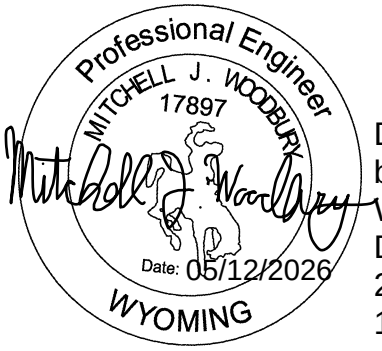
Trout Unlimited
LEWIS AND HOMER DIVERSION PROJECT

Technical Specifications
Reissued For Construction



Digitally signed by Mitchell J. Woodbury
Date: 2026.05.12 15:34:25-06'00'

Prepared For: Trout Unlimited

Prepared By: QRS Consulting

Quadrant + River Structures

May 2026

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TROUT UNLIMITED
LEWIS AND HOMER DIVERSION PROJECT
TECHNICAL SPECIFICATIONS

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SECTION 01 11 00 - SUMMARY OF WORK

PART 1 -- GENERAL

1.1 SUMMARY

A. The WORK to be performed under this Contract shall consist of furnishing tools, equipment, materials, supplies, and manufactured articles, and furnishing all labor, transportation, and services, including fuel, power, water, and essential communications, and performing all work or other operations required for the fulfillment of the Contract in strict accordance with the Contract Documents. The WORK shall be complete, and all work, materials, and services not expressly indicated or called for in the Contract Documents which may be necessary for the complete and proper construction of the WORK in good faith shall be provided by the CONTRACTOR as though originally so indicated, at no increase in cost to the OWNER.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

A. The WORK of this Contract comprises the construction of the following key elements:

1. Installation of a 160 foot-long roughened riffle below the Lewis Ditch Headgate. The roughened riffle will be constructed from imported river cobbles, boulders, and mixed with native streambed material. The riffle control section will be constructed from large diameter angular boulders. The purpose of the roughened riffle design is to set the hydraulic grade to allow for diversion at both the Lewis and Homer headgates while providing fish passage across the diversion.

2. Installation of new steel headgates at the Lewis and Homer headgates. The headgates will be locally designed and fabricated from steel plate, angle iron, and or steel tubing. Headgate installation WORK includes furnishing and installing new corrugated metal pipe and embankment excavation and backfill.

3. Dredge approximately 680 feet of Lewis Ditch.

4. Install riprap revetment along 395 feet of the river embankment upstream of Lewis Ditch.

B. The WORK is located in Uinta County, Wyoming approximately 19-miles south of Evanston following WY-150 to East Chalk Creek Road. The CONTRACTOR will access the project site using dual track dirt roads crossing private property and active cattle grazing areas. The CONTRACTOR shall coordinate with landowners on road usage, management of gates, and any temporary alterations to cattle fencing during performance of the WORK.

1.3 CONTRACT METHOD

A. The WORK hereunder will be constructed under a single lump sum contract.

1.4 WORK BY OTHERS

A. **Interference With Work On Utilities:** The CONTRACTOR shall cooperate fully with all utility forces of the OWNER or forces of other public or private agencies engaged in the relocation, altering, or otherwise rearranging of any facilities which interfere with the progress of the WORK, and shall schedule the WORK so as to minimize interference with said relocation, altering, or other rearranging of facilities.

1.5 WORK SEQUENCE

A. The CONTRACTOR's work sequence shall be at the CONTRACTOR's discretion. The CONTRACTOR's attention is directed to the fact that vehicle access along North Cisco Road must be maintained throughout the Project performance period. In addition, the CONTRACTOR shall consider on-going irrigation and ranching operations on the private properties adjacent to the Project site. The CONTRACTOR shall be responsible for coordinating with the irrigators and maintaining the irrigation needs as required throughout the performance period. Additionally, the CONTRACTOR's work sequence shall consider the time constraints imposed by the work windows associated with paving and chip sealing of North Cisco Road.

1.6 CONTRACTOR USE OF SITE

A. The CONTRACTOR's use of the Site shall be limited to its construction operations, including on-Site storage of materials, on-Site fabrication facilities, and field offices.

B. The CONTRACTOR must receive written permission from the adjacent landowners approving use of any private lands for construction operations.

1.7 OUTAGE PLAN AND REQUESTS

A. Unless the Contract Documents indicate otherwise, the CONTRACTOR shall not interrupt on-going irrigation operations without prior approval from the irrigators.

1.8 OWNER USE OF THE SITE

A. The OWNER may utilize all or part of the ranch access roads during the entire period of construction for the conduct of the OWNER's normal operations. The CONTRACTOR shall cooperate and coordinate with the OWNER to facilitate the OWNER's operations and to minimize interference with the CONTRACTOR's operations at the same time. In any event, the OWNER shall be allowed access to the Site during the period of construction.

1.9 PROJECT MEETINGS

A. **Preconstruction Conference**

1. Prior to the commencement of WORK at the Site, a preconstruction conference will be held at a mutually agreed time and place. The conference shall be attended by the CONTRACTOR'S Project Manager, its superintendent, and its subcontractors as the CONTRACTOR deems appropriate. Other attendees will be:

a. ENGINEER and the Resident Project Representative.

b. Representatives of OWNER.

c. Governmental representatives as appropriate.

d. Others as requested by CONTRACTOR, OWNER, or ENGINEER.

2. The CONTRACTOR shall bring the preconstruction conference submittals in accordance with Section 01 33 00 - Contractor Submittals.

3. The purpose of the conference is to designate responsible personnel and establish a working relationship. Matters requiring coordination will be discussed and procedures for handling such matters established. The complete agenda will be furnished to the CONTRACTOR prior to the meeting date. However, the CONTRACTOR should be prepared to discuss all of the items listed below.

a. Status of CONTRACTOR's insurance and bonds.

b. CONTRACTOR's tentative schedules.

c. Transmittal, review, and distribution of CONTRACTOR's submittals.

d. Processing applications for payment.

e. Maintaining record documents.

f. Critical work sequencing.

g. Field decisions and Change Orders.

h. Use of Site, office and storage areas, security, housekeeping, and OWNER's needs.

i. Major equipment deliveries and priorities.

j. CONTRACTOR's assignments for safety and first aid.

k. Submittal Transmittal Form which the ENGINEER will furnish.

4. The OWNER will preside at the preconstruction conference and will arrange for keeping and distributing the minutes to all persons in attendance.

5. The CONTRACTOR and its subcontractors should plan on the conference taking no less than 4 hours.

B. **Progress Meetings**

1. The ENGINEER will schedule and hold progress meetings as required by progress of the WORK. The CONTRACTOR, ENGINEER, OWNER, and all subcontractors active on the Site shall attend meetings. CONTRACTOR may at its discretion request

attendance by representatives of its suppliers, manufacturers, and other subcontractors.

2. The ENGINEER will preside at the progress meetings and will arrange for keeping and distributing the minutes. The purpose of the meetings is to review the progress of the WORK, maintain coordination of efforts, discuss changes in scheduling, and resolve other problems which may develop. During each meeting, the CONTRACTOR shall present any issues that may impact its progress with a view to resolve these issues expeditiously.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01 14 00 - CONSTRUCTION AND SCHEDULE CONSTRAINTS

PART 1 -- GENERAL

1.1 SUMMARY

A. WORK shall be scheduled, sequenced, and performed in coordination with the OWNER and adjacent irrigators and landowners.

B. The CONTRACTOR shall incorporate the construction and schedule constraints of this Section in preparing the construction schedules.

1.2 PROJECT SCHEDULE

A. Project schedule shall be coordinated with the OWNER. Construction of the Work shall be performed between September 1st and October 31st 2026. Construction sequencing and schedule shall consider the following constraints:

1. Mobilization and material delivery may occur prior to September 1st with Owner and landowner approval.

2. The in-water work shall be completed within the September 1st – October 31st timeline.

3. Demobilization and out of water work may occur outside of the defined in-water work window with permission from the OWNER and landowner.

1.3 OUTAGE REQUESTS

A. The CONTRACTOR will coordinate the timing and duration for the temporary shutdown of irrigation diversions with the project OWNER and irrigators. The CONTRACTOR shall not close the headgates or interrupt irrigation flows without approval from both the irrigator and the OWNER.

B. The CONTRACTOR will not be required to maintain diversion flows outside of the agreed upon outage schedule. The outage schedule will be defined to provide the CONTRACTOR sufficient time for installation of the new headgate structures. Maintenance of irrigation diversion flows may be required outside of the defined outage schedule. The outage schedule shall be negotiated prior to CONTRACTOR mobilization.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION

SECTION 01 55 00 - SITE ACCESS AND STORAGE

PART 1 -- GENERAL

1.1 ACCESS ROAD LIMITATIONS

The CONTRACTOR shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the WORK. It shall be the CONTRACTOR's responsibility to construct and maintain any haul roads required for its construction operations.

1.2 TEMPORARY CROSSINGS

Temporary Bridges: Wherever necessary, to maintain vehicular crossings, the CONTRACTOR shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the CONTRACTOR shall secure the written consent of the responsible individuals or authorities to omit such temporary bridges or steel plates, which written consent shall be delivered to the ENGINEER prior to excavation. Such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the CONTRACTOR shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required.

Private Road Use: CONTRACTOR shall be granted access to the project area through private property. The CONTRACTOR is responsible for management of gates and fencing and repair of roadway or fencing to pre-project conditions. The CONTRACTOR shall adhere to any requirements of the landowner regarding management of cattle fencing and gates. Likewise, the CONTRACTOR’s access may be limited to certain work hours at the landowner’s request.

Temporary Driveway Closure: The CONTRACTOR shall notify the owner or occupant (if not owner-occupied) of the closure of the driveways at least three (3) working days prior to the closure. The CONTRACTOR shall minimize the inconvenience and minimize the time period that the driveways will be closed. The CONTRACTOR shall fully explain to the owner/occupant how long the closure will take and when closure will start.

1.3 CONTRACTOR'S WORK AND STORAGE AREA

The OWNER will designate and arrange for the CONTRACTOR's use, a portion of the property adjacent to the WORK for its exclusive use during the term of the Contract as a storage and shop area for its construction operations on the WORK. At completion of WORK, the CONTRACTOR shall return this area to its original condition, including grading and landscaping.

The CONTRACTOR shall make its own arrangements for any necessary off-Site storage or shop areas necessary for the proper execution of the WORK.

The CONTRACTOR shall construct and use a separate storage area for hazardous materials used in constructing the WORK.

For the purpose of this paragraph, hazardous materials to be stored in the separate area are products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, 2 part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.

Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.

The CONTRACTOR shall develop and submit to the ENGINEER a plan for storing and disposing of the materials above.

The CONTRACTOR shall obtain and submit to the ENGINEER a single EPA number for wastes generated at the Site.

The separate storage area shall meet the requirements of authorities having jurisdiction over the storage of hazardous materials.

Hazardous materials that are delivered in containers shall be stored in the original containers until use. Hazardous materials delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

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SECTION 01 33 00 - CONTRACTOR SUBMITTALS

PART 1 -- GENERAL

1.1 SUMMARY

A. Wherever submittals are required in the Contract Documents, submit them to the OWNER or OWNER's Resident Representative as directed.

B. Within seven (7) Days after the date of commencement as stated in the Notice to Proceed, the CONTRACTOR shall submit the following items for review:

1. A preliminary schedule of Shop Drawings, Samples, and proposed Substitutes ("Or-Equal") submittals listed in the Bid. The schedule of submittals shall be based on CONTRACTOR's priority, planned construction sequence and schedule, long lead items, and size of submittal package. Allow time for resubmittals.

2. A list of permits and licenses the CONTRACTOR shall obtain, indicating the agency required to grant the permit and the expected date of submittal for the permit and required date for receipt of the permit.

1.2 PRECONSTRUCTION CONFERENCE SUBMITTALS

A. At the preconstruction conference of Section 01 11 00 - Summary of Work, the submit the following items to the OWNER for review:

1. A revised schedule of Shop Drawings, Samples, and proposed Substitute ("Or-Equal") submittals listed in the Bid.

2. A list of permits and licenses the CONTRACTOR shall obtain, indicating the agency required to grant the permit, the expected date of submittal for the permit, and required date for receipt of the permit.

1.3 SHOP DRAWINGS

A. All shop drawing submittals along with the shop drawing transmittal form, shall be made electronically in ".pdf" format and distributed by email from the CONTRACTOR to the OWNER's Resident Project Representative (RPR). The OWNER'S RPR shall be responsible to distribute each shop drawing to all reviewers and to receive and compile all review comments generated.

B. Wherever called for in the Contract Documents or where required by the ENGINEER, the CONTRACTOR shall furnish a clear (non-scanned) electronic version, of each Shop Drawing submittal. Shop Drawings may include detail design calculations, shop-prepared drawings, fabrication and installation drawings, erection drawings, lists, graphs, catalog sheets, data sheets, and similar items. Whenever the CONTRACTOR is required to submit design calculations as part of a submittal, such calculations shall bear

the signature and seal of an engineer registered in the appropriate branch and in the state wherein the project is located, unless otherwise indicated.

C. Shop Drawing submittals shall be accompanied by the OWNER's standard submittal transmittal form, an electronic copy of which is available from the OWNER. A submittal without the form or where applicable items on the form are not completed will be returned for resubmittal.

D. **Organization**

1. A single submittal transmittal form shall be used for each technical specification section or item or class of material or equipment for which a submittal is required. A single submittal covering multiple sections will not be acceptable, unless the primary specification references other sections for components.

2. On the transmittal form, index the components of the submittal and insert tabs in the submittal to match the components. Relate the submittal components to specification paragraph and subparagraph, Drawing number, detail number, schedule title, room number, or building name, as applicable.

3. Unless indicated otherwise, terminology and equipment names and numbers used in submittals shall match those used in the Contract Documents.

E. **Format**

1. Minimum sheet size shall be 8-1/2 inches by 11-inches. Maximum sheet size shall be 11-inches by 17-inches. Every page in a submittal shall be numbered in sequence. All sheets shall be submitted on one (1) pdf file and arranged.

2. Where product data from a manufacturer is submitted, clearly mark which model is proposed, with complete pertinent data capacities, dimensions, clearances, diagrams, controls, connections, anchorage, and supports. Sufficient level of detail shall be presented for assessment of compliance with the Contract Documents.

3. Each submittal shall be assigned a unique number. Submittals shall be numbered sequentially, and the submittal numbers shall be clearly noted on the transmittal. Original submittals shall be assigned a numeric submittal number followed by a decimal point and a “1” to indicate it is an original (first) submittal. (For example, if submittal number 16.1 requires a resubmittal, that resubmittal will bear the designation “16.2”. A further resubmittal would bear the designation “16.3”, etc.

F. Disorganized submittals that do not meet the requirements of the Contract Documents will be returned without review.

G. Except as may otherwise be indicated, the ENGINEER will return email comments (in pdf format) of each submittal to the OWNER’s RPR with comments noted thereon, within 14 calendar Days following receipt by the ENGINEER. The OWNER’s RPR will compile all comments and return the complete submittal (in pdf format), within 21 calendar days following original receipt by the OWNER’s RPR. It is considered reasonable that the CONTRACTOR will make a complete and acceptable submittal to the OWNER’s RPR by the first resubmittal on an item. The OWNER reserves the right to withhold monies

due to the CONTRACTOR to cover additional costs of the ENGINEER's review beyond the first resubmittal. The ENGINEER's and OWNER RPR's combined maximum review period for each submittal or resubmittal will be 21 calendar Days. Thus, for a submittal that requires 2 resubmittals before it is complete, the maximum review period could be 63 calendar Days.

H. **Submittal Review Marking**

1. **NO EXCEPTIONS TAKEN**. If a submittal is returned to the CONTRACTOR marked "NO EXCEPTIONS TAKEN," formal revision and resubmission will not be required.

2. **MAKE CORRECTIONS NOTED**. If a submittal is returned marked "MAKE CORRECTIONS NOTED," CONTRACTOR shall make the corrections on the submittal, but formal revision and resubmission will not be required.

3. **REVISE-RESUBMIT.** If a submittal is returned marked "REVISE-RESUBMIT," the CONTRACTOR shall revise it and shall resubmit the required number of copies. Resubmittal of portions of multi-page or multi-drawing submittals will not be allowed. For example, if a Shop Drawing submittal consisting of 10 drawings contains one drawing noted as "REVISE - RESUBMIT," the submittal as a whole is deemed "REVISE - RESUBMIT," and all 10 drawings are required to be resubmitted.

4. **REJECTED-RESUBMIT**. If a submittal is returned marked "REJECTED-RESUBMIT," it shall mean either that the proposed material or product does not satisfy the specification, the submittal is so incomplete that it cannot be reviewed, or is a substitution request not submitted in accordance with Section 01 60 00 - Products, Materials, Equipment, and Substitutions. In the first 2 cases, the CONTRACTOR shall prepare a new submittal and shall resubmit. In the latter case, the CONTRACTOR shall submit the substitution request according to Section 01 60 00.

I. Resubmittal of rejected portions of a previous submittal will not be allowed. Every change from a submittal to a resubmittal or from a resubmittal to a subsequent resubmittal shall be identified and flagged on the resubmittal.

J. Fabrication of an item may commence only after the ENGINEER has reviewed the pertinent submittals and returned copies to the CONTRACTOR marked either "NO EXCEPTIONS TAKEN" or "MAKE CORRECTIONS NOTED." Corrections indicated on submittals shall be considered as changes necessary to meet the requirements of the Contract Documents and shall not be taken as changes to the contract requirements.

K. Submittals shall be carefully reviewed by an authorized representative of the CONTRACTOR prior to submission to the ENGINEER. Each submittal shall be dated and signed by the CONTRACTOR as being correct and in strict conformance with the Contract Documents. In the case of Shop Drawings, each sheet shall be so dated and signed. Any deviations from the Contract Documents shall be noted on the transmittal sheet. The ENGINEER will only review submittals that have been so verified by the CONTRACTOR. Non-verified submittals will be returned to the CONTRACTOR without action taken by the ENGINEER, and any delays caused thereby shall be the total responsibility of the CONTRACTOR.

L. Corrections or comments made on the CONTRACTOR's Shop Drawings during review do not relieve the CONTRACTOR from compliance with Contract Drawings and Specifications. Review is for conformance to the design concept and general compliance with the Contract Documents only. The CONTRACTOR is responsible for confirming and correlating quantities and dimensions, fabrication processes and techniques, coordinating WORK with the trades, and satisfactory and safe performance of the WORK.

1.4 RECORD DRAWINGS

A. The CONTRACTOR shall maintain one set of Drawings at the Site for the preparation of record drawings. On these, it shall mark every project condition, location, configuration, and any other change or deviation which may differ from the Contract Drawings at the time of award, including buried or concealed construction and utility features that are revealed during the course of construction. Special attention shall be given to recording the horizontal and vertical location of buried utilities that differ from the locations indicated, or that were not indicated on the Contract Drawings.

B. The record drawings shall be supplemented by any detailed sketches as necessary or as CONTRACTOR is directed, to fully indicate the WORK as actually constructed. These record drawings are the CONTRACTOR's representation of as-built conditions, shall include revisions made by addenda and change orders, and shall be maintained up-to-date during the progress of the WORK. Red ink shall be used for alterations and notes. Notes shall identify relevant Change Orders by number and date.

C. In the case of those drawings that depict the detail requirement for equipment to be assembled and fabricated in the factory, the record drawings shall be updated by indicating those portions which are superseded by change order drawings or final Shop Drawings, and by including appropriate reference information describing the change orders by number and the Shop Drawings by manufacturer, drawing, and revision numbers.

D. Disorganized or incomplete record drawings will not be accepted. The CONTRACTOR shall revise them and resubmit the drawings for review.

E. Record drawings shall be accessible to the OWNER’s RPR during the construction period.

F. Final payment will not be acted upon until the record drawings have been completed and delivered to the OWNER’s RPR. Said up-to-date record drawings shall be in the form of a set of prints with carefully plotted information overlaid on the Contract Drawings.

G. Information submitted by the CONTRACTOR will be assumed to be correct, and the CONTRACTOR shall be responsible for the accuracy of such information

1.5 INFORMATIONAL SUBMITTALS

A. Informational submittals, such as Requests for Information (RFI), Deviation Request (DR), Change Order Proposals (COR), etc. formalize the flow of information between the CONTRACTOR and the ENGINEER. The OWNER’s standard forms will be employed

for such purpose. Electronic copies of all standard Construction Management forms shall be provided by the OWNER to the CONTRACTOR.

1.6 CONSTRUCTION PHOTOGRAPHS

A. The CONTRACTOR shall be responsible to take digital construction photographs, no less than once per week, showing the progress of the WORK, including documentation of all buried utilities encountered during construction as well as installation of new buried utilities and buried WORK required by the Contract.

B. Upon completion of the WORK and before final payment, the CONTRACTOR shall electronically submit all photographs to the OWNER on a CD or other electronic media with each photograph's file name identified by location and date it was taken.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

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SECTION 01 55 00 - SITE ACCESS AND STORAGE

PART 1 -- GENERAL

1.1 ACCESS ROAD LIMITATIONS

The CONTRACTOR shall make its own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the WORK. It shall be the CONTRACTOR's responsibility to construct and maintain any haul roads required for its construction operations.

1.2 TEMPORARY CROSSINGS

Temporary Bridges: Wherever necessary, to maintain vehicular crossings, the CONTRACTOR shall provide suitable temporary bridges or steel plates over unfilled excavations, except in such cases as the CONTRACTOR shall secure the written consent of the responsible individuals or authorities to omit such temporary bridges or steel plates, which written consent shall be delivered to the ENGINEER prior to excavation. Such bridges or steel plates shall be maintained in service until access is provided across the backfilled excavation. Temporary bridges or steel plates for street and highway crossing shall conform to the requirements of the authority having jurisdiction in each case, and the CONTRACTOR shall adopt designs furnished by said authority for such bridges or steel plates, or shall submit designs to said authority for approval, as may be required.

Private Road Use: CONTRACTOR shall be granted access to the project area through private property. The CONTRACTOR is responsible for management of gates and fencing and repair of roadway or fencing to pre-project conditions. The CONTRACTOR shall adhere to any requirements of the landowner regarding management of cattle fencing and gates. Likewise, the CONTRACTOR’s access may be limited to certain work hours at the landowner’s request.

Temporary Driveway Closure: The CONTRACTOR shall notify the owner or occupant (if not owner-occupied) of the closure of the driveways at least three (3) working days prior to the closure. The CONTRACTOR shall minimize the inconvenience and minimize the time period that the driveways will be closed. The CONTRACTOR shall fully explain to the owner/occupant how long the closure will take and when closure will start.

1.3 CONTRACTOR'S WORK AND STORAGE AREA

The OWNER will designate and arrange for the CONTRACTOR's use, a portion of the property adjacent to the WORK for its exclusive use during the term of the Contract as a storage and shop area for its construction operations on the WORK. At completion of WORK, the CONTRACTOR shall return this area to its original condition, including grading and landscaping.

The CONTRACTOR shall make its own arrangements for any necessary off-Site storage or shop areas necessary for the proper execution of the WORK.

The CONTRACTOR shall construct and use a separate storage area for hazardous materials used in constructing the WORK.

For the purpose of this paragraph, hazardous materials to be stored in the separate area are products labeled with any of the following terms: Warning, Caution, Poisonous, Toxic, Flammable, Corrosive, Reactive, or Explosive. In addition, whether or not so labeled, the following materials shall be stored in the separate area: diesel fuel, gasoline, new and used motor oil, hydraulic fluid, cement, paints and paint thinners, 2 part epoxy coatings, sealants, asphaltic products, glues, solvents, wood preservatives, sand blast materials, and spill absorbent.

Hazardous materials shall be stored in groupings according to the Material Safety Data Sheets.

The CONTRACTOR shall develop and submit to the ENGINEER a plan for storing and disposing of the materials above.

The CONTRACTOR shall obtain and submit to the ENGINEER a single EPA number for wastes generated at the Site.

The separate storage area shall meet the requirements of authorities having jurisdiction over the storage of hazardous materials.

Hazardous materials that are delivered in containers shall be stored in the original containers until use. Hazardous materials delivered in bulk shall be stored in containers which meet the requirements of authorities having jurisdiction.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

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SECTION 01 57 20 - TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 -- GENERAL

1.1 SUMMARY

A. WORK includes furnishing all labor, materials and equipment required for the installation and maintenance of temporary environmental controls, including erosion and sediment controls.

1.2 SUBMITTALS

A. Storm Water Pollution Prevention Plan (SWPPP): Submit a SWPPP indicating storm water pollution prevention measures.

B. Erosion and Sediment Control Plan (ESC Plan): Submit an ESC Plan indicating erosion and sediment control measures and products, as well as installation, maintenance, repair, and removal procedures.

1.3 DUST ABATEMENT

A. The CONTRACTOR shall prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity of the Site. The CONTRACTOR shall be responsible for any damage resulting from dust originating from its operations. Dust abatement measures shall be continued until the CONTRACTOR is relieved of further responsibility by the ENGINEER.

B. **Storage Piles**: Enclose, cover, water (as needed), or apply non-toxic soil binders according to manufacturer's specifications on material piles (i.e. gravel, sand, dirt) with a silt content of 5 percent or greater.

C. **Active Areas of Site**: Water active construction areas and unpaved roads as needed and as requested by ENGINEER.

D. **Vehicle Loads**: Cover or maintain at least 2-feet of freeboard vertical distance between the top of the load and the top of the trailer sides on trucks hauling dirt, sand, soil, or other loose materials off of the Site.

E. **Roads**: When there is visible track-out onto a paved public road, install approved Best Management Practices where the vehicles exit and enter onto the paved roads. Sweep the paved street at the end of each shift with a water spray pick-up broom-type street sweeper as necessary or as directed.

F. **Vehicle Speeds**: If watering of unpaved roads is not sufficient to control dust, reduce vehicle speeds as necessary to control dust.

1.4 STORMWATER POLLUTION PREVENTION

A. CONTRACTOR shall minimize stormwater pollution from the Site in accordance with the Storm Water Pollution Prevention Plan.

1.5 RUBBISH CONTROL

A. During the progress of the WORK, the CONTRACTOR shall keep the Site and other areas for which it is responsible in a neat and clean condition and free from any accumulation of rubbish. The CONTRACTOR shall dispose of rubbish and waste materials of any nature and shall establish regular intervals of collection and disposal of such materials and waste. The CONTRACTOR shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of rubbish and surplus materials shall be off the Site in accordance with local codes and ordinances governing locations and methods of disposal and in conformance with applicable safety laws and the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

1.6 SANITATION

A. **Toilet Facilities:** Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets shall conform to the requirements of Part 1926 of the OSHA Safety and Health Regulations for Construction.

B. **Sanitary and Other Organic Wastes:** The CONTRACTOR shall establish a regular daily collection of sanitary and organic wastes. Wastes and refuse from sanitary facilities provided by the CONTRACTOR or organic material wastes from any other source related to the CONTRACTOR's operations shall be disposed of away from the Site in a manner satisfactory to the ENGINEER and in accordance with Laws and Regulations pertaining thereto.

1.7 CHEMICALS

A. Chemicals used on the WORK or furnished for facility operation, whether defoliant, soil sterilant, herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, shall show approval of either the U.S. Environmental Protection Agency or the U.S. Department of Agriculture. Use of such chemicals and disposal of residues shall be in strict accordance with the printed instructions of the manufacturer. In addition, see the requirements set forth in paragraph 6.11 of the General Conditions.

1.8 CULTURAL RESOURCES

A. The CONTRACTOR's attention is directed to the National Historic Preservation Act of 1966 (16 U.S.C. 470) and 36 CFR 800 which provides for the preservation of potential historical architectural, archaeological, or cultural resources (hereinafter called "cultural resources").

B. In the event potential cultural resources are discovered during subsurface excavations at the Site, the following procedures shall be instituted:

1. The OWNER will issue a temporary Notice to Suspend Work directing the CONTRACTOR to cease construction operations at the location of such potential cultural resources find.

2. The suspension Notice will contain the following:

a. A clear description of the WORK to be suspended

b. Instructions regarding issuance of further orders by the CONTRACTOR for material services

c. Guidance as to the action to be taken on subcontracts

d. Suggestions to the CONTRACTOR to minimize incurred costs

e. Estimated duration of the temporary suspension.

3. Such suspension shall be effective until such time as a qualified archeologist can assess the value of the potential cultural resources and make recommendations to the appropriate authority.

4. The CONTRACTOR shall cease WORK in the area of a discovery until appropriate actions have been determined in accordance with this paragraph.

5. If human remains are discovered, WORK in the immediate vicinity of the find shall stop. The Local Law Enforcement Agency shall be notified.

C. Changes to the Contract Price and Contract Times for suspension due to discovery of a potential cultural resource will be made in the following manner:

1. Contract Times

a. If the WORK temporarily suspended is on the “critical path”, the total number of Days for which the suspension is in effect will be added to the Contract Times.

b. If a portion of WORK at the time of such suspension is not on the “critical path”, but subsequently becomes WORK on the critical path, the Contract Times will be computed from the date such WORK is classified as on the critical path.

2. Contract Price

a. If, as a result of a cultural resources suspension, the CONTRACTOR sustains a loss that could not have been avoided by judicious handling of forces and equipment or redirection of forces or equipment to perform other WORK on the contract, the CONTRACTOR shall negotiate compensation for losses with the OWNER.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01 60 00 - PRODUCTS, MATERIALS, EQUIPMENT AND SUBSTITUTIONS

PART 1 -- GENERAL

1.1 DEFINITIONS

The word "Products," as used in the Contract Documents is defined to include purchased items for incorporation into the WORK, regardless of whether specifically purchased for the project or taken from CONTRACTOR's stock of previously purchased products. The word "Materials," is defined as products which must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, installed, or applied to form WORK. The word "Equipment" is defined as products with operational parts, regardless of whether motorized or manually operated, and particularly including products with service connections (wiring, piping, and other like items). Definitions in this paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including "specialties," "systems," "structure," "finishes," "accessories," "furnishings," special construction," and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

Neither "Products" nor "Materials" nor "Equipment" includes machinery and equipment used for preparation, fabrication, conveying, and erection of the WORK.

1.2 QUALITY CONTROL

Source Limitations: To the greatest extent possible for each unit of WORK, the CONTRACTOR shall provide products, materials, and equipment of a singular generic kind from a single source.

Compatibility of Options: Where more than one choice is available as options for CONTRACTOR's selection of a product, material, or equipment, the CONTRACTOR shall select an option which is compatible with other products, materials, or equipment. Compatibility is a basic general requirement of product, material and equipment selections.

1.3 PRODUCT DELIVERY AND STORAGE

The CONTRACTOR shall deliver and store the WORK in accordance with manufacturer's written recommendations and by methods and means which will prevent damage, deterioration, and loss including theft. Delivery schedules shall be controlled to minimize long-term storage of products at the Site and overcrowding of construction spaces. In particular, the CONTRACTOR shall ensure coordination to ensure minimum holding or storage times for flammable, hazardous, easily damaged, or sensitive materials to deterioration, theft, and other sources of loss.

1.4 TRANSPORTATION AND HANDLING

Products shall be transported by methods to avoid damage and shall be delivered in undamaged condition in manufacturer's unopened containers and packaging.

The CONTRACTOR shall provide equipment and personnel to handle products, materials, and equipment [including those furnished by OWNER,] by methods to prevent soiling and damage.

The CONTRACTOR shall provide additional protection during handling to prevent marring and otherwise damaging products, packaging, and surrounding surfaces.

1.5 STORAGE AND PROTECTION

Products shall be stored in accordance with manufacturer's written instructions and with seals and labels intact and legible. Sensitive products shall be stored in weather-tight climate controlled enclosures and temperature and humidity ranges shall be maintained within tolerances required by manufacturer's recommendations.

For exterior storage of fabricated products, products shall be placed on sloped supports above ground. Products subject to deterioration shall be covered with impervious sheet covering and ventilation shall be provided to avoid condensation.

Loose granular materials shall be stored on solid flat surfaces in a well-drained area and shall be prevented from mixing with foreign matter.

Storage shall be arranged to provide access for inspection. The CONTRACTOR shall periodically inspect to assure products are undamaged and are maintained under required conditions.

Storage shall be arranged in a manner to provide access for maintenance of stored items and for inspection.

1.6 MAINTENANCE OF PRODUCTS IN STORAGE

The CONTRACTOR shall comply with manufacturer's product storage requirements and recommendations.

The CONTRACTOR shall maintain manufacturer-required environmental conditions continuously.

The CONTRACTOR shall ensure that surfaces of products exposed to the elements are not adversely affected and that weathering of finishes does not occur.

For mechanical and electrical equipment, the CONTRACTOR shall provide a copy of the manufacturer's service instructions with each item and the exterior of the package shall contain notice that instructions are included.

1.7 PROPOSED SUBSTITUTIONS OR "OR-EQUAL" ITEM

Whenever materials or equipment are indicated in the Contract Documents by using the name of a proprietary item or the name of a particular manufacturer, the naming of the item is intended to establish the type, function, and quality required. If the name is followed by the words "or equal" indicating that a substitution is permitted, materials or equipment of other manufacturers may be accepted if sufficient information is submitted by the

CONTRACTOR to allow the ENGINEER to determine that the material or equipment proposed is equivalent or equal to that named, subject to the following requirements:

The burden of proof as to the type, function, and quality of any such substitution product, material or equipment shall be upon the CONTRACTOR.

The ENGINEER will be the sole judge as to the type, function, and quality of any such substitution and the ENGINEER's decision shall be final.

The ENGINEER may require the CONTRACTOR to furnish additional data about the proposed substitution.

The OWNER may require the CONTRACTOR to furnish a special performance guarantee or other surety with respect to any substitution.

Acceptance by the ENGINEER of a substitution item proposed by the CONTRACTOR shall not relieve the CONTRACTOR of the responsibility for full compliance with the Contract Documents and for adequacy of the substitution.

The CONTRACTOR shall pay all costs of implementing accepted substitutions, including redesign and changes to WORK necessary to accommodate the substitution.

The procedure for review by the ENGINEER will include the following:

If the CONTRACTOR wishes to provide a substitution item, the CONTRACTOR shall make written application to the ENGINEER on the "Substitution Request Form."

Unless otherwise provided by law or authorized in writing by the ENGINEER, the "Substitution Request Form(s)" shall be submitted within the 35 Day period after award of the Contract.

Wherever a proposed substitution item has not been submitted within said 35 Day period, or wherever the submission of a proposed substitution material or equipment has been judged to be unacceptable by the ENGINEER, the CONTRACTOR shall provide the material or equipment indicated in the Contract Documents.

The CONTRACTOR shall certify by signing the form that the list of paragraphs on the form are correct for the proposed substitution.

The ENGINEER will evaluate each proposed substitution within a reasonable period of time.

As applicable, no shop drawing submittals shall be made for a substitution item nor shall any substitution item be ordered, installed, or utilized without the ENGINEER'S prior written acceptance of the CONTRACTOR'S "Substitution Request Form."

The ENGINEER will record the time required by the ENGINEER in evaluating substitutions proposed by the CONTRACTOR and in making changes by the CONTRACTOR in the Contract Documents occasioned thereby.

The CONTRACTOR's application shall address the following factors which will be considered by the ENGINEER in evaluating the proposed substitution:

Whether the evaluation and acceptance of the proposed substitution will prejudice the CONTRACTOR's achievement of Substantial Completion on time.

Whether acceptance of the substitution for use in the WORK will require a change in any of the Contract Documents to adapt the design to the proposed substitution.

Whether incorporation or use of the substitution in connection with the WORK is subject to payment of any license fee or royalty.

Whether all variations of the proposed substitution from the items originally specified are identified.

Whether available maintenance, repair, and replacement service are indicated. The manufacturer shall have a local service agency (within 50 miles of the site) which maintains properly trained personnel and adequate spare parts and is able to respond and complete repairs within 24 hours.

Whether an itemized estimate is included of all costs that will result directly or indirectly from acceptance of such substitution, including cost of redesign and claims of other contractors affected by the resulting change.

Whether the proposed substitute item meets or exceeds the experience and/or equivalency requirements listed in the appropriate technical specifications.

Without any increase in cost to the OWNER, the CONTRACTOR shall be responsible for and pay all costs in connection with proposed substitutions and of inspections and testing of equipment or materials submitted for review prior to the CONTRACTOR's purchase thereof for incorporation in the WORK, whether or not the ENGINEER accepts the proposed substitution or proposed equipment or material. The CONTRACTOR shall reimburse the OWNER for the charges of the ENGINEER for evaluating each proposed substitution.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 01 71 13 - MOBILIZATION

PART 1 -- GENERAL

1.1 GENERAL

CONTRACTOR shall mobilize as required for the proper performance and completion of the WORK and in accordance with the Contract Documents.

Mobilization shall include at least the following items:

Moving onto the Site and importing equipment necessary for commencement of the WORK.

Providing on-Site sanitary facilities and potable water facilities.

Arranging for and erection of CONTRACTOR's WORK and storage yards.

Obtaining required permits.

Having OSHA required notices and establishing safety programs.

Submitting initial submittals.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION –

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SECTION 01 77 00 - PROJECT CLOSEOUT

PART 1 -- GENERAL

1.1 FINAL CLEANUP

The CONTRACTOR shall promptly remove from the vicinity of the completed WORK, all rubbish, unused materials, concrete forms, construction equipment, and temporary structures and facilities used during construction. Final acceptance of the WORK by the OWNER will be withheld until the CONTRACTOR has satisfactorily performed the final cleanup of the Site.

1.2 CLOSEOUT TIMETABLE

The CONTRACTOR shall establish dates for acceptance periods and on-site instructional periods. Such dates shall be established not less than one week prior to beginning any of the foregoing items, to allow the OWNER, the ENGINEER, and their authorized representatives sufficient time to schedule attendance at such activities.

1.3 FINAL SUBMITTALS

The CONTRACTOR, prior to requesting final payment, shall obtain and submit the following items to the ENGINEER for transmittal to the OWNER:

Written guarantees, where required.

Completed record drawings.

Bonds for WORK, maintenance, etc., as required.

Certificates of inspection and acceptance by local governing agencies having jurisdiction.

Releases from all parties who are entitled to claims against the subject project, property, or improvement pursuant to the provisions of law.

1.4 MAINTENANCE AND GUARANTEE

The CONTRACTOR shall comply with the maintenance and guarantee requirements of the OWNER.

Replacement of earth fill or backfill, where it has settled below the required finish elevations, shall be considered as a part of such required repair work.

The CONTRACTOR shall make all repairs and replacements promptly upon receipt of written order from the OWNER. If the CONTRACTOR fails to make such repairs or replacements promptly, the OWNER reserves the right to do the WORK and the CONTRACTOR and its surety shall be liable to the OWNER for the cost thereof.

1.5 BOND

The CONTRACTOR shall provide a bond to guarantee performance of the provisions provided by the OWNER.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION (NOT USED)

- END OF SECTION -

SECTION 02 41 00 – DEMOLITION, SALVAGE, AND REHABILITATION

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall demolish existing pushup dams and headgates as indicated, in accordance with the Contract Documents.

1.2 COORDINATION

A. The CONTRACTOR shall carefully coordinate the WORK in areas where existing infrastructure will be impacted by completion of the WORK and where existing facilities remain operational. The WORK as indicated is not all inclusive, and the CONTRACTOR shall be responsible for performing the reconstruction indicated plus that which can be reasonably inferred from the Contract Documents as necessary to complete the Project. The Specifications and Drawings identify the major facilities that shall be demolished and reconstructed, but existing utilities such as water, chemicals, drainage, and electrical wiring are not necessarily shown.

B. The CONTRACTOR shall note that the Drawings used to indicate demolition and reconstruction are based on record drawings of the existing facilities. These record drawings have been reproduced to show existing conditions and to clarify the scope of WORK as much as possible. Prior to bidding, the CONTRACTOR shall conduct a comprehensive survey at the Site to verify the correctness and exactness of the Drawings, the scope of WORK, and the extent of existing utilities.

C. While demolition and reconstruction are being performed, the CONTRACTOR shall provide adequate access for the continued operation and maintenance of private property and adjacent utilities. The CONTRACTOR shall remove such protection when reconstruction activities are complete, or as work progresses, or when directed by the ENGINEER.

1.3 CONTRACTOR SUBMITTALS

A. Demolition and reconstruction activities and procedures, including operational sequence, shall be submitted to the ENGINEER for approval. The procedures shall provide for safe conduct of the WORK, careful removal and disposition of materials and equipment, protection of existing facilities which are to remain undisturbed, coordination with existing facilities to remain in service, and timely disconnection and reconnection of utility services. The procedures shall include a detailed description and time schedule of the methods and equipment to be used for each operation and the sequence of operation. A storage plan for salvaged items shall be included.

1.4 DEMOLITION

A. Existing structures, equipment, piping, valves, utilities, and related appurtenances such as anchors, supports, and hardware indicated or required to be demolished as part of the WORK shall be removed and disposed of unless otherwise indicated. Removal of

buried structures, utilities, and appurtenances includes the related excavation and backfill as required. Removed items shall be disposed of offsite by the CONTRACTOR.

B. Items to be removed include:

Item	Description
Existing pushup dams	Two pushup dams consisting of native streambed material, concrete rubble, and concrete ecoblocks shall be removed and sorted. Streambed sediment shall be stockpiled and spread on-site. Concrete rubble shall be hauled offsite and disposed of. Ecoblocks shall be salvaged and stockpiled at the owners discretion.
Lewis Headgate	Lewis headgate consist of a concrete headwall, steel sluicegate, and cmp pipe. All components shall be demolished and hauled offsite for disposal.
Homer Headgate	The Homer headgate consists of a timber headwall, sluicegate, and cmp pipe. All components shall be demolished and hauled offsite for disposal.

1.5 RELOCATION

A. Existing items required to be relocated shall be removed without any degradation in condition from that prior to removal. The CONTRACTOR shall be responsible to properly safeguard the relocated items against damage and loss during removal, handling, storage, and installation in the new location.

B. Items to be relocated include:

Item	Description
Pushup dam ecoblocks	All ecoblocks removed from demolition of the pushup dams shall be stockpiled at a location specified by the landowner.

1.6 REHABILITATION

A. Existing civil, landscaping, structural WORK disturbed or damaged by reconstruction activities shall be repaired and rehabilitated as indicated.

B. Ecoblock retaining walls adjacent to the headgates shall be retained and protected to the extent possible during replacement of the headgates. Where completion of the WORK requires partial removal of the existing retaining walls, the retaining walls shall be reinstalled to pre-project conditions.

1.7 DISPOSAL

A. The CONTRACTOR shall be responsible for the offsite disposal of debris in compliance with local, state, and federal codes and requirements.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 GENERAL

A. The CONTRACTOR shall coordinate demolition and reconstruction WORK with the OWNER and ENGINEER. Unless otherwise indicated, the CONTRACTOR shall be responsible for the sequence of activities. WORK shall be performed in accordance with applicable safety rules and regulations.

B. The CONTRACTOR shall verify that any utilities connected to structures, equipment, and facilities to be removed, relocated, salvaged, replaced, or abandoned are rendered inoperable, replaced with new utilities, or adequately bypassed with temporary utilities before proceeding with demolition and reconstruction.

C. The CONTRACTOR shall take precautions to avoid damage to adjacent facilities and to limit the WORK activities to the extent indicated. If reconstruction beyond the scope indicated is required, the CONTRACTOR shall obtain approval from the ENGINEER prior to commencing.

3.2 PROTECTION OF EXISTING FACILITIES

A. Before beginning any reconstruction, the CONTRACTOR shall carefully survey the existing facilities and examine the Specifications and Drawings to determine the extent of reconstruction and coordination with the WORK. Damaged existing facilities shall be repaired to the previous condition or replaced.

B. Structural elements shall not be overloaded. The CONTRACTOR shall be responsible for shoring, bracing, or adding new supports as may be required for adequate structural support as a result of WORK performed under this Section. The CONTRACTOR shall remove temporary protection when the WORK is complete or when so authorized by the ENGINEER.

C. The CONTRACTOR shall carefully consider bearing loads and capacities before placement of equipment and material on Site. In the event of any questions as to whether an area to be loaded has adequate bearing capacity, the CONTRACTOR shall consult with the ENGINEER prior to the placement of such equipment or material.

3.3 DEMOLITION, SALVAGE, AND RELOCATION

A. The Contract Documents indicate existing facilities to be demolished, salvaged, and/or relocated. Auxiliary utilities including such services as water, chemicals, drainage, electrical wiring, controls, and instrumentation are not necessarily indicated. The CONTRACTOR shall verify the scope of the WORK to remove the equipment indicated;

coordinate its shutdown, removal, replacement, or relocation. The removal of existing facilities for demolition, salvage, and relocation shall include the following requirements:

1. Below-grade areas and voids resulting from demolition of structures shall be completely filled. Fill and compaction shall be in accordance with Section 31 00 00 - Earthwork. After fill and compaction, surfaces shall be graded to meet adjacent contours and to provide flow to surface drainage structures, or as indicated.

2. When existing pipe is removed, the CONTRACTOR shall plug the resulting open ends whether or not so indicated. Where removed piping is exposed, the remaining piping shall be blind-flanged or fitted with a removable cap or plug.

3.4 ABANDONMENT

A. Existing facilities to be abandoned shall be prepared as indicated. Where existing buried piping is to be abandoned, the CONTRACTOR shall remove the abandoned pipe for a distance of 5-feet from any connecting structures. Openings at the existing structures shall be repaired. The remaining pipe shall be capped or crushed at both ends prior to backfill.

3.5 REHABILITATION

A. Certain areas of existing structures, piping, conduits, and the like will be affected by WORK necessary to complete modifications under this Contract. The CONTRACTOR shall be responsible to rehabilitate those areas affected by its construction activities.

3.6 DISPOSAL

A. Site debris, rubbish, and other materials resulting from reconstruction operations shall be legally removed and disposed of. No trace of these structures shall remain prior to placing of backfill in the areas from which structures were removed.

B. Refuse, debris, and waste materials resulting from demolition and clearing operations shall not be burned.

3.7 CLEANING

A. During and upon completion of WORK, the CONTRACTOR shall promptly remove tools and equipment, surplus materials, rubbish, debris, and dust and shall leave areas affected by WORK in a clean, approved condition.

B. Adjacent structures shall be cleaned of dust, dirt, and debris caused by reconstruction, as directed by the ENGINEER or governing authorities, and adjacent areas shall be returned to condition existing prior to start of WORK.

- END OF SECTION -

SECTION 31 05 19 - GEOTEXTILES

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall provide geotextiles, complete and in place, in accordance with the Contract Documents.

B. **Definitions:** The following definitions apply to the WORK of this Section:

1. Fabric: Geotextile, a permeable geosynthetic comprised solely of textiles.

2. Minimum Average Roll Value (MinARV): Minimum of series of average roll values representative of geotextile provided.

3. Maximum Average Roll Value (MaxARV): Maximum of series of average roll values representative of geotextile provided.

4. Nondestructive Sample: Sample representative of finished geotextile, prepared for testing without destruction of geotextile.

5. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.

6. Seam Efficiency: Ratio of tensile strength across seam to strength of intact geotextile, when tested according to ASTM D 4884.

7. Woven geotextile: A geotextile fabric composed of polymeric yarn interlaced to form a planar structure with uniform weave pattern.

8. Nonwoven geotextile: A geotextile fabric composed of a pervious sheet of polymeric fibers interlaced to form a planar structure with uniform random fiber pattern.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The following standards are referenced in this Section:

ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile
ASTM D 4833	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4884	Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Sewn Geotextiles
ASTM D 4886	Standard Test Method for Abrasion Resistance of Geotextiles (Sand Paper/Sliding Block Method)

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

B. Shop Drawings

1. Manufacturer material specifications and product literature.

2. Installation drawings showing geotextile sheet layout, location of seams, direction of overlap, and sewn seams.

3. Description of proposed method of geotextile deployment, sewing equipment, sewing methods, and provisions for holding geotextile temporarily in place until permanently secured.

C. Certifications

1. Certification from geotextile manufacturer that products satisfy the indicated requirements.

2. Field seam efficiency test results.

PART 2 -- PRODUCTS

2.1 NONWOVEN GEOTEXTILE

A. Nonwoven geotextile shall be composed of a pervious sheet of polymeric fibers interlaced to form a planar structure with uniform random fiber pattern. Products shall be calendared or finished so that yarns will retain their relative position with respect to each other.

B. Polymeric yarn shall be long-chain synthetic polymers (polyester, polypropylene, or polyethylene) with stabilizers or inhibitors added to make filaments resistant to deterioration due to heat and ultraviolet light exposure.

C. **Geotextile Edges:** Selvaged or finished to prevent outer material from separating from sheet.

D. **Unseamed Sheet Width:** Minimum 6-feet.

E. **Nominal Weight per Square Yard:** 8 ounces.

F. **Physical Properties:** Conform to minimum requirements below.

PHYSICAL PROPERTY REQUIREMENTS FOR NONWOVEN GEOTEXTILE		
Property	**Requirement**	**Test Method**
Apparent Opening Size (AOS)	No. 80 U.S. Standard Sieve Size	ASTM D 4751
Water Permittivity	1.26 $sec.^{-1}$, MinARV	ASTM D 4491 (Falling Head)
Vertical Waterflow Rate	100 gpm/sq ft, MinARV	
Wide Width Strip Tensile Strength	225 lb/in.-width, MinARV	ASTM D 4595
Wide Width Strip Elongation	50 percent, MaxARV	ASTM D 4595
Trapezoidal Tear Strength	90 lb, MinARV	ASTM D 4533
Puncture Strength	600 lb, MinARV	ASTM D 4833
Ultraviolet Radiation Resistance	75 percent loss/500 hrs	ASTM D 4355

2.2 SEWING THREAD

A. Sewing thread shall be polypropylene, polyester, or Kevlar thread with durability equal to or greater than durability of geotextile sewn.

2.3 SECURING PINS

A. Securing pins shall be steel rods or bars conforming to the following:

1. 3/16-inch diameter.

2. Pointed at one end; head on other end, sufficiently large to retain washer.

3. Minimum Length: 12-inches.

B. Steel washers for securing pins shall be:

1. Outside Diameter: Not less than 1-1/2 inches.

2. Inside Diameter: 1/4-inch.

3. Thickness: 1/8-inch.

PART 3 -- EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver each roll with sufficient information attached to identify manufacturer and product name or number.

B. Handle products in manner that maintains undamaged condition.

C. Do not store products directly on ground. Ship and store geotextile with suitable wrapping for protection against moisture and ultraviolet exposure. Store geotextile in a way that protects it from elements. If stored outdoors, elevate and protect geotextile with waterproof cover.

3.2 LAYING GEOTEXTILE

A. Notify the ENGINEER whenever geotextiles are to be placed. Do not place geotextile prior to obtaining ENGINEER's approval of underlying materials.

B. Lay and maintain geotextile smooth and free of tension, folds, wrinkles, or creases.

3.3 ORIENTATION ON SLOPES

A. Orient geotextile with long dimension of each sheet parallel to direction of slope.

B. Geotextile may be oriented with long dimension of sheet transverse to direction of slope only if sheet width, without unsewn seams, is sufficient to cover entire slope and anchor trench and extend at least 18-inches beyond toe of slope.

3.4 JOINTS

A. Unseamed Joints

1. Unseamed joints shall be overlapped to the following dimensions unless otherwise indicated:

a. Foundation/Subgrade Stabilization: Minimum 18-inches.

b. Riprap: Minimum 18-inches.

c. Drain Trenches: Minimum 18-inches, except overlap shall equal trench width if trench width is less than 18-inches.

d. Other Applications: Minimum 12-inches.

B. Sewn seams shall be used wherever stress transfer from one geotextile sheet to another is necessary. Sewn seams, as approved by ENGINEER, also may be used instead of overlap at joints for applications that do not require stress transfer.

1. Seam efficiency shall be minimum 70 percent, verified by preparing and testing minimum of one set of nondestructive samples per acre of each type and weight of geotextile provided. Test according to ASTM D 4884.

2. Type: "J" type seams are preferred, but flat or butterfly seams are acceptable.

3. Stitch Count: Minimum 3 to maximum 7 stitches per inch.

4. Stitch Type: Double-thread chainstitch, Type 401, Federal Standard No. 751a.

5. Stitch Location: 2-inches from geotextile sheet edges, or more if necessary to develop required seam strength.

6. Sewing Machines: Capable of penetrating 4 layers of geotextile.

3.5 SECURING GEOTEXTILE

A. Secure geotextile during installation as necessary with sand bags or other means approved by ENGINEER.

3.6 PLACING PRODUCTS OVER GEOTEXTILE

A. Notify ENGINEER before placing material over geotextile. Do not cover installed geotextile prior to receiving authorization from the ENGINEER to proceed.

B. If tears, punctures, or other geotextile damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geotextile. Repair damage as indicated below.

3.7 INSTALLING GEOTEXTILE IN TRENCHES

A. Place geotextile in a way that will completely envelope granular drain material to be placed in trench and with indicated overlap at joints. Overlap geotextile in direction of flow. Place geotextile in a way and with sufficient slack for geotextile to contact trench bottom and sides fully when trench is backfilled.

B. After granular drain material is placed to grade, fold geotextile over top of granular drain material, unless otherwise indicated. Maintain overlap until overlying fill or backfill is placed.

3.8 REPAIRING GEOTEXTILE

A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile. Repair damaged geotextile by placing patch of undamaged geotextile over damaged area plus at least 18-inches in all directions beyond damaged area. Remove interfering material as necessary to expose damaged geotextile for repair. Sew patches or secure them with pins and washers, as indicated above for securing geotextile, or by other means approved by ENGINEER.

- END OF SECTION -

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SECTION 31 05 19 - GEOTEXTILES

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall provide geotextiles, complete and in place, in accordance with the Contract Documents.

B. **Definitions:** The following definitions apply to the WORK of this Section:

1. Fabric: Geotextile, a permeable geosynthetic comprised solely of textiles.

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3. Maximum Average Roll Value (MaxARV): Maximum of series of average roll values representative of geotextile provided.

4. Nondestructive Sample: Sample representative of finished geotextile, prepared for testing without destruction of geotextile.

5. Overlap: Distance measured perpendicular from overlapping edge of one sheet to underlying edge of adjacent sheet.

6. Seam Efficiency: Ratio of tensile strength across seam to strength of intact geotextile, when tested according to ASTM D 4884.

7. Woven geotextile: A geotextile fabric composed of polymeric yarn interlaced to form a planar structure with uniform weave pattern.

8. Nonwoven geotextile: A geotextile fabric composed of a pervious sheet of polymeric fibers interlaced to form a planar structure with uniform random fiber pattern.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. The following standards are referenced in this Section:

ASTM D 4355	Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture, and Heat in a Xenon-Arc Type Apparatus
ASTM D 4491	Standard Test Methods for Water Permeability of Geotextiles by Permittivity
ASTM D 4533	Standard Test Method for Trapezoid Tearing Strength of Geotextiles
ASTM D 4595	Standard Test Method for Tensile Properties of Geotextiles by the Wide-Width Strip Method

ASTM D 4751	Standard Test Method for Determining Apparent Opening Size of a Geotextile
ASTM D 4833	Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products
ASTM D 4884	Standard Test Method for Strength of Sewn or Thermally Bonded Seams of Sewn Geotextiles
ASTM D 4886	Standard Test Method for Abrasion Resistance of Geotextiles (Sand Paper/Sliding Block Method)

1.3 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 - Contractor Submittals.

B. Shop Drawings

1. Manufacturer material specifications and product literature.

2. Installation drawings showing geotextile sheet layout, location of seams, direction of overlap, and sewn seams.

3. Description of proposed method of geotextile deployment, sewing equipment, sewing methods, and provisions for holding geotextile temporarily in place until permanently secured.

C. Certifications

1. Certification from geotextile manufacturer that products satisfy the indicated requirements.

2. Field seam efficiency test results.

PART 2 -- PRODUCTS

2.1 NONWOVEN GEOTEXTILE

A. Nonwoven geotextile shall be composed of a pervious sheet of polymeric fibers interlaced to form a planar structure with uniform random fiber pattern. Products shall be calendared or finished so that yarns will retain their relative position with respect to each other.

B. Polymeric yarn shall be long-chain synthetic polymers (polyester, polypropylene, or polyethylene) with stabilizers or inhibitors added to make filaments resistant to deterioration due to heat and ultraviolet light exposure.

C. **Geotextile Edges:** Selvaged or finished to prevent outer material from separating from sheet.

D. **Unseamed Sheet Width:** Minimum 6-feet.

E. **Nominal Weight per Square Yard:** 8 ounces.

F. **Physical Properties:** Conform to minimum requirements below.

PHYSICAL PROPERTY REQUIREMENTS FOR NONWOVEN GEOTEXTILE		
Property	**Requirement**	**Test Method**
Apparent Opening Size (AOS)	No. 80 U.S. Standard Sieve Size	ASTM D 4751
Water Permittivity	1.26 $sec.^{-1}$, MinARV	ASTM D 4491 (Falling Head)
Vertical Waterflow Rate	100 gpm/sq ft, MinARV	
Wide Width Strip Tensile Strength	225 lb/in.-width, MinARV	ASTM D 4595
Wide Width Strip Elongation	50 percent, MaxARV	ASTM D 4595
Trapezoidal Tear Strength	90 lb, MinARV	ASTM D 4533
Puncture Strength	600 lb, MinARV	ASTM D 4833
Ultraviolet Radiation Resistance	75 percent loss/500 hrs	ASTM D 4355

2.2 SEWING THREAD

A. Sewing thread shall be polypropylene, polyester, or Kevlar thread with durability equal to or greater than durability of geotextile sewn.

2.3 SECURING PINS

A. Securing pins shall be steel rods or bars conforming to the following:

1. 3/16-inch diameter.

2. Pointed at one end; head on other end, sufficiently large to retain washer.

3. Minimum Length: 12-inches.

B. Steel washers for securing pins shall be:

1. Outside Diameter: Not less than 1-1/2 inches.

2. Inside Diameter: 1/4-inch.

3. Thickness: 1/8-inch.

PART 3 -- EXECUTION

3.1 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver each roll with sufficient information attached to identify manufacturer and product name or number.

B. Handle products in manner that maintains undamaged condition.

C. Do not store products directly on ground. Ship and store geotextile with suitable wrapping for protection against moisture and ultraviolet exposure. Store geotextile in a way that protects it from elements. If stored outdoors, elevate and protect geotextile with waterproof cover.

3.2 LAYING GEOTEXTILE

A. Notify the ENGINEER whenever geotextiles are to be placed. Do not place geotextile prior to obtaining ENGINEER's approval of underlying materials.

B. Lay and maintain geotextile smooth and free of tension, folds, wrinkles, or creases.

3.3 ORIENTATION ON SLOPES

A. Orient geotextile with long dimension of each sheet parallel to direction of slope.

B. Geotextile may be oriented with long dimension of sheet transverse to direction of slope only if sheet width, without unsewn seams, is sufficient to cover entire slope and anchor trench and extend at least 18-inches beyond toe of slope.

3.4 JOINTS

A. Unseamed Joints

1. Unseamed joints shall be overlapped to the following dimensions unless otherwise indicated:

a. Foundation/Subgrade Stabilization: Minimum 18-inches.

b. Riprap: Minimum 18-inches.

c. Drain Trenches: Minimum 18-inches, except overlap shall equal trench width if trench width is less than 18-inches.

d. Other Applications: Minimum 12-inches.

B. Sewn seams shall be used wherever stress transfer from one geotextile sheet to another is necessary. Sewn seams, as approved by ENGINEER, also may be used instead of overlap at joints for applications that do not require stress transfer.

1. Seam efficiency shall be minimum 70 percent, verified by preparing and testing minimum of one set of nondestructive samples per acre of each type and weight of geotextile provided. Test according to ASTM D 4884.

2. Type: "J" type seams are preferred, but flat or butterfly seams are acceptable.

3. Stitch Count: Minimum 3 to maximum 7 stitches per inch.

4. Stitch Type: Double-thread chainstitch, Type 401, Federal Standard No. 751a.

5. Stitch Location: 2-inches from geotextile sheet edges, or more if necessary to develop required seam strength.

6. Sewing Machines: Capable of penetrating 4 layers of geotextile.

3.5 SECURING GEOTEXTILE

A. Secure geotextile during installation as necessary with sand bags or other means approved by ENGINEER.

3.6 PLACING PRODUCTS OVER GEOTEXTILE

A. Notify ENGINEER before placing material over geotextile. Do not cover installed geotextile prior to receiving authorization from the ENGINEER to proceed.

B. If tears, punctures, or other geotextile damage occurs during placement of overlying products, remove overlying products as necessary to expose damaged geotextile. Repair damage as indicated below.

3.7 INSTALLING GEOTEXTILE IN TRENCHES

A. Place geotextile in a way that will completely envelope granular drain material to be placed in trench and with indicated overlap at joints. Overlap geotextile in direction of flow. Place geotextile in a way and with sufficient slack for geotextile to contact trench bottom and sides fully when trench is backfilled.

B. After granular drain material is placed to grade, fold geotextile over top of granular drain material, unless otherwise indicated. Maintain overlap until overlying fill or backfill is placed.

3.8 REPAIRING GEOTEXTILE

A. Repair or replace torn, punctured, flawed, deteriorated, or otherwise damaged geotextile. Repair damaged geotextile by placing patch of undamaged geotextile over damaged area plus at least 18-inches in all directions beyond damaged area. Remove interfering material as necessary to expose damaged geotextile for repair. Sew patches or secure them with pins and washers, as indicated above for securing geotextile, or by other means approved by ENGINEER.

- END OF SECTION -

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SECTION 31 11 00 - SITE PREPARATION

PART 1 -- GENERAL

1.1 SUMMARY

A. In its initial move onto the Site, the CONTRACTOR shall protect existing fences, houses and associated improvements, streets, and utilities downslope of construction areas from damage due to boulders, trees, or other objects dislodged during the construction process and clear, grub, strip; and regrade certain areas, in accordance with the Contract Documents.

1.2 SITE INSPECTION

A. Prior to moving onto the Site, the CONTRACTOR shall inspect the Site conditions and review maps of the Site and facilities delineating the OWNER's property and right-of-way lines.

PART 2 -- PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 PRIMARY SITE ACCESS

A. The CONTRACTOR shall develop any necessary access to the Site, including access barriers to prohibit entry of unauthorized persons.

B. **Utility Interference:** Where existing utilities interfere with the WORK, notify the utility owner and the ENGINEER before proceeding in accordance with the General Conditions.

3.2 CLEARING, GRUBBING, AND STRIPPING

A. Construction areas shall be cleared of grass and weeds to at least a depth of 6-inches and cleared of structures, pavement, sidewalks, concrete or masonry debris, trees, logs, upturned stumps, loose boulders, and any other objectionable material of any kind which would interfere with the performance or completion of the WORK, create a hazard to safety, or impair the subsequent usefulness of the WORK, or obstruct its operation. Loose boulders within 10-feet of the top of cut lines shall be incorporated in landscaping or removed from the Site. Trees and other natural vegetation outside the actual lines of construction shall be protected from damage during construction.

B. Within the limits of clearing, the areas below the natural ground surface shall be grubbed to a depth necessary to remove stumps, roots, buried logs, and other objectionable material. Septic tanks, drain fields, and connection lines and any other underground structures, debris or waste shall be removed if found on the Site. Objectionable material from the clearing and grubbing process shall be removed from the Site and wasted in approved safe locations.

C. The entire area to be affected by construction shall be stripped of topsoil and organic materials and debris. The stripped materials shall be stockpiled and incorporated into landscaped areas or other non-structural embankments.

D. Unless otherwise indicated, native trees larger than 3-inches in diameter at the base shall not be removed without the ENGINEER's approval. The removal of any trees, shrubs, fences, or other improvements outside of rights-of-way, if necessary for the CONTRACTOR's choice of means and methods, shall be arranged with the owner of the property, and shall be removed and replaced, as part of the WORK.

3.3 OVEREXCAVATION, REGRADING, AND BACKFILL UNDER FILL AREAS

A. Any undesirable topsoil and colluvium shall be removed to the level designated by the ENGINEER and stockpiled for subsequent use as the first material to be placed in the compacted fill.

B. Any steep, very abrupt rock faces and irregularly shaped rock outcrops of bedrock shall be regraded as directed by the ENGINEER.

- END OF SECTION -

SECTION 31 23 19 - DEWATERING

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall dewater trench and structure excavations, in accordance with the Contract Documents. The CONTRACTOR shall secure all necessary permits to complete the requirements of this Section of the Specifications.

B. Dewatering of Bear River will be required for both channel WORK and installation of the new headgates. Dewatering means and methods shall be at the discretion of the CONTRACTOR. Dewatering options shall be discussed at the construction pre-bid meeting held on November 21, 2024.

1.2 CONTRACTOR SUBMITTALS

A. Prior to commencement of excavation, the CONTRACTOR shall submit a detailed plan and operation schedule for dewatering of excavations. The CONTRACTOR may be required to demonstrate the system proposed and to verify that adequate equipment, personnel, and materials are provided to dewater the excavations at all locations and times. The CONTRACTOR's dewatering plan is subject to review by the ENGINEER.

1.3 QUALITY CONTROL

A. It shall be the sole responsibility of the CONTRACTOR to control the rate and effect of the dewatering in such a manner as to avoid all objectionable settlement and subsidence.

B. All dewatering operations shall be adequate to assure the integrity of the finished project and shall be the responsibility of the CONTRACTOR.

PART 2 -- PRODUCTS

2.1 EQUIPMENT

A. Dewatering, where required, may include the use of well points, sump pumps, temporary pipelines for water disposal, rock or gravel placement, and other means. Standby pumping equipment shall be maintained on the Site.

PART 3 -- EXECUTION

3.1 GENERAL REQUIREMENTS

A. The CONTRACTOR shall provide all equipment necessary for dewatering. It shall have on hand, at all times, sufficient pumping equipment and machinery in good working condition and shall have available, at all times, competent workmen for the operation of the pumping equipment. Adequate standby equipment shall be kept available at all times to insure efficient dewatering and maintenance of dewatering operation during power failure.

B. Dewatering for structures and pipelines shall commence when groundwater is first encountered, and shall be continuous until such times as water can be allowed to rise in accordance with the provisions of this Section or other requirements.

C. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and be pumped or drained by gravity from the excavation to maintain a bottom free from standing water.

D. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.

E. If foundation soils are disturbed or loosened by the upward seepage of water or an uncontrolled flow of water, the affected areas shall be excavated and replaced with drain rock.

F. The CONTRACTOR shall maintain the water level below the bottom of excavation in all work areas where groundwater occurs during excavation construction, backfilling, and up to acceptance.

G. Flotation shall be prevented by the CONTRACTOR by maintaining a positive and continuous removal of water. The CONTRACTOR shall be fully responsible and liable for all damages which may result from failure to adequately keep excavations dewatered.

H. If well points or wells are used, they shall be adequately spaced to provide the necessary dewatering and shall be sandpacked and/or other means used to prevent pumping of fine sands or silts from the subsurface. A continual check by the CONTRACTOR shall be maintained to ensure that the subsurface soil is not being removed by the dewatering operation.

I. The CONTRACTOR shall dispose of water from the WORK in a suitable manner without damage to adjacent property. CONTRACTOR shall be responsible for obtaining any permits that may be necessary to dispose of water. No water shall be drained into work built or under construction without prior consent of the ENGINEER. Water shall be filtered using an approved method to remove sand and fine-sized soil particles before disposal into any drainage system.

J. The release of groundwater to its static level shall be performed in such a manner as to maintain the undisturbed state of the natural foundation soils, prevent disturbance of compacted backfill and prevent flotation or movement of structures, pipelines, and sewers.

K. Dewatering of trenches and other excavations shall be considered as incidental to the construction of the WORK and all costs thereof shall be included in the various contract prices in the Bid Forms, unless a separate bid item has been established for dewatering.

- END OF SECTION -

SECTION 31 30 00 - EARTHWORK

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall perform earthwork as indicated and required for construction of the WORK, complete and in place, in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. The CONTRACTOR shall submit certification of material gradations and proposed for the WORK in conformance with the requirements of Section 01 33 00 – Contractor Submittals. Sample sizes shall be as determined by the testing laboratory.

B. CONTRACTOR's Detailed Excavation Plan

1. The CONTRACTOR, prior to beginning any trench or structure excavation 5 feet deep or deeper, shall submit to the OWNER and shall be in receipt of the OWNER's written acceptance of the CONTRACTOR's detailed plan showing the design of shoring, bracing, sloping of the sides of excavation, or other provisions for worker protection against the hazard of caving ground during the excavation of such trenches or structure excavation.

2. The CONTRACTOR’s plan shall be prepared and signed and sealed by a Professional Engineer experienced in the field of geotechnical engineering and licensed in the State where the WORK is being performed.

3. The OWNER’s acceptance of said plan will be for verification of submittal of the plan with this requirement.

PART 2 -- PRODUCTS

2.1 FILL AND BACKFILL MATERIAL REQUIREMENTS

A. **General**

1. Fill, backfill, and embankment materials shall be selected or shall be processed and clean fine earth, rock, gravel, or sand, free from grass, roots, brush, other vegetation and organic matter.

2. Fill and backfill materials that are to be placed within 6 inches of any structure or pipe shall be free of rocks or unbroken masses of earth materials having a maximum dimension larger than 3 inches.

B. **Suitable Materials**

1. Materials not defined below as unsuitable will be considered as suitable materials and may be used in fills, backfilling, and embankment construction, subject to the indicated requirements.

2. If acceptable to the ENGINEER, some of the material listed as unsuitable may be used when thoroughly mixed with suitable material to form a stable composite.

3. Mixing or blending of materials to obtain a suitable composite is the CONTRACTOR's option but is subject to the approval of the ENGINEER.

4. Suitable materials may be obtained from on-Site excavations, may be processed on-Site materials, or may be imported.

5. If imported materials are required by this Section or are required in order to meet the quantity requirements of the WORK, the CONTRACTOR shall provide the imported materials as part of the WORK.

C. **Types of Suitable Materials**. The following types of suitable materials are defined:

Type AS (Aggregate Subbase): Crushed rock aggregate subbase material that can be compacted readily by watering and rolling to form a firm stable base. This material is often specified and required underneath the base course of asphaltic or concrete pavement. At the option of the CONTRACTOR, the grading for either the 3-inch maximum size or 2-inch maximum size gradation shall be used. The sand equivalent value shall be greater than 20. Crushed rock aggregate subbase material shall meet one of the following gradation requirements, as shown on the Drawings or approved by the OWNER:

Sieve Size	Percentage Passing (3-inch Max)	Percentage Passing (2-inch Max)
3-inch	100	100
2.0 inch	90 - 100	100
1.5 inch	-	95 - 100
No. 4	30 - 65	30 - 65
No. 16	15 - 40	15 - 40
No. 200	0 - 20	0 - 20

Type C (Civil Fill) (Not for use beneath concrete foundations): Civil Fill may consist of imported materials or natural on-site materials. Civil Fill may be a combination of Type AS material, Type GF, or Type SF material, or any mixture thereof, except as shown. Some mixing, removal of oversized particles (greater than 4-inch diameter) and/or removal of other unsuitable material may be required.

Type EF (Embankment Fills from on-site materials): Embankment Fill for the general fill and grading portions of the project may be obtained from on-Site excavations, may be processed on-Site materials, or may be imported materials comprised of mixtures of Type AS or Type GF material. If on-site material is used for embankments, it may require moisture conditioning to facilitate compaction. Drying of the embankment fill material may not be practical during cold or wet periods of the year. Acceptable embankment material shall meet or exceed the compaction density of 95 percent as determined by ASTM D-1557.

Type GF (Granular Fill 3/4-inch minus): Angular crushed rock, stone or gravel, and sand conforming to the requirements listed below. Do not use pea gravel as granular backfill: The material shall have a maximum liquid limit of 35 and a maximum plasticity index of 10. The material shall have a sand equivalent value greater than 75. (This material is also known as Class I crushed stone.)

Sieve Size	Percentage Passing
3/4-inch	100
No. 4	30 - 50
No. 200	0 - 6

As an alternative to the above gradation, the CONTRACTOR may use the approved State of Wyoming Standard Specifications for Roads and Bridges – GR gradation for Base aggregate.

Type A (Alluvium): Stockpiled alluvium material which has been obtained on Site by excavating within the existing channel for development of the subgrade. Alluvial fill comprises sands, gravels, and cobble.

Type T (Topsoil): Stockpiled topsoil material which has been obtained at the Site by removing soil to a depth not exceeding 2 feet. Removal of the topsoil shall be done after the area has been stripped of vegetation and debris.

Type RR (Riffle Rock): Well graded mixture of sub-angular to rounded river boulders and cobbles for development of streambed. Riffle rock shall be free of debris and consist of hard and durable rock resistant to weathering.

Size Class (in)	Percentage Passing
24	100
16	30 - 50
10	10

Type VR (Vane Rock): Large diameter angular to sub-angular boulders used for the development of river rock vanes. Boulders shall consist of hard and durable rock that is suitable for stacking and development of a stable in-water structure.

Schedule: Earth materials shall be as indicated in the Contract Drawings. Where clear definition in the drawings is not defined, the following schedule may be used to define acceptable fill materials.

Work Area	Material Type
Embankment Fills – Headgate Embankments and	Type EF material (Native soil unless native is determined to be unsuitable)
CMP Pipe	GF or Screened EF
Trench zone backfill except as identified below	C, EF or an approved mixture thereof.
Final backfill and grading above the ordinary highwater line	T
Backfill around structures (including berms)	C, EF, SF or an approved mixture
Top 6-inches embankment fills, or backfills around structures	T
Rock Riffle	Mixture of Type A and RR
Rock Vane	Type RV

D. **Unsuitable Materials.**

1. Soils which, when classified under ASTM D 2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System), fall in the classifications of PT, OH, CH, MH, or OL shall be classified as unsuitable materials.

2. In addition to the materials identified as unsuitable in the table above, a material shall be classified as unsuitable if one of the following conditions is present;

    a. Soils which cannot be compacted sufficiently to achieve the density specified for the intended use.

    b. Materials that contain hazardous or designated waste materials including petroleum hydrocarbons, pesticides, heavy metals, and any material which may be classified as hazardous or toxic according to applicable regulations.

2.2 IDENTIFICATION TAPE

A. Unless otherwise indicated, identification tape shall be placed above buried pipelines that are not comprised of magnetic components at least in part.

B. Identification tape shall be 6-inches wide, yellow in color, composed of polyethylene, and provided with an integral metallic wire.

C. Tape shall be labeled with CAUTION – BURIED UTILITIES.

PART 3 -- EXECUTION

3.1 EXCAVATION AND BACKFILLING - GENERAL

A. General

1. Except when specifically provided to the contrary, excavation shall include the removal of materials, including obstructions, that would interfere with the proper execution and completion of the WORK.

2. The removal of such materials shall conform to the lines and grades indicated or ordered.

3. Unless otherwise indicated, the entire Site shall be stripped of vegetation and debris and shall be grubbed, and such material shall be removed from the Site prior to performing any excavation or placing any fill.

4. The CONTRACTOR shall furnish, place, and maintain supports and shoring that may be required for the sides of excavations.

5. Excavations shall be sloped or otherwise supported in a safe manner in accordance with applicable state safety requirements and the requirements of OSHA Safety and Health Standards for Construction (29CFR1926).

6. The CONTRACTOR shall provide quantity surveys where so required to verify quantities for Unit Price Contracts.

7. Surveys shall be performed prior to beginning WORK and upon completion by a surveyor licensed in the state where the Site is located.

B. Removal and Exclusion of Water

1. The CONTRACTOR shall remove and exclude water, including stormwater, groundwater, and surface water from excavations.

2. Dewatering wells, wellpoints, sump pumps, or other means shall be used to remove water and continuously maintain groundwater at a level at least 2 feet below the bottom of excavations before the excavation WORK begins at each location.

3. Water shall be removed and excluded until backfilling is complete and field soils testing has been completed.

3.2 OVER-EXCAVATION

A. Indicated

1. Where areas are indicated to be over-excavated, excavation shall be to the depth indicated, and backfill shall be installed to the grade indicated.

B. Not Indicated

1. When ordered to over-excavate areas deeper and/or wider than required by the Contract Documents, the CONTRACTOR shall over-excavate to the dimensions ordered and backfill to the indicated grade.

C. Neither Indicated nor Ordered

1. Any over-excavation carried below the grade that is neither ordered or nor indicated shall be backfilled and compacted to the required grade with the indicated material as part of the WORK

3.3 ROCK EXCAVATION

A. Rock excavation shall include removal and disposal of the following items:

1. Rock material in ledges, bedding deposits, and un-stratified masses that cannot be removed using conventional equipment as defined herein and which require systematic drilling and blasting for removal;

2. Concrete or masonry structures that have been abandoned; and,

3. Conglomerate deposits that are so firmly cemented that they possess the characteristics of solid rock and cannot be removed using conventional equipment as herein defined and require systematic drilling and blasting for removal.

B. Scope and Payment

1. Rock excavation shall be performed by the CONTRACTOR, provided that if the quantity of rock excavation is affected by any change in the scope of the WORK an appropriate adjustment of the Contract Price will be made. Payment for rock excavation shall be as set forth in the Bid form as a unit price item. If a unit price item for rock excavation is not provided in the Bid form, the extra cost for excavation of rock will be treated as a change.

2. Otherwise, payment will be made in accordance with a negotiated price.

C. Explosives and Blasting: Blasting will not be permitted.

3.4 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. Excess native excavated material shall be used to infill scour holes and rebuild embankments eroded from installation of pushup dams.

B. The CONTRACTOR shall be responsible for the balancing, blending, and stabilization of native material on-site. Excess material may be placed on private property at the landowners instruction.

C. The CONTRACTOR shall remove and dispose of excess material not suitable for on-site disposal at a location selected by the CONTRACTOR and as approved by the ENGINEER or at an off-Site location selected and arranged for by the CONTRACTOR.

D. The CONTRACTOR shall obtain required permits and landowner and agency approvals for disposal of excess excavated material on-Site or off-Site and shall submit copies of related documents to the ENGINEER for information prior to disposal. CONTRACTOR shall pay costs associated with the removal and disposal

3.5 BACKFILL

A. General

1. Backfill shall not be dropped directly upon any structure or pipe.

2. Backfill shall not be placed around or upon any structure until the concrete has attained sufficient strength to withstand the loads imposed.

3. Backfill around water-retaining structures shall not be placed until the structures have been tested, and the structures shall be full of water while backfill is being placed.

B. Except for drain rock materials being placed in over-excavated areas or trenches, backfill shall be placed after water is removed from the excavation and the trench sidewalls and bottom have been dried to a moisture content suitable for compaction.

C. Pre-Placement Conditions

1. Immediately prior to placement of backfill materials, the bottoms and sidewalls of trenches and structure excavations shall have any loose, sloughing, or caving soil and rock materials removed.

2. Trench sidewalls shall consist of excavated surfaces that are in a relatively undisturbed condition before placement of backfill materials.

D. Layering

1. Backfill materials shall be placed and spread evenly in layers.

2. When compaction is achieved using mechanical equipment, the layers shall be evenly spread such that when compacted each layer shall not exceed 6 inches in thickness.

E. During spreading, each layer shall be thoroughly mixed as necessary in order to promote uniformity of material in each layer.

F. Moisture Content

1. Where the backfill material moisture content is below the optimum moisture content, water shall be added before or during spreading until the proper moisture content is achieved.

2. Where the backfill material moisture content is too high to permit the indicated degree of compaction, the material shall be dried until the moisture content is satisfactory.

3.6 STRUCTURE AND EMBANKMENT EXCAVATION AND BACKFILL

A. Excavation Beneath Structures and Embankments

1. Except where indicated otherwise for a particular structure or where ordered by the ENGINEER, excavation shall be carried to an elevation 1 foot below the bottom of the footing or slab and brought back to grade with compacted materials acceptable for placement beneath structures.

2. The area where a fill or embankment is to be constructed shall be cleared of vegetation, roots, and foreign material.

3. Where indicated or ordered, areas beneath structures or fills shall be over-excavated.

4. The subgrade areas beneath embankments shall be excavated to remove not less than the top 6 inches of native material and where such subgrade is sloped, the native material shall be benched.

5. When such over-excavation is indicated, both the over-excavation and the subsequent backfill to the required grade shall be performed by the CONTRACTOR.

6. After the required excavation or over-excavation for fills and embankments has been completed, the exposed surface shall be scarified to a depth of 6 inches, brought to optimum moisture content, and rolled with heavy compaction equipment to obtain 95 percent of maximum density.

B. Compaction of Fill, Backfill, and Embankment Materials

1. Each layer of backfill materials as defined herein, where the material is graded such that 10 percent or more passes a No. 4 sieve, shall be mechanically compacted to the indicated percentage of density.

2. Equipment that is consistently capable of achieving the required degree of compaction shall be used, and each layer shall be compacted over its entire area while the material is at the required moisture content.

3. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory compactor that is capable of obtaining the required density in 2 passes.

C. Flooding, ponding, and jetting shall not be used for fill on backfill around structures, for final backfill materials, or aggregate base materials.

D. Heavy Equipment

1. Equipment weighing more than 10,000 pounds shall not be used closer to walls than a horizontal distance equal to the vertical depth of the fill above undisturbed soil at that time.

2. Hand-operated power compaction equipment shall be used where the use of heavier equipment is impractical or restricted due to weight limitations.

E. Layering

1. Embankment and fill material shall be placed and spread evenly in approximately horizontal layers.

2. Each layer shall be moistened and aerated as necessary.

3. Unless otherwise approved by the ENGINEER, no layer shall exceed 6 inches of compacted thickness.

4. The embankment and fill shall be compacted in conformance with Paragraph K, below.

F. Embankments and Fills

1. When an embankment or fill is to be constructed and compacted against hillsides or fill slopes steeper than 4:1, the slopes of the hillsides or fills shall be horizontally benched in order to key the embankment or fill to the underlying ground.

2. A minimum of twelve (12) inches perpendicular to the slope of the hillside or fill shall be removed and re-compacted as the embankment or fill is brought up in layers.

3. Material thus cut shall be re-compacted along with the new material.

4. Hillside or fill slopes 4:1 or flatter shall be prepared in accordance with Paragraph A, above.

G. Compaction Requirements

1. The following compaction requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft^3) (2,700 kN-m/m^3) where the material is graded such that ten (10) percent or more passes a No. 4 sieve and in accordance with ASTM D 4253 - Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density, where the material is coarse granular backfill materials with less than ten (10) percent passing the No. 4 sieve:

Location or Use of Fill or Backfill	**Percentage of Maximum Dry Density**	**Percentage of Relative Density**
Embankments and fills not identified otherwise	90	55

Embankments and fills beneath paved areas or structures	95	70
Backfill beneath structures and hydraulic structures	95	70
Topsoil	80	NA
Aggregate base or subbase	95	NA

3.7 STREAMBED MATERIAL

A. Excavation of streambed

1. Existing streambed material shall be excavated to the elevations shown in the drawings. Excavation depths for rock vane shall extend to the base of the footer stone.

2. Excavated material shall be sorted, as needed, and stockpiled for reuse. Existing streambed sediment shall be used for the infill of imported cobbles and boulders for the rock riffle and rock vane. Mixed sediment and cobbles may be used for streambed embankment development.

B. Backfill and compaction

1. Rock vane boulders shall be individually placed with equipment. Footer boulders shall be placed first and backfilled using streambed fill and imported cobbles. Weir vane boulders shall be placed resting partially on footer stones at the specified elevations. Gaps between footer and weir vane boulders shall be chinked with smaller stone to prevent excess seepage of water and passing of fines.

2. The method of placing roughened riffle boulders and cobbles may be performed at the CONTRACTORS discretion and with the ENGINEER's or RPR's oversight. CONTRACTOR shall ensure:

   a. The roughened riffle is constructed to grade, as shown in the drawings.

   b. Boulders are evenly distributed across the roughened riffle.

   c. Boulders are at least 50% submerged in sediment and cobble

   d. Streambed sediment is washed into roughened riffle to form a firm and void free channel bed. The CONTRACTOR shall continue to infill riffle voids with native sediments through repeated washing as many times as required until water is observed flowing above grade by the ENGINEER or RPR.

3.8 PIPELINE AND UTILITY TRENCH EXCAVATION AND BACKFILL

A. General

1. Unless otherwise indicated or ordered, excavation for pipelines and utilities shall be open-cut trenches with minimum widths as indicated.

B. Trench Bottom

1. Except where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe.

2. Excavations for pipe bells and welding shall be made as required.

3. Where pipe bedding is required, the bottom of the trench shall be excavated uniformly to the grade of the bottom of the pipe bedding.

C. Open Trenches

1. The maximum amount of open trench permitted in any one location shall be 500 feet or the length necessary to accommodate the amount of pipe installed in a single Day, whichever is greater.

2. Trenches shall be fully backfilled at the end of each Day or, in lieu thereof, shall be covered by heavy steel plates adequately braced and capable of supporting vehicular traffic in those locations where it is impractical to backfill at the end of each Day.

3. These requirements for backfilling or use of steel plate will be waived in cases where the trench is located further than 50 feet from any traveled roadway or occupied structure; in such cases, however, barricades and warning lights meeting appropriate safety requirements shall be provided and maintained.

D. Embankments, Fills and Structural Backfills

1. Where pipelines are to be installed in embankments, fills, or structure backfills, the fill shall be constructed to a level at least one foot above the top of the pipe before the trench is excavated.

2. Upon completion of the embankment or structural backfill, a trench conforming to the appropriate detail may be excavated and the pipe may be installed.

E. Trench Shield

1. If a moveable trench shield is used during excavation operations, the trench width shall be wider than the shield such that the shield is free to be lifted and then moved horizontally without binding against the trench sidewalls and causing sloughing or caving of the trench walls.

2. If the trench walls cave or slough, the trench shall be excavated as an open excavation with sloped sidewalls or with trench shoring, as indicated and as required by the pipe structural design.

3. If a moveable trench shield is used during excavation, pipe installation, and backfill operations, the shield shall be moved by lifting the shield free of the trench bottom or backfill and then moving the shield horizontally.

4. The CONTRACTOR shall not drag trench shields along the trench causing damage or displacement to the trench sidewalls, the pipe, or the bedding and backfill.

F. Placing and Spreading Of Backfill Materials

1. Each layer of coarse granular backfill materials with less than 10 percent passing the No. 4 sieve shall be compacted by means of at least 2 passes from a vibratory compactor that is capable of achieving the required density in 2 passes and that is acceptable to the ENGINEER.

2. Where such materials are used for pipe zone backfill, vibratory compaction shall be used at vertical intervals of the lesser of:

   a. one-half the diameter of the pipe; or

   b. 24 inches, measured in the uncompacted state.

3. In addition, these materials shall be subjected to vibratory compaction at the springline of the pipe and the top of the pipe zone backfill, regardless of whether that dimension is less than 24 inches or not.

4. Each layer of backfill material with greater than 10 percent passing the No. 4 sieve shall be compacted using mechanical compactors suitable for the WORK.

5. The material shall be placed and compacted under the haunch of the pipe and up each side evenly so as not to move the pipe during the placement of the backfill.

6. The material shall be placed in lifts that will not exceed 6 inches when compacted to the required density.

G. Mechanical Compaction

1. Backfill around and over pipelines that is mechanically compacted shall be compacted using light, hand-operated vibratory compactors and rollers that do not damage the pipe.

2. After completion of at least 2 feet of compacted backfill over the top of pipeline, compaction equipment weighing no more than 8,000 pounds may be used to complete the trench backfill.

H. Pipe And Utility Trench Backfill

1. Pipe Zone Backfill

   a. Definitions

1) The pipe zone is defined as that portion of the vertical trench cross-section lying between a plane below the bottom surface of the pipe and a plane at a point above the top surface of the pipe as indicated.

2) The bedding is defined as that portion of pipe zone backfill material between the trench subgrade and the bottom of the pipe.

3) The embedment is defined as that portion of the pipe zone backfill material between the bedding and a level line as indicated.

b. Final Trim

1) After compacting the bedding, the CONTRACTOR shall perform a final trim using a stringline for establishing grade, such that each pipe section when first laid will be continually in contact with the bedding along the extreme bottom of the pipe.

2) Excavation for pipe bells and welding shall be made as required.

c. The pipe zone shall be backfilled with the indicated backfill material.

d. Pipe zone backfill materials shall be manually spread evenly around the pipe, maintaining the same height on both sides of the pipe such that when compacted the pipe zone backfill will provide uniform bearing and side support.

e. The CONTRACTOR shall exercise care in order to prevent damage to the pipeline coating, cathodic bonds, and the pipe itself during the installation and backfill operations.

2. Trench Zone Backfill

a. After the pipe zone backfill has been placed, backfilling of the trench zone may proceed.

b. The trench zone is defined as that portion of the vertical trench cross-section lying as indicated between a plane above the top surface of the pipe and a plane at a point 18 inches below the finished surface grade, or if the trench is under pavement, 18 inches below the roadway subgrade.

3. Final Backfill

a. Final backfill is defined as backfill in the trench cross-sectional area within 18 inches of finished grade, or if the trench is under pavement, backfill within 18 inches of the roadway subgrade.

I. Trench Shield

1. If a moveable trench shield is used during backfill operations, the shield shall be lifted to a location above each layer of backfill material prior to compaction of the layer.

2. The CONTRACTOR shall not displace the pipe or backfill while the shield is being moved.

J. Compaction Requirements

1. The following compaction test requirements shall be in accordance with ASTM D 1557 - Test Method for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft - lbf/ft^3) (2,700 kN-m/m^3) where the material is graded such that 10 percent or more passes a No. 4 sieve, and in accordance with ASTM D 4253 - Standard Test Method for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table, and D 4254 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density where the material is coarse granular backfill materials with less than 10 percent passing the No. 4 sieve.

Location or Use of Fill or Backfill	Percentage of Maximum Dry Density	Percentage of Relative Density
Pipe embedment backfill for flexible pipe.	95	70
Pipe bedding and over-excavated zones under bedding for flexible pipe, including trench plugs.	95	70
Final backfill, not beneath paved areas or structures.	90	55
Trench zone backfill, not beneath paved areas or structures, including trench plugs.	90	55

3.9 FIELD TESTING

A. General: Field soils testing is not required.

- END OF SECTION –

SECTION 31 35 00 - EROSION AND SEDIMENT CONTROL GENERAL

PART 1 -- GENERAL

1.1 SUMMARY

A. Work includes furnishing all labor, materials and equipment required for the installation and maintenance of both permanent and temporary erosion and sediment control measures as shown on the drawings and as specified herein.

B. Erosion and sediment control measures shall remain in place while potential for erosion exists from construction activities at the site and disposal area, during the duration of the contract and warranty period;

1. Protect and stabilize soils susceptible to erosion. This includes areas were vegetative cover cannot be achieved due to soils, slopes or time of year. The contractor shall be aware of and conform to measures necessary for the control of erosion and sediment runoff according to applicable regulations.

2. Prevent sediment or sediment laden water from entering all creeks and the storm drain systems or to be discharged from the construction site in accordance with the IDEQ, USEPA and other applicable regulations.

C. All temporary erosion and sediment control measures shall be installed prior to commencement of construction.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

U.S. DEPARTMENT OF AGRICULTURE (USDA) AMS Seed Act (1940; R 1988; R 1998) Federal Seed Act

Wyoming Department of Environmental Quality, Best Management Practices for Erosion and Sediment Control

1.3 SUBMITTALS

A. Submit Erosion and Sediment Control Plans for acceptance in accordance with the provisions of Section 01 33 00 – Contractor Submittals

1. Erosion and Sediment Control Plan is provided in Contract Documents. CONTRACTOR shall take responsibility for implementation and maintenance of the ESC Plan and comply with requirements of the Storm Water Pollution and Prevention Plan (SWPPP). Plan shall meet all federal, state, and local requirements.

2. The CONTRACTOR shall comply with all provisions of the Wyoming Pollutant Discharge Elimination System (WYPDES) program. The CONTRACTOR should review requirements prior to submitting a project bid. The CONTRACTOR is solely responsible for meeting the requirements of WYPDES.

PART 2 – PRODUCTS (NOT USED)

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Install erosion and sediment control measures per manufacturer's directions or as illustrated on the contract drawing or as identified in Section 31 35 26 – Erosion Control Barriers.

3.2 MAINTENANCE AND REMOVAL

B. Repair and reinstall temporary soil erosion control measures as necessary to ensure proper function for the duration of ground disturbing activities and through the warranty period.

C. Temporary erosion control devices shall be removed only after they have performed their intended function.

D. All pipes, end sections, drainage curbs, sand bags, sediment fences and other materials which are removed from temporary erosion control devices and not incorporated into the permanent work shall become the property of the Contractor and shall be removed from the area.

- END OF SECTION -

SECTION 31 35 26 - EROSION CONTROL BARRIER

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall provide erosion control barriers, complete and in place, in accordance with the Contract Documents.

1.2 CONTRACTOR SUBMITTALS

A. Submittals shall be in accordance with Section 01 33 00 - Contractor Submittals.

B. **Product Data:** Manufacturer's catalog sheets on geotextile fabrics.

PART 2 -- PRODUCTS

2.1 FABRIC

A. Fabric may be woven or non-woven, made from polypropylene, polyethylene, or polyamid, and shall contain sufficient UV inhibitors so that it will last for 2 years in outdoor exposure.

B. Fabric shall have the following properties:

Parameter	Standard Method	Value
Grab tensile strength	ASTM D 4632	100 lb
Burst strength	ASTM D 3786	200 psi
Apparent opening size	ASTM D 4751	Between 200 and 70 sieve size

C. Fabric Manufacturer, or equal

1. **Mirafi**

2.2 POSTS

A. Posts shall be wood, at least 2 inches by 2 inches

2.3 FENCING

A. Woven wire fabric fencing shall be galvanized, mesh spacing of 6 inches, maximum 14-gauge, at least 30 inches tall.

2.4 FASTENERS

A. Fasteners to wood posts shall be steel, at least 1 1/2 inches long.

2.5 STRAW WATTLES

A. Straw wattle shall be 9” in diameter and made from 100% certified noxious weed-free straw with biodegradable netting. Netting shall be made from natural fibers such as jute or burlap.

PART 3 -- EXECUTION

3.1 PREPARATION

A. Provide erosion control barriers at the indicated locations and as required to prevent erosion and silt loss from the Site.

B. CONTRACTOR shall not commence clearing, grubbing, earthwork, or other activities which may cause erosion until barriers are in place.

3.2 INSTALLATION

A. Barrier systems shall be installed in such a manner that surface runoff will percolate through the system in sheet flow fashion and allow sediment to be retained and accumulated.

B. Attach the woven wire fencing to the posts that are spaced a maximum of 6 feet apart and embedded a minimum of 12 inches. Install posts at a slight angle toward the source of the anticipated runoff.

C. Trench in the toe of the filter fabric barrier with a spade or mechanical trencher so that the downward face of the trench is flat and perpendicular to the direction of flow. Lay fabric along the edges of the trench. Backfill and compact.

D. Securely fasten the fabric materials to the woven wire fencing with tie wires.

E. Reinforced fabric barrier shall have a height of 18 inches.

F. Provide the filter fabric in continuous rolls and cut to the length of the fence to minimize the use of joints. When joints are necessary, splice the fabric together only at a support post with a minimum 6-inch overlap and seal securely.

G. Wattle shall be staked at 4’ spacing or as specified by the manufacturer.

3.3 MAINTENANCE

A. Regularly inspect and repair or replace damaged components of the barrier. Unless otherwise directed, maintain the erosion control system until final acceptance; then remove erosion and sediment control systems promptly.

B. Remove sediment deposits when silt reaches a depth of 6 inches or 1/2 the height of the barrier. Dispose of sediments on the Site, if a location is indicated on the Drawings, or at a site arranged by the CONTRACTOR which is not in or adjacent to a stream or floodplain.

- END OF SECTION –

SECTION 31 37 00 - RIPRAP

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall provide riprap, including associated earthwork, complete and in place, in accordance with the Contract Documents.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

ASTM C 88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C 535	Standard Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
AASHTO T 85	Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate
AASHTO T 210	Method of Test for Aggregate Durability Index.

1.3 CONTRACTOR SUBMITTAL

A. Furnish submittals in accordance with Section 01 33 00 – Contractor Submittals.

B. Testing certificates from a qualified testing agency shall be submitted prior to acceptance of the rock source to verify the conformity to the requirements of the Contract Documents.

PART 2 -- PRODUCT

2.1 STONES FOR RIPRAP

A. Stones shall be graded in size to produce a reasonably dense mass. Riprap shall consist of dense, natural rock fragments. Stones shall be resistant to weathering and to water action; free from overburden, spoil, shale, and organic material; and shall meet the gradation requirements below. Shale and stones with shale seams are not acceptable.

B. Riprap shall conform to the size types as follows:

1. Type II (12-inch Average Size):

Diameter	Percentage Passing
18-inch	95 - 100
12-inch	25 - 75
6-inch	0 - 5

As an alternative to the above gradation, the CONTRACTOR may use the approved State of Wyoming Standard Specifications for Roads and Bridges – Type II Riprap gradation for Base aggregate

C. The greatest dimension of 50 percent of the stones shall be at least two-thirds but not more than 1-1/2 times the diameter of the average size. Neither the breadth nor thickness of any piece of riprap shall be less than one-third its length. Material shall be of shapes which will form a stable protection structure of required depth. Rounded boulders or cobbles shall not be used.

D. Stones shall consist of durable, sound, hard, angular rock meeting the following requirements for durability absorption ratio, soundness test, and abrasion test:

Durability Absorption Ratio	**Acceptability**
Greater than 23	Passes
10 to 23	Passes only if Durability Index is 52 or greater
Less than 10	Fails
Durability Absorption Ratio	$\frac{\text{Durability Index (Coarse)}}{\text{\% absorption + 1}}$

E. The durability index and percent absorption shall be determined by AASHTO T 210 and AASHTO T 85, respectively. The minimum apparent specific gravity of the stones shall be 2.5 as determined by AASHTO T 85.

F. Stones shall have less than 10 percent loss of weight after five cycles, when tested per ASTM C 88.

G. Stones shall have a wear not greater than 40 percent, when tested per ASTM C 535.

H. Control of gradation shall be by visual inspection. The CONTRACTOR shall furnish a sample of the proposed gradation of at least 5 tons or 10 percent of the total riprap weight, whichever is less. If approved, the sample may be incorporated into the finished riprap at a location where it can be used as a frequent reference for judging the gradation of the remainder of riprap.

I. The acceptability of the stones will be determined by the ENGINEER prior to placement. Any difference of opinion between the ENGINEER and the CONTRACTOR shall be resolved by dumping and checking the gradation of two random truckloads of stones. Arranging for and the costs of mechanical equipment, a sorting site, and labor needed in checking gradation shall be the CONTRACTOR's responsibility.

2.2 FILTER MATERIAL

A. Filter material shall be clean and free from organic matter. It shall be crushed rock or gravel, durable and free from slaking or decomposition under the action of alternate wetting or drying. The material shall be uniformity graded and shall conform to the following gradation:

1. Type 1

Size	Percentage Passing
3-inch	85 – 100
1-1/2 inch	45 – 75
3/4-inch	10 – 25

As an alternative to the above gradation, the CONTRACTOR may use the approved State of Wyoming Standard Specifications for Roads and Bridges – Filter Aggregate for Riprap.

PART 3 -- EXECUTION

3.1 SURFACE PREPARATION

A. Surfaces to receive riprap shall be smooth and firm, free of brush, trees, stumps, and other objectionable material, and shall be brought to the line and grade indicated.

B. If a boulder is encountered during excavation of areas where large riprap is to be placed, the CONTRACTOR shall excavate around the boulder. If the boulder is larger than the largest allowable stone size for that area, the CONTRACTOR shall break up the boulder to an acceptable size or remove it entirely.

3.2 PLACEMENT OF FILTER BLANKET

A. Area of riprap placement shall be excavated to the bottom of the filter blanket as indicated and in accordance with Section 31 00 00 – Earthwork. After the excavation has been completed, the top 12-inches of exposed surface shall be scarified, brought to optimum moisture content, and compacted to 95 percent of maximum density. The finished grade shall be even, self-draining, and in conformance with the slope of the finished grade.

B. Placement of filter material shall be in accordance with Section 31 00 00. Filter material shall be placed, spread, and compacted in lifts not to exceed 12-inches.

C. The CONTRACTOR shall remove any portion of the filter blanket that has been disturbed to the degree that the layers become mixed. Replace the removed portion with the required sizes.

D. Filter material shall be placed as follows, unless otherwise indicated.

1. For Type II, III and IV riprap, use 12-inches of Type 1 filter material.

3.3 PLACEMENT OF RIPRAP

A. Placement of riprap shall begin at the toe of the slope and proceed up the slope. The stones may be placed by dumping and may be spread by bulldozers or other suitable equipment as long as the underlying material is not displaced. Stones shall be placed so as to provide a minimum of voids. Smaller stones shall be uniformly distributed throughout the mass. Sufficient hand work shall be done to produce a neat and uniform surface, true to the lines, grades, and sections indicated.

- END OF SECTION-

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SECTION 33 92 30 - CORRUGATED METAL PIPE (AASHTO M36, MODIFIED)

PART 1 -- GENERAL

1.1 THE SUMMARY

A. The CONTRACTOR shall provide corrugated metal pipe and appurtenant WORK, complete in place, in accordance with the Contract Documents.

B. Corrugated metal pipe shall include round pipe, pipe arch, and underdrain pipe, both corrugated steel and corrugated aluminum, coated and uncoated, with or without a paved invert, and including fittings, couplings, and related accessories.

1.2 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Commercial Standards:

AASHTO M-36	Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains
AASHTO M-190	Specification for Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M-196	Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M-243	Specification for Fluid-Applied Coating of Corrugated Meal Structural Plate for Pipe, Pipe Arches, and Arches
AASHTO M-246	Specification for Steel Sheet Metallic-Coated and Polymer-Precoated for Corrugated Steel Pipe

1.3 CONTRACTOR SUBMITTALS

A. Shop Drawings and catalog data submittals shall be made in accordance with Section 01 33 00 - Contractor Submittals.

B. A manufacturer's or fabricator's Certificate of Compliance shall be furnished stating that samples representing each lot have been tested and inspected in accordance with the Contract Documents and have been found to meet the requirements for the material described.

PART 2 -- PRODUCTS

2.1 CORRUGATED STEEL PIPE, PIPE ARCH, AND UNDERDRAIN

A. Corrugated steel pipe, pipe arch, and underdrain and coupling bands and fittings for each type, shall conform to the requirements of AASHTO M-36, and shall be fabricated from either zinc-coated steel sheet or aluminum-coated steel sheet, as indicated.

B. Zinc-coated steel sheet, if indicated, shall be further coated by pressing inert mineral fibers into the molten zinc on both surfaces of the sheet and then coating the sheet with a bituminous saturant. After fabrication, fiber-bonded pipe and pipe arch shall be fully bituminous-coated in accordance with AASHTO M-190. Fabricated pipe and pipe arches shall be free from blisters, unsaturated spots, cracks in the bonding, unbonded areas and other defects.

2.2 REQUIREMENTS

A. Corrugated metal pipe shall meet the following requirements:

1.	Type of pipe:	Circular
2.	Pipe material:	Steel
3.	If steel, type of coating:	Zinc
4.	Size:	As Indicated
5.	Wall thickness:	12 gauge
6.	Corrugation:	Helical
7.	Corrugation dimension:	½”

PART 3 -- EXECUTION

3.1 INSTALLATION

A. Pipeline trench excavation shall be in accordance with the requirements of Section 31 00 00 - Earthwork, including the situation where pipelines are to be installed in embankment or structure fills.

B. Pipe bedding shall be in accordance with the requirements of Section 31 00 00 - Earthwork, and shall have a thickness of 8-inches under the pipe, unless otherwise indicated.

C. All pipe shall be transported, stored, and handled with care. It shall not be rolled or dragged over gravel or rock, and during placement, shall be prevented from striking rock or other hard objects. Special care shall be taken in handling and placing coated pipe to avoid damaging the coating.

D. Pipe laying shall begin at the downstream end of the line and proceed upstream. Pipe shall be laid carefully and true to line and grade. Pipe shall be placed with longitudinal seams at the sides and with outside laps of circumferential joints upgrade.

E. Pipe sections shall be laid in the trench with a maximum spacing between sections of 1-1/2 inches. Connecting bands shall be placed with clamping angles and bolts at top of the pipe. The pipe coupling corrugations or projections shall properly engage the pipe sections before bolts are tightened. Care shall be taken to ensure that dirt or other particles do not get between the outside of the pipe and the coupling. For watertight joints, the band and gasket material shall be placed in accordance with the manufacturer's recommendations.

F. Pipe trench backfill shall be in accordance with the requirements of Section 31 00 00 - Earthwork. Particular care shall be taken to assure that specified compaction is attained under the haunches of the pipe.

- END OF SECTION –

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SECTION 35 20 18 – FABRICATED STEEL SLIDE GATES

PART 1 -- GENERAL

1.1 SUMMARY

A. The CONTRACTOR shall provide slide gates and headwalls, complete and operable, in accordance with the Contract Documents. This specification relates to the design, materials of construction, fabrication, and supply of slide gates as shown on the Contract Drawings.

B. Headwalls and slide gates shall be designed and fabricated by a local fabricator. Slide gates from large scale manufacturers meeting AWWA specifications is not required. Fabricators shall be responsible for developing headwalls to withstand earth pressures based on embankment elevations shown in drawings. Steel plates and supporting members for headwall shall be designed for a minimum 30-year lifespan.

1.2 CONTRACTOR SUBMITTALS

A. Furnish submittals in accordance with Section 01 33 00 – Contractor Submittals, for ENGINEER's review and approval.

1. Submit the following:

a. Shop drawings of gates, frames, slides, and headwalls

b. design load calculations for deflection at the maximum expected head

PART 2 -- PRODUCTS

2.1 GENERAL

A. **Dimensions.** Nominal gate dimensions shall be for fabricated steel headwall openings as shown on the contract drawing and as follows:

1. **Homer Headgate**: 24" Diameter
2. **Lewis Headgate** 36" Diameter

B. Gate actuators throughout the project shall be products of a single manufacturer.

2.2 FABRICATED STEEL SLIDE GATES

A. **Gate Schedule**

Equip. Location	Wall Opening (inches)	Rated Seating Head* (ft)		Connection	Operator
		Max. Unseating	Max. Seating		
Homer Headgate	24" Diameter	0 feet	4 feet	CMP Collar	manual handwheel
Lewis Headgate	36" Diameter	0 feet	4 feet	CMP Collar	manual handwheel

* Head defined from gate centerline elevation.

B. **Construction Materials**

1. Materials employed in the manufacture and installation of the hydraulic gates and operators shall be suitable for the intended application. Material not specifically called for shall be high-grade, standard commercial quality, free from defects and imperfection that might affect the serviceability of the product for the purpose for which it is intended.

2. Unless otherwise indicated, materials of construction shall be steel.

C. **Design Hydraulic Loading.** Each slide gate shall be designed for the hydraulic loading characteristics as defined by the maximum seating head and unseating head conditions as specified in the Gate Schedule above.

D. **Gate Design.** All fabricated steel gate components shall have a minimum thickness of 1/4-inch unless specified otherwise.

1. **Slide Cover (Disc) and Stiffeners**. The gate slide cover (disc) shall consist of a flat plate reinforced with structural or formed members welded to the plate.

2. **Frame / Guides**. The gate frame shall consist of guides, invert member, and a fabricated operator yoke assembly. The guides shall be of a sandwiched type construction built up of plates, angles, and formed shapes. The guide slot shall engage the disc plate a minimum of 1-inch.

3. **Steel Yoke Support Beam.** Gate lifting and lowering shall be supported by a steel support framing system (yoke). The yoke shall be designed and fabricated according to the following:

    a. Designed to span the open width (W) on the top deck as shown on the Contract Drawings.

E. **Anchor / Mounting Bolts**

1. The diameter, length, quantity and location of the slide gate anchor hardware shall be determined by the slide gate Manufacturer and clearly shown in installation literature.

2. All anchor hardware including studs, adhesive anchor bolts, other bolts, nuts and washers shall be provided by the gate Manufacturer to the CONTRACTOR for installation. Use of expanding style wedge mechanical anchors shall not be allowed.

F. **Lifting Device / Gate Manual Actuator**

1. Provide lifting devices complete with stem, lifting nut, intermediate supports with steady bushings, hand wheel, where indicated.

2. Pedestal Mounting

    a. The lifting devices shall be mounted on pedestals constructed of cast iron or fabricated steel.

b. The pedestals shall have an ample base or bracket area to evenly distribute the load to the supporting structure or yoke of the gate.

3. The centerline of the manual actuator shall be approximately 3 feet above the base for pedestal-mounted actuators, and approximately 3.5 feet above the floor for frame-mounted actuators.

4. Handwheel Crank

a. The unit shall be designed for a 40–pound maximum effort on the crank in order to operate the gate.

b. Clockwise movement of the handwheel shall close the gate.

G. **Coatings**

1. Any exposed ferrous surfaces (non stainless steel components) shall be blasted to SSPC SP-10 and receive coating system No. 51 (Polyamide epoxy), prior to their assembly. The polyamide epoxy coating system shall meet the following requirements:

a. Product shall be a high-build polyamide cure epoxy with a maximum VOC content of 366 g/L. Product shall be suitable for long-term immersion in water and resistant to corrosion.

b. Product shall be applied in a minimum of two coats and shall have a total dry film thickness (DFT) of no less than 12 mils.

c. Acceptable product manufacturers include Ameron Amercoat 370, or Tnemec Pota Pox Series 20 or Carboline Carboguard 61.

PART 3 -- EXECUTION

3.1 STORAGE AND INSTALLATION

A. The CONTRACTOR shall handle, store, and install the fabricated roller slots, gate operating mechanism, stem guides, and accessories in strict accordance with the Manufacturer's approved shop-drawings and recommendations.

B. The slide gates shall be installed in accordance with the Manufacturer’s detailed technical installation procedures and recommendations.

C. As applicable, Operators shall be located as to avoid interference with handrails and structural members.

- END OF SECTION –

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