipes and Laterals

CSA GROUP (CSA)

CSA A23.4	(2016; R 2021) Precast Concrete - Materials and Construction

NATIONAL PRECAST CONCRETE ASSOCIATION (NPCA)

NPCA QC Manual	(2017) Quality Control Manual for Precast and Prestressed Concrete Plants

1.3 SUBMITTALS

All submittals are the responsibility of the precast concrete producer. Government approval is required for submittals with a "G" or "S"

classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Quality Control Procedures

SD-02 Shop Drawings

Standard Precast Units; GG, DO
Custom-Made Precast Units; GG, DO
Special Finishes

SD-03 Product Data

Standard Precast Units
Proprietary Precast Units
Embedded Items
Accessories

SD-05 Design Data

Design Calculations; GG, RO
Concrete Mix Proportions

SD-06 Test Reports

Test Reports

SD-07 Certificates

Quality Control Procedures

SD-11 Closeout Submittals

Recycled content for fly ash and pozzolan; S
Recycled content for Ground Iron Blast-Furnace Slag; S
Recycled content for Silica Fume; S
Recycled content for Synthetic Fiber Reinforcement; S
Recycled content for steel; S

1.4 QUALITY ASSURANCE

Demonstrate adherence to the standards set forth in NPCA QC Manual or ACPA QPC. Meet requirements written in the subparagraphs below.

1.4.1 NPCA and ACPA Plant Certification

The precast concrete producer must be certified by the National Precast Concrete Association's or the American Concrete Pipe Association's Plant Certification Program prior to and during production of the products for this project.

1.4.2 Qualifications, Quality Control and Inspection

1.4.2.1 Qualifications

Select a precast concrete producer that has been in the business of producing precast concrete units similar to those specified for a minimum of 3 years. The precast concrete producer must maintain a permanent quality control department or retain an independent testing agency on a continuing basis.

1.4.2.2 Quality Control Procedures

Submit quality control procedures established by the precast manufacturer in accordance with NPCA QC Manual and ACPA QPC. Show that the following QC tests are performed as required and in accordance with the ASTM standards indicated.

1.4.2.2.1 Slump

Perform a slump test for each 150 cu yd of concrete produced, or once a day, whichever comes first. Perform slump tests in accordance with ASTM C143/C143M.

1.4.2.2.2 Temperature

Measure the temperature of fresh concrete when slump or air content tests are made and when compressive test specimens are made in accordance with ASTM C1064/C1064M.

1.4.2.2.3 Compressive Strength

Make at least four compressive strength specimens for each 150 cubic yards of concrete of each mix or once a day whichever provides the most number of specimens in accordance with the following Standards: ASTM C31/C31M, ASTM C192/C192M, ASTM C39/C39M.

1.4.2.2.4 Air Content

Perform tests for air content on air-entrained, wet-cast concrete for each 150 cu yd of concrete, but not less often than once each day when air-entrained concrete is used. Determine the air content in accordance with either ASTM C231/C231M or ASTM C173/C173M for normal weight aggregates and ASTM C173/C173M for lightweight aggregates.

1.4.2.2.5 Unit Weight

Perform tests for unit weight a minimum of once per week to verify the yield of batch mixes. Perform unit weight tests for each 100 cu yd of lightweight concrete in accordance with ASTM C138/C138M.

1.4.2.3 Inspection

The Contracting Officer may place an inspector in the plant when the units covered by this specification are being manufactured. The burden of payment for plant inspection will be clearly detailed in the specification. The precast concrete producer must give notice 14 days prior to the time the units will be available for plant inspection. Neither the exercise nor waiver of inspection at the plant will affect the Government's right to enforce contractual provisions after units are

transported or erected.

1.4.2.4 Test Reports

Submit the following:

1.4.2.4.1 Material Certifications or Laboratory Test Reports

Include mill tests and all other test data, for portland cement, blended cement, pozzolans, ground granulated blast furnace slag, silica fume, aggregate, admixtures, and curing compound proposed for use on this project.

1.4.2.4.2 Mix Test

Submit reports showing that the mix has been successfully tested to produce concrete with the properties specified and will be suitable for the job conditions. Such tests may include compressive strength, flexural strength, plastic or hardened air content, freeze thaw durability, abrasion and absorption. Clearly detail in the specifications special tests for precast concrete or cast-in items.

1.4.2.4.3 Self-Consolidating Concrete

Submit sufficient documentation, when the use of self-consolidating concrete (SCC) is proposed, showing a minimum of 30-days production track records demonstrating that SCC is appropriate for casting of the product.

1.4.2.4.4 In-Plant QA/QC Inspection Reports

Submit inspection reports upon the request of the Contracting Officer.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

Deliver precast units to the site in accordance with the delivery schedule to avoid excessive build-up of units in storage at the site. Upon delivery to the jobsite, all precast concrete units will be inspected by the Contracting Officer for quality and final acceptance.

1.5.2 Storage

Store units off the ground or in a manner that minimizes potential damage.

1.5.3 Handling

Handle, transport, and store products in a manner to minimize damage. Lifting devices or holes must be consistent with industry standards. Perform lifting with methods or devices intended for this purpose as indicated on shop drawings.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Furnish precast concrete units designed and fabricated by an experienced and acceptable precast concrete manufacturer who has been, for at least three years, regularly and continuously engaged in the manufacture of

precast concrete work similar to that indicated on the drawings. Coordinate precast work with the work of other trades. Below grade structures must comply with ASTM C858.

2.1.1 Standard Precast Units

Design standard precast concrete units to withstand indicated design load conditions in accordance with applicable industry design standards ACI 318, ASTM C857. Design must also consider stresses induced during handling, shipping and installation as to avoid product cracking or other handling damage. Indicate design loads for precast concrete units on the shop drawings. Submit drawings for standard precast concrete units furnished by the precast concrete producer for approval by the Contracting Officer. These drawings must demonstrate that the applicable industry design standards have been met. Include installation and construction information on shop drawings. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings. Submit cut sheets, for standard precast concrete units, showing conformance to project drawings and requirements, and to applicable industry design standards listed in this specification.

2.1.2 Custom-Made Precast Units

Submit design calculations for custom-made precast units, prepared and sealed by a registered professional engineer, for approval prior to fabrication. Include in the calculations the analysis of units for lifting stresses and the sizing of lifting devices. Submit drawings furnished by the precast concrete producer for approval by the Contracting Officer. Show on these drawings complete design, installation, and construction information in such detail as to enable the Contracting Officer to determine the adequacy of the proposed units for the intended purpose. Include details of steel reinforcement size and placement as well as supporting design calculations, if appropriate. Produce precast concrete units in accordance with the approved drawings.

2.1.3 Proprietary Precast Units

Products manufactured under franchise arrangements must conform to all the requirements specified by the franchiser. Items not included in the franchise specification, but included in this specification, must conform to the requirements in this specification. Submit standard plans or informative literature, for proprietary precast concrete units. Make available supporting calculations and design details upon request. Provide sufficient information as to demonstrate that such products will perform the intended task.

2.1.4 Joints and Sealants

Provide joints and sealants between adjacent units of the type and configuration indicated on shop drawings meeting specified design and performance requirements.

2.1.5 Concrete Mix Design

2.1.5.1 Concrete Mix Proportions

Base selection of proportions for concrete on the methodology presented in ACI 211.1 for normal weight concrete and ACI 211.2 for lightweight

concrete. Develop the concrete proportions using the same type and brand of cement, the same type and brand of pozzolan, the same type and gradation of aggregates, and the same type and brand of admixture that will be used in the manufacture of precast concrete units for the project. Do not use calcium chloride in precast concrete containing reinforcing steel or other embedded metal items. At a minimum of thirty days prior to precast concrete unit manufacturing, the precast concrete producer will submit a mix design and proportions for each strength and type of concrete that will be used. Furnish a complete list of materials, including quantity, type, brand and applicable data sheets for all mix design constituents as well as applicable reference specifications. The use of self-consolidating concrete is permitted, provided that mix design proportions and constituents meet the requirements of this specification.

2.1.5.2 Concrete Strength

Provide precast concrete units with a minimum 28-day compressive strength (f'c) of 4,000 psi.

2.1.5.3 Water-to-Cement Ratio

Where exposed to freezing and thawing, furnish concrete containing entrained air and with a water-cementitious ratio of 0.45 or less. Where not exposed to freezing, but required to have a low permeability, furnish concrete with a water-cementitious ratio of 0.48 or less. Where exposed to deicer salts, brackish water, or seawater, furnish concrete with a water-cementitious ratio of 0.40 or less, for corrosion protection.

2.1.5.4 Air Content

The air content of concrete that will be exposed to freezing conditions must be within the limits given below.

	AIR CONTENT PERCENT	
NOMINAL MAXIMUM AGGREGATE SIZE	EXPOSURE CLASS F1	EXPOSURE CLASSES F2 and F3
3/8 inch	6.0	7.5
1/2 inch	5.5	7.0
3/4 inch	5.0	6.0
1.0 inch	4.5	6.0
1.5 inch	4.5	5.5
Note: For specified compressive strengths greater than 5000 psi, air content may be reduced 1 percent		

2.2 MATERIALS

Except as otherwise specified in the following paragraphs, conform material to Section 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE

2.2.1 Reinforcement

2.2.1.1 Reinforcing Bars

a. Deformed Billet-steel: ASTM A615/A615M

b. Deformed Low-alloy steel: ASTM A706/A706M

2.2.1.2 Reinforcing Wire

a. Plain Wire: ASTM A1064/A1064M

b. Deformed Wire: ASTM A1064/A1064M

2.2.2 Inserts and Embedded Metal

All items embedded in concrete must be of the type required for the intended task, and meet the following standards.

a. Structural Steel Plates, Angles, etc.: ASTM A36/A36M

b. Hot-dipped Galvanized: ASTM A153/A153M

c. Proprietary Items: In accordance with manufacturers published literature

2.2.3 Accessories

Submit proper installation instructions and relevant product data for items including, but not limited to, sealants, gaskets, connectors, steps, cable racks and other items installed before or after delivery.

a. Rubber Gaskets for Circular Concrete Sewer Pipe and Culvert Pipe: ASTM C443.

b. External Sealing Bands for Noncircular Sewer, Storm Drain and Culvert Pipe: ASTM C877.

c. Preformed Flexible Joint Sealants for Concrete Pipe, Manholes, and Manufactured Box Sections: ASTM C990.

d. Elastomeric Joint Sealants: ASTM C920

2.2.4 Pipe Entry Connectors

Pipe entry connectors must conform to ASTM C923 or ASTM C1478.

2.2.5 Grout

Nonshrink Grout must conform to ASTM C1107/C1107M. Cementitious grout must be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method. Provide air entrainment for grout exposed to the weather.

PART 3 EXECUTION

3.1 FABRICATION AND PLACEMENT

Perform fabrication in accordance with NPCA QC Manual or ACPA QPC unless specified otherwise.

3.1.1 Forms

Use forms, for manufacturing precast concrete products, of the type and design consistent with industry standards and practices. They should be capable of consistently providing uniform products and dimensions. Construct forms so that the forces and vibrations to which the forms will be subjected can cause no product damage. Clean forms of concrete build-up after each use. Apply form release agents according to the manufacturers recommendations and do not allow to build up on the form casting surfaces.

3.1.2 Reinforcement

Follow applicable ASTM Standard or ACI 318 for placement and splicing. Fabricate cages of reinforcement either by tying the bars, wires or welded wire reinforcement into rigid assemblies or by welding, where permissible, in accordance with AWS D1.4/D1.4M. Position reinforcing as specified by the design and so that the concrete cover conforms to requirements. The tolerance on concrete cover must be one-third of that specified but not more than 1/2 inch. Provide concrete cover not less than 1/2 inch. Take positive means to assure that the reinforcement does not move significantly during the casting operations.

3.1.3 Embedded Items

Position embedded items at locations specified in the design documents. Perform welding in accordance with AWS D1.1/D1.1M when necessary. Hold rigidly in place inserts, plates, weldments, lifting devices and other items to be imbedded in precast concrete products so that they do not move significantly during casting operations. Submit product data sheets and proper installation instruction for anchors, lifting inserts and other devices. Clearly indicate the products dimensions and safe working load.

3.1.4 Synthetic Fiber Reinforced Concrete

Add fiber reinforcement to the concrete mix at the batch plant in accordance with the applicable sections of ASTM C1116/C1116M and the recommendations of the manufacturer. Use a minimum of 1.5 pounds of fibers per cubic yard of concrete.

3.2 CONCRETE

3.2.1 Concrete Mixing

Mixing operations must produce batch-to-batch uniformity of strength, consistency, and appearance.

3.2.2 Concrete Placing

Deposit concrete into forms as near to its final location as practical. Keep the free fall of the concrete to a minimum. Consolidate concrete in such a manner that segregation of the concrete is minimized and

honeycombed areas are kept to a minimum. Use vibrators to consolidate concrete with frequencies and amplitudes sufficient to produce well consolidated concrete.

3.2.2.1 Cold Weather Concreting

Perform cold weather concreting in accordance with ACI 306.1.

a. Provide adequate equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather.

b. All concrete materials, reinforcement, forms, fillers, and ground with which concrete is to come in contact must be free from frost.

c. Do not use frozen materials or materials containing ice.

d. In cold weather the temperature of concrete at the time of placing must not be below 45 degrees F. Discard concrete that freezes before its compressive strength reaches 500 psi.

3.2.2.2 Hot Weather Concreting

Follow recommendations for hot weather concreting in ACI 305R. During hot weather, give proper attention to constituents, production methods, handling, placing, protection, and curing to prevent excessive concrete temperatures or water evaporation that could impair required strength or serviceability of the member or structure. The temperature of concrete at the time of placing must not exceed 90 degrees F.

3.2.3 Concrete Curing

Commence curing immediately following the initial set and completion of surface finishing.

3.2.3.1 Curing by Moisture Retention

Prevent moisture evaporation from exposed surfaces until adequate strength for stripping is reached by one of the following methods:

a. Cover with polyethylene sheets a minimum of 6 mils thick in accordance with ASTM C171.

b. Cover with burlap or other absorptive material and keep continually moist.

c. Use a membrane-curing compound, conforming to ASTM C309 and applied at a rate not less than 200 square ft/gallon, or in accordance with manufacturers' recommendations.

3.2.3.2 Curing with Heat and Moisture

Do not subject concrete to steam or hot air until after the concrete has attained its initial set. Apply steam, if used, within a suitable enclosure, which permits free circulation of the steam in accordance with CSA A23.4. If hot air is used for curing, take precautions to prevent moisture loss from the concrete. The temperature of the concrete must not be permitted to exceed 150 degrees F. These requirements do not apply to products cured with steam under pressure in an autoclave.

3.2.4 Surface Finish

Finish unformed surfaces of wet-cast precast concrete products as specified. If no finishing procedure is specified, finish such surfaces using a strike-off to level the concrete with the top of the form.

3.2.4.1 Formed Non-Architectural Surfaces

Cast surfaces against approved forms following industry practices in cleaning forms, designing concrete mixes, placing and curing concrete. Normal color variations, form joint marks, small surface holes caused by air bubbles, and minor chips and spalls will be accepted but no major imperfections, honeycombs or other major defects will be permitted.

3.2.4.2 Unformed Surfaces

Finish unformed surfaces with a vibrating screed, or by hand with a float. Normal color variations, minor indentations, minor chips and spalls will be accepted. Major imperfections, honeycombs, or other major defects are not permitted.

3.2.4.3 Special Finishes

Troweled, broom or other finishes must be according to the requirements of project documents and performed in accordance with industry standards or supplier specifications. Submit finishes for approval when required by the project documents. The sample finishes must be approved prior to the start of production.

3.2.5 Stripping Products from Forms

Do not remove products from the forms until the concrete reaches the compressive strength for stripping required by the design. If no such requirement exists, products may be removed from the forms after the final set of concrete provided that stripping damage is minimal.

3.2.6 Patching and Repair

No repair is required to formed surfaces that are relatively free of air voids and honeycombed areas, unless the surfaces are required by the design to be finished.

3.2.6.1 Repairing Minor Defects

Defects that will not impair the functional use or expected life of a precast concrete product may be repaired by any method that does not impair the product.

3.2.6.2 Repairing Honeycombed Areas

When honeycombed areas are to be repaired, remove all loose material and cut back the areas into essentially horizontal or vertical planes to a depth at which coarse aggregate particles break under chipping rather than being dislodged. Use proprietary repair materials in accordance with the manufacturer's instructions. If a proprietary repair material is not used, saturate the area with water. Immediately prior to repair, the area should be damp, but free of excess water. Apply a cement-sand grout or an approved bonding agent to the chipped surfaces, followed immediately by consolidating an appropriate repair material into the cavity.

3.2.6.3 Repairing Major Defects

Evaluate, by qualified personnel, defects in precast concrete products which impair the functional use or the expected life of products to determine if repairs are feasible and, if so, to establish the repair procedure.

3.2.7 Shipping Products

Do not ship products until they are at least five days old, unless it can be shown that the concrete strength has reached at least 75 percent of the specified 28-day strength, or that damage will not result, impairing the performance of the product.

3.3 INSTALLATION

3.3.1 Site Access

It is the Contractor's responsibility to provide adequate access to the site to facilitate hauling, storage and proper handling of the precast concrete products.

3.3.2 General Requirements

a. Install precast concrete products to the lines and grades shown in the contract documents or otherwise specified.

b. Lift products by suitable lifting devices at points provided by the precast concrete producer.

c. Install products in accordance with the precast concrete producer's instructions. In the absence of such instructions, install underground utility structures in accordance with ASTM C891. Install pipe and manhole sections in accordance with the procedures outlined by the American Concrete Pipe Association.

d. Field modifications to the product will relieve the precast producer of liability even if such modifications result in the failure of the product.

3.3.3 Water Tightness

Where water tightness is a necessary performance characteristic of the precast concrete product's end use, watertight joints, connectors and inserts should be used to ensure the integrity of the entire system. Water tightness testing to be performed where the collector pipe connects to the manhole and at the base of the manhole.

3.4 FIELD QUALITY CONTROL

3.4.1 Site Tests

When water tightness testing is required for an underground product, use one of the following methods:

3.4.2 Vacuum Testing

Prior to backfill vacuum test system according to ASTM C1244.

3.4.3 Water Testing

Perform water testing according to the contract documents and precast concrete producer's recommendations.

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DIVISION 31 - EARTHWORK

SECTION 31 00 00

EARTHWORK

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SECTION 31 00 00

EARTHWORK

PART 1 GENERAL

The work covered by this section consists of furnishing all plant, labor, equipment and materials and performing all operations necessary for clearing and grubbing, stripping, trench excavation, excavation, placement and compaction of trench backfill and fill, and all other earthwork incidental to the placement of channel fill, drainage ditch modifications, and storm drainage pipe extensions as specified herein, as shown on the drawings or as otherwise directed by the Contracting Officer. This specification also includes earthwork related to haul road reconstruction; restoration of staging, parking, and stockpile areas; and minor grading work.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A798/A798M	(2017) Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D1140	(2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4318	(2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials comprise any materials classified by ASTM D2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC, CL, ML, CL-ML, and CH. Satisfactory materials for earthwork are comprised of stones less than 3 inches, except for fill material for pavements which comprise stones less than 3 inches in any dimension.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; existing left abutment relief well collector system filter aggregate and bedding; material classified as satisfactory which contains material contaminated from hazardous, toxic, biological or radiological substances, and material classified as satisfactory which contains root and other organic matter or frozen material, or stones larger than 3 inches. Notify the Contracting Officer when encountering any contaminated materials.

1.2.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C136/C136M and ASTM D1140.

1.2.4 Clearing and Grubbing

Clearing shall consist of the removal and satisfactory disposal of all unwanted vegetation/sod, snags, slash, brush, garbage, trash, debris, and other items occurring in all areas of earthwork and designated staging, parking and stockpile areas.

1.2.5 Classification of Excavation

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.2.6 Stripping/Topsoil

Stripping shall consist of the removal of topsoil from all excavation areas and stockpiled for later use as topsoil. Topsoil must be as specified in 32 92 19 SEEDING AND EROSION CONTROL.

1.2.7 Filter Sand and Filter Sand Bedding

Filter sand and filter sand bedding material used in these specifications is defined as the cohesionless fill placed as bedding, backfill, and fill for storm drain pipe extensions, drainage ditch modifications, and the relief well channel fill area.

1.2.8 Impervious Fill

Impervious fill used in these specifications is defined as satisfactory

cohesive material placed in fill areas above existing grade for the storm drain pipe extensions, drainage ditch modifications, and relief well channel fill area.

1.2.9 Degree of Compaction

Degree of compaction for impervious backfill and fill, random backfill and fill, and filter sand and filter sand bedding shall be expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D698.

1.2.10 Unstable Material

Unstable material shall consist of materials too wet to properly support the storm drainage pipe extensions, relief well collector pipe in the channel fill area, or appurtenant structures.

1.3 SUBSURFACE INFORMATION

Subsurface soil boring logs, instrumentation logs, and laboratory testing are included under separate cover in the USACE Geotechnical Data Report. Subsoil investigation reports included as part of the Data Report and samples of materials taken from subsurface investigations may be examined at the Omaha District Office. Drawings labeled "For Information Only" provide the best available as-built and sub-surface information; however, variations may exist in the actual conditions. Immediately notify the COR if the actual conditions encountered in the field vary significantly enough to impact the approved construction procedures or design assumptions. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

1.4 HAUL ROADS

The contractor must coordinate load limits with Fort Thompson, Buffalo County, and Lyman County, and any other local state, or federal entities, as required to prevent damage to existing public roads available to the Contractor. The location of haul roads between the quarry, borrow sites, and the work area must be identified in the Project Work Plan.

1.5 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Project Work Plan; G, DO

Submit a written work plan a minimum of 60 days prior to start of construction. Approval of the plan shall be obtained from the Contracting Officer prior to starting the work. If necessary, the plan shall be modified as required to meet field conditions, and the modifications shall be approved prior to implementation. As a

minimum, the plan shall contain the following:

a. Proposed methods for preventing interference with, or damage to, existing underground or overhead utility lines, manholes, relief wells, relief well casing outfalls, piezometers, surface drainage pipes, dam safety instrumentation, and other man-made facilities or natural features designated to remain within or adjacent to the construction area.

b. A stockpiling plan including proposed stockpile locations, estimated limits, and provisions to protect stockpiled material from contamination and surface runoff erosion.

c. A complete listing of equipment used for excavation, placement, spreading, compaction, moisture conditioning, and transportation of materials including asphalt road removal and replacement.

d. Proposed schedule of work. Specifically, the schedule must include mandatory tasks (such as the geotechnical field investigation) and anticipated dates of each stage of work including (but not limited to) dewatering system installation, commencement of demolition, excavation, pipe and storm drain placement, manhole/casing and casing outfall installation, and relief well and piezometer abandonment.

e. The proposed sequence of work for each stage of construction, specifically the installation of any required dewatering system; demolition; excavation and placement of the filter sand material and coarse aggregate material; placement and connection of the HDPE slotted drain for the toe drain and relief well collector pipe; removal of existing manhole; relief well abandonment, and relief well outfall connections. See section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM for additional excavation and backfilling sequence limitations.

f. Construction site plan detailing the proposed location of all the haul roads within the project limits; and between the quarry and borrow site(s) and the project work area; Identify areas which may have to be graveled to prevent the tracking of mud, including construction entrances and areas intersecting public travel, and other information required to demonstrate compliance with the requirements in paragraph 3.1 HAUL ROADS. Show locations of project safety fencing, construction fencing, security fencing and details for installation, site trailers, construction entrances, trash dumpsters, temporary sanitary facilities, and worker parking areas. Unless otherwise directed, limit the staging and stockpile areas to the area indicated on the contract drawings.

g. Name, address, and qualifications of the USACE validated commercial testing laboratory or the Contractor's validated testing facility that will perform the soil testing and inspection. See Section 01 45 00.00 10 QUALITY CONTROL.

h. Erosion control plan for controlling erosion from surface runoff at the work area, stockpile area, designated staging areas, and contractor employee parking area.

i. Personnel responsible for the daily monitoring, recording, and report submission of the dewatering monitoring data as identified

in the Dewatering Plan (see 33 26 00 DEWATERING). Methods and instruments to be used to monitor the dewatering system must also be included.

j. Proposed limits of asphalt road removal.

Pre-Construction Haul Route Survey; G, AO

SD-03 Product Data

Utilization of Excavated Materials; G, AO

Opening of any Excavation or Borrow Pit; G, RO

Compaction Equipment; G, RO

SD-06 Test Reports

Testing; G, DO

Borrow Site Testing; G, DO

Within 24 hours of conclusion of physical tests, submit 2 copies of test results, including calibration curves and results of calibration tests.

SD-07 Certificates

Testing; G, DO

SD-11 Closeout Submittals

Post-Construction Haul Route Survey; G, AO

1.6 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Impervious Fill

Impervious fill must conform to requirements in Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

2.1.2 Filter Sand and Filter Sand Bedding Material

Filter sand and filter sand bedding must conform to requirements in 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

2.1.3 Offsite Impervious Borrow

Offsite impervious borrow must conform to requirements in 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

PART 3 EXECUTION

3.1 HAUL ROADS

Locate and construct haul roads as indicated within the work area boundaries shown on the project drawings and approved by the Contracting Officer. Prior to the start of construction, perform a Pre-Construction Haul Route Survey consisting of a centerline profile surveys and photographs showing pre-construction conditions of all haul roads. Haul roads must be constructed to maintain the intended traffic, be free draining, and be maintained in good condition throughout the contract period. Any haul road which crosses any creek or drainage channel must be constructed and maintained so as to not flood either upstream areas by restricting stream flows or flood downstream areas by the release of any stored water in the event that the crossing fails for any cause. All haul roads within the right-of-way that will remain as public thoroughfares must be cleaned daily and maintained to their preconstruction condition. Following substantial completion, removed haul roads constructed during the contract and restore impacted areas to their pre-construction conditions, with the exception of any improvements to the access haul road between the Spillway Dike Access Road and relief well channel which must remain following completion. After returning disturbed areas to pre-construction grade lines, perform a Post-Construction Haul Route Survey to verify tolerances.

3.2 DRAINAGE AND DEWATERING

3.2.1 Care of Surface Water

Provide for the collection and disposal of surface water encountered during construction in accordance with Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.2.2 Dewatering

Groundwater flowing toward or into excavations must be controlled as specified in Section 33 26 00 DEWATERING to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. The contractor must follow the approved Emergency Contingency Plan (ECP) outlined in Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM. All scenarios in the ECP requiring emergency backfilling must be performed in accordance with the Emergency Backfill Plan.

3.3 UTILITIES

Movement of construction machinery and equipment over pipes, underground utilities, and overhead utilities during construction shall be at the Contractor's risk. Perform work adjacent to non-Government utilities as indicated in accordance with procedures outlined by utility company. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

3.3.1 Underground Utilities

The location of the existing utilities indicated is approximate. The Contractor must physically verify the location and elevation of the existing utilities indicated prior to starting construction. The

Contractor must contact the Contracting Officer for assistance in locating existing Government utilities.

3.3.2 Overhead Utilities

The Contractor must protect overhead power lines and power poles while operating machinery and performing excavations. Should de-energizing of overhead utilities be necessary to perform work, coordination must be made with the COR and owner of the utility at no additional cost to the Government. Refer to Section 01 12 00 CONSTRUCTION GENERAL regarding coordination of outages.

3.4 CLEARING, GRUBBING, AND STRIPPING

Clear sod and unwanted vegetation in areas to be excavated and graded and strip topsoil to a depth of 6 inches or deeper as directed. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 1 inch in diameter, and other materials that would interfere with planting and maintenance operations. Stockpile in locations indicated on the project drawings. Any surplus of topsoil from excavations and grading must be stockpiled. Place topsoil according to 32 92 19 SEEDING AND EROSION CONTROL. Material unsuitable for topsoil (includes sod removed during clearing) will be removed off-site by the Contractor. Where sufficient existing topsoil conforming to the material requirements is not available on site, provide borrow materials suitable for use as topsoil as required per 32 92 19 SEEDING AND EROSION CONTROL. Protect topsoil and keep in segregated piles until needed.

Immediately prior to backfilling operations in the relief well channel, clear vegetation from above water portions of the relief well channel banks in areas to receive fill material. Clearing must be performed only to the depth necessary to remove the vegetative cover. Vegetation growing within/through the water in the relief well channels must be cut down to the water surface elevation. Vegetation removed during the clearing operation must be removed from the site by the Contractor.

3.4.1 Geosynthetic Mat with Gravel

An anchored geosynthetic mat with gravel is present on the slopes of the relief well channel as shown on the contract drawings. Installation of the relief well RW-66R and RW-66A casing outfalls, extension of the relief well collector pipe in the channel fill area, and extension of the RCP storm drain will require localized removal of the mat and gravel. Removal extents must be limited to that required for pipe installation. Care must be taken to not disturb the existing relief well channel gravel, geosynthetic mat, and underlying fine aggregate and/or stabilization riprap in remaining areas.

3.5 EXCAVATION

Excavation incidental to drainage ditch modifications, placement of relief well channel fill, and storm drainage pipe extensions shall be in accordance with Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.5.1 Disposition of Surplus Satisfactory Material

Use satisfactory material removed from excavations, insofar as practicable, for topsoil, fill, or backfill. Do not waste any

satisfactory excavated material without specific written authorization. Stockpile surplus satisfactory material, authorized to be stockpiled, in designated areas approved for surplus material storage or designated waste areas as directed. Stockpile materials as specified in Paragraph 3.10 STOCKPILES. Do not dispose excavated material to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way. All disposal activities must meet Federal, State, and local laws and regulations.

3.5.2 Disposition Of Unsatisfactory and Contaminated Material

Unsatisfactory material or other soils not suitable for filling or backfilling, existing collector pipe system to be demolished (CMP and HDPE), concrete, casings, vegetation, brush, refuse, stumps, roots, and other organic materials stripped as part of site preparation work must be disposed of outside the limits of Government-controlled land at the Contractor's expense, except when otherwise directed in writing by the Contracting Officer. Such directive will state the conditions covering the disposal of such products and will also state the areas in which they may be placed. Written permission to dispose of such products on private property must be filed with the Contracting Officer. Absolutely no burning of debris or refuse is allowed on Government property. No petroleum products, debris or other construction waste products will be allowed to enter the relief well channel or downstream tailwater. All disposal activities must meet Federal, State, and local laws and regulations. Excavated materials impacted by TPH-DRO must be handled according to 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

3.6 BACKFILL AND FILL PLACEMENT AND COMPACTION

Unless otherwise stated below, backfilling and filling for drainage ditch modifications, placement of relief well channel fill, and storm drainage pipe extensions shall be in accordance with Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.6.1 Compaction Equipment

Compaction equipment must meet the requirements of Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.6.2 Filter Sand Bedding for Storm Drainage Pipe

The layer of filter sand bedding on which pipes are to be placed must be to the thicknesses shown on the contract drawings, must be placed at a moisture content that will facilitate compaction, and must be thoroughly compacted with mechanical tampers or rammers. Layers must not exceed 6 inches in compacted depth. Compact filter sand bedding material to 95 percent of the laboratory maximum dry density determined in accordance with ASTM D698.

3.6.2.1 Reinforced Concrete Pipe Bedding for Bell and Spigot Joints

The middle third of the filter sand bedding must be loosely placed. Bell holes and depressions for joints must be removed and formed so entire barrel of pipe is uniformly supported. The bell hole and depressions for the joints must not be more than the length, depth, and width required for properly making the particular type of joint.

3.6.2.2 Corrugated Metal Pipe Bedding

Bedding for corrugated metal pipe and pipe arch must be in accordance with ASTM A798/A798M. It is not required to shape the bedding to the pipe geometry. However, for pipe arches, either shape the bedding to the relatively flat bottom arc or fine grade the foundation to a shallow v-shape.

3.6.3 Impervious Fill

Impervious fill must not be dumped or dropped directly onto the pipe from a height greater than 3 feet. The backfill must be brought up evenly on both sides of the pipe for the full length of the pipe, ensuring impervious fill material is thoroughly compacted under the haunches of the pipe. Compaction equipment or methods that produce horizontal or vertical earth pressures, which may cause excessive displacement or may damage structures, must not be used. Any damaged pipe must be repaired or replaced by the Contractor at no additional cost to the Government.

Impervious fill must be placed in maximum 8-inch loose lifts and compacted to 95 percent maximum density (ASTM D698). In areas where manual compaction is required, place impervious material in maximum 6 inch loose lifts using mechanical hand tampers. Impervious fill must be compacted at moisture contents between -2 to +3% of optimum. Aerate material excessively moistened by rain to a satisfactory moisture content.

3.6.4 Protection of Filter Contamination

Protect filter materials (filter sand and filter sand bedding) from contamination including wind and water borne soils and sediments. Control sloughing of materials from excavated surfaces onto filter materials to prevent contamination. Slope adjacent fills away from the filter materials to prevent contamination from runoff. Protect the filter materials by whatever means and methods necessary, such as grading or berms, when impending precipitation is expected. Prevent soils from adjacent zones from being tracked onto the filter materials. Any filter material whose gradation is altered from that specified herein must be removed and replaced with material conforming to the requirements of the filter material at no additional cost to the government.

3.7 EARTHWORK TOLERANCES

A tolerance of 0.1 feet below or above prescribed grades will be allowed in excavations and fill/backfill areas, provided that any excess material is so distributed to allow for drainage and that there are no abrupt humps or depressions in any surface. The Contractor will provide a topographic survey performed by an independent licensed surveyor in the State of South Dakota to verify and ensure that the lines, grades, profiles and cross sections are within the required tolerance. See section 01 12 00, CONSTRUCTION GENERAL and section 01 78 39.00 24 AS-BUILT DRAWINGS for additional survey requirements.

3.8 SELECTION OF BORROW MATERIAL

Borrow material must meet the requirements and conditions for which it is to be used for backfill or fill. Should additional fill or backfill beyond what is available from excavation be necessary, obtain borrow material from approved off-site private sources. The Contractor is responsible for obtaining the right to procure material, pay royalties and other charges

involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. See Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM for required borrow site testing.

3.9 FINISHING

Finishing operations must meet the requirements of Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.10 STOCKPILES

Stockpiles of satisfactory and wasted materials will be placed and graded as specified. The contractor will include a stockpiling plan in the Project Work Plan detailing the location of stockpiles, method of placement, and protection. Stockpiles will be kept in a neat and well drained condition, giving due consideration to drainage at all times. The ground surface at stockpile locations must be cleared, grubbed, and sealed by rubber-tired equipment. Stockpiles of satisfactory materials will be protected from contamination which may destroy the quality and fitness of the stockpiled material. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material will be removed and replaced with satisfactory material from approved sources at no additional cost to the Government. Satisfactory materials may only be stockpiled in the work area, staging area, or in other areas designated by the Contracting Officer. Materials impacted by TPH-DRO must be stockpiled according to 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

3.11 TESTING

See Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM for fill and backfill testing requirements.

3.11.1 Storm Drainage Pipe Extension Testing

Perform leakage, deflection, and remote camera inspection testing in accordance with Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

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EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM

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SECTION 31 23 00.00 20

EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM

PART 1 GENERAL

The work covered by this section consists of furnishing all plant, labor, equipment and materials and performing all operations necessary for clearing and grubbing, stripping, stockpiling, trench excavation, placement and compaction of trench backfill and fill, and all other earthwork incidental to the construction of the left abutment collector pipe system (toe drain, toe drain outfall, and relief well collector) as specified herein, as shown on the drawings or as otherwise directed by the Contracting Officer. This specification also includes earthwork incidental to removal and replacement of the asphalt road along the new toe drain outfall.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D698	(2012; E 2014; E 2015) Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/cu. ft. (600 kN-m/cu. m.))
ASTM D1140	(2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D2216	(2019) Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4253	(2016; E 2019) Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4254	(2016) Standard Test Methods for Minimum

	Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D4318	(2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4643	(2017) Standard Test Method for Determination of Water Content of Soil and Rock by Microwave Oven Heating
ASTM D6913/D6913M	(2017) Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis
ASTM D6938	(2017a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	(2017) Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926	Safety and Health Regulations for Construction

1.2 DEFINITIONS

1.2.1 Satisfactory Materials

Satisfactory materials comprise any materials classified by ASTM D2487 as GW, GP, GM, GP-GM, GW-GM, GC, GP-GC, GM-GC, SW, SP, SM, SW-SM, SC, SW-SC, SP-SM, SP-SC, CL, ML, CL-ML, and CH. Satisfactory materials for earthwork are comprised of stones less than 3 inches, except for fill material for pavements which comprise of stones less than 3 inches in any dimension.

1.2.2 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; existing left abutment relief well collector system filter aggregate and bedding; material classified as satisfactory which contains material contaminated from hazardous, toxic, biological or radiological substances, and material classified as satisfactory which contains root and other organic matter or frozen material, and stones larger than 3 inches. Notify the Contracting Officer when encountering any contaminated materials.

1.2.3 Cohesionless and Cohesive Materials

Cohesionless materials include materials classified in ASTM D2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C136/C136M and ASTM D1140.

1.2.4 Clearing and Grubbing

Clearing shall consist of the removal and satisfactory disposal of all unwanted vegetation/sod, snags, slash, brush, garbage, trash, debris, and other items occurring in all areas of earthwork and designated staging, parking and stockpile areas.

1.2.5 Classification of Excavation

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

1.2.6 Stripping/Topsoil

Stripping shall consist of the removal of topsoil from all excavation areas and stockpiles for later use as topsoil. Topsoil must be as specified in SECTION 32 92 19 SEEDING AND EROSION CONTROL.

1.2.7 Filter Sand and Filter Sand Bedding

Filter sand and filter sand bedding material used in these specifications is defined as cohesionless fill placed in trench excavations as bedding and backfill for the left abutment collector pipe system.

1.2.8 Coarse Aggregate and Coarse Aggregate Bedding

Coarse aggregate and coarse aggregate bedding material used in these specifications is defined as cohesionless fill placed in trench excavations as bedding and backfill for the left abutment collector pipe system.

1.2.9 Impervious Backfill and Fill

Impervious backfill used in these specifications is defined as satisfactory cohesive material placed in trench excavations as backfill for the left abutment collector pipe system as shown in the contract drawings. Impervious fill used in these specifications is defined as satisfactory cohesive material placed in fill areas above existing grade as shown in the contract drawings.

1.2.10 Random Backfill and Fill

Random backfill used in these specifications is defined as satisfactory cohesive or cohesionless material placed in trench excavations as backfill for the left abutment collector pipe system as shown in the contract drawings. Random fill used in these specifications is defined as satisfactory cohesive or cohesionless material placed in fill areas above existing grade as shown in the contract drawings.

1.2.11 Degree of Compaction

Degree of compaction for impervious backfill and impervious fill, random backfill and random fill, filter sand and filter sand bedding shall be expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D698. Degree of compaction for coarse aggregate and coarse aggregate bedding material shall be expressed as a percentage of relative density in accordance with ASTM D 4253 and ASTM D 4254.

1.2.12 Unstable Material

Unstable material shall consist of materials too wet to properly support the left abutment collector pipe system (toe drain, toe drain outfall, and relief well collector pipe) or appurtenant structures.

1.2.13 Embankment Core Drain

The Big Bend Dam impervious central core is flanked downstream by a pervious section, which provides a drain for the core (herein referred to as the embankment core drain). This pervious drain, coupled with a horizontal drainage blanket, lowers the line of seepage and provides controlled discharge for any seepage through the central core. The gradation of the pervious core drain material is unknown.

1.3 DELIVERY, STORAGE, AND HANDLING

Perform in a manner to prevent contamination or segregation of materials.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Shoring and Sheeting Plan; G, DO

A Shoring and Sheeting Plan must be submitted no more than 60 days after receiving written notice to proceed and prior to the beginning of work. The plan must be prepared by a certified registered professional Geotechnical engineer. Approval of the Shoring and Sheeting Plan must be obtained from the Contracting Officer prior to the start of work. Information to be discussed in the Shoring and Sheeting Plan includes, but is not limited to, the following:

a. Describe protection of the 69 kV West Central Electric Cooperative, Inc. overhead powerline in the vicinity of RW-68 and other overhead electrical lines in the work area.

b. Describe protection of the spillway access road embankment to replace the toe drain outfall pipe.

c. Describe method of protection of toe drain, relief well collector pipe, relief well casing outfalls, and relief well casing excavations.

d. Drawings, calculations, data, and supporting references for shoring and sheeting excavations. Drawings must include material sizes and types, arrangement of members, and the sequence and method of installation and removal

e. Contractor must provide slope stability analysis of the local embankment slopes (downstream dam or spillway access road embankment) excavation trenches for the Shoring and Sheeting design, installation, and operation of the excavation protective devices. All excavations must be sloped to meet OSHA requirements and to ensure trench stability and overall stability of the embankment dam.

Emergency Contingency Plan (ECP); G, DO

A written Emergency Contingency Plan (ECP) must be submitted no more than 45 days after receiving written notice to proceed and prior to the beginning of work. Approval of the ECP must be obtained from the Contracting Officer prior to the start of work. USACE Points of Contact for the Emergency Contingency Plan will be provided after Contract Award. Information to be discussed in the ECP includes, but is not limited to the following:

a. Procedures to monitor the short and long term weather forecast, reservoir (Lake Sharpe) and tailwater (Lake Francis Case) elevations, and identifying any potential weather events that could cause a rise of greater than 1 foot in the tailwater elevation or 1.5 feet of reservoir elevation while there is an open excavation. Regulation forecast information is provided by Northwestern Division Missouri River Basin Water Management and is available online at: https://www.nwd-mr.usace.army.mil/rcc/reports/forecast.html.

b. Delineation of the responsibilities of all involved including contractor, subcontractor, and USACE. The procedures to notify all responsible parties of a potential dam safety emergency must also be included (Contractor will be provided USACE emergency contact list following Contract Award).

c. A list and the location of equipment and materials that are available. As stated in Part 3 EXECUTION, prior to excavation the Contractor must have stockpiled in the staging area(s) a minimum of two times the quantity of filter sand and 1.5 times the coarse aggregate required to backfill the length of open excavation. All pipe, manholes, and appurtenant materials must be onsite prior to the removal of the existing relief well collector pipe system.

At a minimum, the following scenarios must be discussed in the ECP. The discussion must include the actions, resources, and notification procedures that will be undertaken to address a potential dam safety emergency:

1. A significant storm event is predicted within the Missouri River Basin impacting Lake Sharpe, that could raise the reservoir elevation greater than 1421.5 feet with an open excavation of the

embankment or foundation.

2. A significant storm event is predicted within the Missouri River Basin that could raise the Lake Francis Case reservoir to an elevation that could cause water to flow into the relief well channel (above elevation 1364 feet) and impact filling of the relief well channel or excavations in the foundation.

3. A significant quantity of clear seepage (as determined by the COR or the Contractor's Dewatering Engineer) enters the excavation that cannot be controlled by the approved dewatering system. Contractor must stop work and notify the Contracting Officer and Dam Safety for evaluation.

4. A significant quantity of cloudy or muddy seepage (as determined by the COR or the Contractor's Dewatering Engineer) is detected exiting the face, bottom, or side of the trench/excavation or relief well channel. Contractor must stop all work, immediately backfill the excavation with ECP stockpiled materials, and immediately notify the Contracting Officer and Dam Safety.

5. A crack in the embankment or Spillway Access Road is detected around the excavation or other indications of a possible slope failure are observed.

6. Presence of small boil(s) (less than 3 inches in diameter) in the relief well channel or trenches/excavations. The Contractor must stop work and notify the Contracting Officer and Dam Safety for evaluation.

7. Response to an on-site spill of pumped/collected groundwater that contains TPH-DRO. See requirements for spill contingency plan in the Contaminated Media Work Plan submittal, paragraph 1.2.1, Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS.

8. Dewatering system power failure. See requirements for dewatering plan submittal, paragraph 1.1, Section 33 26 00 DEWATERING.

d. Emergency Backfill Plan (paragraph 3.5.4.5). Emergency backfilling initiates when scenarios 2, 3, 4, and 8 are encountered in the field. Backfill according to Paragraph 3.5.4.6 of this Section. This paragraph includes the sequence of activities upon implementing the Emergency Backfill Plan, along with the equipment and materials to be used. In the event emergency backfilling is required, disruption of dewatering system is not permitted.

SD-06 Test Reports

Borrow Site Testing; G, DO

Within 24 hours of conclusion of physical tests, submit 2 copies of test results, including calibration curves and results of calibration tests.

Fill and Backfill; G, DO

Density Tests; G, DO

Moisture Content Tests; G, AO

Material Gradation Tests; G, DO

Copies of all initial laboratory particle size test results for imported materials must be provided to the government prior to commencement of work. Copies of field laboratory particle size test results test reports within 24 hours of the completion of the test.

1.5 CRITERIA FOR BIDDING

Base bids on the following criteria:

a. Surface elevations are as indicated.

b. Shoring, trench box, or sheeting may be used to stabilize excavations for the toe drain, toe drain outfall, relief well collector pipe, and new relief well casing outfalls. Shoring will also be required to stabilize the foundation of the 3-pole 69kV Powerline. All excavations must be sloped to meet OSHA requirements and to ensure trench stability and overall stability of the dam.

c. Subsurface soil information in the areas of work are shown on the "For Information Only" drawings. These drawings represent the best subsurface information available in the area of work; however, variations may exist in the subsurface between boring locations. Boring logs, laboratory test results, initial soils investigation are included in the Geotechnical Data Report under separate cover.

   Groundwater elevations indicated by the boring logs were those existing at the time of the subsurface investigations were made and do not necessarily represent ground water elevations at the time of construction.

d. Material character is indicated by the boring logs, see Geotechnical Data Report under separate cover.

e. Borrow source for impervious backfill and impervious fill is not available on Government property. Additional impervious fill beyond what is excavated from the contract work area must be clean material obtained from off-site sources. Filter sand and coarse aggregate material must be obtained from off-site sources.

f. Blasting will not be permitted; remove material using approved equipment and methods.

1.6 QUALITY ASSURANCE

1.6.1 Shoring and Sheeting Plan

The Contractor is required to hire/retain a professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer is responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer must update the shoring and sheeting plan as construction

progresses to reflect changing conditions and must submit an updated plan if necessary. A written report must be submitted, at least monthly, informing the Contractor and Contracting Officer of the status of the plan and an accounting of the Contractor's adherence to the plan addressing any present or potential problems. The Geotechnical Engineer must be available to meet with the Contracting Officer at any time throughout the contract duration.

1.6.2 Utilities

Movement of construction machinery and equipment over pipes, underground utilities, and overhead utilities during construction shall be at the Contractor's risk. Perform work adjacent to non-Government utilities as indicated in accordance with procedures outlined by utility company. Refer to Specification 01 12 00 CONSTRUCTION GENERAL regarding interruption of Electric Power should work require de-energizing overhead transmission lines that pass through the construction areas. Report damage to utility lines or subsurface construction immediately to the Contracting Officer.

1.7 SUBSURFACE SOIL INFORMATION

Subsurface soil boring logs, instrumentation logs, and laboratory testing are included under separate cover in the USACE Geotechnical Data Report. Subsoil investigation reports included as part of the Data Report and samples of materials taken from subsurface investigations may be examined at the Omaha District Office. Drawings labeled "For Information Only" provide the best available as-built and sub-surface information; however, variations may exist in the actual conditions. Immediately notify the COR if the actual conditions encountered in the field vary significantly enough to impact the approved construction procedures or design assumptions. These data represent the best subsurface information available; however, variations may exist in the subsurface between boring locations.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Impervious Backfill and Fill

Impervious backfill and fill shall consist of satisfactory cohesive soils excavated from the pipe trenches that meet the following criteria. Impervious backfill and fill must have a maximum particle size of 3 inches, a minimum of 50% passing the No. 200 sieve (ASTM D6913/D6913M, ASTM D7928), and a Plasticity Index of 10 or greater in accordance with ASTM D4318. At least 15 days prior to placement, submit soils classification. Additional impervious backfill may be imported from off-site should there be insufficient quantity of satisfactory cohesive material from the on-site excavations.

2.1.2 Random Backfill and Fill

Random backfill and fill must consist of any satisfactory excavated cohesive or cohesionless material not considered topsoil, contaminated soil, or other unsatisfactory materials. This material is to be used for backfilling of replacement relief well casing outfall pipe trenches as shown on the contract drawings.

2.1.3 Filter Sand and Filter Sand Bedding

Filter sand and filter sand bedding must consist of well-graded sand, gravel, or crushed gravel composed of hard, tough, durable particles meeting the gradation limits of ASTM C33 specified in the TABLE I below. The gradation curve must exhibit no abrupt changes in slope denoting skip or gap grading. Filter sand and filter sand bedding must not contain corrosive agents, organic matter, or soft, friable, thin, or elongated particles. Filter sand and filter sand bedding material must be clean and free of foreign materials. Limestone based filter material is not allowed. Filter sand and filter sand bedding material found to be dirty or otherwise contaminated must be removed and replaced with materials meeting the specific requirements, at no additional cost to the Government. A minimum of one initial particle size analysis must be performed prior to hauling to site in accordance with ASTM C136/C136M for each source of material.

TABLE I. FILTER SAND AND FILTER SAND BEDDING GRADATION (ASTM C33 FINE AGGREGATE FOR CONCRETE)

Sieve Size	Percent Passing
3/8 inch	100
No. 4	95 - 100
No. 8	80 - 100
No. 16	50 - 85
No. 30	25 - 60
No. 50	5 - 30
No. 100	0 - 10
No. 200	0 - 2

2.1.4 Coarse Aggregate and Coarse Aggregate Bedding

Coarse aggregate material must be quartzite material consisting of well-graded sand, gravel, crushed gravel, or crushed stone composed of hard, tough and durable particles meeting the gradation limits of ASTM D488 for size No. 89 coarse aggregate specified in TABLE II below. Gradation curves will exhibit no abrupt changes in slope denoting skip or gap grading. The coarse aggregate material must not contain corrosive agents, organic matter, or soft, friable, thin, or elongated particles. Coarse aggregate materials must be clean and free of foreign materials. Coarse aggregate materials found to be dirty or otherwise contaminated must be removed and replaced with material meeting the specific requirements, at no additional cost to the Government. A minimum of one initial particle size analysis must be tested prior to hauling to the site in accordance with ASTM C136/C136M for each source of material.

TABLE II. COARSE AGGREGATE AND COARSE AGGREGATE BEDDING GRADATION (ASTM D488 SIZE NO. 89 COARSE AGGREGATE)

Sieve Size	Percent Passing
1/2 inch	100
3/8 inch	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 50	0-5

2.2 OFFSITE IMPERVIOUS BORROW

Obtain impervious borrow material required in excess of material furnished from excavations from sources outside of Government property. A minimum of one soil classification test (ASTM D2487) per borrow source is required for impervious fill and backfill. Additional tests may be required at the discretion of the Contracting Officer. No borrow material will be hauled to the site until material has been approved by the COR.

PART 3 EXECUTION

3.1 DRAINAGE AND DEWATERING

Provide for the collection and disposal of surface and subsurface water encountered during construction.

3.1.1 Surface Water Sources

Sources of surface water include, but are not limited to, the following:

a. Direct Rainfall

b. Relief Well and Left Abutment Collector Pipe System Discharges

The relief well channel conveys both surface runoff and discharges from 23 relief wells, the left abutment collector pipe system, and herring bone drain system. Relief well discharges in the work area fluctuate seasonally with discharges ranging from 0 to approximately 120 gallons per minute. Pertinent historic relief well flow data near the work area is provided on the "For Information Only" drawings. The Contractor shall be responsible to verify the site conditions including relief well discharges at the time of construction.

c. Ditches and Culverts

d. Tailwater from the Relief Well Channel

Tailwater can be expected to be backed up into the relief well channel as a result of high Lake Francis Case water levels. The extent and elevation of the water depends on the elevation of Lake Francis Case. Lake Francis Case water level normally ranges from approximate elevation 1350 feet Local Project Datum in the fall and winter to as high as 1375 feet Local Project Datum in the spring and summer. The normal high elevation in the spring or summer is approximately

elevation 1358 feet. Historic water level data of Lake Francis Case is presented for information on the drawings. The Contractor shall be responsible to verify the tailwater conditions and take the steps necessary to complete the work as required.

e. Sources Outside of the Construction Area

3.1.2 Care of Surface Water

Full responsibility for the diversion and care of water shall be borne completely by the Contractor. Surface runoff into excavations shall be minimized to the greatest extent possible by use of grading, barriers, stockpiles or other means to prevent erosion and undermining of placed material. Methods and details for care and diversion of water are not detailed on the plans; however, blocking or restricting flow from relief wells is not allowed at any time (excluding installation of relief well casings). Construct storm drainage features at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity or provide temporary ditches, swales, and other drainage features and equipment as required to maintain dry soils and as approved by the COR. When unsuitable working platforms for equipment operation and unsuitable soil support for subsequent construction features develop, remove unsuitable material and provide new soil material as specified herein. It is the responsibility of the Contractor to assess the soil and ground water conditions presented by the plans and specifications and to employ necessary measures to permit construction to proceed. Facilities shall be removed upon completion of the work.

3.1.3 Dewatering

Groundwater flowing toward or into excavations must be controlled as specified in Section 33 26 00 DEWATERING to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. The contractor must follow the approved Emergency Contingency Plan (ECP). All scenarios in the ECP requiring emergency backfilling must be performed in accordance with paragraph 3.5.3.5 Emergency Backfill Plan.

3.2 PROTECTION

The Project Work Plan submittal specified in Section 31 00 00 EARTHWORK must include the Contractor's plan to protect the following features.

3.2.1 Roads

Other than normal traffic, keep all permanent project and public roads well drained and free of mud, debris, materials, and equipment at all times. Pre- and post-construction haul route surveys must be performed in accordance with Section 31 00 00 EARTHWORK. Any damage to roads or appurtenant features will be repaired by the Contractor as directed and approved by the Contracting Officer.

3.2.1.1 Road Closures

As specified in Section 01 12 00 CONSTRUCTION GENERAL, the Spillway Access Road will require temporary closure during installation of the toe drain outfall pipe.

3.2.2 Trench Box, Shoring, and/or Sheeting

In accordance with the approved Shoring and Sheeting Plan, provide shoring, bracing, trench boxes and/or sheeting where required for the protection of existing natural features, man-made features, utilities, pavement, workers, and the public in compliance with EM 385-1-1 and 29 CFR 1926. Remove shoring, bracing, and sheeting as excavations are backfilled, in a manner to prevent caving and disturbance of completed work. In addition to Section 25 A and B of EM 385-1-1 and other requirements set forth in this contract, the shoring and sheeting plan must accomplish the following:

a. Prevent undermining of pavements and utilities adjacent to excavations.

b. Prevent slippage or movement in slopes adjacent to the excavation.

c. A licensed professional Geotechnical Engineer (hired/retained by the Contractor) must provide inspection of excavations and soil/groundwater conditions throughout construction. The Geotechnical Engineer is responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer must update the shoring and sheeting plan as construction progresses to reflect changing conditions and must submit an updated plan if necessary. Submit a monthly written report, informing the Contractor and Contracting Officer of the status of the plan and an accounting of the Contractor's adherence to the plan addressing any present or potential problems. The Contracting Officer is responsible for arranging meetings with the Geotechnical Engineer at any time throughout the contract duration.

3.2.3 Underground Utilities

The location of the existing utilities indicated is approximate. The Contractor must physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor must contact the Contracting Officer for assistance in locating existing Government utilities.

3.2.4 Overhead Utilities

The Contractor must protect overhead power lines and power poles while operating machinery and performing excavations. Should de-energizing of overhead utilities be necessary to perform work, coordination must be made with the COR and owner of the utility at no additional cost to the Government. Refer to Section 01 12 00 CONSTRUCTION GENERAL regarding coordination of outages.

3.2.5 Instrumentation

Project instrumentation devices not scheduled for abandonment or replacement must be protected from damage at all times. Instrumentation devices consist of piezometers, relief wells, relief well outfalls, riser pipes, and herring bone drains and risers as shown in the contract drawings. No heavy equipment or vehicle traffic is permitted on the herring bone drainage area. The Contracting Officer will coordinate with Contractor to properly mark for protection existing dam safety instrumentation within the work area and near haul roads. The Contractor will submit in the Project Work Plan proposed method of protection of the instrumentation as specified in SECTION 31 00 00 EARTHWORK. Notify the Contracting Officer immediately of damage to instrumentation. The

Contractor will be responsible for necessary repairs to existing instrumentation that are indicated or made known to the Contractor prior to the start of operations.

3.2.6 Protection of Filter Contamination

Protect filter materials (filter sand, filter sand bedding, coarse aggregate, coarse aggregate bedding, and embankment core drain) from contamination including wind and water borne soils and sediments. Control sloughing of materials from excavated surfaces onto filter materials to prevent contamination. Slope adjacent fills away from the filter materials to prevent contamination from runoff. Protect the filter materials by whatever means and methods necessary, such as grading or berms, when impending precipitation is expected. Prevent soils from adjacent zones from being tracked onto the filter materials. Any filter material whose gradation is altered from that specified herein must be removed and replaced with material conforming to the requirements of the filter material at no additional cost to the government.

3.3 CLEARING, GRUBBING AND STRIPPING

Perform clearing, grubbing, and stripping in accordance with Section 31 00 00 EARTHWORK.

3.4 EXCAVATION

Excavate to the contours, elevations, and dimensions indicated. Reuse excavated materials that are satisfactory and meet the specified requirements for the material types required for backfill or fill (i.e. random and impervious backfill and fill materials). Keep excavations free from water. Excavate soil disturbed or weakened by Contractor's operations as well as soils softened or made unsuitable for subsequent construction due to exposure to weather. Excavations below indicated depths will not be permitted except to remove unsatisfactory material. Determination of elevations and measurements of approved overdepth excavation of unsatisfactory material below grades indicated must be done under the direction of the Contracting Officer. Unless specified otherwise, backfill excavations cut below design depth with filter sand bedding and compact to 95 percent of ASTM D698 maximum density. Satisfactory material removed below the depths indicated, without specific direction of the Contracting Officer, must be replaced with satisfactory materials to the indicated excavation grade at no additional cost to the Government.

3.4.1 Limitations of Excavation

Excavations for pipe removal and/or replacement will be limited to a maximum 100 foot length at a time. In addition, the toe drain, toe drain outfall, and relief well collector pipe trench excavations are not permitted to be open at the same time. Before beginning excavation, the Contractor must have stockpiled filter sand with a minimum of two times the quantity of the length of open excavation and 1.5 times the coarse aggregate material in the staging area(s) shown on the contract drawings. Trenches must be substantially backfilled (as approved by the Contracting Officer) with filter sand at the end of each work day.

3.4.2 Excavation of Contaminated Soils

The contractor will utilize observation methods to identify potential contamination or unsatisfactory material. If contaminants are observed,

odors are encountered, visible shinning/oily sheens are perceived, or any other suspicion are recognized, the material must be considered not satisfactory. The Contractor will notify the Contracting Officer of any contaminated material and provide stockpile, testing, and disposal according to Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

3.4.3 Sequencing of Excavation

Excavations can be performed once the dewatering criteria have been met, written notice provided by the Contractor's dewatering engineer, required stockpiled materials are on site, required pre-construction submittals have been reviewed and approved, tailwater is below elevation 1362 feet, and approval to proceed provided by the Contracting Officer in writing. No excavation will be permitted in the work areas from relief well collector stations 6+00 to 9+52 (including installation and abandonment of casing outfalls for relief wells 66A, 66AR, 66, 66R, 67, and 67R) until the Geotechnical Investigation Drilling Program Plan and Report (see 02 32 13 SUBSURFACE DRILLING AND SAMPLING) and the Contaminated Media Plan (see 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL) have been reviewed and approved by the Government.

3.4.4 Pipe Trenches

The trench must be excavated to the lines and grades indicated on the contract drawings. Vertical trench walls more than 4 feet high must be shored, braced, or have sheeting installed in accordance with the approved Shoring and Sheeting Plan and EM 385-1-1 to provide equivalent means of protection for employees exposed to moving ground or cave in. Grade bottom of trenches to provide uniform support for each section of pipe after pipe bedding placement. Tamp if necessary to provide a firm pipe bed.

3.4.4.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Remove stones of 2 inch or greater in any dimension, or as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing. Tamp if necessary to provide a firm base for bedding material.

3.4.4.2 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting left abutment collector pipe system (toe drain, toe drain outfall, and relief well collector pipe) or appurtenant structures is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced as approved by the COR to the required grade in accordance with paragraph PLACEMENT AND COMPACTION. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Government.

3.4.4.3 Excavation for Appurtenances

Provide excavation for manholes or similar structures sufficient to leave at least 2 feet clear between the outer structure surfaces and the face of the excavation or support members. Clean rock or loose debris and cut to

a firm surface either level, stepped, or serrated, as shown or as directed. Remove loose disintegrated rock and thin strata. When concrete or masonry is to be placed in an excavated area, take special care not to disturb the bottom of the excavation. Do not excavate to the final grade level until just before the concrete or masonry is to be placed.

3.4.4.4 Embankment Core Drain

During excavation for the toe drain pipe, the Contractor must field verify the elevation and thickness of the embankment core drain in the presence of the Contracting Officer. The core drain must be sufficiently exposed to establish continuous contact between the core drain and toe drain filter sand.

3.4.5 Excavated Materials

Satisfactory excavated material required for topsoil, fill, or backfill must be placed in the proper section of the permanent work required or must be separately stockpiled if it cannot be readily placed. Stockpile materials as indicated in section 31 00 00 EARTHWORK. Satisfactory material in excess of that required for the permanent work must be disposed of as specified in Paragraph DISPOSITION OF SURPLUS SATISFACTORY MATERIAL. Excavated unsatisfactory material must be disposed of according to Paragraph DISPOSAL OF UNSATISFACTORY MATERIALS. Excavated materials impacted by TPH-DRO must be handled according to 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

3.5 BACKFILL AND FILL PLACEMENT AND COMPACTION

3.5.1 Compaction Equipment

All compaction equipment must be approved, conform to the following requirements, and be used as prescribed in this section. Approval will be based on written verification of equipment characteristics, manufacturer's specification/catalog cuts, and continued performance during construction. The Contractor may request to substitute other equipment requiring approval by the Contracting Officer. Maintain sufficient equipment on site to ensure continuous compaction operations.

Compaction of material in areas where it is impracticable to use a roller or tractor compaction must be performed by the use of approved hand operated power compactors such as power tampers or vibratory plate compactors.

3.5.1.1 Vibratory Smooth Drum Rollers

Use vibratory smooth drum rollers for compacting cohesionless backfill and fill. Vibratory smooth drum rollers must be equipped with a heavy duty smooth steel compaction drum and be operated at a frequency of vibration during compaction operations between 1100 and 1900 vibrations per minute (vpm). The minimum drum diameter must be 5 feet and the minimum drum length must be 6 feet. Vibratory smooth drum rollers must be self propelled and have an unsprung drum weight that is a minimum of 60 percent of the roller's static weight. Rollers must have a minimum static weight of 20,000 pounds, a minimum static weight of the drum of 12,000 lbs, a minimum dynamic force of 40,000 pounds when operating at 1100 to 1900 vpm, and an applied force not less than 5,000 pounds nor greater than 9,000 pounds per foot of compaction drum length. Rollers are not permitted within 2 feet of installed pipe or 3 feet of manholes or relief well

casings.

Set the level of amplitude and vibration frequency at high during compaction and maintain uniform compactive effort and machine settings. Operators must not turn down, or turn off the amplitude or frequency unless directed. Operate rollers at speeds not to exceed 1.5 mph. Furnish equipment manufacturer data, drawings, and computation for verification of the above specifications. The character and efficiency of this equipment is subject to approval. Make the frequency and amplitude settings clearly visible for the Contracting Officer.

3.5.1.2 Tamping Rollers

Use tamping rollers for compacting cohesive backfill and fill. Types of tamping rollers may include:

a. Towed: Tamping rollers must consist of two or more non-vibratory roller drums mounted by side-by-side in a suitable frame and towed by either a crawler-type or rubber tired tractor having sufficient power to pull the roller satisfactorily when the drums are fully ballasted. Each drum must be free to pivot about an axis parallel to the direction of travel. Roller operated in tandem sets must be controlled in a manner such that the prints produced by the tamping feet of the tandem units are staggered. Each drum of a roller must have an outside diameter or not less than 5 feet and must not be less than 5 feet in length. The space between two adjacent drums, when on a level surface, must not be less than 12 inches nor more than 15 inches. At least one tamping foot must be provided for each 2 square feet of drum surface. The length of each tamping foot from the outside surface of the drum must be not more than 11 inches and must be maintained at not less than 9 inches. The bearing surface of each tamping foot must be flat with a surface area not less than 7 square inches nor more than 10 inches. During operation of rolling, the spaces between the tamping feet must be maintained clear of materials which would impair the effectiveness of the tampering rollers. The weight of drum length, and the weight of a roller empty must be not less than 4,000 pounds per foot of drum length, and the weight of a roller empty must be not more than 2,500 pounds per foot of drum length. The bearing surface, tamping foot size, the drum loading, and operation of the roller must be as required to obtain the desired compaction. If more than one roller is used on any one layer of random backfill or impervious fill, all rollers so used must be of the same type and essentially of the same dimensions. Rollers must be drawn by crawler-type or rubber tired tractors at a speed not to exceed 5.0 miles per hour (mph). The use of rubber towing equipment must be discontinued if the tired leave ruts that prevent uniform compaction by the tamping roller, and the substitution of crawler-type towing equipment may be directed.

b. Self-propelled: The use of self-propelled non-vibratory tamping rollers conforming with the following specification will be permitted, and their design and operation shall be subject to approval, and subject to the right, at any time during the prosecution of the work, to direct such modifications to the tamping feet or variations in roller drum weight where applicable, as may be found necessary to secure optimum compaction of cohesive backfill and fill. If use of self-propelled tamping rollers causes shearing, laminations, or inadequate compaction of the cohesive backfill and fill the Contracting Officer may direct that such rollers be removed and that appropriate towed tamping rollers be used. Two-or three-drum

side-by-side units that are either in drive position or drawn by separate power equipment must have a clearance between adjacent drums not less than 12 inches nor more than 15 inches. Two-drum or four-drum equipment separated by cab and differential and arranged in tandem must have the tandem drums positioned such that the prints of the tamping feet produced by the tandem drums are staggered. The surface on which the tamping feet are mounted must have a minimum outside diameter of 4 feet and at least one tamping foot for each 2 square feet of drum surface. The distance between the centers of any two adjacent tandem feet must not be less than 9 inches. The length of each tamping foot from the outside mounting surface of the drum must not be more than 11 inches and must be maintained at not less than 9 inches. The bearing surface of each tamping foot must be flat and have a surface are not less than 7 square inches nor more than 14 square inches. Cupped recesses within the bearing surface of each tamping foot will be permitted by must not exceed 0.5 inches in depth. During rolling operation, the spaces between the tamping feet must be maintained clear of materials which would impair the effectiveness of the tamping roller. The weight of all roller drums during compaction must be maintained uniform and with the weight per foot of drum length not less than 4,300 pounds. For self-propelled rollers in which steering is accomplished through the use of rubber-tired wheels, the tire pressure must not exceed 40 psi. The used of compactor must be discontinued if the tires leave ruts that prevent uniform compaction by the tamping rollers and the substitution of appropriate towed tamping rollers may be direction. When a self-propelled roller is provided with a dozer blade, coverage made with the blade operation must not be counted as compaction coverage. Self-propelled rollers must be operated at a speed not to exceed 5.0 mph.

3.5.1.3 Hand Operated Power Tampers

Use special compaction equipment in locations where other compactors specified in this Section cannot operate effectively, and as specified for areas requiring special compaction. Special compaction must be performed in areas where large compaction equipment are not able to access, including the pipe trenches and within 2 feet of pipes and 3 feet of manholes. Use hand operated power tampers, vibratory plate compactors having a minimum static weight of 300 pounds and a minimum dynamic force of 1,000 pounds, or other special compaction equipment acceptable to the COR to obtain the compaction specified.

3.5.1.4 Miscellaneous Equipment

Scarifiers, disks, spring-tooth or spike-tooth harrows, spreaders, and other equipment must be suitable for earthwork construction and approved by the Contracting Officer. Equipment used for blending fill material must be capable of penetrating the full loose lift thickness of the specific material type.

3.5.2 Surface Preparation

3.5.2.1 Unsatisfactory Material

Remove unsatisfactory material defined in paragraph 1.2.2 in trench excavations and areas to receive pavement. Contaminated soils shall be handled in accordance with Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS. Unsatisfactory material encountered below the design grades shown must be removed and replaced with backfill and fill

material as directed by the Contracting Officer.

3.5.2.2 Fill Placement on Existing Grade

If fill is to be placed directly on top of the existing ground surface, loosen the cleared, grubbed, and stripped foundation by scarifying, plowing, discing, or harrowing to a minimum depth of 6 inches and compact the subgrade to the specified density for the adjacent fill prior to fill placement. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material.

3.5.2.3 Replacement of Unstable Material

Unstable material removed from the bottom of the trench or excavation must be replaced with filter sand bedding material placed in layers not exceeding 6 inches loose thickness.

3.5.2.4 Placement on Surfaces Containing Frozen Materials

No fill materials will be placed on a foundation which contains frozen material. This prohibition encompasses all foundation types, including the natural ground, all prepared subgrade, and all layers of previously placed and compacted earth fill which become the foundations for successive layers of earth fill. All material that freezes or has been subjected to freeze-thaw action during the construction work, or during periods of temporary shutdowns, such as, but not limited to nights, holidays, weekends, or winter shutdowns of earthwork operations, must be removed to a depth that is acceptable to the Contracting Officer and replaced with satisfactory material. Alternatively, the material must be thawed, dried, reworked and recompacted to the specified criteria before additional material is placed. The Contracting Officer will determine when placement of fill must cease due to cold weather. The Contracting Officer may elect to use average daily air temperatures, and/or physical observation of the soils for the determination. Filter material must not contain frozen clumps of soil, snow, or ice.

3.5.3 Trench Backfilling

Backfill trenches as rapidly as construction, testing, and acceptance of work permits.

3.5.3.1 Pipe Bedding

3.5.3.1.1 General

Bedding material must be placed and compacted with approved tampers to the grades, elevations, and thickness shown on the drawings. Pipe bedding must be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of pipe, pipe joints, and manholes.

3.5.3.1.2 Filter Sand and Coarse Aggregate Bedding

The layer of filter sand or coarse aggregate bedding on which pipes are to be placed must be to the thicknesses shown on the contract drawings (6-inch or 12-inch), must be placed at a moisture content that will facilitate compaction, and must be thoroughly compacted with mechanical tampers or rammers. Layers must not exceed 6 inches in compacted depth. Compact filter sand bedding material to 95 percent of the laboratory

maximum dry density determined in accordance with ASTM D698. Compact coarse aggregate bedding to at least 75 percent relative density (ASTM D4253and ASTM D4254).

3.5.3.2 Filter Sand and Coarse Aggregate Backfill

Filter sand and coarse aggregate backfill above the bottom of the pipe must be placed and compacted with approved tampers or rammers to the grades, elevations, and thickness shown on the drawings. Filter sand and coarse aggregate must not be dumped or dropped directly onto the pipe from a height greater than 3 feet. The backfill must be brought up evenly on both sides of the pipe for the full length of the pipe, ensuring filter sand and coarse aggregate backfill material is thoroughly compacted under the haunches of the pipe. Compaction equipment or methods that produce horizontal or vertical earth pressures, which may cause excessive displacement or may damage structures, must not be used. Any damaged pipe must be repaired or replaced by the Contractor at no additional cost to the Government.

In areas where manual compaction is required, place filter sand and coarse aggregate in a maximum loose lift thickness of 4 inches at a moisture content that will facilitate compaction. Other compaction equipment may be used beyond 2 feet of pipes and 3 feet of manholes and casings, with loose lifts placed at a maximum of 8 inches. Water must be added to the loose sand lifts immediately prior to compacting. Flooding may be used to achieve required compaction upon approval from the Contracting Officer. Horizontal and vertical surveys must be used continuously during placement to assure and document filter sand construction to the required grades. Compact filter sand with approved equipment to no less than 90 percent of the laboratory maximum dry density (ASTM D698). Compact coarse aggregate using approved equipment to at least 70 percent relative density (ASTM D4253and ASTM D4254). Sand must not be overcompacted to prevent particle breakdown. Should excessive particle breakdown occur (based on field observations and/or testing) resulting in a fines content that exceed s the maximum allowable fines content in ASTM D698, other laboratory test methods may be required to be performed to determine the target density of the filter sand.

3.5.3.3 Random Backfill

Random backfill must not be dumped or dropped directly onto the pipe from a height greater than 3 feet. The backfill must be brought up evenly on both sides of the pipe for the full length of the pipe, ensuring random backfill material is thoroughly compacted under the haunches of the pipe. Compaction equipment or methods that produce horizontal or vertical earth pressures, which may cause excessive displacement or may damage structures, must not be used. Any damaged pipe must be repaired or replaced by the Contractor at no additional cost to the Government.

Random backfill must be placed in maximum 8 inch loose lifts and compacted to 95 percent maximum density (ASTM D698) for all material types. In areas where manual compaction is required, place random backfill in maximum 6 inch loose lifts using mechanical hand tampers. Random fill must be compacted at moisture contents between -2 to +3% of optimum. Aerate material excessively moistened by rain to a satisfactory moisture content.

3.5.3.4 Impervious Backfill

Impervious backfill must be placed in maximum 8-inch loose lifts and compacted to 95 percent maximum density (ASTM D698). In areas where manual compaction is required, place impervious material in maximum 6 inch loose lifts using mechanical hand tampers. Impervious backfill must be compacted at moisture contents between -2 to +3% of optimum. Aerate material excessively moistened by rain to a satisfactory moisture content.

3.5.3.5 Emergency Backfill Plan

In the event emergency backfill is required per the Emergency Contingency Plan (ECP), filter sand will be utilized to immediately backfill open trenches to existing ground surface (note coarse aggregate may also be required for reverse filtering in the event flow rates are sufficient to transport the filter sand). The Contractor shall also immediately notify the Contracting Officer and Dam Safety and await further instructions which may require additional backfilling. During emergency backfilling, there are no lift thickness or compaction criteria/limitations for filter sand and coarse aggregate; the trench should be backfilled as expeditiously as conditions allow.

Emergency backfill placement and operations must not be permitted to disrupt dewatering operations. Do not recommence excavation until approval is received from the Contracting Officer in coordination with the Dam Safety Engineer.

3.5.4 Backfilling of Appurtenances

After new manholes and relief well casings have been constructed, place backfill in such a manner that the structure is not damaged by the shock of falling earth. Deposit the backfill material, compact it as specified for the material type, and bring up the backfill evenly on all sides of the structure to prevent eccentric loading and excessive stress. Hand operated compactors must be used within 3 feet of manholes using a maximum 4-inch loose lift thickness. Beyond 3 feet of the manhole large compaction equipment may be utilized for backfilling, unless otherwise restricted near new pipes.

3.6 EARTHWORK TOLERANCES

A tolerance of 0.1 feet below or above prescribed grades will be allowed in excavations and fill/backfill areas, provided that any excess material is so distributed to allow for drainage and that there are no abrupt humps or depressions in any surface. The Contractor will provide a topographic survey performed by an independent licensed surveyor in the State of South Dakota to verify and ensure that the lines, grades, profiles and cross sections are within the required tolerance. See section 01 12 00, CONSTRUCTION GENERAL and section 01 78 39.00 24 AS-BUILT DRAWINGS for additional survey requirements.

3.7 BORROW

Where satisfactory materials are not available in sufficient quantity from required excavations, approved off-site borrow materials must be obtained as specified in the Section 31 00 00 EARTHWORK.

3.8 TEMPORARY STOCKPILE OF EXCAVATED MATERIALS

Stockpiles of satisfactory excavated materials for topsoil, impervious fill, and random fill, and of wasted materials must be temporarily placed as specified in Sections 31 00 00 EARTHWORK and 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL.

3.9 FINISH OPERATIONS

3.9.1 Grading

Finish grades as indicated on the contract drawings within approved earthwork tolerances. Grade areas to drain water away from structures. Maintain areas free of trash and debris. Finish to a smooth surface by blading, rolling with a smooth roller, or both. For existing grades that will remain but which were disturbed by Contractor's operations, grade as directed.

3.9.2 Topsoil and Seed

In areas to receive topsoil, prepare the subgrade and provide and place topsoil and seed in accordance with Section 32 92 19 SEEDING AND EROSION CONTROL. Seed excavated and disturbed areas as specified in Section 32 92 19 SEEDING.

3.9.3 Protection of Surfaces

Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.10 DISPOSITION OF SURPLUS SATISFACTORY MATERIAL

Satisfactory material not suitable for use will be disposed as described in Section 31 00 00 EARTHWORK.

3.11 DISPOSAL OF UNSATISFACTORY MATERIALS

Disposal of unsatisfactory material will be disposed as described in Section 31 00 00 EARTHWORK and 02 81 00 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.12 FIELD QUALITY CONTROL

3.12.1 Sampling

Take the number and size of samples required to perform the following tests.

3.12.2 Testing

Perform testing by a Corps validated commercial testing laboratory (or the Contractor's validated testing facility, subject to approval of the Contracting Officer or Contracting Officer's Representative). Submit copies of field test results within 24 hours after the tests are performed. Submit qualifications of the USACE validated commercial testing laboratory or the Contractor's validated testing facilities. If the Contractor elects to establish testing facilities, work requiring testing will not be permitted until the Contractor's facilities have been

inspected, Corps validated and approved by the Contracting Officer. The Contracting Officer must approve onsite testing facilities to confirm the laboratory equipment is calibrated and the ASTM procedures are correctly followed.

a. Determine field in-place density in accordance with ASTM D1556/D1556M, ASTM D2167 or ASTM D6938. When ASTM D6938 is used, check the calibration curves and adjust using only the sand cone method as described in ASTM D1556/D1556M. ASTM D6938 results in a wet unit weight of soil in determining the moisture content of the soil when using this method.

b. Check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D6938; check the calibration of both the density and moisture gauges per ASTM D2216 at the beginning of a job on each different type of material encountered and at intervals as directed by the Contracting Officer. Perform oven dry moisture testing ASTM D4643 to check gauge moisture and to use to adjust gauge moisture. For ASTM D2937, use the Drive Cylinder Method only for soft, fine-grained, cohesive soils.

    a. Submit certified copies of test results for approval not less than 30 days before material is required for work.

    b. Submit calibration Curves and related test results prior to using the device or equipment being calibrated.

c. When test results indicate, as determined by the Contracting Officer, that compaction is not as specified, remove the material, replace and recompact to meet specification requirements. Perform tests on recompacted areas to determine conformance with specification requirements. Appoint a registered professional civil engineer to certify inspections and test results. These certifications must state that the tests and observations were performed by or under the direct supervision of the engineer and that the results are representative of the materials or conditions being certified by the tests. The following number of tests, if performed at the appropriate time, will be the minimum acceptable for each type of operation.

3.12.2.1 Gradation

Conduct the following fill and backfill testing in accordance with ASTM C136/C136M and ASTM D1140 for filter sand and coarse aggregate, and ASTM D6913/D6913M and ASTM D7928 for random and impervious fill.

a. Random fill and backfill; impervious fill and backfill:

    1. Verification for imported random or impervious fill and backfill materials must be tested prior to hauling to the project site or work area. Initial particle size test results for imported material must be provided to the government prior to commencement of work.

    2. One test per 200 cubic yards of satisfactory material stockpiled or in-place source material.

b. Filter sand and coarse aggregate:

    1. Verification tests prior to hauling to the site. Initial

particle size test results must be provided to the government prior to commencement of work.

2. One mechanical analysis per 50 tons of coarse aggregate material and 500 tons of filter sand material hauled to the project site must be performed, or any noticeable change in material as directed by the COR.

3. One gradation test each for filter sand and coarse aggregate material collected from in-place filter after compaction for every 100 lineal feet of pipe backfilled.

3.12.2.2 Soil Classification

A minimum of one soil classification (ASTM D2487) including Atterberg Limits (ASTM D4318) must be performed on each different type of fill and backfill material used per day.

3.12.2.3 Moisture-Density Determinations

Tests for determination of maximum dry density and optimum moisture shall be performed by the Contractor in accordance with ASTM D 698. Samples shall be representative of the materials to be placed. A moisture-density curve shall be obtained for each principal type of material or combination of materials encountered or utilized. One moisture-density curve shall be submitted from a representative sample for every 500 cubic yards of material used (or change in material) including filter sand, coarse aggregate, random fill, and impervious fill. Results of these tests shall be the basis of control for compaction where these materials are used. The above testing shall include Atterberg limits (ASTM D 4318), grain size determinations (ASTM D 422), specific gravity (ASTM D 854), insitu moisture content (ASTM D 2216), and soil classification (ASTM D 2487). A copy of these tests shall be furnished to the Contracting Officer prior to placement of these fill materials.

3.12.2.4 Field Density Control

Perform a minimum of one field density test per lift for every 100 feet of installation. Perform an ASTM D1556/D1556M density test at the start of the job, and for every 10 ASTM D6938 density tests thereafter. Include density test results in daily report.

Any disputes regarding the adequacy of in-place bedding material and backfill material densities must be verified by additional density testing performed by the contractor to ensure that the specified density is being obtained. When field density tests indicate that compaction is not as specified, remove the material, replace and recompact to meet specification requirements.

3.12.2.5 Moisture Content

In the stockpile or borrow areas perform a minimum of two tests in accordance with ASTM D2216 per day per type of material or source of materials being placed during stable weather conditions. During unstable

weather, tests must be made as dictated by local conditions. Include moisture content test results in daily report.

-- End of Section --

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DIVISION 31 - EARTHWORK

SECTION 31 24 50

RIPRAP PROTECTION

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SECTION 31 24 50

RIPRAP PROTECTION

PART 1 GENERAL

1.1 SUMMARY

The work covered by this section consists of furnishing all plant, labor, equipment and materials in connection with construction of the riprap slope protection and apron at the downstream (south) end of the new 18-inch solid HDPE relief well collector pipe, the 24-inch RCP storm drain extension pipe and the existing 24-inch CMP (culvert B) in accordance with these specifications, as shown on the contract drawings, and as directed by the Contracting Officer. Riprap protection includes all stone and aggregate materials furnished for riprap, spalls and coarse aggregate. The Contractor must ensure that the materials delivered and placed will meet all specification requirements. The Contractor must perform all sampling and testing required for quality control in accordance with Section 01 45 00.00 10 QUALITY CONTROL, and as specified herein. Quarry operators must be responsible for operating all quarries and for conditioning the area after operations are complete, in accordance with all applicable Federal, State, and local laws and regulations.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 88	(2013) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C117	(2017) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D422	(1963; R2007; E2014;) Particle-Size Analysis of Soils
ASTM E11	(2020) Wire Cloth and Sieves for Testing Purposes

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 103	(1991) Soundness of Aggregates by Freezing and Thawing

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following must be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Initial Sampling and Testing; G-DO

Reference paragraph 1.5.3 for testing requirements.

Bulk Specific Gravity; G, DO

Soundness Of Magnesium Sulfate; G, DO

Test Report For Freezing and Thawing; G, DO

Field Gradation; G-AO.

1.4 SAMPLING AND TESTING

1.4.1 General Requirements

The Contractor must be responsible for all sampling and testing specified herein. The Government may perform verification tests as determined necessary for final approval of the stone protection material. All samples including samples taken during production must be representative of the stone protection material furnished or proposed to be furnished. Samples must be taken in accordance with ASTM D75/D75M or other approved method. All sampling operations must take place in the presence of a representative of the Contracting Officer's Representative. Rock must not be furnished from any ledge which has not been sampled, tested, and approved for use on this project.

1.4.2 Test Results

Results must verify that materials comply with this specification. When a material source is changed, the new material will be tested for compliance. When deficiencies are found, the initial analysis must be repeated and the material already placed must be retested to determine the extent of unacceptable material. All in-place unacceptable material must be replaced or modified as directed by the Contracting Officer's Representative.

1.4.3 Initial Sampling and Testing

Tests for bulk specific gravity, soundness in sodium/magnesium sulfate, and soundness in freezing and thawing must be performed on samples of material obtained from each ledge proposed for use as stone protection prior to start of construction. Test results must describe type of failure of the discrete particles. Tests for these parameters do not need to be performed specifically for this project; if certified test results performed not longer than 12 months prior to delivery to the project together with the name of the owner of the quarry and the legal description are submitted to the Contracting Officer's Representative.

The Contractor shall submit the name and location of each quarry proposed for use along with a geologic section of each quarry indicating the various rock units identified by geologic name of formation and member and indicate from what ledge the samples were obtained.

1.4.3.1 Bulk Specific Gravity

Bulk specific gravity must be computed in accordance with ASTM C 127/ASTM C 128 except that the total sample must weigh 5000 grams +/-2 percent and individual particles must weigh approximately 300 grams each. Stone protection material must be tested in a saturated surface-dry (SSD) condition. The computed bulk specific gravity so determined must not be less than 2.55.

1.4.3.2 Soundness in Sodium/Magnesium Sulfate

Soundness in magnesium sulfate must be determined according to ASTM C 88 with test modifications as listed below. The combined loss at 5 cycles must not be more than 8 percent. The soundness of magnesium sulfate test report must show the percentages of loss calculated as described herein and the number of pieces affected, classified as to number disintegrating, splitting, crumbling, cracking, flaking, etc.

a. Sample Preparation

The sample must be prepared by breaking it into fragments reasonably uniform in size and shape and weighing approximately 100 grams each. The test sample must weigh 5000 grams +/-2 percent. The sample must be thoroughly washed and dried previous to test as described for coarse aggregate.

b. Sample Immersion and Temperature

The sample immersed in the solution must be maintained at a temperature of 80 degrees F +/- 2 degrees F for the immersion period.

c. Quantitative Examination

At the end of the fifth cycle, the percentage loss must be determined by the three following methods. The test report must show the loss computed by each method; however, only the combined loss must be used for acceptance or rejection of the material.

d. Loss By Breaking

An individual piece which has broken or split into three or more fragments must be considered to have failed the test, provided each of the three such fragments is at least 10 percent of the original piece by weight. The total original weight of all pieces failing the test, expressed as percentage of the total original weight of the sample, must be considered as percentage loss by breaking.

e. Loss By Crumbling and Flaking

After the loss by breaking has been determined, the pieces that have not failed in that determination must be screened on the 1/2-inch sieve and the material retained on the sieve must be weighed for purposes required to determine combined losses. The pieces which have failed by breaking must then be added to the material remaining on the 1/2-inch sieve and

screened. The difference between the total original weight of the sample and the total weight of the material retained on the 1/2-inch sieve expressed as percentage of the total original weight, must be considered as percentage loss by crumbling and flaking.

f. Combined Loss

The difference between the total original weight of the sample and the weight of the material retained on the 1/2-inch sieve, after screening the pieces which did not fail by breaking, expressed as percentage of the total original weight, must be considered as percentage combined loss.

1.4.3.3 Soundness in Freezing and Thawing

The test for freezing and thawing shall consist of AASHTO T 103, Ledge Rock Method, Procedure C, modified as indicated below. The loss at 12 cycles shall not exceed 5.0 percent. The test report shall describe the type of failure of the discrete particles.

a. Temperature

The temperature of the surrounding medium during freezing shall be maintained in the range of -20 to -10 degrees F.

b. Freeze/Thaw Cycle

The length of a freezing and thawing cycle shall be sufficient to totally freeze and totally thaw each piece of the same during each cycle. The laboratory shall specifically determine for each sample that the cycle used is sufficient to accomplish total freezing and total thawing and shall report this in the test report. However, in no case shall the cycle consist of less than 2-1/2 hours of freezing followed by 1 hour of thawing. The sample shall be held in the frozen condition whenever necessary to break the cycle (overnight, weekends, etc.).

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 General Requirements

All stone for riprap protection must be durable quarried rock as approved by the Contracting Officer's Representative. Individual pieces of stone protection in-place must be free from cracks, seams, and other defects that will cause rapid or excessive deterioration or degradation during service. The bulk stone protection material delivered to the project must be of such quality that tests performed on representative samples have results within the limits specified. The riprap slope protection must contain not more than 5 percent of undesirable material by weight. Undesirable material is defined as individual pieces of stone which do not meet the quality requirements when tested as specified herein and which can be visually differentiated from the satisfactory pieces, plus dirt, sand, clay, and rock fines. Riprap slope protection material must not contain disintegrated granite or shale. The Contractor shall select the source or sources he proposes to use and perform the initial sampling and testing of the materials well in advance of the time when the material will be required in the work.

2.1.2 Riprap Material

The riprap must consist of stone meeting the requirements specified herein and must be in pieces approximately rectangular in cross section, free from thin slabby pieces having a maximum dimension more than three times the least dimension. Stone for riprap must be reasonably well graded from coarse to fine. Dirt and fines of less than 1/2-inch maximum cross section, accumulated from interledge layers or from blasting or handling operations must not exceed 5 percent by weight.

2.1.2.1 Riprap Material Gradation Requirements

The riprap must be reasonably well-graded. Riprap material meeting the requirements for "Class A" Riprap in the South Dakota Department of Transportation (SDDOT), "Standard Specifications for Roads and Bridges," Series 2015, Section 830 Riprap shall be used for this contract.

2.1.3 Spall Material

Spall material for riprap protection must be at least equal in quality to that of the stone used for riprap and must be well graded between the sizes specified. Spalls material must be quarried stone, crushed cobbles, and crushed gravel consisting of particles having at least one fractured face. The material must be composed of tough, durable particles, must be reasonably free from thin, flat and elongated pieces, and must not contain organic matter or soft, friable particles in quantities considered objectionable by the Contracting Officer's Representative.

2.1.3.1 Spall Material Gradation Requirements

Requirements for gradation specified must apply to the completed spalls material. The spall material must be continuously graded within the following limits:

Sieve Designation	Percentage by Weight Passing Square-mesh Sieve
6 inch	100
4 inch	85-100
2.5 inch	55-100
1 inch	10-50
1/2 inch	0-10
3/8 inch	0-5

2.1.4 Coarse Aggregate Material

Coarse aggregate material for riprap (stone) protection must be at least equal in quality to that of the stone used for riprap and spalls and must be well graded between the sizes specified. Coarse aggregate material must be quarried stone, crushed cobbles, or crushed ravel consisting of particles having at least one fractured face. The material must be composed of tough, durable particles, shall be reasonable, free from thin, flat and elongated pieces, and shall contain no organic matter nor soft, friable particles in quantities considered objectionable by the COR.

2.1.4.1 Coarse Aggregate Bedding Material Gradation Requirements

Gradation requirements for coarse aggregate material for riprap protection must meet the requirements for Coarse Aggregate in Section 31 23 00.00 20,

EXCAVATION AND BACKFILLING FOR COLLECTOR PIPE SYSTEM.

PART 3 EXECUTION

3.1 GENERAL

Quarry operations must be controlled to produce a reasonably well-graded stone of required size, and the Contracting Officer may require changes as necessary to produce the required product. The Contractor's operations must be conducted in a manner that will produce stone meeting the requirements specified and must include selective quarrying, handling, and loading as required.

3.2 PLACEMENT

Placement of material on slopes shall be placed from the toe of the slope and progressively working up the slope to the lines and elevations indicated on the contract drawings.

3.2.1 Coarse Aggregate Material

Coarse Aggregate material must be spread uniformly on the prepared subgrade in a satisfactory manner to the slope lines, thickness, and grades indicated on the drawings or as directed. Placing of material by methods which will tend to segregate particle sizes within the bedding will not be permitted. Any damage to the surface of the bedding foundation during placing of the bedding must be repaired before proceeding with the work. Compaction of the bedding material will not be required but it must be finished to present a reasonably even surface free from depressions, mounds, or wind rows.

3.2.2 Spall Material

Spalls must be spread uniformly on the prepared subgrade in a satisfactory manner to the slope lines, thickness, and grades indicated on the drawings or as directed. Placing of material by methods which will tend to segregate particle sizes within the spalls and bedding will not be permitted. Any damage to the surface of the bedding foundation during placing of the spalls must be repaired before proceeding with the work. Compaction of the spalls material will not be required, but the spall material must be finished to present a reasonably even surface free from depressions, mounds, or windrows.

3.2.3 Riprap Material

Riprap must be placed as shown on the drawings or as directed by the Contracting Officer's Representative. Construct riprap on spall and Coarse Aggregate material as indicated on the contract drawings. Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.25 foot. The placement area must be free of objectionable material. Riprap stone must be placed in such manner as to produce a reasonably well-graded mass of rock with the minimum practicable percentage of voids. Riprap must be placed to its full course thickness in one operation to minimize segregation of riprap. The larger stones must be well distributed and the entire mass of stones in their final position must be roughly graded to conform to the gradation specified. The finished riprap must be free from objectionable pockets of small stones and clusters of larger stones. Placing riprap in layers will not be permitted. The desired distribution of the various sizes of stones

throughout the mass must be obtained by selective loading of the material at the quarry or other source; by controlled dumping of successive loads during final placement.

Dumping of stone at the top of slopes and rolling or pushing into place will not be permitted. Manipulating or moving stone at any time prior to placement by means of dozers or other blade equipment will not be permitted. Rearranging of individual stones by mechanical equipment or by hand will be required to the extent necessary to obtain a reasonably well graded distribution of stone sizes as specified above.

3.2.4 Protection

Maintain the riprap stone until accepted and any material displaced by any cause must be replaced at the Contractor's expense to the lines and grades shown on the drawings.

3.3 FIELD GRADATION TESTS

3.3 Coarse Aggregate and Spalls

A field gradation test of the coarse aggregate and spall material shall be performed for each material by the Contractor to determine if the material as delivered to the job meets the gradation requirements of this specification. One field gradation test shall be performed for each 100 tons of coarse aggregate material or spalls delivered to the project in accordance with ASTM C136. Coarse aggregate gradation shall be performed in conformance with ASTM C117, ASTM C136/C136M, and ASTM D422. Sieves shall conform to ASTM E11. One field gradation test shall be performed for each 100 tons of spall material delivered to the project in accordance with ASTM C136. Spall gradation shall be performed in conformance with ASTM D5519. Bedding and spall material shall not be placed until the material delivered to the job has passed a field gradation test.

3.4 Riprap

One field gradation test of riprap material shall be performed by the Contractor to determine if the material as delivered to the job meets the gradation requirements of this specification. A sample consisting of 1 to 2 tons shall be taken of material delivered to the job and checked for gradation and elongation. The Contractor shall state in writing the method used in blasting, processing, loading, and handling this sample, and shall notify the Contracting Officer's Representative any time any production methods are changed. Riprap material shall not be placed until the material delivered to the job has passed a field gradation test. Gradation shall be determined according to ASTM D5519. At the discretion of the Contracting Officer's Representative, random loads will be dumped or the in-place material will be sampled and a gradation control check shall be performed by the Contractor at the discretion and under the supervision of the Contracting Officer's Representative.

3.3.3 Failure to Meet Gradation Limits

If the material fails to meet the gradation limits specified, the Contractor shall discontinue placement of the material and adjust his operations or he shall propose another source. The Contractor shall verify with the necessary additional tests that acceptable materials are being produced. Tests which do not pass the gradation requirements will not be counted in the additional required tests above. All field tests will be performed by

the Contractor at his expense.

-- End of Section --

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SECTION 32 11 23

AGGREGATE BASE COURSE (FOR ASPHALT ROADS)

PART 1 GENERAL

The work covered by this section consists of furnishing all plant, labor, equipment and materials for aggregate base courses used for the reconstruction of the asphalt spillway access road following replacement of the toe drain outfall pipe in accordance with these specifications, as shown on the contract drawings, and as directed by the Contracting Officer.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2017) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop
AASHTO T 224	(2010) Standard Method of Test for Correction for Coarse Particles in the Soil Compaction Test

ASTM INTERNATIONAL (ASTM)

ASTM C29/C29M	(2017a) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C88	(2018) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C131/C131M	(2020) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM D75/D75M	(2019) Standard Practice for Sampling Aggregates
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000

	ft-lbf/ft3) (2700 kN-m/m3)
ASTM D2167	(2015) Density and Unit Weight of Soil in Place by the Rubber Balloon Method
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4318	(2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D5821	(2013; R 2017) Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6938	(2017a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM E11	(2020) Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION (SDDOT)

2015 SDDOT	Standard Specifications for Roads and Bridges

1.2 DEFINITIONS

For the purposes of this specification, the following definitions apply.

1.2.1 Aggregate Base Course

Aggregate base course (ABC) is well graded, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.2 Graded-Crushed Aggregate Base Course

Graded-crushed aggregate (GCA) base course is well graded, crushed, durable aggregate uniformly moistened and mechanically stabilized by compaction.

1.2.3 Degree of Compaction

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve will be expressed as a percentage of the laboratory maximum dry density in accordance with AASHTO T 180 Method D and corrected with AASHTO T 224.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools; G, AO

Waybills and Delivery Tickets

SD-06 Test Reports

Initial Tests; G, AO

In-Place Tests; G, AO

1.4 EQUIPMENT, TOOLS, AND MACHINES

All plant, equipment, and tools used in the performance of the work will be subject to approval by the Contracting Officer before the work is started. Maintain all plant, equipment, and tools in satisfactory working condition at all times. Submit a list of proposed equipment, including descriptive data. Use equipment capable of minimizing segregation, producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

1.5 QUALITY ASSURANCE

Sampling and testing are the responsibility of the Contractor. Perform sampling and testing using a laboratory approved in accordance with Section 01 45 00.00 10 QUALITY CONTROL. Perform field quality testing according to paragraph 3.12. Work requiring testing will not be permitted until the testing laboratory has been inspected and approved. Test the materials to establish compliance with the specified requirements and perform testing at the specified frequency. The Contracting Officer may specify the time and location of the tests. Furnish copies of test results to the Contracting Officer within 24 hours of completion of the tests.

1.5.1 Sampling

Take samples for laboratory testing in conformance with ASTM D75/D75M. When deemed necessary, the sampling will be observed by the Contracting Officer.

1.5.2 Tests

1.5.2.1 Sieve Analysis

Perform sieve analysis in conformance with 2015 SDDOT Section 882.2 Specific requirements Table 1 (also shown in paragraph 2.1.3 of this Section).

1.5.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D4318.

1.5.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture content in accordance with paragraph 1.2.3, DEGREE OF COMPACTION.

1.5.2.4 Field Density Tests

Measure field density in accordance with ASTM D1556/D1556M, ASTM D2167 or ASTM D6938. For the method presented in ASTM D1556/D1556M use the base plate as shown in the drawing. For the method presented in ASTM D6938 check the calibration curves and adjust them, if necessary, using only the sand cone method as described in paragraph Calibration, of the ASTM publication. Tests performed in accordance with ASTM D6938 result in a wet unit weight of soil and ASTM D6938 will be used to determine the moisture content of the soil. Also check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D6938. Make the calibration checks of both the density and moisture gauges using the prepared containers of material method, as described in paragraph Calibration of ASTM D6938, on each different type of material being tested at the beginning of a job and at intervals as directed. Submit calibration curves and related test results prior to using the device or equipment being calibrated.

1.5.2.5 Wear Test

Perform wear tests on ABC and GCA course material in conformance with ASTM C131/C131M.

1.5.2.6 Soundness

Perform soundness tests on GCA in accordance with ASTM C88.

1.5.2.7 Weight of Slag

Determine weight per cubic foot of slag in accordance with ASTM C29/C29M on the ABC and GCA course material.

1.6 ENVIRONMENTAL REQUIREMENTS

Perform construction when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

PART 2 PRODUCTS

2.1 AGGREGATES

Provide ABC and GCA consisting of clean, sound, durable particles of crushed stone, crushed slag, crushed gravel, angular sand, or other approved material. Provide GCA that is free of silt and clay as defined by ASTM D2487, organic matter, and other objectionable materials or coatings. The portion retained on the No. 4 sieve is known as coarse aggregate; that portion passing the No. 4 sieve is known as fine

aggregate. When the coarse and fine aggregate is supplied form more than one source, provide aggregate from each source that meets the specified requirements.

2.1.1 Coarse Aggregate

Provide coarse aggregates with angular particles of uniform density. Separately stockpile coarse aggregate supplied from more than one source.

a. Crushed Gravel: Provide crushed gravel that has been manufactured by crushing gravels and that meets all the requirements specified below.

b. Crushed Stone: Provide crushed stone consisting of freshly mined quarry rock, meeting all the requirements specified below.

c. Crushed Recycled Concrete: Provide crushed recycled concrete consisting of previously hardened portland cement concrete or other concrete containing pozzolanic binder material. Provide recycled concrete that is free of all reinforcing steel, bituminous concrete surfacing, and any other foreign material and that has been crushed and processed to meet the required gradations for coarse aggregate. Reject recycled concrete aggregate exceeding this value. Provide crushed recycled concrete that meets all other applicable requirements specified below.

d. Crushed Slag: Provide crushed slag that is an air-cooled blast-furnace product having an air dry unit weight of not less than 70 pcf as determined by ASTM C29/C29M, and meets all the requirements specified below.

2.1.1.1 Aggregate Base Course

The percentage of loss of ABC coarse aggregate must not exceed 50 percent when tested in accordance with ASTM C131/C131M. Provide aggregate that contains no more than 30 percent flat and elongated particles. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve specified, the crushed aggregates must contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces determined in accordance with ASTM D5821. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Manufacture crushed gravel from gravel particles 50 percent of which, by weight, are retained on the maximum size sieve listed in TABLE 1.

2.1.1.2 Graded-Crushed Aggregate Base Course

The percentage of loss of GCA coarse aggregate must not exceed 50 percent loss when tested in accordance with ASTM C131/C131M. Provide GCA coarse aggregate that does not exhibit a loss greater than 18 percent weighted average, at five cycles, when tested for soundness in magnesium sulfate, or 12 percent weighted average, at five cycles, when tested in sodium sulfate in accordance with ASTM C88. Provide aggregate that contains no more than 20 percent flat and elongated particles for the fraction retained on the 1/2 inch sieve nor 20 percent for the fraction passing the 1/2 inch sieve. A flat particle is one having a ratio of width to thickness greater than 3; an elongated particle is one having a ratio of length to width greater than 3. In the portion retained on each sieve

specified, the crushed aggregate must contain at least 90 percent by weight of crushed pieces having two or more freshly fractured faces determined in accordance with ASTM D5821. When two fractures are contiguous, the angle between planes of the fractures must be at least 30 degrees in order to count as two fractured faces. Manufacture crushed gravel from gravel particles 90 percent of which by weight are retained on the maximum size sieve listed in TABLE 1.

2.1.2 Fine Aggregate

Provide fine aggregates consisting of angular particles of uniform density.

2.1.2.1 Aggregate Base Course

Provide ABC fine aggregate that consists of screenings, angular sand, crushed recycled concrete fines, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

2.1.2.2 Graded-Crushed Aggregate Base Course

Provide GCA fine aggregate consisting of angular particles produced by crushing stone, slag, or gravel that meets the requirements for wear and soundness specified for GCA coarse aggregate. Produce fine aggregate by crushing only particles larger than No. 4 sieve in size. Provide fine aggregate that contains at least 90 percent by weight of particles having two or more freshly fractured faces in the portion passing the No. 4 sieve and retained on the No. 10 sieve, and in the portion passing the No. 10 sieve and retained on the No. 40 sieve. Manufacture fine aggregate from gravel particles 95 percent of which by weight are retained on the 1/2 inch sieve.

2.1.3 Gradation Requirements

Apply the specified gradation requirements to the completed base course. Provide aggregates that are continuously well graded within the limits specified in TABLE 1. Use sieves that conform to ASTM E11.

Table 1. Gradation of Aggregate Base Course

Sieve	Aggregate Base Course Gradation
1 inch	100
3/4 inch	80-100
1/2 inch	68-91
#4	46-70
#8	34-58
#40	13-35
#200	3.0-12

Sieve	Aggregate Base Course Gradation
Other Properties	
Liquid Limit (max)	25
Plasticity Index	0-6
LA Abrasion Loss (maximum)	40
Crushed Particles (minimum) +#4 Sieve	30% 1-CF
Foot Notes	*1,*2

Notes:
1) The fraction passing the #200 sieve must not be greater than 2/3 of the fraction passing the #40 sieve. In no case will the upper limit specified for the #200 sieve be exceeded.
2) Requirements apply to ledge rock other than limestone ledge rock.

2.2 LIQUID LIMIT AND PLASTICITY INDEX

Apply liquid limit and plasticity index requirements to the completed course and to any component that is blended to meet the required gradation. The portion of any component or of the completed course passing the No. 40 sieve must be either nonplastic or have a liquid limit not greater than 25 and a plasticity index not greater than 5.

2.3 TESTS, INSPECTIONS, AND VERIFICATIONS

2.3.1 Initial Tests

Perform one of each of the following tests, on the proposed material prior to commencing construction, to demonstrate that the proposed material meets all specified requirements when furnished. Complete this testing for each source if materials from more than one source are proposed.

a. Sieve Analysis.

b. Liquid limit and plasticity index.

c. Moisture-density relationship.

d. Wear.

Submit certified copies of test results for approval not less than 30 days before material is required for the work.

2.3.2 Approval of Material

Tentative approval of material will be based on initial test results.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

When the ABC or GCA is constructed in more than one layer, clean the

previously constructed layer of loose and foreign matter by sweeping with power sweepers or power brooms, except that hand brooms may be used in areas where power cleaning is not practicable. Provide adequate drainage during the entire period of construction to prevent water from collecting or standing on the working area.

3.2 OPERATION OF AGGREGATE SOURCES

Clearing, stripping, and excavating are the responsibility of the Contractor. Condition aggregate sources on Government property to readily drain and leave in a satisfactory condition upon completion of the work.

3.3 STOCKPILING MATERIAL

Clear and level storage sites prior to stockpiling of material. Stockpile all materials, including approved material available from excavation and grading, in the manner and at the locations designated. Stockpile aggregates on the cleared and leveled areas designated by the Contracting Officer to prevent segregation. Stockpile materials obtained from different sources separately.

3.4 PREPARATION OF UNDERLYING COURSE OR SUBGRADE

Clean the underlying course or subgrade of all foreign substances prior to constructing the base course(s). Do not construct base course(s) on underlying course or subgrade that is frozen. Construct the surface of the underlying course or subgrade to meet specified compaction and surface tolerances. Correct ruts or soft yielding spots in the underlying courses, areas having inadequate compaction, and deviations of the surface from the specified requirements set forth herein by loosening and removing soft or unsatisfactory material and adding approved material, reshaping to line and grade, and recompacting to specified density requirements. For cohesionless underlying courses or subgrades containing sands or gravels, as defined in ASTM D2487, stabilize the surface prior to placement of the base course(s). Stabilize by mixing ABC or GCA into the underlying course and compacting by approved methods. Consider the stabilized material as part of the underlying course and meet all requirements of the underlying course. Do not allow traffic or other operations to disturb the finished underlying course and maintain in a satisfactory condition until the base course is placed.

3.5 GRADE CONTROL

Provide a finished and completed base course conforming to the lines, grades, and cross sections shown. Place line and grade stakes as necessary for control.

3.6 MIXING AND PLACING MATERIALS

Mix the coarse and fine aggregates in a stationary plant, or in a traveling plant or bucket loader on an approved paved working area. Make adjustments in mixing procedures or in equipment, as directed, to obtain true grades, to minimize segregation or degradation, to obtain the required water content, and to insure a satisfactory base course meeting all requirements of this specification. Place the mixed material on the prepared subgrade or subbase in layers of uniform thickness with an approved spreader. Place the layers so that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Where the base course is placed in more than one layer, clean

the previously constructed layers of loose and foreign matter by sweeping with power sweepers, power brooms, or hand brooms, as directed. Make adjustments in placing procedures or equipment as may be directed by the Contracting Officer to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.

3.7 LAYER THICKNESS

Compact the completed base course to the thickness indicated. No individual layer may be thicker than 6 inches nor be thinner than 3 inches in compacted thickness. Compact the base course(s) to a total thickness that is within 1/2 inch of the thickness indicated. Where the measured thickness is more than 1/2 inch deficient, correct such areas by scarifying, adding new material of proper gradation, reblading, and recompacting as directed. Where the measured thickness is more than 1/2 inch thicker than indicated, the course will be considered as conforming to the specified thickness requirements. The average job thickness will be the average of all thickness measurements taken for the job and must be within 1/4 inch of the thickness indicated. Measure the total thickness of the base course at intervals of one measurement for each 500 square yards of base course. Measure total thickness using 3 inch diameter test holes penetrating the base course.

3.8 COMPACTION

Compact each layer of the base course, as specified, with approved compaction equipment. Maintain water content during the compaction procedure to within plus or minus 2 percent of the optimum water content determined from laboratory tests as specified in this Section. Begin rolling at the outside edge of the surface and proceed to the center, overlapping on successive trips at least one-half the width of the roller. Slightly vary the length of alternate trips of the roller. Adjust speed of the roller as needed so that displacement of the aggregate does not occur. Compact mixture with hand-operated power tampers in all places not accessible to the rollers. Continue compaction until each layer is compacted through the full depth to at least 100 percent of laboratory maximum density. Make such adjustments in compacting or finishing procedures as may be directed by the Contracting Officer to obtain true grades, to minimize segregation and degradation, to reduce or increase water content, and to ensure a satisfactory base course. Remove any materials found to be unsatisfactory and replace with satisfactory material or rework, as directed, to meet the requirements of this specification.

3.9 EDGES OF BASE COURSE

Place the base course(s) so that the completed section will be a minimum of 2 feet wider, on all sides, than the next layer that will be placed above it. Place approved material along the outer edges of the base course in sufficient quantity to compact to the thickness of the course being constructed. When the course is being constructed in two or more layers, simultaneously roll and compact at least a 2 foot width of this shoulder material with the rolling and compacting of each layer of the base course, as directed.

3.10 FINISHING

Finish the surface of the top layer of the base course after final

compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. Do not add thin layers of material to the top layer of the base course to meet grade. If the elevation of the top layer of the base course is 1/2 inch or more below grade, scarify the top layer to a depth of at least 3 inches and blend new material in and compact to bring to grade. Make adjustments to rolling and finishing procedures as directed by the Contracting Officer to minimize segregation and degradation, obtain grades, maintain moisture content, and insure an acceptable base course. Should the surface become rough, corrugated, uneven in texture, or traffic marked prior to completion, scarify the unsatisfactory portion and rework and recompact it or replace as directed.

3.11 SMOOTHNESS TEST

Construct the top layer so that the surface shows no deviations in excess of3/8 inch when tested with a 12 foot straightedge. Take measurements in successive positions parallel to the centerline of the area to be paved. Also, take measurements perpendicular to the centerline at 20 foot intervals. Correct deviations exceeding this amount by removing material and replacing with new material, or by reworking existing material and compacting it to meet these specifications.

3.12 FIELD QUALITY CONTROL

3.12.1 In-Place Tests

Perform each of the following tests on samples taken from the placed and compacted ABC. Take samples and test at the rates indicated.

a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 250 square yards, or portion thereof, of completed area.

b. Perform sieve analysis on every lift of material placed and at a frequency of one sieve analysis for every 500 square yards, or portion thereof, of material placed.

c. Perform liquid limit and plasticity index tests at the same frequency as the sieve analysis.

d. Measure the thickness of the base course at intervals providing at least one measurement for each 500 square yards of base course or part thereof. Measure the thickness using test holes, at least 3 inch in diameter through the base course.

3.12.2 Approval of Material

Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and fully compacted course(s).

3.13 TRAFFIC

Completed portions of the base course may be opened to limited traffic, provided there is no marring or distorting of the surface by the traffic. Do not allow heavy equipment on the completed base course except when necessary for construction. When it is necessary for heavy equipment to travel on the completed base course, protect the area against marring or damage to the completed work.

3.14 MAINTENANCE

Maintain the base course in a satisfactory condition until the full pavement section is completed and accepted. Immediately repair any defects and repeat repairs as often as necessary to keep the area intact. Retest any base course that was not paved over prior to the onset of winter to verify that it still complies with the requirements of this specification. Rework or replace any area of base course that is damaged as necessary to comply with this specification.

3.15 DISPOSAL OF UNSATISFACTORY MATERIALS

Dispose of any unsuitable materials that have been removed outside the limits of Government-controlled land. No additional payments will be made for materials that have to be replaced.

-- End of Section --

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HOT-MIX ASPHALT PAVING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 156	(2013; R 2017) Standard Specification for Requirements for Mixing Plants for Hot-Mixed, Hot-Laid Bituminous Paving Mixtures
AASHTO T 304	(2011; R 2015) Standard Method of Test for Uncompacted Void Content of Fine Aggregate
AASHTO T 329	(2015) Standard Test Method for Moisture Content of Hot Mix Asphalt (HMA) by Oven Method

ASPHALT INSTITUTE (AI)

AI MS-2	(2015) Asphalt Mix Design Methods

ASTM INTERNATIONAL (ASTM)

ASTM C117	(2017) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C127	(2015) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate
ASTM C128	(2015) Standard Test Method for Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C566	(2013) Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying
ASTM D75/D75M	(2019) Standard Practice for Sampling Aggregates

ASTM D140/D140M	(2016) Standard Practice for Sampling Asphalt Materials
ASTM D979/D979M	(2015) Sampling Bituminous Paving Mixtures
ASTM D2041/D2041M	(2011) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures
ASTM D2172/D2172M	(2017; E 2018) Standard Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures
ASTM D2726/D2726M	(2019) Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
ASTM D2950/D2950M	(2014) Density of Bituminous Concrete in Place by Nuclear Methods
ASTM D3665	(2012; R 2017) Standard Practice for Random Sampling of Construction Materials
ASTM D3666	(2016) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D5361/D5361M	(2016) Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing
ASTM D5444	(2015) Mechanical Size Analysis of Extracted Aggregate
ASTM D5821	(2013; R 2017) Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
ASTM D6307	(2019) Standard Test Method for Asphalt Content of Asphalt Mixture by Ignition Method
ASTM D6925	(2014) Standard Test Method for Preparation and Determination of the Relative Density of Hot Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor
ASTM D6926	(2020) Standard Practice for Preparation of Asphalt Mixture Specimens Using Marshall Apparatus
ASTM D6927	(2015) Standard Test Method for Marshall Stability and Flow of Bituminous Mixtures

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION (SDDOT)

2015 SDDOT	(2015) South Dakota Department of

Transportation, Standard Specifications for Roads and Bridges

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Mix Design; G, AO

Contractor Quality Control; G, AO

SD-04 Samples

Asphalt Cement Binder

Submit sample if requested by the Contracting Officer.

SD-06 Test Reports

Aggregates; G, AO

QC Monitoring

Smoothness Testing Results; G, AO

SD-07 Certificates

Asphalt Cement Binder; G, AO

Laboratory Accreditation and Validation

1.3 ACCEPTANCE

1.3.1 Acceptability of Work

Acquire the services of an independent commercial laboratory to perform acceptance testing. The materials and the pavement itself will be accepted on the basis of production testing. The Government may make check tests from split samples to validate the results of the production testing. Testing performed by the Government does not reduce the required testing of the independent commercial laboratory. Split samples can be taken for Government testing to reduce the variability between the independent commercial laboratory and the Government's test results. When the difference between the independent commercial laboratory and the Government's test results for split samples exceed the acceptable range of two results for multilaboratory precision for the appropriate test method (i.e. ASTM) then at least one of the laboratories is determined to be in error. An evaluation of procedures and equipment in both laboratories will be made to determine the cause(s) for the differences. Develop steps to correct procedures and equipment to bring multilaboratory precision to within acceptable limits.

1.3.2 Acceptance Requirements

Provide all sampling and testing required for acceptance. Where appropriate,for individual lots of asphalt pavement will be made based on laboratory air voids, in-place density, smoothness, and grade in accordance with the following paragraphs. Surface smoothness and grade determinations will be made on the lot as a whole. Exceptions or adjustments to this will be made in situations where the mix within one lot is placed as part of both the intermediate and surface courses, thus smoothness and grade measurements for the entire lot cannot be made.

1.3.3 Pavement Lots

A standard lot for all requirements is equal to one day's production or 2,000 tons, whichever is smaller.

1.3.4 Lot Sampling

Take one mixture sample for each lot in accordance with ASTM D979/D979M from a random truck or another location for determining theoretical maximum density, laboratory air voids, any additional testing the Government desires, and Contractor Quality Control. All samples will be selected randomly, using commonly recognized methods of assuring randomness conforming to ASTM D3665 and employing tables of random numbers or computer programs.

1.3.5 Additional Sampling and Testing

The Government reserves the right to direct additional samples and tests for any area which appears to deviate from the specification requirements. The cost of any additional testing will be paid for by the Government. Testing in these areas will be treated as a separate lot. Payment acceptance Payment will be made for the quantity of asphalt pavement represented by these tests in accordance with the provisions of this section.

1.3.6 Theoretical Maximum Density (TMD)

Measure theoretical maximum density one time for each lot in accordance with ASTM D2041/D2041M for purposes of calculating laboratory air voids and determining in-place density. The average TMD for each lot will be determined as the average TMD of the random samples. When the TMD on both sides of a longitudinal joint is different, the average of these two TMD values will be used as the TMD needed to calculate the percent joint density.

1.3.7 Laboratory Air Voids

Take mixture samples at least four times compacted into specimens, using 50 blows per side with the hand-held Marshall hammer as described in ASTM D6926. When the Superpave gyratory compactor is used, mixes will be compacted to 50 gyrations in accordance with ASTM D6925. Hot-mix provided under the SD DOT Superpave option must be compacted in accordance with the DOT requirements. After compaction, determine the laboratory air voids of each specimen. Stability and flow must be determined for the Marshall-compacted specimens, in accordance with ASTM D6927.

1.3.8 In-place Density

Obtain one random 4 inch or 6 inch diameter core from the mat in accordance with ASTM D5361/D5361M for determining in-place density. Cut the sample neatly with a diamond core drill bit. Obtain random cores that are the full thickness of the layer being placed. Select core location randomly using the procedures contained in ASTM D3665. Locate core for mat density no closer than 12 inches from a transverse or longitudinal joint including the pavement edge. Discard samples that are clearly defective as a result of sampling and take an additional random core. When the random core is less than 1 inch thick, it will not be included in the analysis. In this case, obtain another random core sample. Clean and tack coat dry core holes before filling with asphalt mixture. Fill all core holes with asphalt mixture and compact using a standard Marshall hammer to the density specified. Provide all tools, labor, and materials for cutting samples, cleaning, and filling the cored pavement. Measure in-place density in accordance with ASTM D2726/D2726M. A nuclear gauge may be used to monitor pavement density in accordance with ASTM D2950/D2950M.

1.3.9 Surface Smoothness

Use a straightedge for measuring surface smoothness. Use the straightedge method for transverse testing, for longitudinal testing, and at the ends of the paving limits for the project. Smoothness requirements do not apply over crowns or grade breaks. Maintain detailed notes of the testing results and provide a copy to the Government immediately after each day's testing.

1.3.9.1 Smoothness Requirements

1.3.9.1.1 Straightedge Testing

Provide finished surfaces of the pavements with no abrupt change of 1/4 inch or more when checked with an approved 12 foot straightedge. Remove and replace surface lift lots when the surface smoothness exceeds 3/8 inch, at no additional cost to the Government. High spots can be diamond ground as an alternative to remove and replace in order to meet surface smoothness requirements at individual locations.

1.3.9.2 Testing Method

After the final rolling, but not later than 24 hours after placement, test the surface of the pavement in each entire lot in a manner to reveal surface irregularities exceeding the tolerances specified above. If any pavement areas are diamond ground, retest these areas immediately after diamond grinding. The maximum area allowed to be corrected by diamond grinding is 10 percent of the total area of the lot. Check a number of random locations along with any observed suspicious locations primarily at transverse and longitudinal joints with the straightedge.

1.3.9.2.1 Straightedge Testing

Use the straightedge to measure abrupt changes in surface smoothness. Hold the straightedge in contact with the pavement surface and measure the maximum distance between the straightedge and the pavement surface. Determine the amount of surface irregularity by placing the freestanding (unleveled) straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length, and measuring the maximum gap between the straightedge and the pavement surface in the area between these two high points.

1.3.9.2.2 Bumps ("Must Grind" Areas)

Reduce any bumps ("must grind" areas) shown on the profilograph trace which exceed 0.4 inch in height by diamond grinding until they do not exceed 0.3 inch when retested. Taper diamond grinding in all directions to provide smooth transitions to areas not requiring diamond grinding. The following will not be permitted: (1) skin patching for correcting low areas, (2) planing or milling for correcting high areas. Perform additional straightedge testing in all areas corrected by diamond grinding.

1.3.10 Plan Grade

Provide a final wearing surface of pavement conforming to the elevations and cross sections shown and not vary more than 0.05 foot from the plan grade established and approved at site of work. Within 5 working days after completion of a particular lot incorporating the final wearing course, test the final wearing surface of the pavement for conformance with specified plan grade requirements. Match finished surfaces at juncture with other pavements with finished surfaces of abutting pavements. Deviation from the plan elevation will not be permitted in areas of pavements where closer conformance with planned elevation is required for the proper functioning of drainage and other appurtenant structures involved. For roads, the grade will be determined by running lines of levels along the centerline at intervals of 25 feet or less longitudinally to determine the elevation of the completed pavement surface. Measure transverse grades at appropriate intervals. Diamond grinding can be used to remove high spots to meet grade requirements. Skin patching for correcting low areas or planing or milling for correcting high areas will not be permitted. Maintain detailed notes of the results of the testing and provide a copy to the Government immediately after each day's testing.

1.3.11 Laboratory Accreditation and Validation

Provide laboratories used to develop the Job Mix Formula (JMF), perform acceptance testing, and Contractor Quality Control testing that meet the requirements of ASTM D3666. Provide laboratories with a masonry saw having a diamond blade for trimming pavement cores and samples. Perform all required test methods by an accredited laboratory. Schedule and provide payment for laboratory inspections. Additional payment or a time extension due to failure to acquire the required laboratory accreditation is not allowed. All testing laboratories performing acceptance testing require USACE validation by the Material Testing Center (MTC) for both parent laboratory and plant testing laboratory. Validation on all laboratories is required to remain current throughout the duration of the paving project. Contact the MTC manager listed at https://mtc.erdc.dren.mil for costs and scheduling. Submit a certificate of compliance signed by the manager of the laboratory stating that it meets these requirements to the Government prior to the start of construction. At a minimum, include the following certifications:

a. Qualifications of personnel; laboratory manager, supervising technician, and testing technicians.

b. A listing of equipment to be used in developing the job mix.

c. A copy of the laboratory's quality control system.

d. Evidence of participation in the AASHTO Materials Reference Laboratory (AMRL) program.

1.4 ENVIRONMENTAL REQUIREMENTS

Do not place the asphalt mixture upon a wet surface or when the surface temperature of the underlying course is less than specified in Table 1. The temperature requirements may be waived by the Government, if requested; however, meet all other requirements including compaction.

TABLE 1. Surface Temperature Limitations of Underlying Course

Mat Thickness, inches	Degrees F
3 or greater	40
Less than 3	45

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

Perform the work consisting of pavement courses composed of mineral aggregate and asphalt material heated and mixed in a central mixing plant and placed on a prepared course. Provide asphalt pavement designed and constructed in accordance with this section conforming to the lines, grades, thicknesses, and typical cross sections shown on the drawings. Construct each course to the depth, section, or elevation required by the drawings and rolled, finished, and approved before the placement of the next course. Submit proposed Placement Plan indicating lane widths and longitudinal joints for each course or lift.

2.1.1 Asphalt Mixing Plant

Provide plants used for the preparation of asphalt mixture conforming to the requirements of AASHTO M 156 with the following changes:

2.1.1.1 Truck Scales

Weigh the asphalt mixture on approved scales, or on certified public scales at no additional expense to the Government. Inspect and seal scales at least annually by an approved calibration laboratory.

2.1.1.2 Inspection of Plant

Provide access to the Government at all times, to all areas of the plant for checking adequacy of equipment; inspecting operation of the plant; verifying weights, proportions, and material properties; checking the temperatures maintained in the preparation of the mixtures and for taking samples. Provide assistance as requested, for the Government to procure any desired samples.

2.1.2 Hauling Equipment

Provide trucks used for hauling hot-mix asphalt mixture that have tight, clean, and smooth metal beds. To prevent the mixture from adhering to them, lightly coat the truck beds with a minimum amount of paraffin oil,

lime solution, or other approved material. Do not use petroleum based products as a release agent. Provide each truck with a suitable cover to protect the mixture from adverse weather, contamination, and loss of material during hauling. When necessary due to long haul distance and cold weather, provide insulated truck beds with covers (tarps) that are securely fastened.

2.1.3 Material Transfer Vehicle (MTV)

Provide Material Transfer Vehicle for placement of the asphalt mixture. Transfer the material from the hauling equipment to the paver using a self-propelled, material transfer vehicle with a swing conveyor that is capable of delivering material to the paver without making contact with the paver. Provide MTV capable to move back and forth between the hauling equipment and the paver providing material transfer to the paver, while allowing the paver to operate at a constant speed. Provide Material Transfer Vehicle with remixing and storage capability to prevent physical and thermal segregation.

2.1.4 Asphalt Pavers

Provide mechanical spreading and finishing equipment consisting of a self-powered paver, capable of spreading and finishing the mixture to the specified line, grade, and cross section. Provide paver screed capable of laying a uniform mixture to meet the specified thickness, smoothness, and grade without physical or temperature segregation, the full width of the material being placed. Provide a paver with a vibrating screed to be used during all placement.

2.1.4.1 Receiving Hopper

Provide paver with a receiving hopper of sufficient capacity to permit a uniform spreading operation and a distribution system to place the mixture uniformly in front of the screed without segregation. Provide a screed that effectively produces a finished surface of the required evenness and texture without tearing, shoving, or gouging the mixture.

2.1.4.2 Automatic Grade Controls

Provide a paver equipped with a control system capable of maintaining the specified screed elevation. One of three methods can be used to control grade: stringline, laser, or computerized elevations along with GPS. For multiple layers it is acceptable to control the grade in the underlying layer and control the grade of the surface layer by applying a constant thickness over the underlying layer which has been placed to the desired grade. Slope control can also be used to control the grade of the surface for roads. Provide transverse slope controller capable of maintaining the screed at the desired slope within plus or minus 0.1 percent. A ski-type device of not less than 30 ft can be used to provide improved smoothness. Use a shoe on one side of the paver to match an existing paved surface to provide a smooth joint.

2.1.5 Rollers

Provide rollers in good condition and operate at slow speeds to avoid displacement of the asphalt mixture. Provide sufficient number, type, and weight of rollers to compact the mixture to the required density while it is still in a workable condition. Do not use equipment which causes excessive crushing of the aggregate.

2.1.6 Diamond Grinding

Those performing diamond grinding are required to have a minimum of three years experience in diamond grinding. In areas not meeting the specified limits for surface smoothness and plan grade, reduce high areas to attain the required smoothness and grade, except as depth is limited below. Reduce high areas by diamond grinding the asphalt pavement with approved equipment. Perform diamond grinding by sawing with saw blades impregnated with an industrial diamond abrasive. Assemble the saw blades in a cutting head mounted on a machine designed specifically for diamond grinding that produces the required texture and smoothness level without damage to the asphalt pavement or joint faces. Provide diamond grinding equipment with saw blades that are 1/8-inch wide, a minimum of 60 blades per 12 inches of cutting head width, and capable of cutting a path a minimum of 3 feet wide. Diamond grinding equipment that causes raveling, fracturing of aggregate, or disturbance to the underlying material will not be allowed. The maximum area corrected by diamond grinding the surface of the asphalt pavement is 10 percent of the total area of any lot. The maximum depth of diamond grinding is 1/2 inch. Provide diamond grinding machine equipped to flush and vacuum the pavement surface. Dispose of all debris from diamond grinding operations off Government property. At a minimum, include the daily reports for the deficient areas, the location and extent of deficiencies, corrective actions, and equipment. Remove and replace all pavement areas requiring plan grade or surface smoothness corrections in excess of the limits specified.

Prior to production diamond grinding operations, perform a test section at the approved location, consisting of a minimum of two adjacent passes with a minimum length of 40 feet to allow evaluation of the finish and transition between adjacent passes. Production diamond grinding operations cannot be performed prior to approval.

2.2 AGGREGATES

Notify the Government at least 7 days before sampling aggregates. Obtain samples in accordance with ASTM D75/D75M that are representative of the materials to be used for the project. Provide aggregates consisting of crushed stone, crushed gravel, crushed slag, screenings, natural sand, and mineral filler as required. The portion of material retained on the No. 4 sieve is coarse aggregate. The portion of material passing the No. 4 sieve and retained on the No. 200 sieve is fine aggregate. The portion passing the No. 200 sieve is defined as mineral filler. Submit all aggregate test results to the Contracting Officer at least 14 days prior to start of construction.

2.2.1 Coarse Aggregate

Provide coarse aggregate consisting of sound, tough, durable particles, free from films of material that would prevent thorough coating and bonding with the asphalt material and free from organic matter and other deleterious substances. Provide coarse aggregate particles meeting the 2015 SDDOT Section 880.

2.2.2 Fine Aggregate

Provide fine aggregate consisting of clean, sound, tough, durable particles. Provide aggregate particles that are free from coatings of clay, silt, or any objectionable material, contain no clay balls, and must

comply with 2015 SDDOT Section 880.

2.2.3 Aggregate Gradation

Use 2015 SDDOT D, E, or G Type 2 Aggregate see section 880.2.B.

2.3 ASPHALT CEMENT BINDER

Provide asphalt cement binder that conforms to AASHTO M320 Performance Grade (PG) 64-28 or one of the asphalt binders listed in 2015 SDDOT Section 890.D. Provide test data indicating grade certification by the supplier at the time of delivery of each load to the mix plant. Submit copies of these certifications to the Contracting Officer. The supplier is defined as the last source of any modification to the binder. The Contracting Officer may sample and test the binder at the mix plant at any time before or during mix production. Submit 5 gallon sample of the asphalt cement or asphalt binder not less than 14 days before start of the test section for mix design verification and approval, if requested by the Contracting Officer. Obtain samples for this verification testing in accordance with ASTM D140/D140M and in the presence of the Contracting Officer. If requested, provide these samples to the Contracting Officer for the verification testing, which will be performed at the Government's expense. Submit copies of certified test data, amount, type and description of any modifiers blended into the asphalt cement binder.

2.4 MIX DESIGN

a. Develop the mix design. The asphalt mix must be composed of a mixture of well-graded aggregate, mineral filler if required, and asphalt material. The aggregate fractions must be sized, handled in separate size groups, and combined in such proportions that the resulting mixture meets the grading requirements of the job mix formula (JMF). Submit proposed JMF; do not produce hot-mix asphalt for payment until a JMF has been approved. The hot-mix asphalt must be designed in accordance with 2015 SDDOT Class G, D, or E.

b. At the option of the Contractor, a currently used SDDOT Superpave hot mix may be used as described herein. Design the Superpave volumetric mix in accordance with AI SP-2 and ASTM D6925. The nominal maximum aggregate size (NMAS) must be 3/4 inch. Other SDDOT hot mix design methods (Hveem, etc.) may be suitable, as determined by the Contracting Officer.

2.4.1 JMF Requirements

Submit the proposed JMF in writing, for approval, at least 14 days prior to the start of the test section including, as a minimum:

a. Percent passing each sieve size.

b. Percent of asphalt cement.

c. Percent of each aggregate and mineral filler to be used.

d. Asphalt performance grade, viscosity grade, or penetration grade.

e. Number of blows of hammer per side of molded specimen.(NA for Superpave)

f. Number of gyrations of Superpave gyratory compactor, (NA for Marshall design)

g. Laboratory mixing temperature.

h. Laboratory compaction temperature.

i. Temperature-viscosity relationship of the asphalt cement

j. Plot of the combined gradation on the 0.45 power gradation chart, stating the nominal maximum size.

k. Graphical plots and summary tabulation of Marshall stability (NA for Superpave), flow (NA for Superpave), air voids, voids in the mineral aggregate, and unit weight versus asphalt content as shown in AI MS-2. Include summary tabulation that includes individual specimen data for each specimen tested.

l. Specific gravity and absorption of each aggregate.

m. Percent natural sand.

n. Percent particles with two or more fractured faces (in coarse aggregate).

o. Fine aggregate angularity.

p. Percent flat or elongated particles in coarse aggregate.

q. Tensile Strength Ratio and wet/dry specimen test results.

r. Antistrip agent (if required).

s. List of all modifiers.

t. Percentage and properties (asphalt content, aggregate gradation, and aggregate properties) of RAP in accordance with paragraph RECYCLED ASPHALT PAVEMENT, if RAP is used.

2.4.2 Adjustments to Field JMF

The JMF for each mixture is in effect until a new formula is approved in writing by the Contracting Officer. Should a change in sources of any materials be made, perform a new mix design and a new JMF approved before the new material is used. Make minor adjustments within the specification limits to the JMF in Table 2 to optimize mix volumetric properties with the approval of the Contracting Officer. Adjustments to the Laboratory JMF must be applied to the field (plant) established JMF and limited to those values as shown. Adjustments must be targeted to produce or nearly produce 4 percent voids total mix (VTM). Asphalt content adjustments are limited to plus or minus 0.40 from the original JMF.

TABLE 2. Field (Plant) Established JMF Tolerances	
Sieves	Adjustments (plus or minus), percent
1/2 inch	3
No. 4	3
No. 8	3
No. 200	1
Binder Content	0.4

If adjustments are needed that exceed these limits, develop a new mix design. Tolerances given above may permit the aggregate grading to be outside the limits shown in Table 2; while not desirable, this is acceptable, except for the No. 200 sieve, which must remain within the aggregate grading in 2015 SDDOT D, E, or G Type 2 Aggregate see section 880.2.B.

PART 3 EXECUTION

3.1 CONTRACTOR QUALITY CONTROL

3.1.1 General Quality Control Requirements

Submit the Quality Control Plan. Do not produce hot-mix asphalt until the quality control plan has been approved. In the quality control plan, address all elements which affect the quality of the pavement including, but not limited to:

a. Mix Design and unique JMF identification code

b. Aggregate Grading

c. Quality of Materials

d. Stockpile Management and procedures to prevent contamination

e. Proportioning

f. Mixing and Transportation

g. Mixture Volumetrics

h. Moisture Content of Mixtures

i. Placing and Compaction

j. Joints

k. Surface Smoothness

l. Truck bed release agent

m. Correlation of mechanical hammer to hand hammer. Determine the number of blows of the mechanical hammer required to provide the same density of the JMF as provided by the hand hammer. Use the average of three specimens per trial blow application.

3.1.2 Testing Laboratory

Provide laboratory facilities at the plant for the use of the Government's acceptance testing and the Contractor's quality control testing.

3.1.3 Quality Control Testing

Perform all quality control tests applicable to these specifications and as set forth in the Quality Control Program. Use the independent commercial laboratory for acceptance testing in paragraph ACCEPTANCE. Use in-house capabilities or the independent commercial laboratory for quality control testing. Required elements of the testing program include, but are not limited to tests for the control of asphalt content, aggregate gradation, aggregate moisture, moisture in the asphalt mixture, temperatures, VMA, Marshall stability (NA for Superpave), flow (NA for Superpave), and in-place density. Develop a Quality Control Testing Plan as part of the Quality Control Program.

3.1.3.1 Asphalt Content

Determine asphalt content a minimum once per lot (a lot is defined in paragraph PAVEMENT LOTS) using the ignition method in accordance with ASTM D6307. Use the extraction method in accordance with ASTM D2172/D2172M Method A or B, or the nuclear method in accordance with ASTM D4125/D4125M. Calibrate the ignition oven or the nuclear gauge for the specific mix being used. For the extraction method, determine the weight of ash, as described in ASTM D2172/D2172M, as part of the first extraction test performed at the beginning of plant production; and as part of every tenth extraction test performed thereafter, for the duration of plant production. The last weight of ash value obtained must be used in the calculation of the asphalt content for the mixture.

3.1.3.2 Aggregate Properties

Determine aggregate gradations a minimum of once per lot from mechanical analysis of extracted aggregate in accordance with ASTM D5444, ASTM C136/C136M, and ASTM C117. When asphalt content is determined by the ignition oven or nuclear method, aggregate gradation must be determined from hot bin samples on batch plants, or from the cold feed on drum mix plants. Determine the specific gravity of each aggregate size grouping for each 20,000 tons in accordance with ASTM C127 or ASTM C128. Determine fractured faces for gravel sources for each 20,000 tons in accordance with ASTM D5821. Determine the uncompacted void content of natural sand, manufactured sand, and blended aggregate for each 20,000 tons in accordance with AASHTO T 304 Method A.

3.1.3.3 Moisture Content of Aggregate

Determine the moisture content of aggregate used for production a minimum of once per lot in accordance with ASTM C566.

3.1.3.4 Moisture Content of Asphalt Mixture

Determine the moisture content of the asphalt mixture at least once per

lot in accordance with AASHTO T 329.

3.1.3.5 Temperatures

Check temperatures at least four times per lot, at necessary locations to determine the temperature at the dryer, the asphalt cement binder in the storage tank, the asphalt mixture at the plant, and the asphalt mixture at the job site.

3.1.3.6 VMA, Marshall Stability, and Flow

Obtain mixture samples at least four times per lot. Calculate the VMA of each specimen in accordance with AI MS-2 based on ASTM C127 and ASTM C128 bulk specific gravity for the aggregate, as well as the Marshall stability and flow, as described in ASTM D6927. .

3.1.3.7 In-Place Density

Conduct any necessary testing to ensure the specified density is achieved. A nuclear gauge or other non-destructive testing device can be used to monitor pavement density in accordance with ASTM D2950/D2950M. Average in-place mat density to meet between 92 to 96 percent of the theoretical maximum density (TMD).

3.1.3.8 Additional Testing

Perform any additional testing deemed necessary by the Contractor to control the process, may be performed at the Contractor's option.

3.1.3.9 QC Monitoring

Submit all QC test results to the Government on a daily basis as the tests are performed. The Government reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing.

3.1.4 Sampling

When directed by the Government, sample and test any material which appears to not meet specification requirements unless such material is voluntarily removed and replaced or deficiencies corrected. Perform all sampling in accordance with standard procedures specified.

3.2 PREPARATION OF ASPHALT BINDER MATERIAL

Heat the asphalt cement material while avoiding local overheating. Provide a continuous supply of the asphalt material to the mixer at a uniform temperature. Maintain the temperature of the asphalt delivered to the mixer to provide a suitable viscosity for adequate coating of the aggregate particles. For hot-mix, do not heat unmodified asphalt to a temperature exceeding 325 degrees F when added to the aggregate. Do not heat modified asphalt to a temperature exceeding 350 degrees F when added to the aggregate.

3.3 PREPARATION OF MINERAL AGGREGATE

Heat and dry the aggregate prior to mixing. Provide a rate of heating and a maximum temperature that does not damage the aggregates. Do not heat the aggregate to a temperature exceeding 350 degrees F when the asphalt

binder is added. Maintain the temperature no lower than is required to obtain complete coating and uniform distribution on the aggregate particles and to provide a mixture of satisfactory workability.

3.4 PREPARATION OF HOT-MIX ASPHALT MIXTURE

Weigh or meter the aggregates and the asphalt cement and introduce into the mixer the amount specified by the JMF. Mix the combined materials until the aggregate obtains a uniform coating of asphalt binder and is thoroughly distributed throughout the mixture. Wet mixing time must be the shortest time that will produce a satisfactory mixture, but no less than 25 seconds for batch plants. Establish the wet mixing time for all plants based on the procedure for determining the percentage of coated particles described in ASTM D2489/D2489M, for each individual plant and for each type of aggregate used. The wet mixing time will be set to at least achieve 95 percent of coated particles. The moisture content of all asphalt mixture upon discharge from the plant is not to exceed 0.5 percent by total weight of mixture as measured by AASHTO T 329.

3.5 PREPARATION OF THE UNDERLYING SURFACE

Saw cut the full depth of the asphalt of the existing Spillway Access Road asphalt pavement as required for the work as required in this contract for the replacement of the toe drain outfall. Immediately before placing the asphalt mixture, clean the underlying course of dust and debris. Apply a prime coat or tack coat in accordance with 2015 SDDOT Section 320.3G including the saw cut surface of the existing asphalt pavement.

3.6 TRANSPORTING AND PLACING

3.6.1 Transporting

Transport the hot-mix asphalt mixture from the mixing plant to the site in clean, tight vehicles. Schedule deliveries so that placing and compacting of mixture is uniform with minimum stopping and starting of the paver. Hauling over freshly placed material will not be permitted until the material has been compacted as specified, and allowed to cool to 140 degrees F. To deliver mix to the paver, use a material transfer vehicle operated to produce continuous forward motion of the paver.

3.6.2 Placing

Prior to placing asphalt ensure aggregate base course layer as required per Section 32 11 23 AGGREGATE BASE COURSES and the aggregate base course is placed according to 31 00 00 EARTHWORK. Place the mix in lifts of adequate thickness and compact at a temperature suitable for obtaining density, surface smoothness, and other specified requirements. Upon arrival, place the mixture to the full width by an asphalt paver; strike off in a uniform layer of such depth that, when the work is completed, the required thickness is obtained and the surface conforms to the grade and contour indicated. Do not broadcast waste mixture onto the mat or recycle into the paver hopper. Collect waste mixture and dispose off site. Regulate the speed of the paver to eliminate pulling and tearing of the asphalt mat. Begin placement of the mixture along the centerline of a crowned section or on the high side of areas with a one-way slope. Place the mixture in consecutive adjacent strips having a minimum width of 10 feet. Offset the longitudinal joint in one course from the longitudinal joint in the course immediately below by at least 1 foot; however, locate the joint in the surface course at the centerline of the pavement. Offset

transverse joints in one course by at least 10 feet from transverse joints in the previous course. Offset transverse joints in adjacent lanes a minimum of 10 feet. On isolated areas where irregularities or unavoidable obstacles make the use of mechanical spreading and finishing equipment impractical, the mixture can be spread and luted by hand tools.

3.7 COMPACTION OF MIXTURE

3.7.1 General

a. After placing, thoroughly and uniformly compact the mixture by rolling. Compact the surface as soon as possible without causing displacement, cracking, or shoving. Determine the sequence of rolling operations and the type of rollers used with the exception that application of more than three passes with a vibratory roller in the vibrating mode is prohibited. Maintain the speed of the roller, at all times, sufficiently slow to avoid displacement of the asphalt mixture and to be effective in compaction. Correct at once any displacement occurring as a result of reversing the direction of the roller, or from any other cause.

b. Furnish sufficient rollers to handle the output of the plant. Continue rolling until the surface is of uniform texture, true to grade and cross section, and the required field density is obtained. To prevent adhesion of the mixture to the roller, keep the wheels properly moistened, but excessive water is not permitted. In areas not accessible to the roller, thoroughly compact the mixture with hand tampers or small compactors. Remove the full depth of any mixture that becomes loose and broken, mixed with dirt, contains check-cracking, or is in any way defective. Replace with fresh asphalt mixture and immediately compact to conform to the surrounding area. Perform this work at no expense to the Government. Skin patching is not allowed.

3.7.2 Segregation

The Government can sample and test any material that looks deficient. When the in-place material appears to be segregated, the Government has the option to sample the material and have it tested and compared to the in-place density requirements in paragraph 3.1.3.7. If the material fails to meet these specification requirements, remove and replace the extent of the segregated material the full depth of the layer of asphalt mixture at no additional cost to the Government. When segregation occurs in the mat, take appropriate action to correct the process so that additional segregation does not occur.

3.8 JOINTS

Construct joints to ensure a continuous bond between the courses and to obtain the required density. Provide all joints with the same texture as other sections of the course and meet the requirements for smoothness and grade.

3.8.1 Transverse Joints

Do not pass the roller over the unprotected end of the freshly laid mixture, except when necessary to form a transverse joint. When necessary to form a transverse joint, construct by means of placing a bulkhead or by tapering the course. Utilize a dry saw cut on the transverse joint full

depth and width on a straight line to expose a vertical face prior to placing the adjacent lane. Remove the cutback material from the project. In both methods, provide a light tack coat of asphalt material to all contact surfaces before placing any fresh mixture against the joint.

3.8.2 Longitudinal Joints

Provide a joint that meets density and smoothness requirements for joints and has uniform texture. Cut back longitudinal joints which are irregular, damaged, uncompacted, cold (less than 175 degrees F at the time of placing adjacent lanes), or otherwise defective, a maximum of 3 inches from the top of the course with a cutting wheel to expose a clean, sound, near vertical surface for the full depth of the course. Remove all cutback material from the project. Provide a light tack coat of asphalt material to all contact surfaces prior to placing any fresh mixture against the joint. The Contractor will be allowed to use an alternate method if it can be demonstrated that density, smoothness, and texture can be met.

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DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 31 13

VEHICLE BARRIER GATES

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SECTION 32 31 13

VEHICLE BARRIER GATES

PART 1 GENERAL

1.1 SUMMARY

The work covered by this section consists of furnishing all plant, labor, equipment and materials for the construction of two permanent vehicle barrier gates in accordance with these specifications, as shown on the contract drawings, and as directed by the Contracting Officer.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A116	(2011) Standard Specification for Metallic-Coated, Steel Woven Wire Fence Fabric
ASTM A702	(2013) Standard Specification for Steel Fence Posts and Assemblies, Hot Wrought
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM C94/C94M	(2021) Standard Specification for Ready-Mixed Concrete
ASTM F567	(2014a) Standard Practice for Installation of Chain Link Fence
ASTM F626	(2014) Standard Specification for Fence Fittings
ASTM F883	(2013) Padlocks

1.3 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Gate Assembly; G-BB

Gate Hardware and Accessories; G-BB

Erection/Installation Drawings; G-BB

SD-03 Product Data

Gate Assembly; G-BB

Gate Hardware and Accessories; G-BB

Zinc Coating; G-BB

Concrete; G-BB

Gate Posts; G-BB

SD-07 Certificates

Certificates of Compliance; G-BB

SD-08 Manufacturer's Instructions

Gate Assembly; FIO

Hardware Assembly; FIO

Accessories; FIO

1.4 QUALITY CONTROL

1.4.1 Certificates of Compliance

Submit certificates of compliance in accordance with the applicable reference standards and descriptions of this section for the following:

a. Zinc coating

b. Gate hardware and accessories

c. Concrete

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

PART 2 PRODUCTS

2.1 GENERAL

Provide fencing materials conforming to the requirements of ASTM A116, ASTM A702, ASTM F626, and as specified.

Submit manufacturer's installation drawings and instructions that detail proper assembly and materials in the design for fence, gate, hardware and accessories.

Submit erection/installation drawings along with manufacturer's catalog

data for complete gate assembly, hardware assembly and accessories.

2.2 COMPONENTS

2.2.1 Sleeves

Provide sleeves for setting into concrete construction of the same material as post sections, sized 1 inch greater than the diameter or dimension of the post. Weld flat plates to each sleeve base to provide anchorage and prevent intrusion of concrete.

2.2.2 Post-Brace Assembly

Provide bracing consisting of 1.660 inches O.D. pipe Grade A weighing 2.27 pounds per linear foot and 3/8 inch adjustable truss rods and turnbuckles.

2.2.3 Gate Posts

Provide a gate post for supporting each gate leaf as follows:

8-feet galvanized SS-40 gate posts:

Provide 6.625 inch O.D. galvanized pipe weighing 18.97 pounds per linear foot.

2.2.4 Post Tops

Provide tops that are steel, wrought iron, or malleable iron designed as a weathertight closure cap. Provide one cap for each post, unless equal protection is provided by a combination post-cap and wire supporting arm.

Provide caps with an opening to permit through passage of the top rail.

2.2.5 Gates

Gates shall be 2-inch outer diameter tubular double latch gate Schedule 40 Aluminum, Double G-Series Tubular Barrier Gate manufactured by Hoover Fence Co. or approved equal.

Gate components for each location (2 locations as shown on the Project Drawings) will consist of:

1 each: 4 foot high by 26 foot wide galvanized double tubular barrier gate
4 each: 2 inch aluminum post caps for gate
2 each: 6-5/8 inch outside diameter by 8 foot galvanized SS-40 gate hinge posts
2 each: 6-5/8 inch aluminum post caps for gate hinge post
4 each: 6-5/8 inch by 2 inch Malleable butt hinges
1 each: Fulcrum industrial double gate latch
2 each: Manual gate open stops

2.2.6 Gate Hardware and Accessories

Provide gate hardware and accessories that conforms to ASTM A116, ASTM A702, and ASTM F626, and be as specified:

Provide hinges suitable to gate size, non-lift-off type. Provide stops

and holders of malleable iron for vehicular gates. Provide stops that automatically engage the gate and hold it in the open position until manually released.

Provide malleable hinges to suit gate size, non-lift-off type, offset to permit 180-degree opening. Provide latch that permits operation from either side of the gate, with a padlock eye provided as an integral part of the latch.

2.2.7 Miscellaneous Hardware

Provide miscellaneous hot-dip galvanized hardware as required.

2.2.8 Padlocks

Provide padlocks conforming to ASTM F883, with chain.

2.3 MATERIALS

2.3.1 Zinc Coating

Provide hot-dip galvanized (after fabrication) ferrous-metal components and accessories, except as otherwise specified.

Provide galvanizing repair material that is cold-applied zinc-rich coating conforming to ASTM A780/A780M.

2.3.2 Tension Wire

Provide galvanized, coiled spring wire, No. 7-gage. Provide zinc coating that weighs not less than 1.2 ounces per square foot.

2.3.3 Concrete

Provide concrete conforming to ASTM C94/C94M, and obtaining a minimum 28-day compressive strength of 3,000 psi.

2.3.4 Grout

Provide grout of proportions one part portland cement to three parts clean, well-graded sand and a minimum amount of water to produce a workable mix.

PART 3 EXECUTION

Submit manufacturer's erection/installation drawings and instructions that detail proper assembly and materials in the design for fence, gate, hardware and accessories.

Provide complete installation conforming to ASTM F567.

3.1 PREPARATION

Ensure final grading and established elevations are complete for the haul road prior to commencing gate installation.

3.1.1 Clearing and Grading

Clear trees, brush, and other obstacles to install gates. Establish a

graded, compacted haul road and gate post area prior to gate installation.

3.2 INSTALLATION

Gates to be installed at the start of construction to provide construction security of the staging area and the haul road between the relief well channel and the Spillway Access Dike Road.

3.2.1 Excavation

Provide excavations for post footings which are drilled holes in virgin or compacted soil, of minimum sizes as indicated.

When solid rock is encountered near the surface, drill into the rock 18 inches for gate posts. Drill holes at least 1 inch greater in diameter than the largest dimension of the placed post.

Set bottom of each post not less than 42 inches below finished grade with minimum 18-inch diameter when in firm, undisturbed soil. Set posts deeper, as required, in soft and problem soils and for heavy, lateral loads.

Uniformly spread soil from excavations adjacent to the fence line or on areas of Government property, as directed.

If solid rock is below the soil overburden, drill to the full depth required except that penetration into rock need not exceed the minimum depths specified above.

3.2.2 Setting Posts

Remove loose and foreign materials from holes and moisten the soil prior to placing concrete.

Provide tops of footings that are trowel finished and sloped or domed to shed water away from posts. Set hold-open devices, sleeves, and other accessories in concrete.

Maintain vertical alignment of posts set in concrete construction until the concrete has set.

Keep exposed concrete moist for at least 7 calendar days after placement or cured with a membrane curing material, as approved.

3.2.2.1 Earth and Bedrock

Provide concrete bases of dimensions indicated on the manufacturer's installation drawings. Finish concrete to eliminate voids, and finish to a dome shape.

3.2.3 Concrete Strength

Do not hang gates until the concrete has attained its full 28-day design strength.

3.2.4 Gate Installation

Gate must be installed at the start of construction to secure and restrict access to the public of the haul road between the relief well channel and

Spillway Dikes Access Road.

Install gates plumb, level, and secure, with full opening without interference. Install ground set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricated where necessary.

3.2.5 Zinc-Coating Repair

Clean and repair galvanized surfaces damaged by welding or abrasion, and cut ends of fabric, or other cut sections with specified galvanizing repair material applied in strict conformance with the manufacturer's printed instructions.

3.2.6 Accessories Installation

3.2.6.1 Post Caps

Install post caps as recommended by the manufacturer.

3.2.6.2 Padlocks

Provide padlocks for gate openings and provide chains that are securely attached to gate or gate posts. Daisy chain the Contractor padlock to the USACE padlock.

3.2.7 Tolerances

Provide posts that are straight and plumb within a vertical tolerance of 1/4 inch after the gate has been hung. Provide gates that are true to line with no more than 1/2 inch deviation from the established centerline between line posts. Repair defects as directed.

3.3 CLEAN UP

Remove waste gate material and other debris from the work site and dispose of off-site.

3.4 CLOSEOUT ACTIVITIES

During close-out inspection ensure both gates and posts are in good condition, the gates can be opened in both directions, gates are able to be locked, and fence posts are straight and aligned. Remove Contractor padlock to both gates following demobilization from the site.

-- End of Section --

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DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 92 19

SEEDING AND EROSION CONTROL

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SECTION 32 92 19

SEEDING AND EROSION CONTROL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D4972	(2018) Standard Test Methods for pH of Soils
ASTM D5268	(2019) Topsoil Used for Landscaping Purposes

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1940; R 1988; R 1998) Federal Seed Act
DOA SSIR 42	(1996) Soil Survey Investigation Report No. 42, Soil Survey Laboratory Methods Manual, Version 3.0

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION (SDDOT)

2015 SDDOT	Standard Specifications for Roads and Bridges

1.2 DEFINITIONS

1.2.1 Stand of Turf

95 percent ground cover of the established species.

1.3 RELATED REQUIREMENTS

Section 31 00 00 EARTHWORK, and Section 31 23 00.00 20 EXCAVATION AND BACKFILL FOR COLLECTOR PIPE SYSTEM applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance with Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wood Cellulose Fiber Mulch; FIO

Fertilizer; G-AO

Include physical characteristics, and recommendations.

SD-06 Test Reports

Topsoil Composition Tests (reports and recommendations); G-AO

SD-07 Certificates

State Certification and Approval for Seed; G-AO

SD-08 Manufacturer's Instructions

Erosion Control Materials; G-AO

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.5.2 Storage

1.5.2.1 Seed, Fertilizer Storage

Store in cool, dry locations away from contaminants.

1.5.2.2 Topsoil

Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide.

1.5.2.3 Handling

Do not drop or dump materials from vehicles.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.6.1 Restrictions

Do not plant when the ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit. Do not plant during windy conditions.

1.7 TIME LIMITATIONS

1.7.1 Seed

Apply seed within twenty four hours after seed bed preparation.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Seed Classification

Provide State-approved seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Label in conformance with AMS Seed Act and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected.

2.1.2 Planting Dates

TABLE I. PLANTING DATES

Planting Season	Planting Dates
Spring	March 15 - June 1
Fall	August 15 - September 30

2.1.3 Seed Mixture by Weight

Permanent seed species and mixtures shall be proportioned by weight as follows:

TABLE II. FAIRGROUNDS TURF MISXTURE

Common Name/Botanical Name	Where Grown	Percent by Weight	Germination
Fairway Crested Wheatgrass	Canada	19.43	85
Boreal Creeping Red Fescue	Canada	19.59	95
Variety Not Stated Perennial Ryegrass	Minnesota	19.92	95
Honky Tonk Turf-Type Tall Fescue	Oregon	14.76	95
Cert. Washington Kentucky Bluegrass	Washington	24.14	85
Other Crop Sees		00.01	
Inert Matter		2.17	
Weed Seed		00.01	
TOTAL		100	

The seed mixture shall be lab tested and certified weed free by the company in which the seed is purchased. A copy of the certification including the purity, proportion seed mixtures by weight, and viability of the seed mix shall be supplied to the Corps.

2.2 TOPSOIL

2.2.1 On-Site Topsoil

Surface soil stripped from excavation and work areas stockpiled on site and modified as necessary to meet the requirements specified for topsoil in paragraph COMPOSITION. When available topsoil must be existing surface soil stripped and stockpiled on-site in accordance with Section 31 00 00 EARTHWORK. Natural, friable soil representative of productive, well-drained soils in the area, free of subsoil, stumps, rocks larger than one inches diameter, brush, weeds, toxic substances, and other material detrimental to plant growth.

2.2.2 Off-Site Topsoil

Conform to requirements specified in paragraph COMPOSITION. When additional topsoil is required beyond the available topsoil from the stripping operation, the additional topsoil must be furnished by the Contractor at no additional cost to the government.

2.2.3 Composition

Topsoil shall be as defined in ASTM D5268. When available, the topsoil shall be the existing surface soil stripped and stockpiled onsite. When additional topsoil is required beyond the available topsoil from the stripping operation, topsoil shall be delivered and amended for the seed specified. Topsoil shall be free from viable plants, slag, cinders,

stones, lumps of soil, sticks, roots, trash or other material over a minimum 1 inch diameter. Topsoil composition must contain from 5 to 10 percent organic matter as determined by the topsoil composition tests of the Organic Carbon, 6A, Chemical Analysis Method described in DOA SSIR 42. Maximum particle size, 1 inch, with maximum 3 percent retained on 1/4 inch screen. The pH must be tested in accordance with ASTM D4972. Topsoil must be free of sticks, stones, roots, and other debris and objectionable materials. Amend topsoil pH range to obtain a pH of 5.5 to 7.

2.3 FERTILIZER

2.3.1 Fertilizer

Refer to 2015 SDDOT Section 731.

2.4 MULCH

Mulch must conform to 2015 SDDOT Section 732.

2.4.1 Straw

Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw must contain no fertile seed.

2.4.2 Hay

Air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay must be sterile, containing no fertile seed.

2.4.3 Wood Cellulose Fiber Mulch

Use recovered materials of either paper-based (100 percent post-consumer content) or wood-based (100 percent total recovered content) hydraulic mulch. Processed to contain no growth or germination-inhibiting factors and dyed an appropriate color to facilitate visual metering of materials application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 5.5 to 8.2

2.5 WATER

Source of water must be approved by Contracting Officer and of suitable quality for irrigation, containing no elements toxic to plant life.

2.6 EROSION CONTROL MATERIALS

Erosion control material must conform to the following:

2.6.1 Erosion Control Blanket

Erosion Control Blanket shall be Western Excelsior, Excel SS-2 or meeting the following:

TABLE III. EROSION CONTROL BLANKET SPECIFICATIONS

Table Text

Tested Property	Test Method	Value
Tensile Strength (MD) x (TD)	ASTM D6818	10.0 lb/in (1.8 kN/m) x 6.2 lb/in (1.1 kN/m)
Elongation (MD) x (TD)	ASTM D6818	20 % x 26 %
Mass Per Unit Area	ASTM D6475	8.0 oz/yd^2 (271 g/m^2)
Thickness	ASTM D6525	0.28 in (7 mm)
Light Penetration	ASTM D6567	22 % open
Water Absorption	ASTM D1117	450 %

TABLE IV. EROSION CONTROL BLANKET NETTING REQUIREMENTS

Top Net Type	Synthetic, Photodegradable
Bottom Net Type	Synthetic, Photodegradable
Top Net Opening Dimensions	0.5 in (13 mm) x 0.5 in (13 mm)
Bottom Net Opening Dimensions	0.5 in (13 mm) x 0.5 in (13 mm)

2.6.2 Erosion Control Fabric

Fabric must be knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips must have a minimum life of 6 months.

2.6.3 Erosion Control Net

Net must be heavy, twisted jute mesh, weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately one square inch.

2.6.4 Erosion Control Material Anchors

Erosion control anchors must be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 EXTENT OF WORK

Provide soil preparation prior to planting (including soil conditioners as required), fertilizing, seeding, and surface topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.1.1.1 Topsoil

Provide 6 inches of off-site topsoil or on-site topsoil to meet indicated

finish grade. Spread topsoil evenly. Verify that areas have been brought to indicated finish grades as indicated in the drawings, and smooth grading, and compaction requirements have been completed prior to the commencement of the seeding operation. The completed surface will be free of depressed areas where water would pond. All areas will be graded to drain readily. Previously constructed cohesionless fill grades will be repaired, if necessary, so that areas to receive topsoil conform to the final grades shown on the drawings upon completion of topsoil placement. Incorporate fertilizer soil conditioners into soil a minimum depth of 4 inches by tilling or other method approved by the Contracting Officer. Remove debris and stones larger than 1 inch in any dimension remaining on the surface after finish grading. Correct irregularities in finish surfaces to eliminate depressions. Prior to seeding operations the soil must be tilled to a depth of no less than 6 inches to allow root penetration in all areas that have been compacted by construction equipment. Do not place topsoil when frozen or excessively wet or dry. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.1.1.2 Tillage

Soil on slopes up to a maximum 3-horizontal-to-1-vertical must be tilled to a minimum 6 inch depth. Rototillers must be used where soil conditions and length of slope permit. Drainage patterns must be maintained as indicated on drawings. Areas compacted by construction operations must be completely pulverized by tillage. The fertilizer may be applied during this procedure.

3.1.1.3 Fertilizer Application Rates

Apply fertilizer at rates here specified. Fertilizer shall be applied at 350 pounds per acre. Fertilizer shall be incorporated in to the soil to a maximum depth of 4 inches or may be incorporated as part of the tillage or hydroseeding process.

3.2 SEEDING

Place lawn seed in areas of the work area identified for topsoil and seeding. Place field seed on staging areas.

3.2.1 Seed Application Seasons and Conditions

Immediately before seeding, restore soil to proper grade. Do not seed when ground is muddy frozen snow covered or in an unsatisfactory condition for seeding. Seeding must not be performed in windy conditions. If special conditions exist that may warrant a variance in the above seeding dates or conditions, submit a written request to the Contracting Officer stating the special conditions and proposed variance. Apply seed within twenty four hours after seedbed preparation. Sow seed by approved sowing equipment. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing.

3.2.2 Seed Application Method

Seeding method must be broadcasted and drop seeding, drill seeding, or hydroseeding.

3.2.2.1 Broadcast and Drop Seeding

Seed must be uniformly broadcast at the rate of 2 pounds per 1,000 square feet. Use broadcast or drop seeders. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing. Cover seed uniformly to a maximum depth of 1/4 inch in clay soils by means of spike-tooth harrow, cultipacker, raking or other approved devices.

3.2.2.2 Drill Seeding

Seed must be drilled at the rate of 2 pounds per 1,000 square feet. Use of cultipacker seeders or grass seed drills is permissible. Drill seed uniformly to average depth of 1/2 inch.

3.2.2.3 Hydroseeding

First, mix water and fiber. Wood cellulose fiber, paper fiber, or recycled paper must be applied as part of the hydroseeding operation. Fiber must be added at 1,000 pounds, dry weight, per acre. Then add and mix seed and fertilizer to produce a homogeneous slurry. Seed must be mixed to ensure broadcasting at the 2 pounds per 1000 square feet. When hydraulically sprayed on the ground, material must form a blotter like cover impregnated uniformly with grass seed. Spread with one application with no second application of mulch.

3.2.3 Mulching

3.2.3.1 Hay or Straw Mulch

Hay or straw mulch must be spread uniformly at the rate of 2 tons per acre. Mulch must be spread by hand, blower-type mulch spreader, or other approved method. Mulching must be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch must not be bunched or clumped. Sunlight must not be completely excluded from penetrating to the ground surface. All areas installed with seed must be mulched on the same day as the seeding. Mulch must be anchored immediately following spreading.

3.2.3.2 Mechanical Anchor

Mechanical anchor must be a V-type-wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.

3.2.4 Rolling

Immediately after seeding, firm entire area except for slopes in excess of 4H to 1V with a roller not exceeding 90 pounds for each foot of roller width. If seeding is performed with cultipacker-type seeder or by hydroseeding, rolling may be eliminated.

3.2.5 Erosion Control Material

Surface erosion control material must be installed within 24 hours of seeding in accordance with manufacturer's instructions to preserve the condition of the prepared surface until establishment of stand of turf. Soil erosion control material must be placed on all seeded surfaces shown on the plans with slopes of 1 vertical on 4 horizontal (1V:4H) or steeper and all swales concentrating water leading to culverts, inlets and

surfaces around culvert entrances and exits that are not indicated to have riprap. Placement of the material must be accomplished without damage to installed material or without deviation to finished grade.

3.2.6 Watering

Start watering areas seeded as required by temperature and wind conditions. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of 2 inches without run off. During the germination process, seed is to be kept actively growing and not allowed to dry out.

3.3 SATISFACTORY STAND OF GRASS PLANTS

Grass plants must be evaluated for species and health when the grass plants are a minimum 6 inches high but no less than 30 days after finish of the seeding operation. Grass plants may be evaluated for species and health. A satisfactory stand of grass plants from the seeding operation shall be living grass uniform in color and leaf texture. Bare spots shall be a maximum 72 inches square, and shall not exceed 2 percent of the total area. Unsatisfactory stand of grass may require reseeding at the discretion of the COR at no additional cost to the Government

3.4 QUANTITY CHECK

For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as a record for the amount used. The amount of material used shall be compared with the total area covered to determine the rate of application used. Differences between the quantity applied and quantity specified shall be adjusted as directed.

3.5 RESTORATION

Restore to original condition existing turf areas which have been damaged during turf installation operations at the Contractor's expense. Clean other paving when work in adjacent areas is complete. Seeding requirements of disturbed areas should be in accordance with Section 01 57 20.00 10 ENVIRONMENTAL PROTECTION, paragraph 3.13 POST CONSTRUCTION CLEANUP, and as follows. For turf areas that were originally native grass, seed and mulch the disturbed area restoring the area to its original condition.

3.6 SEED ESTABLISHMENT PERIOD

3.6.1 Commencement

The seed establishment period to obtain a healthy stand of turf shall begin on the first day of work under this contract and shall end 6 months after the last day of the seeding operation in areas where there was spring seeding, or 12 months in areas where was fall seeding. Written calendar time period shall be furnished for the seed establishment period. When there is more than 1 seed establishment period, the boundaries of the seeded area covered for each period shall be described. The seed establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.

3.6.2 Field Seeded Areas

A satisfactory stand of grass plants from the seeding operation must be defined as consisting of 100 grass plants per square foot. Bare spots must

be a maximum 6 inches square. Bare spots must be a maximum 5 percent of the total seeded area for any one acre of seeded land.

3.6.3 Repair of Reinstall

Unsatisfactory stand of grass plants and erosion control blanket shall be repaired or reinstalled, and eroded areas shall be repaired in accordance with paragraph 3.1 PREPARATION at no additional cost to the government.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 33 - UTILITIES

SECTION 33 26 00

DEWATERING

-- End of Section Table of Contents --

SECTION 33 26 00

DEWATERING

PART 1 GENERAL

The work covered in this section consists of planning; reporting; furnishing all plant, labor, manpower, power supply (including emergency backup), materials and equipment; and performing all operations in connection with the design, installation, operation, monitoring, and abandonment of a dewatering system for required construction activities in association with the removal and replacement of the existing toe drain, relief well collector pipe, and toe drain outfall; and with installations of new manholes and relief well casing outfalls at Big Bend Dam, South Dakota.

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1110-1-1807	(2014) Drilling in Earth Embankment Dams and Levees
USACE 2022 GDR	(2022) Geotechnical Data Report, Missouri River, Fort Thompson, South Dakota

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Pre Construction Submittals

Dewatering System Design Fieldwork Plan; G-DO

Submitted only if the Contractor and the dewatering system design engineer elect to perform additional field investigation to aid in the dewatering design. The Dewatering System Design Fieldwork Plan must be submitted for approval and must include detail on all intended field information planned to be obtained, rationale supporting information to be obtained, the techniques and equipment to be used to collect the information, and fulfil all requirements in Engineering Regulation ER 1110-1-1807. Information, evaluation, and results of data obtained from the field investigation must be presented in the Dewatering Plan. Approval of all plans pertaining to this field investigation that include pertinent requirements under ER 1110-1-1807 which includes a Dewatering System Fieldwork Design Drilling Program Plan will take 4 to 6 weeks to obtain approval and must be finalized prior

to the start of field activities. See specification 02 32 13 SUBSURFACE DRILLING AND SAMPLING for drilling and sampling requirements if a dewatering system field investigation is be performed.

Dewatering Drilling Program Plan; G, DO

The pre-construction submittal detailing the drilling as part of the dewatering system shall be titled Dewatering Drilling Program Plan (DPP). The dewatering system will include installation and abandonment of well points, piezometers, and other dewatering devices requiring drilling. An approved DPP must be prepared following all requirements outlined in ER 1110-1-1807, "Drilling in Earth Embankment Dams and Levees" (31 December 2014). The DPP shall be designed to minimize the need for any pressurized drilling fluid such as air, gas, water, mud, polymers, slurries or any other drilling fluid. If drilling fluids must be used, the DPP must include an analysis of the potential to cause damage (drilling induced hydraulic fracture analysis) and a plan that covers the measures that will be used to minimize the risk. All drilling activities on USACE dams must be conducted in the presence of a registered professional geotechnical engineer/geologist who must be responsible for maintaining the integrity of the structure. Information described in the plan concerning well and piezometer installation and abandonment must include, but not limited to, well and piezometer locations, installation methods of wells and piezometers, installation materials, development, response testing, handling and disposal of drill cuttings and other environmental and non-environmental related wastes must follow relevant criteria present in specification 02 32 13 SUBSURFACE DRILLING AND SAMPLING. Considerations for work performed in areas impacted by TPH-DRO must follow relevant criteria presented in specification 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS and its appropriate references, abandonment, and surveying techniques; equipment to be used; manufacturers' material cut sheets; design of relief wells and piezometers; locations; surveying components to be completed; proposed field forms/diagrams for logging, well and piezometer construction; drilling crew and surveyor licenses, etc. Jetting techniques for installation of well or piezometers is not allowed. Approval of the Dewatering DPP may take 4 to 6 weeks.

Dewatering Plan; G-DO

The existing site geology and groundwater conditions have the potential to result in instability of the excavation and the risk of dam failure and/or significant damage from internal erosion. The work area must be dewatered to manage this risk and to allow the excavation of the existing toe drain, relief well collector pipe and the toe drain outfall along with all supporting structures (risers, relief well casing outfalls, etc.). A dewatering plan/system must be prepared by a licensed professional engineer with a minimum of 5 years recent experience (within the past 5 years) designing and implementing dewatering systems for dams on projects of similar size and scope.

Primary criteria of the dewatering system is to establish and maintain a distance of 2-feet from the groundwater surface to any

face of the excavation at all times and to prevent embankment and/or formation material from being transported (piped) into any excavation. This includes operating the dewatering system until all new drainage system(s)and collector pipes are installed, fully functional and backfill is place to the original ground surface. Additionally, the dewatering system will need to operate 24 hrs per day, 7 days per week during the entirety of the construction project where construction is below the groundwater table, and resulting in no groundwater flux into any portion of the excavation.

Dewatering must be completed by a dewatering well point system with closely spaced dewatering devices, or other approved method(s), where groundwater is evacuated from dewatering devices by means of pumping via vacuum, submersible pumps, or other approved method(s) (excluding open pumping/sumping) as defined in the Dewatering Plan. Sumps, as approved in the Dewatering Plan and by the Contracting Officer's Representative (COR), may be used for incidental water removal and in low permeability applications where dewatering devices are not considered effective.

Note that a dewatering system design field investigation may be performed by the dewatering system designer to determine groundwater conditions critical to the contractor's design, hydraulic parameters and pumping rates to aid in the development of the Dewatering Plan and apply to the actual dewatering system design and implementation. If a field investigation is completed, a Dewatering System Design Fieldwork Plan must be submitted as specified in the Section. The Dewatering System Design Fieldwork Report must be included in the Dewatering Plan as an appendix.

The Dewatering Plan must include, at a minimum, the following:

1) Dewatering device design and spacing (with backup calculations and other supporting information).

2) Dewatering device row length(s) and alignments.

3) Dewatering device header collection and discharge piping design and routing.

4) Discharge locations, erosion protection, and flow measurement method(s) and equipment.

5) Pumping method(s)and description.

6) Piezometric elevation thresholds that defines safe excavation conditions for each monitoring point.

7) Groundwater level and a quality monitoring plan showing monitoring locations to ensure water level is acceptable for construction along with other measurement locations such as flow and sand content testing.

8) Installation method(s) for dewatering devices and monitoring points.

9) Considerations for work performed in areas impacted by TPH-DRO (must follow relevant criteria for drill cuttings and other waste

handling as presented in specification 02 32 13 SUBSURFACE DRILLING AND SAMPLING and its appropriate references);

10) Isolation/containment capability and plan for contaminated groundwater.

11) List and description of supplies and equipment used for all dewatering system components and monitoring including primary and secondary equipment, pumps, header and discharge piping, power supply, emergency backup equipment and power supply, monitoring supplies and equipment and all other miscellaneous supplies and equipment.

12) System abandonment details.

13) Site restoration details.

14) Dewatering System Contingency Plan(s) that addresses all personnel, measures and equipment (including backup equipment) required to prevent dewatering system outage or failure.

15) Slope stability analysis as it pertains to all components of the dewatering system including design and implementation.

16) Dewatering Drilling Program Plan prepared in accordance with ER 1110-1-1807.

17) Safety worksheet(s) for the various tasks.

A dewatering device is considered as any type or design of a well utilized for dewatering purposes and installed by techniques approved by the COR. Dewatering and monitoring devices must not be installed using jetting techniques. Dewatering criteria and all operating procedures including monitoring requirements along with supporting calculations, figures, tables, references, and pertinent equipment information must be included in this plan. The plan must also include any grading, excavation, or ancillary work required to facilitate dewatering system installation and operation outside of the construction area; grading must be designed by a licensed professional engineer and must ensure adequate slope stability for design, support, and operation of the dewatering system. Spoils/waste handling procedures from dewatering device installation and development must also be addressed in the plan. This plan must include a comprehensive schedule, in Gantt chart format, of all tasks (preparation work, installation, operation, monitoring, abandonment, etc.) showing start and stop dates for all construction efforts. The system must be designed and operated as to limit the amount of discharged sand (measured by a Rossum centrifugal sand tester) to no more than 10 ppm. The dewatering design and operation must consider a maximum reservoir pool and tail water elevations of 1421.5 feet and 1362.0 feet, respectively. The contractor must notify the Contracting Officer when either or both of these elevations are reached and if the dewatering system is/is not meeting performance criteria. Emergency backfilling according to SECTION 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM will be initiated if the Emergency Contingency Plan scenarios outlined are realized (includes reservoir or tailwater elevation will be sustained for more than 12 hours above the maximum

dewatering design) and the dewatering system is unable to maintain the required 2 feet below bottom of excavations.

If dewatering criteria is not met, then backfill of excavations must be completed to a level where criteria are met and the dewatering system shall be upgraded to allow construction to proceed once dewatering criteria are met to the satisfaction of the Contracting Officer. The Contractor must submit the Dewatering Plan to the Contracting Officer for approval no later than 8 weeks prior to start of construction to allow for adequate review and adjustment.

Any drilling conducted as part of the dewatering system must conform to the requirements in ER 1110-1-1807 "Drilling in Earth Embankment Dams and Levees". If there are any construction items awarded as options (that require dewatering) a Dewatering Plan must be submitted as an addendum to the main Dewatering Plan. All federal/state/county/other permits required to install/operate/abandon the dewatering system shall be detailed in the Dewatering Plan and obtained by the Contractor.

Dewatering Personnel Qualifications; G-DO

The Contractor must provide dewatering personnel qualifications prior to or concurrent with submission of the Dewatering Plan. The dewatering system designer must be a licensed professional engineer with a minimum of 5 years recent experience (within the past 5 years) designing and implementing dewatering systems for dams on projects of similar size and scope. Personnel that are operating/monitoring the system must demonstrate a working knowledge of system mechanics and all aspects of the dewatering plan requirements including the Dewatering System Contingency Plan and the Emergency Contingency Plan.

SD-11 Closeout Submittals

Dewatering Final Implementation and Operation Report; G-DO

A Dewatering Final Implementation and Operation Report must be developed at completion of dewatering efforts. The report must include an as-built descriptions of all components of the final dewatering system with general specifications discussion, any surveyed coordinate and elevation information for the final dewatering system, map showing surveyed locations, illustration of all components of the final dewatering system configuration (, tabulated daily piezometric and combined flow readings, tabulated daily Rossum sampler readings, copies of the drilling/sampling logs, piezometer construction diagrams, development forms, response test forms, abandonment forms, and survey coordinate and elevation information, concise descriptions of work completed, techniques used, tabulated construction details, problems encountered and how they were overcome, variations from the plan, etc., difficulties encountered during installation and operation of the system and how these difficulties were overcome, system abandonment, and final site remediation and conditions after system abandonment.

PART 2 PRODUCTS

2.1 GOVERNMENT FURNISHED MATERIALS

All USACE available existing engineering, piezometric, and pumping data are included in USACE, 2022, Geotechnical Data Report, Missouri River, Fort Thompson, South Dakota (USACE 2022 GDR) will be provided to the bidders. This information is to be used for information only and as an aid in developing the dewatering plans and costs. The Contractor is required to assess all available information and in conjunction with their professional knowledge determine and present their actual proposed dewatering strategy and cost. The raw data from pump tests performed by the USACE and presented in USACE 2022 GDR must be evaluated by the Contractor to enable the development of their dewatering strategy.

After contract award, the Contractor may perform additional field study(s) that include aquifer testing, exploration and lab testing as approved by the COR, to validate their critical dewatering design and operational assumptions. Existing relief wells/piezometers may be used as needed for any characterization efforts, however, damage to these relief wells/piezometers must be remedied at no cost and to the acceptance of the government.

2.2 DESIGN ASSUMPTIONS FOR BIDDING, CONSTRUCTION AND OPERATIONAL PURPOSES

All information presented to the Contractor is for consideration and to be used per their judgment to aid in their development of the dewatering strategy and bid development purposes only. The Contractor is required to assess all available information and in conjunction with their professional knowledge determine and present their actual proposed dewatering strategy and cost. The raw data from pump tests performed by the USACE and presented in USACE 2022 GDR must be evaluated by the Contractor and may be used in part, at their discretion, to enable the development of their dewatering strategy. One of the primary criterion of the dewatering system is to establish and maintain groundwater levels at a minimum of 2-feet from all excavation faces during any point in construction that an excavation is at or below the groundwater table (note that the groundwater table level may be influenced during the construction process due to changes in the reservoir and/or tailwater level or other factors). It can be assumed that incidental surface water entering the excavation from precipitation or incidental groundwater bypassing between adjacent dewatering devices can be evacuated from the excavation by constructing sumps and removing the water from the sumps by use of trash pumps. However, the use of sumps to remove incidental groundwater from open excavations is only allowed if groundwater is entering any face of the excavation at a rate/length ratio based on no more than 1 gpm per 80-feet of open excavation and embankment and/or formation materials are not being transported into the excavation by the inflow.

Sumps may be allowed as the primary dewatering method for relief well casing outfall pipe installation from RW-66R and RW-66AR to the Relief Well Channel (these excavations will be in low permeable materials), provided the excavation remains stable and piping is not realized. If this method proves unsatisfactory as deemed by the COR, then the use of other Contracting Officer approved dewatering devices must be used to supplement the dewatering effort.

PART 3 EXECUTION

3.1 DEWATERING FOR EXCAVATIONS

A dewatering system must be installed, operated, maintained, and monitored as designed to facilitate construction in dry conditions and to prevent transportation of embankment and/or foundation materials into excavations due to groundwater flow. The contractor is responsible for providing a safe working environment for all facets of the dewatering operation. The licensed professional engineer who designed the dewatering system must be on-site to inspect the dewatering system and trench stability during the initial start up of the system and if significant issues (trench stability, boils, piping, excessive inflows of water into the trench, etc.) develop during dewatering system operation as determined by the Contracting Officer. A Dewatering Plan must be submitted to the for Government approval.

Excising relief wells may be considered for pumping to support dewatering by COR approved methods. Prior to pumping a capacity test and initial well depth must be obtained; after pumping a capacity test and final depth must be obtained. Any damage to the well will require repair/replacement at no cost to the government and be to the satisfaction of the COR. The intent of the dewatering system is that it must maintain groundwater levels a minimum of 2-feet from any open excavation face (excavation sides/bottom) during all stages of work progress in saturated conditions while maintaining a safe and stable working environment. Incidental amounts of groundwater (defined as groundwater entering any face of the excavation at a total rate/length ratio based on no more than 1 gpm per 80-feet of open excavation unless embankment and/or formation materials are being transported into the excavation by groundwater inflow at that prescribed total rate/length ratio) entering the excavation may be removed by constructing sumps within the excavation and removing water from the sumps by use of submersible pumps as approved by the COR. Note that dewatering by sump methods is to be largely incidental and not to be employed as the primary dewatering method and must not be used if the trench sidewall and bottom are unstable or if piping of materials into the excavation is occurring. Excavation must not take place until it can be shown with monitoring data that groundwater levels are 2-feet from any excavation face and is approved by the COR. Groundwater evacuated by the dewatering system shall be discharged in a safe manner, not causing erosion, and at a distance away from construction site workings as approved in the Dewatering Plan. The Contractor shall also include in the Emergency Contingency Plan the event of a dewatering system power failure and/or if excessive seepage into the excavation is encountered that may/may not require immediate backfilling/filtering as per 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM. As part of the Dewatering System Contingency Plan, prior to and during excavation and backfilling procedures below the pre-pumping static groundwater level, filter sand must be stockpiled along the open trench at a minimum volume of two times the open trench (see specification 31 23 00.00 20 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM for any additional detail). Upon completion of dewatering requirements, the contractor shall remove the system and refurbish all ground disturbed by the construction and operation of the dewatering system to preconstruction or final grade conditions as shown on the drawings and specified in the specifications.

The dewatering design and/or implementation must be adjusted as needed to fulfill the purpose/objectives of the dewatering effort and may require

major or minor adjustments in the field as site conditions and/or construction practices dictate. To ensure that appropriate dewatering/drawdown is being accomplished, a monitoring system must be installed that allows for monitoring groundwater levels adjacent to the excavation (assume a minimum of 7 permanent groundwater piezometer installations of approximately 25 feet deep as outlined in Section 33 66 00 NEW PIEZOMETER AND EXISTING PIEZOMETER ABANDONMENT). Any infrastructure (such as piezometers, relief wells, etc.) that are damaged during any portion of this work are to be replaced at no cost and to the satisfaction of the government. Daily groundwater measurements from this system (in addition to the existing piezometers shown in the drawings) must be recorded by the Contractor in accordance with the approved groundwater monitoring methods identified in the Dewatering Plan. Piezometer readings and visual observation of open excavation must be performed and documented by a competent person and must occur at a similar time each day prior to commencement of work. Excavation must not take place until written notice is provided by the Contractor's dewatering engineer that suitable dewatered conditions have been attained as shown by field data and measurement evaluation as presented to, and accepted by the COR. Suitable dewatered conditions must be verified, and accepted by the COR, on a daily basis. In addition to the groundwater level monitoring system implementation, a system must be in place that allows for accurate readings of the dewatering discharge rates and sand content measurements (not to exceed 10 ppm) by a Rossum centrifugal sand tester. Dewatering discharge rates and sand content measurements shall also apply to the pumping of existing relief wells.

This system must provide for instantaneous and continuous totalized groundwater discharge readings and sand content readings to be read/recorded and reported daily to the COR and emailed daily, along with daily groundwater-level measurement to the Dam Safety Engineer. Contact information for submittal of daily monitoring information will be provided following contract award. Dewatering shall not be abandoned until after final left abutment collector pipe flushing and post installation camera inspection (see 33 46 16 PIPE AND APPURTENANCES FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM). All dewatering devices must be abandoned by pulling the entire length of the point from the ground and backfilling with like formation/embankment material. If this cannot be accomplished without damage to the formation, a suitable abandonment method shall be proposed to, and accepted by the COR. The abandonment method must not interfere in any way with the intended operation of any component, new or existing, of the entire seepage control system. Any damage done by the discharge of the dewatering system must also be restored to the satisfaction of the COR.

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SECTION 33 26 00.00 10

REPLACEMENT RELIEF WELL CASINGS AND ABANDONMENT OF EXISTING RELIEF WELLS, CASINGS & CASING OUTFALLS

PART 1 GENERAL

The work covered in this section consists of planning; reporting; furnishing all plant, labor, materials and equipment; and performing all operations for installing new 36-inch diameter HDPE replacement relief well casings and their cast-in-place concrete base slabs and for the abandonment of existing relief wells and their relief well casings and relief well casing outfalls.

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A618/A618M	(2004; R 2010) Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM C33/C33M	(2018) Standard Specification for Concrete Aggregates
ASTM C150/C150M	(2020) Standard Specification for Portland Cement
ASTM F714	(2022) Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 229	Report on Controlled Low-Strength Materials

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2014) Safety and Health Requirements Manual
USACE 2022 GDR	(2022) Geotechnical Data Report, Missouri River, Fort Thompson, South Dakota

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Existing Relief Well Abandonment Work Plan; G, DO

A well abandonment work plan for the existing relief wells, CMP casings and relief well casing outfall pipes shall be submitted to USACE. The following items shall be included in the report: method and location for sealing inflow and outflow pipes for each well to be abandoned; grout mix and volumetric calculations for relief well abandonments; grouting procedures including surface completion removals and backfill materials and methods; and inflow and outflow pipe abandonment procedures.

The abandonment plan shall also include the following information for the abandonment of existing relief well casing outfall pipes RW-66 and 66A with flowable fill: A description of the method of flowable fill sequence, method of cleaning the outfall pipe, method of camera inspection to confirm no obstructions prior to flowable fill placement, theoretical volume of flowable fill to fill the outfall, projected injection rate and pressure, method of controlling flowable fill pressure, and method of capping/sealing the outlet end of the outfall pipe, hydraulic fracturing calculation, consideration of staged grouting if determined required following hydraulic calculation.

Abandonment of relief wells or relief well casing outfalls is not permitted until written approval is received from the COR and requirements specified herein.

SD-02 Shop Drawings

Relief Well Casing Covers; G, DO

SD-03 Product Data

Existing Relief Well Casing Outfall Pipe Caps; G, DO

Submit product data for the caps for the existing relief well casing outfalls (8" diameter corrugated metal pipe or HDPE pipe) prior to installation and abandonment of the outfall pipe.

SD-04 Samples

Relief Well Valve Assembly; G, DO

Contractor to submit sample relief well assembly valve 15 days prior to installation.

SD-06 Test Reports

Relief Well Casing Outfall Camera Inspection; G, AO

SD-11 Closeout Submittals

Relief Well Decommissioning/Abandonment Record; G, DO

A well abandonment record and sketch of each abandoned well shall be submitted to USACE for each well abandoned. The following

items, at a minimum, shall be included in the abandonment records: a. Project name. b. Well designation. c. Measured well depth and water level prior to abandonment. d. Date of abandonment. e. Method of abandonment. f. All materials used in the abandonment procedure and the interval in which materials were placed. g. Description and total quantity of grout used initially. h. Description and daily quantities of grout used to compensate for settlement. i. surface completion feature removal procedures and depths (including inflow and outflow pipes if present. j. Issues encountered during abandonment. k. Verification of submittal of abandonment records to State of South Dakota.

1.3 PROJECT/SITE CONDITIONS

1.3.1 Existing and Replacement Relief Wells, Casings, and Outfalls

There are six (6) existing relief wells to be abandoned: RW-66, RW-66A, RW-67, RW-68, RW-68A, and RW-68B as indicated on the Contract Drawings. There are six (6) replacement wells (RW-66R, RW-66AR, RW-67R, RW-68R, RW-68AR, and RW-68BR) that require new casings to be installed with new relief well casing outfalls connected to the new left abutment collector pipe system near the locations indicated on the Contract Drawings. USACE will install the replacement wells prior to the Contractor mobilizing to the site. USACE will provide relief well completion diagrams for the replacement wells to the Contractor following their installation. Based on the 2020 rehabilitation work performed on the wells to be abandoned (see USACE, 2022, Geotechnical Data Report, Missouri River, Fort Thompson, South Dakota USACE 2022 GDR submitted under separate cover), for bidding purposes it can be assumed there are no blockages greater than 25% of the entire screen length present.

PART 2 PRODUCTS

2.1 GOVERNMENT FURNISHED INFORMATION AND MATERIALS

All available existing relief well as-built construction and design data (USACE, 2020, Big Bend Dam (SD01092) Toe Drain and Relief Well Collector Pipe Replacement Engineering Geology Report, Missouri River, Fort Thompson, South Dakota) will be provided to the Contractor in the USACE 2022 GDR under separate cover. This information is to be used for information only and as a guide in developing the relief well abandonment plan. The location of the six replacement wells as shown on the Contract Drawings are approximate. Final replacement relief well locations may slightly vary from what is shown on the drawings. USACE will provide the six replacement well locations, boring logs, and relief well completion logs to the Contractor following their installation by USACE. Locks for the six replacement wells will be Government supplied and secured to the relief wells by COR following Post-Installation Inspection of the Left Abutment Collector Pipe System.

2.2 TYPES OF FILL MATERIALS

2.2.1 High Density Grout

Provide weighted neat cement grout composed of 8 gallons water: 94 lbs. Portland Cement: 50 lbs. BAROID® 41 Barite: 5 lbs. CETCO® SUPER GEL-X drilling fluid or equivalent. The desired mixture shall have a density of 16.5 lbs/gal. The CETCO® SUPER GEL-X shall be added to the Portland cement and water prior to adding the BAROID® weighting material. The

material shall be added through a high shear mixer so the entire circulating volume is at uniform weight.

2.2.2 Impervious Fill

Impervious fill must conform to Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

2.2.3 Flowable Fill

Flowable fill must have a compressive strength between 50 and 100 psi and shall be manufactured by a ready-mix concrete producer with a minimum 5 years of experience. Cement shall conform to ASTM C150/C150M, Type I or Type II. Pozzolan shall conform to ASTM A618/A618M, Class C or F, including requirements of Tables 1 and 2. Fine and Coarse Aggregates shall meet the quality and grading requirement of ASTM C33/C33M.

If not otherwise specified, materials shall comply with recommendations of ACI 229, Controlled Low Strength Materials.

2.3 RELIEF WELL VALVE ASSEMBLY

Provide new aluminum relief well valve assemblies to the dimensions shown on Sheet C-504 of the contract drawings.

2.4 REPLACEMENT RELIEF WELL CASINGS

New 36-inch inner diameter smooth solid wall HDPE pipe shall be used for replacement relief well casing as shown on Drawing Sheet C-504 for the six replacement relief wells (RW-66R, RW-66AR, RW-67R, RW-68R, RW-68AR, RW-68BR) as shown on the contract drawings. HDPE casing must consist of new, commercially fabricated, solid smooth wall HDPE pipe and must meet or exceed the requirements of ASTM F714 for pipes 36 inches in diameter. Pipe must be produced from polyethylene certified by the resin producer as meeting the requirements of ASTM D3350, minimum cell class 424420C for pipes with 4 through 10 inches diameters, and 435420C for pipes with 12 to 60 inch diameters, except that carbon black content should not exceed 4%.

Replacement relief wells will be installed by USACE before Contractor mobilization to the site. As-built surveyed information (coordinates and elevations) and completion logs for the replacement wells will be provided to the Contractor after the well completion.

2.5 RELIEF WELL CASING COVERS

Provide new aluminum relief well casing covers with dimensions as shown on the contract drawings. Covers must have two lifting handles and be capable locking onto the relief well casing. The covers must allow for an iron chain threaded through the cover handles and secured by lock to a 3/8" eye bolt on either side of the HDPE Casing as shown in Sheet C-504 of the Contract Drawings.

2.6 MISCELLANEOUS MATERIALS

2.6.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements for 4000 psi concrete. The concrete mixture shall have air content by volume of concrete, based on measurements made

immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C 231. The concrete covering over steel reinforcing shall not be less than 1-1/2 inches thick for concrete base slabs. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches between steel and ground.

Expansion-joint filler material shall conform to ASTM D 1751, or ASTM D 1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D 1752.

PART 3 EXECUTION

3.1 DIVERSION OF RELIEF WELL DISCHARGE

Installing the replacement relief well casings and connecting the replacement relief well casing outfall pipes for relief wells RW-66R, RW-66AR, RW-67R, RW-68R, RW-68AR, RW-68BR will require the relief well flows to be diverted or temporarily stopped. Pumping will be the only method allowed for temporarily stopping flow from the relief well and the Contractor must include details regarding the means for which this will be accomplished in the Dewatering Plan as part of submittal in Specification 33 26 00 DEWATERING. Flow stoppage from existing relief wells shall not exceed 36 continuous hours without the prior approval of the COR. Additionally, the Contractor may only stop the flow from a maximum of two existing relief wells at any one time and the wells cannot be adjacent to each other. Plugging or packering of relief wells for slow stoppage will not be permitted.

3.2 INSTALL REPLACEMENT RELIEF WELL CASINGS

3.2.1 Shoring and Sheeting

Shoring and sheeting shall be performed in accordance with the EM 385-1-1 "Safety and Health Requirements Manual" and accordance to Specifications 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.2.2 Installing Replacement Relief Well Casing

The Contractor shall excavate to the required elevation indicated on the c ontract drawings for installation of the replacement relief well casings. The bentonite slurry around the replacement relief wells will require removal during excavation. The Contractor shall ensure that the bentonite seal for the replacement well is not excavated or otherwise damaged.

Install the smooth 36" HDPE pipe casing centered around the replacement relief well according to the contract drawings, including 2-inch embedment into a new pre-cast concrete base slab. Dimensions and reinforcement for the concrete base slab are shown on the contract drawings. The top of the new replacement relief well casing must be a minimum 2 feet above the final ground surface. Care shall be taken not to damage the relief well riser during excavation.

The replacement relief well risers shall be saw cut level to the design elevation shown on the contract drawings. During the cutting the Contractor shall prevent effluent, debris, sediment or bacterial growth from entering the relief well. Excavation for replacement relief well casing installation cannot begin without

an approved Dewatering Plan, Sheeting and Shoring Plan, Project Work Plan and Contaminated Media Plan. Contaminated Media Plan is applicable to work completed in potentially contaminated as described in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS.

3.2.3 Backfilling Relief Well Casings

Backfill with random fill around the relief well casings as specified in 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM, with the exception of RW-67R in the area of the outfall pipe that required zoning of backfill material (coarse aggregate, sand filter, and impervious fill) as shown on the contract drawings.

3.2.4 Relief Well Valve Assembly Installation

Each of the six replacement relief wells shall have a relief well valve assembly installed following completion of the relief well casing and secured with a stainless steel cable to the casing. See contract drawings for valve assembly dimensions. Contractor to submit sample relief well assembly valve for approval prior to installation.

3.2.5 Relief Well Casing Cover

Install relief well casing cover on top of the relief well casing. Paint and label the cover according to 33 46 16 PIPE AND APPURTENANCES FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM paragraph 3.7. Provide iron chain fur securing manhole covers during Post-Installation Inspection.

3.3 REPLACEMENT RELIEF WELL CASING OUTFALL INSTALLATION

Outfalls shall be installed to the casings of the six (6) replacement relief wells (RW-66R, RW-66AR, RW-67R, RW-68R, RW-68AR, and RW-68BR) and be connected to the new left abutment collector pipe system as shown on the contract drawings. Install replacement relief well casing outfalls in accordance with 33 46 16 PIPE AND APPURTENANCES FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM and 33 23 00.00 10 EXCAVATION AND BACKFILL FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM. Excavation for replacement relief well casing outfall installation cannot begin without an approved Dewatering Plan, Sheeting and Shoring Plan, Project Work Plan and Contaminated Media Plan. Contaminated Media Plan is applicable to work completed in potentially contaminated area as described in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS.

3.4 ABANDONMENT OF EXISTING RELIEF WELLS, 36-INCH CMP CASINGS

3.4.1 General

Existing relief wells (RW-66, RW-66A, RW-67, RW-68, RW68-A and RW68-B) and their 36-inch diameter CMP casings are to be abandoned by the Contractor as part of this Contract. With the exception of existing relief well RW-68, all existing wells, 36-inch casings and their outfalls must not be abandoned until the replacement relief wells, new casings and new outfalls are completed. Excavation for replacement relief well casing cannot begin without an approved Dewatering Plan, Sheeting and Shoring Plan, Project Work Plan and Contaminated Media Plan. Contaminated Media Plan is applicable to work completed in potentially contaminated area as described in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS.

3.4.2 Existing Relief Wells and 36-inch Diameter Corrugated Metal Pipe (CMP) Casings Abandonment

The existing relief wells and their 36-inch diameter CMP casings must be decommissioned according to the requirements of the State of South Dakota and the requirements of this specification. All abandonment procedures shall be performed by a driller licensed in the State of South Dakota. Prior to abandonment, the bottom depth of the well shall be measured and compared to the as-builts. If more than 25% of the well screen length is blocked, the material shall be removed via airlifting, pumping, or bailing methods prior to proceeding with abandonment. Relief wells to be abandoned were recently rehabilitated, pump tested, and camera inspected in 2020, and there were no blockages following rehabilitation (see USACE 2022 GDR, under separate cover for "FY20 Dam Safety Instrumentation Rehabilitation Engineering Geology Report"). Care shall be taken during this process to ensure that no material is allowed to enter the relief well inflow or outflow pipes if present. If the material cannot be removed to less than 25% of the well screen length, USACE shall be contacted for further direction prior to proceeding with abandonment.

The 36-inch corrugated metal pipes (CMP) casings for existing relief wells RW-66, RW-67 and RW-68 are coated with asbestos-containing bituminous coating. All work procedures that disturb the asbestos containing material on these pipes and disposal of any asbestos-containing materials generated during the work procedure for the abandonment of the relief wells including disconnection of outfall pipes shall be performed in accordance with the requirements of Specification 02 82 00 ASBESTOS-CONTAINING MATERIALS.

Immediately prior to the application of high density grout in the existing relief well and 36-inch CMP casing, the outfall for the relief well shall be completely disconnected from the CMP so that no grout is allowed to enter the relief well collector system. To accomplish this, all inflow and outflow connections to the well to be abandoned shall be completely sealed off either at the connection to the relief well casing or at the connection to the relief well collector pipe. The Contractor shall propose the method and location for sealing inflow and outflow pipes for each well to be abandoned for USACE approval as part of the existing relief well abandonment work plan. Note that multiple methods may be required depending on the configuration of the system at each location. Above ground flowing artesian conditions may be present after the outfall pipes are sealed.

After the outfall pipes are completely sealed, the relief wells and casings shall be immediately abandoned. The 36-inch CMP casing for existing relief wells RW-66, RW-66A, RW-67, RW-68A and RW-68B shall be filled with high density grout, cutoff and removed as shown on the c ontract drawings.

The 36-inch CMP casing for existing relief well RW-68 shall be cutoff and removed at the base slab as shown on the contract drawings. The concrete base slab and reinforcement must be complete removed. The high density grout in the relief well should be filled to the top of the concrete slab. Cut flush the relief well riser to the top of the concrete slab.

Prior to grouting, the theoretical volume of grout required to fill the relief well annulus and casing shall be calculated. Abandonment shall consist of placing the high density grouting material in one continuous operation using a grout pump (gravity flow is not allowed). The grout

shall be pumped through a tremie pipe which is lowered to the bottom of the screen or sump (if present) and slowly withdrawn as grouting proceeds. High density grout shall be placed to the distance below ground surface and/or above the top of well as indicated on the contract d rawings. The material shall be added through a high shear mixer so the entire circulating volume is at uniform weight. If artesian groundwater or seepage flow at the ground surface is observed or suspected in the area of the well, the necessary volume of grout required to completely fill the well screen, riser, filter pack, and protective casing void space shall be premixed and applied in one continuous operation. High density grout take shall be carefully monitored and recorded using a meter during grouting operations to ensure that excessive grout take is not occurring. If excessive high density grout take is suspected, grouting operations shall cease immediately and the grout shall be allowed to set up overnight prior to the commencement of additional grout to avoid grout migration into the foundation materials, drains, replacement relief wells, piezometers, or adjacent instruments.

High density grout shall be periodically added to the well and casing to maintain the grout level in the relief well and relief well casing as indicated on the project drawings for a minimum of 24 hours to allow the grout to set. A minimum 6-inch-diameter, ¼-inch-thick, steel marker plate shall be set in the grout directly over the well (at a depth indicated on the project drawings) and shall be marked with the relief well designation and abandonment date. After the high density grout has completely set up and the marker plate has been added, the upper protective surface casing and all associated surface completion features shall be cut off or removed to a depth below ground surface as indicated on contract drawings for details. Once the grout has set, backfill the remaining of the relief well abandonment as shown on the contract drawings and in Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM. After the relief well abandonment procedure outlined above is complete, all associated inflow and outflow pipes that are no longer required as part of the relief well collector pipe system shall be removed according to 02 41 00 DEMOLITION and the trench for outfall pipes shall be backfilled according to Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM and shall be topsoiled and seeded, see 32 92 19 SEEDING.

3.5 EXISTING RELIEF WELL CASING OUTFALL ABANDONMENT

3.5.1 General

The outfall pipes for existing relief wells RW-66, RW-66A, RW-67, RW-68, RW68-A and RW68-B must be formally abandoned as part of this contract. Pipe locations are shown on the Demolition Plan Sheet in the contract d rawings.

The existing outfalls for relief wells RW-66 and RW-66A are to be abandoned in place with flowable fill. All other outfalls are to be removed and disposed of off-site. The Contractor must submit an Existing Relief Well Abandonment Work Plan for Government approval. The abandonment method proposed must be approved by the COR prior to the start of work. The CMP outfalls for existing relief wells RW-66, RW-67 and RW-68 are corrugated metal pipes coated with asbestos-containing bituminous coating. All work procedures that disturb the asbestos containing material on the pipes and disposal of any asbestos-containing materials generated during the work procedure for the abandonment of the relief wells including disconnection of outfall pipes shall be performed in accordance with the

requirements of Specification 02 82 00 ASBESTOS-CONTAINING MATERIALS. Excavation for existing relief well casing outfalls cannot begin without an approved Dewatering Plan, Sheeting and Shoring Plan, Project Work Plan, Existing Relief Well Abandonment Work Plan, and Contaminated Media Plan. Contaminated Media Plan is applicable to work completed in potentially contaminated area as described in Section 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIALS.

3.5.2 Casing Outfall Abandonment for Existing Relief Wells RW-66 and RW-66A

The existing 8-inch diameter relief well casing outfalls for existing relief wells RW-66 and RW-66A are to be abandoned in place with flowable fill.

The Contractor shall clean the outfall pipe by removing any snow, ice, standing water, biofoul, sediment, loose particles, debris, and foreign matter prior to placement of flowable fill placement. Perform a relief well casing outfall camera inspection to confirm the outfall line is relatively clear of foreign debris and obstructions prior to abandonment. Camera equipment to be as specified in 33 46 16 PIPE AND APPURTENANCES FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM. Remove and dispose of rodent screens at the end of the outfall pipes (if present). The outfalls for existing relief wells RW-66 and RW-66A must be capped and sealed at the outlet. Product data for the existing outfall pipe cap must be submitted and approved by the COR prior the start of outfall abandonment.

Prior to grouting, the theoretical volume of grout required to fill the outfall shall be calculated. Flowable fill only to be placed when approved by the Contracting Officer Representative and when weather conditions are within limits established by the manufacturer. Abandonment shall consist of placing the flowable fill in one continuous operation. The Contractor shall ensure there is minimal contamination or voids in the flowable fill being placed. Care shall be taken to prevent movement of any structure from designated locations.

3.5.3 Casing Outfall Abandonment for Existing Relief Well RW-67

The existing corrugated metal pipes relief well casing and outfall pipe for RW-67 are coated with asbestos-containing bituminous coating. All work procedures that disturb the asbestos containing material on the pipes and disposal of any asbestos-containing materials generated during the work procedure for the abandonment of the relief wells including disconnection of outfall pipes shall be performed in accordance with the requirements of Specification 02 82 00 ASBESTOS-CONTAINING MATERIALS. The Contractor shall propose the method of abandonment for the outfall pipes for relief wells RW-67, including addressing the asbestos containing material. Use of the method proposed must be approved by the COR prior to the start of work.

3.5.4 Casing Outfall Abandonment for Existing Relief Wells RW-68A and RW-68B

The Contractor shall propose the method of abandonment for the outfall pipes for relief wells RW-68A and RW-68B. Use of the method proposed must be approved by the COR prior to the start of work.

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SECTION 33 40 00

STORM DRAINAGE PIPE EXTENSIONS

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SECTION 33 40 00

STORM DRAINAGE PIPE EXTENSIONS

PART 1 GENERAL

1.1 SUMMARY

The work covered by this section consists of furnishing all plant, labor, equipment and materials for the construction of the 24-inch corrugated metal pipe (CMP) and 24-inch reinforced concrete pipe (RCP) storm drainage extensions in accordance with these specifications, as shown on the contract drawings, and as directed by the Contracting Officer.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 190	(2004; R 2017) Standard Specification for Asphalt-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M 243	(1996; R 2017) Standard Specification for Field-Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches

ASTM INTERNATIONAL (ASTM)

ASTM A760/A760M	(2015, R 2020) Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM A798/A798M	(2017) Standard Practice for Installing Factory-Made Corrugated Steel Pipe for Sewers and Other Applications
ASTM A929/A929M	(2018) Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
ASTM C76	(2020) Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C231/C231M	(2017a) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C270	(2019) Standard Specification for Mortar

	for Unit Masonry
ASTM C655	(2014) Reinforced Concrete D-Load Culvert, Storm Drain, and Sewer Pipe
ASTM C877	(2008) External Sealing Bands for Concrete Pipe, Manholes, and Precast Box Sections
ASTM D1751	(2004; E 2013; R 2013) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-04 Samples

Pipe for Culverts and Storm Drains

Flared End Section; G, RO

SD-07 Certificates

Resin Certification

Oil Resistant Gasket

Leakage Test

Hydrostatic Test on Watertight Joints

Determination of Density

SD-08 Manufacturer's Instructions

Placing Pipe

SD-11 Closeout Submittals

Post-Installation Inspection Report; G, DO

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery and Storage

Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Contracting Officer. Any materials required to install pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life.

1.4.2 Handling

Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

PART 2 PRODUCTS

2.1 TYPES OF FILL MATERIALS

2.1.1 Topsoil

Topsoil must be in accordance with Section 32 92 19 SEEDING

2.1.2 Filter Sand and Filter Sand Bedding Material

Filter sand and filter sand bedding material must be in accordance with 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

2.1.3 Impervious Fill

Impervious fill to conform to requirements in Specification Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

2.2 PIPE FOR CULVERTS AND STORM DRAINS

Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.

2.2.1 Reinforced Concrete Pipe

Manufactured in accordance with and conforming to ASTM C76, Class III , or ASTM C655, 2000 D-Load.

2.2.2 Corrugated Metal Pipe (CMP)

Zinc or aluminum (Type 2) coated corrugated metal pipe (CMP) with annular 2-2/3 by 1/2 inch corrugations meeting ASTM A760/A760M.

2.2.3 CMP Flared End Sections

Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A929/A929M. Submit Flared End Section sample to COR for approval prior to installation.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Concrete

Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements under Section 03 42 13.00 10 PRECAST CONCRETE PRODUCTS FOR BELOW GRADE CONSTRUCTION and 03 30 53 MISCELLANEOUS CAST-IN-PLACE CONCRETE. The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches. Air content shall be determined in accordance with ASTM C231/C231M. The concrete covering over steel reinforcing shall not be less than 1 inch thick for covers and not less than 1-1/2 inches thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches between steel and ground. Expansion-joint filler material shall conform to ASTM D1751, or ASTM D1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D1752.

2.3.2 Mortar

Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar but in no case shall exceed 5 gallons of water per sack of cement. Water shall be clean and free of harmful acids, alkalis, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.

2.3.3 Joints

2.3.3.1 External Sealing Bands

Requirements for external sealing bands shall conform to ASTM C877.

PART 3 EXECUTION

3.1 EXCAVATION AND BACKFILLING FOR STORM DRAINAGE PIPES

Excavation and backfilling for storm drainage pipes and appurtenances shall be in accordance with the applicable portions of Section 31 00 00 EARTHWORK.

3.2 PLACING PIPE

Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated pipe shall be placed in the same vertical plane as the major axis of the pipe.

Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be the responsibility of the Contractor.

3.2.1 Reinforced Concrete Pipe

Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.2.2 Corrugated Metal Pipe and Pipe Arch

Laying shall be with the separate sections joined firmly together, with the outside laps of circumferential joints pointing upstream, and with longitudinal laps on the sides. Any unprotected metal in the joints shall be coated with bituminous material as specified in AASHTO M 190 or AASHTO M 243. Interior coating shall be protected against damage from insertion or removal of struts or tie wires. Lifting lugs shall be used to facilitate moving pipe without damage to exterior or interior coatings. During transportation and installation, pipe or pipe arch and coupling bands shall be handled with care to preclude damage to the coating or lining. Damaged coatings and linings shall be repaired in accordance with the manufacturer's recommendations prior to placing backfill. Pipe on which coating or lining has been damaged to such an extent that satisfactory field repairs cannot be made shall be removed and replaced. Vertical elongation, where indicated, shall be accomplished by factory elongation. Suitable markings or properly placed lifting lugs shall be provided to ensure placement of factory elongated pipe in a vertical plane.

3.3 JOINTING

3.3.1 Reinforced Concrete Pipe

Reinforced concrete pipe jointings must be made using one of the following approved methods.

3.3.1.1 Cement-Mortar Bell-and-Spigot Joint

The first pipe must be bedded to the established grade line, with the bell end placed upstream. The interior surface of the bell must be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe must be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint must be filled with mortar, and a bead must be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint must be wrapped or bandaged with cheesecloth to hold mortar in place.

3.3.1.2 Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe

A closely twisted gasket must be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing must be in one piece of sufficient length to pass around the pipe and lap at top. This gasket must be thoroughly saturated with neat cement grout. The bell of the pipe must be thoroughly cleaned with a wet brush, and the gasket must be laid in

the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe must be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar must be inserted in the annular space for the upper two-thirds of the circumference. The gasket must be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space must be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made must be wrapped with cheesecloth. Placing of this type of joint must be kept at least five joints behind laying operations.

3.3.1.3 Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe

The pipe must be centered so that the annular space is uniform. The annular space must be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot must be cleaned.

a. Diaper Bands: Diaper bands must consist of heavy cloth fabric to hold grout in place at joints and must be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands must be rolled and stitched around two pieces of wire. Width of fabric bands must be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 8 inches apart. Wires must be cut into lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands must be accurately centered around lower portion of joint.

b. Grout: Grout must be poured between band and pipe from the high side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side must be forced out by pouring, and removed.

c. Remainder of Joint: The remaining unfilled upper portion of the joint must be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper must be left in place. Placing of this type of joint must be kept at least five joints behind actual laying of pipe. No backfilling around joints will be permitted until joints have been fully inspected and approved.

3.3.1.4 Cement-Mortar Tongue-and-Groove Joint

The first pipe must be bedded carefully to the established grade line with the groove upstream. A shallow excavation must be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe must be thoroughly cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe must be cleaned with a wet brush; while in horizontal position, a layer of soft mortar must be applied to the upper half of the tongue. The tongue end of the second pipe must be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar must be used to fill

the joint completely and to form a bead on the outside.

3.3.1.5 Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe

The joint must be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint must not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint must be at least 1/2 inch, thick and the width of the diaper band must be at least 8 inches. The diaper must be left in place. Placing of this type of joint must be kept at least five joints behind the actual laying of the pipe. Backfilling around the joints must not be done until the joints have been fully inspected and approved.

3.3.1.6 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Sealing compounds must follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives must be dry and clean. Sealing compounds must be affixed to the pipe not more than 3 hours prior to installation of the pipe, and must be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds must be inspected before installation of the pipe, and any loose or improperly affixed sealing compound must be removed and replaced. The pipe must be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe must be removed and the joint remade. After the joint is made, all inner protrusions must be cut off flush with the inner surface of the pipe. If non-mastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.

3.3.1.7 Flexible Watertight Joints

Gaskets and jointing materials must be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives must be clean and dry. Gaskets and jointing materials must be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and must be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials must be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials must be removed and replaced. The pipe must be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe must be removed and the joint remade.

3.3.2 Corrugated Steel and Aluminum Pipe

Remove existing metal flared end at the 24" CMP outfall prior to extending. Ensure the surface is clean and clear of defects that may impact proper joint connection to the extensions.

3.3.2.1 Field Joints

Transverse field joints must be designed so that the successive connection of pipe sections will form a continuous line free of appreciable

irregularities in the flow line. In addition, the joints must meet the general performance requirements described in ASTM A798/A798M. Suitable transverse field joints which satisfy the requirements for one or more of the joint performance categories can be obtained with the following types of connecting bands furnished with suitable band-end fastening devices: corrugated bands, bands with projections, flat bands, and bands of special design that engage factory reformed ends of corrugated pipe. The space between the pipe and connecting bands must be kept free from dirt and grit so that corrugations fit snugly. The connecting band, while being tightened, must be tapped with a soft-head mallet of wood, rubber or plastic, to take up slack and ensure a tight joint. Field joints for each type of corrugated metal pipe must maintain pipe alignment during construction and prevent infiltration of fill material during the life of the installations. The type, size, and sheet thickness of the band and the size of angles or lugs and bolts must be as indicated or where not indicated, must be as specified in the applicable standards or specifications for the pipe.

3.3.2.2 Flexible Watertight, Gasketed Joints

Installation must be as recommended by the gasket manufacturer for use of lubricants and cements and other special installation requirements. The gasket must be placed over one end of a section of pipe for half the width of the gasket. The other half must be doubled over the end of the same pipe. When the adjoining section of pipe is in place, the doubled-over half of the gasket must then be rolled over the adjoining section. Any unevenness in overlap must be corrected so that the gasket covers the end of pipe sections equally. Connecting bands must be centered over adjoining sections of pipe, and rods or bolts placed in position and nuts tightened. Band Tightening: The band must be tightened evenly, even tension being kept on the rods or bolts, and the gasket; the gasket must seat properly in the corrugations. Watertight joints must remain uncovered for a period of time designated, and before being covered, tightness of the nuts must be measured with a torque wrench. If the nut has tended to loosen its grip on the bolts or rods, the nut must be retightened with a torque wrench and remain uncovered until a tight, permanent joint is assured.

3.4 FLARED END INSTALLATION

Install flared ends on the outlet end of storm drainage pipes in accordance with the manufacturer's recommendations.

3.5 FIELD QUALITY CONTROL

3.5.1 Tests

Testing is the responsibility of the Contractor. Perform all testing and retesting at no additional cost to the Government.

3.5.1.1 Deflection Testing

Conduct deflection testing using a mandrel or laser profiler no sooner than 10 days after completion of final backfill and compaction testing (see Section 31 00 00 EARTHWORK). Clean or flush all lines prior to testing. Perform a deflection test on entire length of installed storm drainage pipe after substantial completion of work adjacent to and over the pipeline including backfilling, placement of fill, grading, paving, placement of concrete, and any other superimposed loads. Deflection of

pipe in the installed pipeline under external loads must not exceed limits in the following table as percent of the average inside diameter of pipe.

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (percent)
Corrugated Metal Pipe	5
Reinforced Concrete Pipe	3

3.5.1.1.1 Laser Profiler

Inspect pipe interior with laser profiling equipment. Utilize low barrel distortion video equipment for pipe sizes 48 inches or less. Use a camera with suitable lighting to allow a clear picture of the entire periphery of the pipe interior. Center the camera in the pipe both vertically and horizontally. The camera must be able to pan and tilt to a 90 degree angle with the axis of the pipe rotating 360 degrees. Use equipment to move the camera through the pipe that will not obstruct the camera's view or interfere with proper documentation of the pipe's condition. The video image must be clear, focused, and relatively free from roll static or other image distortion qualities that would prevent the reviewer from evaluating the condition of the pipe. For initial post installation inspections for pipe sizes larger than 48 inches, a visual inspection must be completed of the pipe interior.

3.5.1.1.2 Mandrel

Pass the mandrel through each run of pipe by pulling it by hand. If deflection readings in excess of the allowable deflection of average inside diameter of pipe are obtained, stop and begin test from the opposite direction. The mandrel must meet the Pipe Manufacture's recommendations and the following requirements. Provide a Mandrel that is rigid, nonadjustable, has a minimum of 9 fins, pulling rings at each end, and is engraved with the nominal pipe size and mandrel outside diameter. The mandrel must be 5 percent less than the certified-actual pipe diameter for Plastic Pipe, 5 percent less than the certified-actual pipe diameter for Corrugated Steel and Aluminum, 3 percent less than the certified-actual pipe diameter for Concrete-Lined Corrugated Steel and Ductile Iron Culvert. The Government will verify the outside diameter (OD) of the Contractor provided mandrel through the use of Contractor provided proving rings.

3.5.2 Inspection

3.5.2.1 Post-Installation Camera Inspection

Prior to shutdown of the dewatering system, camera inspect each segment of installed corrugated metal or reinforced concrete pipe using the equipment and methods/procedures prescribed in Section 33 46 16 PIPE AND APPURTENANCES FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.5.2.1.1 Reinforced Concrete Pipe

An engineer must evaluate all installed storm drainage pipes with cracks greater than 0.01 inches in width but less than 0.10 inches to determine if any remediation or repair is required.

3.5.2.1.2 Corrugated Metal Pipe

Check each corrugated metal pipe for rips, tears, joint separations, soil migration through the joint, cracks, localized bucking, bulges, settlement and alignment.

3.5.2.1.3 Post-Installation Inspection Report

The deflection results and final post installation inspection report must include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design, deflection and deformation of storm drainage pipe, inspector notes, condition of joints, condition of pipe wall (e.g. distress, cracking, wall damage dents, bulges, creases, tears, holes, etc.).

3.5.3 Repair Of Defects

3.5.3.1 Excessive Deflection

When deflection readings are in excess of the allowable deflection of average inside diameter of pipe are obtained, remove pipe which has excessive deflection and replace with new pipe. Retest 30 days after completing backfill, leakage testing and compaction testing.

3.5.3.2 Excessive Cracking

3.5.3.2.1 Reinforced Concrete Pipe

Replace reinforced concrete pipe having cracks with a width greater than 0.1 inches, or as required by engineering evaluation.

3.5.3.2.2 Corrugated Metal Pipe

Replace corrugated metal pipe having cracks or splits.

3.6 PROTECTION

Protect storm drainage piping and adjacent areas from superimposed and external loads during construction.

3.7 WARRANTY PERIOD

Pipe segments found to have defects during the warranty period must be replaced with new pipe and retested.

-- End of Section --

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SECTION 33 46 16

PIPE AND APPURTENANCES FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM

PART 1 GENERAL

The work covered by this section consists of furnishing all plant, labor, equipment and materials and performing all operations necessary for installation of HDPE collector pipe and appurtenances (including manholes and bases), relief well casing outfall connections, and other work incidental to the construction of the left abutment collector pipe system (toe drain, toe drain outfall, relief well collector) as specified herein, as shown on the contract drawings or as otherwise directed by the Contracting Officer.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 252	(2009; R 2017) Standard Specification for Corrugated Polyethylene Drainage Pipe, 75 to 250-mm (3 to 10 in.) Diameter
AASHTO M 294	(2021) Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM C270	(2019) Standard Specification for Mortar for Unit Masonry
ASTM D2321	(2020) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D3350	(2012) Polyethylene Plastics Pipe and Fittings Materials
ASTM F477	(2014; R 2021) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F2487	(2013) Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Corrugated High Density

	Polyethylene and Polypropylene Pipelines
ASTM F2648	(2020) Standard Specification for 2 to 60 inch [50 to 1500 mm] Annular Corrugated Profile Wall Polyethylene (PE) Pipe and Fittings for Land Drainage Applications

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Pipe Production and Connection Detail Plan; G, DO

The Contactor must submit for review and approval a detailed Pipe Production and Connection Detail Plan for all pipe to be installed to include, but not be limited to, pipe material type, pipe properties, joining systems, and connection details for the relief well casing outfalls to the left abutment collector pipe system including any proposed excavations or outfall modifications needed for a resilient connection, connections at manholes and risers. As part of the approval of this plan, the Contractor must physically demonstrate to the Contracting Officer that all connections are satisfactory before excavation begins. This plan must be submitted 30 days prior to the start of construction. When developing this plan and scheduling the work, the Contractor must take into account any lead time that may be required to special order sections.

SD-02 Shop Drawings

Manholes; G, DO

SD-03 Product Data

Pipe Product Data And Installation Recommendation; G, AO

Printed Copies of the manufacturer's recommendations for installation procedures of the material being placed must be submitted a minimum of 15 days prior to start of construction

Manhole Frames And Covers; G, AO

Flap Gate; G, AO

SD-04 Samples

Pipe and Pipe Fittings

Samples of pipe and pipe fittings before starting the work.

Manhole Cover Lifting Handles; G, AO

SD-07 Certificates

Pipe and Pipe Fittings

SD-11 Closeout Submittals

Post-Installation Inspection Report; G, DO

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Inspect materials delivered to site for damage; unload, and store with minimum handling. Do not store materials directly on the ground. If stored on site for longer than 1 month, protect from UV damage as recommended by the pipe manufacturer. Keep the inside of pipes and fittings free of dirt and debris. Install plastic pipe within 6 months from the date of manufacture unless otherwise approved.

1.3.2 Handling

Handle materials in such a manner as to ensure delivery to the trench in sound undamaged condition. Pipe must be carried and not dragged to the trench.

PART 2 PRODUCTS

2.1 PIPE FOR COLLECTOR PIPE SYSTEM AND RELIEF WELL CASING OUTFALLS

Submit manufacturer pipe product data and installation recommendations for the pipes before starting the work. Provide type and sizes indicated herein and on the project drawings for the collector pipe system and relief well casing outfalls. Submit certifications from the manufacturers attesting that materials meet specification requirements. Certificates are required for drain pipe and pipe fittings. Submit samples of pipe and pipe fittings before starting work.

2.1.1 Solid High Density Polyethylene (HDPE) Pipe

Solid HDPE pipe must consist of new, commercially fabricated, bell and spigot, solid corrugated HDPE pipe with smooth interior and must meet or exceed the requirements of ASTM F2648 for pipes 8 to 18 inches in diameter. Diameters and locations of the new pipe are shown on the contract drawings. Pipe must be produced from polyethylene certified by the resin producer as meeting the requirements of ASTM D3350, minimum cell class 424420C for pipes with 4 through 10 inches diameters, and 435420C for pipes with 12 to 60 inch diameters, except that carbon black content should not exceed 4%.

2.1.2 Slotted High Density Polyethylene (HDPE) Pipe

Slotted HDPE pipe must consist of new, commercially fabricated, bell and spigot, slotted corrugated 8-inch, 12-inch, 15-inch, or 18-inch nominal inner diameter pipe as indicated on the contract drawings. The pipes will meet or exceed the requirements of ASTM F2648 ADS pipe N12 WT IB, for pipes 8 to 18 inches in diameter. Pipe must be produced from polyethylene certified by the resin producer as meeting the requirements of ASTM D3350, minimum cell class 424420C for pipes with 4 through 10 inches diameters,

and 435420C for pipes with 12 to 60 inch diameters, except that carbon black content should not exceed 4%.

Provide pipe slots with a minimum water inlet area of 1 square inch per lineal foot as specified below. Cleanly cut circumferential slots so as not to restrict inflow of water and uniformly space along the length and circumference of the pipe according with AASHTO M 252 Class 2 for pipes l0-inch diameter or less and AASHTO M 294 for pipes 12-inch or greater. Provide slots not exceeding 0.157 inch nor less than 0.125 inch in width. Provide pipe with individual slot lengths not exceeding 10 percent of the pipe inside nominal circumference on an 8 to 18 inch inner diameter pipe. Symmetrically space rows of slots so that they are fully contained in the 2 quadrants of the pipe. Center slots in the valleys of the corrugations of profile wall.

2.1.3 Solid High Density Polyethylene (HDPE) Relief Well Casing Outfall Pipe

Solid HDPE relief well casing outfall pipe must be as specified in 2.1.1 Solid High Density Polyethylene (HDPE) Pipe.

2.1.4 Slotted High Density Polyethylene (HDPE) Relief Well Casing Outfall Pipe

Slotted HDPE relief well casing outfall pipe must be as specified in 2.1.2 Slotted High Density Polyethylene (HDPE) Pipe.

2.1.5 Elbows, Couplers, and Reducers/Tees

Elbows and couplers must be new, 8-inch, 12-inch, 15-inch, or 18-inch, nominal inner diameter, HDPE pipe dependent on the host pipe diameter as indicated in the drawings. Reducers/tees must be new molded HDPE reducing tee saddles or equivalent with the proper branch diameters based on the diameter of adjoining pipes. Fittings must conform to ASTM F2648.

Fittings must be bell and spigot. A locking cover must be installed on top of each protective CMP casing.

2.1.6 Gaskets

Gaskets for joining pipe must conform to ASTM F477.

2.1.7 Corrugated Metal Pipe (CMP) Casing

HDPE risers are to be protected by 24-inch nominal inner diameter zinc or aluminum (Type 2) coated corrugated metal pipe (CMP) casing with annular 2-2/3 by 1/2 inch corrugations meeting ASTM A760/A760M.

2.2 DRAINAGE STRUCTURES

2.2.1 Precast Manholes and Appurtenances

Four (4) precast reinforced concrete manhole risers, bases, and tops, as indicated on the contract drawings, will be furnished by the Contractor with approval from the COR and conform to ASTM C 478. Manholes must conform to 03 42 13.00 10 PRECAST CONCRETE MANHOLES AND MANHOLE BASES. Joints between precast concrete risers and tops must be made with flexible watertight, rubber-type gaskets and finished with mortar meeting the requirements of paragraphs 2.3 and 2.5, respectively.

2.2.1.1 Steel Ladder

Provide a steel ladder by the manhole manufacturer to match the details as shown on the drawings. The ladder will be not less than 16 inches in width, with 3/4 inch diameter rungs spaced 12 inches apart. Provide two stringers that are a minimum 3/8 inch thick and 2 inches wide. Adequately anchor ladder to the wall by means of steel inserts spaced not more than 6 feet apart vertically, and install so as to provide at least 7 inches of space between the wall and the rungs. Ladders and inserts must be galvanized after fabrication in conformance with ASTM A123/A123M. The wall along the line of the ladder must be vertical for its entire length.

2.2.1.2 Manhole Frames and Covers

Frames and covers must be composite material consisting of at least 95% of the total volume by weight of rigid reinforced polymer consisting of "E" fiberglass, vinyl or polyester resin. Covers must be equipped with a water-tight gasket. Weight, shape, and size shall be as indicated on the drawings.

2.2.1.3 Cover Lifting Handles

Four (4) manhole cover lifting handles must be supplied by the contractor and must be Fiberlite FL7 handles for removal and replacement of raised covers.

2.3 MANHOLE JOINTS

2.3.1 Flexible Watertight Joints

Flexible watertight joints must be made with plastic or rubber-type gaskets for concrete pipe. The design of joints and the physical requirements for preformed flexible joint sealants must conform to ASTM C990, and rubber-type gaskets must conform to ASTM C443. Gaskets must have not more than one factory-fabricated splice. Alternate types of watertight joint may be proposed for government approval.

2.3.2 HDPE Pipe Connections to Manholes

All HDPE pipe connections to manholes shall be watertight and must be made using mortar meeting the requirements of 2.5 MORTAR or as recommended by the manufacturer and approved in the contractor's Pipe Production and Connection Detail Plan.

2.4 RELIEF WELL CASING OUTFALL CONNECTIONS TO RELIEF WELL COLLECTOR PIPE

Relief well casing outfall connections from existing well RW-66B and replacement relief wells RW-66R, RW-66AR, and RW-68BR to the new solid and slotted HDPE relief well collector pipe will be made using HDPE reducers/tees with the proper branch diameters based on the diameter of adjoining pipes, and/or as recommended by the manufacturer and approved in the contractor's Pipe Production and Connection Detail Plan.

2.5 MORTAR

Mortar for pipe connections to drainage structures must conform to ASTM C270, Type M, except that the maximum placement time must be 30 minutes. The quantity of water in the mixture must be sufficient to

produce a stiff workable mortar but in no case will exceed 5 gallons of water per sack of cement. Use water that is clean and free of injurious acids, alkalis, and organic impurities. Use the mortar within 30 minutes from the time the ingredients are mixed with water. The inside of the opening must be wiped clean and finished smooth. The mortar head on the outside must be protected from air and sun with a proper covering until satisfactorily cured.

2.6 FLAP GATE

The new 18" HDPE relief well collector pipe outfall must be equipped with a flap gate. Flap gate must be medium duty with circular opening and double hinged. Top pivot points must be adjustable. The seat must be one-piece cast iron with raised section around the perimeter of the waterway opening to provide the seating face. The seating face of the seat must be cast iron. The cover shall be one-piece cast iron with necessary reinforced rib, lifting eye for manual operation, and bosses to provide a pivot point connection with the links. The seating face of the cover be cast iron. Links of hinge arms must be cast or ductile iron. Holes of pivot points must be bronze brushed. All fasteners must be either galvanized steel, bronze, or stainless steel.

2.7 PAINTING

2.7.1 Primer

Primer must be a Steel Structures Painting Council (SSPC) Paint 25 (Zinc Oxide, Alkyd, Linseed Oil Primer).

2.7.2 Paint

Paint must be a P-38 (aluminum, ready mixed) type paint.

2.8 PEA GRAVEL

Pea Gravel shall consist of clean and graded, washed river-run gravels composed of hard, tough, and durable particles. Pea gravel material shall not contain corrosive agents or organic matter and shall be evenly graded between the limits specified in TABLE I:

TABLE I. PEA GRAVEL GRADATION

Sieve Size	Percent Passing
3/4 inch	100
1/2 inch	90 - 100
3/8 inch	40 - 70
No. 4	0 - 15
No. 8	0 - 5
No. 200 (MAX)	1.0

PART 3 EXECUTION

3.1 EXCAVATION AND BEDDING FOR HDPE PIPE

See Section 31 23 00.00 20 EXCAVATION AND BACKFILLING FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.2 MANHOLES, BASES, AND RISERS

3.2.1 Manholes and Bases

Install manholes complete with frames and covers centered on leveled precast concrete manhole bases at the locations and within the limits and sizes indicated. Completely fill precast concrete manhole joints so that they are smooth and free of surplus mortar or mastic on the inside of the structure. Ladders must be installed using post installed 5/8" diameter stainless steel anchor bolts. The bolts must be drilled and secured into place by Hilti HY 150 Max Epoxy (or approved equal) with a minimum 4-inch embedment depth into the precast riser.

3.2.2 Risers

Install riser pipes with lockable hinged covers at the locations indicated. Construct risers of new solid 12-inch nominal diameter HDPE pipe. Join riser pipes to the toe drain as indicated. Each riser pipe is to be protected by a new 24-inch CMP casing installed as indicated on the contract drawings. The annular space between the riser and CMP casing must be backfilled with pea gravel to existing grade.

3.3 PLACING HDPE PIPE

3.3.1 Tolerances

The construction tolerance for HDPE pipe invert elevation is 0.04 feet (0.5 inch).

3.3.2 Assembly

HDPE pipe assembly must be per manufacturer's recommendations and approved in the contractor's Pipe Production and Connection Detail Plan.

3.3.3 Pipe laying

Install pipe in accordance with the manufacturer's recommendations and ASTM D2321. Thoroughly examine each section of pipe before being laid. Any defective or damaged pipe will be rejected. Do not lay pipe when the trench conditions or weather is unsuitable for such work. Proper safety procedures and shoring will be provided for laying and lowering pipe into trenches. Groundwater must be removed from trenches by approved methods outlined in section 33 26 00 DEWATERING. Lay the pipe to the grades and alignment as indicated. Under no circumstances is it permissible to drop or dump pipe, fittings, or other collector pipe system materials into trenches. Bed the pipe to the established gradeline. Center slots on the bottom of the pipe. Cut pipe cleanly, squarely and accurately to the length established at the site and work into place without springing or forcing. Lay bell-and-spigot pipe with the spigot end pointing in the direction of flow (spigot on downstream end and bell on upstream end). Each bell must be cleaned before the spigot of the succeeding pipe is inserted. Grade the pipeline in straight lines: avoid the formation of

dips and low points. Lay pipe so the full length of each section of pipe and each fitting rests solidly on the bedding material; excavate recesses to accommodate bells, joints and couplings. Approval of all in-place pipes by the Contracting Officer is required prior to backfilling.

3.3.4 Jointings

HDPE pipe jointings shall be gasketed bell and spigot type in accordance with the pipe manufacturer's recommendations and approved in the contractor's Pipe Production and Connection Detail Plan.

3.3.5 Connections

3.3.5.1 Precast Manhole HDPE Pipe Connections

All HDPE pipe connections to manholes shall be watertight and must be made using mortar meeting the requirements of 2.5 MORTAR or as recommended by the manufacturer and approved in the contractor's Pipe Production and Connection Detail Plan. HDPE pipes with discharges/flows into the manhole are to protrude into the manhole 6-inches and be 15-inches above the bottom of the manhole to allow for flow readings (note RW-67A is more than 15 inches above the manhole base). Outfall pipes conveying water away from manholes are to be installed flush with the inside of the manhole. The segment of pipe connecting to and/or protruding into manholes/catch basins must be made with solid HDPE pipe to allow mortar connections and flow measurements. The maximum length of the solid HDPE connection must be no more than 5 feet.

3.3.5.2 Relief Well Casing Penetrations and Outfall Connections

Relief well casing penetrations for installation of new outfalls must be performed in such a manner so as to provide minimal disturbance and damage to the remaining portion of the relief well casing and relief well. During cutting and assembly of the new casing outfalls, the Contractor must prevent effluent, debris, sediment, or bacterial growth from entering the relief well.

3.3.5.3 Casing Outfall to Collector Pipe Connections

Connect solid and slotted relief well casing outfalls to the new solid and slotted HDPE relief well collector pipe using HDPE reducers/tees with the proper branch diameters based on the diameter of adjoining pipes, or as recommended by the manufacturer and approved in the contractor's Pipe Production and Connection Detail Plan.

3.4 LEFT ABUTMENT COLLECTOR PIPE SYSTEM INSPECTION AND TESTING

3.4.1 Leakage Testing

Following installation, all new solid HDPE pipe (not including the 5-foot solid connections entering manholes) must be tested for leakage by low pressure air or water testing or exfiltration tests as appropriate. Low pressure air testing for plastic pipe must conform to ASTM F2487.

3.4.2 Deflection Testing

3.4.2.1 Initial Backfill Inspection

Initial backfill deflection testing using a laser profiler or mandrel must

be performed following placement of 2 feet of backfill above the entire length of installed HDPE pipe. A pull through device should be pulled through the pipe to ensure there are no observed defects or blockages of the pipe before backfilling the entire pipe. Deflection of pipe in the installed pipeline under external loads must not exceed 5 percent of the average inside diameter of pipe.

3.4.2.2 Final Backfill Inspection

No sooner than 10 days after completion of installation and final backfill, a post installation inspection must be accomplished. Clean or flush all lines prior to inspection. Perform a deflection test using a laser profiler or mandrel on the entire length of installed HDPE pipe after substantial completion of work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads. Pass the pull-through device through each run of pipe by pulling it by hand. Deflection of pipe in the installed pipeline under external loads must not exceed 5 percent of the average inside diameter of pipe. If deflection readings in excess of the allowable deflection of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction. If retest continues to show excess allowable deflections of the average inside diameter of pipe, remove pipe which has excessive deflection, replace with new pipe, and completely retest in same manner and under same conditions.

3.4.2.3 Equipment

The following equipment may be used for deflection testing and measurement:

a. Pull-through device: The mandrel must be rigid, nonadjustable having a minimum of 9 fins, including pulling rings at each end, engraved with the nominal pipe size and mandrel outside diameter. The mandrel must be 5 percent less than the certified-actual pipe diameter for Plastic Pipe provided by manufacturer. Deflection measuring devices must be approved by the Contracting Officer prior to use.

3.4.3 Flushing and Post-Installation Remote Camera Inspection

Prior to shutdown of the dewatering system, and after other required tests have been performed and the trench backfill compacted to the finished grade surface, all installed HDPE pipe must be inspected to determine whether significant displacement has occurred. This inspection must be conducted in the presence of the Contracting Officer. Pipes must be inspected by the use of television cameras passed through the pipe. If, in the judgment of the Contracting Officer, the interior of the pipe shows poor alignment or any other defects that would cause improper functioning of the system, the defects must be remedied as directed at no additional cost to the Government.

a. The camera must be moved through the line at a uniform rate not to exceed 30 feet/minute, stopping when necessary to insure proper documentation of the pipe's condition. Power winches, TV cable, power rewinds, tractors, floats or other devices that do not obstruct the camera view or interfere with proper documentation of the pipe conditions will be used to move the camera through the collector pipe system lines.

b. If, during the inspection operation the remote camera will not pass through the entire pipe section, then the contractor must clean the

line before continuing with the remote camera inspection. Water jetting or other suitable means must be employed to perform clearing and cleaning of the pipe.

c. Replace HDPE pipe with visible cracking, bulging, offsets, joint separation, or misalignment at no additional cost to the government. Confirm condition with another camera inspection of replaced pipe.

d. The Post-Installation Inspection Report must include: The deflection results, a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design, grade, deviation from line, deflection and deformation of flexible pipe systems, inspector notes, condition of joints, condition of pipe wall (e.g. distress, cracking, wall damage dents, bulges, creases, tears, holes, etc.).

3.4.3.1 Camera

a. The color televised camera used for the inspection must be one specifically designed and constructed for such inspection. The camera must be a Pan & Tilt or radial view camera. The camera must be operable in 100 percent humidity conditions. The camera, television monitor, and other components of the video system must be capable of producing a minimum of 500 line resolution video picture. Picture quality and definition must be to the satisfaction of the Contracting Officer's Representative and if unsatisfactory, equipment must be removed. Videos must be .MOV format and submitted on a government furnished external hard drive and must be recorded in color at standard speed. The cable length must be sufficient to go from the nearest access point to the most remote upstream terminus.

b. A skilled technician must control the operation of the equipment from a control panel located in the mobile unit and must have control of the movement of the camera at all times. This may be accomplished by means of remote-control winches or self-propelled tractor or other suitable means.

3.4.3.2 Inspection Logs and Videos

a. A log approved by the Contracting Officer's Representative must be prepared by the Contractor for all camera inspections listing the date, project, project number, inspection number, manhole numbers, risers numbers, and relief well numbers where applicable. A key to all abbreviations used must be included on each log sheet as well as a key map depicting the layout of the pipe systems and the designation for each run to correlate with the video recordings.

b. The locations of all points of interest must be identified by logging the distance to each defect or point of interest measured from the center of the entry point. The importance of accurate distance measurements is emphasized. The measuring device for location of defects must be above ground by means of a meter device. Accuracy of the distance meter must be checked by use of a walking meter, roll-a-tape, cloth tape or other suitable device and the accuracy must be satisfactory to the Contracting Officer's Representative. The entry points and the running distance from the entry point must be continuously displayed on the video recording.

c. All remote camera inspections must be video recorded in digital

format. The video must be recorded at standard speed. Digital videos and written logs must be considered property of the Government. Each video file must be named with the start location and end location of each run including the name of the pipe being inspected.

3.4.3.3 Relief Well and Piezometer Camera Inspection

Following substantial completion of work, camera inspect the replacement relief wells and permanent groundwater piezometers installed by the Contractor in accordance with 3.4.3 Flushing and Post-Installation Remote Camera Inspection. At the discretion of the Contracting Officer, the Contractor must correct any damage or obstructions as a result of construction activities at no additional cost to the government.

3.5 PAINTING AND LABELING

Each instrument casing and/or cover identified for painting in Table II must be cleaned by power tool or wire brush. The first coat must be brush or spray applied in the shop or field as indicated with a Steel Structures Painting Council (SSPC) Paint 25 (Zinc Oxide, Alkyd, Linseed Oil Primer) and touched up in the field as necessary to maintain its integrity at all times. The second and third coats must be applied in the field using P-38 (aluminum, ready mixed) type paint. Relief well covers must be painted with the color as indicated in paragraph 3.8.1 painting.

3.5.1 Painting

All instruments must be color coded as indicated in Table III.

Table II

Instrument	Color
Piezometer Steel Casings	Orange
Aluminum Relief Well Covers	Blue
Riser CMP Casings	Blue

3.5.2 Labeling

Instrument designations must be provided by the Corps of Engineers. Instrument casings and/or covers must be labeled with the appropriate designation using government furnished stamped metal tags. Piezometers must also have the number designation clearly handwritten and visible within the steel casing lid interior. Covers for risers must have the same label under the cover inscribed in black permanent marker. Labels must be placed on the side of the casing with the lock.

-- End of Section --

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SECTION 33 66 00

NEW PIEZOMETER INSTALLATION AND EXISTING PIEZOMETER ABANDONMENT

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SECTION 33 66 00

NEW PIEZOMETER INSTALLATION AND EXISTING PIEZOMETER ABANDONMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C150/C150M	(2021) Standard Specification for Portland Cement
ASTM D1586/D1586M	(2018) Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

1.2 QUALITY ASSURANCE

The new piezometers are to be installed and the existing piezometer(s) are to be abandoned in compliance with applicable federal, state, and local regulations for piezometer installation.

PART 2 PRODUCTS

2.1 NEW PIEZOMETERS

2.1.1 Riser Pipe

The riser portion of the new piezometers must be as shown in the contract drawings and consist of new, commercially fabricated, flush threaded, 2-inch nominal diameter, schedule 40 solid polyvinyl chloride (PVC) casing. The riser must be capped with a j-plug or friction fit cap.

2.1.2 Screen

The screened portion of the new piezometers must be as shown in the plans and consist of new, commercially fabricated, flush threaded, 2-inch nominal inner diameter, continuous wrap slotted schedule 40 PVC. The screen slot size must be 0.010 inch (10 slot). The bottom of the screen must be capped with a schedule 40 PVC bottom cap to match the threading of the well screen.

2.1.3 Filter Pack

Piezometer filter pack must be clean, washed, well-rounded silica sand to perform as a filter between the formation material and the well screen.

The grain size of the filter pack that is used must be 20-40 gradation as required with 10-slot screen.

2.1.4 Bentonite Chips

A bentonite seal must be composed of bentonite chips or pellets of no more than 3/8-inch diameter that are commercially manufactured, solvent free and uncoated that are used specifically for well construction.

2.1.5 Protective Casing

The outer protective casing must be 5-feet in length minimum, 4-inch by 4-inch measurement and constructed of non-corrosive steel or aluminum that is lockable and paintable.

2.1.6 Cement-Bentonite Grout

Cement-bentonite grout, used for abandonment purposes only, must be composed of a mixture of Portland cement (ASTM C150/C150M) and water in the proportion of not more than 7 gallons of manufacturer approved water per bag of cement (94 pounds) with 3 percent by weight of commercially available sodium bentonite powder.

PART 3 EXECUTION

3.1 Drilling Program Plan (DPP)

Piezometer installation and abandonment must be performed in accordance with USACE Engineering Regulation ER 1110-1-1807 Drilling in Earth Embankment Dams and Levees (31 December 2014) and included in the Dewatering Drilling Program Plan Submittal (Section 33 26 00 DEWATERING) for review and approval.

3.2 New Piezometer Installation

A minimum of seven (7) new permanent open tube piezometer must be installed, developed, and tested for functionality prior to startup of the dewatering system and/or any excavation. Any piezometer installed beyond the initial seven must be abandoned following the final left abutment collector pipe flushing and post installation camera inspection (see 33 46 16 PIPE AND APPURTENANCES FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM). All piezometers must be surveyed for horizontal and vertical position to allow use during construction activities.) All installation and abandonment aspects must be completed by a licensed South Dakota driller according to the requirements of the State of South Dakota and the requirements herein. Borings for piezometers installation must be completed in such a manner that allows for non-collapsing borehole walls with a minimum diameter of 8 inches. Lithologic logging of the borings must be completed with samples obtained at 2.5 foot intervals or less. Logs completed must contain USCS classification (ASTM D2487), consistency of cohesive materials or apparent density of non-cohesive materials, general moisture content such as moist or saturated, color, and other descriptive features. The contacts between various lithological types must be clearly shown on log forms exhibiting a vertical scale of 1 inch equals 1 foot. Blow counts from split-barrel samplers must be shown on the log as appropriate and follow ASTM D1586/D1586M. Additionally, handling and disposal of drill cuttings and other environmental related wastes considerations for work performed in areas impacted by TPH-DRO must follow relevant criteria presented in specification 02 32 13 SUBSURFACE

DRILLING AND SAMPLING and its appropriate references.

The borehole must be to depth and free and clear of formation material and all drilling fluids (if used) when the piezometer is installed. The piezometer screen and riser pipe must be installed plumb and centered in the borehole. The screen must be 10-feet in length and must be installed at depths of 0-feet above to 10-feet below the static water level observed in the boring at the time of installation but before dewatering operations commence. The piezometer riser pipe must extend 2 to 3 feet above the final/design grade upon completed piezometer construction. Filter pack must be installed from 1-foot below to 1-foot above the top of the screen and must be tremied into place via tremie pipe technique to avoid bridging and ensure a continuous filter pack. Bentonite chips or pellets must be placed in the remainder of the borehole. Bentonite chips installed above the groundwater table must be placed in a maximum of 2-foot, hydrated lifts. Hydration with water of each lift must be allowed for 1/2-hour before the next lift is added. A protective steel casing must be installed over the riser and extend into the hydrated chips a minimum 2 feet below ground surface. Note that the bentonite chip seal, or impervious fill, must be built up around the top of the borehole to promote and ensure surface-water runoff. The number designation of the piezometer must be clearly handwritten and visible within the casing lid interior and with stamped metal tags affixed to the exterior of the protective casing. The stamped metal tags will be government furnished and provided to the Contractor for installation. Post-Inspection all surface completions must be approved by the COR. Develop piezometers using methods provided in 3.2.1 Piezometer Development to remove all fines from the bottom of the piezometer and allow hydraulic connection between the formation and screen. The elevation of the ground and riser and horizontal coordinates of the riser for each piezometer must be surveyed by a surveyor licensed in South Dakota. Horizontal coordinates must be provided in State Plane Zone 3002 and the elevations in local project datum (LPD) for the dam site. All spoils/waste, including drill cutting, drilling fluid, groundwater, etc. from piezometer installation, development, testing, and abandonment must be disposed properly and in compliance with state and local regulations. All aspects of spoils/waste handling must be addressed in planning and reporting documentation including the Contaminated Media Work Plan (See 02 61 13 EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL).

3.2.1 Piezometer Development

Within one week after each piezometer has been constructed, but no sooner than 48 hours after grouting is completed, the Contractor shall develop the piezometer. The objectives of piezometer development are to: (a) assure that groundwater enters the well screen freely, thus yielding an accurate water level measurement and (b) remove very fine grained sediment in the filter pack and nearby formation so that silting of the piezometer does not occur. Development must consist of mechanical surging and bailing until little or no sediment enters the well. Development shall continue for a minimum of two (2) hours. Sediment that enters the piezometer during this process shall be removed. At the end of that time, the piezometer shall be continuously pumped using an electric submersible or pneumatic-drive, positive displacement bladder pump. Temperature, pH, specific conductivity, and turbidity must be monitored during pumping (minimum of one reading per piezometer volume). Pumping shall continue until these parameters have stabilized (less than 0.2 pH units, turbidity of less than 25 nephelometric turbidity units [NTUs] and less than 10% change for the other parameters between four consecutive readings) and the

water is clear and free of fines. If these parameters have not stabilized after four (4) hours of continuous pumping, then the COR shall be contacted for further direction.
In all cases, the utmost care shall be taken not to collapse piezometer screens during development activities. The Contractor shall collect approximately 1 liter of the last water withdrawn from the piezometer during development in a clear glass jar, label, immediately photograph it, and submit the photo as part of the piezometer development form included in the Dewatering Final Implementation and Operation Report (Section 33 26 00 DEWATERING). The photograph shall be a suitably back-lit, close-up that shows the clarity of the water. Fines remaining in the water shall not be allowed to settle out prior to taking the photograph. The thickness of any sediment that collects in the bottom of the jar after the sample is allowed to settle shall be noted on the Piezometer Development Form. The nephelometric turbidity of the water shall be determined using a Photoelectric Nephelometer and shown on the piezometer development form.

3.2.1.1 Development Form

A legible piezometer development form must be prepared and completed for each piezometer installed. The geologist/geological engineer present during the piezometer development operations shall prepare the form. A sample form shall be submitted in the Dewatering Drilling Program Plan Submittal (Section 33 26 00 DEWATERING). Copies of the completed piezometer development records shall be included in the Dewatering Final Implementation and Operation Report (Section 33 26 00 DEWATERING). Information provided on the piezometer development record shall include, but not be limited to, the following:

a. Name of project and site, piezometer identification number, and date(s).

b. Date, time, and depth to the static water level and bottom of piezometer before development.

c. Method used for development, to include equipment, size, type and make of bailer and/or pump used during development.

d. Time spent developing the piezometer by each method, to include the typical pumping rate if a pump was used in development.

e. Volume and physical character of water removed, to include changes during development in clarity, color, particulates, and odor.

f. Volume and source of any water added to the piezometer.

g. Volume and physical character of sediment removed, to include changes during development in color and odor.

h. Clarity of water before, during, and after development, including a backlit photo, and thickness of any sediment which settles to the bottom of the jar containing the last one liter of water withdrawn from the piezometer during development.

i. Total depth of piezometer and the static water level immediately after, and no sooner than the following day after development.

j. Readings of pH, specific conductance, temperature, and turbidity taken before, during, and after development.

k. Name(s) and job title of individual(s) developing piezometer.

l. Name and/or description of the disposal facility/area for the waters removed during development.

m. Photograph(s).

3.2.2 Response Testing

Newly installed piezometers must be response tested to confirm that the piezometers are operational. Response testing must be performed in accordance with the following and must be described in the Dewatering Drilling Program Plan Submittal (Section 33 26 00 DEWATERING) with results submitted in the Dewatering Final Implementation and Operation Report (Section 33 26 00 DEWATERING). Rising-head response tests must be completed on all new piezometer installations after piezometer development has been completed. The response testing must be conducted by measuring the recovering water levels over time until 90% to 100% recovery has been achieved. Groundwater must be evacuated from static conditions to no less than 10 feet of water column. After evacuation of the groundwater, measurements of the rate of recovery will be taken at intervals of 1 min, 1.5 min, 2 min, 3 min, 4 min, 5 min, 6 min, 7 min, 8 min, 9 min, 10 min, 15 min, 30 min, 1 hr, 2 hrs, 4 hrs, 8 hrs, and 24 hrs. Note that an initial recovery reading must be taken as soon as feasible. All testing results and equipment used must be documented on a rising-head response test form and provided to the COR upon completion. If it is found that any piezometer does not respond to 90% of the static condition within 4 hours then additional development and response testing must be completed at the direction of the COR.

3.2.3 Protection

During all phases of construction all existing piezometers (in particular existing piezometers J320Ra, J320Rb, PZ-19, PZ-21, PZ-25R, PZ-27, PZ-28, PZ-29, H560Ra, H560Rb, and H560RB-12) must be protected from any damage. If damage occurs, the piezometer(s) must be replaced at no cost and to the acceptance of the government.

3.2.4 Painting

Paint and Label new piezometer steel casings according to Section 33 46 16 PIPE AND APPURTENANCES FOR LEFT ABUTMENT COLLECTOR PIPE SYSTEM.

3.3 ABANDONMENT

One existing piezometer (OW20-2) and any temporary piezometer installed as part of exploration or dewatering requirements must be abandoned. Prior to grouting, the total depth and water level in the piezometer must be measured and documented. Abandonment must consist of tremieing cement-bentonite grout from the bottom of the piezometer until it flows undiluted from the top of the piezometer. The cement-bentonite grout must be allowed to settle a minimum of 24 hours and must then be topped off as required to ensure the grout level is at ground surface. Then the piezometer must be cut at three feet below ground surface (with removal of surface casing as appropriate) and backfilled with compacted impervious fill. The cement-bentonite grout mixture must comply with the description in section 2.1.6. A piezometer abandonment record must be submitted documenting the type and volume of cement-bentonite grout used, the depth

and diameter of the riser pipe and screen, and the procedures used to abandon the piezometer.

-- End of Section --

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