Appendix D. Greenway Revegetation and Restoration Plans

FINAL South Tahoe Greenway Shared Use Trail Revegetation and Restoration Plan for Disturbance Areas

Prepared for:

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INTRODUCTION

The purpose of this report is to describe the approaches to revegetation and erosion control as well as proposed methodologies and materials that may be used for the South Tahoe Greenway Shared Use Trail in South Lake Tahoe, CA. There are currently 2 proposed alternatives for the trail corridor between the intersection of Pioneer Trail and US Highway 50 and the Martin Avenue Bridge, both which have been thoroughly surveyed for erosion potential and vegetation. Detailed construction specifications will be developed as part of the final plans following completion of environmental documents, and selection of the preferred alternative.

Ground and vegetation disturbance will be minimized during construction to the trail corridor (including cut and fill boundaries), which will be limited to project area defined on the plan sheets (e.g., wide right-of-way for trail construction). The primary objective of this plan is to maximize restoration and erosion control along the trail corridor through the establishment of a self-sustaining native plant community. This will be accomplished by salvaging topsoil and selected native plants (roses, willows), and by the use of native species of grasses, forbs and shrubs that are both mycorrhizal and nitrogen-fixing, in order to maintain soil flora and fauna and support the soil food web (Conifers are expected to naturally colonize the site, and have historically not performed well in seed mixes, being gymnosperms, with lack of seed protection). It will also include the installation of erosion control measures meant to stabilize sites while vegetation becomes established. A secondary objective is to support species of wildlife through the establishment of berry-producing vegetation such as currants and roses. During clearing and grubbing, native vegetation, woody debris, and rocks will be salvaged and stockpiled for replacement over the construction right-of-way. Grading specifications will require the salvage, stockpiling, storage, and replacement of native topsoil. Mycorrhizae will be specified to enhance native plant establishment and limit colonization by weedy annuals. Other Best Management Practices that will be implemented include soil roughening, application of soil amendments (where topsoil is unavailable), and application of mulches and tackifiers. Erosion control specifications may include installation of rice straw wattles (sediment rolls) for slope checks on slopes 3:1 and steeper. Erosion control blankets may be specified for channels and slopes 3:1 and steeper. Containerized plantings are not recommended except in selected areas, for screening or traffic control. Containerized planting on restoration plantings in Tahoe have had poor success over the last decade with maximum survival between 30-50%. Even when plants have been irrigated through a system, hand watered, and truck watered success has been poor. Slow-release water systems, such as DRiWater, can be effective but also require maintenance including periodic replacement of cartons and final removal. If containerized plantings are still desired by the owner, an extended warranty of up to there years should be required. The revegetation work will be concurrent with final grading to the maximum extent practicable.

A Noxious and Invasive Weed plan will be required as part of the Contractor's submittal package, and standard BMPs will insure the establishment and maintenance of clean works sites, as well as clean materials and equipment. The plan shall address, but not be limited to the abatement of perennial pepperweed a.k.a. tall whitetop (*Lepidium latifolium),* Klamath weed (*Hypericum perforatum*), and thistles (*Cirsium spp*.). All Noxious Weeds listed by the California Department of Food and Agriculture and US Forest Service LTBMU must be controlled. At a minimum, the sites will be vigilantly surveyed during the warranty period for occurrence of noxious weeds. If noxious weeds are present, the revegetation specialist (RS) will be immediately notified and the appropriate sections of the Noxious Weed Abatement Plan will be implemented. Removal and abatement, at a minimum, shall consist of mechanical treatment (e.g. pruning and removal of vegetation and dead material) in combination with herbicide applications.

Five types of areas will require treatment: 1) disturbed upland shoulders and staging areas, 2) SEZs adjacent to the right-of-way (ROW), 3) 3:1 upland slopes, 4) topsoil stockpiles, and 5) footrail restoration. Temporary erosion control will be applied as needed.

SEZ restoration may include a variety of types, such as stand of willows and roses, where materials will be salvaged and replanted, wetter sites, where sod will be salvaged and replanted, and mesic SEZs, which will

require seeding and mulching. Woody vegetation and thorny vegetation may be used in selected areas for screening and traffic control

The work will be conducted by a licensed landscape contractor (C-27) and overseen by a Certified Professional Soil Erosion and Sediment control Specialist (CPESC), who will represent the Owner and will act as the project Revegetation Specialist (RS) and verify through review of submittals and documentation of inspections that the work has been conducted in a satisfactory manner. A two-year warranty period will be required for each phase of construction to insure success.

PRELIMINARY REVEGETATION SPECIFICATIONS

GENERAL

All treatment types will be implemented in the Fall, as approved by the Revegetation Specialist (RS), with the exception of Temporary Erosion Control. All work will be conduced by a licensed C-27 and overseen by a Certified Professional Soil Erosion and Sediment control Specialist (CPESC).

TREATMENT TYPES AND AREAS

1. Upland Sites, staging areas, disturbed soils behind retaining walls, miscellaneous disturbed areas. Clear and grub and stockpile rocks, topsoil and vegetation to greatest practicable extent. Salvage and stockpile topsoil, maintain until re-applied. Prior to re-application, loosen compacted soils to a depth approximately 6 inches, as directed. Apply salvaged topsoil and organic matter, apply soil inoculants and incorporate to a depth of 3 inches. Apply Revegetation Seed Mix 1, incorporate to a depth of one-quarter to one-half inches. Install sediment logs where located on plans and as directed. Apply wood chips or clean pine needles to a depth of one-half inch and 85% cover.

2. SEZs. During clearing and grubbing, the General Contractor shall salvage vegetation such as willows and roses. All organic matter and topsoil will be salvaged and stored. Contain material with proper Best Management practices. Prior to re-application, loosen compacted spoils, apply salvaged topsoil and incorporate. Apply soil inoculants and incorporate, apply Revegetation Seed Mix 2, incorporate. Apply wood chips or clean pine needles to a depth of one-half inch and 85% cover. Salvaging and transplanting of wetland sod may also occur at some SEZs.

3. Upland slopes 3:1 and steeper. Clear and grub and stockpile rocks, topsoil and vegetation to greatest practicable extent. Salvage and stockpile topsoil, maintain until re-applied. Prior to re-application, loosen compacted soils to a depth approximately 6 inches, as directed. Apply salvaged topsoil and organic matter, apply soil inoculants and incorporate to a depth of 3 inches. Apply Revegetation Seed Mix 1, incorporate to a depth of one-quarter to one-half inches. Install sediment logs where located on plans and as directed Apply recycled paper mulch at 2,000 lbs/acre with tackifier at 150 lbs/acre in a hydromulch slurry. Cover by the slurry shall be 100%.

4. Clear Zones, bikepath right-of-way. Salvage topsoil and organic matter, store and maintain as specified. Prepare seed beds apply and incorporate salvaged material. Apply revegetation Seed Mix 3 with soil inoculants, incorporate; apply wood chip mulch or pine needle mulch.

5. Trail Restoration. Loosen compacted soils to a depth of up to 12 inches, as directed by the RS. Apply and incorporate soil amendments and inoculants. Apply revegetation Seed Mix 1, rake to incorporate. Apply wood chip mulch or pine needle mulch.

6. Topsoil/Organic Matter Stockpiles. Do not configure to a greater dimension (see I-580). Install temporary BMPs such as sediemt rolls at toe of slope of stockpiles, as approved by the RS. Apply recycled paper mulch @1,000 lbs/acre with tackifier @150 lbs/acre in a hydromulch slurry. If stockpiled

more than 6 months apply mycorrhiza @60 lbs/acre with Seed Mix 4, and recycled paper mulch @2,000 lbs/acre with tackifier @150 lbs/acre in a hydromulch slurry.

7. Temporary Erosion Control. Apply recycled paper mulch @1,000 lbs/acre with tackifier @150 lbs/acre in a hydromulch slurry.

SUBMITTALS

The Contractor will be required to submit to the RS material samples or labels for the following materials:

- Seed
- Sediment Logs
- Soil Inoculants
- Soil Amendments
- Slow-release fertilizer
- Pine Needles and/or Wood Chips
- Paper Mulch
- Tackifier
- Erosion Control Blankets and Stakes
- Noxious and Invasive Weeds Abatement Plan
- Schedule

MATERIALS

Salvaged Organic Matter/Topsoil. In all areas disturbed during construction the Contractor shall salvage and stockpile wood debris, existing plant material, topsoil and all other materials required for construction of the Project as directed by the RS. These materials shall be used during revegetation and construction of improvements as shown on the Plans and as directed by the RS. Place salvaged materials outside SEZ in approved locations.

Salvaged Willows and Roses. All willow and rose clumps in and adjacent to mapped SEZs will be removed for immediate re-planting, concurrent with construction. Prior to removal, plants shall be pruned so that branches include two-three nodes but do not exceed 18 inches in length. Cuts shall be clean, leave no frayed bark, and be made ½ inch above the node. Soils surrounding plants shall be moist to root zone prior to removal which may require watering. Gently remove plants by excavating around the root zone with hand tools, a backhoe bucket, or other equipment approved by the RS. As much of the root ball as feasible shall be removed intact and damaged roots pruned. Burlap may be used to wrap and protect the root zone during transport.

Slow-release Fertilizer. Slow-release fertilizer shall consist of SYMBIOS 6-4-4 or product equal.

Seed. All seed shall conform with all laws and regulations pertaining to the sale and shipment of seed required by the, the California Food and Agricultural Code of 1982, Regulations of 1983, and the Federal Seed Act. All shipments of seed shall be reported to the California Department of Food and Agriculture for inspection. Deliver seed to the site tagged and labeled in accordance with the State Agricultural Code and

acceptable to the County Agricultural Commissioner. For rabbitbrush and sagebrush, test seed within 6 months prior to seeding. All other species shall be tested within one year prior to seeding date. Seed tags must reflect the most recent test date. Do not use wet, moldy, or otherwise contaminated or damaged seed. Do not mix seed until approved by the RS.

Submit original seed tests by individual species and lot number to the RS a minimum of 10 days prior to commencing the work for approval before seed is blended. Weed seed shall not exceed 0.50% of the pure live seed specified and shall not include any seed of cheatgrass *(Bromus tectorum*), or sweet clovers (*Melilotus officinalis, M. alba*). Crop seed shall not exceed 0.50%. Inoculate legume seed with approved cultures according to the manufacturer's instructions.

Seed tags shall show the following information:

- Scientific name
- Common name
- Lot number
- Percent purity
- Percent germination, including hard and dormant seed
- Percent weed seed
- Percent crop seed
- Origin

Table 1. Revegetation Seed Mix 1 for Upland Areas

Botanical Name	**Common Name/Variety**	**PLS lbs/acre**
Achillea millefolium	Yarrow	0.10
Achnatherum occidentalis	Western needlegrass	1.00
Artemisia tridentata ssp. vaseyana	Mtn. Sagebrush	1.00
Bromus carinatus	California Brome	3.00
Cercocarpus ledifolius	Mtn. mahogany	1.00
Chrysothamnus nauseosus	Rabbitbrush	0.50
Elymus elymoides	Squirreltail	2.00
Elymus trachycaulus	Slender wheatgrass, 'Revenue'	4.00
Eriogonum nudum	Naked buckwheat	0.50
Eriogonum umbellatum	Sulphur buckwheat	0.50
Ipomposis aggregata	Scarlet trumpetflower	0.25
Linum lewisii	Lewis flax	0.50
Lupinus argenteus	Silver lupine	1.00
Poa secunda	Sandberg bluegrass 'Sherman'	1.00
Purshia tridentata	Antelope bitterbrush	1.00
Ribes cereum	Wax currant	0.50
Totals		17.85

Table 2. Revegetation Seed Mix 2 for SEZ Areas

Botanical Name	Common Name/Variety	PLS lbs/acre
Bromus carinatus	California brome	4.00
Carex praegracilis	Slender sedge	0.25
Deschampsia cespitosa	Tufted hairgrass	0.50
Elymus glaucus	Blue wildrye, high elevation	3.00
Elymus trachycaulus	Slender wheatgrass	4.00
Hordeum brachyantherum	Meadow barley, from 6,000' and higher	2.00
Leymus triticoides	Creeping wildrye	4.00
Lupinus polyphyllus	Tahoe lupine	0.50
Festuca rubra	Red fescue	2.00
Penstemon rhydbergii	Meadow penstemon	0.25
Poa pratensis	Kentucky bluegrass,Tahoe source	2.00
Potentilla gracilis	Cinquefoil	0.50
TOTAL		23.00

Table 3. Revegetation Seed Mix 3 for Clear Areas

Botanical Name	Common Name/Variety	PLS lbs/acre
Eriogonum umbellatum	Sulfur buckwheat	1.00
Festuca ovina	Sheep fescue. 'Covar'	2,00
Festuca trachyphylla	Hard fescue, 'Durar'	2.00
Lupinus argenteus		1.00
Totals		6.00

Table 4. Revegetation Seed Mix 4 for Soil Stockpile Areas

Botanical Name	Common Name/Variety	PLS lbs/acre
Achillea millefolium	Yarrow	0.10
Bromus carinatus	California Brome	3.00
Elymus elymoides	Squirreltail	2.00
Elymus trachycaulus	Slender wheatgrass, 'Pryor'	4.00
Lupinus argenteus	Silver lupine	1.00
Totals		10.10

Soil Inoculants. Mycorrhizal inoculants shall consist of spores, mycelium, and mycorrhizal root fragments in a solid carrier suitable for handling by dry application. The carrier shall be the material in which the inoculum was originally produced, and may include organic materials, vermiculite, perlite, calcined clay, or other approved materials consistent with proper application and good plant growth.

Each endomycorrhizal inoculum shall carry a supplier's guarantee of number of propagules per unit weight or volume of bulk material. Species shall be 50% *Glomus intraradices* (Utah), 25% *Glomus intraradices* (Arizona), and 25% *Glomus etunicatum.* The inocula shall contain at minimum 120 spores per gram. The product bag shall be labeled with a lot number and the harvest date of the inocula. One-ounce sub-samples shall be made available to the RS thirty days prior to application for verification of species and spore counts. Inocula shall be transported and stored in areas with a temperature of less than 90º F. Use a dust mask when handling the material. Apply at 60 lbs/acre.

Soil Amendments. Amendments shall be slow-release8-2-4 derived from turkey waste or other approved product equal. Amendments will only be applied where topsoil is not available.