

Technical Specifications

For

North Bank Lane Tidal Floodplain Restoration Project Phase 2

Prepared for
Coos Soil and Water Conservation District

100% Submittal

November 17, 2022



EXPIRES: 6/30/2023

FOR USE IN CONNECTION WITH
STATE OF OREGON, DEPARTMENT OF TRANSPORTATION STANDARD
SPECIFICATIONS FOR CONSTRUCTION, CURRENT EDITION

**North Bank Lane Tidal Restoration Project
Phase 2
Technical Specifications
100% Submittal**

**Table of Contents
Page 1**

Section No.	Title
015000.....	Construction Facilities and Temporary Controls
015713.....	Temporary Erosion Control and BMPS
015713.01.....	Fiber Roll
017123.16.....	Construction Surveying
311100.....	Clearing and Grubbing
312316.....	Stripping and Excavation
312319.....	Dewatering
312323.....	Engineered Fill
313519.16.....	Slope Protection Fabric
321123.....	Aggregate Base
323126.....	Wire Fence and Gates
329219.....	Seeding
329300.....	Planting
330533.....	Polyethylene Utility Pipe
354200.....	Log Structures
354237.....	Rock Slope Protection

INDEX
SECTION 015000
MOBILIZATION

Paragraph	Page
1. GENERAL	1
1.1 Description.....	1
2. PRODUCTS – Not Used.....	1
3. EXECUTION.....	1
3.1 Contractor’s Plant and Equipment	1
3.2 Mobilization and Demobilization.....	2
3.3 Project Signs.....	2
3.4 Excavation	2
3.5 Staging Areas	2
3.6 Hazardous Materials Control and Spill Prevention Plan	2
3.7 Construction Site Housekeeping	3
3.8 Protection of Existing Improvements	3
3.9 Restoration of Structures and Surfaces	3
3.10 Storage of Materials and Equipment.....	3
3.11 Traffic Control	3
4. MEASUREMENT AND PAYMENT	4
4.1 Measurement	4
4.2 Payment	4

SECTION 015000
TEMPORARY FACILITIES AND CONTROLS
(a.k.a. Mobilization & Demobilization)

1. GENERAL

1.1 DESCRIPTION

- A. The work covered by this section consists of the construction facilities and temporary controls, including mobilization and demobilization, as specified, as shown on the Drawings, or as otherwise directed by the Engineer. Work includes traffic control and erosion control items not specifically addressed under other pay items.
- B. Mobilization shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the site; for the establishment of all offices, and other facilities necessary for work on the project; and for all other work and operations which must be performed, or costs incurred prior to beginning work, on the various items on the project site.
- C. Demobilization shall consist of work and operations necessary to disband all mobilized items and cleanup the site. The removal of all temporary crossings, ramps, access ways, roads, signs, and fencing; dewatering facilities; and temporary facilities or works, and the restoration of surfaces to an equal or better than existing condition shall also be included as part of demobilization.

2. PRODUCTS – Not Used

3. EXECUTION

3.1 CONTRACTOR'S PLANT AND EQUIPMENT

- A. Security. Contractor shall, at all times, be responsible for security of their plant and equipment. Owner shall not be responsible for missing or damaged equipment, tools, or personal belongings.
- B. Construction Power and Communication Facilities. Contractor shall be responsible for providing sufficient electrical power and communication facilities to construct the work.
- C. Storage Facilities.
 - 1. Provide storage facilities for the protection of materials and supplies from weather, and shall keep the facilities clean and in proper order at all times.
 - 2. Provide a storage area for lubricants, oils, and hazardous materials with sufficient means to contain spills. Facilities, handling, and any required cleanup will comply with all current local, state, and federal standards. Petroleum products stored on the site shall be secured from vandalism.
- D. Sanitary Facilities. Maintain adequate toilet facilities at or near the work site.
- E. Solid Waste Handling. Provide sufficient solid waste handling facilities to maintain site in a clean, orderly condition.
- F. Water. Contractor shall provide all water necessary for construction and maintenance as specified.

3.2 MOBILIZATION AND DEMOBILIZATION

- A. General. Perform mobilization and demobilization activities in accordance with the Drawings, and as specified.

3.3 PROJECT SIGNS

- A. General. Erect project, safety and hard hat signs at each work site within five (5) days after commencement of work at that site.

3.4 EXCAVATION

- A. The Contractor, and any subcontractor, is required to notify the Oregon Utility Notification Center forty-eight hours in advance of performing excavation work, by calling the toll free number (800) 332-2344.

3.5 STAGING AREAS

- A. General. Staging areas at the project site are provided for the Contractor's use. By making this area available to the Contractor, the Engineer, and any other person or agency connected with the properties shall in no way be responsible or liable for any activity of the Contractor, subcontractors, or any individual or organization connected with the project.
- B. Alternative Staging Areas. Alternative sites must be acceptable to Owner, and the Contractor must make all arrangements for their use at the Contractor's expense, and in accordance with all local, State and Federal regulations.
- C. Additional Storage Areas. Should the Contractor require space in addition to that available on-site, the Contractor shall make arrangements for storage of materials and equipment in locations off the construction site, and shall provide the Engineer a copy of the letter of authorization for storage from the Owner.

3.6 HAZARDOUS MATERIALS CONTROL AND SPILL PREVENTION PLAN

- A. General. Before starting work on the project, the Contractor shall submit for acceptance by the Engineer a Hazardous Materials Controls and Spill Prevention Plan. The Plan shall include provisions for preventing hazardous materials from contaminating soil or entering water courses and shall establish a Spill Prevention and Countermeasure Plan.
- B. Facilities. Provide staging and storage areas for equipment, as required to contain contaminants away from water courses. Provide a contained, locked storage facility for fuels, lubricants, construction chemicals and other hazardous materials and supplies stored at site.
- C. Equipment Maintenance. Clean and maintain equipment to prevent any leakage of fuel and lubricants. Establish a designated equipment refueling area. All fueling and maintenance of vehicles and other equipment and staging area shall occur at least 75 feet from any riparian habitat or water body.
- D. Spills Countermeasures. Isolate work areas during in-water construction activities by using oil containment booms. Maintain a supply of oil booms, sorbent pads and other supplies to contain and clean spills. Contain and cleanup any hazardous material spills immediately and notify Engineer.

3.7 CONSTRUCTION SITE HOUSEKEEPING

- A. Remove rubbish, trash, and debris from site on a regular basis. Transport and dispose of all rubbish and debris in accordance with all local regulations. Maintain staging area in an orderly manner. Regularly clean mud and debris, resulting from work at the site, from roadways.

3.8 PROTECTION OF EXISTING IMPROVEMENTS

- A. Existing facilities, utilities, and property shall be protected from damage resulting from the Contractor's operations. Roadways and other improved surfaces shall be protected from damage by vehicles with tracks or lugs. Any damage resulting from the Contractor's operations shall be repaired by the Contractor to the condition which existed prior to the damage, and to the satisfaction of the Engineer, at no additional cost to the Owner.

3.9 RESTORATION OF STRUCTURES AND SURFACES

- A. Structures, Equipment, and Pipework. The Contractor shall remove such existing structures, equipment, and pipework as may be necessary for the performance of the work, and shall rebuild, or replace, the items thus removed in as good a condition as found. Contractor shall repair any existing structures that were damaged as a result of the Work.
- B. Roads and Streets. Roadways used by the Contractor for hauling materials, equipment, supplies, etc., shall be cleaned and repaired if the condition of the roadway is damaged, or otherwise affected, due to the Contractor's operations.
- C. Curbs, Gutters, Driveways, and Sidewalks. All curbs, gutters, driveways, sidewalks, and similar structures that are broken, or damaged, by the installation of the work shall be reconstructed by the Contractor. Reconstruction shall be of the same kind of materials with the same finish, and in not less than the same dimensions as to original work. Repairs shall be made by removing and replacing the entire portions between joints or scores, and not merely refinishing any damaged part. All restoration work shall match the appearance of the existing improvements, as nearly as possible.
- D. Cultivated Areas and Other Surface Improvements. All cultivated and natural areas, either agricultural or lawns, and other surface improvements which are damaged by actions of the Contractor, shall be restored, including roadside drainage ditches, as nearly as possible, to their original conditions.

3.10 STORAGE OF MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be stored so as to ensure the preservation of their quality and fitness for the work. Stores of equipment and materials shall be located so as to facilitate inspection. The Contractor shall be responsible for all damages that occur in connection with the care and protection of all materials and equipment, supplied by the Contractor, until completion and final acceptance of the Work by the Owner.

3.11 TRAFFIC CONTROL

- A. General. The Contractor shall be responsible for public safety and traffic control at all times.
- B. The Contractor shall furnish, install, and maintain temporary construction warning signs, flaggers, barricades, and other devices necessary to safeguard the general public and

the work, and to provide for the safe and proper routing of all vehicular and pedestrian traffic within and through the limits of the project during the performance of the work.

- C. Traffic Control Plan. The Contractor will provide a traffic control plan to the Engineer for review and approval prior to project construction including: access points to North Bank Lane, staging areas, dump sites, operating hours, project duration, scheduling and phasing, and total number of construction vehicles and their respective haul routes, per project phase.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Work under this section will be measured for payment on a lump sum basis.

4.2 PAYMENT

- A. The lump sum contract price for Construction Facilities and Temporary Controls, also known as Mobilization and Demobilization, will include full compensation for the furnishing of all labor, materials, tools, equipment, administrative costs, and incidentals for mobilization; demobilization; and temporary facilities and controls.
- B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Mobilization & Demobilization	Lump Sum (LS)

END OF SECTION

INDEX
SECTION 015713.01
FIBER ROLL

Paragraph	Page
1. GENERAL	1
1.1 Description	1
1.2 Submittals	1
2. PRODUCTS.....	1
2.1 Materials	1
3. EXECUTION.....	1
3.1 Installation	1
3.2 Maintenance.....	2
3.3 Removal	2
4. MEASUREMENT AND PAYMENT	2
4.1 Measurement	2
4.2 Payment	2

SECTION 015713.01 FIBER ROLL

1. GENERAL

1.1 DESCRIPTION

- A. Work under this Section includes furnishing all labor, materials, equipment, and incidentals to install, maintain, remove and dispose of Fiber Roll, as shown on the Drawings, as specified in the Erosion and Sediment Control Plan, as specified herein, or as otherwise directed by the Engineer.
- B. Fiber Roll shall be furnished, installed, and maintained at the locations shown on the Drawings, as specified, and as indicated on the approved Erosion and Sediment Control Plan,. Fiber Roll shall be installed on excavation and embankment slopes and other disturbed soil areas, active or non-active.
- C. Related Sections
 - 1. Section 015000, Mobilization
 - 2. Section 015713, Temporary Erosion Control and BMP's

1.2 SUBMITTALS

- A. Submit to the Engineer, for review, the following manufacturer's data and Certification's:
 - 1. A certificate stating the name of the Fiber Roll manufacturer, product name, style compositions of filaments or yarns and other pertinent information to fully describe the geotextile, along with the manufacturer's certification of compliance with the material specifications contained herein.

2. PRODUCTS

2.1 MATERIALS

- A. Straw Wattle. Straw Wattle shall be:
 - 1. A pre-manufactured roll made from 100% weed free straw and wrapped in a 100% biodegradable tubular 7 oz. Plain Burlap liner. The burlap is Medium Weight Natural Burlap with a 9 X 8 Warp & Fill, and a minimum weight of 7 oz. per square yard. Plastic netting will not be accepted as an alternate.
 - 2. 9-inch rolls shall have a minimum weight of approximately 1.6 pounds per foot.
 - 3. 12-inch rolls shall have a minimum weight of approximately 3.8 pounds per foot.
- B. Stakes. Wood stakes shall be a minimum of 2" x 4" x 24" (ripped diagonally) for Type 1 installation or a minimum of 1" x 2" x 24" in size for Type 2 installation. Wood stakes shall be untreated fir, redwood, cedar, or pine and cut from sound timber. They shall be straight and free of loose or unsound knots and other defects which would render them unfit for the purpose intended. Metal stakes shall not be used.
- C. Rope. Rope shall be biodegradable, such as sisal or manila, with a minimum diameter of 1/4 inch.

3. EXECUTION

3.1 INSTALLATION

- A. Rope and notched stakes shall be used to restrain the Fiber Rolls against the slope. Stakes shall be driven into the slope until the notch is even with the top of the Fiber Roll. Rope shall be knotted at each stake and laced between stakes. After installation of the rope, stakes shall be driven into the slope such that the rope will hold the Fiber Roll tightly to the slope. Furrows will not be required.
- B. Fiber Roll shall be placed 10 feet apart along the slope for slope inclination (horizontal:vertical) of 2:1 and steeper, 15 feet apart along the slope for slope inclination between 2:1 and 4:1, 20 feet apart along the slope for slope inclination between 4:1 and 10:1, and a maximum of 50 feet apart along the slope for slope inclination of 10:1 and flatter.
- C. The bedding area for the Fiber Roll shall be cleared of obstructions including rocks, clods, and debris greater than one inch in diameter before installation.
- D. Fiber Roll shall be installed approximately parallel to the slope contour and the terminus of rows shall be angled up-slope at 45 degrees for a distance of three feet. Where fiber rolls meet, provide an overlap of two feet, with adjacent rolls tightly abutting each other.
- E. Fiber Roll shall be installed prior to seeding where used without slope protection fabric.
- F. Fiber roll shall be installed over fabric (after seeding) where slope protection fabric is specified.

3.2 MAINTENANCE

- A. The Contractor shall inspect all Fiber Roll immediately after each rainfall, and at least daily during prolonged rainfall. Any deficiencies shall be immediately corrected by the Contractor.
- B. The Contractor shall also make a daily review of the location of Fiber Roll in areas where construction activities have altered the natural contour and drainage runoff to ensure that the Fiber Rolls are properly located for effectiveness. Where deficiencies exist as determined by the Engineer, additional Fiber Rolls shall be installed as directed by the Engineer.
- C. Damaged or otherwise ineffective Fiber Roll shall be repaired or replaced promptly. Fiber Roll shall be maintained to disperse concentrated water runoff and to reduce runoff velocities. Split, torn, or unraveling rolls shall be repaired or replaced. Broken or split stakes shall be replaced. Sagging or slumping Fiber Roll shall be repaired with additional stakes or replaced. Locations where rills and other evidence of concentrated runoff have occurred beneath the rolls shall be corrected. Fiber Roll shall be repaired or replaced within 24 hours of identifying the deficiency.

3.3 REMOVAL

- A. Fiber Rolls shown on the Drawings shall remain in place after project completion, unless otherwise specified, and be allowed to naturally degrade.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Fiber Roll will not be separately measured for payment.

4.2 PAYMENT

- A. No separate payment will be made for Fiber Roll. Full compensation for all costs associated with this work shall be included in the contract price for Temporary Erosion Control and BMPS,

Section 015713.

END OF SECTION

INDEX
SECTION 015713
TEMPORARY EROSION CONTROL AND BMPS

Paragraph	Page
1. GENERAL	1
1.1 Description.....	1
1.2 Related Sections.....	1
2. PRODUCTS – not used.....	1
3. EXECUTION.....	1
3.1 General.....	1
3.2 Turbidity Monitoring.....	2
3.3 Maintenance	2
3.4 Dust Control	2
4. MEASUREMENT AND PAYMENT	3
4.1 Measurement	3
4.2 Payment	3

SECTION 015713
TEMPORARY EROSION CONTROL AND BMPS

1. GENERAL

1.1 DESCRIPTION

- A. This work shall consist of temporary erosion control and water or air quality control measures, devices, and BMPs that may be shown on the Drawings, and as specified in the Contract Documents, Project Permit(s), Project Erosion and Sediment Control Plan (ESCP), Standard Specifications, these Technical Specifications, or as directed by the Engineer during the life of the contract. Temporary erosion control measures and other BMPs will also be required at staging/storage areas utilized during project construction. Said work is intended to provide prevention, control, and abatement of water and air pollution within the limits of the project and to minimize damage to the work, adjacent properties, streams or other bodies of water.
- B. Attention is directed to the Erosion and Sediment Control Plan. The Owner will transfer ownership of the DEQ 1200-C Construction Stormwater Permit prior to construction. As part of the ESCP submittal process, the Contractor shall submit on any proposed revisions to the applicable Project Plan sheets for Temporary Erosion Control and the Dewatering and/or Diversion operations. Do not start work until the SWPPP, applicable plan sheets, schedules and methods of operation for temporary pollution control are reviewed and accepted by the Engineer. During the course of project construction, cooperate with the Engineer and other regulatory officials and take immediate action as directed to protect water bodies and sensitive areas, and provide for erosion or other pollution control.
- C. Installation and maintenance of temporary erosion control measures, devices and BMPs shall conform to the requirements as shown on the Drawings stated within this section, the ESCP, and DEQ requirements.

1.2 RELATED SECTIONS

- A. Section 015000, Mobilization
- B. Section 015626, Temporary Fence – Type ESA
- C. Section 015713.01, Fiber Roll
- D. Section 312319, Dewatering
- E. Section 312323, Engineered Fill

2. PRODUCTS – NOT USED

3. EXECUTION

3.1 GENERAL

- A. Install temporary soil stabilization materials for water pollution control in all disturbed work areas that are considered inactive (i.e. excess of 14 days) or before forecast storm events. Should any temporary erosion control of this nature be required elsewhere as directed by the Engineer and/or regulatory agencies, install them within 48 hours of notification. Where applicable and upon acceptance of the Engineer, furnish and apply/install temporary mulch, temporary hydraulic mulch, temporary erosion control blankets, or temporary covers in

conformance with the Standard Specifications and these Technical Specifications. Materials and construction methods shall comply with the Standard Specifications and these Technical Specifications.

- B. Maintain a temporary cover on all stockpiles at all times and install and maintain appropriate BMPs (sediment logs, filter fence, check dams, etc.) around the perimeter at the base of stockpile to control the potential runoff of any loose sediments and pollutants. Whenever a temporary cover is removed to perform other work, replace and secure the temporary cover within one (1) hour of stopping work.

3.2 TURBIDITY MONITORING

- A. Maintain copies of all turbidity monitoring in accordance with the permits and submit copies to the Owner's Representative at the conclusion of construction.

3.3 MAINTENANCE

- A. Maintain all temporary erosion control measures, devices, and/or BMPs placed in the work for the duration of the project. Maintenance includes all Manufacturer recommendations, and includes but is not limited to the following:
 1. Immediately repair upon discovery damage to any temporary erosion control devices and/or BMPs during the course of the project at the Contractor's expense.
 2. Inspect temporary erosion control devices and/or BMPs routinely, immediately after each rainfall event, and at least daily during prolonged rainfall events. Make required repairs immediately.
 3. Routinely inspect all signage as required for the project and repair or replace upon discovery of damage, vandalism, and/or missing parts.
 4. Should a Fiber Roll decompose or become ineffective prior to the end of the expected usable life and the barrier is still necessary, replace Fiber Roll promptly.
 5. Replace single or group of gravel bag(s) when the bag material is ruptured or when the yarn has failed, allowing the bag contents to spill out.
 6. Routinely inspect stakes and/or rope used to secure a Fiber Roll in place and repair as necessary if found to be loose or ineffective.
 7. Repair or replace damaged temporary gravel bag berm (or other measures which require gravel bags per the Project Drawings, Project Permits, these Technical Specifications and the ESCP) on the same day when the damage occurs or is discovered.
 8. Remove sediment deposits and other debris when they reach approximately one-half the height of the sediment barrier (or as recommended by the Manufacturer) and dispose of in a manner acceptable to the Engineer, and in conformance with the ESCP.
 9. Remove and dispose of sediment deposits remaining in place after the temporary erosion control measure and/or BMPs is no longer required in a manner acceptable to the Engineer, and in conformance with the ESCP.

3.4 DUST CONTROL

- A. General. Before starting work on the project, submit a Dust Suppression Plan for acceptance by the Engineer. The Contractor shall be responsible for the control of dust within the limits of the project at all times. Take whatever steps are necessary to eliminate the nuisance of blowing dust. Responsibility for any damage to property, crops, or orchards from dust caused by the Contractor's operations shall be borne by the Contractor.
- B. Dust Control. Periodically, water or otherwise treat access roads and haul roads, as required to suppress dust. Cover or control water content of earthen materials being hauled, as required

to control dust emissions. Cover or otherwise stabilize soil stockpiles to prevent erosion by wind.

- C. Cleanup. Keep all streets, roadways, and easements, as well as all ground adjacent to the project site, clean and free of dust, mud and debris resulting from the Contractor's operations. Daily cleanup throughout the project shall be required as the Contractor progresses with the work. Immediately remove spillage of earth, gravel, concrete, asphalt, or other materials resulting from hauling operations along or across any public street or private driveway or access road.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Temporary Erosion Control and BMPs will be measured on lump sum basis.

4.2 PAYMENT

- A. The lump sum contract price for Temporary Erosion Control and BMPs will include full compensation for the furnishing of all labor, materials, tools, equipment, administrative costs, and incidentals for temporary erosion control measures, devices, and BMPs, provisions and requirements as stated in the ESCP, stockpile management, dust control, sweeping, and maintenance of all such water pollution control measures that may be shown on the Project Drawings, and as specified in the Contract Documents, Project Permit(s), Project ESCP, Standard Specifications, these Technical Specifications, and as directed by the Engineer, and no additional compensation shall be allowed therefore.
- B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Temporary Erosion Control and BMPs	Lump Sum (LS)

END OF SECTION

INDEX
SECTION 017123.16
CONSTRUCTION SURVEYING

1.	GENERAL	1
1.1	Description	1
1.2	Work Included.....	1
1.3	Submittals	1
1.4	References	1
1.5	Quality Assurance	1
2.	PRODUCTS (Not Used)	2
3.	EXECUTION.....	2
4.	MEASUREMENT AND PAYMENT	2
4.1	Measurement	2
4.2	Payment	2

SECTION 017123.16 CONSTRUCTION SURVEYING

1. GENERAL

1.1 DESCRIPTION

- A. The work required under this Section shall include, but is not limited to, all labor, tools, materials, equipment and incidentals required to perform construction surveying necessary to establish the lines and grades of the proposed work, as shown on the Drawings, as specified, or as directed by the Engineer.

1.2 WORK INCLUDED

- A. The Contractor shall be responsible for procuring professional land surveying services as necessary to construct this project. An Oregon licensed Land Surveyor, or Civil Engineer authorized to practice land surveying in Oregon, shall be in responsible charge of all survey work to be performed in conjunction with the scope of work of this project.
- B. The Contractor shall preserve and protect all project survey control and reference points shown on the Drawings and located outside the limits of disturbance. Monuments disturbed by the Contractor shall be reestablished by the Contractor at his sole expense.
- C. The Contractor shall be solely responsible for the protection and maintenance of all existing and Contractor-established survey marks and monuments, and all constructed lines and grades.

1.3 SUBMITTALS

- A. The Contractor shall provide the name, license number, and documentation for the required minimum qualifications of the Land Surveyor to be employed by the Contractor for the Project, prior to any work being completed by the Contractor or Surveyor.

1.4 REFERENCES

- A. Oregon Standard Specifications for Construction, Oregon Department of Transportation (current edition).

1.5 QUALITY ASSURANCE

- A. All Work shall be performed to the satisfaction of the Engineer.
- B. The Engineer may, at his sole discretion, perform his own surveys for: verification of project control points, verification of lines and grades, and inspection of survey monument preservation. Contractor shall provide unrestricted access for the Engineer to spot-check the work. This does not relieve the Contractor of their responsibility to perform additional independent surveying, as need to complete the work.
- C. In the event that the construction staking reveals a design inconsistency or error, Contractor shall notify the Engineer immediately and shall not proceed with the work until directed by the Engineer.

2. PRODUCTS (Not Used)

3. EXECUTION

- A. The Engineer will establish a minimum of three survey control monuments, as shown on the Drawings. The Contractor's surveyor will be provided with the northing, easting and elevation of the control points existing in the field as shown on the Drawings. In addition the Engineer of Record will also provide the Contractor's surveyor with the final linework and surface files developed in AutoCAD Civil 3D (2019 version). The Contractor's surveyor will be required to access AutoCAD in order to use the electronic files. Civil 3D information does not transfer to base AutoCAD or older versions of AutoCAD and therefore will not be available to Land Surveyors who do not have this program.
- B. From this information, the Contractor shall establish the baseline control points and reference points for horizontal and vertical control and make all additional detailed surveys and measurements and establish markings or monuments necessary for the construction of the work as dimensioned on the Drawings.
- C. At a minimum, construction staking shall include the following:
 - 1. Proposed clearing and grubbing limits,
 - 2. Proposed channel alignment (centerline),
 - 3. Proposed grading and contours for earthwork,
 - 4. Proposed channel treatments, structures, and modifications,
 - 5. Any other items required for a full, complete and accurately built project
- D. All stakes and survey markers will be conspicuously marked with flagging tape or paint by the Contractor. The Contractor shall be responsible for protecting and maintaining all stakes from destruction.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Construction Surveying shall not be independently measured for payment.

4.2 PAYMENT

- A. No separate payment will be made for the work covered under this section. Full compensation for all costs in connection with Construction Surveying shall be included in the contract price for related work.
- B. The cost of resetting and verifying control points disturbed by the Contractor will be borne by the Contractor. The cost of any such verification or replacement of bench marks and/or control survey points will be deducted from any monies due to the Contractor. The Contractor will not be allowed any adjustment in working days for such verification or replacement of survey control points.

END OF SECTION

INDEX
SECTION 311100
CLEARING AND GRUBBING

Paragraph		Page
1.	GENERAL	1
	1.1 Description.....	1
	1.2 Related Sections.....	1
	1.3 References	1
2.	PRODUCTS - Not Used	1
3.	EXECUTION.....	1
	3.1 Clearing	1
	3.2 Grubbing	2
	3.3 Disposal of Debris	2
4.	MEASUREMENT AND PAYMENT	2
	4.1 Measurement	2
	4.2 Payment	2

SECTION 311100 CLEARING AND GRUBBING

1. GENERAL

1.1 DESCRIPTION

- A. The work covered by this section consists of furnishing all labor, equipment, and materials necessary to perform the clearing and grubbing, salvage of trees for reuse as log structures, and the filling of all grubbing holes, as specified, as shown on the Drawings, or as directed by the Engineer.

1.2 RELATED SECTIONS

- A. Section 015000, Mobilization
- B. Section 312316, Stripping and Excavation
- C. Section 312323, Engineered Fill
- D. Section 354200, Log Structures

1.3 REFERENCES

- A. State of Oregon, Department of Transportation (ODOT) State Standard Specifications, current edition.

2. PRODUCTS - Not Used

3. EXECUTION

3.1 CLEARING

- A. General. All work shall comply with Section 00320, Clearing and Grubbing of the Standard Specifications.
- B. All trees, stumps, down timber, snags, brush, vegetation, old piling, stone, concrete rubble, abandoned structures, and similar debris shall be cleared within the limits of the construction extents, unless otherwise shown on the Drawings or directed by the Engineer.
- C. In areas where grubbing is not required, the clearing operations shall consist of the complete removal of all obstructions above the ground surface.
- D. Trees. Where trees are approved by the Owner's representative for removal, trees shall be salvaged with the trunk intact with the rootwad for reuse as Log Structures.
- E. Vegetation. Vegetation to be removed shall consist of all heavy growth of brush and woody vegetation, unless shown otherwise on the Drawings or directed by the Engineer.
- F. Debris Removal. Abandoned foundations, rip rap, drainage materials, debris, and other unsuitable material and any other debris designated for removal on the Drawings shall be removed and disposed of in accordance with this section. Buried unsuitable debris

encountered during excavations shall be removed and disposed of in accordance with Section 312316, Stripping and Excavation.

3.2 GRUBBING

- A. General. Grubbing shall consist of the removal of all stumps, roots, buried logs, old piling, old paving, concrete, abandoned utilities, timbers, fencing, and other objectionable matter encountered.
- B. Limits. Except as noted on the Drawings, the entire area within the limits of the footprint of proposed berm stabilization and reinforcement areas, shall be thoroughly grubbed.
- C. Filling of Holes. All holes caused by grubbing operations, except in borrow areas, shall be excavated with 3 to 1 (horizontal to vertical) side slopes in conformance with Section 312316, Stripping and Excavation. The excavation shall then be backfilled with compacted embankment material in conformance with Section 312323, Engineered Fill.

3.3 DISPOSAL OF DEBRIS

- A. Cleared and Grubbed Materials. Except as hereinafter specified or otherwise indicated on the Drawings, all concrete, asphalt, treated timbers, and other non-organic debris which are the products of the clearing and grubbing operations shall be disposed of off-site. Remove any or all of the products of clearing and grubbing operations from the site and dispose of the material at other locations or through other sources arranged for, by, and at the expense of the Contractor, in accordance with applicable laws and ordinances.
- B. Clean organic plant material products of the clearing and grubbing operations not designated for salvage may be chipped and disposed of on site at the location shown on the Drawings, or as specified by the Owner’s Representative.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Clearing and Grubbing will be measured as a lump sum pay item.

4.2 PAYMENT

- A. Clearing and Grubbing will be paid for at the lump sum contract price, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to complete the clearing and grubbing operation as specified, including disposal or salvage of materials, and restoration of ground surfaces.
- B. Removal and disposal of buried debris, not encountered during grubbing operations, will be paid for in accordance with Section 312316, Excavation – Unsuitable Debris.
- C. Payment will be made under:

Pay Item

Pay Unit

Clearing and Grubbing

Lump Sum (LS)

END OF SECTION

INDEX
SECTION 312316
STRIPPING AND EXCAVATION

Paragraph	Page
1. GENERAL	2
1.1 Description	2
1.2 Related Sections.....	2
1.3 References	2
1.4 Quality Assurance	3
2. PRODUCTS.....	3
A. Materials - Section not used	3
3. EXECUTION.....	3
3.1 General.....	3
3.2 Stripping.....	3
3.3 Excavation.....	3
3.4 Unclassified Excavation.....	4
3.5 Preconstruction Potholing	4
4. MEASUREMENT AND PAYMENT	5
4.1 Measurement	5
4.2 Payment	5

SECTION 312316

STRIPPING AND EXCAVATION

1. GENERAL

1.1 DESCRIPTION

- A. The work covered by this section consists of furnishing all labor, equipment, materials, and performing all operations necessary to complete Stripping and Excavation, as specified, as shown on the Drawings, or as directed by the Engineer. Work includes, but is not limited to the following:
 - 1. Construction Staking.
 - 2. Stripping for removal of vegetation and surface organics.
 - 3. Excavation for removal of unsuitable material.
 - 4. Channel Excavation.
 - 5. Excavation for pipe installation.
 - 6. Excavation for berm stabilization.
 - 7. Other miscellaneous excavation incidental to the construction of the improvements.
- B. This section also covers performance of pre-construction potholing to confirm soil suitability for Engineered Fill with the Geotechnical Engineer.
- C. Over-excavation for placement of RSP or culverts is not included within this section but is considered incidental to the work for which it is required.

1.2 RELATED SECTIONS

- A. Section 017123.16, Construction Surveying
- B. Section 311100, Clearing and Grubbing
- C. Section 312323, Engineered Fill
- D. Section 354237, Rock Slope Protection

1.3 REFERENCES

- A. State of Oregon, Department of Transportation (ODOT) State Standard Specifications (current edition).
- B. Surveys. All construction staking shall be performed by the Contractor, in accordance with Section 017123.16, Construction Surveying. The Owner shall provide control points at the

locations shown on the Drawings. Control points disturbed by the Contractor shall be replaced by the Contractor, at his sole expense

1.4 QUALITY ASSURANCE

- A. Comply with all applicable permits and regulations.
- B. Provide necessary construction staking and references points, as required to meet the specified tolerances for the work.

2. PRODUCTS

- A. **MATERIALS - SECTION NOT USED.**

3. EXECUTION

3.1 GENERAL

- A. Protect existing utilities in performing any excavation work.
- B. Comply with all permit conditions in performing any excavation work.
- C. Perform an independent earthwork estimate for the purpose of preparing bid prices for earthwork. Quantities indicated on the Drawings are approximate estimates provided only for permitting purposes and are not suitable for bidding purposes.
- D. The bid price shall include costs for any necessary transport disposal of excess or unsuitable earth materials to the on-site locations shown in the plans or as directed by the Engineer.

3.2 STRIPPING

- A. Stripping. Strip surfaces of excavations and fill foundations of heavy growth of crops, grass, weeds and other vegetation as specified in Section 311100, Clearing and Grubbing. Greater depths of stripping may be necessary in selected areas to remove vegetation, as determined by the Engineer.

3.3 EXCAVATION

- A. General. Excavations shall extend into firm, undisturbed native soils. Excavation shall consist of removal of material for embankment foundation preparation, mass excavation and finish grading of the channel and slope improvements, and other miscellaneous excavations to the lines and grades shown on the Drawings, or as directed by the Engineer. In the event that organic materials, yielding sub-grade (pumping) or other deleterious materials are encountered during foundation excavations, they shall be removed as directed by the Engineer.

- B. Control of Water. Water control shall be performed in accordance with project permit conditions and Dewatering, Section 312319 of these Specifications. When water is encountered, either ground water or surface runoff, the Contractor shall furnish, install, maintain, and operate all necessary machinery and equipment required to keep the excavation reasonably free from water, as approved by the Engineer, until the placement backfill material has been completed, inspected, and approved, and all danger of flotation and other damage is removed. Water pumped from the excavation shall be disposed of in such manner as will not cause injury to public or private property, or constitute a nuisance or menace to the public, and the disposal method shall be subject to the approval of the Engineer. Water shall be controlled until work is complete.
- C. Excess Excavation. Care shall be exercised by the Contractor not to excavate below the grades shown on the Drawings, except as specified herein, and as directed by the Engineer. All excavations in excess of the grades shown on the Drawings which are not directed by the Engineer shall be backfilled with compacted embankment at the Contractor's expense, per Section 312323, Engineered Fill.
- D. Temporary Excavations. With exposure and drying, on-site soils may experience progressive sloughing if excavated near vertical and left un-shored during construction. Engineer suggests that the soils on-site should be considered Type C when applying OSHA regulations.
- E. Tolerances. The excavation tolerance shall typically be +0.1 feet to -0.2 feet from the grades shown on the Drawings, except within the low flow channel, where excavation tolerance shall be +0.1 feet to -0.1 feet from the elevations shown on the Drawings.

3.4 UNCLASSIFIED EXCAVATION.

- A. Unclassified Excavation. Unclassified excavation shall consist of the excavation and disposal of all material, regardless of its nature. Unclassified Excavation includes excavation required to reach finished grade. Over-excavation for the placement of materials (e.g. Rock Slope Protection, Log Structures, Pipes) or the removal of unsuitables, as described below under Excavation of Unsuitables, is not included in Unclassified Excavation.

3.5 PRECONSTRUCTION POTHOLING

- A. Preconstruction Potholing. Preconstruction potholing shall consist of providing equipment and an operator for ten (10) hours to excavate holes to at multiple locations in the floodplain where work is to be performed in coordination with the geotechnical engineer. These potholed areas shall be backfilled with the excavated material once the geotechnical engineer is finished with all inspections and sampling.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Stripping. Stripping will not be separately measured for payment.
- B. Unclassified Excavation. Unclassified Excavation will be measured by the cubic yard of Unclassified Excavation, based on the Dimensions shown on the Drawings. This is a neat-line quantity and does not consider the loose volume of the excavated material. Where the dimensions of any portion of the work are revised by the Engineer, or a portion of the work is eliminated, the change will be measured by the cubic yard.
- C. Preconstruction Potholing. Preconstruction Potholing will be measured on a lump sum basis.
- D. Supplemental Earthwork. Supplemental Earthwork, (including stripping, excavation, and on-site material disposal) at locations not shown on the Drawings at the direction of the Engineer will be measured by the hours of work performed round to the nearest 1 hour for work performed by the Contractor in the presence of the Owner's Representative.
- E. Other Miscellaneous Excavations. All other excavations will not be measured for payment.
- F. Surveys: Construction staking will not be separately measured for payment.

4.2 PAYMENT

- A. Stripping. No separate payment will be made for stripping. All costs in connection with this work will be considered incidental to the contract price per cubic yard for Excavation.
- B. Unclassified Excavation, measured as specified above, will be paid for at the contract unit price per cubic yard, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to complete Unclassified Excavation, as specified, including mass excavation and finish grading of channel banks and floodplains, to the lines and grades shown on the Drawings.
- C. Preconstruction Potholing, measured as specified above, will be paid for at the contract lump sum price, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to complete Preconstruction Potholing, as specified, including excavation and backfilling of the potholes as directed by the Engineer.
- D. Supplemental Earthwork, measured as specified above, will be paid for at the contract unit price per hour of work performed, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to complete the earthwork as specified, including excavation, all handling of materials, and disposal of unsuitable materials.

- E. No separate payment will be made for other miscellaneous grading incidental to the work. All costs in connection with this work will be considered incidental to the cost of construction of associated improvement.
- F. Surveys: No separate payment will be made for surveys or construction staking. All costs in connection with this work will be considered incidental to the contract price per cubic yard for Excavation.
- G. Mixing and transport of suitable materials for reuse shall be paid for under Engineered Fill, Section 312323.
- H. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Unclassified Excavation	Cubic Yard (CY)
Preconstruction Potholing	Lump Sum (LS)
Supplemental Earthwork	Hourly (HR)

END OF SECTION

INDEX
SECTION 312319
DEWATERING

Paragraph	Page
1. GENERAL	1
1.1 Description	1
1.2 Related Sections.....	1
1.3 Submittals	1
1.4 Quality Assurance	1
2. PRODUCTS.....	2
2.1 Materials	2
3. EXECUTION.....	2
3.1 General.....	2
3.2 Fish Removal	2
3.3 Sediment Control	2
3.4 Hazardous Material Control.....	2
3.5 Cofferdams.....	Error! Bookmark not defined.
3.6 Flow Bypass.....	Error! Bookmark not defined.
3.7 Dewatering.....	3
3.8 Water Levels During the Construction Period	3
3.9 Cleanup	3
3.10 Removal of Dewatering Facilities.....	4
4. MEASUREMENT AND PAYMENT	4
4.1 Measurement	4
4.2 Payment	4

SECTION 312319 DEWATERING

1. GENERAL

1.1 DESCRIPTION

- A. Furnish all labor, materials, equipment, and incidentals necessary to design, construct, operate, maintain, and remove all cofferdams, flumes shoring, diversions, filtration systems and/or other measures, including pumping, to dewater the construction site and to divert streamflow and other surface waters through or around the project area 24 hours a day during the entire field construction period, as shown on the Drawings, as specified, or as directed by the Engineer.
- B. Dewatering details on the Drawings (if provided) are schematic. The design and implementation of the Dewatering Plan is solely the responsibility of the Contractor. Contractor shall make their own independent evaluation of water sources (surface and groundwater) in preparing their Dewatering Plan.
 - 1. The Dewatering Plan shall include a description of how the work area will be isolated from the Coquille River during construction.
- C. Dewatering shall comply with all project permit conditions, applicable laws and local ordinances.

1.2 RELATED SECTIONS

- A. Section 015000, Mobilization and Demobilization
- B. Section 312316, Stripping and Excavation
- C. Section 312323, Engineered Fill
- D. Section 354237, Rock Slope Protection

1.3 SUBMITTALS

- A. The Contractor shall submit the following for review and approval of the Engineer:
 - 1. A Dewatering Plan listing materials, method of work, equipment to be used, methods for disposal of pumped water, provisions to prevent scour and erosion, provisions to prevent inundation of active work areas by the Coquille River, and the proposed schedule shall be submitted to the Engineer. Approval of the Engineer shall be required before the Contractor proceeds with water control measures.
 - 2. Product data for:
 - a) pumps
 - b) silt control filter fabric
 - c) washed rock
 - d) impervious liners
 - e) cofferdam material
 - f) turbidity curtains
 - g) other materials used in dewatering

1.4 QUALITY ASSURANCE

- A. Comply with all applicable permits and regulations.

- B. Comply with approved Hazardous Materials Control and Spill Prevention Plan, in accordance with Section 015000, Part 3.9.
- C. Notify Engineer 48 hours in advance of installation of temporary cofferdam(s) or diversion.
- D. Notify Engineer 48 hours in advance of removal of temporary cofferdam(s) or diversion.

2. PRODUCTS

2.1 MATERIALS

- A. General. The Contractor shall be responsible for sizing and design of temporary cofferdams, well points, pumps, drains, pipes and other diversion and dewatering facilities. Comply with Drawings and regulatory requirements.
- B. Imported Rock. Use only clean washed gravel. Sand will not be allowed.
- C. Dewatering Facilities. Provide and operate dewatering facilities of suitable size and capacity. The use of equipment shall be consistent with the manufacturer's recommendations.

3. EXECUTION

3.1 GENERAL

- A. Contractor is solely responsible for the design, construction, and maintenance and monitoring of the diversion and dewatering facilities. Comply with the Drawings, Specifications, and applicable permit conditions.

3.2 FISH REMOVAL

- A. Fish relocation to be provided by others (NIC). Provide the Owner 72 hours notice prior to dewatering operations to allow for removal of fish from the project area. Coordinate work with fish relocation experts.

3.3 SEDIMENT CONTROL

- A. General. Comply with Permits.
- B. Discharge of diverted flow. Unless otherwise specified, a diversion must discharge into the same natural drainage way in which its headworks are located. Where feasible, discharge to existing pools or onto bedrock or otherwise erosion resistant surfaces. Construct energy dissipators at diversion outlets, where necessary to prevent scour at point of discharge.
- C. Discharge of Seepage/Groundwater. Discharge water from the dewatered construction site either by gravity or pumping in a manner to prevent excessive turbidity from entering the receiving waters and to prevent scour and erosion outside of the construction site. Pumped water should be pre-filtered with a gravel pack around sumps for subsurface flows and a silt fence or hay bales around pumps for surface flow.
- D. Discharge pumped water into adjacent gravel bars, isolated local depressions, or temporary sediment basins. Where discharging water into the river will create excessive turbidity, route water through a sediment interceptor or other facilities to remove sediment from water.
- E. Isolation of Construction Area. Place turbidity curtains or cofferdams between construction area and flowing river channel, at all locations.

3.4 HAZARDOUS MATERIAL CONTROL

- A. General. Comply with the approved Hazardous Materials Control and Spill Prevention Plan (HMC&SPP) in accordance with Construction Facilities and Temporary Controls, Section 015000.
- B. Equipment and Lubricants. Steam-clean all equipment prior to its use. Inspect all equipment for cleanliness and fluid leaks prior to use and monitor during its use. Maintain equipment as required. Equipment refueling shall only take place in a designated, contained area.
- C. Isolation of Construction Area. Prior to performing work within flowing water, outside of cofferdams, install oil containment booms downstream of the work area. Maintain booms until completion of the work within the channel is complete.
- D. Spills. Maintain a supply of oil spill booms, sorbent pads, and other supplies to contain and clean spills. Comply with approved HMC&SPP should spills occur.

3.5 DEWATERING

- A. General. Remove water from construction area using pumping, well points, drains, or other approved methods. Discharge of water shall comply with Part 3.3.D of this Specification section. Construction water shall be segregated from seepage water and routed through sediment interceptors or other facilities to remove contaminants and sediment. Excavated slopes in the saturated soils may need to be retained, tied back, or otherwise stabilized.
- B. Well Points. Well points shall be designed to preclude the loss of fine soil by gravel packing or other suitable means.
- C. Pumping Facilities. All pump intakes shall be screened to prevent the entrainment of fish, in accordance with project permit conditions. Pumps and discharge piping shall be suitable for the type of service provided and shall be a sufficient size and capacity to satisfactorily dewater work areas.
- D. Power Supply. Consider the availability and reliability of power sources for dewatering operation in dewatering system design and make provisions for temporary or backup power supply as deemed necessary. Where the primary diversion is operated by pumping, provide a backup system with automatic controls capable of starting the backup upon failure of the primary system.
- E. Groundwater. Dewatering shall maintain water surfaces below the base of temporary excavations or trenches, to allow for visual inspection of the work, if requested by the Engineer. Lower groundwater tables within excavations for structures to a minimum of two (2) feet below foundations or as otherwise required to establish a firm, stable foundation. Control groundwater within excavation until completion of backfill operations.

3.6 WATER LEVELS DURING THE CONSTRUCTION PERIOD

- A. The Contractor shall be responsible for making an independent evaluation of site conditions. The Contractor's dewatering plan shall address all potential sources of surface and groundwater, including but not limited to streamflow (natural or managed), backwatering of the channel from downstream blockages, domestic water lines, storm drain outfalls, irrigation tailwater, industrial discharges, seepage, and direct rainfall.
- B. Construction Dewatering. Groundwater in excavations is discussed in the Geotechnical Report identified in Engineered Fill, Section 312323.

3.7 CLEANUP

- A. Thoroughly clean up area to remove debris and contaminated materials. Remove fine sediments and restore disturbed area prior to removal of the dewatering facilities. Clean and

round river run gravels or cobbles, if used in cofferdam construction, may be spread in the creek channel in lieu of removal, provided grading will not interfere with facility operation.

3.8 REMOVAL OF DEWATERING FACILITIES

- A. Prior to removal of the dewatering facilities, complete the following activities:
 - 1. Complete required tests and inspections.
 - 2. Thoroughly cleanup work site.
 - 3. Perform final walkthrough with Engineer.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Dewatering will be measured for payment on a lump sum basis.

4.2 PAYMENT

- A. Dewatering will be paid for at the lump sum contract price for Dewatering, which price will include payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the dewatering operations, as specified, including temporary cofferdams, pumping, silt control, filter fabric, sediment control, erosion control, removal of muck, disposal of materials, and removal of dewatering facilities.

<u>Pay Item</u>	<u>Pay Unit</u>
Dewatering	Lump Sum (LS)

END OF SECTION

INDEX
SECTION 312323
ENGINEERED FILL

Paragraph	Page
1. GENERAL	1
1.1 Description	1
1.2 Related Sections.....	1
1.3 References	1
2. PRODUCTS.....	2
2.1 Materials	2
3. EXECUTION.....	2
3.1 Engineered Fill Construction.....	2
3.2 Cross Sections and Zoning of Materials	4
3.3 Finish	4
3.4 Roads and Ramps.....	4
3.5 Grade Tolerances	5
3.6 Slides	5
3.7 Special Measures	5
4. MEASUREMENT AND PAYMENT	5
4.1 Measurement	5
4.2 Payment	5

SECTION 312323 ENGINEERED FILL

1. GENERAL

1.1 DESCRIPTION

- A. The work covered by this section consists of furnishing all plant, labor, and materials, and performing all operations necessary for the construction of Engineered fills (unless separately designated elsewhere), including surveying, salvage of soil, subgrade preparation, furnishing, loading, and on-site and off-site hauling of materials, processing, screening placement and compaction of Engineered Fill materials, construction of ramps, and other incidental earthwork as may be necessary to complete the Engineered Fills, as specified in the Geotechnical Report, as shown on the Drawings, as specified, or as otherwise directed by the Engineer.
- B. All grading shall comply with Section 00300 of the Standard Specifications, and with the recommendations of the Geotechnical Investigation. Prior to beginning work, the Contractor shall be familiar with the geotechnical investigation. In the event of discrepancy between the report and the notes herein, the report shall prevail. It shall be the responsibility of the Contractor to visit the site and make his own interpretations with regard to materials, methods and equipment necessary to perform the work required for this project.
- C. Temporary erosion control and BMP's shall be installed and approved by the Engineer prior to beginning Engineered Fill Construction.
- D. The Contractor is responsible to locate, identify, and protect all existing utilities from damage.
- E. Surveys. All construction staking shall be performed by the Contractor. Survey control points are shown on the Drawings.

1.2 RELATED SECTIONS

- A. 017123.16, Construction Surveying
- B. Section 312319, Dewatering
- C. Section 311100, Clearing and Grubbing
- D. Section 312316, Stripping and Excavation

1.3 REFERENCES

- A. Geotechnical Engineering Investigation by:
Pali Consulting, Inc.
1410 Washington St., Suite 191
Oregon City, OR 97045
503-502-0820
Job No. 014-18-001
Dated: January 28, 2019

- B. American Society for Testing of Materials (ASTM) Standards:
 - D1556 Test Method for Density of Soil in Place by the Sand Cone Method
 - D1557 Test Method for Moisture-Density Relations of Soils and Soil-Aggregate Moistures Using 10 lb (4.54 kg) Rammer and 18-inch (457 mm) Drop
 - D2974 Test Method for the Organic Content of Soils
 - D2922 Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth)
 - D3017 Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shall Depth)
 - D4318 Test Method for the Liquid Limit and Plastic Limit of Soils
 - D422C Particle-Size Analysis of Soils
- C. Design and Construction of Levees, EM 1110-2-1913, US Army Corps of Engineers, April 30, 2000.
- D. Oregon Standard Specifications for Construction, Oregon Department of Transportation, current edition.
- E. NRCS Construction Specification 903 – Engineered Fill, current edition.

2. PRODUCTS

2.1 MATERIALS

- A. Engineered Fill Materials. To the extent they are needed, all suitable materials from the specified excavations shall be used in the construction of required permanent engineered fill. The suitability of materials for specific purposes will be subject to the approval of the Engineer, in conformance with these specifications. Materials used for engineered fill shall be salvaged during excavation at the direction of the Geotechnical Engineer.
- B. Surplus Materials. All surplus or unsuitable excavated materials will be designated as waste and shall be disposed in accordance with Section 312316, Excavation.

3. EXECUTION

3.1 ENGINEERED FILL CONSTRUCTION

- A. General. Compacted Engineered Fill in Engineered Fills shall be placed in the dry and compacted as specified herein.
- B. Subgrade Preparation. Following Clearing and Grubbing, the subgrade surfaces shall be graded to remove surface irregularities and shall be scarified parallel to the axis of the fill and loosened to a minimum depth of 2 inches. The moisture content of the loosened material shall be controlled as specified for the Engineered Fill, and the surface materials of the subgrade shall be compacted and bonded with the first layer of Engineered Fill.
- C. Earth abutment surfaces shall be free of loose, uncompacted earth in excess of two

inches in depth normal to the slope and shall be at such a moisture content that the Engineered Fill can be compacted against them to ensure a good bond between the fill and the abutments. Subgrade and abutment surfaces shall not be steeper than 1 horizontal to 1 vertical. The sites of the borrow area shall be stripped to sufficient depth to remove all vegetation, roots, brush, sod and other objectionable material. Clearing and disposal methods shall be in accordance with applicable state and county laws with due regards to the safety of persons and property. Fill shall not be placed until the required excavation and subgrade preparation has been completed.

- D. Fill shall not be placed on or in standing water, nor upon a frozen surface, nor shall snow, ice, or frozen material be incorporated in the fill.
- E. If soft, wet, or pumping subgrade soils are present, the required minimum level of compaction for the initial fill lift may be reduced, subject to approval of the Geotechnical Engineer. The intent of the reduction is to limit the amount of construction traffic that could lead to further deterioration and destabilization of the exposed subgrade and to build a more stable pad upon which to place subsequent fill lifts.
- F. Horizontal Layer Construction. The compacted Engineered Fill shall be constructed to a sufficient section so as to achieve the required compaction throughout the finished section. Materials to be compacted shall be placed or spread in layers not more than 24 inch loose thickness prior to compaction. Materials excavated to form keyways or over-excavations, and suitable for use as Engineered Fill, shall be blended uniformly with other excavated soils or disposed of. All fill placed on slopes steeper than 5 horizontal to 1 vertical shall be keyed and. If the surface of any layer becomes too hard and smooth for proper bond with the succeeding layer, it shall be scarified parallel to the axis of the fill to a depth of not less than 2 inches before the next layer is placed. Fill placed around structures will be brought up at approximately uniform height on all sides of the structure.
- G. Compaction. When, in the opinion of the Engineer, the surface of any compacted layer is too smooth to bond properly with the succeeding layer, it shall be scarified to a depth of 6 inches before the succeeding layer is placed thereon. Construction equipment shall be operated over each layer of fill to ensure that the required compaction is obtained to the satisfaction of the Engineer. Special equipment shall be used if needed to obtain the required compaction. Heavy compaction equipment shall not be operated within 2 feet of any structure. Fill adjacent to structures, pipe, conduits, and anti-seep collars shall be compacted to a density equivalent to that of the surrounding fill by means of hand tampers or plate vibrators. Hand directed tampers or compactors shall be used on areas not accessible to heavy compaction equipment, fills compacted in this manner shall be placed in layers not greater than 4 inches in thickness before compaction, and shall meet the same density requirement as for the adjacent area. All compaction testing shall be performed by the Owner, unless otherwise noted. The cost of re-testing of areas that have failed to meet specified compaction requirements shall be borne by the Contractor.
- H. At the discretion of the Engineer, the top 18 inches of fill, within areas specified to receive revegetation treatments, may be compacted to a lesser degree to facilitate plant establishment. Prior to seeding, the surface shall be prepared as specified in Section 329200, Seeding.

- I. Moisture Control. The moisture shall be uniformly distributed throughout the layer prior to compaction. If the material is not within the required moisture content, the Contractor will be required to moisture condition the soil. The moisture conditioning of fill materials shall be performed prior to placement in the section. The final minor moisture conditioning may be made on the fill, as required. Harrowing, or other approved methods will be required to work the moisture into the material until a uniform distribution of moisture is obtained. Water applied on a layer of fill shall be accurately controlled in amount and distribution so that free water will not appear on the surface during or subsequent to rolling. If the material is too wet for proper compaction or soft and yielding sub-grade is experienced (pumping), the Contractor will be required to aerate the material to a moisture content within the desired limits prior to compaction. If the top surface of the preceding layer of compacted fill or a subgrade or abutment surface in the zone of contact with the fill becomes too dry to permit suitable bond, it shall either be removed or scarified and moistened to an acceptable moisture content prior to placement of the next layer of fill.
- J. Dressing. Engineered Fill slopes shall be dressed by over-building and cutting back to the required grade. The Contractor may compact the shoulder of each lift during the placement of fill materials to assist in the subsequent dressing of the slopes.

3.2 CROSS SECTIONS AND ZONING OF MATERIALS

- A. Standard Engineered Fill Sections. The dimensions, slopes, and zoning of materials shall conform to the sections shown on the Drawings and specified herein.
- B. Zoning of Materials. Unless otherwise specified, the Engineered Fill materials shall be homogeneous. The Engineered Fill shall be free of pockets, lenses, streaks, layers, etc. of different materials.

3.3 FINISH

- A. The finished grades shall transition naturally into adjacent existing grades to provide a functional and naturalistic finished surface. Due to the complex nature of the project and the desired aesthetic and functional features, not all details can be accurately represented on the Drawings. As a result, the Contractor may be directed by the Engineer to make minor adjustments to finish grades to best achieve these results. These adjustments may include smoothing or rounding conforms, or changing slope angles or daylight points as necessary to conform to the variable geometry inherent in natural topography. Compensation for this work shall be considered as included in the price paid for the various contract items of work involved, and no additional compensation will be allowed.
- B. After the placement of the engineered fills and spoils, the sides and top shall be dressed by final passage of compaction equipment or by dragging to give a smooth surface. The surface area shall be graded to provide surface drainage to flow to desired locations.

3.4 ROADS AND RAMPS

- A. Maintain Access. At locations where access roads to existing facilities are destroyed because of the work required under this contract, the Contractor shall provide temporary roads, if directed by the Engineer, to give access to fields and buildings during the construction period. Such facilities shall be removed to the extent required

by the Engineer.

- B. Temporary Haul Roads. Temporary haul roads shall be constructed as required to transport materials from borrow source or excavation to Engineered Fill site. Temporary ramps to be constructed for the Contractors convenience need not comply with these foundation preparation and Engineered Fill construction requirements. Unless otherwise directed by the Engineer, temporary ramps shall be removed prior to completion of the work.

3.5 GRADE TOLERANCES

- A. Engineered Fill:
 - 1. General. Engineered Fills shall be constructed to the net grade and cross section shown on the Drawings.
 - 2. Grade Tolerances. At all points a tolerance of 0.2 (two-tenths) foot above, and 0.1 (zero) foot below the prescribed grade will be permitted in the final dressing, provided that any excess material is so distributed that the crown of the Engineered Fill drains in the desired direction and that there are no abrupt humps or depressions in surfaces. However, this tolerance above grade may be modified at locations where, in the opinion of the Engineer, such modifications will not impair the design or appearance of the project.

3.6 SLIDES

- A. In the event of the sliding of any part of the Engineered Fill during its construction, or during the one year period after acceptance, the Contractor shall, upon written order of the Engineer, cut out and remove the slide and then rebuild that portion of the Engineered Fill.

3.7 SPECIAL MEASURES

- A. Measures and construction methods shall be incorporated as needed and practical that enhances fish and wildlife values. Special attention shall be given to protecting visual resources and maintaining key shade, food, and den trees.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Engineered Fill. Engineered Fill will be measured by the cubic yard of Engineered Fill placed based on the Dimensions shown on the Drawings. This is a finished surface and does not take into account the loose volume of the material prior to compaction.

4.2 PAYMENT

- A. Engineered Fill, measured as specified above, will be paid for at the contract unit price per cubic yard, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and doing all work necessary to construct compacted Engineered Fills as specified, including hauling of excavated materials from the source.
- B. No payment will be made for the Engineered Fill foundation preparation, shrinkage of material or materials placed above the net grades and slopes as allowance for shrinkage.

- C. No separate payment will be made for incidental grading beyond the projected toe of the Engineered Fill cross section. The cost for this work shall be included in contract unit price for compacted Engineered Fill.
- D. No payment will be made for construction or removal of temporary roads or ramps.
- E. No additional payment will be made for costs associated with stabilizing unstable materials. The cost for this work shall be included in contract Lump Sum price for compacted Engineered Fill.
- F. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Engineered Fill	Cubic Yard (CY)

END OF SECTION

INDEX
SECTION 313519.16
SLOPE PROTECTION FABRIC

Paragraph	Page
1. GENERAL	1
1.1 Description	1
1.2 Related Sections.....	1
1.3 References	1
1.4 Submittals	1
1.5 Delivery, Storage, and Handling	2
1.6 Quality Assurance	2
2. PRODUCTS.....	2
2.1 Slope Protection Fabric.....	2
2.2 Stakes.....	3
3. EXECUTION.....	3
3.1 Preparation	3
3.2 Installation	4
3.3 Inspection and Maintenance	4
4. MEASUREMENT AND PAYMENT	4
4.1 Measurement	4
4.2 Payment	5

SECTION 313519.16

SLOPE PROTECTION FABRIC

1. GENERAL

1.1 DESCRIPTION

- A. Work under this section includes furnishing all labor, materials, equipment, and incidentals to install and maintain Slope Protection Fabric to protect newly constructed or excavated and seeded soil slopes, as shown on the Drawings, and as specified herein, or as otherwise directed by the Engineer.

1.2 RELATED SECTIONS

- 1. Section 015000, Mobilization and Demobilization
- 2. Section 015713.01, Fiber Rolls
- 3. Section 312316, Stripping and Excavation
- 4. Section 312232, Engineered Fill
- 5. Section 329200, Seeding

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
 - 1. D1117 – Standard Guide for Evaluating Nonwoven Fabrics
 - 2. D6241 - Standard Test Method for Static Puncture Strength of Geotextiles and Geotextile-Related Products Using a 50-mm Probe
 - 3. D6475 - Test Method for Measuring Mass Per Unit Area of Erosion Control Blankets.
 - 4. D6525 - Standard Test Method for Measuring Nominal Thickness of Rolled Erosion Control Products.
 - 5. D6567 – Standard Test Method for Measuring the Light Penetration of a Turf Reinforcement Mat (TRM)
 - 6. D6818 - Standard Test Method for Ultimate Tensile Properties of Rolled Erosion Control Products

1.4 SUBMITTALS

- A. Submit to the Engineer, for review and approval, the following manufacturer's data and certification's:
 - 1. A certificate stating the name of the Slope Protection Fabric manufacturer, product name, style, chemical compositions of filaments or yarns and other pertinent information to fully describe the geotextile.
 - 2. A certificate stating that the furnished products meet requirements of the Specification as evaluated under the manufacturer's quality control program. The certificate shall be attested to by a person having legal authority to bind the Manufacturer.
- B. Independent Performance Test Results shall be provided upon request.

- C. The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the Specification. Documentation describing the quality control program shall be made available upon request.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Slope Protection Fabric labeling, shipment and storage shall follow ASTM D 4873.
- B. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.
- C. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.
- D. Each Slope Protection Fabric roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.
- E. The protective wrapping shall be maintained during periods of shipment and storage.
- F. During storage, Slope Protection Fabric rolls shall be elevated off the ground and adequately covered to protect them from the following: Site construction damage, extended exposure to ultraviolet (UV) radiation, precipitation, chemicals that are strong acids or strong bases, flames, sparks, temperatures in excess of 71 deg C (160 deg F) and any other environmental condition that might damage the Slope Protection Fabric.

1.6 QUALITY ASSURANCE

- A. Slope Protection Fabric shall be subject to sampling and testing to verify conformance with this Specification. Sampling for testing shall be in accordance with ASTM D 4354.
- B. Acceptance shall be in accordance with ASTM D 4759 based on testing of either conformance samples obtained using Procedure A of ASTM D 4354, or based on manufacturer's certifications and testing of quality control samples obtained using Procedure B of ASTM D 4354.
- C. Sewn Seams (if required):
 - 1. For seams that are to be sewn in the field, the Contractor shall provide at least a 2 meter (six-foot) length of sewn seam for sampling by the Engineer before the fabric is installed.
 - 2. For seams that are sewn in the factory, the Engineer shall obtain samples of the factory seams at random from a roll of geotextile that is to be used on the project.
 - 3. If seams are to be sewn in both directions, samples of seams from both directions shall be provided.
 - 4. For seams that are field sewn, the seams sewn for sampling shall be sewn using the same equipment and procedures as will be used for the production seams.
 - 5. The seam assembly description shall be submitted by the Contractor along with the sample of the seam. The description shall include the seam type, sewing thread, and stitch density.

2. PRODUCTS

2.1 SLOPE PROTECTION FABRIC

- A. Fabric. Slope Protection Fabric shall be Geocoir 700 by Belton Industries, or equivalent, meeting the following material Specifications:

<u>Property</u>	<u>Test Method</u>	<u>Typical</u>
Thickness	ASTM D6525	396 mils
Mass per Unit Area	ASTM D6475	18.96 oz/yd ² (903 g/m ²)
Water Absorption	ASTM D1117	184%
Light Penetration	ASTM D6567	36%
MD Tensile Strength	ASTM D6818	102.8 lbs/in (18.0 kN/m)
MD Elongation	ASTM D6818	45.1%
TD Tensile Strength	ASTM D6818	75.8 lbs/in (13.3 kN/m)
<u>TD Elongation</u>	<u>ASTM D6818</u>	<u>40.3%</u>

MD – Machine Direction

TD – Transverse Direction

2.2 STAKES

- A. Stakes shall be shaped hardwood pins designed to safely and effectively secure the slope stabilization fabric. The wood stake must exhibit ample rigidity to enable being driven into hard ground, with sufficient flexibility to resist breakage. The wood stake shall be the Tensar (North American Green) Eco-Stake or approved equal, with the following dimensions:

Leg Length:	11.00 in
Head Width:	1.25 in.
Head Thickness:	0.40 in.
Leg Width:	0.60 in. (tapered to a point)
Leg Thickness	0.40 in.
Total Length:	12.0 in

3.EXECUTION

3.1 PREPARATION

- A. Grade and compact areas to be treated with Slope Protection Fabric as specified or as directed by Engineer.
- B. Remove large rocks, soil clods, vegetation, and other sharp objects that could keep Slope Protection Fabric from intimate contact with subgrade.
- C. Prepare seedbed by loosening the upper 50 to 75 mm (two to three inches) of soil.

- D. Apply seed and mulch in accordance with Section 329200 to the scarified surface prior to installation of Slope Protection Fabric.
- E. Construct 150 x 150 mm (six-inch x six-inch) anchor trench at top of slope.

3.2 INSTALLATION

- A. Install Slope Protection Fabric at elevation and alignment indicated.
- B. Extend Slope Protection Fabric two to three feet over crest of slope, secure into a six-inch x six-inch trench with a row of staples/stakes approximately 12 inches apart in the bottom of the trench. Backfill and compact the trench after stapling. Apply seed to compacted soil and fold remaining 12 inch portion of Slope Protection Fabric's back over seed and compacted soil. Secure Slope Protection Fabric over compacted soil with a row of staples/stakes spaced approximately 12 inches apart across the width of the Slope Protection Fabric. Embed the entire perimeter within a key trench.
- C. Unroll Slope Protection Fabric downslope. Consecutive rolls spliced down or along the slope must be placed end over end (shingle style) with 12 inches overlap. Staple through overlapped area, approximately 12 inches apart across entire Slope Protection Fabric's width.
- D. Secure Slope Protection Fabric to slope with ground anchoring devices in accordance with the manufacturer's recommendations for the application (slope or channel).
- E. Where Slope Protection Fabric abuts against rock slope protection or other rock placements, the Slope Protection Fabric shall be placed under the first course of adjacent rock and also staked per section 3.2D.
- F. Alternate installation methods must be approved by Engineer prior to execution.

3.3 INSPECTION AND MAINTENANCE

- A. The Contractor shall inspect Slope Protection Fabric immediately after each rainfall, and at least daily during prolonged rainfall. Any deficiencies shall be immediately corrected by the Contractor.
- B. The Contractor shall also make a daily review of the location of Slope Protection Fabric in areas where construction activities have altered the natural contour and drainage runoff to ensure that the Slope Protection Fabric is properly located for effectiveness. Where deficiencies exist as determined by the Engineer, repairs or replacement shall be performed as directed by the Engineer.
- C. Damaged or otherwise ineffective Slope Protection Fabric shall be repaired or replaced promptly.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Slope Protection Fabric will be measured by the square yard of slope protection fabric installed in accordance with the Drawings, as specified, or as directed by the Engineer. Measurements will be taken parallel to the finished surface. No additional payment will be made for seams, overlaps, anchor trenches, or wastage.

4.2 PAYMENT

- A. Slope Protection Fabric will be paid for at the contract unit price per square yard, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing fabric, complete in place, including trench excavation and backfill, and maintenance, as shown on the Drawings, as specified herein, or as directed by the Engineer.

<u>Pay Item</u>	<u>Pay Unit</u>
Slope Protection Fabric	Square Yard (SY)

END OF SECTION

INDEX
SECTION 321123
AGGREGATE BASE

Paragraph	Page
1. GENERAL	1
1.1 Description	1
1.2 Related Sections.....	1
1.3 References	1
1.4 Submittals	1
1.5 Project Conditions.....	1
2. PRODUCTS.....	1
2.1 Materials	1
3. EXECUTION.....	1
3.1 Placing, Compacting, and Finishing	1
3.2 Field Quality Control	2
4. MEASUREMENT AND PAYMENT	2
4.1 Measurement	2
4.2 Payment	3

SECTION 321123 AGGREGATE BASE

1. GENERAL

1.1 DESCRIPTION

- A. The work covered by this section consists of furnishing all plant, labor, and material and performing all operations necessary for placing aggregate base as specified, as shown on the Drawings, or as otherwise directed by the Engineer.

1.2 RELATED SECTIONS

- A. Section 312316, Stripping and Excavation
- B. Section 312323, Engineered Fill

1.3 REFERENCES

- A. Oregon Standard Specifications for Construction, Oregon Department of Transportation, current edition.

1.4 SUBMITTALS

- A. Submit to the Engineer for review, the following:
 - 1. Source of aggregates
 - 2. Test results, performed within the last six (6) months, showing that the aggregates conform to all the material requirements specified herein.
 - 3. Certified weights of aggregate base rock delivered to the site.

1.5 PROJECT CONDITIONS

- A. Aggregate shall be placed when the atmospheric temperature is above 35 degrees Fahrenheit. Areas of completed base course that are damaged by freezing, rainfall, or other weather conditions shall be corrected to meet specified requirements.

2. PRODUCTS

2.1 MATERIALS

- A. Aggregate Base rock shall be stone embankment material conforming to Section 00330.16 of the State Standard Specifications with a maximum rock size of 4 inches.

3. EXECUTION

3.1 PLACING, COMPACTING, AND FINISHING

- A. Preparation of Subgrade. Prior to constructing the aggregate base course, the sub-grade shall be cleaned of all foreign substances. The sub-grade then shall be scarified to a depth of 6 inches, moisture conditioned, and compacted. Ruts or soft, yielding spots shall be corrected by loosening and removing soft or unsatisfactory material and by adding approved material, reshaping to line and grade, and recompacting.

- B. Grade Control. During construction, the lines and grades including crown and cross slope indicated for the aggregate base course shall be maintained by means of line and grade stakes placed by the Contractor.
- C. Placing. The mixed material shall be placed on the prepared subgrade in layers of uniform thickness with a suitable spreader. No layer shall exceed 6 inches or be less than 3 inches when compacted. The layers shall be so placed that when compacted they will be true to the grades or levels required with the least possible surface disturbance. Such adjustments in placing procedures or equipment shall be made as may be directed to obtain true grades, to minimize segregation and degradation, to adjust the water content, and to insure an acceptable base course.
- D. Compaction. In all places not accessible to the rollers, the aggregate base course material shall be compacted with mechanical tampers.
- E. Finishing. The surface of base course shall be finished after final compaction by cutting any overbuild to grade and rolling with a steel-wheeled roller. In no case shall thin layers of material be added to the top layer of base course to meet grade. If the elevation of top layer of base course is one inch or more below the grade, the top layer of base shall be scarified to a depth of at least three inches, new material shall be added, and the layer shall be blended and recompacted to bring to grade. Adjustments in rolling and finishing procedures shall be made as may be directed to obtain grades, to minimize segregation and degradation of aggregate base course material, to adjust the water content, and to insure an acceptable aggregate base course. Material found unacceptable shall be removed and replaced, with acceptable material.

3.2 FIELD QUALITY CONTROL

- A. Smoothness. The surface of the aggregate base course shall not deviate more than one inch when tested with a ten-foot straightedge applied parallel with and at right angles to the centerline of the area covered. Deviations exceeding 2 inch shall be corrected as directed.
- B. Thickness. The completed thickness of the aggregate base course shall be within one half inch of the thickness indicated on the Drawings. The thickness of the aggregate base course will be measured at intervals providing at least one measurement for at least each 150 linear feet of aggregate base course. The depth measurement will be made by test holes at least three inches in diameter. Where the measured thickness of the aggregate base course is more than one half inch deficient, such areas shall be corrected by excavating and placing with additional material as specified in Article 3.02.C. The average job thickness shall be the average of the job measurements as specified above but within 3 inches of the thickness indicated.
- C. Rework. Where tests indicate the base course does not meet specified relative compaction, the material represented by the test shall be reworked and recompacted to the specified relative compaction. Reworked areas will be retested until they meet the specified relative compaction. The costs of all retests will be deducted from monies due or to become due the Contractor.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Aggregate Base will be measured for payment by the cubic yard, to the nearest full cubic yard. Quantities of aggregate base to be paid for by the cubic yard will be calculated on the basis of the dimensions shown on the Drawings, adjusted by the amount of any change ordered by the Engineer.

- B. Aggregate base for repair of roadways outside of construction footprint that are damaged by construction activities will not be separately measured for payment.

4.2 PAYMENT

- A. Aggregate Base will be paid for at the contract price per cubic yard, which price will be payment in full for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in constructing aggregate base, including subgrade preparation and subgrade compaction, as shown on the Drawings, and as specified, and as directed by the Engineer.
- B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Aggregate Base	Cubic Yard (CY)

END OF SECTION

INDEX
SECTION 323126
WIRE FENCES AND GATES

- 1. GENERAL 1
 - 1.1 Description 1
 - 1.2 Related Sections..... 1
 - 1.3 References 1
 - 1.4 Submittals 1
- 2. PRODUCTS..... 1
 - 2.1 Materials 1
- 3. EXECUTION..... 2
 - 3.1 Field Assembly: 2
- 4. MEASUREMENT AND PAYMENT 3
 - 4.1 Measurement 3
 - 4.2 Payment 3

SECTION 323126 WIRE FENCES AND GATES

1. GENERAL

1.1 DESCRIPTION

- A. Work under this Section includes furnishing all labor, materials, equipment, and incidentals to install wire fences (a.k.a. Livestock Fence), as shown on the Drawings, and as specified, or as directed by the Engineer.

1.2 RELATED SECTIONS

- 1. Section 311100, Clearing and Grubbing
- 2. Section 312323, Engineered Fill

1.3 REFERENCES

- A. Oregon Standard Specifications for Construction, Oregon Department of Transportation (current edition).
- B. NRCS Construction Specification RI-382(a) – Fences Barbed Wire, January 2010.

1.4 SUBMITTALS

- A. Submit to the Engineer for review, the manufacturer's data for the following fence components:
 - 1. Line Posts, Brace Posts, Post Backfill, Wire, Stays and Battens.

2. PRODUCTS

2.1 MATERIALS

- A. Line Posts
 - 1. At the Contractor's option, line posts shall be wooden or steel posts except where noted otherwise in this specification.
 - a. Wooden posts shall be 4" diameter lumber comprised of black locust, red cedar (mostly heartwood), redwood, and pressure treated pine or other wood of equal life and strength. Pressure treatment shall meet the requirements for ground contact.
 - b. Steel posts shall be painted or galvanized and weigh a minimum of 1.25 pounds per one foot of length. Lightweight stamped-steel posts shall not be allowed. The following steel posts are acceptable for line posts:
 - i. Style 1 – "T" Section 1-3/8" x 1-3/8" x 1/8" thick
 - ii. Style 2 – "U" Section 2" x 1-1/4" x 3/32"
 - iii. Style 3 – "L" Section 2" x 2" x 1/4"
- B. Brace Posts
 - 1. Vertical Brace Posts shall be 5" diameter lumber comprised of black locust, red cedar (mostly heartwood), redwood, and pressure treated pine or other wood of equal life and strength. Pressure treatment shall meet the requirements for ground contact.

2. Horizontal rail brace posts are to be 4" minimum diameter with length as shown on the Drawings.
- C. Post Backfill Material
 1. Post Backfill Material shall be Engineered Fill meeting the requirements of Section 312323.
- D. Wire
 1. Wire shall consist of class 3 galvanized 4-point barbs spaced not more than 5" apart. Galvanized barbed wire shall be fabricated from 12-1/2 gauge class 1 galvanized or better or 15-1/2 gauge class 3 galvanized strand wire and shall meet the requirements of ASTM A121. HT Class 3 barbed 15 ½ gauge wire meeting the requirement of ASTM A121 may also be used.
- E. Brace Wire
 1. Brace wire shall be high tensile, galvanized steel, or 9 gauge soft wire.

3. EXECUTION

3.1 FIELD ASSEMBLY:

- A. Clear fence alignment of brush and trees per Section 311100, Clearing and Grubbing. Clearing along stream banks shall be held to a minimum and no vegetation may be removed within the buffer area, except as required for stream crossings.
- B. Wire Fences shall be constructed per the drawings on pages 6 through 9 of the NRCS Construction Specification RI-382(a) – Fences Barbed Wire, January 2010, https://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs144p2_016341.pdf
- C. Posts. If hand set, all backfilled material shall be thoroughly tamped in 4" layers. Post holes shall be at least 6" larger than the diameter or side dimension of the posts.
 1. Line Posts
 - a. Maximum spacing between line posts shall be as shown on the Drawings.
 - b. All wooden line posts shall be set at least 30" below finished grade.
 - c. All steel line posts shall be driven to a depth as shown on the Drawings.
 - d. Every 50 feet or 4th line post in a row shall be wooden.
 2. Brace Posts

- a. Posts shall be set and maintained in a vertical position and set 3 feet into the ground.
- b. Horizontal rail brace posts shall be installed 8"-12" below the top of the vertical brace post.
- c. Single H Brace corners and end braces shall only be installed at the ends of straight fence spans of 165 feet or less.
- d. All corners, fence line ends and gate openings require Double H Brace assemblies, except that Single H Braces may be substituted in straight fence spans of 165 feet or less. A bend in the fence tighter than 20 degrees is considered a corner and not a "straight" pull brace.
- e. Double H Brace pull assemblies are required in straight fence spans at a maximum spacing of 660 feet.
- f. A fence adjoining an existing fence must terminate in a brace assembly as required above.

D. Wire

- 1. Barbed 3-wire fence shall be spaced as shown in the Drawings.
- 2. Wire shall be pulled taut and shall sag no more than 4" in the middle stretch of 100 feet (prior to attaching to posts).
- 3. The fencing wire shall be placed on the livestock side of line posts and on the outside of corners and posts in bends and braces in bends.
- 4. Each strand of barbed wire shall be attached to each wooden post using 9-gauge galvanized 1½" staples, driven diagonally with the grain of the wood and at a slight downward angle (except in dips). Staples shall not be driven tight to the post.
- 5. Wire splices shall be crimped or spliced with 8 wraps around the other ("Western Union Splice").
- 6. The wire shall be fastened to steel line posts with either 2 turns of 14 gauge galvanized steel wire or the post manufacturer's special wire clips.

E. Stays and Battens

- 1. If used, stays may be made of rot-resistant wood, plastic, fiberglass, or heavy galvanized twisted wire. Stays shall be properly fastened to each fence wire. Stay length shall be sufficient for attachment to all fence wires while maintaining correct wire spacing.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Fencing will be measured by the linear foot of Livestock Fence installed in accordance with the Drawings, as specified, or as directed by the Engineer. Measurements will be taken along the post centerline.

4.2 PAYMENT

- A. Livestock Fence will be paid for at the contract unit price per linear foot, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing fence, complete in place, including post excavation and backfill, posts, wire stays and battens, as shown on the Drawings, as specified herein, or as directed by the Engineer.
- B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Livestock Fence	Linear Foot (LF)

END OF SECTION

INDEX
SECTION 329200
SEEDING

Paragraph	Page
1. GENERAL	1
1.1 Description	1
1.2 Related Sections.....	1
1.3 Submittals	1
1.4 Quality Assurance	1
2. PRODUCTS.....	1
2.1 Materials	1
3. EXECUTION.....	2
3.1 Preparation	2
3.2 Application of Seed	2
3.3 Repair	2
3.4 Field Quality Control	3
4. MEASUREMENT AND PAYMENT	3
4.1 Measurement	3
4.2 Payment	3

SECTION 329200 SEEDING

1. GENERAL

1.1 DESCRIPTION

- A. Work covered under this section consists of furnishing all labor, tools, materials, equipment and incidentals required to perform Seeding, as specified, as shown on the Drawings, or as directed by the Engineer.

1.2 RELATED SECTIONS

- A. Section 312316, Excavation
- B. Section 312323, Engineered Fill
- C. Section 313519.16, Slope Protection Fabric
- D. Section 329000, Planting

1.3 SUBMITTALS

- A. Submit to the Engineer for review a product data sheet listing the species, ratios, and purity of the seed mixture.

1.4 QUALITY ASSURANCE

- A. All seed shall be labeled in accordance with State Standard Specifications, Section 01030.13(a). Seed treated with mercury compounds shall not be used.
- B. Fertilizer shall be delivered in containers labeled in accordance with applicable state regulations and bearing the warranty of the producer for the grade furnished.
- C. Seed which has become wet, moldy, or otherwise damaged in transit or in storage, will not be acceptable.

2. PRODUCTS

2.1 MATERIALS

- A. Quantities shown on the Drawings represent pure live seed (pls).
- B. At no time shall the seed mix contain noxious weed seed. Seed shall be maintained in optimal health and be protected at all times from animal damage; vandalism; inclement weather conditions, including drought, wind, and frost; toxic water; sunlight; moisture; or contact with vehicles, equipment, and tools and any other conditions that would damage or reduce the viability of the seed.
- C. Seed Mix. The seed mix and application rates are as shown on the Drawings. No substitutions are allowed without written consent of the Engineer.
- D. Straw Mulch. Straw mulch shall meet the requirements of Standard Specification section 01030.15(b) for straw mulch.

Or use

- E. Water. Water shall be furnished by the Contractor and shall be free of chemicals detrimental to the seed mixture.
- F. Stabilizing Emulsion (Tackifier) shall meet the requirements of Standard Specification section 01030.16.

3. EXECUTION

3.1 PREPARATION

- A. General. Seed the areas disturbed by construction activities, as specified herein or as directed by the Engineer.
- B. Debris Removal. Prior to ground surface preparation operations remove and dispose of all wire, rubbish, stones, and other material which might hinder proper grading, and subsequent maintenance.
- C. Surface Preparation. Surfaces which are too hard or smooth to accept the seeding, as determined by the Engineer, shall be broken up to a minimum depth of 3 inches, by disking or other methods approved by the Engineer, until the condition of the soil is acceptable. When conditions are such, by reason of excessive moisture or other factors, that satisfactory results are not likely to be obtained, the work shall be stopped and shall be resumed only when directed.

3.2 APPLICATION OF SEED

- A. Seeding Areas: Apply seed to areas indicated on the Drawings, or as directed by the Engineer.
- B. Time of Seeding: Perform all seeding after September 15th of the year construction begins. The seeding operation shall be halted when, in the opinion of the Engineer, conditions of high winds, excessive moisture or other factors are not conducive to satisfactory results. Upon written request of the Contractor, and upon written approval of the Engineer, seeding may be done during off seasons provided that:
 - 1. The resulting stand of grass shall be at least equal to the stand that might be expected from planting during the normal season; and
 - 2. The establishment period shall be lengthened, as required, to produce the above specified stand at no additional cost to the Owner.
 - 3. Perform seeding prior to placement of slope protection fabric, where slope protection fabric is specified.
- C. Method of Seeding: Seeding may be performed mechanically in a dry condition or with hydro-seeding equipment, at the Contractor's option.
- D. Hydro-seeding. Hydro-seeding shall be performed in accordance with Standard Specification Section 01030.18(a).
- E. Broadcast Seeding. Broadcast seeding may be used in lieu of hydro-seeding or to reseed any previously hydro-seeded areas disturbed during planting operations. Seed shall be dry-applied in accordance with Standard Specification Section 01030.48 (b).
- F. Mulching. All areas receiving broadcast seeding treatment, including areas being covered by slope protection fabric, shall be covered with straw mulch and tackifier following seeding, but before installation of the slope protection fabric, where applicable.

3.3 REPAIR

- A. General. When any portion of the ground surface becomes gullied or otherwise damaged following seeding within the period of Contractor's responsibility, repair the affected portion to re-establish the condition and grade of the soil prior to planting and then reseed as specified for initial planting, all at no cost to the Owner.
- B. Reseeding. When it becomes evident that the seeding has been unsuccessful, the Engineer will require that these areas be reseeded with the same seed and quantity as specified for the initial seeding. Complete reseeding within fifteen (15) days following notification and these areas shall be maintained by watering, as specified above, until the successful grass is established. Prepare the area to be reseeded as directed by the Engineer, to receive the reseeding.

3.4 FIELD QUALITY CONTROL

- A. During the course of work or upon completion of the project, a check of the quantities of materials will be made against the areas treated, and if the minimum rates of application have not been met, the Engineer will require the distribution of additional quantities of those materials to make up the minimum applications specified.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Seeding will be measured on a per acre basis for each acre of seed furnished and installed by the Contractor and approved by the Engineer (as shown on the Drawings).
- B. Areas disturbed by the Contractor and requiring seeding outside the designated limits of disturbance shall not be measured for payment.

4.2 PAYMENT

- A. Seeding will be paid for at the contract unit price for each acre seeded, which price will include furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the Seeding as specified, as shown on the Drawings, or as directed by the Engineer.
- B. The cost of seeding areas outside the designated limits of disturbance shall be solely borne by the Contractor.
- C. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Seeding	Acre (AC)

END OF SECTION

INDEX
SECTION 329300
PLANTING

Paragraph	Page
1. GENERAL	1
1.1 Description.....	1
1.2 Related Sections.....	1
1.3 Quality Assurance	1
2. PRODUCTS.....	1
2.1 General.....	1
2.2 Materials	1
3. EXECUTION.....	2
3.1 General.....	2
3.2 Live Stake	2
4. MEASUREMENT AND PAYMENT	2
4.1 Measurement	2
4.2 Payment.....	2

SECTION 329300 PLANTING

1. GENERAL

1.1 DESCRIPTION

- A. The work required under this Section shall include, but is not limited to, all labor, tools, materials, equipment and incidentals required to supply and install all of the plants and appurtenances, as shown on the Drawings, described in these Specifications or as directed by the Engineer.
- B. The SWCD will provide sources for live stake cuttings within a ten (1) mile radius of the project area. The Contractor shall be responsible for the collection and delivery of the cuttings to the project site.

1.2 RELATED SECTIONS

- A. Section 313519.16, Slope Protection Fabric
- B. Section 329200, Seeding

1.3 QUALITY ASSURANCE

- A. Proper Installation. The Contractor shall be responsible for proper installation of the native plants to ensure healthy and vigorous growth and development according to the Plans, these Specifications and the Engineer's direction.
- B. Responsibility. If plants are damaged before or during installation, the Contractor shall be responsible for replacement until the Contract expiration.
- C. Willows. ASTM International. (2003). D6765-02 Standard Practice for Live Staking.

2. PRODUCTS

2.1 GENERAL

- A. Handling. The Contractor shall ensure that the plants and planting supplies are not damaged at any time. After acceptance by the Engineer, handling and storage of the plants and bulk materials delivered to the site shall become the responsibility of the Contractor.
- B. Plants Storage. Plants shall be maintained in optimal health and be protected at all times from animal damage; vandalism; inclement weather conditions, including drought, wind, and frost; toxic water; sunlight; moisture; or contact with vehicles, equipment, and tools and any other conditions that would damage or reduce the viability of the plants. Plants may be stored on the site in the Contractor's staging area provided a temporary fence is erected for plant protection. Shade, frost, and wind protection may be used if necessary to protect the health of the plants. Plants shall be maintained moist at all times before planting and shall be completely watered 1-hour or less before installation and shall be moist when installed.

2.2 MATERIALS

- A. Live Stakes. Live stakes are woody plant cuttings, capable of rooting, that are taken from trees and shrubs. All plant materials must be top quality stock. Plant materials shall be of the Salix genus. They shall be sound, healthy specimens and first-class representatives of their species. Plant materials that have serious injuries, insect pests, diseases or are shriveled will be rejected. Live stakes shall be cut from approved sources using a sharp tool. Live willow stakes shall meet the dimensions shown on the Drawings. The top ends shall be blunt; butt ends shall be angled at 45 degrees. Stakes shall be stripped of all stems and leaves, taking care to minimize scarring or bruising of the willow stakes.
 - 1. Collect willow stakes from locations approved by the Owner's representative. These locations shall be within a 10 mile radius of the project.

3. EXECUTION

3.1 GENERAL

- A. Drawings. The Drawings are partially diagrammatic for graphic clarity and, therefore, do not show the exact individual planting locations for each species to be installed. The Contractor shall be responsible for the installation of all of the plants at the typical spacing and layouts shown on the Drawings and described in these Specifications, and as directed by the Engineer.

3.2 LIVE STAKE

- A. Handling. Install willow stakes within 6 hours of collection. If planting does not occur within 6 hours, plant material must be properly stored according to the guidelines given in the following section.
- B. Storage. All woody plant cuttings collected more than 6 hours prior to installation, must be carefully bound, secured, and stored submerged in clean fresh water for a period of up to one week. If stored outdoors temperatures must be less than 50 degrees F. Temperature indoors and in storage containers must be between 34 and 50 degrees F. If the willow stakes cannot be installed during the dormant season, cut during the dormant season and hold in cold storage at temperatures between 33 and 39 degrees F for up to 2 months.
- C. Location. Prior to placement or installation of willow stakes and live fascines, the Contractor shall flag all plant material locations for approval by the Engineer. The Engineer may require adjustments to willow stake locations to meet field conditions.
- D. Live Stake Installation. Planting of willow stake shall be performed during above periods only when weather and soil conditions are suitable. Deviation from the above planting dates will be permitted only when approved in writing by the Engineer. Plant materials shall be placed at intervals as indicated on the Drawings, with butt end down. Installed eighty percent of the stake below ground, leaving only twenty percent of the willow stake extending above ground.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Live Stake Planting. Live Stake Plantings will be measured on a unit basis for each individual Live Stake completely supplied and installed by the Contractor and approved by the Engineer.

4.2 PAYMENT

A. Live Stake Planting. Payment for Live Stake Planting, measured as specified, will be paid at the contract unit price for each Willow Stake, which price will include all costs in connection therewith.

B. Payment shall be listed under the following:

<u>Pay Item</u>	<u>Pay Unit</u>
Live Stake Planting	Each (EA)

END OF SECTION

INDEX
SECTION 330533.13
POLYETHYLENE UTILITY PIPE

Paragraph	Page
1. GENERAL	1
1.1 Description	1
1.2 Related Sections.....	1
1.3 Submittals	1
1.4 Delivery, Storage, and Handling	1
1.5 Quality Assurance	1
1.6 References	1
2. PRODUCTS.....	1
2.1 Materials	1
3. EXECUTION.....	2
3.1 General.....	2
3.2 Installation	2
4. MEASUREMENT AND PAYMENT	2
4.1 Measurement	2
4.2 Payment	2

SECTION 330533
POLYETHYLENE UTILITY PIPE

1. GENERAL

1.1 DESCRIPTION

- A. Work included within this section includes all related excavation, structural fill within the crossing prism, furnishing and installation of the Livestock Crossing Culverts, complete, in place, as specified, as shown on the Drawings, and as otherwise directed by the Engineer.

1.2 RELATED SECTIONS

- A. Section 312316, Stripping and Excavation
- B. Section 312319, Dewatering
- C. Section 312323, Engineered Fill

1.3 SUBMITTALS

- A. Submit to the Engineer, for review, the manufacturer's product data sheets for pipe materials.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. General. Comply with manufacturer's recommendations.

1.5 QUALITY ASSURANCE

- A. Testing. Comply with manufacturer's recommendations.

1.6 REFERENCES

- A. Oregon Standard Specifications for Construction, Oregon Department of Transportation (current edition).

2. PRODUCTS

2.1 MATERIALS

- A. Livestock Crossing Culvert. The culverts associated with the livestock crossings shall meet the dimensions shown on the Drawings and consist of corrugated-wall, smooth interior HDPE pipe with water tight joints and shall conform to the Section 00440 of the Standard Specifications for Corrugated polyethylene culvert pipe, Type S.
- B. Pipe zone material shall meet the requirements of Aggregate Base Material, Section 321123, Part 2.1.B.

3. EXECUTION

3.1 GENERAL

- A. Comply with the manufacturer's installation guidelines.
- B. Verify all measurements and take all necessary field measurements before delivery to site. Provide additional materials and parts, not specifically specified, but as required for a complete and proper installation.
- C. Where cited references contain duplicate information, the most stringent shall apply, as determined by the Engineer.

3.2 INSTALLATION

- A. Comply with the notes and details on the Drawings and the manufacturer's installation guidelines.
- B. Install the culverts in accordance with Section 00405, Trench Excavation, Bedding, and Backfill of the Standard Specifications.
- C. Pipe bedding shall conform to the lower section of the structure and be constructed to avoid distortions that may create undesirable stresses in the structure.
- D. Place backfill symmetrically on each side of the culvert in 6 to 8 inch lifts.
- E. Comply with manufacturer's guidelines for allowable loads on structure during construction.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. 60 inch Diameter HDPE Pipe will be measured by each continuous length of 60 inch diameter pipe installed as indicated on the Drawings, as specified, or as directed by the Engineer.
- B. 48 inch Diameter HDPE Pipe will be measured by each continuous length of 48 inch diameter pipe installed as indicated on the Drawings, as specified, or as directed by the Engineer.
- C. 36 inch Diameter HDPE Pipe will be measured by each continuous length of 36 inch diameter pipe installed as indicated on the Drawings, as specified, or as directed by the Engineer.

4.2 PAYMENT

- A. 60 inch Diameter HDPE Pipe will be paid for at the contract price each for 60 inch Diameter HDPE Pipe, which price will be considered payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary for the complete installation of the culvert, including but not limited to excavation and fill for culvert, placement of pipe bedding, delivery and installation of culvert, placement of pipe zone backfill and miscellaneous work as shown on the Drawings as specified, and as directed by the Engineer.

- B. 48 inch Diameter HDPE Pipe will be paid for at the contract price each for 48 inch Diameter HDPE Pipe, which price will be considered payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary for the complete installation of the culvert, including but not limited to excavation and fill for culvert, placement of pipe bedding, delivery and installation of culvert, placement of pipe zone backfill and miscellaneous work as shown on the Drawings as specified, and as directed by the Engineer.
- C. 36 inch Diameter HDPE Pipe will be paid for at the contract price each for 36 inch Diameter HDPE Pipe, which price will be considered payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary for the complete installation of the culvert, including but not limited to excavation and fill for culvert, placement of pipe bedding, delivery and installation of culvert, placement of pipe zone backfill and miscellaneous work as shown on the Drawings as specified, and as directed by the Engineer.
- D. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
60 inch Diameter HDPE	Each (EA)
48 inch Diameter HDPE	Each (EA)
36 inch Diameter HDPE	Each (EA)

END OF SECTION

INDEX
SECTION 354200
LOG STRUCTURES

Paragraph	Page
1. GENERAL	1
1.1 Description.....	1
1.2 Related Sections.....	1
2. PRODUCTS.....	1
2.1 Materials	1
3. EXECUTION.....	1
3.1 General.....	1
3.2 Field Quality Control	2
4. MEASUREMENT AND PAYMENT	2
4.1 Measurement	2
4.2 Payment.....	2

**SECTION 354200
LOG STRUCTURES**

1. GENERAL

1.1 DESCRIPTION

- A. Work within this section includes furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the Log Structures, complete in place, including excavation, and backfilling, log salvage, preparation, and placement, and backfill of voids, as specified, as shown on the Drawings, or as otherwise directed by the Engineer.
- B. Log structures include shown on the Drawings.

1.2 RELATED SECTIONS

- A. Section 312319, Dewatering
- B. Section 312316, Stripping and Excavation
- C. Section 312319, Dewatering
- D. Section 312323, Engineered Fill
- E. Section 354237, Rock Slope Protection

2. PRODUCTS

2.1 MATERIALS

- A. Logs.
 - 1. Logs salvaged during clearing and grubbing shall meet the material specifications shown on the Drawings.
 - 2. All logs shall be inspected for approval by the Engineer, prior to installation.

3. EXECUTION

3.1 GENERAL

- A. Prior to the start of work, the Engineer shall designate representatives authorized to observe the Contractor's placement of Log Structures. Contractor shall notify the authorized representative 72 hours prior to placement of Log Structures. Construct all Log Structures in the presence of the authorized representative.
- B. Log structure designs are shown conceptually due to the inherent variability of material properties. The design requires that the Engineer will observe construction of the log structures to ensure the intent of the design is met. Observations must include log and boulder selection, placement, connections for ballasting, and placement of backfill. Any log structures constructed without the Engineer present may result in rejection of the work by the Engineer.
- C. The construction of Log Structures requires equipment which can place rock and logs in precise locations. An excavator of a suitable size and containing a thumb is suggested.
- D. Log Placement. Log placement locations shown on the Drawings are approximate. Exact locations shall be as approved by the Engineer, or his authorized representative.

- E. Place rootwads at an elevation where the majority of the root mass is below ordinary low water, as approved by the Engineer.

3.2 FIELD QUALITY CONTROL

- A. Tolerances. Log and boulder placements shall be as approved by the Engineer.
- B. Logs. All logs shall be inspected for approval by the Engineer, prior to installation.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Salvage and Install Log Structures will be measured by the number of Log Structures installed, as shown on the Drawings, as specified, and as directed by the Engineer.

4.2 PAYMENT

- A. Salvage and Install Log Structures will be paid for at the contract unit price for each Log Structure installed including all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing each Log Structures, complete in place, including excavation and backfill, as shown on the Drawings, as specified herein, or as directed by the Engineer.
- B. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Salvage and Install Log Structures	Each (EA)

END OF SECTION

INDEX
SECTION 354237
ROCK SLOPE PROTECTION

Paragraph	Page
1. GENERAL	2
1.1 Description	2
1.2 Related sections	2
1.3 Submittals	2
1.4 Quality Assurance	2
1.5 References	3
2. PRODUCTS.....	3
2.1 Materials	3
3. EXECUTION.....	4
3.1 General.....	4
3.2 RipRap	4
3.3 Engineered Streambed Material.....	4
4. MEASUREMENT AND PAYMENT	5
4.1 Measurement	5
4.2 Payment	5

SECTION 354237 ROCK SLOPE PROTECTION

1. GENERAL

1.1 DESCRIPTION

- A. Work within this section shall include furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing Riprap and Engineered Streambed Material where shown on the Drawings, as specified herein, or as otherwise directed by the Engineer. Stone protection, rock slope protection, and riprap are interchangeable in these Specifications and Drawings.
- B. All loading, transport, temporary stockpiling, processing and mixing of stone materials to achieve designated gradations, washing, on-site hauling, excavation, preparation of sub-grade, placement, embedment, backfill, grading, compaction, finish grading, clean-up, and off-haul and disposal of excess materials needed to install all Rock Slope Protection work, where incorporated in the work, shall be considered as included in the applicable bid item unit price, and no additional compensation will be allowed.
- C. The location, alignment, angles, elevations, grades, slopes, dimensions, etc. of the proposed creek channel improvements, treatments, and structures as described in this section are shown on the Project Plans to provide a basis for construction and bidding purposes. The Engineer is expected to make minor revisions and provide direction in the field to fit any varying field conditions. The Contractor shall include all costs for working under the direction of the Engineer in his/her bid for this work, as no additional compensation will be allow therefore.

1.2 RELATED SECTIONS

- A. Section 312316, Stripping and Excavation
- B. Section 312319, Dewatering
- C. Section 312323, Engineered Fill

1.3 SUBMITTALS

- A. Submit to the Engineer, for review, the following:
 - 1. A representative 5 cubic yard sample of each of the proposed Rock Materials specified herein shall be provided to the Engineer for approval, ten days prior to delivery of the remainder of material to the project site. The Engineer reserves to the right to reject said materials.
- B. Sampling and Testing Assistance. Any difference of opinion between the Engineer and the Contractor shall be resolved by dumping and checking the gradation of the two random truck loads of rock. Mechanical equipment, a sorting site and labor needed to assist in checking gradation shall be provided by the Contractor at no additional cost to the Client.

1.4 QUALITY ASSURANCE

- A. Tolerances. Place rock to a vertical tolerance of minus 2 to plus 3 inches.

- B. Subgrade Preparation. Prior to placement of rock, Engineer shall verify subgrade preparation, and placement of fabric for rock. Where backing is shown on the Drawings, Engineer shall verify subgrade preparation and backing placement prior to placement of outer rock course.

1.5 REFERENCES

- A. Oregon Standard Specifications for Construction, Oregon Department of Transportation (current edition).

2. PRODUCTS

2.1 MATERIALS

- A. Salvaged Rock Material. Native rock found on site may be salvaged for reuse, subject to compliance with the material requirements for the intended use, and subject to the approval by the Engineer. The Engineer may require the Contractor to provide testing (e.g. gradation curve, hardness, etc.) to ensure that materials are suitable for reuse. Salvaged creek bed material shall be placed on a hardened surface or other suitable material (i.e. steel plate, pavement, filter fabric) in order to protect the said material from contamination or mixing with other soils, earthen material and debris. The Engineer may, at his sole discretion, waive certain testing requirements to facilitate the Contractor’s use of locally salvaged materials.
- B. Stones shall be sound, durable, hard, resistant to abrasion and free from laminations, weak cleavage planes, and the undesirable effects of weathering. It shall be of such character that it will not readily disintegrate from the action of air, water, or the typical conditions experienced during handling and placing. All aggregate material shall be clean and free from deleterious impurities, including alkali, earth, clay, refuse, and adherent coatings.
- C. Rock size classes not designated below shall be as shown on the Drawings, or as directed by the Engineer. All stone, rock, aggregate materials, and soils imported to the site shall be from a certified “Weed Free” source.
 - 1. Riprap. Comply with Section 00390.11 of the State Standard Specifications for the rock classes indicated on the Drawings. RSP shall be sub-rounded to angular.
- D. Engineered Streambed Material. Engineered Streambed, and consist of dense, hard, durable non-friable stone free of organic debris and other deleterious substances. The rock shall have a minimum specific gravity of 2.5. Volcanic cinder material shall not be acceptable. The material shall be washed (at the point of supply) to reduce the percentage of fines (sieve #200 or less) and protected during all associated operations (i.e. loading, transport, stockpiling, on-site hauling, placement, etc.) to minimize or eliminate the potential for contamination.
 - 1. Engineered Streambed Material shall conform to the gradation requirements of Table 1, below.

Table 1: Gradation requirements for Engineered Streambed Material, inches or sieve size

Percent of Mix (by weight)	Size Range (inches)
20	18-30
30	12-18
30	2-12
12	.08-2
8	< .08

E.

3. EXECUTION

3.1 GENERAL

- A. Rounded and smooth gravel, cobbles, and boulders shall not be placed on slopes steeper than 2:1 (horizontal: vertical) unless otherwise directed by the Engineer.
- B. All rock materials shall be placed in such a manner as to smoothly conform with adjacent graded areas. Smaller rock shall be chinked into the margins of larger rock placements, as necessary to conform to earthwork and prevent migration of fines from adjacent graded areas into the rock matrix.

3.2 RIPRAP

- A. Install Rock Slope Protection in accordance with Section 00390 of the Standard Specifications (Keyed Riprap), as modified below, and to the lines and the minimum dimensions shown on the Drawings. Use equipment to place rock on slopes, or below the water. Place rock so as to minimize the number of voids. Rock shall be placed in lifts with a thickness not exceeding the D100 of the specified stone.

3.3 ENGINEERED STREAMBED MATERIAL

- A. Engineered Streambed Material shall be placed to the lines, grades and depths shown on the Drawings, or as directed by the Engineer. Uniformly distribute large stones to produce the required gradation of rock. Prevent contamination of rock materials by excavation and/or earth materials. Subgrade shall be uniform with no soil clumps or rocks greater than two inches. Where the specified depth of placement exceeds twelve inches, the material shall be placed in lifts not exceeding twelve inches depth and water jetted after each lift is placed, as outlined below.
- B. Following placement of each ESM lift, rock surface shall be jetted with water to improve compaction and embed the fines within the mix. Jetting shall start at the upstream limits of placement and progress downstream. Jetting shall continue until water ponds at the surface, and until the turbidity levels of runoff produced from the jetting process have reached an

acceptable level. All sediment-laden runoff generated by the jetting operations shall be pumped to a settling tank or similar device to reduce turbidity to acceptable levels, in compliance with permit conditions, prior to discharge to the creek. Comply with Section 312319, Dewatering.

- C. In the event that the Engineered Streambed Materials are manipulated after placement, there is the potential for segregation by size class, which typically results in the larger fraction rising to the surface and fines being lost to the base of the lift. If in the opinion of the Engineer, there is excessive segregation of materials, the contractor shall remove all Engineered Streambed Materials, re-mix to a uniform gradation, and replace as specified.

4. MEASUREMENT AND PAYMENT

4.1 MEASUREMENT

- A. Riprap will be measured by the Cubic Yard of Riprap, in-place, based on the dimensions shown on the Drawings. Where the dimensions of any portion of the work are revised by the Engineer, or a portion of the work is eliminated, the change will be measured by the cubic yard, in-place.
- B. Engineered Streambed Material. Engineered Streambed Material will be measured by the cubic yard of Engineered Streambed Material, in-place, based on the dimensions shown on the Drawings. Where the dimensions of any portion of the work are revised by the Engineer, or a portion of the work is eliminated, the change will be measured by the cubic yard, in-place.
- C. Volumetric measurements will be determined from the dimensions as shown on the Drawings or the dimensions constructed as directed by the Engineer. Materials placed in excess of these dimensions will not be included the measurement for payment. Surface areas will be measured to the horizontal limits parallel to the ground surface.
- D. Excavation and backfill for rock slope protection will not be separately measured for payment.

4.2 PAYMENT

- A. Riprap, measured as specified above, will be paid for at the contract price per Cubic Yard, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals necessary to complete the riprap placement, including subgrade preparation, geotextile fabric, processing work, backing, rock placement, backfill of voids, excavation and fill.
- B. Engineered Streambed Material, measured as specified above, will be paid for at the contract unit price per Cubic Yard, which price will be payment in full for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing the Engineered Streambed Material, complete in place, including subgrade preparation, processing work, excavation, and jetting, as shown on the Drawings, as specified herein, or as directed by the Engineer.
- C. No separate payment will be made for excavation and backfill incidental to slope protection work. All costs in connection with this work will be considered incidental to the cost of construction of the associated slope protection work. Where embankment is shown to be placed over completed rock slope protection, the embankment shall be considered incidental to the cubic yard price paid for associated Rock Slope Protection work.

- D. No separate payment will be made for Riprap Backing Fabric. All costs in connection with this work will be considered incidental to the cost of construction of the associated improvement.
- E. Payment will be made under:

<u>Pay Item</u>	<u>Pay Unit</u>
Class 50 Riprap	Cubic Yard (CY)
Class 200 Riprap	Cubic Yard (CY)
Engineered Streambed Material	Cubic Yard (CY)

END OF SECTION