Request for Bid

Truckee Meadows Restoration Project

The Truckee River Watershed Council is seeking construction bids for the Truckee Meadows Restoration Project

Lead: Truckee River Watershed Council

Mailing address:
P.O. Box 8568
Truckee, CA 96162

Physical address
10418 Donner Pass Rd (enter from High Street)
Truckee, CA 96161

530-550-8760
Matt Freitas, Program Manager
Lisa Wallace, Executive Director

Amendments to this Request for Bid will be posted on www.truckeeriverwc.org within the "news" section. Please refer to that site frequently as amendments may not be otherwise distributed.

RELEASE DATE- MAY 3, 2017

A. PROJECT DESCRIPTION

The lead for the project is Truckee River Watershed Council (TRWC). Several land owners and managers are project partners:

Truckee Donner Land Trust
Truckee Tahoe Airport District
Truckee Donner Public Utilities District
Truckee Donner Recreation and Park District
Oregon Investors X Limited Partnership- Village Oaks Community Association
Truckee Pines Apartments LLC.- Cascade Housing Association
Town of Truckee
Truckee Sanitary District
Tahoe-Truckee Sanitation Agency

Background. The Hilltop-Ponderosa area was once a single contiguous wet meadow complex that discharged to the Truckee River. Since the settlement of Truckee in the 1800's it has been significantly impacted by land use and urban development which has altered and disconnected the hydrology of the system. This has contributed to loss of wetland habitat and hydrologic function as well as contributed to downstream erosion and sedimentation issues. Despite the level of alteration, feasibility and conceptual design basis studies have demonstrated that there are significant opportunities for restoration and functional uplift of the site.

The Truckee Meadows Restoration project (TMRP) is designed to restore hydrologic function and reestablish historic wetlands by reversing historic and modern impacts and making improvements to the existing infrastructure. Moreover it seeks to remedy erosion issues downstream of the meadow complex to reduce sedimentation of the Truckee River.

Work. The project work is described in detail in the attached 100% Design Plans (Attachment 1) and Technical Specifications (Attachment 2). General construction activities include:

- Fill approximately 1,000 linear feet of constructed ditches in the meadow complex;
- Remove artificial fill and regrade portions of meadow surface;
- Install log features to stabilize filled ditches and promote dispersal of surface waters across meadow surface;
- Install two log weir features at culvert entrances to promote inundation at meadow outlets;
- Reconfigure (i.e. excavation/grading) irrigation pond to create wetland bench and reduce bank slopes;
- Install boulder outflow features at irrigation pond outlets;
- Install "sod block" features in minor drainage paths to promote dispersal of surface flows across meadow surface;
- Realign and block ephemeral stream channel downstream of meadow complex;
- Grade to promote appropriate drainage within a stormwater basin;
- Improve drainage and road surface on access roads;
- Install 3 metal gates and miscellaneous boulders to control vehicle access on access roads;
- Remove and block concrete-lined ditch on Truckee River floodplain;
- Provide erosion control during construction period;
- Revegetate with native plants (seeds, container plants, native pole cuttings, salvaged sod);
- Install of approximately 0.4 miles of recreational trails around irrigation pond and meadow complex; and
- Plant establishment, maintenance, and optional temporary irrigation system.

Please refer to the 100% Design Plans and Technical Specifications for construction detail, typicals of project features, materials requirements, staging, access, etc.

Access. Work will take place in sensitive areas, so access routes will be strictly limited to avoid impacts to natural and cultural resources.

Traffic Control Plan. Portions of work will be within the Town of Truckee right-of-way and will require a Traffic control plan. Please see Technical Specifications (Attachment 2) Section 01 55 26 and the draft Town of Truckee encroachment permit (Attachment #4) for details.

Materials. Except where noted, contractor will furnish labor, materials, equipment, tools, and incidentials as necessary to complete the project and comply with permits, This includes erosion control measures as outlined in the sample contract and specified on the 100% Design Plans, Technical Specifications, and Stormwater Pollution Prevention Plan (SWPPP; Attachment 3).

Materials provided by TRWC are:

- Log materials: Class 1, 2, and 3 logs.
- All container plants, seed mixes, and Submerseed ™ for the initial revegetation

Alternatives. Due to a water pipeline in the construction area, there are two alternative designs for the construction of the culvert overflow on sheet 3.5 of the 100% restoration designs (dashed rectangle). Both alternates are included on sheet 3.6. Submitted bids must include the bid cost for both alternates (Bid Item #10 and 10a) as well as a Base Bid Total (including Bid Item 10, excluding 10a) and a Bid Alternate Total (including Bid Item 10a, excluding 10).

Bid Completeness. All sections of this bid package are important and must be addressed. Bids must be submitted for the entirety of the work as described in the 100% Design Plans Set (Attachment 1) and Technical Specifications (Attachment 2).

Construction Oversight. Work will be observed by the Licensed Civil Engineer or Engineer's Representative as described in the 100% Plans.

Schedule. Estimated start work date is August 15, 2017. Work shall be completed by October 15, 2017.

Projected Project Schedule

Task	**Date**
Pre-bid tour (mandatory)	May 15, 2017
Deadline for requests for additional information	May 17, 2017
Bids due	May 26, 2017
Interviews	June 1, 2017
Contract award (expected)	June 5, 2017
Construction start (estimated)	August 15, 2017
Construction completion	October 15, 2017

B. WORK REQUIREMENTS

Work Schedule. The Work Schedule will be established between Contractor and TRWC – either 10 hrs/day, 4 days/week or 8 hrs/day, 5 days/week. In either case, the work is expected to continue until the project is completed. No over time charges can be accommodated.

Staging and Access. Equipment/site access will be limited to routes designated in the 100% Design Plans and as approved by the Engineer's Representative and Project Archaeologist. All equipment staging and stockpiling will take place in designated areas.

Equipment. Contractor must provide equipment in excellent operating condition. No leaks of any size will

be allowed. Contractor will be required to secure replacement equipment if any equipment is inoperable for two (2) days or longer. Failure to perform these requirements is grounds for contract termination.

All equipment will be pressure washed prior to mobilizing to the site to remove any vegetative matter, soil, or other organic matter to prevent the spread of noxious weeds. Any equipment that leaves the site must be cleaned again before re-entry.

Contractor will be required to provide all fuel, servicing and repairs to maintain equipment in operating condition. The Contractor shall fuel equipment at staging areas shown on the 100% Design Plans whenever practical. When fueling must be done at a construction area, the Contractor shall design a site(s) and obtain approval in writing from the Engineer before using. All fueling, servicing and repairs will be done in designated fueling areas at a minimum of 50 feet from any water surface or drainage area to prevent accidental petroleum discharge in riparian and other sensitive areas. Please refer to the 100% Design Plans and Technical Specifications for any additional details on access, staging, and stockpiling.

Water quality concerns require that all equipment be free of all operating fluid leaks. The Contractor will be required to follow spill prevention procedures as outlined in the SWPPP, and is required to have the appropriate materials on-site to clean up any spills that may occur.

Spark arresters will be required on equipment for fire prevention.

Construction Water. Water will be available from the Southside Well operated by Truckee Donner Public Utilities District (TDPUD) located at 10514 Brockway Road (approx. 0.3 miles west the primary staging area). Access will be coordinated prior to project initiation by TRWC and TDPUD. Construction water will be provided at no cost to the Contractor by the TDPUD.

Personnel. TRWC reserves the right to have Contractor replace a non-performing operator. No change in personnel will occur without written agreement between the Contractor and TRWC.

Materials. All materials to be used in the project must meet the specifications stated in the Technical Specifications and on the 100% Design Plans. The Engineer or Engineer's representative will approve all materials prior to installation.

Best Management Practices. All BMPs and dewatering systems will be installed and approved by the Engineer or Engineer's Representative before any work can begin, per Technical Specification 02 73 00 and the SWPPP (Attachments 2 and 3).

C. TOUR AND SUBMISSION

A **mandatory** pre-bid tour of the project site is scheduled on May 15, 2017. Tour participants are to meet at the parking area on the Estate Drive at 10 AM – 12:00noon (Attachment 7). Attendance at the pre-bid tour is a prerequisite for submitting a bid. Access to the site will be on foot. Expect the tour to last the full 2 hours.

Bids must be received by 5:00 P.M. on May 26, 2017. Bids must be submitted electronically in .pdf format, all materials must be contained in a single file. Send bids to: mfreitas@truckeeriverwc.org.

D. BID PACKAGE AND EVALUATION

In the Bid Package, the Contractor shall document the following experience:

1. The Contractor shall have completed wetland and stream restoration projects as the prime

contractor which included the construction of log structures and soil bioengineering in channels, wetlands, and riparian areas.

2. The Contractor's superintendent or foreman assigned to this project shall have at least three years' experience supervising wetland and stream restoration projects which included significant earthwork, soil bioengineering, and log structures.
3. State of California Class A General Engineering Contractor's license and Class C-27 Landscaping Contractor's license.
4. Work experience – minimum 3 example projects showing related native revegetation planting and seeding work in the past 3 years. Submit a minimum of 10 representative photographs (electronically) showing operations for each project, including seeding, planting, irrigation (if applicable), and maintenance.

In the Bid Package, the Contractor shall document qualifying experience for a minimum of three (3) projects, all completed within the last ten (10) years, representing the above type of work with project descriptions and contact information in the Formal Bid Proposal.

Bids will be evaluated on the basis of cost, project experience, past performance, qualifications of proposed equipment operators, integrity and capability of bidders, and probable level of service and convenience to the agency. TRWC will conduct interviews with select Contractor(s) or teams based on their evaluation of bids.

If in the sole opinion of the TRWC, the Contractor does not meet the required qualifications the bid will be non-responsive.

TRWC reserves the right to retain all bids for a period of 60 days for examination and comparison, and to delete any portion of work from the contract. TRWC reserves the right to reject any and all bids.

E. BID FORMAT

Bids should include the following:

- Brief Scope of Work that outlines approach to the project
- Project Schedule
- Cost Estimate prepared on attached Bid Sheet (Attachment #5)
- Rate sheet
- List of relevant project experience, with photographs and contact information for references
- List of current certifications of staff assigned to project (e.g. Class A Contractor's license)
- Experience of operators assigned to project
- Exact specifications of equipment to be used

Bids should be no longer than 25 pages, including all attachments.

Bids must be submitted electronically in .pdf format, all materials must be contained in a single file.

No overhead or administration costs are allowed.

Alternatives. Submitted bids must include the bid cost for both culvert overflow design alternatives on sheet 3.6 of the 100% designs. In other words, bids must include both Bid Item #10 and 10a) as well as a Base Bid Total (including Bid Item 10, excluding 10a) and a Bid Alternate Total (including Bid Item 10a, excluding 10).

Amendments. Once a contract has been executed, no changes to the agreed upon scope of work shall occur without written agreement between the Contractor and TRWC.

F. PAYMENT SCHEDULE

Funding sources for this project only allow invoices to be submitted once every 90 days (as per the schedule below) for work completed. It is expected that payment can be made within 120 days of invoice(s) submittal; however payment will only be made to the Contractor once TRWC has received payment from the project funders. All efforts will be made by TRWC to expedite payment; however no interest will be paid on overdue payments.

TRWC invoices project funders quarterly (March 20, June 20, September 20, and December 20) for work completed. The obligation of TRWC to pay its Contractors shall be subject to and conditioned upon its receipt of payment Project Funders.

G. REQUESTS FOR ADDITIONAL INFORMATION

All requests for additional information or clarifications after the pre-bid tour shall be submitted via e-mail to Matt Freitas at TRWC (mfreitas@truckeeriverwc.org) by 5 PM May 17, 2017. Responses will be sent to all potential bidders that participated in the pre-bid tour via e-mail.

H. CONTRACT REQUIREMENTS

Bonding. Contractor must furnish a performance bond in favor of TRWC in the following amounts: faithful performance (100%) of contract value; labor and materials (100%) of contract value for any contract over $25,000 (Civ. Code, § 3247 et seq.; Pub. Contract Code, § 7103).

Insurance. Contractor must provide insurance certificates covering $2 Million per Each Occurrence and no less than $4 Million Aggregate showing the Truckee River Watershed Council, Truckee Donner Land Trust, Truckee Donner Public Utilities District, Truckee Donner Recreation and Parks District, Truckee Tahoe Airport District, Oregon Investors X Limited Partnership- Village Oaks Community Association, Truckee Pines Apartments LLC.- Cascade Housing Association, Town of Truckee, Truckee Sanitary District, and Tahoe-Truckee Sanitation Agency as special endorsements to be added to the insurance policy.

Indemnification. TRWC and Contractor agree they shall attempt to settle any dispute arising out of this contract, to include allegations of professional negligence, through communication and negotiation in the spirit of mutual friendship and cooperation. If the dispute cannot be resolved in this manner, Contractor, at its expense, shall indemnify, hold harmless, and when requested by TRWC to do so, defend TRWC, its officers, agents, and employees from any and all claims, demands or charges and from any loss or liability, including attorney's fees and expenses of litigation, resulting from negligence or carelessness on the part of the Contractor, its employees, or agents in the execution of the work or delivery of materials and supplies, by or on account of any act or omission of the Contractor, its employees or agents, including damage or destruction of any property or properties arising from, caused by or connected with the performance of work by Contractor, its agents, subcontractors and employees, and any failure to fulfill the terms of any laws or regulations which apply to the contract.

The Contractor will be required to enter into indemnification and hold harmless and/or right of entry agreements with some or all of the project land owners and managers.

Prevailing Wage. The Contractor **does not** need to comply with the wage provisions of the Davis-Bacon Act for this project.

Qualifications. Contractor must possess a valid California Class A General Engineering Contractor's license and Class C-27 Landscaping Contractor's license.

TRWC cannot contract with any party who is debarred or suspended or otherwise excluded from or

ineligible for participation in federal assistance programs under Executive Order 12549, “Debarment and Suspension”; or any individual or organization on USEPA’s List of Violating Facilities. (40 CFR, Part 31.35, Gov. Code, §4477) Subcontractors are also subject to this provision.

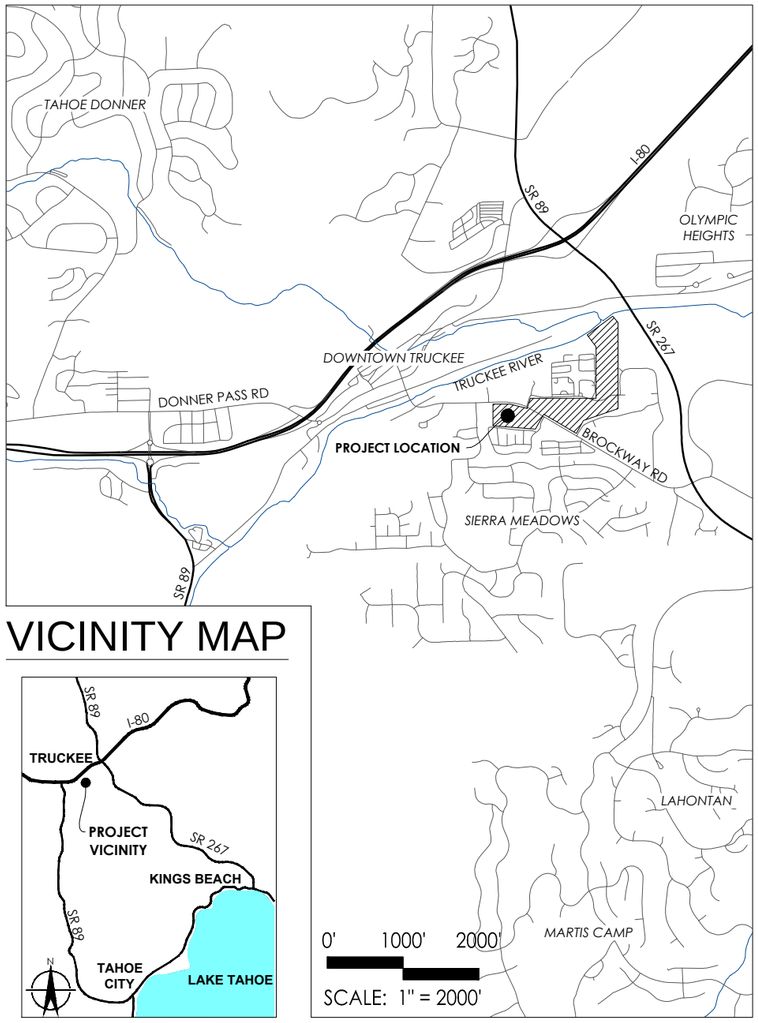
I. ATTACHMENTS

Attachment 1. 100% Design Plans
Attachment 2. Technical Specifications
Attachment 3. 95% Draft Stormwater Pollution Prevention Plan (SWPPP)
Attachment 4. Draft Town of Truckee Encroachment Permit
Attachment 5. Bid Sheet
Attachment 6. Sample Contract
Attachment 7. Map for pre-bid tour

TRUCKEE MEADOWS RESTORATION

TOWN OF TRUCKEE, NEVADA COUNTY, CALIFORNIA

LOCATION MAP



VICINITY MAP

SHEET INDEX

PROJECT TEAM

CLIENT
TRUCKEE RIVER WATERSHED COUNCIL
MATT FRIETAS
P.O. BOX 8568
TRUCKEE, CALIFORNIA 96162
TEL. (530) 550-8760 X.6

GEOMORPHOLOGIST/
SITE CIVIL ENGINEER
BALANCE HYDROLOGICS
DAVID SHAW, P.G.
PETER KULCHAWIK, P.E.
12020 DONNER PASS ROAD, SUITE B1
TRUCKEE, CALIFORNIA 96161
TEL. (530) 550-9776

SOILS/DRAINAGE SPECIALIST
INTEGRATED ENVIRONMENTAL RESTORATION SERVICES
KEVIN DRAKE, CPESC, QSD/QSP
2780 LAKE FOREST ROAD
TAHOE CITY, CALIFORNIA 96145
TEL. (530) 581-0359

REVEGETATION SPECIALIST
TRUCKEE RIVER WATERSHED COUNCIL
MATT FRIETAS
P.O. BOX 8568
TRUCKEE, CALIFORNIA 96162
TEL. (530) 550-8760 X.6

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0100-TITLE.DWG

PREPARED FOR:
Truckee River Watershed Council

Balance Hydrologics, Inc.
P.O. Box 1077
12020 Donner Pass Road
Truckee, CA 96161
tel and fax (530) 550-9776
www.balancehydro.com

SUBMITTALS / REVISIONS	BY	DATE
30% PLANS	DS	3-11-15
60% PLANS	PK	11-25-15
95% PLANS	PK	5-13-16
100% PLANS	PK	4-26-17

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER · PETER J. KULCHAWIK · No. CE8062 Exp. 06/30/18 · CIVIL · STATE OF CALIFORNIA

COVER SHEET

TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER
214128

SCALE
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SHEET
1.0

LEGEND:

EXISTING MAJOR CONTOUR - 5 FT — 5835

EXISTING MINOR CONTOUR -1 FT

EXISTING CHANNEL/FLOWPATH

EXISTING OVERHEAD ELECTRIC LINE AND POWERPOLE — OHE — OHE

EXISTING UNDERGROUND ELECTRIC LINE — UGE — UGE

EXISTING UNDERGROUND COMMUNICATION LINE — TEL — TEL

EXISTING GAS LINE — GAS — GAS — GAS

EXISTING WATER LINE — WTR — WTR

EXISTING SEWER LINE — SWR — SWR

EXISTING STORM DRAIN — SD — SD

EXISTING CULVERT — SD

EXISTING FENCE — X — X — X — X

EXISTING EDGE OF GRAVEL AREA

EXISTING TRAIL

EXISTING WETLAND LIMIT — W — W — W

EXISTING PROPERTY LINE

EXISTING TREE/SHRUB LIMIT

PROPOSED MAJOR CONTOUR — 5950

PROPOSED MINOR CONTOUR

PROPOSED FENCE — X — X — X — X

GRADE BREAK

GRADING LIMIT

PRESERVATION FENCING — ESA — ESA — ESA — ESA

TEMPORARY PINE NEEDLE WATTLE — PNW — PNW

TEMPORARY DIVERSION PIPE — DIV — DIV

PROPOSED FINISHED GRADE ELEVATION — 5850.0

PROPOSED FINISHED GRADE SLOPE — 2%

PROPOSED SURFACE FLOW DIRECTION

PROPOSED EMBANKMENT SLOPE (3:1 UNLESS NOTED OTHERWISE)

PRESERVE (SAVE) EXISTING TREE — (S)

REMOVE EXISTING TREE

EXISTING BOULDERS

PROPOSED BOULDERS

PROPOSED SOD BLOCK

TEMPORARY GRAVEL BAG CHECK DAMS

FILL EXISTING DITCH

SCRAPE TO REMOVE HIGH POINT AND MATCH ADJACENT EG

PLACE SURFACE AGGREGATE

EXISTING RIP RAP/ROCK PILE

SEE SHEET 5.0 FOR PLANTING SYMBOLS

ABBREVIATIONS:

'	FEET
"	INCH
#	NUMBER
AB	AGGREGATE BASE
APPROX	APPROXIMATE
CBF	CHANNEL BED FILL
℄	CENTERLINE
CMP	CORRUGATED METAL PIPE
DBH	DIAMETER AT BREAST HEIGHT (4' FROM GROUND)
DG	DECOMPOSED GRANITE
DIA, Ø	DIAMETER
E	EASTING
EG	EXISTING GRADE
ELEV	ELEVATION
EOP	EDGE OF PAVEMENT
ESA	ENVIRONMENTALLY SENSITIVE AREA
EX	EXISTING
FES	FLARED END SECTION
FG	FINISH GRADE
FT	FEET
GALV	GALVANIZED
H	HORIZONTAL
HDPE	HIGH DENSITY POLYETHYLENE
IE	INVERT ELEVATION
IN	INCH
INV	INVERT
LT	LEFT
LWM	LARGE WOODY MATERIAL
MAX	MAXIMUM
MIN	MINIMUM
N	NORTHING
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
OC	ON CENTER
PC	POLE CUTTING
PROP	PROPOSED
Q10	10-YEAR STREAMFLOW
Q100	100-YEAR STREAMFLOW
RCP	REINFORCED CONCRETE PIPE
ROW	RIGHT OF WAY
RSP	ROCK SLOPE PROTECTION
STA	STATION
STR	STRUCTURE
SWPPP	STORMWATER POLLUTION PREVENTION PLAN
T-TSA	TAHOE-TRUCKEE SANITATION AGENCY
TDLT	TRUCKEE DONNER LAND TRUST
TDPUD	TRUCKEE DONNER PUBLIC UTILITY DISTRICT
TDRPD	TRUCKEE-DONNER RECREATION & PARK DISTRICT
TOT	TOWN OF TRUCKEE
TSD	TRUCKEE SANITARY DISTRICT
TTAD	TRUCKEE TAHOE AIRPORT DISTRICT
TYP	TYPICAL
V	VERTICAL
W/I	WITHIN
WSE	WATER SURFACE ELEVATION
YR	YEAR
Z	ELEVATION

SEE SHEET 5.0 FOR PLANTING ABBREVIATIONS

GENERAL NOTES:

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VISITING THE PROJECT SITE TO VERIFY SITE CONDITIONS AND FOR COMPLETELY UNDERSTANDING THE REQUIRED SCOPE OF WORK SHOWN ON THESE DRAWINGS AND CONTAINED IN THE PROJECT SPECIFICATIONS.
2. ALL PARTS OF THIS PROJECT - INCLUDING SOIL PREPARATION, EARTHWORK, AND PLANTING - ARE SUBJECT TO FIELD DESIGN BY THE ENGINEER'S REPRESENTATIVE. AT ANY TIME, THE CONTRACTOR'S OPERATIONS AND CONSTRUCTION MAY BE SUBJECT TO OBSERVATION BY THE ENGINEER'S REPRESENTATIVE. WHEN REQUESTING THE PRESENCE OF THE ENGINEER'S REPRESENTATIVE AT THE PROJECT SITE FOR DESIGN CLARIFICATION, STAGE ACCEPTANCE, OR OTHER APPROVALS, THE CONTRACTOR SHALL PROVIDE 48 HOURS ADVANCE NOTICE DIRECTLY TO THE ENGINEER'S REPRESENTATIVE.
3. UTILITY LOCATIONS DEPICTED HEREIN ARE APPROXIMATE. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL EXISTING UNDERGROUND UTILITIES BEFORE THE START OF ANY CONSTRUCTION OPERATIONS, INCLUDING AND NOT LIMITED TO EXCAVATION OR TRENCHING. THE CONTRACTOR SHALL CALL UNDERGROUND SERVICE ALERT (USA) AT 811/1-800-227-2600. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF 48 HOURS ADVANCE NOTICE FOR LOCATING UTILITIES.
4. THE CONTRACTOR SHALL INSTALL PRESERVATION FENCING, STAKE AND FLAG THE LIMITS OF GRADING, AND INSTALL EXCLUSION FENCING AS PRESCRIBED IN THE SPECIFICATIONS AT LOCATIONS SHOWN ON THE DRAWINGS BEFORE THE START OF ANY OTHER SITE WORK INCLUDING DEMOLITION, CLEARING AND GRUBBING, AND EARTHWORK. REFER TO THE SPECIFICATIONS FOR ADDITIONAL PRESERVATION REQUIREMENTS AND INFORMATION.
5. THE CONTRACTOR SHALL CONTACT THE ENGINEER'S REPRESENTATIVE IMMEDIATELY UPON FINDING ANY FIELD CONDITIONS THAT WOULD CONFLICT WITH THE INFORMATION INDICATED ON THESE DRAWINGS OR THE PROJECT SPECIFICATIONS. ALL FIELD ADJUSTMENTS MUST BE APPROVED BY THE ENGINEER'S REPRESENTATIVE BEFORE CONSTRUCTION OF SAID ADJUSTMENTS; FAILURE TO DO SO SHALL RESULT IN THE CONTRACTOR ASSUMING FULL RESPONSIBILITY FOR ANY REQUIRED REVISIONS OR FIELD MODIFICATIONS, AS DIRECTED BY THE ENGINEER'S REPRESENTATIVE, AT NO ADDITIONAL COST.
6. CONFORM TO EXISTING GRADES AND CONDITIONS WHENEVER POSSIBLE. ANY ADJACENT OR OFFSET AREAS DISTURBED BY THE CONTRACTOR'S OPERATION MUST BE RESTORED BY THE CONTRACTOR TO THE PRE-DISTURBANCE CONDITIONS TO THE SATISFACTION OF THE ENGINEER'S REPRESENTATIVE.
7. ALL LUBRICATION, REFUELING, OR MAINTENANCE OF CONSTRUCTION VEHICLES SHALL BE CONDUCTED WITHIN APPROVED CONSTRUCTION STAGING AREAS AND BE A MINIMUM OF 100 FEET AWAY FROM EXISTING CHANNELS
8. STAGING AREAS MUST BE CONTAINED BY MEANS DESCRIBED IN THE SWPPP TO CONFINE THE AREA AND PREVENT CONTAMINANTS FROM ENTERING NEARBY CHANNELS AND WATER BODIES.
9. SEE SHEET 5.0 FOR ADDITIONAL REVEGETATION NOTES
10. ELEVATIONS ARE RELATIVE TO THE NAVD88 DATUM.
11. ADD 2,200,000 TO ALL NORTHINGS AND 7,000,000 TO ALL EASTINGS TO OBTAIN GRID COORDINATES IN CALIFORNIA STATE PLANE NAD83 ZONE II.
12. PRIOR TO ANY STAKING, THE CONTRACTOR SHALL VERIFY THAT A STAFF PLATE READING OF 3.50 FEET ON THE STAFF PLATE LOCATED AT THE SOUTHWEST END OF THE PONDEROSA GOLF COURSE IRRIGATION POND IS EQUIVALENT TO AN ELEVATION OF 5850.00 (NAVD88) WITHIN A TOLERANCE OF +/- 0.05 FEET. IF THE CONTRACTOR'S ESTIMATION OF THE ELEVATION CORRESPONDING TO 3.50 FEET ON THE STAFF PLATE IS NOT WITHIN THIS TOLERANCE, DO NOT PROCEED WITH STAKING WORK AND CONSULT WITH THE ENGINEER'S REPRESENTATIVE IMMEDIATELY.
13. WHERE NO WORK LIMIT IS SHOWN, THE PRESERVATION FENCING SHALL BE THE WORK LIMIT.
14. PRESERVE TREES AND VEGETATION OUTSIDE OF THE LIMITS OF WORK. ANY TREES OR VEGETATION DISTURBED OUTSIDE OF THE LIMITS OF WORK SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

100% DESIGN

PREPARED FOR: Truckee River Watershed Council
Balance Hydrologics, Inc.
P.O. Box 1077
12020 Donner Pass Road
Truckee, CA 96161
tel and fax (530) 550-9776
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DESIGNED BY D SHAW
DRAWN BY P KULCHAWIK
CHECKED BY E BALLMAN
IN CHARGE P KULCHAWIK
DATE 4-26-17

REGISTERED PROFESSIONAL ENGINEER P. KULCHAWIK No. C83062 Exp. 06/30/18 CIVIL STATE OF CALIFORNIA

SYMBOLS AND GENERAL NOTES

TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

SCALE --

SHEET 2.0

LEGEND:

- CONSTRUCTION ACCESS ROUTE
- CONSTRUCTION ACCESS ROUTE WITH CONSTRUCTION PROTECTION MATS
- CONSTRUCTION ACCESS ROUTE - LIGHT EQUIPMENT AND FOOT TRAVEL ONLY
- STAGING AND STOCKPILE AREA
- CONSTRUCTION ENTRANCE; SEE DETAIL 2, SHEET 4.1

NOTES:

1. CONTRACTOR SHALL COORDINATE STAGING AGREEMENTS WITH TOT, TDRPD, AND TDPUD PRIOR TO MOBILIZATION.
2. CONTRACTOR SHALL COORDINATE USE OF THE STAGING AREA ADJACENT TO THE EQUESTRIAN ARENA WITH TDRPD FOR POTENTIAL CONFLICTS WITH TDRPD EVENTS.
3. CONTRACTOR SHALL COORDINATE WITH TOT AND TDRPD PRIOR TO UTILIZING TRUCKEE RIVER LEGACY TRAIL FOR ACCESS. THE CONTRACTOR MAY, WITH THE PERMISSION OF TOT AND TDRPD, PROPOSE AN ALTERNATE ROUTE TO ACCESS FEATURES ALONG THE LEGACY TRAIL, INCLUDING BUT NOT LIMITED TO, ACCESS VIA THE PEDESTRIAN BRIDGE TO WEST RIVER STREET OR VIA RANCH WAY (NOT SHOWN).
4. LIGHT EQUIPMENT SHALL MEAN RUBBERIZED TRACK EQUIPMENT APPLYING NO MORE THAN 5 PSI GROUND PRESSURE.
5. CONSTRUCTION ACCESS ROUTES IN THE VICINITY OF THE TDRPD POND (FOR EXAMPLE, SHEETS 3.2, 3.3, 5.2, AND 5.3) SHALL BE FIELD MARKED FOR APPROVAL BY THE ENGINEER'S REPRESENTATIVE BEFORE START OF CONSTRUCTION.
6. TDRPD POND DEWATERING: THE CONTRACTOR SHALL COORDINATE WITH TDRPD STAFF TO TEMPORARILY LOWER THE WATER LEVEL IN THE POND BY PUMPING WATER OUT OF THE POND WITH THE IRRIGATION PUMP, WITHOUT RECHARGING THE POND WITH THE GROUNDWATER PUMP.

N

0' 150' 300' 600'

SCALE: 1" = 150'

EAST RIVER STREET
TRUCKEE RIVER
FLOW DIRECTION
TRUCKEE RIVER LEGACY TRAIL
INSTALL TEMPORARY GRAVEL BAGS ALONG PROJECT FRONTAGE WITH TRUCKEE RIVER (60' MIN)
TRUCKEE RIVER LEGACY TRAIL PEDESTRIAN BRIDGE
T-TSA BASIN
INSTALL TEMPORARY CONSTRUCTION TRACK OFF PAD
SHEET 3.5
SHEET 5.5
TOWN OF TRUCKEE OLD CORP YARD
INSTALL TEMPORARY GRAVEL BAGS AROUND CULVERT INLET
KUDU COURT
RIVER LOOP
RIVERVIEW DRIVE
INSTALL TEMPORARY GRAVEL BAGS IN DITCH SPACED EVERY 25' FOR APPROX 400'
INSTALL TEMPORARY PINE NEEDLE WATTLES
CREST VIEW DRIVE
VILLAGE WAY
SHEET 3.4
SHEET 5.4
NO CONSTRUCTION ACCESS
MARTIS DRIVE
EQUESTRIAN ARENA
TRUCKEE RIVER REGIONAL PARK
INSTALL TEMPORARY GRAVEL BAGS AROUND CULVERT INLET
RIVERVIEW DRIVE
INSTALL TEMPORARY CONSTRUCTION TRACK OFF PAD
COORDINATE ACCESS WITH TDPUD TO AVOID TRAFFIC CONFLICTS WITH OTHER USERS OF CONSTRUCTION WATER
BROCKWAY ROAD TRAIL
BROCKWAY ROAD
ESTATES DRIVE
PALISADES DRIVE
TDRPD POND
NO HEAVY EQUIPMENT ALLOWED AROUND SOUTH SIDE OF POND
SHEET 3.3
SHEET 5.3
NO HEAVY EQUIPMENT PAST THIS POINT
INSTALL TEMPORARY GRAVEL BAGS AROUND CULVERT INLET
NO HEAVY EQUIPMENT PAST THIS POINT
SHEET 3.1
SHEET 5.1
SHEET 3.2
SHEET 5.2
SEE NOTES (THIS SHEET) FOR POND DEWATERING
IF FLOW IS PRESENT AT TIME OF CONSTRUCTION, INSTALL TEMPORARY GRAVEL BAG DAM AT UPSTREAM END OF WORK LIMIT; PUMP IMPOUNDED WATER AND SPRAY IN ADJACENT MEADOW
MAINTAIN ACCESS TO PUMP HOUSE DURING CONSTRUCTION
WINTER CREEK LOOP
PONDEROSA GOLF COURSE

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-020I -OVERVIEW.DWG

PREPARED FOR:
Truckee River Watershed Council
Collaborative solutions to protect and restore the Truckee River watershed

Balance Hydrologics, Inc.
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12020 Donner Pass Road
Truckee, CA 96161
tel and fax (530) 550-9776
www.balancehydro.com

SUBMITTALS / REVISIONS	BY	DATE
30% PLANS	DS	3-11-15
60% PLANS	PK	11-25-15
95% PLANS	PK	5-13-16
100% PLANS	PK	4-26-17

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

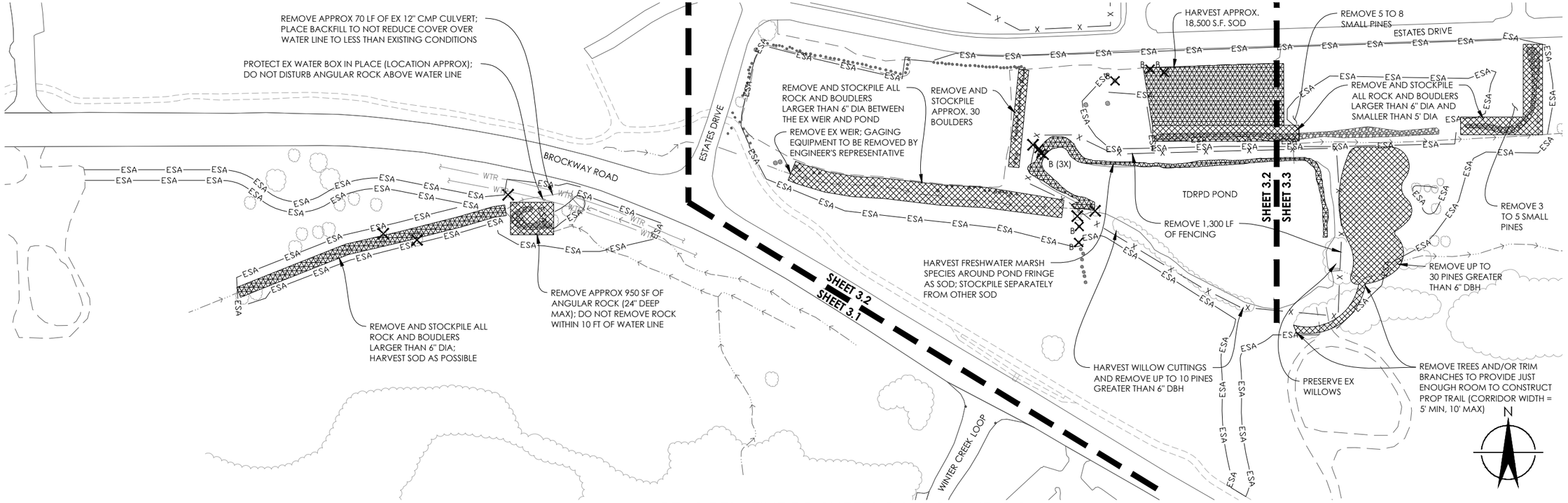
REGISTERED PROFESSIONAL ENGINEER PETER T. KULCHAWIK No. C83362 Exp. 09/30/18 CIVIL STATE OF CALIFORNIA

KEY MAP, SITE PREPARATION, AND ACCESS/STAGING PLAN

TRUCKEE MEADOWS RESTORATION

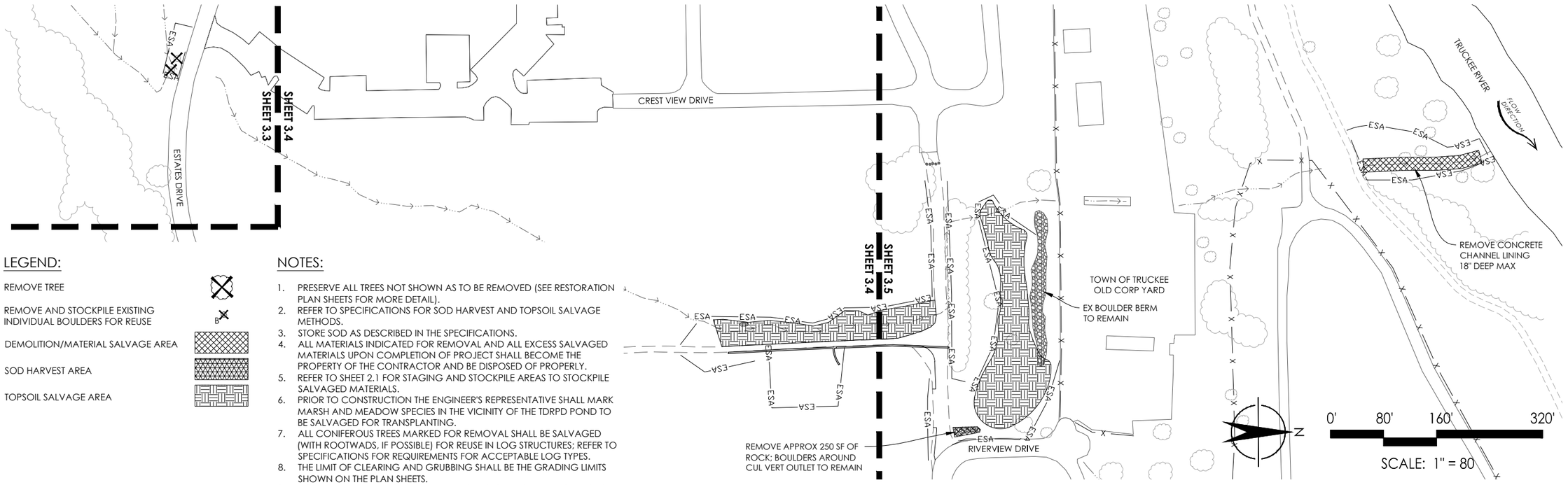
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128
SCALE 1" = 150'
SHEET 2.1



AREAS RELATIVE TO SHEETS 3.1, 3.2, AND 3.3

1" = 80'



AREAS RELATIVE TO SHEETS 3.3, 3.4, AND 3.5

1" = 80'

LEGEND:

- REMOVE TREE
- REMOVE AND STOCKPILE EXISTING INDIVIDUAL BOULDERS FOR REUSE
- DEMOLITION/MATERIAL SALVAGE AREA
- SOD HARVEST AREA
- TOPSOIL SALVAGE AREA

NOTES:

1. PRESERVE ALL TREES NOT SHOWN AS TO BE REMOVED (SEE RESTORATION PLAN SHEETS FOR MORE DETAIL).
2. REFER TO SPECIFICATIONS FOR SOD HARVEST AND TOPSOIL SALVAGE METHODS.
3. STORE SOD AS DESCRIBED IN THE SPECIFICATIONS.
4. ALL MATERIALS INDICATED FOR REMOVAL AND ALL EXCESS SALVAGED MATERIALS UPON COMPLETION OF PROJECT SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND BE DISPOSED OF PROPERLY.
5. REFER TO SHEET 2.1 FOR STAGING AND STOCKPILE AREAS TO STOCKPILE SALVAGED MATERIALS.
6. PRIOR TO CONSTRUCTION THE ENGINEER'S REPRESENTATIVE SHALL MARK MARSH AND MEADOW SPECIES IN THE VICINITY OF THE TDRPD POND TO BE SALVAGED FOR TRANSPLANTING.
7. ALL CONIFEROUS TREES MARKED FOR REMOVAL SHALL BE SALVAGED (WITH ROOTWADS, IF POSSIBLE) FOR REUSE IN LOG STRUCTURES; REFER TO SPECIFICATIONS FOR REQUIREMENTS FOR ACCEPTABLE LOG TYPES.
8. THE LIMIT OF CLEARING AND GRUBBING SHALL BE THE GRADING LIMITS SHOWN ON THE PLAN SHEETS.
9. NOT ALL UTILITIES ARE SHOWN, REFER TO RESTORATION PLAN SHEETS FOR APPROXIMATE UTILITY LOCATIONS.

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0300-DEMO.DWG

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100% PLANS	PK	4-26-17

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER P. KULCHAWIK No. C83062 Exp. 06/18 CIVIL STATE OF CALIFORNIA

DEMOLITION AND SOD HARVEST PLAN

TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

SCALE 1" = 80'

SHEET 3.0

REGRADE TO ELIMINATE HIGH POINT (APPROX. 1' OF CUT THROUGHOUT); DO NOT GRADE WITHIN 10' OF EX WATER LINE

PROTECT EX WATER BOX IN PLACE (LOCATION APPROX)

CONSTRUCTION ACCESS ROUTE (SEE SHEET 2.1 FOR ACCESS FROM BROCKWAY ROAD)

BROCKWAY ROAD

ESTATES DRIVE

INSTALL LOG WEIR SEE DETAIL 4, SHEET 4.0

N 49907.3
E 78447.5

NO HEAVY EQUIPMENT PAST THIS POINT

N 49875.7
E 78430.9

N 49848.9
E 78461.7

N 49868.2
E 78542.3

FILL EXISTING DITCH WITH BOULDERS AND SOIL PER SECTION A, THIS SHEET

END DITCH INFILL
N 49903.1
E 78314.6

FILL EXISTING DITCHES WITH SOIL ONLY PER SECTION A, THIS SHEET (HAND WORK ONLY)

SEE SHEET 3.2

SALVAGE AND STOCKPILE (AT LOCATIONS SHOWN ON SHEET 2.1) EXCESS BOULDERS FROM DITCH INFILL WORK FOR REUSE ELSEWHERE IN PROJECT

PLACE DITCH STABILIZATION LOG (SEE DETAIL 3, SHEET 4.0) AND BEGIN DITCH INFILL
N 49781.2
E 77919.7

LIGHT EQUIPMENT AND FOOT TRAVEL CONSTRUCTION ACCESS ROUTE

PLACE SOD BLOCK
N 49697.9
E 78643.9

PLACE SOD BLOCK
N 49651.2
E 78668.9

SOD BLOCKS ARE HAND WORK ONLY; SEE DETAIL 1, SHEET 4.1

PLACE SOD BLOCK
N 49609.7
E 78690.3

PLACE SOD BLOCK
N 49546.0
E 78677.8

EX DETENTION BASIN (TO REMAIN)

EX DETENTION BASIN (TO REMAIN)

WINTER CREEK LOOP

EX BOULDER (SALVAGE FOR REUSE)

EG

PLACE SOIL AND BOULDER FROM BERM AREA IN EX DITCH; FG OVER EX DITCH TO BE CROWNED TO AVOID FLOW CONCENTRATION; COMPACT WITH TRACK EQUIPMENT

FG

BERM AREAS: SALVAGE SOD AS POSSIBLE

DITCH INFILL
TYPICAL CROSS SECTION VIEW — 1" = 5' — A 3.1

N

0' 40' 80' 160'

SCALE: 1" = 40'

NOTES:
1. TRIMMING OF BRANCHES ON TREES MARKED TO BE SAVED IS ALLOWABLE UPON APPROVAL BY THE ENGINEER'S REPRESENTATIVE.
2. REFER TO SHEET 5.1 FOR PLANTING PLAN.
3. REFER TO SHEET 2.1 FOR LIGHT EQUIPMENT DEFINITION.

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128-SHEETS\214128-030I-PLAN01.DWG

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60% PLANS	11-25-15	PK
95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER PETER T. KULCHAWIK No. C83362 Exp. 06/30/18 CIVIL STATE OF CALIFORNIA

TDLT PARCEL RESTORATION PLAN

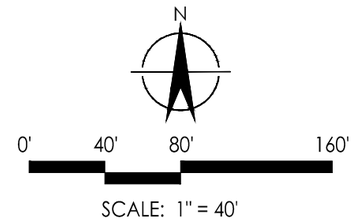
TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

SCALE 1" = 40'

SHEET 3.1



NOTES:

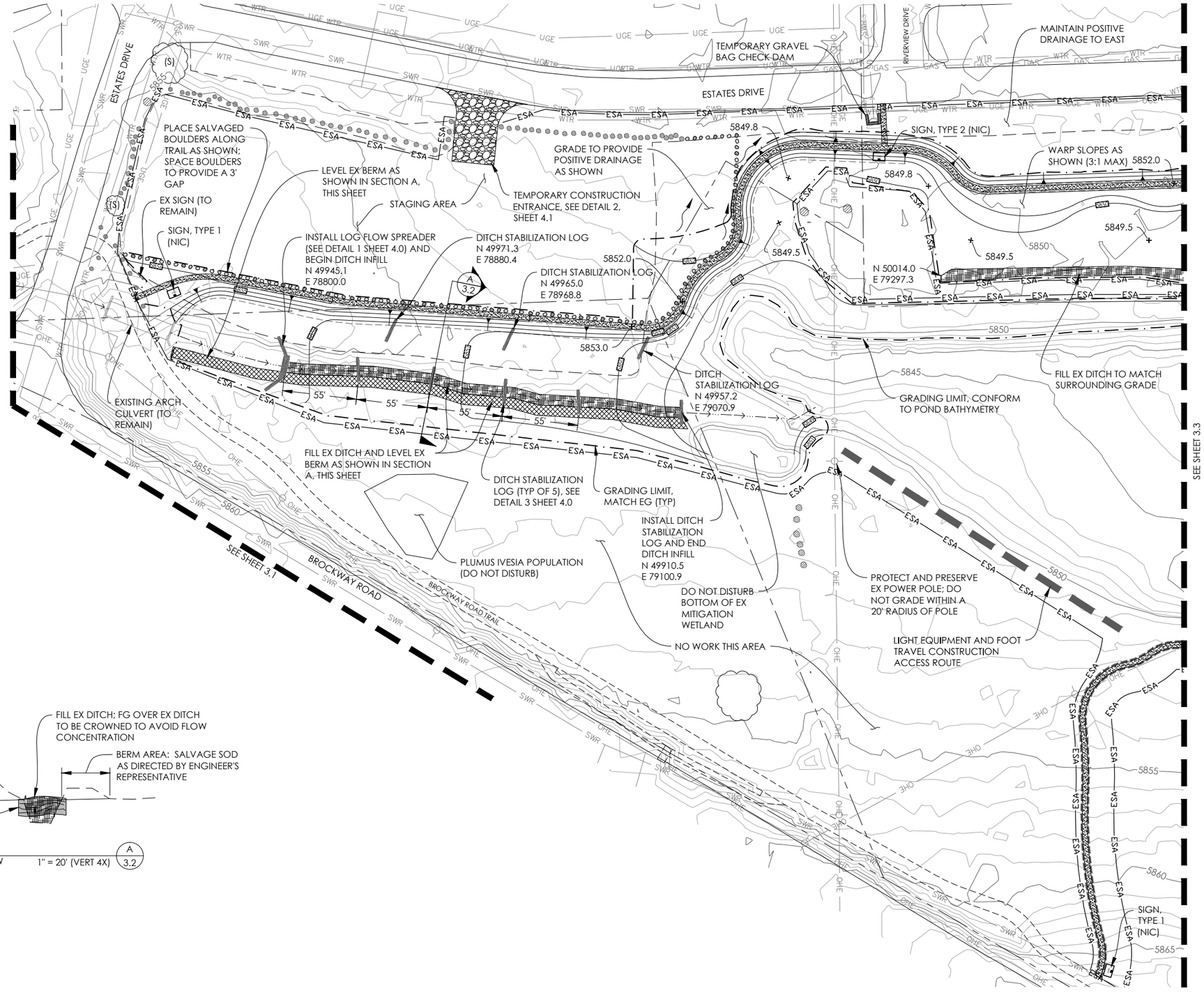
1. SEE SHEET 5.2 FOR PLANTING PLAN (INCLUDES SOD AREAS FOR SOD PLACEMENT).
2. NOT ALL EX TREES AND BOULDERS ARE SHOWN.
3. SEE SHEET 4.5 FOR LAYOUT OF PATHS.
4. SEE SHEET 2.1 FOR LIGHT EQUIPMENT DEFINITION.
5. SEE SHEET 4.4 FOR CROSS SECTIONS OF POND AREA.
6. REFER TO SPECIFICATIONS FOR SOD STORAGE REQUIREMENTS.

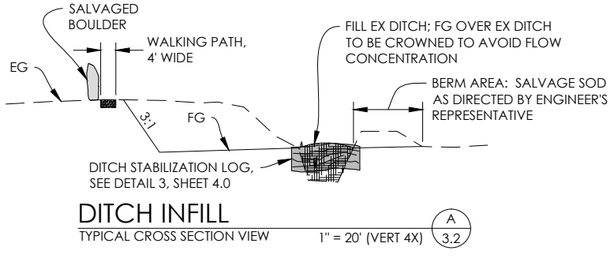
LEGEND:

INTERPRETIVE SIGN
(NOT PART OF CONTRACT)

WALKING PATH
(SEE DETAIL 1, SHEET 4.2)

TURNPIKE STYLE WALKING PATH
(SEE DETAIL 2, SHEET 4.2)





DITCH INFILL
TYPICAL CROSS SECTION VIEW — 1" = 20' (VERT 4X) — A 3.2

100% DESIGN

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SUBMITTALS / REVISIONS	DATE	BY
30% PLANS	3-11-15	DS
60% PLANS	11-25-15	PK
95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

TDRPD POND RESTORATION PLAN

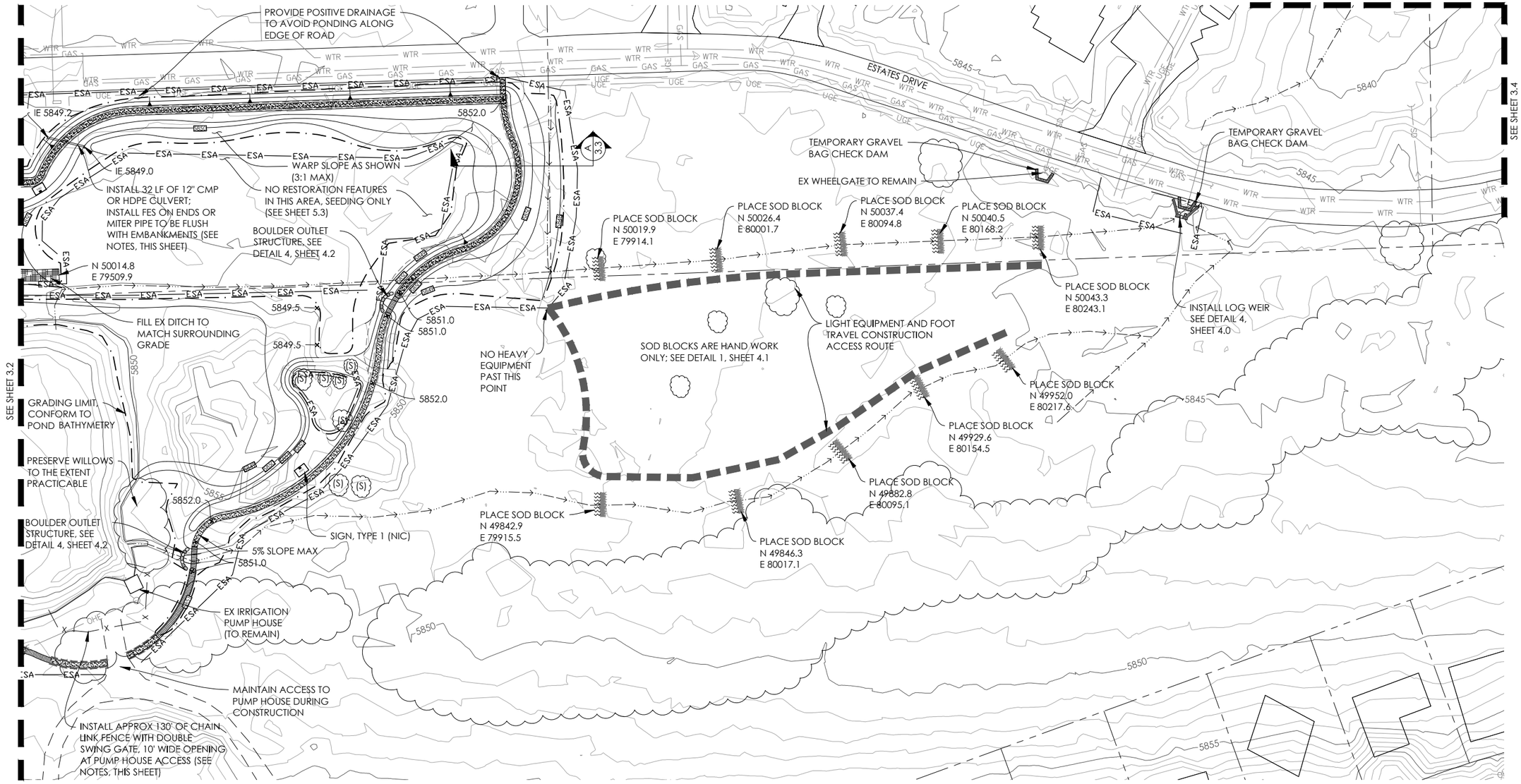
TRUCKEE MEADOWS RESTORATION

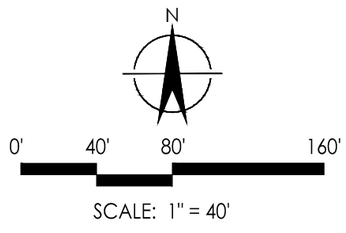
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER
214128

SCALE
1" = 40'

SHEET
3.2





NOTES:

1. SEE SHEET 5.3 FOR PLANTING PLAN.
2. NOT ALL EX TREES AND BOULDERS ARE SHOWN.
3. SEE SHEET 2.1 FOR DEFINITION OF LIGHT EQUIPMENT.
4. SEE SHEET 4.5 FOR LAYOUT OF PATHS.
5. SEE SHEET 4.4 FOR CROSS SECTIONS OF POND AREA.
6. REFER TO SPECIFICATIONS FOR SOD STORAGE REQUIREMENTS.
7. CONTRACTOR SHALL SUBMIT A SHOP DRAWING OF THE CULVERT AND FES FOR APPROVAL BY THE ENGINEER'S REPRESENTATIVE PRIOR TO INSTALLATION.
8. CONTRACTOR SHALL SUBMIT A SHOP DRAWING OF THE CHAIN LINK FENCE AND DOUBLE SWING GATE FOR APPROVAL BY THE ENGINEER'S REPRESENTATIVE PRIOR TO INSTALLATION. FENCE AND GATE SHALL BE 6' IN HEIGHT AND SHALL BE FACTORY PAINTED BLACK.

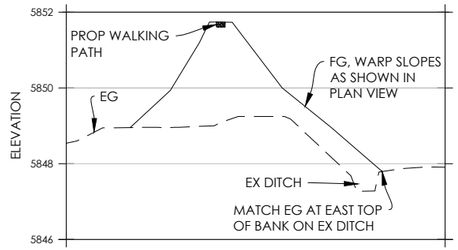
LEGEND:

INTERPRETIVE SIGN (NOT PART OF CONTRACT)

WALKING PATH (SEE DETAIL 1, SHEET 4.2)

TURNPIKE STYLE WALKING PATH (SEE DETAIL 2, SHEET 4.2)

PUNCHEON STYLE WALKING PATH (SEE DETAIL 3, SHEET 4.2)



WALKING PATH/DITCH INFILL (A 3.3)
TYPICAL CROSS SECTION VIEW 1" = 20' (VERT 10X)

100% DESIGN

X:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0303-PLAN03.DWG

PREPARED FOR:
Truckee River Watershed Council
Collaborative solutions to protect and restore the Truckee River watershed

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30% PLANS	DS	3-11-15
60% PLANS	PK	11-25-15
95% PLANS	PK	5-13-16
100% PLANS	PK	4-26-17

DESIGNED BY	DATE
D SHAW	
DRAWN BY	
P KULCHAWIK	4-26-17
CHECKED BY	
E BALLMAN	
IN CHARGE	
P KULCHAWIK	

REGISTERED PROFESSIONAL ENGINEER PETER T. KULCHAWIK No. C83362 Exp. 06-30-18 CIVIL STATE OF CALIFORNIA

TDRPD POND TO ESTATES DRIVE RESTORATION PLAN

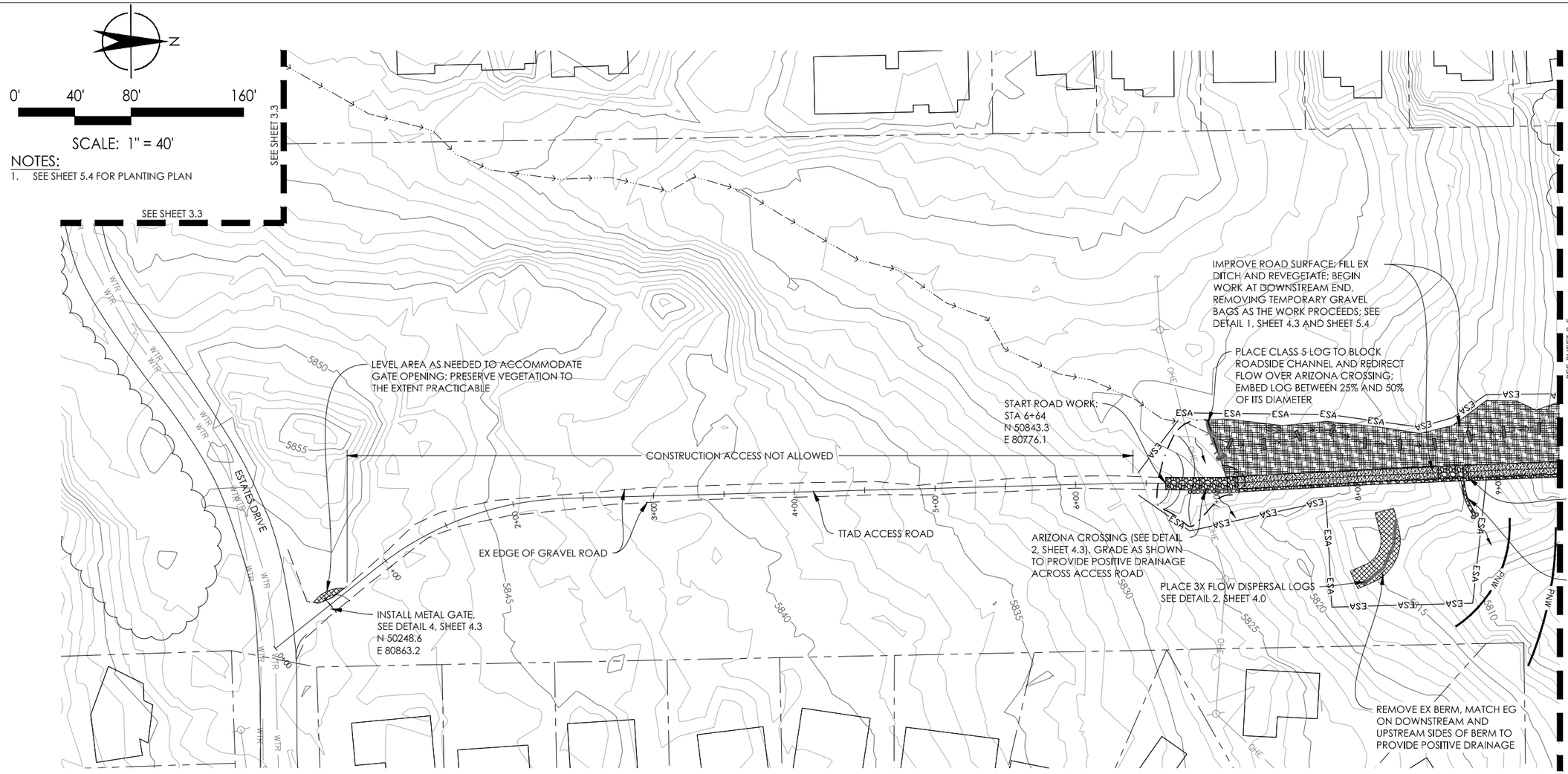
TRUCKEE MEADOWS RESTORATION

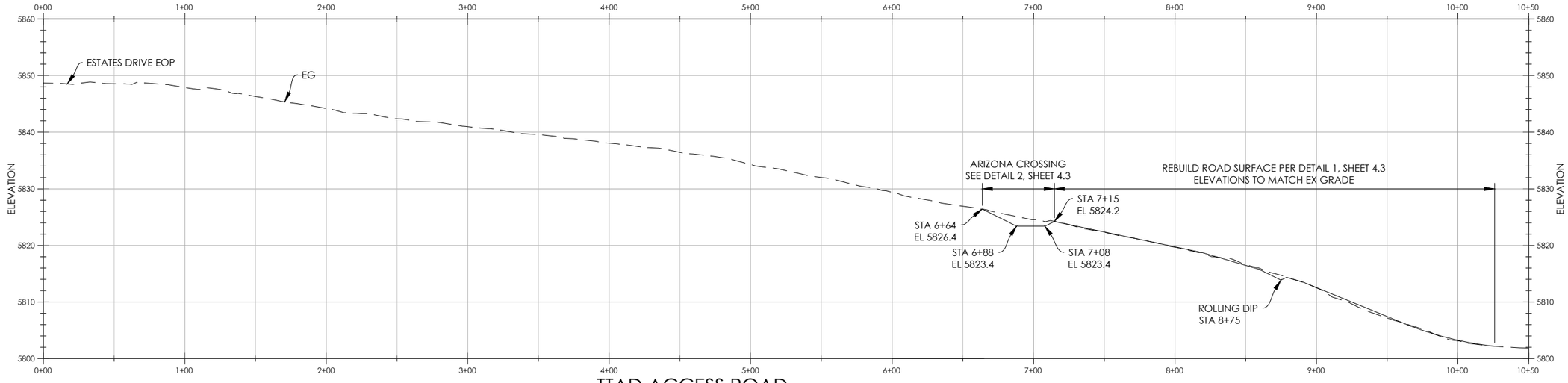
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

SCALE 1" = 40'

SHEET 3.3





TTAD ACCESS ROAD
PROFILE VIEW 1" = 40' (H); 1" = 10' (V)

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0304-PLAN04.DWG

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30% PLANS	3-11-15	DS
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95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
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IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER PETER T. KULCHAWIK No. C83362 Exp. 06/30/18 CIVIL STATE OF CALIFORNIA

TTAD ACCESS ROAD RESTORATION PLAN

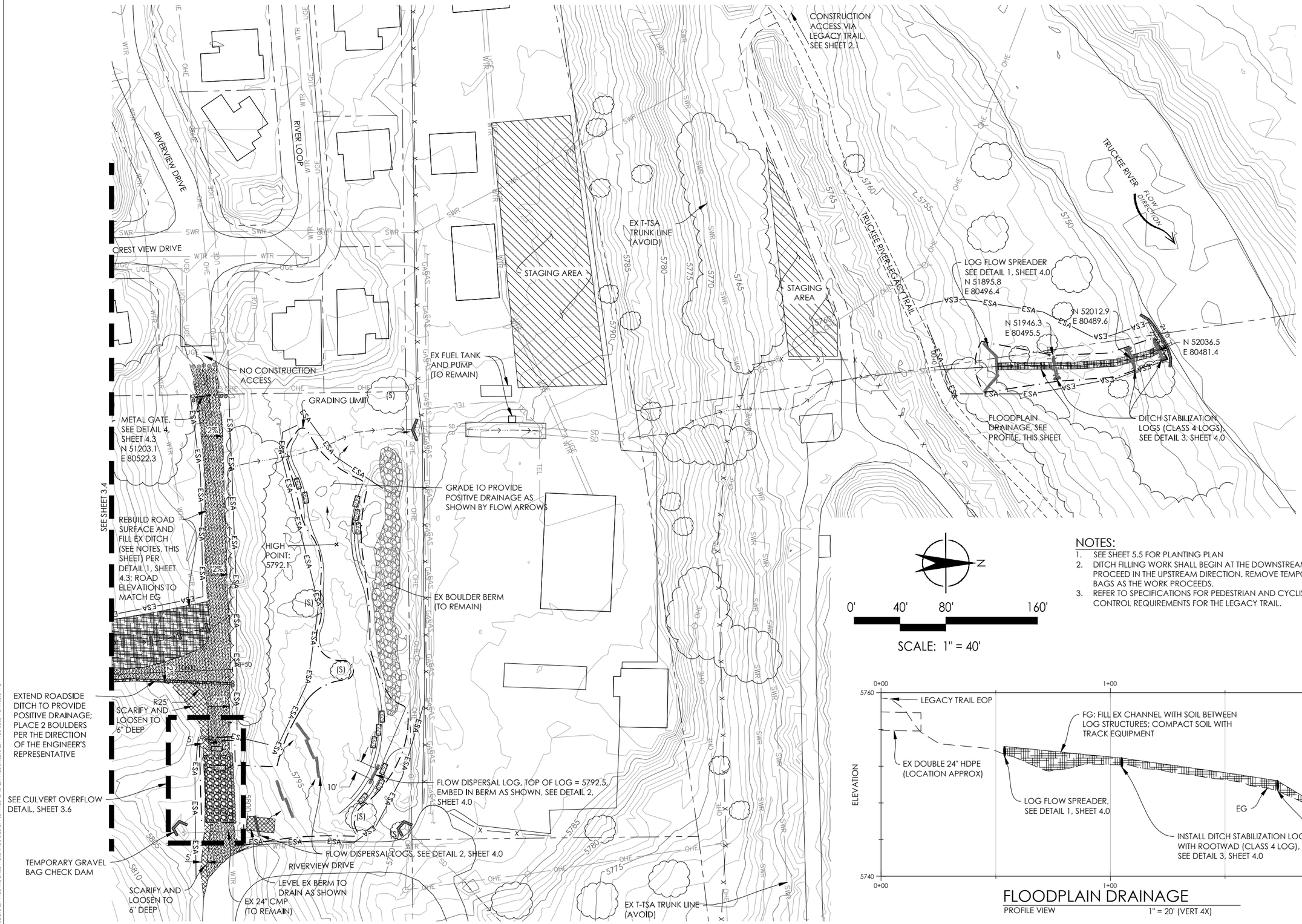
TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER
214128

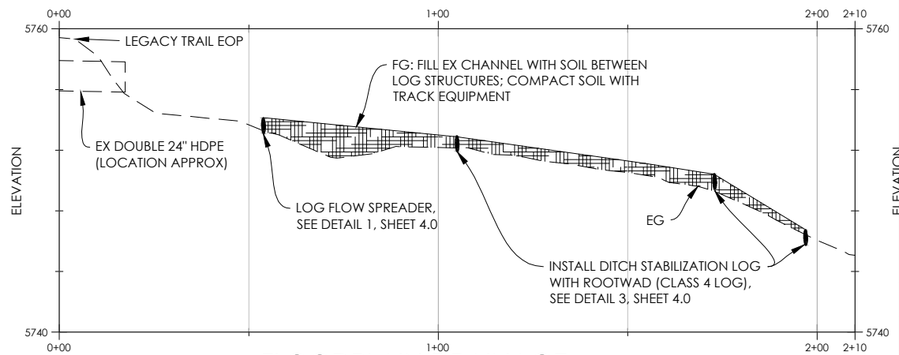
SCALE
1" = 40'

SHEET
3.4



NOTES:

1. SEE SHEET 5.5 FOR PLANTING PLAN
2. DITCH FILLING WORK SHALL BEGIN AT THE DOWNSTREAM END, AND PROCEED IN THE UPSTREAM DIRECTION. REMOVE TEMPORARY GRAVEL BAGS AS THE WORK PROCEEDS.
3. REFER TO SPECIFICATIONS FOR PEDESTRIAN AND CYCLIST TRAFFIC CONTROL REQUIREMENTS FOR THE LEGACY TRAIL.



FLOODPLAIN DRAINAGE

PROFILE VIEW 1" = 20' (VERT 4X)

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128-SHEETS\214128-0305-PLAN05.DWG

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DESIGNED BY	D SHAW		
DRAWN BY	P KULCHAWIK		
CHECKED BY	E BALLMAN		
IN CHARGE	P KULCHAWIK		
DATE	4-26-17		

DATE	BY	SUBMITTALS / REVISIONS
3-11-15	DS	30% PLANS
11-25-15	PK	60% PLANS
5-13-16	PK	95% PLANS
4-26-17	PK	100% PLANS

REGISTERED PROFESSIONAL ENGINEER PETER L. KULCHAWIK No. C83062 EXP. 6-30-18 CIVIL STATE OF CALIFORNIA

TOT OLD CORP YARD RESTORATION PLAN

TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

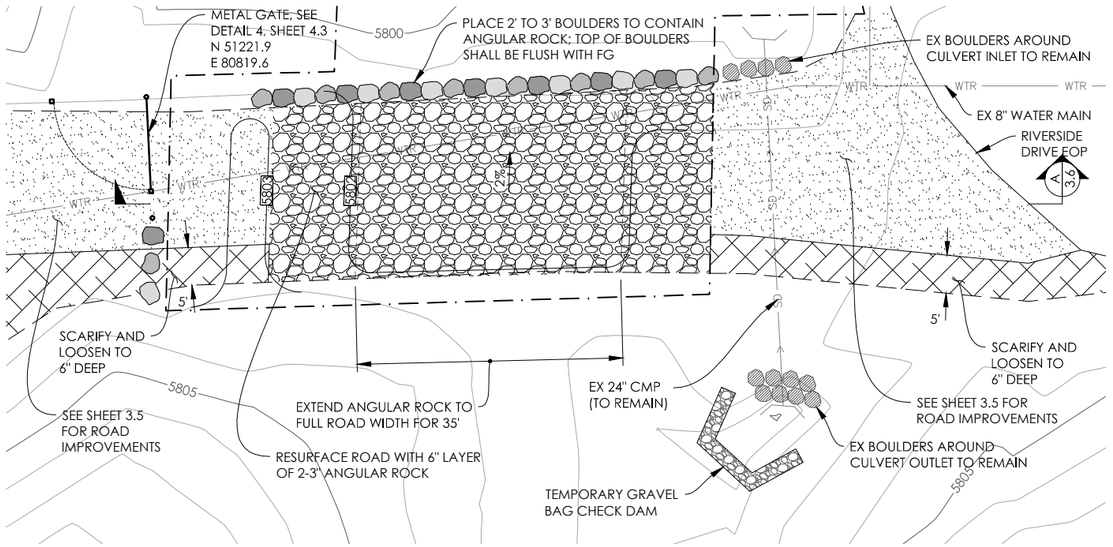
SCALE 1" = 40'

SHEET 3.5

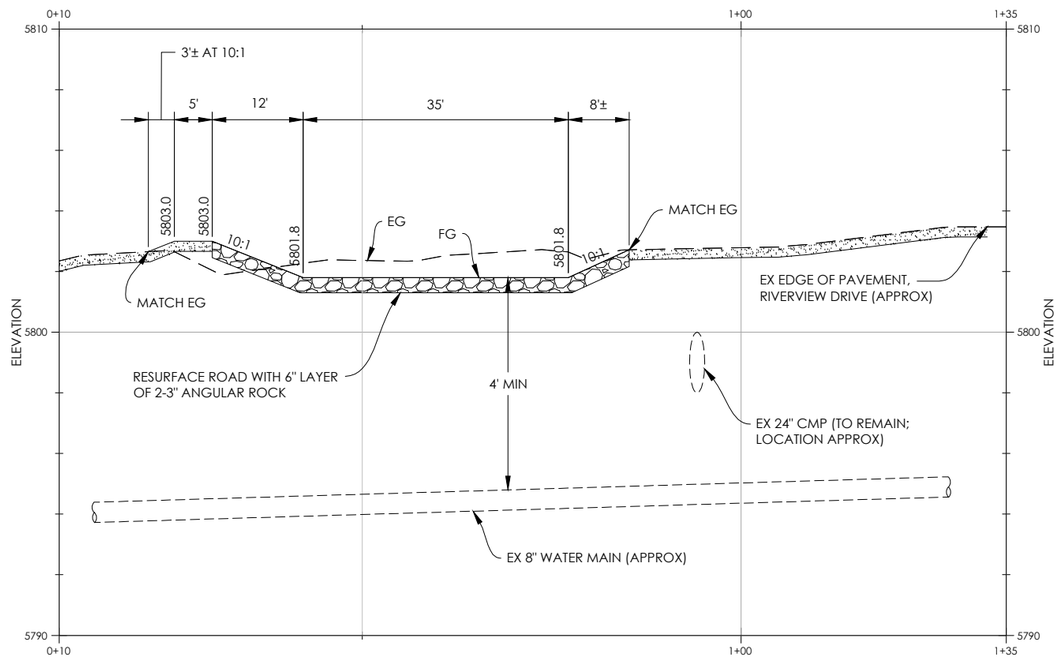
BASE DESIGN:

NOTES:

1. CONSTRUCTION OF THE CULVERT OVERFLOW ENTAILS GRADING AND ARMORING OF THE EXISTING GRAVEL ROADWAY TO CREATE A LOW POINT IN THE ROADWAY TO CONVEY FLOW IN EXCESS OF THE CAPACITY OF THE EXISTING 24" CMP.
2. BEFORE ANY GROUND DISTURBANCE OCCURS THE CONTRACTOR SHALL VERIFY THE DEPTH OF THE 8" WATER MAIN BY POTHOLING OR OTHER MEANS TO CONCLUSIVELY DETERMINE THE AMOUNT OF COVER OVER THE PIPE (THE EXISTING GROUND ELEVATION MINUS THE TOP OF PIPE ELEVATION) ALONG THE ENTIRE LENGTH OF THE CULVERT OVERFLOW.
3. THE CONTRACTOR SHALL SUBMIT THE RESULTS OF THE WATER MAIN DEPTH VERIFICATION TO THE ENGINEER'S REPRESENTATIVE PRIOR TO BEGINNING WORK ON THE CULVERT OVERFLOW; THE ENGINEER'S REPRESENTATIVE SHALL ADVISE THE CONTRACTOR TO IMPLEMENT EITHER THE BASE DESIGN OR BID ALTERNATE BASED ON THE RESULTS.
4. IF THE GRADING SHOWN FOR THE BASE DESIGN MAINTAINS AT LEAST 4.0 FEET OF COVER OVER THE 8" WATER MAIN FOR THE ENTIRE LENGTH OF THE CULVERT OVERFLOW, THEN THE CONTRACTOR SHALL CONSTRUCT THE BASE DESIGN.
5. IF THE GRADING SHOWN FOR THE BASE DESIGN WILL CAUSE THE AMOUNT OF COVER OVER THE 8" WATER MAIN TO BE LESS THAN 4.0 FEET AT ANY POINT ALONG THE LENGTH OF THE CULVERT OVERFLOW, THEN THE CONTRACTOR SHALL CONSTRUCT THE BID ALTERNATE.



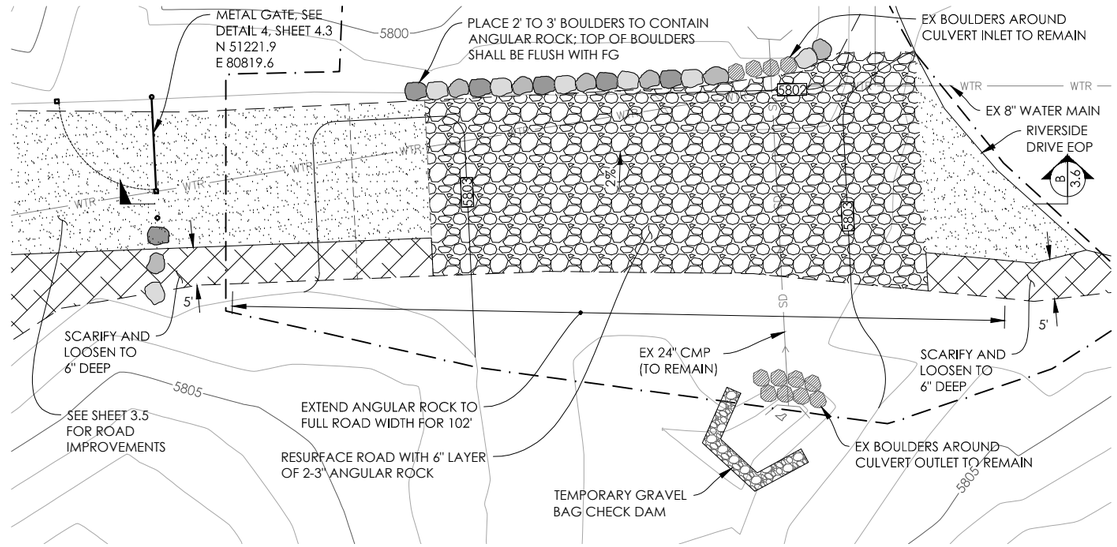
BASE DESIGN
PLAN VIEW 1" = 10'



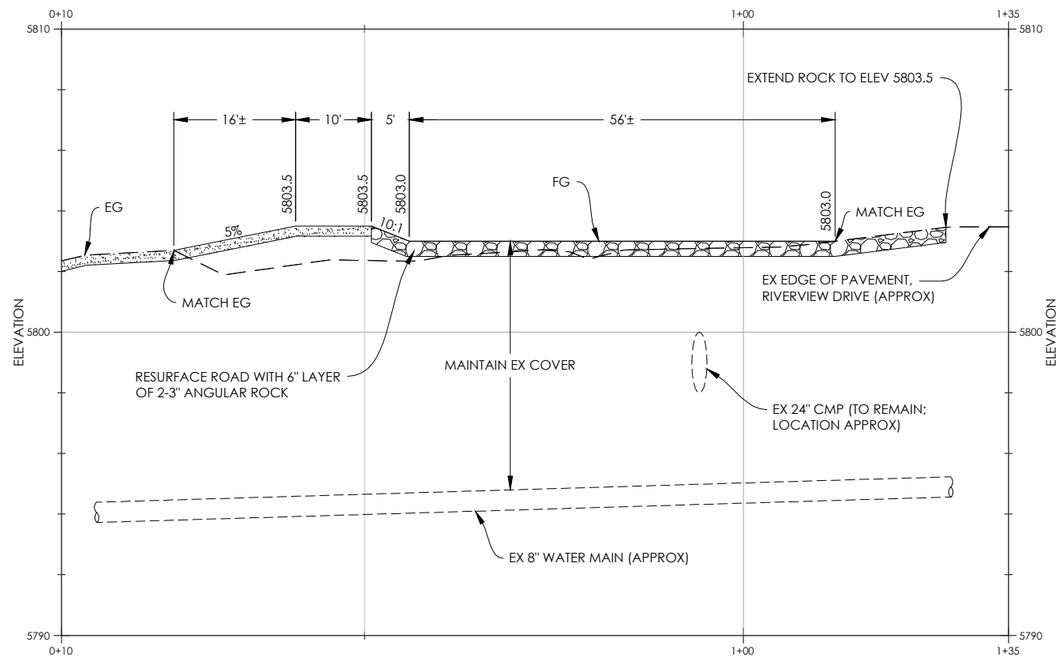
BASE DESIGN
SECTION VIEW 1" = 10' (VERT 4X) A 3.6

100% DESIGN

BID ALTERNATE:



BID ALTERNATE
PLAN VIEW 1" = 10'



BID ALTERNATE
SECTION VIEW 1" = 10' (VERT 4X) B 3.6

PREPARED FOR:
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95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

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DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER PETER T. KULCHAWIK No. C83062 Exp. 09/30/18 CIVIL STATE OF CALIFORNIA

CULVERT OVERFLOW

TRUCKEE MEADOWS RESTORATION

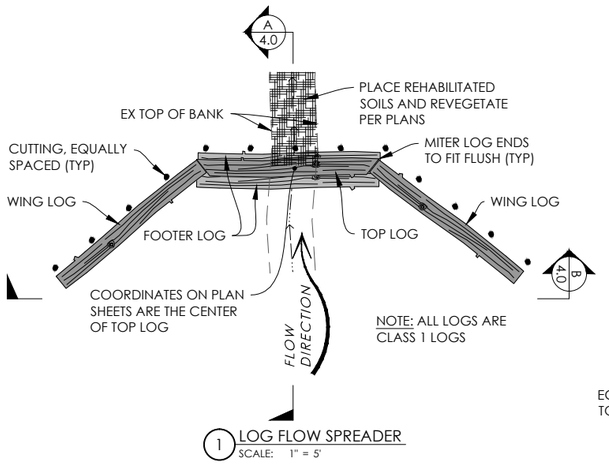
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

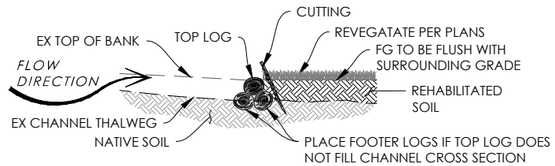
SCALE AS SHOWN

SHEET 3.6

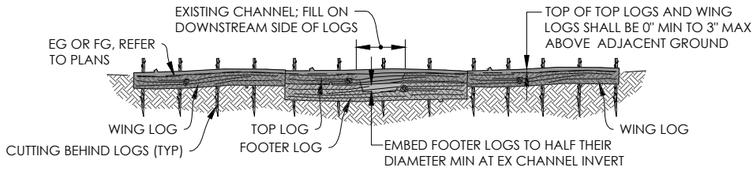
Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN 214128 CAD\214128 SHEETS\214128-0306-PLAN06.DWG



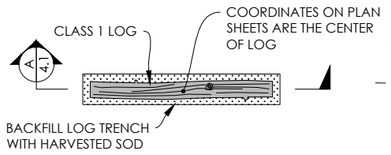
1 LOG FLOW SPREADER
SCALE: 1" = 5'



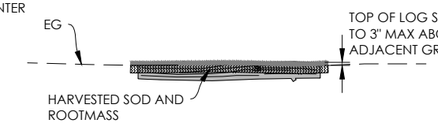
LOG FLOW SPREADER
PROFILE VIEW
1" = 5' A 4.0



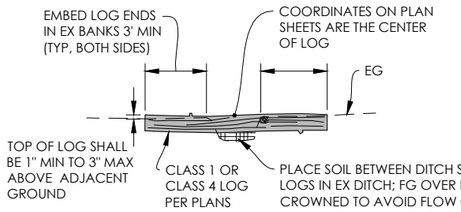
LOG FLOW SPREADER
ELEVATION VIEW
1" = 5' B 4.0



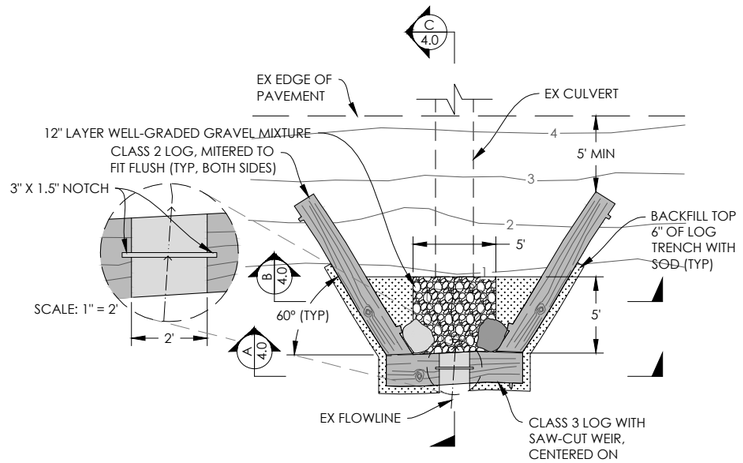
2 FLOW DISPERSAL LOG
SCALE: 1" = 5'



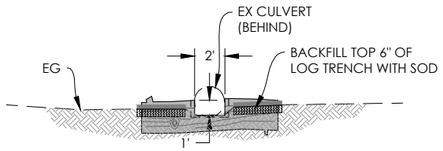
FLOW DISPERSAL LOG
CROSS SECTION VIEW
1" = 5' A 4.0



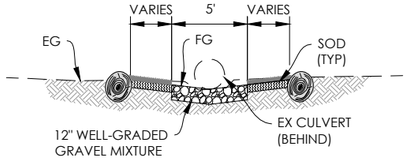
3 DITCH STABILIZATION LOG
SCALE: 1" = 5'



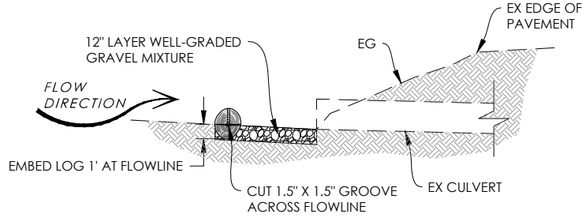
4 LOG WEIR
SCALE: 1" = 5'



LOG WEIR
ELEVATION VIEW
1" = 5' A 4.0



LOG WEIR
ELEVATION VIEW
1" = 5' B 4.0



LOG WEIR
PROFILE VIEW
1" = 5' C 4.0

SE

100% DESIGN

PREPARED FOR:
Truckee River Watershed Council
Balance Hydrologics, Inc.
P.O. Box 1077
12020 Donner Pass Road
Truckee, CA 96161
tel and fax (530) 550-9776
www.balancehydro.com

SUBMITTALS / REVISIONS	DATE	BY
30% PLANS	3-11-15	DS
60% PLANS	11-25-15	PK
95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER PETER L. KULCHAWIK No. C83362 Exp. 06/30/18 CIVIL STATE OF CALIFORNIA

WETLAND DETAILS 1

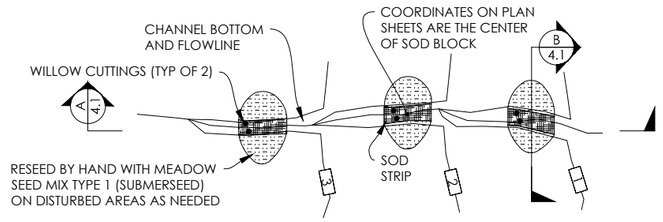
TRUCKEE MEADOWS RESTORATION
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER
214128

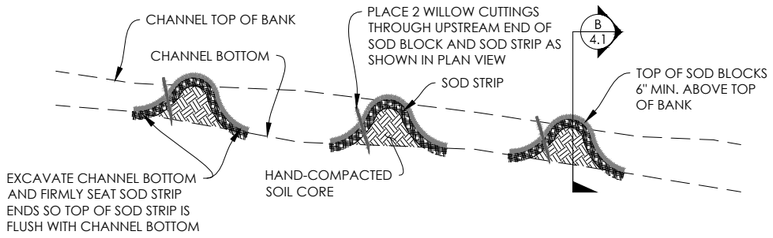
SCALE
AS SHOWN

SHEET
4.0

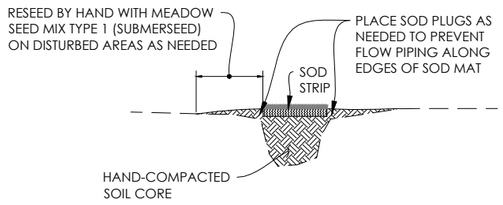
Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128SHEETS\214128-0400-DETAIL00.DWG



1 SOD BLOCKS (PLAN VIEW)
SCALE: 1" = 5'

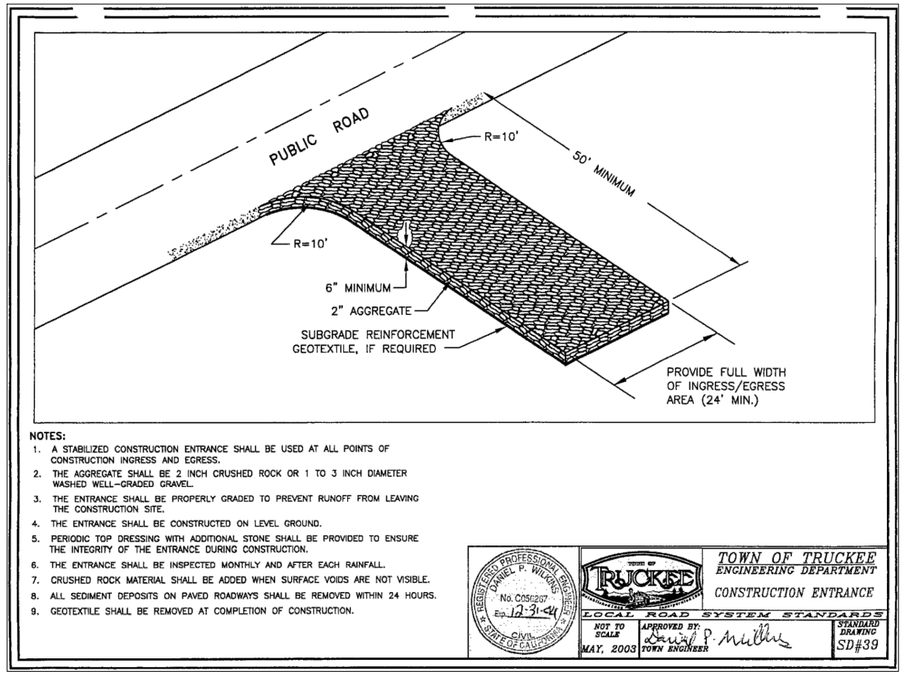


SOD BLOCK
PROFILE VIEW 1" = 5' (A 4.1)



SOD BLOCK
SECTION VIEW 1" = 5' (B 4.1)

SOD BLOCK NOTES:
1. SOD STRIPS SHALL BE THE TYPE SHOWN ON DETAIL 1, SHEET 5.6.
2. EACH SOD BLOCK SHALL INCLUDE ONE OR MORE SOD STRIPS. THE NUMBER OF STRIPS IN EACH SOD BLOCK SHALL BE DETERMINED BY FIELD CONDITIONS.
3. IF MORE THAN ONE SOD STRIP IS NEEDED TO CONSTRUCT A SOD BLOCK, MINIMIZE SEAMS AMONG STRIPS BY PLACING THEM FIRMLY AGAINST ONE ANOTHER.
4. TRIM SOD STRIPS AS NEEDED TO CONFORM TO FIELD CONDITIONS.
5. SOD PLUGS SHALL BE THE TYPE DESCRIBED ON SHEET 5.0.
6. ALL SOD STRIPS AND MATS SHALL BE HARVESTED AND STORED AS DESCRIBED IN THE SPECIFICATIONS AND ON SHEET 5.0.



NOTES:
1. A STABILIZED CONSTRUCTION ENTRANCE SHALL BE USED AT ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS.
2. THE AGGREGATE SHALL BE 2 INCH CRUSHED ROCK OR 1 TO 3 INCH DIAMETER WASHED WELL-GRADED GRAVEL.
3. THE ENTRANCE SHALL BE PROPERLY GRADED TO PREVENT RUNOFF FROM LEAVING THE CONSTRUCTION SITE.
4. THE ENTRANCE SHALL BE CONSTRUCTED ON LEVEL GROUND.
5. PERIODIC TOP DRESSING WITH ADDITIONAL STONE SHALL BE PROVIDED TO ENSURE THE INTEGRITY OF THE ENTRANCE DURING CONSTRUCTION.
6. THE ENTRANCE SHALL BE INSPECTED MONTHLY AND AFTER EACH RAINFALL.
7. CRUSHED ROCK MATERIAL SHALL BE ADDED WHEN SURFACE VOIDS ARE NOT VISIBLE.
8. ALL SEDIMENT DEPOSITS ON PAVED ROADWAYS SHALL BE REMOVED WITHIN 24 HOURS.
9. GEOTEXTILE SHALL BE REMOVED AT COMPLETION OF CONSTRUCTION.

REGISTERED PROFESSIONAL ENGINEER DANIEL P. WILKINS No. C050207 Exp. 12-31-04 CIVIL STATE OF CALIFORNIA

TOWN OF TRUCKEE
ENGINEERING DEPARTMENT
CONSTRUCTION ENTRANCE
LOCAL ROAD SYSTEM STANDARDS
NOT TO SCALE | MAY, 2003
APPROVED BY: TOWN ENGINEER
STANDARD DRAWING SD#39

2 TEMPORARY CONSTRUCTION ENTRANCE
SCALE: NTS

100% DESIGN

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PREPARED FOR: Truckee River Watershed Council

Balance Hydrologics, Inc.
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tel and fax (530) 550-9776
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SUBMITTALS / REVISIONS	BY	DATE
30% PLANS	DS	3-11-15
60% PLANS	PK	11-25-15
95% PLANS	PK	5-13-16
100% PLANS	PK	4-26-17

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER PETER F. KULCHAWIK No. C83362 Exp. 06-30-18 CIVIL STATE OF CALIFORNIA

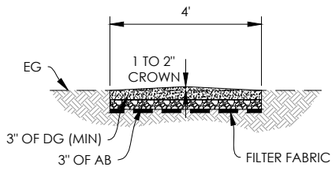
WETLAND DETAILS 2

TRUCKEE MEADOWS RESTORATION
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

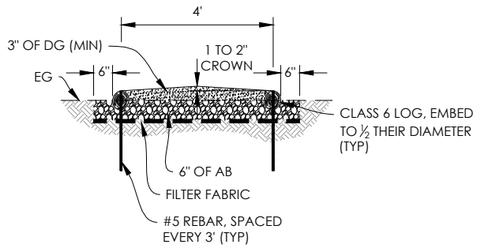
PROJECT NUMBER
214128

SCALE
AS SHOWN

SHEET
4.1



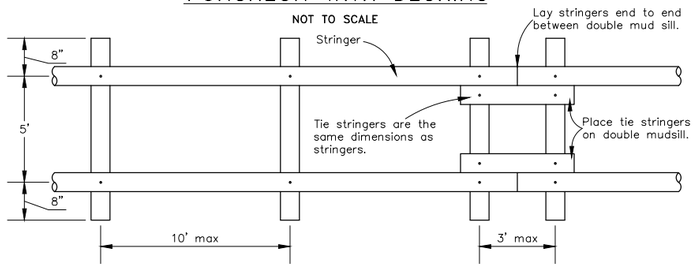
1 WALKING PATH
SCALE: 1" = 2'



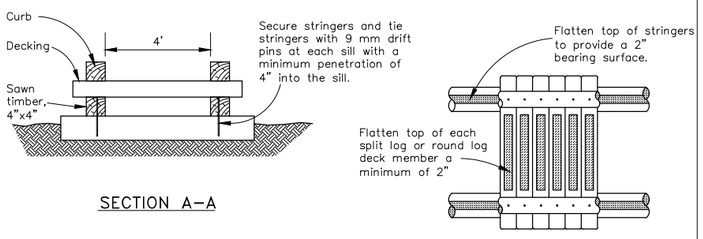
2 TURNPIKE STYLE WALKING PATH
SCALE: 1" = 2'

PUNCHEON WITH DECKING

NOT TO SCALE

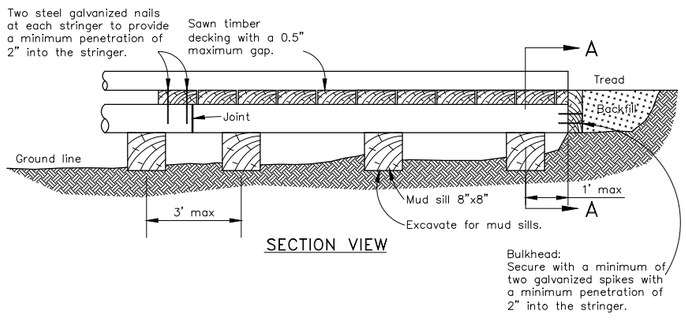


MUD SILL AND STRINGER LAYOUT



SECTION A–A

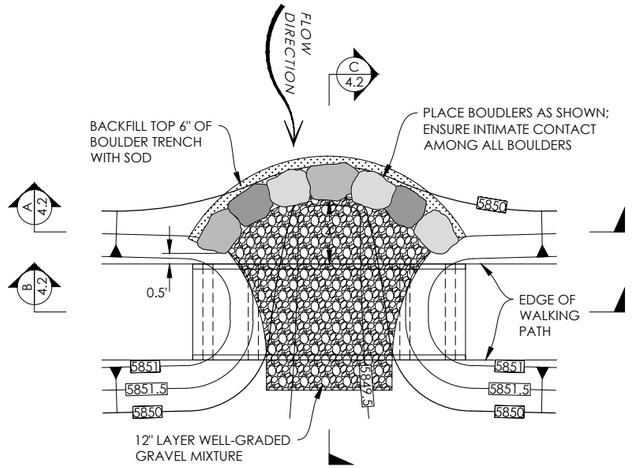
PLAN VIEW



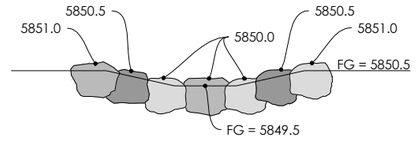
SECTION VIEW

6/96 932–2

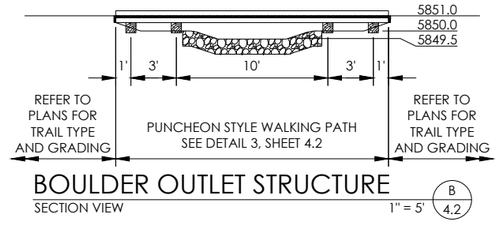
3 PUNCHEON STYLE WALKING PATH
SCALE: NTS



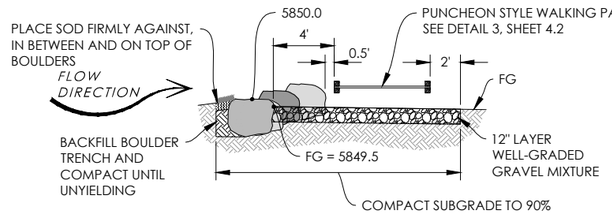
4 BOULDER OUTLET STRUCTURE
SCALE: 1" = 5'



BOULDER OUTLET STRUCTURE
SECTION VIEW 1" = 5' A 4.2



BOULDER OUTLET STRUCTURE
SECTION VIEW 1" = 5' B 4.2



BOULDER OUTLET STRUCTURE
PROFILE VIEW 1" = 5' C 4.2

NOTE: REFER TO SPECIFICATIONS FOR BOULDER SIZE AND TYPE REQUIREMENTS

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0402-DETAIL02.DWG

PREPARED FOR: Truckee River Watershed Council
Balance Hydrologics, Inc.
P.O. Box 1077
12020 Donner Pass Road
Truckee, CA 96161
tel and fax (530) 550-9776
www.balancehydro.com

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60% PLANS	11-25-15	PK
95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

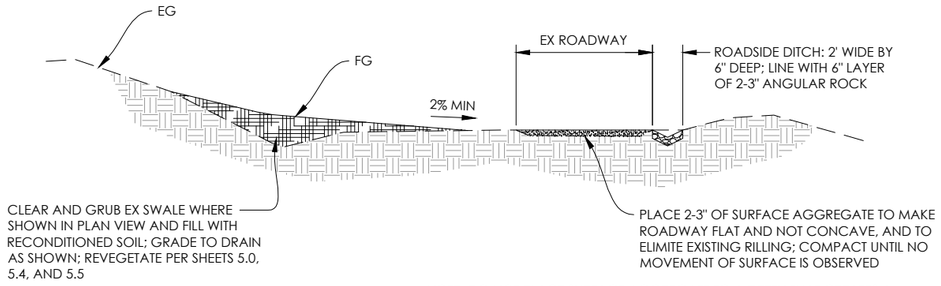
DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER PETER L. KULCHAWIK No. C83062 Exp. 06/18 CIVIL STATE OF CALIFORNIA

TRAIL DETAILS

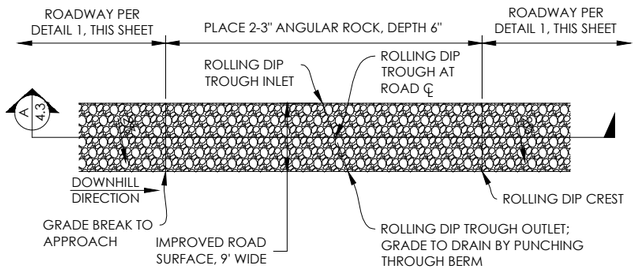
TRUCKEE MEADOWS RESTORATION
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128
SCALE AS SHOWN
SHEET 4.2

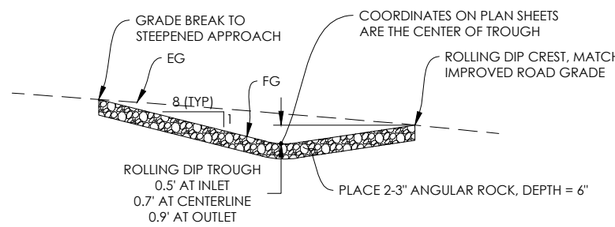


NOTE: DO NOT PLACE SURFACE AGGREGATE TO A DEPTH THAT CREATES A MOUND SO AS TO NOT CONCENTRATE FLOW ALONG THE ROADWAY MARGINS

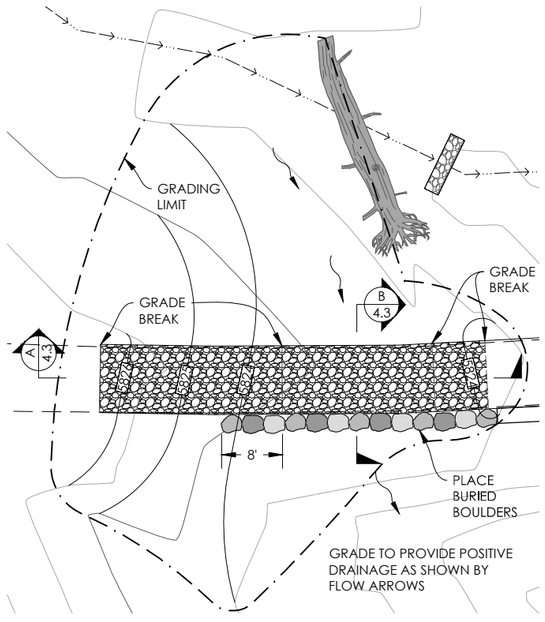
1 TYPICAL TTAD ACCESS ROAD CROSS SECTION
SCALE: 1" = 5' (VERT 4X)



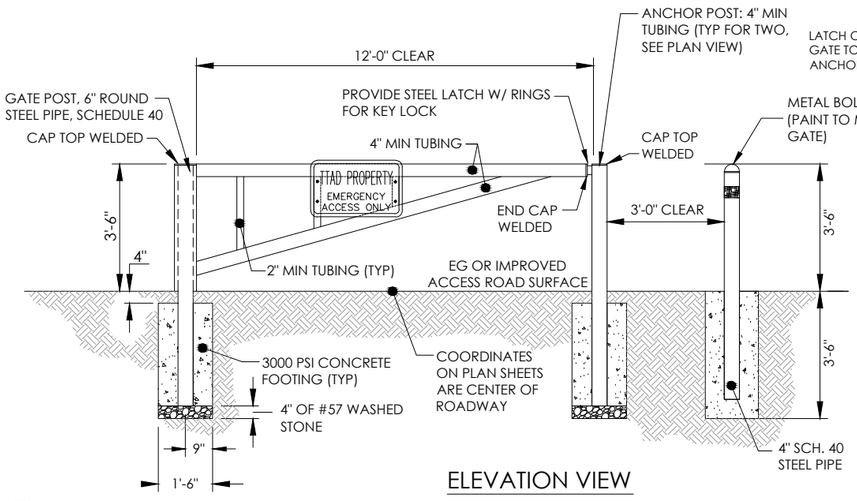
3 ROLLING DIP
SCALE: 1" = 10'



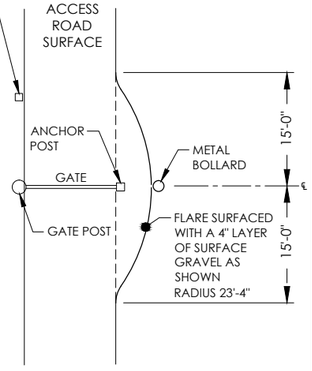
ROLLING DIP
PROFILE VIEW 1" = 10' (VERT 2X) A 4.0



2 ARIZONA CROSSING
SCALE: 1" = 10'



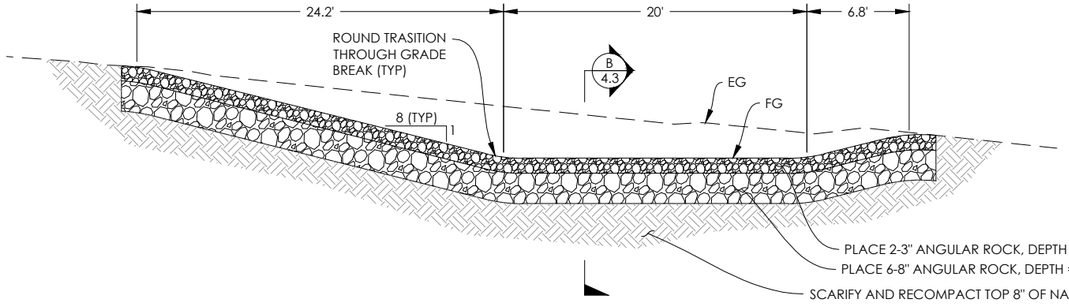
ELEVATION VIEW



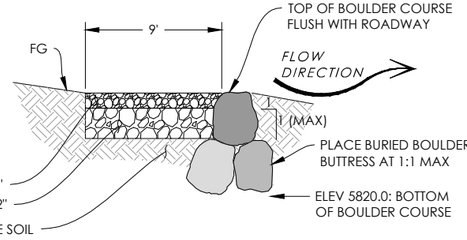
PLAN VIEW

NOTES:
1. THE CONTRACTOR SHALL SUBMIT A SHOP DRAWING TO THE ENGINEER'S REPRESENTATIVE FOR APPROVAL PRIOR TO INSTALLATION OF THE FIRST METAL GATE.
2. ALL METAL SHALL BE GALVANIZED SCHEDULE 40 STEEL, PRIMED AND PAINTED. USE ONE COAT HAMMERITE PRIMER AND TWO COATS DARK GREEN OR BROWN METAL ENAMEL PAINT.
3. ALL JOINTS SHALL BE WELDED SOLID.
4. CONTRACTOR SHALL PROVIDE SHOP DRAWING OF GATE LATCH ASSEMBLY ON ARM & ANCHOR POSTS TO THE ENGINEER'S REPRESENTATIVE.
5. 3" DIAMETER REFLECTORS WITH GALVANIZED METAL BACKS SHALL BE ATTACHED TO THE STREET SIDE OF THE GATE, ON ALL POSTS AND IN CENTER OF GATE ARM.

4 METAL GATE
SCALE: NTS



ARIZONA CROSSING
PROFILE VIEW 1" = 5' (VERT 2X) A 4.3



ARIZONA CROSSING
SECTION VIEW 1" = 5' (VERT 2X) B 4.3

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0403-DETAILS03.DWG

PREPARED FOR: Truckee River Watershed Council

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DESIGNED BY	DATE
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DRAWN BY	3-11-15
P KULCHAWIK	11-25-15
CHECKED BY	5-13-16
E BALLMAN	4-26-17
IN CHARGE	
P KULCHAWIK	4-26-17

REGISTERED PROFESSIONAL ENGINEER · PETER KULCHAWIK · No. C83062 Exp. 6/30/18 · CIVIL · STATE OF CALIFORNIA

TTAD ACCESS ROAD DETAILS

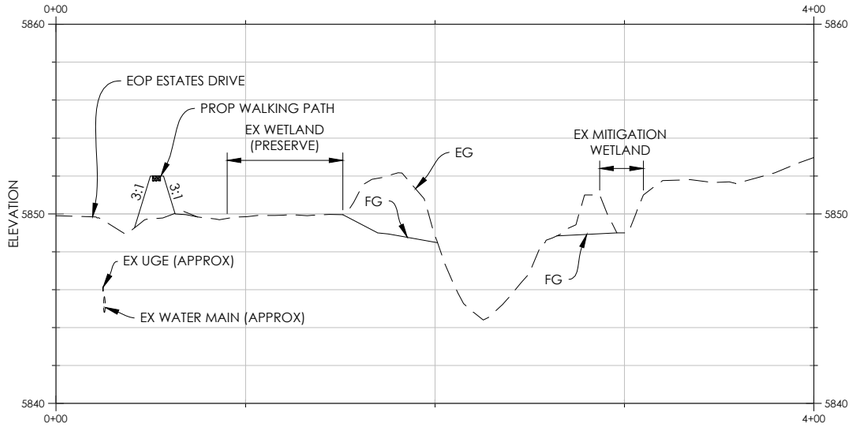
TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

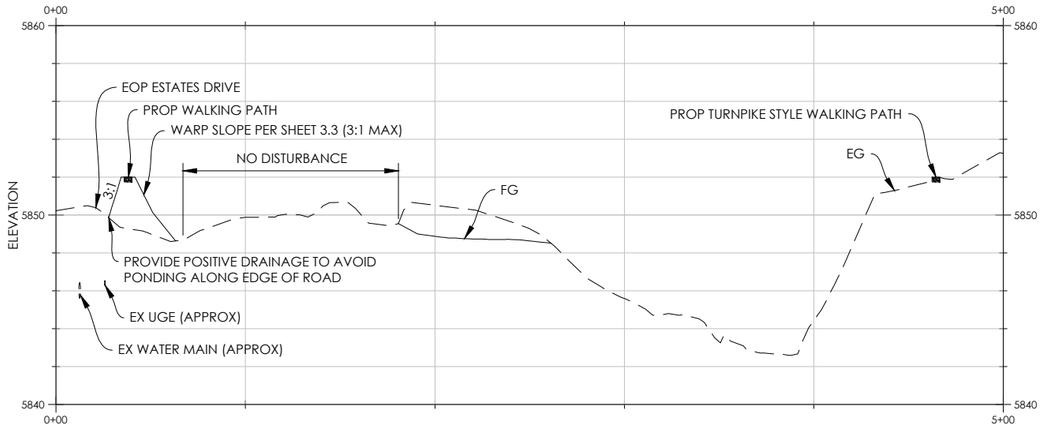
SCALE AS SHOWN

SHEET 4.3



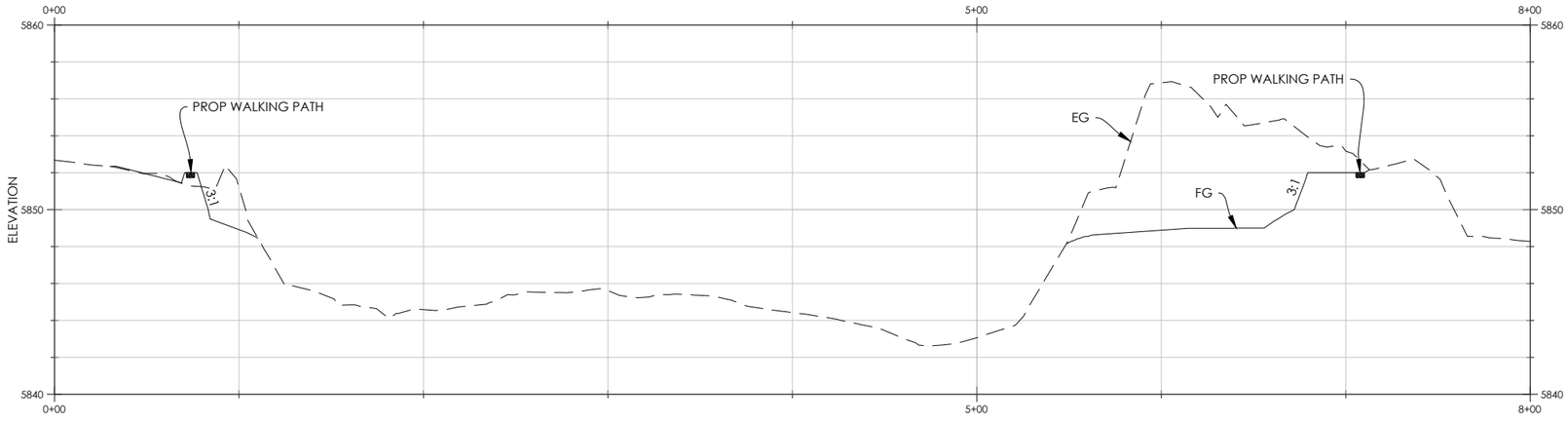
POND NORTH-SOUTH 1

SECTION VIEW 1" = 40' (H); 1" = 4' (V)



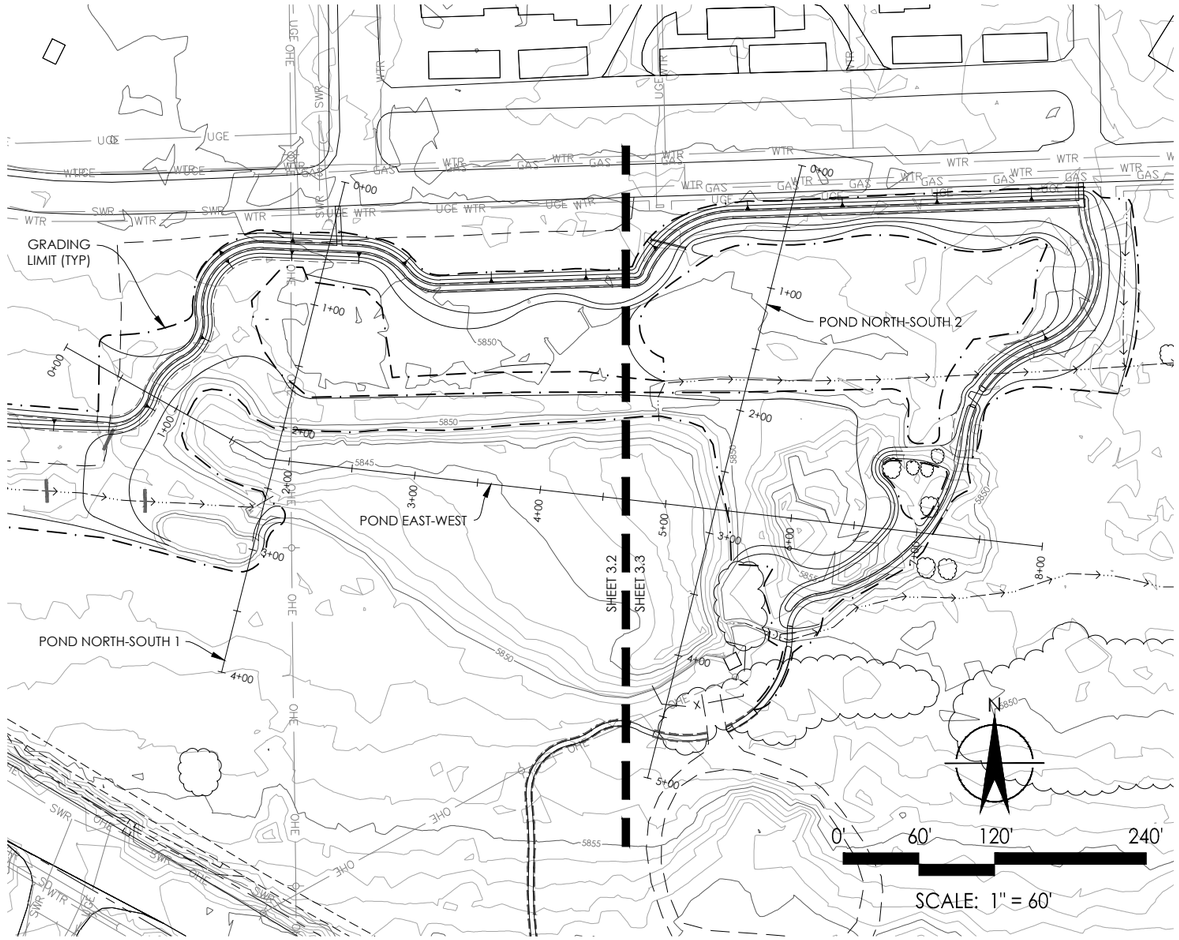
POND NORTH-SOUTH 2

SECTION VIEW 1" = 40' (H); 1" = 4' (V)



POND EAST-WEST

SECTION VIEW 1" = 40' (H); 1" = 4' (V)



100% DESIGN

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PREPARED FOR:

Truckee River Watershed Council

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CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

REGISTERED PROFESSIONAL ENGINEER
PETER L. KULCHAWIK
No. C83362
Exp. 6/30/18
CIVIL
STATE OF CALIFORNIA

TDRPD POND CROSS SECTIONS

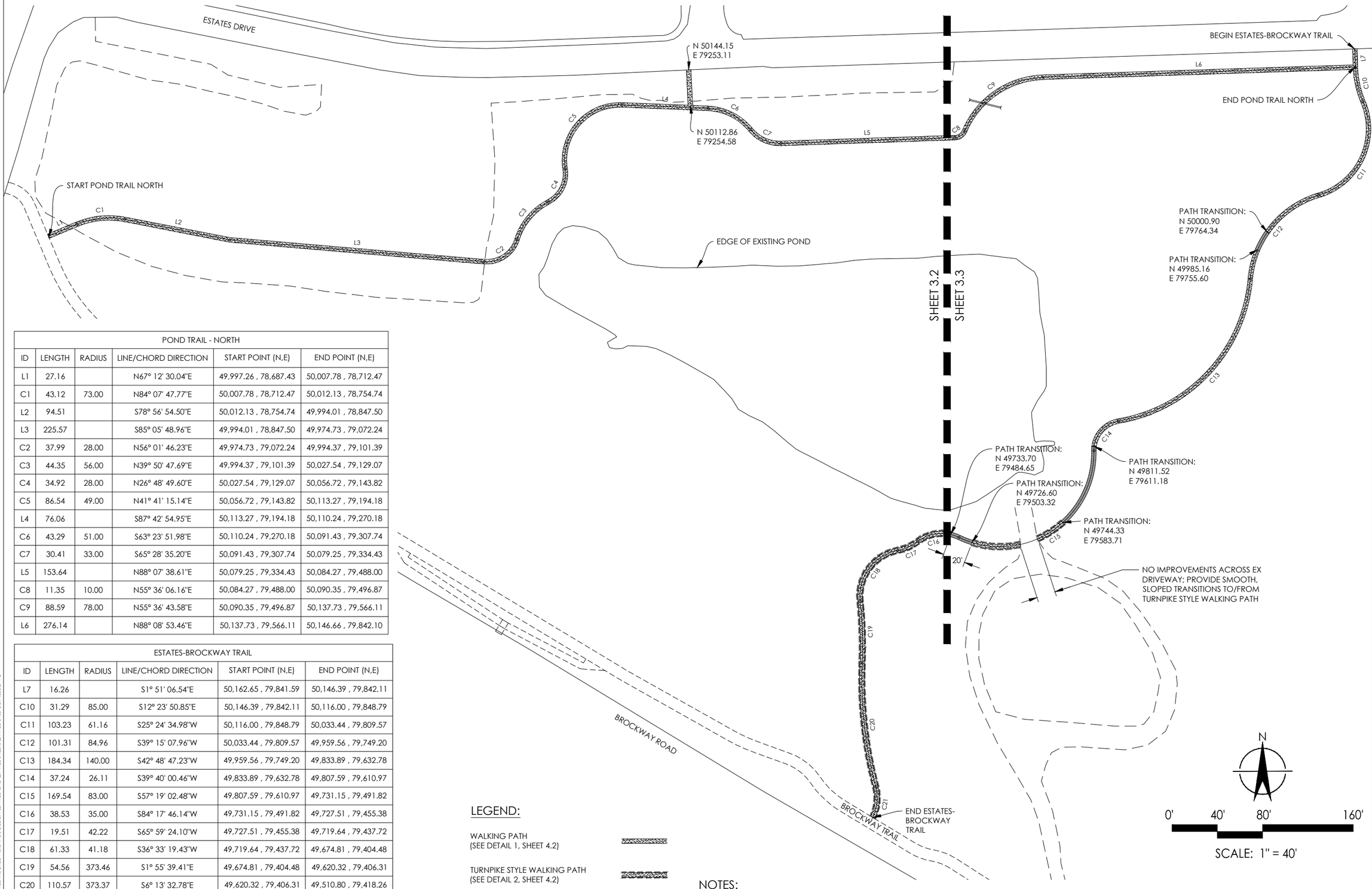
TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER
214128

SCALE
AS SHOWN

SHEET
4.4



POND TRAIL - NORTH					
ID	LENGTH	RADIUS	LINE/CHORD DIRECTION	START POINT (N,E)	END POINT (N,E)
L1	27.16		N67° 12' 30.04"E	49,997.26 , 78,687.43	50,007.78 , 78,712.47
C1	43.12	73.00	N84° 07' 47.77"E	50,007.78 , 78,712.47	50,012.13 , 78,754.74
L2	94.51		S78° 56' 54.50"E	50,012.13 , 78,754.74	49,994.01 , 78,847.50
L3	225.57		S85° 05' 48.96"E	49,994.01 , 78,847.50	49,974.73 , 79,072.24
C2	37.99	28.00	N56° 01' 46.23"E	49,974.73 , 79,072.24	49,994.37 , 79,101.39
C3	44.35	56.00	N39° 50' 47.69"E	49,994.37 , 79,101.39	50,027.54 , 79,129.07
C4	34.92	28.00	N26° 48' 49.60"E	50,027.54 , 79,129.07	50,056.72 , 79,143.82
C5	86.54	49.00	N41° 41' 15.14"E	50,056.72 , 79,143.82	50,113.27 , 79,194.18
L4	76.06		S87° 42' 54.95"E	50,113.27 , 79,194.18	50,110.24 , 79,270.18
C6	43.29	51.00	S63° 23' 51.98"E	50,110.24 , 79,270.18	50,091.43 , 79,307.74
C7	30.41	33.00	S65° 28' 35.20"E	50,091.43 , 79,307.74	50,079.25 , 79,334.43
L5	153.64		N88° 07' 38.61"E	50,079.25 , 79,334.43	50,084.27 , 79,488.00
C8	11.35	10.00	N55° 36' 06.16"E	50,084.27 , 79,488.00	50,090.35 , 79,496.87
C9	88.59	78.00	N55° 36' 43.58"E	50,090.35 , 79,496.87	50,137.73 , 79,566.11
L6	276.14		N88° 08' 53.46"E	50,137.73 , 79,566.11	50,146.66 , 79,842.10

ESTATES-BROCKWAY TRAIL					
ID	LENGTH	RADIUS	LINE/CHORD DIRECTION	START POINT (N,E)	END POINT (N,E)
L7	16.26		S1° 51' 06.54"E	50,162.65 , 79,841.59	50,146.39 , 79,842.11
C10	31.29	85.00	S12° 23' 50.85"E	50,146.39 , 79,842.11	50,116.00 , 79,848.79
C11	103.23	61.16	S25° 24' 34.98"W	50,116.00 , 79,848.79	50,033.44 , 79,809.57
C12	101.31	84.96	S39° 15' 07.96"W	50,033.44 , 79,809.57	49,959.56 , 79,749.20
C13	184.34	140.00	S42° 48' 47.23"W	49,959.56 , 79,749.20	49,833.89 , 79,632.78
C14	37.24	26.11	S39° 40' 00.46"W	49,833.89 , 79,632.78	49,807.59 , 79,610.97
C15	169.54	83.00	S57° 19' 02.48"W	49,807.59 , 79,610.97	49,731.15 , 79,491.82
C16	38.53	35.00	S84° 17' 46.14"W	49,731.15 , 79,491.82	49,727.51 , 79,455.38
C17	19.51	42.22	S65° 59' 24.10"W	49,727.51 , 79,455.38	49,719.64 , 79,437.72
C18	61.33	41.18	S36° 33' 19.43"W	49,719.64 , 79,437.72	49,674.81 , 79,404.48
C19	54.56	373.46	S1° 55' 39.41"E	49,674.81 , 79,404.48	49,620.32 , 79,406.31
C20	110.57	373.37	S6° 13' 32.78"E	49,620.32 , 79,406.31	49,510.80 , 79,418.26
C21	30.25	39.80	S7° 03' 50.99"W	49,510.80 , 79,418.26	49,481.50 , 79,414.63

LEGEND:

WALKING PATH
(SEE DETAIL 1, SHEET 4.2)

TURNPIKE STYLE WALKING PATH
(SEE DETAIL 2, SHEET 4.2)

PUNCHEON STYLE WALKING PATH
(SEE DETAIL 3, SHEET 4.2)

NOTES:
1. SEE SHEETS 3.2 AND 3.3 FOR GRADING PLAN.
2. ADD 2,200,000 TO ALL NORTHINGS AND 7,000,000 TO ALL EASTINGS TO OBTAIN GRID COORDINATES IN CALIFORNIA STATE PLANE, ZONE 2.
3. PROVIDE SMOOTH TRANSITIONS BETWEEN DIFFERENT STYLES OF WALKING PATHS THROUGHOUT.

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0405-DETAILS05.DWG

PREPARED FOR: Truckee River Watershed Council

Balance Hydrologics, Inc.
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www.balancehydro.com

SUBMITTALS / REVISIONS	DATE	BY
30% PLANS	3-11-15	DS
60% PLANS	11-25-15	PK
95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

DESIGNED BY D SHAW
DRAWN BY P KULCHAWIK
CHECKED BY E BALLMAN
IN CHARGE P KULCHAWIK
DATE 4-26-17

REGISTERED PROFESSIONAL ENGINEER PETER KULCHAWIK No. C83062 Exp. 6/30/18 CIVIL STATE OF CALIFORNIA

TRAIL LAYOUT

TRUCKEE MEADOWS RESTORATION
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128
SCALE 1" = 40'
SHEET 4.5

PLANT MATRIX

Symbol	Treatment	Botanical Name	Common Name	Type / Size	Rate	Approximate Quantities
					Pure Live Seed (Pounds per Acre)	Pounds of Seed
	MEADOW SEED MIX TYPE 1 (SUBMERSEED)	*Amica chamissonis*	meadow arnica	Seed	0.50	0.6
		Carex athrostachya	slender beak sedge	Seed	1.50	1.9
		Carex nebrascensis	Nebraska sedge	Seed	1.50	1.9
		Carex praegracilis	field sedge	Seed	1.50	1.9
		Deschampsia cespitosa	tufted hair grass	Seed	0.25	0.3
		Hordeum brachyantherum	meadow barley	Seed	4.00	5.0
		Mimulus guttatus	seep monkeyflower	Seed	0.10	0.1
		Symphyotrichum spathulatum	western mountain aster	Seed	0.25	0.3
		Potentilla gracilis	northwest cinquefoil	Seed	0.25	0.3
		Sidalcea oregana	Oregon checkerblooom	Seed	0.50	0.6
				Total Seed Mix	*1.257 acres*	*13.0*
					Pure Live Seed (Pounds per Acre)	Pounds of Seed
	MEADOW SEED MIX TYPE 2	*Amica chamissonis*	meadow arnica	Seed	0.10	0.2
		Carex praegracilis	field sedge	Seed	0.50	0.8
		Carex nebrascensis	Nebraska sedge	Seed	0.50	0.8
		Deschampsia cespitosa	tufted hair grass	Seed	0.25	0.4
		Elymus trachycaulus	slender wheatgrass	Seed	4.00	6.5
		Geum macrophyllum	large leaf avens	Seed	1.00	1.6
		Hordeum brachyantherum	meadow barley	Seed	4.00	6.5
		Penstemon rydbergii	Rydberg's penstemon	Seed	0.50	0.8
		Poa secunda	Sandberg's bluegrass	Seed	1.00	1.6
		Potentilla gracilis	northwest cinquefoil	Seed	0.25	0.4
		Sidalcea oregana	Oregon checker bloom	Seed	0.50	0.8
		Symphyotrichum spathulatum	western mountain aster	Seed	0.25	0.4
				Total Seed Mix	*1.616 acres*	*20.8*
					Pure Live Seed (Pounds per Acre)	Pounds of Seed
	SAGESCRUB SEED MIX	*Artemisia tridentata ssp. vaseyana*	mountain big sagebrush	Seed	0.50	0.4
		Bromus carinatus	California bromegrass	Seed	7.00	5.4
		Elymus elymoides	squirreltail	Seed	6.00	4.6
		Ericameria nauseosa	rubber rabbitbrush	Seed	2.00	1.5
		Eriogonum umbellatum	sulphur buckwheat	Seed	1.00	0.8
		Lupinus argenteus	silvery lupine	Seed	1.00	0.8
		Lupinus grayi	Sierra lupine	Seed	3.00	2.3
		Penstemon speciosus	royal penstemon	Seed	1.00	0.8
		Poa secunda ssp. secunda	Sandberg's bluegrass	Seed	0.50	0.4
		Purshia tridentata	antelope bitterbrush	Seed	1.00	0.8
		Stipa occidentalis	Sierra needlegrass	Seed	1.80	1.4
				Total Seed Mix	*0.768 acres*	*19.0*
					Spacing	# Cuttings
	CUTTINGS	*Salix lasiandra*	Pacific willow	Cuttings	3'-0" OC	193
		Salix lemmonii	Lemmon's willow	Cuttings	3'-0" OC	193
		Salix scouleriana	Nuttall willow	Cuttings	3'-0" OC	193
					Spacing	# Containers
AU	CONTAINER PLANTS	*Amelanchier alnifolia*	service berry	Gallon	5.0 OC	3
FV		*Fragaria virginiana*	mountain strawberry	3" pot	4.0 OC	8
P		*Pinus contorta ssp. murrayana*	lodgepole pine	Gallon	8.0 OC	3
PE		*Prunus virginiana var. demissa*	chokecherry	Gallon	5.0 OC	5
RW		*Rosa woodsii ssp. ultramontanum*	interior rose	Gallon	4.0 OC	20
SRM		*Sambucus racemosa var. melanocarpa*	Rocky mountain elder	Gallon	8.0 OC	5

REVEGETATION NOTES

GENERAL

1. ALL AREAS OF REVEGETATION ARE SUBJECT TO IN-FIELD DESIGN VERIFICATION AND ADJUSTMENTS AS DIRECTED BY THE ENGINEER'S REPRESENTATIVE. AT ALL TIMES, RETAIN EXISTING NATIVE VEGETATION WHENEVER POSSIBLE.
2. EXISTING GRADES AND CONDITIONS SHALL BE CONFORMED TO WHENEVER POSSIBLE. ANY ADJACENT OR OFFSITE AREAS DISTURBED BY THE CONTRACTOR'S OPERATION MUST BE RESTORED BY THE CONTRACTOR TO THE PREDISTURBANCE CONDITION TO THE SATISFACTION OF THE ENGINEER'S REPRESENTATIVE.
3. REFER TO THE PROJECT SPECIFICATIONS AND THE DETAILS ON THE DRAWINGS FOR ADDITIONAL INFORMATION.
4. ALL REVEGETATION AREAS SHALL RECEIVE SOIL REHABILITATION TREATMENTS BEFORE PLANTING AND/OR SEEDING; REFER TO SPECIFICATIONS SECTION 32 91 00, PLANTING PREPARATION.

SOD NOTES

1. HARVEST
   - 1.1. ALL SOD (SOD STRIPS, SOD PLUGS, AND FRESHWATER MARSH SOD PLUGS) SHALL BE HARVESTED AND STORED AS DESCRIBED IN THE SPECIFICATIONS.
   - 1.2. SOD STRIPS SHALL BE 2' BY 3' PIECES OF SOD, AS SHOWN IN DETAIL 1, SHEET 5.6.
   - 1.3. SOD PLUGS SHALL BE 4-INCH DIAMETER, MINIMUM.
   - 1.4. FRESHWATER MARSH SOD PLUGS SHALL BE 1' BY 1' SQUARE PIECES OF FRESHWATER MARSH SOD.
2. GENERAL SOD INSTALLATION
   - 2.1. SOD SHALL BE INSTALLED WHERE SHOWN ON THE DRAWINGS AND APPROVED BY THE ENGINEER'S REPRESENTATIVE.
   - 2.2. SCARIFY COMPACTED SOILS TO A DEPTH OF 6 INCHES MIN. PRIOR TO SOD PLACEMENT.
   - 2.3. THE SUBGRADE BELOW SOD INSTALLATIONS SHALL CONSIST OF NATIVE OR REHABILITATED SOILS GRADED TO A SMOOTH, STABLE SURFACE, PRIOR TO PLACEMENT, THE SUBGRADE SHALL BE SATURATED TO A MINIMUM DEPTH OF 4 INCHES.
   - 2.4. SOD STRIPS SHALL BE INSTALLED WITH SIDES SNUGLY ADJOINING ADJACENT SECTIONS. ANY VOIDS BETWEEN SOD STRIPS SHALL BE BACK-FILLED WITH NATIVE TOPSOIL AND HAND-TAMPED. SOD STRIPS SHALL BE FIRMLY TAMPED OR ROLLED AFTER PLACEMENT TO MINIMIZE AIR POCKETS BETWEEN THE PREPARED SURFACE AND ROOTS.
   - 2.5. SOD PLUGS AND FRESHWATER MARSH SOD PLUGS SHALL BE INSTALLED WITH THE ROOT CROWN AT THE ADJACENT GRADE ELEVATION.
   - 2.6. SOD PLUGS AND FRESHWATER MARSH SOD PLUGS SHALL BE FIRMLY TAMPED OR ROLLED AFTER PLACEMENT TO MINIMIZE AIR POCKETS.
3. FRESHWATER MARSH SOD PLUG INSTALLATION
   - 3.1. FRESHWATER MARSH SOD PLUGS SHALL BE INSTALLED IN A CHECKERBOARD PATTERN, LEAVING A 1'X'1 SPACE BETWEEN PLUGS.

PLANTING

1. PLANTING AREAS ARE SHOWN DIAGRAMMATICALLY. PLANTS SHALL BE LOCATED BY THE CONTRACTOR ACCORDING TO THE LAYOUT SHOWN ON THE DRAWINGS. PLANTS SHALL BE PLACED IN A RANDOM DISTRIBUTION TO MIMIC A NATURAL LAYOUT; REFER TO PLANT LAYOUT DETAIL ON SHEET 5.2.
2. PLANT QUANTITIES SHOWN IN THE PLANT MATRIX ARE FOR INFORMATION ONLY. THE CONTRACTOR SHALL VERIFY AND INSTALL THE ACTUAL QUANTITIES FROM THE PLANTING PLANS.
3. UNLESS OTHERWISE NOTED ON THE DRAWINGS OR DIRECTED BY THE ENGINEER'S REPRESENTATIVE, ANY AREA OUTSIDE OF THE GRADING LIMITS THAT IS DISTURBED BY THE CONSTRUCTION OPERATIONS SHALL BE REVEGETATED USING WITH THE APPROPRIATE SEED MIX AT THE SATISFACTION OF THE ENGINEER'S REPRESENTATIVE.

IRRIGATION AND WATERING

1. THE PROJECT HAS BEEN DESIGNED TO PROVIDE LONG-TERM HYDROLOGIC SUPPORT FOR THE PLANTING AREAS. WATERING IS PRESCRIBED FOR THE PLANT ESTABLISHMENT PERIOD, AND IS DESCRIBED IN THE SPECIFICATIONS. AN IRRIGATION SYSTEM IS NOT PRESCRIBED, HOWEVER, IF IN THE OPINION OF THE CONTRACTOR AN IRRIGATION SYSTEM IS NEEDED FOR SUPPLEMENTAL WATERING IN ORDER TO MEET THE PERFORMANCE STANDARDS, THEN THE CONTRACTOR MAY ELECT TO INSTALL A TEMPORARY IRRIGATION SYSTEM.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROVIDING WATER TO THE PLANTING AREAS AS NECESSARY TO MEET THE PERFORMANCE STANDARDS (SEE SECTION 32 98 00 PLANT ESTABLISHMENT OF THE SPECIFICATIONS).
3. THE SOURCE OF IRRIGATION WATER SHALL BE THE TDRPD POND (AS APPROVED BY TDRPD).

PLANT ESTABLISHMENT

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE PLANTS IN A HEALTHY CONDITION AND THE IRRIGATION SYSTEM THROUGHOUT THE PLANT ESTABLISHMENT PERIOD ACCORDING TO THE SPECIFICATIONS.
2. THE CONTRACTOR SHALL FURNISH ALL LABOR, MATERIALS, EQUIPMENT, AND INCIDENTALS DURING THE PLANT ESTABLISHMENT PERIOD WHICH WILL BEGIN UPON THE FINAL ACCEPTANCE OF THE CONTRACTOR'S INSTALLATION OPERATIONS. ALL PLANT ESTABLISHMENT ACTIVITIES SHALL BE COORDINATED WITH THE ENGINEER'S REPRESENTATIVE.

PREPARED FOR:
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www.balancehydro.com

SUBMITTALS / REVISIONS	DATE	BY
30% PLANS	3-11-15	DS
60% PLANS	11-25-15	PK
95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

DESIGNED BY	J HALDERMAN
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

PLANTING MATRIX AND NOTES

TRUCKEE MEADOWS RESTORATION
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128
SCALE --
SHEET 5.0

100% DESIGN

PLANTING AREA LEGEND

- WILLOW CUTTING PLANTINGS AND MEADOW SEED MIX TYPE 1 (SEE NOTES, THIS SHEET)
- MEADOW SEED MIX TYPE 1 (SUBMERSEED, NO CONTAINER PLANTINGS)
- MEADOW SEED MIX TYPE 2 (NO CONTAINER PLANTINGS)
- SAGESCRUB SEED MIX (NO CONTAINER PLANTINGS)
- SOD (SEE DETAIL 1, SHEET 5.6)

REVEGETATE CONSTRUCTION ACCESS ROUTE

BROCKWAY ROAD

ESTATES DRIVE

REFER TO DETAIL 4, SHEET 4.0 FOR SOD PLACEMENT AROUND LOG WEIR

NO HEAVY EQUIPMENT PAST THIS POINT

LIGHT EQUIPMENT AND FOOT TRAVEL CONSTRUCTION ACCESS ROUTE

HAND RESEED SOD BLOCKS AND PLACE 2 WILLOW CUTTINGS FOR EACH SOD BLOCK PER DETAIL 4, SHEET 4.1 (TYP)

EX DETENTION BASIN (TO REMAIN)

EX DETENTION BASIN (TO REMAIN)

WINTER CREEK LOOP

SEE SHEET 5.2

N

0' 40' 80' 160'

SCALE: 1" = 40'

NOTES:

1. SEE SHEET 3.1 FOR RESTORATION PLAN
2. INSTALL WILLOW CUTTINGS 3'-0" ON CENTER WHERE SPECIFIED

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128-SHEETS\214128-050-REVEG01.DWG

PREPARED FOR: Truckee River Watershed Council

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95% PLANS	PK	5-13-16
100% PLANS	PK	4-26-17

DESIGNED BY	J HALDERMAN
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	4-26-17

TDLT PARCEL PLANTING PLAN

TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

SCALE 1" = 40'

SHEET 5.1

PLANTING AREA LEGEND

- MEADOW SEED MIX TYPE 1 (SUBMERSEED, NO CONTAINER PLANTINGS)
- MEADOW SEED MIX TYPE 2 (NO CONTAINER PLANTINGS)
- SAGESCRUB SEED MIX (NO CONTAINER PLANTINGS)
- SOD (SEE DETAIL 1, SHEET 5.6)
- FRESHWATER MARSH SOD (SEE NOTES, SHEET 5.0)
- TEMPORARY REVEGETATION SIGN (SEE DETAIL 5, SHEET 5.6)

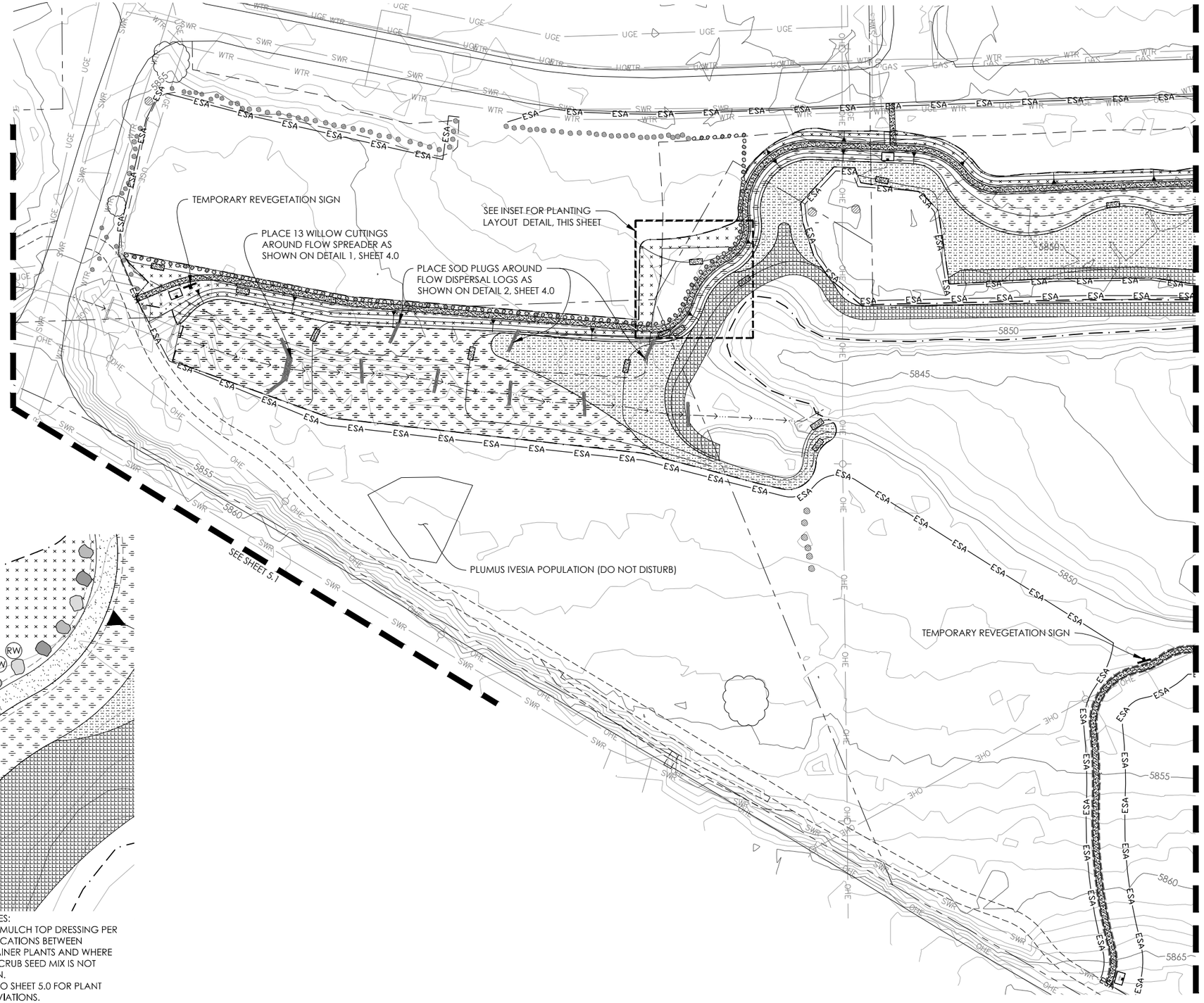
N

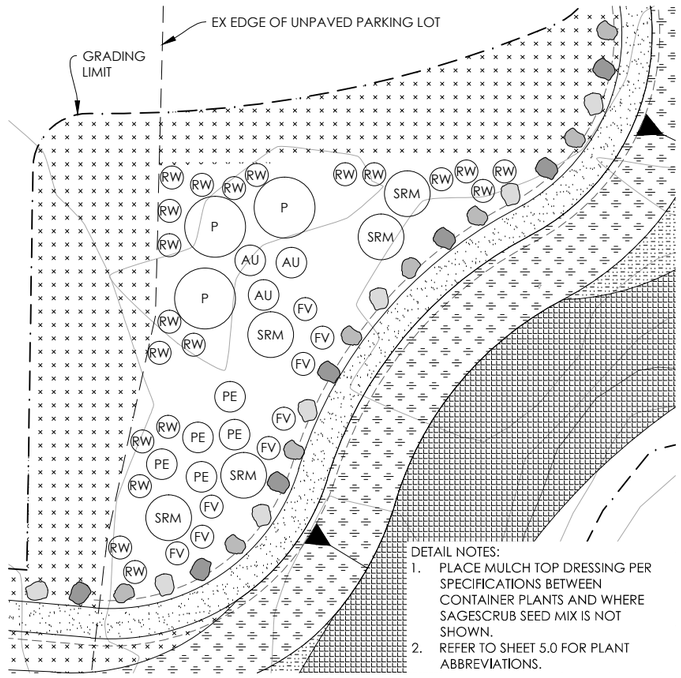
0' 40' 80' 160'

SCALE: 1" = 40'

NOTES:

1. SEE SHEET 3.2 FOR RESTORATION PLAN
2. NOT ALL TREES AND BOULDERS ARE SHOWN





DETAIL NOTES:
1. PLACE MULCH TOP DRESSING PER SPECIFICATIONS BETWEEN CONTAINER PLANTS AND WHERE SAGESCRUB SEED MIX IS NOT SHOWN.
2. REFER TO SHEET 5.0 FOR PLANT ABBREVIATIONS.

PLANTING LAYOUT DETAIL

1" = 10'

100% DESIGN

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30% PLANS	DS	3-11-15
60% PLANS	PK	11-25-15
95% PLANS	PK	5-13-16
100% PLANS	PK	4-26-17

DESIGNED BY	J HALDERMAN
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P. KULCHAWIK
DATE	4-26-17

TDRPD POND PLANTING PLAN

TRUCKEE MEADOWS RESTORATION

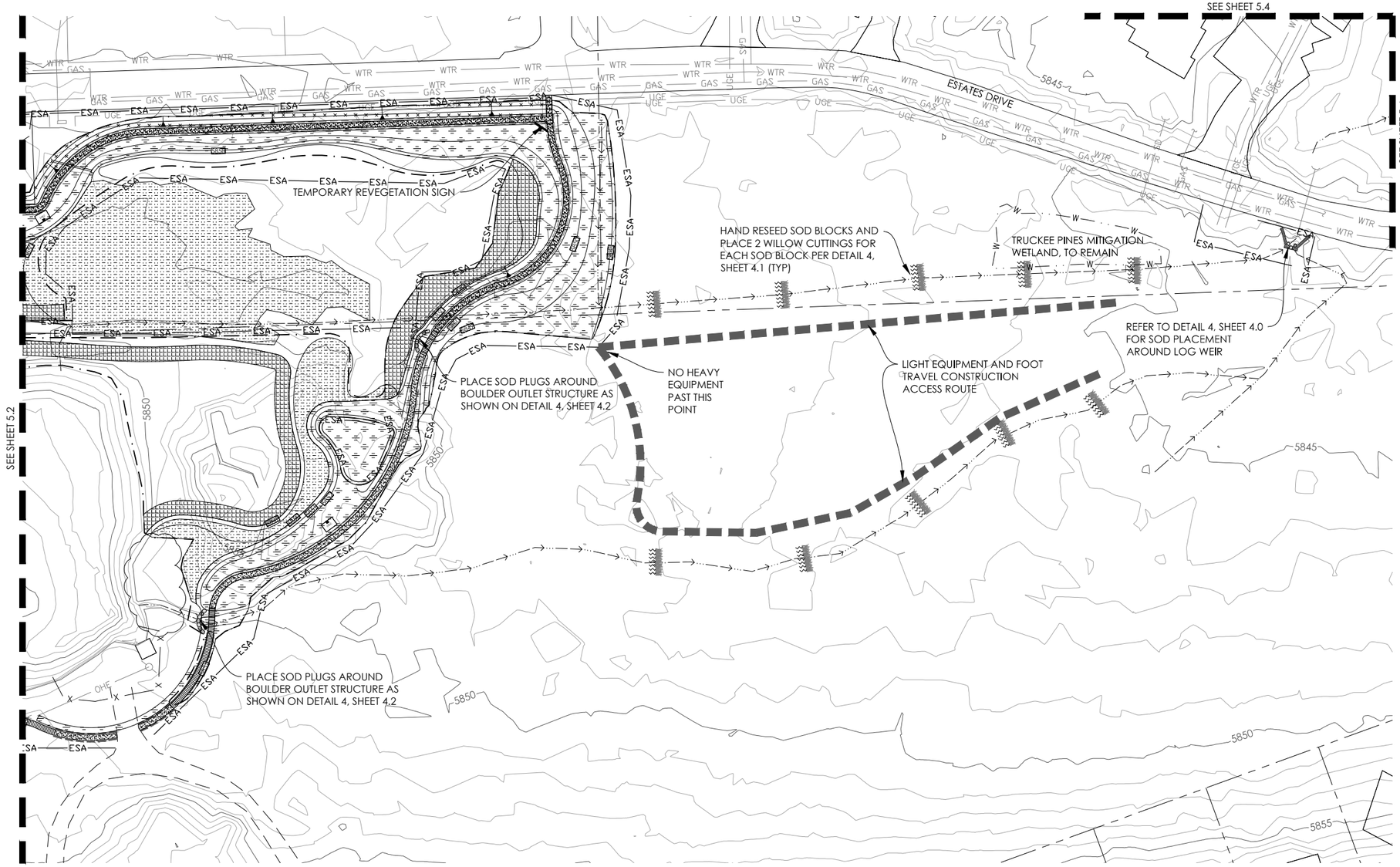
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128

SCALE 1" = 40'

SHEET 5.2

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0500-REVEG02.DWG



N

0' 40' 80' 160'

SCALE: 1" = 40'

PLANTING AREA LEGEND

- MEADOW SEED MIX TYPE 1 (SUBMERSEED, NO CONTAINER PLANTINGS)
- MEADOW SEED MIX TYPE 2 (NO CONTAINER PLANTINGS)
- SAGESCRUB SEED MIX (NO CONTAINER PLANTINGS)
- SOD (SEE DETAIL 1, SHEET 5.6)
- FRESHWATER MARSH SOD (SEE NOTES, SHEET 5.0)
- TEMPORARY REVEGETATION SIGN (SEE DETAIL 5, SHEET 5.6)

NOTES:

1. SEE SHEET 5.3 FOR RESTORATION PLAN

100% DESIGN

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60% PLANS	11-25-15	PK
95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

DESIGNED BY	J HALDERMAN
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P. KULCHAWIK
DATE	4-26-17

TDRPD POND TO ESTATES DRIVE PLANTING PLAN

TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER
214128

SCALE
1" = 40'

SHEET

5.3

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-05SD-REVEG03.DWG

0' 40' 80' 160'

SCALE: 1" = 40'

NOTES:

1. SEE SHEET 3.4 FOR RESTORATION PLAN

PLANTING AREA LEGEND

SAGESCRUB SEED MIX (NO CONTAINER PLANTINGS)

MEADOW SEED MIX TYPE 2 (NO CONTAINER PLANTINGS)

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0504-REVE004.DWG

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30% PLANS	DS	3-11-15
60% PLANS	PK	11-25-15
95% PLANS	PK	5-13-16
100% PLANS	PK	4-26-17

DESIGNED BY	J HALDERMAN
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P. KULCHAWIK
DATE	4-26-17

TTAD ACCESS ROAD PLANTING PLAN

TRUCKEE MEADOWS RESTORATION

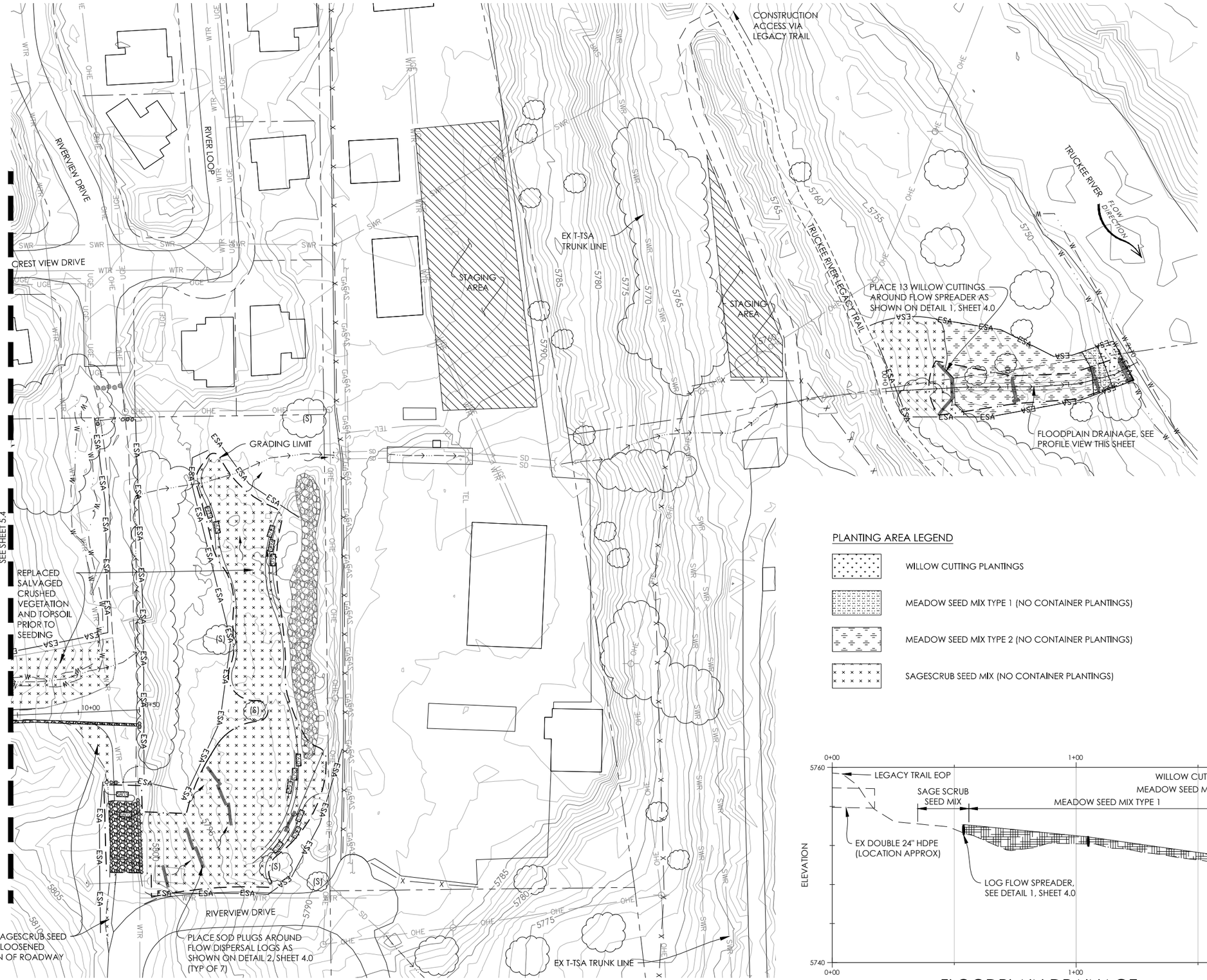
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER
214128

SCALE
1" = 40'

SHEET

5.4

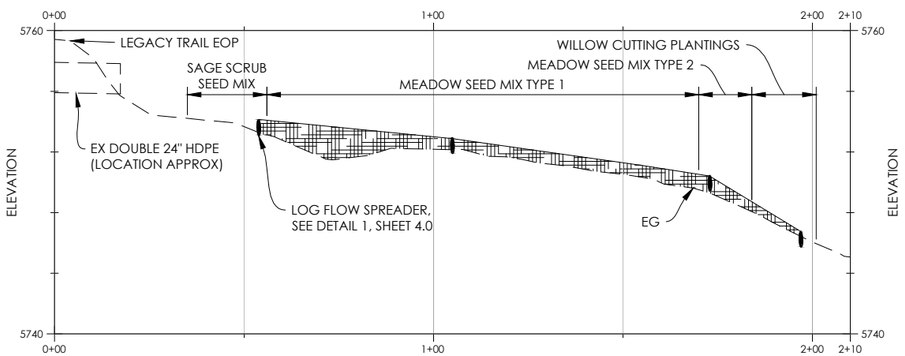


NOTES:

1. SEE SHEET 3.5 FOR GRADING PLAN
2. INSTALL WILLOW CUTTINGS 3'-0" ON CENTER WHERE SPECIFIED

PLANTING AREA LEGEND

- WILLOW CUTTING PLANTINGS
- MEADOW SEED MIX TYPE 1 (NO CONTAINER PLANTINGS)
- MEADOW SEED MIX TYPE 2 (NO CONTAINER PLANTINGS)
- SAGESCRUB SEED MIX (NO CONTAINER PLANTINGS)



FLOODPLAIN DRAINAGE
PROFILE VIEW 1" = 20' (VERT 4X)

100% DESIGN

Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0505-REVEG05.DWG

PREPARED FOR: Truckee River Watershed Council

Balance Hydrologics, Inc.
P.O. Box 1077
12020 Donner Pass Road
Truckee, CA 96161
tel and fax (530) 550-9776
www.balancehydro.com

DESIGNED BY	DATE	BY	SUBMITTALS / REVISIONS
J HALDERMAN	3-11-15	DS	30% PLANS
DRAWN BY	11-25-15	PK	60% PLANS
P KULCHAWIK	5-13-16	PK	95% PLANS
CHECKED BY	4-26-17	PK	100% PLANS
E BALLMAN			
IN CHARGE			
P KULCHAWIK			
DATE			
4-26-17			

TOT OLD CORP YARD PLANTING PLAN

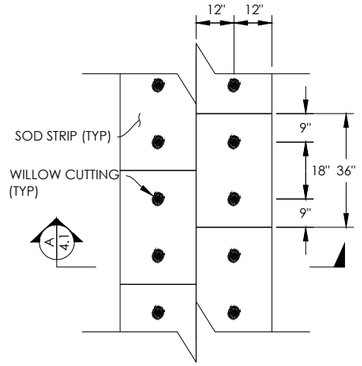
TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

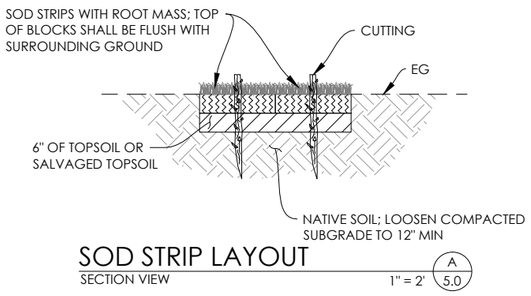
PROJECT NUMBER
214128

SCALE
1" = 40'

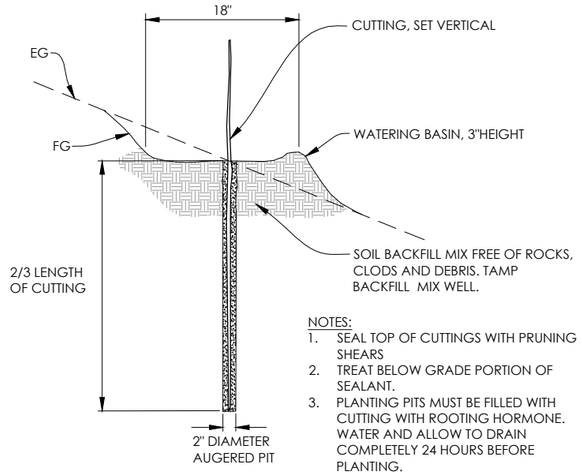
SHEET
5.5



1 SOD STRIP LAYOUT
SCALE: 1" = 2'

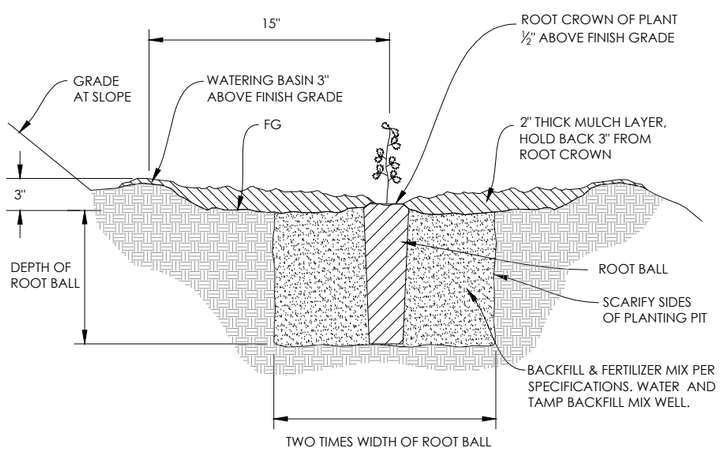


SOD STRIP LAYOUT
SECTION VIEW 1" = 2' A 5.0

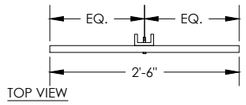


NOTES:
1. SEAL TOP OF CUTTINGS WITH PRUNING SHEARS
2. TREAT BELOW GRADE PORTION OF SEALANT.
3. PLANTING PITS MUST BE FILLED WITH CUTTING WITH ROOTING HORMONE. WATER AND ALLOW TO DRAIN COMPLETELY 24 HOURS BEFORE PLANTING.

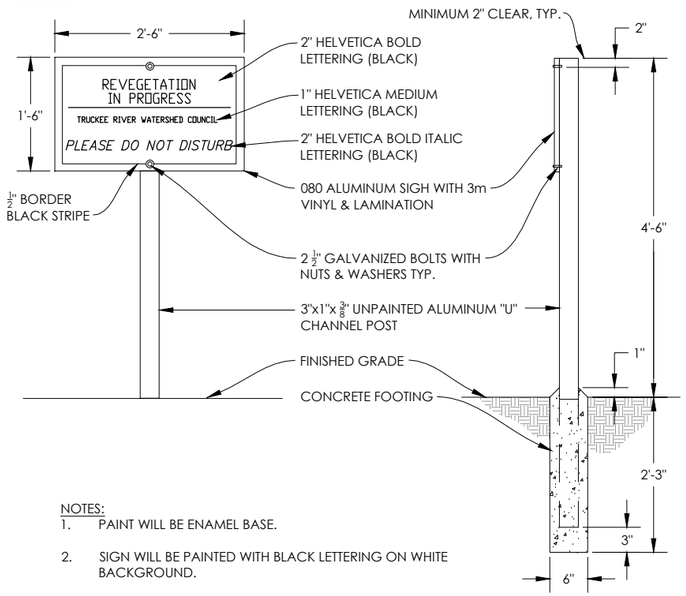
2 CUTTING PLANTING
SCALE: NTS



3 TREEPOT4/DEEPOT TREE/SHRUB PLANTING
SCALE: NTS



TOP VIEW

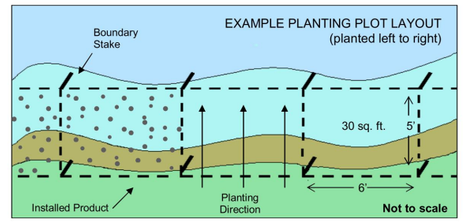


NOTES:
1. PAINT WILL BE ENAMEL BASE.
2. SIGN WILL BE PAINTED WITH BLACK LETTERING ON WHITE BACKGROUND.
3. ALL EXPOSED BOLT THREADS, EXTENDING BEYOND NUT, WILL BE STRIPPED AFTER INSTALLATION.

4 TEMPORARY REVEGETATION SIGN
SCALE: NTS

SubmerSeed® APPLICATION GUIDELINES

submerseed



Deep Water Zone
(Usually Inundated: > 6 inches)

Shallow Water Zone
(Usually Inundated: < 6 inches)
** PLANTING ZONE **

Transition Zone
(Occasionally Inundated/ Usually Saturated)
** PLANTING ZONE **

Upland Zone
(Rarely/never Saturated)

GENERAL RECOMMENDATIONS:

Pre-Application –

- Take care not to allow product to be exposed to excessive cold, heat, direct sun, or moisture prior to or during application. If short-term storage is necessary, the product should be stored in its original packaging in a cool (optimally 50 to 70 degree Fahrenheit) location, away from exposure to direct sunlight. Basements and garages are often the most appropriate location for storage, but take care not to place the product in a location that is prone to excessive afternoon heating or broad temperature swings. Stable conditions are preferable.
- Target the **shallow water zone** where water is usually present but is usually less than six (6) inches deep during the growing season (May – August). Do not hesitate to apply product to substrate that is not currently inundated (covered with water), especially if there are clues to suggest that water does reach the area during a good portion of the growing season (**transition zone**). NOTE: If the transition zone where the product is placed becomes excessively dry especially early on in the plant's development, periodic watering will increase germination success.
- Seek out soft (e.g. sandy, muddy, etc.) soils rather than seeding on a stone-lined bank. If stone banks are the only option, consider adding some organic topsoil to create a more inviting setting for plant development. Be sure that the amount of available moisture is appropriate (see below).
- Avoid seeding in areas that are almost always dry (**upland zone**) or where water is almost always deeper than six (6) inches (**deep water zone**). Obligate species thrive in moist to shallow-water conditions, but extremely dry conditions or deep waters will not allow for germination or long-term survival. Unless a significant drawdown is anticipated **DO NOT SOW PRODUCT IN MORE THAN SIX (6) INCHES OF WATER – GENERALLY, SHALLOWER IS BETTER**

Application –

- Establish ***planting plots*** (like the ones shown above) by marking the corners of each plot with a ***boundary stake*** – the stakes can be removed after application (take care not to disturb product), or can be left in place until the seedlings are well established. A typical application rate is 2,000-lbs of SubmerSeed per surface acre (43,560 square feet) or ~1 lb/22 square feet. This rate attempts to ensure sufficient coverage over a given area without adding so much material that resulting seedlings struggle from competitive forces with plants from adjacent particles.
- The **planting plots** should be small enough (no larger than 20' x 20') that product can be evenly distributed throughout their area. EXAMPLE: (see above) – Planting plot = 5' x 6' or 30 square feet; each planting plot – in the example above – would require 1.5 pounds of product. ***General Rule of Thumb:*** **At the 2,000-lb/acre application rate, particles should average one to three inches from their nearest neighboring particle.**
- When possible, sow product in a consistent **planting direction** (i.e. shore line, out – left to right) to best ensure uniform coverage.

Post-Application –

- Consider protecting the area from waterfowl, at least until seedlings are well established. Document the seeded location for future reference and to monitor establishment through time.
- Make a conscious effort to avoid disturbance of areas already sown with product. Take care to minimize traffic over these areas until plants can establish themselves. Depending on weather and site-specific conditions, plants may not bloom until their second or even third full season. Be patient; nature has a tendency to move at its own pace.

AquaBlok, Ltd.
3401 Glendale Ave. Suite 300
Toledo, Ohio 43614 U.S.A.
Telephone (800) 688-2649
Facsimile (419) 385-2990

AquaBlok® Composite Particle System

5 SUBMERSEED APPLICATION
SCALE: NTS

PREPARED FOR:
Truckee River Watershed Council
Balance Hydrologics, Inc.
P.O. Box 1077
12020 Donner Pass Road
Truckee, CA 96161
tel and fax (530) 550-9776
www.balancehydro.com

SUBMITTALS / REVISIONS	DATE	BY
30% PLANS	3-11-15	DS
60% PLANS	11-25-15	PK
95% PLANS	5-13-16	PK
100% PLANS	4-26-17	PK

DESIGNED BY	J HALDERMAN
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P. KULCHAWIK
DATE	4-26-17

PLANTING DETAILS

TRUCKEE MEADOWS RESTORATION
NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128
SCALE AS SHOWN
SHEET 5.6

100% DESIGN

See Request for Bids for Supplemental Contract Requirements.

SECTION 00 01 10

TABLE OF CONTENTS

END OF SECTION

SECTION 00 41 05

DESCRIPTION OF BID ITEMS

1.01 GENERAL

A. The General Conditions and Supplementary Conditions shall apply to all work of every Division, Section, or Subsection of these specifications as if fully repeated in each

1.02 SCOPE OF WORK

A. Furnish all labor, equipment, materials, storage, transportation, and services required for the completion of the project

1.03 BASE BID

A. The Base Bid shall include all work as shown on the Drawings and/or described in the specifications. The responsibility for determining the quantities of work for the lump sum bid item rests with the Contractor.

B. The lump sum Base Bid includes twenty (20) individual items as described below. The Contractor shall also provide a Bid Alternate that includes the 20 items below, except substituting Item 10a for Item 10.

1. Base Bid Item No. 1: Environmental Requirements: As shown on the Drawings and/or described in the Specifications, and including SWPPP Implementation, Preservation Fencing, Pine Needle Wattles, Temporary Construction Entrances, Construction Mats, and Gravel Bag Check Dams.

2. Base Bid Item No. 2: Layout and Staking: As shown on the Drawings and/or described in the Specifications.

3. Base Bid Item No. 3: Mobilization and Demobilization: As shown on the Drawings and/or described in the Specifications, including As-Built Drawings and Traffic Regulation.

4. Base Bid Item No. 4: Demolition: As shown on the Drawings and/or described in the Specifications.

5. Base Bid Item No. 5: Dewatering: As shown on the Drawings and/or described in the Specifications.

6. Base Bid Item No. 6: Earthwork: As shown on the Drawings and/or described in the Specifications.

7. Base Bid Item No. 7: Clearing and Grubbing: As shown on the Drawings and/or described in the Specifications.

8. Base Bid Item No. 8: Aggregate Surfacing: All roadway and associated drainage improvement—with the exception of the culvert overflow—as shown on the Drawings and/or described in the Specifications, including Arizona Crossings, Rolling Dips, and Roadway Resurfacing.

9. Base Bid Item No. 9: Paths and Trails: As shown on the Drawings and/or described in the Specifications, including Walking Paths, Turnpike Style Walking Paths, and Puncheon Style Walking Paths.

10. Base Bid Item No. 10: Culvert Overflow: The base design shown on the Drawings and/or described in the Specifications.

10a. Bid Alternate Item No. 10a: Culvert Overflow: The bid alternate design shown on the Drawings and/or described in the Specifications. Construct the bid alternate instead of the base bid based on the guidance included in the Drawings.

11. Base Bid Item No. 11: Metal Gates: As shown on the Drawings and/or described in the Specifications.

12. Base Bid Item No. 12: Chain Link Fence with Double Swing Gate: As described on the Drawings and shown on the Shop Drawings submitted to and approved by the Engineer's Representative.

13. Base Bid Item No. 13: Culvert and Flared End Sections: As described on the Drawings and shown on the Shop Drawings submitted to and approved by the Engineer's Representative.

14. Base Bid Item No. 14: Planting Irrigation: As shown on the Drawings and/or described in the Specifications.

15. Base Bid Item No. 15: Planting Preparation: As shown on the Drawings and/or described in the Specifications.

16. Base Bid Item No. 16: Seeding: As shown on the Drawings and/or described in the Specifications.

17. Base Bid Item No. 17: Planting: As shown on the Drawings and/or described in the Specifications.

18. Base Bid Item No. 18: Plant Establishment: As shown on the Drawings and/or described in the Specifications.

19. Base Bid Item No. 19: Boulder Structures: As shown on the Drawings and/or described in the Specifications.

20. Base Bid Item No. 20: Log Structures: As shown on the Drawings and/or described in the Specifications.

END OF SECTION

SECTION 00 41

BID SHEET

Bid Item	Spec. No.	Description	UNIT	QTY	UNIT COST	TOTAL COST
1	01 35 44	Environmental Requirements	LS			
2	01 71 23	Layout and Staking	DAYS			
3	01 90 00	Mobilization and Demobilization	LS			
4	02 41 13	Demolition	LS			
5	02 73 00	Dewatering	LS			
6	31 00 00	Earthwork	LS			
7	31 11 00	Clearing and Grubbing	SY			
8	32 11 23	Aggregate Surfacing	LS			
9	32 18 00	Paths and Trails	LS			
10	32 20 00	Culvert Overflow	LS			
10a	32 20 00	Culvert Overflow - Bid Alternate	LS			
11		Metal Gate	EA			
12		Chain Link Fence with Double Swing Gate	LS			
13		Culvert and Flared End Sections	LS			
14	32 84 00	Planting Irrigation	LS			
15	32 91 00	Planting Preparation	LS			
16	32 92 19	Seeding	LS			
17	32 93 00	Planting	LS			
18	32 98 00	Plant Establishment	MON			
19	35 42 35	Boulder Structures	LS			
20	35 42 41	Log Structures	LS			
		BASE BID TOTAL				
		BID ALTERNATE TOTAL				

END OF SECTION

SECTION 01 42 17

DEFINITIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Definitions for terms used throughout the contract documents

1.2 DEFINITIONS

A. "Client" shall mean the Truckee River Watershed Council (TRWC).

B. "Drawings" shall mean engineering plan set prepared by Balance Hydrologics, Inc. entitled *Truckee Meadows Restoration* prepared for the Truckee River Watershed Council and labeled 100% Design.

C. "Engineer's Representative" shall mean the person or persons appointed by the Client to oversee construction.

D. "Revegetation Specialist" shall be the person(s) appointed by the Client to oversee planting, seeding, and irrigation.

E. "Owner" shall mean, depending on the property boundaries shown on the Drawings, either Town of Truckee (TOT), Truckee Donner Public Utility District (TDPUD), Truckee-Donner Recreation & Parks District (TDRPD), Truckee Donner Land Trust (TDLT), or Truckee Tahoe Airport District (TTAD).

F. "Stormwater Specialist" shall mean Integrated Environmental Restoration Services (IERS).

G. "Work" shall refer to any proposed changes to the existing conditions shown in the Drawings and described in the contract documents including activities related logistical, maintenance, and safety issues necessary for executing said changes to existing conditions.

H. "Extra Work" shall mean work that is not required under the contract, and is done in addition to the requirements of the contract. The Contractor shall be entitled to charge for Extra Work only if it has been approved by the Client.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01 35 44

ENVIRONMENTAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work Included:

1. Contractor shall be responsible for maintaining compliance with applicable Federal, State, and local environmental regulations in the execution of the Work.

2. Implement mitigation measures for construction impacts detailed in the mitigation monitoring plan certified under the California Environmental Quality Act (CEQA) for this project.

3. Contractor is responsible for adhering to the requirements of the permits and obtaining the specified permits herein.

4. Implement the required environmental plans, procedures, and controls described herein during performance of the Work.

5. Meet with the Engineer's Representative prior to commencement of the Work to review the project environmental requirements as applicable to the Contractor's procedures and to develop mutual understandings relative to compliance with the environmental protection requirements and administration of the Contractor's environmental pollution control programs.

B. Site Activities

1. No debris, soil, silt, sand, bark, slash, sawdust, asphalt, rubbish, paint, oil, cement or concrete or washings thereof, oil or petroleum products, or other organic or earthen materials from construction activities shall be allowed to enter into or be placed where it may be washed by rainfall or runoff outside the construction limits. When operations are completed, excess materials or debris shall be removed from the work area by legal means and at the cost of the Contractor.

2. Excess material shall be disposed of in locations approved by the Engineer's Representative consistent with all applicable legal requirements. For materials disposed offsite, the Contractor shall obtain disposal facility permits. Recycled materials shall be recycled offsite as per State and local regulations.

3. The Contractor shall not create a nuisance or pollution as defined in the California Water Code. The Contractor shall not cause a violation of any applicable water quality standards for receiving waters adopted by the Regional Board or the State Water Resources Control Board, as required by the Clean Water Act.

4. The Contractor shall clean up all spills and immediately notify the Engineer's Representative in the event of a spill.

5. Stationary equipment such as motors, pumps, and generators, shall be equipped with drip pans.

6. The Contractor shall divert or otherwise control surface water and waters flowing from existing projects, structures, or surrounding areas from coming onto the work areas. The method of diversions or control shall be adequate to ensure the safety of stored materials and of personnel using these areas. Following completion of Work, ditches, dikes, or other ground alterations made by the Contractor shall be removed and the ground surfaces shall be returned to their former condition or as near as practicable in the opinion of the Engineer's Representative.

7. Construction sites shall be maintained to ensure that drainage from these sites will minimize erosion of stockpiled or stored materials and the adjacent native soil material. The Contractor shall replace materials lost due to erosion at no additional cost and be responsible for remediating any impacts at or outside the project site from eroded materials.

8. The Contractor shall furnish all labor, equipment, and means required to carry out effective measures wherever, and as often as necessary, to prevent Contractor's operations from causing visible dust emissions to leave the work areas. These measures shall include, but are not limited to, providing additional watering equipment, reducing vehicle speeds on haul roads, restricting traffic on haul roads, covering haul vehicles, and applying an Engineer's Representative-approved, environmentally safe, dust palliative to well traveled haul roads. The Contractor shall be responsible for damage resulting from dust originating from its operations. The dust abatement measures shall be continued during all grading and earthwork construction activities. Water the site in the morning and evening, and clean vehicles leaving the site as necessary to prevent the transportation of dust and dirt onto public roads. Dust control involving water shall be done in such a manner as to minimize runoff from the site.

9. The Contractor shall furnish all labor, equipment and means required to prevent excessive noise from the Work activities, and comply with all local noise ordinances.

10. All construction equipment shall be properly serviced and maintained in excellent operating condition to reduce emissions. No leaks of any size are permitted at any time. The Contractor shall secure replacement equipment is equipment on site is inoperable for more than two (2) days. Contractor shall make copies of equipment service logs available upon request.

11. Any chemical or hazardous material used in the performance of the Work shall be handled, stored, applied, and disposed of consistent with all applicable Federal, State, and local laws and regulations.

12. Contaminated materials excavated from the construction area shall be disposed of consistent with all applicable local, State, and Federal laws and regulations.

1.02 RELATED SECTIONS

A. Section 31 00 00 Earthwork

B. Section 31 11 00 Clearing and Grubbing

C. Section 32 91 00 Planting Preparation

1.03 REFERNCED STANDARDS

A. ASTM D3786 Standard Test Method for Bursting Strength of Textile Fabrics—Diaphragm Bursting Strength Tester Method

B. ASTM D4355 Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

C. Caltrans Standard Specifications, State of California, Department of Transportation, Standard Specifications dated 2015.

1.04 DEFINITIONS

A. Hazardous waste: A waste or combination of wastes as defined in 40 CFR 261.3, or regulated as hazardous waste in California pursuant to Chapter 11, Division 4.5, Title 22, California Code of Regulations, and Chapter 6.5, Division 20, California Health and Safety Code, or those substances defined as hazardous wastes in 49 CFR 171.8.

1.05 SUBMITTALS

A. The Client shall submit a copy of the Stormwater Pollution Prevention Plan (SWPPP) to the Contractor prior to the commencement of work.

B. Hazardous Waste Manifests:

1. Contractor shall use the new "Uniform Hazardous Waste Manifest," EPA form 8700-22. The manifest must be printed by a USEPA approved printer as listed at http://www.epa.gov/epaoswer/hazwaste/gener/manifest/registry/printers.htm.

2. Submit the "Generator's Initial Copy" and a legible photocopy of the first page of hazardous waste manifests, land disposal restriction forms, or other documentation required by applicable regulations governing transport and disposal of hazardous wastes for disposal of hazardous substances within 5 days of offhaul.

3. Submit proof that the transporter is certified by the State to transport hazardous wastes prior to any offhaul of hazardous wastes.

4. Submit name of disposal site where hazardous waste will be disposed of for Engineer's approval.

C. The Contractor shall provide dust control measures as described under Section 10 of the Caltrans Standard Specifications.

D. The Contractor shall provide air pollution control measures as described under Section 14 of the Caltrans Standard Specifications.

E. The Contractor shall develop and submit a detailed traffic control plan to the Engineer's Representative prior to construction as described in Section 01 55 26.

PART 2 - PRODUCTS

2.01 PRESERVATION FENCING

A. Preservation fencing material shall be brightly colored (clearly visible), at least 48 inches high, and securely fastened to metal posts.

B. Preservation fencing must be capable of preventing the public from entering the work area. Post-and-rope style fencing may only be used south of Brockway Road and for interior vegetation preservation areas within a larger fenced-in work area.

2.02 PINE NEEDLE WATTLE

A. Pine needle wattles shall be made from clean pine needles, free from garbage, sediment, weeds, or other deleterious materials.

B. Fabric shall consist of coir (coconut) DeKoWe 900 or equivalent.

C. Pine needle wattles shall meet the following specifications:

1. Coir fabric shall be fastened with standard rebar wire ties at 12 to 18 inch intervals.
2. Wattles shall be loosely rolled to provide a minimum of 8 inches of direct surface contact when installed.
3. Minimum 6 inches tall when installed (measured on vertical axis)
4. Un-cut (un-frayed) edge of coir fabric shall be on outside of wattle.

D. Wattles may either be fully enclosed (as described above) or placed in a windrow, covered with coir fabric, and then secured in place using wooden stakes or rebar. This latter method is herein referred to as a "berm." In either case, the wattle/berm shall have a minimum width of 8 inches of pine needles in direct contact with the soil surface.

2.03 GRAVEL BAG CHECK DAM

A. Bag Material: Bags shall be either polypropylene, polyethylene or polyamide woven fabric, minimum unit weight 4 oz/yd^2 (135 g/m^2), mullen burst strength exceeding 300 psi (2,070 kPa) in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.

B. Bag Size: Each gravel-filled bag shall have a length of 18 in (450 mm), width of 12 in (300 mm), thickness of 3 in (75 mm), and mass between 28 and 48 lb (13 kg and 22 kg). Bag dimensions are nominal, and may vary based on locally available materials. Alternative bag sizes shall be submitted to the Engineer's Representattive for approval prior to deployment.

C. Fill Material: Fill material shall be between 0.4 and 0.8 inch (10 mm and 20 mm) in diameter, and shall be clean and free from clay balls, organic matter, weeds, and other deleterious materials. The opening of gravel-filled bags shall be secured such that gravel does not escape. Gravel-filled bags shall be between 28 and 48 lb (13 kg and 22 kg) in mass. Fill material is subject to approval by the Engineer's Representative.

2.04 CONSTRUCTION MATS

A. Construction mats shall be GeoTerra® Construction Mats or an equivalent product capable of minimizing soil compaction and vegetation mortality during construction.

B. Construction mats shall be connected to one another with hardware recommended by the manufacturer.

C. Construction mats shall be minimally anchored to the ground on an as-needed basis to prevent shifting caused by vehicle traffic. Anchoring materials shall be hardware recommended by the manufacturer.

PART 3 - EXECUTION

3.01 PRESERVATION FENCING

A. Temporary preservation fencing shall be provided around areas not to be disturbed including construction limits of disturbance, sod storage areas, trees and vegetation requiring protection, completed construction as work is progressing, and stockpiled topsoil and vegetation and other items as directed by the Engineer's Representative.

B. Install fencing to protect large areas and other vegetation as a group rather than individual trees where feasible. Protective fencing shall be placed around the perimeter of the dripline at minimum.

C. Preservation fencing shall be furnished, constructed, maintained, and later removed as specified in these specifications and as directed by the Engineer's Representative.

Preservation fencing that is damaged from any cause during the progress of the work shall be repaired or replaced by the Contractor at the Contractor's expense.

D. When no longer required for the work as determined by the Engineer's Representative, preservation fencing shall be removed. Removed facilities shall become the property of the Contractor and shall be removed from the site of the work, except as otherwise provided in this Section.

E. Holes, trenches and other soil disturbance caused by the removal of preservation fencing shall be backfilled and permanently stabilized in accordance with Section 32 91 00 Planting Preparation and Section 32 92 19 Seeding.

F. Full compensation for furnishing all labor, material, and equipment necessary to install, move, maintain, remove, and dispose of preservation fencing shall be considered as included in the Contract lump sum price paid for 01 35 44 Environmental Requirements, and no additional compensation will be allowed.

3.02 PINE NEEDLE WATTLE

A. Install wattles at the locations shown on the Drawings. Install wattles parallel to slope contours on slopes and perpendicular to flow direction when installed in water flow paths.

B. Secure wattles every 4 linear feet with gravel bags or wooden stakes.

C. Terminal ends of wattles shall either be "J-hooked" upslope or overlapped at least 12 inches – not abutted.

D. Wattles shall be installed such that there is at least 8 inches of direct surface contact between pine needles and soil. Berms should not be twisted or installed over roots and rocks. No trenching is required to install wattles unless such trenching is necessary to achieve the minimum 8 inches of direct contact with soil.

E. Following project completion, wattles may be left in place or the coir fabric removed and pine needles used as surface mulch.

F. If wattles are removed, collect and dispose of any accumulated sediment and fill any holes or other disturbed soil areas to blend with adjacent ground.

3.03 GRAVEL BAG CHECK DAM

A. Gravel bag check dams shall be tightly abutted. Gravel bags shall be stacked using a pyramid approach, such that gravel bags shall overlap joints in lower rows. Gravel bags shall not be stacked any higher than 3.2 ft.

B. The bedding area for the gravel bag check dam shall be cleared of obstructions including rocks, dirt clods, and debris greater than one (1) inch in diameter prior to installation.

C. Gravel bag check dams shall be installed perpendicular to the direction of flow when installed in concentrated flow paths or stream channels.

D. Check dams shall be constructed with a slight depression near the center of the upper row of gravel bags. The center of this depression shall be at an elevation at least 4 inches lower than the outer bags on the upper row of the check dam, such that if water overtops the check dam it does not cause scouring around the outer edge of the check dam.

3.04 SAMPLING AND ANALYSIS

A. Refer to the project SWPPP for sampling and analysis procedures.

3.05 CONSTRUCTION MATS

A. Construction mats shall be installed within the construction work limits designated on the Drawings, and at minimum cover the construction access routes with construction protection mats designated on the plans.

B. Construction mats shall be installed upon mobilization and prior to any vehicle traffic within the construction work limits or delivery of construction materials to staging areas.

C. Install and remove construction mats per the manufacturer's guidelines.

D. Perform corrective maintenance on construction mats throughout the duration of the Work as needed to keep them in their designated locations. The Engineer's Representative may prescribe corrective maintenance on the construction mats at any time if in their opinion the mats have shifted to the point of exposing sensitive vegetation or soil.

E. The Contractor shall not remove construction mats from the project site until all Work has been completed and approved, no further construction equipment traffic is anticipated, and all stockpile areas have been cleared.

3.06 WASTE DISPOSAL

A. Hazardous waste (as defined by the EPA), if encountered shall be handled as follows:

1. The Engineer's Representative will review laboratory analysis results and accept Contractor Characterization of waste classification.

2. The Engineer's Representative will obtain a Hazardous Waste Generator's EPA ID Number if required for disposal of hazardous wastes.

3. The Engineer's Representative will give Contractor written notice to dispose of all or a portion of the waste material at a Class I disposal site if the Engineer's Representative determines that such disposal is required based on review of Contractor's waste characterization and the analytical results of samples collected.

B. Non-hazardous waste shall be disposed as outlined in Section 02 41 00 Demolition and Section 31 11 00 Clearing and Grubbing.

C. Waste materials from different sites shall not be transported or mixed until the material is determined to be non-hazardous. Excavation materials shall be stored or stockpiled at each site until classified.

D. Transport materials in accordance with all local, State, and Federal laws, rules, and regulations.

E. Contractor shall be responsible for all costs of disposal of construction and demolition waste material and liquid wastes, along with any waste generated by the Contractor.

3.07 DUST CONTROL

A. The Contractor shall provide dust control at all times, including holidays and weekends, as required to abate dust nuisance on and about the site which is a result of construction activities. Dust control shall be by means of sprinklered water, by applying an Engineer's Representative-approved, environmentally safe, dust palliative, or by other approved methods. Chemicals, oil, or similar palliatives shall not be used.

B. Quantities and equipment for dust control shall be sufficient to effectively prevent dust nuisance on and about the jobsite; and when weather conditions warrant, sprinklering equipment shall be on hand at all times for immediate availability.

C. The Engineer's Representative shall have authority to order dust control work whenever conditions warrant, and there shall be no additional cost to the TRWC. Dust control shall be effectively maintained whether or not the Engineer's Representative orders such work.

D. Complaints from the public shall be reported to the Engineer's Representative and shall be acted on immediately.

E. Where earthwork operations are in progress, keep exposed earth surfaces dampened continuously. Also, keep dirt accessways and roads dampened continuously.

F. If portions of the site are temporarily inactive or abandoned for whatever reason, provide dust control and abatement continuously during such periods of inactivity.

G. Where dust resulting from construction activities has collected on public sidewalks and streets, hose down such sidewalks and streets to abate flying dust particles. Clean all sidewalks and streets from accumulated dirt and dust.

3.08 SOUND CONTROL

A. Comply with all local sound control and noise level rules, regulations and ordinances which apply to any work performed pursuant to the contract. Contractor is responsible for taking appropriate measures, including muffling of equipment, selecting quieter equipment, modifying work operations, and other mitigations as needed to bring construction noise into compliance.

B. Each internal combustion engine, used for any purpose on the job or related to the job, shall be equipped with a muffler of a type recommended by the manufacturer. No internal combustion engine shall be operated on the project without said muffler.

3.09 AIR POLLUTION CONTROL

A. During construction the contractor shall utilize existing power sources (e.g., power poles) or clean fuel (e.g., gasoline, biodiesel, natural gas) generators rather than temporary diesel power generators.

B. During construction, the contractor shall minimize idling time to a maximum of 5 minutes for all diesel powered equipment.

C. Signs shall be posted in the designated queuing areas of the construction site to limit idling to a maximum of 5 minutes.

D. Idling of construction related equipment and construction related vehicles should not occur within 1,000 feet of any sensitive receptor.

3.10 CLEAN UP

A. See Section 01 90 00 Mobilization and Demobilization.

3.11 TEMPORARY CONSTRUCTION ENTRANCE

A. Temporary construction entrances shall be per Town of Truckee Standard Details, as shown on the Plans.

END OF SECTION

SECTION 01 55 26

TRAFFIC REGULATION

PART 1 – GENERAL

1.01 SCOPE

A. This item will consist of providing, moving, replacing, maintaining, cleaning, and removal upon completion of work, all signs, barricades, pavement markings, barriers, cones, lights, signals, and other devices necessary for the safe movement of all vehicular, bicycle, and pedestrian traffic through and within the Project.

B. The Contractor shall arrange the Work so that there will be as little disruption of traffic as possible.

1.02 REFERENCE SPECIFICATIONS

A. Caltrans Standard Specifications, State of California, Department of Transportation, Standard Specifications dated 2015.

B. Referenced sections of the Caltrans Standard Specifications are hereby incorporated into these Specifications in their entirety including any sections referenced there within, except measurement and payment.

1.03 SUBMITTALS

A. General: The General Contract Provisions apply to work in this Section with same force and effect as though repeated in full herein.

B. Traffic Control Plan:

1. A Traffic Control Plan shall be developed and submitted to the Engineer's Representative Engineer a minimum of three weeks prior to commencing construction for approval.

2. The Traffic Control Plan shall be coordinated with the project schedule.

3. Traffic control methods and procedures shall be detailed and well-defined.

4. The Traffic Control Plan shall include maintenance of traffic for the Truckee River Legacy Trail.

5. If the Traffic Control Plan is not submitted a minimum of three weeks prior to commencing construction, the Contractor shall bear full responsibility for any costs associated with delaying the project schedule.

C. The Caltrans detail plates are a minimum requirement and it is the Contractor's responsibility to provide a safe traffic, pedestrian and working environment in accordance with the governing regulations. The Contractor shall adjust the Traffic Control Plan as necessary to meet the field conditions at no additional cost to the Client.

D. The Traffic Control Plan shall be reviewed by the Town of Truckee and the Engineer's Representative for approval prior to beginning construction.

1.04 SITE CONDITIONS

A. The Traffic Control Plan shall include guidelines for controlling pedestrian and bicycle traffic associated with the Truckee River Legacy Trail.

B. Contractor shall place W 51 signs (SLOW TRUCKS) 1,000 feet from construction entrances.

PART 2 - PRODUCTS

2.01 INSTALLATION STANDARDS

A. All signs, barricades, pavement markings, traffic control signals, and channelizing devices used to handle traffic shall be provided for and erected in accordance with Caltrans Standard Specifications. Traffic signs shall be high-intensity flat surface reflective sheeting.

PART 3 - EXECUTION

3.01 GENERAL

A. Comply with the conditions of the project encroachment permit.

3.02 MAINTENANCE OF TRAFFIC LANE AND ROAD CLOSURES

A. The Contractor shall arrange the Work so that there will be as little disruption of traffic as possible.

3.03 LOCAL TRAFFIC

A. The roads shall be kept open to two-way traffic during construction, except one lane traffic will be permitted provided experienced flag personnel are used. One lane traffic controls shall be reviewed and approved by the respective right-of-way owner for where the control is proposed. Necessary barricades, safety vests, and flags shall be used. NO residences or places of business shall be isolated. Suitable access shall be provided whenever construction interferes with the existing means of access.

3.04 BICYCLE AND PEDESTRIAN TRAFFIC

A. The Contractor shall take precautions to ensure the safety of cyclists and pedestrians passing near work areas. This may entail the erection of temporary fencing at the Project limits. Travel way shoulders shall remain open and clean of dirt and debris at all times.

B. The Contractor shall maintain bicycle and pedestrian traffic on the Truckee River Legacy Trail during construction. This may include, but not be limited to, erecting of temporary signage, temporary fence, coordination of detour routes, and providing flag personnel.

END OF SECTION

SECTION 01 71 23

LAYOUT AND STAKING

PART 1 – GENERAL

1.01 SCOPE

A. Section includes requirements for laying out and staking features shown on the Drawings.

PART 2 – PRODUCTS

NOT USED

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor shall establish reference benchmarks and provide documentation on the locations of the benchmarks to the Engineer's Representative and the Client.

B. From the information provided, the Contractor shall develop and make such additional surveys as are needed for construction, such as control lines, slope stakes, and stakes for pipe locations and other working points, lines, and elevations. Survey work shall be performed under the supervision of a professional land surveyor licensed in the State of California. Contractor shall reestablish reference benchmarks and survey control monuments destroyed by his operations at no cost to the Client.

C. In the interest of protecting existing wetlands and cultural resources, the layout for the work limits, construction access routes, and preservation fencing shall be conducted on foot. No vehicles shall enter the project site beyond exiting roadways until all preservation fencing has been erected.

D. The extents of vegetation clearing, topsoil salvage, and sod harvesting shall be in coordination with the grading limits. The grading limit shall be staked in the field prior to vegetation clearing, topsoil salvage, and sod harvesting.

E. The Engineer's Representative shall approve the staked location of the grading limit prior to commencing earthwork.

F. Prior to any staking, the Contractor shall verify that a staff plate reading of 3.50 feet on the staff plate located at the southwest end of the Ponderosa Golf Course Irrigation Pond is equivalent to an elevation of 5850.00 (NAVD88) within a

tolerance of +/- 0.05 feet. If the Contractor's estimation of the elevation corresponding to 3.50 feet on the staff plate is not within this tolerance, do not proceed with staking work and consult with the Engineer's Representative immediately.

END OF SECTION

SECTION 01 78 29

AS-BUILT SURVEY

PART 1 – GENERAL

1.01 SCOPE

A. Section includes requirements for preparing and submitting as-built drawings.

1.02 RELATED SECTIONS

A. 01 71 23 Layout and Staking

B. 31 00 00 Earthwork

C. 32 15 00 Aggregate Surfacing

D. 32 18 00 Paths and Trails

E. 32 91 00 Planting Preparation

F. 32 92 19 Seeding

G. 32 93 00 Planting

H. 32 98 00 Plant Establishment

I. 35 42 35 Boulder Structures

J. 35 42 41 Log Structures

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 GENERAL

A. The Contractor shall prepare as-built drawings to document the installation of all features including: trails (all types), earthwork (i.e. correct elevations and changes made in site grading), roadways, log structures, boulder structures, planting preparation, as well as the installation of plants, irrigation system, seeding, and biotechnical treatments.

B. These drawings shall be updated as needed and maintained at the project site. The original contract drawings shall be used as the base drawings for the as-built drawings; these will be prepared as "red-lined" mark-ups on the original contract drawings and shall be submitted to the Engineer's Representative.

C. The as-built drawings shall include the work done for planting preparation, as well as the locations, species or types, quantities, and sizes of all materials installed. Specific requirements for irrigation system are included in Sections 32 98 00 Plant Establishment. As-built drawings shall also include:

1. A legend listing all materials used;

2. Any features installed as results from change orders or field instructions;

3. Any known areas not installed as designed; and

4. Record of any areas that wildlife activity was noticed.

D. As-built progress sheets shall be updated daily as the work proceeds, showing the work as actually completed or installed, and shall be the basis for measurement and payment for work completed. When additional detail is needed, the Contractor shall make clear and concise notes and sketches to accompany changes marked on the "red-lined" mark-ups.

E. As-built progress sheets shall be available at all times for observation and shall be kept in a location easily accessible to the Engineer's Representative. In the event that the progress sheets are not available for review or not current at the time of any site visit by the Engineer's Representative, it will be assumed that no work has been completed.

F. Make neat and legible notations on the as-built progress sheets. Transfer notations on the progress sheets to the final as-built drawings as necessary, but at least weekly.

G. On or before the date of the Final Installation Acceptance, deliver the corrected and completed as-built progress sheets to the Engineer's Representative. Delivery of the as-built progress sheets will not relieve the Contractor of the responsibility of furnishing required information that may have been omitted from the as-built progress sheets.

H. As-builts progress sheets shall be provided with plus or minus 1-foot horizontal accuracy and plus or minus 0.1-foot vertical accuracy unless noted otherwise.

END OF SECTION

SECTION 01 90 00

MOBILIZATION AND DEMOBILIZATION

PART 1 – GENERAL

A. Mobilization shall consist of preparatory work and operations, including, but not limited to, those necessary for the movement of personnel, equipment, supplies, and incidentals to the project site; the establishment of temporary facilities necessary for work on the project; and all other work and operations that must be performed or costs incurred before work begins on the various Contract items on the project site.

PART 2 – PRODUCTS

Not used.

PART 3 – EXECUTION

3.01 MOBILIZATION

A. The Contractor shall confine all storage of materials, preparatory work, equipment, and vehicle parking to the staging areas shown on the Drawings. The Contractor shall supply all vehicles with a minimum of one fire extinguisher, one shovel, and a spill kit (refer to SWPPP for required contents in spill kit). Appropriate precautions shall be taken by the Contractor to minimize fire at the project site at all times.

B. Before the Contractor begins work, the Contractor (including but not limited to any subcontractors and project foremen) shall be required to schedule and attend a one-day meeting (i.e. the pre-construction meeting) at the project site with the Client, the Engineer's Representative, and others as necessary to review and discuss the overall implementation of the project including: design objectives, environmental permit limitations, endangered species issues, emergency contact information and protocol, contract management and chain of command, media protocol, project construction documents, implementation schedule (including key milestones), and any addenda.

C. All equipment will be pressure washed prior to mobilizing to the site to remove any vegetative matter, soil, or other organic matter to prevent the spread of

noxious weeds. Any equipment that leaves the site must be cleaned again before re-entry (with the exception of equipment used for off-haul of soils, trash, and debris).

D. The Contractor shall supply all materials, labor, and training to maintain a safe and clean work site for the duration of the project. These measures shall include, but not be limited to: marking underground utility locations, signage for overhead utilities, sanitary facilities, and regular cleaning of the work site.

3.02 DEMOBILIZATION

A. Demobilization tasks shall consist of work and operations at the conclusion of construction, including, but not limited to necessary activities for the removal of personnel, equipment, supplies, and incidentals from the project site; removal of temporary facilities and materials; and all other work and operations that must be performed or costs incurred to conclude work on the various Contract items for the project.

B. Upon approval of the revegetation installation and maintenance, demobilization shall also include complete removal and recycling of the temporary irrigation system (if Contractor elects to install). The Contractor shall be responsible for disposal and recycling all components and materials of said system according to State and local regulations.

3.03 CONSTRUCTION ACCESS ROUTE DECOMMISSIONING

A. Construction access route decommissioning shall be as described in Section 32 91 00 Planting Preparation.

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Demolition, removal, and disposal of existing features.

B. Removal of mature vegetation and trees.

C. Safe removal and preservation of large woody material (LWM) for the purpose of reuse in other project features.

1.02 RELATED SECTIONS

A. Section 01 35 44 Environmental Requirements

B. Section 31 11 00 Clearing and Grubbing (specifies removal of vegetation and trees less than 6 inches diameter measured 4 feet from the ground)

C. Section 35 42 41 Log Structures

1.03 SITE CONDITIONS

A. Protection of persons and property:

1. Prior to beginning demolition work, install and/or be prepared to implement all site preparation and protection features and measures:

   i. Shown on the Drawings,

   ii. Described in Section 01 35 44 Environmental Requirements

   iii. Described in Section 01 55 26 Traffic Regulation

   iv. Described in the project SWPPP

2. Protect utilities, pavements, and facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by demolition operations.

3. Promptly repair damages caused to adjacent facilities or property by demolition operations at Contractor's expense

B. Protection of utilities:

1. Protect active sewer, water, gas, electric, and other utilities, including drainage and irrigation lines indicated or, when not indicated, found or otherwise made known to the Contractor before or during demolition work. If utility is damaged, immediately notify the utility owner for corrective action.

2. Maintain existing utilities to be kept in service during demolition and construction operations.

3. Arrange with and perform work required by utility companies and municipal departments for discontinuance or interruption of utility services due to demolition work.

C. Unfavorable Weather Conditions:

1. Selective site demolition shall not be performed during weather conditions which might damage or be detrimental to the condition of existing ground, in-progress work, or completed work.

D. Prevention of Erosion: Comply with requirements specified in the project SWPPP, and the following:

1. Prevent erosion of stockpiles, ditches, embankments, filled, backfilled, and graded areas until such time as permanent drainage and erosion control measures have been installed.

2. Perform "protective grading" to provide positive drainage and to minimize ponding of surface water.

E. Unknown Conditions:

1. The Drawings and related documents may not represent all surface conditions at the site and adjoining areas. The known surface conditions are as indicated, and shall be compared with actual conditions before commencement of work.

2. Existing utilities and drainage systems below grade are located from existing documents and from surface facilities such as manholes, valve boxes, area drains, and other such surface fixtures.

1.04 PERMITS

A. The Contractor shall obtain all special permits and licenses and give all notices required for performance and completion of the demolition and removal work, hauling, and disposal of debris.

PART 2 – PRODUCTS

2.01 MATERIALS, EQUIPMENT, AND FACILITIES

A. The Contractor shall furnish all materials, tools, equipment, devices, appurtenances, facilities, and services as required for performing the demolition and removal work.

PART 3 - EXECUTION

3.01 GENERAL

A. Contractor shall remove all debris located within the limit of grading shown on the Drawings, and demolition operations shall be conducted in accordance with Article 31 of the Construction Safety Orders, Title 8, California Code of Regulations.

B. Conduct demolition operations and removal of debris in a manner that ensures minimum disturbance of the adjacent ground.

C. Use water sprinkling, temporary enclosures, and other suitable methods to limit dust and dirt rising. Clean adjacent road surfaces of dust, dirt, and debris caused by demolition operations.

D. Removed materials, trash, and debris shall become the property of the Contractor and shall be removed from the site and disposed of in a legal manner. Location of disposal site and length of haul shall be the Contractor's responsibility.

E. Remove, handle, and dispose of off-site, in a safe, appropriate, and lawful manner all materials and equipment that are required to be removed from the site under this contract.

F. Burning of removed materials is not permitted on the site.

G. Blasting is not permitted.

H. Where asphalt concrete pavement is required to be removed in preparation for trenching, asphalt concrete pavement shall be sawcut along both sides of trench and parallel to the trench alignment.

3.02 DEMOLITION

A. Drawings define features to be removed. Unless otherwise shown, rough cuts or breaks may be made exceeding limits of demolition only as necessary and with the consent of the Engineer’s Representative.

B. Remove material from existing improvements as required to permit connection of new work. Avoid both damage to any portion to remain, and interference with the

use and operation of existing structures and utilities.

3.03 LWM SALVAGE

A. Prior to removing any trees from the project site, the Contractor shall evaluate areas shown on the Drawings where tree removal is indicated, and shall flag potential trees meeting the requirements of Section 35 42 41 Log Structures to be salvaged for reuse.

B. Delivery, Handling, and Storage

1. LWM shall be stockpiled onsite. Log stockpiles shall be managed by the Contractor to sort and select materials for use in various features and to facilitate inspection by the Engineer's Representative prior to incorporation into features.

2. LWM shall be handled to prevent breakage of branches.

3. At the completion of construction, any remaining LWM material shall be removed from the site and disposed of by the Contractor.

3.04 BOULDER REMOVAL AND STOCKPILING

A. Remove and stockpile boulders for reuse from locations shown on the Drawings.

B. Only boulders meeting the requirements of Section 35 42 35 Boulder Structures shall be stockpiled for reuse. Boulders that do not meet these requirements shall be disposed of by the Contractor at their expense.

C. Boulders shall be cleaned of debris and soil prior to stockpiling.

D. Objectionable material encountered within boulder removal areas shall be disposed of by the Contractor. Objectionable material includes, but is not limited to: concrete clasts, rebar, metal scraps, and other garbage.

END OF SECTION

SECTION 02 73 00

DEWATERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section includes requirements for preventing surface water from entering excavations, from ponding on prepared subgrades, and from flooding the project site and surrounding areas and thus preventing the proper execution of the work. The Contractor shall be responsible for implementing dewatering measures as needed over the duration of the project.

B. Dewatering shall entail the following activities:

1. Coordination with TDRPD staff to facilitate temporary lowering of the water level in the TDRPD pond by using the irrigation pump for the Ponderosa Golf Course. Depending on elevation of the irrigation pump intake, supplemental pumping may be required.

2. Building temporary cofferdams in existing drainage ways to pond water so it may be pumped and discharged by spraying in adjacent meadow areas.

3. Routine pumping to dewater excavation areas.

C. The systems shall be furnished and installed, maintained and later abandoned/removed as shown on the Drawings, as specified herein, and as directed by the Engineer's Representative.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM): D3786 Standard Test Method for Bursting Strength of Textile Fabrics

PART 2 - PRODUCTS

2.01 TEMPORARY SANDBAGS

A. Sand bag fabric shall be woven polypropylene, polyethylene or Polymide with a *minimum* unit weight of 0.25 lb per square yard. The fabric shall have a mullen burst strength of at least 300 psi, per ASTM Designation: D3786 and an ultraviolet (UV*)* ability exceeding 70 percent.

B. Sand bags shall have a length of 24 to 32 inches, width of 16 to 18 inches, thickness of 6 to 8 inches, and weight of 90 to 120 lbs.

C. Sand bag fill material shall be non-cohesive sand, free from deleterious material, silt, clay or fines.

2.02 IMPERMEABLE PLASTIC SHEETING

A. The material shall be suitable for use as protective liner and shall be commercial quality polyethylene with a minimum thickness of 0.25 mm or Mirafi 700X or equal approved by the Engineer's Representative. All plastic sheeting shall be free of cracks, cleavages, or other defects adversely affecting the protective characteristic of the material

2.03 PUMPS

A. The Contractor shall furnish all labor, materials, tools, equipment, and services as required for providing the necessary dewatering work and provide back-up equipment as necessary for replacement and for unanticipated emergencies.

B. The pumps and pumping apparatus used for the dewatering shall be of the submersible type with sufficient capacity to control sump water levels as described herein. It shall be the Contractor's responsibility to provide power to operate the dewatering systems, including the pumping equipment, as needed to assure that dewatering is effective during all work within the channel banks. The Contractor shall provide back-up power as needed to assure that power interruptions do not lead to damage to finished or in-process work or delays in completing the work. All equipment, including any generators used for primary or back-up power supply, shall be operated in compliance with all Nevada County noise and air pollution reduction requirements.

PART 3 - EXECUTION

3.01 SITE EXAMINATION

A. Contractor shall visit the Worksite and become aware of any and all existing conditions that may affect execution of the work under this contract.

B. Contractor's work area at each dewatering site shall not extend upstream or downstream more than 10 feet from the cofferdam locations shown.

3.02 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.

3.03 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide water pollution control measures as required to protect site from soil erosion as specified in the Project SWPPP.

3.04 DUST CONTROL

A. Refer to Section 01 35 44 Environmental Requirements, for dust control.

3.05 EROSION AND SEDIMENT CONTROL

A. Refer to Section 01 35 44 Environmental Requirements and the Project SWPPP for erosion and sediment control.

3.06 DEWATERING

A. Except as otherwise noted herein, dewatering shall be performed to accomplish a lowering of measured static ground water level to an elevation which is suitable for construction of the restoration features below grade. Dewatering shall also be performed to contain seeps or artesian conditions during construction activities.

B. The Contractor shall remove all water that accumulates in all excavations during the progress of work so that all work can be done in the dry, unless otherwise approved by the Engineer's Representative. Excavated areas shall be kept free from water while underground utilities or structures are constructed, while concrete is setting and until backfill has been placed to a sufficient height to anchor the work against possible flotation or leakage.

C. The Contractor shall, at all times, have on the project site sufficient pumping equipment for immediate use, including standby pumps for use in case other pumps become inoperable. Water shall be disposed of in accordance with the detailed requirements specified herein and so as to cause no injury to personnel or the public, damage to public or private property, or menace to the public health.

D. The preferred method of dewatering shall use submersible pumps installed in shallow sumps at low points within the excavation area.

E. Groundwater pumping shall not remove fines from below grade. Sumps shall be constructed and filter(s) shall be provided to prevent such pumping of fines. If any dewatering well pumps fines, pumping shall be terminated and a new sump shall be properly constructed at a different location with a revised design which eliminates the pumping of fines.

F. If the Contractor's methods, as accepted, include displacing groundwater as concrete or other work is placed in excavations, the Contractor's dewatering system shall capture groundwater as it is displaced and follow the procedures herein for its containment and discharge.

G. Discharge shall be on to upland areas through spraying. Discharge shall not be directed toward roadways. The Contractor shall take care to monitor the discharge to ensure it is not causing erosion, and shall relocate the spraying nozzle if erosion is occurring.

END OF SECTION

SECTION 31 00 00

EARTHWORK

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. The work of this section consists of providing all necessary labor, tools, equipment, and incidentals for excavation and placement of diverse types of fill to construct the restoration features including, but not limited to, paths and trails, log structures, boulder structures, and roadway improvements in order to complete the work described in the Technical Specifications and shown on the Drawings.

B. The work of this section shall comply with all environmental and permitting requirements as referenced herein, elsewhere in the Technical Specifications, and on the Drawings.

1.02 RELATED SECTIONS

A. 01 35 44 Environmental Requirements

B. 31 11 00 Clearing and Grubbing

C. 32 15 00 Aggregate Surfacing

D. 32 91 00 Planting Preparation

E. 35 42 35 Boulder Structures

F. 35 42 41 Log Structures

1.03 DEFINITIONS

A. "Unsuitable material" shall mean excavated material or material below the natural ground surface in embankment areas or below sub grade elevation in excavated areas, which is unsuitable for its planned use. Unsuitable material is further defined as material determined to be:

1. Of such nature as to be incapable of being compacted to specified density using ordinary methods at optimum moisture content; or

2. Too wet to be properly compacted and circumstances prevent suitable drying prior to incorporation into the work, or otherwise unsuitable for the planned use.

3. The presence of excessive moisture in a material is not, by itself, sufficient cause for determining that the material is unsuitable. The existence of unsuitable material may be indicated in the Drawings or may be determined by the Engineer's Representative during the progress of the work.

B. "Backfill" shall mean soil material used to fill an excavation.

C. "Bulk excavation" shall mean excavation of a broad nature that is not trenching. Generally, more than 10 feet in width and more than 10 feet in length.

D. "Unauthorized excavation" shall mean excavation below subgrade elevations or beyond indicated lines and dimensions without direction by the Engineer's Representative. Unauthorized excavation, as well as remedial work directed by the Engineer's Representative, shall be without additional compensation.

E. "Embankment fill" shall mean satisfactory soil materials used to raise existing grades.

F. "Rock excavation" shall mean removal of solid material which by actual demonstration cannot, in the opinion of the Engineer's Representative, be reasonably loosened or ripped by power equipment equivalent to a CAT 350 Trackhoe Excavator, or similar, having a two cubic yard rock bucket with "tiger teeth" and that must be systematically drilled or broken with power-operated hammers or other such equipment or removal of solid rock boulders greater than 54 cubic feet in volume.

G. "Structures" shall mean buildings, footings, foundations, columns, retaining and/or seat walls, slabs, tanks, curbs, underground utility structures, or other man-made stationary features constructed above or below the ground surface.

H. "Subgrade" shall mean surface or elevation remaining after completing excavation, or top surface of an embankment fill or backfill immediately below subbase, base, topsoil, or other subsequent fill materials.

I. "Utilities" shall mean on-site pipes, conduits, ducts, and cables, as well as underground services within buildings.

J. "Relative compaction" shall mean the ratio, expressed as a percentage, of the in-place dry density of material as compacted in the field to the maximum dry density of the same material as determined by laboratory test ASTM D1557.

K. "Optimum moisture content" shall mean the water content at which a soil can be compacted to a maximum dry unit weight by a given compactive effort.

L. "Relative density" shall mean the mass per unit volume as specified in ASTM D4253 and ASTM D4254, as applicable to the soil and test method employed.

M. Soil Classification: Soil classification is based on the Unified Soil Classification System given in ASTM D2487. Group symbols, when used, conform to the symbols of ASTM D2487.

N. Earthwork Terminology: Terms used in this Section and not defined herein shall be interpreted in accordance with the definitions given in ASTM D653.

1.04 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
2. ASTM D422 Method for Particle-Size Analysis of Soils
3. ASTM D653 Terminology Related to Soil, Rods, and Contained Fluids
4. ASTM D1557 Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54-kg) Rammer and 18-in. (457-mm) Drop
5. ASTM D2487 Test Method for Classification of Soils for Engineering Purposes
6. ASTM D2974 Test Method for Moisture, Ash, and Organic Matter of Peat and Other Organic Materials
7. ASTM D4253 Test Methods for Maximum Index Density of Soils Using a Vibratory Table
8. ASTM D4254 Test Methods for Minimum Index Density of Soils and Calculation of Relative Density

B. State of California, Department of Transportation (CalTrans), Standard Test Methods:

1. Calif. Test 217 Method of Test for Sand Equivalent

1.05 CLASSIFICATION OF EARTHWORK

A. For specification purposes, earthwork shall be classified as follows:

1. Excavation: All excavation involved in grading and construction of the new channels, floodplains, boulder grade control structures, culvert crossings, log structures, roadways, and embankments.

2. Fill: Excavated material used for grading and construction of new channels, floodplains, log structures, and embankments that has been deemed suitable by the Engineer's Representative and conditioned per Part 2.01.

3. Rehabilitated soils: Soils that have been disturbed by construction activities and are located within planting or seeding areas. Rehabilitate disturbed soils as specified in Section 32 91 00 Planting Preparation.

1.06 SUBMITTALS

A. General: Submit as per the Contract provisions.

B. The Contractor shall submit a Restoration Earthwork Plan that clearly describes the schedule, sequencing, methods, and equipment for all excavation and fill placement activities shown on the Drawings and described in the Technical Specifications. The Restoration Earthwork Plan shall include, but not be limited to, the following detailed information:

1. Coordination of the work with dewatering requirements.

2. Sequencing of grading activities.

3. Specific means and methods for excavating and trenching related to installation of boulder and log structures.

4. Specific measures to be taken to protect trees that are to be preserved and assure that excavation and fill activities do not harm such trees.

C. Samples: The Contractor shall furnish and deliver samples of fill materials to the Engineer's Representative for approval prior to placement of fill materials. It is the responsibility of the Engineer's Representative to either visually approve the materials or prescribe specific tests and analyses as appropriate for qualifying the suitability of each classification of earthwork.

D. Delivery Tickets: Submit delivery ticket within five (5) working days for each load of imported fill material delivered to the site and for each load of excavated material hauled off the site, stating the type of fill material and the quantity.

E. Material Test Reports: From a qualified testing agency indicating and interpreting test results for compliance of the following with requirements indicated:

1. Laboratory compaction curves according to ASTM D 1557 for each on-site and borrow soil material proposed for embankment fill, initial backfill, final backfill, and structural backfill.

2. Classification according to ASTM D 2487 of soil material proposed for initial backfill and final backfill.

F. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

G. Record Plans identifying and accurately locating all grading revisions and changes to trench alignments.

1.07 REGULATORY REQUIREMENTS

A. Regulatory requirements that govern the work of this Section include, but are not limited to, the following governing codes:

1. California Code of Regulations, Title 8, Chapter 4, Subchapter 4 — Construction Safety Orders, and Subchapter 19 — Trench Construction Safety Orders.

2. California Code of Regulations, Title 24, Part 2, California Building Code, Chapter 33 and Appendix Chapter 33, and Structural Chapters 18 and 18A.

1.08 QUALITY CONTROL

A. Quality Control: The Contractor shall provide proper quality control measures to assure compliance with specified requirements.

B. Tolerances:

1. Construct finished surfaces to plus or minus 3-inches of the elevations indicated and as acceptable to the Engineer's Representative.

2. Complete slopes to plus or minus 6 inches of the slope line indicated and as acceptable to the Engineer's Representative. Do not encroach on roadbeds or features to remain.

3. Maintain the moisture content of fill material as it is being placed within plus or minus five percent of the recommended moisture content of the material.

1.09 SITE CONDITIONS

A. Unfavorable Weather Conditions:

1. Excavating, filling, and grading work shall not be performed during weather conditions which might damage or be detrimental to the condition of existing ground, in-progress work, or completed work. When the work is interrupted by rain or snow; excavating, filling, and grading work shall not resume until the site and soil condition (moisture content) are suitable for compaction.

2. Sub grade shall be free from mud, snow, ice, and deleterious material when work is resumed.

3. Soil material that is too wet for compaction shall be left to drain, then to be aerated and dried by disking and harrowing or other approved methods until the moisture content of the material is uniform and within the specified limits.

B. Prevention of Erosion: Comply with requirements specified in Section 01 35 44 Environmental Requirements, the Project SWPPP, and the following:

1. Prevent erosion of stockpiles, ditches, embankments, filled, and graded areas until such time as permanent drainage and erosion control measures have been installed.

2. Perform protective grading to provide positive drainage and to minimize ponding of surface water.

3. No earthwork shall occur on this project between October 15 and May 1 without written approval of the Owner, Client, Placer County, and the Regional Water Quality Control Board – Lahontan.

1.10 EXCAVATION SAFETY

A. Install and maintain shoring, sheeting, bracing, and sloping necessary to support the sides of excavations, to keep and to prevent any movement, which may damage adjacent facilities, or endanger life and health. Install and maintain shoring, sheeting, bracing, and sloping as required by OSHA and other applicable governmental regulations and agencies.

B. The Contractor shall be solely responsible for making all excavations in a safe manner. Provide appropriate measures to retain excavation side slopes and prevent rock falls to ensure that persons working in or near the excavation are protected.

PART 2 – PRODUCTS

2.01 EARTHWORK MATERIALS - GENERAL REQUIREMENTS

A. Material used for fill shall be an inert, inorganic soil, free from deleterious substances, and of such quality that it will compact thoroughly without the presence of voids when rolled. Inorganic soil is defined as soil containing less than two percent by weight of organic material when tested in accordance with ASTM D2974. Excavated on-site material will be considered suitable for fill, if it is free from organic matter and other deleterious substances and conforms to the requirements specified herein.

B. Excavated material that is suitable for fill shall be conditioned for reuse and properly stockpiled for later filling operations. Conditioning shall consist of spreading material in layers not to exceed 8 inches and raking free of debris and rubble. Conditioning may take place within the grading limits and staging areas. Excavated materials shall be deemed suitable if materials conform to the specifications herein and are accepted by the Engineer's Representative. Deleterious material shall be removed from the site and disposed of as specified elsewhere in this Section.

C. Where conditions require the importing of fill material, the material shall be an inert soil or soil-rock material free of organic matter and meeting or exceeding the minimum requirements specified herein for the location and free of asbestos or other hazardous materials.

D. All material to be used for filling requires written approval of the Engineer's Representative.

2.02 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from on-site excavations.

B. Satisfactory Soils: Soil materials having the following properties:

1. Granular material nearly free of organic debris
2. Liquid limit of less than 40
3. Plasticity index less than 15
4. 100 percent passing the 8-inch sieve
5. Less than 30 percent passing the No. 200 sieve
6. Equivalent to ASTM D2487 soil classification groups ML, CL, MH, and CH or some combination thereof
7. Organic content less than 3%

C. Soils used for engineered fill shall be uniformly moisture conditioned to within 2% of optimum and placed in layers of 8-inches or less in loose thickness.

D. Unsatisfactory Soils: Soil materials not meeting the above requirements and/or containing debris, waste, frozen materials, vegetation, and other deleterious matter.

E. Unsatisfactory soils also include satisfactory soils not maintained within 2% moisture content at time of compaction.

:2.03 WELL-GRADED GRAVEL MIXTURE

A. Unless otherwise specified or directed by the Engineer's Representative, well-graded gravel mixture shall be clean and subangular to subrounded rock and generally consisting of cobbles, gravels, and sands.

B. Materials excavated on-site will be visually inspected by the Engineer's Representative to determine suitability for re-use as well-graded gravel and may be stockpiled for re-use after acceptance. No other testing of suitable on-site material will be required.

C. See the Drawings for plans associated with excavation and grading. It is the Contractor's responsibility to verify estimated volumes required to implement the Drawings.

D. All imported well-graded gravel will be rejected by the Engineer's Representative if it is not clean or contains excessive fines as specified below:

Sieve Opening	% Passing, by Weight
3"	100
5/8"	84
3/8"	50
No. 4	16
No. 10	5

E. Unsatisfactory well-graded gravel mixture material shall include or be equivalent to ASTM D2487 soil classification groups GM, GC, SW, SP, SM, SC, ML, CL, OL, MH, CH, OH, and Pt. Other unacceptable soils would include rip-rap unless otherwise specified herein.

F. The well-graded gravel shall be well mixed prior to placement.

2.04 REHABILITATED SOILS

A. Unless otherwise specified or directed by the Engineer's Representative, rehabilitated soils shall be topsoil salvaged from the project site and mixed with compost as described in Section 32 91 00 Planting Preparation.

2.05 COMPACTION EQUIPMENT

A. Compaction equipment shall be of suitable type and adequate to obtain the densities specified, and shall provide satisfactory breakdown of materials to form a dense fill.

B. If inadequate densities are obtained, larger and/or different types of additional equipment shall be provided by the Contractor.

1. Hand-operated equipment shall be capable of achieving the specified densities.

2. Flooding or jetting will not be allowed.

C. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations. Equipment shall be maintained in such condition that it will deliver the manufacturer's rated compaction effort.

PART 3 – EXECUTION

3.01 STAKING AND GRADES

Lay out the work, establish all necessary markers, bench marks, grading stakes, and other stakes

as required, in accordance with the requirements specified in Section 01 71 23 Layout and Staking.

3.02 EARTHWORK GENERAL REQUIREMENTS

A. Dust Control: Refer to Section 01 35 44 Environmental Requirements and the Contract provisions for dust control requirements.

B. Erosion Protection: Prevent erosion of the site at all times as outlined in the Project SWPPP. Construct temporary berms and dikes and cut temporary swales to promote natural drainage of site.

C. Construction Traffic: Disperse travel paths of traffic and construction equipment over entire width of compacted surfaces so as to aid in obtaining uniform compaction. Protect exposed soil layers with high moisture content from excessive wheel loads.

D. Non-native plant control: Prevent the introduction and spreading of weeds as described in the SWPPP and Appendix A of these specifications.

E. Refer to Section 32 91 00 Planting Preparation for topsoil salvage and soil rehabilitation requirements; coordinate all work.

F. On-Site Excavation: Do not excavate or remove any material from the project site or right-of-way which is not within the designated grading limits, as indicated by the slope and grade lines, and defined in the Restoration Earthwork Plan, without written authorization from the Engineer's Representative.

G. Stockpiling of Fill and Backfill Material:

1. Excavate and separately stockpile suitable material for well-graded gravel mixture and topsoil, as indicated, during the progress of the excavation work. Save sufficient suitable excavated material, if available, for later use.

2. Store materials from required excavations that are suitable for fill as excavated, in stockpiles segregated by type.

3. Establish excavated material stockpiles on site only in locations where they will not interfere with the progress of the work. Offsite stockpiling, if necessary, shall be the responsibility of the Contractor.

H. Disposal of Native Surplus Material:

1. It is anticipated that there will be a surplus of excavated material and possibly boulders. A disposal site for surplus material will be identified by the Client.

2. Delivery to the disposal site shall be the Contractor's responsibility.

I. Maintenance of Excavations, Slopes, and Embankments:

1. Excavate and remove material outside the limits of the excavation which is unstable and constitutes potential slides, and material which comes into excavations for any reason.

2. Maintain slopes and embankments until substantial completion and acceptance of the work. Promptly repair slides, slipouts, washouts, settlements, and subsidences that occur for any reason, and refinish the slope or embankment to the indicated lines and grades.

3.03 SUBSURFACE EXTRACTION

A. Locations of utilities shown on the Drawings are approximate. It is the responsibility of the Contractor to field verify the locations of existing utilities prior to commencing work.

B. When subsurface facilities are encountered during excavation that interfere with new construction, and such facilities are not indicated, notify the Engineer's Representative promptly for corrective determination.

3.04 ROUGH GRADING AND FILLING

A. Prior to commencement of earthwork, perform such soil and rock removal and filling as may be required to facilitate the progress of the work and bring all elevations to the excavation contours indicated on the Drawings.

B. Fill or backfill test pits, holes, swales, and low points greater than 12-inches deep that will not otherwise be removed in the course of the work to the indicated grades and compact as herein specified in layers not exceeding 8 inches (maximum loose) in thickness.

3.05 EXCAVATION

A. General Excavation Requirements:

1. It is the responsibility of the Contractor to identify field-verified locations of existing utilities and provide all safety measures necessary to work under and around existing utilities prior to commencing excavation.

2. Soil shall be salvaged and stockpiled as specified in Section 32 91 00 Planting Preparation in sufficient quantities to meet the demand for rehabilitated soil as specified in the drawings and in Section 32 91 00 Planting Preparation.

3. Perform excavation as indicated and required for constructing the work as shown on the Drawings.

4. Comply with applicable requirements of CCR, Title 8, Trench Construction Safety Orders.

5. The bottoms of excavations shall be level, firm, undisturbed earth, clean and free

from loose material, debris, and foreign matter.

6. Excavate to the lines and grades indicated on the Drawings accounting for overexcavation for later fill placement as shown on the Drawings or described herein.

7. Limits of excavations shall allow for adequate working space and as required for safety of personnel.

8. Remove unstable bottom material. Remove debris, and compressible soils from the bottom of excavation to a minimum depth of 12 inches. Remove loose and unsound material.

9. Except as otherwise indicated, preserve the material below and beyond the lines of excavations. Where an excavation is carried below the indicated grade, backfill to the indicated grade as herein specified.

10. Excavations for convenience of the Contractor must be approved in advance by the Engineer's Representative.

11. Place excavated material at a sufficient distance from edge of excavation so as not to cause cave-ins or bank slides, but in no case closer than 3 feet from the edge of excavations.

12. Excavated earth material that is suitable for fill shall be conditioned for re-use and properly stockpiled for later fill placement as herein specified. Test, screen, and mix as necessary to meet specified requirements.

13. Boulders encountered during excavation shall be properly stockpiled as specified herein for reuse contingent upon the specification in Section 35 42 35 Boulder Structures and approval by the Engineer's Representative. Unsuitable boulders for reuse shall be disposed of as specified elsewhere in this Section.

14. Boulders too large to be removed may be broken by mechanical means into smaller fragments for removal or treated as bedrock as described elsewhere in this Section.

15. Bedrock encountered during excavation and that interferes with trenching for buried or partially buried structures shall be the lower limit of excavation. In this circumstance, depths of bedding layers or the number of vertically stacked boulders may be adjusted per the discretion of the Engineer's Representative to achieve the finished grade specified in the Drawings. If a structure is unable to be installed within the specified tolerances and using bedrock as the lower limit of excavation it shall be brought to the immediate attention of the Engineer's Representative.

16. Nothing in this Section shall be construed to allow the use of explosives for excavation or removal of boulders or bedrock.

3.06 SUBGRADE INSPECTION

A. Notify the Engineer's Representative when excavations have reached required subgrade.

B. If the Engineer's Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or embankment fill material as directed. Authorized additional excavation and replacement material will be paid for according to Contract provisions for Extra Work.

C. Proof-roll subgrade at locations requested by the Engineer's Representative with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Engineer's Representative, without additional compensation.

3.07 GENERAL FILL REQUIREMENTS

A. Use materials removed from site excavations, if such material meets specified requirements and is acceptable to the Engineer's Representative.

B. Backfilling is required around all structures.

C. Place fill in layers not to exceed eight (8) inches of loose material and compact each layer to specified density before next layer is placed.

D. Place fill material in such a manner that unbalanced horizontal loads shall not be applied to existing or newly placed structures or portions of structures, utilities, or pipelines.

3.08 GENERAL COMPACTION REQUIREMENTS

A. Unless otherwise specified, compact each layer of fill material to not less than 85 percent relative compaction, as determined by ASTM D1557.

B. The Contractor is responsible for achievement of proper compaction, as specified herein, during fill and backfill placement.

C. Do not use compaction equipment and methods that produce excessive horizontal or vertical earth pressures on structures. Excessive horizontal earth pressures are those in excess of at-rest earth pressures. Excessive vertical earth pressures are those in excess of overburden pressures.

3.09 FINISH GRADING

A. Finish grading shall prepare the excavated and filled areas for planting or seeding by assuring a uniform surface free of debris, and as described in Section 32 91 00 Planting Preparation.

B. Verify that grades are correct. If discrepancies occur, notify the Engineer's Representative and do not commence finish grading work until instructed by the Engineer's Representative.

C. Smooth grade breaks and slope transitions so that they are gradual and provide positive drainage.

3.10 FIELD QUALITY CONTROL

A. Testing Agency: Client will engage a qualified independent geotechnical engineering testing agency to perform field quality control testing.

B. Allow testing agency to inspect and test subgrades and each embankment fill or backfill layer. Proceed with subsequent earthwork only after test results for previously completed work complies with requirements.

C. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at up to five (5) locations as instructed by the Engineer's Representative upon completion of grading and prior to construction of features described in Section 32 18 00 Trailways.

D. When testing agency reports that subgrades, embankment fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil to depth required; recompact and retest until specified compaction is obtained.

3.11 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

1. Scarify or remove and replace soil material to depth as directed by Engineer's Representative; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.12 FINE GRADING

A. Planting and seeding areas shall be fine-graded to finish grade to produce a surface

suitable for planting and seeding. Protect areas from compaction after they have been prepared.

B. Ensure that the top 2 inches of soil is free of stones, debris, branches, roots, stumps, wire, or other deleterious matter 1-inch in diameter and larger. Remove rocks in the upper 6 inches of soil. Dispose of debris offsite according to State and local regulations at no additional cost.

C. Smooth soil conditions to remove large clods. Establish finish grades to eliminate uneven areas resulting from rough-grading operations, filling as needed and remove surplus soil and float areas to a smooth, uniform grade to elevations as indicated on the Drawings. Blend finish grades with existing grades, providing for smooth transitions to existing grades and positive drainage. All areas shall be fine graded to within 1-1/2 inches (vertical tolerance) of paved areas and curbs.

D. Fine grading shall be done manually around sensitive areas, vegetation to be preserved, and existing hardscape elements and structures.

E. Unless otherwise directed by the Engineer's Representative, roadway cross-slopes shall be 2%, maximum.

F. At no time will the finish grade surfaces have a glazed appearance.

G. The Engineer's Representative will approve all finish grades.

END OF SECTION

SECTION 31 11 00

CLEARING AND GRUBBING

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Clearing and grubbing

B. Sod harvesting, storage, and placement

1.02 RELATED SECTIONS

A. Section 01 35 44 Environmental Requirements

B. Section 01 55 26 Traffic Regulation.

C. Section 02 41 00 Demolition

D. Section 31 00 00 Earthwork.

E. Section 32 91 00 Planting Preparation.

1.03 REFERNCES

A. Town of Truckee Standard Specifications

B. Standard Specifications, State of California, Department of Transportation (Caltrans), 2015, Section 17-2 Clearing and Grubbing.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. The Contractor shall furnish all materials, tools, equipment, facilities, and services as required for performing site clearing, grubbing and other site preparation work.

PART 3 – EXECUTION

3.01 CLEARING AND GRUBBING

A. Clearing and grubbing shall include the removal and disposal of all objectionable material not specified for separate payment elsewhere in these technical specifications, including trees (less than 6 inches in diameter measured 4 feet from the ground), shrubs, other vegetation; and debris and rubbish of any nature.

B. The limits of clearing and grubbing shall be the grading limit as shown on the Drawings.

C. Do not start earthwork operations in areas where clearing and grubbing is not complete, except that stumps and large roots may be removed concurrently with excavation.

D. Where the work includes requirements for wood chip mulch, acceptable material from clearing and grubbing activities may be used to produce such mulch if it meets the specifications described in Section 32 91 00 Planting Preparation. At no time shall non-native invasive species be used as a wood chip material.

E. Remove tree branches overhanging roadways to within 20 feet of finish grade. Cut off branches neatly and close to the tree boles. Remove other branches as necessary to present a balanced appearance. Treat scars resulting from tree branch removal with a heavy coat of an approved asphaltic tree paint.

F. All existing vegetation, outside the areas to be cleared and grubbed, shall be protected from injury or damage resulting from the Contractor's operations.

G. All clearing and grubbing controlled by the Contractor, except cleanup, shall be confined within the limits of the areas to be graded.

H. Nothing herein shall be construed as relieving the Contractor of responsibility for final cleanup.

I. Stockpiling of items removed in conjunction with clearing and grubbing operations by the Contractor will not be allowed. Contractor shall remove and dispose of all such materials from the site within three days of clearing and grubbing operations.

3.02 SOD HARVESTING AND STORAGE

A. Sod shall be harvested from areas designated in the Drawings for sod harvest. If additional suitable sod is encountered during construction the Engineer’s Representative may direct the Contractor to harvest up to an additional 10 percent of sod beyond the sod harvest area shown on the Drawings at no additional cost to the Client.

B. Sod shall consist of above ground and below ground plant materials including leaves and roots, and the soil bound by the root mass. Plants shall be healthy, vigorous and well rooted. Plants which constitute the minimum density requirement shall be either perennial bunchgrasses, rushes, sedges or a combination thereof. Sod shall have 100

percent (100%) cover consisting of living plants, thatch and plant detritus. Soil mass of sod shall contain a uniform distribution of roots with a minimum 50 percent (50%) root mass by volume to a depth of six (6) inches from the root crown. Sod sections shall be rejected when, in the opinion of the Engineer's Representative, they are of insufficient root mass. At all times, sod salvage shall be free of noxious weeds.

C. Sod shall be precut into three-foot (3) by two-foot (2) sections resulting in clean, vertical edges. Sod shall be moistened through the root zone before harvest. Sod shall be scalped from the original ground surface to a depth of no less than six (6) inches, as measured from the root crown. Sod shall be lifted from the subgrade in contiguous sections using machinery equipped with a front end bucket or otherwise approved apparatus. Work shall progress in such a manner as to minimize the disturbance of the soil bound by the root mass and the contiguous integrity of the sod section. Sod shall be rejected when, in the opinion of the Engineer's Representative, it is improperly handled resulting in the disruption of root mass and thatch integrity. Amounts of sod removed shall be verified by the Engineer's Representative to ensure that adequate amounts of sod exist to complete restoration treatments.

D. Do not stockpile more sod than can be installed at the site in one day. Do not pile sod strips on one another. Protect root system from exposure to the weather. Protect sod against dehydration, contamination and heating during transportation and delivery. At all times maintain stored sod moist and under shade.

E. Sod shall not be stored at the project site for longer than 8 hours; unless the Contactor has identified a safe location and water source that is approved by the Engineer's Representative before storage operations. Sod shall be protected from exposure to wind, shaded from the sun, and kept in moist conditions until ready for installation. Protect root system from exposure to the weather. Protect sod against dehydration, contamination and heating during transportation and delivery.

F. If sod needs to be stored for longer than 8 hours, the Contractor shall submit a Sod Storage Plan 48 hours before the start of sod storage. The Contractor shall not begin sod storage until the Plan is approved in writing by the Engineer's Representative. Upon receipt of approval by the Engineer's Representative, sod may be stored and maintained at locations indicated on the Plans for a period of time not to exceed 72 hours. Sod shall be placed roots down with edges snugly adjoining adjacent sections. Sod shall not be stacked. Sod on the perimeter of the storage area shall have the outermost edges draped with wetted burlap within thirty (30) minutes of placement for storage to protect roots and conserve soil moisture. The Contractor shall be responsible for irrigating sod to maintain moisture levels of no less than 15 percent (15%) moisture by volume during the interim storage period as measured with a volumetric soil moisture meter.

G. The Contractor shall restore the sod storage area in the same manner as staging areas and construction access roads as indicated in Section 32 91 00 Planting Preparation.

H. Store sod consisting of freshwater marsh species separately. Locations for placement of freshwater marsh sod shall be per the Drawings and at the direction of the Engineer's

Representative.

END OF SECTION

SECTION 32 15 00

AGGREGATE SURFACING

PART 1 - GENERAL

1.01 SCOPE

A. This Section includes the following:

1. Aggregate surfaces for the roadway,
2. Rolling dips, and
3. Arizona crossings

1.02 RELATED SECTION

A. Sections:

1. Section 31 00 00 Earthwork

1.03 DEFINITIONS

A. Subgrade: Surface or elevation remaining after completing excavation, or top surface of an embankment fill or backfill immediately below subbase, base, topsoil, or other subsequent fill materials.

1.04 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
2. ASTM D424 Method of Test for Plastic Limit & Plasticity Index of Soils

1.05 SUBMITTALS

A. The Contractor shall submit a signed verification from each source of supply for aggregate material employed indicating that the materials meet the Specifications.

1.06 TOLERANCES

A. All material limits shall be constructed within a tolerance of 0.1-foot for horizontal layout or dimensions and within a tolerance of 0.1-foot for vertical layout with reference to elevation or grade with the following additional requirements:

1. Minimum thicknesses and slopes shall be as shown on the Plans.

2. All grading shall be performed to maintain slopes and drainage as shown.

3. Where aggregate base is to be placed on the grading plane, the grading plane at any point shall not be more than 0.05 feet above the grade indicated on the Drawings.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Soil materials shall conform to the types described in Section 31 00 00 Earthwork and the Drawings.

2.02 ANGULAR ROCK

A. Angular rock must be clean and consist any combination of the following:

1. Broken stone

2. Crushed gravel

3. Natural rough-surfaced gravel

B. Angular rock shall be the size class indicated on the drawings.

C. Angular rock for surface courses must be of a color that blends with the natural surroundings, either dark gray or brown. Bright white rock will not be accepted.

2.03 SURFACE AGGREGATE

A. Surface aggregate shall consist of a mixture of crushed stone, gravel, and natural sands. The mixture shall be free of organic matter or other deleterious substances.

B. Gradation, in accordance with ASTM C136, shall be:

Sieve Opening	% Passing, by Weight
3/4”	100
No. 4	50 to 75
No. 8	40 to 65
No. 40	15 to 35
No. 200	4 to 15

C. The portion of the material passing the No. 40 sieve shall have a plastic index between 4 and 12 as determined in accordance with ASTM D424.

2.04 MISCELLANEOUS

A. Materials to restore the project site shall be the same or equal to the materials existing prior to construction.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Roadway Excavation: Roadway Excavation shall include grading of roadways to subgrade. The Contractor shall perform his own estimate of the roadway excavation quantity and determine his bid price accordingly.

1. If excavated materials intended for embankment fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.02 SUBGRADE INSPECTION

A. Notify the Engineer’s Representative when excavations have reached required subgrade.

B. If the Engineer’s Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or embankment fill material as directed. Authorized additional excavation and replacement material will be paid for according to Contract provisions for Extra Work.

C. Proof-roll subgrade at locations requested by the Engineer’s Representative with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer’s Representative, without additional compensation.

3.03 COMPACTION

A. Subgrade compaction shall comply with methods and tolerances described in Section 31 00 00 Earthwork.

B. Seat courses of 6- to 8-inch angular rock by traversing with track equipment until no movement is observed.

C. Compact courses of 2- to 3-inch angular rock with vibratory plate equipment until surface is non-yielding.

END OF SECTION

SECTION 32 18 00

PATHS AND TRAILS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Walking path

B. Turnpike style walking path

C. Puncheon style walking path

D. The work of this section does not include:

1. Trenching, compacting original ground or scarified sub grade will not be measured separately for payment, and all costs in connection therewith will be considered incidental to the construction of the paths and trails.

2. Sub grade and bearing-foundation preparation, including placement of aggregate base, will not be measured separately for payment, and all costs in connection therewith will be considered incidental to the construction of the paths and trails.

3. Re-handling of stockpiled material will not be measured separately for payment, but will be considered incidental to the work to which it pertains.

1.02 RELATED SECTIONS

A. Section 31 00 00 Earthwork

B. Section 35 42 41 Log Structures

1.03 REFERNCES

A. Town of Truckee Standard Specifications

B. Caltrans Standard Specifications, State of California, Department of Transportation, Standard Specifications, dated 2015

C. Construction of Trails and Trail Bridges on Forest Service Projects, dated 10/30/2014

D. ASTM A615 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

1.04 SUBMITTALS

A. General: Submit as per the requirements of the Contract provisions.

B. Samples:

1. Class 2 Aggregate Base: The Contractor shall furnish a 5-pound sample of Class 2 Aggregate Base to the Engineer's Representative for approval prior to placement. It is the responsibility of the Engineer's Representative to either visually approve the material or prescribe specific tests and analyses as appropriate for qualifying the suitability the material.

2. Decomposed Granite: The Contractor shall furnish a 5-pound sample of Decomposed Granite to the Engineer's Representative for approval prior to placement. It is the responsibility of the Engineer's Representative to either visually approve the material or prescribe specific tests and analyses as appropriate for qualifying the suitability the material.

3. Puncheon Materials: The Contractor shall submit five 5" X 7" color photographs of the proposed timber and lumber to the Engineer's Representative fifteen (15) days before commencing work. All photos shall include a person for scale.

C. Delivery Tickets: Submit a delivery ticket with each load of imported logs and channel bed material delivered to the site, stating the type of material and the quantity.

1.05 TOLERANCES

A. Construct finish surfaces of work described in this Section to plus or minus 3 inches of the elevations indicated on the Drawings.

PART 2 – PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. The Contractor shall furnish all materials, tools, equipment, facilities, and services as required for constructing all paths and trails.

2.02 CLASS 2 AGGREGATE BASE

A. Aggregate base material shall be Class 2, ¾-inch maximum grading Aggregate Base as specified in Section 26-1.02 of the Caltrans Standard Specification.

2.03 DECOMPOSED GRANITE

A. Decomposed granite shall be crushed granite rock graded from 3/8-inch particles to dust. Blends of coarse sand and rock dust are not acceptable.

B. Decomposed granite shall be uniform in texture and color; the color shall be light brown or a medium shade of gray. The color shall be approved by TDRPD prior to construction.

C. Gradation, in accordance with ASTM C136, shall be:

Sieve Opening	% Passing, by Weight
3/8”	100
No. 4	50 to 100
No. 30	25 to 50
No. 100	15 to 25
No. 200	5 to 15

2.04 DECOMPOSED GRANITE BINDER

A. The decomposed granite binder shall be Stabilizer® Binder, or an approved equivalent non-toxic, organic binder that is a colorless and odorless concentrated powder that binds decomposed granite.

2.05 LOGS

A. Logs shall be Class 6 logs as specified in Section 35 42 41 Log Structures.

2.06 FILTER FABRIC

A. Filter fabric shall be a lightweight, non-woven material as specified in the Caltrans Standard Specifications.

2.07 PUNCHEON MATERIALS

A. Puncheon timbers, lumber, and hardware shall be as specified in Section 995 of the Standard Specifications for Construction of Trails and Trail Bridges on Forest Service Projects.

B. Puncheon timbers and lumber shall be treated as specified in Section 995.04 of the Standard Specifications for Construction of Trails and Trail Bridges on Forest Service Projects. Treated timbers and lumber shall have a natural wood color; a green hue is not acceptable.

2.08 REBAR

A. Steel reinforcing bar used to secure logs shall be #5 bar conforming to ASTM A615, and cut into 2-foot lengths.

PART 3 – EXECUTION

3.01 GENERAL

A. Paths and trails shall be constructed to the dimensions and at the locations indicated on the Drawings and within the tolerances specified herein.

B. The Contractor shall complete the first installation of each of the four different styles of paths and trails with the Engineer's Representative present such that the specific construction methods and tolerances are agreed upon.

C. Carefully place filter fabric where indicated in the Drawings, stretching the fabric as needed to avoid wrinkling. Overlap 12 inches minimum and 18 inches maximum at seams. Trim any loose or excess material.

3.02 WALKING PATH

A. Overexcavate to accommodate the decomposed granite and prepare the subgrade as described in Section 31 00 00 Earthwork.

B. Place filter fabric as shown in the Drawings. Do not extend fabric beyond limits of walking path.

C. Install the aggregate base as specified in Section 26 of Caltrans Standard Specifications.

D. Refer to the stabilizer manufacturer's specifications for mixing decomposed granite with stabilizer and installation means and methods.

E. Construct to the finished grades specified on the Drawings. Provide a crown (2 inch maximum) to avoid flow concentration on the path.

3.03 TURNPIKE STYLE WALKING PATH

A. Overexcavate to accommodate the decomposed granite and prepare the subgrade as described in Section 31 00 00 Earthwork.

B. Place filter fabric as shown in the Drawings.

C. Install the aggregate base as specified in Section 26 of Caltrans Standard Specifications. Leave a slight groove for placing the logs.

F. Place Class 6 Logs as shown in the Drawings. Provide intimate contact between logs, mitering log ends as needed. Stagger log joints so joints are not directly opposite each other on the left and right sides of the path. Firmly seat logs in aggregate base prior to placing decomposed granite.

G. Anchor the Class 6 Logs by pounding rebar through pre-drilled holes and into the subgrade. The top of the rebar shall be flush with the top of log, and shall not protrude from the log. Rebar shall be placed every 3 feet.

H. Refer to the stabilizer manufacturer's specifications for mixing decomposed granite with stabilizer and installation means and methods.

I. Construct to the finished grades specified on the Drawings. Provide a crown (2 inch maximum) to avoid flow concentration on the path.

3.04 PUNCHEON STYLE WALKING PATH

A. Construct the puncheon style walking path as shown in the Drawings and specified in Section 934 of the Standard Specifications for Construction of Trails and Trail Bridges on Forest Service Projects; if information conflicts with these Specifications, the Specifications shall govern.

B. In no case shall the walking surface (i.e. top of decking) be more than 30 inches above the finished grade or existing ground.

END OF SECTION

SECTION 32 20 00

CULVERT OVERFLOW

PART 1 - GENERAL

1.01 SCOPE

A. The purpose of the culvert overflow is to provide a formal flow path for runoff to pass over the roadway in the event that the adjacent culvert does not have sufficient capacity to pass the design flow.

B. The Contractor shall either construct the base design or the bid alternate design for the culvert overflow based on the amount of cover over the existing water lines, as described in the Drawings.

C. This Section includes the following:

1. Culvert overflow

2. Bid alternate for culvert overflow

1.02 RELATED SECTION

A. Sections:

1. Section 31 00 00 Earthwork

2. Section 32 15 00 Aggregate Surfacing

1.03 DEFINITIONS

A. Subgrade: Surface or elevation remaining after completing excavation, or top surface of an embankment fill or backfill immediately below subbase, base, topsoil, or other subsequent fill materials.

1.04 TOLERANCES

A. All material limits shall be constructed within a tolerance of 0.1-foot for horizontal layout or dimensions and within a tolerance of 0.1-foot for vertical layout with reference to elevation or grade with the following additional requirements:

1. Minimum thicknesses and slopes shall be as shown on the Plans.

2. All grading shall be performed to maintain slopes and drainage as shown.

3. Where aggregate base is to be placed on the grading plane, the grading plane at any point shall not be more than 0.05 feet above the grade indicated on the Drawings.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Soil materials shall conform to the types described in Section 31 00 00 Earthwork and the Drawings.

2.02 ANGULAR ROCK

A. Angular rock shall conform to the types described in Section 32 15 00 Aggregate Surfacing.

2.03 BOULDERS

A. Boulders shall conform to the type described in Section 35 42 35 Boulder Structures.

2.04 MISCELLANEOUS

A. Materials to restore the project site shall be the same or equal to the materials existing prior to construction.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Roadway Excavation: Roadway Excavation shall include grading of roadways to subgrade. The Contractor shall perform his own estimate of the roadway excavation quantity and determine his bid price accordingly.

1. If excavated materials intended for embankment fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.

3.02 SUBGRADE INSPECTION

A. Notify the Engineer’s Representative when excavations have reached required subgrade.

B. If the Engineer’s Representative determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or embankment fill material as directed. Authorized additional excavation and replacement material will be paid for according to Contract provisions for Extra Work.

C. Proof-roll subgrade at locations requested by the Engineer's Representative with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.

D. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by Engineer's Representative, without additional compensation.

3.03 BOULDERS

A. Place boulders along the downstream side of the culvert overflow as shown in the Drawings.

B. Do not disturb existing boulders within three (3) feet of the existing culvert.

C. Embed boulders such that the top of the boulder course is flush with the finished grade elevation of the adjacent angular rock.

D. Carefully select and place boulders to maximize contact among all boulders.

3.03 COMPACTION

A. Subgrade compaction shall comply with methods and tolerances described in Section 31 00 00 Earthwork.

B. Compact courses of 2- to 3-inch angular rock with vibratory plate equipment until surface is non-yielding.

END OF SECTION

SECTION 32 91 00

PLANTING PREPARATION

PART 1 – GENERAL

1.01 SCOPE

A. Furnish all materials, labor, transportation, services, and equipment necessary to conduct planting preparation work as specified herein. The Contractor shall perform work according to all applicable laws, codes, and regulations required by federal, State, and local authorities to complete the work specified herein. Any and all permits, fees, bonds, and observations necessary to perform and complete the work shall be included.

B. Work included in this Section:

1. Soil Sampling;
2. Non-native Invasive Plant Control;
3. Topsoil Salvage;
4. Soil Rehabilitation;
5. Duff/Mulch Replacement and Pine Needle Placement;
6. Cleanup;
7. Site Observation Before Final Installation Acceptance;
8. Site Observation Schedule; and
9. Final Installation Acceptance.

C. Work related in other Sections:

1. Section 31 00 00 Earthwork;
2. Section 32 92 19 Seeding;
3. Section 32 93 00 Planting; and

4. Section 32 98 00 Plant Establishment.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. All federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship or a level of construction that exceeds the level of Federal, State, or local requirements, the provisions of this Section shall take precedence.

1.03 REFERENCE STANDARDS

A. The Best Management Practices (BMPs) prescribed in the following document directly apply to the non-native invasive plant control work for this project. The BMPs are included as an Appendix to these Specifications.

1. Cal-IPC. 2012. Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (3rd ed.). Cal-IPC Publication 2012-03. California Invasive Plant Council, Berkeley, CA. Available at www.cal-ipc.org. See http://www.cal-ipc.org/ip/prevention/PreventionBMPs_LandManager.pdf

2. The Contractor shall conduct the non-native invasive plant control work for this project in conformance to Chapters 2, and 4 through 9 of and the checklists included in the BMPs.

B. The Truckee River Watershed Council's "Weed Warriors" program directly applies to the non-native invasive plant control work for this project; see http://www.truckeeriverwc.org/weed-warriors .

C. The Nevada & Placer Weed Management Area guidelines directly apply to the non-native invasive plant control work for this project; see http://www.cal-ipc.org/WMAs/Nevada_Placer_WMA.php

1.04 DEFINITIONS

A. Compacted Soil: Compacted soil is soil having a density and strength sufficient to reduce plant growth and survival. Soil penetrability requiring greater than 250 pounds per square inch (PSI) to insert a cone penetrometer shall indicate compacted conditions.

B. Duff: Duff is a layer of decomposing organic materials between and intergrading with the overlying mulch and underlying topsoil.

C. Final Installation Acceptance: Final Installation Acceptance is the milestone when all installation work (i.e., all work except that required under Section 32 98 00 Plant Establishment) is completed and approved by the Engineer's Representative.

D. Final Project Acceptance: Final Project Acceptance is the milestone when all work, including work under Section 32 98 00 Plant Establishment, is completed and approved by the Engineer's Representative. Final Project Acceptance does not in any way release the Contractor from the requirements or duration of any guarantees as per the Specifications.

E. Installation Period: The Installation Period begins when the Notice to Proceed (NTP) is given and continues until all requirements indicated in the Drawings and Specifications are completed and approved, and the Engineer's Representative gives a written notice of a Final Installation Acceptance.

F. Mulch: Mulch is the coarse and loosely consolidated organic materials (such as pine needles, leaves, and small branches) that lie on top of duff and soil.

G. Plant Establishment Period: The Plant Establishment Period begins immediately after the Engineer's Representative gives a written notice of a Final Installation Acceptance and continues until all requirements indicated in Section 32 98 00 Plant Establishment are completed and approved and the Engineer's Representative gives a written notice of a Final Project Acceptance.

H. Topsoil: Topsoil is the uppermost layer of the existing soil that typically is rich in organic matter and usually distinct in color from deeper layers of soil. For this project, the upper 4-6 inches of soil on the project site will be considered topsoil.

I. Non-Native Invasive Plants: Non-native invasive plants shall include noxious weeds, weeds, and invasive plants; said species shall be those species not naturally occurring in the project region. Refer to the Truckee River Watershed Council's "Weed Warriors" program at http://www.truckeeriverwc.org/weed-warriors.

1.05 QUALITY CONTROL

A. Verify all dimensions and information shown on the Drawings and these Specifications with actual field conditions.

1. All discrepancies should be immediately reported to the Engineer's Representative. Work will be terminated in the area of the discrepancy until the Engineer's Representative has provided a written resolution to the conflict. Assume full responsibility for proceeding with work without written approval.

B. Coordinate the planting preparation operations to avoid conflicts with other construction and any existing features. If conflicts are foreseen or arise, immediately notify the Engineer's Representative for resolution.

1.06 SUBMITTALS

A. Submit no later than 10 days after the award of Contract a Soil Sampling Plan for the project site for approval.

B. Submit a 1-lb bag of compost (if used) within 10 days before the start of installation. Said sample shall be approved by the Engineer's Representative before ordering and performing work.

C. Within 10 days of receiving soil sampling results, submit the following to the Engineer's Representative for review and approval:

1. Results of soil sample testing.

2. Recommendations from the certified soils laboratory for specific amendments to be added.

3. Samples and verification (i.e., an analysis of the chemical percentages and ratios) of the soil amendment before ordering any soil amendment materials. Submit samples as 1-lb bags of each amendment recommended.

D. Engineer's Representative will provide approvals or direction for any needed corrections within 10 days of receipt of said submittals.

1.07 SUBSTITUTIONS

A. Specific reference to manufacturers' names and products specified in this Specification are used as standards of quality. This implies no right to substitute other materials without prior written approval by the Engineer's Representative.

B. Any substituted materials installed without written approval by the Engineer's Representative may be rejected.

C. If an approval is granted for a substitution, adjustment in the Contract amount will be made in accordance with the Contract Conditions.

1.08 SAMPLES AND TESTS

A. The Engineer's Representative reserves the right to take and analyze selected samples of materials for conformity to this Specification at any time.

B. At the Engineer's Representative's request, the Contractor shall provide samples of all supplied materials and an analysis from an approved laboratory verifying the manufacturer's guarantee.

C. Rejected materials shall be removed from the site and be replaced at no cost.

1.09 PROJECT CONDITIONS

A. Perform planting preparation operations only when weather and soil conditions are suitable in accordance with locally accepted practice.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

A. All materials delivered to the project site shall be clearly marked to identify the item. Materials shall be delivered to the project site in their original, unopened packaging containing the manufacturer's guarantee.

B. Exercise care in handling, loading, unloading, and storing planting preparation materials to ensure they are not damaged.

C. Provide a storage site for the planting preparation materials at the staging areas shown on the Drawings or as directed by the Engineer's Representative. Store in a manner to prevent damage from sunlight, moisture or contact with vehicles, equipment or tools.

1.11 REJECTION OF MATERIAL

A. All material not conforming to the requirements herein shall be considered defective and will be rejected.

1. The Engineer's Representative shall mark such materials, whether in place or not, as rejected.

2. Replacement materials shall be of the same types and condition as that indicated on the Drawings.

B. Rejected materials shall be removed and disposed of according to State and local regulations by the Contractor at no additional cost. Rejected materials shall be replaced at no additional cost.

1.12 PROTECTION OF THE SITE

A. Protect previously installed work and materials which may be affected by work of this Section. Provide safeguards and exercise caution against injury or defacement of existing site improvements.

B. Repair damage and return the area to the previous condition at no additional cost.

1.13 COORDINATION

A. Coordinate operations with subcontractors, as well as other contractors on or adjacent to the project site.

B. Exercise extreme care in excavating and working near existing utilities. Repair any damages to these utilities at no additional cost. Locations of utilities shown on the Drawings are approximate. It is the responsibility of the Contractor to field-verify the locations of existing utilities prior to commencing work.

C. Coordinate installation of all seeding materials to avoid interference with utilities, other construction elements, and any existing vegetation.

D. The Contractor shall coordinate with the Engineer's Representative to schedule the placement of materials and equipment necessary to complete the work.

1.14 CONSTRUCTION SCHEDULE

A. After mobilization, layout, and testing are complete, the Contractor shall follow the general construction schedule detailed below:

1. Perform soil loosening, incorporate soil amendments, and complete fine grading as necessary by September 30, before planting operations according to Section 32 93 00 Planting.

2. Conduct planting operations according to Section 32 93 00 Planting.

3. Within 30 days of completed planting operations, and no later than October 15, conduct seeding operations according to Section 32 92 19 Seeding.

PART 2 – PRODUCTS

2.01 GENERAL

A. All planting preparation materials shall be mold-free, air-dry, and certified weed-free and seed-free by the County Agricultural Commissioner.

2.02 MATERIALS

A. Topsoil

1. Shall be existing site material free of rubbish, sharp objects, and particles larger than 1½-inches in diameter.

2. Shall not contain clay soils.

B. Wood Chips

1. Wood chips shall consist of material chipped from non-diseased trees at or near the project site from an elevation within 1,500 feet of the project site elevation and east of the Sierra Crest. Eighty-percent (80%) of chipped material shall be able to pass through a 1.5-inch sieve. Wood chips shall not contain leaves, small twigs,

cones, or impurities such as rocks, garbage or debris; mineral soil shall be less than 2% of the volume of chipped material. Wood chips shall be manufactured from clean wood.

C. Soil Amendments

1. Soil amendments such as Biosol shall be used at a rate determined by soil sampling results and approved by the Engineer's Representative.

PART 3 – EXECUTION

3.01 SOIL SAMPLING

A. The Contractor shall collect representative samples of existing soils within revegetation areas (for spoil soils around the pond and used to construct raised trail) according to the Soil Sampling Plan and perform soil tests to determine soil properties affecting plant growth. Multiple samples shall be collected and shall each be the size of shovel/spade and taken at a depth of at 6-inches.

1. Perform tests at 6 representative separate locations within the project site boundaries where native soil and exposed subsoil serve as the planting medium. The test locations shall be representative of site conditions considering the overall site as approved by the Engineer's Representative.

2. Two vertical tests shall be performed at each location, one 6-inches and a second at 3-feet below the soil surface.

3. Each soil sample shall contain approximately one quart of soil and be labeled on a plan for location and depth.

4. Record, map and submit the analysis for review and approval.

B. The topsoil samples shall be tested by a State-certified soils testing laboratory to determine soil properties affecting plant growth, including soil texture, organic content, pH, particle size, nutrient level, salinity, chemical analysis, and mechanical analysis.

C. If the analysis of testing results indicates the soil is detrimental to plant growth, the Contractor shall submit recommendations from the certified soils laboratory for specific amendments to be added to the existing topsoil for review and approval by the Engineer's Representative. Any issues that arise from the Contractor's failure to submit treatment options to rectify inappropriate soil conditions shall be corrected at no additional cost. The Client will pay for any additional costs resulting from modified treatments based on the soils reports.

3.02 NON-NATIVE INVASIVE PLANT CONTROL

A. Non-native invasive plant control shall consist of removing all non-native invasive plants within the planting areas shown on the Drawings before any revegetation work, including topsoil salvage and soil rehabilitation. Non-native invasive plant control shall be conducted according to Section 32 98 00, Plant Establishment and as approved by the Engineer's Representative.

B. Non-native invasive plants shall be removed according to Cal-IPC BMPs, the Truckee River Watershed Council's "Weed Warriors" program, and the Nevada & Placer Weed Management Area guidelines.

1. Before any non-native invasive plant removal, the Contactor shall complete the following training and activities, and submit completed Cal-IPC BMP checklists for said training and activities:

    a. Checklist B: Routine Vegetation Management

    b. Checklist D: New Project - Implementation

    c. Checklist E: Inspection & Cleaning

C. The Contractor shall use staging areas shown on the Drawings for cleaning equipment and related activities for non-native invasive plant removal; equipment shall be cleaned before and after leaving the each site specific revegetation area. Refer to the Cal-IPC BMP checklists.

3.03 TOPSOIL SALVAGE

A. Where shown on the Drawings, the Contractor shall salvage existing mulch, duff, and topsoil, as defined in this Section, from areas to be planted or seeded, or otherwise disturbed by the project as directed by the Engineer's Representative.

B. Where a discernable topsoil or duff layer exists, a minimum of six inches (6") shall be removed.

C. The Contractor shall stockpile existing mulch and duff together, but separately from topsoil.

D. Stripped topsoil will be pushed back so that subsoil spoil material or weedy vegetation is not mixed with topsoil.

E. Mulch, duff, and topsoil shall be stockpiled in a manner as to not be contaminated with non-native invasive plant species.

F. Topsoil shall be stockpiled at designated material storage areas and shall not be stockpiled in a manner which destroys or damages existing vegetated areas not marked for excavation. Areas disturbed by the stockpiling of topsoil outside of

designated material storage areas will be restored to their pre-construction conditions as approved by the Engineer's Representative.

G. To minimize adverse alteration of soil properties, store topsoil with a minimum of handling and compaction, and place in piles that are shallow and narrow (not to exceed three feet in height) as practicable.

H. At no time shall topsoil and mulch/duff be stockpiled for more than 3 months without approval of Engineer's Representative.

I. Topsoil shall not be compacted, used as temporary fill or further disturbed once stockpiling has occurred unless approved in writing by the Engineer's Representative.

J. Topsoil salvage operations shall be conducted before and in direct coordination with the project's earthwork operations according to Section 31 00 00 Earthwork.

K. All stockpiles will be surrounded with specified BMP material to prevent runoff and erosion as specified in SWPPP and Section 01 35 44 Environmental Requirements.

3.04 SOIL REHABILITATION

A. The Contractor shall rehabilitate compacted or otherwise disturbed soil conditions in planting and seeding areas as necessary as described herein. Rehabilitation will be necessary in areas impacted by excavation, grading, compaction, or disturbance of soil surface by vehicles or stockpiled materials, with the exception of those areas around the pond that will be inundated with water most the time following construction. At no time will soil rehabilitation operations be conducted when said soil is too wet, as determined by the Engineer's Representative. If significant rain occurs during soil rehabilitation, the Engineer's Representative may temporarily halt soil rehabilitation work if the soil moisture content has exceeded an acceptable level. Soil rehabilitation work shall resume upon the direction of the Engineer's Representative. Excessive passes of equipment that would compact areas shall be avoided. Where equipment access routes are required across areas of soil rehabilitation, the sequence of construction activity shall be coordinated to only allow equipment access before the loosening of soils. Soil rehabilitation shall consist of the following sequence of operations:

1. Soil Loosening and Ripping

    a. In areas from which topsoil was removed and stockpiled, loosen the subgrade soils a minimum of 12-inches (with exception of areas to be inundated with 12" of pond water following construction).

b. To salvage existing mulch/duff, do not invert soil during loosening.

c. Soil loosening shall be performed with a hand implements (such as a pick mattock or Pulaski) or a mini-excavator equipped with a backhoe bucket. Soil shall be loosened but not turned over or inverted. Resulting soil clods shall be less than 5-inches in all dimensions.

d. Soil loosening shall be conducted with hand implements in areas where topsoil was removed beneath the drip lines of trees or shrubs.

e. Soil loosening shall be uneven in depth by at least 1- to 2-inches to reduce the chance of soil slumping. Wherever soil loosening takes place, existing plants and tree roots to remain shall be avoided.

f. In areas where roads formerly occurred, remove all remaining decomposed gravel and/or base materials; then rip said areas to a 24-inch depth.

g. Construction access routes shall be decommissioned by loosening compacted soils to an average depth of twelve (12) inches without inverting the soil profile. This method of soils loosening can be accomplished by inserting the bucket of an excavator or backhoe (with or without bucket mounted ripping tines) vertically into the soils profile and removing the bucket without curling the bucket. The intention of this loosening method is to minimize disturbance to existing vegetation and to maintain the majority of existing topsoil and plant detritus on or near the soil surface when loosening is complete.

h. At no time shall equipment traffic occur following soil loosening within a given area.

2. Topsoil Replacement

a. Replace topsoil in areas where it was removed before construction by distributing at an even a depth of 4 inches.

3. Incorporation of Wood Chips

a. Wood chips shall be added and incorporated into planting and seeding areas where spoil soils are used (i.e., soils from spoil berm around pond to be used to create new trail). Wood chips will not be incorporated into all revegetated areas. Evenly spread wood chips on topsoil at the rates prescribed in this Section. Incorporate compost to a depth of 4 inches. Blend and incorporate with hand

implements (such as a pick mattock or Pulaski) or a mini-excavator equipped with a backhoe bucket.

3.05 DUFF/MULCH REPLACEMENT AND PINE NEEDLE PLACEMENT

A. Apply salvaged duff/mulch and pine needles to seeded and planted areas as specified in Section 32 92 19 Seeding and Section 32 93 00.

3.06 CLEANUP

A. Site cleanup shall occur on a daily basis and as each phase of the work concludes.

B. Remove all trash and excess dirt caused from the work according to State and local regulations. Contractor shall make arrangements for disposing of these materials outside the project site and shall pay all costs involved. Arrangements shall include, but not be limited to, entering into agreements with property owners and obtaining necessary permits, licenses, and environmental clearances.

C. Sweep all adjacent paved areas as needed throughout the duration of the project to meet cleanliness requirements described in these Specifications and the project permits.

D. Repair all scars, ruts or other marks in the ground caused by the work.

E. Upon completion of the work, smooth all ground surfaces, remove excess dirt, materials, rubbish and debris according to State and local regulations to an offsite location or as directed by the Engineer's Representative. Sweep adjacent streets, curbs, and gutters, and remove construction equipment from the premises.

3.07 SITE OBSERVATION BEFORE FINAL INSTALLATION ACCEPTANCE

A. Corrective actions shall be in strict conformance with the Drawings and these Specifications and according to the Engineer's Representative, and shall be completed at the Contractor's expense.

B. The Engineer's Representative will perform progress observations of the planting preparation work and construction operations on completion of installation stages. The Engineer's Representative and the Contractor shall be agree upon the installation stages for this Specification before starting work and be present on mutually agreed-on dates for the observations for each stage.

C. If, after an observation, the Engineer's Representative is satisfied with the construction to date and its conformance to the Drawings and the Specifications, the Engineer's Representative will grant written notice of provisional acceptance for that construction stage.

D. If, after an observation, the Engineer's Representative is dissatisfied with the construction to date and its conformance to the Drawings and the Specifications, the Engineer's Representative will prepare a written punch list of necessary corrective action on defective work for that construction stage. All corrections must be completed and will be re-observed by the Engineer's Representative within 10 working days from the date of the initial observation.

E. Project observations shall not occur until all punch list items from previous observations are corrected. Failure to correct problems in the time specified by the Engineer's Representative may result in a delay of payment for the said tasks until the items in question are remedied per the Engineer's Representative's direction.

F. The Contractor shall be charged for any additional construction observations and punch lists required from the Engineer's Representative for unscheduled and necessary re-observation of the work due to unsatisfactorily or incompletely addressing previous punch lists.

3.08 SITE OBSERVATION SCHEDULE

A. Provide the Engineer's Representative with 48 hours of advance notification, except as otherwise noted, for required stage acceptance observations including, but not limited to, the following:

1. Completed planting preparation mobilization operations.

2. Observation of staking of perimeter boundary, existing vegetation, and other structures to be protected.

3. Progress soil rehabilitation operations. The Contractor shall loosen a test area of approximately 1,000 square feet for review by the Engineer's Representative before soil loosening is started in any other areas.

4. Completed soil rehabilitation operations.

5. Progress fine grading operations.

6. Completed fine grading operations.

7. Progress duff/mulch replacement & pine needle placement.

8. Completed demobilization operations.

9. Substantial Completion Observation: Final installation observation before the start of the Plant Establishment Period. (Provide 10 working days of advance written notice).

3.09 FINAL INSTALLATION ACCEPTANCE

A. Final Installation Acceptance will be issued as specified in the Contract Documents. Following the Final Installation Acceptance, the Plant Establishment Period shall begin.

END OF SECTION

SECTION 32 92 19

SEEDING

PART 1 – GENERAL

1.01 SCOPE

A. Furnish all materials, labor, transportation, services, and equipment necessary to execute the required revegetation seeding as shown on the Drawings and as specified herein. The Contractor shall perform work according to all applicable laws, codes, and regulations required by federal, State, and local authorities to complete the work specified herein. Any and all permits, fees, bonds, and observations necessary to perform and complete the work shall be included.

B. Work included in this Section:

1. Verification of Existing Conditions;
2. Surface Drainage of Seeding Areas;
3. Preparation;
4. Seeding (including Submerseed);
5. Watering;
6. Cleanup;
7. Site Observation Before Final Installation Acceptance;
8. Site Observation Schedule; and
9. Final Installation Acceptance.

C. Work related in other Sections:

1. Section 32 91 00 Planting Preparation;
2. Section 32 93 00 Planting; and
3. Section 32 98 00 Plant Establishment.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. All federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship or a level of construction that exceeds the level of federal, State, or local requirements, the provisions of this Section shall take precedence.

1.03 REFERENCE STANDARDS

A. All seed material shall be true to botanical and common name as indicated in:

1. American Nursery & Landscape Association. 2004. American Standard for Nursery Stock. ANSI Z60.1–2004. Washington, DC.

2. Balwin, B.G., Goldman, D., Keil, D.J., Patterson, R., Rosatti, T.J., and D. Wilken (editors).2012. The Jepson Manual: Vascular Plants of California, Thoroughly Revised and Expanded. University of California Press. Berkeley, CA.

3. L. H. Bailey Hortorium of Cornell University. 1976. Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada. Macmillan. New York, NY.

4. McClintock, E. M., and A. T. Leiser. 1979. An Annotated Checklist of Woody Ornamental Plants of California, Oregon and Washington. University of California, Division of Agricultural Sciences. Berkeley, CA.

5. U.S. Natural Resources Conservation Service. 2009. Plants Database. Available: <http://plants.usda.gov>. Last updated June 15, 2009.

B. All seed shall conform to all laws and regulations pertaining to the sale and shipment of seed required by the California Food and Agricultural Code of 1982, Regulations of 1983, and the Federal Seed Act.

1.04 DEFINITIONS

A. Final Installation Acceptance: Final Installation Acceptance is the milestone when all installation work (i.e., all work except that required under Section 32 98 00 Plant Establishment) is completed and approved by the Engineer's Representative.

B. Final Project Acceptance: Final Project Acceptance is the milestone when all work, including work under Section 32 98 00 Plant Establishment, is completed and approved by the Engineer's Representative. Final Project Acceptance does not in any way release the Contractor from the requirements or duration of any guarantees as per the Specifications.

C. Installation Period: The Installation Period begins when the Notice to Proceed (NTP) is given and continues until all requirements indicated in the Drawings and Specifications are completed and approved, and the Engineer's Representative gives a written notice of a Final Installation Acceptance.

D. Plant Establishment Period: The Plant Establishment Period begins immediately after the Engineer's Representative gives a written notice of a Final Installation Acceptance and continues until all requirements indicated in Section 32 98 00 Plant Establishment are completed and approved and the Engineer's Representative gives a written notice of a Final Project Acceptance.

1.05 QUALITY CONTROL

A. Manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in this Specification furnish directions covering points not shown in the Drawings and Specifications.

B. At the time of delivery to the project site, the Contractor and the Engineer's Representative shall inspect seed mixes for moisture, mold, and insect infestation. The Contractor shall provide the Engineer's Representative with 48-hour advance notice for each request for approval of partial or complete deliveries to the project site.

1.06 QUALIFICATIONS

A. In the event that reseeding is required during the Plant Establishment Period, the seed mix supplier shall be a reputable supplier that specializes in and has the ability to provide native plant seed materials originating from similar montane vegetation with soils and climate as the project site, from an elevation within 1,500 feet of the project site elevation, and originating at or near the revegetation site, and/or east of the Sierra Nevada crest.

1.07 SUBMITTALS

A. Submit verification of the required minimum qualifications as specified in Section 32 93 00 Planting for approval by the Engineer's Representative.

B. Submit written Planting Guarantee as detailed in this Section within 5 days after the award of Contract.

C. In the event that reseeding is required during the Plant Establishment Period, submit the following information 30 days prior to any reseeding work:

1. List of all proposed materials and equipment to be used indicated by description, manufacturer and model number, if applicable. Include catalog cuts where applicable. Include seed supplier's certification for required seed

mixtures, indicating percentage by weight, and percentages of purity, germination and weed seed for each mix.

2. A copy of the seed mix procurement order from the supplier including the name, address, and phone number of said supplier and the estimated date(s) and quantities for delivery from the supplier.

3. Submit original seed tests by lot number to the Engineer's Representative for approval before mixing. All seed test shall be approved by the California State Department of Agriculture.

4. Written documentation that the seed mixes listed on the Drawings are available. Any substitutions required due to unavailability must be requested in writing before confirmation of ordering.

5. A schedule identifying seed mix procurement, storage, anticipated delivery dates, and anticipated installation dates for review and approval.

6. Seed tags shall be submitted for approval before seed installation must reflect the most recent test date and show the following information:

   a. Scientific name

   b. Common name

   c. Lot number

   d. Percent purity

   e. Percent germination, including hard and dormant seed

   f. Percent weed seed

   g. Percent crop seed

   h. Origin

   i. Lab tests

D. Submit all required samples and test results within 10 days before the start of any reseeding work. Samples shall be approved by the Engineer's Representative before ordering and performing work. Submit the following to the Engineer's Representative.

1. Seed mixes, 1-lb bag of each seed mix

2. Testing results from a State-licensed seed lab showing percent germination and purity for each seed mix for review and approval.

E. Provide and keep as-built drawings during the Installation Period as specified under Section 32 93 00 Planting.

F. Engineer's Representative will provide approvals or direction for any needed corrections within 10-days of receipt of said submittals.

1.08 SUBSTITUTIONS

A. Specific reference to manufacturers' names and products specified in this Specification are used as standards of quality. This implies no right to substitute other materials without prior written approval by the Engineer's Representative.

B. Requests for substitute species, and/or varieties must be submitted in writing for approval from the Engineer's Representative before ordering.

C. Any substituted materials installed without written approval by the Engineer's Representative may be rejected.

D. If an approval is granted for a substitution, adjustment in the Contract amount will be made in accordance with the Contract Conditions.

1.09 SAMPLES

A. The Engineer's Representative reserves the right to take and analyze selected samples of seeding materials for conformity to this Specification at any time. Rejected seeding materials shall be removed from the site and be replaced at no cost.

1.10 PROJECT CONDITIONS

A. Perform seeding operations only when weather and soil conditions are suitable in accordance with locally accepted practice.

1.11 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery

1. Deliver all seeding and reseeding materials with legible and durable identification labels.

2. Seed shall be delivered to the project site tagged and labeled in accordance with the State Agricultural Code, and shall be acceptable to the County Agricultural Commissioner. Seed shall be delivered to the project site in unopened containers.

B. Storage

1. Provide a storage site for the seeding materials at the staging areas shown on the Drawings or as directed by the Engineer's Representative.

2. Store seeding materials immediately in a dry, weather and damp proof structure. Any seed which has become wet, moldy or damaged in transit or storage will not be acceptable for seeding and shall be the responsibility of the contractor to replace at no additional cost.

C. Handling

1. Handle all seeding materials to ensure they are not damaged or subjected to excessive heat, wind or desiccation during storage, handling, and shipping.

2. Any seeding materials that are damaged due to mishandling shall be removed and replaced with new material at no additional cost.

3. Do not throw or drop Submerseed containers.

1.12 REJECTION OF SEEDING MATERIAL

A. All seeding material not conforming to the requirements herein shall be considered defective and will be rejected.

1. The Engineer's Representative shall mark such seeding materials, whether in place or not, as rejected.

2. Replacement seeding material shall be of the same types and condition as that indicated on the Drawings.

B. Rejected materials shall be removed and disposed of according to State and local regulations by the Contractor at no additional cost. Rejected materials shall be replaced at no additional cost.

1.13 PROTECTION OF THE SITE

A. Protect previously installed work and materials which may be affected by work of this Section. Provide safeguards and exercise caution against injury or defacement of existing site improvements.

B. Repair damage and return the area to the previous condition at no additional cost.

1.14 COORDINATION

A. Coordinate operations with subcontractors, as well as other contractors on or adjacent to the project site.

B. Exercise extreme care in excavating and working near existing utilities. Repair any damages to these utilities at no additional cost. Locations of utilities shown on the Drawings are approximate. It is the responsibility of the Contractor to field verify the locations of existing utilities prior to commencing work.

C. Coordinate installation of all seeding materials to avoid interference with utilities, other construction elements, and any existing vegetation.

D. The Contractor shall coordinate with the Engineer's Representative to schedule the placement of materials and equipment necessary to complete the work.

1.15 PLANTING GUARANTEE

A. All seeding material installed under this Contract shall be guaranteed against poor, inadequate and inferior quality and installation for a period of 1 year from the date of Final Project Acceptance, as specified in Section 32 98 00 Plant Establishment.

PART 2 – PRODUCTS

2.01 GENERAL

A. Procure all seeding materials and incidentals required for this project, except for seed mixes and Submerseed used for initial seeding.

B. All seed and propagule materials shall be from local genetic stock originating from similar montane vegetation with soils and climate as the project site, from an elevation within 1,500 feet of the project site elevation, and originating at or near the revegetation site, and/or east of the Sierra Nevada crest, unless otherwise approved by the Engineer's Representative. Representative similar conditions are wetland, riparian and upland habitats found at or in the vicinity of the project site.

C. All seeding materials shall be shall be mold-free, air-dry, and certified weed-free by the County Agricultural Commissioner.

2.02 MATERIALS

A. Seed Mixes

1. Seed mixes for initial seeding shall be provided by Client. Any replacement seed required for reseeding shall be provided by the Contractor.

2. Seed species shall be approved or the Client-provided species. All seed shall be from local genetic stock from a similar climate, elevation, and soil type as the project site, unless otherwise approved by the Engineer's Representative.

3. All seed shall conform to all laws and regulations pertaining to the sale and shipment of seed required by the California Food and Agricultural Code of 1982, Regulations of 1983, and the Federal Seed Act.

4. Seed mixes shall consist of the mixes shown on the Drawings; the seed mixes shall conform to the prescribed requirements for pure live seed rate per species. Seed mixes shall not be mixed until individual species' seed is approved by the Engineer's Representative.

5. Weed seed shall not exceed 0.25% of the pure live seed specified. At no time shall the mixes contain seeds of cheatgrass (*Bromus tectorum*), alfalfa (*Medicago sativa*) or sweetclovers (*Melilotus alba, Melilotus officinalis*). Crop seed shall not exceed 0.50%.

6. For sagebrush (*Artemisia tridentata*) and rabbitbrush (*Chrysothamnus nauseosus*), test seed within 6 months before seeding, unless otherwise directed by the Engineer's Representative. All other seed must be tested within 1 year of application date.

7. Legume seed shall be pellet-inoculated or industrial-inoculated with Rhizobia. Inoculated seed shall have a calcium carbonate coating. Industrial-inoculated seed shall be used within 180 calendar days of inoculation.

8. Application rates shall be as shown on the Drawings.

B. Submerseed

1. Submerseed shall be ordered and provided by TRWC.

2. Submerseed is a method of composite seeding technology, where select meadow and other wet habitat seed are mixed into a bentonite clay and a polymer mixture and adhered to pieces of gravel (3/8" – ½" diameter). See http://www.aquablok.com/ecosystem-restoration for more information.

C. Mychorrhizal Inoculant

1. 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.

2. Each endomycorrhizal inoculum shall be provided with a supplier's guarantee of number of propagules per unit weight or volume of bulk material.

3. Inocula shall contain a minimum of 50% Glomus intraradices with a propagule count of 120 per gram of which a minimum of 20 spores per gram shall be present in random tested sampling. Product bag shall be labeled with a lot number and the harvest date of the inocula.

4. A representative 100 gram sample (from a re-mixed bay in order to obtain a homogeneous sample) from each bag of material supplied to the project shall be obtained thirty days before application for verification of spore count (a rounded ½ cup kitchen measuring scoop will yield roughly 100 grams of material).

5. The Contractor shall provide independent testing results of actual counts of viable spores using both Evan's Blue and MTT, through a laboratory approved by the Engineer's Representative. If the inoculant spore-density is below specified counts, the Contractor shall be required to supply additional material to meet specifications.

6. Inocula shall be transported and stored in areas with a temperature of less than 90 ºF. At all times, use a dust mask when handling the material.

D. Pine Needles

1. Pine needles brought to the site for application as a top-dressing shall originate from as close to the site as possible and shall contain less than 20% impurities by volume as follows:

   a. No more than 10% other coarse organic material (e.g., twigs, cones),

   b. No more than 8% decomposed organic matter (i.e., duff), and

   c. No more than 2% mineral soil.

E. Tackifier

1. The tackifier shall be an organic, plant-derived substance containing corn starch, psyllium or guar gum, or a combination thereof such as Fisch-Stick, PT-TAC, Reclamare 2400, Ecology M-Binder, Eco-tak, Triple-Tac or approved equal. The tackifier shall form a transparent three-dimensional film-like crust permeable to water and air and containing no agents toxic to seed germination. The tackifier shall be packed in clearly marked bags stating the contents of each package. The tackifier will require no curing time, shall remain soft and rewettable, and shall not inhibit seed germination. All ingredients shall be biodegradable.

2. Application rate: the tackifier application rate shall be according to manufacturer's recommendations.

F. Layout Stakes (to define limits of Revegetation Areas)

1. Layout stakes shall be 48-inch wood lath surveyor stakes, with a pointed tip on one end and topped with colored surveyor tape on the other end. The top 12-inches of the blunt end of all laths shall be spray painted with florescent colored paint. If the laths are used for multiple purposes, different colors shall be used to identify each specific purpose.

2.03 EQUIPMENT

A. Broadcast Seeding – Equipment

1. Seeding equipment for broadcast seeding shall be hand spreaders.

PART 3 – EXECUTION

3.01 VERIFICATION OF EXISTING CONDITIONS

A. Before performing the work in this Section, examine previously installed work from other contractors at the project site (if any) and verify that such work is complete and as required, to the point where this installation may begin properly.

B. Seeding areas shall be prepared according to Section 32 91 00 Planting Preparation. Ensure that seeding areas are not compacted due to any construction operations before seeding.

C. If the soil in the area to be seeded was already "prepared" as part of planting operations, inspect the areas to be seeded to determine if the soils have become hard or plastic and submit a report to the Engineer's Representative. If the soil conditions are not appropriate for seeding, submit a plan for preparing the soils for seeding without disturbing existing or installed plants to the satisfaction of the Engineer's Representative and at no additional cost.

D. Remove all rocks, stones, sticks and debris larger than 1-inch in diameter from the surface of the seeding areas.

E. Obtain approval of finished grading performed under Section 32 91 00 Planting Preparation by the Engineer's Representative before starting seeding operations.

3.02 SURFACE DRAINAGE OF SEEDING AREAS

A. Ensure proper drainage has been established by others in all seeding areas before the start of seeding operations. Any discrepancy in the Drawings or Specifications, obstructions on the site or prior work done by another contractor that could preclude the establishment of proper drainage, shall be brought to the immediate attention of the Engineer's Representative for correction or relief of said

responsibility. Failure to notify the Engineer's Representative of any drainage issues will render the Contractor responsible for rectifying any issues due to improper drainage at no additional cost.

3.03 PREPARATION

A. Seeding Area Layout

1. Locations for all seeding areas shall be marked on the ground either by flagged grade stakes indicating seed mix type for the Engineer's Representative's review and approval before seeding. Seeding areas will be located according to the approximate areas shown on the Drawings.

2. The areas to be seeded shall have a firm seed bed which has previously been roughened by scarifying, disking, harrowing, chiseling, or otherwise worked to a depth of at least 4 inches on soil or 2 inches on intact rock surfaces. The seed bed may be prepared at the time of completion of excavation or earthwork. Construction debris and extraneous piles of soil shall be removed before seeding.

3.04 SEEDING

A. General Seeding Guidelines

1. All seeding operations shall be conducted before plant installation, except for cuttings. Seeding shall occur between September 1 and October 15. Seed shall be applied before any snow accumulation and ground freeze, unless otherwise approved by the Engineer's Representative.

2. The Contractor shall notify the Engineer's Representative no less than 72 hours in advance of revegetation work and shall not begin the work until prepared treatment areas have been approved. All work shall take place within planting windows approved by the Engineer's Representative.

3. Seeding shall not occur when wind speeds exceed 5 miles per hour.

4. Seed only those areas that can be watered on that same day as installation.

5. During seeding operations, care shall be taken to avoid damaging existing facilities, vegetation to remain, or any other items on or around the seeding areas. Take care to avoid damaging the root zone or trunks of any vegetation to remain. Installed plantings shall be protected from damage during seeding operations.

6. Seeding area shall be protected against trespassing, vehicular traffic, and from damage at all times. If areas are damaged, they shall be reseeded. No work shall be performed in seeding areas without proper safeguards.

B. Broadcast Seeding

1. Hand-broadcast seeding methods shall be used to apply seed to all areas.

2. Fertilizer shall not be applied to seeding areas.

3. Mychorrizal inoculant shall be mixed with the seed and applied during the seeding operations.

4. Seed shall be uniformly broadcast with hand-held seeders and lightly raked to incorporate to a depth of 0.25 to 0.5 inches. Seed shall not be left uncovered for more than 24 hours, unless otherwise approved by the Engineer's Representative.

5. All broadcast seeding areas shall be hand-raked to cover the seeds.

C. Submerseed Application

1. Within the areas identified on the Drawings to receive Suberseed, establish planting plots (see Drawings) by marking the corners of each plot with a boundary stake– the stakes can be removed after application (take care not to disturb product), or can be left in place until the seedlings are well established.

2. The planting plots should be small enough (typically no larger than 20' x 20') that product can be evenly distributed throughout their area. EXAMPLE: (as shown on Drawings) – Planting plot = 14' x 14' or 196 square feet; if the target application rate is 4 ½ pounds of product per 100 square feet, each planting plot – in the example above – would require ~ 9 pounds of product.

3. Apply to areas shown on Drawings. Can be applied to areas inundated by water or dry.

4. When possible, sow in multiple planting directions (preferably, perpendicular to each other) to better ensure uniform coverage. Broadcast half of the product designated for a given plot over the entire plot, and then come back over the plot with the remainder to fill in any void spaces (to help ensure more uniform coverage). Particles should average two to three inches from their nearest neighboring particle.

5. Avoid disturbance of areas already sown with product.

D. Duff/Mulch, Pine Needles

1. Following seed application in all areas except those receiving Submerseed, salvaged duff/mulch as collected in Section 32 91 00 Planting Preparation

shall be evenly applied to the surface of the seeding areas to a 1-inch depth; pine needles shall then be applied to increase depth to 2-inches.

2. If pine needles and duff are not available on site, the Contractor shall procure, supply, and install pine needles from within 30 miles of the project site.

3. After duff/mulch/pine needle application is completed in an area, tackifier shall be applied as indicated herein in that area on the same working day.

3.05 WATERING

A. Seeding areas shall be watered immediately after installation. After the first watering, water shall be applied to all seeding areas to achieve continually moist conditions as required to keep the vegetation in a healthy and vigorous growing condition until the completion of the Installation Period.

B. Watering shall continue during the Plant Establishment Period as prescribed in Section 32 98 00 Plant Establishment.

3.06 CLEANUP

A. Site cleanup shall occur on a daily basis and as each phase of the work concludes.

B. Remove all trash and excess dirt caused from the work according to State and local regulations. Contractor shall make arrangements for disposing of these materials outside the project site and shall pay all costs involved. Arrangements shall include, but not be limited to, entering into agreements with property owners and obtaining necessary permits, licenses, and environmental clearances.

C. Sweep all adjacent paved areas as needed throughout the duration of the project to meet cleanliness requirements described in these Specifications and the project permits.

D. Repair all scars, ruts or other marks in the ground caused by the work.

E. Upon completion of the work, smooth all ground surfaces, remove excess dirt, materials, rubbish and debris according to State and local regulations to an offsite location or as directed by the Engineer's Representative. Sweep adjacent streets, curbs, and gutters and remove construction equipment from the premises.

3.07 SITE OBSERVATION BEFORE FINAL INSTALLATION ACCEPTANCE

A. Corrective actions shall be in strict conformance with the Drawings and these Specifications and according to the Engineer's Representative, and shall be completed at the Contractor's expense.

B. The Engineer's Representative will perform progress observations of the work and construction operations on completion of installation stages. The Engineer's Representative and the Contractor shall be agree upon the installation stages for this Specification before starting work and be present on mutually agreed-on dates for the observations for each stage.

C. If, after an observation, the Engineer's Representative is satisfied with the construction to date and its conformance to the Drawings and the Specifications, the Engineer's Representative will grant written notice of provisional acceptance for that construction stage.

D. If, after an observation, the Engineer's Representative is dissatisfied with the construction to date and its conformance to the Drawings and the Specifications, the Engineer's Representative will prepare a written punch list of necessary corrective action on defective work for that construction stage. All corrections must be completed and will be re-observed by the Engineer's Representative within 10 working days from the date of the initial observation.

E. Project observations shall not occur until all punch list items from previous observations are corrected. Failure to correct problems in the time specified by the Engineer's Representative may result in a delay of payment for the said tasks until the items in question are remedied per the Engineer's Representative's direction.

F. The Contractor shall be charged for any additional construction observations and punch lists required from the Engineer's Representative for unscheduled and necessary re-observation of the work due to unsatisfactorily or incompletely addressing previous punch lists.

3.08 SITE OBSERVATION SCHEDULE

A. Provide the Engineer's Representative with 48 hours of advance notification, except as otherwise noted, for required stage acceptance observations including, but not limited to, the following:

1. Seeding materials after delivery to project site and before seeding.

2. Seeding area locations layout before seeding.

3. Seeding operations, of a minimum 100-square foot area before installation of remaining seed mixes.

4. Progress seeding operations.

5. Completed seeding operations.

6. Substantial Completion Observation: Final installation observation before the start of the Plant Establishment Period. (Provide 10 working days of advance written notice).

3.09 FINAL INSTALLATION ACCEPTANCE

A. Final Installation Acceptance will be issued as specified in the Contract Documents. Following the Final Installation Acceptance, the Plant Establishment Period shall begin.

END OF SECTION

SECTION 32 93 00

PLANTING

PART 1 – GENERAL

1.01 SCOPE

A. Furnish all materials, labor, transportation, services, and equipment necessary to execute the required revegetation planting as shown on the Drawings and as specified herein. The Contractor shall perform work according to all applicable laws, codes, and regulations required by federal, State, and local authorities to complete the work specified herein. Any and all permits, fees, bonds, and observations necessary to perform and complete the work shall be included.

B. Work included in this Section:

1. Verification of Existing Conditions;
2. Surface Drainage of Planting Areas;
3. Preparation;
4. Plant Installation;
5. Cutting Installation;
6. Sod Installation;
7. Watering;
8. Revegetation Signs;
9. Cleanup;
10. Site Observation Before Final Installation Acceptance;
11. Site Observation Schedule; and
12. Final Installation Acceptance.

C. Work related in other Sections:

1. Section 01 78 29 As-built Survey;

2. Section 32 91 00 Planting Preparation;

3. Section 32 92 19 Seeding; and

4. Section 32 98 00 Plant Establishment.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. All Federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship or a level of construction that exceeds the level of federal, State, or local requirements, the provisions of this Section shall take precedence.

1.03 REFERENCE STANDARDS

A. All plant material shall be true to botanical and common name as indicated in:

1. American Nursery & Landscape Association. 2004. American Standard for Nursery Stock. ANSI Z60.1–2004. Washington, DC.

2. Balwin, B.G., Goldman, D., Keil, D.J., Patterson, R., Rosatti, T.J., and D. Wilken (editors).2012. The Jepson Manual: Vascular Plants of California, Thoroughly Revised and Expanded. University of California Press. Berkeley, CA.

3. L. H. Bailey Hortorium of Cornell University. 1976. Hortus Third: A Concise Dictionary of Plants Cultivated in the United States and Canada. Macmillan. New York, NY.

4. McClintock, E. M., and A. T. Leiser. 1979. An Annotated Checklist of Woody Ornamental Plants of California, Oregon and Washington. University of California, Division of Agricultural Sciences. Berkeley, CA.

5. U.S. Natural Resources Conservation Service. 2009. Plants Database. Available: <http://plants.usda.gov>. Last updated June 15, 2009.

B. All plant material shall conform to the California State Department of Agriculture's regulations for nursery observations, rules and ratings.

1.04 DEFINITIONS

A. Collection: Collection refers to harvesting cuttings directly from live growing plant material. It involves cutting the material from the parent plant; pruning all lateral branches off; bundling the cuttings for transport; delivering bundles to the project

site; and cleaning up collection site by cutting up pruned branches left in a natural appearing condition.

B. Container Plantings: Container plants shall be woody and herbaceous plant materials of the species and installed as detailed on the Drawings, and as specified in this Section. For the purposes of this Section, they shall include Gallon and 3 inch containers, unless otherwise specified.

C. Sod: Sod blocks, strips, mats, etc. salvaged from the construction area. The sod mats and strips are staked for support during establishment. Sod blocks and sod strips or mats, broken into specified pieces and installed as per container plant specifications.

D. Cuttings: Cuttings, as described herein, refer to live plant material for use as (pole) cuttings and "buffet" cuttings. Cuttings are stocks or branches taken from live growing material. Cuttings can be any tree or shrub species designated as such, but generally are species that sprout easily at nodes when placed in direct contact with soil.

E. Harvest: Harvest refers to collecting cuttings directly from live growing plant material. It involves cutting the material from the parent plant; pruning all lateral branches off; bundling the cuttings for transport; delivering bundles to the project site; and cleaning up collection site by cutting up pruned branches left in a natural appearing condition.

F. Final Installation Acceptance: Final Installation Acceptance is the milestone when all installation work (i.e., all work except that required under Section 32 98 00 Plant Establishment) is completed and approved by the Engineer's Representative.

G. Final Project Acceptance: Final Project Acceptance is the milestone when all work, including work under Section 32 98 00 Plant Establishment, is completed and approved by the Engineer's Representative. Final Project Acceptance does not in any way release the Contractor from the requirements or duration of any guarantees as per the Specifications.

H. Installation Period: The Installation Period begins when the Notice to Proceed (NTP) is given and continues until all requirements indicated in the Drawings and Specifications are completed and approved, and the Engineer's Representative gives a written notice of a Final Installation Acceptance.

I. Plant Establishment Period: The Plant Establishment Period begins immediately after the Engineer's Representative gives a written notice of a Final Installation Acceptance and continues until all requirements indicated in Section 32 98 00 Plant Establishment are completed and approved and the Engineer's Representative gives a written notice of a Final Project Acceptance.

1.05 QUALITY CONTROL

A. Manufacturer's directions and drawings shall be followed in all cases where the manufacturers of articles used in this Specification furnish directions covering points not shown in the Drawings and Specifications.

B. For any required replanting materials, upon execution of the order, the Engineer's Representative has the option of either observing the plant materials at the nursery or supplier, requesting representative color photos or observing the material as it is being delivered to the site for conformity to the Drawings and Specifications.

1. Such approvals shall not impair the right of additional observations during further progress of the Work.

C. Any tagging of plant material by the Engineer's Representative does not constitute his/her approval of the plant materials' health and vigor. The health and vigor of the plant material is the sole responsibility of the Contractor.

D. At the time of delivery to the project site, the Contractor and the Engineer's Representative shall observe cuttings for injury, disease, and insect infestation. The Contractor shall provide the Engineer's Representative with 48-hour advance notice for each request for approval of partial or complete deliveries to the project site.

E. The Engineer's Representative reserves the right to refuse observation, if in his judgment that a sufficient quantity of plant material is not available for observation at that time.

F. TRWC shall be responsible for providing healthy plants with evidence of new growth.

G. The Contractor shall be responsible for installing healthy plants with evidence of new growth before the start of the Plant Establishment Period.

H. At no time during the Plant Establishment Period shall any plants show symptoms of damaged foliage, disease, size, color, wilting, defoliation, and vandalism. At no time shall any plants show symptoms of disease, browsing by wildlife, insect damage, girdling, structural deformities, dieback, dry rootball, and sunburn. At no time shall any plant show symptoms of water stress (caused by overwatering or underwatering), stunted growth, wilting, premature loss of leaves (for deciduous species), and premature yellowing of leaves (for deciduous species).

1.06 QUALIFICATIONS

A. The Contractor shall be responsible for demonstrating that he/she meets minimum qualifications as described in Section 00 41 05 Contract.

B. In the event that replanting is required during the Plant Establishment Period, the nursery that supplies the planting materials shall be a reputable nursery that specializes in and has the ability to provide native plants materials originating from similar montane vegetation with soils and climate as the project site, from an elevation within 1,500 feet of the project site elevation, and originating at or near the revegetation site, and/or east of the Sierra Nevada crest.

1.07 SUBMITTALS

A. Submit verification of the required minimum qualifications as specified herein for approval by the Engineer's Representative, within 5 days after the award of Contract.

B. Submit written Planting Guarantee as detailed in this Section no later than 5 days after the award of Contract.

C. Submit no later than 10 days after the award of Contract, 2 three-ring hard cover binders containing the following information:

1. List of all proposed materials and equipment to be used indicated by description, manufacturer and model number, if applicable. Include catalog cuts where applicable.

2. A copy of the procurement orders from other suppliers including the name, address, and phone number of said supplier and the estimated date(s) and quantities for delivery from the supplier.

3. Plant list.

    a. Plant quantities shown on the Drawings are for estimation only. Provide the actual planting quantities.

4. A schedule identifying plant material storage and anticipated installation dates for review and approval.

D. In the event that replanting is required during the Plant Establishment Period, submit no later than 30 days prior to replanting

1. A copy of the plant procurement order from the nursery including the name, address, and phone number of said nursery and the estimated date(s) and quantities for delivery from the nursery.

2. Compliance with State of California and federal quarantine restrictions.

E. Submit a 1-lb bag of wood mulch within 10 days before to the start of any planting-related work. Said sample shall be approved by the Engineer's Representative before ordering and performing work.

F. Provide and keep up to date at all times, a complete, full-size printed set of "red-lined" as-built drawings documenting the work carried out during the Installation Period. On or before the date of the Final Installation Acceptance, submit final as-built drawings as detailed herein.

G. Engineer's Representative will provide approvals or direction for any needed corrections within 10-days of receipt of said submittals.

1.08 SUBSTITUTIONS

A. Specific reference to manufacturers' names and products specified in this Specification are used as standards of quality. This implies no right to substitute other materials without prior written approval by the Engineer's Representative.

B. Any substituted materials installed without written approval by the Engineer's Representative may be rejected.

C. If an approval is granted for a substitution, adjustment in the Contract amount will be made in accordance with the Contract Conditions.

1.09 SAMPLES, TESTS AND MOCK-UPS

A. The Engineer's Representative reserves the right to take and analyze selected samples of plant material for conformity to this Specification at any time. Rejected plant material shall be removed from the site and be replaced at no cost.

1.10 PROJECT CONDITIONS

A. Perform planting operations only when weather and soil conditions are suitable in accordance with locally accepted practice.

1.11 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery

1. Deliver all planting materials with legible and durable identification labels.

2. Coordinate and schedule the collection and delivery of cuttings. The Contractor shall verify collection and delivery site conditions before the start of collection. Adhere to specific delivery requirements as described in Part 2 of this Section.

3. Notify the Engineer's Representative within 7 days of the delivery of plant materials to the site. Indicate the quantity and type of plant materials in each delivery.

4. At no time shall plant material be pruned, trimmed or topped before delivery.

B. Storage

1. Provide a storage site for the plant materials at the staging areas shown on the Drawings or as directed by the Engineer's Representative.

2. Store planting materials in the shade and protect from the weather.

3. Maintain and protect container and ground plants not planted within 4 hours of delivery.

4. Before installation, all cuttings shall be stored in such a manner as to prevent damage from heat, sunlight, wind or contact with vehicles, equipment, and tools that may cause abrasion to bark or buds. Protection from sun, frost, and wind may be necessary to preserve the health of the cuttings. Cuttings shall be maintained moist at all times.

5. Refer to Drawings and Section 31 11 00 Clearing and Grubbing for sod storage requirements.

C. Protection

1. Protect plants after delivery to the site in order to prevent damage to root balls or desiccation of leaves.

D. Handling

1. Take extreme care in the loading and unloading of plants. Do not lift or move container plants by their stems or trunks.

2. Handle all plant materials to ensure they are not damaged or subjected to excessive heat, wind or desiccation during storage, handling, and shipping.

3. Any plant materials that are damaged due to mishandling shall be removed and replaced with new material at no additional cost.

1.12 REJECTION OF PLANT MATERIAL

A. If due to Contractor practices during storage, handling, or installation of plant material it is found to not conform to the requirements herein, the plant material shall be considered defective and will be rejected.

B. The Engineer's Representative shall mark such plants, whether in place or not, as rejected.

C. Replacement plant material shall be of the same size, species and condition as that indicated on the Drawings.

D. Rejected materials shall be removed and disposed of according to State and local regulations by the Contractor at no additional cost. Rejected materials shall be replaced at no additional cost.

1.13 PROTECTION OF THE SITE

A. Protect previously installed work and materials which may be affected by work of this Section. Provide safeguards and exercise caution against injury or defacement of existing site improvements.

B. Repair damage and return the area to the previous condition at no additional cost.

1.14 COORDINATION

A. Coordinate operations with subcontractors, as well as other contractors on or adjacent to the project site.

B. Exercise extreme care in excavating and working near existing utilities. Repair any damages to these utilities at no additional cost. Locations of utilities shown on the Drawings are approximate. It is the responsibility of the Contractor to field verify the locations of existing utilities prior to commencing work.

C. Coordinate installation of all planting materials to avoid interference with utilities, other construction elements, and any existing vegetation.

D. The Contractor shall coordinate with the Engineer's Representative to schedule the placement of materials and equipment necessary to complete the work.

1.15 PLANTING GUARANTEE

A. All plant material installed under this Contract shall be guaranteed against poor, inadequate and inferior quality and installation for a period of one- year from the date of Final Project Acceptance, as specified in Section 32 98 00 Plant Establishment.

PART 2 – PRODUCTS

2.01 GENERAL

A. TRWC shall provide all container plantings required for the initial revegetation. Any plant materials required for replanting to meet performance standards or otherwise shall be provided by the Contractor.

B. Procure all materials and incidentals required for this project.

C. All plant material delivered to the site shall have a normal habit of growth and be well formed and shaped, healthy, vigorous, and free of any insects, diseases, sunscalds, windburn, abrasions of the bark, or other objectionable disfigurements.

D. The size of the plant material shall correspond with that normally expected for species and variety of commercially available nursery stock or as specified on the Drawings.

E. All plant materials shall be from local genetic stock originating from similar montane vegetation with soils and climate as the project site, from an elevation within 1,500 feet of the project site elevation, and originating at or near the revegetation site, and/or east of the Sierra Nevada crest, unless otherwise approved by the Engineer's Representative. Representative similar conditions are wetland, riparian and upland habitats found at or in the vicinity of the project site.

F. The use of plant material larger than that specified on the Drawings may be used, pending approval from the Engineer's Representative. However, there will be no change in the Contract amount if the larger plant material is approved and used.

G. All planting materials shall be shall be mold-free, air-dry, and certified weed-free by the County Agricultural Commissioner.

2.02 MATERIALS

A. Planting soil for all planting pits shall be existing topsoil that is amended according to Section 32 91 00 Planting Preparation.

B. Container Grown Stock

1. Container grown stock shall be in a vigorous and healthy condition and not root bound or with the root system hardened off.

2. Container sizes for specific plant species shall be as indicated on the Drawings. Plant container dimensions shall be as follows:

a.	Treepot4	=	4-inch square by 14-inch long
b.	Deepot	=	2½-inch diameter by 10-inch long
c.	Gallon	=	6-inch diameter by 7-inch deep
d.	3" pots	=	3-inch diameter by 2¼-inch deep

C. Cuttings

1. The Contractor shall harvest all required cuttings. Before the start of harvest operations, the Contractor shall confirm with the Engineer's Representative on site, the plant species to be collected as specified on Drawings. Cuttings shall be harvested an additional 6 inches longer than prescribed length to account for potential hammering damage.

2. Cuttings shall be harvested from within or immediately adjacent to the project site. If needed, cuttings shall be harvested from riparian habitats within the Martis Valley or Truckee watersheds, unless otherwise directed by the Engineer's Representative. At all times, harvest locations must be approved by the Engineer's Representative before the start of any harvesting.

3. Cuttings to be used for pole planting shall be harvested at a length of 4 feet (to account for potential hammering damage) with a caliper ranging from ½- to 1½-inches. Leaves, branches, and twigs shall be removed on each cutting immediately after harvesting the cutting from the source plant. The leaves, branches, and twigs shall be removed from the entire cutting, starting from the base and moving toward the top. At all times, vegetation shall be removed carefully to avoid damage to bark or any buds existing on the cutting.

4. With assistance from the Engineer's Representative, the Contractor shall obtain written approval from property owners before accessing their land for cutting collection operations. Copies of the written approval must be provided to the Engineer's Representative. The Contractor shall perform the operations in conformance to all codes and regulations of governing agencies and private parties having authority over the collection areas.

5. Donor plants shall be field verified for the Engineer's Representative's approval while said plants are in leaf (this period may be a few months before actual collection). At all times, diseased and unhealthy donor material shall be avoided. The Contractor shall identify plant material collection sites for approval by the Engineer's Representative before collecting any cuttings.

6. Cuttings shall be collected according to standard collection and nursery standards. Cuttings shall be from vigorous stock and free of insects and disease. The Contractor shall take special care not to collect propagation material from non-native species.

7. Cuttings shall be collected from various representative sources to ensure the genetic diversity and viability of the cuttings.

8. Cuttings shall be collected to minimize disturbance to the collection site. The source plant collection area shall be left able to physically and visually recover to undisturbed conditions within one year. At no time

shall material sources be denuded or stripped in excess of 25% of total branches. The Contractor shall contact the Engineer's Representative for direction if the required cutting species, type, or quantities cannot be collected, including major disease infestation, poor source plants, poor growth, or limited source plant population. The Engineer's Representative may choose to accept substitute stock to wholly or partially make up for any order deficit; the Contractor shall be responsible for finding substitutes from another source.

9. The cuttings shall be cut at a right angle at the wide end of the cutting. Cutting materials shall be harvested when the cuttings are dormant. All cuttings shall be hardened off green wood that is a maximum of 1-year-old growth.

10. To ensure cuttings are adequately dormant, cuttings should not be collected until after October 1 and before October 15. Cuttings shall not be collected when the air temperature is greater than 21°C (70°F). Cuttings shall be installed within 7 days of collection.

11. Immediately after removing the cuttings from a source plant, the cuttings shall be bundled, in quantities of 25 or 50, to facilitate counting. Bundles shall be marked with durable, waterproof labels indicating the correct plant botanical name and collection location. Each bundle shall be wrapped in burlap or other approved material that protects the cuttings from sunlight and allows air circulation within the bundle.

12. Immediately after removing the cuttings from a source plant and bundling, the cuttings shall be kept cool, at a temperature less than 60°F, and saturated in water immediately after collection and until just before installation.

13. Cuttings shall be stored in large containers that hold water. Alternately, the creeks on site may be used for temporary cutting storage as approved by the Engineer's Representative.

14. Immediately after cutting harvest and at the time of initial cutting storage in containers, apply rooting growth hormone according to manufacturer's recommendations. Rooting growth hormone shall be Hormex rooting powder, or approved equal.

15. The cuttings shall be delivered by the Contractor to the project site. Access to the site shall be as indicated on the Drawings. Delivery vehicles must have closed or covered beds to minimize windburn to cuttings during transport. Cuttings shall be delivered in bundles to the project site. The Contractor shall unload cuttings, placed in bundles as specified herein, at the project site to facilitate counting.

D. Wood Mulch

1. Wood mulch shall be walk-on type (1½-inch diameter) fir bark or shredded cedar mulch available through Redi-Gro Corporation, Sacramento (916/381-6063), or approved equal. Wood mulch shall be free of dirt, sticks, rocks, or other debris. At no time shall redwood bark be used.

E. Sod Blocks (and/or mats, strips) and Sod Plugs – Refer to Drawings for harvest, storage, and installation requirements.

F. Layout Stakes (to define limits of Revegetation Areas)

1. Layout stakes shall be 48-inch wood lath surveyor stakes, with a pointed tip on one end and topped with colored surveyor tape on the other end. The top 12 inches of the blunt end of all laths shall be spray painted with florescent colored paint. If the laths are used for multiple purposes, different colors shall be used to identify each specific purpose.

G. Revegetation Signs

1. Revegetation sign materials shall be constructed of new materials as prescribed and detailed on the Drawings.

PART 3 – EXECUTION

3.01 VERIFICATION OF EXISTING CONDITIONS

A. Before performing the work in this Section, examine previously installed work from other contractors at the project site (if any) and verify that such work is complete and as required, to the point where this installation may begin properly.

B. Planting areas shall be prepared according to Section 32 91 00 Planting Preparation.

C. Remove all rocks, stones, sticks and debris larger than 1-inch in diameter from the surface of the planting areas.

D. Obtain approval of finished grading performed under Section 32 91 00 Planting Preparation by the Engineer's Representative before starting planting operations.

3.02 SURFACE DRAINAGE OF PLANTING AREAS

A. Ensure proper drainage of all planting areas. Any discrepancy in the Drawings or Specifications, obstructions on the site or prior work done by another contractor that could preclude the establishment of proper drainage, shall be brought to the immediate attention of the Engineer's Representative for correction or relief of said responsibility. Failure to notify the Engineer's Representative of any drainage

issues will render the Contractor responsible for rectifying any issues due to improper drainage at no additional cost.

3.03 PREPARATION

A. Planting Layout

1. Verify the location and depth of all underground utilities.

2. If any underground construction or utility lines are encountered in the excavation of planting holes, alternative planting locations may be selected by the Engineer's Representative.

3. Locations for all plants shall be marked on the ground either by color-coded pin flags, flagged grade stakes, or field-marking paint indicating plant type and size, or the actual plants themselves for the Engineer's Representative's review and approval before planting. Plants will be located according to the layout shown on the Drawings.

3.04 CONTAINER PLANT INSTALLATION

A. General Planting Guidelines

1. Plant only as many plants as can be planted and watered on that same day within a given planting area.

2. Protect the planting areas from excessive vehicle compaction.

3. Face plant material with fullest growth into the prevailing wind and/or the primary direction of view. Wherever possible, plants shall be placed to north of large rocks, logs, and other obstacles that prevent planting but may provide some shelter during establishment.

4. Container plants shall be installed between September 1 and September 30.

B. Excavate planting pit to twice the depth of the container plant root ball as shown on the Drawings. Break up large clods and try to avoid the smooth-sided "bathtub" effect in the hole. Planting pits shall have vertical sides and roughened surfaces. The native soil should be soft and friable. Eliminate large rocks and clods from your backfill soil.

C. Planting Pit Settling: Before planting, the soil in each planting pit shall be settled. Settlement shall accomplished by either by repeated filling of the irrigation basins with 2 to 3 inches of standing water or by "jetting" said basins with a ¾-inch diameter PVC pipe at least 6 feet long, attached securely to a flexible hose. The free end of the PVC pipe shall be cut to a sharp angle and driven to the base of the planting hole. Water shall be run through the pipe as the end of the PVC pipe is

drawn up through the backfilled hole at a rate slow enough to allow full saturation of all of the soil in the basin. Repeated probing with the jet will be necessary to uniformly settle the soil. Upon the Engineer's Representative's approval, planting may proceed only after enough drainage and drying has occurred such that the soil structure is not damaged.

D. No soil amendment shall be added to any container plantings.

E. After the Engineer's Representative has approved the planting pit settling, backfill the planting pits with planting soil to attain the proper level for the plant. Set plant root ball atop the moistened backfill so that plant collar is 1" higher than finished grade. Plant containers shall be opened and removed in such a manner that the soil surrounding the rootball shall not be broken. Do not injure the root ball while removing the container. After removing plant, superficially cut edge roots with a knife on 3 sides.

F. Center plant material in the planting pit.

G. Apply planting soil to the planting pit up to 1/2 the height of the rootball. Add water to the top of the remaining planting pit and let soak in before completing the remainder of backfilling. Finish backfilling with planting soil of the planting pit by tamping the soil firmly around the rootball and watering thoroughly.

H. Water Retention Basins

1. After final backfilling, construct a water retention basin around the base of each tree and shrub planting (only) to a 30-inch diameter with backfill mix sufficient to hold 3-inches of water.

I. Wood Mulch Topdressing

1. Spread a 2-inch deep layer of wood mulch in all tree, shrub, and ground cover planting basins. (Mulch is not necessary for cuttings.)

J. Irrigate thoroughly, filling the basin with water and sprinkling around to settle backfill, mulch and berm. Allow to soak in and repeat.

K. Plant Settling

1. Any plant material that has settled deeper than the surrounding grade shall be raised to the correct level.

3.05 CUTTING INSTALLATION

A. To ensure cuttings are adequately dormant, cuttings should not be planted until after October 1 and before October 15.

B. At no time during cutting placement shall bark be scraped, roughed, or grinded; or buds be stripped. Damaged cuttings shall be removed off site according to State and local regulations; fresh, healthy cuttings shall be installed in place of damaged cuttings at no additional cost.

C. If planting adjustments are necessary, the Contractor shall proceed only after receiving approval from the Engineer's Representative for such adjustments. Planting holes for cuttings shall be excavated as detailed on the Drawings. Depending on the planting surface, it is expected that planting hole excavation may require, but may not be limited to, the use of one or more of the following methods: hand digging, pry bar, hydraulic bar with spade or chisel point, and/or auger.

D. Cuttings on slopes shall be installed vertically so that the narrow end is exposed above grade. All cuttings shall be installed with ⅔ of their length below grade. At no time will fertilizer be applied to cuttings. Whether the cuttings are hammered in place or not, the top 6-inches of each cutting shall be cut off to provide a fresh cut top; as prescribed in Part 2, the Contractor shall provide for extra cutting length to accommodate for the fresh cut; the resulting cutting length shall be as prescribed herein.

E. If necessary, the cutting planting hole shall be backfilled with planting soil. Backfill materials shall be tamped in place to completely encircle the cutting and leave no air pockets.

F. Cuttings shall be installed daily, ensuring that the number of cuttings distributed can actually be installed and watered. Protect the planting area from excessive vehicle compaction.

G. Cutting layout shall be at the density shown on the Drawings, and shall be located somewhat irregularly to avoid existing shrubs and to mimic a natural layout. Same species cuttings shall be placed in groups of 3 to 5 maximum in a given area.

H. Before the start of the Plant Establishment Period, the Contractor shall maintain a 2-foot diameter area around each cutting in a weed-free state (i.e., free of herbaceous vegetation and volunteer seedlings). Weeds shall be removed only by hand pulling or hoeing.

3.06 SOD INSTALLATION

A. The Contractor shall install and maintain sod at locations shown on the Drawings. The Contractor shall flag or otherwise field-mark all sod locations for approval before the start of sod installation.

B. Whenever possible, sod installation shall occur immediately after salvage. If possible, the sod salvage and installation operations shall occur in the latter part of September; the exact dates for salvage and installation operations shall be coordinated with and approved by the Engineer's Representative.

C. Sod salvage, installation, and establishment operations shall be conducted as indicated on the Drawings and as directed by the Engineer's Representative. Sod salvage and installation operations shall be conducted in coordination with other work on the project site.

D. Before installation, the Contractor shall excavate an area to accommodate the width and depth of the sod material without any resulting plant settlement. The Contractor shall ensure that sod installation areas are not compacted due to any construction operations before sod installation. Contractor shall carefully smooth out all surface irregularities that will be receiving sod, roll the area to expose soil depressions, and regrade as necessary. Water soil to a depth of 4-inches, 48 hours before sod placement. Verify that soil rehabilitation and related preparatory work have been completed before placing sod. Do not begin work until conditions have been approved by the Engineer's Representative.

E. Prior to sod placement, the graded soil surface shall be loosened to a minimum depth of four (4) inches. Biosol organic fertilizer (or equivalent) shall be applied at a rate of 500 lbs/acre to the loosened soil surface and incorporated into the soil to a depth of no more than two (2) inches by raking or other approved methods. Soil shall be irrigated within four (4) hours of sod placement and water shall have infiltrated to a minimum depth of four (4) inches prior to placement. In those locations shown on the Drawings where sod is to be placed on a rock substrate, two (2) inches of a clean sand substrate shall be placed on the soil surface, or adequate depth to create a smooth surface for sod replacement, and sod shall be placed directly on this sand substrate to minimize air space between the sod and soil substrate.

F. At all times, sod salvage shall be free of noxious weeds.

G. For sod mats, blocks, and strips, begin sod placement at the bottom of slopes. Sod shall be unrolled and placed parallel to the anticipated flow direction. Lay the first sod as strips along a straight baseline, parallel to the creek. Butt joints tightly but do not overlap the joints. On the second strip, stagger sod in a running bond pattern. Ends shall be keyed in place; coir logs shall be placed at the toe of the slope as detailed on the Drawings; coordinate as appropriate with installation of the coir logs. Use a sharp knife to cut the sod to fit irregular curved areas and any structures. Do not tear, stretch or drop sod during placement.

H. Sod mats, blocks, and strips shall be anchored with a minimum of 4 wood stakes per square yard, placed through the mats. The stakes shall be installed so that the top of the stake is 4- inches above the top of the mat with the notches on the stakes securing the top of the mats.

I. For sod plugs and small blocks (i.e. freshwater marsh blocks shall be cut into 1'x1' chunks), the plugs and small blocks shall be installed per container plant detail shown on plans (no watering basin shall be constructed for the sod plugs and small blocks).

J. Do not lay the entire amount of sod before start of watering. Water in lightly, where a relatively large area of sod has been placed. Sod shall be immediately watered after installation and shall be maintained moist throughout the Contract period. Keep sod moist during the first week after installation. After the first week, supplement rainfall to produce a total of 2-inches per day. Repeat watering at regular intervals until the sod establishes itself. Once the sod has become established, decrease the watering frequency and increase the amount of water per application.

3.07 WATERING

A. All container plants and cuttings shall be watered immediately after installation. After the first watering, water shall be applied to all plants to achieve continually moist conditions as required to keep the vegetation in a healthy and vigorous growing condition until the completion of the Installation Period.

B. Keep sod moist during the first week after installation. After the first week, supplement rainfall to produce a total of 2 inches per day. Repeat watering at regular intervals until the sod establishes itself. Once the sod has become established, decrease the watering frequency and increase the amount of water per application.

C. Watering shall continue during the Plant Establishment Period as prescribed in Section 32 98 00 Plant Establishment.

3.07 REVEGETATION SIGNS

A. The Contractor shall furnish and install revegetation signs at locations shown and as detailed on the Drawings, and as directed by the Engineer's Representative.

B. The Contractor shall stake, or otherwise field mark, all sign locations for approval by the Engineer's Representative before any installation.

C. Revegetation signs shall be installed at locations indicated on the Drawings, placed parallel to the top of bank of the creeks (flow of the creeks) and adjacent roads. The informational side of the sign shall face way from the creeks (flow of the creeks) and towards adjacent roads.

3.08 CLEANUP

A. Site cleanup shall occur on a daily basis and as each phase of the work concludes.

B. Remove all trash and excess dirt caused from the work according to State and local regulations. Contractor shall make arrangements for disposing of these materials outside the project site and shall pay all costs involved. Arrangements shall include, but not be limited to, entering into agreements with property owners and obtaining necessary permits, licenses, and environmental clearances.

C. Sweep all adjacent paved areas on a weekly basis throughout the duration of the project.

D. Repair all scars, ruts or other marks in the ground caused by the work.

E. Upon completion of the work, smooth all ground surfaces, remove excess dirt, materials, rubbish and debris according to State and local regulations to an offsite location or as directed by the Engineer's Representative. Sweep adjacent streets, curbs, and gutters and remove construction equipment from the premises.

3.09 SITE OBSERVATION BEFORE FINAL INSTALLATION ACCEPTANCE

A. Corrective actions shall be in strict conformance with the Drawings and these Specifications and according to the Engineer's Representative, and shall be completed at the Contractor's expense.

B. The Engineer's Representative will perform progress observations of the work and construction operations on completion of installation stages. The Engineer's Representative and the Contractor shall be agree upon the installation stages for this Specification before starting work and be present on mutually agreed-on dates for the observations for each stage.

C. If, after an observation, the Engineer's Representative is satisfied with the construction to date and its conformance to the Drawings and the Specifications, the Engineer's Representative will grant written notice of provisional acceptance for that construction stage.

D. If, after an observation, the Engineer's Representative is dissatisfied with the construction to date and its conformance to the Drawings and the Specifications, the Engineer's Representative will prepare a written punch list of necessary corrective action on defective work for that construction stage. All corrections must be completed and will be re-observed by the Engineer's Representative within 10 working days from the date of the initial observation.

E. Project observations shall not occur until all punch list items from previous observations are corrected. Failure to correct problems in the time specified by the Engineer's Representative may result in a delay of payment for the said tasks until the items in question are remedied per the Engineer's Representative's direction.

F. The Contractor shall be charged for any additional construction observations and punch lists required from the Engineer's Representative for unscheduled and necessary re-observation of the work due to unsatisfactorily or incompletely addressing previous punch lists.

3.10 SITE OBSERVATION SCHEDULE

A. Provide the Engineer's Representative with 48 hours of advance notification, except as otherwise noted, for required stage acceptance observations including, but not limited to, the following:

1. Field marking of all cutting collection locations.
2. Field markings of all sod salvage areas.
3. Field markings of all sod installation areas.
4. Areas prepared for sod installation for each type.
5. Progress sod installation for each type.
6. Completed sod installation for each type.
7. Cutting collection, delivery, and storage operations.
8. Plant materials after delivery to project site and before planting.
9. Plant locations layout before planting pit excavation.
10. Planting operations, one complete installation of each plant type/size before installation of remaining plants.
11. Progress container plant and cutting installation operations.
12. Completed container plant and cutting installation operations.
13. Revegetation sign field-marked locations for approval before installation.
14. Revegetation sign installation.
15. Substantial Completion Observation: Final installation observation before the start of the Plant Establishment Period. (Provide 10 working days of advance written notice).

3.11 FINAL INSTALLATION ACCEPTANCE

A. At completion of the Installation Period, schedule a Final Installation Acceptance observation with the Engineer's Representative. Provide 10 working days of advance written notice for the requested date.

B. The Engineer's Representative, Contractor, and others deemed necessary by the Engineer's Representative may be present at the Final Installation Acceptance observation.

C. Before requesting Final Installation Acceptance observation, all installation work shall be completed.

If during the Final Installation Acceptance observation the Engineer's Representative is of opinion that installation work has been substantially completed in accordance with the Drawings and Specifications, the Engineer's Representative shall provide written notice of recommendation to start the Plant Establishment Period.

D. If during the Final Installation Acceptance observation the Engineer's Representative is of opinion that installation work has not been substantially completed in accordance with the Drawings and Specifications, the Engineer's Representative will prepare a written punch list of necessary corrective action on defective work. All corrections must be completed by the Contractor and re-observed by the Engineer's Representative within 10 working days from the date of the initial Final Installation Acceptance observation. Written notice of recommendation to allow Contractor to be proceed to the Plant Establishment Period will not be provided until all corrective actions have been addressed.

E. Corrective actions shall be in strict conformance with the Drawings and Specifications and shall be completed at the Contractor's expense.

F. Following issuance of Final Installation Acceptance, the Plant Establishment Period shall begin.

END OF SECTION

SECTION 32 98 00

PLANT ESTABLISHMENT

PART 1 – GENERAL

1.01 SCOPE

A. After planting and seeding work have been completed, reviewed and accepted the Engineer's Representative, furnish materials, labor, transportation, services and equipment necessary to provide plant establishment as indicated on Drawings and as specified herein.

B. The Plant Establishment Period shall be a minimum of 2 years, beginning immediately after the Engineer's Representative gives written notice of Final Installation Acceptance and continuing until the Engineer's Representative gives written notice of Final Project Acceptance.

C. The intent for this project is to have healthy and vigorous, persistent plants and seeded areas at the end of the Plant Establishment Period that can survive without irrigation or other maintenance actions. Water shall be applied in a way that will allow for the "weaning off" of plants. Wherever possible, these plantings and seeded areas should consist of the original materials installed during the Installation Period.

D. Work included in this Section:

1. General Plant Establishment;
2. Maintaining Water Retention Basins;
3. Watering;
4. Non-native Invasive Plant Control;
5. Replacement Planting;
6. Seeded area establishment/reseeding;
7. Other Maintenance;
8. Record Drawings;

9. Plant Establishment Reports;

10. Cleanup;

11. Site Observation Before Final Project Acceptance;

12. Site Observation Schedule; and

13. Final Project Acceptance.

E. Work related in other Sections:

1. Section 01 78 29 As-built Survey;

2. Section 32 91 00 Planting Preparation;

3. Section 32 92 19 Seeding; and

4. Section 32 93 00 Planting.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. All federal, State, and local laws and regulations governing this work are hereby incorporated into and made part of this Section. When this Section calls for certain materials, workmanship or a level of construction that exceeds the level of federal, State, or local requirements, the provisions of this Section shall take precedence.

1.03 DEFINITIONS

A. Final Installation Acceptance: Final Installation Acceptance is the milestone when all installation work (i.e., all work except that required under this Section) is completed and approved by the Engineer's Representative.

B. Final Project Acceptance: Final Project Acceptance is the milestone when all work, including work under this Section, is completed and approved by the Engineer's Representative. Final Project Acceptance does not in any way release the Contractor from the requirements or duration of any guarantees as per the Specifications.

C. Healthy Plants: Healthy plants shall be those that are of good form, free of disease and insect infestation, are robust, and exhibit vigorous growth (foliage and wood). They must not be heat or water stressed.

D. Installation Period: The Installation Period begins when the Notice to Proceed (NTP) is given and continues until all requirements indicated in the Drawings and Specifications are completed and approved, and the Engineer's Representative gives a written notice of a Final Installation Acceptance.

E. Watering Season: The Irrigation Season refers to the beginning and ending dates for watering. It shall be June 1 to September 30, or adjusted depending on current weather patterns.

F. Plant Establishment Period: The Plant Establishment Period begins immediately after the Engineer's Representative gives a written notice of a Final Installation Acceptance and continues until the Engineer's Representative gives a written notice of a Final Project Acceptance.

G. Non-Native Invasive Plants: Non-native invasive plants shall include noxious weeds, weeds, and invasive plants; said species shall be those species not naturally occurring in the project region. Refer to the Truckee River Watershed Council's "Weed Warriors" program at http://www.truckeeriverwc.org/weed-warriors.

1.04 PERFORMANCE STANDARDS

A. Target Survival Rates.

1. The target survival rate for individual woody species container plants shall be a minimum of 80% survival for each growing year.

2. The target survival rate for individual herbaceous species container plants shall be a minimum of 50% survival for each growing year.

3. The target survival rate for all cuttings shall be a minimum 50% for each growing year within Plant Establishment Period.

4. The target survival rate for sodded and seeded areas larger than 400 square feet shall be 50% cover with native vegetation and free of non-native invasive plants throughout the growing season. Non-native invasive plant species shall be removed and disposed of, prior to flower set, as approved by the Engineer's Representative.

B. Other Standards

1. At no time shall any plants show symptoms of damaged foliage, disease, size, color, wilting, defoliation, and vandalism. At no time shall any plants show symptoms of disease, browsing by wildlife, insect damage, girdling, structural deformities, dieback, dry rootball, and sunburn. At no time shall any plant show symptoms of water stress (caused by overwatering or underwatering), stunted growth, wilting, premature loss of leaves (for deciduous species), and premature yellowing of leaves (for deciduous species).

2. No visible signs of on-going, excessive erosion, such as rills.

3. Biotechnical treatments (i.e. log, boulder, and sod-based structures) are stable and in place.

4. Project site planting areas shall have a typical (i.e., median) soil penetrability of less than 250 psi as measured at depths of 0- to 12-inches with a cone penetrometer.

5. At the soil surface, total cover of duff/mulch/pine needles plants, rock, and woody debris shall meet the following standards.

   a. Duff/pine needles shall have at least 90% cover during the first growing season, and at least 85% cover during the second growing season; however, if rocks and plant bases occupy more than 10% of the site, 5% of soil surface being bare will be acceptable.

   b. Overall cover of plants, mulch, rocks, and coarse woody debris shall be at least 90% (i.e., the cover of exposed soil shall be less than 10%). Rocks and woody debris greater than 3 inches in length and width count towards this cover percentage.

   c. Cover will be visually estimated by the Engineer's Representative. Measurements of cover at points along transects will be used to verify cover if deemed necessary by the Engineer's Representative.

1.05 REFERENCE STANDARDS

A. The Best Management Practices (BMPs) prescribed in the following document directly apply to the plant establishment work for this project. The BMPs are included as an Appendix to these Specifications.

   1. Cal-IPC. 2012. Preventing the Spread of Invasive Plants: Best Management Practices for Land Managers (3rd ed.). Cal-IPC Publication 2012-03. California Invasive Plant Council, Berkeley, CA. Available at www.cal-ipc.org. See http://www.cal-ipc.org/ip/prevention/PreventionBMPs_LandManager.pdf

   2. The Contractor shall conduct the plant establishment work for this project in conformance to Chapters 2, and 4 through 9 of and the checklists included in the BMPs.

B. The Truckee River Watershed Council's "Weed Warriors" program directly applies to the plant establishment work for this project; see http://www.truckeeriverwc.org/weed-warriors .

C. The Nevada & Placer Weed Management Area guidelines directly apply to the plant establishment work for this project; see http://www.cal-ipc.org/WMAs/Nevada_Placer_WMA.php

1.06 QUALIFICATIONS

A. The applicator of all non-native invasive plant control materials shall be licensed by the State of California as a Pest Control Operator and a Pest Control Advisor (PCA) in addition to any subcontractor licenses that are required.

1.07 SUBMITTALS

A. Submit to the Engineer's Representative at least 10 days before the start of the Plant Establishment Period, 2 bound booklets containing the following information:

1. A schedule of activities planned during the Plant Establishment Period. This schedule must be accepted by the Engineer's Representative before starting work under this Section. During the Plant Establishment Period, document scheduled changes and obtain acceptance by the Engineer's Representative.

2. A written watering schedule, including rate and length of application for each watering event over the duration of the Plant Establishment Period for approval.

3. The PCA shall submit a list of the non-native invasive plant control materials and quantities per acre intended for use in controlling the non-native invasive plant types prevalent and expected on the site. Non-native invasive plant control information shall include:

   a. Data to demonstrate the compatibility of the non-native invasive plant control materials and methods with the intended planting and seed varieties.

   b. A written list of the proposed herbicide application equipment to be used in performance of the non-native invasive plant control work, including descriptive data and calibration tests. Include the herbicide trade name, chemical composition, formulation, concentration, application rate of active ingredients and methods of application for all materials furnished, as well as the name and State license number of the State certified applicator.

   c. Records of manufacturer's literature, labels, and laboratory analytical data for verification of herbicide to be used, including the chemical makeup and application rate.

   d. Certificates of compliance certifying that herbicide materials meet the requirements specified shall be shall be submitted before the delivery of materials. Herbicide material shall include EPA registration number and registered uses.

   e. A Herbicide Treatment Plan (HTP) proposing a sequence of spot herbicide treatments and a written delivery schedule and written

PCA recommendation. The herbicide trade name, chemical composition, formulation, concentration, application rate of active ingredients and methods of application for all materials furnished, and the name and state license number of the state certified applicator shall be included. Records of manufacturer's literature, labels, and laboratory analytical data for verification of herbicide to be used, including the chemical makeup and application rate shall be submitted. Once approved by the Engineer's Representative, the Contractor shall receive written authorization to proceed with the treatment.

4. A list of materials that are to be used during plant establishment in written form to the Engineer's Representative for review and approval before purchasing or delivering to the site.

B. Replacement Materials

1. For all replacement container plants, submit a copy of the plant procurement order, as specified in Section 32 93 00 Planting. If the nursery is different than that TRWC used to supply the materials for the initial planting, submit the name, address, and phone number of the nursery. Submit all samples and testing results as required in Section 32 93 00 Planting.

2. For all replacement cuttings, submit a plan for collection following the collection requirements of Section 32 93 00 Planting. Include the plant species (by botanical and common name), sizes, and quantities to be collected. This plan must be accepted by the Engineer's Representative before collection proceeds.

3. For any reseeding materials, submit seed supplier's certification for required seed mixtures, indicating percentage by weight, and percentages of purity, germination and weed seed for each mix. Submit all samples and testing results as required in Section 32 92 19 Seeding. Submit a list of all proposed materials and equipment to be used indicated by description, manufacturer and model number, if applicable.

4. Submit a schedule for replacement materials work, including plant and/or seeding procurement, storage, anticipated delivery dates, and anticipated installation dates for review and approval.

C. Record Drawings

1. Provide and keep up to date at all times, a complete, full-size printed set of record drawings documenting the work performed during the Plant Establishment Period.

2. On or before the date of the Final Project Acceptance, submit final record drawings as detailed herein.

3. Refer to Section 01 78 29 As-Built Survey.

D. Plant Establishment Reports

1. Submit plant establishment reports for review during the progress observations.

E. Engineer's Representative's Review

1. Engineer's Representative will provide approvals or direction for any needed corrections within 10 days of receipt of said submittals.

1.08 PROTECTION OF THE SITE

A. Protect previously installed work and materials which may be affected by work of this Section. Provide safeguards and exercise caution against injury or defacement of existing site improvements.

B. Repair damage and return the area to the previous condition at no additional cost.

1.09 COORDINATION

A. Coordinate operations with subcontractors, as well as other contractors on or adjacent to the project site.

B. Exercise extreme care in excavating and working near existing utilities. Repair any damages to these utilities at no additional cost. Check existing utility drawings for existing utility locations.

C. Coordinate installation of all plant establishment work to avoid interference with utilities, other construction elements, and any existing vegetation.

D. The Contractor shall coordinate with the Engineer's Representative to schedule the placement of materials and equipment necessary to complete the work.

1.10 PLANTING GUARANTEE

A. All planting and seeding materials installed under this Contract shall be guaranteed against poor, inadequate and inferior quality and installation for a period of 2 years from the date of Final Project Acceptance.

1. Manufacturer's warranties shall not relieve the Contractor of its own liability under the Planting Guarantee. Such warranties shall only supplement the Planting Guarantee.

2. Replacement planting and seeding material shall also be guaranteed for a period of 1 year upon installation.

B. Replace at no additional cost and as soon as weather permits, all dead vegetation and all vegetation not found in a vigorous, thriving condition, as determined by the Engineer's Representative during and at the end of the guarantee period.

1. Replacement materials shall be installed as per the requirements of the replacement plant and reseeding area subsections detailed herein.

PART 2 – PRODUCTS

2.01 GENERAL

A. All plant establishment materials prescribed in this Section, including but not limited to replacement plants and seed mixes, shall be shall be mold-free, air-dry, and certified weed-free by the County Agricultural Commissioner.

2.02 MATERIALS

A. Provide materials and equipment for plant establishment work in accordance with requirements of 32 92 19 Seeding and 32 93 00 Planting, except as described herein.

1. Supply all replacement planting and seeding materials as required during the Plant Establishment Period. Replacement materials shall be of same species and size according to Sections 32 92 19 Seeding and 32 93 00 Planting, unless otherwise directed by the Engineer's Representative. Sources proposed for acquisition of replacement plant material must be approved by Engineer's Representative before acquisition. In no event shall plants of larger sizes than those originally planted be required.

B. Herbicide

1. Herbicide for all non-native invasive plants shall be non-selective, broad-spectrum, post-emergent, trans-locating herbicide with low toxicity to wildlife approved for use in and around aquatic habitats by the U.S. Environmental Protection Agency (EPA). Herbicide shall be of high grade quality and in perfect condition at time of installation. Select herbicides as appropriate for the desired effect (i.e., broadleaf herbicide to avoid harm to grasses). All herbicides shall be State and County approved for land or aquatic applications.

2. Herbicide shall be according to the PCA's recommendations and the HTP.

PART 3 – EXECUTION

3.01 GENERAL PLANT ESTABLISHMENT

A. Continuously maintain areas included in this Contract during the Plant Establishment Period until Final Project Acceptance has been granted.

B. Improper maintenance or possible poor condition of planting at termination of the scheduled final site observation may cause the Plant Establishment Period to be continued at no cost.

C. The Contractor shall be responsible for establishing and maintaining all plants, sod and seeded vegetation in a healthy condition throughout the Plant Establishment Period. The Contractor shall check the condition of each plant and seeded vegetation for symptoms of disease, size, color, wilting, defoliation, new growth, browsing by wildlife, insect damage, girdling, structural deformities, dieback, sunburn and vandalism and shall notify the Engineer's Representative of the corrective actions required.

D. General plant establishment operations shall include, but not limited to:

1. Maintaining planting. Sod, and seeding areas and irrigation systems (if Contractor chooses to install and use one) as described specifically herein.

2. Improper maintenance or possible poor condition of planting at termination of the scheduled final site observation may cause the Plant Establishment Period to be continued at no cost.

3. Providing debris removal in all planting, sod and seeding areas.

4. Maintain adequate protection of planting, sod and seeding areas. Repairing damaged areas.

5. Maintaining stability of biotechnical treatments.

6. Replacing all dead and severely stressed plants and other materials, as required and in accordance with the performance standards.

7. Maintaining all planting areas free of non-native invasive plants and removing said plants from entire project site. Cultivate at intervals of not more than 10 days.

8. Watering as necessary throughout the duration of the Plant Establishment period and up to the Final Project Acceptance, as necessary to meet the performance standards and success criteria.

9. Keeping up-to-date record drawings during the Plant Establishment Period.

E. The Contractor shall be responsible for 100% of the remediation efforts (to meet the requirements prescribed herein), except when remediation is required because of fire or vandalism in which case the Engineer's Representative will provide direction.

F. The Contractor shall ensure site drainage. At no time will ponding of water be allowed on the site (with the exception of meadow, wetland and other habitats expected to pond) because of local runoff.

3.02 MAINTAINING WATER RETENTION BASINS

A. Unless otherwise directed by the Engineer, maintain water retention basins around each container plant. As directed by the Engineer's Representative, modify the basin to ensure it is capable of containing the required amount of water at each watering event at one time. The lip (or earthen berm) of the basin shall be preserved to a height as shown on the Drawings. Maintenance actions may include importing soil, reforming, and re-compacting the lip (or earthen berm) of the basin. Should water be retained within a basin for more than 4-hours, breach the berm of said basin in order to provide drainage at a given plant, especially during the rainy season and at other times as necessary. Take corrective actions to ensure positive drainage at a given plant; the berm shall then be restored to reform the water retention basin as prescribed herein.

3.03 WATERING

A. The Contractor shall conduct weekly site evaluations of water application from June 1 to September 30, during the Plant Establishment Period. These evaluations shall include observing all plants for signs of inappropriate watering, including water stress (caused by overwatering or under-watering), stunted growth, wilting, premature loss of leaves (for deciduous species), and premature yellowing of leaves (for deciduous species).

B. Watering shall consist of the application of water in a manner that is sufficient to wet the soil and saturate the root zone and as frequent as necessary to maintain healthy growth, without damaging the plants, the surrounding grade or the existing watering basins.

C. Hand watering shall be provided for plantings not receiving water by way of irrigation systems or when irrigation systems are not chosen to be installed or used by the Contractor, and at other times as directed by the Engineer's Representative. Water shall be applied in an amount equal to the rates prescribed herein.

D. The schedule for watering shall be determined collaboratively by the Contractor and the Engineer's Representative. At all times, watering scheduling will be approved by the Engineer's Representative. The Contractor shall not change the watering schedule independently. The Engineer's Representative and Contractor

will meet at the project site as necessary to check and adjust watering scheduling. The frequency and duration of the watering will depend on current weather patterns and site-specific moisture conditions at each revegetation area. During transition periods (e.g., spring into summer, summer into fall) or during extreme heat or dry cold periods, site visits may be called weekly until a revised watering schedule is determined. During the year, quarterly observations will serve as the venue for irrigation adjustments. If modifications are made to the watering schedule, provide the Engineer with 2 copies of the adjusted watering schedule within 2 weeks of receiving the Engineer's verbal acceptance, plus subsequent written approval of the modifications.

1. The recommended schedule is to initially water plants and seeded areas at a rate of 2 inches per week, and then slowly wean the plants off of supplemental watering so that they will be persistent without supplemental watering.

2. At no time shall the watering occur in excess of 1 hour at an individual planting site (if irrigation system is used).

3. Water plants at a rate of 1-2-gallons/for each gallon size container plant per week applied in one event per week. Where applicable, planting basins shall be completely filled with water at each application. At all times, after each watering, the root zone around each plant shall be saturated to 1-foot depth across the entire width of the planting basin, minimum. At no time shall the watering occur in excess of 1 hour at an individual planting site (if irrigation system used).

E. The Contractor shall be responsible for observation and timely reporting of water deficiency or excess. Throughout warm weather conditions, the plants may require additional watering events. If most of the plants appear to be stressed and in danger of perishing, consult the Engineer's Representative within 24 hours to determine the frequency and duration of additional or decreased watering. Modify frequency and duration as approved within 24 hours. Assume full responsibility for corrective actions resulting from inappropriate water applications and failure to contact the Engineer's Representative for direction.

F. If exceptionally hot, dry weather continues past the scheduled shutdown date, the Contractor shall consult the Engineer's Representative to determine whether to continue watering the plants after the end of the Watering Season. If plants appear to be suffering from excessive irrigation water, the irrigation schedule is subject to reduction at the direction of the Engineer's Representative. Should watering be required in dry winter periods, said watering will be conducted as directed by the Engineer's Representative; said watering will be administered as a change order.

G. Water pressure shall be regulated to a level that applies sufficient water without causing damage to vegetation or erosion to the planting basin. At no time shall any water be applied in a way that will cause erosion, damage to plants, or excessive

runoff. Regulate watering times to minimize erosion and gullying. At no time will direct truck watering be allowed.

H. The temporary irrigation system shall be removed by the Contractor at the end of the Contract period, upon approval from the Engineer's Representative.

3.04 IRRIGATION SYSTEM MAINTENANCE (IF TEMPORARY IRRIGATION SYSTEM USED)

A. Following re-contouring of the meadow/pond areas, the areas to be revegetated are expected to retain more water in the soils for a longer period of time, with the expectation that supplemental watering following seeding may not be required following revegetation. However, this will depend on the weather and precipitation during following construction/revegetation.

B. If the Contractor determines they would like to install a temporary irrigation system for supplemental watering, the Engineer's Representative shall review and approve the proposed irrigation system design, water source, operating system, schedule, etc. prior to installation and operation of the irrigation system.

C. The irrigation systems shall be operated, at a minimum, for the first year of the Plant Establishment Period. The length and frequency of the irrigation cycles during the subsequent years of the Plant Establishment Period depend on the health and vigor of the plant material. The beginning and shutdown dates for the irrigation schedule may be similar to the first year of the Plant Establishment Period but will depend on the weather; the beginning and shutdown dates will be approved by the Engineer's Representative. If the majority of the plant material appears to be stressed and in danger of perishing, the Contractor shall consult the Engineer's Representative to determine the frequency and duration of any required watering during the subsequent growing seasons following the two year Plant Establishment Period.

D. Irrigation maintenance shall include examining the irrigation systems once every week during the Irrigation Season, including cleaning and adjusting spray sprinkler heads; repairing damaged equipment; testing each valve location to ensure that the irrigation systems are operational; and checking pipes for leaks or blocked lines.

E. At the end of each Irrigation Season, the Contractor shall winterize the system as follows:

1. Close gate valve in irrigation main line located at the irrigation point of connection;

2. Insert a quick coupling quill, connected to a compressor supplied by the Contractor, into the quick coupling valve located at the irrigation point of connection;

3. Following the start of the air compressor, program the irrigation controller through 3 complete cycles or until all water has been forced out of the system;

4. Insert a quick coupling quill into quick coupling valve located at dead-end runs of the main line to force out all trapped water; and

5. Remove the air compressor, leaving the gate valve to the irrigation system closed.

F. The Contractor shall operate and make any necessary repairs to the irrigation systems to ensure the system is efficient in watering to meet performance standards.

3.05 NON-NATIVE INVASIVE PLANT CONTROL

A. Non-native invasive plant control shall consist of maintaining the individual planting sites, areas between individual planting sites, and all areas within planting areas (as shown on the Drawings) free of non-native invasive plants for the duration of the Plant Establishment Period. Non-native invasive plant control shall also consist of maintaining the seeded areas to meet the performance standards specified herein.

B. The primary goal is to control non-native invasive plants before they produce viable seed.

C. Personnel performing non-native invasive plant control shall be trained to identify species installed as part of the Contract and shall remove, within planting basins, only those plants that were not planted as part of the Contract. Installed plants or any native plant volunteers shall not be damaged by non-native invasive plant control operations. However, seeded plants are to be treated as non-native invasive plants inside watering basins.

D. Observe the project site a minimum of once every three weeks during the growing season (April 1 through November 1, or weather permitting) of the Plant Establishment Period to evaluate potential non-native invasive plant problems. Any non-native invasive plant species shall be targeted for removal and long-term control through manual or chemical methods. Manual removal by hand-pulling shall be the preferred non-native invasive plant eradication method.

1. Mechanical methods (such as mowing) or spot herbicide applications may be considered upon receipt of an HTP and approval from the Engineer's Representative before application. If approved, herbicide applications shall be conducted according to the approved HTP and under the direction of the Engineer's Representative. At no time shall non-native invasive plant control include burning.

2. Avoid frequent soil cultivation that destroys shallow surface roots.

3. Replenish lost mulch to reduce non-native invasive plant growth.

4. Non-native invasive plants that grow within the planting basins and on the basin berms shall be removed before reaching 4-inches in height or before covering 30% of the planting basin or equivalent area. All non-native invasive plant control in the planting basins shall be performed by hand pulling. At no time shall herbicide or mechanical methods be used to control non-native invasive plants in the basin areas. Non-native invasive plant removal shall not cause disruption to the root systems and aboveground structure of the installed plants and basins.

E. Non-native invasive plant species in or near the project area include, but are not limited to, the following species:

Scientific Name		Common Name
Agropyron	*cristatum*	crested wheatgrass
Alopecurus	*pratensis*	meadow foxtail
Astragalus	*cicer*	cicer milkvetch
Bromus	*tectorum*	cheatgrass
Carduus	*nutans*	Musk thistle
Cirsium	*vulgare*	bull thistle
Chenopodium	*album*	lamb's quarter
Convolvulus	*arvensis*	field bindweed
Decurania	*sophia*	herb sophia
Festuca	*arundinacea*	tall fescue
Humulus	*lupulus*	common hop
Lactuca	*serriola*	prickly lettuce
Leucanthemum	*vulgare*	oxeye daisy
Melilotus	*albus*	white sweat clover
Melilotus	*officinalis*	yellow sweat clover

Poa	*bulbosa*	bulbous bluegrass
Polygonum	*aviculare*	prostrate knotweed
Salsola	*tragus*	prickly Russian thistle
Sisymbrium	*altissimum*	tumble mustard
Taraxacum	*officinale*	dandelion
Tragapogon	*dubius*	false salsify
Verbascum	*thapsis*	woolly mullen

F. Non-native invasive plants shall be removed within 7 days of when they are first observed.

G. Non-native invasive plants shall be removed according to Cal-IPC BMPs, the Truckee River Watershed Council's "Weed Warriors" program, and the Nevada & Placer Weed Management Area guidelines.

1. Before any non-native invasive plant removal, the Contactor shall complete the following training and activities, and submit completed Cal-IPC BMP checklists for said training and activities:

a. Checklist B: Routine Vegetation Management

b. Checklist D: New Project - Implementation

c. Checklist E: Inspection & Cleaning

H. The Contractor shall distinguish non-native invasive plants from Noxious List A, B and C species, and non-native invasive plants that are not on said lists. Refer to Truckee River Watershed Council's "Weed Warriors" program and Nevada & Placer Weed Management Area guidelines referenced in these Specifications for the noxious species lists. Contact the Truckee River Watershed Council's "Weed Warriors" program for additional direction.

1. The Contractor shall remove Noxious List A and B species from site-specific revegetation locations from within project and temporarily placed within the project staging areas; said plants will be removed off site and disposed of by Nevada County to an approved disposal yard. At all times, the Contractor shall document and report all non-native invasive plants from the Noxious List A and B species to the Truckee River Watershed Council's "Weed Warriors" program. At all times the Contractor shall be responsible for coordinating the removal, disposal and reporting with the

Truckee River Watershed Council's "Weed Warriors" program and Nevada County.

2. The Contractor shall remove Noxious List C species, and other non-native invasive plants that are not Noxious List A, B and C species, from site-specific locations from within project. The Contractor shall conduct the removal according to the "Bag and Bake" disposal method summarized below:

    a. Excavate plants with flowers or seeds, removing as much root as is practical;

    b. Double bag seeds and flower parts using strong plastic yard waste bags, a minimum of 6 ml thickness; do not use "green bags" that are to be used for composting and redistribution;

    c. Spray plants with a 50% dish soap / 50% water solution;

    d. Tie the bag and leave out in sun to decompose (for a minimum of two months);

    e. Dispose the bags offsite according to State and local regulations; and

    f. Observe site for regrowth of invasive weeds from remaining rootstock and seedlings; repeat the "Bag and Bake" disposal method as needed.

I. The Contractor shall use staging areas shown on the Drawings for cleaning equipment and related activities for non-native invasive plant removal; equipment shall be cleaned before and after leaving the each site specific revegetation area. Refer to the Cal-IPC BMP checklists.

3.06 REPLACEMENT PLANTING

A. Plant material replacement shall be in strict conformance to the Drawings, these Specifications, and the Engineer's Representative's direction, and shall be completed at no additional expense. Installation and materials shall be a prescribed in Section 32 93 00 Planting.

B. Plant material that has no easily observable viable aboveground living matter or is of consistently poor vigor and form shall be considered dead, unless otherwise directed by the Engineer's Representative. Any herbaceous vegetation that fails to show new growth from its root system after one dormant period and within the first 9 months after planting will be considered dead.

C. Replace dead plants according to the Drawings and the Specifications at a rate of replacement that will meet the performance standards described herein. Dead

plants shall be removed before installation of replacement plants. All dead plants shall be removed offsite according to State and local regulations at no additional expense.

D. All materials determined to be salvaged shall be handled and removed with care. All replacement plant containers and racks shall be salvaged and recycled offsite or returned to the suppliers at no additional cost.

3.07 SEEDING AND SOD AREA ESTABLISHMENT/RESEEDING AREAS

A. Seeded and sod area establishment shall include the seeding and sod areas as shown on the Drawings. Seeding and sod area establishment shall be in coordination with weed control maintenance according to this Specification Section.

B. Reseeding shall be in strict conformance to the Drawings, these Specifications, and the Engineer's Representative's direction, and shall be completed at no additional expense. Installation and materials shall be a prescribed in Section 32 92 19 Seeding.

C. Herbaceous vegetation that fails to show new growth from its root system after one dormant period and within the first 9 months after planting will be considered dead.

D. The Contractor shall reseed areas larger than 400 square feet with less than 15% cover by target species with a modified seed mix (a mix comparable in cost) submitted by the Contractor to the Engineer's Representative for approval.

E. Reseeding shall be conducted in the seeding and sod areas to meet the performance standards described herein. Dead vegetation shall be removed before reseeding. All dead vegetation shall be removed offsite according to State and local regulations at no additional expense.

F. At no time shall fertilizer be applied to reseeding areas.

3.08 OTHER MAINTENANCE

A. Coordinate with the Engineer's Representative to provide any remedial actions or field-design adjustments necessary to ensure that the performance standards as specified herein are being met.

B. Work necessary to meet the performance standards as specified herein shall be completed at no additional cost.

3.09 RECORD DRAWINGS

A. Provide and keep up to date at all times, a complete set of full size, blue line bond print record drawings, which shall be corrected as needed to show every change during the Plant Establishment Period from the final as-built drawings completed as specified in Section 32 93 00 Planting. The record drawings shall also show the exact installed locations, sizes, and kinds of materials and equipment used during the Plant Establishment Period. Record drawings shall be retained on the site.

B. Each record drawing shall include the following:

1. A legend listing all materials used;

2. Any features installed as results from change orders or field instructions;

3. Any known areas not installed as design;

4. Record of any areas that wildlife activity was noticed;

5. Percentage of plant survival and provided information of areas that required replanting;

6. Percentage of seeding survival and provided information of areas that required reseeding;

7. For replacement plantings, include the plant species, quantities, and sizes;

8. For reseeding areas, include the species and types of the reseeding areas;

C. Record progress sheets shall be updated daily as the work proceeds, showing the work as actually installed, and shall be the basis for measurement and payment for work completed. Record progress sheets shall be available at all times for observation and shall be kept in a location easily accessible to the Engineer's Representative. In the event that the progress sheets are not available for review or not current at the time of any site visit by the Engineer's Representative, it will be assumed that no work has been completed and the Contractor will be assessed the cost of that site visit at the current billing rate of the Engineer's Representative. No other site observations shall take place without prior payment of this assessment.

D. Make neat and legible notations on the record progress sheets. The relocated equipment and dimensions will then be transferred to the final record drawings at the proper time.

E. Before the date of the Final Project Acceptance, transfer all information from the progress sheets to final record drawings prepared as "red-lined" mark-ups on the original contract drawings; said record drawings shall be submitted to the

Engineer's Representative for approval. Address any comments and make any revisions to the record drawings before the Final Project Acceptance.

F. On or before the date of the Final Project Acceptance, deliver the corrected and completed record drawings to the Engineer's Representative. Delivery of the record drawings will not relieve the Contractor of the responsibility of furnishing required information that may have been omitted from the record drawings.

G. The final record drawings shall be to scale and reproducible.

3.10 PLANT ESTABLISHMENT REPORTS

A. Plant establishment activities, including, but not limited to watering, pruning, non-native invasive plant control, and repairs to biotechnical treatments shall be logged on a weekly basis in conjunction with the weekly site observations for irrigation, non-native invasive plant control, and biotechnical treatments, and other maintenance submitted for review during the progress observations.

3.11 CLEANUP

A. Site cleanup shall occur on a daily basis and as each phase of the work concludes.

B. Remove all trash and excess dirt caused from the work according to State and local regulations. Contractor shall make arrangements for disposing of these materials outside the project site and shall pay all costs involved. Arrangements shall include, but not be limited to, entering into agreements with property owners and obtaining necessary permits, licenses, and environmental clearances.

C. Sweep all adjacent paved areas on a weekly basis throughout the duration of the project.

D. Repair all scars, ruts or other marks in the ground caused by the work.

E. Upon completion of the work, smooth all ground surfaces, remove excess dirt, materials, rubbish and debris according to State and local regulations to an offsite location or as directed by the Engineer's Representative. Sweep adjacent streets, curbs, and gutters, and remove construction equipment from the premises.

F. Upon conclusion of the Plant Establishment Period, the Contractor shall completely remove and recycle the irrigation systems off site according to State and local regulations.

3.12 SITE OBSERVATION BEFORE FINAL PROJECT ACCEPTANCE

A. Corrective actions shall be in strict conformance with the Drawings and these Specifications and according to the Engineer's Representative, and shall be completed at the Contractor's expense.

B. The Engineer's Representative will perform progress observations of the work and construction operations on completion of installation stages. The Engineer's Representative and the Contractor shall be agree upon the installation stages for this Specification before starting work and be present on mutually agreed-on dates for the observations for each stage.

C. If, after an observation, the Engineer's Representative is satisfied with the construction to date and its conformance to the Drawings and the Specifications, the Engineer's Representative will grant written notice of provisional acceptance for that construction stage.

D. If, after an observation, the Engineer's Representative is dissatisfied with the construction to date and its conformance to the Drawings and the Specifications, the Engineer's Representative will prepare a written punch list of necessary corrective action on defective work for that construction stage. All corrections must be completed and will be re-observed by the Engineer's Representative within 10 working days from the date of the initial observation.

E. Project observations shall not occur until all punch list items from previous observations are corrected. Failure to correct problems in the time specified by the Engineer's Representative may result in a delay of payment for the said tasks until the items in question are remedied per the Engineer's Representative's direction.

F. The Contractor shall be charged for any additional construction observations and punch lists required from the Engineer's Representative for unscheduled and necessary re-observation of the work due to unsatisfactorily or incompletely addressing previous punch lists.

3.13 SITE OBSERVATION SCHEDULE

A. Progress observations of the plant establishment work shall be one per month. The Engineer's Representative and the Contractor shall agree upon a regular day and time for the monthly observations.

B. An annual observation will occur in August of each year of the Plant Establishment Period. The Engineer's Representative will prepare a list confirming the number of live and dead plants of each species by location, as well as the percent coverage of native plants in the seeding areas.

3.14 FINAL PROJECT ACCEPTANCE

A. At completion of the Plant Establishment Period, schedule a Final Project Acceptance observation with the Engineer's Representative. Provide 10 working days of advance written notice for the requested date.

B. The Engineer's Representative, Contractor, and others deemed necessary by the Engineer's Representative may be present at the Final Project Acceptance observation.

C. Before requesting Final Project Acceptance observation, all plant establishment work shall be completed.

D. If during the Final Project Acceptance observation the Engineer's Representative is of opinion that plant establishment work has been completed in accordance with the Drawings and Specifications, the Engineer's Representative shall provide written notice of Contractor release from the project. Substantial completion of the work includes meeting the performance standards as stated herein.

E. If during the Final Project Acceptance observation the Engineer's Representative is of opinion that plant establishment has not been substantially completed in accordance in accordance with the Drawings and Specifications, the Engineer's Representative will prepare a written punch list of necessary corrective action on defective work. Corrective actions to meet performance standards may include, but are not limited to, additional non-native invasive plant control, additional planting and/or additional seeding, All corrections must be completed by the Contractor and re-observed by the Engineer's Representative within 10 working days from the date of the initial Final Project Acceptance observation. Written notice of Contractor release from the project shall not be issued until all corrective actions have been addressed.

F. Corrective actions shall be in strict conformance with the Drawings and Specifications and shall be completed at the Contractor's expense.

END OF SECTION

SECTION 35 42 35

BOULDER STRUCTURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Boulder outlet structure

B. Rock slope protection

C. The work of this section does not include:

1. Trenching, compacting original ground, or scarifying sub grade will not be measured separately for payment, and all costs in connection therewith will be considered incidental to the construction of the boulder structures.

2. Sub grade and bearing-foundation preparation, including placement of channel bed material, will not be measured separately for payment, and all costs in connection therewith will be considered incidental to the construction of the boulder structures.

3. Re-handling of stockpiled material will not be measured separately for payment, but will be considered incidental to the work to which it pertains.

1.02 RELATED SECTIONS

A. Section 01 35 44 Environmental Requirements

B. Section 01 71 23 Layout and Staking

C. Section 31 00 00 Earthwork

1.03 DEFINITIONS

A. Boulder outlet structure: A weir made of carefully selected boulders placed to control outflow from the Ponderosa Golf Course irrigation pond (referred to on Plans as TDRPD Pond).

1.04 SUBMITTALS

A. General: Submit as per the requirements of the Contract provisions.

B. Samples:

1. Boulders: Submit three (3) boulders or 5" x 7" color photographs of all sides of three boulders, in sizes representative of the range specified to the Engineer's representative ten (10) days before commencing work on the rock slope protection. If photographs are submitted, photographs shall include a person to show scale.

2. Well-graded gravel mixture: Refer to Section 31 00 00 for sample and acceptance requirements.

C. Delivery Tickets: Submit a delivery ticket with each load of imported posts and channel bed material delivered to the site, stating the type of material and the quantity.

1.05 QUALITY CONTROL

A. Tolerances:

1. Construct finished surfaces to plus or minus 1 inch of the elevations indicated.

2. Complete embankment slopes to plus or minus 6 inches of the slope line indicated.

3. The diameter of any boulder measured along its largest axis shall not exceed the diameter measured along its smallest axis by more than a factor of three.

1.06 SITE CONDITIONS

A. Unfavorable Weather Conditions:

1. Trenching, and placement of well-graded gravel mixture or boulders shall not be performed during weather conditions which might damage or be detrimental to the condition of existing ground, in-progress work, or completed work.

B. Prevention of Erosion: Comply with requirements specified in Section 01 35 44 Environmental Requirements, the Project SWPPP, and the following:

1. Prevent erosion of stockpiles, ditches, embankments, filled, backfilled, and graded areas until such time as permanent drainage and erosion control measures have been installed.

2. Perform "protective grading" to provide positive drainage and to minimize ponding of surface water.

PART 2 - PRODUCTS

2.01 BOULDERS

A. All boulders may be sourced from within the project site. There are far more suitable boulders on site than what is needed to construct the boulder structures. It is important for the success of boulder structures—particularly the boulder outlet structures—that individual boulders fit together tightly to minimize void spaces among boulders that would lead to piping. The Contractor shall carefully evaluate all of the available boulders and separately stockpile boulders for the boulder structures.

B. General: Boulders proposed for the construction of boulder structures shall have an average diameter of 2.5 feet in all directions, and shall be approved by the Engineer's Representative.

C. Satisfactory Boulder Type: Boulders can be composed of a variety of rock types typically used in construction such as igneous rocks (granite, diorite, basalt, andesite). Rocks should have no cracks, bedding planes, or other weaknesses. Rocks should not have cracks filled, or healed, with calcite. Boulders shall not be riprap and shall have rounded edges.

2.02 WELL-GRADED GRAVEL MIXTURE

A. Well-graded gravel mixture shall conform to the type indicated on the Drawings and described herein and to the specifications in Section 31 00 00 – Earthwork.

2.03 CUTTINGS

A. Cuttings shall conform to the type indicated on the Drawings and described in Section 32 93 00 Planting.

2.04 SOD

A. Sod shall conform to the type indicated Section 31 11 00 Clearing and Grubbing. Sod shall only be sourced from onsite clearing and grubbing operations, and shall not be purchased or imported from offsite.

2.05 FILTER FABRIC

A. Filter fabric shall conform to the type indicated in Section 32 18 00 Paths and Trails.

PART 3 - EXECUTION

3.01 STAKING AND GRADES

A. Lay out the work, establish all necessary markers, bench marks, grading stakes, and other stakes as required, in accordance with the requirements specified in Section 01 71 23 Layout Staking.

3.02 BOULDER OUTLET STRUCTURE

A. Boulder outlet structures shall be constructed to the dimensions and at the locations indicated on the Drawings.

B. Boulder outlet structures shall be constructed prior to the portion of the puncheon style walking path located downstream of the boulder outlet structure.

C. The Contractor shall complete the first installation of a boulder outlet structure with the Engineer's Representative present such that specific construction methods and tolerances are agreed upon. No further structures shall be constructed without the approval of the Engineer's Representative on the first structure.

D. Trenching, placement of sub grade material and placement of the boulders shall be such that the elevation of the top of the uppermost course of boulder conform to the elevations shown on the Drawings. Finished elevations shall be within plus or minus 1 inch of the elevations shown on the Drawings.

E. Trenching shall be completed to the required depth after which the subgrade shall be compacted to 90 percent relative compaction. Boulders shall be placed on top of the sub grade by mechanical means. Dumping shall not be an allowable placement method. Carefully select boulders so each boulder makes firm contact with adjacent boulders.

F. Firmly seat the boulders into the subgrade with the back of an excavator bucket. Void areas exceeding 3 inches between rocks shall be filled by hand-chinking with appropriately-sized material from the well-graded gravel mixture.

G. Place well-graded gravel mixture as shown on the Drawings and mechanically compact until no movement is observed in the surface.

H. Backfill the remaining portion of the boulder trench in 4-inch lifts maximum, compacting each lift until the surface is unyielding. Finish the boulder trench with a sod strip. Press the sod strip firmly into place by hand or with light equipment to form a tight seal along the upstream side of the boulder outlet structure.

I. Fine grade and revegetate as shown on the Drawings.

END OF SECTION

SECTION 35 42 41

LOG STRUCTURES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Log flow spreader

B. Flow dispersal log

C. Ditch stabilization log

D. Log weir

E. Notched berm

F. The work of this section does not include:

1. Trenching, compacting original ground or scarified sub grade will not be measured separately for payment, and all costs in connection therewith will be considered incidental to the construction of the log structures.

2. Sub grade and bearing-foundation preparation, including placement of channel bed material, will not be measured separately for payment, and all costs in connection therewith will be considered incidental to the construction of the log structures.

3. Re-handling of stockpiled material will not be measured separately for payment, but will be considered incidental to the work to which it pertains.

1.02 RELATED SECTIONS

A. Section 01 71 23 Layout and Staking

B. Section 02 41 00 Demolition

C. Section 31 00 00 Earthwork

D. Section 32 93 00 Planting

1.03 DEFINITIONS

A. Log flow spreader: A grouping of logs placed across an existing channel to backwater flow and direct diffuse flow to the adjacent meadow area.

B. Flow dispersal log: A log embedded for most of its diameter and oriented with its longitudinal axis parallel to contours; the purpose is to discourage flow concentration by diffusing flow.

C. Ditch stabilization log: A log oriented perpendicular to an existing ditch with its ends embedded in the existing banks for most of its diameter; the purpose is to help hold soils placed in the ditch upstream and downstream of the log.

D. Log weir: A grouping of logs placed around the inlet of an existing culvert; one of the logs has a saw cut weir with slots to place boards so water levels in the meadow upstream of the log weir may be adaptively managed.

E. Notched berm: An existing berm graded at its midpoint to the elevation of the surrounding drainage course so it no longer impounds runoff; the notch is reinforced with an embedded, on-grade log as well as boulders.

1.04 SUBMITTALS

A. General: Submit under as per the requirements of the Contract provisions.

B. Samples:

1. Logs: The Contractor shall submit one representative 5” X 7” color photograph of each of the various log types specified in Part 2 herein to the Engineer’s Representative fifteen (15) days before commencing work. Pressure treated or otherwise chemically treated logs will not be allowed under any circumstances. All photos shall include a person for scale.

2. Well-graded gravel mixture: Refer to Section 31 00 00 Earthwork for sample and acceptance requirements.

3. Boulders: Refer to Section 35 42 35 Boulder Structures for sample and acceptance requirements.

C. Delivery Tickets: Submit a delivery ticket with each load of imported logs delivered to the site, stating the log class(es) and the quantity.

1.05 QUALITY CONTROL

A. Tolerances: Place logs and construct other finish surfaces of work described in this Section to plus or minus 3 inches of the elevations indicated on the Drawings.

1.06 SITE CONDITIONS

A. Unfavorable Weather Conditions:

1. Trenching, and placement of channel bed material or posts shall not be performed during weather conditions which might damage or be detrimental to the condition of existing ground, in-progress work, or completed work.

B. Prevention of Erosion: Comply with requirements specified in Section 01 35 44 Environmental Requirements, the Project SWPPP, and the following:

1. Prevent erosion of stockpiles, ditches, embankments, filled, backfilled, and graded areas until such time as permanent drainage and erosion control measures have been installed.

2. Perform "protective grading" to provide positive drainage and to minimize ponding of surface water.

PART 2 - PRODUCTS

2.01 LOGS

A. General:

1. Logs shall first be obtained from material salvaged onsite during clearing operations, and by means described in Section 02 41 00 Demolition. Additional logs may be obtained from locations within the Truckee-Tahoe area.

2. Logs shall be portions of pine, fir, or cedar trees and shall be sound, free from rot or infestation by insects, and free from adhered dirt, litter, or other material.

3. Cuts shall be smooth, without breaks or jagged edges.

4. Logs shall not have weaknesses such as cracks and splits through more than 25 percent of the log diameter.

5. Unless otherwise noted, logs shall be generally straight, and shall be trimmed so that branches protrude no more than 6 inches from the trunk.

6. Where logs are specified to have their rootwad attached, the diameter of the rootwad fan shall be no less than 4 feet, and trimmed to be no greater than 8 feet. Rootwads shall be thoroughly cleaned of adhered dirt, litter, or other material prior to delivery to the project site.

B. Satisfactory logs shall conform to the following types:

1. Class 1 logs shall be 18 feet long, and 12 to 18 inches in diameter.

2. Class 2 logs shall be 12 feet long, and 18 to 24 inches in diameter.

3. Class 3 logs shall be 9 feet long, 18 to 24 inches in diameter, and shall be saw cut as shown on the Drawings.

4. Class 4 logs shall be 18 feet long, 12 to 18 inches in diameter, and shall have their rootwad attached.

5. Class 5 logs shall be 24 feet long, have a diameter of 20 to 30 inches, and shall have their rootwad attached.

6. Class 6 logs shall be 12 to 24 feet long, and 6 to 8 inches in diameter.

2.02 WELL-GRADED GRAVEL MIXTURE

A. Well-graded gravel mixture shall conform to the type indicated on the Drawings and described herein and to the specifications in Section 31 00 00 Earthwork.

2.03 CUTTINGS

A. Cuttings shall conform to the type indicated in Section 32 93 00 Planting.

2.04 SOD

A. Sod shall conform to the type indicated Section 31 11 00 Clearing and Grubbing. Sod shall only be sourced from onsite clearing and grubbing operations, and shall not be purchased or imported from offsite.

2.05 BOULDERS

A. Boulders shall conform to the type indicated in Section 35 42 35 Boulder Structures.

PART 3 - EXECUTION

3.01 GENERAL

A. Log structures shall be constructed to the dimensions and at the locations indicated on the Drawings and within the tolerances specified herein.

B. The Contractor shall complete the first installation of each of the five different types of log structures with the Engineer's Representative present such that specific construction methods and tolerances are agreed upon. No further structures shall be constructed without the approval of the Engineer's Representative on the first structure of each type.

C. Trenching, placement of sub grade material and placement of the logs shall be such that the elevation of the top of each log conforms to information on the Drawings. The depth of trenches shall be determined in the field, based on the information on the Drawings, the size of the log, and site-specific field conditions.

D. Logs shall be placed on top of the subgrade (be it channel bed material or native soils) by mechanical means or hand placement.

E. Carefully select logs that best conform to site-specific conditions, these Specifications, and tolerances herein.

F. For structures consisting of multiple logs, all voids exceeding 3-inches between logs shall be chinked using appropriately sized materials selected from the channel bed material mixture.

G. Cuttings shall be placed after installation on log structures as shown on the Drawings.

H. Place harvested sod as shown on the Drawings and per the direction of the Engineer's Representative.

3.02 STAKING AND GRADES

A. Lay out the work, establish all necessary markers, bench marks, grading stakes, and other stakes as required, in accordance with the requirements specified in Section 01 71 23 Layout Staking.

B. Final placement of log structures shall be subject to fine tuning at the direction of the Engineer's Representative.

3.03 LOG FLOW SPREADER

A. The two footer logs of the log flow spreader shall be buried to a minimum depth of one half their diameter measured below the invert of the existing channel. Seat logs firmly in place into the subgrade with the back of an excavator bucket. If there is a conflict between this criteria and the dimensions indicated on the Drawings, immediately contact the Engineer's Representative for field adjustment.

B. Place the top log and two wing logs so the elevations along the top of the structure are as uniform as possible, and vary by no more than 1 inch. Miter log ends as shown on the Drawings and minimize void space between logs to the extent practicable.

C. Backfill the trench and the downstream side of the former channel with rehabilitated soils as shown on the Drawings and compact with track equipment.

D. Hand grade around the log diversion structure so there is no pooling and so drainage is directed toward the former channel.

3.04 FLOW DISPERSAL LOG

A. Where the Drawings indicate a flow dispersal log is to be constructed with a log with attached rootwad, additional trenching to bury the rootwad end of the log may be required.

B. Place the log in the trench and seat the log firmly in place into the subgrade with the back of an excavator bucket.

C. The top of log elevation shall be at or 3 inches maximum above the adjacent existing ground. If there is a conflict between this criteria and the field conditions at the location of the structure indicated on the Drawings, immediately contact the Engineer's representative for field adjustment.

D. Place the log parallel with the contours, so that the log is not tilted and elevations across the top of the log vary as little as possible, and by no more than 1 inch.

3.05 DITCH STABILIZATION LOG

A. Trench the banks of the ditch to the required depth; if the diameter of the log exceeds the depth of the ditch, trench the bottom the ditch to the required depth.

B. Place the log in the trench and seat the log firmly in place into the subgrade with the back of an excavator bucket.

C. The top of log elevation shall be at or 3 inches maximum above the adjacent existing ground. If there is a conflict between this criteria and field conditions at the location of the structure indicated on the Drawings, immediately contact the Engineer's representative for field adjustment.

D. Place the log so that it is not tilted and elevations across the top of the log vary as little as possible, and by no more than 1 inch.

E. Backfill and revegetate the ditch as shown on the Drawings.

3.06 LOG WEIR

A. At all times the Contractor shall take extreme care to not damage the existing culvert. If the existing culvert is damaged as a result of the Contractor's operations, the Contractor shall replace the culvert, like for like, at their expense.

B. Place logs in the trench and seat logs firmly in place into the subgrade with the back of an excavator bucket. Miter log ends as shown on the Drawings and minimize void space between logs to the extent practicable.

C. Saw cut the center log to the dimensions shown on the Drawings. The size of the notches should allow for placement of standard 2x4 boards with minimum seepage around or under the boards.

D. Backfill the trenches as shown on the Drawings with either native soils, well-graded gravel mixture, boulders, or sod.

END OF SECTION

Preventing the Spread of Invasive Plants:

Best Management Practices for Land Managers

3rd Edition

California Invasive Plant Council

Available at www.cal-ipc.org

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Contents

Introduction

Purpose Statement

The goal of this manual is to present voluntary guidelines that help those managing wildlands in California to prevent the accidental spread of terrestrial invasive plants.

Invasive Plants

Federal Executive Order 13112 defines an invasive species as an alien (non-native) species whose introduction does or is likely to cause economic or environmental harm, or harm to human health. While the majority of non-native plants do not pose a threat to natural or human systems, the Cal-IPC Invasive Plant Inventory identifies 200 species, approximately 3% of the plant species growing in the wild in California, as invasive (Cal-IPC 2006). These plants have the capacity to alter native ecosystems, with potential detrimental implications for wildlife communities, fire regimes, water flow, and nutrient cycling.

Background

Invasive plants can degrade the ecological integrity of wildlands, and land managers employ a range of tactics to reduce this damage. Controlling already established invasive plant infestations is important. However, stopping the introduction and spread of new invasive plant infestations is the most cost-effective approach to reducing this damage. Prevention is a key aspect of invasive plant management that deserves more attention.

Revegetate or mulch disturbed areas to prevent invasive plants from establishing. Photo: David Chang, Santa Barbara County Agricultural Commissioner

Land managers must have a good understanding of ways to avoid accidentally spreading invasive plants through their work. Such work often involves travel from one worksite to another. Tools, equipment, vehicles, animals, clothing, boots, and project materials moved between worksites can become potential vectors for the spread of invasive plants. Generally speaking, soil and vegetation disturbance, including construction and maintenance activities, can also create suitable conditions for the establishment of invasive plants.

This manual was developed by a technical advisory team made up of land management experts in the state, organized by the nonprofit California Invasive Plant Council (Cal-IPC) and funded by the USDA Forest Service, State & Private Forestry. The team reviewed existing resources to develop an accessible overview of key prevention measures that can be used by all land managers. References to source documents, some of which include extensive detail, can be found in the References section at the end of this manual.

Terminology

In this manual, we occasionally use the term "weed" to mean "invasive plant", such as when referring to "weed-free straw" for erosion control. We also use the general term invasive plant "spread" to mean introduction of invasive plants to a new area, establishment of new invasive plant populations, or spread of existing invasive plant populations. The Glossary at the end of the manual lists terms used in this text.

Best Management Practices (BMPs)

Best Management Practices are methods or techniques found to be the most effective and practical in achieving an objective, such as preventing or reducing invasive plant spread, while making optimal use of resources.

Prevention BMPs that reduce invasive plant spread can help:

- Reduce future maintenance needs and cost
- Reduce fire hazards
- Reduce herbicide use
- Enhance access and safety
- Limit liability for the governing agency or lessee
- Maintain good public relations
- Protect existing wildlife habitat, native plant populations, beneficial insects, as well as threatened and endangered species.

Target Audience

This manual was developed for those managing wildlands, and includes guidelines for those involved in wildland fire management. The manual can be used in a number of ways. For instance, land managers can use the material in the manual to conduct trainings for work crews. The manual can help land managers by providing language for contractor specifications for work on their land. Managers can also use the manual to develop educational materials for the public.

Scope

The primary focus of this manual is preventing the spread of terrestrial invasive plants. Therefore this manual does not focus on invasive plant control methods; however, control measures are discussed insofar as they relate to prevention. For example, mowing as a control method is not discussed, but because timing of mowing relates directly to potential for invasive plant spread, this aspect is included. Invasive aquatic plants are outside the scope of this manual.

Implementation of BMPs

Effective implementation of prevention BMPs requires a process of continuous learning. These voluntary BMPs were developed with the understanding that each situation and entity has different needs, constraints and resources. The applicability and effectiveness of BMPs will vary with existing land uses, degree of human

disturbance, the objectives of the land owners, and the resources available for management activities. For example, programmatic planning BMPs may be less applicable to smaller restoration groups, as these BMPs are more suited for large agencies. A discussion of Prioritizing BMP Implementation appears later in this section on page 5 of this draft to help determine which BMPs to emphasize depending on situational factors. Some BMPs may be able to be implemented with existing resources, while others may only be possible pending allocation of additional resources.

Conducting a thorough pre-activity assessment will help to identify which tasks can spread invasive plants (See Pre-Activity Assessment Outline on page 6 of this draft). Many of these BMPs may overlap with existing practices or standard mitigations, such as those for Storm Water Pollution Prevention, clean air regulations, pest quarantines, or rare species protections.

Using This Manual

This manual provides BMPs to aid in preventing the introduction and spread of invasive plants. Its recommendations are voluntary; each organization can choose how to best incorporate and phase this information into their operations.

Section I includes overview information on what BMPs are, why they are important, and how to best implement them. This section also provides recommendations for BMP prioritization.

Section II provides detail on a wide range of topic-specific BMPs for preventing the spread of invasive plants. Each BMP is appropriate for particular situations; users can select those that are suitable for their use.

The BMPs described in Section II are structured as follows:

> **BMP Statement: Prevention BMP statements, in bold font, describe practices that can prevent the introduction and spread of invasive plants.**
>
> **Considerations:**
>
> a. BMP Considerations are listed below the BMP Statement\
> b. BMP Considerations give more information about why the BMP is important, and may include details, suggestions, examples, and issues to consider when applying the BMP.

Section III presents ready-to-use checklists which contain only the BMP statements to provide a quick and portable reference for field activities. The checklists are divided into five categories:

- Site Assessment, Field Mapping and Monitoring
- Routine Vegetation Management
- New Project – Planning
- New Project – Implementation
- Inspection and Cleaning

These checklists can be used as templates and be modified based on your needs.

Section IV has additional resources and information, a glossary, and other references.

Definition and Categorization of Activities

Definition and categorization of activities may vary among agencies and organizations. For this reason, the definition and scope of each activity and how it may spread invasive plants is described in the introduction of each chapter. When using this manual, consider your activity's scope and potential impact as it relates to the potential to introduce or spread invasive plants. Refer to BMPs in related chapters to customize your prevention practices.

Overall Prevention Principles

Take time to plan. Proper planning can reduce future maintenance costs by reducing the potential for invasive plant introduction and spread. A good first step is to conduct a pre-activity assessment of the work area to determine which activities could spread weeds and which BMPs are applicable.

Stop movement of invasive plant materials and seeds. The movement of workers, materials and equipment can carry weeds between sites. This manual identifies potential vectors of spread and how to eliminate them or reduce their effects.

Reduce soil and vegetation disturbance. Disturbance can allow invasive plants to colonize a new area. When disturbance is unavoidable, managers should conduct follow-up monitoring to ensure early detection of any invasive plants that may have been introduced.

Maintain desired plant communities. A healthy plant community with native and desirable species provides resistance to invasive plant establishment.

Practice early detection and rapid response (EDRR). Early detection and eradication of small populations helps prevent the spread of invasive plants and significantly reduces weed management costs. Regular monitoring increases the chances of success.

Prioritizing BMP Implementation

The prevention BMPs in this manual are developed with the understanding that each situation and entity has different needs and resources. This outline can help you select which areas and species to prioritize when integrating BMPs into management activities.

1. **Management costs. Prioritize:**
   - Areas where future control costs will be high if invasive plants become established
   - Areas where fire risk is high
   - BMPs with approaches that are measurable in cost and effectiveness

2. **Ecological value of habitats. Prioritize:**
   - Areas with threatened or endangered species and habitat
   - Areas of high ecological or conservation value
   - Areas where invasive plants have not invaded

3. **Context of the area being managed. Prioritize:**
   - Wildland and natural areas
   - Areas with new construction or disturbance
   - Areas containing water bodies
   - Areas with important scenic or recreational resources
   - Areas where adjacent land owners are cooperative
   - Areas where wildland interfaces with urban areas
   - Wildland areas frequented by vehicles, equipment and foot traffic

4. **Treatment of invasive species. Prioritize:**
   - Species known or suspected to be invasive but still in small numbers
   - Species that can alter ecosystem processes
   - Species with the potential to alter fire regimes
   - Species that occur in areas of high conservation value
   - Species with the potential to require high management costs
   - Species that are likely to be controlled successfully
   - Species determined to be of regional concern as identified through regional partnerships

Pre-Activity Assessment Outline

This assessment outline can help you proactively address activities that have the potential to spread invasive plants. A site assessment and a description of planned activities will need to be completed as part of this pre-activity assessment.

1. **Conduct a site assessment to ascertain:**
   - A list of invasive plant species found in route to and within worksites. Include exact locations and densities, and the species' dispersal mechanisms.
   - A list of priority areas for implementing prevention BMPs. Refer to Prioritizing BMP Implementation on the previous page for guidance on prioritization.

2. **Describe each activity (e.g. roadside mowing, facility inspection, access road grading and maintenance, and pole/tower repair) to ascertain:**
   - Location(s) of the activity
   - Location(s) of access routes
   - Timing for the activity
   - Tools and equipment to used
   - Materials to be moved, imported or exported
   - Expected alteration of existing vegetation and soil

3. **List the sequence of tasks that are included in the activity. Identify which tasks can be altered to reduce the likelihood of invasive plant spread based on:**

   Task location

   a. Is there a location for this task with less potential to spread invasive plants?

   b. Can access routes be changed to avoid traveling through invasive plant populations?

   c. If materials are being moved, is there a better location for materials to be stored?

   Task timing

   a. Can the task be performed in a different time (earlier/later in the season) or in a different sequence (e.g. spraying after mowing)?

   b. Can invasive plant populations be treated before project tasks commence to reduce the spread of invasive plant parts and seeds?

   Task method

   a. Is there a different method of performing the task that can reduce the risk of spread?

   b. Could using different tools/equipment/materials reduce the risk of spread?

   c. Are weed-free materials available?

4. **Select BMPs from the following chapters to address the potential introduction and spread of invasive plants.**

List of Best Management Practices

Chapter 1: Planning BMPs

Programmatic Planning

- PL1: Adopt official policy to prevent invasive plant introduction and spread.
- PL2: Include invasive plant risk evaluation as a component of initial project planning.
- PL3: Integrate invasive plant prevention BMPs into design, construction, vegetation management and maintenance planning activities.
- PL4: Coordinate invasive plant prevention efforts with adjacent property owners and local agencies.
- PL5: Develop monitoring plans for BMP implementation and effectiveness.

Activity Planning

- PL6: Provide prevention training to staff, contractors and volunteers prior to starting work.
- PL7: Conduct a site assessment for invasive plant infestations before carrying out field activities.
- PL8: Schedule activities to minimize potential for introduction and spread of invasive plants.
- PL9: Integrate cleaning BMPs into planning for land management activities.
- PL10: Prepare worksite to limit the introduction and spread of invasive plants.
- PL11: Monitor the site for invasive plants after land management activities.

Chapter 2: Project Material BMPs

- PM1: Use a weed-free source for project materials.
- PM2: Prevent invasive plant contamination of project materials when stockpiling and during transport.

Chapter 3: Travel BMPs

- TR1: Plan travel to reduce the risk of invasive plant spread.
- TR2: Integrate cleaning activities into travel planning.

Chapter 4: Tool, Equipment and Vehicle Cleaning BMPs

- TE1: Designate cleaning areas for tools, equipment, and vehicles.
- TE2: Inspect tools, equipment, and vehicles before entering and leaving the worksite.
- TE3: Clean soils and plant materials from tools, equipment, and vehicles before entering and leaving the worksite.
- TE4: Clean pack, grazing and support animals.

Chapter 5: Clothing, Boots and Gear Cleaning BMPs

- CB1: Wear clothing, boots and gear that do not retain soil and plant material.
- CB2: Designate cleaning areas for clothing, boots and gear.
- CB3: Clean clothing, footwear and gear before leaving the worksite.

Chapter 6: Waste Disposal BMPs

- WD1: Designate waste disposal areas for invasive plant materials.
- WD2: Render invasive plant material nonviable when keeping it on-site.
- WD3: When disposing of invasive plant material off-site, contain it during transport.

(continued)

List of Best Management Practices *(continued)*

Chapter 7: Soil Disturbance BMPs

SD1: Minimize soil disturbance.

SD2: Implement erosion control practices.

SD3: Manage existing topsoil and duff material to reduce contamination by invasive plants.

Chapter 8: Vegetation Management BMPs

VM1: Schedule vegetation management activities to maximize the effectiveness of control efforts and minimize introduction and spread of invasive plants.

VM2: Manage vegetation with methods favorable to desirable vegetation.

VM3: Retain existing desirable vegetation and canopy.

Chapter 9: Revegetation and Landscaping BMPs

RL1: Develop revegetation and landscaping plans that optimize resistance to invasive plant establishment.

RL2: Acquire plant materials locally. Verify that species used are not invasive.

RL3: Revegetate and/or mulch disturbed soils as soon as possible to reduce likelihood of invasive plant establishment.

Chapter 10: Fire and Fuel Management BMPs

Fire Management Planning BMPs

FP1: Consider wildfire implications when setting overall priorities for invasive plant management programs.

FP2: Integrate invasive plant prevention into fire management plans.

FP3: Provide training in preventing the spread of invasive plants.

FP4: Plan to utilize weed-free materials for post-fire activities.

Fuel Management BMPs

FM1: Incorporate invasive plant considerations when developing fuel management programs.

FM2: Maintain active management of invasive plants on fuel management sites.

FM3: Reduce disturbance when implementing fuel management activities.

FM4: Incorporate invasive plant considerations when using prescribed fire.

Fire Suppression BMPs

FS1: Develop operational procedures related to fire suppression to reduce the spread of invasive plants.

FS2: Locate indirect fire lines to reduce additional disturbance and invasive plant spread where feasible.

FS3: Locate fire activity areas in locations free of invasive plants where feasible.

FS4: Clean vehicles, equipment, clothing and gear before arriving and leaving fire activity areas.

FS5: Use water sources free of invasive plants for fire suppression when feasible.

Post-Fire Activities BMPs

PF1: Manage access to burned areas.

PF2: Use weed-free materials for post-fire activities.

PF3: Cover and rehabilitate soil disturbed by suppression activity.

PF4: Develop and implement post-fire integrated invasive plant management prescriptions.

PF5: Revegetate burned areas to reduce the spread of invasive plants.

Chapter 1: Planning BMPs

Integrating prevention BMPs into land management can significantly minimize the introduction and spread of invasive plants. Effective planning reduces costs and enhances project success. This chapter addresses how and when to integrate prevention BMPs into planning and management, and highlights the importance of communication among staff, adjacent property owners and local agencies.

Identifying invasive plant risks early in the planning process helps organizations develop strategies to prioritize prevention measures, allocate resources, and incorporate prevention costs into budgets throughout the project life cycle. Additionally, tracking the costs and results of implementing prevention BMPs will provide references for future projects.

Planning includes developing schedules, budgets, and strategies as well as identifying critical control points for carrying out preventation BMPs. Identifying and mapping invasive plants at worksites is critical for evaluating threats. This helps determine high-risk spots for potential establishment and spread, and helps land managers select appropriate prevention practices.

This chapter includes two sections on planning: programatic planning and activity planning. **Programmatic Planning BMPs** are critical because they lay the framework for prevention BMPs to be integrated into all activity planning and land management. **Activity Planning BMPs** focus on limiting the introduction and spread of invasive plants during each stage of land management. These BMPs start on page 11.

PROGRAMMATIC PLANNING BMPs:

PL1: Adopt official policy to prevent invasive plant introduction and spread.

a. Adopt an environmental stewardship policy that encourages preventing the introduction and spread of invasive plants.

b. Increase organization/agency-wide awareness of invasive plant impacts.

Map invasive plants before starting work to designate work routes and detect invasive plant infestations early. Photo: Arpita Sinha, Cal-IPC

c. Consider using multi-disciplinary teams to address site-specific invasive plant prevention and control challenges.

d. Identify funding, priorities, and personnel assignments for invasive plant prevention. Consider having a dedicated invasive plant contact person.

PL2: Include invasive plant risk evaluation as a component of initial project planning.

a. Integrate invasive plant identification and risk analysis as a part of NEPA/CEQA processes.

b. Evaluate invasive plant spread risks and the long-term maintenance consequences with natural resource managers. Determine project alternatives and management needs based on a pre-activity assessment. See Pre-Activity Assessment Outline on page 6.

c. Incorporate invasive plant prevention measures into project layout, design, and project decisions.

d. Develop mitigation plans for areas where avoidance of invasive plants is not possible.

e. Designate known invasive plant occurrences in maintenance plans and any associated contracts.

PL3: Integrate invasive plant prevention BMPs into design, construction, vegetation management and maintenance planning activities.

a. Include BMP costs in all budgets, estimates and bid packages. Include costs for prevention training for staff and contractors, cleaning routines for clothing, tools, equipment and vehicles, and site preparation and monitoring.

b. Track cost and results of implementing BMPs as a reference for future project planning and cost estimates.

c. Integrate cleaning routines into all land management activities. For detailed cleaning protocol see Checklist E on page 49.

d. Develop incentive programs among staff and volunteers to encourage invasive plant detection and reporting.

e. Include invasive plant prevention measures as part of contract notes and specifications.

f. Develop plant lists and design guidelines for revegetation and landscaping that will optimize resistance to invasive plant establishment. For details see RL1 on page 31.

g. Plan to minimize soil and vegetation disturbance during activities. For details see SD1 on page 27 and VM3 on page 30.

h. When designing vegetation management projects, consider the life cycle and dispersal mechanisms of the invasive plant species within and/or adjacent to the worksite.

i. Acquire documentation of invasive plants along roadways and address treatment strategies in the course of road maintenance activities.

PL4: Coordinate invasive plant prevention efforts with adjacent property owners and local agencies.

a. Coordinate prevention efforts with adjacent property owners to ensure their activities will minimize the introduction or spread of invasive plants into the worksite or neighboring properties.

b. Coordinate with local and state agencies to streamline record keeping systems of invasive plant infestations. Incorporate updates into appropriate databases such as CalWeedMapper (www.calweedmapper.calflora.org) and share with local and state agencies.

c. Coordinate new research on invasive plant prevention and technology with Cal-IPC, agencies, and universities. Share findings with public and private partners.

PL5: Develop monitoring plans for BMP implementation and effectiveness.

a. Establish a periodic monitoring program based on knowledge of high priority invasive plant life cycles (ideally three times a year and during growth periods).

b. Identify and monitor sites that are susceptible to invasion, such as post construction areas and roadsides (from the edge of pavement extending a minimum of fifteen feet), pull outs, trailheads, campgrounds and parking lots.

c. Define "zero tolerance" zones in critical habitats. Commit to keeping these areas free of invasive plants through frequent monitoring and control efforts.

d. Track results of implementing BMPs as a reference for future project planning and cost estimates.

e. Develop follow-up treatments as needed based on monitoring results.

f. Consider modifying BMP implementation based on the following questions:
   - Were invasive plant populations reduced or adequately suppressed thus preventing spread?
   - Was the planned procedure used? If not, why did it vary from the original plan?
   - Were invasive plant prevention costs equal to, less than, or more than projected prevention costs?
   - What was the effect on the targeted invasive plant species?
   - Were there any side-effects on non-target organisms from implementing prevention measures?
   - Was available funding and manpower adequate?
   - Was personnel training adequate?

ACTIVITY PLANNING BMPs:

In addition to the following BMPs, also refer to related BMPS in:

- Chapter 2: Project Materials for procuring and managing erosion and project materials.

PL6: Provide prevention training to staff, contractors and volunteers prior to starting work.

a. Provide pre-work training on invasive plants and prevention BMPs to staff, contractors and volunteers. Training should include:
   - Field identification of invasive plants in the work area
   - Reproductive biology of invasive plants
   - Ecological and economic impacts of invasive plants
   - Invasive plant prevention BMPs
     - Inspection and cleaning protocols for vehicles, tools, equipment, clothes and personal gear
     - When and how to record and report occurrences for invasive plants
     - How to use prevention resources (reporting websites, checklists, etc.)
     - How to treat materials infested with invasive plant propagules.

Photo: John Luker, California State Parks, Angeles District

Train staff and contractors in prevention measures.

b. Provide additional training to staff and contractors managing project materials. Training should include:
   - How to acquire weed-free materials
   - Project material inspection protocols

c. Ensure staff and contractors understand provisions for invasive plant prevention throughout the project. Invasive plant considerations should be routinely addressed during pre-bid, pre-work and meetings, as appropriate.

d. Identify and train personnel responsible for inspection of cleaned tools, equipment and vehicles at facilities and worksites. Require an inspection form or checklist be used to document tools, equipment and vehicles are cleaned before leaving an infested worksite and are clean upon arrival at a clean/uninfested worksite.

e. Provide invasive plant identification guides, prevention BMPs, activity, and cleaning and inspection checklists (see Checklists on page 53) to staff, contractors, and volunteers. Provide these resources in other languages when appropriate. Also have these resources available at highly visible locations such as:
   - Access points
   - Field stations and work trailers

f. Educate all site users about preventing invasive plant spread.
   - Post invasive plant prevention messages using signs and posters at prominent locations such as visitor centers, campgrounds, trailheads. Provide informational materials to site users at visitor centers and events.
   - Install prevention equipment such as boot brushes and washing stations at trailheads.

PL7: Conduct a site assessment for invasive plant infestations before carrying out field activities.

a. A site assessment for invasive plant infestations includes scouting for invasive plants found within the worksite (including the exact locations and densities), and determining priority areas for implementing prevention BMPs.

b. Scout for invasive plants at likely introduction sites such as roadsides, trailheads, campgrounds, staging areas, and other disturbed areas. Wet areas may also be especially susceptible.

c. Scout not only within the worksite but nearby as well.

d. Gauge the extent and intensity of scouting based on:
   - Threat of invasive plants to critical habitats
   - Size of the worksite
   - Type of activity (whether the activity disturbs ground or vegetation, and the degree of the disturbance)
   - Adjacent environment

e. Be especially aware of invasive plant species that are not widespread in the work area and can be controlled using early detection and rapid response. Flag areas infested with invasive plants that are not widespread in the work area. Either avoid disturbance in those areas, or identify and

Photo: Martin Hutten, Yosemite National Park

Evaluate invasive plant risk as a part of project planning and environmental analysis.

isolate contaminated soils during construction or other disturbance. Isolated contaminated soils should be either placed back in the original location or disposed of appropriately to avoid spreading isolated populations of invasive plants throughout the worksite.

f. Review internal documentation and consult local groups and online resources for information on existing and potential invasive plant infestations on and near worksites.
   - Weed Management Areas (WMAs), County Agricultural Commissioner offices, and Resource Conservation Districts are key local groups that have broad awareness of infestations in a given area. Cal-IPC currently maintains an online list of WMAs (www.cal-ipc.org/WMAs).
   - Cal-IPC works with a range of partners to map invasive plants across the state. Occurrence data for invasive plants can be found online at CalWeedMapper (www.calweedmapper.calflora.org), Calflora (calflora.org) and on the California Department of Fish & Game's BIOS viewer (www.bios.dfg.ca.gov).
   - Specimen data can also be found at the California Consortium of California Herbaria (http://ucjeps.berkeley.edu/consortium/), which houses data for over 20 California herbaria including the California Department of Food and Agriculture Weed Laboratory.

g. Document invasive plant findings and communicate them to resource or facility managers.

h. Incorporate findings into a database (e.g. www.calweedmapper.calflora.org) and project drawings or maps.

i. Evaluate invasive plant risks. Determine invasive prevention and management needs at the onset of activity planning. Prioritize treatment of invasive plants based on guidelines in Prioritizing BMP Implementation on page 4.

PL8: Schedule activities to minimize potential for introduction and spread of invasive plants.

a. Prioritize reducing invasive plant seed production along roadsides (edge to fifteen feet along roadway edge) to reduce seed movement by vehicles.

b. Conduct work under conditions that minimize the risk of spread (e.g. frozen ground, snow cover, seed absence).

c. Avoid working during rain events and high winds. Wet conditions make it easier for seeds to be picked up by a vehicle and spread miles down the road.

d. Develop site-specific plans for controlling existing invasive plants before ground-disturbing activities begin.
   - Control invasive plants along access roads before moving equipment into the worksite.
   - Manage invasive plants three to five years prior to the planned disturbance to minimize invasive plant seeds in the soil, when feasible.

e. For details on scheduling vegetation management see VM1 on page 29.

PL9: Integrate cleaning BMPs into planning for land management activities.

a. Determine cleaning needs for tools, vehicles, equipment, clothing, boots and gear in conjunction with each activity and worksite. Include these cleaning needs in project plans, and make prior arrangements for any special needs identified. For details on cleaning see Chapters 4 and 5 on pages 21 and 23.

b. Include cleaning costs in project budgets.

c. Acquire necessary cleaning tools.

d. Designate sites for cleaning vehicles, equipment, pack animals, clothing and gear.

e. Identify cleaning facilities (such as car washes) near the worksite, in the event that cleaning on-site is not an option.

f. Use inspection checklists to ensure comprehensive cleaning. See Checklist E on page 59.

PL10: Prepare worksite to limit the introduction and spread of invasive plants.

a. Protect likely introduction sites such as pull-outs, trailheads, campgrounds, and parking lots from invasive plant introductions by paving, deep mulching, or planting a dominant non-invasive groundcover.

b. Periodically inspect areas of concentrated use, such as staging areas, parking areas, trailheads, or campgrounds, and keep them free of invasive plants.

c. Treat invasive plants at access roads and staging areas before using them.

d. Control invasive plants in areas adjacent to worksites. This prevents seeds or other reproductive structures from moving into the worksite. If removing plants is not feasible, stopping seed set can be an effective way to reduce the potential for spreading the plant.

e. Position activity boundaries to exclude areas infested with invasive plants. Activity boundaries include staging areas, timber harvest landings, skid trails, access roads and other temporary facilities. If this is not possible, control invasive plants in infested areas prior to their use.

PL11: After land management activities, monitor worksites for invasive plants.

a. Carry out the established monitoring plan. Partner with local WMAs (www.cal-ipc.org/WMAs), agencies and organizations to help with monitoring when possible.

b. Train staff to recognize and report invasive plants as part of ongoing monitoring.

c. Monitor areas including:
   - On-site cleaning area
   - Waste disposal area
   - Areas where project materials are stored
   - Access routes, roads and other areas of concentrated use
   - Areas near salt licks, watering sites, loading/unloading areas and corrals for animals

d. Monitor and maintain revegetation and landscaping to ensure long-term establishment of desired plant species.

e. Monitor during multiple growing seasons, especially at times of germination and flowering, for a minimum of three years after project completion to ensure that any invasive plants are promptly detected and controlled. If three years is not sufficient to control invasive plants, monitoring and treatment should be continued until confident that invasion has been controlled.

f. For on-going projects, continue to monitor until reasonably certain that invasive plants will not reappear. Plan for follow-up treatments based on presence of invasive plants.

Photo: Martin Hutten, Yosemite National Park

Monitor worksite for invasive plant infestations after activities.

Chapter 2: Project Materials BMPs

Project materials are common vectors of invasive plant introduction into new areas. Infested project materials that are imported to worksites can introduce invasive plant propagules and lead to new infestations. This chapter includes practices for minimizing the spread of invasive plants from project materials.

Effective project material management can prevent invasive plant spread at the source and minimize contamination during transport and stockpiling. Because project materials are often managed by different entities or departments during different project phases, developing a procedure for procuring, storing, and inspecting materials at critical control points will streamline materials management and minimize contamination. Additionally, developing relationships with suppliers and requesting that they supply weed-free materials can help to increase demand and availability of these materials.

Project materials include:

- Erosion control materials (silt fences, fiber roll barriers, straw wattles, mulch and straw)
- Soil and aggregate (topsoil, fill, sand, and gravel)
- Landscape materials (plants, seed, sod, mulch, and soil amendments)
- Animal/livestock feed
- Water (for cleaning or irrigation)
- Construction/building materials

Project materials contaminated with invasive plant seeds and parts and spread invasive plants. Use weed-free materials to prevent spreading invasive plants. Photo: Martin Hutten, Yosemite National Park

PM1: Use a weed-free source for project materials.

a. Develop a procedure for procuring and storing weed-free materials and inspecting material sources. Cultivate relationships with suppliers to streamline sourcing of weed-free materials.

b. Select materials based on the environmental needs of the worksite. Understand how weed-free materials are produced, whether the screening criteria is based on noxious weeds or wildland invasive plants. Weed-free materials may not be 100% weed-free, but using weed-free materials can reduce the probability of exposure to invasive plant parts and seeds.
   - Noxious weeds are agricultural weeds listed by the California Department of Food and Agriculture. www.cdfa.ca.gov/plant/ipc/weedinfo/winfo_list-pestrating.htm
   - California Invasive Plant Council's inventory lists wildland invasive plants. www.cal-ipc.org/ip/inventory/

c. Determine the degree to which weed-free project materials are needed for each worksite. Materials from an infested site may be suitable for a worksite that is already infested with the same species. Excavated material from areas containing invasive plants may be reused within the limits of the infestation.
   - For example, materials from a yellow starthistle infested site could be reused in areas already infested by yellow starthistle, but not in areas free of yellow starthistle.
   - Unused excavated material contaminated with invasive plants should be stockpiled on an impervious surface and managed until all invasive plant material is non-viable. For details on managing stockpiled materials see PM2 on page 18.

d. Use weed-free materials for erosion control and soil stabilization.
   - When available, use weed-free straw certified by a county agriculture department, coconut fiber, rice straw and/or native grass straw. These types of erosion control material have limited quantities of invasive plants or contain wetland species that may not survive in dry upland conditions. See Cal-IPC (www.cal-ipc.org/ip/prevention) for a Weed-Free Forage & Straw Supplier List.

Photo: Marla Knight, USDA Forest Service

Contaminated project materials, like this gravel pile, can spread invasive plants to worksites.

   - Perform follow-up inspections at sites where erosion control materials have been used to ensure that any invasive plant introductions are caught early and treated.

e. Use weed-free sand and gravel.
   - Any fill material brought on-site should be clean, debris-free, and devoid of invasive plant parts or seeds. Do not borrow fill from weed-infested stockpiles, road shoulders or ditch lines.
   - Inspect aggregate material sources (including but not limited to surrounding ditches, topsoil piles, gravel/sand piles or pits). See Cal-IPC (www.cal-ipc.org/ip/prevention) for information about procuring weed-free sand and gravel.

f. Use weed-free seed. Verify seed mix to ensure it does not contain invasive plants.
   - Use local seeding guidelines for your county to determine procedures and appropriate seed mixes.
   - A certified seed laboratory should test each lot according to Association of Seed Technologists and Analysts (AOSTA) standards (which include a statewide invasive plant list) and provide documentation of the seed inspection test. Check state, federal, and California Invasive Plant Council lists to see if any local weeds need to be added prior to testing. For more information on locating lists of invasive plants, see PM1d on page 16.

- Seed purchased commercially should have a label that states the following:
  - Species
  - Purity: Most seed should be no less than 75% pure and preferably over 85% pure. The rest is inert matter, weed seed, or other seed.
  - Weed seed content: The tag should state NO invasive plants are present. Only certified weed-free seed should be used. Note that seed is usually certified to be "noxious weed free", referring to the California Department of Food and Agriculture noxious weed list, and may still contain seeds of wildland invasive plant species not included on the noxious weed list.
  - Germination of desired seed: Germination generally should not be less than 50% for most species, although some shrubs and forbs will have lower percentages.

g. Keep and reuse on-site weed-free materials rather than importing new materials to limit contamination.
   - Stockpile topsoil along perimeter of project for later use rather than importing topsoil. For details on topsoil management, see SD3 on page 28.
   - Consider using mulch from non-invasive plant species chipped on site when feasible.

h. Find local sources when off-site weed-free project materials are needed. Inspect project material suppliers as appropriate to determine if the source is weed-free. Weed-free materials may not be 100% weed-free, but using these materials can reduce the probability of exposure to invasive plant contamination.

i. Designate and use weed-free water sources for each project.
   - Inspect water sources to prevent introduction of invasive plants or animals.
   - Designate weed free pathways to water sources.

j. Provide weed-free feed for livestock and pack animals before and after project use to limit invasive plant seed transport via manure.

k. If unable to obtain materials from a weed-free source:
   - Work with a local weed specialist to sterilize or treat materials and provide results of post-treatment inspection. Monitor application areas. For monitoring protocol see PL11 on page 14.
   - If soil sources are infested, treat the invasive plants, then strip the infested topsoil and stockpile the contaminated material for several years to further deplete the soil seed bank. Check regularly for re-emergence of invasive plants and treat as needed.
   - Inspect the area where material from weed-infested sources were used annually for at least three years after project completion to ensure that any invasive plants transported to the site are promptly detected and controlled. For monitoring protocol see PL11 on page 14.

l. Inspect project materials, sources, and storage areas for invasive plants annually and prior to each use to ensure that no invasive plants have invaded since the last inspection. Record inspection results. Continue to monitor worksites for three year after project completion.

m. When feasible, include penalties, performance standards, or withholding provisions in contract specifications by which a contractor is assessed monetary damages for importing invasive plants as a result of non-compliance with contract specifications.

Photo: Mona Robison, California State Parks

These certified weed-free rice straw wattles are contained in plastic packaging to protect them from invasive plant establishment.

PM2: Prevent invasive plant contamination of project materials when stockpiling and during transport.

a. Move only weed-free materials into uninfested areas. Moving materials from one infested location to another within a particular zone may not cause contamination, but moving materials from infested to uninfested areas could lead to the introduction and spread of invasive plants.

b. Clean transport vehicles before and after loading project materials.

c. Encourage log yard and biomass plant operators to maintain weed-free yards, equipment parking areas, off-loading areas, and staging areas. This will reduce the likelihood of invasive plant spread from yard to worksite.

d. During transport, cover exposed piles of materials with geotextile fabric or impermeable material to prevent contamination of weed-free materials or spread of infested materials.

e. Cover exposed piles of project materials with impermeable material to protect materials from wind and rain, and reduce germination of invasive plants.

f. Cover active and inactive soil stockpiles with soil stabilization material or a temporary cover:
   - Soil stabilization used on bare slopes can be used for stockpiled soils. Temporary soil stabilization materials include:
     - Hydroseed (tackifier, fiber or seed)
     - Erosion control blanket (jute mesh or netting)
     - Mulch
     - Soil binder
     - Geosynthetic fabric
   - Surrounded with a linear sediment barrier (e.g. fiber roll).

g. For managing existing topsoil and duff materials see SD3 on page 28.

h. Frequently monitor stockpiles, materials storage areas and borrow pits. Quickly treat new invasive plant populations prior to seed production.

Photo: Ramona Robison, California State Parks

Cover soil stockpiles to prevent invasive plant establishment. Monitor worksites for invasive plants following activities.

Chapter 3: Travel BMPs

Land managers traveling between worksites can become vectors for the spread of invasive plants. For instance, driving a truck along an infested road can pick up seeds and carry them to a worksite. This chapter includes practices for minimizing the introduction of invasive plants by equipment, vehicles, animals and people.

It is important to be aware of travel routes. While cleaning vehicles, equipment, pack animals, clothing and gear is essential; land managers' travel practices can reduce the amount of plant reproductive material that gets transported in the first place.

TR1: Plan travel to reduce the risk of invasive plant spread.

a. Consider the scale of infestation at worksites and travel routes. Typically not all areas are infested to the same degree with the same plants; this may affect the type and degree of prevention measures implemented.

b. Avoid driving off-road whenever possible.

c. When driving off-road, avoid patches of invasive plants.

d. Exclude areas infested with invasive plants from equipment travel corridors and staging areas.

e. Avoid parking on the side of the road in areas infested with invasive plants.

f. Prevent animals (pack and grazing) from entering areas infested with invasive plants.

g. When traveling through infested areas cannot be avoided:

Vehicles traveling through areas infested with invasive plants can spread viable plant material. Photo: Peter Schuyler, ecological consultant

- Consider the sequence of operations. Arrange travel routes from uninfested areas to infested areas. Work first in uninfested areas when vehicles and equipment are free from invasive plant material.
- Control invasive plants at access roads and staging areas before using them.
- Clean your vehicle before leaving the infested area.
- Travel under dry conditions when feasible. Traveling under wet conditions, particularly along unpaved roads, greatly elevates the risk of picking up invasive plant seeds and transporting them.
- Restrict travel to those periods when spread of seed is least likely, such as just prior to flowering or late in the season when seeds have already dropped.

h. Limit the number of roads traveled to minimize soil disturbance and the risk of unintentionally transporting invasive plant parts and seeds on equipment into uninfested areas.

i. Close or reroute public roads or trails in areas infested with invasive plants. Where appropriate, ask user groups to become actively involved to help control an infestation so the trail can be reopened.

j. Perform road maintenance such as road grading, brush clearing, and ditch cleaning from uninfested to infested areas. If possible, schedule such activities when seeds or propagules are least likely to be viable.

Photo: Noa Rishe, California State Parks, Angeles District

Clean seeds and plant parts from vehicles before leaving worksites infested with invasive plants.

TR2: Integrate cleaning activities into travel planning.

a. Include cleaning when planning travel time.

b. Set up cleaning operations to be efficient and effective to have minimal impact on travel time.

c. Remove soil and plant materials from tools, vehicles, equipment, clothing, boots and gear before entering and leaving a worksite.

d. Refer to an inspection checklist to ensure comprehensive cleaning of vehicles, equipment, pack animals, clothing and gear. See Checklist E on page 59.

e. Avoid traveling through areas infested with invasive plants when collecting water for dust abatement or cleaning.

Chapter 4: Tool, Equipment and Vehicle Cleaning BMPs

Tools, equipment and vehicles used for land management activities are potential vectors for invasive plant spread. For example, a mower used at a site infested with yellow starthistle can trap seeds in the mower deck and deposit them at the next worksite. This chapter presents ways to prevent the spread of invasive plants by cleaning hand tools, power tools, construction equipment, vehicles, and pack and grazing animals. For a detailed cleaning protocol see Checklist E in the checklists section of this manual on page 59.

TE1: Designate cleaning areas for tools, equipment, and vehicles.

a. Tools, equipment, and vehicles should be cleaned in areas that are:
   - Easily accessible for monitoring and control
   - Located away from waterways
   - Located away from areas of sensitive habitats or species
   - Near areas already infested with invasive plants
   - Contained with silt fences or soil berms
   - Paved or have sealed surfaces to avoid re-accumulation of soil and plant material on cleaned vehicles and equipment

TE2: Inspect tools, equipment, and vehicles before entering and leaving the worksite.

a. Consider the extent of infestation at worksites. Typically not all areas are infested to the same degree with the same plants, and this may affect the type and degree of inspection needed.

b. Prior to entering an uninfested area, inspect vehicle and equipment undercarriages and tires for seeds or plant parts.

c. Refer to an inspection checklist to ensure comprehensive inspection. See Checklist E on page 59.

Clean tools, equipment, and vehicles to reduce the spread of invasive plants. Photo: Martin Hutten, Yosemite National Park

d. Train staff, contractors and volunteers to inspect for seeds, seed heads, plant material, soil and mud.

e. Procure appropriate equipment for inspections, such as flashlights, portable lighting if night-time inspections are necessary, and under-vehicle mirrors.

f. Inspect areas where tools, equipment and vehicles are stored for invasive plants. Maintain these facilities as weed-free.

g. Ensure that rental equipment is free of invasive plant material before accepting it.

TE3: Clean soils and plant materials from tools, equipment, and vehicles before entering and leaving the worksite.

a. Clean tools, equipment, and vehicles if soil and plant materials are found during inspections.

b. Remove soil, seeds and plant parts from tools, the undercarriage, tires, sideboards, tailgates, and grills of all vehicles and equipment. Wash tires and under carriage if the travel route is muddy. For detailed cleaning protocol see Checklist E on page 59. Cleaning methods are divided into two categories:

- Cleaning without water:
  - Bristle brushes, brooms, scraper and other hand tools (to remove heavy accumulation of soil and debris prior to washing with other tools)
  - High pressure air devices
  - Vacuum cleaner
  - Hand removal
- Cleaning with water:

Wash on a paved surface to avoid creating mud. Contain waste water and splash to prevent invasive plant parts and seed from spreading through runoff. Berms or silt fences installed along perimeters of work areas can aid in preventing the spread of contaminated materials outside the cleaning area.

  - High pressure washers (preferably with 2,000-psi): wash once for six minutes or two to three times for three minutes for best results.
  - Portable cleaning station with undercarriage washers and pressure hoses (useful during maintenance of multiple sites).

c. Dispose of propagule-containing water from equipment washing at a waste management facility or incinerator; not a wastewater treatment plant.

d. Clean carpet, rubber, nylon or plastic materials using:

- A vacuum cleaner
- A variety of brushes with bristles of varying length and texture.

e. Frequently wash vehicles, especially after driving off-road or along roads bordered by a high density of invasive plants, and after traveling under wet conditions.

f. Include cleaning as part of routine maintenance activities for tools, equipment and vehicles. This is in addition to regular cleaning on site.

TE4: Clean pack, grazing and support animals.

a. Brush and clean animals — especially their hooves and legs — before leaving areas infested with invasive plants. For detailed cleaning protocol see Checklist E on page 59.

b. Provide weed-free forage or pelletized feed for livestock (preferably for three days or more) before and after project use to limit invasive plant seed transport via manure.

c. Consider using transitional pastures when moving livestock from invasive plant infested areas.

- Allow animals to graze invasive plants only before they flower or set seed. If this is impossible, contain animals in a weed-free holding area (preferably for three days or more) before moving them into uninfested areas.

Photo: Marla Knight, USDA Forest Service

Contain waste water when washing vehicles to prevent spreading invasive plant parts.

Chapter 5: Clothing, Boots and Gear Cleaning BMPs

Land managers have the potential to be a vector of seed dispersal through what they wear and what they carry into the field. The tendency for a fabric to attract and hold seeds and other plant material varies significantly depending on its texture. This chapter presents prevention practices that can minimize the spread of invasive plant material via clothing, boots, and gear. For a detailed cleaning protocol see Checklist E on page 59.

CB1: Wear clothing, boots and gear that do not retain soil and plant material.

a. Wear fabrics that do not retain invasive plant propagules:
   - Cotton duck (canvas),
   - Nylon
   - Leather
   - Fabrics such as Para-aramid Kevlar®[1] and Meta-aramid Ripstop Nomex®[2]

b. Avoid brushed cotton, netting, Velcro, and bulky knits like wool and fleece

c. Use special gear as appropriate:
   - Nylon gaiters to cover socks and laces
   - Leather laces on leather boots
   - Rubber boots

d. Consider dedicating a pair of shoes or boots for use only in infested sites.

Wear fabric that does not retain plant material to reduce the spread of invasive plants. Photo: Martin Hutten, Yosemite National Park

1. DuPont™ and Kevlar® are registered trademarks of DuPont
2. DuPont™ and Nomex® are registered trademarks of DuPont

CB2: Designate cleaning areas for clothing, boots and gear.

a. Select cleaning areas that are:
   - Easily accessible for monitoring and control
   - Located away from waterways
   - Located away from sensitive habitats or species
   - Near areas already infested with invasive plants

CB3: Clean clothing, boots and gear before leaving worksite.

a. Carry appropriate equipment to help remove soil, seed, and plant parts. This may include wire brushes, small screwdrivers, boot brushes, extra water free of invasive species, and bags for plant material.

b. Remove soil, mud, seeds, and any plant material from clothing, boots and gear before leaving a worksite infested with invasive plants.

c. Clean clothing, boots and gear at the designated cleaning area or at location of exposure to invasive plant seeds or material. In some cases it may be appropriate to bag seeds and plant parts for off-site disposal.

d. Inform coworkers about possible seeds or other propagules carried on their clothing, footwear and gear.

e. For a detailed cleaning protocol see Checklist E on page 59.

Photo: Jen Stern, Cal-IPC

Clean clothing, boots and gear to reduce the spread of invasive plants.

Chapter 6: Waste Disposal BMPs

After removing invasive plants, land managers need to decide what to do with the resulting plant biomass. Our definition of waste includes invasive plant biomass, seeds and contaminated materials such as soil and mulch. These materials may spread invasive plants if they are left viable and uncovered or are transported without containment. This chapter presents guidelines for proper waste disposal to prevent the spread of viable plant material and seeds.

WD1: Designate waste disposal areas for invasive plant materials.

a. Select disposal areas where viable invasive plant materials will be contained, buried or destroyed.

b. Locate debris burn piles in areas that minimize the possibility of invasive plant establishment.

c. Do not dispose of viable invasive plant material that has the ability to resprout or spread at a facility that produces mulch or chipped products.

d. Do not dispose of soil, seeds, or plant material down a storm drain. This action may promote the spread of invasive plants downstream.

e. Develop a monitoring plan for waste disposal areas, including burn piles, to prevent the introduction and spread of invasive plants.

Prevent invasive plant materials from contacting soil when disposing of materials on-site. Photo: Cindy Roessler, Midpeninsula Regional Open Space District

WD2: Render invasive plant material nonviable when keeping on-site.

a. When composting invasive plants on site, consider the reproductive biology of the invasive plants:
   - Composting will render invasive plant material nonviable only if compost piles reach very high temperatures. Finished compost should be monitored for invasive plant emergence.
   - For large amounts of invasive plant material or for invasive plants with rigid stems, contain plant materials by placing them on asphalt or black plastic (4-mm-thickness minimum), covering with black plastic (4-mm-thinkness minimum), and securing the edges with landscaping staples, large rocks or sand bags. Effectiveness of this method varies by plant species.
   - For smaller amounts of plant material or for plants with pliable stems, bag the material in heavy-duty (3-mm or thicker) garbage bags. Keep plant material bagged for at least one month. Effectiveness of this method varies by plant species.
   - Keep covered or bagged materials in the sun, preferably on a dark surface such as asphalt, to accelerate the decomposition process. Material is nonviable when partially decomposed, very slimy or brittle. Once material is nonviable, it can be disposed of in a landfill or brush pile.
   - Monitor the bagged or covered material to ensure the plants do not escape through rips, tears or seams in the plastic.

b. When drying out invasive plants in piles:
   - Prevent cut surfaces of invasive plant stems from contacting soil, to avoid root growth and reestablishment.
   - Invasive plants with viable seeds or fruit attached should not be left on-site to dry out in an exposed manner.

c. When burying invasive plants on-site:
   - Contain all invasive plant material in an excavated pit, cover with woven geotextile, and cover with a minimum of 3 feet of uncontaminated fill material. Effectiveness of this method varies by plant species.
   - This method is best used on a worksite that already has disturbed soil.

d. Burn plant material after obtaining necessary permits.

e. Monitor all disposal sites for emergence of new invasive plants. Locate disposal sites so that they are easy to monitor.

WD3: When disposing of invasive plant material off-site, contain it during transport.

a. Contain invasive plant material in heavy-duty (3-mm or thicker, contractor quality plastic) garbage bags. Securely tie the bags and transport under tarps or in an enclosed truck to an appropriate disposal area.

b. Clean vehicles after transporting invasive plant material. For detailed cleaning protocol see Checklist E on page 59.

c. If invasive plant material has the ability to re-sprout or spread by seed, do not dispose of it at a facility that produces mulch or chip products. Contact your local solid waste authority for additional details.

Photo: Courtesy of Mario Abreu, California Native Plant Society

Contain invasive plant material in heavy-duty garbage bags when disposing of materials off-site.

Chapter 7: Soil Disturbance BMPs

Soil disturbance includes contouring, grubbing, logging, moving, removing, excavating and cutting. Soil disturbance destabilizes and exposes soil, which can impact water and air movement, biological activity, root growth and seedling emergence. Disturbed soil provides an opportunity for invasive plants to establish and spread, to compete with native species, and to colonize new areas.

Soil disturbance often occurs during:

- Road maintenance
- Timber harvesting
- Soil excavation
- Vegetation clearing
- Movement of vehicles and heavy equipment

Minimize soil disturbance by selecting low impact equipment. Photo: Martin Hutten, Yosemite National Park

Soil disturbance should be minimized to the extent practical. Disturbed soil should be stabilized and covered as soon as possible to prevent the germination and growth of invasive plants. If a worksite is infested with invasive plants, schedule treatment of these plants prior to ground disturbance to minimize spread of invasive plants into other uninfested areas. Project materials such as fill, aggregate and erosion control materials can also carry invasive plant seeds, which further increase the risk for infestation after soil disturbance.

In addition to the following BMPs, also refer to related BMPS in:

- Chapter 2: Project Materials for procuring and managing erosion and project materials.

SD1: Minimize soil disturbance.

a. Retain soil and desirable vegetation in and around the activity area as much as possible to prevent the introduction and spread of invasive plants.

b. Minimize ground disturbance, as increased bare ground creates suitable habitat for invasive plant germination.

c. Consider the impacts of different types of equipment. Choose equipment that minimizes soil disturbance.

d. Minimize the frequency of soil disturbance. If a site has to be cleared of vegetation regularly (such as brush clearing), consider paving or otherwise protecting the site with weed-free materials (gravel, mulch, decomposed granite), deep mulching or planting non-invasive groundcover, or sealing bare surface with soil stabilizer. For more information on soil stabilizers see PM2f on page 18.

e. Limit the number of roads and access points used to help minimize soil disturbance, and to limit the risk of unintentionally transporting invasive plants into uninfested areas.

SD2: Implement erosion control practices.

a. Promptly revegetate and/or mulch disturbed soil after ground disturbing activities. This will stabilize soils and reduce the likelihood of invasive plant establishment. For more details on revegetation and erosion control see RL3 on page 33.

b. Use weed-free mulch, logging slash, native plant seed or a native or non-persistent cover crop as temporary cover during the delay between soil disturbance and revegetation.

c. Contain and manage water runoff, which may carry soil, seeds and plant material. Silt fences installed along perimeters of worksites can aid in preventing the spread of infested materials.

SD3: Manage existing topsoil and duff material to reduce contamination by invasive plants.

a. Save local existing topsoil for reuse. Plan topsoil management prior to soil disturbance.
   - Develop topsoil management plans on all projects that include grading or earthwork unless the topsoil and duff material are determined to be contaminated with invasive plants.
   - Identify on the plans where local topsoil and duff material, within the worksite, should be:
     - Removed or excavated
     - Stockpiled
     - Reapplied

b. When excavating local topsoil and removing duff material, minimize handling of the material to reduce detrimental impacts to soil microorganisms.

c. Stockpile local topsoil and duff material in windrows no taller than ten feet for local topsoil and five feet for duff. Implement temporary erosion control measures to reduce the likelihood of invasive plant establishment and loss of material. For erosion considerations see PM2 on page 18.

d. Seed local topsoil stockpiles that will remain in place for over six months with a fast-growing non-invasive native plant species to maintain soil microorganisms. Covering topsoil stockpiles with impermeable barriers such as plastic sheeting may destroy living soil microorganisms. For information on temporary cover materials see PM2f on page 18.

e. Monitor stockpiles of topsoil and duff material regularly as they are highly susceptible to invasion by invasive plants. Determine management needs based on presence of invasive plants.

Photo: Cindy Roessler, Midpeninsula Open Space District

Install wattles or erosion control mats to reduce soil erosion.

Chapter 8: Vegetation Management BMPs

Integrating prevention BMPs into vegetation management can greatly minimize the introduction and spread of invasive plants. For example, scheduling vegetation management activities prior to seed production can reduce the spread of invasive plants. Life cycles of both invasive and desirable plants should be considered when scheduling activities. Mowing invasive plants after seed production will promote seed dispersal and increase the size of infestations.

Vegetation management activities may include but are not limited to: mowing, manual clearing, trimming, mechanized clearing and trimming, herbicide application, prescribed grazing and burning.

VM1: Schedule vegetation management activities to maximize the effectiveness of control efforts and minimize introduction and spread of invasive plants.

a. Consider the timing of invasive plant control efforts based on the plant's life cycle.
   - Schedule land-disturbing activities to occur prior to seed set to minimize spreading seeds. Keep in mind that seeds may be present in the soil.
   - Consider invasive plant reproductive biology and response to fire when planning prescribed burns.
   - Coordinate the timing of maintenance activities and invasive plant control activities. For example, delay mowing until two weeks after herbicide application and delay spraying after mowing until vegetative regrowth has occurred.

Schedule mowing of invasive plants to minimize impact on desirable plants.
Photo: Noa Rishe, California State Parks, Angeles District

- Before excavating invasive plants from drainage ditches, treat the entire infestation to ensure that the plant parts will not spread to adjacent and downstream areas. Avoid side casting (piling excavated soil on either side of a trench when digging a drainage ditch) of accumulated road materials infested with invasive plants. Stockpile in one area that can be monitored.

b. For more details on scheduling see PL8 on page 13.

VM2: Manage vegetation with methods favorable to desirable vegetation.

a. Coordinate management of invasive plants and desirable plants.
   - Schedule mowing, clearing, trimming or grazing of desirable plants for after seed maturation, ensuring desirable plants grow unrestricted and produce seed.
   - Schedule management of invasive plants at early flowering stage (or well before seed development) to avoid spreading viable invasive plant seeds.

b. Limit mowing and other mechanical control to the minimum needed to control invasive plants.
   - To reduce plant shock and root dieback of desirable plant species, mowing height should not be less than six inches. Mowing too low during the growing season will increase soil exposure to sun, soil temperatures and erosion risks, and encourage invasive plant growth.

c. Identify conditions under which invasive plants should not be mowed to avoid spreading them. Some invasive plants have the ability to sprout from stem and root fragments. Mowing these plants should be avoided.

VM3: Retain existing desirable vegetation and canopy.

a. Identify and protect desirable vegetation on site to increase competition with invasive plants. Desirable vegetation should be non-invasive and suitable for the conditions.

b. Train personnel to identify invasive and non-invasive plants on-site. Provide identification guides to field staff.

c. Minimize clearing large amounts of vegetation and creating canopy openings. Increased sunlight and bare ground creates suitable habitats for invasive plant germination.

d. Consider the impacts of different types of equipment. Choose equipment that minimizes vegetation disturbance.

Photo: Noa Rishe, California State Parks, Angeles District

Flag native plants for avoidance before treating invasive plants.

Chapter 9: Revegetation and Landscaping BMPs

Revegetation and landscaping work is often derived from different needs and carried out by different staff or contractors. Revegetation is the process of replanting and rebuilding the vegetated community on disturbed land. Landscaping modifies land to meet functional, aesthetic and regulatory requirements. Despite the differences, revegetation and landscaping share the fundamental goal of creating weed-resistant plant communities.

Creating weed-resistant plant communities requires planning and a thorough understanding of site ecology including: existing soil condition, hydrology, exposure, existing plant community and habitat, invasive plant risk assessment, human impact, and the surrounding environment.

Plant native or desirable non-invasive plants to optimize resistance to invasive plant establishment. Photo: Jack Broadbent, California Department of Transportation

Plant selection is critical to successful revegetation projects. Revegetation and landscaping with desirable non-invasive plants suitable for local conditions can create weed-resistant communities that prevent or slow the establishment, growth, and reproduction of invasive plants. The following prevention BMPs are for revegetation and landscaping projects.
In addition to the following BMPs, also refer to related BMPS in:

- Chapter 2: Project Materials for procuring and managing erosion and project materials.

RL1: Develop revegetation and landscaping plans that optimize resistance to invasive plant establishment.

a. Identify areas where revegetation or landscaping is needed to improve invasive plant resistance of plant communities. Determine the goal of vegetation coverage. Evaluate annually for three years to determine if vegetation establishment is successful.

- Develop weed-resistant plant communities in disturbed areas such as roadsides. Consider using plants that have low growth forms, require no mowing, establish well, and are well adapted to disturbance.
- Revegetate or landscape with local native plants or appropriate non-invasive plants to prevent invasive plant introduction. Native species grown outside of the region may not establish well.

b. Evaluate existing soil type, texture and health to determine vegetation selection, fertilization and maintenance needs.
   - Improve unhealthy soil by adding healthy topsoil, compost, fertilizer and/or using aeration to incorporate oxygen into the soil.
   - Fertilization, if done improperly, can encourage weed growth and reduce the ability to establish native plants. Organic fertilizers are better suited for native plants because they release nitrogen at a very slow and stable rate.
   - Do not fertilize areas treated with compost as the compost will provide the plants with the necessary micro-nutrients to support healthy growth. Compost should be supplied by participants in the US Compost Council's Seal of Testing Assurance Program. A list of current STA program participants is available at: http://compostingcouncil.org.
   - If improving soil health is not possible, choose vegetation with low soil-nutrient requirements.

c. Develop a plant palette that will occupy various planting zones/ecological niches in order to create a weed-resistant landscape.
   - Select plants, with the aid of a revegetation/landscaping specialist, based on existing soil conditions, drainage patterns, amount of rainfall or irrigation available, exposure and adjacent environment.
   - Use native material to the greatest extent possible.

d. Encourage passive regeneration of native plant cover where site conditions permit and where the risk of introducing invasive plants is low.

e. Design irrigation systems with attention to irrigation timing, coverage and quantity to encourage the growth of desirable plants and discourage the growth of invasive plants. Too much water can stunt the growth of drought-tolerant plants and encourage undesirable invasive plants.

RL2: Acquire plant materials locally. Verify that species used are not invasive.

a. Identify sources of native and appropriate nonnative plant materials. Specify and use weed-free locally appropriate seed mixes that will occupy various niches in order to create weed-resistant plant communities.

b. Check seed label for purity, composition, source and germination. Confirm consistency with specifications. For seed label details see PM1 on page 16.

c. Use local native ecotypes when feasible. Native species grown outside of the region may not establish well. Consider contract growing of local native plants.

d. When using local native species is not feasible and the risk of invasive plant infestation is high, use locally grown, non-invasive species proven to grow well locally.

e. Do not plant invasive plants. Verify plant lists do not contain invasive plant species by checking Cal-IPC's invasive plant inventory (www.cal-ipc.org/ip/inventory/weedlist) and the local Agricultural Commissioner's Office.

f. Confirm that only selected plant species are used in the planting, especially when naming inconsistencies are possible.

g. Have extra plant materials on hand. Plan for mortality of 20-30% percentage of container plants.

RL3: Revegetate and/or mulch disturbed soils as soon as possible to reduce likelihood of invasive plant establishment.

a. Promptly revegetate and/or mulch disturbed areas, including new forest openings, with local native or non-invasive plants. For details on acquiring plant materials see RL2 on page 32.

b. Use proper horticultural practices to promote healthy root and foliage growth that will aid in the vegetation's ability to withstand adverse conditions and to compete with invasive plant growth.
   - Avoid use of fertilizer in areas with high infestations of invasive plants where fertilizer may favor growth and spread of invasive plants over desirable species.
   - Consider using compost or organic slow release fertilizer when planting native species. Excessive nitrogen availability promotes the growth of weedy annual grasses, which can dry out the site and crowd out slow-growing perennials.
   - Consider soil inoculation to improve establishment success for planted species. Inoculation refers to the adding of "inoculants" which are mycorrhizal fungi that help with moisture retention and soil/root relationships in the first year of establishment.

c. When revegetation is impossible, consider limited and judicious use of paving/hardscape or otherwise protecting the site using weed-free materials (gravel, logging slash, long-fiber mulch, decomposed granite), deep mulching or using a soil stabilizer. For more information on soil stabilizers see PM2f on page 18.

d. When using mulch:
   - Use weed-free mulch. For information on weed-free mulch see PM1 on page 16.
   - Consider fire risk at the application site. Some long-fiber mulches such as shredded redwood bark (gorilla hair) are highly flammable.
   - Apply mulch at the recommended thickness to suppress the establishment and growth of invasive plants. Ensure mulch remains on-site. Lighter mulches will blow away in areas prone to heavy wind; mulches can move if watering results in surface flow. Consider the use of tackifiers or biodegradable netting.
   - Supplement with additional mulch to retain thickness and effectiveness after it begins to decompose.

Photo: Jim Dempsey, California State Parks

Select plant materials from local sources. Verify that all plants selected are not invasive.

Chapter 10: Fire and Fuel Management BMPs

Wildfire is a natural part of California ecosystems, and the structure and composition of most of California's plant communities are dependent on the periodic occurrence of fire. However, it also has significant potential for creating conditions that aid the establishment or spread of invasive plants which can damage the state's ecosystems. Disturbance created by wildfire suppression activities and pre-fire fuel treatments can also inadvertently contribute to the spread of invasive plants. This chapter addresses the many steps that can be taken to limit invasive plant establishment or spread. However, it must first be stated that **in wildfire suppression, protection of life is the foremost goal. Implementation of the prevention measures described in this manual should not interfere with this goal.** As stated in federal policy, "the safety of firefighters and the public is the first objective on all fire management activities, followed by the protection of property and minimizing impacts to natural and cultural resources."

In addition to the prevention measures summarized in previous chapters, this chapter provides measures specific to wildfire management activities, with sections on: **1) fire management planning, 2) fuel management, 3) fire suppression,** and **4) post-fire activities**. These prevention measures should be considered even for prescribed burns, since they can also inadvertently contribute to the spread of invasive plants.

Fires can result in reduced competition for light, water and nutrients; invasive plants are poised to take advantage of such conditions. In the worst cases, fire and invasive plants form a positive feedback loop where wildfire increases invasive plants, which then alter the fire regime in ways that favor further invasive plant spread (e.g. increasing fire frequency or intensity). An example is the shift seen in some locations in Southern California, where invasive annual grasses are replacing native chaparral. Such major changes in vegetation can also greatly impact

Invasive plants can spread following the disturbance of fire. Photo: Garrett Dickman, Yosemite National Park

hydrology, erosion, nutrient levels, and wildlife habitat. There is a strong tie between disturbance and invasive plant establishment and spread. Activities associated with fire and fuel management (for instance, cutting fuel breaks) can be a cause of disturbance, potentially facilitating the spread of invasive plants. Vehicles, personnel and materials (such as hay used for erosion control), can act as vectors for spreading invasive plant seeds. Fire managers working for land management organizations and agencies share the responsibility of managing public and private lands with other resource professionals and can play a key role in reducing the spread of invasive plants associated with fire management.

Preventing the spread of invasive plants by fire and fire-related management activities requires an assessment of land management goals and an understanding of how resident plant communities and species (both native and non-native) will respond to fire and the post-fire environment. Tools such as the Fire Effects Information System website (www.fs.fed.us/database/feis/) and the *A Manual of California Vegetation* and *Fire in California's Ecosystems* can help land managers learn the specific invasive plants of their region and how they are likely to interact with fire in California ecosystems. Additional resources are listed in the Fire and Fuel Management Resources on page 63.

Photo: S. Kocher, UC Cooperative Extension

Wildfire is a natural part of California ecosystems. The structure and composition of most California plant communities are dependent on the periodic occurrence of fire.

10.1 Fire Management Planning BMPs

Fire management activities include fuel management, fire suppression, and post-fire activities. A fire management plan provides the basis for communication, coordination, and project planning with partner agencies. Because fire, fire management, and invasive species all impact each other, natural resource managers should consider wildfire implications when designing invasive plant management programs, and consider invasive plant implications when designing wildfire management programs.

Because agencies conducting fire management activities do not always have jurisdictional authority over all of the properties that are relevant to fire management, it is important for all entities involved to work together in developing integrated fire and land management plans. Cooperative Agreements can be an effective way to establish allowable techniques for each property and include property owners in planning efforts.

It is essential that land managers understand the relationship between fire, plant communities and invasive plants in order to effectively integrate fire management activities into overall land management planning. Awareness building and training on invasive plant prevention can be integrated into fire management planning without interfering with fire management priorities.

In addition to the following BMPs, also refer to related BMPs in:

- Chapter 1: Planning BMPs for integrating prevention BMPs into land and fire management activities.

Coordinate mapping efforts for invasive plant management with mapping efforts for wildfire management to the extent possible. Photo: Forest Schafer, North Lake Tahoe Fire Protection District

FP1: Consider wildfire implications when setting overall priorities for invasive plant management programs.

a. Identify areas most susceptible to future wildfires and identify invasive plant populations within these areas. Evaluate the likely effects of wildfire on invasive plant populations and invasive plants on wildfires in these areas. Utilize this information in setting invasive plant management priorities with the intent to prevent future spread of existing populations.
   - To the extent feasible, coordinate mapping efforts for invasive plant management with mapping efforts for wildfire management.
   - For fire effect information for specific species, see the USDA Forest Service's Fire Effect Information System (FEIS) website (www.fs.fed.us/database/feis/).
   - Identify priority areas for invasive plant management. Refer to the Prioritizing BMP Implementation on page 5.

Evaluate high-potential wildfire areas where prescribed burns can be used to benefit native plant communities and species while proactively reducing the threat of invasive plant spread following a wildfire in that area.

FP2: Integrate invasive plant prevention into fire management plans.

a. Use an interdisciplinary team when developing fire management plans, in order to address preventing the spread of invasive plants. Include those versed in other disciplines, such as botanists, endangered species specialists, soil scientists, hydrologists, and GIS specialists.

b. Include invasive plant prevention priorities identified in land management plans when developing fire management plans. These priorities should ideally be coordinated with existing local invasive weed committees and incorporated into an Integrated Pest Management (IPM) plan.

c. Include actions to prevent invasive plant spread in all levels of fire and fuel planning documents where appropriate. For instance, integrate appropriate measures into:
   - Fire and fuel management plans

Photo: Athena Demetry, Sequoia and Kings Canyon National Parks

Fire crew staging at a low elevation site for mobilization to wildfire at higher elevation. Helibases, fire camp and staging areas infested with invasive plants can be a vector of spreading invasive plants.

   - Suppression Repair Plans
   - Burned Area Emergency Response (BAER) plans
   - Burned Area Rehabilitation (BAR) plans
   - Wildland Fire Decision Support System (WFDSS) protocol
   - Community Wildfire Protection Plans (CWPPs) for private lands in the Wildland-Urban Interface (WUI)
   - Minimum Impact Suppression Tactics (MIST).

d. Ensure wildfire infrastructure areas (existing or planned) are invasive plant free.
   - Initiate the establishment of a network of helibases and potential fire camp and staging areas that can be maintained in an acceptably invasive plant-free condition. Identify potential cleaning stations for those entering and leaving these areas.
   - Identify water sources infested and uninfested with aquatic and terrestrial invasive plants. Map acceptable and contaminated water sources and ensure this information is available to resource advisors and fire personnel.

e. Integrate equipment cleaning BMPs into planning for fire management activities. See PL9 on page 13.

f. Encourage sound forestry and range management practices to maintain healthy, vigorous overstory vegetation (where appropriate), which generally tends to "shade out" invasive species. Healthy forest and rangeland is typically less susceptible to intense burning conditions in the event of wildfire.

Photo: Forest Schafer, North Lake Tahoe Fire Protection District

Incorporate invasive plant information in existing fire and fuel management training.

g. Ensure that the use of fire retardant is discussed within the fire management plan. Consider the impacts of fire retardant on soil fertility.

FP3: Provide training in preventing the spread of invasive plants.

a. Include invasive plant awareness and prevention in existing fire and fuel management training.. Consider the best ways to provide information to Resource Advisors, Incident Management Teams, and agency leadership. Include information in regular trainings such as employee orientation and annual refresher courses.

b. Include consideration of invasive plant risk factors and implementation of prevention practices in Resource Advisor duties on all Incident Management teams and Burned Area Emergency Response teams.

FP4: Plan to utilize weed-free materials for post-fire activities.

a. See Chapter 2: Project Materials on page 15.

b. Consider development of as-needed contracts for weed-free materials. For example, contracting for specialized weed-free materials can take weeks to months—a timeframe that exceeds most fire emergency rehabilitation and suppression repair projects. If contracts are in place prior to fire suppression, it is more likely that weed-free materials can be effectively acquired. As-needed contracts are commonly used in other fire management activities (e.g. water tankers, helicopters, fuel management crews).

c. Consider stockpiling native and appropriate nonnative seed for use in post-fire activities. Like weed-free materials, the time needed for contracting and acquisition of seed can exceed the timeframe of most fire emergency rehabilitation and suppression repair projects.

Photo: S. Kocher, UC Cooperative Extension

Have weed-free materials ready for use in post-fire activities.

10.2 Fuel Management BMPs

Fuel management is designed to change future fire behavior, to contain fires, or to reverse negative ecosystem changes. Fire-adapted ecosystems, like those in California, will change in unnatural ways when fire is excluded. Fuel management can be used to counteract these changes so that fires are less destructive. Fuel management activities typically involve the thinning or removal of understory vegetation and the rearrangement or removal of surface fuels. Methods used in fuel management include prescribed fire, mechanical or hand thinning, mechanical mastication, machine piling, pile burning, and chipping. This work happens in both wildlands and the Wildland-Urban Interface (WUI), where property owners are often required to maintain significant safe space around structures.

Fuel management activities, themselves a type of disturbance, can potentially impact the introduction, establishment and spread of invasive plants. Vegetation clearing and soil disturbance can provide openings for invasive plants. Thus it is important to include an assessment of this potential when designing fuel management activities. There is significant variability in impact depending on ecosystem. Fuel management that reduces disturbance while meeting overall fuel management objectives can reduce the risk of introduction or spread of invasive plants. It is important to consider both human-caused factors and environmental conditions that influence invasive plant spread when developing fuel management plans.

The best management system for maintaining native plant diversity is likely one that mimics natural disturbance processes (including the characteristic fire regime) of the frequency, intensity, and duration of fire with which native species evolved. When this is not possible (such as when the natural disturbance is stand-replacing fire and the area is in the WUI), managing for general resiliency to climate change, fire, and invasion may be the best option. The complex and diverse ecosystems in California may require a mosaic of diagnostic and prescriptive actions to effect best management results.

When planning fuel management activities, consider environmental conditions that influence invasive plant spread. Photo: Forest Schafer, North Lake Tahoe Fire Protection District

In addition to the following BMPs, also refer to related BMPs in:

- Chapter 8: Vegetation Management for general prevention measures.
- Chapter 6: Waste Disposal for managing invasive plant disposal on-site and off-site.

FM1: Incorporate invasive plant considerations when developing fuel management plans.

a. Use an interdisciplinary team when developing fuel management plans, in order to address preventing the spread of invasive plants. Include those versed in other disciplines, such as botanists, endangered species specialists, soil scientists, hydrologists, and GIS specialists that are knowledgeable about invasive plants and native plant life histories. This may necessitate partnering with other agencies or organizations.

b. Survey for invasive plants to create baseline data for fuel treatments. Make sure survey data from local and state resource agencies is available and integrated.

c. Have a set of clear target conditions for vegetation and fuel. When developing these target conditions, consider both the effects of fuel treatments on invasive plants and native plants, and the effects of invasive plants on fuel treatments.

d. Assess both human-caused factors and environmental conditions that influence invasive plant spread when developing fuel management plans.

Photo: Kathy VanZuuk, National Forest

Invasive plants can spread after implementing fuel reduction/prescribed burn in areas where invasive plants were initially present.

Photo: Forest Schafer, North Lake Tahoe Fire Protection District

Include invasive plant considerations as a part of community outreach for fuel reduction projects.

- Human-caused factors include:
  - Fuel break construction methods
  - The scale of fuel breaks
  - Maintenance methods
  - Maintenance frequency
  - Connectivity to roads and trails (e.g. distance to roads and road level)
  - Extent of private inholdings in a given area
  - Fire regime changes
- Environmental conditions:
  - Proximity to populations of invasive plants
  - Overstory canopy cover
  - Litter cover, rock cover, duff depth, and bare ground
  - Vegetation type
  - Elevation
  - Slope
  - Fire regime
  - Climate change
- For information on conducting a site assessment on invasive plant infestation, see PL7 on page 12.

e. In prioritizing fuel treatment activities, consider site-specific information on the following in addition to target conditions like habitat integrity and fuel load:

- The role of invasive plants in preventing the achievement of target conditions (or vegetation management goals)
- The role of invasive plants in affecting the fire regime.

Photo: Forest Schafer, North Lake Tahoe Fire Protection District

Burned and unburned areas after a prescribed burn. Fuel management activities are themselves a type of disturbance, which can create openings for invasive plants.

f. For details on preventing invasive plant spread during vegetation management, see Chapter 8: Vegetation Management on page 29.

g. For all types of fuel treatment projects (e.g., prescribed burning, thinning and pile burning) where the potential for introduction or spread is moderate to high as a result of implementation, remove high risk areas from the project footprint, develop a pre-fire treatment prescription (including any post-fire mitigation/follow-up), or incorporate project design features to reduce the risk of spreading or introducing invasive plants.
   - Focus on invasive plant species that have been identified as local early detection priorities. For more information, see CalWeedMapper (www.calweedmapper.calflora.org).
   - Learn about how fire affects the particular species of interest. For more information, see FEIS (www.fs.fed.us/database/feis/).

h. Develop outreach and education information for adjacent property owners and fire safety councils about the effects of fuel treatments on invasive plants, and BMPs to reduce spread of invasive plants on their own property and nearby wildlands.

FM2: Maintain active management of invasive plants on fuel management sites.

a. Implement ongoing Integrated Pest Management (IPM) activities for all fuel management sites to keep invasive plants from spreading.

b. Capitalize on opportunities for coordinating efforts with those focusing on invasive plant management. There may be opportunities for supporting invasive plant management goals as well as fuel reduction goals through the efforts of multiple parties. Any activities that are counterproductive to one set of goals can be identified and revised.

FM3: Reduce disturbance when implementing fuel management activities.

a. Maintain shaded fuel breaks, where appropriate, in key fire suppression areas to reduce the need for bulldozing and cutting operations during emergency fire suppression.

b. To prevent the spread of invasive plants, remove only enough vegetation and ground cover to accomplish the fuel management and resource objectives.
   - Construct fuel breaks no wider than necessary to accomplish fuel reduction and resource objectives.
   - Remove vegetation adjacent to prescribed fire control lines only as needed to prevent additional fire spread or for safety and access.
   - For more information on preventing invasive plant spread during vegetation management, see Chapter 8: Vegetation Management on page 29.

c. Favor thinning techniques that do not result in ground disturbance—such as hand thinning, thinning using a chainsaw, mowing, or mastication—over techniques that result in ground disturbance—such as grapple piling or blading, whenever this can be done with no loss in fuel management effectiveness.
   - Ground disturbance can promote invasive plant establishment and spread. Reduce soil disturbance. See Chapter 7: Soil Disturbance on page 27.

Photo: Forest Schafer, North Lake Tahoe Fire Protection District

If heavy equipment is required, use equipment with less exerted ground pressure per square inch to reduce soil compaction.

- If heavy equipment is required for thinning, use alternative mechanized equipment with greater reach or less exerted ground pressure per square inch to reduce soil compaction or the total area disturbed.
- Mow fuel breaks before invasive plants set seeds to prevent spread. For details on mowing, see VM2 on page 30.

d. Transition vegetation (trees or shrub) removal in such a way that invasive plants are less likely to become established in the interior of the fuel break or fuel management unit. For instance, when working along roads, thin vegetation in the fuel break to a minimum level in order to meet fuel objectives, thus providing a potential vegetative barrier (i.e., competition) to reduce the spread of invasive plants from the roadside to the interior.

e. Where fuel reduction and resource objectives necessitate ground disturbance and soil exposure, or substantial ground cover and canopy removal, include appropriate revegetation or invasive plant management strategies in the fuel treatment plan.
   - Rehabilitate/restore or treat disturbed areas after fuel management activities and conduct follow up monitoring on these areas susceptible to invasive plant spread.
   - Cover and reduce exposure of bare ground. Use on-site chipping or treated fuels from mastication.

FM4: Incorporate invasive plant considerations when using prescribed fire.

a. Use both invasive species-specific and site-specific knowledge when assessing the use of fire on invasive plants. Consider invasive plant biology/life cycle, site conditions, plant community composition and distribution, and fire regime.

b. Consider follow-up treatments including mechanical, chemical or re-vegetating areas treated with fire.

c. When feasible, reduce the amount of control line construction and associated soil disturbance during prescribed burning, and plan for rehabilitation where necessary. For details on control line construction, see FM3 on page 42.

d. Incorporate invasive plant information into pre-burn briefings when needed.

e. When using prescribed fire to control invasive plants, burning should be integrated into an Integrated Pest Management (IPM) prescription. Evaluate the potential impact when using fire to control invasive plants. When planning to use herbicide treatments in concert with the burn, submit pesticide use permit applications with enough lead time to secure permission prior to implementing a prescribed burn.

10.3 Fire Suppression BMPs

Firefighter and public safety is the first priority in every fire management activity. Along with resource management objectives and the ability to hold a fire line, human safety should dictate fire suppression strategy and tactics including line placement. After human safety has been accounted for, land managers should attempt to incorporate invasive plant prevention measures into fire suppression activities in order to reduce post-fire resource impacts. Fire suppression activities can spread and promote the establishment of invasive plants by disturbing soil, dispersing plant parts and seeds, and altering plant nutrient availability. For example, simple prevention practices include cleaning vehicles, equipment, clothing and gear between activity areas and avoiding invasive plant populations when constructing indirect fire lines or locating activity areas, such as staging areas.

After human safety has been accounted for, attempt to incorporate invasive plant prevention measures into fire suppression activities. Photo: Martin Hutten, Lassen National Park

In addition to the following BMPs, also refer to related BMPs in:

- Chapter 4: Tool Equipment and Vehicle Cleaning for cleaning protocols.
- Chapter 5: Clothing, Boots and Gear Cleaning for cleaning protocols.
- Chapter 7: Soil Disturbance for erosion control measures.

FS1: Develop operational procedures related to fire suppression to reduce the spread of invasive plants.

a. Incorporate the following into the Delegation of Authority given to the Incident Commander:
   - The importance of invasive plant prevention
   - The techniques to be used to prevent the spread of invasive plants

b. Incorporate prevention awareness information and operational practices in the Incident Action Plan (IAP).

c. Encourage Resource Advisors to consider invasive plant issues as part of their focus on every incident.

d. When feasible, plan travel routes to avoid spreading invasive plants from infested to non-infested areas. For details on travel route planning, see Chapter 3: Travel on page 19.

e. Develop standardized invasive plant prevention direction for use in the Wildland Fire Decision Support System (WFDSS) and make it readily available to Agency Representatives. Ensure that the direction is consistent with relevant resource and wildland fire management plans. Include incident-specific invasive plant information in the WFDSS, as needed.

FS2: Locate indirect fire lines to reduce additional disturbance and invasive plant spread where feasible.

a. Safety and holding ability remain the priority motivation for any fire line location; however, when feasible, place indirect fire lines in areas free of invasive plants.

b. Provide the Resource Advisors, the Field Observer or other appropriate personnel (crew bosses, Incident Commander, Division Supervisors, etc., depending on the size of the incident organization) with priority invasive plant identification aids and maps.

c. Tie fire lines into pre-existing fuel breaks and managed fuel zones. Use existing natural and man-made breaks (lakes, streams, roads, trails, etc.) when feasible.

d. As feasible, keep ground disturbance to a minimum.

Photo: Jeanne Pincha-Tulley, Tahoe National Forest

Soil disturbance can facilitate invasive plant spread. Where feasible, locate indirect fire lines to reduce additional disturbance.

FS3: Locate fire activity areas in locations free of invasive plants where feasible.

a. Fire activity areas include:
- Incident Base Camp and staging areas
- Fire crew camps, including spike camps
- Helibases
- Drop points
- Parking areas

b. Coordinate with the Resource Advisor in choosing fire activity areas with the most reasonable qualities of resource protection and safety concerns.
- Use pre-approved infrastructure when available. For details, see FP2d on page 38.
- Map fire activity areas for post-fire invasive plant monitoring.

c. Keep fire activity areas free of invasive plants.
- Incorporate cleaning stations in fire activity areas for equipment, personnel and vehicles.
- For BMPs on keeping activities areas clean, see PL9 and PL10 on page 13 and 14.

d. Where situations dictate that the fire activity areas must be located on a site infested with invasive plants, take actions to reduce the spread of invasive plant seeds. Examples include:
- Consider flagging, fencing, or placing cones at the perimeters of invasive plant populations to keep people out.
- Consider mowing or otherwise treating invasive plants.
- Designate travel routes to avoid invasive plants.
- Clean equipment before leaving infested sites.

e. For more information on worksite management, see PL10 on page 14.

FS4: Clean vehicles, equipment, clothing and gear before arriving and leaving fire activity areas.

a. For detailed recommended cleaning protocols, see:
- Chapter 4: Tool Equipment and Vehicle Cleaning on page 21
- Chapter 5: Clothing, Boots and Gear Cleaning on page 23
- Checklist E: Inspection and Cleaning on page 43

Photo: Garrett Dickman, Yosemite National Park

Clothing, personal protective equipment, and hand tools can spread invasive plants. Clean them between fire activity areas when feasible.

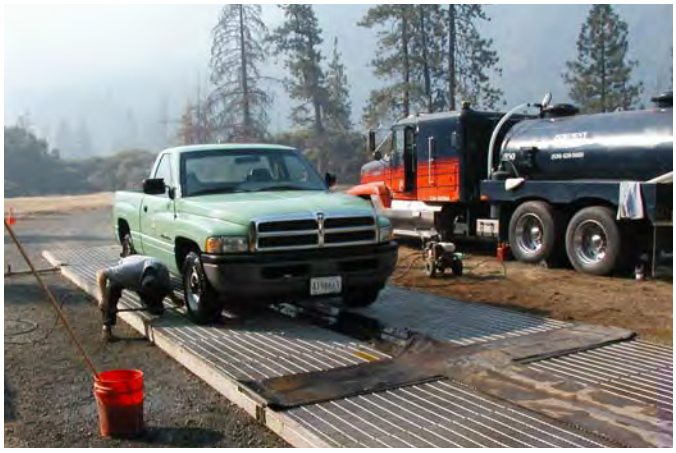

Photo: Julie Nelson, Shasta-Trinity National Forest

Remove dirt from the undercarriage of vehicles prior to entering and existing fire activity areas.

b. Inspect and clean equipment and vehicles during check-in and before demobilization from fires, especially if vehicles have been traveling from out-of state, off-road, or through areas infested with invasive plants. The following are examples only and don't represent the entire list of equipment that potentially could need to be cleaned:
   - Keep fire hoses clean and free from invasive plant parts when feasible.
   - Inspect helicopter nets for invasive plant parts and seeds. Bundle and store nets in areas free of invasive plants. Consider spreading nets on clean tarps or concrete/asphalt pads, so nets can be inspected, loaded and bundled up for storage in a weed-free state.
   - Inspect and remove weed seed and plant parts from cargo nets and other external loads.

c. Prior to arriving and leaving a fire, clean equipment. For example:
   - Personal belongings (e.g., boots, clothes, sleeping bag, tent)
   - Personal Protective Equipment (PPE) (e.g., gloves, helmet, goggles, fire pack, fire shelter)
   - Back-pack pumps
   - Hand tools (e.g., shovels, pulaskis, axes, fire rakes, and hoes).

FS5: Use water sources free of invasive plants for fire suppression when feasible.

a. Avoid use of water sources known to contain aquatic invasive plants to prevent the spread of aquatic invasive plants to other water bodies.

b. Avoid moving water on the surface of vehicles, tools and equipment from infested water sources to water sources that are not infested with invasive plants. Inspect and clean equipment prior to use in another water body.

c. Any equipment that draws water from one water source should not be drained into another water source. Flush equipment, such as portable pumps and hoses, with clean water between

Photo: Athena Demetry, Sequoia and Kings Canyon National Parks

Stage gear on tarps to avoid contact with invasive plants prior to loading and transport.

Photo: Jeanne Pincha-Tulley, Tahoe National Forest

Aquatic invasive plants can spread through water-drafting equipment, tools and vehicles. Use water sources free of invasive plants and clean equipment between water bodies when feasible.

10.4 Post-Fire Activity BMPs

uses and between fire activity areas.

Post-fire activities include four phases: Suppression damage repair, burned area emergency response (BAER), burned area rehabilitation (BAR), and restoration.

- Suppression damage repair is focused on restoring fire lines and features that were damaged by the fire suppression activities. Activities include rehabilitating fire line and staging areas, fixing roads and fences, etc.
- BAER is aimed to protect life and property from post-fire events. BAER is implemented to prevent erosion, stabilize soil, and minimize damage from post-fire flooding immediately after wildfires to prevent further damage to life, property, water quality and deteriorated ecosystems.
- BAR is implemented to restore ecosystems and repair damage caused by fire. Activities include the repair or improvement of fire-damaged lands that are unlikely to recover naturally, or repair of minor facilities damaged by fire.
- Restoration is the long term land management program.

Activities conducted for these purposes can result in invasive plant spread. Vehicles, equipment, erosion control, revegetation materials, humans, livestock, and support animals, can inadvertently spread invasive plant parts and seeds.

The effects of fire on invasive plant spread can also vary depending on the biology of the native vegetation, the level of disturbance, and the habitat condition. A ready-to-use burned-area integrated invasive plant management plan that is consistent with long term land management objectives will help identify priority areas for invasive plant monitoring, the appropriate treatments and prevention measures for post-fire activities.

Cover bare ground with non-invasive plants or weed-free erosion control materials as soon as possible following a fire. Photo: S. Kocher, UC Cooperative Extension

In addition to the following BMPs, also refer to related BMPs in:

- Chapter 2: Project Materials for procuring and managing erosion control and revegetation materials on page 15.
- Chapter 4: Tool, Equipment and Vehicle Cleaning for cleaning protocols on page 21.
- Chapter 5: Clothing, Boots and Gear Cleaning for cleaning protocols on page 23.
- Chapter 9: Revegetation and Landscaping for general prevention measures on page 31.

PF1: Manage access to burned areas.

a. Use an interdisciplinary team to determine when activities (including public access, agency work, and grazing, etc.) may resume in burned areas. The team should include natural resource staff knowledgeable about invasive plants.

b. Consider how vehicles can spread invasive plants and how to reduce their risk. For example, close public access to burned areas temporarily to reduce the risk of introduction and spread of invasive plants.

c. Restrict travel to established roads and trails to avoid compacting soil. Off-road travel could reduce the recovery of desired plants and will create additional disturbance or act as invasive plant vectors.
   - Examples include: Block access to fire lines to prevent vehicles from traveling on them. Place sufficient soil, downed trees, slash, root wads, or boulders to block vehicle access and to slow the flow of water, both of which may carry seeds of invasive plants.

d. Manage human, pack animal, and livestock entry into burned areas until desirable vegetation has recovered sufficiently to resist invasive plant establishment.

e. Consider deferring livestock grazing in burned areas until vegetation has successfully reestablished.
   - Grazing removes plant biomass, reduces levels of competition, and increases the availability of soil nutrients, thus increasing the potential for invasive plant establishment. Grazing also increases soil disturbance, thus creating a seed bed for invasive plants.
   - Grazing Management Plans and permits should emphasize the potential recovery times for burned areas to reduce conflict with permitees.

f. For additional information on access, see Chapter 3: Travel on page 19.

PF2: Use weed-free materials during post-fire activities.

a. When procuring seeds, soil stabilization and revegetation materials, see Chapter 2: Project Materials on page 15.

b. When acquiring local plant materials, see Chapter 9: Revegetation and Landscaping on page 31.

Photo: S. Kocher, UC Cooperative Extension

Use local native plant materials for revegetation.

PF3: Cover and rehabilitate soil disturbed by suppression activity.

a. Cover bare soil that results from fire lines by pulling duff, litter, and cut material back over lines as soon as possible, or by using weed-free mulch (e.g., hydromulch, chipped fuels).

b. Implement erosion control practices. See SD2 on page 28.

c. Encourage the reestablishment of native vegetation by limiting soil disturbance and ensuring invasive plants do not become established.
   - Consider planting locally collected, genetically appropriate, native species to compete with invasive plants.
   - For details, see Chapter 9: Revegetation and Landscaping on page 31.

d. Limit soil disturbance during post-fire activities.

Photo: S. Kocher, UC Cooperative Extension

Erosion control with weed-free materials post-fire is important for reducing invasive plant spread.

e. For details on rehabilitating disturbed soil, see RL3 on page 33.

PF4: Develop and implement post-fire integrated invasive plant management prescriptions.

a. Develop both short-term and long-term treatment prescriptions (including monitoring) to manage invasive plants.

b. Work with a local invasive plant specialist to develop and review BAER reports.

c. Concentrate prevention efforts in high risk areas:
   - Areas highly susceptible to invasive plants establishment and spread include:
     - Areas where invasive plants are already present
     - Wet areas (creeks, seeps, meadows, and seasonal streams)
     - High severity burn areas (high overstory mortality, exposed mineral soil)
     - Burn areas adjacent to roads and trails
   - Areas disturbed by fire suppression activities:
     - Dozer/hand lines (especially where they intersect pre-existing roads or trails)
     - Drop points/sling sites
     - Retardant drops
     - Fire activity areas
   - Transportation corridors
     - Roads and trails
   - Perpetually disturbed areas
     - Campgrounds, dumpsters, and parking lots
     - Residential areas

d. Secure funding to inventory and treat invasive plants, such as BAER and BAR funding.

e. Inspect, evaluate, control and monitor invasive plants at all fire activity areas as needed.
   - Inspect for and map establishment and spread of invasive plants:
     - At fire access roads, cleaning sites, fire lines, staging areas, observation points, sling road sites, safety zones, and within areas affected by fire suppression activity (e.g., riparian areas, fire activity areas, etc.).
     - For more information on conducting a site assessment for invasive plant infestations, see PL7 on page 12.
   - Evaluate invasive plant status and risks.
     - For additional suggestions on areas and species to prioritize, see Prioritizing BMP Implementation on page 5.
   - Control invasive plants.
     - Practice early detection and rapid response

Photo: Garrett Dickman, Yosemite National Park

Practice early detection and rapid response during the first 5-10 years following fire to detect and control new populations of invasive plants within the fire area.

during the first 5-10 years following fire to detect and control new populations of invasive plants within the fire area.

- Control infestations to prevent spread within burned areas; control nearby infestations to prevent spread into burned areas.
- For a list of reference on invasive plant control and management, see General Resources on page 61.

- Monitor for new infestations of invasive plants.
  - Monitoring needs to determine whether objectives of the management actions have been achieved and the retreatments if objectives have not been met.
  - Monitoring will sometimes extend to secondary effects (i.e., the influence of fuel management on fuel characteristics, and ultimately on fire behavior and fire regimes).

PF5: Revegetate burned areas to reduce the spread of invasive plants.

a. Determine soon after a fire whether revegetation is needed to speed recovery of a desirable native plant community, or whether desirable plants in the burned area will recover naturally.

b. Secure funding and revegetate areas vulnerable to invasive plants (e.g. areas that are near existing populations of invasive plants, intersections of dozer lines with road systems).

c. Avoid use of fertilizer. Supplemental nutrients may favor growth and spread of invasive plants.

d. For details, see Chapter 9: Revegetation and Landscaping, on page 31.

e. Create a monitoring plan for revegetation.
   - Monitor burned areas until desirable vegetation is established. Burned areas may be susceptible to weed infestation for 5-10 years or more.
   - For more details on monitoring, see PL11 on page 14.

Photo: Garrett Dickman, Yosemite National Park

Determine soon after a fire whether revegetation is needed to speed recovery of a desirable native plant community, or whether desirable plants in the burned area will recover naturally.

Checklist Introduction

The following checklists contain only the BMP statements to provide a quick and portable reference for field activities. Checklists A, B, C and D are organized by land management activities, and Checklist E is organized by items to inspect and clean. These checklists can be attached to a field notebook, clipboard, or corkboard in an office for easy reference. BMP selection depends on the particular nature of the project or conditions. Land managers are encouraged to modify and develop their own invasive plant prevention checklists according to their specific needs.

Checklist A: Site Assessment, Field Mapping & Monitoring

This checklist is designed for those who perform site assessments, field mapping and monitoring.

Checklist B: Routine Vegetation Management

This checklist is designed for those who perform routine vegetation management.

Checklist C: New Project - Planning

This checklist is designed for those who perform planning tasks for new projects.

Checklist D: New Project - Implementation

This checklist is designed for those who perform pre-activity and implementation tasks for new projects. Some of these tasks include pre-work training, scheduling and revegetation and landscaping.

Checklist E: Inspection & Cleaning

This checklist is designed for use before entering and leaving worksites and should be used when acquiring inspection and cleaning equipment.

Key to BMP Chapter Acronymns

CB – Clothing, Boots and Gear Cleaning BMPs, Chapter 5, page 23
FM – Fuel Management BMPS, Chapter 10.2, page 40
FP – Fire Management Planning BMPs, Chapter 10.1, page 37
FS – Fire Suppression BMPs, Chapter 10.3, page 44
PF – Post-Fire Activity BMPs, Chapter 10.4, page 47
PL – Planning, Chapter 1 , page 9
PM – Project Materials, Chapter 2 , page 15
RL – Revegetation and Landscaping, Chapter 9 , page 31
SD – Soil Disturbance, Chapter 7 , page 27
TE – Tools, Equipment and Vehicle Cleaning, Chapter 4 , page 21
TR – Travel, Chapter 3 , page 19
VM – Vegetation Management, Chapter 8 , page 29
WD – Waste Disposal, Chapter 6, page 25

Checklist A: Site Assessment, Field Mapping & Monitoring

BMP #	Best Management Practice	Project Manager	Field Supervisor	Crew	Contractor	Completed	Comments
BEFORE YOU START							
Planning							
PL6	Provide prevention training and appropriate invasive plant identification resources to staff and contractors prior to starting work.						
PL7	Review internal documentation and consult local groups and online resources for information on existing invasive plant infestations on and near worksite.						
PL8	Schedule activities to minimize potential for introduction and spread of invasive plants.						
PL9	Integrate cleaning BMPs into planning for land management activities.						
PL10c	Treat invasive plants at access roads and staging areas before using them.						
CB1	Plan to wear clothing, boots and gear that do not retain soil and plant material.						
Travel							
TR1	Plan travel to reduce the risk of invasive plant spread (avoid travel through infested areas, and travel from clean to infested worksites).						
TR2	Integrate cleaning activities into travel planning.						
Inspection & Cleaning							
TE1 & CB2	Designate cleaning areas for tools, equipment, vehicles, clothing, boots and gear.						
TE2 & TE3	Inspect and clean soil and plant materials from tools, equipment, and vehicles before entering the worksite.						
DURING							
Inspection & Cleaning							
TE2 & TE3	Inspect and clean soil and plant materials from tools, equipment, and vehicles before leaving the worksite.						
CB3	Clean clothing, footwear and gear before leaving the worksite.						
TE4	Clean livestock and support animals.						
Soil Disturbance							
SD1	Minimize soil disturbance.						

Checklist B: Routine Vegetation Management

BMP #	Best Management Practice	Project Manager	Field Supervisor	Crew	Contractor	Completed	Comments
BEFORE YOU START							
Planning							
PL6	Provide prevention training and appropriate invasive plant identification resources to staff and contractors prior to starting work.						
PL7	Conduct a site assessment for invasive plant infestations before carrying out field activities.						
VM1	Schedule vegetation management activities to maximize the effectiveness of control efforts and minimize introduction and spread of invasive plants.						
PL9	Integrate cleaning BMPs into planning for land management activities.						
PL10c	Treat invasive plants at access roads and staging areas before using them.						
CB1	Plan to wear clothing, boots and gear that do not retain soil and plant material.						
Travel							
TR1	Plan travel to reduce the risk of invasive plant spread (avoid travel through infested areas, and travel from clean to infested worksites).						
TR2	Integrate cleaning activities into travel planning.						
Inspection & Cleaning							
TE1 & CB2	Designate cleaning areas for tools, equipment, vehicles, clothing, boots and gear.						
TE2 & TE3	Inspect and clean soil and plant materials from tools, equipment, and vehicles before entering the worksite.						
Waste Disposal							
WD1	Designate waste disposal areas for invasive plant materials.						

Checklist B: Routine Vegetation Management *(continued)*

BMP #	Best Management Practice	Project Manager	Field Supervisor	Crew	Contractor	Completed	Comments
DURING							
Inspection & Cleaning							
TE2 & TE3	Inspect and clean soil and plant materials from tools, equipment, and vehicles before leaving the worksite.						
CB3	Clean clothing, footwear and gear before leaving the worksite.						
TE4	Clean livestock and support animals.						
Vegetation Management							
VM2	Manage vegetation with methods favorable to desirable vegetation.						
VM3	Retain existing desirable vegetation and canopy.						
Soil Disturbance							
SD1	Minimize soil disturbance.						
SD2	Implement erosion control practices.						
Waste Disposal							
WD2	Render invasive plant material nonviable when keeping it on-site.						
WD3	When disposing of invasive plant material off-site, contain it during transport.						
Monitoring							
PL11	Monitor the site for invasive plants after land management activities.						

Checklist C: New Project - Planning

BMP #	Best Management Practice	Project Manager	Field Supervisor	Crew	Contractor	Completed	Comments
PL2	Include invasive plant risk evaluation as a component of initial project planning and environmental analysis.						
PL3	Integrate invasive plant prevention BMPs into design, construction, vegetation management and maintenance planning activities.						
PL4	Coordinate invasive plant prevention efforts with adjacent property owners and local agencies.						
PL5	Develop monitoring plans for BMP implementation and effectiveness.						
PL9	Integrate cleaning BMPs into planning for land management activities.						
PL11	Designate staff to monitor the worksite for invasive plants after land management activities.						
RL1	Develop revegetation and landscaping plans that optimize resistance to invasive plant establishment.						
PM1	Plan to use a weed-free source for project materials.						

Checklist D: New Project - Implementation

BMP #	Best Management Practice	Project Manager	Field Supervisor	Crew	Contractor	Completed	Comments
BEFORE YOU START							
Training & Scheduling							
PL6	Provide prevention training and appropriate invasive plant identification resources to staff and contractors prior to starting work.						
PL8	Schedule activities to minimize potential for introduction and spread of invasive plants.						
TR1	Plan travel routes to reduce the risk of invasive plant spread.						
TR2	Integrate cleaning activities into travel planning.						
Site Preparation							
PL7	Refer to site assessment for locations of invasive plant infestations before carrying out field activities.						
PL10a	Protect likely invasive plant introduction sites such as pull-outs, trailheads, campgrounds and parking lots by mulching, planting or paving.						
PL10c	Treat invasive plants at access roads and staging areas before using them.						
Project Materials							
PM1	Acquire weed-free project materials.						
PM2	Prevent invasive plant contamination of project materials during transport.						
RL2	Acquire plant materials locally. Verify that species used are not invasive.						
Inspection & Cleaning							
CB1	Select clothing, boots and gear that do not retain soil and plant material.						
TE1 & CB2	Designate cleaning areas for tools, equipment, vehicles, clothing, boots and gear.						
TE2 & TE3	Inspect and clean soil and plant materials from tools, equipment, and vehicles before entering the worksite.						
Waste Disposal							
WD1	Designate waste disposal areas for invasive plant materials.						

Checklist D: New Project - Implementation *(continued)*

BMP #	Best Management Practice	Project Manager	Field Supervisor	Crew	Contractor	Completed	Comments
DURING							
Inspection & Cleaning							
TE2 & TE3	Inspect and clean soil and plant materials from tools, equipment, and vehicles before leaving the worksite.						
TE4	Clean pack, grazing and support animals.						
CB3	Clean clothing, footwear and gear before leaving the worksite.						
Project Materials							
PM1	Use a weed-free source for project materials.						
PM2	Prevent invasive plant contamination of project materials when stockpiling and during transport.						
Vegetation Management							
VM2	Manage vegetation with methods favorable to desirable vegetation.						
VM3	Retain existing desirable vegetation and canopy.						
Soil Disturbance							
SD1	Minimize soil disturbance.						
SD2	Implement erosion control practices.						
SD3	Manage existing topsoil and duff material to reduce contamination by invasive plants.						
Revegetation & Landscaping							
RL3	Revegetate and/or mulch disturbed soils as soon as possible to reduce likelihood of invasive plant establishment.						
Waste Disposal							
WD2	Render invasive plant material nonviable when keeping it on-site.						
WD3	When disposing of invasive plant materials off-site, contain it during transport.						
Monitoring							
PL11	Monitor the site for invasive plants after land management activities.						

Checklist E: Inspection & Cleaning

Clothing and Gear:

Check for soil, seeds, and plant material	Inspected	Cleaned
1. Hats		
2. Hoods		
3. Collars and cuffs		
4. Clothing folds or flaps		
5. Ventilation openings		
6. Pockets		
7. Zippers		
8. Straps or Velcro grips		
9. Belts or buckles		
10. Buttons, fasteners, and rivets		
11. Laces or ties		
12. Gloves		
13. Pant cuffs		
14. Socks		

Boots or Shoes:

Check for soil, seeds, and plant material	Inspected	Cleaned
1. Shoelaces or ties		
2. Straps or Velcro grips		
3. Shoe tongues		
4. Treads		

Hand and Power Tools:

Check for soil, seeds, and plant material	Inspected	Cleaned
1. Chainsaw chain		
2. Hand saw blades		
3. Mower deck and blades		
4. Weed-eater blades		
5. Crevices on other tools		

Hand and Power Tools:

Check for soil, seeds, and plant material	Inspected	Cleaned
1. Chainsaw chain and body		
2. Hand saw blades		
3. Mower deck and blades		
4. Weed-eater blades and guard		
5. Crevices on all other tools		

Checklist E: Inspection & Cleaning *(continued)*

Vehicles and Large Equipment (including ATVs, OHVs, motorcycles and bikes):

Check for soil, seeds, and plant material	Inspected	Cleaned
1. Truck bed		
2. Exhaust systems		
3. Vent openings		
4. Grills: Front and back		
5. Tray under radiator		
6. Top of transmission		
7. Stabilizer bar		
8. Shock absorber joint with axles		
9. Front and rear axles		
10. Top of front suspension units		
11. Wheel well/quarter panels		
12. Ledges under bumper (front and rear)		
13. Tire rims and treads		
14. Between rear wheel brake drums and the rim of the wheel		
15. At the bend in the fuel inlet tube		
16. Spare tire and mounting area		
17. Under the floor mat (inside cab)		
18. Under the seat (inside cab)		
19. Upholstery (inside cab)		
20. Beneath foot pedals (inside cab)		
21. Gear shift cover folds (inside cab)		

Livestock and Support Animals:

Check for soil, seeds, and plant material	Inspected	Cleaned
1. Underbelly		
2. Legs		
3. Hooves		
4. Coat or wool		
5. Ears		
6. Tack (saddles, blankets, panniers)		

General Resources

The following are websites that contain, and link to, significant amounts of information on invasive plant management.

California Invasive Plant Council
http://www.cal-ipc.org
This site provides a wide range of invasive plant information specific to California. Resources include prevention, invasive plant inventory, CalWeedMapper, invasive plant profiles with links to articles, publications, reports, and educational brochures.

California Department of Food and Agriculture Integrated Pest Control Branch
http://www.cdfa.ca.gov/plant/ipc/index.html
The Integrated Pest Control Branch conducts a wide range of pest management and eradication projects as part of the Division of Plant Health and Pest Prevention Services Pest Prevention Program. This site provides the Encycloweedia, noxious weeds and weed ratings, and the CalWeed Database.

Center for Invasive Plant Management
http://www.weedcenter.org
The Center for Invasive Plant Management (CIPM) is a hub for management information in the western U.S. Includes plant biology and management information; education information; and publications. CIPM also provides grants to weed projects in western states. Grant information is available at this site.

Invasive.org: Center for Invasive Species and Ecosystem Health
http://www.invasive.org
This site provides an easily accessible archive of high quality images of invasive and exotic species of North America with identifications, taxonomy and descriptions for use in educational applications.

Invasive Species Council of California
http://www.iscc.ca.gov
The invasive Species Council of California provides general information on invasive species in California including animals, plants, insects, and plant and animal disease.

National Invasive Species Council
http://www.invasivespecies.gov
The National Invasive Species Council (NISC) was established by Executive Order (EO) 13112 to ensure that Federal programs and activities to prevent and control invasive species are coordinated, effective and efficient.

National Invasive Species Information Center
http://www.invasivespeciesinfo.gov
This site is a gateway to invasive species information; covering Federal, State, local and international sources. The information center is maintained by the U.S. Department of Agriculture's National Agricultural Library.

USDA Forest Service Invasive Species Program—Control and Management http://www.fs.fed.us/invasivespecies/controlmgmt/index.shtml
This page provides links for more information on research, management planning, Forest Service activities, and pest-specific control and management.

Weed Research and Information Center
http://wric.ucdavis.edu
The University of California's Weed RIC provides control notes and photos for invasive plants as well as agricultural weeds.

Prevention Resources

A Builder and Contractor's Guide to Preventing the Introduction and Spread of Invasive Weeds
http://ucanr.org/sites/csnce/files/57340.pdf
El Dorado County's Invasive Weed Management Group provides an illustrated pamphlet with tips and considerations that contractors and landscapers can integrate into their general practice in order to stop unsightly and costly invasive plant infestations before they begin.

Hazard Analysis and Critical Control Point (HACCP) Planning for Natural Resource Pathways
http://nctc.fws.gov/EC/Resources/pdf/HACCP%20Manual.pdf
The HACCP plan is a structured process that assesses a natural resource management activity, identifies possible risks, and facilitates the removal or reduction of non-target (i.e. invasive) species. The five-step process records important elements of who, what, where, when, how and why of each activity to help manage target problems and improve best management practices.

Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species
http://www.usbr.gov/mussels/prevention/docs/EquipmentInspectionandCleaningManual2010.pdf
The U.S. Bureau of Reclamation has developed a set of procedures to address the transport of invasive species and pests through equipment movement. This manual provides guidance for inspecting and cleaning vehicles and large equipment.

Storm Water Quality Handbook: Project Planning and Design Guide http://www.dot.ca.gov/hq/oppd/stormwtr/ppdg/swdr2010/PPDG-July-2010-r2.pdf
This handbook provides guidance on the process and procedures for evaluating project scope and site conditions to determine the need for and feasibility of incorporating BMPs into projects. The key objective of this guide is to provide the overall process for selecting and designing BMPs within the Caltrans planning and design processes and incorporating those BMPs into the appropriate documents.

USDA Forest Service. The Early Warning System for Forest Health Threats in the United States
http://www.fs.fed.us/foresthealth/publications/EWS_final_draft.pdf
This is a monitoring framework for early detection and response to environmental threats (e.g., insects, diseases, invasive species, and fire) to forest lands. The framework is based on the following steps: 1) identify potential threats, 2) detect actual threats, 3) assess impacts, and 4) respond.

USDA Forest Service—Dangerous Travelers: Controlling Invasive Plants along America's Roadsides (Video)
http://www.fs.fed.us/invasivespecies/
The video outlines the best management practices that road crews should be following in their day-to-day operations. This is the first in a series on "Best Management Practices for Invasive Species Prevention." Ordered on DVD by contacting: USDA Forest Service; San Dimas Technology and Development Center; 444 East Bonita Avenue; San Dimas, CA 91773; (909) 599-1267.

Fire and Fuel Management Resources

A Manual of California Vegetation, 2nd Edition
http://www.cnps.org/cnps/vegetation/manual.php
Sawyer, J.O., Keeler-Wolf, T., and Evens, J. 2009. California Native Plant Society Press.

California Native Plant Society has adopted a definitive system for describing vegetation statewide. This standard vegetation classification has been accepted by state and federal agencies. The principal vegetation unit is called "Alliance" (or series), which is a floristically defined vegetation type identified by its dominant and/or characteristic species.

Emergency Stabilization/Burned Area Rehabilitation
http://www.fws.gov/fire/ifcc/esr/home.htm
DOI National Burned Area Emergency Stabilization and Rehabilitation Group provides policy, guidance, and reference materials on BAER, BAR and incident business management.

Fire Ecology by USGS Western Ecological Research Center (WERC)
http://www.werc.usgs.gov/ResearchTopicPage.aspx?id=6
To restore more normal fire dynamics to a particular region, managers need to know how fire has historically affected the local system, and how it functions today. Researchers at the (WERC) are making contributions to this effort through detailed studies of fire history and fire ecology in the Sierra Nevada forests, California shrublands, and Mojave and Sonoran deserts.

Fire in California's Ecosystems
http://www.ucpress.edu/book.php?isbn=9780520246058
Sugihara, N.G., Van Wagtendonk, J.W., Fites-Kaufman, J., Shaffer, K., and Thode, A. Klinger, R.C. ML. Brooks, and Randall, J.M. (eds.) 2006. The University of California Press. Berkeley, California.

Written by many of the foremost authorities on the subject, this book synthesize the knowledge of the science, ecology, and management of fire in California. It introduces the basics of fire ecology, including an historical overview of fire and vegetation in California; an exploration of the history and ecology of fire in each of California's nine bioregions; an examination of fire management in California; and discussion on current issues related to fire policy and management.

USDA Forest Service's Fire Effect Information System website (FEIS)
http://www.fs.fed.us/database/feis/
FEIS summarizes and synthesizes research about living organisms in the United States—their biology, ecology, and relationship to fire.

Wildland Fire Decision Support Systems (WFDSS)
https://wfdss.usgs.gov/wfdss/WFDSS_Home.shtml
The US Geological Survey hosts a web-based decision support system that assists fire managers and analysts in making strategic and tactical decisions for fire incidents and provides a record of these decisions.

Glossary

Ankle-gaiters: a protective covering for the lower leg and ankle designed to prevent snow, mud, gravel, or seeds from entering the top of the boot. Gaiters can also prevent seeds from adhering to pants, socks, boots and laces.

Best management practices: methods or techniques found to be the most effective and practical in achieving an objective, such as preventing or minimizing invasive plant spread, while making the optimum use of resources.

Burned Area Emergency Response (BAER): an emergency risk management action taken within one year of wildfire containment to stabilize and prevent unacceptable degradation to natural and cultural resources, to minimize threats to life or property resulting from the effects of a fire, or to repair/replace/construct physical improvements necessary to prevent degradation of land or resources. BAER should be a part of all Fire Management Plans. It should cover acceptable methods, techniques, and materials to stabilize and rehabilitate soils, native vegetation, and prevention of further damage.

Burned Area Rehabilitation (BAR): efforts undertaken within three years of wildfire containment to repair or improve fire-damaged lands unlikely to recover naturally to management approved conditions, or to repair or replace minor facilities damaged by fire. The process concludes with long-term restoration.

CEQA: California Environmental Quality Act. A statute passed in 1970 to institute a statewide policy of environmental protection. http://ceres.ca.gov/ceqa

Clean: not contaminated with viable invasive plant propagules.

Contaminated: contains viable invasive plant propagules.

Control line: an inclusive term for all constructed or natural barriers used to control a fire.

Critical control point: the best point, step, or procedure at which significant hazards can be prevented or reduced to minimum risk. Source: USFWS-NCTC. 2004. Hazard Analysis and Critical Control Point (HACCP) Planning for Natural Resource Pathways.

Delegation of Authority: an instrument signed by both the Incident Commander and Agency Administrator which identifies the acceptable methods of fire suppression and rehabilitation, notes any specific concerns (such as prevention of invasive plant spread), and names an Agency Representative that will speak for the Agency regarding resource matters.

Desiccate: to kill a plant by drying it thoroughly.

Disturbance: any activity leading to increased sunlight and bare ground, conditions that can be suitable for invasive plant introduction.

Duff: partially decomposed organic matter lying beneath the litter layer and above the mineral soil. It includes the humus and fermentation layers of the forest floor.

Early detection and rapid response (EDRR): a cost-effective approach to invasive plant management that aims to detect newly established invasive plant infestations early and to remove them before they spread.

Environmental stewardship: responsible use and protection of the natural environment through conservation and sustainable practices.

Equipment: machinery such as mowers and bulldozers used during land management activities.

Eradicate: the complete elimination of an invasive plant population, including all viable propagules.

Field Observer (FOBS): this Incident Command System position is responsible for collecting and reporting situation information for an incident

through personal observations and interviews and reports to the Situation Unit Leader.

Fire activity areas: an inclusive term for areas used for fire suppression activities, which include incident areas, Incident Base Camp, staging areas, fire crew camps, spike camps, helibases, drop points, parking areas, etc.

Fire frequency: the recurrence of fire in a given area over time, stated as number of fires per unit time.

Fire line: A line to break up fire fuels. Also known as a control line, a fire line is scraped or dug, by hand or mechanically, into mineral soil.

Fire Management Plan (FMP): a plan which identifies and integrates all wildland fire management and related activities within the context of approved land/resource management plans. It defines a program to manage wildland fires (wildfire, prescribed fire, and wildland fire use). The plan is supplemented by operational plans, including but not limited to preparedness plans, preplanned dispatch plans, and prevention plans. Fire Management Plans assure that wildland fire management goals and components are coordinated.

Fire Management Unit (FMU): a land management area definable by objectives, management constraints, topographic features, access, values to be protected, political boundaries, fuel types, major fire regime groups, etc., that set it apart from the characteristics of an adjacent FMU. The FMU may have dominant management objectives and pre-selected strategies assigned to accomplish these objectives.

Fire regime: characteristic pattern of burning over large expanses of space and long periods of time. Fire regimes are described for a specific geographic area or vegetation type by the characteristic fire type (ground, surface, or crown fire), frequency, intensity, severity, size, spatial complexity, and seasonality.

Fire suppression: all work and activities connected with fire-extinguishing operations, beginning with discovery and continuing until the fire is completely extinguished.

Fuel break: a generally wide (60 to 1000ft. or 18 to 305m) strip of land on which native vegetation has been permanently modified so that a fire burning into it can be more readily controlled.

Fuel treatment: manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control (e.g., lopping, chipping, crushing, piling and burning).

Fuel zone: a defined area within which fuels are managed to influence fire behavior and/or fire regimes.

Fuel: living and dead vegetation that can be ignited.

Hand line: fire line constructed with hand tools.

Impact: the cumulative effect, economic and ecological, of an invasive plant population on natural resources.

Incident Action Plan (IAP): contains objectives reflecting the overall incident strategy and specific tactical actions and supporting information for the next operational period. The plan may be oral or written. When written, the plan may have a number of attachments, including: incident objectives, organization assignment list, division assignment, incident radio communication plan, medical plan, traffic plan, safety plan, and incident map. Formerly called shift plan.

Incident Base Camp: location at the incident where the primary logistics functions are coordinated and administered. (Incident name or other designator will be added to the term Base.) The incident command post may be collocated with the base. There is only one Base per incident.

Incident Commander: this Incident Command System position is responsible for overall management of the incident and reports to the agency administrator for the agency having incident jurisdiction. This position may have one or more deputies assigned from the same agency or from an assisting agency(s).

Incident Management Team: the incident commander and appropriate general and command staff personnel assigned to an incident.

Indirect attack: A method of suppression in which the control line is located at some considerable distance away from the fire's active edge. Generally done in the case of a fast-spreading or high-intensity fire and to utilize natural or constructed firebreaks, fuel breaks and favorable breaks in the topography. The intervening fuel is usually backfired; but occasionally the main fire is allowed to burn to the line, depending on conditions.

Indirect fire line: fire line built for implementing indirect attack during fire suppression.

Infested: populated by invasive plants.

Invasive plants: non-native plants that cause economic or ecological harm. Used interchangeably with "weeds".

Land management plan: a document prepared with public participation and approved by an agency administrator that provides general guidance and direction for land and resource management activities for an administrative area. The plan identifies the need for fire's role in a particular area and for a specific benefit. The objectives in the plan provide the basis for the development of fire management objectives and the fire management program in the designated area.

Land manager: a person who manages public or private land.

Management unit: see Fire Management Unit (FMU).

Minimum Impact Suppression Tactics (MIST): the concept of using actions with a minimum amount of impact to effectively achieve the fire management protection objectives consistent with land and resource management objectives.

Monitoring: evaluating the success of prevention measures and management actions; including regular inspection of worksites to detect change, in this case the presence or absence of invasive plants.

Native plants: plants that evolved in a particular region. Plants that evolved without human intervention in a particular region, such as a California bioregion or watershed. These are usually species that occurred naturally before European colonization of North America.

NEPA: National Environmental Policy Act. A national law that established a U.S. national policy promoting the enhancement of the environment. http://ceq.hss.doe.gov

Nonviable: when a plant propagule is not able to produce a new plant.

Pathways: processes through which invasive plants can be introduced or spread.

Prescribed fire: a fire ignited on purpose, with planned oversight and specific management goals. The fire is applied to fuels in specified environmental conditions that allow the fire to be confined to a predetermined area and, at the same time, to produce fire behavior that will attain the planned management objectives.

Project materials: materials that soil and invasive plant parts and seeds can adhere to. These materials include soil, mulch (woody and straw), aggregate (sand and gravel), wood products (firewood and brush), landscape material (plants and seed), erosion control materials (silt fence, straw bales, straw wattles, geotextiles, and rip rap), pack animal feed, and packing/shipping materials.

Propagule: plant reproductive material, such as seeds, rhizomes or stolons.

Pulaski: a hand tool used in wildland fire suppression for construction firebreaks. The tool combines an axe and an adze in one head, and it can be used to both dig soil and chop wood.

Resource Advisor: personnel primarily responsible for identifying and evaluating potential impacts and benefits of fire operations (wildfire or prescribed fire) on natural and cultural resources. The Resource Advisor anticipates impacts on resources as suppression or prescribed fire operations evolve; communicates requirements for resource protection to the Incident Commander (IC) or Incident Management Team (IMT); ensures that planned mitigation measures are carried out effectively; and provides input in the development of short- and long-term natural resource and cultural rehabilitation plans.

Retardants: any substance except plain water that by chemical or physical action reduces flammability of fuels or slows their rate of combustion.

Scout: the act of searching for, locating, and documenting invasive plants on a worksite.

Seed set: the plant reproductive stage during which seeds mature.

Site assessment: the act of scouting for invasive plant species found within the worksite, including documentation of exact locations and densities of invasive plants, and determining priority areas for implementing prevention BMPs

Slash: debris resulting from such natural events as wind, fire, or snow breakage, or such human activities as road construction, logging, pruning, thinning, or brush cutting. Slash includes logs, chunks, bark, branches, stumps, and broken understory trees or brush.

Source populations: infestations of invasive plants which produce seed or other reproductive plant parts that can spread to new areas.

Spike camp: remote camp usually near a fire line, and lacking the logistical support that a larger fire camp would have.

Staging areas: locations where tools, equipment and vehicles are assembled before and during projects.

Sterile: not able to reproduce.

Support animals: dogs that provide hearing or seeing assistance.

Suppression: all the work of extinguishing a fire or confining fire spread.

Target conditions: land or resource conditions that are expected to result if goals and objectives are fully achieved.

Tools: implements used during land management activities, such as shovels and chainsaws.

Transitional pastures: designated areas where grazing animals can graze before and after being used for vegetation management.

Vectors: people or things that can carry invasive plants or their propagules from one place to another inadvertently.

Vehicle: cars, trucks, and all terrain vehicles used during land management activities.

Viable: when a propagule is able to produce a new plant.

Waste-disposal areas: locations where waste can be disposed without the risk of spreading invasive plant materials.

Water sources: natural and man-made water bodies. Water sources do not include equipment.

Weed-free forage: hay, oats, and other feed for pack and grazing animals from a clean source (not contaminated with viable invasive plant propagules).

Weed-free materials: project materials from a clean source (not contaminated with viable invasive plant propagules).

Weeds: used interchangeably with "invasive plants" (non-native plants that cause economic or ecological harm). Not all weeds are considered invasive plants, but for the purpose of this document the two terms are used interchangeably.

Wildfire: a wildland fire whose ignition is unplanned, such as a fire caused by lightning, volcanoes, unauthorized and accidental human-caused fires, and escaped prescribed fires.

Wildland Fire Decision Support Systems (WFDSS): a web-based decision support system that assists fire managers and analysts in making strategic and tactical decisions for fire incidents and provides a record of these decisions.

Wildland Fire: a general term describing any non-structure fire that occurs in wildlands. Wildland fires include wildfires and prescribe fires.

Wildland Urban Interface (WUI): the line, area, or zone where structures and other human development meet or intermingle with undeveloped wildlands.

Worksites: locations or properties where land management activities occur.

Definitions of fire and fuel management terms in this glossary are adapted from the following references:

- Guidance from Implementation of Federal Wildland Fire Management Policy http://www.nifc.gov/policies/policies_documents/GIFWFMP.pdf
- National Wildfire Coordination Group website http://www.nwcg.gov/pms/pubs/glossary/index.htm
- The Bureau of Land Management Fire Management Glossary website http://www.blm.gov/wy/st/en/programs/Fire/glossary.2.html

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Cal-IPC

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

for the

TRUCKEE MEADOWS RESTORATION PROJECT

Prepared for:
Jeannette Halderman
Truckee River Watershed Council
10418 Donner Pass Rd # B
Truckee, CA 96161

Prepared by:
Kevin Drake, QSD/QSP
Integrated Environmental Restoration Services, Inc.
P.O. Box 7559
Tahoe City, CA 96145

April 2016

Document Control

It is the responsibility of the QSD to institute document control protocols for revisions, updates, and amendments to this SWPPP. The QSD shall ensure that each plan recipient is supplied with any revision or amendment within 30 calendar days.

There are 3 official numbered copies of this SWPPP, which will be distributed as follows:

Copy Number	Recipient	Date	Address
1	Jeannette Halderman Owner's Representative		Truckee River Watershed Council 10418 Donner Pass Rd # B Truckee, CA 96161
2	Contractor (TBD)		
3	Kevin Drake QSD		Integrated Environmental Restoration Services, Inc. P.O. Box 7559 Tahoe City, CA 96145

Amendment and Revision Instructions

All amendments to the SWPPP shall be prepared and certified by the QSD, uploaded to SMARTS and distributed to SWPPP recipients within 30 calendar days.

SWPPP recipients shall insert new or amended SWPPP content and the updated SWPPP Amendment Log into Attachment A of the SWPPP. Additionally, the recipient shall insert the green Amendment Notification Card (on next page) into the appropriate section of the SWPPP to identify that it has been amended. This card will direct the reader to the specific amendment in Attachment A.

Amendment Notification

This section of the SWPPP has been amended.

Please refer to Attachment A for amended SWPPP content.

Section Amended:

Amendment Date:

Amendment Number:

Approved by (QSD):

Description:

TABLE OF CONTENTS

1.0 INTRODUCTION AND CERTIFICATIONS

1.1 SWPPP OBJECTIVES

- Identify pollutant sources including sediment sources that may affect the quality of storm water discharges associated with construction activity.
- Identify non-storm water discharges.
- Identify, construct, implement and maintain Best Management Practices (BMPs) to reduce or eliminate pollutants in storm water discharges and authorized non storm water discharges from the construction site.
- Identify effluent outfall locations, sampling and analysis strategy and protocols, and a sampling schedule for discharges from the identified outfalls for the project area.

1.2 PERMIT REGISTRATION DOCUMENTS

INSERT NOI ONCE SUBMITTED

1.3 WDID NUMBER

Insert WDID letter once received

1.4 CERTIFICATION AND TRAINING REQUIREMENTS

1.4.1 Initial SWPPP Certification

Project Name: Truckee Meadows Restoration Project

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Legally Responsible Person (LRP)

Lisa Wallace
Truckee River Watershed Council
10418 Donner Pass Rd # B
Truckee, CA 96161

Signature: _____

Date: _____

Qualified SWPPP Developer/Practitioner (QSD/QSP)

Kevin Drake, CPESC, QSD
Integrated Environmental Restoration Services, Inc.
PO Box 7559
Tahoe City, CA 96145

Signature: _____

Date: _____

QSD Certification #: 01229

1.4.2 SWPPP Training for Site Personnel

Training is an integral part of effective SWPPP implementation and water quality protection. Training educates project personnel on the importance of protecting water quality, their role in the implementation of the SWPPP, and the consequences of non-compliance. Different levels of training will be conducted for different personnel, depending on their role and function on the job site.

1.4.2.1 Structure and Timing

Superintendents, foreman and project personnel whose job functions directly relate to soil disturbance (e.g. grading) or BMP installation and maintenance are required to attend a SWPPP training at the beginning of each construction season. This training will take place on-site and will provide technical and regulatory background information along with hands-on training on installation and maintenance of site-specific BMPs. This training will also cover protocols for conducting and documenting daily BMP inspections, site management BMPs, housekeeping BMPs, and rain event preparation.

Other project personnel whose job functions are not directly related to soil-disturbing activities and SWPPP implementation will receive periodic tailgate trainings on an as-needed basis depending on construction phase and sub-contractor activities. These tailgate trainings will typically be scheduled to coincide with morning safety meetings and will be customized to their specific roles on the project and water quality threats related to their operations.

1.4.2.2 Documentation

All trainings will be documented and all personnel will sign in to record their attendance. Training sign-in records will be attached to an outline of topics covered in the session and be maintained in the SWPPP (Attachment B). A sample SWPPP training outline and sign-in form is included in Attachment B.

1.5 PROJECT CONTACT INFORMATION

Legally Responsible Person (LRP):
Lisa Wallace
Truckee River Watershed Council
10418 Donner Pass Rd # B
Truckee, CA 96161
530-550-8760

Qualified SWPPP Developer/Practitioner (QSD/QSP):
Kevin Drake, CPESC, QSD
Integrated Environmental Restoration Services
PO Box 7559
Tahoe City, CA 96145
530.581.4377

General Contractor:
TBD

Project Engineer:
Peter Kulchawik, P.E.
12020 Donner Pass Rd, Suite B1
Truckee CA 96161
(530) 550-9776

1.5.1 Sub-Contractors

The following sub-contractors will be responsible for carrying out activities that directly relate to effective implementation of this SWPPP (Sub-contractors will be added once a General Contractor is selected):

Subcontractor	Role

1.6 EMERGENCY CONTACT PERSON AND 24-HOUR PHONE NUMBER

Superintendent contact information to be added once contractor is selected

1.7 SWPPP AVAILABILITY AND PUBLIC RECORDS ACCESS

This SWPPP and any amendments will be kept on site during construction and made available upon request of a representative of the Regional Water Board or any local storm water management agency which receives the storm water discharge. This SWPPP will also be posted on SMARTS for access by the general public.

1.8 SWPPP AMENDMENTS

This SWPPP will be amended whenever there is a change in construction site conditions or SWPPP implementation protocols that may affect the discharge or pollutants to surface waters, groundwater, or a municipal storm drain system. This SWPPP will be maintained such that it reflects the actual site conditions for the duration of the project, including keeping disturbed soil area (DSA) maps current as the project progresses. Changes in BMP implementation features or activities shall be documented and included as amendments to the SWPPP. An amendment log will be maintained in Attachment A that summarizes all changes to the SWPPP for the duration of the project.

2.0 PROJECT INFORMATION

2.1 PROJECT DESCRIPTION AND LOCATION

Truckee Meadows Restoration Project is located along Old Brockway Road Meadow Complex, along Brockway Road in the Town of Truckee, and ends at the south side of the Truckee River along the Legacy Trail.

The Truckee Meadows Restoration Project (TMRP) will include restoration/enhancement of degraded meadow (Discharge Slope, Lacustrine Fringe, and Riparian High Gradient types), drainage, and floodplain habitats along an approximately 0.75 mile drainage course of a fragmented meadow complex and drainages that lead to the Truckee River. Previously completed Feasibility and Assessment studies demonstrate enough of the complex remains along with significant opportunities for re-connecting the hydrology that 13 acres of wetland and meadow can be restored and 1.5 acres of meadow and riparian habitat can be increased.

Restoring function will improve meadow habitat and wildlife habitat, and provide other co-benefits such as recreation and education opportunities. Project objectives related to co-benefits include:

- Improve hydrology of 13 acres of meadow
- Increase area of attenuation in the restored and enhanced meadows and expanded pond
- Expand meadow and riparian habitat area by approximately 1.5 acres
- Reduce Erosion/sedimentation to downstream and the Truckee River by spreading flows from approximately 0.5 acres of existing drainages onto the meadows
- Ameliorate impacts of climate change through reducing flooding caused by rain on snow events
- Redirect flows currently flowing and eroding approximately 0.25 acres of upland habitat, into drainage course
- Create recreation/education opportunities

Total construction site area = 11.7 acres

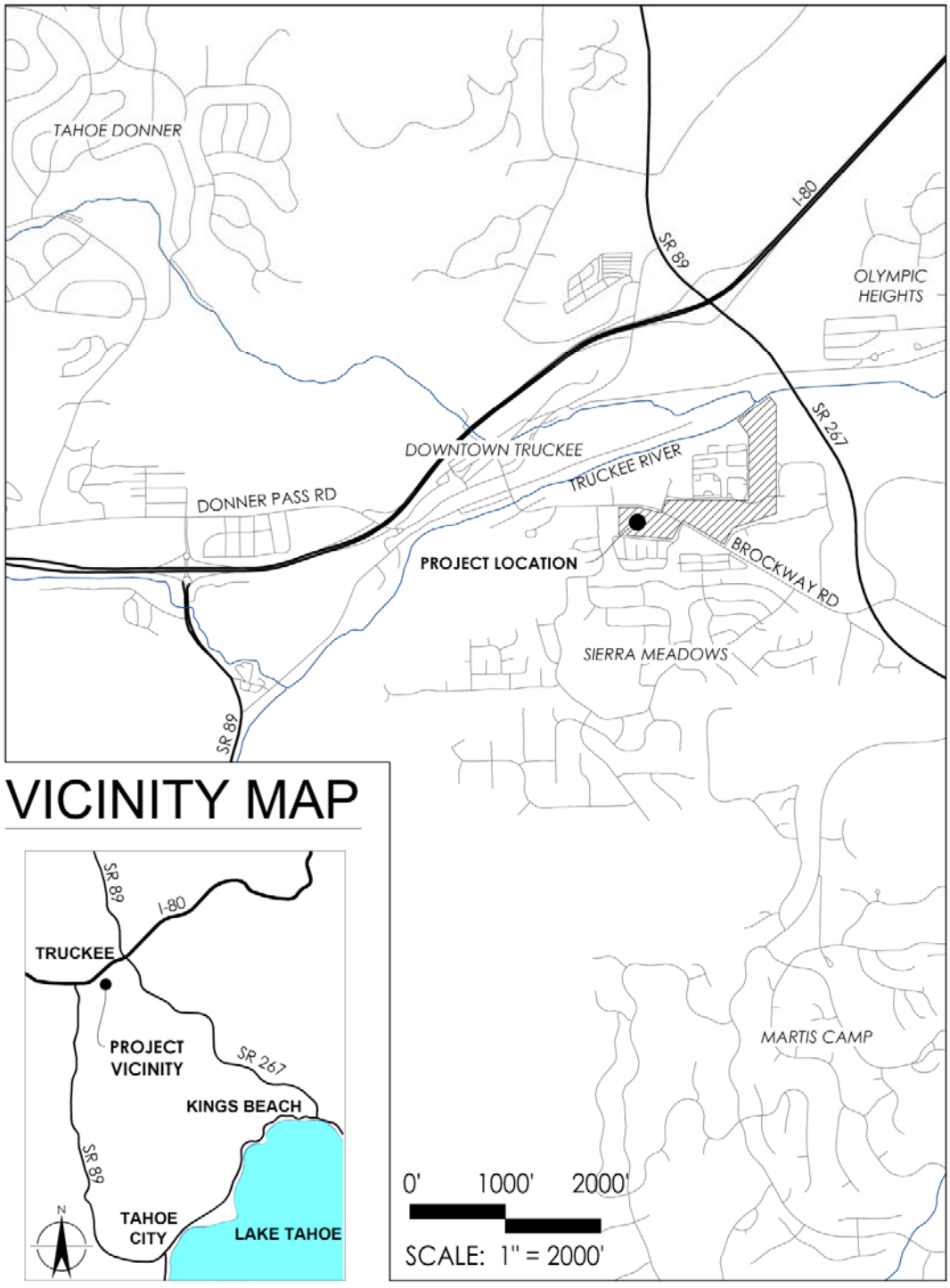
Total construction disturbance area = 5.9 acres

2.2 PROJECT RISK LEVEL

This project is determined to be Risk Level 2.

2.3 PROJECT LOCATION MAP

LOCATION MAP



VICINITY MAP

2.4 CONSTRUCTION SCHEDULE

INSERT SCHEDULE ONCE FINALIZED WITH CONTRACTOR

3.0 BEST MANAGEMENT PRACTICES

3.1 EXISTING SITE DRAINAGE AND WATER FLOW

The origin of surface water within the project area is a combination of groundwater seepage from a wet meadow on the south side of Brockway Road and, to a lesser degree, seasonal surface runoff from surrounding impervious areas. Water from this meadow flows north through a culvert under Brockway Road then east through a culvert under Estates Drive. It then flows west primarily within a man-made ditch that ends at the Brockway Pond. Overflow from the pond supplies water to a series of man-made channels flowing west, eventually veering north and passing through another culvert under Estates Drive. Runoff then flows north alongside an unpaved service road, through several more culverts, then daylights in an old concrete-lined channel that routes flows directly to the Truckee River.

3.2 POTENTIAL CONSTRUCTION SITE POLLUTANTS OF CONCERN AND SOURCES

Construction activities that have the potential to contribute sediment to stormwater runoff include:

- Clearing and grubbing
- Drainage dewatering and rewatering
- Excavation and grading in and near wet meadows and artificial channels
- Soil storage, import, and export
- Onsite material handling, sorting and staging
- Inappropriate application of water for dust control or irrigation has the potential to cause erosion and contribute sediment to stormwater runoff

Construction activities that have the potential to contribute pollutants other than sediment to stormwater runoff include:

- Equipment and vehicle malfunctions and/or leaks have the potential to contribute oil, grease, fuel, hydraulic fluid, and coolants
- Removal of a concrete-lined channel has the potential to contribute concrete and cement materials
- Asphalt paving operations have the potential to contribute hydrocarbons
- Inappropriate storage and application of revegetation materials such as topsoil and fertilizer has the potential to contribute nutrients such as nitrogen and phosphorus
- Inappropriate application of water for dust control or irrigation has the potential to contribute excess nutrients to stormwater runoff
- Inappropriate storage of general litter/trash could contribute pollutants to stormwater runoff

3.3 LINKING WATER QUALITY THREATS AND BMPS

The following table contains a list of construction-related water quality threats and corresponding BMPs which should be used to protect water quality during construction. This is not a complete list of all potential water quality threats or BMPs. The BMP Guide for Water Quality Threats (Attachment C) provides a more comprehensive guide to appropriate BMPs for a range of specific water quality threats. Technical notes for installation, monitoring and maintenance each BMP are listed in Attachment D. Locations of specific BMPs for this project are shown on the BMP Plan in Section 3.8. BMPs will be implemented according to the schedule shown in Section 2.4.

Water Quality Threats	Applicable BMPs	BMP #
Clear and Grub Operations	Scheduling	SM-09
	Soil Disturbance Management	SM-01
Grading Operations	Scheduling	SM-09
	Soil Disturbance Management	SM-01
	Traffic Control	SM-14
	Track off Control	SM-15
	Material Delivery and Storage	HP-03
	Material Use	HP-04
	Preservation of Vegetation	SM-08
	Pine Needle Wattles/Fiber Rolls	SC-01
	Water Conservation	SM-17
Soil Import/Export Operations	Scheduling	SM-09
	Traffic Control	SM-14
	Track off Control	SM-15
	Material Delivery and Storage	HP-03
	Pine Needle Wattles/Fiber Rolls	SC-01
Stockpiling	Stockpile Management	SM-12
	Material Use	HP-04
	Soil Disturbance Management	SM-12
	Pine Needle Wattles/Fiber Rolls	SC-01
Vehicle Fluids: Grease, Oil, Fuel, Hydraulic Fluid, Coolant	Vehicle and Equipment Refueling	HP-08
	Vehicle and Equipment Maintenance	SM-16
	Vehicle and Equipment Cleaning	HP-07
	Hazardous Material Management	HP-01
	Material Use	HP-04
Concrete/Cement Materials and Curing Compounds	Concrete Materials Containment	SM-02
	Concrete Washout	SM-03
	Solid Waste Management	HP-06
	Contaminated Soil	SM-04
	Material Use	HP-04
Solvents, Thinners, Acids	Spill Prevention	SM-10
	Spill Response and Notification	SM-11
	Contaminated Soil	SM-04
	Hazardous Waste Management	HP-01
Revegetation Materials and Operations	Stockpile Management	SM-12
	Preservation of Vegetation	SM-08
	Material Delivery and Storage	HP-03
	Water Conservation	SM-17
Treated Lumber	Material Delivery and Storage	HP-03
	Hazardous Waste Management	HP-01
General Litter	Solid Waste Management	HP-06
Vehicle Maintenance / Fueling	Vehicle and Equipment Refueling	HP-08
	Vehicle and Equipment Maintenance	SM-16
	Vehicle and Equipment Cleaning	HP-07

Water Quality Threats	Applicable BMPs	BMP #
	Hazardous Waste Management	HP-01

3.4 SITE MANAGEMENT BMPS

3.4.1 Site Planning

Site planning integrates a range of specific BMPs to effectively anticipate, map and manage the flow of construction activities and materials on the construction site to maximize water quality protection. Thoughtful site planning is required throughout the entire construction process in order to create and maintain a safe, efficient, and low-impact construction site. Site planning BMPs applicable to this project include:

- SM-01 Soil Disturbance Management
- SM-09 Scheduling
- SM-12 Stockpile Management
- SM-14 Track Off Control
- SM-15 Traffic Control
- HP-03 Material Delivery and Storage
- HP-04 Material Use

Refer to the Site Management and Housekeeping BMPs in Attachment D for specific implementation guidance.

3.4.2 Dewatering

The ditch that flows into Brockway Pond is expected to be dry once construction begins in that area. However, if surface water is encountered in the ditch near the time construction needs to begin, an isolation dam will be constructed and a sump pump will be used to divert the water to a series of sprinkler heads. This water will be disbursed throughout well-vegetated areas in a manner that ensures no erosion or soil movement.

3.4.3 Waste Management and Storage

All chemicals stored on site will be stored in a designated staging area in a manner that prevents any spillage or leakage and prevents exposure to precipitation or surface run-on. Such methods include storing chemicals in locked storage containers or in covered, water-tight containers on pallets with secondary containment. Sanitary facilities onsite will be located at least 50 feet away from any surface flow paths, placed on drip pans, and regularly serviced per manufacturer's specifications. All dumpsters and other waste disposal containers will be regularly checked for leaks and covered prior to and during all rain events. Specific BMPs applicable to waste management and storage at this site include:

- HP-01 Hazardous Waste Management
- HP-02 Liquid Waste Management
- HP-04 Material Use
- HP-05 Sanitary Waste Management
- HP-06 Solid Waste Management

Refer to the Housekeeping BMPs in Attachment D for specific implementation guidance on proper management and storage of waste materials.

3.4.4 Preservation of Vegetation

Protecting existing vegetation minimizes the potential of damaging existing trees, shrubs, and grasses that are intended to remain onsite after construction. Many small trees are being removed in some of the meadow restoration areas of this project. However, most other construction work areas will be tightly delineated with construction fencing in order to protect vegetation from unplanned disturbance. Refer to SM-08 under Site Management BMPs in Attachment D for specific details and guidance on protecting vegetation during construction.

3.4.5 Traffic Control

Traffic control is the practice of limiting the number of locations, number of vehicles and equipment and timing of vehicle traffic that is allowed to enter and exit the "dirty zone" of a construction site. The purpose is to minimize unnecessary soil disturbance and reduce the potential for tracking disturbed soil and non-stormwater pollutants from the "dirty zone" onto paved roadways outside of the construction site. Two stabilized construction site entrances/exits have been designated for this project (see BMP Plans). Non-essential vehicle traffic will not be permitted. Refer to SM-15 under Site Management BMPs in Attachment D for specific details and guidance on implementing Traffic Controls.

3.4.6 Track-Off Control

Track-off is the tracking of soil/sediment from the construction site onto pavement or paved roads outside of the construction site by vehicles, equipment, or foot traffic. Track-off from the project site is **not permitted** under any circumstances. The contractor is responsible for ensuring that track-off is prevented by limiting construction traffic to stabilized construction entrances/exits and implementing other track-off prevention methods (such as hand sweeping) as necessary. Two stabilized construction entrances/exits have been identified for the project site. It is the contractor's responsibility to inspect, maintain and adjust controls as necessary to ensure track-off is prevented (per Track-Off Control technical note, SM-14). All immediate access roads to and from the construction site will be inspected on a daily basis. Any track-off of sediment or other construction-related materials observed on roads or parking lots on the "clean side" of the construction site will be swept or vacuumed immediately in accordance with the Street Sweeping technical note (SM-13).

3.4.7 Weed Prevention and Management

The Contractor shall be responsible for preventing introduction and spread of weeds. At minimum, the following shall be implemented. Please refer to document and checklists included in Cal-IPC Prevention of the Spread of Weeds: Best Management Practices for Land Managers, 3rd Edition (http://www.cal-ipc.org/ip/prevention/PreventionBMPs_LandManager.pdf)

1. On-site materials for BMP's shall be used whenever possible.
2. Imported BMP straw materials shall be certified weed-free (California noxious and agricultural). For example, use weed-free straw certified by a county agriculture department, coconut fiber, rice straw and/or native grass straw.

3. Any sand, gravel, or fill material brought on-site shall be clean, debris-free, and devoid of invasive plant parts or seeds (certified or some sort of verification from source required). Do not borrow fill from weed-infested stockpiles, road shoulders or ditch lines.
4. The Engineer's Representation shall inspect aggregate material sources (including but not limited to surrounding ditches, topsoil piles, gravel/sand piles or pits). If it is determined the materials are contaminated with weed materials, the material shall be rejected and removed from the site at the Contractor's expense.
5. All equipment entering the project area shall be cleaned and free of weed materials (i.e. stems, flowers, seeds, etc.) before and after entering the project area or loading and project materials.
6. Staging and storage areas shall be maintained weed-free during the entire construction period.
7. During transport, exposed piles of materials shall be covered with geotextile fabric or impermeable material to prevent contamination of weed-free materials or spread of infested materials.
8. Exposed piles of project materials shall be covered with impermeable material to protect materials from wind and rain, and reduce germination of invasive plants.
9. Prior to entering and leaving the project site, soil and plant materials shall be removed from tools, vehicles, equipment, clothing, boots and gear at a designated and approved cleaning area (Refer to inspection Checklist E in Cal-IPC Prevention of the Spread of Weeds: Best Management Practices for Land Managers, 3rd Edition (http://www.cal-ipc.org/ip/prevention/PreventionBMPs_LandManager.pdf)
10. A cleaning area for tools, equipment, and vehicles shall be designated that is easily accessible for monitoring and control, located away from waterways, located away from areas of sensitive habitats or species, near areas already infested with invasive plants, contained with silt fences or soil berms, and be paved or have sealed surfaces to avoid re-accumulation of soil and plant material on cleaned vehicles and equipment.

As part of maintenance, the Engineer's Representative shall perform follow-up inspections at sites where erosion control materials have been used to ensure that any invasive plant introductions are identified early and treated.

3.5 EROSION AND SEDIMENT CONTROL BMPS

3.5.1 Soil Stabilization and Erosion Control

Soil stabilization, also referred to as erosion control, is a source control measure designed to prevent soil particles from being detached and transported in stormwater runoff. Soil stabilization BMPs protect the soil surface from erosion by covering and/or binding soil particles. Soil stabilization/erosion control BMPs will be used as a first line of defense to protect against sediment discharges, rather than relying solely on sediment control BMPs. The following measures will be implemented on this project to achieve effective temporary and permanent soil stabilization:

- Soil disturbance and compaction will be minimized to the greatest extent possible.
- Existing vegetation will be protected and preserved to the greatest extent possible.
- Construction activities will be scheduled such that existing vegetation is left undisturbed until immediately prior to grading or excavation.
- Soil stabilization BMPs will be deployed as soon as operationally feasible following soil disturbance.

- All disturbed soil areas (DSAs) will be stabilized with durable mulch materials (such as wood chips or pine needles), erosion control fabric or Bonded Fiber Matrix within 14 days of cessation of soil disturbing activities. Soil stabilization measures will be re-applied as necessary to maintain effectiveness.
- Sufficient soil stabilization materials (such as wood chips or pine needles) will be maintained on-site to enable rapid implementation in conformance with requirements described in this SWPPP. This includes implementation requirements for active areas and non-active areas that require winterization before October 15th.
- Water will be applied to DSAs and unpaved roads to control dust and wind erosion. Water application rates will be regulated as necessary such that no runoff or pooling occurs.
- If a temporary irrigation system is installed (Contractor's option), the configuration and operation of the temporary irrigation system used for plant establishment will be closely monitored and adjusted such that irrigation water does not cause runoff, excessive ponding or erosion anywhere onsite.
- Stockpiles of erodible materials (such as soil or sand) will be watered and/or covered during windy conditions to prevent wind erosion.
- The entire site shall be winterized each season prior to the October 15th grading deadline.
- At completion of construction, all DSAs will be permanently stabilized using treatments described in the project plans.

Selected soil stabilization and erosion control BMPs for this project include:

- SC-04 Soil Physical Preparation
- SC-05 Temporary Surface Protection
- SC-06 Temporary Winter Soil Stabilization
- SM-01 Soil Disturbance Management
- SM-08 Preservation of Existing Vegetation
- SM-12 Stockpile Management
- SM-18 Wind Erosion

3.5.1.1 Wood Chip Mulch

Wood chip mulch will be the primary method of temporary soil stabilization on this project. Wood chips will be applied to DSAs and shallow slopes at a depth of 3 inches to provide adequate protection.

3.5.1.2 Pine Needle Mulch

Pine needles are particularly effective at stabilizing moderate to steep slopes, since their interlocking structure helps them resist movement by water and gravity. However, they are not as durable as wood chips and should not be used in areas expected to be re-disturbed by vehicles or heavy equipment.

3.5.1.3 Hydraulically-Applied Mulch

If necessary, hydraulically-applied mulch may be used to provide temporary stabilization of DSAs, steep slopes and stockpiles. Hydraulically-applied mulch used on this project shall consist only of wood fiber mulch applied with a water-resistant bonding agent.

3.5.1.4 Plastic Covers

Polyethylene sheeting (in conjunction with perimeter BMPs), may be used to cover and temporarily protect erodible stockpiles, such as soil or sand, from wind and water erosion.

3.5.2 Sediment Control

Sediment controls are structural measures that are intended to complement and enhance soil stabilization (erosion control) measures to prevent sediment discharges from construction areas. Sediment controls are designed to intercept, filter and/or settle out soil particles that have been mobilized by the force of water.

The following measures will be implemented on this project to achieve sediment control objectives:

- Prior to the commencement of any soil disturbing activities, temporary sediment controls will be implemented along the down-gradient perimeter of disturbed soil areas.
- Linear sediment controls will be installed along the toe of slopes, face of slopes, and at grade breaks on disturbed slopes as necessary to prevent the downslope transport of sediment. Specific placement and spacing of linear sediment controls will be determined in the field based on site-specific conditions and construction operations.
- Pine needles wattles (or equivalent linear sediment controls) will be placed along temporary construction access roads wherever surface runoff is able to discharge from the road prism. Sediment controls shall be placed perpendicular to the direction of flow and weighted or staked such that 100% contact between the wattle and ground surface is able to be maintained during runoff events.
- Gravel bag check dams will be installed at the downstream end of channel segments (and intermittently along the channels where necessary) where excavation and grading are occurring in order to isolate any runoff from these areas.
- Gravel bag weirs will be installed at culvert inlets downslope of grading areas to prevent sediment-laden water from being conveyed during storm events.
- Throughout the active contraction season, sediment control BMPs will be inspected, maintained and replaced such that they function in accordance with technical specifications.
- A 20% overage of wattles, gravel bags and plastic sheeting will be maintained onsite for the duration of the project to enable implementation of temporary sediment controls in the event of predicted rain, and for rapid response to failures or emergencies.
- Track-off controls and stabilized construction entrances/exits will be maintained throughout the life of the project such that no sediment is tracked beyond the project boundary.

Locations of specific sediment control BMPs for this project are shown on the BMP Plan in Section 3.8.

Selected temporary sediment control BMPs for this project are listed below:

- SC-01 Fiber Rolls or Pine Needle Wattles
- SC-02 Pine Needle Filter Berms
- SM-07 Outlet Protection
- SM-12 Stockpile Management
- SM-13 Street Sweeping and Vacuuming
- SM-14 Track-Off Control

Refer to the BMP technical notes in Attachment D for specific details and guidance.

3.6 NON-STORMWATER AND MATERIAL MANAGEMENT

3.6.1 Concrete-Type Materials

Concrete-type wastes are byproducts of concrete, mortar, grout, cement, or any other potentially pH-altering material used as a construction material. The only concrete expected to be generated on this project will be the demolition and removal of the concrete-lined ditch just upslope of the Truckee River. Wet and dry concrete-type materials will be stored in sealed containers away from drainage areas at all times. Concrete mixing will be conducted only on impenetrable/cleanable surfaces with secondary containment to prevent contact with soil, vegetation and surface water. Concrete materials will be swept up and disposed of properly and under no circumstances allowed to enter storm drains or surface water. Management and disposal of concrete-type materials will be discussed as part of contractor BMP trainings. Specific guidelines for managing concrete-type materials can be found in technical note SM-02 in Attachment D.

3.6.2 Concrete Washouts

Concrete washouts are portable, self-contained, and watertight roll-off bins that control, capture, and contain concrete wastewater and washout material. Concrete wash is planned to be off-hauled directly in dump trucks from this project. If waste concrete material needs to be stored onsite overnight, a concrete washout-type container will be used. Specific guidelines for using, inspecting and maintaining concrete washouts are found in technical note SM-03 in Attachment D.

3.6.3 Vehicle and Equipment Operations

Several types of vehicles and equipment will be used on-site throughout the project, including excavators, loaders, rollers, trucks and trailers, backhoes, generators, and compressors. Vehicle cleaning will not be performed on-site except for concrete washout activities, which is addressed above. Self-propelled vehicles will be fueled off-site, if practical. Fuel trucks, each equipped with absorbent spill clean-up materials, can be used for on-site fueling. All vehicle maintenance and mobile fueling operations will be conducted at least 50 feet away from operational inlets and drainage facilities and on a level graded area. Drip pans will be used for all mobile fueling. The fueling truck will be parked on a paved fueling area for overnight storage, or be stored off-site. Drip pans or absorbent pads will be used for all vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids. Drip pans or absorbent pads will be used for overnight/long-term storage of on-site vehicles and equipment with minor fluid leaks that cannot be repaired the same day.

Selected non-stormwater and material management BMPs for this project are listed below:

- SM-02 Concrete Type Materials
- SM-03 Concrete Washout
- SM-04 Contaminated Soil
- SM-05 Drain Inlet Protection
- SM-10 Spill Prevention
- SM-11 Spill Response and Notification
- SM-14 Track-Off Control
- SM-16 Vehicle and Equipment Maintenance
- SM-17 Water Conservation Practices

Refer to Site Management BMPs in Attachment D for specific details and guidance on addressing non-stormwater pollution.

3.7 POST-CONSTRUCTION CONTROL PRACTICES

The Contractor is responsible for maintaining all restoration treatment areas for 2 years following the completion of construction.

3.8 BMP PLANS AND DISTURBED SOIL AREA (DSA) MAPS

3.8.1 Temporary BMP Plan

LEGEND:

- CONSTRUCTION ACCESS ROUTE
- CONSTRUCTION ACCESS ROUTE WITH CONSTRUCTION PROTECTION MATS
- CONSTRUCTION ACCESS ROUTE - LIGHT EQUIPMENT AND FOOT TRAVEL ONLY
- STAGING AND STOCKPILE AREA
- CONSTRUCTION ENTRANCE; SEE DETAIL 2, SHEET 4.1

NOTES:

1. CONTRACTOR SHALL COORDINATE WITH TOT AND TDRPD PRIOR TO UTILIZING TRUCKEE RIVER LEGACY TRAIL FOR ACCESS. THE CONTRACTOR MAY, WITH THE PERMISSION OF TOT AND TDRPD, PROPOSE AN ALTERNATE ROUTE TO ACCESS FEATURES ALONG THE LEGACY TRAIL, INCLUDING BUT NOT LIMITED TO, ACCESS VIA THE PEDESTRIAN BRIDGE TO WEST RIVER STREET OR VIA RANCH WAY (NOT SHOWN).
2. CONTRACTOR SHALL COORDINATE WITH TDPUD PRIOR TO UTILIZING THE STAGING AREA SOUTH OF BROCKWAY ROAD AND EAST OF PALISADES DRIVE.
3. LIGHT EQUIPMENT SHALL MEAN RUBBERIZED TRACK EQUIPMENT APPLYING NO MORE THAN 5 PSI GROUND PRESSURE.
4. CONSTRUCTION ACCESS ROUTES IN THE VICINITY OF THE TDRPD POND (FOR EXAMPLE, SHEETS 3.2, 3.3, 5.2, AND 5.3) SHALL BE FIELD MARKED FOR APPROVAL BY THE ENGINEER'S REPRESENTATIVE BEFORE START OF CONSTRUCTION.
5. TDRPD POND DEWATERING: THE CONTRACTOR SHALL COORDINATE WITH TDRPD STAFF TO TEMPORARILY LOWER THE WATER LEVEL IN THE POND BY PUMPING WATER OUT OF THE POND WITH THE IRRIGATION PUMP, WITHOUT RECHARGING THE POND WITH THE GROUNDWATER PUMP.

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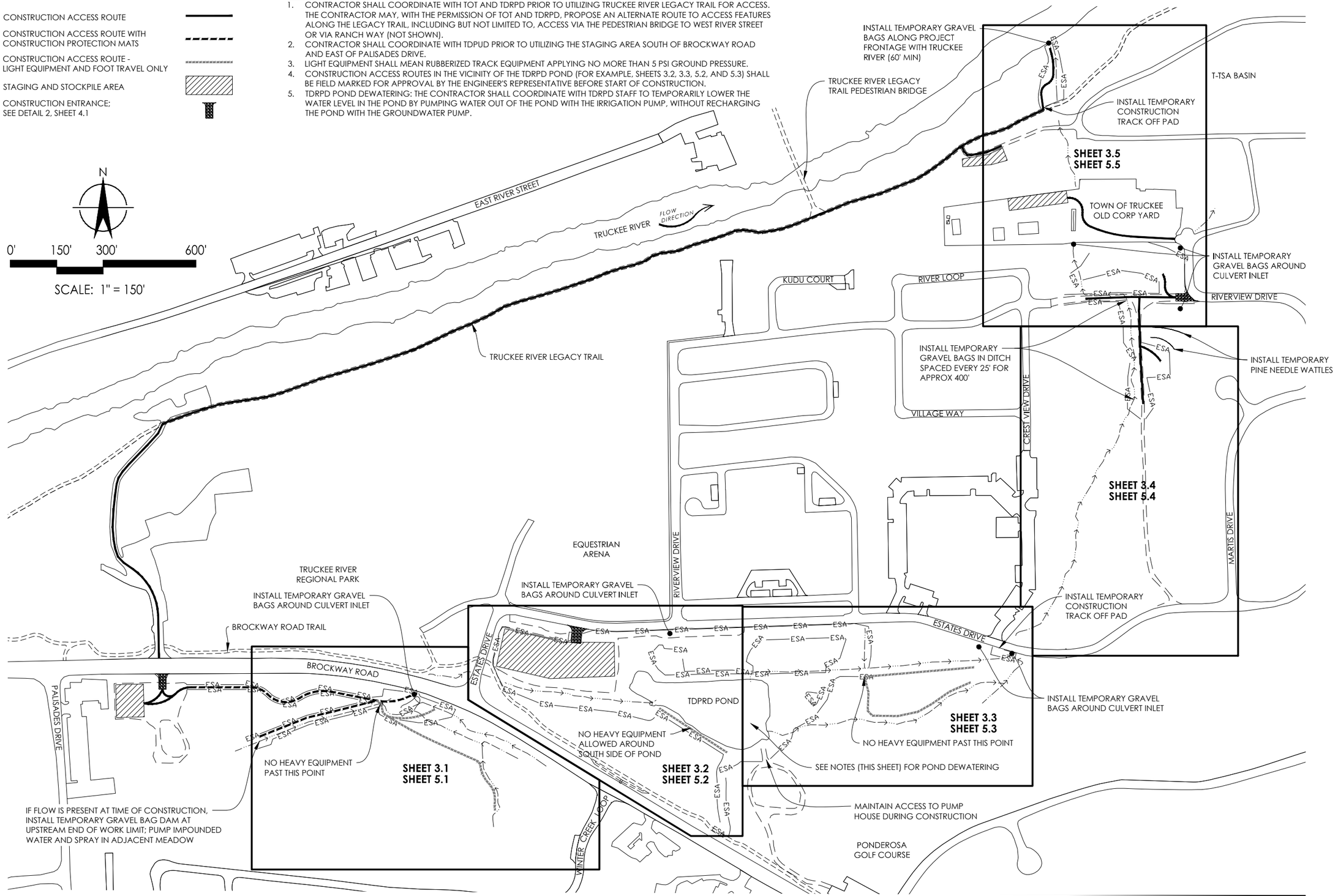
0' 150' 300' 600'

SCALE: 1" = 150'



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Y:_PROJECTS\214128 TRUCKEE WETLANDS DESIGN\214128 CAD\214128 SHEETS\214128-0201-OVERVIEW.DWG

PREPARED FOR:

Truckee River Watershed Council

Balance Hydrologics, Inc.

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12020 Donner Pass Road
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SUBMITTALS / REVISIONS	BY	DATE
30% PLANS	DS	3-11-15
60% PLANS	PK	11-25-15
95% PLANS	PK	5-13-16

DESIGNED BY	D SHAW
DRAWN BY	P KULCHAWIK
CHECKED BY	E BALLMAN
IN CHARGE	P KULCHAWIK
DATE	5-13-16

REGISTERED PROFESSIONAL ENGINEER ★ PETER T. KULCHAWIK ★ No. C83042 Exp. 09-30-16 ★ CIVIL ★ STATE OF CALIFORNIA

KEY MAP, SITE PREPARATION, AND ACCESS/STAGING PLAN

TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER
214128

SCALE
1" = 150'

SHEET
2.1

3.8.2 DSA Maps

DSA maps will be updated and added to this SWPPP and updated regularly throughout the construction process.

4.0 BMP INSPECTION, MAINTENANCE AND RAIN EVENT ACTION PLANS

4.1 BMP INSPECTION, MAINTENANCE AND REPAIR

BMP inspections are conducted to identify potential sources of water quality pollution and to guide BMP installation, maintenance and repair activities throughout the life of the project. In accordance with the Construction Site Monitoring and Reporting Plan (CSMRP) in Section 5, BMP inspections will be conducted on the following schedule:

- Daily during the construction season (May 1 – October 15)
- Monthly during inactive periods of no soil disturbance (October 16 – April 30)
- 48 hours prior to an anticipated rain event (50% chance or greater) – refer to Rain Event Action Plan section below
- Once every 24 hours during periods of extended rain
- Within 24 hours after a qualifying rain event (0.5" of liquid precipitation)
- Within 24 hours of any non-storm water discharge

Inspections will be conducted according to the protocols in the CSMRP (Section 5) using the Visual Monitoring/BMP Inspection Form in Attachment F. Ineffective BMPs or other water quality threats identified during inspections will be repaired or otherwise addressed within 72 hours of identification, or prior to the next rain event, whichever is sooner. The QSP may require some failed BMPs or water quality threats to be addressed within 24 hours if they pose a direct threat to water quality.

4.2 RAIN EVENT ACTION PLAN

Rain Event Action Plans (REAPs) will be prepared during pre-storm inspections, which will be conducted by the QSP or staff trained and overseen by the QSP, at least 48 hours prior to an anticipated rain event (50% chance or greater). The inspector will visually inspect all areas of active construction using the inspection checklist in the REAP template in Attachment G. Ineffective BMPs or other potential water quality threats identified during inspections will be documented using the REAP template and a hard copy of the event-specific REAP will be given to and reviewed with the Contractor's BMP maintenance lead at the time of inspection. Implementation of SWPPP action items identified in the REAP must begin at least 24 hours prior to the anticipated start of precipitation.

5.0 CONSTRUCTION SITE MONITORING AND REPORTING PLAN (CSMRP)

5.1 CSMRP OBJECTIVES

- Demonstrate that the site is in compliance with the discharge prohibitions and NALs of the General Permit.
- Determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.
- Determine whether immediate corrective actions, additional BMPs, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.
- Determine whether BMPs included in the SWPPP/REAP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.
- Demonstrate that appropriate sample collection, handling, and analyses procedures are implemented.

5.2 VISUAL MONITORING (INSPECTIONS)

Visual monitoring (inspections) are conducted to identify potential sources of water quality pollution and to guide BMP installation, maintenance and repair activities throughout the life of the project. Inspections will be conducted on the following schedule:

- Daily during the construction season (May 1 – October 15)
- Monthly during inactive periods of no soil disturbance (October 16 – April 30)
- 48 hours prior to an anticipated rain event (50% chance or greater) – refer to Rain Event Action Plan section below
- Once every 24 hours during periods of extended rain
- Within 24 hours after a qualifying rain event (0.5" of liquid precipitation)
- Within 24 hours of any non-storm water discharge
- Non-stormwater inspections in all drainage areas and discharge locations once per quarter (January-March, April-June, July-September, and October-December).

If inspections are not completed on this schedule, the reason will be recorded in writing in a monitoring exemption form and maintained with the inspection reports onsite. Inspections do not need to be conducted during snow events or during dangerous conditions such as flooding or electrical storms. Inspections will only be conducted during construction site business hours. **Business hours for this project are Monday – Friday, 7AM – 5PM.** If a qualifying storm event (0.5" of liquid precipitation) occurs during non-business hours, a monitoring exemption form will be filled out and maintained with the inspection reports onsite.

Specific items that should be identified during visual monitoring include (but are not limited to):

- Improperly installed or ineffective perimeter sediment controls
- Unauthorized vehicle access, or vehicle access into designated non-construction areas not subject to disturbance
- Construction area boundary fence damage or removal
- Disturbed soil areas (DSAs) with inadequate erosion prevention and sediment control BMPs
- Evidence of leakage or other malfunctions in the stream diversion system

- Evidence of any leakage or water flow through, under or around gravel bag isolation dams in the stream channel
- Scouring or sediment deposition at outlet from stream diversion pipe
- Stockpiles that are unprotected or located in a drainage way
- Spilled and improperly stored chemicals, paint, fuel, oil, solvents, sealants, etc.
- Any evidence of sediment track-off from construction equipment
- Any signs of soil erosion or deposition down-gradient from discharge points
- Concrete washouts that are at or near capacity
- Concrete spills or unprotected concrete-type materials
- Any evidence of non-stormwater discharges from the project site. The inspection report shall note whether any such discharges are authorized, or are illicit and not authorized. If authorized, the condition of the applicable BMPs must be indicated.
- Damaged or disturbed vegetation and/or vegetation protection fencing
- Damaged, improperly installed or failing erosion and sediment control BMP's on slopes or recently graded areas
- Stray trash/litter not placed in appropriate containers
- Inadequate supply of erosion and sediment control BMPs onsite (in addition to those already installed)

Visual inspections will be documented using the Visual Monitoring/BMP Inspection Form in Attachment F. The inspection report will be submitted to the Contractor's BMP maintenance lead at the time of the inspection whenever possible, or within 24 hours of the inspection. All ineffective BMPs or other water quality threats identified during inspections will be repaired or otherwise addressed within 72 hours of identification, or prior to the next rain event, whichever is sooner. Some failed BMPs or water quality threats may be required by the QSP to be addressed within 24 hours if it is determined to present a high risk to water quality.

Copies of all inspection reports will be kept onsite with the project SWPPP for the duration of the project. Electronic copies of the inspection reports will be forwarded to the project managers and appropriate SWPPP contacts by the end of each working day.

5.3 STORMWATER MONITORING

5.3.1 Stormwater Monitoring Locations and Map

- TMR-01: inlet to culvert under Brockway Road at TDLT parcel.
- TMR-02: outlet from culvert leading to current ditch on TDRPD parcel.
- TMR-03: inlet to culvert under Estates Drive east of irrigation pond.
- TMR-04: natural drainage upslope of grading area alongside TTAD access road.
- TMR-05: inlet to culvert downslope of grading area alongside TTAD access road.
- TMR-06: upslope end of existing concrete-lined ditch above Truckee River.
- TMR-07: downslope end of existing concrete-lined ditch above Truckee River.

LEGEND:

- CONSTRUCTION ACCESS ROUTE
- CONSTRUCTION ACCESS ROUTE WITH CONSTRUCTION PROTECTION MATS
- CONSTRUCTION ACCESS ROUTE - LIGHT EQUIPMENT AND FOOT TRAVEL ONLY
- STAGING AND STOCKPILE AREA

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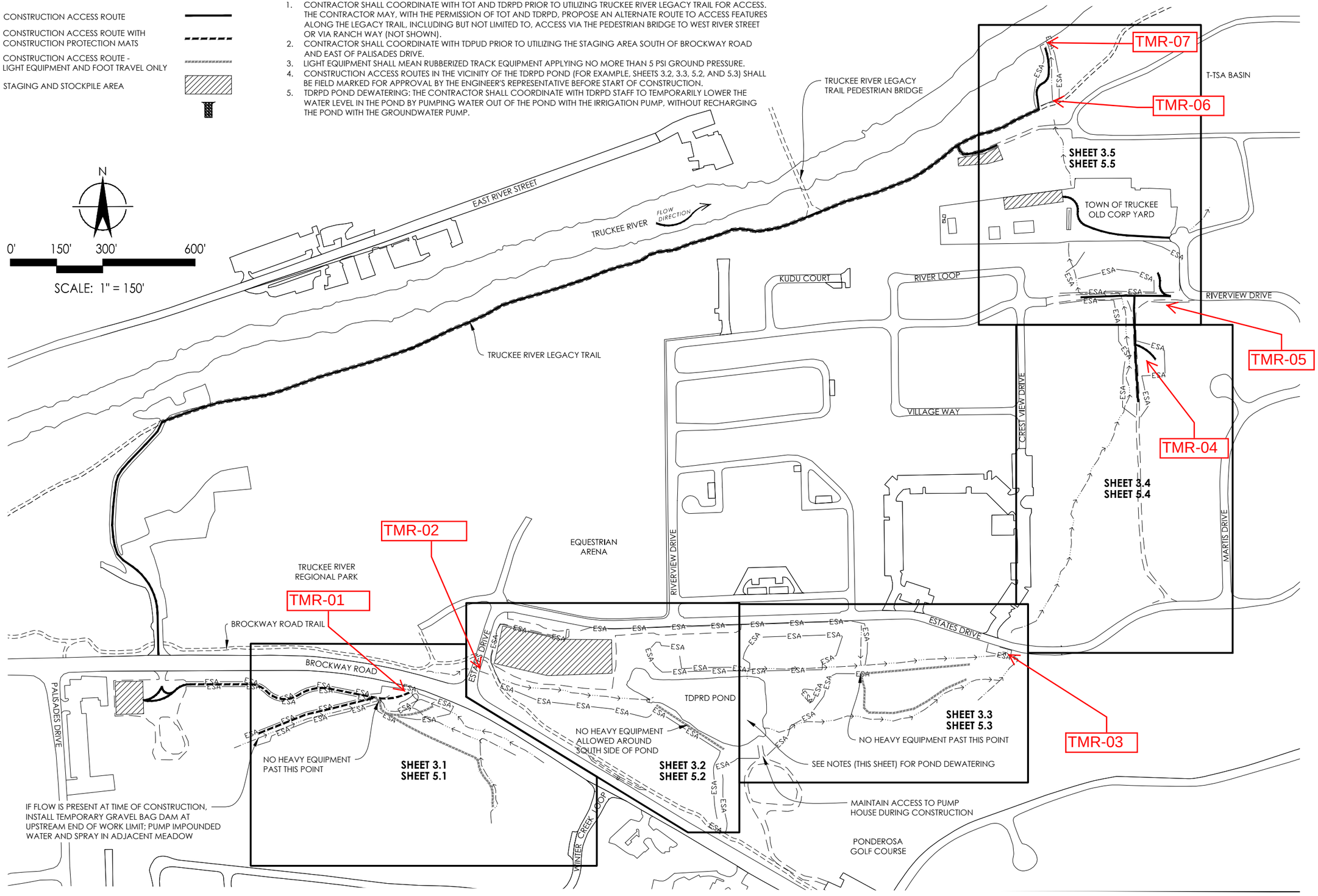

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PREPARED FOR:
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IN CHARGE	P KULCHAWIK
DATE	5-13-16

REGISTERED PROFESSIONAL ENGINEER * PETER KULCHAWIK * No. C083062 Exp. 09-30-16 CIVIL * STATE OF CALIFORNIA

KEY MAP, SITE PREPARATION, AND ACCESS/STAGING PLAN

TRUCKEE MEADOWS RESTORATION

NEVADA COUNTY, CALIFORNIA
TRUCKEE RIVER WATERSHED COUNCIL

PROJECT NUMBER 214128
SCALE 1" = 150'
SHEET 2.1

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5.3.2 Field Sample Collection Procedures (Turbidity and pH)

5.3.2.1 Turbidity Sample Collection Procedures

Turbidity measurements will be taken using a Hach 2100P portable turbidimeter. The turbidimeter will be calibrated at least once every three months (per manufacturer's recommendations), or prior to the next sampling event, whichever is first, using Hach standards (0.1, 20, 100, and 800 NTUs). A field calibration check will be performed prior to each sampling event. Allowable drift is ± 2 NTUs. If calibration check indicates that meter needs calibration, calibration shall be performed before any samples are collected. Meter calibration will be documented on the calibration log which is kept with each meter.

Stormwater samples will be collected using a separate container, and then transferred to the sample cell for reading. The sample cell should be wiped with a clean, lint-free cloth before each use. If settling particles are visible in the sample cell, take one reading before settling and one reading after settling, then average the two readings. If the sample reading is outside of the calibration standard limits, recalibrate with a different standard.

5.3.2.2 pH Sample Collection Procedures

pH measurements will be taken using an ExStik PH100 waterproof pH meter. The pH meter will be calibrated using a three-point calibration with pH 4, 7, and 10 standards at least once per month, or prior to the next sampling event, whichever is first, A field calibration check will be performed prior to each sampling event. Allowable drift is ± 0.2. If the calibration check reveals that pH meter needs calibration, calibration shall be performed before any samples are collected. Meter calibration will be documented on the calibration log which is kept with each meter.

Stormwater pH readings will be collected by either: 1) submerging the electrode end of the meter directly in the flow of the water being sampled, or 2) collecting stormwater in the small plastic container (kept with the pH meter) and submerging the electrode end of the meter directly in the collected water. Allow the meter to equilibrate for at least 30 seconds before recording pH to the nearest 0.1 pH unit. Make sure to replace the cap on the electrode and that the sponge inside the cap is moist (with pH 4 solution).

5.3.3 Sampling Plan for Sediment

5.3.3.1 Storm/Runoff Monitoring

Stormwater discharges due to rainfall events during active construction periods will be sampled if surface runoff from active construction areas reaches culverts or other defined drainages conveying it away from the active construction areas. The risk of discharges to active water bodies on his project is considered to be low given the very low slope angles and the fact that most of the active soil disturbance areas are a considerable distance from the Truckee River. The area posing the highest risk to water quality is the removal of the concrete-lined ditch just upslope from the Truckee River. If a discharge event were to occur and stormwater discharges to the Truckee River, the results would be documented through photos and turbidity readings and reported to Lahontan Water Board, along with a plan for corrective actions to be deployed to address the source of the discharge. If turbidity monitoring results exceed Numeric Effluent Limits, Lahontan Water Board will be notified and a report will be provided describing the source/cause of the discharge, actions taken to prevent future discharges, and results of turbidity sampling.

5.3.4 Sampling Plan for Non-Stormwater/Non-Visible Pollutants

5.3.4.1 Potential Non-Visible Pollutants

The following is a list of construction materials that will be used and activities that will be performed which have the potential to contribute pollutants other than sediment to stormwater runoff:

- Vehicle fluids including oil, grease, fuel, hydraulic fluid, and coolants
- Vehicle fuels including gasoline and diesel
- Concrete materials and concrete curing compounds
- Solvents, thinners, and acids
- Raw landscaping materials and wastes including topsoil and fertilizers
- Treated lumber (materials and wastes)

The Pollutant Testing Guidance Table in Attachment H lists specific visual observation cues, pollutant indicators, field and lab analysis methods for specific construction site materials and non-visible pollutants.

5.3.4.2 Sample Collection Criteria

Sampling for non-stormwater/non-visible pollutants will be conducted if a breach, malfunction, leakage, or spill is identified that has the potential to result in the discharge of a non-visible pollutant, or the discharge of a non-visible pollutant is already occurring. Sampling will be conducted using the collection and handling methods below and analyzed for the specific non-visible pollutants that may have been transported by stormwater to the discharge point(s) for the applicable drainage area. Additionally, samples will also be collected of stormwater runoff that has not come into contact with the pollutants of concern and analyzed for comparison with the non-visible pollutant discharge sample.

5.3.4.3 Sample Collection Procedures

Discharge samples will be collected at designated sampling locations or other discharge locations (as appropriate) for observed breaches, malfunctions, leakages, spills, or other operations that triggered the sampling event. Grab samples will be collected and preserved in accordance with the methods summarized in Tables 1 and 2. Sampling will only be conducted by staff trained in the sampling collection, handling and documentation procedures below.

Samples will be collected by placing a separate sample container directly into a stream of water down-gradient and in close proximity to the potential non-visible pollutant discharge location. This separate sample container will be used to collect the water, which will be transferred to sample bottles for laboratory analysis. The up-gradient and uncontaminated background samples shall be collected first prior to collecting the down-gradient to minimize cross-contamination. Sampling personnel will collect the water up-gradient of where they are standing. Once the separate sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte(s) being monitored.

Table 1. Sample Collection, Preservation, and Typical Analysis for Monitoring Non-Stormwater Discharges.

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time
VOCs-Solvents	EPA 8260B	3 x 40 mL	VOA-glass	Store at 4°C, HCl to pH<2	1 µg/L	14 days
SVOCs	EPA 8270C	1 x 1 L	Glass-Amber	Store at 4°C	10 µg/L	7 days
Pesticides/PCBs	EPA 8081A/8082	1 x 1 L	Glass-Amber	Store at 4°C	0.1µg/L	7 days
Herbicides	EPA 8151A	1 x 1 L	Glass-Amber	Store at 4°C	Check Lab	7 days
BOD	EPA 405.1	1 x 500 mL	Polypropylene	Store at 4°C	1 mg/L	48 hours
COD	EPA 410.4	1 x 250 mL	Glass-Amber	Store at 4°C, H_2SO_4 to pH<2	5 mg/L	28 days
DO	SM 4500-0 G	1 x 250 mL	Glass-Amber	Store at 4°C	Check Lab	8 hours
pH	EPA 150.1	1 x 100 mL	Polypropylene	None	Unitless	Immediate
Alkalinity	SM 2320B	1 x 250 mL	Polypropylene	Store at 4°C	1 mg/L	14 days
Metals (Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Na, Th, Va, Zn)	EPA 6010B/7470A	1 x 250 mL	Polypropylene	Store at 4°C, HNO_3 to pH<2	0.1 mg/L	6 months
Metals (Chromium VI)	EPA 7199	1 x 500 mL	Polypropylene	Store at 4°C	1µg/L	24 hours

Notes:
°C - Degrees Celsius
BOD - Biological Oxygen Demand
COD - Chemical Oxygen Demand
DO - Dissolved Oxygen
EPA - Environmental Protection Agency
HCl - Hydrogen Chloride
H_2SO_4 - Hydrogen Sulfide
HNO_3 - Nitric Acid
L - Liter
mg/L - Milligrams per Liter
µg/L - Micrograms per Liter
mL - Milliliter
PCB - Polychlorinated Biphenyl
SVOC - Semi-Volatile Organic Compound
SM - Standard Method
TPH - Total Petroleum Hydrocarbons
TRPH - Total Recoverable Petroleum Hydrocarbons
VOA - Volatile Organic Analysis
VOC - Volatile Organic Compound

Table 2. Sample Collection Specifications and Typical Analysis for Monitoring Typical Construction-Related Stormwater Discharges.

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle Type	Sample Preservation
Total Dissolved Solids	EPA 160.1	2 x 250 mL	Polypropylene	Store at 4°C
Total Suspended Solids	EPA 160.2	2 x 250 mL	Polypropylene	Store at 4°C
Total Settleable Solids	SM 2540 F	2 x 250 mL	Polypropylene	Store at 4°C
Total Kjeldahl Nitrogen	EPA 351.2	2 x 250 mL	Polypropylene	Store at 4°C
Nitrite	EPA 354.1	2 x 250 mL	Polypropylene	Store at 4°C
Total Phosphorus	EPA 365.3	2 x 250 mL	Polypropylene	Store at 4°C
Total Nitrogen	Calculated	2 x 250 mL	Polypropylene	Store at 4°C
Nitrate/Nitrite	EPA 353.1	2 x 250 mL	Polypropylene	Store at 4°C
Turbidity	EPA 180.1	250 mL	Polypropylene	Store at 4°C
Dissolved Oxygen	SM 4500-0 G	100 mL	Polypropylene	Store at 4°C, 8 hour hold time
Oil and Grease	EPA 1664	500 mL	Glass-Amber	Store at 4°C, H_2SO_4

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clan pair of surgical gloves prior to the collection and handling of each sample at each

location
- Protect the inside of the sample bottle from contamination by not allowing it to come into contact with any material other than the water sample
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection
- Not leave the cooler lid open for an extended period of time once samples are placed inside
- Not sample near a running vehicle where exhaust fumes may impact the sample
- Not touch the exposed end of a sampling tube, if applicable
- Avoid allowing rainwater to drip from rain gear or other surfaces into sample bottles
- Not eat, smoke, or drink during sample collection
- Not sneeze or cough in the direction of an open sample bottle
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample to take place

5.3.4.4 Sample Handling Procedures

Immediately following collection, sample bottles for laboratory analytical testing will be capped, labeled, and documented on a Chain of Custody form provided by the analytical laboratory. Samples will be sealed in a re-sealable storage bag, placed in an ice-chilled cooler, at as near to 4 degrees Celsius as practicable, and delivered within 48 hours to a California state-certified laboratory.

5.3.4.5 Sample Documentation Procedures

All original data documented on sample bottle identification labels, Chain of Custody forms, Effluent Sampling and Measurement Field Logs, and Visual Inspection Checklists will be recorded using waterproof ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. All corrections will be initialed and dated. Sampling and field analysis activities will be documented in the following manner:

- **Sample Bottle Identification Labels:** Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label, as appropriate:
  - Project name
  - Unique location and sample identification number
  - Quality assurance/quality control (QA/QC) samples shall be identified similarly using a unique location and sample identification number or designation
  - Collection date/time (no time applied to QA/QC samples)
  - Analysis constituent

- **Chain of Custody (COC) forms:** All samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.

- **Effluent Sampling and Measurement Field Log (Attachment J):**
  - Names of sampling personnel
  - Sampling date
  - Separate times for collected samples and QA/QC samples recorded to the nearest minute
  - Unique location and sample identification number
  - Analysis constituent(s)
  - Weather conditions (including precipitation amount)

- Field measurement results
- Other pertinent data and field observations

- **Visual Inspection Checklists:** When sampling is conducted, it will be noted on the Visual Inspection Checklist that samples for non-visible pollutants were collected during a rain event.

5.4 QUALITY ASSURANCE AND QUALITY CONTROL

For an initial verification of laboratory or field analysis, duplicate samples will be collected at a rate of ten percent or one (1) duplicate per sampling event. The duplicate sample will be collected, handled, and analyzed using the same protocols as primary samples. A duplicate sample will be collected at each location immediately after the primary sample has been collected. Duplicates will be collected where contamination is likely, not on the background sample. Duplicate samples will not influence any evaluations or conclusions; however, they will be used as a check on laboratory quality assurance.

5.5 REPORTING

5.5.1 Monitoring Data Reporting

All turbidity and pH analytical results collected with field instruments during qualifying storm events (0.5" precipitation or greater) will be submitted through SMARTS within five days after the conclusion of the storm event and certified by the LRP or an approved signatory. All other results determined by an analytical laboratory will be submitted within five days of receipt of the results from the laboratory.

All lab results will be reported with the applicable Minimum Level (ML) and the current Method Detection Limit (MDL). Sample results greater than or equal to the reported ML shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample). Sample results less than the ML, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported.

For the purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ as well as the words "Estimated Concentration" (may be shortened to "Est. Conc."). The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (percentage of the reported value), numerical ranges (low to high), or any other means considered appropriate by the laboratory. Analytical laboratories will establish calibration standards so that the ML value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

5.5.2 Reporting of Adverse Conditions

The QSD or QSP will immediately notify the Lahontan Water Board orally within 24 hours whenever an adverse condition occurs as a result of a discharge. An adverse condition includes, but is not limited to, a violation or threatened violation of the conditions of this General Permit, significant spills of petroleum products or toxic chemicals, or damage to control facilities that could affect compliance pursuant to Section 13267(b) of the California Water Code. A written notification of the adverse condition will be submitted to the Lahontan Water Board within five days of occurrence. The written notification shall

identify the adverse conditions, describe the actions necessary to remedy the condition and/or the actions implemented to abate the problem from continuing, and specify a timetable, subject to the modifications of the Lahontan Water Board, for remedial actions.

5.5.3 NAL Exceedance Reporting

In the event that discharge sampling results exceed the Numeric Action Level (NAL) for turbidity (250 NTU) or are outside of the specified range for the pH NAL (6.5 – 8.5), the QSP will orally notify the Lahontan Water Board within 24 hours after the NAL exeedance has been identified. Within 24 hours of an identified NAL exceedance, a construction site evaluation will be conducted to identify pollutant sources that may have contributed to the NAL exceedance, any run-on to the construction site, and implement appropriate corrective measures to prevent future NAL exceedances. All storm event sampling results will be submitted electronically through SMARTS within 10 days after the conclusion of the storm event. Additionally, an NAL Exceedance Report (Attachment K) will be submitted detailing the nature of the discharge, follow-up responses and corrective actions (with schedule for completion).

5.6 ANNUAL REPORT

On or before September 1 of each year, an Annual Report for the period of July 1 of the previous year through June 30 of the current year will be prepared and electronically submitted through SMARTS. The Annual Report will contain, at a minimum, the following information:

A. The project name, location and WDID number.
B. Summary of all violations of the General Permit.
C. A summary of any significant problem(s) that occurred during project construction and corrective measures implemented.
D. A summary of any compliance activities or identified corrective actions not completed during compliance year.
E. Log summarizing date, location, time and nature of all inspections and sampling events (including rain gauge measurements if applicable).
F. Names of individuals who performed visual inspections, sampling, and measurements.
G. A summary and evaluation of all sampling and analysis results, including copies of laboratory reports and rain gauge measurements from monitoring activities, including the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter.
H. Visual inspection and sample collection exemption records.
I. A certified statement indicating that the site has been winterized in accordance with this SWPPP.
J. Documentation of required QSD/QSP certifications and personnel training for all individuals responsible for SWPPP compliance, SWPPP amendments, and BMP inspections/maintenance/repair. Personnel training records shall include, at a minimum, signed attendance sheets and topics covered during trainings.
K. A certified statement signed by the QSP indicating that the project is in compliance with the conditions of the General Permit and the SWPPP.

5.7 FINAL MONITORING REPORT

Following completion of project construction, a Final Monitoring Report will be prepared and electronically submitted through SMARTS. The Final Monitoring Report will contain, at a minimum, the following information:

A. Details of any modification of the construction plans for the proposed storm water collection treatment, or disposal facilities or restoration work.
B. Details on any change in the amount of impervious coverage for the project site.
C. Any significant problem(s) which occurred during project construction and remedial measures planned or implemented.
D. A statement certifying that onsite soil stabilization and revegetation measures have been completed and that the site is permanently stabilized in a manner that will remain effective.
E. A statement certifying that post-construction storm water treatment and disposal facilities were implemented in accordance with plans submitted and are operational.
F. Certification that construction activity has been completed, that construction and equipment maintenance waste have been disposed properly, that the site is in compliance with all local storm water management requirements including erosion prevention and sediment control requirements, policies, and guidelines, and that the project site is in compliance with the conditions of the General Permit. This certification shall be signed by QSP.
G. The final report shall be signed and dated by the LRP, or the approved signatory of the LRP, and submitted within 30 days of project completion.
H. Records of all inspections, compliance certificates, monitoring reports, and non-compliance reporting will be maintained by the LRP for a period of at least three years.

6.0 ATTACHMENTS

ATTACHMENT A: SWPPP AMENDMENTS AND AMENDMENT LOG

SWPPP Amendment Form

Project Name:
WDID #:

Amendment Number:
Amendment Date:
SWPPP Section Amended:

Amendment Description:

Attachments:

QSD Approval Signature:

SWPPP Amendment Log

Project Name:
WDID #:

Amendment Number	Date	SWPPP Section Amended	Amendment Description	Prepared by:

ATTACHMENT B: SWPPP TRAINING OUTLINE AND SIGN-IN FORM

Sample SWPPP Training Outline

Presentation
Duration – 30min

- Why Are You Here
    - Reasons for training, what you will learn
- What to Expect During the Training
    - Agenda for training, expectations at end of session
- Why Protect Water Quality
    - Water pollution statistics
    - Common storm water pollutants from construction sites
    - Why is Construction SWPP so important
    - How do Construction storm water pollutants adversely affect the environment and water supply
    - SWPP is not a recommendation, it is the law and has consequences and repercussions for non-compliance
- Potential Penalties of Non-Compliance
    - What are the consequences and repercussions
    - Who are the agencies and groups that are ensuring that we are protecting water quality
    - Take away message – Fines are real, expensive, and more frequent. There is zero tolerance for non-compliance on our jobsites.
- Erosion Definitions and Processes
    - Define: BMP, Erosion, Sediment, Sedimentation
    - Define types of erosion: splash, sheet flow, rills, gullies, pulse, track off
    - Erosion processes from rain and snowmelt
    - Photos of aforementioned types of erosion
- BMPs – Erosion Control Devices
    - Definitions, applicability, limitations and costs analysis of common erosion control devices on our jobsites:
        - Silt Fence
        - Orange Fence
        - Pine Needle Wattles
        - Straw Wattles
        - Gravel Bags
- Site Assessment and BMP Installation
    - Methodology for evaluating your job site
        - What are the characteristics of the site that will influence erosion
        - Identifying the pollutants on the job site
        - Utilizing the correct BMP (device or procedure) to address those pollution risks
- BMPs – Practices and Management Procedures
    - Goals of procedural BMPs

    - Identifying correct procedures for the jobsite using the SWPPP handbook and technical notes
    - "What would you do here?" exercise – interactive with class
- SWPPP – Is and Is-Not
    - SWPPP purpose and goals
    - Simple organization of SWPPP
    - Why is SWPPP required?
    - Modifications and amendments to SWPPP
- Communication
    - Project management organizational structure on the STHS project
    - Communication mechanisms and channels
    - Written report structure and distribution
    - SWPPP documentation
    - SWPPP responsibilities
    - Response time to reports to identification of damaged BMPs
    - Checks and Balances – inspection and response schedule
    - Accountability – rewarding efforts, addressing non-compliance
- Success Criteria
    - Are you looking to ensure that water quality is being addressed
    - Who is a manager – who can effect a change
    - What to do – when to do it: regardless of your role on-site

Tour of project site, known water quality threats and sensitive areas

Outdoor Demonstration

Duration – 60 min

These exercises are conducted on the project site.

- BMP Erosion Control Device Demonstration area
    - Common BMPs correctly installed
- Project Site Walk and Evaluation
    - Identify BMPs installed correctly/incorrectly/needing maintenance
    - What would you do here exercise
    - Damaged identification and response
    - Compile action items into inspection report
- BMP Challenge
    - Straw wattle installation race (2 teams race to install 2x section of straw wattles each. Team are evaluated on time and correctness of installation)
    - Silt fence installation race (2 teams race to install 2x section of straw wattles each. Team are evaluated on correctness of installation)

SWPPP Training Sign-In Log

Date:

Project Name:

Training Topics (or attach separate training outline):

Name	Company

ATTACHMENT C: BMP GUIDE FOR WATER QUALITY THREATS

BMP Guide for Water Quality Threats

Water Quality Threat	Applicable BMP Technical Notes	IERS BMP Reference	Appropriate Application/ Function	CASQA BMP Reference #
Concrete/Masonry	• Concrete Type Materials • Concrete Washout • Solid Waste Management • Contaminated Soil	SM-02 SM-03 HP-06 SM-04	Material Containment Concrete Waste Concrete Waste Concrete Spills	**NS-03, 12, 13** **WM-08** **WM-05** **WM-07**
Drainages & Flow Paths	• Pine Needle Berms • Drain Inlet Protection • Outlet Protection • Earth Dikes/Drainage Swales	SC-02 SM-05 SM-07	Concentrated flows Drain Inlet protection Drain outlet protection Redirecting flows	**N/A** **SE-10** **EC-10, 11, 12;** **EC-09**
Material Management	• Preservation of Vegetation • Concrete Type Materials • Contaminated Soil • Stockpile Management • Material Delivery and Storage • Material Use	SM-08 SM-02 SM-04 SM-12 HP-03 HP-04	Protecting vegetation Material containment Spill response Material containment Material management Material management	**EC-02** **NS-03, 12, 14** **WM-07** **WM-03** **WM-01** **WM-02**
Sediment Control	• Fiber Rolls • Silt Fence • Temporary Surface Protection • Water Conservation • Wind Erosion • Contaminated Soil	SC-01 SC-03 SC-05 SM-17 SM-18 SM-04	Low flows, top-of-slope Low flows, toe-of-slope Temporary stabilization Water use control Dust control Spill management	**SE-05** **SE-01** **EC-5, 6, 7, 8** **NS-01** **WE-01** **WM-07**
Site Planning	• Scheduling • Soil Disturbance Management • Track-Off Control • Traffic Control • Material Delivery and Storage • Material Use	SM-09 SM-01 SM-14 SM-15 HP-03 HP-04	BMP install prior to const. Limit grading Vehicle entrance/exit Traffic patterns/parking Material management Material management	**EC-01** **N/A** **TR-03** **TR-1,2** **WM-01** **WM-02**
Spill Control	• Spill Prevention • Spill Response & Notification • Contaminated Soil • Hazardous Waste Management	SM-10 SM-11 SM-04 HP-01	Spill prevention Contain and notify QSP Disposing of contaminated soil Disposing of spill wastes	**WM-04** **WM-04** **WM-07** **WM-06**
Stockpile Management	• Stockpile Management • Contaminated Soil • Material Use • Material Delivery and Storage • Fiber Rolls • Silt Fence	SM-12 SM-04 HP-04 HP-03 SC-01 SC-03	Dust / sediment control Containing spill wastes Material management Material management Perimeter protection Containment	**WM-03** **WM-07** **WM-02** **WM-01** **SE-05** **SE-01**
Storm Drain Inlet/Outlet Protection	• Drain Inlet Protection • Outlet Protection	SM-05 SM-07	Sediment capture High-flow, velocity diffusion	**SE-10** **EC-10, 11, 12; SE-04**
Track-Off Control	• Track-Off Control • Traffic Control • Material Delivery and Storage • Street Sweeping • Soil Disturbance Management • Contaminated Soil	SM-14 SM-15 HP-03 SM-13 SM-01 SM-04	Site entrance/exit Traffic patterns/parking Material Management Dust control/track-off Limit soil disturbance Containing contaminated soil	**TR-03** **TR-1 ,2** **WM-01** **SE-01** **N/A** **WM-07**
Vegetative Protection	• Preservation of Vegetation • Traffic Control • Temporary Surface Protection	SM-08 SM-15 SC-05	Protecting Vegetation Traffic patterns/parking Temporary stabilization	**EC-02** **TR-1,2** **EC-5, 6, 7, 8**

Water Quality Threat	Applicable BMP Technical Notes	IERS BMP Reference	Appropriate Application/ Function	CASQA BMP Reference #
Vehicle Maintenance/Fueling	• Vehicle and Equipment Refueling	HP-08	Onsite refueling	**NS-09**
	• Vehicle and Equipment Maintenance	SM-16	Onsite maintenance	**NS-10**
	• Vehicle and Equipment Cleaning	HP-07	Onsite cleaning	**NS-08**
	• Hazardous Management	HP-01	Disposing of hazardous waste	**WM-06**
Waste Management	• Solid Waste Management	HP-06	Trash management	**WM-05**
	• Sanitary Waste Management	HP-05	Port-o-potty management	**WM-09**
	• Liquid Waste Management	HP-02	Non- hazardous liquid wastes	**WM-10**
	• Hazardous Waste Management	HP-01	Disposing of hazardous waste	**WM-06**
	• Concrete Washout	SM-03	Concrete wastes	**WM-08**
	• Concrete Type Materials	SM-02	Material management	**NS-03, 12, 14**
	• Contaminated Soil	SM-04	Spill clean-up/disposal	**WM-07**
Wind Erosion/Dust Control	• Wind Erosion	SM-18	Dry, exposed soil/stockpiles	**WE-01**
	• Soil Disturbance Management	SM-01	Limiting soil disturbance	**N/A**
Winterization	• **Temporary Winter Soil Protection**	**SC-06**	**Preparing disturbed soil areas for winter**	**TR-02; EC-5, 6, 7, 8**
	• **Temporary Surface Protection**	**SC-05**		**EC-5, 6, 7, 8**
	• **Soil Physical Preparation**	**SC-04**		**N/A**

ATTACHMENT D: TEMPORARY BMP TECHNICAL NOTES

BMP Technical Notes

Table of Contents

BMP Life Cycle Cost Analysis

As you research the cost for appropriate BMP materials, one thing to keep in mind is the installation and repair expense for various structures. Every device has an initial installation and removal once the BMP is no longer needed. Certain practices are more susceptible to damage, however, and require subsequent installations, removals, and/or repairs to meet inspection standards. The estimated costs over the lifetime of a few common devices are compared in the table and graph below. Each tier represents a higher order of magnitude for installations and repairs.

Table 1: BMP Cost Comparison by Level of Maintenance

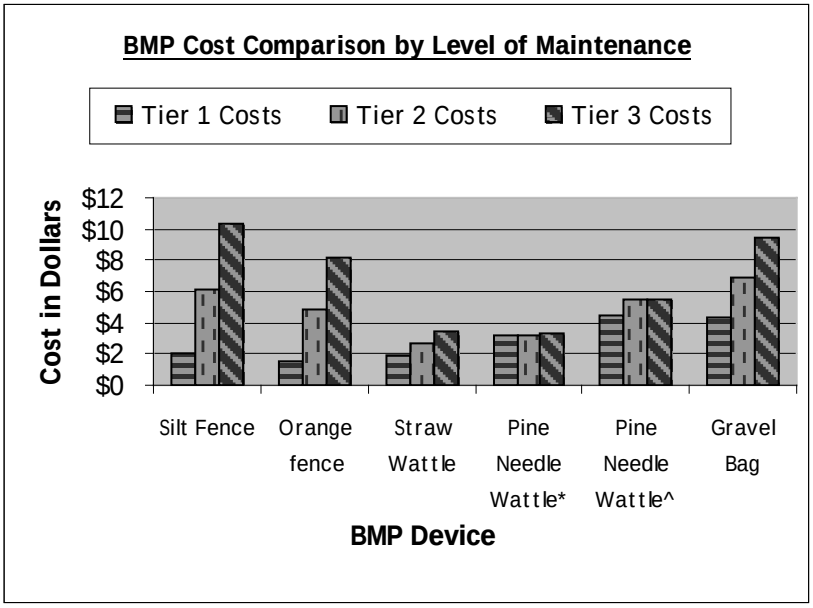
BMP Device	**Tier 1 Costs** *Materials Only*	**Tier 2 Costs** *Materials, Install, & Removal*	**Tier 3 Costs** *Material, Install, Removal & Repair*
Silt Fence	$1.99	$6.15	$10.31
Orange fence	$1.56	$4.89	$8.21
Straw Wattle	$1.89	$2.67	$3.45
Pine Needle Wattle*	$3.15	$3.22	$3.27
Pine Needle Wattle^	$4.50	$5.50	$5.55
Gravel Bag	$4.29	$6.89	$9.49

* *Wattles that are manufactured by contractor.*
^ *Wattles that are purchased from a manufacturer.*
All costs are per linear foot or per unit (gravel bag).

Assumptions:

- Labor is assumed at $52/Hr.
- Silt fence needs to be reinstalled at the end of each winter.
- Silt fence is initially installed correctly (75%-95% of silt fence is not installed correctly which would yield a higher failure rate).
- Straw wattles are not appropriate BMPs for hard surfaces such as asphalt or concrete.

* *Wattles that are manufactured by contractor.*
^ *Wattles that are purchased from a manufacturer.*



Notice the initial cost of straw and pine needle wattle. If you were only considering this value in your plans, you might purchase straw wattle because it is over a dollar cheaper per linear foot. If you considered tier two costs, you would still find straw wattle cheaper because they both require the same amount of effort and skill to install. Once you look at tier three however, you see that straw is actually more expensive than pine needle wattle. This is because pine needle wattle has been shown to have a longer life and sustain injury better than straw wattle. In this instance, an initial investment saves you time and money in the end.

Information Sources:

- Q&D Construction Corp
- California Straw Works
- Integrated Environmental Restoration Services
- CAREC Ski Area Guidelines
- White Cap Direct
- The Rock Company

Fiber Rolls/ Straw Wattles

Category
- Training
- Oversight/documentation
- Hydrologic function
- Soil function
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- Waste Management
- **Runoff Management**

Definitions, Description and Purpose
A fiber roll consists of straw, flax, or other similar materials bound into a tight tubular roll. Its purpose is to slow stormwater runoff, enabling sediments to precipitate.

Application
Fiber rolls are appropriate:
1. Along the perimeter of a project,
2. As check dams in unlined ditches,
3. Around temporary stockpiles.

Strengths
- ⊕ Is well suited for containing sedimentation from temporary stockpiles when no other erosion potential is present.
- ⊕ Is relatively inexpensive and readily available.

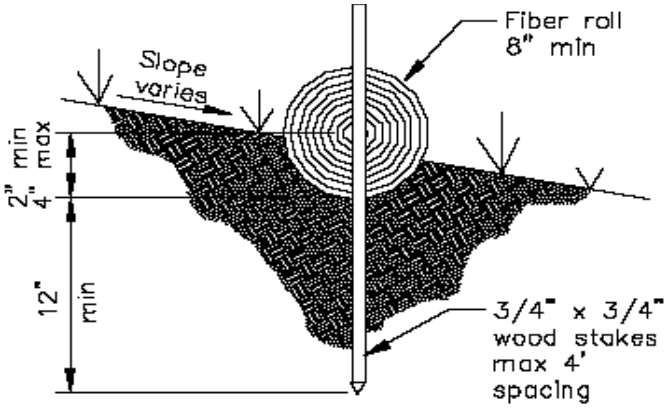
Limitations
- ⊖ Ineffective on paved surfaces
- ⊖ Ineffective unless keyed in and staked
- ⊖ Difficult to move once saturated.
- ⊖ Fiber rolls have a very limited sediment capture zone.
- ⊖ Fiber rolls are delicate
- ⊖ Fiber rolls should not be intended to filter sedimentation form stormwater runoff.

Standard Specifications

Installation

- Fiber Rolls **must** be entrenched four (4) inches to ensure maximum contact surface area with the soil (Figure 1)

Figure 1: Entrenchment

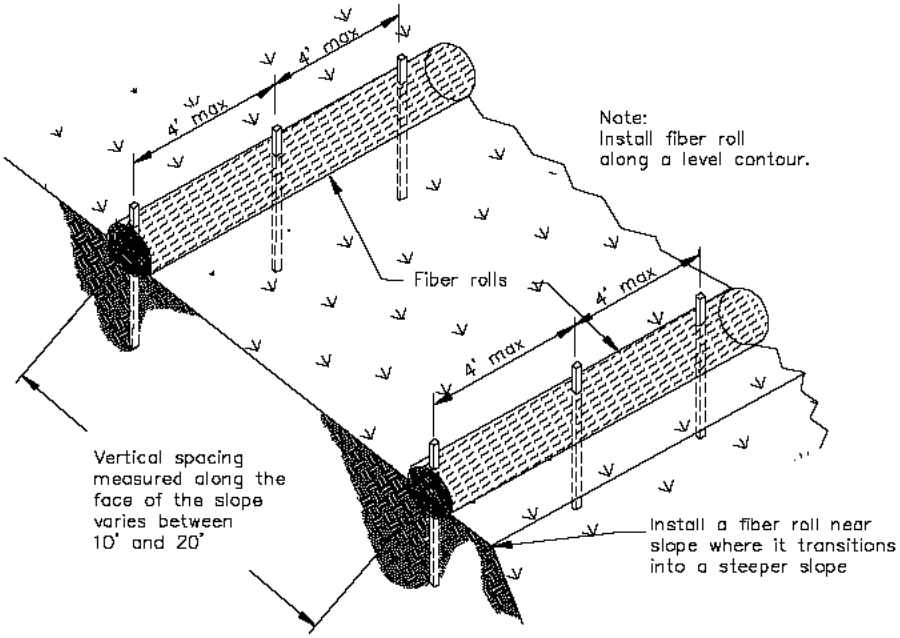


- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Ensure that the fiber roll makes good contact with the soil at all locations; there shall be no gaps beneath the fiber roll.
- Fiber rolls shall be staked in such that they are not disturbed by wind or sheet flow runoff.

Fiber Rolls/ Straw Wattles

- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted (see Figure 2).

Figure 1: Fiber Roll Staking and Installation



TYPICAL FIBER ROLL INSTALLATION
N.T.S.

Inspections and Maintenance

- ☑ Inspect fiber rolls daily.
- ☑ Inspect fiber rolls prior, during (if during daylight hours) and after a known precipitation event.
- ☑ Replace damaged fiber rolls.
- ☑ Re-entrench improperly installed or disturbed fiber rolls.
- ☑ If the fiber roll is used as sediment capture device, the sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when accumulation reaches one-half the distance between the top of the fiber roll and the adjacent ground surface.

Success Criteria

- ☑ Full contact with soil surface
- ☑ No visible breaching over or under berms
- ☑ In-tact weave over 90% of fabric

Management Response to Failed Success Criteria

Repair or replace any area that do not meet success criteria

Supporting Information

Field Application/ trial sites

1. Schaffer's Camp stockpiles
2. Old Greenwood rock pile

Fiber Rolls/ Straw Wattles

Application Results: Known/measured outcomes

- Fiber rolls are well suited for trapping low volume sheet flows on soils; **however** they are ineffective on pavement.
- They are easily damaged by any disturbance.
- They are not suitable for sediment filtration applications.

Supporting Literature

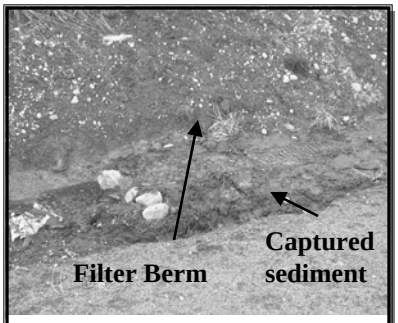
1. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual,
2. State of California Department of Transportation (Caltrans), November 2000.

Pine Needle Filter Berm

Definitions, Description and Purpose
A pine needle filter berm (wattle) is a temporary structure that is designed to reduce flow rates of overland flow from construction and other disturbance areas. They are used to filter out sediment from such flows.

This type of structure is designed to be of a low aesthetic impact and high filtration efficiency.

The pine needle filter is made by wrapping high tensile strength coir fabric around pine needles. The needles can be fully contained, or loosely wrapped. The latter method is then stapled to the soil surface to retain cohesion with the ground



Category
- Training
- Oversight/documentation
- **Hydrologic function**
- Soil function
- **Mulch/surface protection**
- Vegetation
- **Protection from disturbance**
- Waste Management
- **Runoff Management**

Application
Pine needle filter berms are appropriate for any area of a construction site where sediment and runoff might collect. This includes:

1. Below construction areas,
2. Below or around the perimeter of disturbed areas,
3. Around the perimeter of bare or denuded areas,
4. In areas of sheet or concentrated flows,
5. Around material stockpiles.

Strengths
- ⊕ Uses local materials
- ⊕ Allows 3-dimensional filtration, as compared to filter fabric, that filters water in a vertical plane.
- ⊕ Adheres to topography more easily than other sediment filter types
- ⊕ Is aesthetically less obtrusive
- ⊕ Is less prone to disturbance than filter fence
- ⊕ Does not disturb soil upon removal
- ⊕ Can be disassembled or left in place; disassembly consists of removing coir fabric and spreading pine needles. In some cases, coir disintegrates over time without removal
- ⊕ Trapped sediment may develop into a planting medium
- ⊕ Is completely biodegradable, unlike straw wattles or filter fabric.
- ⊕ Can be used on asphalt surfaces

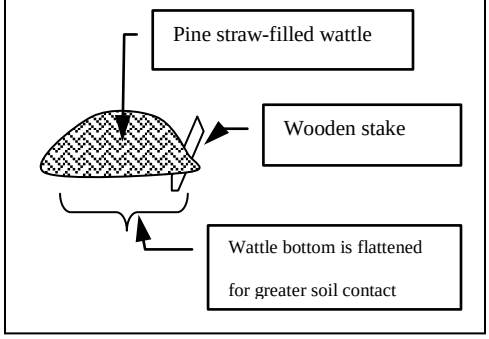
Limitations
- ⊖ Requires pine needles
- ⊖ Requires on-site fabrication (can be made off site and transported)

Standard Specifications
- Filter berms shall be made from clean pine needles, free from garbage, sediment or other deleterious materials.

Pine Needle Filter Berm

- Berms may either be wrapped or staked to the soil surface. Needles can also be placed in a windrow, covered with coir fabric, and then staked in place. In either case, the bottom of the berm shall have at least **eight inches** of pine needles in contact with the soil surface.
- In order to increase filtration capacity, berms can be as wide as 24 to 36 inches.
- Cover fabric shall consist of coir (coconut) DeKoWe 900 or equivalent.
- Stakes can consist of pointed wood stakes or metal spikes. To install stakes:
    - Drive stakes into the soil at a 60 degree angle from the horizontal plane.
    - Ensure that the top of the coir material is stretched tightly over the top surface of the pine needles, and
    - Ensure that the stakes are deep enough to prevent lateral force from loosening the them.
    - A minimum of **eight inches** soil penetration is generally sufficient except in extremely loose and unconsolidated soils.
    - Berms can also be secured with rocks or gravel bags on both soil and asphalt surfaces.

Diagram of pine wattle installation



- Berms can be permanently installed on asphalt surfaces with a Hilti™ type nail gun.
- Berms may be used in drainage ways if enough sediment catchment is provided behind the berms.
- Following project completion, berms may remain in place or the coir fabric removed and pine needles used as surface mulch.

Inspections and Maintenance

- ☑ Filter Berms should be inspected daily.
- ☑ Filter Berms should be inspected prior, during (if during daylight hrs.) and after an expected precipitation event.

Success Criteria

- ☑ Full contact with soil surface
- ☑ No visible breaching over or under berms
- ☑ In-tact weave over 90% of fabric

Management Response to Failed Success Criteria

Repair or replace any areas that do not meet criteria.

Supporting Information

Field Application/ trial sites

1. Bullwheel building parking lot slope, Incline Village (temporary application, 1999)
2. Highway 80 near Trout Creek, Truckee, CA.

Pine Needle Filter Berm

3. Village at Northstar
4. Schaffer's Camp, Northstar at Tahoe
5. Northstar Gas Station
6. Murphy Residence restoration, Incline Village, NV
7. Incline-4 Subdivision, Incline Village, NV

Application Results: Known/measured outcomes

- Based on a series of five berms in a flow path, during one ± 1-inch rainstorm event there was decreasing sediment along series. The topmost burn captured > 4" of sediment
- Based on a series of 10 berms in a flow path below eroding (treated) hillside, each berm captured > 0.5 yd^3 sediment, filled and breached. Captured sediment remained behind berm.

Supporting Literature

1. Demars, Kenneth R. and Richard P. Long. Performance Specifications for Wood Waste Materials as an Erosion Control Mulch and as a Filter Berm. 1997. Storrs, CT, University of Connecticut Department of Civil and Environmental Engineering.

Figure 2: Example of Filter Berm Application

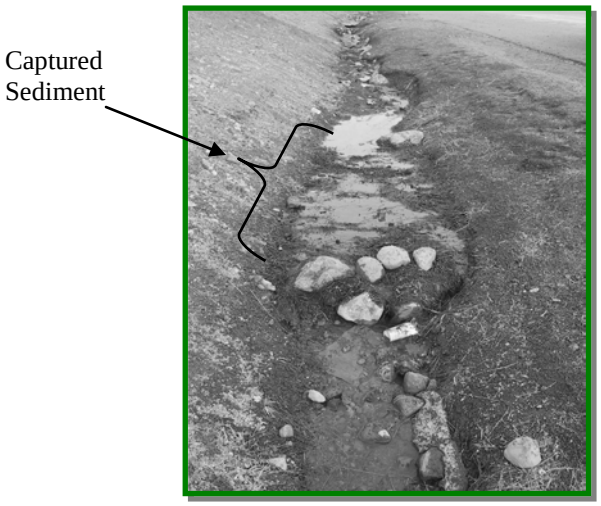
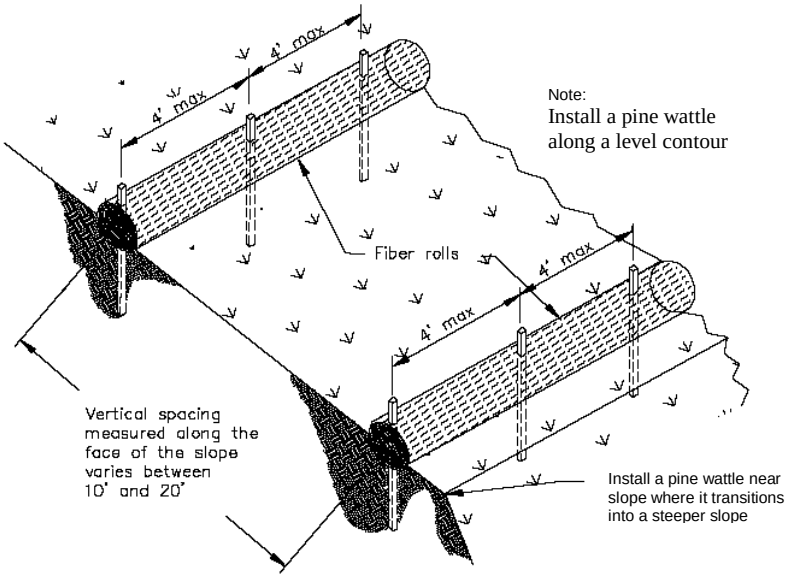


Figure 3: Pine Needle Wattle Installation



TYPICAL FIBER ROLL INSTALLATION
N.T.S.

Silt Fence

Definitions, Description and Purpose
A silt fence is made of a filter fabric that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Category
- Training
- Oversight/documentation
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- **Protection from disturbance**
- Waste Management
- **Runoff Management**

Application
Silt fences require certain criteria to achieve maximum protection:
- Silt fence can be used only on flat areas where sheet flow is know to occur.
- Silt fences must have a large flat area to pool water for settling sedimentation.
- Silt fence must not be used on slopes or at the toe of a slope.
- Silt fences are not appropriate for use where high volume runoff flows are present or expected.
- Silt fences must not be used as check dams or linear barriers.
- Can only be installed when called for in site diagrams.

Strengths
- ⊕ This structure is well suited for application in large flat areas with low runoff flows where settling can occur.

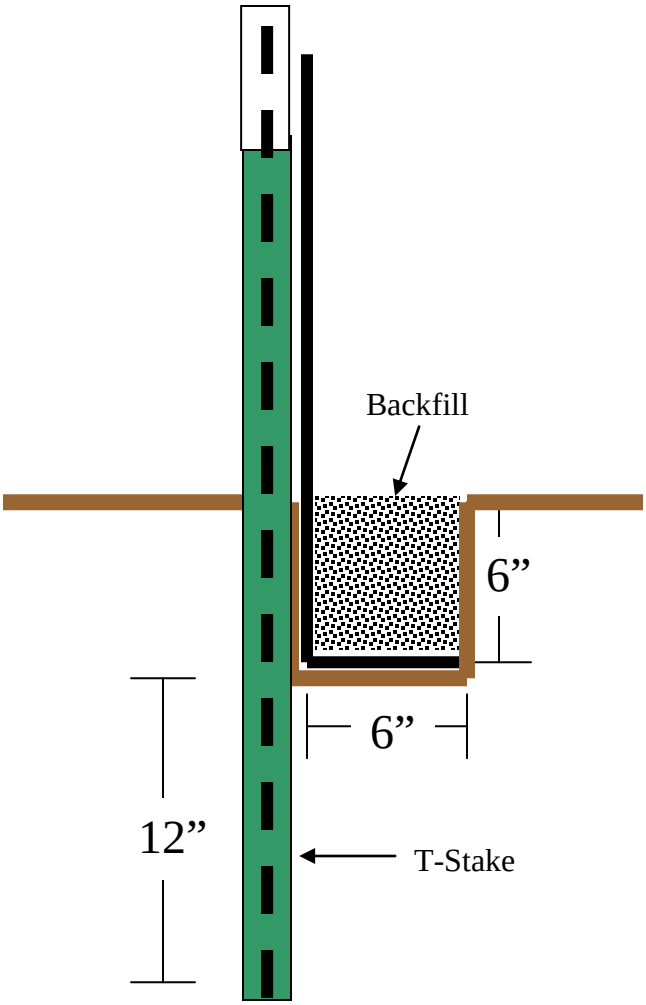
Limitations
- ⊖ Must only be installed when called for in site diagrams.
- ⊖ Silt fences only operate correctly if properly installed and maintained in very specific applications.
- ⊖ Required laborious installation.
- ⊖ Correct installation of silt fences requires specific training.
- ⊖ Silt fences are not easily installed in loose and/or rocky soils as are found in the Lake Tahoe area.
- ⊖ Cannot withstand snow load and therefore cannot be used in winter months.

Standard Specifications
- Silt fences must be entrenched **6 inches deep** (Figure 1).
- Silt fences must be "toed-in" an additional 6 inches with the toe facing **towards** the direction of flow (Figure 1).
- Silt fences must not be backfilled above grade for entrenchment (Figure 2).
- Silt fence must be firmly staked in every **6 feet**, stakes shall be driven into the ground a minimum of **12 inches** below the bottom of the trench.
- Silt fence must be back with hog-wire fencing to provide adequate support (Figure 3).
- Utilizing pine needle wattles in conjunction with a correct silt fence installation provides additional settling capacity.

Silt Fence

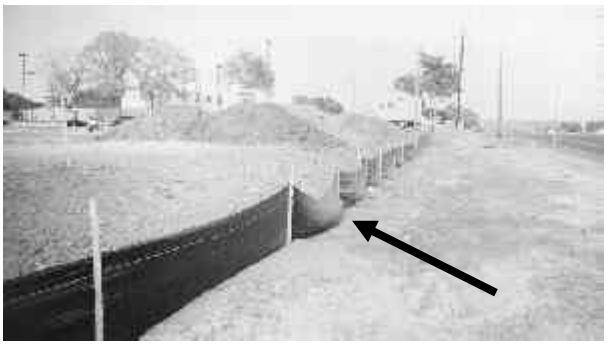
- Joining sections of silt fence must be wrapped together and staked to provide a continuous barrier.
- Silt fence stakes and hog-wire backing should be installed on the **opposite** side of the fence from the direction of sheet flow.

Detail of Correct Entrenchment of Silt Fence



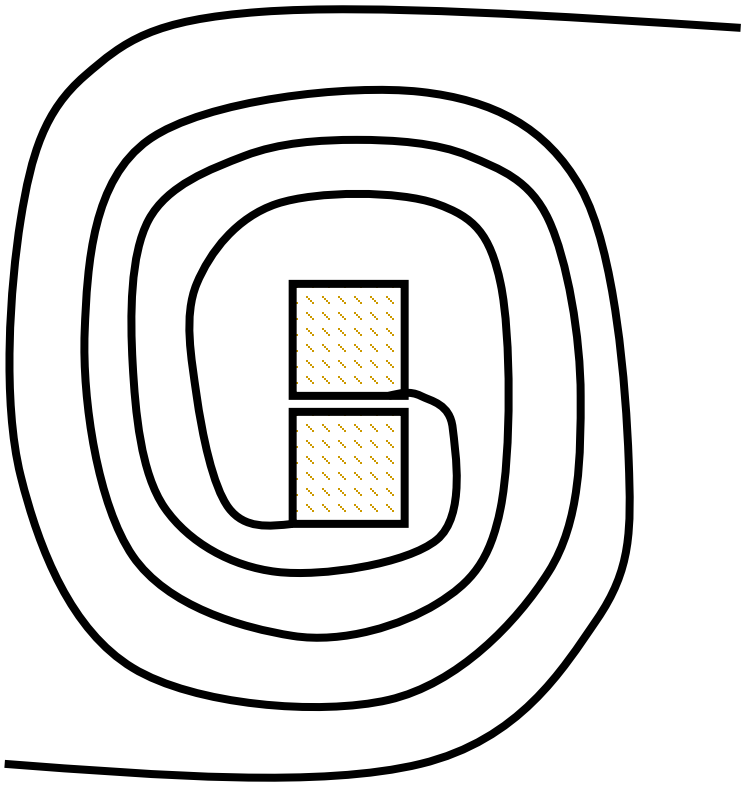
Detail of Hog Wire Backing used to Support Silt Fence

Example of Silt Fence Entrenchment Backfill Above Grade



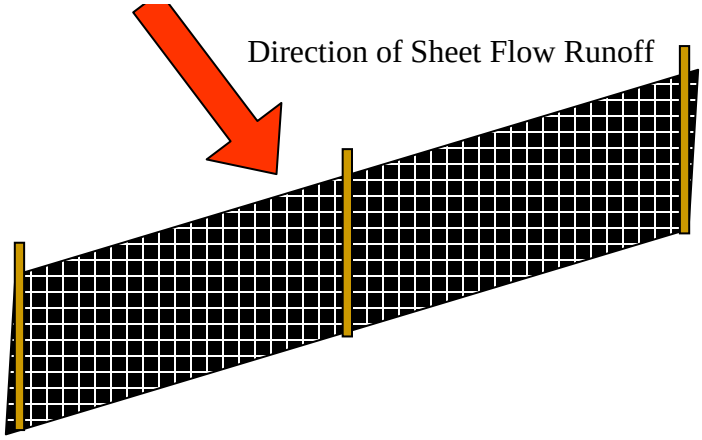
Silt Fence

Filter Fence Splice Detail



Silt Fence

Detail of Silt Fence Installation Showing Silt Fence, Wire Backing, and Stakes Opposite Sheet Flow Direction



Silt Fence Loaded with Sediment Requiring Maintenance

Inspections and Maintenance

Silt fence must be inspected daily to ensure that the BMP has not been compromised by:

- Excavation
- Vehicle or equipment movement
- Accidental disruption by other construction activity
- Precipitation or runoff flow

Sediment build up around the silt fence must be removed periodically. (Figure 6)

Silt Fence

Success Criteria

Silt fence is successful if it is providing adequate ponding for settling and is maintaining its properly installed integrity.

Management Response to Failed Success Criteria

Failure of success criteria will result in removal & reinstallation, repair, or replacement.

Supporting Information

Field Application/ trial sites

8. Village at Northstar
9. Shaffer's Camp, Northstar at Tahoe

Application Results: Known/measured outcomes

- Silt fences are generally ineffective even when regularly inspected and maintained.
- Many inappropriate installation locations were identified.
- Many incorrect installations were found.
- Silt fences fail to stand up to weather and work area conditions.
- Improper installations and applications have failed to prove effective in preventing sedimentation transmission.

Supporting Literature

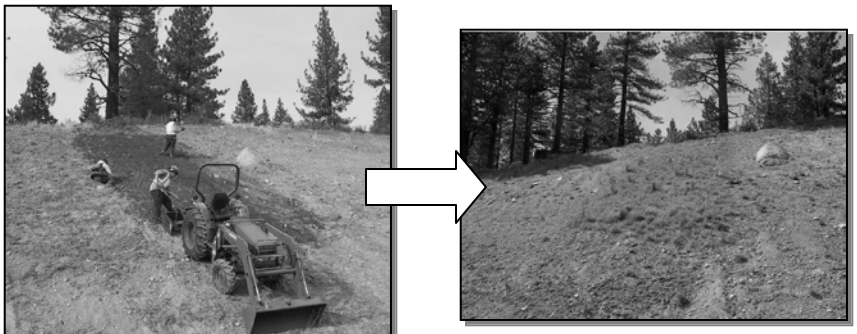
1. Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.
2. National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.
3. Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.
4. Sedimentation and Erosion Control Practices, and Inventory of Current Practices (Draft), UESPA, 1990.
5. Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991
6. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.
7. Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.
8. U.S. Environmental Protection Agency (USEPA). Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1992.
9. Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Soil Physical Preparation

Side by Side Comparison of Tilled and Untilled Plots

Definition and purpose

Soil physical treatment consists of breaking up or loosening the soil to allow water infiltration and root penetration. Physical treatment is generally done on highly compacted or otherwise dense soils.



Result of tilling to 12". The surrounding area was treated the previous fall and received the same seed mix as the tilled site. Note the difference in vegetation between treatments.

Category

- Training
- Oversight/documentation
- **Hydrologic function**
- **Soil function**
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- Waste Management
- Runoff Management

Description

Drastically disturbed sites, such as road cuts, ski runs and construction sites are often underlain by dense and/or compacted material. Compaction and high-density material may be the result of one or more parameters. For instance, a road cut may consist of dense subsoil or parent material, as is the case in much of the volcanic portion of the Lake Tahoe-Truckee River watershed.

Construction activities also usually compact soil. In any case, compaction and high bulk density result in several negative impacts on soil, plant growth and ultimately sediment yield from that site.
Soil physical treatment is used to de-compact soil and allow increased infiltration, root penetration, gas exchange and aeration for both plants and microbes.

Soil physical treatment can consist of a number of treatments. Specific treatments will be addressed in other technical notes. Physical treatment may include tilling-ripping, turning soil over or the use of infiltration tines to open and loosen dense soils without turning them over. The latter technique would be used on a steep and/or unstable slope where massive disruption of the soil 'strength' may result in a mass-type of soil movement.
Soil physical treatment is often combined with application of organic amendments such as compost or aged wood chips in order to incorporate those materials to a specific depth.

Application

- Construction areas including areas surrounding building sites, temporary access roads, former stockpile areas, logging landings and anywhere that equipment or other traffic has compacted the soil.
- Compacted cut and fill slopes where planting is to take place

Soil Physical Preparation

Strengths

- ⊕ Soil physical treatment increases infiltration, thereby reducing or eliminating runoff and sediment yield on newly treated sites (note: this physical treatment must be combined with other applications such as mulch and soil organic amendment in order to achieve long lasting results)
- ⊕ Soil physical treatment allows roots to penetrate more deeply into the soil, thus accessing a greater volume of nutrients and water.
- ⊕ This penetration also increases the shear and tensile strength provided by the roots over a greater volume of soil.

Limitations

- ⊖ Soil physical preparation loosens soil and can result in destabilization, mass wasting and transport of soil particles from the soil surface if surface flows occur.
- ⊖ In steep or oversteepened sites, the project must be timed so that plants can become established during the first season, thus strengthening the soil.
- ⊖ Further, adequate mulch is a necessity so that the soil surface is well protected from both rain and runoff impacts.

Standard Specifications

- Generally, soil shall be tilled or mechanically loosened to at least 12 to 18 inches.
- In cases where soil organic matter amendments are required, compost and/or wood chips shall be applied to the soil ***prior*** to tilling so that tilling will incorporate compost and/or wood chips to the depth of tilling.
- **Note:** standard specifications for each type of soil physical treatment will be described elsewhere. The specification in this note describes the determination of need for soil physical treatment.

Success Criteria

- ☑ Soil physical treatment shall be done so that following treatment, a cone penetrometer with a recording meter, can penetrate the soil to at least **12 inches** while encountering physical resistance of no more that **200 psi** (excepting rocks).
- ☑ Soil penetrometer readings shall be taken on a grid pattern across the site so that at least **ten** readings are taken and averaged at one inch increments.
- ☑ The grid shall be randomly placed and the ten points shall be evenly spaced and fit to the site.

Management Response to Failed Success Criteria

In the case that penetrometer readings do not meet the required criteria, re-treatment shall take place unless this treatment is likely to cause destabilization of the site.

Soil Physical Preparation

Supporting Information

Field Application/ trial sites

1. Luther Pass 5A
2. Highway 80 at Trout Creek
3. Resort at Squaw Creek
4. Hall property-Painted Rock at Squaw Creek
5. Lookout Mountain lower lift terminal, Northstar-at-Tahoe
6. Unit 7-The Overlook, Northstar-at-Tahoe
7. Dollar Hill One tilling trials
8. Cascade Road tilling trials
9. Meyers Chain and Luther Flats tilling and incorporation trials

Application Results

- Tilled areas produced significantly greater plant growth compared to the untilled areas.
- Tilled areas produced greater infiltration rates than untilled areas.
- Tilled areas demonstrated lower resistance to penetration as measured by cone penetrometer by at least 4 times.

Supporting Literature

1. Ehlers, W., U. Kopke, F. Hesse, and W. Bohm. 1983. Penetration resistance and root growth of oats in tilled and untilled loess soil. Soil and Tillage Research 3:261-275.
2. Luce, Charles H. 1997. Effectiveness of road ripping in restoring infiltration capacity of forest roads. Restoration Ecology 5, no. 3:265=270.
3. Nolte, B. H. and N. R. Fausey. Soil Compaction and Drainage. 2002. Ohio, Ohio State University.
4. Torbert, H. A. and C. W. Wood. 1992. Effects of soil compaction and water-filled pore space on soil micribial activity and N losses. Commun. Soil Sci. Plant Anal. 23, no. 11&12:1321-1331.

Types of Tilling

Figure 1: Mini-excavator tilling soil

Soil Physical Preparation

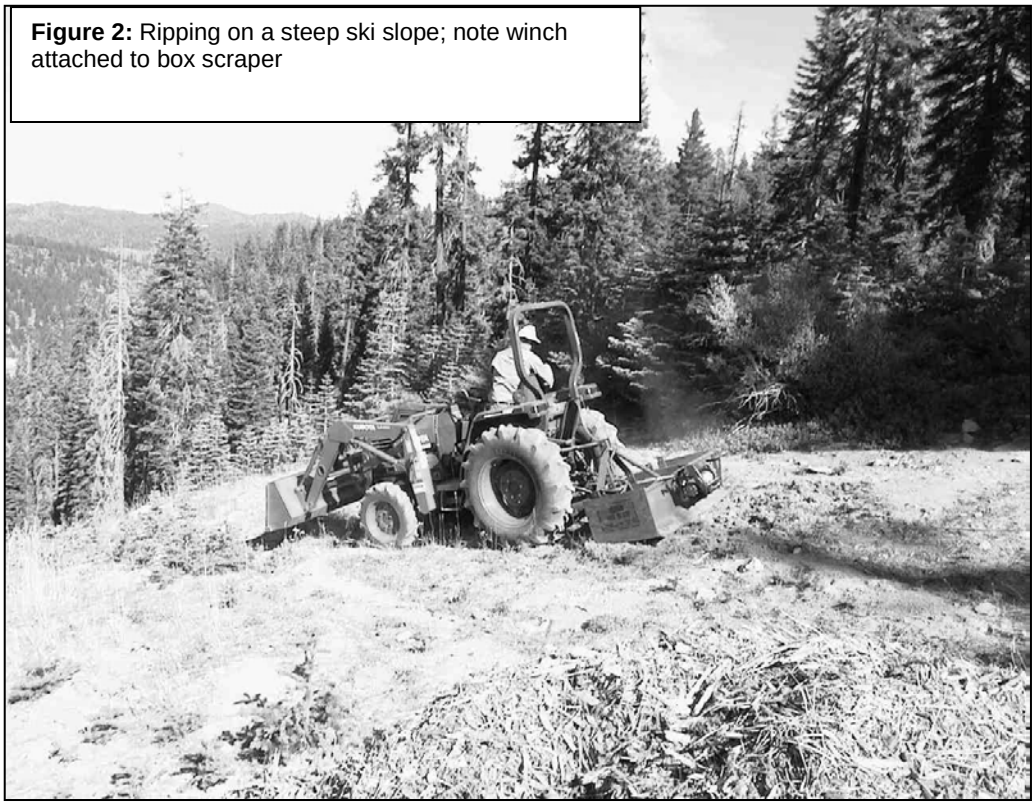


Figure 2: Ripping on a steep ski slope; note winch attached to box scraper

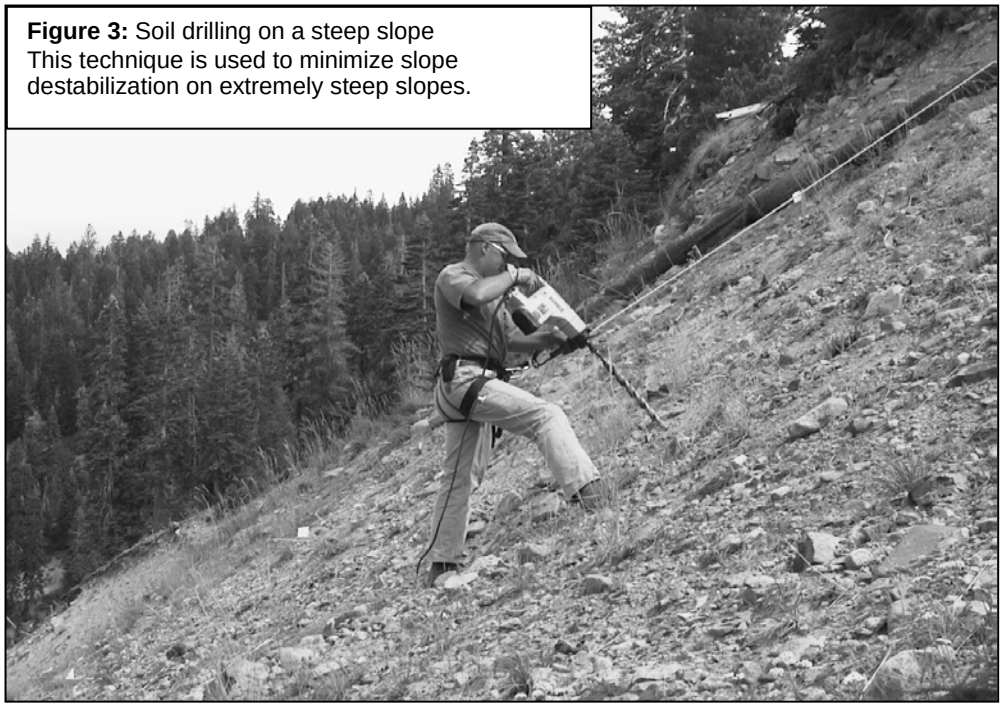


Figure 3: Soil drilling on a steep slope
This technique is used to minimize slope destabilization on extremely steep slopes.

Soil Physical Preparation

Figure 4: Infiltration tine-type of treatment in hard to reach areas using a reach forklift.

Soil Physical Preparation

Alternatives Assessment: Specific Soil Physical Preparation Techniques

Alternative	Description	Strength	Weakness	Desc.
Tilling	Breaking up of the soil by turning over of the soil material using a backhoe, shovel or other device that completely mixes the soil	The most complete mixing of the soil of the methods described.	This method is slower than ripping and is difficult on very steep slopes.	Fig 1
Ripping	Breaking up of the soil using a machine mounted ripping tine. This process does not mix the soil completely but rather breaks it up in place.	This method is generally quicker than other methods. If the tilling tines are properly built and used, this can be an effective method of tilling.	Difficult to use on steep slopes. Does not mix or incorporate as completely as tilling. Large rocks can create difficulties	Fig 2
Roto tilling	Breaking up the soil by mechanical rotary tiller	Can be quick if soil conditions are amenable to roto-tilling.	This method has limited use in areas where soil is extremely compacted or where rocks exists. Also, depth is very limited, possibly to 6" max.	
Drilling	Breaking up small amounts of soil to create rooting and infiltration channels through the use of a mechanical drill	Provides an increase in infiltration and organic matter mixing on extremely steep slopes without destabilizing the site.	Slow and labor intensive. Does not mix as completely as other methods.	Fig 4
Infiltration tines	Breaking up the soil by the use of fork-like tines usually from a front loader or backhoe bucket. This technique is often used in hard to reach areas.	Can be used in hard to reach areas such as very steep slopes.	May be slow (though not neccisarily). Tends to destabilize the slope and must be used with adequate treatment including irrigation in the 1st season so that plant roots can stabilize slope.	Fig 3
Hand tilling/mixing	Mixing of the soil by hand implements such as pick mattock	Can be used where other methods are not adequate	Does not mix deeply. Is extremely slow.	

Temporary Surface Protection

Category
- Training
- Oversight/documentation
- Hydrologic function
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- Protection from disturbance
- Waste Management
- Runoff Management

Definitions, Description and Purpose
Temporary surface protection is used for winterization or temporary cover for a potential rainstorm event. Typically, straw or plastic is used, however both of these treatments pose potential problems.

Straw may contain weed seeds and is known to blow from the site during wind events. Likewise, plastic can be easily blown from soil piles during high winds. Thus, for longer-term surface protection, wood chips are a high quality surface protection that can remain in place even during high wind events.

Wood chips can also be tilled into the soil during reapplication of soil or final treatment of protected areas, which adds organic matter and water holding capacity to the soil.

Application
- Used for protection of bare soil surfaces during construction periods and especially during ongoing **winter construction** when bare soil is prone to movement and sediment production off-site.
- Also used to protect topsoil and other soil piles that are being stored on-site during construction. This offers a high level of protection when combined with filtration berms.

Strengths
- ⊕ Provides long-lasting surface protection that resists winds
- ⊕ Can be produced by chippings from trees removed during construction or forest health clearing
- ⊕ Does not import materials that are either foreign or non-bio-degradable.
- ⊕ Can be incorporated into soil during soil treatment, thus adding organic matter and water holding capacity (must be combined with **slow-release organic fertilizer** so that high carbon wood chips don't lock up nitrogen during the break-down period).

Limitations
- ⊖ May lock up nitrogen if not combined with organic fertilizer during incorporation.
- ⊖ May be difficult to remove from site if driven on.
- ⊖ Can be more costly and difficult to apply than straw and plastic.

Standard Specifications
- Wood chips shall be applied either by hand or by blower (preferred) such as Shred-Vac, or an equivalent, to a uniform depth of one inch.
- Wood material shall be derived from clean, disease-free native trees of local origin. They shall be either chipped or tub-ground to non-uniform chip size.
- Following application, chips shall be wetted thoroughly to assure complete contact with soil surface.
- In cases of application to soil piles, chips shall be tackified at a rate of 120 pounds of tackifier per acre.
- Tackifier shall be derived from organic material and shall be M binder or equivalent.

Temporary Surface Protection

- Tackifier shall be applied by a hydroseeder equipped with a paddle agitator and mixed to a rate of at least 250 gallons hydroseed to 60 pounds of tackifier.

Success Criteria

- ☑ 98 percent of the ground shall be covered by wood chips to a depth of at least one inch.
- ☑ No area of greater than four square inches shall be bare soil.

Management Response to Failed Success Criteria

Where bare soil exists, re-apply wood chips to the appropriate depth and cover rate.

Supporting Information

Field Application/ trial sites

Several sites including Homewood Ski Resort bottom area, Northstar at Tahoe various areas, South Tahoe Public Utility District B Line Sewer Export Project, Luther Flats and Meyers Chain research sites and Brockway Summit Erosion Control Project, some sites.

Application Results: Known/measured outcomes

No visible erosion on all sites

Supporting Literature

1. Grismer and Hogan, 2004 A&B Land Degradation and Rehabilitation
2. Many studies have shown the critical usefulness of surface mulches including wood chips.

Temporary Winter Soil Protection

Definitions, Description and Purpose
Temporary winter soil protection is a combination of practices that maximize soil protection during winter operations. These various practices, covered in depth in separate technical notes, are integrated together to provide winterized protection. This protection can take place on construction sites where minimal threat to water quality is present and/or areas such as summer roads or other bare areas that may become snow free during low snow periods.

The purpose of temporary protection is to allow operations to continue while stabilizing and protecting soil surfaces against impacts from equipment and other types of traffic.

Temporary winter protection is designed to offer the highest level of protection for water quality with back-up protection in case of soil movement. The winter protective measures described here offer several advantages over standard protective measures such as silt fence or straw surface protection.

Category
- Training
- Oversight/documentation
- Hydrologic function
- **Soil function**
- **Mulch/surface protection**
- Vegetation
- Protection from disturbance
- Waste Management
- Runoff Management

Application
Temporary winter protection is used where construction activities are allowed to proceed during the winter. The three main lines if defense against erosion are:

1. Narrow traffic pattern focus,
2. Total surface protection,
3. Fail-safe backup through installation of filter berms.

Strengths

⊕ The practices described here allow a much greater level of wintertime soil protection since they have been designed to withstand some disturbance pressures and unlike silt fences, settling ponds and other practices, have been designed to minimize sediment movement at its source.

⊕ Wintertime soil protection allows construction to continue during some periods of the winter.

⊕ Careful planning and protective treatment can offer a high level of surface protection against erosion when intentionally applied.

⊕ High level of winter season protection can remain in place during summer construction season for added protection

Limitations

⊖ Wintertime protection must be extremely durable and able to withstand impacts during snow periods that are difficult to plan for.

⊖ Wintertime protection requires additional vigilance so that soil is not removed during snow removal operations.

⊖ Wintertime protective measures require a higher level of operator training and awareness.

Temporary Winter Soil Protection

Standard Specifications

Temporary wintertime soil protection consists of the following elements:

- Carefully delineated travel ways that are protected on both the surface and adjoining areas,
- Surface protection of all unvegetated areas,
- High level of roadway protection,
- Filter berms and backup extending throughout the project area
- Training of personnel, especially equipment operators,
- Vigilant monitoring plan.

Success Criteria

- ☑ All travelways, whether vehicle or foot paths, shall be made as narrow as possible and have the appropriate mulch and BMPs applied as discussed in the following winterization article.
- ☑ All bare dirt shall be treated with the appropriate mulch (pine or wood), and applied to the correct depth as prescribed in the following winterization article.
- ☑ All treatments will be recognized and applied **prior** October 15th.

Management Response to Failed Success Criteria

- ☑ Rebuild or replace disturbed elements
- ☑ Interrupt patterns that lead to problem, such as keeping traffic our of a specific area or re-aligning paths to minimize disturbances

Description of Wintertime Soil Protection Elements and Integration

Introduction

Full protection of soil surfaces during wintertime operations require a set of integrated practices that are outlined here. With vigilant coordination and implementation of these elements, soil can be protected to a high level. The land manager assumes a great amount of responsibility in wintertime operation and with proper training, coordination and monitoring, will in most cases, be capable of water quality protection. The following descriptions delineate and describe those elements required for soil surface protection during winter operations and references specific technical notes that develop these concepts more fully.

1: Personnel Training

Perhaps the most important component of adequate protection during winter operations is the adequate training of personnel who will be involved in the project. The ability to help personnel, especially equipment and vehicle operators, is critical. The project proponent must be able to offer adequate and frequent training sessions in order to explain the purpose and importance of adhering to,

implementing and monitoring the various components of winter soil protection. The training plan will include familiarization with all of the technical notes included in this document as well as a chain of responsibility for assessing and monitoring the functionality of the various protective practices.

2: Soil Surface Protection

2.1 : Pine Needle Mulch

Pine needle mulch will be used where bare soil exists prior to snowfall, but where that soil is not expected to either be impacted by vehicles or other traffic and where that soil is expected to be covered by snow for the majority of the winter. Pine needle mulch is highly effective in protecting against erosion and is not known to import weeds.

2.2 : Wood Chip Mulch

Wood chip mulch is described in the 'Temporary Surface Protection' technical note. During winter operation, wood chips can be used for both non-impacted surface protection instead of or in conjunction with pine needles, and will be used on all dirt surfaced roads. In the case of dirt surface roads, road delineation is described below. Wood chips will be applied to road surfaces to a depth of at least 2 inches and will be monitored daily to assure adequate coverage.

Wood chip availability and storage

Wood chips must be stored and available during the winter season for use where snow removal operations have disturbed or removed the existing wood chip cover. Piles will be located in accessible locations and will be covered with a heavy tarp or be contained beneath a temporary roofed structure so that chips will remain as dry as possible. The perimeter of the piles will be staked with high visibility stakes so that piles can be located following a large snow event and so that piles will not be disrupted during normal operations. The amount and size of the piles will be dependant upon the extent of dirt surface travelways.

2A; Mulch-surface protect all bare, non-travel areas

As described in 2.1, above, all areas that are not to be impacted during winter operations but are bare or otherwise non-stabilized, will be identified by October 15th and will receive a minimum one inch (1") layer of either pine mulch or wood chip mulch. That mulch will be tackified using 120 pounds per acre of psyllium-based tackifier mixed with 100 pounds per acre virgin wood fiber mulch as a tracer, and applied evenly over the mulch in order to protect that mulch against wind.

2b: Focused-delineated and surface-protected travelways

Surface protection

All travelways throughout the project that are composed of bare dirt, whether vehicle or foot paths, will be mulched with at least two inches (2") of wood chip mulch. Wood chip mulch provides a high level of protection to the soil surface and can be tilled into the soil during final soil preparation for soil restoration, and in fact, increased the soil water holding capacity when properly tilled in.

Focused travelways

All travelways, whether vehicle or foot paths, shall be made as narrow as possible and shall be delineated by high visibility poles of at least six feet height from the ground surface to the top of the pole. These poles will allow operators and pedestrians to stay on the protected paths and roadways and will help snow removal personnel to locate the pathways after a snowfall event. Poles will be inspected daily to assure adequate compliance with these specifications. Mulch on the travelways will extend at least twenty percent beyond the edge of travelway for additional protections.

Temporary Winter Soil Protection

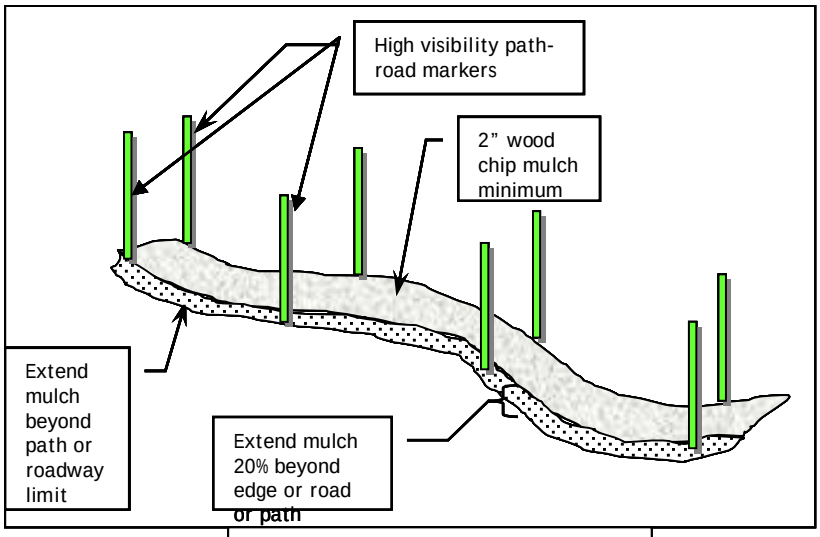


Diagram of Delineated and Mulched Road or Footpath

3: Filter berms, back-UP FILTER berms

Filter berms are the fail-safe component of wintertime soil protection. Filter berm description is addressed in the Filter Berm and Application of Pine Needle Filter Berms technical notes. We will use filter berms around the project area where any potential for runoff might occur. Additionally, in areas of potential over the snow vehicle traffic or other traffic areas, double or back up berms will be installed so that if the first berm should be disturbed or should fail due to disturbance, a second berm will capture any sediment. This is especially important in areas of potential water flow such as in low spots, swales and ephemeral drainage ways.
All locations for filter berms and back up berms shall be identified prior to October 15th. Those locations will be subject to quick review by Lahontan staff. In the case that staff has inadequate time to review those locations, the project manager shall consult with an erosion control specialist and determine the final location.

4: Monitoring Program

An effective monitoring program is essential to the success of properly applied soil protection measures. The monitoring program for wintertime soil protection will consist of the following elements:

- Inclusive Involvement
  All personnel will be involved in protection measures monitoring. This program is based on a high level of personal involvement. This point will be emphasized in the training sessions and through those sessions, we will stress not only the technical details of soil protection, but the critical need for monitoring from all personnel involved in this project as well. All disturbances or non-standard conditions of the soil surface protection shall be reported to the project foreman who will be responsible to take action to remedy the situation. For instance, if a filter berm has been disrupted by equipment, the foreman will contact the appropriate individual to make sure that the berm is repaired immediately. Further, wherever disturbances occur, an attempt will be made to remedy the situation that caused that disturbance.

- Vigilance
  A sense of urgency and immediacy will be imparted to all personnel working in the project area so that problems can be noted and remedied as soon as possible.

Temporary Winter Soil Protection

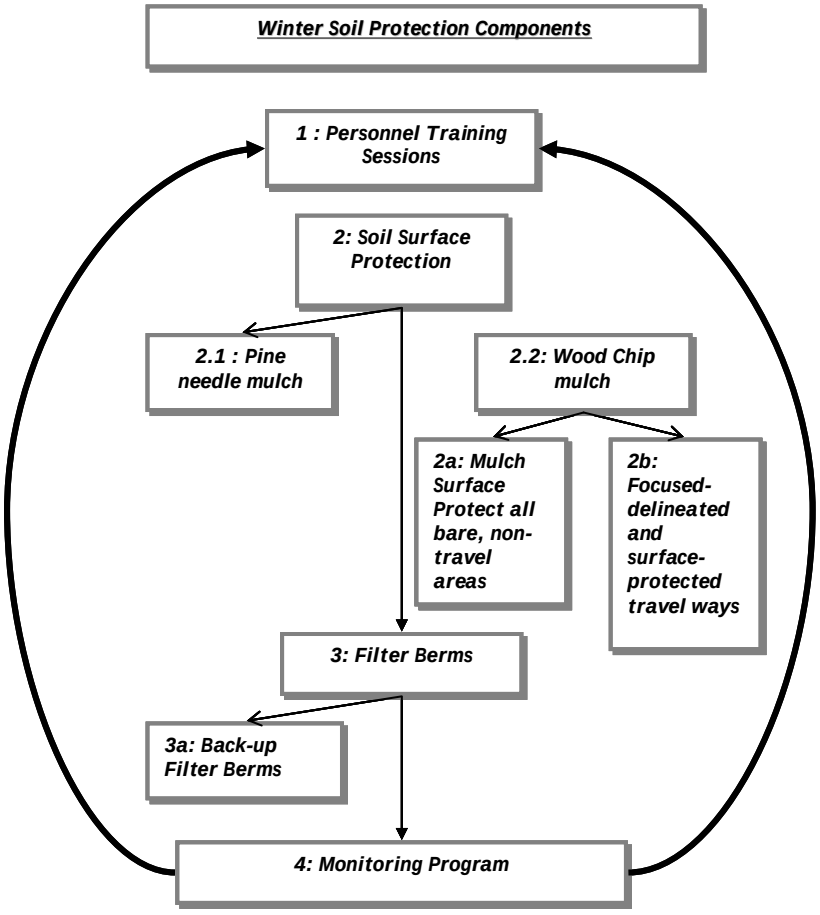
- Timing
  A visual monitoring shall occur at the beginning and end of each shift. Wood chip surface protection, travelway visibility stakes and other element of soil surface protection shall be observed and noted. Where repair needs to occur, that repair work shall begin within the same shift that it is noted. Repair of soil protection elements shall be given the highest priority.

- Specific Elements
  All personnel shall be trained in all of the soil protection elements and instruction shall be given for what remedial actions need to be taken and who needs to take those actions when needed. The line of responsibility shall extend from the individual worker to the foreman to the project manager, thus assuring the highest level of involvement.

Conclusion

This winter soil surface protection plan describes elements that, when integrated, will provide the highest level of soil surface and water quality protection possible during winter operations. This plan is based on sediment source control practices. Other technical notes describe these and related "BMP's" that can be used together. We rely on surface protection and avoidance of problem areas and use filter berms as a 'fail-safe' backup strategy. Minimum emphasis is placed on such things as settling ponds or other treatment methods since our strategy involves keeping sediment in place rather that allowing movement to occur.

Temporary Winter Soil Protection



Soil Disturbance Management

Definitions, Description and Purpose
Soil Disturbance Management is a holistic approach to limiting the potential for sediment transmission within the construction site. This is accomplished by establishing borders around disturbed soils areas, and delineating clean and dirty zones of the construction site.

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Application
Any construction site that disturbs soil and has numerous subcontractors working concurrently can benefit from Soil Disturbance Management.

Strengths
⊕ Controls and delineates areas where soil disturbance and excavation activities will occur.

Limitations
⊖ Communication, education, and schedule coordination are critical to the success of this strategy.

⊖ Additional parking for personnel and subcontractor vehicles must be identified.

⊖ Compliance by subcontractors and material delivery vehicles is critical.

⊖ Identifying and limiting access points to the construction site (see **Traffic Control Tech note**).

⊖ Installing and maintaining track-off controls at access points are critical (see **Track-off Control Tech Note**).

⊖ Street sweeping will likely be required outside of the dirty area (see **Track-off Tech Note**).

Standard Specifications

Vehicle and Equipment Site Control

- Using a site map – delineate zones where it is acceptable for vehicles, equipment, and personnel to operate in disturbed soils.
- Separate the site into designated "dirty zone" and "clean zone".
- Specify entrances/exits for vehicles, equipment, and personnel foot traffic to pass through.
- Minimize the number of entrance/exits to the dirty zone for vehicles, equipment, and personnel foot traffic.
- Plan for site delineation and entrances/exit to be moved as the project site develops.
- Implement immovable physical barriers to delineate the "clean" and "dirty" zones identified on the site map.
- Vehicles and equipment that must operate in the dirty zone shall enter and exit ONCE – using the established exit control areas upon exit. Construction equipment will be stored onsite in the dirty zone.
- Vehicles and equipment that are not critical in the dirty zone are prohibited from entering that area. These vehicles must park in designated personnel and subcontractor lots.

Soil Disturbance Management

- Utilize carts or designated transport vehicles to transfer tools and other non-motorized equipment into the dirty zone.
- Personnel and Subcontractors will enter the dirty zone, on foot, through designated walk areas. DO NOT CIRCUMVENT ENTRANCE/EXIT CONTROL AREAS.

Education/Training

- All personnel working on the site must be trained on both the concept of site control and the policies used to enforce it.
- POST SIGNS at all entrances, exits, and control areas to reinforce the site control policies and communicate instructions.

Inspections and Maintenance

- ☑ Inspection of the site controls will occur on a daily basis.
- ☑ Areas of concern:
  - o Are the control areas able to handle the volume and type of personnel, vehicles, and equipment entering the site?
  - o Any breaches in the physical barrier, whether accidental or deliberate.
  - o Inspect track off into the clean zone of the project area.
  - o Communicate personnel, subcontractors, or drivers non-compliance issues through the appropriate chain of command.

Success Criteria

Success is measured by minimizing the amount of sediments transported from DSAs (Disturbed Soil Areas) into uncontrolled areas and public roads outside of the project site

Management Response to Failed Success Criteria

Failure of success criteria will trigger management review of procedures that may require re-delineation of the project site, retraining of personnel, subcontractors, and material delivery drivers. Repeated violations of project site policy may require disciplinary actions by project management.

Supporting Information

Field Application/ trial sites

None identified

Application Results: Known/measured outcomes

None identified

Supporting Literature

None identified

Concrete Type Materials

Definitions, Description and Purpose
Concrete Type wastes are byproducts of concrete, mortar, grout, cement, or any other potentially pH-altering material used as a construction material.

These waste management guidelines are intended to prevent the discharge of pollutants associated with concrete type wastes from entering by specifying practices to be used by employees and subcontractors.

Category
- **Training**
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- **Waste Management**
- **Runoff Management**

Application
Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete, mortar, grout, cement, or any other potentially pH altering material (to be referred to as concrete-type wastes) is used as a construction material.
- Dust and debris result from construction or demolition activities.
- Mortar, grout, and cement-mixing stations exist.

Strengths
- ⊕ Controls, contains, and ensures proper disposal of concrete-type wastes.
- ⊕ Minimizes or eliminates discharges of ecologically hazardous concrete-type waste into the environment.

Limitations
- ⊖ Requires subcontractors to provide a suitable debris receptacle for concrete type wastes. A suitable container consists of a trashcan, steel drum, etc.
- ⊖ Requires that subcontractors empty their debris receptacle on a minimum daily basis.

Standard Specifications
Implementation
- Requirements for concrete type material management will be written into subcontractor contracts.
- Store concrete type dry and wet materials in a weatherproof area, away from drainage areas.
- Avoid mixing excess amounts of fresh concrete type materials.
- Concrete type mixing will be conducted only on an impenetrable/cleanable surface that provides protection from accidental runoff (Figure 1).
- Concrete-type wastes will be cleaned up and disposed of properly for a minimum of once per shift. Additional cleanups as necessary.
- Minimize concrete-type waste track-off from foot traffic through good housekeeping practices.
- Do not wash out concrete mixers into storm drains, open ditches, streets, streams, or vegetated areas.

Concrete Type Materials

- Sweepings from exposed aggregate concrete type wastes shall not be washed into the street or storm drain. Collect and dispose of wastes in the debris receptacle.

- A foreman or construction supervisor will monitor the concrete type activities. This foreman or construction supervisor is responsible for all of the concrete type activities of his/her crew.

Education/Training

- Subcontractors will be educated on site policies for managing concrete-type materials. It is the responsibility of those subcontractors to ensure this information is passed onto their onsite personnel.

- A contractor's superintendent or representative will oversee and enforce concrete waste management procedures.

Inspections and Maintenance

- ☑ Inspect and verify that BMPs are in place prior to the commencement of concrete work.

- ☑ While activities associated with concrete type materials are under way, inspect daily to verify continued BMP installation and maintenance.

- ☑ Note and report any and all non-compliance with concrete waste management policies to your Subcontractor Foreman.

Success Criteria

Concrete wastes will not be disposed of, or discharged, outside of the debris disposal receptacles.

Management Response to Failed Success Criteria

Failure of success criteria will trigger a written warning to the subcontractor and/or transporter and subsequent disciplinary action for continued non-compliance with policy by Site Management.

Supporting Information

Field Application/ trial sites

Village at Northstar

Application Results: Known/measured outcomes

Concrete type materials where contained when BMPs were properly implemented by subcontractors.

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

2. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

3. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Concrete Type Materials

Figure 1: Proper Concrete/Grout Mixing and Containment Station

Note: Mixing station is setup on a bermed and impenetrable surface that can be removed and/or cleaned thereby minimizing the risk of accidental discharge of concrete materials. The entire containment area must be readily covered upon threat of precipitation.

Concrete Washout

Definitions, Description and Purpose
Concrete washouts are portable, self-contained and watertight roll-off bins that control, capture, and contain concrete wastewater and washout material.

The concrete washout guidelines are established to provide employees and subcontractors with instructions on the use of this Best Management Practice.

Category
- **Training**
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- Waste Management
- **Runoff Management**

Application
Concrete waste management procedures and practices are implemented on construction projects where:

- Concrete, mortar, grout, cement, or any other potentially pH altering material, to be referred to as concrete-type wastes, is used as a construction material or where dust and debris result from construction or demolition activities.

- Slurries containing Portland Cement Concrete (PCC) or asphalt concrete (AC) are generated, such as from saw cutting, coring, grinding, grooving, and hydro-concrete demolition.

- Concrete trucks and other concrete-coated equipment are washed out onsite in designated areas.

Strengths
- ⊕ Ensures proper disposal of concrete washout wastes.
- ⊕ Minimizes or eliminates discharges of ecologically hazardous concrete washout wastes into the environment.

Limitations
- ⊖ Requires accessible washout location.
- ⊖ Requires training of concrete vehicle operator with use and location of washout stations.
- ⊖ Requires coordination of concrete delivery schedules to avoid washout backups.
- ⊖ Requires regular/scheduled cleanout and maintenance.

Standard Specifications
Implementation
- Requirements for concrete washout will be written into material supplier and subcontractor contracts.

- The concrete transporter will be made aware of the site's concrete waste management techniques. **It is the transporter's responsibility to ensure that each driver is compliant with this policy.**

- Concrete trucks **will not** washout into storm drains, open ditches, streets, streams, or vegetated areas.

- The construction sites will incorporate self contained concrete washout stations (Figure 1).

Concrete Washout

- All concrete vehicles and pumper trucks will use these washout stations – **NO EXCEPTIONS**.
- Washouts will be located at least **50 feet** from storm drains, open ditches, or water bodies.
- Pumper truck wastes, hoses, and attachments shall be "blown-out" only into concrete washouts.
- Wash off areas shall not be overfilled. If wash off is near 75% capacity, subcontractors shall notify general contractor **immediately** and await washout instructions.
- A sign shall be installed adjacent to each concrete washout facility to inform concrete equipment operators to utilize the proper facilities.
- A foreman or construction supervisor will monitor the activities of concrete pour and washout. This foreman or construction supervisor is responsible for all of the concrete activities while he/she is monitoring

Education/Training

- Subcontractors will be educated on site policies for managing concrete washouts. It is the responsibility of those subcontractors to ensure this information is passed onto their onsite personnel.
- A contractor's superintendent or representative will oversee and enforce concrete waste management procedures.

Inspections and Maintenance

- ☑ Inspect and verify that the concrete washout is in good working order prior to the commencement of concrete work.
- ☑ While concrete washout activities are under way, inspect daily to verify continued BMP implementation.
- ☑ Note and report any and all non-compliance with concrete washout policies to your Subcontractor Foreman.
- ☑ Concrete washouts shall be maintained to provide adequate holding capacity with a minimum freeboard of 4 in.
- ☑ Maintaining concrete washout facilities shall include removing and disposing of hardened concrete and returning the washout to a functional condition. Hardened concrete materials shall be removed and disposed of.
- ☑ Once the concrete washout is 75% full it must be cleaned, or a new roll-off must be ready for use.
- ☑ The concrete washout shall be emptied and/or covered prior to an expected precipitation event or 50% precipitation probability.

Success Criteria

Concrete washout wastes will not be disposed of outside of the designated washout area.

Management Response to Failed Success Criteria

Failure of success criteria will trigger a written warning to the subcontractor and/or transporter and subsequent disciplinary action for continued non-compliance with policy by Site Management.

Concrete Washout

Supporting Information

Field Application/ trial sites

Village at Northstar

Application Results: Known/measured outcomes

Concrete washout stations consistently meet success criteria when properly managed and subcontractors adhere to site policies.

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

2. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

3. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Figure 1: Examples of a Concrete Washout systems used on Northstar construction

Contaminated Soils

Definitions, Description and
Contaminated soil results when hazardous materials are not contained or properly remediated and are subsequently released into the environment.

Purpose
The purpose of this Tech Note is to provide procedure for addressing that potential scenario.

Application
All development projects

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Strengths
- ⊕ Addresses soils that have become contaminated with various pollutants from various potential sources discovered during construction activities.
- ⊕ Prevents transmission of hazardous materials to the environment by establishing standards for containing and disposing of contaminated soils.

Limitations
- ⊖ Contaminated soils cannot be treated onsite and must be disposed of offsite by a licensed hazardous waste hauler and TSDF.
- ⊖ Requires training subcontractors in procedure for identifying and communicating the presence of contaminated soil.

Standard Specifications

Pre-Construction Surveys
- Conduct thorough, pre-construction inspections of the site and review documents related to the site.
- If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.

Contaminated Soil Identification
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Test suspected soils at an approved certified laboratory.

Handling Procedures for Contaminated Soils
- Avoid temporary stockpiling of contaminated soils.
- Take the following precautions if temporary stockpiling is necessary:
  - Cover the stockpile with plastic sheeting or tarps.
  - Install a berm around the stockpile to prevent runoff from leaving the area.
  - Do not stockpile in or near storm drains or watercourses.
- Decontaminate the exterior of transport vehicle(s) and excavators prior to the equipment leaving the contaminated soil zone.

Contaminated Soils

- Collect water from decontamination procedures and treat or dispose of it in accordance with the **Liquid Waste Tech Note.**

- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.

- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.

- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):

    - United States Department of Transportation (**USDOT)**
    - United States Environmental Protection Agency (**USEPA**)
    - California Environmental Protection Agency (**CAL-EPA**)

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with contaminated soils.

- If water does enter an excavation and becomes contaminated, such water must be managed according to the Liquid Waste Tech Note.

Inspections and Maintenance

- ☑ During regular site inspections pay particular attention to excavation areas and spoil piles for signs of discoloration or petroleum odors.

- ☑ During and following precipitation events, pay particular attention to runoff in the vicinity of spoil piles for petroleum sheen.

- ☑ Document and communicate any findings of potential soil contamination to the Subcontractor Foreman.

Success Criteria

- ☑ Construction activities will not create contaminated soils.

- ☑ Should contaminated soils from a historical event be uncovered, the soils will be identified in a timely manner, and the site will be remediated **promptly**.

If failure of success criteria:

Management Response to Failed Success Criteria

- Address contaminated soil issues, control, contain, cover and remediate contaminated soil area.

- Review, revise, and retrain site personnel in spill prevention and spill response and notification.

Contaminated Soils

Supporting Information

Field Application/ trial sites
None identified

Application Results: Known/measured outcomes
None identified

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Non-point Source Pollution Control Program, 1995.

2. Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

3. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

4. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Drain Inlet Protection

Definitions, Description and Purpose
Storm drain inlet protection devices prevent sediments and pollutants from entering storm water. It consist of different types of protection either inside, around, or upstream of storm drain inlets. Storm drain inlet protection slows, ponds, and filters runoff before it enters the storm drain system.

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Application
All storm drain inlets receiving run-off influenced by construction activities.

Strengths
⊕ Prevents excess sediment and pollutants from entering waterways and watercourses.

Limitations
⊖ Requires frequent maintenance and inspection.

⊖ Sediment and erosion controls must be correctly implemented and in place before storm events.

⊖ Requires an adequate area for water to pond without causing subsequent safety concerns, in the event of heavy runoff.

⊖ Requires the use of other erosion control devices and material protections to prevent stormwater and non-stormwater discharges from entering the storm drain system.

Standard Specifications

Installation

- Drain inlets should be protected by installing pine needle filter pillows or wattles around or on top of the drain inlet grate (Figure 1a & 1b).
- Drain inlets grates should be protected by placing filter fabric underneath the grate.
- Drain inlets should be marked with visible barriers when necessary to prevent damage of protection devices (e.g. traffic cones, barricade fence, snow stakes, large painted stones) (Figure 2).
- If water is backing up at drain inlet, install a pine needle wattle or several gravel bags around the drain inlet and poke several holes in the filter fabric.
- Gravel bags are appropriate for use behind curbs where soil has the potential to be carried into a drainage way during storm events.
- Gravel bags are appropriate for use upstream of drain inlets where high stormwater runoff flows could exceed the capacity of the drain inlet.
- Gravel bags may also be used to establish pooling of stormwater runoff around a drain inlet to aid in directing filtration through pine needle wattles and/or filter fabric.

Drain Inlet Protection

Inspections and Maintenance

Drain inlet protection should be inspected daily for:

- ☑ BMP integrity (Filter fabric, Pine needle filter berms, or gravel bags), 80% of material weave should be intact.

- ☑ BMP sediment capture and build-up, the BMP should be replaced if saturated with captured sediment and sediment build-up should be removed frequently (Figure 3).

- ☑ BMP configuration, the BMP should not have its function compromised by vehicle traffic and should be clearly marked.

Success Criteria

- ☑ Drain inlet BMPs are effective if resistant to through traffic.

- ☑ Drain inlet BMPs are effective if capturing sediment from water entering the storm drain system.

- ☑ Drain inlet BMPs are effective if storm water does not excessively pool around the inlet.

- ☑ Drain inlet BMPs are effective in properly inspected and maintained prior to storm events.

Management Response to Failed Success Criteria

Failure of success criteria will result in the repair, replacement, or redesigning of drain inlet protection. Failed drain inlet protections due to lack of maintenance will result in disciplinary action.

Supporting Information

Field Application/ trial sites

1. Village at Northstar
2. Northstar Gas Station▫Stormwater Quality

Stormwater Quality

Application Results: Known/measured outcomes

Sediment remains outside of drain inlet and drainage system when drain inlet protection measures are in place.

Supporting Literature

1. Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

2. Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

Drain Inlet Protection

Figure 1a: Drain Inlet with Pine Needle Pillow and Filter Fabric over Drain Inlet

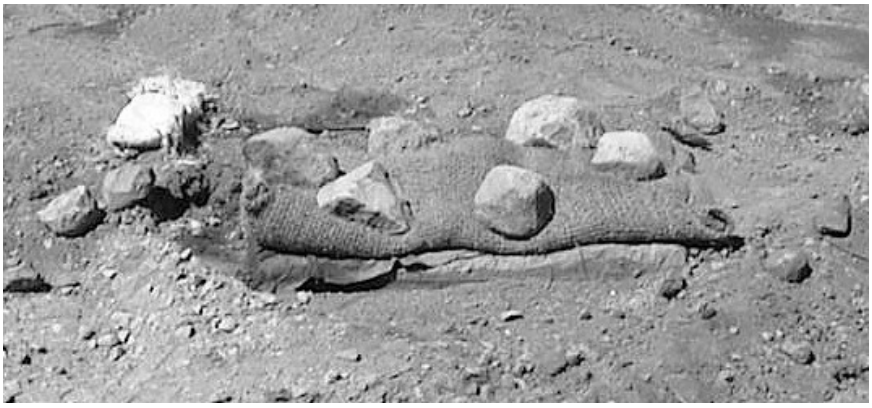
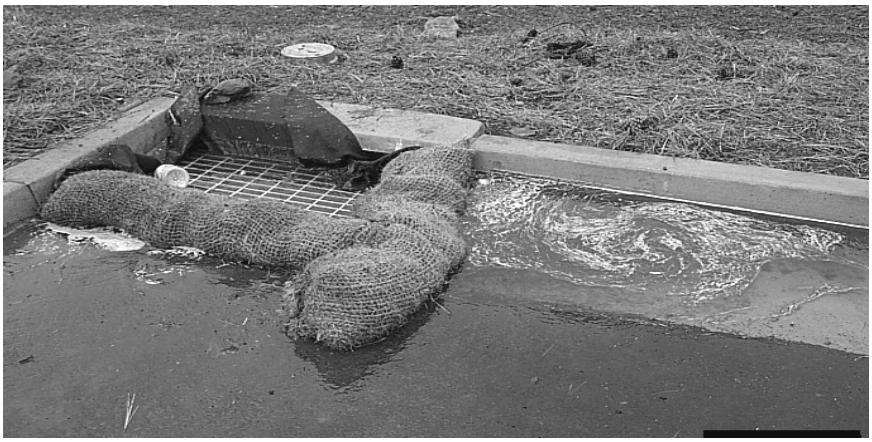


Figure 1b: Drain Inlet with Pine Needle Wattles and Filter Fabric Installed around Drain Inlet



Drain Inlet Protection

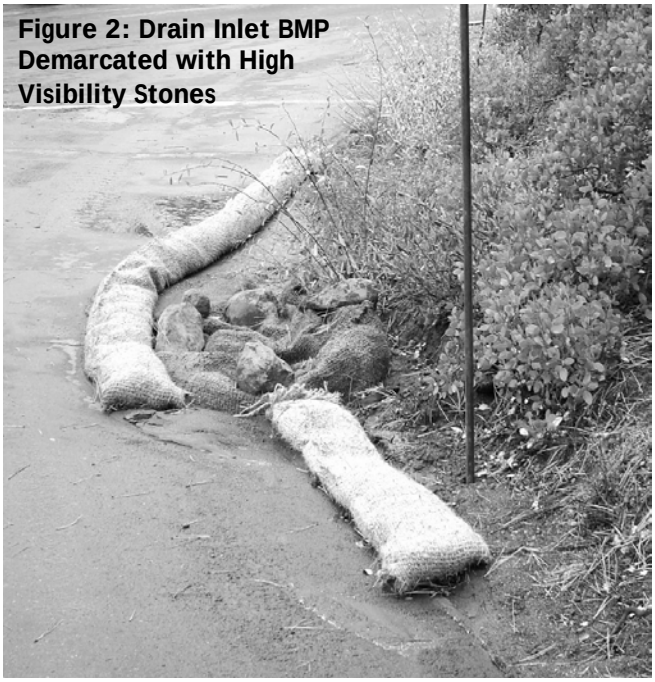


Figure 2: Drain Inlet BMP Demarcated with High Visibility Stones

Figure 3: DI BMP saturated with sediment

Environmental Site Manager

Definitions, Description and Purpose

An environmental site manager is a competent point person for each project whose sole responsibility is to oversee the environmental affairs for that given project. In California, the Environmental Site Manager should be a Qualified SWPPP Practitioner (QSP). Responsibilities of an environmental site manager include, but are not limited to:

- Routine site inspections and reports
- Rain event action planning
- Storm event monitoring and sampling
- Coordination of BMP installation and maintenance with subcontractors
- BMP trainings and education

Category

- **Training**
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- Waste Management
- **Runoff Management**

Application

All construction projects.

Strengths

⊕ Designates person whose primary job is water quality protection and maintaining compliance with stormwater permit.

Limitations

⊖ Requires that Environmental Site Manager have field-testing resources.

⊖ Requires the Environmental Site Manager to communicate through all levels of the organization.

⊖ Requires that the Environmental Site Manager be empowered to make decisions and direct contractor as needed.

⊖ Requires that Environmental Site Manager be appropriately trained and experienced in stormwater management and stormwater permit compliance.

Standard Specifications

- Must become familiar with all sections of SWPPP.
- Must be able to conduct effective SWPPP training sessions.
- Must become familiar with construction schedules and attend regularly scheduled construction meetings.
- Must develop rapport with superintendents and foremen in order to communicate effectively.
- Must log and report all daily site SWPPP activities.
- Must be able to identify, address, and resolve SWPPP failures and shortcomings.

Inspections and Maintenance

☑ Must conduct daily site inspections.

Environmental Site Manager

- ☑ Must conduct pre/post rain event inspections.
- ☑ Must conduct inspections every 24 hours during precipitation events.

Success Criteria

Environmental Site Manager is established for construction project. This person is familiar with all site activities, requirements, documents, and communicates clearly.

Management Response to Failed Success Criteria

Failure of success criteria will results in review of candidate qualifications. Review and re-train employee as necessary. Repeated failure of standard specifications may result in disciplinary actions or termination pending management review of employee performance.

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Supporting Literature

None Identified

Outlet Protection

Definitions, Description and Purpose
Outlet protection is a physical device composed of rock, grouted riprap, or gravel, which is placed at the outlet of a pipe or channel. Its purpose is to prevent scouring of the soil caused by concentrated high velocity flows.

Category
- Training
- Oversight/documentation
- **Hydrologic function**
- Soil function
- **Mulch/surface protection**
- Vegetation
- **Protection from disturbance**
- Waste Management
- **Runoff Management**

Application
Velocity dissipation devices are effective in the following areas:

- Outlets of pipes, drains, culverts, slope drains, diversion ditches, swales, conduits, or channels.
- Outlets located on mild to steep slopes.
- Discharge outlets that carry continuous flows of water.
- Outlets subject to short, intense flows of water, such as flash floods.
- Connections between lined conveyances discharging to unlined or earthen conveyances.

Strengths
- ⊕ Prevents concentrated and high flow discharges from scouring soils around drainage outlet.
- ⊕ Slows water movement decreasing the ability for water to carry excess sediment loads.

Limitations
- ⊖ Sediment captured by the rock outlet protection may be difficult to remove without removing and replacing rock.
- ⊖ Large storms or high flows can wash away smaller rock outlet protections and leave the area susceptible to erosion.
- ⊖ Outlet protection may negatively impact the channel habitat.
- ⊖ Grouted riprap may break up in areas where freeze/thaw has occurred.
- ⊖ A combination of velocity dissipation devices may be necessary.

Standard Specifications
The appropriate velocity dissipating device(s) may vary dependent upon location specific characteristics such as slope, soil exposure, water volume and velocity, and sensitivity of the receiving area. An example of a velocity dissipation device can be found in Figure 1.

- Velocity dissipation BMPs include, but are not limited to:
  - Rock lined channels and/or rip-rap
  - Pine needle filter berms
  - Gravel bags
  - Pine needle wattles
  - Wood chips
  - Filter fabric

Outlet Protection

- Installation of outlet protection **shall be completed as soon as possible.**
  - Before contributing to a discharge
  - **Before the end of the grading season on October 15th**

Inspections and Maintenance
Drainage outlets will be inspected daily, prior to, during (if during daylight hours), and after precipitation events. If the BMP becomes sediment laden, the accumulated sediment will have to be removed prior to the next storm event.

Inspections should include:

- ☑ Ensuring components of the BMP are correctly installed.
- ☑ Examine post weather event to ensure that stormwater has not circumvented the dissipation device.
- ☑ Examine during or post weather event to ensure that the BMP size is sufficient to accommodate the volume and flow of stormwater discharge and scouring is not occurring.
- ☑ Examine post weather event to ensure that BMP does note need repair or replacement.

Success Criteria

- ☑ No scouring or erosion should be occurring at or around the outlet protection.
- ☑ BMP must be installed correctly.

Management Response to Failed Success Criteria
Failure of success criteria should result in repair, replacement, redesign, and/or reinstallation of outlet protection device.

Supporting Information

Field Application/ trial sites

1. Schaffer's Camp, Northstar at Tahoe
2. Northstar Gas Station
3. Village at Northstar

Application Results: Known/measured outcomes
Outlet protection is effective when properly inspected and maintained.

Supporting Literature

1. County of Sacramento Improvement Standards, Sacramento County, May 1989.
2. Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursztynsky, P.E., McGraw Hill Book Company, 1986.
3. Handbook of Steel Drainage & Highway Construction, American Iron and Steel Institute, 1983.
4. Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Outlet Protection

5. Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, state of California Department of Transportation (Caltrans), November 2000.

6. Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

7. Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Outlet Protection

Figure 4: Examples of Velocity Dissipation Devices

Preservation of Vegetation

Category
- Training
- Oversight/documentation
- Hydrologic function
- Soil function
- Mulch/surface protection
- **Vegetation**
- **Protection from disturbance**
- Waste Management
- Runoff Management

Definitions, Description and Purpose
Protecting existing vegetation minimizes the potential of injuring existing trees, vines, shrubs, and grasses that will remain onsite permanently.

Application
All development projects

Strengths
- ⊕ Is less expensive to protect vegetation than it is to replace it.
- ⊕ Is required by law for all permanent vegetation.
- ⊕ Defines limits of construction area.
- ⊕ Has an aesthetic benefit.
- ⊕ Enhances property values.

Limitations
- ⊖ Requires forward planning by the owner/developer, contractor, and design staff.
- ⊖ For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site.

Standard Specifications
- Clearly mark and leave a buffer area around these vegetated areas during construction to protect from mechanical and other injury while the land is being developed (Figure 1).
- During construction, the limits of disturbance should remain clearly marked at all times.
- Irrigation or maintenance of existing vegetation shall be described in the landscaping plan.
- Trench as far from tree trunks as possible, outside of the tree drip line (Figure 1) or canopy.
  - Curve trenches around trees to avoid large roots or root concentrations. I
  - If roots are encountered, consider tunneling under them.
  - When trenching or tunneling near or under trees to be retained, place tunnels **at least 18 in.** below the ground surface, and not below the tree center to minimize impact on the roots.
- Fill trenches and tunnels **as soon as possible**. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- Retain protective measures until **all other construction activity is complete** to avoid damage during site cleanup and stabilization.
- If damage to protected trees occurs, maintenance guidelines described below shall be followed:
  - Verify that protective measures remain in place.
  - Restore damaged protection measures immediately.
  - Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.

Preservation of Vegetation

Inspections and Maintenance

- ☑ Ensure that orange barricade fences and BMPs are in place.
- ☑ Ensure that orange barricade fences and BMPs have not been tampered with.
- ☑ Ensure that trees and other preserved vegetation have not been damaged by construction activities.

Success Criteria

Vegetated areas that will remain permanently shall be protected by orange barricade fence and will be undamaged as a result of construction activity.

Management Response to Failed Success Criteria

Identify specific failure of BMP and take necessary action to address failure, this may include but not be limited to:

- Re-define onsite roadways for vehicle and equipment travel.
- Relocate material piles and staging areas.
- Add additional BMPs and demarcate native vegetation areas.
- Hold subcontractors responsible for any failure to comply with standard specification.

Supporting Information

Field Application/ trial sites

1. Village at Northstar
2. Schaffer's Camp, Northstar at Tahoe

Application Results: Known/measured outcomes

Preservation of existing vegetation, as required by Placer County

Supporting Literature

1. County of Sacramento Tree Preservation Ordinance, September 1981.
2. Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.
3. Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.
4. Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Preservation of Vegetation

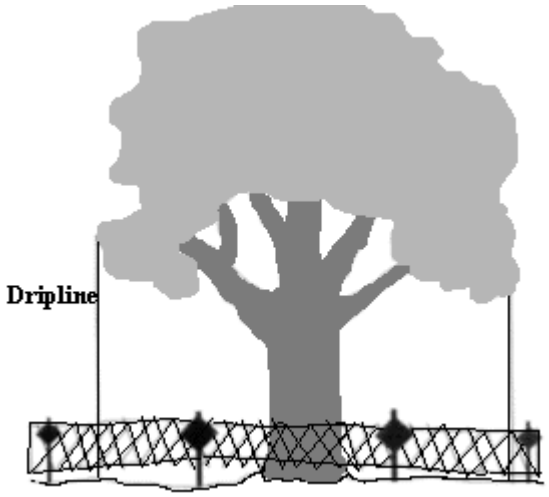


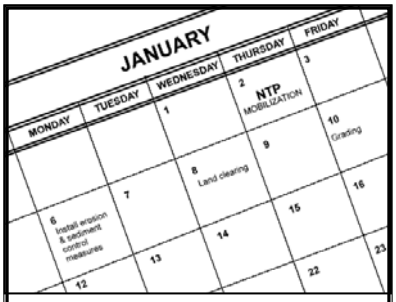
Figure 1
Barricades that extend beyond the dripline are a good way to protect trees during construction

Protective fences should be erected as far out from the trunks as possible in order to protect the root systems.

Scheduling

Definitions, Description and Purpose
Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs while taking local climate (rainfall, wind, etc.) into consideration.

The purpose is to minimize the volume and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.



Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Application
Construction sites disturb soil at any given time and/or have numerous sub-contractors.

Strengths
- ⊕ Limits disturbed soil at any given time by phasing the project.
- ⊕ Coordinates the movements of erosion and sediment control devices with the changing characteristics of the construction site.
- ⊕ Allows project management to anticipate potential erosion control problems in time to make proactive decisions.

Limitations
- ⊖ Environmental constraints such as seasonal run-off may supersede the use of some BMPs such as DI protection.
- ⊖ Communication, education, and schedule coordination are critical to the success of this strategy.

Standard Specifications
- ALL major grading operations will be scheduled from April 15th to October 15th. Allow enough time in the schedule to stabilize the soil with physical means or to install sediment-trapping devices before the October 15th deadline.
- During project scheduling, examine the potential to phase the disturbance of soils.
- Conduct construction in a limited area, stabilize, and revegetate the disturbed area as soon as earth moving activities have been completed.
- Educate engineers, project site management, personnel and sub contractors as to the strategy and schedule for the project.
- Clearly document and train all employees how the site will be properly winterized prior to the October 15th deadline.
- Include in the schedule, details on precipitation event and winterization locations of:
  - Erosion control BMPs
  - Sediment control BMPs
  - Tracking control BMPs
  - Wind erosion control BMPs
  - Non-stormwater BMPs

Scheduling

- Waste management and materials pollution control BMPs.
- Identify dates and runoff control instructions for activities that may generate non-stormwater discharges such as dewatering, excavation, mortar mixing, paving, track-off control (tire wash-off), etc.
- Monitor the weather forecast for precipitation events at least 10-days out.
- When rainfall is forecast, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Communicate changes to the schedule and BMP changes to all site employees and subcontractors.
- Ensure that subcontractors understand that it is their responsibility to implement BMP changes in accordance with the schedule change or forecast weather event.

Inspections and Maintenance

- ☑ Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- ☑ Amend the schedule when changes are warranted.
- ☑ Ensure that when schedule amendments are made, or a rain event is forecast that BMP changes are implemented and that the changes are communicated throughout all employees and subcontractors.
- ☑ Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

Success Criteria

- ☑ BMPs are staged and installed prior to start of work activities.
- ☑ There are no inactive, unstabilized, disturbed areas on the project site.
- ☑ Site inspections find that all work activities are properly protected by prescribed BMPs.
- ☑ Subcontractors will respond to schedule changes and prepare for forecast precipitation events appropriately and timely.

Management Response to Failed Success Criteria

Re-evaluate schedule and precipitation event preparedness for feasibility; make organizational and/or material and BMP staging changes as necessary.

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Scheduling

Supporting Literature

1. Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

2. Stormwater Management for Construction Activities Developing Pollution Prevention Plans and Best Management Practices (EPA 832-R-92-005), U.S. Environmental Protection Agency, Office of Water, September 1992.

Spill Prevention

Category
- **Training**
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- **Waste Management**
- Runoff Management

Definitions, Description and Purpose

Spill prevention is intended to reduce the potential for releasing a hazardous material into the environment by:

- Eliminating the source of spills
- Providing containment for high risk operations
- Training employees.

Spill response is initiated when either spill prevention has failed or an unpreventable event has occurred. Spill response is intended to contain, collect, and properly dispose of released hazardous material.

Application

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Fertilizers
- Deicing/anti-icing chemicals
- Fuels
- Lubricants
- Other petroleum distillates
- Concrete (see **Concrete Waste, Concrete Washout, Material Use Tech Notes**)

Strengths

⊕ Prevents hazardous materials from entering the environment.

⊕ Prevents human exposure to hazardous materials.

⊕ Prevention reduces costly cleanup and potential fines as well as work stoppage.

Limitations

⊖ In some cases it may be necessary to activate professional hazmat teams or a private spill cleanup company.

⊖ Procedures and practices presented in this BMP are general. Contractor shall identify appropriate practices for the specific materials used or stored onsite.

⊖ Cleanup of hazardous material release **can be extremely costly.**

Standard Specifications

Education

- The contractor shall ensure that employees are familiar with all of the hazardous materials that they will be working with, how to properly handle and store them, as well as proper cleanup and disposal methods in the event of a spill.

- The contractor shall be responsible for educating employees on potential dangers to humans and the environment from spills and leaks.

Spill Prevention

- Contractor's superintendent or representative will oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely all spill of hazardous material shall be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers, store in secondary containment, and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Designate responsible individuals to oversee and enforce control measures.
- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that are no longer suitable for the intended purpose.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Vehicles and Equipment

- If maintenance must occur onsite, use the designated maintenance area.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately.
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids**. Do not allow leaking vehicles or equipment onsite.**
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. **Don't leave full drip pans or other open containers lying around.**

Fueling

- Use designated refueling area **only**.
- Do not "top off" fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Spill Prevention

Inspections and Maintenance

- ☑ Inspect and verify that BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect daily.
- ☑ Ensure that an ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- ☑ Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

Success Criteria

- ☑ Elimination of onsite material spills.
- ☑ In the event of material spill, identification, notification, and cleanup response will occur immediately following the accident event.

Management Response to Failed Success Criteria

If failure of success criteria, site management will review, revise and retrain site personnel and subcontractors accordingly.

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.
2. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.
3. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Spill Response & Notification

Definitions, Description and Purpose
Spill Response and Notification is initiated when either spill prevention has failed or an unpreventable event has occurred. Spill response is intended to contain, collect, and properly dispose of released hazardous material.

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Application
This BMP is suitable for all construction projects. Spill response and notification procedures are implemented anytime chemicals or hazardous substances are released into the environment, including but not limited to the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Fertilizers
- Deicing/anti-icing chemicals
- Fuels
- Lubricants
- Other petroleum distillates
- Concrete (see concrete waste, concrete washout, material use)

Strengths

⊕ Notifies site management of release of hazardous material.

⊕ Activates containment and clean up procedures to respond to a release of a released material.

⊕ Initiates formal notification to regulatory and emergency agencies of the release of a hazardous material.

Limitations

⊖ In some cases, it may be necessary to activate professional hazmat teams or a private spill cleanup company.

⊖ Spill notification to Lahontan RWQCB can bring about Notices of Violation, and/or fines, and/or work stoppages, and/or cleanup & abatement orders.

⊖ Spills that exceed federal reportable quantities require notification to the National Response Center and can trigger large-scale mobilization of professional hazmat teams and comprehensive investigations from regulatory agencies.

Standard Specifications

General

- It is the responsibility of the general contractor and subcontractors to identify spills, contain, control, cleanup, remediate (if necessary), and notify all appropriate parties and regulatory agencies.

Education/Training

- The contractor shall ensure that employees are familiar with all of the hazardous materials that they will be working with, how to properly handle and store them, as well as proper cleanup and disposal methods in the event of a spill.

Spill Response & Notification

- The contractor shall be responsible for educating employees on potential dangers to humans and the environment from spills and leaks.

- Contractor's superintendent or representative will oversee and enforce proper spill cleanup of *small-scale spills*.

Small Scale Cleanup and Notification Measures

A small-scale spill is one that can be cleaned up with spill response materials staged **onsite**, and can be managed by the subcontractor's employees **within** the workday that the spill occurred.

- To the extent that work can be accomplished safely, all work will stop until the spill has been fully cleaned up.

- Notify site management and the Site Project Manager of the spill.

- Use the attached **Worksheet 1** to collect and communicate the following information:

    - Your name and company
    - Development project name
    - Cellular number where you can be reached onsite
    - Where **YOU ARE LOCATED ONSITE?**
    - What material has spilled?
    - Where has the material spilled?
    - How much material has spilled?
    - How much material has the potential to continue spilling?
    - Has the material entered a vegetated area or stormwater conveyance?
    - Has the source of the spill been stopped?
    - What cleanup actions have already been taken?
    - Has the spill been contained?
    - Has anyone been injured or exposed requiring EMS response?

- Notify the Lahontan RWQCB and California Fish and Wildlife (if necessary).

- The subcontractor foreman or superintendent is responsible for the control, containment, cleanup, and disposal activities.

- Use a rag for small spills on paved surfaces.

- Use a damp mop for general cleanup.

- Absorbent materials for larger spills.

- If the spilled material is hazardous, the used cleanup materials are also hazardous and must be disposed of as hazardous waste.

- If material has spilled from a leaking container, vehicle, or piece of equipment, take immediate action to stop the leak and remove, and contain the item from service until properly repaired.

- Spills shall be covered and protected from stormwater run-on to the extent that it does not compromise cleanup activity.

- Do not bury or wash spills with water.

Spill Response & Notification

- Contain, store, properly label, and dispose of used cleanup materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose (see Hazardous Waste Tech Note).

Large Scale Spill Cleanup and Notification Measures

A large scale spill is one of hazardous material that cannot be controlled by personnel onsite. The following steps should be taken:

Subcontractors:

- If the spill exceeds the ability of site personnel to contain it, take reasonable defensive actions to prevent the material from entering vegetated areas or stormwater conveyances if possible **without putting personnel at risk.**

- Notify site management and the Site Project Manager of the spill.

- Use the attached Worksheet 1 to collect and communicate the information:
  - Your name and company
  - Development project name
  - Cellular number where you can be reached onsite
  - Where **YOU ARE LOCATED ONSITE?**
  - What material has spilled?
  - Where has the material spilled?
  - How much material has spilled?
  - How much material has the potential to continue spilling?
  - Has the material entered a vegetated area or stormwater conveyance?
  - Has the source of the spill been stopped?
  - What cleanup actions have already been taken?
  - Has the spill been contained?
  - Has anyone been injured or exposed requiring EMS response?

Project Management Notification Requirements:

- Notify local emergency response by dialing 911, in addition the fire department will notify the proper county officials.

- Notify the Governor's Office of Emergency Services Warning Center at (916) 854-8911.

- For spill of Federal Reportable Quantities, in conformance of the requirements of 40 CFR Parts 110, 119, & 302 the site management must notify the National Response Center at (800) 424-8802.

- Notify Lahontan RWQCB (530)542-5400 and California Fish and Wildlife of the spill event. Within 24 hours. The written report must be completed and submitted within 14 days.

- Notification will first be made by telephone and followed up with a written report.

- Notify the Placer County Environmental Health Department 530-581-6240 within 24 hours. The written report must be completed and submitted within 14 days.

- Notify the Placer County Sheriff Department of any sewage-type spills.

Inspections and Maintenance

- ☑ Inspect and verify that BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect daily.

Spill Response & Notification

- ☑ Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- ☑ Update your spill prevention, control, and countermeasure plan and stock cleanup materials as changes occur in the types of chemicals onsite.

Success Criteria

In the event of material spill, identification, notification, and cleanup response will occur immediately following the accident event

Management Response to Failed Success Criteria

If failure of success criteria, site management will review, revise and retrain site personnel and subcontractors accordingly.

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.
2. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.
3. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Spill Response & Notification

Worksheet 1:

<table>
<tr><td colspan="2"><u>Spill Response and Notification Worksheet</u>
If a spill has occurred at the work place, complete this form. The Subcontractor Foreman should collect the information listed before the Site Project Manager is contacted.</td></tr>
<tr><td rowspan="2"><u>Can this spill be:</u>

o Cleaned up with spill response materials staged onsite,
o And managed by your employees within the workday that the spill occurred?</td><td><u>If YES,</u> then this is a small-scale spill and should be contained and cleaned <u>before</u> you contact Site Project Manager.</td></tr>
<tr><td><u>If NO</u>, then you have a large-scale spill and should contact the Site Project Manager <u>immediately</u> after information is collected.</td></tr>
<tr><td colspan="2">Your name and company:</td></tr>
<tr><td colspan="2">Development project name:</td></tr>
<tr><td colspan="2">Cellular number where you can be reached onsite:</td></tr>
<tr><td colspan="2">Where you are located ONSITE?</td></tr>
<tr><td colspan="2">What material has spilled?</td></tr>
<tr><td colspan="2">Where has the material spilled?</td></tr>
<tr><td colspan="2">How much material has spilled?</td></tr>
<tr><td colspan="2">How much material has the potential to continue spilling?</td></tr>
<tr><td colspan="2">Has the material entered a vegetated area or stormwater conveyance?</td></tr>
<tr><td colspan="2">Has the source of the spill been stopped?</td></tr>
<tr><td colspan="2">What cleanup actions have already been taken?</td></tr>
<tr><td colspan="2">Has the spill been contained?</td></tr>
<tr><td colspan="2">Has anyone been injured or exposed requiring EMS response?</td></tr>
</table>

Stockpile Management

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Definitions, Description and Purpose
Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of construction materials such as:
soil, paving materials (Portland cement concrete -PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), lumber, steel, and any masonry components.

Application
Implement in all projects that stockpile soil and other materials.

Strengths
- ⊕ Minimizes construction site contaminated stormwater run-off.

Limitations
- ⊖ Stockpiles BMPs must be easily removed and reinstalled.
- ⊖ Subcontractors must be vigilant with reinstalling BMP when stockpiles are not being accessed.

Standard Specifications
To properly manage stockpiles:

- All subcontractors will be responsible for protecting their own stockpiles.
- Locate stockpiles away from flows of stormwater, drainage courses, and drain inlets.
- Locate all stockpiles away from where they will be affected by stormwater run-on.
- Implement wind erosion control practices as appropriate on all stockpiled material.
- Place bagged materials on pallets and under cover such that they will not come into contact with precipitation.
- All stockpiles in contact with the ground will be protected with a sediment control barrier i.e. fiber roll and/or pine needle wattle.
- Sediment control barriers will extend around the **entire** base of the stockpile leaving no gaps.
- If a precipitation event is forecast and is expected to total greater than **1/10th inch of water**, all stockpiles (except pine needles and wood chips) shall be covered with tarp, plastic, or other waterproof material and secured.
- Stockpiles of "cold mix" should be placed on and covered with plastic or comparable material.
- Stockpiles of "slash" material shall be protected at all times with perimeter barriers such as a fiber roll, pine needle wattle.

Stockpile Management

Inspections and Maintenance

- ☑ Inspect and verify that BMPs are in place prior to the commencement of associated activities.
- ☑ While activities associated with the BMP are under way, inspect twice daily to verify continued BMP implementation.
- ☑ Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

Success Criteria

All stockpiles will be protected by erosion control devices as soon as they are staged onsite.

Management Response to Failed Success Criteria

If there is a failure of success criteria, site management will hold site personnel and contractors accountable for compliance with site policy.

Supporting Information

Field Application/ trial sites

1. Village at Northstar
2. Schaffer's Camp, Northstar at Tahoe

Application Results: Known/measured outcomes

These devices are ineffective if selected BMPs do not completely surround pile, and/or they are not properly entrenched or staked down.

Supporting Literature

1. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Street Sweeping

Category
- Training
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- **Protection from disturbance**
- Waste Management
- **Runoff Management**

Definitions, Description and Purpose
Street sweeping involves the use of self-propelled equipment to remove sediment from streets and roadways and to clean paved surfaces in preparation for final paving. Sweeping and vacuuming assists in preventing sediment from the project site from entering storm drains or receiving waters.

Application
Sweeping and vacuuming are suitable anywhere sediment is tracked from the project site onto public or private paved streets and roads, typically at points of egress. Sweeping and vacuuming are also applicable during preparation of paved surfaces for final paving.

Strengths
- ⊕ Constant sweeping of the paved areas around the delineated work area greatly helps in the prevention of track off.
- ⊕ Street sweeping is also very helpful in the cleanup of soil or other material spill on paved areas one the gross volume of material has been collected and removed.

Limitations
- ⊖ Not effective when sediment is wet or when tracked soil is caked (caked soil may need to be scraped loose).
- ⊖ Not effective on clay laden soil that is compacted into asphalt gaps without the use of large amounts of wash water.
- ⊖ **Cannot be conducted during or immediately following rain or snow events**.

Standard Specifications
- Street sweepers will be utilized on an "as needed" basis throughout the winter operations months.
- Sweepers will be called to the site within 24hrs of noted track off during winter months.
- Water will be used to clean the streets **only** when thorough street sweeping has been completed.
- Entrance/egress points to the dirty zone of the construction site will be limited thereby allowing sweeping and vacuuming efforts to be focused (**see Entrance/Egress and Traffic Control Tech Notes**).
- Do not use kick brooms or sweeper attachments. These tend to spread the dirt rather than remove it.
- When tracked or spilled sediment is observed outside the construction limits, it must be removed **immediately**.
- Be careful not to sweep up any unknown substance or any object that may be potentially hazardous.
- Adjust brooms frequently; maximize efficiency of sweeping operations.
- After sweeping is finished, properly dispose of sweeper wastes at an approved dumpsite.

Street Sweeping

Inspections and Maintenance

- ☑ Inspect potential sediment tracking locations twice daily.
- ☑ Roadways susceptible to track off must be inspected at least twice during non-winter operations periods and once during winter operations periods.
- ☑ Regular communications with street sweeper operations must be maintained to address any track off issues that may be identified.

Success Criteria

There will be no track off issues identified.

Management Response to Failed Success Criteria

If there is a failure of success criteria, re-examine procedure of street sweeping equipment. Examine non-compliance to site procedures by contractors.

Supporting Information

Field Application/ trial sites

1. Village at Northstar
2. Northstar Gas Station

Application Results: Known/measured outcomes

- Sweepers found difficulty in removing fine particulates of soil ground into asphalt.
- Limited use of water made track off worse in certain situations.
- Defining entrance/exit routes to gain access to the construction site minimized the volume of roadway requiring street sweeping.

Supporting Literature

1. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.
2. Labor Surcharge and Equipment Rental Rates, State of California Department of Transportation (Caltrans), April 1, 2002 – March 31, 2003.

Track-off Control

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Definitions, Description and Purpose
Construction entrance/exits are designed to eliminate track-off. Track-off is the tracking of soils from the construction site onto pavement or paved roads outside of the construction site by construction vehicles, equipment, or foot traffic.

Track off is **not allowable** under the Lahontan Region General Sector Construction Storm Water Permit.

This best management practice for vehicles and equipment will consist of four levels of control

1. No control required
2. Gravel strip,
3. Gravel strip and rumble strip
4. Gravel strip, rumble strip, and tire wash-off

This best management practice for foot traffic consists of installing boot scraper stations at all foot traffic entrances/exits (**see Traffic Control Tech Note**).

Application
- To be used at all locations where construction vehicles, equipment, and foot traffic will leave the construction site dirty zone (see **Clean Side/Dirty Side Tech Note**) and travel on pavement or paved public roadways.
- If vehicle entering paved roadway outside of the construction site does not track sediment, no controls are required (level 1).
- If vehicle entering paved roadway outside of the construction site is tracking sediment, installation of a gravel strip is required (level 2).
- If vehicle entering paved roadway outside of the construction site across gravel strip is tracking sediment, then additional installation of a rumble strip is required (level 3).
- If vehicle entering paved roadway outside of the construction site across a gravel strip and rumble strip is tracking sediment, then additional installation of a tire wash-off is required (level 4).

Strengths
- ⊕ Prevents sediment from tracking onto roadways outside of the construction site and into stormwater conveyances.

Limitations
- ⊖ Must be inspected and maintained on a daily basis.
- ⊖ Subcontractors/material delivery vehicle drivers require training on the proper use of track-off control strategies.
- ⊖ Slows the flow of traffic entering/exiting the construction site.
- ⊖ Tire wash off station requires a supply of water.
- ⊖ Tire wash off stations require proper disposal location for wastewater.
- ⊖ Foot traffic boot scraper stations require maintenance.

Track-off Control

Standard Specifications

- Traffic flow will be delineated with physical barriers, if required, to ensure that exiting traffic will utilize track off controls.
- The entrance/exit shall incorporate the use of filter berms to prevent conveyance of sediment-laden runoff resulting from tire wash off or stormwater runoff.
- The entrance/exit shall be constructed of coarse, clean (washed) aggregate **two (2) inches** in diameter. This should be done on level ground when possible.
- The gravel strip shall be **fifty (50) feet** long.
- A geotextile fabric shall be placed below the aggregate.
- Hoses associated with tire wash-off with automatic shutoff nozzles shall be used to prevent hoses from being left on.
- **All** employees, subcontractors, and others that leave the site will use the track off control area(s). See ingress/egress technical note.
- Construction equipment and vehicles leaving the site will use the track off area to remove any sediment on tires.
- Figure 1 depicts the configuration of an ideal construction site entrance/exit
- Boot scraper stations will be installed at all foot traffic entrances/exits.

Inspections and Maintenance

- ☑ The entrances/exits shall be inspected at a minimum of once daily
- ☑ Inspections shall include:
    - o Verification that all physical components of the track off control BMP are in good working order.
    - o Verification that erosion control devices are operating properly.
    - o Verification that vehicles are utilizing entrance/exit control devices in accordance with this BMP.
- ☑ Repair or Replace any component or erosion control device of the entrance/exit that is not in good working order.

Success Criteria

Elimination of sediment track-off from the construction site onto pavement outside of the work site.

Management Response to Failed Success Criteria

If **ANY** track off onto pavement outside of construction site occurs, practices will be reviewed, redesigned, reinstalled, and/or additional training of personnel will occur. Repeated non-compliance with entrance/exit policy by subcontractors/ vehicle drivers will result in disciplinary action.

Track-off Control

Supporting Information

Field Application/ trial sites

Village at Northstar

Application Results: Known/measured outcomes

Success criteria achieved when BMPs were properly maintained and utilized.

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

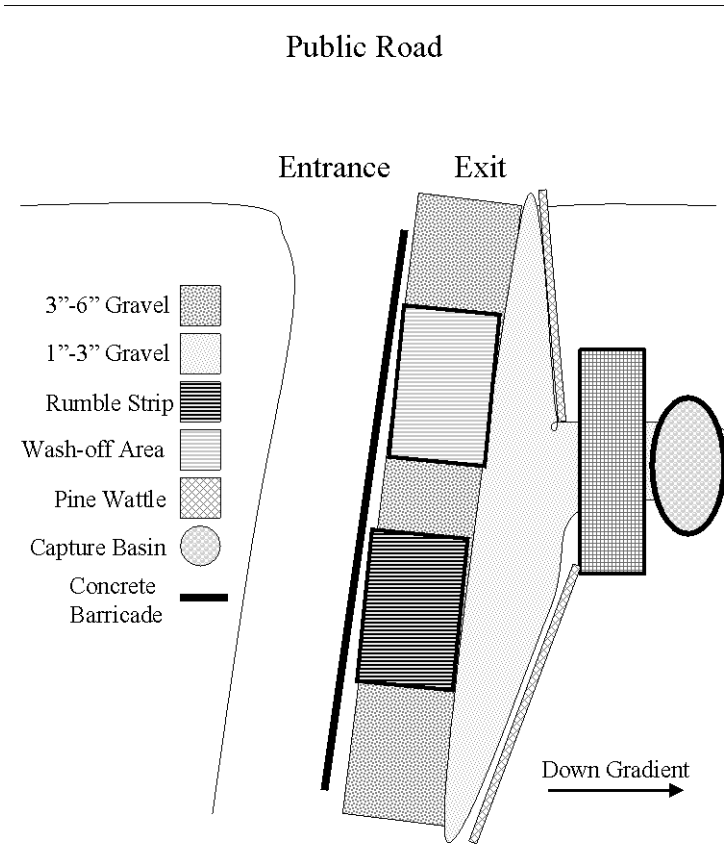
2. Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

3. Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

4. Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

5. Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Figure 5: Configuration of Construction Entrance/Exit Incorporating Tracking Control and Sediment Recovery Techniques



Note – Wastewater filtering into the capture basin should be reused for tire wash off (if feasible) or for dust control, or irrigation as conditions permit. Wastewater in the capture basin shall not be permitted to runoff into adjacent areas.

Traffic Control

Definitions, Description and Purpose
Traffic Control is the practice of limiting the volume of vehicles and equipment that is allowed to enter and exit the dirty zone of a construction site.

The purpose is to reduce the potential for tracking disturbed soil and non-stormwater pollutants from the dirty zone onto paved roadways outside of the construction site.

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Application
Construction sites that disturb soil and have numerous subcontractors working concurrently

Strengths
- ⊕ Minimizes potential for track-off onto paved roadways outside of the construction site.
- ⊕ Identifies point sources if track-off is discovered.
- ⊕ Keeps non-essential vehicles outside of the dirty zone.

Limitations
- ⊖ Communication, education, and schedule coordination are critical to the success of this strategy.
- ⊖ Additional parking for personnel and subcontractor vehicles must be identified.
- ⊖ May require use of carts or designated transport vehicles to transfer tools and other non-motorized equipment into the dirty zone.
- ⊖ Training and compliance by subcontractors and material delivery vehicles is critical.
- ⊖ Limited access points to the construction site.
- ⊖ Installing and maintaining track-off controls at access points are critical (see **Track-off Control Tech Note**).
- ⊖ Street sweeping and will likely be required outside of the dirty area (see **Track-off Tech Note**).

Standard Specifications

Vehicle, Equipment, and Foot Traffic Control

- Using the site map created to identify clean and dirty zones on the construction site, specify entrances/exits for vehicles, equipment, and personnel foot traffic to pass through.
- Plan for entrances/exit to be moved as the project site develops.
- On the site, install barriers and gates to identify the entrances and exits for vehicular and foot traffic.
- Project managers will determine which vehicles are critical to enter the dirty zone. They will communicate this information to subcontractors and foremen who will be responsible for ensuring compliance.
- Vehicles and equipment that must operate in the dirty zone shall enter and exit **ONCE** – using the established exit control areas upon exit. Construction equipment will be stored in the dirty zone throughout the period that it is required to be onsite.

Traffic Control

- Vehicles and equipment that are not critical to work in the dirty zone are prohibited from entering that area. These vehicles must park in designated personnel and subcontractor lots.
- Utilize carts or designated transport vehicles to transfer tools and other non-motorized equipment into the dirty zone.
- Personnel and subcontractors who enter the dirty zone on foot will do so through designated foot traffic gates only. DO NOT CIRCUMVENT ENTRANCE/EXIT CONTROL AREAS.

Education/Training

- All personnel working on the site must be trained on both the concept of site control and the policies used to enforce it.
- **POST SIGNS** at all entrances, exits, and control areas to reinforce the site control policies and communicate instructions.

Inspections and Maintenance

☑ Inspection of the site controls will occur on a daily basis.

☑ Inspection will target:

- o Adequacy of the control areas to handle the volume and type of personnel, vehicles, and equipment entering the site,
- o Breaches in the physical barrier, accidental or deliberate,
- o Track off into the clean zone of the project area,
- o Non-compliance with site policies by personnel, subcontractors, or drivers.

Success Criteria

Success is determined by elimination of sediment track-off into paved areas and public roads outside of the project site.

Management Response to Failed Success Criteria

Failure of success criteria will trigger management review of procedures that may require changes in the traffic control configurations, retraining of employees and subcontractors. Continues non-compliance may require disciplinary action

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Supporting Literature

None Identified

Vehicle and Equipment Maintenance

Definitions, Description and Purpose
This BMP is intended to provide guidance and controls by specifying location and preventative measures for vehicle and equipment maintenance. This in turn will reduce the potential for accidental discharge of materials from the maintenance area.

Category
- **Training**
- Oversight/documentation
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- **Waste Management**
- **Runoff Management**

Application
All development projects

Strengths
- Reduces the volume of onsite maintenance.
- Limits location of onsite maintenance.
- Establishes controls for supply and waste management.
- Incorporates good housekeeping procedures.
- Establishes regular inspection of maintenance area.

Limitations
- Requires establishing a dedicated, controlled maintenance area.
- Requires training of employees and subcontractors.
- Does not account for equipment failures that may result in material release on the construction site. (**See Spill Response and Notification Tech Note**)

Standard Specifications

Implementation
- All scheduled/preventative maintenance of vehicles will take place off site.
- Vehicle maintenance onsite is allowed only if the vehicle has broken down and off-site maintenance is not feasible.
- Equipment maintenance is allowed onsite only if it is not feasible to mobilize the equipment to an offsite location.
- If maintenance must occur onsite, use designated areas only.
- Dedicated maintenance areas must be protected from stormwater run-on and runoff.
- Dedicated maintenance areas must have an impenetrable work surface.
- Dedicated maintenance areas must be located at least 50 ft from storm drain inlets.
- Drip pans or absorbent pads must be used during vehicle and equipment maintenance to prevent runoff off of materials.
- A stockpile of spill cleanup materials must be supplied by the subcontractor conducting maintenance and available in the maintenance area during maintenance activities.

Vehicle and Equipment Maintenance

- Employees and subcontractors are responsible for being fully trained in proper maintenance of their equipment and spill cleanup procedures. (**See Spill Response and Notification Tech Note)**

- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials, used batteries, and waste tires. (**See Hazardous Waste Management and Solid Waste Management Tech Notes**)
- The maintenance area shall be cleaned up by the subcontractor immediately following vehicle or equipment maintenance.

Inspections and Maintenance

- Inspect the maintenance area daily and verify that is kept in good order and that BMP are installed and maintained.

- Ensure that supplies of spill cleanup materials in the maintenance area are fully stocked.

- Report any misuse or poor housekeeping of the maintenance area to site management immediately.

Success Criteria

Zero environmental releases of hazardous material resulting from vehicle and equipment maintenance.

Management Response to Failed Success Criteria

Failure of success criteria will result in a review of the subcontractor's procedures and BMP for conducting vehicle & equipment maintenance onsite. Subsequent training and/or disciplinary action to follow pending investigation.

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

2. Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992

3. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Water Conservation

Definitions, Description and Purpose
Water conservation practices are activities that minimize the use of water during the construction project in a manner that avoids causing erosion and the transport of pollutants offsite.

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Application
Water conservation practices are suitable for all construction sites where water is used.

Strengths
- ⊕ Identifies leaking pipes, valves, and fittings
- ⊕ Controls dust through use of dewatering wastes
- ⊕ Will not allow water connections will not run continuously unless necessary

Limitations
- ⊖ None identified

Standard Specifications
- Keep water equipment in good working condition.
- Stabilize water truck filling by installing a gravel pad prior to start up of truck filling.
- Identify and repair water leaks promptly.
- Prohibit washing of vehicles and equipment anywhere but on the tire wash off station.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.
- Lock water tank valves to prevent unauthorized use.

Inspections and Maintenance
- ☑ Inspect and verify that BMPs are in place around any water usage areas prior to commencement of water use.
- ☑ Inspect BMPs daily.
- ☑ Inspect and maintain water equipment as needed to prevent unintended discharges.
  - o Water trucks
  - o Water reservoirs
  - o Irrigation systems
  - o Hydrant connections
  - o Dewatering equipment

Success Criteria
- ☑ Inspections will not find leaking equipment or connections on the construction site.
- ☑ Dust control will use dewatering wastes when available.
- ☑ Water connections will not run continuously unless necessary.

Water Conservation

Management Response to Failed Success Criteria
Failure of success criteria will result in:

- Repair, replacement or reinstallation of any failing BMP or equipment
- Retraining of employees or subcontractors to address any confusion or misconceptions.
- Disciplinary actions for repeated non-compliance by employees or subcontractors.

Supporting Information

Field Application/ trial sites
None Identified

Application Results: Known/measured outcomes
None Identified

Supporting Literature

1. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Wind Erosion

Definitions, Description and Purpose
Wind erosion protection BMPs stabilize exposed surfaces and minimize conditions that suspend or track dust particles. Dust control consists of applying water or other palliative to unpaved roadways or covering stockpiles to protect them from wind.

Category
- Training
- Oversight/documentation
- Hydrologic function
- Soil function
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- Waste Management
- Runoff Management

Application
Wind erosion control BMPs are suitable during the following construction activities:
- Construction vehicle traffic on unpaved roads.
- Sediment tracking onto paved roads.
- Soils and material storage piles.
- Areas with unstabilized soil.
- Final grading/site stabilization.

Strengths

⊕ Compliance with California Air Pollution Control Laws.

⊕ Minimizes wind erosion in disturbed areas.

⊕ Reduces load on equipment and Vehicles.

Limitations

⊖ Prevents dust only for a short period and should be applied daily (or more often) to be effective.

⊖ Over watering may cause erosion

⊖ In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

Standard Specifications
The following can be used as dust control. Specific applications of each can be found in Table 1.
- Wet suppression (watering),
- Gravel asphalt surfacing,
- Track off controlled entrances/exits,
- Cover haul truck loads,
- Minimization of disturbed surface areas,
- Limiting onsite traffic to 15 mph,
- Limiting the number of vehicles on a site at any given time.

Inspections and Maintenance

☑ Inspections multiple times per day may be required.

☑ Ensure that personnel are complying with dust control directives.

☑ Wet suppression applications will be required multiple times daily.

☑ Daily review of long term weather forecast to predict when modifying wind erosion BMPs will be necessary.

Wind Erosion

Success Criteria

Absence of dust clouds in vicinity of construction area.

Management Response to Failed Success Criteria

- Review if wet suppression schedule is sufficient.
- Review if personnel on site are complying with dust control BMP directives.

Supporting Information

Field Application/ trial sites

1. Shaffer's Camp
2. Village at Northstar

Application Results: Known/measured outcomes

- There are limited complaints regarding dust pollution when wind erosion BMPs are in place.
- These practices reduce the visual profile of Construction activities.

Supporting Literature

1. Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.
2. California Air Pollution Control Laws, California Air Resources Board, 1992.
3. Caltrans, Standard Specifications, Sections 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative".
4. Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.
5. Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Table 1: Dust Control Practices

SITE CONDITION	DUST CONTROL PRACTICES								
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Silt Fences	Temporary Gravel Construction Entrances/Equipment Wash Down	Haul Truck Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X				X
Disturbed Areas Subject to Traffic			X	X	X		X		X
Material Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/ Excavation			X	X		X			X
Truck Traffic on Unpaved Roads			X	X	X		X	X	
Mud/Dirt Carry Out					X		X		

Hazardous Waste Management

Definition, Description and Purpose
Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Application
This best management practice (BMP) applies to all construction projects. Hazardous waste management practices are implemented on construction projects that generate waste from the use of:

- Petroleum Products
- Asphalt Products
- Concrete Curing Compounds
- Pesticides
- Palliatives
- Acid
- Septic Wastes
- Paints
- Stains
- Solvents
- Wood Preservatives
- Roofing Tar

Category
- Training
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- **Waste Management**
- **Runoff Management**

Any materials deemed a hazardous waste in California, Title 22 Division 4.5, or listed in 40 CFR Parts 110, 117, 261, or 302

Strengths

⊕ Meets Federal and State regulatory requirements for proper management of hazardous wastes.

⊕ Minimizes potential for hazardous materials spills.

⊕ Minimizes of potential for contaminated soil.

⊕ Minimizes of potential of hazardous material discharge to the environment.

⊕ Enforces good housekeeping.

Limitations

⊕ A licensed hazardous waste hauler must dispose of hazardous waste.

⊕ Does not relieve the contractor from responsibility for compliance with federal, state, and local laws regarding storage, handling, transportation, and disposal of hazardous wastes.

⊕ This BMP does not cover aerially deposited lead (ADL) soils.

⊕ Potential for federal fines and/or incarceration of company officers for not properly registering and managing hazardous waste properly (40 CFR 261)

Standard Specifications

General

- The general contractor and subcontractors are responsible for ensuring that hazardous waste is properly identified, containerized, stored, labeled, shipped, documented, and disposed.

Hazardous Waste Management

- If the project generates hazardous wastes the General Contractor must register with the Environmental Protection and obtain an EPA ID number and establish a waste generation status. Most projects will register as VSQG (Very Small Quantity Generator).

- Designate hazardous waste storage areas onsite away from storm drains or watercourses and away from moving vehicles and equipment to prevent accidental spills.

- A foreman or construction supervisor should monitor onsite hazardous waste storage and disposal procedures.

- Waste storage areas should be kept clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.

- Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Central Storage Facility

- Waste containers should be stored in a central storage facility that must comply with the following requirements:

- The central storage facility should provide for a spill containment volume equal to **1.5 times** the volume of all containers able to contain precipitation from a **25 year storm event**, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest tank within its boundary, whichever is greater.

- The central storage facility should be impervious to the materials stored there for a minimum contact time of **72 hours.**

- The central storage facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be placed into drums after each rainfall. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. Non-hazardous liquids should be sent to an approved disposal site.

- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.

- Incompatible materials, such as chlorine and ammonia, **should not be stored in the same** temporary containment facility.

- Throughout the rainy season, temporary containment facilities should be covered during non-working days, and prior to rain events. Covered facilities may include use of plastic tarps for small facilities or constructed roofs with overhangs.

- Drums must not be overfilled and wastes should not be mixed.

- Containers of dry waste must be stored on pallets.

- Dispose of excess oil-based paints and sludge as hazardous waste.

- Ensure that adequate hazardous waste storage volume is available.

Hazardous Waste Management

- Ensure that hazardous waste collection containers are conveniently located.
- Minimize production or generation of hazardous materials and hazardous waste on the job site.
- Segregate potentially hazardous waste from non-hazardous construction site debris.
- Keep liquid or semi-liquid hazardous waste in appropriate containers.
- Clearly label all hazardous waste containers with the waste being stored, chemical hazard, and the date of accumulation.
- Do not allow potentially hazardous waste materials to accumulate on the ground.
- Use the entire product before disposing of the container.
- Hazardous materials and wastes should be stored in covered containers and protected from vandalism.
- **Do not mix wastes;** this can cause chemical reactions, making recycling impossible and complicating disposal.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are **not** disposed of in dumpsters designated for construction debris.
- Arrange for regular waste collection before containers overflow.
- Make sure that hazardous waste is collected, removed, and disposed of **only at authorized disposal areas**.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- If a container does spill, **clean up immediately**.

Disposal Procedures

- Waste should be disposed of by a licensed hazardous waste transporter and licensed disposal facility or recycling facility, utilizing properly completed Uniform Hazardous Waste Manifest forms.
- A copy of the hazardous waste manifests must be provided and maintained on record for a minimum of three years

Education

- Educate employees and subcontractors on hazardous waste storage and disposal procedures.
- Educate employees and subcontractors on potential dangers to humans and the environment from hazardous wastes.
- Instruct employees and subcontractors on safety procedures for common construction site hazardous wastes.
- Instruct employees and subcontractors in identification of hazardous and solid waste.
- The contractor's superintendent or representative should oversee and enforce proper hazardous waste management procedures and practices.

Hazardous Waste Management

Inspections and Maintenance

☑ Hazardous waste central storage facility must be inspected weekly, the weekly inspection should include:

- o Incompatible waste separation,
- o Proper labeling,
- o Proper containerization,
- o General Housekeeping of Central Storage Area.

☑ Any violation of the Standard Specifications must be documented, addressed, resolved, and communicated to the Subcontractor Foreman immediately.

Success criteria

Hazardous wastes will be identified, containerized, labeled, stored, transported, treated, and documented in full accordance with 40 CFR §110,117,261,302 and 22 CCR §4.5

Management response to failed success criteria

If failure of success criteria management will review and revise site policies and training accordingly as well as hold site personnel and subcontractors accountable for non-compliance.

Supporting Information

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Non-point Source Pollution Control Program, 1995.

2. Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

3. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

4. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992

Hazardous Waste Management

Figure 1: Example of fueling station containment setup.

Liquid Waste Management

Definition, Description and Purpose
Liquid waste management includes practices to identify, prevent, and manage, wastewater contaminated by construction materials.

Application
Liquid waste management is applicable to any onsite activity that generates water that becomes contaminated by contact with construction materials.

Category
- Training
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- **Waste Management**
- **Runoff Management**

Strengths
⊕ Provides standards for identifying and managing contaminated wastewaters unsuitable for stormwater or sewer discharge.

Limitations
⊖ Requires training of employees and subcontractors.

⊖ Requires vigilant review of site activities and identification of contaminated wastewaters.

⊖ Requires additional permitting and treatment dependent upon the waste chemical characteristics.

Standard Specifications
- Personnel and subcontractors will be accountable identify and contain contaminated wastewater
- Personnel and subcontractors are responsible for their activities waste generation, storage and disposal activities.
- It is **illegal** for contaminated wastewater to enter **any** storm drainage, waterway, or receiving water.
- All contaminated liquid wastes that have the potential to affect the storm drainage system shall be captured before they run off a surface.
- Liquid wastes will not be permitted to flow or discharge uncontrolled.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud shall be contained and not allowed to flow into drainage channels or receiving.
- Liquid wastes shall be contained in a roll-off bin, or portable tank.
- Containment devices must be emptied on a regular basis as not to risk overflow.
- Containment devices shall not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.
- Containment devices shall be pumped out to container, tank truck, hauled, treated, and disposed of by a licensed waste handler.
- In the event that an unplanned contaminated wastewater is identified, the wastewater should be contained and the Subcontractor Foreman should be contacted immediately for further instructions.

Liquid Waste Management

Inspections and Maintenance

- ☑ Inspect and verify that BMPs are in place prior to the commencement of associated activities.
- ☑ Inspect BMPs subject to liquid waste discharge daily, prior to, during (if during daylight hours), and after precipitation events.
- ☑ Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task.
- ☑ Repair or replace failing BMPs **immediately**.

Success criteria

Contaminated liquid wastes will not discharge to stormwater drainage conveyances, water bodies, or channels.

Management response to failed success criteria

If failed success criteria management will address:

- Potential failure of BMP – redesign, repair, and/or replace as needed
- Potential failure of training, review and revise as needed.
- Potential failure or disregard of compliance by personnel or contractor, discipline as necessary.

Supporting Information

Field Application & Trial Sites

- Village at Northstar

Application Results: Known & Measured Outcomes

- Liquid waste was captured and disposed of according to policy when facility was properly operated and utilized.

Supporting Literature

1. Stormwater Quality Handbooks - Construction Site Best
2. Management Practices (BMPs) Manual, State of California
3. Department of Transportation (Caltrans), November 2000.

Material Delivery and Storage

Definitions, Description and Purpose
Material delivery and storage procedures are designed to prevent any discharge of pollutants from material delivery and storage to the stormwater system or watercourses.

Category
- **Training**
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- Waste Management
- **Runoff Management**

Application
These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components
- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Strengths
- ⊕ Minimizes the volume of hazardous materials stored onsite.
- ⊕ Establishes storing materials in a designated area.
- ⊕ Minimizes potential for non-stormwater discharges of construction materials.
- ⊕ Specifies secondary containment for all storage areas.

Limitations
- ⊖ Requires space dedication.
- ⊖ Requires that weatherproof storage areas with secondary containment be constructed or purchased.
- ⊖ Requires that subcontractors dedicate time and material resources to train and ensure that employees obey delivery and storage policies.

Standard Specifications

General
- Designated onsite locations for material delivery and storage.
- All material storage facilities will be construction prior to the delivery of any construction materials.
- An up to date inventory of materials delivered and stored onsite must be kept accurate at all times.
- Minimize the volume of hazardous materials storage.
- Handle hazardous materials as infrequently as possible.
- Storage of reactive, corrosive, or flammable liquids must comply with the fire codes of your area.
- Stockpiles will be protected in accordance with the Stockpile Management Tech Note.

Material Delivery and Storage

- Subcontractors will train their employees on the proper material delivery and storage practices as specified each materials MSDS.
- Material storage facilities will be secured to prevent access from unauthorized personnel.

Material Storage Areas

- Material delivery and storage areas will be located away from waterways.
- Material containment facilities must provide a spill containment volume able to contain precipitation from a B, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- Containment facilities will be impervious to the materials stored therein for a minimum contact time of **72 hours.**
- Containment facilities will be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills will be collected and placed into drums. These liquids will be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids will be sent to an approved disposal site.

Material Containers

- Materials will be stored in their original containers and the original product labels will be maintained in place in a legible condition. Damaged or otherwise illegible labels shall be replaced immediately.
- Bagged and boxed materials will be stored on pallets **and** plastic and will not be allowed to accumulate on the ground. To provide protection from wind and rain bagged and boxed materials will be covered during non-working days and prior to and during rain events.
- Materials will be stored indoors within existing structures or sheds when available, and appropriately covered if stored out of doors.
- Proper storage instructions will be posted at all times in an open and conspicuous location.
- Contractors will provide sufficient separation between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, will not be stored in the same containment facility.
- An ample supply of appropriate spill clean up material should be kept near storage areas.

Material Delivery Practices

- Utilize spill containment devices when materials are being unloaded.
- Have material spill kits staged near material unloading areas.
- Employees trained in emergency spill cleanup procedures **must** be present when dangerous materials or liquid chemicals are unloaded.

Inspections and Maintenance

- ☑ Material storage areas will be inspected daily.

Material Delivery and Storage

- ☑ Deviation from the standard specifications will be documented, addressed, and resolved immediately with the subcontractor.
- ☑ Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

Success Criteria

Success is measured by the prevention or elimination of discharges of pollutants from material delivery and storage into the stormwater system or watercourses.

Management Response to Failed Success Criteria

If failure of success criteria, site management will review current practices and hold transporters and subcontractors accountable for non-compliance with the standard specifications of the Material Delivery and Storage Tech Note.

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

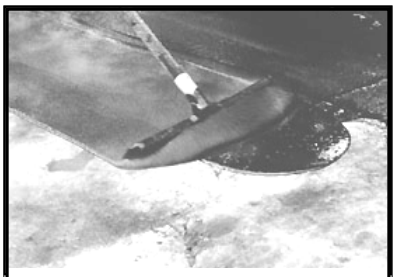
2. Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

3. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

4. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Material Use

Definitions, Description and Purpose
Good handling procedures for construction materials can minimize or eliminate the potential for contact with stormwater, which can lead to illegal discharges of hazardous materials into the environment.



Category
- **Training**
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- **Waste Management**
- **Runoff Management**

Application
This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete type materials
- Other materials that may be detrimental if released to the environment.

Strengths
⊕ Prevents construction materials from contaminating stormwater runoff.

⊕ Limits the volume of materials prepared for application at any given time.

⊕ Ensure that employees and subcontractors are familiar with the materials they are using and hazards associated with them.

Limitations
⊖ Requires that contractors be trained, proficient, and responsible in safe material use practices.

Standard Specifications
- Minimize use of hazardous materials onsite where possible.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- **Do not over-apply materials**. Over-application is expensive and environmentally harmful.
- Prepare **only** the amount needed.
- Follow the recommended usage instructions.
- Properly dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information.
- Use the **entire** product before disposing of the container.

Material Use

- Mix paint indoors or in a containment area.
- **Never** clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- Use **less** hazardous products when practical.
- Use materials only where and when needed to complete the construction activity.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.
- Contractors are responsible for ensuring that employees are familiar with the materials they are using as well as the proper handling, use, disposal, and hazards associated with those materials.
- Material Safety Data Sheets (MSDS) shall be available onsite for all materials. They will be provided by individual contractors

Inspections and Maintenance

☑ Inspect work site daily.

☑ Identify, document, communicate, and address any observed work practices that could contribute to stormwater pollution with the employee, foreman or subcontractor immediately.

☑ Spot check employees and subcontractors throughout the job to ensure appropriate practices are being employed.

Success Criteria

There will be **no** soil or stormwater contamination associated with the use or mixing of materials used on the construction site.

Management Response to Failed Success Criteria

If there is a failure to meet the Success Criteria, site management will be held personnel, and subcontractors accountable, for non-compliance of construction site policy.

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

2. Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

3. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

4. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Sanitary Waste Management

Category
- Training
- Oversight/documentation
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- **Waste Management**
- Runoff Management

Definitions, Description and Purpose
Sanitary waste management prevents the discharge of pollutants from sanitary and septic waste by providing convenient, well-maintained facilities.

Application
All construction sites that use temporary or portable sanitary and septic waste systems.

Strengths
⊕ Maintains containment of sanitary wastes

⊕ Eliminates potential discharges to sensitive areas

Limitations
⊖ None

Standard Specifications

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation.
- Sanitary facilities should be located in a convenient location.
- Sanitary wastewater will not be discharged or buried within the project site.
- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, must comply with the local health agency, city, county, and sewer district requirements.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illegal discharges.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.
- When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.

Education/Training

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.

Inspections and Maintenance
☑ Arrange for regular waste collection.

☑ Inspect portable sanitary facilities daily.

Sanitary Waste Management

- ☑ Note, communicate, and repair or remove any sanitary facility with failed containment immediately.
- ☑ If sanitary facility containment fails, prevent sanitary wastes from discharging to storm drain, vegetative or native area, or stormwater conveyance.
- ☑ If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.

Success Criteria

There will be no spills, leaks, or discharges from portable sanitary facilities.

Management Response to Failed Success Criteria

If failure of success criteria, examine operations and maintenance of sanitary facilities, contact vendor if necessary

Supporting Information

Field Application/ trial sites

1. Village at Northstar
2. Schaffer's Camp, Northstar at Tahoe

Application Results: Known/measured outcomes

- Zero discharge from portable sanitary facilities when properly maintained.

Supporting Literature

1. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.
2. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management

Definitions, Description and Purpose
Solid waste management procedures and practices are designed to control and contain trash. The purpose is to ensure that trash is properly disposed of and does not become and ecological or aesthetic problem at the construction site.

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Application
All construction projects.

Strengths
⊕ Prevents construction trash from becoming strewn about the construction site and adjacent areas.

⊕ Prevents potential contamination of unstabilized soils or native areas.

⊕ Prevents animal scavenging.

⊕ Prevents aesthetic nuisances.

⊕ Provides example of good housekeeping practices when regulators, inspectors, and visitors tour the construction site.

Limitations
None

Standard Specifications

Implementation
- Littering is prohibited.
- Designate waste collection areas onsite.
- Ensure that the proper number of waste collection areas is sufficient to contain all of the trash-generated onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use.
- Inspect dumpsters for leaks and reject any dumpster that is not watertight.
- All trashcans shall be covered **at all times**.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Site trash will be collected daily and deposited in dumpsters.
- Dumpsters will be removed from the site weekly or more frequently as needed.
- Solid waste storage areas will be located at least **50 ft** from drainage facilities and watercourses and will not be located in areas prone to flooding or ponding.
- Make sure that hazardous materials are not disposed of in trash dumpsters or trashcans. (**See Hazardous Waste and Concrete Waste Tech Notes**)

Solid Waste Management

- Do not hose out dumpsters. Leave dumpster cleaning to the trash hauling contractor.
- Clean up immediately if a container does spill.
- Contractor's superintendent or representative is responsible to oversee and enforce proper solid waste management procedures and practices.
- Employees and subcontractors will be trained on identification and proper disposal of solid waste and hazardous waste.

Inspections and Maintenance

- ☑ Inspect dumpsters and waste collection areas daily.
- ☑ Note any trash dispersal during regular site inspections.
- ☑ Collect and properly dispose of any trash found outside of trash containers.
- ☑ To prevent clogging of the storm drainage system by removing litter and from drainage grates, parking lots, and ditches.

Success Criteria

Trash as waste materials will be contained to appropriate disposal containers, e.g. dumpster, trashcans, etc.

Management Response to Failed Success Criteria

If failure of success criteria:

- Examine location and availability of appropriate waste containers.
- Review schedule for removal of solid wastes.
- Hold site personnel and subcontractors accountable for non-compliance with site policy.

Supporting Information

Field Application/ trial sites

None identified

Application Results: Known/measured outcomes

None identified

Supporting Literature

1. Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.
2. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.
3. Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Cleaning

Definitions, Description and Purpose
Vehicle and equipment cleaning guidelines are intended to eliminate or reduce the discharge of pollutants from vehicle and equipment cleaning operations into stormwater. The guidelines are an overview of cleaning protocols. For specific details on tire wash off and concrete washout, see the Tire Wash Off and Concrete Washout Tech Notes.

Category
- **Training**
- **Oversight/documentation**
- **Hydrologic function**
- **Soil function**
- **Mulch/surface protection**
- **Vegetation**
- **Protection from disturbance**
- **Waste Management**
- **Runoff Management**

Application
These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Strengths
⊕ Provides controls on vehicle cleaning activities.

⊕ Provides training for operators and drivers.

⊕ Reduces non-stormwater discharges into drainages and runoff.

Limitations
⊖ Wash off locations must be identified.

⊖ Wash off location run-off controls must me installed (**see Tire Wash Off Tech Note**).

⊖ A source of wash water must be installed.

⊖ Drivers and operators must be trained and supervised.

Standard Specifications
Vehicle and equipment cleaning is **only** permitted under the following circumstances in designated locations:

Soil wash off

- Soil wash off will be conducted **only** in the tire wash off area near the entrance/exit of the construction site.
- Equipment/vehicles will **only** be washed off when they are leaving the construction site.
- There will be **no** equipment or vehicle cleaning outside of the Tire wash off area.
- See Tire Wash Off Tech Note for further instructions.

Concrete Wash off

- Concrete wash off will **only** be conducted is the designated concrete wash off containment areas. Additionally concrete vehicles will wash tires at the entrance/exit wash off.
- See Concrete Washout Tech Note for further instructions.

Inspections and Maintenance
☑ Wash off areas will be inspected at a minimum of once daily to ensure that all vehicle drivers and subcontractors comply with site policy.

Vehicle and Equipment Cleaning

- ☑ Inspection shall seek evidence of concrete waste and/or sedimentation runoff from the wash off/cleanout areas.
- ☑ All non-compliance with the site policy shall be reported to site management immediately.
- ☑ All breaches of containment will be repaired and remediated immediately.

Success Criteria

Zero discharge of concrete waste or sedimentation from concrete washout or tire wash off areas.

Management Response to Failed Success Criteria

Failure of success criteria will trigger a site management review of training and compliance with policy by subcontractors.

Supporting Information

Field Application/ trial sites

Village at Northstar

Application Results: Known/measured outcomes

- Concrete washouts need regular monitoring and maintenance.
- Tire wash off requires runoff controls and driver supervision.

Supporting Literature

1. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

2. Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

Vehicle and Equipment Refueling

Definitions, Description and Purpose
Vehicle and equipment fueling procedures and practices are designed to prevent fuel spills. They also demonstrate the correct response to a potential incidental spill to ensure there is no discharge outside of the designated fueling area.

Category
- **Training**
- **Oversight/documentation**
- Hydrologic function
- Soil function
- Mulch/surface protection
- Vegetation
- Protection from disturbance
- **Waste Management**
- **Runoff Management**

Application
These procedures are suitable on all construction sites where vehicle and equipment fueling take place.

Strengths
⊕ Establishes controls for refueling operations.

⊕ Reinforces spill prevention procedures.

⊕ Provides provisions for inspection and maintenance.

Limitations
⊖ Requires establishment of designated fueling area.

⊖ Requires staging of spill control equipment.

⊖ Requires training of employees and subcontractors.

⊖ Requires regular inspection, maintenance, and housekeeping.

Standard Specifications

Fueling area design

- Dedicated fueling areas will be located at least **50 ft away** from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Fueling area should have an impenetrable surface and containment dam surrounding the entire area.
- Nozzles used in vehicle and equipment fueling shall be equipped with an automatic shutoff to control drips.
- Vapor recovery nozzles will be used to control drips as well as air pollution.
- Identify fueling areas in the SWPPP and on Construction site diagrams.
- Federal, state, and local requirements shall be observed for any stationary above ground storage tanks

Use of fueling areas

- Use designated fueling areas only.
- Fueling operations must not be left unattended.
- Drip pans or absorbent pads will be used during vehicle and equipment fueling.
- Discourage "topping-off" of fuel tanks.
- **Immediately** clean up spills and properly dispose of contaminated soil and cleanup materials.

Vehicle and Equipment Refueling

- Absorbent spill cleanup materials and spill kits will be available in fueling areas.
- Use absorbent materials on small spills.
- Do not hose down or bury the spill.
- Remove the adsorbent materials promptly and dispose of properly (**see Hazardous Waste Management Tech Note**).
- Employees and subcontractors shall be trained in proper fueling and cleanup procedures.

Mobile Fueling Operations

- Mobile fueling is permitted only for equipment that cannot be reasonably moved to the fueling area. This includes cranes, pile drivers, drilling rigs, and excavators.
- Mobile fueling can only be conducted if drip pans, pads, or absorbents are in place before fueling begins.
- Mobile fueling vehicles **MUST** carry sufficient spill containment materials at all times.

Inspections and Maintenance

- ☑ The fueling areas shall be inspected at a minimum of once daily.
- ☑ Ample supplies of spill cleanup materials shall be staged at the fueling area.
- ☑ Spill cleanup materials must be restocked daily if used.
- ☑ Fueling area must be kept in good order, report any poor housekeeping practices to project management immediately.

Success Criteria

Zero releases of fuels from refueling operations.

Management Response to Failed Success Criteria

Failure of success criteria will trigger immediate investigation by site management to determine if the cause of the fuel spill is either:

- Equipment failure
- Training failure
- Subcontractor non-compliance with refueling protocols.

Site management will determine if additional training and/or disciplinary action is required.

Supporting Information

Field Application/ trial sites

None Identified

Application Results: Known/measured outcomes

None Identified

Vehicle and Equipment Refueling

Supporting Literature

1. Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

2. Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

3. Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

4. Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Glossary

Active Construction Area: Construction areas where soil-disturbing activities have already occurred and continue to occur or will occur during the ensuing 21 days. This may include areas where soils have been disturbed as well as areas where soil disturbance has not yet occurred.

Aggregate Base: typically composed of crushed rock comprised of material capable of passing through a 3/4 inch rock screen. The component particles will vary in size from 3/4 inch down to dust. The material can be made of virgin (newly mined) rock, or of recycled asphalt and concrete.

AB is used as a base course in roadways, as a base course for cement pads and foundations, and as backfill material for underground pipelines and other underground utilities.

Best Management Practices (BMPs): Includes schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent, eliminate, or reduce the pollution of waters of the receiving waters. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Catch Basin (Also known as Inlet): Box-like underground concrete structure with openings in curbs and gutters designed to collect runoff from streets and pavement.

Clean Water Act (CWA): (33 U.S.C. 1251 et seq.) requirements of the NPDES program are defined under Sections 307, 402, 318 and 405 of the CWA.

Cease Work Notification (CWN): Notification issued by SWPPP Advisors to stop **ALL** work on a project site and divert all human, equipment and material resources as required to address immediate water quality protection issues. A CWN shall stay in effect until the SWPPP Advisor determines that conditions are adequate that construction activities may resume. A CWN may be issued in conjunction with a Notice of Non-Compliance (NONC) or a Notice of Violation (NOV).

Compost: The aerobically decomposed remnants of organic materials (those with plant and animal origins). Compost is used as a soil amendment. It is also used for erosion control, land/stream reclamation, wetland construction, and as landfill cover.

Con-Span®: A style of bridge construction that incorporates the use of pre-cast steel reinforced concrete members to create the bridge foundation, arch, head walls and wing walls. These members are transported to, and assembled at the project site.

Construction Activity: Includes clearing, grading, excavation, and contractor activities that result in soil disturbance.

Construction General Permit: A National Pollutant Discharge Elimination System (NPDES) permit issued by the State Water Resources Control Board for the discharge of stormwater associated with construction activity from soil disturbance of five acres or more. Threshold lowered to one acre beginning October 10, 2003. Construction General Permit No. CAS000002.

Contamination: An impairment of the quality of the waters of the state by waste to a degree that creates a hazard to the public health through poisoning or through the spread of disease including any equivalent effect resulting from the disposal of waste, whether or not waters of the state are affected.

Contractor: Party responsible for carrying out the contract per plans and specifications. The Standard Specifications and Special Provisions contain storm water protection requirements the contractor must address.

Denuded: Land stripped of vegetation or land that has had its vegetation worn down due to the impacts from the elements or humans.

Detention: The capture and subsequent release of stormwater runoff from the site at a slower rate than it is collected, the difference being held in temporary storage.

Glossary

Discharge: A release or flow of stormwater or other substance from a conveyance system or storage container. Broader – includes release to storm drains, etc.

Disturbed Soil Areas (DSAs): Areas of exposed, erodible soil, including stockpiles, that are within the construction limits and that result from construction activities.

Effluent Limits: Limitations on amounts of pollutants that may be contained in a discharge. Can be expressed in a number of ways including as a concentration, as a concentration over a time period (e.g., 30-day average must be less than 20 mg/l), or as a total mass per time unit, or as a narrative limit.

Erosion: The wearing away of land surface by wind or water. Erosion occurs naturally from weather or runoff but can be intensified by land-clearing practices related to farming, new development, redevelopment, road building, or timber cutting.

Erosion Control Device: some sort of physical barrier, such as vegetation, wattle or rock, to absorb some of the energy of the wind, water or other disturbance that is causing the erosion.

Facility: Is a collection of industrial processes discharging stormwater associated with industrial activity within the property boundary or operational unit.

Fetch Area: An area that can be of part of or an entire watershed whereas all liquid precipitation or snowmelt will untimely converge into a point discharge location.

Filter Berm: See Pine Needle Wattle

General Permit: The General Permit for Storm Water Discharges Associated with Construction Activity (Order No. 99-08-DWQ, NPDES Permit CAS000002) issued by the State Water Resources Control Board.

Grading: The cutting or filling of the land surface to a desired slope or elevation.

Granitic Soil: Soil that is comprised of granite. These soils are low in mineral nutrients. These soils tend to have weak water holding capacity and a high hydraulic conductivity.

Gravel Bags: Burlap bags filled with gravel used as a velocity dissipater.

Green Tag: A mechanism of identifying locations in erosion control devices where maintenance or replacement of the device is located. These tags are installed on the East West Partners' Northstar-at-Tahoe projects by the SWPPP advisors to identify repair locations for the BMP crews.

Gully: Severe erosion in which trenches are cut to a depth greater than 30 centimeters (a foot). Generally, ditches enough to cross with heavy equipment are considered deep gullies.

Hazardous Waste: A waste or combination of wastes that, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either cause or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of or otherwise managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special EPA or state lists. Regulated under the federal Resource Conservation and Recovery Act and the California Health and Safety Code.

Illicit Discharges: Any discharge to a municipal separate storm sewer that is not in compliance with applicable laws and regulations as discussed in this document.

Industrial General Permit: A National Pollutant Discharge Elimination System (NPDES) Permit (No. CAS000001) issued by the State Water Resources Control Board for discharge of stormwater associated with industrial activity. Board Order 97-03-DWQ.

Inlet: An entrance into a ditch, storm drain, or other waterway.

Integrated Pest Management (IPM): An ecosystem-based strategy that focuses on long-term prevention of pests or their damage through a combination of techniques such as biological control, habitat

Glossary

manipulation, modification of cultural practices, and use of resistant varieties. Pesticides are used only after monitoring indicates they are needed according to established guidelines, and treatments are made with the goal of removing only the target organism.

Mulch: a protective cover placed over the soil, primarily to modify the effects of the local climate. For erosion control - protects soil from rain and preserves moisture. For sediment control - slows runoff velocity. Pine needles or tub grindings are typically used.

Municipal Separate Storm Sewer System (MS4): A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) designed or used for collecting or conveying storm water; (ii) which is not a combined sewer; and (iii) which is not part of a Publicly Owned Treatment Works (POTW) as defined at Title 40 of the Code of Federal Regulations (CFR) 122.2. A "Small MS4" is defined as an MS4 that is not a permitted MS4 under the Phase I regulations. This definition of a Small MS4 applies to MS4 operated within cities and counties as well as governmental facilities that have a system of storm sewers.

National Pollutant Discharge Elimination System (NPDES) Permit: A permit issued pursuant to the Clean Water Act that requires the discharge of pollutants to waters of the United States from storm water be controlled.

Native: Living or growing naturally in a particular region. Compatibility and competitiveness of selected plant materials with the environment.

Non-active Construction Area: Any area not considered to be an active construction area. Active construction areas become non-active construction areas whenever construction activities are expected to be discontinued for a period of 21 days or longer.

Non-Stormwater Discharge: Any discharge to municipal separate storm sewer that is not composed entirely of stormwater.

Non-point Source Pollution: Pollution that does not come from a point source. Non-point source pollution originates from aerial diffuse sources that are mostly related to land use.

Notice of Intent (NOI): A formal notice to SWRCB submitted by the owner of an industrial site or construction site that said owner seeks coverage under a General Permit for discharges associated with industrial and construction activities. The NOI provides information on the owner, location, type of project, and certifies that the owner will comply with the conditions of the construction General Permit.

Notice of Non Compliance (NONC): A notification document issued by SWPPP Advisors indicating that a previously identified water quality action item has not been appropriately addressed within 24hrs as indicated on a Green Tag Action Notice. An NONC indicates that the associated action items is of the highest priority and requires immediate attention

Notice of Termination (NOT): Formal notice to SWRCB submitted by owner/ developer that a construction project is complete.

Notice of Violation (NOV): A notification document issued by the Regional Water Quality Control board that indicates that management of water quality pollution preventions measures are inadequate and/or operations have created conditions that violate the terms of the General Sector Construction Permit and the Stormwater Pollution Prevention Plan. An NOV will trigger the immediate mobilization of any and all resources necessary to address the water quality threats identified therein.

NPDES Permit: NPDES is an acronym for National Pollutant Discharge Elimination System. NPDES is the national program for administering and regulating Sections 307, 318, 402, and 405 of the Clean Water Act (CWA). In California, the State Water Resources Control Board (SWRCB) has issued a General Permit for stormwater discharges associated with industrial activities (see Appendix A).

Outfall: The end point where storm drains discharge water into a waterway.

Glossary

Pine-needle Wattle: A pine needle filter berm (wattle) is a temporary structure that is designed to reduce flow rates of overland flow from construction and other disturbance areas. They are used to filter out sediment from such flows. This type of structure is designed to be of a low aesthetic impact and high filtration efficiency.

The pine needle filter is made by wrapping high tensile strength coir fabric around pine needles. The needles can be fully contained, or loosely wrapped. The latter method is then stapled to the soil surface to retain cohesion with the ground**.**

Point Source: Any discernible, confined, and discrete conveyance from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural stormwater runoff.

Pollutant: Generally, any substance introduced into the environment that adversely affects the usefulness of a resource.

Pollution Prevention (P2): Practices and actions that reduce or eliminate the generation of pollutants.

Precipitation: Any form of rain or snow.

Pretreatment: Treatment of waste stream before it is discharged to a collection system.

Rainy Season: The dates of the rainy season shall be as specified: use dates in the local permit if a local permit is applicable to the project site and rainy season dates are specified therein; or, if the local permit does not specify rainy season dates and/or in areas of the state not subject to a local permit, the rainy season dates shall be determined using Figure 2-1.

Reclaim (water reclamation): Planned use of treated effluent that would otherwise be discharged without being put to direct use.

Retention: The storage of stormwater to prevent it from leaving the development site.

Reuse (water reuse): (see Reclaim)

Rill: The removal of soil by concentrated water running through little streamlets, or headcuts. Detachment in a rill occurs if the sediment in the flow is below the amount the load can transport and if the flow exceeds the soil's resistance to detachment. As detachment continues or flow increases, rills will become wider and deeper.

Runoff: Water originating from rainfall, melted snow, and other sources (e.g., sprinkler irrigation) that flows over the land surface to drainage facilities, rivers, streams, springs, seeps, ponds, lakes, and wetlands.

Run-on: Off site stormwater surface flow or other surface flow which enters your site.

Scarified: Soil or pavement surface that has been broken up.

Scour: The erosive and digging action in a watercourse caused by flowing water.

Secondary Containment: Structures, usually dikes or berms, surrounding tanks or other storage containers, designed to catch spilled materials from the storage containers.

Sedimentation: The process of depositing soil particles, clays, sands, or other sediments that were picked up by runoff.

Sediment Basin: a man-made basin or intentional ponding area designed to hold storm water for a period of time to allow sediment and other suspended material to settle. The water eventually flows out of the basin to downstream waterways, evaporates into the atmosphere, or infiltrates the ground.

Sediment Control: These are devices that limit the transfer of sediments and pollutants from the work site to neighboring areas. They also reduce erosion when installed and maintained correctly.

Sediments: Soil, sand, and minerals washed from land into water, usually after rain, that collect in reservoirs, rivers, and harbors, destroying fish nesting areas and clouding the water, thus

Glossary

preventing sunlight from reaching aquatic plants. Farming, mining, and building activities without proper implementation of BMPs will expose sediment materials, allowing them to be washed off the land after rainfalls.

Sheet flow: Flow that occurs overland in places where there are no defined channels, the flood water spreads out over a large area at a uniform depth. This also referred to as overland flow.

Significant Materials: Includes, but not limited to, raw materials; fuels; materials such as solvents, detergents, and plastic pellets; finished materials such as metallic products; raw materials used in food processing or production; hazardous substances designed under Section 101(14) of CERLCA; any chemical the facility is required to report pursuant to Section 313 of Title III of SARA; fertilizers; pesticides; and waste products such as ashes, slag, and sludge that have the potential to be released with stormwater discharges.

Significant Quantities: The volume, concentrations, or mass of a pollutant in stormwater discharge that can cause or threaten to cause pollution, contamination, or nuisance that adversely impact human health or the environment and cause or contribute to a violation of any applicable water quality standards for receiving water.

Silt Fence: A silt fence is made of a filter fabric that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Soil Amendment: materials added to soil to improve plant growth and health. The type of conditioner added depends on the current soil composition, climate and the type of plant. Some soils lack nutrients necessary for proper plant growth and others hold too much or too little water. A conditioner or a combination of conditioners corrects the soil's deficiencies.

Source Control BMPs: Operational practices that reduce potential pollutants at the source.

Source Reduction (also source control): The technique of stopping and/ or reducing pollutants at their point of generation so that they do not come into contact with stormwater.

Splash Detachment: When a drop of water hits the ground, all the water goes flying separating sediment particles from the soil. The first step in mobilization.

Staging Area: a temporary location where people, vehicles, equipment or material are assembled prior to their use.

Straw Wattle: A fiber roll consists of straw, flax, or other similar materials bound into a tight tubular roll. Its purpose is to slow stormwater runoff enabling sediments to precipitate.

Storm Drains: Above- and below-ground structures for transporting stormwater to streams or outfalls for flood control purposes.

Stormwater: Defined as urban runoff and snowmelt runoff consisting only of those discharges, which originate from precipitation events. Stormwater is that portion of precipitation that flows across a surface to the storm drain system or receiving waters.

Stormwater Discharge Associated with Industrial Activity: Discharge from any conveyance which is used for collecting and conveying stormwater from an area that is directly related to manufacturing, processing, or raw materials storage activities at an industrial plant.

Stormwater Pollution Control Plan (SWPCP): A less formal plan than the SWPPP that addresses the implementation of BMPs at facilities/businesses not covered by a general permit but that have the potential to discharge pollutants.

Stormwater Pollution Prevention Plan (SWPPP): A written plan that documents the series of phases and activities that, first, characterizes your site, and then prompts you to select and carry out actions which prevent the pollution of stormwater discharges.

Tackifier: A substance added to resins to improve the initial and extended tack range of the adhesive.

Glossary

Tilling: The preparation of soil by loosening it up. Usually involves digging into the soil by hand (pickmatic) or by machine (tines of a tractor, bucket of an excavator, etc)

Treatment Control BMPs: Treatment methods to remove pollutants from stormwater.

Toxicity: Adverse responses of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity: Describes the ability of light to pass through water. The cloudy appearance of water caused by suspended and colloidal matter (particles).

Vegetative Protection: The Preservation of vegetation through traffic controls and temporary surface protection.

Velocity Dissipater: A device installed typically on a culvert or drainage outlet that will slow the velocity of stormwater. Dissipaters can be construction in many configurations and of various materials but are typically tear shaped and comprised of cobblestones.

Volcanic Soil: Soils that are derived of decomposed volcanic rock and lahar material from volcanic eruptions. These soils tend to contain a higher percentage of fine particles making erosion control difficult once these particles have become mobilized by wind or water.

Waste Management: Products, systems and services for the collection, handling, treatment (including recycling) and disposal of municipal, commercial and industrial wastes. Examples include landfill liners and composters (products), landfill gas extraction (systems), and collection and disposal (services).

Wattle: a form of erosion control typically used to reduce sediment in runoff. A wattle is often constructed of natural plant materials such as hay bales, or plant material grubbed from a construction site and arranged in piles on a down flow slope.

Winterization: The preparation of equipment for operation in conditions of winter weather. This applies to preparation not only for cold temperatures, but also for snow, ice, and strong winds.

Working Pile: A pile of materials for a project that is currently being used on-site.

List of Acronyms

AASHTO American Association of State Highway and Transportation Officials

AB Aggregate Base

AC Asphalt Concrete

ADL Aerially Deposited Lead

AIMP Impervious Area

AINF Infiltration Area

ANSI American National Standards Institute

APHA American Public Health Association

APWA American Public Works Association

ARS Agricultural Research Service

AQMD Air Quality Management District

ASTM American Society for Testing Materials

AWWA American Water Works Association

BAT Best Available Technology (economically available)

BCT Best Conventional Technology (pollution control)

BFP Bonded Fiber Matrix

BMPs Best Management Practices

BOD Biological Oxygen Demand

CA Contractor Activities

CAL-EPA California Environmental Protection Agency

CAL-OSHA California Division of Occupational Safety and Health Administration

CAO Cleanup and Abatement Order

CASQA California Stormwater Quality Association

CCR California Code of Regulations

CCS Cellular Confinement System

CEQA California Environmental Quality Act

CERCLA Comprehensive Environmental Response Compensation and Liability Act

CFR Code of Federal Register

CMA Congestion Management Program

COE U.S. Army Corps of Engineers

CPI Coalescing Plate Interceptor

CWA Clean Water Act (Federal Water Pollution Control Act of 1972 as amended in 1987)

CWN Cease work Notification

DCIA Directly Connected Impervious Area

DI Drainage Inlet

DTSC California Department of Toxic Substances Control

EEC Effect Effluent Concentration

List of Acronyms

EIR	Environmental Impact Report
EMC	Event Mean Concentration
EOS	Equivalent Opening Size
ESA	Environmentally Sensitive Area
ESC	Erosion and Sedimentation Control
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
GIS	Geographical Information System
Hazmat	Hazardous Material
HSG	Hydrologic Soil Groups
IPM	Integrated Pest Management
JURMP	Jurisdictional Urban Runoff Management Program
MEP	Maximum Extent Practicable
MS4	Municipal Separate Storm Sewer System
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
NMFS	National Marine Fisheries Service
NONC	Notice of Noncompliance
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of Intent
NOV	Notice of Violation
NPDES	National Pollution Discharge Elimination System
NPS	Non-point Source
NRC	National Response Center
NRCS	Natural Resources Conservation Service
O&G	Oil and Grease
O&M	Operations and Maintenance
OSDS	On-site Disposal System
OSHA	Occupational Safety and Health Administration
P2	Pollution Prevention
PCBs	Polychlorinated Biphenyls
PCC	Portland Concrete Cement
PPT	Pollution Prevention Team
POTW	Publicly Owned Treatment Works
PSD	Particle Size Distribution
RCRA	Resource Conservation and Recovery Act
RWQCB	Regional Water Quality Control Board

List of Acronyms

SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SIC	Standard Industrial Classification
SPCC	Spill Prevention Control and Countermeasure
SWMP	Stormwater Management Program
SWPCP	Stormwater Pollution Control Plan
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resource Control Board
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TSS	Total Suspended Solids
UFC	Uniform Fire Code
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
WEF	Water Environment Federation

ATTACHMENT E: CHAIN OF CUSTODY FORM

Chain of Custody Record

INTEGRATED ENVIRONMENTAL RESTORATION SERVICES, INC
2780 LAKE FOREST ROAD
TAHOE CITY, CA 96145

Analytical Laboratory Information:
High Sierra Water Lab
PO Box 171
Truckee, CA
hswaterlab@aol.com

Project Name:	**Project Location:**
Project Manager:	**Phone #**
Sampled by:	**Sampler Signature:**

Billing Information:

Sample ID	# of containers	Date Sampled	Time Sampled	Sample Type	Type of Analyses to be Performed								Turnaround Time			Notes
				Grab/Water												
				Grab/Water												
				Grab/Water												
				Grab/Water												
				Grab/Water												
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				Grab/Water												

	Signature	Print Name	Company	Date	Time	On Ice (Y or N)
Reliquished By:						
Received By:						
Reliquished By:						
Received By:						
Reliquished By:						
Received By:						

ATTACHMENT F: VISUAL MONITORING/BMP INSPECTION FORM

SWPPP Visual Monitoring/BMP Inspection Report

Project Name	
Project Location	
WDID#	
General Contractor	
24/7 Contact Person Info	
Inspector Name	
Title/Company	
Date of Inspection	
Time of Inspection	
Type of Inspection (circle one)	Daily Weekly Storm Post-Storm
Current Weather	
Precipitation Since Last Inspection	
Cumulative Precip. (storm total)	
Inspector's Signature	

SWPPP Compliance Action Items

ID#	SWPPP Non-Compliance Item	Location and BMP Plan Sheet #	Corrective Action Required	To be Completed By: Date/Time	Completion Date/Time and Signature

NOTES (include stages of construction currently in progress)

Erosion and Sediment Control BMPs

- ☐ **Disturbed soil areas** are stabilized with wood chips, pine needles or gravel. No signs of rills, gullies.
- ☐ **Wattles** are installed, maintained and functioning per specifications (e.g. in full contact with soil surface, minimum 6" freeboard, deposited sediment removed, etc).
- ☐ **Silt fence** is installed, maintained and functioning per specifications (e.g. trenched into soil, upright, firmly attached to wire backing, staked every 6 ft, no tears in filter fabric, deposited sediment removed, etc).
- ☐ **Gravel bag check dams** are installed, maintained and functioning per specifications (e.g. oriented perpendicular to flow path and free of sediment).

Describe observations, any non-compliance issues and immediate corrective actions taken:

Site Management BMPs

- ☐ **Track-off controls** are in place and effective at preventing track-off from construction vehicles. No track-off observed anywhere onsite.
- ☐ **Concrete washouts** are less than 75% full and placed in designated locations. No concrete leaks or spills observed. Washouts are covered with plastic sheeting if chance of rain in forecast.
- ☐ **Drain inlets** are free of accumulated debris/sediment. Filter socks are cleaned out or replaced weekly.
- ☐ **Stormwater outlet protection** features (e.g. rock aprons) are free of accumulated sediment, providing soil coverage, no evidence of erosion or scouring.
- ☐ **Vegetation/tree protection** is in place and effective in all areas of active construction.
- ☐ **Spill kits** are onsite and accessible to contain and clean up any chemical and hazardous material spills (e.g. fertilizers, fuels, lubricants, paints, adhesives, etc.). *If a spill occurs, contain the spill and contact IERS (530.581.4377) immediately to report spills and clean-up/containment actions.*
- ☐ **Stockpiles** of erodible materials are located in designated areas (on BMP plans), completely contained with perimeter sediment control barriers (e.g. wattles weighted with gravel bags), and covered with plastic sheeting if chance of rain in 48 hour forecast exceeds 50%.
- ☐ **Sweeping** – all roads, parking areas and other impervious surfaces are free of accumulated sediment, sand or other debris. No track-off anywhere on project site.

Describe observations, any non-compliance issues and immediate corrective actions taken:

Housekeeping BMPs

- ☐ **Spill prevention** – all chemicals and hazardous materials (e.g. fertilizers, fuels, lubricants, paints, adhesives, etc.) are stored in spill-proof containers.
- ☐ **Temporary sanitary facilities** are located away from drainage paths, regularly emptied/replaced, and fully containing all sanitary waste.
- ☐ **Solid waste mgmt –** Construction site is free of trash and litter. Garbage dumpsters/cans are covered, located away from drainage paths, regularly emptied/replaced, and fully containing all solid waste.

Describe observations, any non-compliance issues and immediate corrective actions taken:

Attach inspection photos, a printout of the weather forecast from the NOAA website, and a copy of the BMP or DSA maps (if applicable) to this report.

ATTACHMENT G: RAIN EVENT ACTION PLAN TEMPLATE

Rain Event Action Plan

Project Name	
Project Address/Location	
WDID#	
General Contractor	
24/7 Contact Person Info	
Inspector Name	
Title/Company	
Date of Inspection	
Time of Inspection	
Current Weather	
Date Rain is Predicted to Occur	
Predicted Chance of Rain (%)	
Inspector's Signature	

I certify under the penalty of the law that this Rain Event Action Plan (REAP) will be carried out in accordance with the General Permit.

Kevin Drake, Qualified SWPPP Practitioner

Notes

To Do List

- ☐ Inform site personnel of predicted rain
- ☐ Check erosion and sediment control material stock
- ☐ Check scheduled construction activities and reschedule as needed
- ☐ Alert erosion control contractor (TBD)
- ☐ Schedule staff for extended rain inspections
- ☐ Review and update BMP and DSA maps
- ☐ Distribute report and corrective action items to key personnel
- ☐
- ☐

SWPPP Compliance Action Items

ID#	SWPPP Non-Compliance Item	Location and BMP Plan Sheet #	Corrective Action Required	To be Completed By: Date/Time	Completion Date/Time and Who

Erosion and Sediment Control BMPs

- ☐ **Disturbed soil areas** are stabilized with wood chips, pine needles or gravel. No signs of rills, gullies.
- ☐ **Wattles** are installed, maintained and functioning per specifications (e.g. in full contact with soil surface, minimum 6" freeboard, deposited sediment removed, etc).
- ☐ **Silt fence** is installed, maintained and functioning per specifications (e.g. trenched into soil, upright, firmly attached to wire backing, staked every 6 ft, no tears in filter fabric, deposited sediment removed, etc).
- ☐ **Gravel bag check dams** are installed, maintained and functioning per specifications (e.g. oriented perpendicular to flow path and free of sediment).

Describe observations, any non-compliance issues and immediate corrective actions taken:

Site Management BMPs

- ☐ **Track-off controls** are in place and effective at preventing track-off from construction vehicles. No track-off observed anywhere onsite.
- ☐ **Concrete washouts** are less than 75% full and placed in designated locations. No concrete leaks or spills observed. Washouts are covered with plastic sheeting if chance of rain in forecast.
- ☐ **Drain inlets** are free of accumulated debris/sediment. Filter socks are cleaned out or replaced weekly.
- ☐ **Stormwater outlet protection** features (e.g. rock aprons) are free of accumulated sediment, providing soil coverage, no evidence of erosion or scouring.
- ☐ **Vegetation/tree protection** is in place and effective in all areas of active construction.
- ☐ **Spill kits** are onsite and accessible to contain and clean up any chemical and hazardous material spills (e.g. fertilizers, fuels, lubricants, paints, adhesives, etc.). *If a spill occurs, contain the spill and contact IERS (530.581.4377) immediately to report spills and clean-up/containment actions.*
- ☐ **Stockpiles** of erodible materials are located in designated areas (on BMP plans), completely contained with perimeter sediment control barriers (e.g. wattles weighted with gravel bags), and covered with plastic sheeting if chance of rain in 48 hour forecast exceeds 50%.
- ☐ **Sweeping** – all roads, parking areas and other impervious surfaces are free of accumulated sediment, sand or other debris. No track-off anywhere on project site.

Describe observations, any non-compliance issues and immediate corrective actions taken:

Housekeeping BMPs

- ☐ **Spill prevention** – all chemicals and hazardous materials (e.g. fertilizers, fuels, lubricants, paints, adhesives, etc.) are stored in spill-proof containers.
- ☐ **Temporary sanitary facilities** are located away from drainage paths, regularly emptied/replaced, and fully containing all sanitary waste.
- ☐ **Solid waste mgmt –** Construction site is free of trash and litter. Garbage dumpsters/cans are covered, located away from drainage paths, regularly emptied/replaced, and fully containing all solid waste.

Describe observations, any non-compliance issues and immediate corrective actions taken:

Attach inspection photos, a printout of the weather forecast from the NOAA website, and a copy of the BMP or DSA maps (if applicable) to this report.

ATTACHMENT H: POLLUTANT TESTING GUIDANCE TABLE

Pollutant Testing Guidance Table

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Asphalt Products (Sections 37, 39, 92, 93, 94, and Special Provisions)	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
	Asphalt Emulsion				
	Liquid Asphalt (tack coat)				
	Cold Mix				
	Crumb Rubber	Yes – Black, solid material	Visually Observable - No Testing Required		
	Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
Cleaning Products	Acids	No	**pH** Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	pH Meter Acidity Test Kit	EPA 150.1 (pH)
					SM 2310B (Acidity)
					EPA 300.0 (Anion)
	Bleaches	No	**Residual Chlorine**	Chlorine	SM 4500-CL G (Res. Chlorine)
	Detergents	Yes - Foam	Visually Observable - No Testing Required		
	TSP	No	**Phosphate**	Phosphate	EPA 365.3 (Phosphate)
	Solvents	No	**VOC**	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Portland Concrete Cement & Masonry Products (Section 27, 28, 29, 40, 41, 42, 49, 50, 51, 53, 63, 65, 72, 73, 80, 81, 83, 90, and Special Provisions)	Portland Cement (PCC)	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Masonry products	No	**pH**	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Alkalinity		SM 2320 (Alkalinity)
	Sealant (Methyl Methacrylate - MMA)	No	**Methyl Methacrylate**	None	EPA 625 (SVOC)
			Cobalt		EPA 200.8 (Metal)
			Zinc		
	Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash Municipal Solid Waste	No	**Aluminum** **Calcium** **Vanadium** **Zinc**	Calcium Test	EPA 200.8 (Metal) EPA 200.7 (Calcium)
	Mortar	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Concrete Rinse Water	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Non-Pigmented Curing Compounds	No	Acidity	pH Meter Alkalinity or Acidity Test Kit	SM 2310B (Acidity)
			Alkalinity		SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
Landscaping and Other	Aluminum Sulfate	No	Aluminum	TDS Meter	EPA 200.8 (Metal)

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Products (Section 20, 24, and Special Provisions)			**TDS**	Sulfate	EPA 160.1 (TDS)
			Sulfate		EPA 300.0 (Sulfate)
	Sulfur-Elemental	No	**Sulfate**	Sulfate	EPA 300.0 (Sulfate)
	Fertilizers-Inorganic [4]	No	**Nitrate**	Nitrate	EPA 300.0 (Nitrate)
			Phosphate	Phosphate	EPA 365.3 (Phosphate)
			Organic Nitrogen	None	EPA 351.3 (TKN)
			Potassium	None	EPA 200.8 (Metal)
	Fertilizers-Organic	No	TOC	Nitrate	EPA 415.1 (TOC)
			Nitrate		EPA 300.0 (Nitrate)
			Organic Nitrogen		EPA 351.3 (TKN)
			COD		EPA 410.4 (COD)
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity	Visually Observable - No Testing Required		
	Herbicide	No	**Herbicide**	None	Check lab for specific herbicide or pesticide
	Pesticide		**Pesticide**		
	Lime		Alkalinity	pH Meter Alkalinity or Acidity Test Kit	SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)
Painting Products (Section 12-3.08, 20-2.32, 50-1.05, 59, 91, and Special Provisions)	Paint	Yes	Visually Observable - No Testing Required		
	Paint Strippers	No	**VOC**	None	EPA 601/602 or EPA 624 (VOC)

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
			SVOC	None	EPA 625 (SVOC)
	Resins	No	**COD**	None	EPA 410.4 (COD)
			SVOC		EPA 625 (SVOC)
	Sealants	No	**COD**	None	EPA 410.4 (COD)
	Solvents	No	**COD**	None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Lacquers, Varnish, Enamels, and Turpentine	No	**COD**	None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Thinners	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
			COD		EPA 410.4 (COD)
Portable Toilet Waste Products	Portable Toilet Waste	Yes	Visually Observable - No Testing Required		
Contaminated Soil [5]	Aerially Deposited Lead[3]	No	**Lead**	None	EPA 200.8 (Metal)
	Petroleum	Yes – Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		
	Mining or Industrial Waste, etc.	No	**Contaminant Specific**	Contaminant Specific – Check with laboratory	Contaminant Specific – Check with laboratory

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
Line Flushing Products	Chlorinated Water	No	**Total Chlorine**	Chlorine	SM 4500-CL G (Res. Chlorine)
Adhesives	Adhesives	No	COD	None	EPA 410.4 (COD)
			Phenols	Phenol	EPA 420.1 (Phenol)
			SVOC	None	EPA 625 (SVOC)
Dust Palliative Products (Section 18)	Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	Chloride	Chloride	EPA 300.0 (Chloride)
			TDS	TDS Meter	EPA 160.1 (TDS)
			Cations (Sodium, Magnesium, Calcium)	None	EPA 200.7 (Cations)
Vehicle	Antifreeze and Other Vehicle Fluids	Yes - Colored Liquid	Visually Observable - No Testing Required		
	Batteries	No	Sulfuric Acid	None	EPA 300.0 (Sulfate)
			Lead	None	EPA 200.8 (Metal)
			pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
	Fuels, Oils, Lubricants	Yes - Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		
Soil Amendment/Stabilization Products	Polymer/Copolymer [6, 7]	No	**Organic Nitrogen**	None	EPA 351.3 (TKN)
			BOD	None	EPA 405.1 (BOD)
			COD	None	EPA 410.4 (COD)
			DOC	None	EPA 415.1 (DOC)
			Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
			Nickel	None	EPA 200.8 (Metal)
	Straw/Mulch	Yes - Solids	Visually Observable - No Testing Required		
	Lignin Sulfonate	No	Alkalinity	Alkalinity	SM 2320 (Alkalinity)
			TDS	TDS Meter	EPA 160.1 (TDS)
	Psyllium	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
	Guar/Plant Gums	No	COD	None	EPA 410.4 (COD)
			TOC		EPA 415.1 (TOC)
			Nickel		EPA 200.8 (Metal)
	Gypsum	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Calcium	Calcium	EPA 200.7 (Calcium)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Aluminum	None	EPA 200.8 (Metal)
			Barium		
			Manganese		
			Vanadium		
Treated Wood Products (Section 58, 80-3.01B(2), and Special Provisions)	Ammoniacal-Copper-Zinc-Arsenate (ACZA) Copper-Chromium-Arsenic (CCA)	No	Arsenic	Total Chromium	EPA 200.8 (Metal)
			Total Chromium		
			Copper		

Category	Construction Site Material	Visually Observable?	Pollutant Indicators [2]	Suggested Analyses Field [3]	Laboratory
	Ammoniacal-Copper-Arsenate (ACA) Copper Naphthenate		Zinc		
	Creosote	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		

Notes:

1. If specific pollutant is known, analyze only for that specific pollutant. See MSDS to verify.
2. For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.
3. See www.hach.com, www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits
4. If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.
5. Only if special handling requirements are required in the Standard Special Provisions for aerially deposited lead (ADL)
6. If used with a dye or fiber matrix, it is considered visually observable and no testing is required.
7. Based upon research conducted by Caltrans, the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is **not** required: Super Tak™, M-Binder™, Fish Stik™, Pro40dc™, Fisch-Bond™, and Soil Master WR™.

Acronyms:

BOD – Biochemical Oxygen Demand
COD – Chemical Oxygen Demand
DOC – Dissolved Organic Carbon
EPA – Environmental Protection Agency
HACH – Worldwide company that provides advanced analytical systems and technical support for water quality testing.
SM – Standard Method
SVOC – Semi-Volatile Organic Compounds
TDS – Total Dissolved Solids
TKN – Total Kjeldahl Nitrogen
TOC – Total Organic Carbon
TSP – Tri-Sodium Phosphate
VOC - Volatile Organic Compounds

References:

Construction Storm Water Sampling and Analysis Guidance Document, California Stormwater Quality Task Force, October 2001.
Environmental Impact of Construction and Repair Materials on Surface and Ground Waters, Report 448, National Cooperative Highway Research Program, 2001
Soil Stabilization for Temporary Slopes, Environmental Programs, California Department of Transportation, October 1, 1999.
Statewide Storm Water Management Plan, Division of Environmental Analysis, California Department of Transportation, April 2002.
Statewide Storm Water Quality Practice Guidelines, Environmental Program, California Department of Transportation, August 2000.
Soil Stabilization for Temporary Slopes and District 7 Erosion Control Pilot Study, June 2000.
Stormwater Monitoring Protocols, Guidance Manual, California Department of Transportation, May 2000.

ATTACHMENT I: EFFLUENT SAMPLING AND MEASUREMENT FIELD LOG

Effluent Sampling and Measurement Field Log

Project Name	
Project Location	
WDID#	
Sampler Name	
Title/Company	
Sampling Date	
Sampling Start Time/Stop Time	
Sampling Event Type (circle one)	**Stormwater Non-stormwater** **Non-visible pollutant Post-NEL exceedance**
Current Weather	
Sampler's Signature	

Field Meter Calibration

pH Meter #	Date of Last Calibration	Turbidity Meter #	Date of Last Calibration	Turbidity Meter Field Calibration Check
				.01 __ 20 ___ 100___ 800___

Field pH and Turbidity Measurements

Sample Location ID	pH	Turbidity	Time

Grab Sampling

Sample Location ID	O&G	Other (specify)	Time

Sampling Notes

ATTACHMENT J: NAL EXCEEDANCE REPORT TEMPLATE

NAL Exceedance Report Template

Date:

To:

Subject: Notice of NAL Exceedance

Project Name:

WDID#:

Date, time, and location of NAL exceedance

NAL parameter(s) exceeded[1]

Construction operations and/or pollutant sources that caused the NAL exceedance

Initial assessment of any impact caused by the NAL exceedance

Existing BMP(s) in place prior to NAL exceedance discharge event

---

[1] Include the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit")

Corrective actions taken after the NAL exceedance (include dates, locations and types of BMPs deployed)

Actions taken or planned to reduce, eliminate and/or prevent recurrence of the discharge and NAL exceedance

Implementation and maintenance schedule for any affected BMPs

Attach copies of pre-discharge inspection report,

If further information or a modification to the above schedule is required, notify the contact person below.

Name of Contact Person	Title
Company	Telephone Number
Signature	Date

ENCROACHMENT PERMIT

APPLICANT:		PERMITTEE:	
Truckee River Watershed Council	Lisa Wallace		
PO Box 8568	Phone: 530-550-8760		Phone:
Truckee, CA 96162	Cell:		Cell:

PROJECT: This permit authorizes the grading work within the Town of Truckee right-of-way as per the approved construction plans submitted by the Truckee River Watershed Council (TRWC) for the Truckee Meadows Restoration Project. The work is proposed primarily within the Town right-of-way on Brockway Road, Estates Drive and Riverview Drive. Work includes compliance with the conditions of this permit.

SPECIAL CONDITIONS:

1. Cost of this permit is $264.00
2. Traffic control, according to the MUTCD, shall be in place during all construction activities in the roadway.
3. All construction activities shall be limited to 7:00 AM to 6:00 PM.
4. All equipment and materials shall be off the roadway and properly delineated at night, according to the MUTCD.
5. Expiration date of this permit is October 15, 2017.
6. Proper BMP's for erosion control according to the Lahontan Regional Water Quality Control Board shall be in place prior to and maintained throughout construction. Measures for spill prevention and spill clean up shall be readily available onsite.
7. If any part of the completed installation interferes with the use of the roads by the general public, or needs adjusting to match the grade of the roadway, or is in conflict with any future Town improvement projects, including underground drainage, it must be relocated or removed at the sole expense of the applicant, its assigns or successors.
8. Work zones within pavement or shoulder sections shall be cleaned daily and maintained free of dirt or dust during non-work hours. Cleaning shall consist of sweeping, washing or other means necessary to remove dirt and debris from the roadway surface.
9. All excavation, backfill, compaction, and pavement repair shall be performed in accordance with the *Town of Truckee Public Improvement and Engineering Standards* adopted May 2003.
10. Applicant shall, to the maximum extent allowed by law, indemnify, defend, and hold harmless Town, its officers, employees, agents, and volunteers, from any and all claims, actions, losses, damages, or liabilities stemming from or otherwise relating to this Permit, the Town property, and/or the permitted work, except for such claims, actions, losses, damages or liabilities caused by the sole negligence or gross misconduct of Town.
11. **Notify Michael Vaughan of the Engineering Department at 530-582-2923 at least 48 hours prior to beginning work and at the completion of the permitted project.**

_____ _____

Lisa Wallace, TRWC Date Date

The permit is approved subject to applicant's and permittee's acceptance of the Special Conditions. The start of any specified work shall constitute acceptance of all provisions. The permit shall become void if all contemplated work is not completed before the expiration date and is revocable at any time. Any voided or revoked permit shall become a violation, which will be handled in accordance with applicable State and Town regulations.

_____ _____

Michael L. Vaughan, Senior Engineer Date

SECTION 00 41

BID SHEET

Bid Item	Spec. No.	Description	UNIT	QTY	UNIT COST	TOTAL COST
1	01 35 44	Environmental Requirements	LS			
2	01 71 23	Layout and Staking	DAYS			
3	01 90 00	Mobilization and Demobilization	LS			
4	02 41 13	Demolition	LS			
5	02 73 00	Dewatering	LS			
6	31 00 00	Earthwork	LS			
7	31 11 00	Clearing and Grubbing	SY			
8	32 11 23	Aggregate Surfacing	LS			
9	32 18 00	Paths and Trails	LS			
10	32 20 00	Culvert Overflow	LS			
10a	32 20 00	Culvert Overflow - Bid Alternate	LS			
11		Metal Gate	EA			
12		Chain Link Fence with Double Swing Gate	LS			
13		Culvert and Flared End Sections	LS			
14	32 84 00	Planting Irrigation	LS			
15	32 91 00	Planting Preparation	LS			
16	32 92 19	Seeding	LS			
17	32 93 00	Planting	LS			
18	32 98 00	Plant Establishment	MON			
19	35 42 35	Boulder Structures	LS			
20	35 42 41	Log Structures	LS			
		BASE BID TOTAL				
		BID ALTERNATE TOTAL				

END OF SECTION

Sample Contract

Truckee Meadows Restoration Project – Construction

Contractor:

Lead: Truckee River Watershed Council

Mailing address:
P.O. Box 8568
Truckee, CA 96162

Physical address
10418 Donner Pass Rd (enter from High Street)
Truckee, CA

(530) 550-8760, office

Matt Freitas, Program Manager
Lisa Wallace, Executive Director

I. DEFINITIONS

A. Acceptance (or Final Completion) – Acceptance occurs when all the provisions and requirements of the Contract are complete and is so certified by the Client.

B. Bulletin – A Bulletin is a written order directed to Contractor and issued by the Client, directing a minor change or making a clarification in the Work, or requesting information from Contractor about the Work. A Bulletin is to be used for minor changes or clarifications which Client believes will have no impact on the Contract Sum or Contract Time.

C. Calendar Day (or Day) – A Calendar Day is a day of twenty-four (24) hours measured from one midnight to the next midnight, Pacific Time. Unless otherwise indicated, a "day" shall mean a Calendar Day.

D. Change Order (or Amendment) – A Change Order is a written modification of the Contract Documents made in accordance with the provisions of Section IV.C of this Contract and which has been signed by Client and Contractor.

E. Client – the Client is the Truckee River Watershed Council (TRWC). TRWC and Client are used interchangeably in the Contract.

F. Contract (or Contract Documents) – The Contract shall consist of this Contract, Bid Form, Performance Bond, Plans, Technical Specifications, Certificate of Insurance, Addenda, Amendments, and Proof of Contractor's licenses.

G. Contract Sum – The Contract Sum is the total amount of money stated in the Contract as payable to Contractor for the performance of the Work under the Contract, including authorized adjustments thereto.

H. Contractor – The Contractor is the person, firm, individual, partnership, company, corporation, association, joint venture, or any combination thereof, which has entered into the Contract with TRWC.

I. Engineer and Engineer's Representative – The Engineer for this project is Peter Kulchawik, Balance Hydrologics. The Engineer's Representatives include employees of Balance, TRWC personnel, and any other individuals that are named by the Engineer as Engineer's Representatives.

J. Field Order – A Field Order is a written order directed to Contractor and signed by the Client directing a change or making a clarification in the Work, or requesting information from Contractor about the Work. A Field Order signed by Contractor indicates receipt of the Field Order. A Field Order shall be followed by a Change Order.

K. Milestone Date – A Milestone Date is a significant point in the development of the Work that is illustrated on Contractor's Project Work Schedule.

L. Not-in-Contract (NIC) – Not-in-Contract means work not included in the Contract.

M. Owner's Representative – The Owner's Representative is an employee of the Truckee Donner Land Trust, Truckee Donner Public Utilities District, Truckee Donner Recreation and Parks District, Truckee Tahoe Airport District, Oregon Investors X Limited Partnership- Village Oaks Community Association, Truckee Pines Apartments LLC.- Cascade Housing Association, Town of Truckee, Truckee Sanitary District, or Tahoe-Truckee Sanitation Agency.

N. Project – The Project means the erection, construction, alteration, repair, or improvement to be accomplished under the Contract.

O. Project Work Schedule – The Project Work Schedule is the schedule furnished by Contractor to Client in accordance with Section IV.D of this Contract displaying the anticipated schedule for completing the Work.

P. Regular Work Hours – Regular Work Hours for this project are Monday – Friday, 7:00 AM – 7:00 PM. Work outside of these hours must be approved in advance by the Engineer's Representative.

Q. Schedule of Values – The Schedule of Values is the statement furnished by Contractor to Client in accordance with Section III.C of this Contract displaying the portions of the Contract Sum allotted for the various parts of the Work.

R. Subcontractor – A Subcontractor is anyone having a direct contract with Contractor or another Subcontractor and includes one who furnishes material worked to a special design according to the Plans, but does not include one who merely furnishes material.

S. Work – The Work is everything required to complete the Project, including, but not limited to, all labor, suppliers, material, equipment, and tools.

II. SPECIFIC CONDITIONS

A. Project Description

The lead for the project is Truckee River Watershed Council (TRWC). Several land owners and managers are project partners:

Truckee Donner Land Trust
Truckee Tahoe Airport District
Truckee Donner Public Utilities District
Truckee Donner Recreation and Park District
Oregon Investors X Limited Partnership- Village Oaks Community Association
Truckee Pines Apartments LLC. - Cascade Housing Association
Town of Truckee
Truckee Sanitary District
Tahoe-Truckee Sanitation Agency

Background. The Hilltop-Ponderosa area was once a single contiguous wet meadow complex that discharged to the Truckee River. Since the settlement of Truckee in the 1800's it has been significantly impacted by land use and urban development which has altered and disconnected the hydrology of the system. This has contributed to loss of wetland habitat and hydrologic function as well as contributed to downstream erosion and sedimentation issues. Despite the level of alteration, feasibility and conceptual design basis studies have demonstrated that there are significant opportunities for restoration and functional uplift of the site.

The Truckee Meadows Restoration project (TMRP) is designed to restore hydrologic function and reestablish historic wetlands by reversing historic and modern impacts and making improvements to the existing infrastructure. Moreover it seeks to remedy erosion issues downstream of the meadow complex to reduce sedimentation of the Truckee River.

Work. The project work is described in detail in the attached 100% Design Plans (Attachment 1) and Technical Specifications (Attachment 2). General construction activities include:

- Fill approximately 1,000 linear feet of constructed ditches in the meadow complex;
- Remove artificial fill and regrade portions of meadow surface;
- Install log features to stabilize filled ditches and promote dispersal of surface waters across meadow surface;
- Install two log weir features at culvert entrances to promote inundation at meadow outlets;
- Reconfigure (i.e. excavation/grading) irrigation pond to create wetland bench and reduce bank slopes;
- Install boulder outflow features at irrigation pond outlets;
- Install "sod block" features in minor drainage paths to promote dispersal of surface flows across meadow surface;
- Realign and block ephemeral stream channel downstream of meadow complex;
- Grade to promote appropriate drainage within a stormwater basin;
- Improve drainage and road surface on access roads;
- Install 3 metal gates and miscellaneous boulders to control vehicle access on access roads;
- Remove and block concrete-lined ditch on Truckee River floodplain;
- Provide erosion control during construction period;
- Revegetate with native plants (seeds, container plants, native pole cuttings, salvaged sod);
- Install of approximately 0.4 miles of recreational trails around irrigation pond and meadow complex; and
- Plant establishment, maintenance, and optional temporary irrigation system.

Please refer to the 100% Design Plans and Technical Specifications for construction detail, typicals of project features, materials requirements, staging, access, etc.

Access. Work will take place in sensitive areas, so access routes will be strictly limited to avoid impacts to natural and cultural resources.

Traffic Control Plan. Portions of work will be within the Town of Truckee right-of-way and will require a Traffic control plan. Please see Technical Specifications (Attachment 2) Section 01 55 26 and the draft Town of Truckee encroachment permit (Attachment #4) for details.

Materials. Except where noted, contractor will furnish labor, materials, equipment, tools, and incidentials as necessary to complete the project and comply with permits, This includes erosion control measures as outlined in the sample contract and specified on the 100% Design Plans, Technical Specifications, and Stormwater Pollution Prevention Plan (SWPPP; Attachment 3).

Materials provided by TRWC are:
- Log materials: Class 1, 2, and 3 logs.
- All container plants, seed mixes, and Submerseed ™ for the initial revegetation

Alternatives. Due to a water pipeline in the construction area, there are two alternative designs for the construction of the culvert overflow on sheet 3.5 of the 100% restoration designs (dashed rectangle). Both alternates are included on sheet 3.6. Submitted bids must include the bid cost for both alternates (Bid Item #10 and 10a) as well as a Base Bid Total (including Bid Item 10, excluding 10a) and a Bid Alternate Total (including Bid Item 10a, excluding 10).

Bid Completeness. All sections of this bid package are important and must be addressed. Bids must be submitted for the entirety of the work as described in the 100% Design Plans Set (Attachment 1) and Technical Specifications (Attachment 2).

Construction Oversight. Work will be observed by the Licensed Civil Engineer or Engineer's Representative as described in the 100% Plans.

Schedule. Estimated start work date is August 15, 2017. Work shall be completed by October 15, 2017.

B. Work Requirements

Work Schedule. The Work Schedule will be established between Contractor and TRWC – either 10 hrs/day, 4 days/week or 8 hrs/day, 5 days/week. In either case, the work is expected to continue until the project is completed. No over time charges can be accommodated.

Staging and Access. Equipment/site access will be limited to routes designated in the 100% Design Plans and as approved by the Engineer's Representative and Project Archaeologist. All equipment staging and stockpiling will take place in designated areas.

Equipment. Contractor must provide equipment in excellent operating condition. No leaks of any size will be allowed. Contractor will be required to secure replacement equipment if any equipment is inoperable for two (2) days or longer. Failure to perform these requirements is grounds for contract termination.

All equipment will be pressure washed prior to mobilizing to the site to remove any vegetative matter, soil, or other organic matter to prevent the spread of noxious weeds. Any equipment that leaves the site must be cleaned again before re-entry.

Contractor will be required to provide all fuel, servicing and repairs to maintain equipment in operating condition. The Contractor shall fuel equipment at staging areas shown on the 100% Design Plans whenever practical. When fueling must be done at a construction area, the Contractor shall design a site(s) and obtain approval in writing from the Engineer before using. All fueling, servicing and repairs will be done in designated fueling areas at a minimum of 50 feet from any water surface or drainage area to prevent accidental petroleum discharge in riparian and other sensitive areas. Please refer to the 100% Design Plans and Technical Specifications for any additional details on access, staging, and stockpiling.

Water quality concerns require that all equipment be free of all operating fluid leaks. The Contractor will be required to follow spill prevention procedures as outlined in the SWPPP, and is required to have the appropriate materials on-site to clean up any spills that may occur.

Spark arresters will be required on equipment for fire prevention.

Construction Water. Water will be available from the Southside Well operated by Truckee Donner Public Utilities District (TDPUD) located at 10514 Brockway Road (approx. 0.3 miles west the primary staging area). Access will be coordinated prior to project initiation by TRWC and TDPUD. Construction water will be provided at no cost to the Contractor by the TDPUD.

Personnel. TRWC reserves the right to have Contractor replace a non-performing operator. No change in personnel will occur without written agreement between the Contractor and TRWC.

Materials. All materials to be used in the project must meet the specifications stated in the Technical Specifications and on the 100% Design Plans. The Engineer or Engineer's representative will approve all materials prior to installation.

Best Management Practices. All BMPs and dewatering systems will be installed and approved by the Engineer or Engineer's Representative before any work can begin, per Technical Specification 02 73 00 and the SWPPP (Attachments 2 and 3).

C. Funding

Funding sources for this project only allow invoices to be submitted once every 90 days (as per the schedule below) for work completed. It is expected that payment can be made within 120 days of invoice(s) submittal; however payment will only be made to the Contractor once TRWC has received

payment from the project funders. All efforts will be made by TRWC to expedite payment; however no interest will be paid on overdue payments.

TRWC invoices project funders quarterly (March 31, June 30, September 30, and December 31) for work completed. The obligation of TRWC to pay its Contractors shall be subject to and conditioned upon its receipt of payment Project Funders.

Attachments:

Attachment 1. 100% Design Plan Set
Attachment 2. Technical Specifications
Attachment 3. Stormwater Pollution Prevention Plan (SWPPP)

III. CONSIDERATION

A. Invoice instructions

Contractor shall submit an invoice to TRWC for compensation earned during the previous quarter. All costs and time incurred by Contractor to prepare, review, respond to, estimate, or otherwise process Bulletins, Field Orders, Amendments, Schedules, Correspondence, or any other paperwork shall be part of Contractor's base contract administration and no additional compensation will be allowed therefore.

Contractor shall **address and submit** invoices for each payment to: TRWC, PO Box 8568, Truckee, CA 96162. Invoices may also be submitted electronically to: mfreitas@truckeeriverwc.org.

Contractor shall submit invoices by close of business on September 25, 2017 and December 15, 2017. If a second construction season is needed, additional invoices shall be submitted by close of business on September 25, 2018 and December 15, 2018.

Each invoice shall include cost data to support the invoice, including current percentage of completion on a line-item basis and an updated Project Work Schedule.

Note: final invoice shall be marked *Final*.

B. Subcontracts

Contractor shall include the billing requirements of this in all its contracts with subcontractors and outside consultants. Billing and audit provisions of all contractor's subcontracts over $100,000 shall be reviewed and approved in writing by TRWC for compliance with the availability of information provision, prior to contractor's execution of the subcontract. For subcontracts over $50,000 and less that $100,000, contractor shall provide to TRWC a copy of the executed subcontract within ten days of its full execution. Nothing in this contract shall create any contractual relations between a subcontractor and TRWC.

C. Schedule of Values

The successful bidder, within ten (10) days, not including Saturdays, and Sundays, after receiving notice that he/she is the successful bidder, shall submit along with the Contract Documents a complete itemized Schedule of Values that includes, but is not necessarily limited to, the cost of each line item equal to or greater than one and one-half percent of the contractor's total bid and every work item (activity) shown on the Project Work Schedule. The sum of the cost of all activities in the Schedule of Values shall equal the Contract Amount. Contractor's mobilization, profit, fees, taxes, and administration must be itemized separately and not be prorated across other categories. The Schedule of Values, when approved by Client shall be used to monitor the progress of the Work and as a basis for payment requests. Each item shall show its total Scheduled Value, percentage completed, total value completed and value yet to be

completed. Contractor is to add approved Change Orders (Amendments) to the Schedule of Values on a monthly basis.

IV. GENERAL CONDITIONS

A. Independent Contractor

In assuming and performing the obligations of this contract, Contractor shall not be eligible for any benefits which TRWC may provide its employees or other contractors. All persons, if any, hired by contractor shall be employees or subcontractors of contractor and shall not be construed as employees or agents of TRWC in any respect.

B. Conflict Of Interest/Business Ethics

1. During the term of this contract, Contractor will not accept any employment or engage in any work that creates a conflict with, or in any way compromises the work to be performed under this contract.

2. Contractor or its employees shall not offer substantial gifts, entertainment, payments, loans or other consideration to TRWC employees, their families, vendors, subcontractors and other third parties for the purpose of influencing such persons to act contrary to TRWC's interest.

3. All financial statements, reports, billings, and other documents rendered shall properly reflect the facts about all activities and transactions handled for the account of the TRWC.

4. Contractor shall immediately notify TRWC of any and all violations of this clause upon becoming aware of such violation.

C. Changes in work

TRWC reserves the right to make such changes in work, specifications, or level of effort as may be necessary or desirable, and any difference in contract price resulting from such changes shall be agreed upon in writing by TRWC before the work is begun.

i. Change Orders (Amendments) – When adjustments in the Contract Sum are determined, such determination shall be effective immediately and shall be recorded by preparation and execution of an appropriate Change Order. A Change Order signed by Contractor indicates Contractor's final and binding agreement therewith, including the adjustment in the Contract Sum. No Change Order shall authorize an adjustment in the Contract Sum unless such Change Order specifies such adjustment. If no adjustment in the Contract Sum is specified, Contractor's execution of the Change Order shall constitute Contractor's agreement that no such adjustment shall be made. Contractor agrees that in no event shall it make any subsequent claim relating to the items covered by an executed Change Order, whether direct, indirect, or consequential in nature.

ii. Bulletins and Field Orders – A Bulletin or Field Order shall not be recognized as having any impact upon the Contract Sum. Contractor shall have no Claim therefore unless, within five (5) days from the date such direction or order was given, Contractor submits a written Change Order Request to the Client with estimates of any adjustment in the Contract Sum to which Contractor believes it is entitles as a result of the change in the Work described in the Bulletin or Field Order, including sufficient detail to allow evaluation by the Client.

iii. Pricing Changes – When submitting its change proposal, Contractor shall include and set forth in clear and precise detail, breakdowns of labor, materials and allowable costs for all trades involved and the estimated impact on the Project Work Schedule. If requested by Client, Contractor shall furnish spreadsheets from which the breakdowns were prepared, plus spreadsheets, if requested, of any Subcontractors. Allowable costs to be included in Contractor's change proposal shall be strictly limited to those set forth in this Section of the Contract.

Allowable costs include and shall be strictly limited to the following:

a. The actual and reasonable cost of additional materials required as a result of such change, purchased by Contractor (or any Subcontractor) and used in the work, including sales taxes, freight and delivery charges.

b. Construction Equipment costs shall be substantiated by vendor's invoices. In no event shall the cost of such items exceed (1) the average current wholesale prices at which the items are locally available in the quantities required, delivered to the site, less applicable cash or trade discounts or (2) the equipment rental rates in the Labor Surcharge and Equipment Rental Rates published by Caltrans; whichever is less. The allowable rate constitutes full compensation to the contractor including cost of fuel, oil, lubrication, supplies, necessary attachments, repairs, maintenance, depreciation, storage, insurance, labor except for construction equipment operators, and incidentals. No costs will be allowed for time while construction equipment is inoperative, idle or on standby, unless approved by the Client.

c. Labor costs including welfare and fringe benefits shall be the actual labor cost, required as a result of such change in the Work, including no more than one (1) working foreman, but not including any supervisory or administrative personnel.

d. The cost of Work performed by Subcontractors or sub-Subcontractors is based on the actual direct costs of material, labor, and construction equipment and is determined pursuant to the provisions of this Section of the Contract.

e. For deleted Work otherwise required to be performed hereunder, the Contract Sum shall be reduced by an amount equal to the net savings to Contractor and all Subcontractors and sub-Subcontractors on account of the deleted work for material, labor, and construction equipment.

Failure of Contractor and Client to agree on an adjustment of the Contract Sum or extension of Contract end date for performance under the Contract Documents shall not excuse Contractor from proceeding with the prosecution and performance of the Work as changed. Client shall have the right within its sole discretion to require Contractor to commence performance of changes to the Work. If Contractor and Client cannot agree on an appropriate stipulated sum for any change, the adjustment to the Contract Sum, if any shall, subject to the provisions of this Contract, be determined by Client on the basis of the allowable costs incurred as a result of such change as set forth in Section IV.C.iii of this contract.

D. Contractor's Construction Schedules

Within ten (10) calendar days of the Notice to Proceed, Contractor shall furnish to the Client one electronic copy of a Project Work Schedule, presenting an orderly and realistic plan for completing the Work. The schedule includes all scheduled working days, relevant work activities by trade and critical path dates. Within five (5) working days from the date the Project Work Schedule is furnished to the Client, Client shall review and comment on the Project Work Schedule and approve or disapprove it, giving reasons for any disapproval. If disapproved, Contractor shall modify the Project Work Schedule and resubmit it for approval following the above stated timeframes. The Project Work Schedule shall be maintained at the work site and all revisions, along with the reasons therefore, as well as any effect on the critical path of the Work and the completion date, shall be furnished to Client as soon as possible after the date of the revision, but in no event later than five (5) days after its revision.

E. Contractor's Use of TRWC and/or Owner's Property

All materials, equipment or other property in whatever form provided by TRWC or Owner(s) for Contractor's use in performance of services under this contract shall remain the property of those agencies and shall be returned to the appropriate agency immediately upon completion of contractor's use or upon written request by the agency.

F. Cancellation

TRWC may cancel this contract upon 48 hours written notice if the Contractor for any reason whatsoever fails, refuses, or is unable to perform the work in accordance with this contract. In the event of cancellation, TRWC will pay Contractor for services satisfactorily performed prior to the effective date of cancellation. Contractor shall not enter into any agreements, commitments, or subcontracts that would incur cancellation costs without prior written approval of TRWC. Such written approval is a condition precedent to the payment of any cancellation charges by TRWC.

G. Availability of Information

TRWC's duly authorized representatives shall have, during the term of the contract and for six (6) years thereafter, access at all reasonable times to all of Contractors and its subcontractors' personnel, accounts and records of all description, including but not limited to computer files, pertaining to the contract to verify or review the quantity, quality, work program and progress of the work, reimbursable costs, amounts claimed by contractor, estimates of cost for fixed rates including those applicable to proposed changes, and for any other reasonable purposes.

This provision shall apply to all contracts except those performed solely on a lump-sum basis. However, where lump-sum and time and materials work (unit price, reimbursable cost, fixed rates, etc.) are performed together, either as a part of this contract or as separate contracts, then the above audit privilege shall also extend to TRWC access to all contractor's records pertaining to all contracts including the lump-sum for assurance TRWC the portions of the work performed on a time and materials basis are not being charged with time, material or other units or cost which are intended to be covered by lump-sum or fixed rates, etc. provided herein, supplement hereto or in such other agreements.

Contractor's and its subcontractors' accounts shall be kept in accordance with generally accepted accounting principles in the particular industry and shall be kept in such a manner and in sufficient detail to clearly disclose the nature and amounts of the different items of service and cost pertaining to the contract and the basis for charges or allocations to the contract.

H. Compliance with Laws

Contractor shall comply with all applicable federal, state, and local laws, rules, and regulations and shall obtain all applicable licenses and permits for the conduct of its business and the performance of the work called for in this contract.

I. Compliance with Tax Reform Act Of 1986

Contractor represents and warrants that it will withhold all taxes, if any, which are required to be withheld under applicable law with respect to payments to persons hired by Contractor who perform services for Contractor. Contractor shall indemnify and hold TRWC harmless, on an after-tax basis, for any liability incurred by TRWC as a result of contractor's failure to institute any such required withholding.

J. Choice of Laws

This contract shall be construed and interpreted in accordance with the laws of the state of California excluding any choice of law rules that may direct the application of the laws of another jurisdiction.

K. Nonwaiver

The waiver by either party of any breach of any term, covenant, or condition contained in this contract or any default in the performance of any obligations under this contract shall not be deemed to be a waiver of any other breach or default of the same or any other term, covenant, condition, or obligation. Nor shall any waiver of any incident of breach or default constitute a continuing waiver of same.

L. Enforceability

In the event that any of the provisions or the application of any of the provisions of this contract are held to be illegal or invalid by a court of competent jurisdiction, TRWC and Contractor shall negotiate an equitable adjustment in the provisions of this contract with a view toward effectuating the purpose of this contract. The illegality or invalidity of any of the provisions or the application of any of the provisions of this contract shall not affect the legality or enforceability of the remaining provisions of the contract.

M. Incidental and Consequential Damages

TRWC shall not be liable for incidental or consequential damages including, but not limited to, loss of profits, commitments to subcontractors, rental or lease agreement(s), and personal services contracts unless expressly authorized in writing by TRWC.

N. Prior Work

Services performed by Contractor pursuant to TRWC authorization, but before the execution of this contract, shall be considered as having been performed subject to the provisions of this contract.

O. Force Majeure

Neither TRWC nor Contractor shall be considered in default in the performance of its obligations under this contract, except obligations to make payments hereunder, for work previously performed to the extent that the performance of any such obligation is prevented or delayed by any cause, existing or future, which is beyond the reasonable control of the affected party. In the event either party claims that performance of its obligations was prevented or delayed by any such cause, that party shall promptly notify the other parties of that fact and of the circumstances preventing or delaying performance. Such party so claiming a cause-delayed performance shall endeavor, to the extent reasonable, to remove the obstacles which preclude performance.

P. Integration

This contract including the attached Plans, Technical Specifications, and additional Attachments contains the entire agreement and understanding between the parties as to the subject matter of the contract. It merges and supersedes all prior or contemporaneous agreements, commitments, representations, writings, and discussions between Contractor and TRWC, whether oral or written, and has been induced by no representations, statements, or agreements other than those expressed herein. Neither contractor nor TRWC shall be bound by any prior or contemporaneous obligations, conditions, warranties, or representations with respect to the subject matter of this contract.

Should Contractor discover conflicts, omissions, or errors in the Contract Documents or have any question concerning interpretation of clarification of the Contract Documents, or if it appears to Contractor that the Work to be done or any matters relative thereto are not sufficiently detailed or explained in the Contract Documents, then, before proceeding with the Work affected, Contractor shall immediately notify Client in writing to request interpretation, clarification, or furnishing of additional detailed instructions concerning the Work. Such questions shall be resolved and instructions to Contractor issued within fourteen (14) Calendar Days by Client, whose decision shall be final and conclusive. Should Contractor proceed with the Work affected before resolution, Contractor shall be responsible for any resultant damage or added cost, and Contractor shall remove, replace, or adjust the Work not in accordance with Client's subsequent instructions.

Q. Safety Precautions and Protection of Property

Contractor shall plan and conduct the work to safeguard persons and property from injury. Contractor shall direct performance of work in compliance with reasonable safety and work practices and applicable federal,

state, and local laws, rules, and regulations including, but not limited to, *occupational safety and health standards*. Neither the issuance of special instructions by TRWC nor the adherence thereto by contractor shall relieve contractor of the sole responsibility to maintain safe and efficient working conditions.

All work shall conform to the requirements of the California Administrative Code, Title 8, Industrial Relations, Division of Industrial Safety. The Contractor along shall be responsible for responding to and for the final satisfaction of the any and all claims of personal injury or property damage.

R. Insurance Requirements

Contractor shall, at its expense, maintain in effect at all times during the duration of this Contract not less than the following coverage and limits of insurance:

Liability. A certificate of liability insurance. Such comprehensive liability insurance as shall protect TRWC, its officers, agents, and employees and Contractor from claims which may arise from Contractor's operations under this Contract, whether such operations are by Contractor or by its employees, subcontractors, or anyone directly or indirectly employed by any of the foregoing. The liability insurance shall include, but not be limited to, protection against claims arising from bodily or personal injury or damage to property resulting from operations, equipment, or products of Contractor or by its employees, subcontractors, or anyone directly or indirectly employed by any of the foregoing. The amount of insurance shall be as follows:

a. Worker's Compensation insurance covering any persons to be employed in connection with the Project including subcontractors, and Employers' Liability insurance for all employees with a limit of no less than $500,000 each accident for bodily injury, $500,000 each employee for bodily injury by disease and $500,000 policy limit for disease;
b. Commercial General Liability insurance in an occurrence form in an amount of no less than $2,000,000 per occurrence and $4,000,000 in the aggregate (including, without limitation, bodily injury, property damage, products/completed operations, contractual and personal injury liability coverage); and
c. Commercial Auto Liability insurance with a limit of insurance no less than $2,000,000 combined single limit each accident for bodily injury and property damage covering "any auto" whether owned, non-owned, scheduled, leased, hired or other.

Such insurance shall be issued by an insurer licensed to do business in California, with a rating of not less than A- VII by AM Best's Insurance Rating Guide.

General and Auto Liability insurance shall include a provisions or endorsements naming Truckee River Watershed Council, Truckee Donner Land Trust, Truckee Donner Public Utilities District, Truckee Donner Recreation and Parks District, Truckee Tahoe Airport District, Oregon Investors X Limited Partnership-Village Oaks Community Association, Truckee Pines Apartments LLC.- Cascade Housing Association,, Town of Truckee, Truckee Sanitary District, and Tahoe-Truckee Sanitation Agency as additional insured, with respect to liability arising out of the performance of any work under this Contract, and providing that such insurance is primary insurance with respect to the interests of TRWC and that any other insurance maintained by TRWC is excess not contributing insurance with the insurance required hereunder. If contractor hires subcontractor(s), the subcontractor(s) shall comply with the above requirements.

Contractor shall notify the Client within 10 days of a receipt of a notice of cancellation, expiration, or any reduction in coverage, or if the insurer commences proceedings or has proceedings commenced against it, indicating the insurer is insolvent. Contractor shall provide to Client evidence of replacement policy at least ten (10) working days prior to the effective date of such cancellation, expiration, or reduction in coverage.

Should Contractor fail to keep the insurance required to be carried by these provisions in full force and effect at all times, Client may, in addition to any other remedies Client has, terminate this contract immediately, and all payments due or that become due will be withheld, until notice is received by Client that such

insurance has been restored or replaced in full force and effect and that the premiums, therefore, have been paid to cover a period of time satisfactory to the Client.

S. Indemnification

TRWC and Contractor agree they shall attempt to settle any dispute arising out of this contract, to include allegations of professional negligence, through communication and negotiation in the spirit of mutual friendship and cooperation. If the dispute cannot be resolved in this manner, Contractor, at its expense, shall indemnify, hold harmless, and when requested by TRWC to do so, defend TRWC, its officers, agents, and employees from any and all claims, demands or charges and from any loss or liability, including attorney's fees and expenses of litigation, resulting from negligence or carelessness on the part of the Contractor, its employees, or agents in the execution of the work or delivery of materials and supplies, by or on account of any act or omission of the Contractor, its employees or agents, including damage or destruction of any property or properties arising from, caused by or connected with the performance of work by Contractor, its agents, subcontractors and employees, and any failure to fulfill the terms of any laws or regulations which apply to the contract.

T. Shop Drawings, Product Data, and Samples

Reference in the Contract Documents to any equipment, material, article, or process by specific brand, trade name, make, or catalog number, followed by the term "or approved equal", shall be regarded as establishing a standard of quality. In such cases Contractor may, subject to Client's review and approval, substitute any other brand of equal quality, utility, and availability. Engineer's Representative shall be the sole judge of equality and suitability of substitute materials. Contractor shall bear all costs and expenses, including, but not limited to, costs and expenses related to demonstrating equality or suitability of such substitutions, including, but not limited to, those related to other parts of the Work or the Work of other contractors. Client's approval of any substitution shall not relieve Contractor from compliance with all requirements of the contract Documents. Where the contract Documents do not specifically permit the use of "approved equals" for any equipment, material, article, or process referred to by specific brand, trade name, make or catalog number, no substitutions shall be permitted except by means of the Change Order procedures as set forth in Section IV.C of this contract.

Contractor shall not be relieved of responsibility for any deviations from requirements of the Contract Documents or allowed any additional compensation by reason of Client's approval of Shop Drawings, Product Data, Samples or similar submittals unless Contractor has specifically informed Client in writing of such deviation at the time of submittal and fully complied with Section IV.C of this Contract, and Client has given written approval to the specific deviation. If Shop Drawings provide detail not shown in Contract Documents, Contractor shall be deemed to have primary design-build responsibility for such items. Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals by Client's approval thereof.

U. Safety and Clean-Up

Contractor acknowledges that Owners will continue to occupy and must maintain continuous operations at the Project site. It is critical that these operations shall not suffer any significant interference, including, without limitation, unreasonable noise, dust, odor, or vibration. Contractor shall perform the Work and limit its use of the Project site in such a manner as to minimize any interference with use of the Project site. Contractor shall be liable for all costs for all claims related to dust, mud, noise, odor, vibration, or windblown materials attributed to the Work hereunder.

V. Inspection and Acceptance

Authorized employees and/or agents of Client, Owners, or Engineer shall have access to the Work at all times. When the Work is completed, Contractor shall notify Client and shall request final inspection. Within five (5) calendar days, Client shall make final inspection. Contractor shall be notified in writing of any deficiencies. Contractor shall remedy these deficiencies to complete satisfaction of the Client. After all the

Work under this Contract has been completed and is so certified by the Client, formal acceptance will be made in writing by the Client.

W. Correction of Work

If, within one (1) year after the date of Final Project Acceptance of the entire Work, or within such longer period of time as may be prescribed by laws or in equity, any of the Work is found to be defective in product, materials, and/or workmanship or otherwise not in accordance with the requirements of the Contract Documents, Contractor shall correct it promptly after receipt of written notice from Client to do so unless Client has previously given Contractor a written acceptance of such condition. Corrective Work shall be warranted to be free from defects for a period equal to or longer of six (6) months after the completions of the corrective Work or one (1) year after the Date of Final Completion or such longer period of time as may be prescribed by law or in equity, whichever is longer. Any defect in such Work shall be corrected again by Contractor promptly upon written notice of the defect from the Client. The obligations under this Section IV.W of this Contract shall survive acceptance of the Work under the Contract and termination of the Contract. If Contractor fails to correct such Work, Client may proceed to have the work corrected at Contractor's expense and Contractor shall pay the costs thereof on demand.

X. Sanitary Facilities

Contractor shall provide potable drinking water and sanitary toilet facilities for Contractor's workers. Contractor shall locate temporary facilities as directed by the Client or Owners and maintain such facilities in good repair and in a sanitary condition. Contractor shall remove such facilities completely at the conclusion of the Work.

Y. Storage of Equipment and Materials

Client shall inform Contractor of the availability of suitable areas for the storage of Contractor's equipment and materials. Contractor shall maintain the storage of equipment and materials within the confines of the area designated in the Plans or by Client.

Contractor shall store materials intended for use on this Project in such a manner that their quality and fitness for the Work will be preserved. When considered necessary by Engineer, materials shall be stored so as to facilitate inspection. It shall be Contractor's responsibility to protect those stored items. All stored materials remain the property of the Contractor until such time as they are installed in their final position as intended in the Contract Documents.

Z. Site Conditions

In performance of the Work, Contractor shall undertake such further investigations and studies as may be necessary or useful to determine subsurface characteristics and patent and concealed conditions. In connection with the foregoing, Contractor shall be solely responsible for locating (and shall locate prior to performing any Work) all utility lines, telephone company lines and cables, sewer lines, water pipes, gas lines, electrical lines, including, without limitation, all buried pipelines and buried telephone cables and shall perform the Work in such a manner so as to avoid damaging any lines, cables, pipes, and pipelines. Utility points of connection and other site relationships referenced in the contract documents are diagrammatic in nature. The exact location and routing requirements are the responsibility of the Contractor and are subject to the approval of the Client.

All access routes and staging areas shall be restored to pre-project conditions after project completion as described in the Technical Specifications.

V. ADDITIONAL REQUIREMENTS

A. Performance Bond

Contractor must furnish a performance bond in favor of TRWC in the following amounts: faithful performance (100%) of contract value, product, materials and/or workmanship for a period as described in Section IV.W (100%).

B. Debarment and Suspension

TRWC can not contract with any party who is debarred or suspended or otherwise excluded from or ineligible for participation in federal assistance programs under Executive Order 12549, "Debarment and Suspension"; or any individual or organization on USEPA's List of Violating Facilities. (40 CFR, Part 31.35, Gov. Code, §4477) www.epls.gov.

C. Lobbying prohibition

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
b. If any funds other than Federal appropriated funds have been paid or will be paid to any person influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

D. Human Trafficking

Contractor or Contractor's employees may not: 1) Engage in severe forms of trafficking in persons during the period of time that the contract is in effect; 2) Procure a commercial sex act during the period of time that the contract is in effect; or 3) Use forced labor in the performance of the award or subawards under this contract.

E. Non-discrimination

During the performance of this Agreement, Contractor shall not unlawfully discriminate, harass, or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, physical disability (including HIV and AIDS), mental disability, medical condition (e.g., cancer), age (over 40), marital status, and denial of family care leave. Contractor shall ensure that the evaluation and treatment of their employees and applicants for employment are free from such discrimination and harassment. Contractor shall comply with the provisions of the Fair Employment and Housing Act (Gov. Code §12990 (a-f) et seq.) and the applicable regulations promulgated there under (California Code of Regulations, Title 2, Section 7285 et seq.). The applicable regulations of the Fair Employment and Housing Commission implementing Government Code Section 12990 (a-f), set forth in Chapter 5 of Division 4 of Title 2 of the California Code of Regulations, are incorporated into this Agreement by reference and made a part hereof as if set forth in full. Contractor shall give written notice of their obligations under this clause to labor organizations with which they have a collective bargaining or other Agreement.

F. AMENDMENTS

No modification or change to this contract that is beyond the scope of work described herein shall be binding or effective unless expressly set forth in writing and signed by the TRWC Executive Director. TRWC's staff is not authorized to make modifications or changes to this contract that are beyond the scope

of work agreed upon. Contractor agrees that all costs for any such modification or change that is performed by contractor without TRWC's prior written approval shall be at contractor's sole risk and expense.

VI. EXECUTION

Accepted By:_____

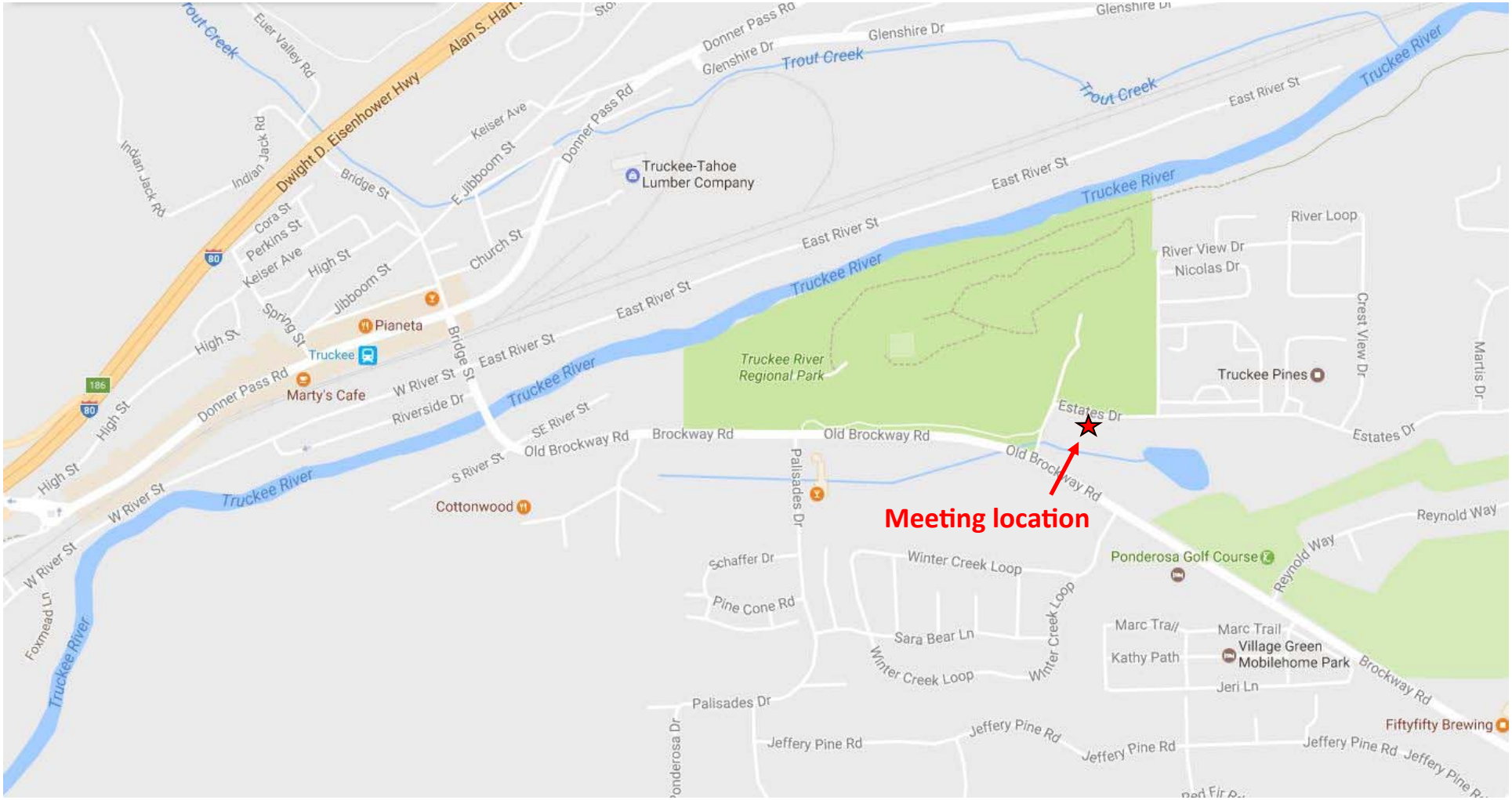
TITLE: Executive Director, TRWC

Date: _____

Accepted By: _____.

TITLE:

Date: _____



Directions from Interstate 80

Exit 188B for CA 89/267 Sierraville/ Lake Tahoe

Take CA 267 South towards Lake Tahoe

At stoplight, turn right onto Brockway/Old Brockway Road

Continue Straight through traffic circle

Turn right on Estates Drive

Within 100 feet, turn right to stay on Estates Drive and immediately park on right hand side of road in pull out.