

APPENDIX B
Section 00280 – Erosion and Sediment Control
Section 01030 - Seeding

For the Special Provision templates 00280 Erosion Control and 01030 Seeding, go to the following websites:

<https://www.oregon.gov/odot/business/pages/special-provisions.aspx>

Section 00280 - Erosion and Sediment Control

Description

00280.00 Scope - This work consists of installing, maintaining, and removing temporary erosion and sediment control devices such as berms, dikes, swales, check dams, sediment traps, sediment basins, matting, mulching, slope drains, sediment fences, sediment barriers, construction accesses, and other structural or nonstructural erosion and sediment control devices. Typical work areas include medians, interchanges, cut and fill slopes, areas disturbed by Project construction, material sources, and disposal sites.

The work described in these Specifications and shown on the plans is the Erosion and Sediment Control Plan (ESCP) and is the minimum requirement for wet weather site conditions.

Coordinate all temporary erosion control features with all permanent erosion control features, if applicable, to the extent practicable to assure economical, effective, and continuous erosion control throughout the construction and post-construction period.

00280.01 National Pollutant Discharge Elimination System - The Agency's ESCP's are developed to comply with Federal, State, and local laws, rules and regulations, and the National Pollutant Discharge Elimination System (NPDES) General Construction Permit for erosion prevention and sediment control for on-site construction activities. A copy of the Permit is available from the Agency. Erosion and sediment control features, other than those shown on the plans, may be required depending on the Contractor's methods of operation and schedule.

00280.02 Agency Controlled Lands Erosion and Sediment Control Plan - For work on all Agency-controlled lands, submit signed copies of the following for review and approval ten days before the preconstruction conference:

- A Contractor developed ESCP that incorporates the Agency's ESCP and all proposed modifications to it
- Implementation schedules for the ESCP

The Contractor may submit the ESCP that is included in the Project plans. To assist in the preparation or modification of the ESCP, refer to the Agency's Erosion and Sediment Control Manual.

For each phase of the scheduled work indicate on the ESCP how the proposed erosion and sediment control devices will divert flows, store flows, limit runoff from exposed areas, stabilize exposed soil, and filter sediment.

Include the following information in the implementation schedules, if applicable:

- A list of emergency on site stockpiled materials
- Clearing and grubbing for perimeter controls
- Installing perimeter controls
- Construction phasing
- Clearing and grubbing, grading, and trenching for activities other than perimeter controls
- Grading related to the Project
- Temporary stabilizing exposed soil surfaces
- Final grading, landscaping, and stabilization
- Work on or at bridges and other watercourse structures
- Isolating work area from surface water during in-water work
- Installing and removing utilities
- Work required in wetlands

- Monitoring rainfall
- Inspecting controls
- Installing, maintaining, monitoring, and removing temporary controls
- Installing and maintaining permanent controls
- Disposing of waste materials
- Haul road and borrow pit controls
- Additional controls for wet season work and temporary work suspensions

The ESCP and the implementation schedules shall be prepared by an individual who is knowledgeable in erosion and sediment control.

Keep a copy of the approved ESCP on site during all construction activities. During inactive periods longer than 7 calendar days, the ESCP may be on-site or retained by the Agency.

Do not begin work until the ESCP and the implementation schedules are approved.

Update the ESCP and schedules as needed for unexpected storm events or for other reasons to ensure that sediment-laden water does not leave the construction site. Add approved changes to the ESCP and schedules as soon as possible after changes have been implemented, but no later than 24 hours after implementation.

00280.03 Non-Agency Controlled Lands Erosion and Sediment Control Plan - For work on all non-Agency controlled lands, submit signed copies of the following for review ten days before the preconstruction conference:

- A Contractor developed ESCP
- A description of the methods to be used for the ESCP

Describe the following:

- Clearing and grubbing
- Installing perimeter controls
- Construction phasing
- Grading
- Temporary stabilizing exposed soil surfaces
- Final grading, landscaping, and stabilization
- Inspecting controls
- Installing, maintaining, monitoring, and removing temporary controls
- Installing and maintaining permanent controls
- Disposing of waste materials
- Haul road and borrow pit controls
- Additional control for wet season work and temporary work suspensions
- Methods of diverting flows, storing flows, limiting runoff from exposed areas, stabilizing exposed soil, and filtering sediment

The ESCP and methods of operation shall be prepared by an individual who is knowledgeable in erosion and sediment control.

Also, furnish the following:

- Signed, written letter from the property owner that allows the Contractor access to the property. Include a statement in the letter that holds the Agency harmless for all consequences related to the Contractor's use of the property.

- Signed agreement with the property owner detailing the Contractor's operation and use of the property.
- Copies of permits or proof that permits are not required from all pertinent federal, State, county, city, and local agencies.

If the Contractor's operations requires work on non-Agency controlled lands that were not presented at the preconstruction conference, or if changes to the Contractor's submitted ESCP are necessary, submit a new or revised ESCP to the Agency for review.

00280.04 Erosion and Sediment Control Manager (ESCM) - Designate and provide a representative, experienced in all disciplines of highway construction, as the Erosion and Sediment Control Manager (ESCM). The ESCM is responsible for assuring the duties described in 00280.61 are done and has the authority to immediately mobilize necessary personnel to correct and modify erosion prevention and sediment control devices as required. Provide the ESCM's name and working phone number ten days before the preconstruction conference. Provide written changes in the appointment of this individual during the term of the Contract.

Materials

00280.10 General - Provide materials meeting the following requirements. The Contractor may submit a request for proposed alternate materials by following the requirements of 00140.70.

(a) Biofilter Bags - Provide minimum size 460 mm x 150 mm x 760 mm (18" x 6" x 30") plastic mesh bags with 13 mm (1/2 inch) openings filled with approximately 20 kg (45 pounds) of clean, 100% recycled wood-product waste.

(b) Check Dams - Provide check dam material meeting the following requirements:

- **Aggregate** - Aggregate with maximum size between 150 mm (6 inches) and 75 mm (3 inches) meeting the requirements of 00330.16.
- **Straw Bales** - Standard rectangular straw bales meeting the requirements of 00280.10(n).
- **Biofilter Bags** - Biofilter bags meeting the requirements of 00280.10(a).
- **Sand Bags** - Sand bags meeting the requirements of 00280.10(l).
- **Stakes** - Stakes meeting the requirements of 00280.10(n).
- **Prefabricated** - Prefabricated check dam system meeting the manufacturers recommendations.

(c) Construction Entrances - Provide construction entrance material meeting the following requirements:

- **Aggregate** - Aggregate with a maximum size between 150 mm (6 inches) and 75 mm (3 inches) meeting the requirements of 00330.16.
- **Geotextile** - Subgrade geotextile meeting the requirements of Section 02320. Provide "Level B" documentation according to 02320.10(c).

(d) Diversion Dike/Swale - Provide diversion dike/swale material meeting the following requirements:

- **Aggregate** - Aggregate with maximum size between 100 mm (4 inches) and 25 mm (1 inch) meeting the requirements of 00330.16.

- **Seeding** - Temporary seeding meeting the requirements of 01030.13.

(e) **Temporary Drainage Curbs** - Provide temporary drainage curb material as follows:

- **Type 1** - Concrete drainage curb meeting the requirements of 00480.11.
- **Type 2** - Asphalt concrete drainage curb meeting the requirements of 00480.12.
- **Type 3** - Sand bags meeting the requirements of 00280.10(l).

(f) **Dust Control** - For dust control, use water at an application rate determined by the Engineer or use liquid stabilizer emulsion or dry powder tackifier according to the following:

- **Liquid Stabilizer Emulsion** - Provide a tackifier base material of liquid and polyvinyl acetate polymers with emulsion resins containing not less than 55 % total solids by mass (weight). Do not use tackifiers that contain polyacrylates or polyvinyl acrylics.
- **Dry Powder Tackifier** - Provide a tackifier base consisting of one or more active hydrocolloids from natural plant sources which hydrates in water and blends with other slurry materials, and upon application and drying tacks the slurry particles to the soil surface, and exhibits no growth or germination inhibiting factors. Provide stabilizing emulsion in a dry powder form that may be remulsifiable and consists of a processed organic adhesive derivative of one of the following:
 - Gumbinder derived from guar (*Cyamopsis tetragonoloba*)
 - Gumbinder derived from plantain (*Plantago insularis*)

Use nontoxic dust control materials that do not have an adverse effect on soil structure or establishment and growth of vegetation.

(g) **Flow Spreader** - Provide aggregate for flow spreaders with a maximum size between 150 mm (6 inches) and 75 mm (3 inches) meeting the requirements of 00330.16.

(h) **Inlet Protection** - Provide inlet protection materials meeting the following requirements:

- **Wire Mesh** - Provide wire mesh materials as follows:
 - **Type 1 Inlet Protection** - Wire mesh meeting the requirements of 00280.10(o).
 - **Type 2 Inlet Protection** - 1 mm diameter (19 gage) steel-wire mesh with 10 mm x 10 mm (3/8" x 3/8") openings.
- **Geotextile** - Type 1 sediment fence geotextile meeting the requirements of Section 02320. Provide "Level B" documentation according to 02320.10(c).
- **Aggregate** - Aggregate with maximum size between 100 mm (4 inches) and 25 mm (1 inch) meeting the requirements of 00330.16.
- **Stakes** - Stakes meeting the following requirements:
 - **Type 1 Inlet Protection** - Use commercial grade metal posts with a mass (weight) of at least 2 kg/m (1.35 pounds/foot).
 - **Type 4 Inlet Protection** - Use minimum 25 mm x 50 mm x 450 mm (1" x 2" x 18") wooden posts.

- **Biofilter Bags** - Biofilter bags meeting the requirements of 00280.10(a).
- **Prefabricated Filter Inserts** - Provide prefabricated filter inserts manufactured specifically for collecting sediment in drainage inlets and listed on the QPL. Include handles and/or fasteners sufficient to keep the insert from falling into the inlet during maintenance and removal of the insert from the inlet.
- **Concrete Masonry Units** - Provide nominal 200 mm x 200 mm x 400 mm (8" x 8" x 16"), 13 kg (29 pound) concrete building blocks with two 140 mm x 140 mm (5 1/2" x 5 1/2") openings and 25 mm (1 inch) minimum outer wall thickness.
- **Sod** - Provide grass sod grown on agricultural land that is cultivated specifically for turf sod meeting the following requirements:
 - Free of weeds, diseases, nematodes, and insects
 - Mature and not less than 10 months old
 - Machine cut to a uniform thickness of 16 mm (5/8 inch) or more, excluding top growth and thatch
 - Broken pieces and torn or uneven ends will not be accepted
- **Reinforcing Steel** - Provide commercial grade reinforcing steel.

(i) **Matting** - Provide matting material that conforms to the Texas DOT/TTI Hydraulics and Erosion Control Laboratory requirements and meets the following performance criteria categories:

- **Type A** - Slope protection mat for clay soil slopes 1V:3H or flatter.
- **Type B** - Slope protection mat for sandy soil slopes 1V:3H or flatter.
- **Type C** - Slope protection mat for clay soil slopes steeper than 1V:3H.
- **Type D** - Slope protection mat for sandy soil slopes steeper than 1V:3H.
- **Type E** - Flexible channel liner for shear stress from 0 to 96 Pa (0 to 2 pounds/square foot).
- **Type F** - Flexible channel liner for shear stress from 0 to 192 Pa (0 to 4 pounds/square foot).
- **Type G** - Flexible channel liner for shear stress from 0 to 287 Pa (0 to 6 pounds/square foot).
- **Type H** - Flexible channel liner for shear stress from 0 to 383 Pa (0 to 8 pounds/square foot).

Provide check slot material and fasteners as follows:

- **Check Slot:**
 - **Channel Application** - Compacted class 25 (50) riprap meeting the requirements of Section 00390.
 - **Slope Application** - Compacted native material.

- **Fasteners** - Use U-shaped wire staples or heavy duty pins as follows:
 - **Staples** - 2 mm diameter (14 gage) steel wire staples. 25 mm (1 inch) "U" width with a length of 150 mm (6 inches) minimum for cohesive soils and 200 mm (8 inches) minimum for non-cohesive soils.
 - **Pins** - 4.75 mm (3/16 inch) diameter steel pin with a 50 mm (2 inch) diameter steel washer secured at the head of the pin with a length of 450 mm (18 inches) minimum for cohesive soils and 600 mm (24 inches) minimum for non-cohesive soils.

Provide the manufacturer's material and installation specifications to the Agency prior to installation.

(j) Temporary Mulch - Provide mulch material conforming to 01030.15(b) and tackifier material conforming to 001030.16.

(k) Plastic Sheeting - Provide plastic sheeting slope protection, anchoring system, and toe protection according to the following:

- **Plastic Sheeting** - Minimum 0.15 mm (6 mil) thick polyethylene plastic sheeting.
- **Anchoring System** - Anchor system consisting of minimum 30 kg (65 pounds), non-puncture type anchor weights with cords or ropes of adequate strength to support the weights on the slope or new or used chain link fence conforming to 03010.30.
- **Stakes** - Commercial grade metal posts with a mass of at least 2 kg/m (1.35 pounds/foot).
- **Rock** - Class 25 (50) riprap conforming to Section 00390.

(l) Sand Bags - Provide 610 mm x 300 mm x 150 mm (24" x 12" x 6") durable, weather-resistant, tightly woven bags sufficient to prevent leakage of filler material. Fill bags with at least 34 kg (75 pounds) of firmly packed fine pcc aggregate 9.75 mm - 0 (3/8" - 0) or round 9.5 mm - 4.75 mm (3/8" - 3/16") pea gravel.

(m) Temporary Scour Holes - Provide class 50 (100) riprap for temporary scour holes conforming to Section 00390.

(n) Sediment Barriers - Provide sediment barriers and sediment barrier materials meeting the following requirements:

- **Straw Bales** - Provide standard 20 - 30 kg (45 - 65 pound) rectangular straw bales that are wire-bound or string-tied. Straw material shall meet the requirements of 01030.15(b).
- **Biofilter Bags** - Biofilter bags meeting the requirements of 00280.10(a).
- **Wattles** - Provide wattles made of straw meeting the requirements of 01030.15(b) except use only rice or coconut straw material. Wrap the straw, to a minimum density of 44 kg/m³ (2.75 pounds/cubic foot), in tubular plastic netting meeting the following requirements:
 - 200 mm (8 inch) to 260 mm (10 inch) diameter size
 - Minimum strand thickness of 0.08 mm (0.003 inch)
 - Knot thickness of 1.4 mm (1/16 inch)
 - Mass of 33 g/m (Weight of 0.35 ounces/foot) (plus or minus 10%)
 - Made from 85% high density polyethylene, 14% ethyl vinyl acetate, and 1% color for UV inhibition

- **Sand Bags** - Sand bags meeting the requirements of 00280.10(l).
- **Brush Barrier** - Provide maximum 150 mm (6 inch) diameter woody debris brush or topsoil strippings for brush barriers. Provide type 1 sediment fence geotextile meeting the requirements of Section 02320. Provide "Level B" documentation according to 02320.10(c).
- **Filter Berm and Rock Filter** - Provide aggregate with maximum size between 100 mm (4 inches) and 25 mm (1 inch) meeting the requirements of 00330.16. Provide subgrade geotextile meeting the requirements of Section 02320. Provide "Level B" documentation according to 02320.10(c).
- **Prefabricated Barrier System** - Provide prefabricated barriers manufactured specifically for temporarily obstructing the flow of sediment-laden water and listed on the QPL.
- **Stakes** - Provide the following size stakes:
 - Biofilter Bags - Use minimum 25 mm x 50 mm x 450 mm (1" x 2" x 18") wood posts
 - Brush Barrier - Use minimum 25 mm x 50 mm x 450 mm (1" x 2" x 18") wood posts
 - Straw Bales - Use minimum 38 mm x 38 mm x 900 mm (1 1/2" x 1 1/2" x 36") wood posts
 - Wattle - Use minimum 25 mm x 25 mm x 600 mm (1" x 1" x 24") wood posts

(o) Sediment Fence - Provide the following materials for sediment fences:

- **Geotextile** - Sediment fence geotextile meeting the requirements of Section 02320. Provide "Level B" documentation according to 02320.10(c).
- **Posts** - Posts meeting the following requirements:
 - **Supported Sediment Fence** - Commercial grade metal posts with a mass of at least 2 kg/m (1.35 pounds/foot).
 - **Unsupported Sediment Fence** - 38 mm x 38 mm x 1200 mm (1 1/2" x 1 1/2" x 48") minimum wooden posts.
- **Wire Mesh** - Galvanized wire mesh with 50x50 - MW3.2xMW3.2 (2x2 - W0.5xW0.5) or 102x50 - MW3.2xMW3.2 (4x2 - W0.5xW0.5) openings or horizontal and vertical self supporting, prior to fastening to posts, mesh with a minimum tensile strength of 485 MPa (70 ksi) meeting the requirements of ASTM A 82.

(p) Sediment Mat - Provide sediment mats from the QPL.

(q) Temporary Sediment Trap - Provide the following materials for sediment traps:

- **Geotextile** - Type 2 drainage geotextile meeting the requirements of Section 02320. Provide "Level B" documentation according to 02320.10(c).
- **Aggregate Base** - 37.5 mm - 0 (1 1/2" - 0), 25 mm - 0 (1" - 0), or 19 mm - 0 (3/4" - 0) aggregate for aggregate base meeting the requirements of Section 00641.
- **Aggregate** - Aggregate with maximum size between 150 mm (6 inches) and 75 mm (3 inches) meeting the requirements of 00330.16.

(r) Temporary Slope Drains - Provide either plastic pipe meeting the requirements of Section 02410 or metal pipe meeting the requirements of Section 02420. If the contributing area is not established, use 300 mm (12 inch) diameter.

(s) Slope Berms - Provide earthwork materials for slope berms according to 00330.41 or stone embankment material with the maximum size between 100 mm (4 inches) and 25 mm (1 inch) meeting the requirements of 00330.16.

(t) Tire Wash Facility - Provide the following materials for tire wash facilities:

- **Aggregate** - 37.5 mm - 0 (1 1/2" - 0), 25.0 mm - 0 (1" - 0), or 19.0 mm - 0 (3/4" - 0) aggregate base material meeting the requirements of Section 00641.
- **Reinforcing Steel** - Reinforcing steel meeting the requirements of 02510.10.
- **Geotextile** - Subgrade geotextile meeting the requirements of Section 02320. Provide "Level B" documentation according to 02320.10(c).
- **Concrete** - Commercial grade concrete meeting the requirements of Section 00440.

(u) Chemical Soil Stabilization - Provide a liquid stabilizing emulsion meeting the requirements of 00280.10(f).

Construction

00280.40 Installation - Install erosion and sediment control devices as shown and according to the Agency's Erosion and Sediment Control Manual. Install erosion and sediment control devices before performing clearing, grading, or other land alteration activities. Ensure that sediment laden water does not leave the Project boundaries, enter drainage systems or waterways, or violate applicable water standards.

00280.41 Work Restrictions - The following work restrictions apply:

(a) Disturbance Limits - Flag all construction site-clearing limits. Do not disturb areas outside the flagging limits. Maintain the flagging during Project construction.

(b) Perimeter Controls - Perimeter controls include interceptor ditches, berms in fill areas, and sediment fences or straw bales along the banks of existing streams and toes of slopes. Install all appropriate perimeter controls before beginning major site grubbing operation.

Install all erosion and sediment control features for soil disturbing activities that are within 90 meters (300 feet) horizontal distance of the two-year flood elevation before beginning work.

(c) Wet Season Work and Temporary Work Suspension - Wet season work is defined as work between October 1 and May 30. Before working during the wet season and before temporary work suspension for winter, meet with the Agency to review and update the ESCP and to develop a schedule to ensure that appropriate controls are implemented and maintained during the wet season work and work suspension periods.

During wet season work, stabilize soil stockpiles at the end of each workday by diverting flows, placing covers, or installing sediment barriers at the stockpiles. Also, limit excavation and bare ground activities to only that which is required for immediate operations.

(d) Disturbance Restrictions - If soil erosion and sediment resulting from construction activities is not effectively controlled, the Agency will limit the amount of disturbed areas to that which can be effectively

controlled. Incorporate erosion and sediment control measures into the Project at the earliest practicable time. Install all erosion and sediment control devices according to the approved implementation schedule and these Specifications. If the Contractor fails to control erosion, the Agency will stop all construction work according to 00180.70.

00280.42 Stabilization - Stabilize soil areas as follows:

(a) Soil Exposure Limitations - Stabilize all soils which are exposed and disturbed during construction related activities according to the following:

- **Statewide (Entire Year)** - Stabilize within seven days of exposure, all areas within 30 meters (100 feet) of waterways, wetlands, or other sensitive areas using methods that do not rely solely upon germination to control erosion.
- **West of the Cascades (Entire Year)** - Stabilize all other areas within 14 days of exposure.
- **East of the Cascades (October 1 through April 30)** - Stabilize all other areas within 14 days of exposure.
- **East of the Cascades (May 1 through September 30)** - Stabilize slope and embankment construction in stages based on site conditions, weather, and as determined by the Agency.

(b) Temporary Stabilization - Protect from erosion the surface area of exposed soils caused by construction activities. Temporary stabilize exposed soil surfaces not at finish grade at all times and soil surfaces at finish grade when working outside the permanent seeding dates. Provide the following until permanent stabilization measures are implemented:

- Schedule temporary stabilization on an 14 day basis, or more frequent, if needed or directed
- Implement at a minimum, appropriate temporary stabilization measures according to the schedule. Temporary stabilization includes, chemical soil tackifiers, temporary seeding, temporary mulching, erosion control matting, plastic sheeting, preparing seed bed, fertilizing, watering, and adding soil amendments.
- Document implemented measures on the ESCP

Active work areas scheduled for re-disturbance before the next scheduled temporary stabilization period may be left unstabilized if approved by the Agency.

(c) Permanent Stabilization - Permanently stabilize exposed soil surfaces at finished grade. Permanent stabilization methods include, but are not limited to, seeding, mulching, riprap protection, and bio-engineered slope stabilization. Permanent stabilization includes stabilization of temporary structures such as detours, stockpiles, and staged earthwork. Immediately perform permanent stabilization at each completed excavation and embankment area except for areas that are scheduled to be redisturbed.

If areas that have been seeded and are not sufficiently stabilized by an established stand of vegetation according to 01030.60, or the soil surface is not protected with sufficient temporary stabilization measures by November 1 of each year, do the following:

- Take measures necessary to redirect the flows away from the disturbed areas
- Re-grade disturbed areas to finished grade
- Apply permanent seeding at the original specified rate
- Apply temporary mulching or matting

If areas to be stabilized, prior to re-grading, are too steep or lack access for effective straw mulch application, apply, upon approval, other effective measures such as chemical soil stabilizers.

Incorporate permanent erosion control features into the Project at the earliest practicable time. Use temporary erosion control features for the following situations:

- To correct conditions that occur during construction activities that were not foreseen during the design stage of the Project
- That are needed prior to installing permanent erosion control features
- To temporarily control erosion that develops during normal construction activities

Where erosion will be a problem and if construction permits, construct permanent erosion control features immediately after clearing and grubbing and grading operations are complete. If permanent erosion control features cannot be constructed furnish and install temporary erosion control features.

00280.43 Area Preparation - Prepare areas according to 01040.48(d).

Track all fill slopes at finished grades steeper than 1V:3H and flatter than 1V:1.5H so that track impressions run parallel to slope contours. Maintain at least 35 mm (1 3/8 inch) tall track grousers.

00280.46 Application - Install erosion and sediment control devices as shown and according to the following:

(a) Biofilter Bags - Place and arrange biofilter bags as shown or directed.

(b) Check Dams - Construct check dams as shown or as directed.

Type 1: Aggregate - Place aggregate in the ditch section with the center low point below the outside edge.

Type 2: Straw Bales - Place aggregate in ditch section and extend check dam with straw bales sufficient to direct flow over aggregate weir.

Type 3: Biofilter Bags - Place aggregate in ditch section and extend check dam with biofilter bags sufficient to direct flow over aggregate weir. Aggregate weir may be replaced with additional biofilter bags if approved.

Type 4: Sand Bags - Place aggregate in ditch section and extend check dam with sand bags sufficient to direct flow over aggregate weir. Aggregate weir may be replaced with additional sand bags if approved.

Type 5: Pre-fabricated Check Dam System - Install pre-fabricated check dam systems according to the plans, Special Provisions, and the manufacturer's recommendations. Field fabricated systems are not allowed.

(c) Construction Entrances - Construct construction entrances at each access point between the construction site and all public or private roads or other paved surfaces.

When construction entrances are in use and mud and dirt tracking is evident, take additional steps to eliminate tracking by hosing off tires before vehicles leave the site, or by modifying construction techniques or work operation. Perform tire washing on gravel pads. Use silt-trapping structures to collect and drain wash water before it leaves the construction site.

(d) Diversion Dike/Swale - Construct diversion dikes and swales above the cut slope to divert runoff from undisturbed areas away from disturbed slope areas. Convey runoff to an undisturbed area and discharge in a nonerosive manner.

Construct diversion dikes and swales at the toe of fill slopes to divert and convey sediment-laden water to a sediment control facility. Compact dike material according to the MFTP.

Immediately after completing constructing diversion dikes and swales place temporary seed and mulch according to Section 01030, or place erosion matting and seed as directed.

(e) Temporary Drainage Curbs - Construct temporary drainage curbs as shown or directed.

(f) Dust Control - Apply appropriate dust (wind erosion) control according to the following:

- **Water** - Apply water according to Section 00340.
- **Liquid Stabilizer Emulsions** - Dilute liquid stabilizer with water at a ratio of 30:1 then apply at a rate of 270 L/ha (29 gallons/acre) unless the manufacturer recommends a greater rate of application.
- **Dry Powder Tackifier** - Apply at a rate of 157 kg/ha (140 pounds/acre) unless the manufacturer recommends a greater rate of application.

(g) Flow Spreader - A flow spreader is a 300 mm (12 inch) to 450 mm (18 inch) high berm of aggregate that is at a uniform grade throughout its length. Place the flow spreader to receive channeled runoff so that the water is uniformly dispersed along the length of the spreader. Discharge water into a stabilized area at nonerosive velocities.

(h) Inlet Protection - Construct inlet protection that directs flows through the control and into the inlet. Select materials from alternatives shown on the plans or Special Provisions.

Type 1 - Install supported sediment fence around the perimeter of the inlet according to 00280.46(n).

Type 2 - Place wire mesh over the inlet grate. Place sediment fence geotextile over the wire mesh and perimeter area near the inlet. Install aggregate over the geotextile fabric.

Type 3 - Install pre-fabricated inserts according to the plans, Special Provisions, and manufacturer's recommendations. Field fabricated inserts are not allowed.

Type 4 - Install biofilter bags according to the plans.

Type 5 - Install concrete masonry units around the perimeter of the inlet. Place sediment fence geotextile around the outside perimeter, up the outside face, and on the top of masonry units. Place aggregate over the geotextile fabric and flush with the top of masonry units.

Type 6 - Within 36 hours of harvest, install sod around the perimeter of the inlet.

(i) Matting - Insure that the matting is installed according to the plans, these Specifications, or the manufacturer's recommendations, whichever is more stringent.

(1) Area Preparation - Remove all materials (vegetation, rocks, wood, etc.) larger than 50 mm (2 inches) in size. Smooth the surface and remove undulations sufficient to allow the matting to be placed in complete contact with the soil.

(2) Seeding - Apply seeding over the same area where matting is required according to one of the following:

- a. Seeding Prior to Mat Installation** - Apply according to Section 01030. This method is preferred.
- b. Seeding After Mat Installation** - This method is allowed only if specified in the Special Provisions or approved. Apply according to Section 01030 at double the application rate for seed.
- c. Single Application - Mat and Seed:**
 - **Hydraulically Applied Mat** - Apply seed at double the rate specified in Section 01030. Thoroughly mix seed, fertilizer, and mat material.
 - **Manually Applied (Pre-seeded) Mat** - Pre-seed the mat at double the rate specified with the seed mix specified in Section 01030.

(3) Mat Placement - Apply matting loosely so it is in complete contact with the soil to prevent erosion occurring beneath it. Apply mat and fasteners as shown. Construct check slots on all channel applications and on slope applications when shown or specified.

(j) Temporary Mulch - Evenly apply dry mulch and tackifier material according to these Specifications. In areas not accessible to heavy equipment, mulch by hand or by other approved methods. Areas not prepared according to 01040.48(d) will require greater rates of application at the Contractor's expense. Tack mulch material in place mechanically or with hydraulically applied tackifier to form a cohesive surface cover that is resistant to displacement by wind and water.

(1) Dry Mulch - Apply straw mulch on slopes 1V:1.5H or flatter. Spread straw mulch by hand or blower. Place approximately 50 mm (2 inch) deep, in loose condition, at a rate between 4.5 to 6.7 Mg/ha (2 to 3 tons/acre) of dry mulch. Place straw mulch so that it is loose enough for sunlight to penetrate and air to circulate, but dense enough to shade the ground, reduce water evaporation, and materially reduce soil erosion. Anchor using hydraulically applied tackifier, crimping disc, or sheep's-foot roller approved by the Agency or methods specified in the Special Provisions.

Provide blower equipment that uses air pressure with an adjustable spout that uniformly applies dry mulch at constantly measured rates. Apply the materials using a sweeping, horizontal motion of the nozzle.

(2) Tacking - Straw mulch may be tackified using hydraulically applied tacking agents or mechanical methods at the following rates of application:

- a. Hydraulically Applied Tacking Agents:**
 - **Liquid Stabilizer Emulsions** - Dilute liquid stabilizer with water at a ratio of 30:1 then apply at a rate of 270 L/ha (29 gallons/acre) unless the manufacture recommends a greater rate of application.
 - **Dry Powder Tackifier** - Apply at 90 kg/ha (80 pounds/acre) with 880 kg (1,940 pounds) of hydromulch fiber unless the manufacturer recommends a greater rate of application.

b. Mechanical Methods - Straw mulch may be mechanically tackified using a crimping disk or sheep's-foot roller.

- **Crimping disc** - A heavy disk with flat, scalloped discs approximately 6 mm (1/4 inch) thick, having dull edges and spaced no more than 230 mm (9 inches) apart.
- **Sheep's-Foot Roller** - Modified sheep's-foot roller equipped with straight studs, made of approximately 20 mm (3/4 inch) steel plate, placed approximately 200 mm (8 inches) apart and staggered. Ensure that the studs are not less than 150 mm (6 inches) long nor more than 150 mm (6 inches) wide, and rounded to prevent withdrawing the straw from the soil. Use a roller with enough mass to incorporate the straw sufficiently into the soil providing a uniform surface cover.

(k) Plastic Sheeting - Place plastic sheeting on disturbed, temporary slopes where immediate protection is required and mulching or other methods of soil stabilization are not feasible. Temporary slopes include vertical excavations for retaining walls and other temporary soil excavations and embankments related to structural work.

Cover exposed soils with plastic sheeting and secure it tightly in place using an anchoring system of sand bags, chain link fence, or other approved methods. Do not allow the anchoring system to puncture the plastic sheeting. Trench plastic sheeting at the top of slope and secure adequately to maintain cover during reasonably expected conditions in the area. Direct water away from areas above the plastic sheeting to prevent erosion from undermining the plastic sheeting.

Control drainage from areas covered by the plastic sheeting so that the discharge occurs onto the toe protection.

(l) Temporary Scour Holes - Construct temporary scour holes at the outfall ends of temporary slope drains or as shown.

(m) Sediment Barriers:

Type 1: Straw Bales - Place and arrange straw bales as shown or directed.

Type 2: Biofilter Bags - Place and arrange biofilter bags as shown or directed.

Type 3: Wattles - Place and arrange wattles as shown or directed.

Type 4: Sand Bags - Place and arrange sand bags as shown or directed.

Type 5: Brush Barrier - Place and arrange brush barriers as shown or directed. Place woody debris or topsoil strippings in a linear pile.

Type 6: Filter Berm - Place and arrange filter berms as shown or directed. Place rock in an evenly spread, trapezoidal berm.

Type 7: Pre-fabricated Barrier System - Install pre-fabricated barrier systems according to the plans, Special Provisions, and manufacturer's recommendations. Field fabricated systems are not allowed.

(n) Sediment Fence - Construct supported (mesh and metal posts) and unsupported (no mesh) as follows:

- When installing geotextile and mesh, or geotextile alone, use a continuous roll of geotextile cut to the length of the barrier to avoid joints
- Manufacturer's factory seams are acceptable. Field sewn seams are not acceptable.
- Drive posts into undisturbed soil as shown.
- Securely fasten the geotextile (and mesh) to the upslope side of the posts. Securely fasten each end of the geotextile (and mesh) to the end posts.
- Use stitched loops over posts for unsupported silt fence
- Excavate a trench on the upslope side of the fence and place geotextile to the bottom of the trench. Backfill the trench with native material and compact.
- Attach the supported sediment geotextile to the wire mesh
- Install the manufactured silt fence system according to the plans, Special Provisions, and manufacturer's recommendations. Connect end of rolls as shown.

(o) Sediment Mat - Place sediment mats a minimum of 6 m (20 feet) downstream of work areas. Install mats individually or in groups on the stream bottom. Remove the mats not later than 48 hours after stream activities are complete. Remove them from the Project site, or if approved, place them on the stream bank and cover with permanent seeding.

(p) Temporary Sediment Trap - The trap may be formed by constructing a berm or by partial or complete excavation. Direct the discharge flow to a stabilized conveyance outlet or level spreader.

(q) Temporary Slope Drains - Construct watertight slope drains and extend as the embankment height increases. Construct temporary slope berms at the top of embankment slopes to direct water into the drains until permanent drainage structures are completed.

(r) Temporary Stabilization - Surfaces which require temporary stabilization include, but are not limited to:

- Exposed soil surfaces not at finished grade
- Exposed soil surfaces at finished grade when outside permanent seeding dates
- Stockpiles of exposed soils

Temporary stabilization methods include chemical soil stabilization, permanent seeding with temporary mulching, temporary mulching, matting, bark mulch and other temporary cover and stabilization measures. Prepare soil surfaces as specified for the appropriate method used.

If seed of any kind is applied and has not achieved 70% density of the surrounding existing grass areas prior to the end of the permanent seeding dates, then apply additional temporary stabilization measures, other than seeding.

(s) Slope Berm - Construct a 0.5 m (18 inch) minimum high berm of compacted material at the top of embankments during construction to direct water away from exposed slopes.

(t) Tire Wash Facility - Excavate the area for installation of the tire wash facility. Install subgrade geotextile, aggregate base coarse, reinforced concrete, and water as shown.

(u) Chemical Soil Stabilization - Hydraulically apply a liquid stabilization emulsion chemical soil stabilizer at the following rates unless the manufacturer recommends a greater rate of application:

- **Long Term Control of Exposed Soil Surfaces** - 325 L/ha (35 gallons/acre). Dilute the emulsion with water at the rate of one part emulsion to 20 parts water.
- **Steep Slopes with Raveling Small Rock** - 435 L/ha (45 gallons/acre). Dilute the emulsion with water at the rate of one part emulsion to 10 parts water.

00280.47 Work Quality - Protect areas according to 01030.49.

00280.48 Emergency Materials - Provide, stockpile, and protect emergency materials on-site for unknown weather or erosion conditions. A list of emergency materials will be listed in the Special Provisions. Replenish emergency materials as they are used.

The emergency materials are in addition to the other erosion control materials required to implement and maintain the ESCP.

Remove all unused emergency materials from the Project site at the completion of the Project.

Maintenance

00280.60 General - Maintain installed erosion and sediment control devices in good working order at all times. Keep the devices in place until the Agency issues notification of acceptance of stabilization. All maintenance and repairs are at the Contractor's expense.

00280.61 Erosion and Sediment Control Manager - The ESCM's duties include:

- Manage and insure proper implementation of the ESCP
- Accompany the Agency's representative to the field to review the ESCP before beginning construction activities
- Monitor rainfall on and in the vicinity of the Project site
- Monitor receiving streams in the vicinity of the Project site
- Weekly inspect erosion and sediment control features on active construction sites
- Every two weeks inspect erosion and sediment control features on inactive sites
- Inspect erosion and sediment control features on all inactive and active sites at least daily during rainy periods when 15 mm (5/8 inch) or more of rain has fallen within a 24 hour period
- Mobilize crews to make immediate repairs to the control devices or to install additional control devices during working and non-working hours
- Record actions taken to clean up significant amounts of sediment
- Complete the Erosion Control Monitoring form
- Update the ESCP monthly and within 24 hours after changes are implemented
- Prepare a contingency plan in preparation for emergencies and the rainy season
- Accompany the Agency's representative on inspections and, if requested, on inspections made by the regulating agency representatives

00280.62 Ineffective Controls - If a control feature does not function effectively, immediately repair, replace, or provide additional devices. Devices repaired, replaced, or added due to improper installation, insufficient maintenance, or damage from Contractor operations will be at the Contractor expense.

00280.63 Monitoring - Monitoring consists of the following:

(a) Rainfall - Furnish and install a rain gauge at the Project site. Notify the Agency if 15 mm (5/8 inch) or more of rainfall occurs within a 24 hour period. As soon as practicable, but not later than 24 hours, after 15 mm (5/8 inch) or more of rainfall occurs, including weekends and holidays, inspect the entire Project to determine the condition of all erosion and pollution control devices.

(b) Receiving Stream - Observe and record color and turbidity or clarity within 10 m (30 feet) upstream and downstream of locations where surface waters from the construction site enter the receiving stream. Note whether sheen and floating matter are present or absent. Describe any apparent color and the clarity of the discharge, and any observable difference in comparison with the receiving stream.

(c) Monitoring Form - Complete the Erosion Control Monitoring form after each inspection, observation of the receiving stream erosion control facility modification, or maintenance action. Submit the forms to the Agency weekly for active sites and every two weeks for inactive sites.

00280.64 Sediment Removal - Remove sediment and upgrade or repair the devices as needed as soon as practicable, but not later than two days after the surrounding exposed ground has dried sufficiently to prevent further damage from equipment needed for repair operations. If rainfall continues over a 24 hour period, or other circumstances that preclude equipment operation in the area, hand carry and install additional sediment control devices with best management practices and approved by the Agency.

(a) Catch Basins - Maintain catch basin inserts and other forms of inlet protection by removing trapped sediment when storage capacity has been reduced by 50%.

(b) Sediment Controls - Remove sediment from sediment fences, sediment barriers, check dams, and sediment traps once it has reached one third of the exposed height of the device or storage depth. Replace aggregate and rock filter material with new aggregate material when the sediment reduces the filtering capacity of the device by one half. Replace biofilter bags with clean, washed bags when removing sediment from them. Wash bags in an approved sediment control area.

(c) Paved Areas - Keep all paved areas clean for the duration of the Project. Use cleaning methods that do not transport sediment-laden water to receiving streams.

(d) Construction Entrances - Add and remove aggregate or other specified material as needed to maintain the proper function of the construction entrances.

(e) Permanent Stabilization - Restabilize within two calendar days of disturbance all areas disturbed by the Contractor's operations or other causes including wind, water, and vandalism.

(f) Straw Bales - Replace straw bales when they become non-functional or, at a minimum, on an annual basis or at the beginning of each construction season as appropriate.

Finishing and Clean Up

00280.70 Removal - Within 30 days of the notification of acceptance of permanent stabilization, remove temporary erosion and sediment control devices and materials from the area. Remove accumulated sediment before removing the devices and materials. Immediately shape and permanently stabilize areas affected by the removal process. All temporary erosion and sediment control features that are not incorporated into the permanent work remain the property of the Contractor. Do not remove temporary erosion and sediment control devices before permanent stabilization is accepted.

00280.71 Sediment Disposal - Re-grade removed sediment into slopes or remove and dispose of off-site according to all federal, state, and local laws and ordinances. Do not flush sediment-laden water into drainage systems.

Measurement

00280.80 Lump Sum Basis - No separate measurement will be made for lump sum items.

00280.81 Unit Basis - Unit basis items will be measured on a unit basis, per each, by actual count of each device or location where the device is constructed or placed and accepted.

00280.82 Length Basis - Length basis items will be measured by the meter (foot) along the line and grade of the item or device constructed or placed and accepted.

- Flow spreaders and diversion dike/swale will be measured along the long axis
- Sediment barrier, when measured on the length basis, will be measured along the long axis of the barrier regardless of type
- Temporary slope drains will be measured from the beginning of the metal end pieces to the end of the drain. Measurement will be made when each installation is at its maximum length.

00280.83 Area Basis - Area basis items will be measured on the ground surface by the meter (foot), and computed to the m² (square foot) or ha (acre) unit as applicable.

00280.85 Limitations - The quantities of emergency materials listed in 00280.48 of the Special Provisions are included in the pay item quantities listed in bid schedule.

Payment

00280.90 General - The accepted quantities of erosion and sediment control devices will be paid for at the Contract unit price per unit of measure for the following items:

Pay Item	Unit of Measurement
Erosion Control.....	Lump Sum
Check Dams.....	Each
Construction Entrances.....	Each
Inlet Protection.....	Each
Temporary Scour Holes.....	Each
Temporary Sediment Traps.....	Each
Tire Wash Facility.....	Each
Biofilter Bags.....	Each or m (Foot)
Sand Bags.....	Each or m (Foot)
Sediment Barrier.....	Each or m (Foot)
Diversion Dike/Swale.....	m (Foot)
Temporary Drainage Curbs.....	m (Foot)
Flow Spreader.....	m (Foot)
Sediment Fence, Supported.....	m (Foot)
Sediment Fence, Unsupported.....	m (Foot)
Temporary Slope Drains.....	m (Foot)
Plastic Sheeting.....	m ² (Square Foot)
Sediment Mat.....	m ² (Square Foot)
Chemical Soil Stabilization.....	m ² or ha (Square Foot or Acre)
Matting.....	m ² or ha (Square Foot or Acre)
Temporary Mulching.....	m ² or ha (Square Foot or Acre)

"Erosion Control" includes the following:

- Developing, revising, and documenting the ESCP
- Mobilization
- Monitoring activities
- Furnishing, stockpiling, protecting, restocking, and removing emergency materials
- Preparing Project for winter shut-down
- Inspecting, maintaining, and removing erosion control devices
- Restoring all disturbed ground and work areas

If "Erosion Control" is not listed as a pay item, it is Incidental work for which no separate payment will be made.

Emergency materials that are incorporated into the Project will be paid for under the appropriate pay item.

"Plastic Sheetting" includes the costs for protecting exposed slopes with plastic sheets, anchoring devices, and toe protection maintenance.

"Matting" includes the costs for preparing the slope surface and stabilizing exposed soil with erosion mat material.

Biofilter bags and sand bags used in constructing check dams or sediment barriers will not be separately paid for. Biofilter bags and sediment fence used in constructing inlet protection will not be separately paid for. Payment for these items will be included in payment made for the items "Check Dams", "Sediment Barriers", and "Inlet Protection" as applicable.

No separate or additional payment will be made for the following:

- Removing and disposing of sediment build up behind sediment fences and sediment barriers
- Removing and reinstalling required appurtenances to modify temporary slope drains as the embankment slopes are changed
- Constructing and removing temporary slope berms
- Applying dust control
- Erosion control for work outside the construction limits including but not limited to borrow pits, haul roads, disposal sites, and equipment storage sites

Payment will be payment in full for furnishing and placing all materials, performing all work, and furnishing all equipment, labor, and incidentals necessary to complete the work as specified.

00280.91 Lump Sum Progress Payments - The amount paid for lump sum items in the Contract progress payment will be based on the percent of the original Contract amount that is earned from other Contract items, not including advances on materials, and as follows:

- 50% upon initial installation of erosion items
- An additional 25% when 50% of the original Contract amount is earned
- The remaining 25% when the Project is complete and all temporary erosion control devices are removed from the Project site

PART 01000 - RIGHT OF WAY DEVELOPMENT AND CONTROL

Section 01030 - Seeding

Description

01030.00 Scope - This work consists of seeding and associated tasks to develop plant growth for erosion control, environmental mitigation, and roadside development.

01030.02 Definitions:

Certified Seed - A grass or legume seed named variety that has been reviewed and accepted into the Oregon Certified Seed program. Currently certified seed is individually sold in bags with a blue-colored Oregon Certification Tag, thus the name commonly used for such seed is "blue tag stock".

Establishment Period - A period when planting work has been performed and initially accepted, and there is a Contract requirement to care for the planted areas in some way until the period ends.

Native Plant (existing) - A variety of plant species that occurs in its natural habitat without direct or indirect human actions.

Noxious Weed - Any weed designated by the Oregon State Weed Board, County, or Weed Control District that is injurious to public health, agriculture, recreation, wildlife, or any public or private property as authorized by the most current edition of the following:

- Oregon Revised Statute (ORS) 570.505, Noxious Weed Control Law
- Oregon Department of Agriculture (ODA) Noxious Weed Policy and Classification System
- Oregon Administrative Rule (OAR), 603-56, Noxious Weed List
- ODA Quarantine on Kudzu and Purple Loosetrife
- ORS Chapter 452, Vector and Weed Control
- ORS Chapter 561, Quarantines, State Weed Board
- ORS Chapter 570, Plant Inspection, Quarantine, Pest, and Weed Control

Pure Live Seed (PLS) - The seed in a quantity of seed which is viable (alive) and able to germinate and grow into a living plant.

Weed - A plant that is undesirable where it is growing.

Materials

01030.11 Topsoil - Furnish topsoil according to 01040.14.

01030.12 Soil Conditioners, Amendments, and Bio-Amendments - Furnish soil modifiers according to 01040.15, 01040.16, and 01040.17.

01030.13 Seed - Furnish seed meeting the following requirements:

(a) Label - Deliver all seed in standard, sealed containers. Label each container with the following:

- The kind and variety of the seed
- The kind and variety of each seed of 3% or more in a mixture, by mass (weight)
- Percent of germination - each kind of seed
- Percent of Pure Live Seed (PLS) - each kind of seed
- Percent and kind of other crop

- Percent of inert material
- Percent of weed seed
- Statement of "No Noxious Weed Found"
- Date of test
- Lot number
- Net mass (weight) of contents
- Responsible party (name and address of labeler)
- Origin for each seed (state or foreign country)
- For native seeds only - date and location of collection

Alternate label requirements may be required for certain native grass and plant seeds when indicated in the Special Provisions.

(b) Quality - Furnish seed that is not sprouted, moldy, or shows evidence of having been wet or otherwise damaged and meets one of the following requirements:

- Certified as "Oregon Certified Seed" at the time of planting, or the equivalent from another state. The current certified seeds are found in the most recent edition of the "Oregon Certification Acres Applied for Certification Summary". The minimum requirements of Oregon certified seed are published in the current year's "Oregon Certified Seed Handbook". Both certified seed references are available from County Extension Offices or Oregon State University. This seed is typically used for specialty or lawn seeding.
- Meets the requirements of the Oregon Seed Law. This seed is typically used for permanent and temporary erosion control and for seed varieties that are not available as certified seed.

Furnish seed that has been tested within 18 months of the planting date and labeled according to the Oregon Seed Law and Federal Seed Act.

(c) Pure Live Seed (PLS) - PLS is the amount of living, viable seed in a larger total amount of seed. The amount of seed to be applied is obtained by using the purity and germination percentages from the label on the actual bag of seed to be used on the Project.

To calculate the amount of seed to be applied:

- Obtain the PLS factor by multiplying the seed label germination percentage times the seed label purity percentage
- Divide the specified PLS rate by the PLS factor

Metric Example

A PLS seeding rate of 10 kg/ha is specified. The seed label shows a purity of 80% and germination is 90%. After converting percentages to decimals, 0.80×0.90 equals a factor of 0.72. The specified PLS rate, 10 kg/ha, divided by the factor of 0.72 equals 13.88. About 14 kg/ha of total seed needs to be applied in order to meet a PLS seeding rate of 10 kg/ha.

English Example

A PLS seeding rate of 10 pounds per acre is specified. The seed label shows a purity of 80% and germination is 90%. After converting percentages to decimals, 0.80×0.90 equals a factor of 0.72. The specified PLS rate, 10 pounds per acre, divided by the factor of 0.72 equals 13.88. About 14 pounds per acre of total seed needs to be applied in order to meet a PLS seeding rate of 10 pounds per acre.

(d) Inspection - Each lot of seed is subject to inspection upon delivery to the Project. Seed that is not labeled or that does not conform to the Specifications will be rejected and replaced at the Contractor's expense.

(e) Mixes - Furnish seed mixes that meet the labeling, quality and inspection requirements stated above. Submit any other proposed seed or seed mixes for consideration and receive written approval before seeding work begins.

(f) Types of Seed Mixes - Seed mixes, quantities, standards, and other information will be included in the Special Provisions for each type of seed mix.

The following are the functional categories of seed mixes that may be included on projects (a category may actually have multiple functions on a project site):

- **Temporary Seeding** - To provide short-term control of soil erosion until permanent seeding is done or the potential for erosion is removed.
- **Permanent Seeding** - The final seeding, or only seeding performed for control of soil erosion.
- **Lawn Seeding** - Seeding for high visibility or pedestrian areas where a finished turf appearance is desired.
- **Wildflower Seeding** - Seeding to develop growth of wildflowers. The seed mix will typically contain grass or other plant seed to provide erosion control.
- **Plant Seeding** - Seeding for revegetation or restoration, often using native plant seeds, and which may include woody plant species.
- **Water Quality Seeding** - For use in water quality facilities such as swales or settling basins.
- **Wetland Seeding** - To revegetate wetlands, most often using native plant species.

(g) Availability - Provide a list of seed sources for all specified seeds within 60 calendar days after execution of the Contract. Verify that all specified seed has been located and will be available for use on the Project.

01030.14 Fertilizer - Furnish standard, commercial grade fertilizer conforming to the following:

(a) General - Deliver fertilizers in separate or mixture containers that have the percentage of total nitrogen, available phosphoric acid, and water-soluble potash (NPK) in the amounts specified. Label each container with a quality compliance certificate that includes the container mass (weight), the percentage of each ingredient, and the source of each component in the mixture. Ensure that each container is labeled with a Quality Compliance Certificate that meets the applicable requirements of Section 00165.

Furnish fertilizer according to State and Federal regulations. Fertilizer is subject to testing by the State Department of Agriculture.

(b) Type of Fertilizer - Furnish fertilizer according to the following:

- (1) West of the Cascades** - Inorganic fertilizer 22-16-8, analyzing 22% nitrogen, 16% phosphoric acid, 8% soluble potash, and including a minimum of 2% sulfur. Furnish fertilizer containing not

less than 50% available water-insoluble, controlled-release nitrogen derived from one of the following sources:

- Urea formaldehyde (Nitroform)
- Isobutylidene Diurea (IBDU)
- Polymer coated urea (no sulfur)

(2) East of the Cascades - Inorganic fertilizer 22-10-5, analyzing 22% nitrogen, 10% phosphoric acid, 5% soluble potash, and including a minimum of 10% sulfur. In the fertilizer, furnish not less than 50% available water-insoluble, controlled-release nitrogen derived from one of the three sources stated for west of the Cascades above.

(3) East and West, Near Water - Low-phosphorus fertilizer 22-2-11, analyzing 22% nitrogen, 2% phosphorus, and 11% potassium which releases slowly over an eight to nine month period. In the fertilizer, furnish a minimum of 60% available water-insoluble, controlled-release nitrogen derived from one of the three sources stated for west of the Cascades above. Furnish phosphorus and potassium coated to allow a minimum of 95% controlled-release.

01030.15 Mulch - Furnish mulch materials free of noxious weed seeds and plants and which contain no substances detrimental to plant life. The kind of mulch material(s) acceptable for use will be shown on the plans or listed in the Special Provisions, or as approved.

(a) Hydromulch - Cellulose fiber produced from virgin wood, straw, or paper fiber product from the QPL.

Process the wood or straw mulch so that the fibers remain uniformly suspended under agitation in water. Furnish wood or straw fiber having moisture-absorption and percolation properties.

Ship hydromulch in packages of uniform mass (weight), plus or minus 5%, that are labeled with the manufacturer's name and air-dry mass (weight).

(b) Straw - Straw mulch for non-hydroseeding applications from bentgrass, bluegrass, fescue or ryegrass singly or in combination. If grass seed straw is not available within a reasonable distance of the Project, straw from barley, oat or wheat may be allowed upon approval of the Agency. Provide straw that is not moldy, caked, decayed or of otherwise low quality. Submit certification from the supplier that the straw is free of noxious weed seeds or plant parts. Acceptable documentation will show either (1) that the straw source is from an "Oregon Certified Seed" field, or (2) the seed lab test results of the seed harvested from the straw meet minimum Oregon Certified Seed quality for weed seed content. Use a straw binder or tackifier.

(c) Tracer - For hydromulch application, include green dye for visibility.

01030.16 Tackifier - Furnish a commercial quality tackifier containing no agent toxic to plant life. Provide tackifier of either a liquid stabilizing emulsion or a dry powder tackifier complying with the following:

(a) Liquid Stabilizer Emulsion - Tackifier with a base material of liquid, polyvinyl acetate polymers, using emulsion resins and containing not less than 55% total solids by mass (weight). Furnish tackifier containing no polyacrylates or polyvinyl acrylics. The emulsion shall, when diluted with water and upon drying, allow exchange of air and moisture to the seeds and have an effective life of one year or more.

(b) Dry Powder Tackifier - Tackifier base consisting of one or more active hydrocolloids from natural plant sources, which hydrates in water and blends with other slurry materials, and upon application and drying tacks the slurry particles to the soil surface, and exhibits no growth or germination inhibiting factors. Provide stabilizing emulsion in a dry powder form that may be re-emulsifiable, and consisting of a processed organic adhesive derivative of one of the following:

- Gumbinder derived from guar (*Cyamopsis tetragonoloba*)
- Gumbinder derived from plantain (*Plantago insularis*)

Construction

01030.40 General - Notify the Agency not less than 24 hours in advance of any seeding operation. Do not begin work until the prepared slopes have been approved for seeding. Following approval, begin seeding immediately and continue seeding the Project slopes as they become ready. Do not perform seeding during windy weather or when the ground is frozen, excessively wet, or otherwise not tillable.

Do not disturb or damage existing desirable vegetation that is to be left in place. Do not disturb areas previously seeded and mulched, with the exception of disturbances caused by stage construction. If previously seeded areas are disturbed, rework and reseed as directed, at the Contractor's expense.

01030.41 Temporary Seeding - Temporarily seed disturbed soils and slopes that are not at finished grade and which will be exposed for two months or longer before being disturbed again. Provide fertilizer, mulch, water, and other amendments necessary to ensure establishment. Ensure that temporary seeding work achieves the coverage of live plants required by 01030.60 by the end of the next permanent seeding date stated in 01030.42. If this coverage is not achieved, or if the Agency determines that it is not effective in stabilizing the soil from erosion, stabilize the area with other temporary stabilization methods as described in 00280.42 at the Contractor's expense.

01030.42 Permanent and Other Seeding - Perform permanent seeding during the permanent seeding dates shown below. If work done within the seeding dates does not provide coverage according to 1030.60, re-seed according to 1030.48 and as directed. The dates for permanent, wildflower, plant, water quality, wetland, and lawn seeding are as follows:

- **West of the Cascades** - March 1 through May 15 and September 1 through October 31. If new lawn areas are regularly watered, they can be seeded anytime from March 1 through November 15.
- **East of the Cascades** - October 1 through February 1. If new lawn areas are regularly watered, they can be seeded anytime from March 1 through October 31.
- **Wetland (East and West)** - September 1 through October 31 and March 1 through April 30.

Permanent seeding outside the permanent seeding dates requires written authorization from the Agency. Written approval to seed outside of the seeding dates will only be given when physical completion of Project work is imminent and environmental conditions are conducive to satisfactory growth. For permanent seeding work done outside the seeding dates, ensure that the seeding provides the coverage of live plants required by 01030.60, achieved no later than three weeks into the next permanent seeding period. If this coverage is not achieved, re-seed and re-fertilize areas of insufficient coverage according to the permanent seeding requirements, at the Contractor's expense.

01030.43 Area Preparation - Refer to 01040.48 for the following:

- Temporary Seeding - Method E soil preparation
- Permanent Seeding - Method D soil preparation
- Wildflower Seeding - Method B soil preparation
- Plant Seeding - Method B soil preparation
- Water Quality Seeding - Method B soil preparation
- Wetland Seeding - Method B soil preparation
- Lawn Seeding - Method C soil preparation

01030.44 Fertilizer:

(a) General Use - Do not apply inorganic fertilizer within 15 m (50 feet) of bodies of water. In all other areas, apply 22-16-8 or 22-10-5 at the rate of 450 kg/ha (400 pounds per acre).

(b) Low-phosphorous - Use low-phosphorus fertilizer within 15 m (50 feet) of bodies of water and for water quality swales only when indicated in the Special Provisions. Apply 22-2-11 polymer coated urea low-phosphorus fertilizer at the rate of 225 kg/ha (200 pounds per acre).

01030.45 Soil Testing - Test soil according to 01040.13.**01030.46 Topsoil and Wetland Topsoil** - Construct topsoil according to 01040.43 or 01040.44 as appropriate.**01030.47 Soil Amendments and Bio-Amendments** - Incorporate soil amendments and bio-amendments into the seeding operation according to 01040.45 and 01040.46, as appropriate.**01030.48 Application** - The following application methods are acceptable for both temporary and permanent seeding:

(a) Hydroseeding, Fertilizing, Hydromulching, and Tacking - Apply seed, fertilizer, mulch, and tackifier as follows:

Use hydraulic equipment that continuously mixes and agitates the slurry and applies the mixture uniformly through a pressure-spray system providing a continuous, non-fluctuating delivery. Ensure the equipment and application method provide a uniform distribution of the slurry. Place seed, fertilizer, mulch, and tackifier in the hydroseeder tank no more than 30 minutes prior to application.

(1) Hydroseeding operation - Perform hydroseeding in a one-step or two-step process. The two-step process is preferred.

a. Two-step operation - Apply materials in two steps:

- **Step 1** - Apply seed, fertilizer, and tracer (separately or together).
- **Step 2** - Apply mulch and tackifier. (The 560 kg/ha (500 pounds per acre) of mulch used for tracer may be included as part of the specified rate per hectare (acre) of mulch.)

b. One-step operation - Apply seed, fertilizer, mulch, tackier, and tracer in one step. When using the one-step process, double the amount of seed (to compensate for seed suspended above soil by the mulch).

(2) **Seed** -Thoroughly mix seeds when more than one kind is to be used.

(3) **Mulch** - Apply hydromulch at the following rates based on dry fiber mass (weight):

- **Slopes Flatter Than 1V:2H** - Apply cellulose fiber that includes a tackifier at a rate of 2.2 Mg/ha (2,000 pounds per acre).
- **Slopes 1V:2H or Steeper** - Apply cellulose fiber that includes a tackifier at a rate of 3.4 Mg/ha (3,000 pounds per acre).

(4) **Tackifier for Cellulose Fiber Applications** - Use one of the following:

a. Liquid Stabilizer Emulsions - Dilute liquid stabilizer with water at a ratio of 30:1 then apply at the rate of 270 L/ha (30 gallons per acre) unless the manufacturer recommends a greater rate of application.

b. Dry Powder Tackifier - Apply at the following rates unless the manufacturer recommends a greater rate of application:

- **Slopes flatter Than 1V:2H** - 67 kg/ha (60 pounds per acre) mixed with hydromulch fibers at the rate specified.
- **Slopes of 1V:2H or Steeper** - 112 kg/ha (100 pounds per acre) mixed with hydromulch fibers at the rate specified.

(b) Seeding, Fertilizing, Dry Mulching, and Tacking - Apply seed and fertilizer separately or together as the first step. Apply dry mulch as the second step. Tackify the mulch as the third step.

(1) Seed and Fertilizer - Apply seed and fertilizer at the specified rates. When fertilizer and seed are to be applied in dry condition, apply them separately. When applied from separate compartments, the application may be done in one operation. Apply seed and fertilizer by one of the following methods:

a. Blower - Blower equipment using air pressure and an adjustable spout that uniformly applies dry fertilizer and dry seed in separate and successive applications at constant measured rates.

b. Helicopter - Helicopter equipped with hoppers and adjustable disseminating mechanisms that separately and successively apply fertilizer and seed in uniform and prescribed quantities.

c. Mechanical Spreaders - Hand or machine operated mechanical spreaders that uniformly apply dry fertilizer and dry seed separately and successively in the prescribed quantities.

d. Hydroseeding - Uniformly apply at the rate specified. Add 560 kg/ha (500 pounds per acre) of hydromulch fiber to the seed and fertilizer mixture to visibly aid uniform application at the Contractor's expense.

(2) Dry Mulch - Evenly apply straw mulch material according to these Specifications within 24 hours after seeding and fertilizing. In areas not accessible to heavy equipment or hose, mulch by hand or by other approved methods.

Place straw mulch approximately 50 mm (2 inches) deep, in loose condition, which requires roughly 5.6 Mg/ha (2 1/2 tons per acre) of dry mulch, depending on moisture content. Do not use straw mulch on slopes of 1V:1.5H or steeper.

(3) Tacking - Anchor mulch using one of the following methods:

a. Dry Powder Tackifier - Unless the manufacturer recommends a greater rate, apply dry powder tackifier at the rate of 90kg/ha (80 pounds per acre) mixed with 880 kg (800 pounds per acre) of hydromulch.

b. Mechanical Crimping - Mechanically incorporate the straw into the top 50 mm (2 inches) of the soil forming uniform erosion control surface cover.

c. Crimping Disc - A heavy disk with flat scalloped discs approximately 6 mm (1/4 inch) thick, having dull edges and spaced no more than 230 mm (9 inches) apart.

d. Sheep's-Foot Roller - Modified sheep's foot roller equipped with straight studs, made of approximately 20 mm (3/4 inch) steel plate, placed approximately 200 mm (8 inches) apart and staggered. Ensure that the studs are not less than 150 mm (6 inches) long, nor more than 150 mm (6 inches) wide, and are rounded to prevent withdrawing the straw from the soil. Use a roller with enough mass to incorporate the straw sufficiently into the soil providing a uniform surface cover.

(c) Drill Seeder - Apply seed and fertilizer with a grass seed drill that works fertilizer into the soil and places seed under about a 6 mm (1/4 inch) soil cover.

(d) Seeding Over Mulched Areas - If an area has been previously mulched for erosion control or temporary seed and mulch is present on the soil surface, double the kilogram rate for each seed type used. Apply seed and fertilizer hydraulically and add a green dye to the mixture to visibly aid uniform application. Upon approval, fertilizer and seed may only be applied after mulching if one of the following conditions apply:

- Mulch is punched into the soil by mechanized means
- It is necessary to hold down mulch with netting or like material
- The slope is 1V:1.5H or steeper and a slurry mixture would tend to run down the slope
- Mulch is removed prior to seeding

01030.49 Work Quality:

(a) Drift - Prevent drift and displacement of seed and fertilizer regardless of equipment and methods used. Use protective covering on structures and objects where coverage and stains would be objectionable and when tacking agents are used with mulch. Protect vehicles and people from drifting spray. If equipment and methods of application result in wasting material, make corrections to prevent waste.

(b) Displacement - Prevent seed, fertilizer, and mulch from falling or drifting onto areas occupied by rock base, rock shoulders, plant beds, or other areas where grass is detrimental. Remove material that falls on plants, roadways, gravel shoulders, structures, areas where material is not specified.

(c) Damage - Prevent damage to prepared areas and to completed fertilizer, seed, and mulch work. Replace any material that becomes displaced before acceptance of the work.

Maintenance

01030.60 General - Ensure that seeded areas have a uniform, healthy and weed-free stand of grass or other seeded plants growing at the end of the establishment period. The minimum living plant

coverage standards for acceptance of seeding are as follows:

- **Temporary Seeding** - 70% coverage of ground surface.
- **Permanent, Wildflower, and Wetland Seeding** - 90% coverage of ground surface.
- **Water Quality and Lawn Seeding** - 100% of ground surface.
- **Woody or Other Plant Seeding** - The Special Provisions will list the minimum living plant coverage standards.

01030.61 Establishment Period - The seeding establishment period is as follows:

(a) Erosion Control Seeding - For temporary and permanent seeding done solely for erosion control, the establishment period begins upon acceptance of the initial seeding work and ends upon satisfactory plant growth and coverage of the seeded areas according to 01030.42 and 01030.60.

(b) All Other Seeding - Establishment periods for wildflower, plant, water quality, lawn, wetland, and permanent seeding begins upon acceptance of the initial seeding work and ends as follows:

- The seeding establishment period will end 45 days after the beginning of the establishment period, if the area was seeded during the seeding season and all establishment responsibilities have been met
- If the original seeding construction is completed and accepted outside the permanent seeding dates, the establishment period will end 45 calendar days after any necessary reseeding is completed and accepted during the following seeding season

01030.62 Establishment Work:

(a) Erosion Control Seeding - Select and provide establishment work for erosion control seeding from 01030.62(b) necessary to provide performance described in 01030.60.

(b) All Other Seeding - Ensure the establishment of wildflower, lawn, plant, water quality, wetland, and permanent seeding by the following:

(1) Protection - Protect seeded areas from trespass and other hazards of damage. Use protective fences and signs at the discretion and expense of the Contractor. Obtain approval of any protective methods used.

(2) Fertilizing and Watering - Apply fertilizer according to 01030.44. Apply water according to good horticultural practice under the prevailing conditions, as required to promote a healthy stand of plants. Obtain water at the Contractor's expense.

(3) Weed Control - Weed control includes identifying, killing, and removing plants as defined by the Oregon Department of Agriculture to be Type "A" or Type "B" rated weeds and Weeds as defined in 01030.02 prior to plants going to seed. Keep the seeded areas "weed-free" throughout the establishment period. "Weed free" is defined as zero Type "A" weeds, one Type "B" weed per m² (square yard), and two Weeds, as defined in 01030.02, per m² (square yard).

Conduct weeding according to 01040.21 and as approved by the Agency.

(4) Mowing - Mowing is required for lawn seeding and water quality seeding only. Do the first mowing of grass when soil is firm enough to prevent rutting and grass is about 75 mm (3 inches) tall. After mowing, leave grass that is approximately 50 mm (2 inches) tall. At each subsequent

mowing, leave about 40 mm (1 1/2 inches) of growth. After the second mowing, grass clippings may be left in place upon written approval. The approval may be granted if:

- Mowing is done with a mulching blade
- There are no weed seeds in the mulch
- Mulch is not detrimental to the growth of grass

(5) Repair and Restore - Repair and restore soil grades and re-seed any damaged, settled, or unproductive areas to the specified conditions of this Section at the Contractor's expense

Finishing and Clean Up

01030.70 Cleanup - Remove weeds, litter, debris, stones, and all other extraneous matter from seeded areas as directed and dispose of according to 00310.43.

01030.71 Waste Disposal - Do not flush excess materials into the drainage system. Dispose of protective coverings used on structures off site. All waste materials associated with seeding, fertilizing, and mulching become the property of the Contractor.

Measurement

01030.80 General - The quantities of seeding and associated items will be measured by the applicable basis as follows:

- **Lump Sum Basis** - No separate measurement will be made for lump sum items.
- **Unit Basis** - Unit basis items will be measured on a unit basis, per each, by actual count of each item that is constructed or placed and accepted.
- **Area Basis** - Area basis items will be measured on the ground surface by the meter (foot) and computed to the m² (square yard) or ha (acre) unit as applicable.

Payment

01030.90 General - The accepted quantities of seeding and associated items will be paid for at the Contract unit price per unit of measurement for the following items:

Pay Item	Unit of Measurement
(a) Seeding Mobilization.....	Each
(b) Fertilizing	ha (Acre)
(c) Mulching	ha (Acre)
(d) Permanent Seeding,.....	ha (Acre) or Lump Sum
(e) Plant Seeding,	ha (Acre)
(f) Temporary Seeding,	ha (Acre)
(g) Water Quality Seeding,.....	ha (Acre)
(h) Wetland Seeding,	ha (Acre)
(i) Wildflower Seeding,	ha (Acre)
(j) Lawn Seeding,.....	m ² (Square Yard)

In items (d) through (j), the type of seed mix, (Mix No. 1, Mix No. 2, etc.), if applicable, will be inserted in the blank.

Item (a) includes all labor and transportation of materials and equipment, each time the Contractor mobilizes as required for all hydraulically or airborne applied seeding, fertilizing, and mulching.

Mobilization for application by blowers, mechanical spreaders, or hand spreading is Incidental work for which no separate payment will be made.

If "Seeding Mobilization" is not listed as a pay item, it is Incidental work for which no separate payment will be made.

Items (d) through (j) includes preparing the seed bed, soil preparation, seeding, fertilizing, mulching, applying tacking agent, and all establishment work.

Payment will be payment in full for furnishing and placing all materials, performing all work including inspecting and maintenance, and for furnishing all equipment, labor, and incidentals necessary to complete the work as specified.