MELSTONE DAM LIVESTOCK WATER SYSTEM

BUREAU OF LAND MANAGEMENT

MUSSELSHELL COUNTY, MONTANA

TECHNICAL SPECIFICATIONS

PREPARED FOR

BUREAU OF LAND MANAGEMENT
MONTANA STATE OFFICE
5011 SOUTHGATE DRIVE
BILLINGS, MT 59101

APRIL 2026

MELSTONE DAM LIVESTOCK WATER SYSTEM
TECHNICAL SPECIFICATIONS

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DIVISION 1

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED:

This project will install a livestock water system at the Melstone Dam reservoir, located in Musselshell County, approximately 1.5 miles west of Melstone, MT. Major items of work at this dam include:

A. Install an inlet structure below normal reservoir water elevation when the Melstone Dam reservoir has been drained for dam reconstruction.

B. Install an 18" annular Corrugated Metal Pipe (CMP) riser with a pitless adapter, solar pump, and 800W solar array.

C. Install 4" and 1.5" HDPE pipeline from and to: 1) Inlet to Pump and 2) Pump to Outlet.

D. Reclaim all disturbed areas, including construction staging areas and temporary roads. Reclamation consists of the preparation of soil for seeding.

1.02 CONTRACTOR USE OF PREMISES:

Confine operations to the site of the proposed Work or within the right-of-way or construction easements provided and shown on the drawings. [The construction area will be the same as that of the Melstone Dam Reconstruction project, as shown in the provided drawing.] Construction camps and staging areas outside the construction area must be approved by the GOVERNMENT. Obtain advance approval from the GOVERNMENT of all staging areas, excavated soil stockpile, waste areas, and camping areas. NOTE: Awardee will coordinate work with exsisting contractor at the site.

It shall be understood the responsibility for protection and safekeeping of equipment and materials on or near the site will be entirely that of the CONTRACTOR and that no claim shall be made against the GOVERNMENT by reason of any act of an employee or trespasser whether GOVERNMENT has paid CONTRACTOR for equipment or materials in storage or not. It shall be further understood should any occasion arise necessitating access by the GOVERNMENT to the sites occupied by these stored materials and equipment, the CONTRACTOR owning or responsible for the stored materials or equipment shall immediately remove same. No materials or equipment may be placed upon the property of the GOVERNMENT until the GOVERNMENT has agreed to the location contemplated by the CONTRACTOR to be used for storage. CONTRACTOR is solely responsible for obtaining and shall pay all costs in connection with any additional work area, storage sites, access to the site, or temporary right-of-way, which may be required for proper completion of the Work.

1.03 PROTECTION OF EXISTING UTILITIES:

Utility service connections are generally shown on the drawings, but the CONTRACTOR is solely responsible for locating all existing underground installations, including service connections, in advance of excavating or trenching by calling One Call of Montana at 811. The CONTRACTOR shall use his own information and shall not rely solely upon the information shown on the drawings concerning existing underground installations. Repair all damage to existing utilities or property at the CONTRACTOR's expense.

1.04 PROTECTION OF EXISTING STRUCTURES:

Where excavation will be required adjacent to existing structures, the CONTRACTOR is solely responsible for maintaining the structural integrity of the existing structures. Take whatever means necessary to ensure the existing structures are not damaged. Repair all damage to the existing structures at the CONTRACTOR's expense. Repair any fences destroyed during construction to the satisfaction of the Government or property owner. Unless otherwise noted on the Construction Drawings, restore all existing ditches disturbed by construction to their original size, line, and grade.

Structures located downstream of the dam shall also be protected during reservoir dewatering activities. Restore or repair to original condition roads, culverts, bridges, cattle guards, fences, or any other structures damaged by the CONTRACTOR’s activities and access to the sites at no additional cost to the project.

1.05 FIELD CHECK OF EXISTING STRUCTURES:

Dimensions and elevations of existing structures and locations of existing fences, pipelines, conduits, cables, and equipment shown on the drawings were taken, for the most part, from available records and survey data and are not guaranteed for accuracy.

Check all dimensions and elevations of existing structures, pipelines, conduits, cables, equipment, or other existing items, both above and below ground, affected by or affecting the Work under this contract, prior to the start of construction or ordering materials and equipment affected thereby.

1.06 SITE ACCESS:

A. The CONTRACTOR shall provide a Site Access Plan submittal to the GOVERNMENT prior to beginning site work. The submittal will show how the CONTRACTOR proposes to install, maintain, remove, and restore temporary access to key locations within the project’s construction limits.

Determine the adequacy of all roads, culverts, cattle guards, and bridges used in moving or gaining access for equipment and materials to the construction site. Provide alternative methods of access, such as a temporary crossing for any equipment that exceeds the structural limits of existing facilities. Improvements for road access including fill, culverts, and fencing to remain after project completion as approved by GOVERNMENT.

B. Costs associated with maintaining existing access routes, or constructing, maintaining, removing, and restoring temporary access routes after completion are considered incidental, and no separate or additional payment shall be made.

C. Any modifications to facilitate site ingress/egress along the Access Road shall not go beyond the current disturbed extent of the road without prior authorization from the GOVERNMENT.

1.07 LIVESTOCK:

The CONTRACTOR shall provide temporary fencing [or barriers] for excluding livestock from construction areas, excavations, trenches, etc.

CONTRACTOR shall be solely responsible for any livestock injuries or losses as a result of CONTRACTOR's activities.

1.08 CONTRACTOR FIELD OFFICES AND SHEDS:

The CONTRACTOR is responsible for providing their own temporary field offices and storage sheds required for the completion of the work. Locate these temporary structures in areas approved by the GOVERNMENT. All expenses for telephone, utilities, security, and waste disposal are the responsibility of the CONTRACTOR.

1.09 REFERENCES:

References to documents, such as ASTM, shall be for the current printing.

1.10 ABBREVIATIONS:

AASHTO - American Association of State Highway and Transportation Officials
ACI - American Concrete Institute
ASTM - American Society for Testing and Materials
AWWA – American Water Works Association
OSHA - Occupational Safety and Health Act
PVC - Polyvinyl Chloride
RCP – Reinforced concrete pipe
CMP – Corrugated Metal Pipe

1.11 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals.

B. Site Access Plan: The Contractor is to submit a Site Access Plan that, at a minimum, includes the following details and procedures: access route(s), alterations to existing roads, maintenance during the project, and restoration at project completion.

PART 2 - PRODUCTS – NONE

Not Used.

PART 3 - EXECUTION – NONE

Not Used.

END OF SECTION

PART 1: GENERAL

1.1 SUMMARY:

A. Section Includes: Materials to be furnished by the Government and their locations.

1.2 DELIVERY, STORAGE, AND HANDLING:

A. Location: The Government-furnished property will be provided by the Bureau of Land Management at Melstone Dam (on-site of this project).

B. Notify the Contracting Officer Representative 3 working days prior to picking up the government furnished property to schedule pickup time.

PART 2: PRODUCTS

2.1 MATERIALS:

A. Materials to be furnished by the Government:

Specification Section	Materials Description	Estimated Quantity	Unit
02665	Water Quality Signs	1	Each

2.2 EQUIPMENT:

(There are no applicable requirements.)

PART 3: EXECUTION

(There are no applicable requirements.)

END OF SPECIFICATION

PART 1 - GENERAL

1.01 WORK INCLUDED:

A. This section covers Contractor requirements for providing environmental controls consistent with regulatory requirements throughout the duration of the project.

B. All costs associated with these permits are to be included as part of the Contract Bid Price, and no separate payment will be made for these costs.

C. The CONTRACTOR is responsible for obtaining all permits and licenses necessary for the completion of the work unless specifically designated as GOVERNMENT provided.

1.02 SUBMITTALS

A. Submit the following in accordance with Section 01300 – Submittals.

1. The CONTRACTOR shall obtain and submit a copy of the Storm Water Discharge Permit [as needed] prior to start of work.
2. Submit copies of all additional required permits to the GOVERNMENT when they are acquired.
3. The CONTRACTOR will perform all compliance testing required by all permits. Submit results of compliance testing directly to the appropriate review agency. Provide copies of all results to the GOVERNMENT.

1.03 REGULATORY REQUIREMENTS

A. In cases of conflict, conform with the most stringent requirement.

B. Laws, Regulations, and Permits:

1. Perform construction operations, including management of subcontractors, to comply, with: Applicable Federal, and local laws, orders, regulations, and water quality standards concerning control and abatement of water pollution; and terms and conditions of applicable permits issued by permit issuing authority.

C. Contractor Violations:

1. If noncompliance should occur, immediately (verbally) report noncompliance to the GOVERNMENT. Submit specific written information within two days.
2. Violation of applicable Federal or local laws, orders, regulations, or water quality standards may result in the GOVERNMENT stopping unrelated site activities until compliance is achieved.
3. The Contractor will not be entitled to an extension of time, claim for damage, or additional compensation by reason of such a work stoppage.
4. In accordance with FAR 52.236-7, corrective measures required to bring activities into

compliance and remediate environmental impacts will be at the Contractor's expense.

1.04 PERMITS

A. GOVERNMENT Obtained Permits

1. The GOVERNMENT has the following permits for this project:

a. The CONTRACTOR shall abide by the conditions of the GOVERNMENT-obtained permits.

b. The GOVERNMENT will provide the CONTRACTOR copies of permits obtained by GOVERNMENT. The CONTRACTOR shall provide the ENGINEER copies of all permits obtained by CONTRACTOR.

B. Contractor Obtained Permits

1. Montana Pollutant Discharge Elimination System (MPDES) General Permit [as needed] for Discharges from Construction Activities:

a. The CONTRACTOR is responsible for obtaining all permits and licenses necessary for the completion of this Work. The CONTRACTOR is responsible for all permits relating to the discharge of water associated with construction activity under the MTPDES, including but not limited to the following: storm water discharge, Storm Water Pollution Prevention Plan, and construction site dewatering.

2. Other required permits and licenses not obtained by GOVERNMENT.

1.05 CONTRACTOR RESPONSIBILITIES

A. Permits:

1. For the Stormwater Discharge Permit, the GOVERNMENT will designate the Contractor as the operator or holder of the Permit.

2. Monitoring: Provide monitoring, reporting, and records as required by the permits.

B. Prepare, maintain, and proceed in conformity with Storm Water Discharge Permit/Storm Water Pollution Prevention Plan as required [as needed] by the Montana Department of Environmental Quality. Once the CONTRACTOR prepares and submits the final permit to the GOVERNMENT, the GOVERNMENT will obtain this permit and pay all associated fees.

C. During construction the CONTRACTOR is responsible for all maintenance to the pollution prevention plan. When the CONTRACTOR has completed work on the project and has been issued the final payment, the GOVERNMENT will continue maintenance on the pollution prevention plan. When all criteria have been met, the GOVERNMENT will file the Notice of Termination for the permit.

D. Except as otherwise noted, identify, obtain, maintain, and proceed in conformity with any and

all additional required permits necessary for completion of the Work.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE:

The method of measurement and basis of payment is described in this section.

1.02 GENERAL:

A. The bid price for each item of the Contract covers all Work shown on the Drawings and required by the specifications and other Contract Documents.

B. All costs are included in the unit and lump-sum prices bid, including all materials, equipment, supplies, and appurtenances; all construction plant, equipment, and tools; and all labor and supervision necessary to fully complete the Work.

C. No item that is required by the Contract Documents for the proper and successful completion of the Work will be paid for outside of or in addition to the prices submitted in the Bid.

D. All work not specifically set forth as a pay item in the Bid Form is considered an incidental obligation of the CONTRACTOR, and all costs in connection therewith shall be included in the unit prices bid.

1.03 ESTIMATED QUANTITIES:

A. All quantities in the Price Schedule of the Bid Form or other Contract Documents, which are to be paid per field measurement, are approximate only and are to be used only as:

1. A basis for estimating the probable cost of the Work, and
2. For the purpose of comparing Bids submitted for the Work.

B. Actual work performed and materials furnished under the unit-price items for those items to be field measured may differ from the estimated quantities.

C. The basis of payment for work and materials will be the actual amount of work done and materials furnished to the pay lines defined in this section.

D. Payment will be paid at the unit price bid for listed items successfully completed according to the Contract requirements.

E. Lump-sum items and those based on neat-line plan dimensions are not field-measured. They will be paid at neat-line or the lump-sum price bid for the items listed.

1.04 AUTHORITY:

A. CONTRACTOR will perform all measurements and compute quantities for payment [with GOVERNMENT oversight and observation during measurements].

B. GOVERNMENT will verify measurements and quantities provided by the CONTRACTOR.

C. CONTRACTOR provides access to work areas for survey measurements, as required.

1.05 MEASURED QUANTITIES:

A. Measurement by Volume: Measured by cubic dimension using mean length, width, and height or thickness.

1. Measurement for payment of excavations upon or against which concrete or cementitious backfill is to be placed will be limited to the lines and grades shown on the Drawings or to the most practical lines, grades, and dimensions established by the GOVERNMENT in writing. No measurement will be made for over excavations beyond design lines and grades.
2. Fill quantities will be computed using the average-end-area method or other computation method approved by the GOVERNMENT.

B. Measurement by Area: Measured by square dimension using mean length and width. Items that are measured by area will be measured parallel to the ground surface.

C. Linear Measurement: Measured by linear dimension at the item centerline or mean chord. Items that are measured by the lineal foot will be measured parallel to the ground surface, unless otherwise specified.

D. Stipulated Sum/Price Items: Measured by weight, volume, area, or linear means, or combination, as appropriate, as completed items or units of the work.

E. Lump-Sum Items: Will not be measured for payment. Interim measurements may be made to monitor work progress.

1.06 MEASUREMENT AND PAYMENT ITEMS:

A. Item 1 – Mobilization & Preparatory Work: Consists of preparatory work and operations performed by the CONTRACTOR, including but not limited to those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; for the establishment of all offices, buildings, and other facilities necessary for all work on the project; for premium on bonds and insurance for the Contract; and for other work and operations that must be performed or costs incurred before beginning work on the various items on the project site.

1. This item also includes maintaining traffic control devices as necessary to restrict public access through the project site for the duration of the project.
2. Mobilization costs for subcontracted work are also considered included in this item.
3. Demolition and disposal of all existing structures designated for removal in the Contract Documents but not specifically included in other payment items are included in this payment item.
4. Measurement and payment for mobilization and preparatory work will be made at the Contract lump sum price.
5. Clearing, topsoil stripping, and restoration as needed. (Consists of stripping, stockpiling, and replacing topsoil from the dam embankment and all staging and waste areas and restoring the project site to pre-construction conditions.

Measurement and payment will be made at the Contract lump sum price.

B. Item 2 – Inlet Structure: Consists of furnishing and installing all materials for the construction of the Inlet Structure. Item includes sand filter material, drain gravel material, 6 inch perforated pipe, riprap protection, geotextile fabric, and all other items necessary to construct the structure in accordance with the Contract Documents. Excavation and compacted backfill for the Inlet Structure is also included in this item. Measurement and payment will be made at the Contract lump sum price.

C. Item 3 – Riser Casing, Pump and Solar Array: Consists of furnishing and installing solar pump and solar array in accordance with the Contract Documents. This item includes wiring between the solar pump and solar array with proper protection or burial of wiring. This item includes all components for a fully functional pump and solar array, including structural mounting, riser casing, pitless adapter, pipeline connection components, and all other items necessary to construct in accordance with the Contract Documents. Excavation and backfill for the Inlet Structure is also included in this item. Measurement and payment will be made at the Contract lump sum price.

D. Item 4 – Tank and Outlet: Consists of furnishing and installing the livestock water tank and outlet piping in accordance with the Contract Documents. This item includes the automatic outlet drain, drain gravel, stabilization post, post straps, piping fittings and all other items necessary to construct in accordance with the Contract Documents. Excavation and backfill for the Inlet Structure is also included in this item. Measurement and payment will be made at the Contract lump sum price.

E. Item 5 – Pipeline: Consists of furnishing and installing the 4 inch and 1.5 inch pipeline in accordance with the Contract Documents. This item includes HDPE pipe, trenching, excavation, and backfill. Measurement will be based on length of pipe installed. Payment for this work will be made at the Contract lump sum price.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01150

PART 1 - GENERAL

1.01 PRE-CONSTRUCTION CONFERENCE:

A. A pre-construction conference will be held prior to the start of work. The CONTRACTOR will be notified in advance of the meeting time, date, and place. The purpose will be to review required work, project drawings and specifications, construction schedules, payroll and payments, and administrative provisions of the Contract.

B. CONTRACTOR, subcontractors, and the persons responsible for the coordination of the work are required to be present at the meeting.

C. CONTRACTOR is required to be prepared to summarize and explain procedures planned for the project and to present the pre-construction submittals required.

1.02 FINAL INSPECTION:

A. Notify the Contracting Officer at least five working days prior to the completion date, allowing the Government to schedule a final inspection. The final inspection may be scheduled during final day of completion of work.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01200

PART 1 - GENERAL

1.01 DESCRIPTION:

This section includes the procedures for submittals. Items that need to be reviewed by the GOVERNMENT are included.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 SUBMITTAL PROCEDURE:

A. Coordinate all submittals and review them for accuracy, completeness, and compliance with contract requirements; and indicate CONTRACTOR's approval thereon as evidence of such coordination and review. Items submitted without evidence of the CONTRACTOR's approval will be returned for resubmission.

B. Date and Number: Forward to the GOVERNMENT at least 10 days prior to needing approval or delivery to the site all items required by the individual sections of the specifications.

C. Cover Letter: Forward all submittals with a cover letter from the CONTRACTOR, identifying the Project and the portion of the Project to which it applies. Submittals that are related to or affect each other shall be forwarded simultaneously as a package to facilitate a coordinated review. Uncoordinated submittals will be rejected. The GOVERNMENT reserves the right to require submittals in addition to those called for in individual sections.

3.02 GOVERNMENT'S APPROVAL:

The GOVERNMENT will indicate approval or disapproval of each submittal and, if not approved, will indicate reasons therefor. Any work done prior to approval shall be at the CONTRACTOR's own risk. Any work done, or materials provided, prior to approval will not be eligible for payment until approval is obtained. Approvals do not relieve the CONTRACTOR from responsibility for complying with the requirements of this Contract. If submittals show variations from the Contract requirements, the CONTRACTOR shall describe such variations in writing in the cover letter at the time of submission. The request for a variation shall include a proposal addressing the net effect on the contract price and time.

3.03 REQUIRED SUBMITTALS:

A. List of Subcontractors and Suppliers

1. At the preconstruction conference, provide a list of all suppliers and subcontractors to be used on the Project and a completed Form SF1413 (form provided at the end of this section) for each subcontractor.

B. Certificates

1. For those items called for in individual sections, furnish certificates from manufacturers, suppliers, or others certifying that materials or equipment being furnished under the Contract comply with the requirements of these specifications.

C. Summary of Required Submittals

1. The following table is a summary of submittals, by section, required by these specifications. Consult individual sections of the specifications for a complete description of individual requirements.

List of Submittals*

Submittal Number	Submittal	Specification Reference	Date Due**
01010-1	Site Access Plan	1010	Preconstruction
01700-1	Project Record Documents (as needed)	1700	Post-construction
01700-1	Operation and Maintenance Manuals/Instructions	1700	Post-construction
02300-1	Source Submittals	2300	Preconstruction
02300-2	Riprap, Filter Sand, and Drain Gravel Placement Plan	2300	Preconstruction
02370-1	Geotextile Product Data	2370	Preconstruction
02665-1	Material List, Product Data, Material Certification	2665	Preconstruction

*This list is not intended to be comprehensive; consult individual sections.
**Due date for all submittals is 10 days prior to needing approval or delivery to the site, unless stated otherwise.

STATEMENT AND ACKNOWLEDGMENT

OMB Control Number: 9000-0014
Expiration Date: 1/31/2021

Paperwork Reduction Act Statement - This information collection meets the requirements of 44 U.S.C. § 3507, as amended by section 2 of the Paperwork Reduction Act of 1995. You do not need to answer these questions unless we display a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 9000-0014. We estimate that it will take .05 hours to read the instructions, gather the facts, and answer the questions. Send only comments relating to our time estimate, including suggestions for reducing this burden, or any other aspects of this collection of information to: U.S. General Services Administration, Regulatory Secretariat Division (M1V1CB), 1800 F Street, NW, Washington, DC 20405.

PART I - STATEMENT OF PRIME CONTRACTOR

1. PRIME CONTRACT NUMBER	2. DATE SUBCONTRACT AWARDED	3. SUBCONTRACT NUMBER

4. PRIME CONTRACTOR			5. SUBCONTRACTOR		
a. NAME			a. NAME		
b. STREET ADDRESS			b. STREET ADDRESS		
c. CITY	d. STATE	e. ZIP CODE	c. CITY	d. STATE	e. ZIP CODE

6. The prime contract ☐ does, ☐ does not contain the clause entitled "Contract Work Hours and Safety Standards Act -- Overtime Compensation."

7. The prime contractor states that under the contract shown in Item 1, a subcontract was awarded on the date shown in Item 2 to the subcontractor identified in item 5 by the following firm:

a. NAME OF AWARDING FIRM

b. DESCRIPTION OF WORK BY SUBCONTRACTOR

8. PROJECT	9. LOCATION

10a. NAME OF PERSON SIGNING	11. BY *(Signature)*	12. DATE SIGNED
10b. TITLE OF PERSON SIGNING		

PART II - ACKNOWLEDGMENT OF SUBCONTRACTOR

13. The subcontractor acknowledges that the following clauses of the contract shown in Item 1 are included in this subcontract:

- Contract Work Hours and Safety Standards Act - Overtime Compensation (If included in prime contract see Block 6)
- Payrolls and Basic Records
- Withholding of Funds
- Disputes Concerning Labor Standards
- Compliance with Construction Wage Rate Requirements and Related Regulations
- Construction Wage Rate Requirements
- Apprentices and Trainees
- Compliance with Copeland Act Requirements
- Subcontracts (Labor Standards)
- Contract Termination - Debarment
- Certification of Eligibility

14. NAME(S) OF ANY INTERMEDIATE SUBCONTRACTORS, IF ANY

A		C	
B		D	

15a. NAME OF PERSON SIGNING	16. BY *(Signature)*	17. DATE SIGNED
15b. TITLE OF PERSON SIGNING		

AUTHORIZED FOR LOCAL REPRODUCTION
PREVIOUS EDITION IS NOT USABLE

STANDARD FORM 1413 (REV. 4/2013)
Prescribed by GSA/FAR (48 CFR) 53.222(e)

END OF SECTION 01300

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This section covers the requirements for Quality Control (QC) on all work performed to ensure it conforms to the drawings and specifications.

1.02 DEFINITIONS:

A. Quality Assurance (QA) – Inspection and tests performed by the Government to verify the Work complies with the contract documents. QA testing is not used to determine construction procedures or operations. QA includes oversight of the Contractor's quality control, verifying the results of the CONTRACTOR's testing, and additional assurance sampling and testing. QA testing and oversight will be provided at a level/frequency determined necessary by the GOVERNMENT.

B. Quality Control (QC) - Activities performed by the Contractor to ensure work conforms to the contract requirements. Quality control is keyed to the construction sequence to quickly determine when the Work is out of compliance with the contract documents and to respond to correct the situation and bring the Work into compliance. QC is the responsibility of the CONTRACTOR.

C. Quality Control Testing:

1. Compacted backfill will be tested and approved by the Government, no independent or 3rd party testing is required for the Contractor.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

3.01 QUALITY CONTROL

A. The Contractor is responsible for adequate quality control for the WORK to be performed in compliance with these specifications.

3.02 COOPERATION WITH QUALITY ASSURANCE:

A. Assure the GOVERNMENT has access to all work areas at all times Work is in progress. Provide any special facilities or equipment to access work areas at CONTRACTOR expense.

B. Notify the GOVERNMENT when the Work is ready for quality assurance/quality control testing.

END OF SECTION 01400

PART 1 - GENERAL

1.01 COMPLETION OF WORK:

It is understood that, except as otherwise specifically stated in the Contract Documents, the CONTRACTOR shall provide and pay for all materials, labor, tools, equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the Work within the specified time.

1.02 CONTRACTOR RESPONSIBILITY:

Store materials to ensure the preservation of their quality and fitness for the Work. Locate stored materials to be incorporated into the Work to facilitate a prompt inspection by the GOVERNMENT. The CONTRACTOR is responsible for the condition and security of all materials furnished by the CONTRACTOR and shall replace all such material found to be defective or which has been damaged after delivery. This includes the replacement of material that is found to be defective at any time prior to the expiration of the guarantee period.

1.03 MANUFACTURER'S RECOMMENDATIONS:

Apply, install, connect, erect, use, clean, and condition manufactured articles, materials, and equipment as directed by the manufacturer.

1.04 SAMPLES:

Provide materials, supplies, and equipment in accordance with samples submitted by the CONTRACTOR and approved by the GOVERNMENT.

PART 2 - PRODUCTS

Not Used.

PART 3 - EXECUTION

Not Used.

END OF SECTION 01600

PART 1 - GENERAL

1.01 DESCRIPTION:

The work covered under this section includes items required in the final closeout of this Project. Included are items such as post-construction inspection, acceptance of the work, and closeout records (manuals, operational notes, or other installation notes).

1.02 SUBMITTALS:

Provide closeout submittals for approval prior to final payment. Items to be submitted include:

A. Project Record Documents - See Item 3.02 for requirements [as needed].

B. Operation and Maintenance Instructions - Furnish electronically complete literature, operating instructions, installation instructions, maintenance instructions, parts lists, and technical data on all items required herein or by the GOVERNMENT.

PART 2 - PRODUCTS

2.01 MISCELLANEOUS PRODUCTS:

Provide all maintenance materials, spare parts, tools, keys, and other items either required in the Contract Documents or furnished by the suppliers of the various products.

PART 3 - EXECUTION

3.01 CLEANING:

Remove all tools, equipment, surplus materials, and rubbish. Repair all marred surfaces, and remove grease, dirt, stains, and foreign materials from finished surfaces.

3.02 PROJECT RECORD DRAWINGS:

Using red-colored ink, the CONTRACTOR shall mark changes on a set of clean prints. Indicate all changes and revisions to the original design that affect the permanent structures and that exist in the completed work. Reference all underground facilities to permanent physical objects. Reference elevation of all existing lines on profile sheets or call out elevations in the plan view if no profile exists. Keep record drawings current during construction activities. Certification of accuracy and completeness is required on monthly payment requisitions.

END OF SECTION 01700

DIVISION 2

SITEWORK

PART 1: PART 1: GENERAL

1.1 SUMMARY:

A. Section Includes: Trenching, backfilling and compacting for the installationslo of water pipeline.

1.2 QUALITY ASSURANCE:

A. Failure Criteria: Not limited to the following:

1. Settlement of backfill below natural ground surface.

2. Bury depth less than designated depth.

1.3 PROJECT/SITE CONDITIONS:

A. Borrow Sources: On Government land shall be as shown on the drawings or as approved prior to excavation.

PART 2: PRODUCTS

2.1 MATERIALS:

A. General: Material excavated shall be considered unclassified.

B. Fill Material: Shall be approved before use. Material from excavations or plowing shall be used unless it contains material which might damage the utility or create voids.

C. Bedding: Shall be round and be free of material that is sharp and angular. Bedding of trench shall evenly support the pipe.

PART 3: EXECUTION

3.1 PREPARATION:

A. Clearing: Provide minimum disturbance to existing grass and sod. Dispose of debris in the immediate vicinity of the pipeline. In areas of construction, topsoil will be stockpiled separately from other material, and be reused in reclamation of the disturbed areas.

B. Trenches: Follow OSHA regulation Part 1926, subpart p., Excavations.

3.2 INSTALLATION:

A. Trenches: Excavated trenches shall be a minimum of 4+ inches beyond the pipeline size. The bury depth shall be measured from the top of the pipe to the natural ground surface.

B. Pipe Bedding: The pipe shall be bedded in the bedding zone with approved bedding material. If rock is encountered, over excavate as directed by the Government and then backfill with 2 inches of bedding material under the pipe.

C. Trench Backfill: After testing and approval of the pipeline, trench backfilling may be completed. Mound excess material over the trenched backfill in an inverted U-shape as directed by the Government. All backfill shall be compacted by wheel or other equivalent equipment to reduce the amount of settlement. Place compacted backfill in 8 inch lifts.

D. Borrow: Furnish borrow materials required for backfill, bedding, and water bars.

3.3 FIELD QUALITY CONTROL:

A. Testing of Pipe Lines: Shall be done according to Specification 02665 - Water Systems.

B. Bury Depth: Depth of excavated trench shall be checked or verified by measuring excavated trenches and assemblies are proper depths by observing the location of the natural ground surface in relation to bottom of trench/top of pipe or by probing covered or backfilled lines. Lines not at the designated depth shall be required to be excavated to the proper depth, re-routed or additional cover added from an approved borrow source as directed by the Government. Responsibility and expenses shall be determined by the Government. Pipeline shall be installed at a 6 foot minimum bury depth at all locations between appurtenances.

END OF SPECIFICATION

PART 1 - GENERAL

1.01 REFERENCES

A. ASTM International (ASTM)

1. ASTM C127	Specific Gravity and Absorption of Coarse Aggregate
2. ASTM C136	Sieve Analysis of Fine and Coarse Aggregate
3. ASTM D422	Particle-Size Analysis of Soils
4. ASTM D653	Terminology Relating to Soil, Rock, and Contained Fluids
5. ASTM D1140	Amount of Material in Soils Finer than the No. 200 (75-µm) Sieve
6. ASTM C88	Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
7. ASTM C535	Test Method for Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
8. ASTM D4992	Standard Practice for Evaluation of Rock to be Used for Erosion Control
9. ASTM D6473	Standard Practice for Evaluation of Rock to be Used for Erosion Control

1.02 DEFINITIONS

A. Use definitions from ASTM D653.

B. Borrow: Material from required site excavations or from designated borrow areas.

C. Coverage: One “coverage” is the result of successive passes by a piece of compaction equipment, which, by means of sufficient overlap, ensures all areas have been subjected to one pass of the compaction equipment.

D. Fines: Material passing the No. 200 sieve size (ASTM D1140).

E. Optimum Water Content: The water content that will result from the estimated maximum dry unit weight of the soil when subjected to the ASTM D698 compaction test.

F. Percent Compaction: The ratio expressed as a percentage of the in-place dry density to the estimated maximum dry density, in accordance with ASTM D698, at the location of the in-place density test.

G. Percent Relative Compaction: The percent compaction of a cohesionless soil where the

laboratory maximum density is determined by Maximum Index Unit Weight test (ASTM D7382).

H. Percent Relative Density: The ratio of,(1) the difference between the void ratio of a cohesionless soil in the loosest state and any given void ratio to (2) the difference between its void ratios in the loosest state and densest state (ASTM D4254).

I. Suitable Material: Material imported or from required excavations that meets the specification requirements for a designated fill.

J. Topsoil: Native surface soil capable of supporting native plant growth.

K. Unsuitable Materials: Materials that contain waste, debris, roots, organic matter, frozen matter, stone or rock with any dimension greater than 3 inches, or any other materials determined by the GOVERNMENT that does not meet the requirements for any embankment zone or required fill.

L. Well Graded: A mixture of particle sizes that has no specific concentration, or lack thereof, of one or more sizes. A material that, when compacted, produces a strong, relatively incompressible soil mass with a minimum of voids.

1.03 SUBMITTALS

A. Filter Sand, Drain Gravel, and Riprap - Source Submittals

1. Submit test results from a qualified testing agency demonstrating that off-site sources conform to the requirements of this section. Test reports shall not be more than 2 years old at the time of submittal. Provide submittals a minimum of 30 days prior to delivery of material to the site.
2. Submit quality control gradation test results for filter sand material during production and delivery. Submit a minimum of one test per 500 cubic yards of filter sand delivered.
3. Submit quality control gradation test results for drain gravel material during production and delivery. Submit a minimum of one test per 500 cubic yards of drain gravel delivered.

B. Filter Sand, Drain Gravel, and Riprap Placement Plan

1. Develop and submit a plan for the placement of the filter sand and drain gravel materials.
2. Detail the equipment and methods proposed for the spreading, placement and compaction of embankment materials that limits the waste of drain materials.

1.04 PROJECT/SITE CONDITIONS

A. Final excavation lines will be determined by the GOVERNMENT in the field based on the conditions encountered, and they may not be the same as the estimated excavation lines shown on the drawings.

PART 2 - PRODUCTS

2.01 COMPACTED BACKFILL

A. Reasonably well-graded non-organic soils with a maximum size of 2 inches and at least 50%

passing the No. 200 sieve.

B. Soils with visible organic materials or salt crystals shall not be used as backfill.

2.02 FILTER SAND

A. Provide from off-site sources, approved prior to delivery, free draining, reasonably well-graded sand meeting the following grading limits after placement and compaction:

Table 02300-2
Filter Sand Gradation

Sieve Size	Percent Smaller By Weight
3/8 inch	100
No. 4	95-100
No. 8	80-100
No. 16	50-85
No. 30	25-60
No. 50	10-30
No. 100	2-10
No. 200	0-5

B. Filter sand material shall be non-plastic and meet the aggregate durability requirements of ASTM C33.

2.03 DRAIN GRAVEL

A. Provide from off-site sources, approved prior to delivery, free draining, reasonably well-graded gravel meeting the following grading limits after placement and compaction:

Table 02300-3
Drain Gravel Gradation

Sieve Size	Percent Smaller By Weight
1 inch	100
3/4 inch	85-100
1/2 inch	45-75
3/8 inch	25-55
No. 4	0-10

Table 02300-3
Drain Gravel Gradation

Sieve Size	Percent Smaller By Weight
No. 8	0-5

1.01 RIPRAP ROCK

A. Riprap provided from offsite shall be dense, semi-angular, reasonably well-graded, sound rock fragments resistant to abrasion, free of cracks, seams, clay, organic material, and defects that would hasten degradation by water and/or frost action.

B. Quarried rock or boulders for use as slope protection and in the stilling basin from offsite shall have the following properties:

1. Bulk specific gravity (saturated-surface dry): 2.50 minimum, (apparent specific gravity minimum: 2.60) when tested in accordance with ASTM D6473.
2. Absorption: 2 percent or less, when tested in accordance with ASTM D6473.
3. Sodium sulfate soundness, loss: 10 percent loss or less for five cycles, when tested in accordance with ASTM C88, 5 cycles.
4. Resistance to abrasion, loss: 10 percent or less after 100 revolutions and 40 percent or less after 500 revolutions, when tested in accordance with ASTM C535.

C. Shape:

1. Semi-angular boulders or cobbles are acceptable.
2. Maximum dimension is not greater than 3 times the minimum dimension.

D. Gradation: Furnish stone that is reasonably well-graded conforming to the gradation listed in Table 02275-1.

TABLE 02275-1
UPSTREAM SLOPE RIPRAP GRADATION
(MDT Class I Riprap)

Diameter* (inches)	Percent Smaller by Weight
13	100
11	70 – 90
8	40 – 60
3	0 – 10**

* Diameter is the median dimension when measuring length, depth and breadth.
** Include rock spalls or cobbles in an amount to just fill spaces between larger rocks, but not to excess. Larger-sized rock should be in point-to-point contact.

2.04 COMPACTING EQUIPMENT

A. Compacted Backfill: The Contractor shall use lightweight, maneuverable compaction equipment suitable for achieving uniform compaction without overstressing the adjacent structures.

1. Acceptable Compaction Equipment:
    a. Trench rollers (padfoot/sheepsfoot style), remote-operated or ride-on, with segmented padfeet capable of achieving uniform kneading compaction.
    b. Rammax-type or comparable articulated trench compactors with padfoot drums having: Uniformly spaced tamping feet, foot length not less than 4–6 inches, and drum width typically 24–33 inches
    c. Jumping-jack/rammer compactors may be used only in areas where larger equipment cannot operate due to clearance limitations.
    d. All compaction equipment shall be sized so that the Contractor can compact around adjacent structures without causing distortion or excessive lateral loading.
2. Equipment Performance Requirements: Equipment shall provide sufficient static and/or vibratory force to achieve the required compaction specified. Compaction shall be performed in lifts not exceeding 8 inches loose thickness. Equipment operation shall avoid impact, collision, or excessive pressure against the CMP riser or appurtenances.

B. Filter Sand Drain Gravel (Confined Areas):

1. Provide vibratory plate compactors meeting the following:
    a. Minimum operating weight: 160 lb
    b. Centrifugal force: not less than 2,900 lb
    c. Limit vibratory passes to prevent breakdown of sand or gravel particles.

C. Special Compaction Equipment: Provide hand-operated impact tampers, vibrating plate tampers, or small tamping equipment for compacting fill against concrete surfaces in restricted spaces and at locations where large compacting equipment cannot operate effectively.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Classification: No classification as to class, nature, or condition will be made of any soil or rock from required excavations or borrow areas. If the CONTRACTOR believes the excavation class has changed, CONTRACTOR shall notify GOVERNMENT.

B. Excavate: Excavate according to the lines and grades shown on the Drawings or written field clarifications.

C. Required excavation lines shown on the Drawings are the final or actual lines unless otherwise directed by the GOVERNMENT. Final quantities may be higher or lower than those estimated.

D. Topsoil strip the all areas to receive fill to a minimum depth of 6 inches. Topsoil at the project

site is limited. Perform stripping operations in a manner that conserves all topsoil that contains organics.

E. Backfill unauthorized excavations, excessive soil excavations, and excavations for CONTRACTOR convenience with approved materials as determined by the GOVERNMENT, at no additional cost to GOVERNMENT.

F. Take precautions to preserve, in a sound condition, the material below and beyond the lines of all excavations.

G. Reuse, as much as is practicable, all suitable materials from required excavation in the permanent construction. Separate unsuitable materials and remove them from the work area as soon as practicable and in a location determined by the Government.

H. Excavated materials shall be stockpiled and moisture-conditioned in temporary stockpiles prior to being placed in the embankment.

I. Water-condition materials that are too dry for immediate compaction. Use water and equipment to water condition materials directly in borrow areas and in temporary stockpiles prior to their being transported to fill areas. Water conditioning is incidental to the work.

J. Level and trim waste piles to reasonably regular lines and slope to drain. Finished slopes shall be no more than 3H:1V.

3.02 PLACEMENT

A. Compacted Backfill

1. Distribute water uniformly throughout each lift of material prior to and during compaction.
2. Water-condition Compacted Backfill material in stockpiles and borrow areas to a water content between optimum and 2% above optimum for compaction before transporting. Add supplemental water to the material prior to compaction by uniform sprinkling followed by uniform mixing.
3. Spread materials in uniform layers not to exceed 8 inches in loose thickness, and compact by rolling with approved compaction equipment.
4. Place at a water content between 2% below and 3% above optimum for compaction (ASTM D698). Compact to not less than 97% of the laboratory maximum dry density (ASTM D698).

B. Filter Sand and Drain Gravel

1. Control and conduct all transporting, stockpiling, excavation, production, and placement operations to minimize contamination, segregation, and particle breakdown.
2. Prevent soils from adjacent embankment from being tracked onto the filter sand.
3. Place drain material in continuous, horizontal lifts not to exceed 12 inches in loose thickness on the filter blanket and chimney drain, free from segregation and contamination.
4. Thoroughly wet filter-drain material during placement and compaction. Clean, potable

water, from a source approved by the GOVERNMENT, shall be used to wet filter zones to avoid contamination from clay fines.

5. Compact each lift of the filter sand blanket with 2 passes of the approved vibratory roller operated in vibratory mode. A combination of static mode vs. vibratory mode, or compaction by spreading equipment may be utilized to control particle breakdown, subject to testing and review by the GOVERNMENT.

6. Carry out coverages of compaction equipment so the compactive effort is distributed uniformly and in a systematic manner over the entire lift.

3.03 FIELD QUALITY CONTROL

A. The CONTRACTOR is responsible for adequate quality control and to develop and submit a quality control plan describing how the WORK will be performed in compliance with these specifications. The CONTRACTOR must conduct inspections to document that their process control is achieving the specification requirements.

B. The Government will provide onsite quality control tests.

C. Testing

1. Testing will generally use the standard test methods listed in Table 02300-4 Standards for Testing for determining conformance with specification requirements.

2. The Government will perform tests as required to demonstrate that type of material used, material placement, and material compaction conform to contract requirements.

3. Notify the GOVERNMENT 48 hours before compaction work begins and before significant changes in compaction operations (major change in equipment or procedure used).

4. Notify the GOVERNMENT immediately of equipment change due to breakdown, or re-deployment.

Table 02300-4 Standards for Testing

Procedure	ASTM Standard(s)
Soil Classification	ASTM D2487 ASTM D2488
Gradation Analysis	ASTM D6913, D7928
Atterberg Limits	ASTM 4318
Dispersive Characteristics by the Crumb Test	ASTM D6572
Laboratory Maximum Density	ASTM D698
Water (Moisture) Content	ASTM D 2216
In-Place Moisture and Density: Nuclear	ASTM D 6938
In-Place Density: Low-Activity Nuclear Method	ASTM D8167

Water Content of Soil by Calcium Carbide Gas Pressure Tester	ASTM D4944
Rapid Construction Control	ASTM D 5080

D. Testing Frequency

1. The Government conduct tests to demonstrate process control of all products during production and placement to achieve the specification requirements, including, but not limited to, compacted backfill, filter sand, and drain gravel.
2. Testing is normally performed more frequently at the beginning of new work, new work crews, or new equipment.
3. The minimum testing frequencies for construction of the dam embankment and appurtenant elements and features is defined in Table 02300-5.

Table 02300-5 Minimum Testing Frequencies for Quality Control Testing

Feature	Section	Test	Minimum Frequency
Compacted Backfill	2.02	Moisture Density Gradation/Atterberg/Classification In-Place Density	Each soil type 1 test / 2,000 CY 1 test / 500 CY or 1 test / lift if the lift is less than 500 CY
Filter Sand	2.04	Gradation	1 test / 500 CY
Drain Gravel	2.05	Gradation	1 test / 100 CY

3.04 QUALITY ASSURANCE

A. Testing

1. The GOVERNMENT will perform independent quality assurance tests at their discretion to verify the type of material used, material placement, material compaction conforms to contract requirements and the CONTRACTOR's quality control complies with specification requirements.

B. Support/Access

1. Provide timely access to areas for density testing and/or for examination of in-place materials. Excavate and level an area in compacted material to provide a surface for testing.
    a. Fills compacted by sheepsfoot rollers are normally tested one or two lifts below surface.
2. When density is being measured by a sand-cone device (ASTM D1556), cease

construction activity in immediate vicinity of testing.

3. Provide warning lights, flags, or other safety devices as needed by testing personnel.
4. Provide adequate lighting for performing test if required.

END OF SECTION 02300

PART 1 - GENERAL

1.01 DESCRIPTION:

This work consists of furnishing and placing a geotextile fabric as a permeable separator between dissimilar materials, such as between subgrade and riprap bedding or gravel, permanent erosion control measure, sediment control device, or subsurface drainage fabric, and to aid in stabilizing poor subgrade soils.

1.02 SUBMITTALS:

A. Submit the following in accordance with Section 01300 – Submittals.

B. Geotextile Product Data:

1. Manufacturer's certification that the geotextile meets specified chemical, physical, and manufacturing requirements.
2. Include the manufacturer's test results covering properties listed in Table 02370-1 – Geotextile Properties.
3. Manufacturer information:
    a. Name and address of the manufacturer.
    b. Evidence of manufacturer experience.
    c. Total square footage of installation, installation date, project manager, designer, fabricator (if any), and installer.
    d. Descriptive documentation of manufacturer's quality control program.

C. Samples:

1. Geotextile: 3 feet in length from the entire roll width.

PART 2 - PRODUCTS

2.01 GEOTEXTILE FABRIC:

A. Nonwoven geotextile is to be GEOTEX 1001 manufactured by Propex Inc., Chattanooga, TN, Mirafi 1100N manufactured by TenCate, Pendergrass, GA, or approved equal.

B. Conform to roll values listed in Table 02370-1 – Geotextile Properties.

1. Values listed in the table are minimum average roll values (MARV's), unless otherwise noted.

C. Physical and Chemical Requirements:

Fibers used in the manufacture of geotextiles, and the threads used in joining geotextiles by sewing, shall consist of long-chain synthetic polymers, composed of at least 95% by weight polyolefins, polyesters, or polyamides. They must be formed into a network so the filaments on yarns retain dimensional stability relative to each other, including selvages. All nonwoven geotextiles shall be

needle punched. Heat-bonded or resin-bonded geotextiles shall not be used.

TABLE 02370-1 – Geotextile Properties

Property	Test Method	Value	Units
Grab Tensile Strength	ASTM D 4632	250	lbs
Grab Tensile Elongation	ASTM D 4632	50	%
Trapezoidal Tear	ASTM D 4533	100	lbs
CBR Puncture Strength	ASTM D 6241	700	lbs
Ultraviolet light (% residual tensile strength)	ASTM D 4355 500-hr exposure	70	%
Permittivity	ASTM D 4491	0.8	sec^{-1}
Water Flow Rate	ASTM D 4491	75	$gal/min/ft^2$
Apparent Opening Size	ASTM D 4751	#100 max.	U.S. Sieve Size

PART 3 - EXECUTION

3.01 SHIPMENT AND STORAGE:

During shipment and storage, protect the fabric from direct sunlight, ultra-violet rays, temperatures exceeding 140° F (60° C), mud, dust, and debris. Keep the fabric in the manufacturer's wrapping until just before use. Include in each shipping document a certification that the geotextile meets the manufacturer's certificate and guarantee previously submitted.

3.02 EQUIPMENT

A. Do not drive equipment on geosynthetic products (geotextile, or any other geosynthetic material onsite), unless approved by the GOVERNMENT.

3.03 EXAMINATION

A. Verify site conditions are as indicated on the drawings. Notify the GOVERNMENT if site conditions are not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

3.04 SUBGRADE PREPARATION

A. Prepare surface upon which geotextile is to be placed to a firm surface, reasonably even and smooth, and free of offsets, abrupt indentations, and protruding materials greater than 1-1/2 inches.

B. Obtain GOVERNMENT approval of subgrade before installing geotextile.

3.05 INSTALLATION – FILTER/SEPARATION APPLICATIONS:

Store, handle, and deploy geotextile fabric in accordance with manufacturer recommendations and as specified herein. Place geotextile fabric between the prepared subgrade and riprap, where shown on the Drawings, and other locations as shown on the Drawings. Subgrades will be subject to

approval by the GOVERNMENT prior to placement of geotextile fabric. Place geotextile fabric in the stilling basins by unrolling the fabric from the top of the slopes to the toe areas. Overlap successive geotextile sheets in such a manner the upstream sheet is placed over the downstream sheet and/or upslope over downslope. Overlap adjacent seams a minimum of 2 feet when over compacted subgrade (e.g., the upstream face of the dam and compacted subgrade soils on stilling basin sides). Make seam overlaps 3 feet in areas of poor subgrade compaction (e.g., under stilling basin bottoms). Provide a minimum offset of 5 feet between adjacent roll ends. Anchor fabric or otherwise hold firmly in place to prevent movement during construction. Pins or other methods that puncture the fabric are not allowed. Place geotextile fabric and secure it against the prepared subgrade surfaces such that the geotextile is in continuous (smooth) contact between the geotextile and subgrade with no void areas or wrinkles.

3.06 INSTALLATION - STABILIZATION APPLICATIONS:

Storage, handle, and deploy geotextile fabric in accordance with manufacturer recommendations and as specified herein. Fabric placed without the GOVERNMENT's approval is at CONTRACTOR expense. The minimum seam overlaps shall be 3 feet. Repair geotextiles damaged during installation in accordance with the manufacturer's recommendations at the CONTRACTOR's expense.

3.07 INSTALLATION OF COVER MATERIAL

A. Place cover material so as not to damage geotextile or composite fabric.

   1. Place directly on geotextile fabric with a drop height not exceeding 1 foot.

   2. Place cover material in a manner to minimize movement of the fabric and assure that no tensile stress is induced.

   3. Place cover material from the bottom of the slope, proceeding upwards.

B. Before placing cover material, demonstrate to the GOVERNMENT that the placing technique will not damage the fabric. If the demonstration does not show cover material can be installed without damaging geotextile, modify the cover material placing technique (such as reducing drop height, installing an additional layer of sacrificial geotextile, or installing an additional gravel cushion).

C. Cover material includes riprap bedding, riprap, drain gravel, or concrete materials.

3.08 REPAIRS

A. At placement, geotextile fabric will be rejected if it has defects, rips, holes, flaws, deterioration, contamination, or damage.

B. Replace or repair geotextile damaged during installation or placement of cover in the following manner:

1. Remove the cover from the damaged area.
2. Remove any soil or other material that may have penetrated torn geotextile.
3. Repair the damaged geotextile by placing an additional layer of geotextile to cover the damaged area and overlap the undamaged geotextile by at least 3 feet on all sides.

END OF SECTION 02370

PART 1: GENERAL

1.1 SUMMARY:

A. Section Includes: Furnishing and installing livestock water system with HDPE pipe.

1.2 REFERENCES:

A. American Society for Testing and Materials:

ASTM A53	Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM D1784	Standard Classification System and Basis for Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D2241	Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D2466	Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2564	Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D2672	Standard Specification for Joints for IPS PVC Pipe Using Solvent Cement
ASTM D2774	Standard Practice for Underground Installation of Thermoplastic Pressure Piping
ASTM D2855	Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets
ASTM F656	Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
ASTM D1248	Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM F1807	Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring, or Alternate Stainless Steel Clamps, for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT) Tubing
ASTM D1599	Standard Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and Fittings
ASTM D2122	Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM D2239	Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
ASTM D2290	Standard Test Method for Apparent Hoop Tensile Strength of Plastic or Reinforced Plastic Pipe
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D2657	Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
ASTM D2737	Standard Specification for Polyethylene (PE) Plastic Tubing
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
ASTM D3035	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
ASTM D3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTM D3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials

B. American Wood Preservers' Association (AWPA)

AWPA U1	User Specifications for Treated Wood
AWPA T1	Processing and Treatment Standards
AWPA P23	Standard for Chromated Copper Arsenate Type C (CCA-C)
AWPA P36	Standard for Copper Naphthenate (CuN)
AWPA P35	Standard for Pentachlorophenol (PCP)
AWPA P48	Standard for Copper Azole Type C (CA-C)

C. National Sanitation Foundation (NSF)

1.3 SUBMITTALS:

A. Materials List: Prior to beginning work, Contractor shall submit for approval a complete list of proposed Contractor furnished materials showing brand, model, type, size or class designation as applicable, and intended location of use. When requested, Contractor shall also submit manufacturer's literature fully describing materials including manufacturer's recommended methods of sizing, installing and adjusting.

B. Product Data, Manuals, and Warranties: Contractor shall deliver to Contracting Officer before final inspection all installation instructions, manuals, product data, parts lists, and warranties packaged with products by manufacturer. At minimum, include product data or shop drawings

for CMP riser cap, automatic drain valve, 6" perforated PVC pipe (including slot size), solar array mounting system, submersible pump, and pitless adapter.

C. Plastic Pipe Certification: Pipe shall be marked with the appropriate ASTM designation, pipe diameter, type of plastic pipe material (designation code number), manufacturer's name and code, schedule number or SDR (or pressure rating) and National Sanitation Foundation (NSF) designation.

1.4 QUALITY ASSURANCE:

A. Failure Criteria: Not limited to the following:

1. Evidence of leakage

2. Evidence of breakage of pipe

3. Malfunctioning valves

4. Blockage of piping

5. Pressure drop

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Storage: Store materials and equipment according to the manufacturer's recommendations.

PART 2: PRODUCTS

2.1 CONTRACTOR-FURNISHED MATERIALS:

A. Plastic Pipe & Fittings: Pipe and fittings shall be manufactured of material approved by NSF for potable water systems. Fittings shall be the same size as the adjoining pipeline except where otherwise specified, or where reducers are required to enter a valve body. Pressure rating of fittings shall be equal to or greater than the adjoining pipeline.

1. HDPE Pipe: High density polyethylene pipe manufactured from PE4710 resin polyethylene in accordance with ASTM D2239, D2837 and D3350.

2. HDPE Pipe Fittings: Fittings shall be PE4710 HDPE to conform to applicable ASTM Standards D2513, D3035, D3261, or D3350.

3. Transition Fittings [as needed]: Fittings shall be brass, stainless steel, fabricated or

molded fittings shall be rated equal to or greater than the adjoining pipeline to adapt HDPE pipe to steel/PVC connections.

B. Brass Pipe and Fittings: Threaded, schedule 40. All fittings shall be either PVC or Brass. Fitting size shall be the same as the adjoining pipeline except where otherwise specified, or where reducers are required to enter a valve body.

C. Perforated Pipe: Provide 6-inch nominal diameter Schedule 80 PVC perforated pipe with machine-slotted perforations. Perforations shall be 0.020-inch wide slots. Slot size shall be suitable to retain the drain gravel envelope while providing adequate hydraulic capacity for the flow rate. Pipe shall be manufactured from materials conforming to ASTM D1785 or ASTM F441 for Schedule 80 PVC. The perforated section shall extend from elevation 2945.00 ft to 2952.00 ft, or as shown on the drawings. Provide solid (non-perforated) PVC pipe extensions or fittings as required for connections.

D. Riser and Cap for Pump and Pitless Adapter:

1. Annular Corrugated Metal Pipe (CMP) Riser: Riser pipe shall be 18-inch diameter annular corrugated metal pipe (CMP) conforming to AASHTO M 36 for Type II galvanized steel. Sheet steel shall meet the coating requirements of ASTM A653 for galvanized steel. Corrugation profile shall be annular to maximize structural rigidity and long-term stability under soil loads. CMP wall thickness shall be a minimum of 16 gauge, or the manufacturer's standard for structural risers capable of withstanding burial, compaction, and incidental construction loading, whichever is greater. CMP shall be furnished in a single length when possible; otherwise, provide manufacturer-approved connecting bands for couplings.

2. CMP Riser Cap: Provide a galvanized steel flat plate cap or fabricated CMP end cap designed to fully close the 18-inch annular CMP riser. Cap shall be fabricated from minimum 12-gauge galvanized steel conforming to ASTM A653. Cap shall include welded or bolted attachment hardware allowing removal for pump access and provide ability to lock the cap to prevent tampering. Cap shall prevent entry of animals, debris, and precipitation.

3. Fasteners: All bolts, nuts, and attachment hardware shall be hot-dip galvanized in accordance with ASTM A153. Hardware shall match or exceed corrosion resistance of the CMP riser.

4. Pump and Pitless Adapter Compatibility: CMP riser shall provide adequate internal clearance to house the solar submersible pump, pump drop pipe, wiring, and pitless adapter discharge assembly as shown on the Drawings. CMP shall be positioned to allow vertical removal and reinstallation of the pump.

E. Pipe Wrap: 10 mil minimum thickness, 2 inch minimum width, 14,000 volts minimum dielectric strength, 1,000,000 megohms minimum insulation resistance. Polyethylene backing with butyl rubber resin adhesive.

F. Polyethylene Sheeting: 6 mil minimum thickness.

G. Strapping and Nails for Outlet: 3/4 inch x 22 gauge minimum galvanized steel strapping, with 16d minimum galvanized nails.

H. Nails for Water Quality signs: 16d galvanized nail minimum.

I. Wood Fence Post: 6-1/2 feet long, 4 inch diameter, entire post pressure-treated with a waterborne preservation in accordance with AWPA C5 standards. Post shall be straight, single-stem, and sound.

J. Urethane Coating: Black polyurethane spray or brush on truck liner protective coating.

K. Galvanized Pipe: Schedule 40 grade B, conforming to ASTM A53 standards, and wrapped with pipe wrap.

L. Solar Pump, Pitless Adapter, and Solar Array:

1. Pump: Provide a Grundfos SQFlex submersible pump, model 35 SQF-2, or approved equal. Pump shall be designed for solar-direct operation, variable DC input, and capable of delivering the design flow and head shown on the Drawings.

2. Pump Motor: Integrated brushless DC motor compatible with the solar array system voltage. Motor shall include internal dry-run protection, overload protection, and soft-start functionality.

3. Drop Pipe: Drop pipe from the pump to the pitless adapter shall be 1.25-inch or 1.5-inch Schedule 80 PVC. Drop pipe shall be suitable for vertical pump support and handling stresses associated with pump installation and removal.

4. Check Valves: Provide pump-rated check valves as recommended by the pump manufacturer.

5. Pitless Adapter: Pitless adapter shall be a heavy-duty bronze or stainless steel unit designed for freeze-proof water discharge through the CMP riser. Adapter size shall match the pump drop pipe and horizontal discharge pipeline.

6. Discharge Fittings: Provide all elbows, nipples, unions, couplings, and transition fittings required to complete watertight connection to the buried pipeline.

7. Gaskets & Hardware: All gaskets, seals, and bolts shall be compatible with potable water systems and corrosion protected (galvanized or stainless steel).

8. Solar Array: Provide 800-watt photovoltaic (PV) panel array, polycrystalline or monocrystalline, with aluminum frames and weather-resistant wiring. Panels shall be UL-listed for outdoor use.

9. PV Mounting Structure: Mounting structure shall be steel or aluminum, rated for local wind and snow loads, and suitable for ground or pole installation.

10. Electrical Wiring: PV wiring shall be PV-rated USE-2 or PV Wire, sized per manufacturer recommendations. Wiring to the pump shall be submersible pump cable, sunlight-resistant, rated for direct burial or conduit installation. Wiring entering or exiting the CMP riser shall pass through a watertight conduit penetration using a gland seal or conduit hub.

11. Conduit: Provide Schedule 40 PVC electrical conduit or galvanized steel conduit. Conduit shall extend from the solar array to the CMP riser and from the riser cap into the interior riser space.

12. Protection: All above-grade wiring shall be UV-resistant; all below-grade wiring shall be direct-burial rated or installed in conduit.

2.2 GOVERNMENT-FURNISHED PROPERTY:

A. Refer to Specification 01019 - Government Furnished Property. The signs shall be contractor installed as directed by the Government. See Part 3-3.2.-G.-3. for installation requirements.

PART 3: EXECUTION

3.1 PREPARATION:

A. General: Clearing, grubbing, topsoiling, excavation, backfill, and bedding shall be performed in accordance with Specification 02229 – Pipeline Installation.

3.2 INSTALLATION:

A. HDPE Pipe, Joint, and Fittings: HDPE pipe, joints and fittings shall be assembled and installed in accordance with the pipe manufacturer’s instructions and ASTM specifications

D2737 and D3350. The ends of the pipe shall be covered during progress of the work to preclude intrusion of undesirable material. HDPE pipe, joints and fittings shall be heat fusion welded unless otherwise specified or approved.

B. Steel Pipe & Fittings: Except where otherwise specified, steel pipe and steel fittings shall not be used where they will be in contact with the soil. Only brass fittings, stainless steel fittings, and HDPE pipe shall be used in such locations.

C. Pipe Wrap: All buried exposed steel pipe and fittings shall be wrapped with pipe wrap. Wraps shall be tight and moisture-proof, with each wrap overlapping one-half the previous lap. All uncoated and exposed HDPE steel transition fittings and other HDPE steel fittings shall be wrapped with pipe wrap as described above and the wrap sprayed or brush coated with an adequate layer of black urethane protective bed liner.

D. Thread Lubrication: Thread lubricant shall be used on all threaded fittings.

E. Inlet Structure and Perforated Pipe: Install the 6-inch Schedule 80 PVC perforated pipe plumb and true to the lines and elevations shown on the Drawings. The perforated section shall extend from elevation 2945.00 ft (bottom) to elevation 2952.00 ft (top), unless otherwise indicated. Connect the 4-inch HDPE inlet pipeline to the bottom of the perforated pipe at or below elevation 2945.00 ft using appropriate PVC-to-HDPE transition fittings or adapters. Place drain gravel material (minimum 1 foot thickness on all sides) directly against the perforated pipe, ensuring complete and uniform contact around the entire perforated section. Place filter sand material (minimum 1 foot thickness on all sides) outside the drain gravel envelope. Place filter sand directly against the native soils on the sides and bottom of the excavation where no geotextile is required. Result is perforated pipe has drain gravel and filter sand providing a 2 foot separation from native soils. Install geotextile fabric only at the top of the sand filter envelope and beneath the riprap layer as shown on the Drawings. The geotextile shall be placed to provide stable base for riprap, prevent migration of debris/soil into the filter sand while allowing free passage of water. Protect the perforated pipe and filter materials from contamination during placement. Do not allow native clayey soils to mix with the drain gravel or filter sand. After placement of the filter materials, install the specified riprap protection over the top and sides of the inlet structure as shown on the Drawings, with geotextile fabric separating the riprap from the filter sand. Cap or plug the top and bottom of the perforated pipe to prevent entry of foreign material until the heavy-duty riser cap is installed. Inspect the perforated pipe and filter envelope for proper alignment, cleanliness, and uniform material placement prior to backfilling or placing riprap. Correct any deficiencies to the satisfaction of the Government.

F. Pump and Pitless Adapter:

1. Placement: Install the 18-inch annular CMP riser plumb at the location shown on the

Drawings. Orient the riser to provide unobstructed alignment with the pump, drop pipe, and pitless adapter assembly.

2. Bedding and Initial Support: Prepare a level foundation for the CMP riser consistent with standard CMP installation practices as outlined in the CMP Installation Guide. Place compacted bedding material beneath the CMP to provide uniform support across the pipe's circumference. Avoid point-loading or voids that may deform the riser during backfill.

3. Backfilling: Backfill around the CMP riser using approved material. Place backfill in uniform lifts not exceeding 8 inches loose thickness and compact each lift by mechanical tamping or bucket/track walking to achieve firm, supportive confinement of the CMP riser. Density testing is not required for the riser or outlet piping trench unless otherwise directed by the Government. Care shall be taken to avoid impact from construction equipment that could cause distortion or displacement of the CMP riser.

4. Cap Installation: Install the galvanized steel CMP cap after riser placement and pitless adapter installation. Attach cap using galvanized steel hardware. Ensure cap is snug and secure, preventing debris and moisture intrusion while allowing pump access when removed.

5. Clearances and Access: Confirm that the riser provides adequate space for removal and reinstallation of the pump, drop pipe, pitless adapter components, and wiring. Verify that riser height matches the Drawings and provides weather protection and maintenance access.

G. Solar Pump, Pitless Adapter, and Solar Array:

1. Submersible Pump Installation: Install pump at the depth shown on the Drawings. Lower pump using approved lifting methods to prevent cable or pipe damage. Secure pump cable to the drop pipe at intervals not exceeding 10 feet using stainless steel or UV-resistant nylon ties. Ensure adequate clearance inside the CMP riser for pump removal.

2. Pitless Adapter Installation: Install pitless adapter level and plumb at the elevation shown. Pitless adapter installed per manufacturer's recommendations. Ensure watertight seating between pump drop pipe and pitless body. Connect the pump drop pipe to the pitless adapter using threaded or compression fittings recommended by manufacturer. Connect horizontal discharge to the buried outlet pipeline. Seal all conduit penetrations in the CMP riser cap using watertight gland seals.

3. Solar Array Installation: Install mounting system plumb and secure per manufacturer's

instructions. Orient array for maximum solar exposure. Bond all metal components to the grounding system. Ensure the array is properly grounded and wired according to manufacturer specifications, including all connections, conductors, and grounding methods required for safe and reliable operation.

4. Electrical Wiring Installation:

    a. Above-grade runs: Route all exposed wiring in electrical conduit (Schedule 40 PVC or galvanized steel). Provide drip loops and strain reliefs as required by the pump manufacturer.

    b. Below-grade runs: Underground wiring may be direct-buried when cable is listed and rated for direct burial; conduit is not required for such runs. Where cable is not direct-burial rated—or where added mechanical protection is desired (e.g., rocky soils, vehicle crossings, under roads/paths, entry/exit transitions)—install wiring in electrical conduit.

    c. CMP riser penetrations: Seal all wiring penetrations into the CMP riser using watertight electrical conduit hubs or cord-grip glands compatible with the cable jacket. Provide strain-relief at each penetration. Inside the riser, protect and organize wiring from the cap penetration to the drop-pipe attachment point using short conduit sleeves or UV-resistant raceway as needed to prevent abrasion.

    d. Connections and junctions: Make array-to-pump electrical connections using manufacturer-approved connectors inside a weatherproof, electrically suitable junction enclosure. Bond/ground metallic components per manufacturer recommendations.

    e. Cable management on drop pipe: Secure pump cable to the drop pipe at intervals not exceeding 10 feet; avoid sharp bends and abrasion points.

5. Testing: After installation, operate the pump under solar power and verify flow and head match design conditions. Inspect all electrical connections for continuity and proper polarity. Confirm watertight seals at the pitless adapter and CMP riser cap penetrations.

3.3 FIELD QUALITY CONTROL:

A. General:

B. Testing [not anticipated within this contract, but contractor shall prove functionality of the system]: The pipeline may be tested as requested by the Government at the cost to the BLM. The Contractor shall prove pipeline integrity if lack of quality control or mishandling or poor

installation has been observed during the installation of the pipeline. The Contractor shall make necessary accommodations if any tests are requested.

C. Testing Procedure [not anticipated within this contract, but contractor shall prove functionality of the system]: The pipeline may be tested in whole or in segments as work progresses. If the pipeline is connected to an existing system, the test shall apply to both systems. A 24 hour notice is required for conducting second and final tests. Test pressure shall be the maximum operating pressure as listed in the drawings. Fill pipeline with water and conduct test as follows:

1. First Test: The presence of the Government is not required at the first test. Pressurize to test pressure and inspect for failure. Correct all defects and repeat the test until no further defects are observed.

2. Second Test: Once the first test has been conducted and all defects corrected, a second test shall be conducted with Government observation and approval. Pressurize to test pressure. Hold this pressure for a minimum of 4 hours and then inspect for failure. Correct all defects and repeat the test until no further defects are observed and until test is approved. Backfilling may be completed after approval of second test.

3. Final Test: Once backfilling is complete a final test shall be conducted with Government observation and approval. Pressurize to test pressure. Hold this pressure for a minimum of 24 hours and then inspect for failure. Correct all defects and repeat the test until no further defects are observed and until test is approved.

END OF SPECIFICATION