

# EGGE DIVERSION DAM Removal Project

Located on the Musselshell River  
near Lavina, MT

FWP # 14-38

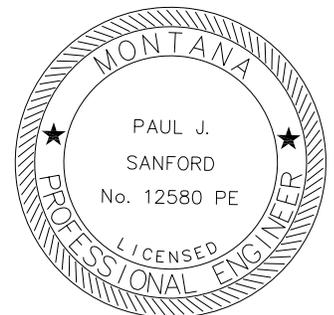


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**Montana Fish,  
Wildlife & Parks**



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EGGE DIVERSION, FWP #14-38

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## SECTION 01010

### SUMMARY OF WORK

#### PART 1 GENERAL

##### 1.1. DESCRIPTION

The Egge Diversion Dam is located on the Musselshell River in Golden Valley County, Montana about 4.6 miles downstream (east of) of the City of Lavina. The diversion structure is located at latitude 46.285600° and longitude -108.843100°. Flood water in 2011 bypassed the right side of the diversion creating a scoured channel approximately 60-70 feet wide around the structure. The project goal is to remove the diversion dam and restore the right bank that was washed out by recent flood events. Removal of the dam will provide fish passage for select warm water species.

The Egge Diversion Dam Removal Project consists of removal and disposal of a concrete irrigation structure on the Musselshell River, including the head wall, footing and abutments. The work will also entail placement of roughly 3,300 CY of material to fill the scour hole and 180 feet of bank construction. Concrete from the irrigation structure will be buried in an existing abandoned irrigation canal adjacent on the descending left river bank or along the inside edge of the scour hole fill area as decided by the Owner. The existing head gate structure will also be removed and disposed in one of these two areas. All disturbed areas will be reclaimed as part of this work.

The work will be divided between the Contractor and the Owner. Work to be completed by the Owner includes:

- Acquiring the Permits Listed in the Specifications.

The bid will be awarded based on the BASE BID and, potentially, any combination of ALTERNATE BIDS that is determined to be within FWP's budget and in the best interests of FWP.

##### 1.2. MATERIAL SUPPLIED BY OWNER

No material will be supplied by the Owner.

##### 1.3. FIELD QUALITY CONTROL

- A. The Owner's Representative will perform periodic site visits to inspect work, direct placement of certain project elements and provide confirmation of crucial design elements.
- B. Specifications and drawings included in these contract documents establish the performance and quality requirements and establish minimum standards for workmanship and appearance.

#### 1.4. DEDUCTIVE ALTERNATE BID ITEMS

Deductive Alternate Bid Item will be used if the Owner directs the concrete diversion dam to be disposed of in the Option 2 Disposal Area. If the Owner directs the Contractor to implement Deductive Alternate Bid #1, the bid items in Deductive Alternate Bid Item #1 would replace Base Bid Items #4 Demolition, #5 Earthwork and #12 Reclamation.

#### 1.5. MEASUREMENT AND PAYMENT

Measurement and payment for all bid items included in the Proposal shall be in accordance with the method of measurement and basis of payment described in the various sections of the Specifications.

The total bid price for each item of the contract shall cover all work required by the specifications and other contract documents. All costs in connection with the work, including furnishing all materials, equipment, supplies and appurtenances; providing all construction plant, equipment, and tools; and performing all necessary labor and supervision to fully complete the work, shall be included in the unit and lump sum prices bid. No item that is required by the Contract Documents for the proper and successful completion of work will be paid for outside of, or in addition to, the prices submitted in the bid. All work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Contractor, and all costs in connection therewith shall be included in the prices bid. Bid items shall not be considered for payment until all work associated with the bid item is completed. This work may include, but is not limited to, backfilling and cleanup.

All estimated quantities stipulated in the Proposal or other contract documents are approximate and are to be used only (a) as a basis for estimating the probable cost of the work, and (b) for the purpose of comparing the bids submitted for the work. The actual amounts of work done and materials furnished under unit price items may differ from the estimated quantities. The basis of payment for work and materials will be the actual amount of work done and materials furnished, as measured by the Engineer. The Contractor agrees that he will make no claim for damages, anticipated profits, or otherwise on account of any difference between the amount of work actually performed and materials actually furnished and the estimated amounts herein.

Either the Owner or the Contractor may demand in writing that a supplemental agreement or change order be prepared to authorize an adjustment in the unit price of any Major Contract item if the quantity of said Major Contract item increases or decreases by more than 25 percent from that shown in the Contract Documents. A Major Contract item is defined as any item having an original contract value in excess of 10 percent of the total original contract (all schedules included together).

## **SECTION 01300 SUBMITTALS**

### **PART 1: GENERAL**

#### 1.1 DESCRIPTION

This Section outlines in general the items the Contractor must prepare or assemble for submittal prior to and during the progress of the work. There is no attempt herein to state all of the procedures and requirements for each submittal. The Contractor's attention is directed to the individual Specification Sections that may contain in detail additional and special submittal requirements. The Owner's Representative reserves the right to direct and modify the procedures and requirements for submittals as necessary to accomplish the specific purpose of each submittal. Should the Contractor be in doubt as to the procedure, purpose, or extent of any submittal, he should direct his inquiry to the Owner's Representative.

The Contractor will furnish Submittals for any and all such parts of the Work as set forth in the Specifications. The procedures for review of the submittals will be as follows:

1. The Contractor will submit to the Owner's Representative for his review, sets of drawings, material specifications, or requests for information. Contractor will submit these documents electronically to the Owner's Representative at both [psanford@alliedengineering.com](mailto:psanford@alliedengineering.com) and [Mmcnearney@mt.gov](mailto:Mmcnearney@mt.gov).
2. When a drawing or material specification is satisfactory to the Owner's Representative, one electronic version will be returned to the Contractor and will be dated and marked, "Approved as Corrected" or "Approved as Submitted".
3. Should a drawing or material specification be unsatisfactory to the Owner's Representative, he will mark thereon "Revise and Resubmit", or "Rejected", and will return one electronic version to the Contractor with the necessary corrections and changes indicated. The Contractor must make such corrections and changes, and again submit the drawings or specifications for approval. The Contractor will revise and resubmit the working drawings or specifications until satisfactory review by the Owner's Representative is obtained.
4. The Contractor will allow sufficient time for preliminary review, correction, resubmission, and final review of all working (shop) drawings. Drawings of items critical to job progress will be given priority review by the Owner's Representative.

### **PART 2: PRODUCTS – NOT USED**

## **PART 3: EXECUTION**

### **3.1 GENERAL**

Items for which submittals will be required include but are not limited to:

#### **1. Plans**

<b>Plan</b>	<b>Section</b>
Overall Construction Schedule	02100
River Ingress/Egress	02116
Control of Water Plan	02230
Demolition	02240

#### **2. Materials**

<b>Item</b>	<b>Section</b>
Rock Type 1 - Gravel	02600
Rock Type 2 - Cobble	02600
Coir Fabric	02600
Topsoil	02700
Seed	02710

### **3.2 SAMPLES AND TEST SPECIMENS**

Where required in the Specifications, and as determined necessary by the Owner's Representative, test specimens or samples of materials to be used or offered for use in connection with the Work will be submitted to the Owner's Representative, at the Contractor's expense, with information as to their sources, with all cartage charges prepaid, and in such quantities and sizes as may be required for proper examination and tests to establish the quality or equality thereof, and to determine conformance to the Specifications as applicable.

All samples and test specimens will be submitted in ample time to enable the Owner's Representative to make any tests or examinations necessary without delay to the work. The Contractor will be held responsible for any loss of time due to his neglect or failure to deliver the required samples and test specimens to the Owner's Representative, as specified.

The Contractor will submit additional samples and test specimens as required by the Owner's Representative to assure equality with the original approved sample and/or for determination of Specification compliance.

### **3.3 RECORD DRAWINGS**

The Contractor will maintain one set of Plans on the jobsite, designated "Record Drawings". The Contractor will contemporaneously maintain the Record Drawings in a condition that reflects the current status of the construction work. The Record Drawings will be available to the Owner's Representative for inspection and copying during the progress of the work. All markings will be neatly performed with red pencil.

The Record Drawings will be marked up as required to show all deviations from the original contract drawings including changes resulting from minor field adjustments, field orders, and Contract Modifications. Changes should be drawn after the respective construction work is completed and all new locations, dimensions, and elevations will be shown. Where larger scale presentation is required, the Contractor will prepare additional drawings and attach them to the appropriate prints.

At the completion of the work but before Substantial Completion, the Record Drawings will be submitted to the Owner's Representative.

#### **PART 4: MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

No measurement will be made for Submittals.

##### **4.2 PAYMENT**

The work specified in this Section will be considered incidental and no separate payment will be made for Submittals.

**SECTION 02100**  
**SCHEDULE AND SEQUENCE OF OPERATIONS**

**PART 1: GENERAL**

1.1 DESCRIPTION

The work will be performed at such times and in or on such parts of the project and with such forces, materials and equipment to prevent any delay to the completion of the project within the time limits stated in the Contract and in conformance with the Overall Construction Schedule specified herein.

1.2 PRE BID CONFERENCE

A pre bid conference will be held at the location and the time identified in the Invitation to Bid. The pre bid conference is not mandatory but is recommended.

1.3 PRECONSTRUCTION CONFERENCE

Before beginning the work and after the Contract has been awarded, the Owner's Representative will conduct a Preconstruction Conference to discuss the Contractor's schedules and the Contractor's procedures, development of a plan for site protection and reconstruction, Contractor's use of the site, Owner's regulations, regulatory permit requirements, landowner requests, and other matters deemed relevant to the effective performance of the work.

The conference will be attended by the Contractor's Authorized Representative and any subcontractor's or supplier's representatives whom the Contractor may desire to invite or the Owner's Representative may request.

1.4 PROJECT DURATION

The project will have a 60-day duration based on calendar days.

**PART 2: PRODUCTS – NOT USED**

**PART 3: EXECUTION**

3.1 OVERALL CONSTRUCTION SCHEDULE

In-stream excavation and major ground disturbance, including grading and excavation immediately adjacent to the river, will occur during the period of September 15 – December 15 or March 1 – April 30. Work outside of this timeframe will be by approval of the Owner's Representative.

Construction may be delayed based on weather conditions. **To protect access roads, construction will not be allowed during wet periods.**

### 3.2 SEQUENCING

Construction activities will take place in a sequence determined by the Contractor. Specific sequencing requirements are included in the specifications.

### 3.3 SUBMITTALS

The Contractor will prepare and submit to the Owner's Representative, within 7 days after the Notice to Proceed, his Overall Construction Schedule (Overall Schedule). The Overall Schedule will be comprised of preparatory and construction operations covering all work to be done in connection with the Contract. The Overall Schedule will include:

1. Anticipated project start and end date
2. Implementation and maintenance of Erosion Control measures
3. Implementation of Control of Water measures
4. Main construction phases
5. Dates of Seeding

The Contractor will submit to the Owner's Representative a revised and updated Overall Schedule, based on work progress to date, every two weeks after the construction has commenced (on the 1<sup>st</sup> and 16<sup>th</sup> of each month following the initial submittal of the Overall Schedule). The revised Overall Schedule will be submitted to the Owner's Representative in electronic format.

## **PART 4: MEASUREMENT AND PAYMENT**

### 4.1 MEASUREMENT

No measurement will be made of activities associated with Schedule and Sequence of Operations.

### 4.2 PAYMENT

No payment will be made for Schedule and Sequence of Operations.

## **SECTION 02110 MOBILIZATION**

### **PART 1: GENERAL**

#### 1.1 DESCRIPTION

This section covers the work necessary to mobilize and demobilize for the construction including, but not limited to, providing bonds, insurance, permits, and licenses; setting up and taking down temporary sanitary facilities; moving equipment and materials to and from the site; and preparation of the site for construction as specified and shown on the Plans.

### **PART 2: PRODUCTS**

#### 2.1 GENERAL

The Contractor will provide all temporary facilities required for performing the work. Temporary construction facilities are solely the Contractor's responsibility based on his selected method of operation and schedule.

### **PART 3: EXECUTION**

#### 3.1 GENERAL

Set up construction facilities in a neat and orderly manner within areas designated by the Owner. Accomplish all required work in accordance with applicable portions of these specifications, or as approved. Confine operations to the approved work area.

Remove all construction facilities and return the areas used for that purpose to the original condition, including, as necessary, clean-up, material removal, soil de-compaction, and installation of erosion control measures, as directed and approved by the Owner.

#### 3.2 EQUIPMENT CONDITION

- A. All equipment will be in good working condition in order to minimize the risk of major component failure while working within the stream or lake. The Contractor will take all reasonable practices to protect the river as the work is being completed.
  
- B. As a means of preventing the introduction of undesirable vegetation (noxious weeds) to the project site, as well as preventing the introduction of oil and grease to the river, all heavy equipment working within the project area will be steam-cleaned prior to entering the project area. Personal vehicles will be parked in an area where soils are not disturbed. Vehicles transporting materials to the site are exempt from this requirement.

- C. All equipment on-site will be inspected daily for any fluid leakage prior to entering the stream.
- D. Any leakage found will be repaired before the piece of equipment is allowed to return to work.
- E. Any fluid leakage within the river will be reported to the proper authorities. If any spillage or environmental contamination occurs as a result of Contractor negligence, the Contractor will provide clean-up to the satisfaction of all Permitting Authorities at no additional cost to the Owner.
- F. All refueling and maintenance will be performed outside of the river.

#### **PART 4: MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

No measurement will be made for Mobilization.

##### **4.2 PAYMENT**

Payment for the work specified in this section will be made based on the lump sum amount stated in the Bid. Payment for 80% of the amount of this bid item will be made following implementation of mobilization and setup activities. Payment for the remaining 20% of the amount for this bid item will be made following completion of demobilization and cleanup activities and submittal of Record Drawings to Owner's Representative.

## **SECTION 02112 CONSTRUCTION STAKING**

### **PART 1: GENERAL**

#### 1.1 DESCRIPTION

This specification covers the furnishing of all labor, materials, tools and equipment necessary to perform construction staking. The Owner will be responsible for one-time initial construction staking. The Contractor will be responsible for any additional staking required and for replacing stakes removed, damaged or destroyed due to Contractor activities at no cost to the Owner.

### **PART 2: PRODUCTS**

#### 2.1 GENERAL

Wooden stakes and lath for reference staking will be labeled with the appropriate information (station, offset, elevation, location, etc.).

Plastic flagging will be brightly colored or fluorescent plastic ribbon securely tied to the survey stake. Plastic flagging that becomes faded, torn or dislodged will be replaced at the Contractor's expense.

Paint, when used in lieu of plastic flagging to mark survey stakes, will be brightly colored or fluorescent to be visible from passing equipment. Paint that becomes faded will be remarked or reset at the Contractor's expense.

### **PART 3: EXECUTION**

#### 3.1 GENERAL

The Owner will provide one-time staking of alignments and other key features as described in Section 3.2. The Contractor is responsible for providing any additional staking or re-setting of disturbed stakes.

All errors and discrepancies found on the construction stakes, plans, or specifications will be called to the attention of the Owner's Representative by the Contractor prior to proceeding with further survey and construction work. Any deficient survey layout or staking performed by the Contractor, or any unreported errors in previous surveys that may result in construction errors, will be corrected by the Contractor at no additional cost to the Owner.

#### 3.2 CONSTRUCTION STAKING PROVIDED BY OWNER

The alignment and grade of the constructed floodplain and bank shown on Plan Sheet 4 will be staked. Where alignments are located in water, an offset will be provided. Staking points consisting of wooden stakes will be provided.

### 3.3 SURVEY CONTROL

Survey control benchmark locations and coordinates are provided on Plan Sheet 2. The Contractor will protect survey control benchmarks. The Contractor is responsible for re-setting of disturbed benchmarks.

### 3.4 SURVEY TOLERANCES

Tolerances for earthwork and bank restoration will be  $\pm 1$  foot horizontal and  $\pm 0.1$  feet vertical.

## **PART 4: MEASUREMENT AND PAYMENT**

### 4.1 MEASUREMENT

No measurement will be made for Construction Staking.

### 4.2 PAYMENT

Construction Staking will be considered incidental to other work items. No payment will be made for Construction Staking.

**SECTION 02115**  
**SITE ACCESS AND STAGING AREAS**

**PART 1: GENERAL**

1.1 DESCRIPTION

The Work covered by this Section includes the furnishing of all labor, materials, equipment and incidentals for construction, installation, protection and maintenance and reclamation of:

1. Site Access;
2. Staging Areas; and
3. Remove and Replace Fence.

**PART 2: PRODUCTS**

2.1 DESCRIPTION

If necessary, the Contractor will provide road surface material at the approval of the Owner.

**PART 3: EXECUTION**

3.1 GENERAL

At a minimum, the site access and staging areas will include appropriate standard erosion control best management practices (BMPs).

3.2 SITE ACCESS

Access to the south side of the river is provided via Highway 3, 3 Pines Road, Brusk Road and then a two-track farm field road. Access to the north side of the river is provided via Highway 12, Egge Road, and then a two-track farm field road. Refer to Plan Sheets 1 and 3.

3.3 SITE ACCESS IN NON-ROADED AREAS

- A. The Contractor will provide methods to install, maintain, and remove the Site Access in Non-Roaded Areas so as to minimize impact to the surrounding landscape.
- B. Contractor will be responsible for maintaining function of the Site Access in Non-Roaded Areas during use.
- C. The Contractor will be responsible for maintaining site drainage during construction and restoration while Site Access in Non-Roaded Areas is used.

- D. Upon completion of the project, the Contractor will be responsible for removing the Site Access in Non-Roaded Areas and returning the area to a natural state. The Contractor will remove the access road materials, dispose of the access road materials, apply topsoil, and re-grade the areas to match the existing grade according to the Specifications.

### 3.4 STAGING AREAS

- A. The Contractor will provide methods to install, maintain, and remove the Staging Areas so as to minimize impact to the surrounding landscape.
- B. Contractor will be responsible for maintaining function of the Staging Areas during use.
- C. The Contractor will be responsible for maintaining site drainage during construction and restoration while the Staging Areas are used.
- D. The location and dimensions of the Staging Areas will be within the area marked on the Plans that depicts the limits of disturbance.
- E. Upon completion of the project, the Contractor will be responsible for removing the Staging Areas and returning the areas to a natural state. The Contractor will scarify the surface (harrow rake) and apply seed.

### 3.5 REMOVE AND REPLACE FENCE

Remove and replace fence as necessary.

## **PART 4: MEASUREMENT AND PAYMENT**

### 4.1 MEASUREMENT

No measurement will be made for Site Access and Staging Areas.

Remove and Replace Fence will be measured by the lineal feet of fence.

### 4.2 PAYMENT

No Payment will be made of activities associated with Site Access and Staging Areas. The cost for Site Access and Staging Areas is incidental to Mobilization.

Payment for removal and replacement of fence will be made at the lineal foot bid price for Remove and Replace Fence.

## SECTION 02116

### RIVER INGRESS/EGRESS

#### **PART 1 GENERAL**

##### 1.1. DESCRIPTION

- A. This work consists of locating, building, removing and reclaiming ingress and egress areas and associated temporary access roads on the north and south sides of the Musselshell River. This work also consists of any temporary access roads constructed within the river channel.

#### **PART 2 MATERIAL – NOT USED**

#### **PART 3 EXECUTION**

##### 3.1. GENERAL

- A. The Contractor has the option to construct a single egress point on each side of the river within designated areas shown on Plan Sheet 3. The Contractor will provide a plan for ingress/egress locations to the Owner's Representative prior to initiation of the work.
- B. Each ingress/egress location will be a maximum disturbance width of 40 feet generally measured perpendicular to the river channel.
- C. Each ingress/egress point will be situated in a position designed to minimize ecological impacts such as bank destabilization and vegetation destruction. Trees with trunk diameters over six inches may not be removed nor roots disturbed without approval of the Owner's Representative.
- D. The Contractor will provide suitable erosion control measures to minimize bank erosion during construction in accordance with project permits. Once work is complete, the Contractor will be responsible for reclaiming the ingress/egress locations in accordance with the Plans and permits. The Contractor will remove all non-biodegradable erosion control measures upon final stabilization in accordance with the project permits. Biodegradable erosion control measures will be left in place unless directed otherwise by the Owner's Representative.
- E. In the event of a conflict between the Plans or Specifications and applicable permits, the more stringent of the two will apply.

#### **PART 4 MEASUREMENT AND PAYMENT**

##### 4.1. MEASURE

- A. No measurement will be made for River Ingress/Egress.

4.2. PAY

- A. No payment will be made for River Ingress/Egress.

The cost of constructing ingress and egress to the river will be included in the cost of Demolition. The cost of reclaiming the ingress and egress locations will be included in Reclamation. The cost of seeding the ingress and egress locations will be included in Seeding.

END OF SECTION

**SECTION 02210  
PROTECTION OF THE ENVIRONMENT**

**PART 1: GENERAL**

1.1 DESCRIPTION

This Work consists of protecting existing soils and subsoils, ground topography and drainage, herbaceous and woody vegetation, and fish and wildlife during the implementation of the project.

**PART 2: PRODUCTS – NOT USED**

**PART 3: EXECUTION**

3.1 GENERAL

To mitigate potential impacts to the environment, the Contractor will use appropriate Erosion Control practices on the site. The following general practices will be employed, where applicable:

- A. The smallest practical area of land will be exposed at any given time through construction scheduling. The duration of such exposure before application of temporary erosion control measures or final revegetation will be as short as practicable.
- B. Proceed carefully with construction adjacent to stream channels to avoid washing, sloughing, or deposition of materials into the stream.
- C. Avoid removal of trees and surface vegetation wherever possible.
- D. Take measures to prevent erosion from spoil or topsoil stockpiles such as covering with tarpaulins, or plastic.
- E. No construction, except for that associated with erosion control measures, will occur when excessive precipitation is expected in the immediate future, during periods of heavy precipitation or high stream flow.
- F. Erosion control measures must be in place at the end of each working day.
- G. Periodic inspection, repair, and maintenance of erosion control measures are required until the project is completed. Inspection and maintenance must occur after each rain event exceeding ½-inch rainfall or at least once each week.
- H. Contractor must allow free and unlimited access to the project site at any time to any Regulatory agency employee investigating the project's construction, operation or maintenance.

- I. Construction related disturbance is anticipated to be less than 1-acre. If contractor calculates disturbance limits to exceed 1 acre, Owner will be notified. The Owner will apply for the Montana Department of Environmental Quality (MDEQ) General Permit for Stormwater Discharges Associated with Construction Activity (NOI and SWPPP).

Pumped dewatering operations are not an anticipated component of the project. However, if pumped dewatering operations are undertaken, all purge water from dewatering operations will be land applied to the same aquifer from which the water was taken. If sediment-laden water is land-applied and will not reach state water, then a discharge permit is not required (e.g. sediment-laden water will infiltrate into the ground or be used for irrigation through a sprinkler system). If the Contractor desires to route purge water to surface water, a Construction Dewatering Discharge Permit must be obtained from MDEQ. It will be the Contractor's responsibility to apply for a Construction Dewatering Discharge Permit. No payment will be made to Contractor for obtaining and complying with this permit. Permit application fee is approximately \$900 or as specified by MDEQ, and the estimated processing time is 10 to 30 days. Refer to the following website for information about the permit:

<http://deq.mt.gov/wqinfo/MPDES/ConstructionDewatering.mcp>.

The Owner will obtain the Floodplain Development Permit, Montana Stream Protection Act (124), Montana Department of Environmental Quality (318), and Federal Clean Water Act (404) permits. The Contractor will familiarize himself with the conditions of the permits and will comply with the conditions of these permits. Contractor will keep a copy of all permits and approved plans at the project site at all times until the project is completed.

The Contractor will minimize disturbance of all roads used to provide equipment, material and labor access to the project site. Any road damage resulting from Contractor operations will be repaired by the Contractor, at no expense to the Owner, prior to issuance of Substantial Completion.

#### **PART 4: MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

No measurement will be made of activities associated with Protection of the Environment.

##### **4.2 PAYMENT**

No payment will be made of activities associated with Protection of the Environment.

**SECTION 02220  
EROSION CONTROL**

**PART 1: GENERAL**

**A. DESCRIPTION**

The Work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for construction and installation of:

1. Erosion Control Fabric on disturbed ground surfaces. Note – Erosion Control Fabric is a provisional Bid Item to be placed at locations directed by the Engineer; and
2. Straw Wattle along the contours of slopes. Note – Straw Wattle is a provisional Bid Item to be placed at locations directed by the Engineer.

**PART 2: PRODUCTS**

**2.1 EROSION CONTROL FABRIC**

Coir fabric is a biodegradable erosion control fabric made from the fibers of coconut husks. Woven coir fabric is used as erosion control of disturbed ground surfaces.

**A. COIR FABRIC MATERIAL PROPERTY REQUIREMENTS**

The woven coir fabric material will consist of 100% coconut fiber in continuously woven mat. The material will conform to the following values:

Thickness	ASTM D1777	0.30 in. (min)
Tensile Strength (dry)	ASTM D4595	60 x 60 lb./in. (min)
Mass Per Unit Area	ASTM D3776	13 oz./sy. (min)
Open Area	Measured	65% (max)

**B. PREAPPROVED PRODUCTS**

Woven coir fabric will be DeKoWe 400, Nedia KoirMat 400, Rolanka BioDMat 40 or approved equal. Do not order, deliver, or install other products without the written approval of the Owner's Representative.

**C. SUBMITTALS**

Contractor will provide the following submittals.

1. Name, address, and phone number of supplier(s) of all coir fabrics used on the project.
2. Technical Specification of the coir fabrics with associated testing standards with 8 by 10 inch samples in plastic bags.

3. Documentation of equivalency to products specified.
4. Manufacturer's shipping, storing, and placement recommendations.

## 2.2 STRAW WATTLE

Straw Wattles are elongated tubes of compacted straw and/or other fibers that are installed along contours or at the base of slopes to help reduce soil erosion and retain sediment. They function by shortening slope length, reducing runoff water velocity, trapping dislodged soil particles and ameliorating the effects of slope steepness.

### A. STRAW WATTLE MATERIAL PROPERTY REQUIREMENTS

Straw Wattles will be a rice or wheat straw-filled tube of flexible netting material exhibiting the following properties. It will be a machine-produced tube of compacted rice or wheat straw that is Certified Weed Free Forage, by a manufacturer whose principle business is wattle manufacturing. The netting will consist of natural fibers (such as coir, burlap or cotton). Straw Wattle with plastic netting is not acceptable.

Wattle Thickness	8 in. (min)
Wattle Length	10 ft. or greater
Fiber Content	Rice or wheat straw
Mass Per Unit Weight	1.5 lbs/lf (min)

### B. PREAPPROVED PRODUCTS

Straw Wattle will be Earth Saver® Rice Straw Wattle (EE0825BRP-10 or EE0810BRP-24) with natural fiber (burlap) netting or approved equal. Straw Wattle with plastic netting is not approved. Do not order, deliver, or install other products without the written approval of the Owner's Representative.

### C. SUBMITTALS

Contractor will provide the following submittals.

1. Name, address, and phone number of supplier(s) of the Straw Wattle used on the project.
2. Technical Specification of the Straw Wattle with associated testing standards.
3. Documentation of equivalency to products specified.
4. Manufacturer's shipping, storing, and placement recommendations.

## 2.3 WOODEN STAKES

Fabric stakes will be wooden stakes 12 inches long and 1 inch by 0.75 inches in diameter, or other dimensions as approved by the Owner's Representative. Fabric stakes will not be treated with preservative. Other types of stakes will be subject to the approval of the Owner's Representative. Metal pins or staples are not acceptable.

Preapproved stakes are Wooden Pegs from Rolanka International ([www.rolanka.com](http://www.rolanka.com)) as long as they meet the dimension and length requirements in these specifications.

### **PART 3: EXECUTION**

#### **3.1 EROSION CONTROL FABRIC**

- A. Place Erosion Control Fabric as directed by the Engineer.
- B. This section describes the placement of woven coir fabric as Erosion Control Fabric on all disturbed surfaces where bare soil is present.
- C. Seeding of disturbed surfaces will be carried out prior to installation of Erosion Control Fabric and in accordance with the specifications.
- D. Before placing Erosion Control Fabric, the surface on which it is to be placed will be prepared by removal of all sharp objects. All holes and large ruts will be filled with material. The surface will be reviewed by the Owner's Representative prior to placement of Erosion Control Fabric.
- E. The Contractor will handle the fabric in a manner that does not damage the fabric. Place Erosion Control Fabric rolling the fabric lengthwise, parallel to the channel. Erosion Control Fabric will be unrolled directly on the prepared surface.
- F. Erosion Control Fabric will be placed in parallel rows oriented in a downstream direction. End joints from one row to the next will be offset by a minimum of 10 feet. Fabric end joints will be overlapped in an upstream to downstream direction to prevent flowing water from dislodging the fabric. Fabric parallel joints will be overlapped in a near-channel to far-channel direction to prevent flowing water from dislodging the fabric. All joints between fabric rolls will consist of a minimum of 12 inches of fabric overlap.
- G. The Erosion Control Fabric will be even, smooth, and taut, such that the fabric is in direct contact with the underlying soil in all areas, and to the satisfaction of the Owner's Representative. Mechanical tightening may be required to remove slack.
- H. Install Wooden Stakes along all edges, overlaps and at intervals as specified herein or as approved by the Owner's Representative. Install Wooden Stakes at 4-foot spacing along all seams and key trenches and at 4-foot spacing within fabric rolls, staggered with respect to seams. Do not cut woven coir fabric to install stakes: thread stakes between fabric strands. With Owner's Representative's approval, stakes may be tilted up to 45 degrees with respect to vertical if underlying materials prevent vertical insertion. After insertion, stake tops will protrude 2 inches maximum above the adjacent fabric surface. Broken, split, or damaged stakes will be removed and replaced at the Contractor's expense.

## 3.2 STRAW WATTLE

- A. This section describes the installation of Straw Wattle on slope contours.
- B. Proper site preparation is essential to ensure complete contact of the Straw Wattle with the soil.
- C. The slope should be prepared to receive the surface mulching/re-vegetation treatment prior to installation of the Straw Wattle.
- D. Remove all rocks, clods, vegetation or other obstructions so that the installed Straw Wattles will have direct contact with the soil.
- E. Straw Wattle will be placed along the contours on disturbed slopes according to the following:
  - a. About 20 feet (diagonal or slope distance) apart on slopes between 3:1 and 2:1;
  - b. About 10 feet apart on slopes greater than 2:1; and
  - c. According to the Owner's Representative.
- F. Excavate a small trench (2-3 inches) in depth on the slope contour and perpendicular to water flow. Soil from the excavation should be placed down-slope next to the trench.
- G. Install the Straw Wattles in the trench, insuring that no gaps exist between the soil and the bottom of the Straw Wattle. The ends of adjacent Straw Wattles should be tightly abutted so that no opening exists for water or sediment to pass through. Alternately, Straw Wattles may be lapped, 6 inches minimum to prevent sediment passing through the field joint.
- H. Wooden stakes should be used to fasten the Straw Wattles to the soil. When conditions warrant, a straight metal bar can be used to drive a pilot hole- through the Straw Wattle and into the soil.
- I. Wooden stakes should be placed 6 inches from the Straw Wattle end angled towards the adjacent Straw Wattle and spaced at 4 feet centers 1-2 inches of stake exposed above the Straw Wattle. Alternately, stakes may be placed on each side of the Wattle tying across with a natural fiber twine or staking in a crossing manner ensuring direct soil contact at all times.
- J. Terminal ends of Straw Wattles may be dog legged up slope to ensure containment and prevent channeling of sedimentation.
- K. Care will be taken during installation so as to avoid damage occurring to the Straw Wattle as a result of the installation process. Should the Straw Wattle be damaged during installation, a wooden stake will be placed either side of the damaged area terminating the log segment.

- L. Any Straw Wattle damaged during placement will be replaced as directed by the Owner's Representative, at the Contractor's expense.

#### **PART 4: MEASUREMENT AND PAYMENT**

##### **4.1 MEASUREMENT**

- A. The quantity of Erosion Control Fabric will be the actual fabric surface treatment area, computed in square yards as the product of the measured length and width of exposed Erosion Control Fabric as seen in plan view, to the nearest 10 square yards. Overlapped fabric will not be measured for payment.
- B. Measurement of Straw Wattle will be by the lineal foot of continuous, material installed according to the specifications and Plans. Overlaps and joints will not be measured.

##### **4.2 PAYMENT**

- A. Payment for Erosion Control Fabric will be made at the unit price per square yard. The unit price per each square yard for Erosion Control Fabric will constitute full compensation for all materials, staking, labor, equipment, and incidentals necessary to furnish materials and for installation as specified in the specifications and on the Plans.
- B. Payment of Straw Wattle will be at the unit price per lineal foot. The unit price per each lineal foot of Straw Wattle will constitute full compensation for all materials, staking, labor, equipment, and incidentals necessary to furnish materials, installation as specified in the specifications and on the Plans.

## SECTION 02230 CONTROL OF WATER

### PART 1: GENERAL

#### 1.1 DESCRIPTION

The work covered by this section includes provisions to be considered by the Contractor to design, control, handle, and dispose of surface water and groundwater, and all other water that may be encountered, as required for performance of the work.

The Contractor will be responsible for the continuous control of water at all times during the course of earthwork and structure installation, and will provide adequate backup systems to accomplish control of water. The method of control, handling, and disposal of groundwater and surface water will be by whatever means are necessary and in conformance with this specification to obtain satisfactory working conditions and to maintain the progress of the work. All required drainage, pumping and disposal will be done without damage to adjacent property. The Contractor will modify the water control system at his own expense if, after installation and while in operation, fails to function or it causes or threatens to cause damage to adjacent property.

Control of water includes three aspects to facilitate diversion structure demolition and bank restoration:

1. Control of water for diversion structure demolition does not require that demolition occur in dry or dewatered conditions. Rather, control of water will be undertaken if and where required to minimize riverbank erosion at ingress and egress routes and temporary access roads and to maintain the function and efficiency of the project implementation;
2. Diversion of river flow from the river bank restoration and scour hole fill area to allow placement of fill, rock toe and river bank restoration elements. Note: it is anticipated that construction of the lower elevation of the scour hole fill will be conducted in the wet;
3. Controlling any and all groundwater, surface water and storm water.

Stream flow varies based on a number of conditions including but not limited to upstream irrigation diversions and return flows, snowmelt and rainfall conditions. The USGS stream gage “06125600 Musselshell River ab Big Coulee Creek at Lavina MT” ([http://waterdata.usgs.gov/mt/nwis/nwisman/?site\\_no=06125600&agency\\_cd=USGS](http://waterdata.usgs.gov/mt/nwis/nwisman/?site_no=06125600&agency_cd=USGS)) is the nearest USGS stream gage to the site. This gage is located upstream of the project site in Lavina and upstream of Big Coulee Creek. The gage provides current stream flow and daily stream flow statistics for the period April 1, 2012 to October 31, 2013. The mean of the daily mean values in the period of August through November are approximately 10 to 190 cfs. These flows and timings should be considered a rough estimate to provide some estimate of the flow diversion requirements at the project site. It is the Contractor’s responsibility to determine flow diversion requirements.

## **PART 2: PRODUCTS**

### **2.1 GENERAL**

The Contractor will determine the materials required to meet these specifications.

Prior to start of work, the Contractor will furnish all labor, materials and equipment, and perform all operations required to design, furnish, install, test, pump, measure, and maintain the diversion and excavation dewatering equipment, including pumps, peizometers and pre-drainage well point and well systems, ditches, dikes, coffer dams; sandbags, sumps, power supply and distribution; all as required to dewater the steam channel and excavations so that the work can be conducted under controlled conditions. The Contractor will demobilize all diversion and dewatering equipment and materials after completing the irrigation diversion retrofit and fish trap installation.

## **PART 3: EXECUTION**

### **3.1 GENERAL**

It is the intent of these specifications that the river flow should be diverted to the maximum reasonable extent prior to bank construction and scour hole fill work. A suggested control of water plan is provided on Plan Sheet 10.

### **3.2 FLOW CHARACTERISTICS**

It is the responsibility of the Contractor to evaluate the seasonal flow characteristics of the Musselshell River and to size the Diversion and Dewatering measures to accommodate these seasonal flows. During rain events the flow rate in the Musselshell River can exceed the seasonal average. The Contractor will be responsible for calculating his own estimate of flow at any given time.

### **3.3 STREAM DIVERSION**

The Contractor will temporarily divert flow in the Musselshell River away from the bank restoration area as generally shown in the Plans to facilitate bank construction and scour hole fill. The Contractor will take measures to minimize sediment transport during stream diversion.

The diversion will be installed in the general location shown in the Plans. The Contractor will size the diversion system to accommodate flow in the Musselshell River. The Contractor will be responsible for modifying the capacity of the diversion system to accommodate variable flows in the Musselshell River during the bank construction and scour hole fill.

All man-made materials used to divert river flow will be removed from the project area and disposed of offsite upon completion of construction.

### 3.4 DEWATERING

Pumped dewatering is not required. Refer to Protection of the Environment should pumping operations be undertaken by the Contractor.

### 3.5 REMOVAL OF WATER CONTROL MEASURES

Once work is complete, the Contractor will remove the water control measures and reclaim conditions disturbed as a result of the water control measures.

### 3.6 SUBMITTALS

Contractor will provide a Control of Water Plan submittal associated with Work covered by this Specification, to include:

1. Anticipated Schedule of Diversion and Dewatering Activities.
2. Shop Drawings depicting Control of Water practices to be implemented by the Contractor.
3. At the request of the Owner's Representative, hydraulic and other calculations showing the adequacy of the Control of Water Plan to meet criteria in Section 3.4 Stream Diversion.

The Control of Water Plan submittals will meet the requirements of the Permits that have been acquired for this project by the Owner. Minimum components of the Control of Water Plan submittals are specified in this Specification. Failure to comply with this requirement will result in withholding the Notice to Proceed (NTP).

## **PART 4: MEASUREMENT AND PAYMENT**

### 4.1 MEASUREMENT

There will be no measurement of activities associated with the Control of Water.

### 4.2 PAYMENT

Payment for the Control of Water specified in this section will be made based on the lump sum amount stated in the Bid.

## **SECTION 02240 DEMOLITION**

### **PART 1: GENERAL**

#### 1.1 DESCRIPTION

This work consists of removing and disposing of the existing diversion weir and headgate. The existing diversion weir and headgate are made of concrete and contain reinforcing steel.

### **PART 2: PRODUCTS**

#### 2.1 GENERAL

The Contractor will provide all materials and equipment in suitable and adequate quantities as required to accomplish the work shown, specified herein, and as required to complete the project.

#### 2.2 ON-SITE EXCAVATED SAND/GRAVEL MATERIAL

As specified in Earthwork.

#### 2.3 COMMON BACKFILL

As specified in Earthwork.

### **PART 3: EXECUTION**

#### 3.1 GENERAL

The location of the structure to be demolished is indicated on the Plans and described herein. Based on the field investigations, it is suspected that the concrete structure contains reinforcing steel. No design or as-built plans of the diversion structure are available. Depictions of the existing structure shown on the Plans are not based on extensive field verification/investigation. The Contractor will field verify the material and geometric characteristics of the structure.

The Contractor will remove the concrete and other material that make up the diversion structure in as large of pieces as is feasible. Care will be taken in order to minimize the downstream loss of materials from the structure. The Contractor will excavate river sand and gravel from below and around the diversion structure to the elevation specified on the Plans. The excavated material will be used to fill the scour hole or as fill between layers of disposed concrete.

#### 3.2 SEQUENCING

A suggested demolition sequence is provided on Plan Sheet 10. Contractor will provide a Demolition plan to the Owner's Representative.

During demolition, the Contractor may choose to construct temporary coffer dams and diversions in order to allow remaining work to be completed under dry conditions. Impounded sediment from directly upstream of the dam in the area specified on the plans may be used to create the coffer dam and diversion. Any temporary coffer dams or diversions will be completely removed after construction is complete.

### 3.3 DISPOSAL

The Contractor will dispose of all concrete and associated materials in the designated fill areas in accordance with the Plans and Specifications. Two areas for disposal are shown on the Plans. The Owner will direct the Contractor to use only one of these areas. The Base Bid is based on using Option 1 Disposal Area. While no indications of hazardous materials has been uncovered, if found, these materials will not be disposed of in the designated fill area. The Owner's Representative will be notified immediately if hazardous materials are discovered.

Disposal of concrete in areas not designated on the Plans requires written approval from the Owner's Representative. In order to minimize the void space between segments of concrete, each lift will be covered with a lift of On-Site Excavated Sand/Gravel Material or Common Backfill as discussed below prior to placing the next lift of concrete debris.

Rock removed in conjunction with the structure demolition, Salvage Rock, will be salvaged and reused along the Bank Construction, the floodplain bench transition, and other areas as shown on the Plans and as directed by the Owner's Representative.

Depending upon the integrity of the structure, demolition of the dam could result in a range of concrete debris sizes that will require disposal.

1. For concrete pieces larger than 18 inches in diameter;
  - a. Salvage sod and topsoil according to 02700 Topsoil.
  - b. Prepare canal fill area floor or scour hole area to an even surface and place concrete carefully to minimize void spaces. In general, the larger the pieces, the more care that will be required to minimize void spaces. Pieces should be locked together as tightly as possible and as level as possible to prevent rocking.
  - c. The top of each lift of debris will be as level as possible prior to placement of a lift of sediment. Utilize On-Site Excavated Sand/Gravel Material or Common Backfill to carefully fill void spaces between pieces of debris prior to placement of the lift over the top.
  - d. Each lift of On-Site Excavated Sand/Gravel Material or Common Backfill over the debris will be placed in no greater than 18-inch

high loose lifts. Compact the material to 90 percent of its Standard Proctor Density based on ASTM D-698 using vibratory equipment.

2. For concrete pieces smaller than 18 inches in diameter;
  - a. Salvage sod and topsoil according to 02700 Topsoil.
  - b. Minimizing void spaces of smaller concrete pieces will be easier. However, care will still be taken to assure the pieces are locked together as tightly as possible prior to the placement of each sediment lift.
  - c. The top of each lift of debris will be as level as possible prior to placement of a lift of On-Site Excavated Sand/Gravel Material or Common Backfill.
  - d. Each lift of On-Site Excavated Sand/Gravel Material or Common Backfill over the debris will be placed in no greater than 18-inch high loose lifts. Compact the material to 90 percent of its Standard Proctor Density based on ASTM D-698 using vibratory equipment.

#### 3.4 RECLAIMING CONCRETE DISPOSAL AREA

Concrete and On-Site Excavated Sand/Gravel Material or Common Backfill will be placed to an elevation as shown on the Plans. The concrete disposal area will be covered with a thickness of topsoil as shown on the Plans and reclaimed according to Reclamation.

### **PART 4: MEASUREMENT AND PAYMENT**

#### 4.1 MEASUREMENT

No measurement will be made of activities associated with Demolition.

#### 4.2 PAYMENT

Payment for the Demolition specified in this section will be made based on the lump sum amount stated in the Bid.

## **SECTION 02300 EARTHWORK**

### **PART 1: GENERAL**

#### **1.1 DESCRIPTION**

This work consists of the earthwork as specified and shown on the Plans, including excavation and backfill.

#### **1.2 RESPONSIBILITY**

It is the Contractor's responsibility to review the Plans, Specifications, and existing site conditions prior to bidding to ascertain the extent of the work requiring ground support systems. Elements designed, furnished and installed by Contractor for stability and safety during construction are not shown on the Plans.

#### **1.3 SUBSURFACE AND SITE INFORMATION**

The Owner has not made estimates of the character of the subsurface materials. It will be the Bidder's sole responsibility to estimate the type and quantity of materials and the amount of surface and groundwater that will be encountered in the work, based on their selected methods of construction.

### **PART 2: PRODUCTS**

#### **2.1 ON-SITE EXCAVATED SAND/GRAVEL MATERIAL**

Riverbed material used for fill of the scour area, concrete disposal area, the reconstructed riverbank, and the ingress/egress locations, if needed, will be sand and gravel material free from organics, concrete, rock riprap or other debris.

#### **2.2 SALVAGE ROCK**

Rock riprap salvaged from the demolition area around the diversion structure and elsewhere within the limits of disturbance.

#### **2.3 COMMON BACKFILL**

Excavated borrow material free from roots and organic matter, topsoil, debris, rock fragments larger than 6 inches, and other deleterious materials. Material shall not have a liquid limit over 50 (e.g., no fat clay or elastic silt). Common Backfill will need to be imported as it is not available within the limits of disturbance.

## 2.4 COMPACTION EQUIPMENT

Compaction equipment will be of suitable type and adequate to obtain the material in-place densities specified for the contract work acceptable to the Owner's Representative. Compaction equipment will be operated in strict accordance with the manufacturer's instructions and recommendations. Equipment will be maintained in such condition that it will deliver the manufacturer's rated compactive effort.

## **PART 3: EXECUTION**

### 3.1 SITE PREPARATION

Site preparation includes the following.

1. Grade areas to receive fill to the lines and grades shown prior to fill placement.

### 3.2 SHORING, SHEETING, AND BRACING OF EXCAVATIONS

Whenever necessary to prevent caving during excavation to protect adjacent structures, property, workmen, and the public, trenches and other excavations will be adequately sheeted and braced. Trench/excavation sheeting will be kept in place until the structure has been placed and backfilled. Shoring and sheeting will be removed as the backfilling is done, in a manner that will not damage the structure, or permit voids in the backfill. All sheeting, shoring, and bracing of trenches and other excavations will conform to the safety requirements of the Federal, State, or local public agency having jurisdiction over such matters. The most stringent of these requirements will apply.

All sheathing, shoring, and bracing of excavations will conform to the requirements of the Montana Rules of Industry, Labor, and Human Relations and OSHA. Sheathing, shoring, and bracing systems will be selected and placed in such a manner as to control the inflow of groundwater and infiltration of fines, to prevent bottom heave and to preserve the in-situ strength of soils in the bottom of the excavation. Sheathing, shoring, and bracing systems will be modified as necessary during the course of the work to suit all soil and groundwater conditions encountered.

### 3.3 GROSS EXCAVATION

All Gross Excavation for the project is included under this specification. Gross Excavation is the removal of earth, subsoil and stone material; it does not include the placement of backfill (which is described under On-Site Excavated Sand/Gravel Material). Gross Excavation will primarily consist of excavation under and around the footprint of the diversion dam and excavation under the constructed riverbank.

Excavate to the depths and widths, as shown in the Plans and as specified. Allow for sheathing, forms, working space, structural fill, and rock where required. Do not carry excavation deeper

than the elevation shown. Excavation carried below the subgrade lines shown or established by the Owner's Representative will be replaced with approved compacted granular material. Cuts below grade will be corrected by similarly cutting adjoining areas and creating a smooth transition. The Contractor will bear all costs for correcting over-excavated areas.

### 3.4 SITE GRADING

Perform all earthwork to the elevations, lines, and grades as shown, specified, and/or established by the Owner's Representative, with proper allowance for other materials where specified or shown. Finished site grading will be approved by the Owner's Representative.

### 3.5 TOLERANCES

Construct all earthwork and rock components of the project to the lines and grade shown on the Plans. Tolerance in the horizontal plane will be +/- 1.0 ft. Final elevations will be +/-0.1 ft. of those shown on the Plans. Surface elevations of rock materials will be measured at the average surface height, which is defined as the elevation midway between the lowest and highest points of the exposed rock on the surface. No rock will deviate more than 0.5 ft. from the average surface elevation. This elevation tolerance may be increased for larger sized rock at the discretion of the Owner's Representative.

### 3.6 BACKFILL

#### A. ON-SITE EXCAVATED SAND/GRAVEL MATERIAL & COMMON BACKFILL

Fill to the lines and grades shown, or as approved by the Owner's Representative. Place fill in 12 inch lifts or less and compact each lift using tracked equipment (dozer and/or excavator) by making at least two passes over the entire area of each lift at a minimum. Make proper allowance for topsoil and other materials where required. Do not operate earth-moving equipment within 5 feet of walls of concrete structures for the purpose of depositing or compacting backfill material, except as approved. Compact backfill adjacent to concrete walls with hand-operated tampers or other approved equipment that will not damage the structure.

### 3.7 FIELD QUALITY CONTROL

#### A. TESTING

1. The Owner's Representative will perform tests as required to verify that type of backfill used, placement of backfill, and compaction of backfill conforms to these Specifications and the Plans.
2. Notify the Owner's Representative 24 hours before compaction work begins and before significant change in compaction operations (major change in equipment or procedure used).

3. Notify the Owner's Representative immediately of equipment change due to breakdown or redeployment.

**B. TESTING FREQUENCY**

1. Frequency of testing is at discretion of the Owner's Representative.
2. Greater frequency of testing is normally performed at beginning of new work, new work crew, or new equipment.

**C. TESTS**

The Owner's Representative for testing compacted soil for conformance with specification requirements will generally use standards listed in the following table.

<b>Procedure</b>	<b>Standard Number</b>
Soil Classification	ASTM D 2487 ASTM D 2488
Gradation Analysis	ASTM D 422
Atterberg Limits	ASTM D 4318
Laboratory Maximum Density	ASTM D 698
Water (Moisture) Content	ASTM D 2216
In-Place Moisture and Density: Nuclear	ASTM D 2922 ASTM D 3017
Density In-place by Drive Cylinder Method	ASTM D 2937
Relative Density of Cohesionless Soils	ASTM D 4253 ASTM D 4254
In-Place Density: Sand Cone	ASTM D 1556
Rapid Construction Control	ASTM D 5080

**PART 4: MEASUREMENT AND PAYMENT**

**4.1 MEASUREMENT**

No measurement will be made of activities associated with Gross Excavation.

No measurement will be made of activities associated with backfill of On-site Excavated Sand/Gravel Material.

No measurement will be made of activities associated with backfill of Common Backfill.

No measurement will be made of activities associated with Salvage Rock.

## 4.2 PAYMENT

Payment for Earthwork which includes Gross Excavation and backfill of On-Site Excavated Sand/Gravel Material and Common Backfill specified in this section will be made based on the lump sum amount stated in the Bid. The lump sum amount will constitute full compensation for all gross excavation and backfill, as well as materials, labor, equipment, and incidentals necessary to satisfy the Specifications and on the Plans.

No payment will be made for Salvaged Rock under this Specification. Payment for Salvaged Rock will be made for work undertaken in the Reclamation Specification.

## SECTION 02600

### RECLAMATION

#### PART 1 GENERAL

##### 1.1. DESCRIPTION

- A. The work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for placement of fill in the scour hole area, bank construction along the scour hole area, placement of woody material on the floodplain, placement of topsoil on the concrete disposal areas, reclamation of the equipment ingress/egress locations, and reclamation of any incidental damage to ground surfaces from equipment activity.
- B. All reclamation will be performed as shown on the Plans and described within the Specifications.
- C. Salvage, storage, and placement of sod and topsoil are described in Topsoil.
- D. Installation of seed and placement of erosion control fabric are not part of Reclamation but are described in Seeding and Erosion Control Fabric.

##### 1.2. SCOUR HOLE AREA

- A. The scour hole area will be filled with on-site riverbed material, import gravel and cobble material, and import topsoil to reconstruct the floodplain surface and provide a growing surface for riparian vegetation.

##### 1.3. RIVERBANK RECONSTRUCTION

- A. Set reconstructed riverbank elevation to the elevation shown on the Plans. Transition reconstructed bank elevation to tie into the upstream and downstream existing bank elevations.
- B. Upper riverbank reconstruction consists of two lifts of fabric-encapsulated soil (FES). FES lifts are “pillows” of fabric-encapsulated soil used to reconstruct the upper (vegetated) portion of the riverbank. FES lifts include a two-layer biodegradable erosion control fabric covering: an outer fabric layer that primarily provides tensile strength and resistance to surface erosion; and an inner fabric layer that primarily provides a barrier, or filter, to prevent the loss of fine soil material from within the lift.
- C. Willow cuttings will be installed under each of the two lifts of FES at the time of construction. Conifer fascines will be installed under the second lift of FES at the

time of construction.

- D. On the floodplain bench, Wood Material in Trenches consists of live and dead woody material placed in excavated trenches, which are subsequently backfilled so that this woody material extends both beneath and above the surface of the floodplain.

#### 1.4. CONCRETE STRUCTURE DISPOSAL AREA

- A. After placement of the concrete structure and sediment, the disposal area will be covered with topsoil and seeded.

#### 1.5. INGRESS/EGRESS LOCATIONS

- A. The ingress and egress locations will be graded to match the adjacent topography. If needed, sediment will be used to return the ingress and egress locations to grade. Once these locations are to grade, they will be covered with topsoil and seeded.

#### 1.6. OTHER DISTURBED GROUND

- A. Ground disturbed as a result of construction activities will be graded to match the adjacent topography. If needed, sediment will be used to return the disturbed ground to grade. Once these disturbed areas are to grade, they will be covered with topsoil and seeded.

### **PART 2 MATERIALS**

#### 2.1. ON-SITE EXCVATED SAND/GRAVEL MATERIAL

- A. As specified in Earthwork.

#### 2.2. TOPSOIL

- A. Sod and topsoil will be salvaged and stockpiled as described in Topsoil. This material is to be used in the concrete disposal area and ingress/egress locations.
- B. Imported topsoil will be used exclusively for reclamation of the scour hole area.

#### 2.3. IMPORTED ROCK MATERIAL

- A. ROCK TYPE 1 – GRAVEL

Rock Type 1 will be naturally rounded in shape and will have a naturally smooth surface such as stream or river stone. Material will be 3-inch minus sand and

gravel.

**B. ROCK TYPE 2 – PIT-RUN**

Furnish material consisting of hard, durable stone, gravel or other similar materials mixed or blended with sand, and silt, providing a uniform mixture meeting the following gradation:

<u>Passing</u>	<u>Percentage by Weight</u>
8 inch	100
3 inch	75
No. 4	25 – 60
No. 40	10 – 30
No. 200	less than or equal to 5

The Owner’s Representative will consider other gradations if they meet the design intent for the Pit-Run material.

**2.4. COIR FABRIC MATERIAL PROPERTIES AND DIMENSIONS**

**A. WOVEN COIR FABRIC**

1. Coir fabric is a biodegradable erosion control fabric made from the fibers of coconut husks. Woven coir fabric is a relatively high-tensile strength coir fabric used in constructing riverbanks and providing erosion control of floodplain surfaces and hill slopes. Woven coir fabric is used to lend surface (tensile) strength to FES installations. Woven coir fabric is often used in conjunction with a non-woven coir fabric.
2. The woven coir fabric material will consist of 100% coconut fiber in continuously woven mat. The mat will be without seams. The material will conform to the following values:

Thickness	ASTM D1777	0.30 in. (min)
Tensile Strength (dry)	ASTM D4595	100 x 70 lb./in. (min)
Mass Per Unit Area	ASTM D3776	20 oz./sy. (min)
Open Area	Measured	50% (max)
Roll Width	Measured	6.56 ft. (min)

**B. NON-WOVEN COIR FABRIC**

1. Non-woven coir fabric is a dense coir fabric used to provide fine soil retention and added strength to FES stream banks. This fabric is used as an inner fabric in the construction of the FES lifts to reduce piping loss. Non-woven coir fabrics include a minor, biodegradable component such as

cotton netting to hold individual coconut fibers in place.

2. The non-woven coir fabric material will be 100% mattress grade non-woven coir enclosed in biodegradable cotton and/or jute netting and will conform to the following values:

Thickness	ASTM D1777	0.25 in. (min)
Tensile Strength (dry)	ASTM D4595	18 x 10 lb./in. (min)
Mass Per Unit Area	ASTM D3776	10 oz./sy. (min)
Roll Width	Measured	5 ft. (min)

#### C. PRE-APPROVED PRODUCTS

1. The following products have been pre-approved. Do not order, deliver, or install other products without the written approval of the Owner's Representative.
2. Woven coir fabric will be DeKoWe 700, Nedia KoirMat 700, Rolanka BioDMat 70 or approved equal.
3. Non-woven coir fabric will be Nedia C400B, North American Green C125BN, Rolanka BioD-OCF 30, or approved equal.
4. Nedia KoirWrap 1000 may be used as a combined high strength woven coir fabric and a non-woven coir fabric.

#### D. SUBMITTALS

1. Name, address, and phone number of supplier(s) of all coir fabrics used on the project.
2. Technical Specification of the coir fabrics with associated testing standards with 8 by 10 inch samples in plastic bags.
3. Documentation of equivalency to products specified.
4. Dimensional sizes of delivered products.
5. Manufacturer's shipping, storing, and placement recommendations.

#### E. MATERIALS HANDLING AND STORAGE

1. Store all coir fabric elevated off the ground and insure that it is adequately covered to protect the material from damage. Protect fabric from sharp

objects that may damage the material. Materials damaged during transport, storage or placement will be replaced at the Contractor's expense. The Owner's Representative will inspect and approve all materials prior to installation.

## 2.5. PLANT CUTTINGS

- A. Plant cuttings will consist of local willow and cottonwood species. Plants will be live cuttings harvested from live deciduous plants.
- B. Live cuttings for the reconstructed riverbank will be a minimum of 5 feet long. All cuttings will be greater than 0.5 inch in diameter at the narrowest portion of the cutting and will be no greater than 1.5 inches at the widest portion of the cutting. Twenty five percent of the cutting will be 1 to 1.5 inches in diameter. Any deviations will be approved by the Owner's Representative.
- C. The basal end (bottom) of cuttings will be indicated by a clean, slanted cut. All lateral stems will be removed at the juncture with the main stem. Tops of cuttings (distal ends) will be indicated by a cut perpendicular to the stem.
- D. Cuttings will be collected after leaf off and prior to bud swell. Cuttings will be collected no more than 14 days before installation. Any deviation from this specification requires approval of the Owner's Representative.
- E. Once harvested, cuttings will be divided into bundles of 50 stems of the same species and oriented with the basal ends all at the same end of the bundle. Bundles of cuttings will be moistened with water, and tied with twine in such a manner as to prevent damage to the stems, bark, or other plant parts. Labels will identify the collection date, species, and quantity. Soaking bundles of cuttings in water is also a recommended method of temporary storage for up to 10 days. Cuttings will not be stored for more than 14 days without approval of Owner's Representative. Long term storage of cuttings may require a cooler or storage under snow.
- F. Ponderosa conifer fascines will be ~8-ft long branches with base diameters of 1 to 4 inches. Juniper fascines will be 4 to 6-ft long. An equal mix of juniper and ponderosa fascines will be used.
- G. Woody Material in Trenches will consist of brush, tree branches, and live dormant cuttings (as described above) of woody vegetation species approved by the Owner's Representative (e.g. willow stingers, cottonwood poles). Each 10-ft long trench shall be backfilled with a minimum of 20 live dormant cuttings, and enough brush and tree branches to achieve desired 'roughness', as directed by the Project Coordinator.

The pieces of tree trunks, branches, shrubs, live dormant cuttings, and other

materials will be variable in size.

At least 3 days prior to installation, the Contractor will identify the Woody Material to be used. The Contractor will gain approval by the Owner's Representative prior to installation.

### **PART 3 EXECUTION**

#### **3.1. GENERAL**

##### **A. SCOUR HOLE AREA**

1. Clear the scour area of large organic debris. Stockpile sod as specified in Topsoil.
2. Fill the scour area according to the Plans and the Earthwork specification.
3. The completed fill should be relatively level.
4. Grade an area on the floodplain bench to provide a lowered wetland area. Grade to the elevation specified on the Plans. Provide a bottom area as specified on the Plans. Coordinate with the Owner's Representative on location and shape of the depressions as a natural and irregular appearance is desired.
5. Woody Material in Trenches. Trenches will be oriented more or less perpendicular to expected flow patterns across the floodplain surface. Trenches will be excavated to the depth and length as shown in the Plans. Woody Material and live dormant woody vegetation cuttings will be placed in the trenches. Native materials (inclusive of fine sediment, salvaged soil and other growth media) will be used to backfill the trenches in layers. Layers will be washed in using any available ground or surface water source. To the extent possible, the backfill material will be tamped with the teeth of an excavator bucket, or other suitable method.
6. Place Topsoil to a minimum depth of 6 inches as described in Topsoil.
7. Seed the Topsoil according to Seeding.

##### **B. BANK RECONSTRUCTION**

1. The pit-run foundation will be placed to the dimensions and elevations shown in the Plans or as directed by the Owner's Representative.
2. Prior to placement of erosion control fabric, the foundation on which it is

to be placed will be reviewed by the Owner's Representative.

3. Place conifer fascine material on top of the first lift of FES and arrange so long axis of individual branches is set at a downstream angle. Place fascines at 0.2 foot intervals. Once the fascine is installed, place a mixture of topsoil and river cobble on the branches to anchor the fascine in place and to provide substrate for the willow cuttings to root in. Compress in place using an excavator. Place willow cuttings at a spacing of 12 per lineal foot of FES. Cover the base of the willow cuttings with topsoil and cobble.
4. The Contractor will handle the fabric in a manner that does not damage the fabric or deposit soil in the channel. Place erosion control fabric rolling the fabric lengthwise, parallel to the channel. Erosion control fabric will be unrolled directly on the prepared surface.
5. Erosion control fabrics will be installed in a downstream direction. Fabric end joints will be overlapped in an upstream to downstream direction to prevent flowing water from dislodging the fabric. All joints between fabric rolls will consist of a minimum of 12 inches of fabric overlap.
6. The erosion control fabrics will be even, smooth, and taut, such that the fabric is in direct contact with the underlying soil in all areas, as shown on the Plans, and to the satisfaction of the Owner's Representative.
7. Fill the lift with a gravel and cobble mixture in the anchor trench and a gravel/cobble/topsoil mix near the face of the lift. Well-drained material is required for the first lift. Compact the lift with an excavator. Extreme care will be taken to avoid over-compaction of Topsoil. Over-compacted Topsoil will be loosened to a depth of 2 inches by raking or tilling. Soil moisture will be monitored, and adjusted if necessary, to that specified compaction is achieved. The Contractor will make every effort to keep Topsoil out of the channel. Spread seed along the face and top of the lift before the top of the fabrics are pulled over. It is important that the lift anchor trench be deep and wide enough to allow each successive lift to slope away from the stream edge and not be flat. Otherwise, as the lifts are completed, the top layers will end up sloping towards the stream edge which will decrease stability. Use the excavator bucket to saturate each lift of FES to ensure that the plant cuttings and surrounding soil are saturated.
8. Seeding of Topsoil within the reconstructed riverbank will be carried out prior to installation of the top wrap of the inner erosion control fabric layer and in accordance with the Design Specifications. Seed will be applied to the surface of the lifts at the broadcast rate by hand seeding or with

approved hand operated seeding devices. Seed will be hand raked into the prepared seedbed and covered with the required fabric.

9. Pull top of fabrics over and place in key trench. Set cobble fill in anchor trench and tighten using an excavator bucket. The teeth of the bucket are pushed through the cobble and lightly penetrate the fabric. The operator pushed out and down to stretch the fabric tight. The weight of the cobble on the fabric keeps it tight once the excavator bucket is removed. The Contractor will submit detailed drawings for any variations to these Plans and will gain approval by the Owner's Representative prior to their use.
10. Install willow cuttings under each of the two lifts at a spacing of 12 per lineal foot for each lift as shown in the Plans or as directed by the Owner's Representative. Place the willow cuttings to extend downward below the low-water level as shown in the Plans or as directed by the Owner's Representative. Install the cuttings such that the distal end (top) of cuttings will be exposed no more than 6 inches. Cover each lift of willow cuttings with topsoil.
11. Salvaged Sod, if available, should be installed as fill along the face and top of the FES lifts in lieu of Topsoil.
12. Place willow cuttings vertically in the anchor trench at an interval of 6 per lineal foot with the cut ends sitting in water. Fill the anchor trench with a mixture of cobble and soil.

#### C. CONCRETE STRUCTURE DISPOSAL AREA

1. Place concrete debris, on-site excavated sand/gravel material and common backfill as described in Demolition.
2. Place topsoil to a minimum depth of 6 inches as described in Topsoil.
3. Seed the topsoil according to Seeding.

#### D. INGRESS/EGRESS LOCATIONS

1. Refer to River Ingress/Egress.

#### E. OTHER DISTURBED GROUND

1. Ground disturbed as a result of construction activities will be graded to match the adjacent topography. Grade these locations to match the adjacent topography. If directed by the Owner's Representative, sediment will be used to return the disturbed ground to grade.

2. Once the grading and configuration of these locations meet the approval of the Owner's Representative, they will be covered with topsoil to a minimum depth of 6 inches. Topsoil source will be from the original topsoil removed from the disturbed ground.
3. The Topsoil will be seeded according to Seeding.

F. OWNER'S REPRESENTATIVE INSPECTION AND APPROVAL

1. Due to the complexity involved, the Contractor will coordinate with the Owner's Representative during all aspects of the Reclamation process. The Owner's Representative will approve the lower FES lift before the Contractor proceeds with the upper lift.

**PART 4 MEASUREMENT AND PAYMENT**

4.1. GENERAL

- A. The cost of constructing and reclaiming the ingress and egress to the river will be included in the cost of Earthwork and Reclamation. The cost of seeding the ingress and egress locations will be included in Seeding.
- B. The cost for reclamation of the concrete disposal area and reclamation of any other disturbed ground is included in the Reclamation bid item.
- C. The cost for reclamation of the scour hole area is included in the following bid items: Earthwork; Scour Hole Fill – Import Sand & Gravel (Rock Type 1); Scour Hole Fill – Import Pit Run (Rock Type 2); Scour Hole Fill – Import Topsoil; Bank Construction – Salvage Rock; Bank Construction – FES; Floodplain Treatment – Wood Material in Trenches; and Seeding.

4.2. MEASURE

- A. No measurement will be made for Reclamation.
- B. Scour Hole Reclamation will be measured as follows;
  1. Earthwork – as specified in the Earthwork specification.
  2. Scour Hole Fill – Import Sand & Gravel (Rock Type 1) – will be measured by the cubic yard in place based on the neat lines of the Plans.

3. Scour Hole Fill – Import Pit-Run (Rock Type 2) – will be measured by the cubic yard in place based on the neat lines of the Plans.
4. Scour Hole Fill – Import Topsoil – as specified in the Topsoil specification.
5. Bank Construction – Salvage Rock – no measurement will be made.
6. Bank Construction – Fabric Encapsulated Soil (two lifts) – will be measured by the lineal foot based on neat lines of the Plans.
7. Floodplain Treatment – Wood Material in Trenches – will be measured per each installation.
8. Seeding will be measured as specified in the Seeding specification.

#### 4.3. PAY

- A. Payment for Reclamation will be made at the lump sum bid price for Reclamation.
- B. Payment for Sour Hole Reclamation will be made at the base unit bid price for the following items;
  1. Payment for Earthwork will be as specified in the Earthwork specification.
  2. Payment for Scour Hole Fill – Import Sand & Gravel (Rock Type 1) will be made at the unit price per cubic yard. The unit price will constitute full compensation for all materials, labor, equipment, and incidentals necessary to furnish materials and for installation as specified in the specifications and on the Plans.
  3. Payment for Scour Hole Fill – Import Pit-Run (Rock Type 2) will be made at the unit price per cubic yard. The unit price will constitute full compensation for all materials, labor, equipment, and incidentals necessary to furnish materials and for installation as specified in the specifications and on the Plans.
  4. Payment for Scour Hole Fill – Import Topsoil will be made at the unit price per cubic yard. The unit price will constitute full compensation for all materials, labor, equipment, and incidentals necessary to furnish materials and for installation as specified in the specifications and on the Plans.

5. Bank Construction – Salvage Rock will be made based on the lump sum amount stated in the Bid. The lump sum amount will constitute full compensation for all materials, labor, equipment, and incidentals necessary to furnish materials and for installation as specified in the specifications and on the Plans.
6. Bank Construction – Fabric Encapsulated Soil (two lifts) will be made at the unit price per lineal foot. The unit price will constitute full compensation for all materials, labor, equipment, and incidentals necessary to furnish materials and for installation as specified in the specifications and on the Plans. The unit price includes all materials necessary to construct the FES (coir fabric, plant cuttings, specified backfill material, conifer fascines, etc.).
7. Floodplain Treatment – Wood Material in Trenches will be made at the unit price per each installed. The unit price will constitute full compensation for all materials, labor, equipment, and incidentals necessary to furnish materials and for installation as specified in the specifications and on the Plans.
8. Payment for Seeding will be as specified in the Seeding specification.

**END OF SECTION**

## SECTION 02700

### TOPSOIL

#### PART 1 GENERAL

##### 1.1. DESCRIPTION

- A. The Work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for salvaging, storing and placing Sod and Topsoil for use in the disposal area for the concrete and wooden (if any) structures, repair of the north ingress/egress area, and the final lift of material in the scour hole fill area as shown on the Plans and described within these Specifications.

#### PART 2 MATERIALS

##### 2.1. GENERAL

- A. The Contractor will determine the materials required to meet these Specifications.

##### 2.2. MATERIAL PROPERTIES

- A. Salvaged sod and topsoil and imported topsoil will be properly stored and protected. All topsoil will comply with the following requirements:
  - 1. Topsoil will be loose, friable, loamy soil, free of excess acid and alkali.
  - 2. Assure that topsoil does not contain objectionable amounts of sod, hard lumps, gravel, sub-soil or other undesirable material that would form a poor seedbed.
  - 3. Before stripping topsoil, assure that it has supported the growth of healthy, weed free crops, grass or other vegetable growth
  - 4. It is expected that onsite salvaged material will meet these specifications.
- B. Sod will be properly stored and protected. It will be stored in windrows no more than 6 feet high and 10 feet wide. Once the sod is stockpiled, the sod windrows will be kept moist without saturating using a water truck jet, hose, irrigation line or other method approved by the Owner's Representative. Sod watering will occur daily or more frequently and storage time will be minimized to approximately 10 days or less as needed to maintain the viability of the sod during the storage period.

### 2.3. MATERIALS HANDLING AND STORAGE

- A. Topsoil and sod will be stockpiled at the Contractor's option, and at a location under his responsibility. Contractor will protect stockpiled topsoil from erosion by covering it in a manner approved by the Owner's Representative.
- B. The Owner's Representative will inspect and approve all materials prior to installation.

## **PART 3 EXECUTION**

### 3.1. GENERAL

- A. Salvaged Topsoil and sod will be utilized in the northern ingress/egress area and the concrete debris fill area.
- B. Imported Topsoil will be used only in the scour hole fill area.

### 3.2. TOPSOIL SALVAGE AND PLACEMENT

- A. The Contractor will salvage topsoil and sod from the canal prior to placement of the concrete or wooden pieces. Since the quantity of topsoil is limited, the Contractor will remove as much topsoil as possible from the area of the canal to be used for material disposal. The Contractor will also salvage topsoil from the ingress/egress areas and other disturbed areas for use in Reclamation.
- B. Install topsoil in accordance with the Specifications and Plans. A minimum of 6 inches of topsoil will be placed on all areas that require the placement of topsoil.
- C. Place topsoil in lifts no greater than 6 inches and level material to an even surface. Compact to a maximum of 85% according to ASTM D698/AASHTO T99. Extreme care will be taken to avoid over-compaction of Topsoil. Soil moisture will be monitored, and adjusted if necessary, to achieve the specified compaction.
- D. As the amount of topsoil is limited, topsoil will not be placed to a depth that exceeds 12 inches.
- E. Before installing seed, till the topsoil to a depth of 3 inches until soil attains a well-mixed, light, fluffed-up condition, free of large clods and clumps of vegetative material. Rake or drag area until surface is thoroughly settled with a smooth, firm surface, free of humps or hollows.

### 3.3. IMPORTED TOPSOIL PLACEMENT

- A. Compact topsoil within FES lifts to a maximum of 85% according to ASTM D698/ AASHTO T99 according to the Specifications using a plate compactor for

the riverbanks and a roller for the scour area, or similar means as approved by the Owner's Representative. Do not over compact topsoil. Over-compacted topsoil will be loosened at the Contractor's expense by disking and raking to a depth of at least 3 inches. During the compacting operations, maintain optimum practicable moisture content required for compaction purposes in the topsoil. Maintain moisture content uniform throughout the topsoil layer. Insofar as practicable, add needed water to the material at the site of excavation. Do not compact topsoil which contains excessive moisture. Aerate material by blading, disking, harrowing, or as approved, to hasten the drying process.

- B. In the scour hole fill area, topsoil will be placed so that the areas closest to the riverbank are fully covered with topsoil.
- C. Before installing seed, till the topsoil to a depth of 3 inches until soil attains a well-mixed, light, fluffed-up condition, free of large clods and clumps of vegetative material. Rake or drag area until surface is thoroughly settled with a smooth, firm surface, free of humps or hollows.

#### **PART 4 MEASUREMENT AND PAYMENT**

##### **4.1. MEASURE**

- A. No measurement will be made for handling of salvaged sod and topsoil.
- B. Measurement for Imported Topsoil to be used in the scour hole area will be by the cubic yard.

##### **4.2. PAY**

- A. No payment will be made for handling of salvaged sod and topsoil.
- B. The cost of handling of salvaged sod and topsoil will be included in the cost of Demolition and Reclamation.
- C. Payment for import and placement of Topsoil in the scour hole area will be paid for at the unit base bid price. The unit price per each cubic yard of material will constitute full compensation for all materials, labor, equipment, and incidentals necessary to complete installation as specified in the Specifications and on the Plans.

END OF SECTION

**SECTION 02710  
SEEDING**

**PART 1: GENERAL**

1.1 DESCRIPTION

This work consists of ground surface preparation; furnishing and planting seed on areas of disturbed, bare soil within the project limits as described in these specifications or directed by the Owner's Representative.

The Contractor will make effort to minimize the spread of noxious weeds into the project site.

1.2 SUBMITTALS

Submit to the Owner's Representative applicable seed mixture certifications. Furnish duplicate signed copies of the vendors' statement certifying that each seed lot has been tested by a recognized seed testing laboratory within 6 months of date of delivery. Assure the statement includes: Name and address of laboratory, date of test, lot number for each seed species and the test results including name, percentages of purity and of germination, percentage of weed content for each kind of seed furnished and, for seed mixes, the proportions of each kind of seed.

**PART 2: PRODUCTS**

2.1 SEED

Furnish seed mixture, free of all prohibited noxious weed seed or any other weed seed prohibited by state or local ordinance. Do not use wet, moldy, or otherwise damaged seed in the work.

Seal and label all seed containers to comply with Montana Seed Law and Regulations, if shipped in interstate commerce. Furnish seed in standard containers labeled with the seed name, lot number, net weight, percentages of purity, germination, hard seed, and percentage of maximum weed seed content for each seed species. Furnish seed mixture of the following species:

<b>Seed Name</b>	<b>% Pure Live Seed</b>	<b>Lbs. Per Acre</b>
Western Wheatgrass	30	*
Bluebunch Wheatgrass	20	*
Hard Fescue	20	*
Slender Wheatgrass	15	*
Green Needlegrass	15	*

\* Drilled Rate = 25 lbs/acre, Broadcast and Hydroseed Rate = 50 lbs/acre

## **PART 3: EXECUTION**

### **3.1 ALLOWABLE SEEDING MONTHS**

Perform seeding when the temperature and moisture are favorable to germination and plant growth. Seed after September 15<sup>th</sup> or according to a timeframe approved by the Owner's Representative. Seeding dates must be approved by the Owner's Representative.

### **3.2 SEEDBED PREPARATION AND SOWING**

Clear the areas to be seeded of all debris, vegetation, and other material determined by the Owner's Representative to be detrimental to the preparation of a seedbed. Once the area is cleared, disc, harrow, rake, or work the area by other suitable methods, into a smooth, even seedbed. Assure the prepared seedbed surface is firm enough to prevent seed loss from high winds or normal rainfall. If rolling is required, perform rolling before seeding using a suitable roller, of a weight appropriate to the soil conditions.

Sow seed using hand broadcaster. Use equipment in good working order. Do not sow seed in winds that prevent proper embedment into the surface.

### **3.3 CARE OF SEEDED AREAS**

Protect all seeded areas from traffic or pedestrian use with warning barricades or other Owner's Representative approved methods.

### **3.4 CONTROL OF UNDESIRABLE PLANT SPECIES**

The Contractor will make reasonable efforts to control the introduction and spreading of undesirable plant species into the project area. Noxious weeds and other invasive species, include, but are not limited to Canada thistle, Musk thistle, Knapweed, Purple Loosestrife, Houndstongue, and Skeletonweed.

### **3.5 WARRANTY**

The success criteria for areas that have been seeded are as follows.

- A. By June 2015, seeded areas will have 60% coverage with planted vegetation and no more than 10% of seeded areas should contain noxious weeds.
- B. By June 2016, or termination of the Owner's agreement with the landowner (whichever is first), seeded areas should have > 90% coverage with planted vegetation and noxious weeds occupying < 5% of the seeded area.

**PART 4: MEASUREMENT AND PAYMENT**

**4.1 MEASUREMENT**

Seeding will be measured by the square yard and includes seedbed preparation and seeding, complete in place and accepted by the Owner's Representative.

**4.2 PAYMENT**

Payment for Seeding will be made at the unit price per square yard seeded as stated in the Bid.