



## REVEGETATION PROJECT SUMMARY

Received: 12/16/2021

**Park:** Rocky Mountain National Park (ROMO)

**Project Title:** Fall River Entrance Improvements

**PMIS Number:** 160755 (BASE); 199703 (Wastewater); 249028 (Water System); 3188223 (Transportation)

**PEPC#:** 73837

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**Construction Date:** May 1, 2022 to November 2022

**Estimated Disturbance Area:** 2.5 acres (88,000 square feet or 2.0 acres +15% contingency)

**Project Cost:** \$5,620,867.00

**Revegetation Cost (for seed increase and weed control):** \$106,993

### Project Description

Facilities at the Fall River Entrance Station no longer meet the safety or operational needs of the park. The Fall River Entrance Improvement Project would remove all existing buildings and replace them with newly constructed buildings to comply with federal accessibility standards and code requirements. Improvements to buried utilities will also take place. As part of the project there will be adjustments to the roadway layout and circulation, the southern-most median, a storm culvert. The improvements will be constructed in a similar configuration that preserves and enhances the historic setting. It is anticipated that the replacement of these structures and utilities will result in an estimated 2.5 acres of vegetative disturbance. There are three vegetated medians at the entrance that are covered with graminoids and wooded predominately with Ponderosa pine and some Douglas fir trees. The existing trees are to be protected to the maximum extent feasible during construction. An estimated total of forty-five (45) trees will be removed for construction of the new entrance improvements. Construction is scheduled to begin May 2022 and continue through November 2022 and could extend into 2023 to address any outstanding revegetation items.

### Revegetation Summary

Delivery of the revegetation effort associated with this project will be accomplished via a combination of construction contractor work, separate revegetation contracts, and park staff time. Park staff will hand collect site appropriate seed and assist with identifying trees for salvage and relocation. Separate revegetation contracts will be issued for weed control and seed increase. The prime construction contractor will salvage, store, replant, and maintain trees during construction and warranty period; salvage topsoil; install slope stabilization and erosion control materials; reapply salvaged soils, grade and prepare site for seeding; and hydroseed and mulch following construction.

## Description / Objectives

The overall objective of the activities described in this revegetation plan are to facilitate the implementation of this project such that mitigation measures detailed in the park compliance documents are implemented, the project impacts are managed in line with the NPS policies and mission related to resource management and conservation, and that short and long-term resource impacts resulting from disturbance associated with this project are minimized. To that end the core activities of this revegetation effort will include:

- *Weed control to minimize spread of non-native plants and to allow native seeded and planted areas to establish.*
- *Seed increase to have appropriate plant materials available for project revegetation work.*
- *Slope stabilization treatments on steep slope areas.*
- *Salvaged plant materials to re-use on site and mitigate tree removal.*

Other activities described here include soil salvage, soil decompaction, slope stabilization, and seeding. These are activities to be completed by the construction contractor or their approved subcontractor and are described here to provide additional guidance.

The guiding principles for this revegetation effort and objectives originate from the National Park Service mission of resource preservation and stewardship and NPS Management Policies 2006 specifically:

4.0 The National Park Service will preserve and protect the natural resources, processes, systems, and values of units of the national park system in an unimpaired condition to perpetuate their inherent integrity and to provide present and future generations with the opportunity to enjoy them.

4.4.1.2 The restoration of native plants and animals will be accomplished using organisms taken from populations as closely related genetically and ecologically as possible to park populations, preferably from similar habitats in adjacent or local areas.

4.4.2.4 Management of Natural Landscapes. Landscape revegetation efforts will use seeds, cuttings, or transplants representing species and gene pools native to the ecological portion of the park in which the restoration project is occurring. ...”

9.1.3.1 Park Facilities, Construction Sites. The cost of restoring areas impacted by construction will be considered part of the cost of construction, and funding for restoration will be included in the construction budgets.

9.1.3.2 Revegetation and Landscaping. “Where practicable, soils and plants affected by construction will be salvaged for use in site restoration.”

## Revegetation Methods and Responsibilities

### Topsoil

Salvage and replacement (Prime Contractor): Within the construction limits of disturbance and staging areas the top 4 to 6 inches of topsoil will be salvaged and set aside for replacement following all construction activities. To protect the structural integrity and biological activity of local topsoil, salvaged material will be handled and transported as little as possible. The preferred method is to excavate and store in windrowed piles (no more than 3 feet high, 3 feet

long) along the outer edge of the clearing limits. If topsoil cannot be windrowed adjacent to the disturbed area the topsoil may be removed and stockpiled at an approved location (See specifications in appendix).

Importing Topsoil (Prime Contractor in coordination with ROMO staff): In areas where soil is too sparse to support revegetation, importing topsoil may be approved if topsoil sources are weed free and of similar composition to the on-site materials this would require soil testing and a source site survey by qualified vegetation staff.

Steep Slopes (Prime Contractor): Any slope that is 3:1 or greater requires a minimum of 6 inches of topsoil placed following construction. Some “excess” topsoil may be generated from the road work if so, this should be planned to be used on slopes to assure the final topsoil depth after placement and settling is at least 6 inches.

Decompaction (Prime Contractor): Prior to topsoil replacement and revegetation efforts, any soils that are overly compacted from construction activities shall be decompacted. The target is that all soils will be in a similar condition that they were prior to any construction activities. The critical decompaction zone includes the depth of the most common plant species root zones or about 12-16 inches. The targeted depth should be a minimum of 12 inches before topsoil placement. This will allow pioneering grass and forb species to establish and may facilitate shrubs and deeper-rooted colonize. No vehicle and only incidental foot traffic will be permitted any areas where topsoil has been replaced, where planting and seeding will occur, and during plant material establishment.

Log Erosions Barriers (Prime Contractor): Materials to stabilize steep slopes on roadside cuts may include salvaged snags and logs taken during construction site preparation, clearing, and grubbing activities. CO will designate trees and snags to conserve for use. Materials will be stockpiled at designated locations until ready for use. After soil contouring and decompaction, salvaged logs and snags of random lengths with irregular ends (preferably broken and not flush cut) will be limbed, placed in a random manner perpendicular to slope drainage, embedded, and staked into the ground. Topsoil placement and hydroseeding and hydromulching follows installation.

Erosion Control Blankets (Prime Contractor): Biodegradable blankets, composed of all-natural fibers, will be installed within 7 days of hydroseeding/hydromulching.

**Non-native Plant Control**

Prevention (Prime Contractor, inspected by NPS): All vehicles, equipment, and tools shall be cleaned of dirt, mud, plant materials and all seed prior to entering ROMO to prevent the introduction of non-native plant species. All seeding equipment and tools (hydromulchers) must be completely free of mulch and seed residuals and must be inspected by qualified staff prior to entering the park.

Control (DSC-T Revegetation contract): Presence of invasive non-native species in the project area poses a challenge to restoration efforts. Known non-native plant species located within or near the project site that will be targeted for treatment are in Table 1. This list is not exhaustive and weed contractors will need to survey the entire project area and vegetated areas 50 feet beyond the construction limits of disturbance (LOD) to determine if additional species and areas within the 50 feet buffer require treatment. The contractor will implement non-native plant control methods compliant with the Park’s 2003 Invasives Exotic Plant Management Plan. Total area for control expected to be approximately 2.5 acres but may be more based on survey of infestations in the 50 feet buffering the LOD. Treatment will occur one season prior to construction and for two growing seasons post construction.

*Table 1. Prioritized species with treatment method & timing (Source: ROMO Veg ExoticsInventory pt).*

Species	Common Name	Treatment Method	Treatment Timing
<i>Cirsium arvense</i>	Canada thistle	Herbicide	Spring / Summer
<i>Linaria vulgaris</i>	Yellow toadflax	Herbicide	Spring / Summer

<i>Verbascum thapsus</i> *	Common mullein	Manual removal	Spring / Summer
<i>Carduus nutans</i> *	Musk thistle	Manual removal and herbicide	Spring / Summer
<i>Euphorbia esula</i>	Leafy spurge	Herbicide	Spring / Summer
<i>Bromus tectorum</i>	Cheatgrass	Herbicide (Esplanade or other)	Spring / Fall
<i>Bromus inermis</i>	Smooth brome	Herbicide	Spring / Fall
<i>Phleum pratense</i>	Timothy	Manual removal	Spring / Fall

\* priority species for treatment at Big Horn Ranger Station and Septic Tank areas.

As recently as 2020, in areas where the infestation of invasives (thistle spp. and common mullein) was less than 10% cover, mechanical treatments (hand pulling, removal of seed heads, and dig with tools) have been used. Chemical treatments using a backpack sprayer were also employed in 2020 to control leafy spurge, located in the adjacent Aspenglen Campground. Musk thistle and common mullein are predominating the west side of the Big Horn Ranger Station and septic tank area and should be prioritized for treatment. To minimize invasives following construction activities the pre-construction weed treatment focus will be on those species that are rhizomatous and those that spread aggressively in disturbed areas.

### Plant Materials

Plant salvage and installation (Prime Contractor): It is estimated that 29 Ponderosa pines and 16 aspen trees will be removed during construction. More than a dozen potential Ponderosa pine saplings 1-5' tall are located within the project's utility corridor. Park resource staff will identify 12 trees within the construction limits of disturbance for the contractor to salvage. Salvage should occur as early in spring as possible, before construction. All plant materials will be salvaged per industry standards and specifications provided in appendices. Plants will be balled and burlapped or potted and stored by the Contractor. Contractor will transport, store, and maintain the materials until installed post construction. Slow-release, non-synthetic tree fertilizer nuggets/cake shall be added to the hole (at rates consistent to manufacturer's label). Before any trees are replanted fire and facilities staff will be consulted to assure plant materials will not create problems for road or concrete surfaces, create issues with fire safety measures around buildings, or impact buried utilities.

Seed (ROMO and DSC-T Revegetation contract): Currently ROMO has a contract for seed increase at a Colorado plant material center. This project will fund one additional production year for three fields currently under production. In the fall of 2021 DSC-T Revegetation Program will modify an existing native seed increase task order for three species for one growing season (species on the existing task order include *Elymus elymoides*, *Koeleria macrantha*, and *Muhlenbergia montana*). This should produce enough seed to cover the resource impacts associated with this construction and utility work. Additional species diversity will be added to the seed mix from ROMO's own hand collections and on hand inventory of seed.

Table 2. Seed Mix. Other mixes may be developed for shade or full sun depending on seed availability. Based on target 200 seeds/ft<sup>2</sup> for 2.5 acres (rate for hydroseeding).

Species	Common name	% Mix	Pure Live Seed Rate (lbs. / acre)	Total PLS (lbs.)
<i>Elymus elymoides</i> *	Bottlebrush squirreltail	27	12.98	38.94
<i>Koeleria macrantha</i> *	Prairie junegrass	18	1.16	3.48

<i>Muhlenbergia montana</i> *	Mountain muhly	42	2.44	7.32
<i>Artemisia frigida</i>	Prairie sagewort	3	0.06	0.19
<i>Elymus canadensis</i>	Canada wildrye	10	10.11	30.33
<i>Additional forb species as available from ROMO collections.</i>				

\* grass species currently grown under a ROMO/DSC-T Reveg seed increase contract.

Hydroseeding and hydromulching (Prime Contractor, inspected by NPS): All disturbed soils will be hydroseeded and hydromulched using a two-step application method and with government-furnished, native seed, (See specs in appendix of this document). In steep slope areas hydroseeding and mulching will extend 50 feet beyond the limit of disturbance to improve probability of revegetation success. Temporary carsonite posts may be installed to protect seeded areas.

Watering and Plant Maintenance (Prime Contractor): Contractor will maintain plant materials (salvaged Ponderosa pines) during construction and warranty period of up to two growing seasons to assist with plant establishment. All plantings should be staked or caged to protect from wildlife browsing, rubbing, and trampling. Water planted Ponderosa pines for at least one (ideally two) growing season(s). Water weekly, unless there is rainfall of 1/2-inch or greater that week from June 15 - Sept 15.

## Schedule

Table 3. identifies timing of and responsible parties for key revegetation tasks. ROMO refers to Park staff. Critical points of coordination and timing between ROMO staff and contractor include:

- Plant material salvage and planting: Ideal collection timing for plant salvage is in the late fall/early spring (right after snowmelt). ROMO staff will identify and Contractor will salvage Ponderosa pines saplings (<3' tall) and other materials that may be appropriate within the proposed project area. The preferred planting window is between late summer and late fall. Planting by Contractor will be completed before disturbed areas are seeded. The Contractor must notify the park resource staff when areas are ready for planting and a minimum of 4 weeks before seeding is to occur.
- Seeding: Hydroseeding will be completed by the Prime contractor. Hydroseeding should not occur if there is snow on the ground or the ground is excessively wet. The preferred seeding window is October 1 to November 15 or until soils are frozen and ground is covered with snow. The spring window is less desirable but may be utilized if needed and is from April 1 to May 15 when soils are snow free.

Table 3. Responsible parties and timing of revegetation tasks.

Revegetation Task	FY-22	FY-23	FY-24
Seed increase	Mod existing Task Order (DSC-Reveg)	Mod existing Task Order (DSC-Reveg)	
Plant salvage / storage of salvaged material	Prime Contractor (Spring '22)		
Invasives control	Contract (DSC Reveg)	Contract (DSC Reveg)	Contract (DSC Reveg)
Topsoil salvage	Prime Contractor (spring)		
Slope stabilization (erosion blankets and landscaping logs)	Prime Contractor		
Soil replacement/ decompaction	Prime Contractor (fall)		
Plant installation (salvage materials)	Prime Contractor (fall)	Prime Contractor	
Hydroseeding	Prime Contractor (fall)	Prime Contractor ( <i>Hand seeding if needed</i> )	
Watering / plant maintenance	Prime Contractor	Prime Contractor	Prime Contractor

## Budget

Table 4. Estimated revegetation costs per year (and total).

Revegetation Task	Description	Funds Request	FY-22	FY-23	FY-24	Total
Seed Increase	3 grasses, funded for one additional production year	DSC-T Reveg modify existing contract to add one year of seed production				<b>\$54,493</b>
Invasives control	surveys and spot treatments	DSC-T Reveg New Task Order	\$7000/ acre x 2.5 acres (pre-construction)	\$7000/ acre x 2.5 acres (post construction)	\$7000/ acre x 2.5 acres (post construction)	<b>\$52,500</b>
Total Estimated Cost (Revegetation Contracts)						<b>\$106,993</b>
<b>Revegetation Costs for plant materials and invasives control as % of Total Project</b>						<b>1.9%</b>

Note: Tree salvage, storage, transport, installation, watering, and maintenance; soil management (salvage, replacement, decompaction, planting preparation); slope stabilization and erosion control; hydroseeding and mulching are included in construction costs.

## Appendix

### SAMPLE CONSTRUCTION SPECIFICATIONS

#### *Equipment Cleaning*

Construction Equipment Cleaning: All vehicles and equipment entering the project area must be clean of plant materials and dirt and free from leaks and are subject to inspection. Wash all construction and restoration / revegetation equipment (including the inside beds of vehicles hauling materials) to thoroughly remove all dirt, plant, and other foreign material prior to entering the project. Particular attention must be shown to the under carriage, mower decks (top and bottom) and any surface where soil containing exotic seeds may exist. Allow the NPS to inspect each piece of equipment before entering the project. Provide the cleaning and inspection records to the CO. Equipment found operating on the project that has not been inspected or has oil leaks will be shut down and subject to citation.

Hydroseeding Equipment Cleaning: All hydromulching equipment shall be free of all residual seed, mulch, and dirt inside and outside of the tank and hoses. If the contractor is using corrugated hoses, then only new hoses shall be used on this project. The tank and all (smooth/un-corrugated)) hoses must be rinsed a minimum of three times, to remove any seed and mulch residuals prior to arriving at the project site. The Contracting Officer or authorized representative shall inspect the hydroseed equipment prior to operations and the Contractor should assume a demonstration of clean water running through the tank/hoses shall be required.

Weed Free Material Sources: Do not import into the project limits rock, sand, gravel, earth, subsoil, or other natural materials from a Contractor-selected non-commercial materials source, that have not been certified free of non-native, invasive plant species. Materials imported into the project limits which do not include a noxious weed free certification may be rejected and ordered by the CO to be removed from the project limits. The NPS has the discretion of requesting inspection of certified materials by a third party and rejecting the use of the source if non-native plants or seeds thereof are found to be present.

Imported Topsoil: All topsoil imported for this project shall be from a certified weed free source. If a certified location is locally unavailable the contractor will work with the CO to identify an acceptable source location. The contractor shall provide the government with the preferred source of topsoil at least 45 calendar days before importing. The government will survey the source location for weeds and approve or reject the source based on species present and risks of importing non-native species to the park.

#### *REVEGETATION CONTRACTOR QUALIFICATIONS-*

The Contractor/Subcontractor shall have a minimum of three years of experience performing non-native plant treatment, post-disturbance site preparation activities (e.g., slope recontouring, soil decompaction, soil scarification, erosion control material installation), and hydroseeding utilizing native plant seed. The Contractor/Sub must also provide a listing of relevant project experience, as well as three references available for contact.

#### *EROSION CONTROL MATERIALS-*

Landscaping Logs: Use CO designated trees and snags removed during construction site preparation and grubbing. Stagger and embed trees and snags parallel to slope drainage. Place trees and snags in a manner to prevent flush cut edges being visible to the road, broken ends are preferred. Install wooden stakes on downhill side of the log, flush to the top.

Wattles/Sediment Logs: Provide Excelsior (certified weed free) logs that consist of drainage filter made of curled aspen wood excelsior and rolled into a cylindrical shape with a consistent width of fibers evenly distributed throughout the cylinder. Provide logs that are 12 inches in diameter. Provide logs encased in 100% biodegradable netting, no photodegradable netting will be permitted. Provide certification that all material in the log is weed free.

Erosion Control Blankets: Furnish an erosion control blanket composed of certified weed free processed all-natural fibers (i.e., coir, excelsior) mechanically bound between two all-natural fiber nettings to form a continuous matrix with a minimum dry weight of 0.4 pounds per square yard according to ASTM D 6475. Utilize U-shaped wire staples minimum 6-inch-long legs and No. 11 diameter or of sufficient hardness to facilitate installation without bending. Ensure materials are protected from weather and/or handling damage.

Hydromulch and Tackifier:

HYDROMULCH: 100% virgin long strand wood fiber conforming to the following:

- (1) Colored with a green dye non-injurious to plant growth;
- (2) Readily dispersible in water;
- (3) Nontoxic to seed or other plant material;
- (4) Free of growth or germination inhibiting substances;
- (5) Free of weed seed;
- (6) Air dried to an moisture content of 12±3 percent;
- (7) Packaged in new labeled containers with the manufacturer's name; and
- (8) Packaged in a condition appropriate for mixing in a homogeneous slurry suitable for application with power spray equipment.

TACKIFIER: Non-toxic, natural and biodegradable plant-base psyllium alpha/plantago tackifier.

EROSION CONTROL INSTALLATION-

Wattles/Sediment Logs: Place sediment logs in a shallow trench the depth of which shall be 1/3 the diameter of the log. Secure the log every 2 linear feet across the length of the log with a 24-inch wooden 1 inch x 1 inch (or larger stakes) driven a minimum of 14 inches from backfilled grade or 10 inches from the bottom of the wattle, into the ground. Do not use wooden stakes that are severely split. When placing more than one log in a continuous section the logs should overlap 2'. Install uniformly over the entire area at 10 or less foot intervals (as directed by the CO) perpendicular to the contour, in a staggered overlapping pattern so that an unnatural pattern cannot be detected.

Erosion Control Blankets: Apply seed by hand or hydraulically with a light mulch tracer before installation of blankets. Unroll the blankets parallel to the primary direction of flow and place it in direct contact with soil surface. Do not stretch or allow blankets to bridge over surface inconsistencies. Overlap edges of adjacent blanket by 6 inches. Use a sufficient number of staples to prevent seam separation. Overlap roll ends of joining blanket by 6 inches in the direction of flow.

(a) Slope installations. At the top of slope, anchor the blanket by one of the following methods:

- (1) Staples. Install the blanket 36 inches over the shoulder of the slope onto flat final grade. Secure with a single row of staples on 12-inch centers;



(2) Anchor trench. Construct a 6- by 6-inch trench. Extend the upslope terminal end of the blanket 36 inches past the trench. Use staples on 12-inch centers to fasten the blanket into the trench. Backfill the trench and compact the soil. Secure the terminal end with a single row of staples on 12-inch centers and cover the end with soil.

Securely fasten RECP to the soil by installing staples at a minimum rate of 1.5 per square yard.

#### *SUBSOIL DECOMPACTION, SOIL SALVAGE, AND REPLACEMENT-*

Topsoil Salvage: Salvage topsoil from all areas to be disturbed by construction activities. Salvage soil before construction activities or ground disturbance begins. Topsoil refers to the uppermost soil horizon (top 6 inches) which includes organic duff and other materials capable of supporting vegetation. Work may only be commenced when dry soil conditions exist. Break down grass and forb vegetation and minor shrubs less than 3-feet in height and woody plants less than 2-inches in diameter by chipping, mowing, shredding or removing from the site. Incorporate this material with the conserved topsoil. Remove the topsoil in one pass under dry soil conditions. Do not mix topsoil with subsoil. Stockpile topsoil in an area determined by the NPS for no longer than 12 months. When possible windrow soil directly adjacent to the area from which it originated directly outside the construction area. Form piles with a maximum height of 3 feet tall by 3 ft wide. If windrowing on site is unfeasible store topsoil at an approved location in as small (3ftx3ft recommended) piles as possible. Flag or install barriers to keep heavy equipment/vehicles off stockpiled topsoil. Coordinate at least 2 weeks prior to topsoil salvage with CO to ensure their on-site presence at the initiation of salvage activities. If necessary, cover to prevent windblown dust and erosion by water. Covering of topsoil shall only be done with permeable material to allow for soil respiration no plastic or tarps with impermeable materials are permitted. Virgin wood fiber mulch or erosion control blankets are acceptable

Decompaction and Seedbed Preparation: Before topsoil has been spread, any impacted areas where the subsoils have been compacted by heavy equipment, tracked vehicles, and construction activities (staging areas or other trafficked areas) shall be decompacted to a depth of 6 to 12 inches. Decompaction shall be performed by equipment capable of decompacting soil down to a depth of 6-12 inches, or to a depth as site conditions allow. Decompaction furrows shall be no further than 6-9 inches apart and, where possible, equipment will travel across the site in 2 passes in perpendicular directions (cross-hatched pattern). Leave the soil surface roughened such that obvious furrows are eliminated. Maximum dirt clod size shall be 4–6 inches in order to obtain a roughened surface that will maximize soil/seed contact.

Topsoil Replacement: Topsoil will be re-spread to a uniform depth (3-6 inches). Topsoil replacement depth on any slope 3:1 or greater shall be a minimum of 6 inches. Leave the soil surface roughened such that obvious furrows are eliminated and a clear break between topsoil and subgrade layers is not produced. Do not place topsoil when the ground or topsoil is frozen, excessively wet, or otherwise in a condition detrimental to soil structure. Topsoil should not be spread with a substantial use of water. Take care to not compact the placed topsoil. No vehicle and only incidental foot traffic will be permitted any areas where topsoil has been replaced, where planting and seeding will occur, and during plant material establishment.

#### *SEEDING & PLANTING-*

Seed Source: All seed shall be Government furnished. The contractor should anticipate the application rate of seed to be between 80 and 200 pure live seeds per square foot.

Time of Seeding: October 1 to November 15.

Amendments: No fertilizers, mycorrhizae, or other amendments shall be added to the project areas.

Hydroseeding and Mulching Implementation: Seed shall be applied utilizing the two-stage seeding/mulching method described below:

#### METHOD 1-

##### First Application (Seed):

Hand Application: In the field measure and mark areas to be seeded in  $\frac{1}{4}$  or  $\frac{1}{2}$  acre intervals. Mix seed with sand, or other weed free inert matter, at a 1:1 ratio to aid in seed dispersal. Divide government furnished seed into quantities appropriate for marked areas and evenly apply seed to the entire area. Do not seed if winds exceed 10 mph. Lightly rake the seed into the soil to a depth of  $\frac{1}{8}$  to  $\frac{1}{4}$ ".

##### Second Application (Mulch):

- Apply mulch in a separate application from the seed using hydraulic-type equipment
- Apply wood fiber or grass straw cellulose fiber mulch at a rate of 1900 pounds per acre.
- Mulch by hand areas inaccessible to mulching equipment. Apply tackifier at a rate of 80 lbs. per acre on slopes less than 3H:1V and apply at a rate of 100 lbs./acre on slopes greater than 3H:1V.

The Contractor shall spray designated areas with the slurry in a sweeping motion and in an arched stream until a uniform coat is achieved, with no slumping or shadowing, as the material is spread at the required rate. The hydroseed slurry should float down from the arched stream, as opposed to being shot directly at the ground. During hydroseeding the existing native vegetation must be protected from damage (including, but not limited to, coating with mulch, damage by direct spray, and dragging hose).

#### METHOD 2

##### First Application (Seed and Mulch Tracer):

Hydraulic method. Use hydraulic-type equipment capable of providing a uniform application using water as the carrying agent. Add a tracer material consisting of mulch to the water. Apply the tracer material at a rate of 400 pounds per acre to provide visible evidence of uniform application. Add the seed to the water slurry no more than 30 minutes before application. Seed by hand areas inaccessible to seeding equipment.

##### Second Application (Mulch):

- Hydraulic method. Apply mulch in a separate application from the seed using hydraulic equipment
- Apply wood fiber mulch at a rate of 1500 pounds per acre.
- Mulch by hand areas inaccessible to mulching equipment.

The Contractor shall spray designated areas with the slurry in a sweeping motion and in an arched stream until a uniform coat is achieved, with no slumping or shadowing, as the material is spread at the required rate. The hydroseed slurry should float down from the arched stream, as opposed to being shot directly at the ground. During hydroseeding the existing native vegetation must be protected from damage (including, but not limited to, coating with mulch, damage by direct spray, and dragging hose).

#### *BARRIERS-*

After seeding activities are complete, temporary carsonite posts shall be placed at project locations with a potential for unwanted vehicle/foot traffic.

#### Plant Salvage:

##### Handling, Transport, and Storage:

- Collect transplants when soil is moist. If precipitation has not occurred, irrigate prior to lifting. Removal and transplantation should only occur in the mornings on cool, cloudy days when the plant is fully turgid.
- Mark the orientation of the plant on the stem. Using the "dripline" of the plant as a guide, make shovel cuts with the blade as perpendicular to the surface of the ground as possible because maintaining an intact ball of soil around the roots is important. Root morphology shall be considered in this process. Roots growing in deep soils or arid soils will tend to grow down rather than laterally. Roots growing in shallow soils will tend to spread laterally, requiring a much larger area of disturbance. Do not attempt to transplant plants if the soil falls off the root system.
- Lift the root ball gently out of the hole while attempting to keep the root ball intact. Hand pruners/saws can be used to cut away woody roots that do not come free during removal. Cover the root ball with damp untreated burlap until planting. The root ball can then be transferred to a suitable container (large bucket, pot, burlap, or plastic bag) for transport to the transplanting site/nursery. The plant must be protected when transporting to a planting site or nursery. Covered trucks and vans are best, but if a pickup truck is used, a tarp must be in place to protect the plant canopies and roots from drying winds in transit.

##### Outplanting:

- Outplanting shall occur during the rains of early winter/late fall or early spring when soil moisture is high and evapotranspirational losses are low. Planting during the summer is discouraged because the plants are not dormant and will experience severe transplant shock. If plants are carefully handled and plants can be irrigated, then summer plantings are possible.
- Planting Area and Arrangement: The DSC COR shall determine where plants are to be transplanted to and their arrangement.
- Temporary Storage: If transplants cannot be planted in one day, they can be stored in the field in a well-sheltered area protected from the sun and animals. If plants are left out, the root plug should not be allowed to dry out. If they do lose moisture, the containers should be irrigated prior to planting.
- Transplantation should occur on a cool, cloudy day. Planting holes should be located near the center of the prepared planting spot and be dug vertically rather than perpendicular to the ground surface. The planting hole should be as deep as the total length of the rootball, and twice as wide as the width of the rootball. After excavation and before planting, the planting holes shall be filled filled with water. After the water has drained, add a slow-release, non-synthetic tree fertilizer nugget/cake in each hole (at rates consistent with vendor label - release at minimum 3 months, up to 12 months). Plants shall be set in the planting holes so that the crowns of the root balls are 0.5 inch above finished grade when backfilled with soil. The roots shall not be forced into the planting hole, distorted, or broken during planting. Orient the plant in the same direction, relative to the sun, as it was facing in its previous location. After placing the plant in the hole, excavated soil shall be placed firmly around the root system so there is no loose soil or air pockets around the root plug. The root system should not be damaged during this operation. A watering basin 24 inches in diameter shall be constructed around each plant. The basin shall be constructed by creating a berm above grade. The soil inside and outside of the basin shall be at the same level. The basin shall not be a depression

in the soil. After creation of the basin, the plant shall be watered enough to ensure water has reached the entire root system.

#### Tree Watering and Maintenance Post Installation

- Plantings should be staked or caged to protect plantings from wildlife browse and rubbing or trampling.
- Water planted ponderosa pines for at least one (ideally two) growing season(s). Water weekly, unless there is rainfall of 1/2-inch or greater that week from June 15 - Sept 15.