

# REDWOOD NATIONAL PARK

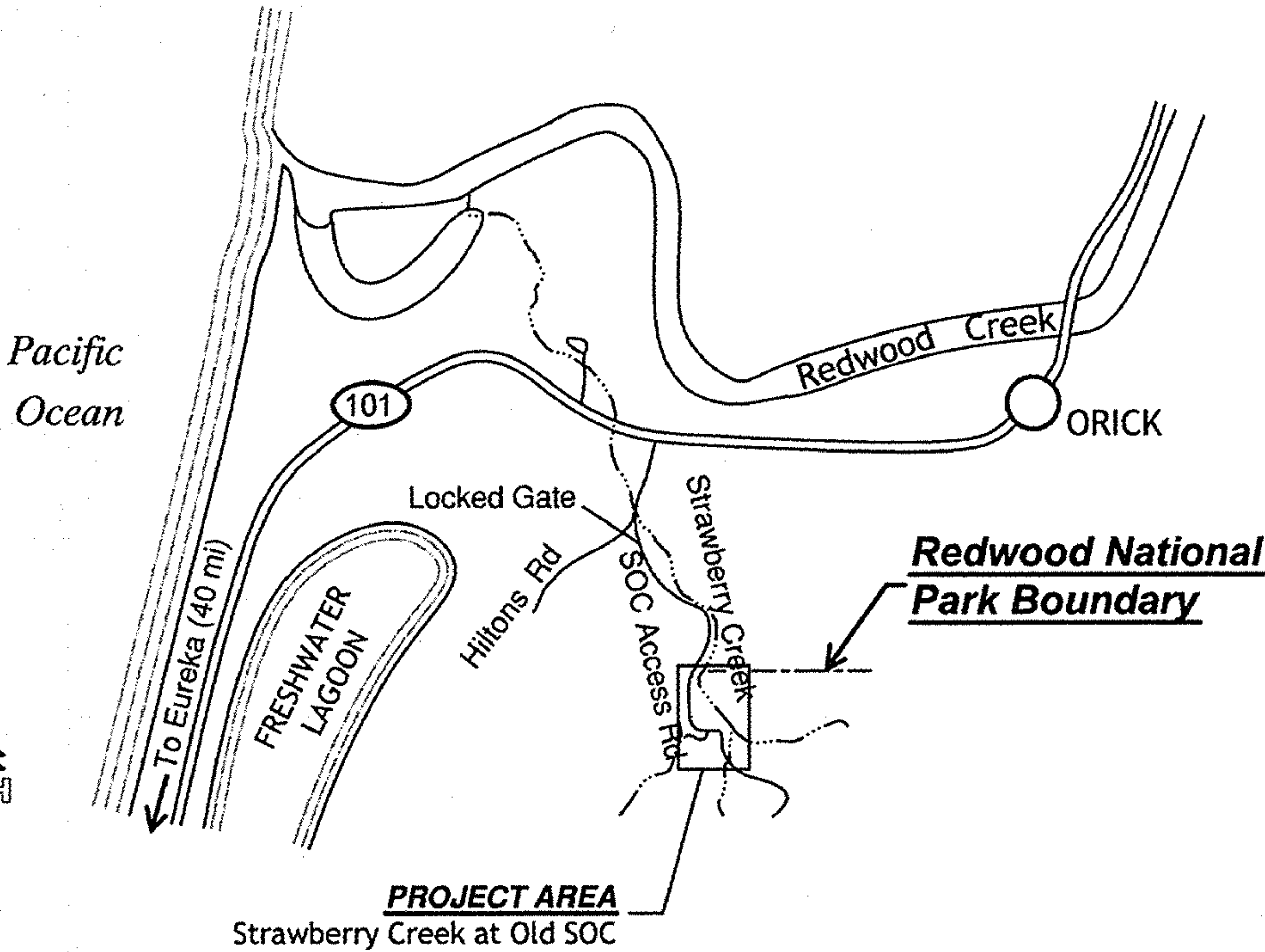
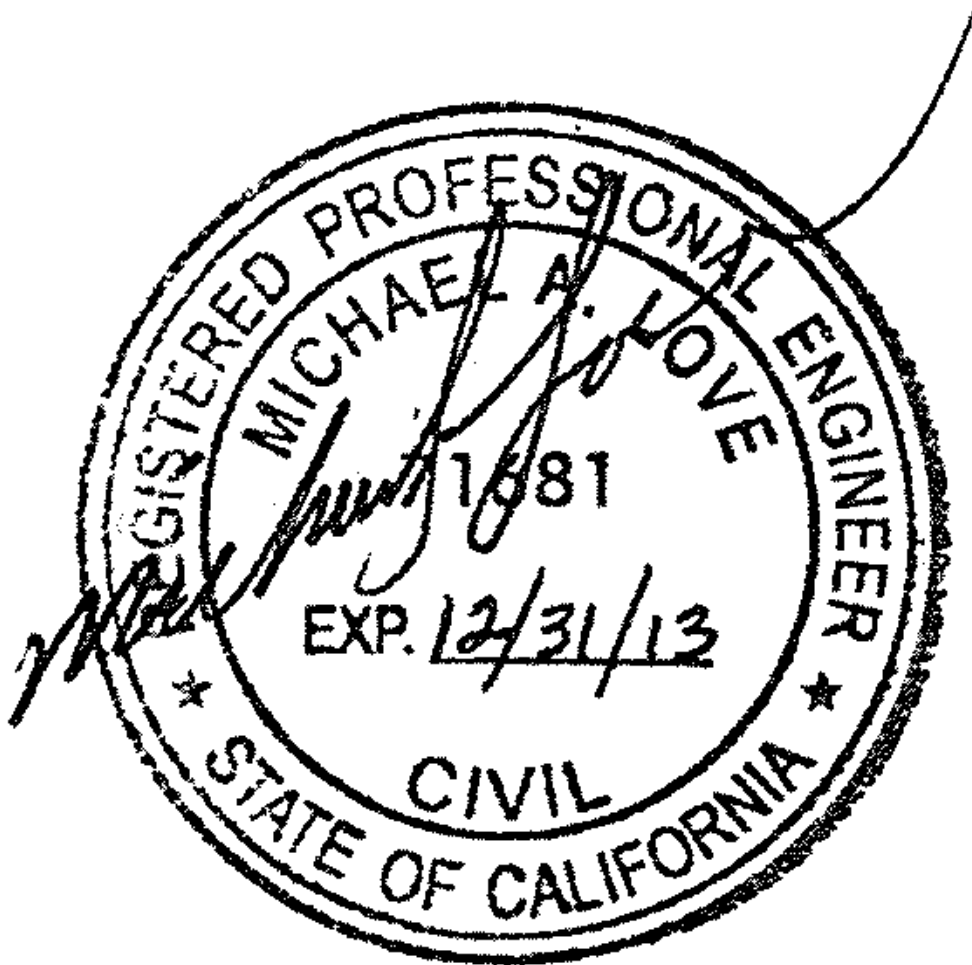
DESIGN PLANS FOR CONSTRUCTION OF

## STRAWBERRY CREEK RESTORATION PROJECT

REDWOOD NATIONAL PARK (RNP)  
March, 2012  
FINAL PLANS

- Prepared For:
- Redwood National Park (RNP)
  - Pacific Coast Fish, Wildlife and Wetlands Restoration Association (PCFWRA)

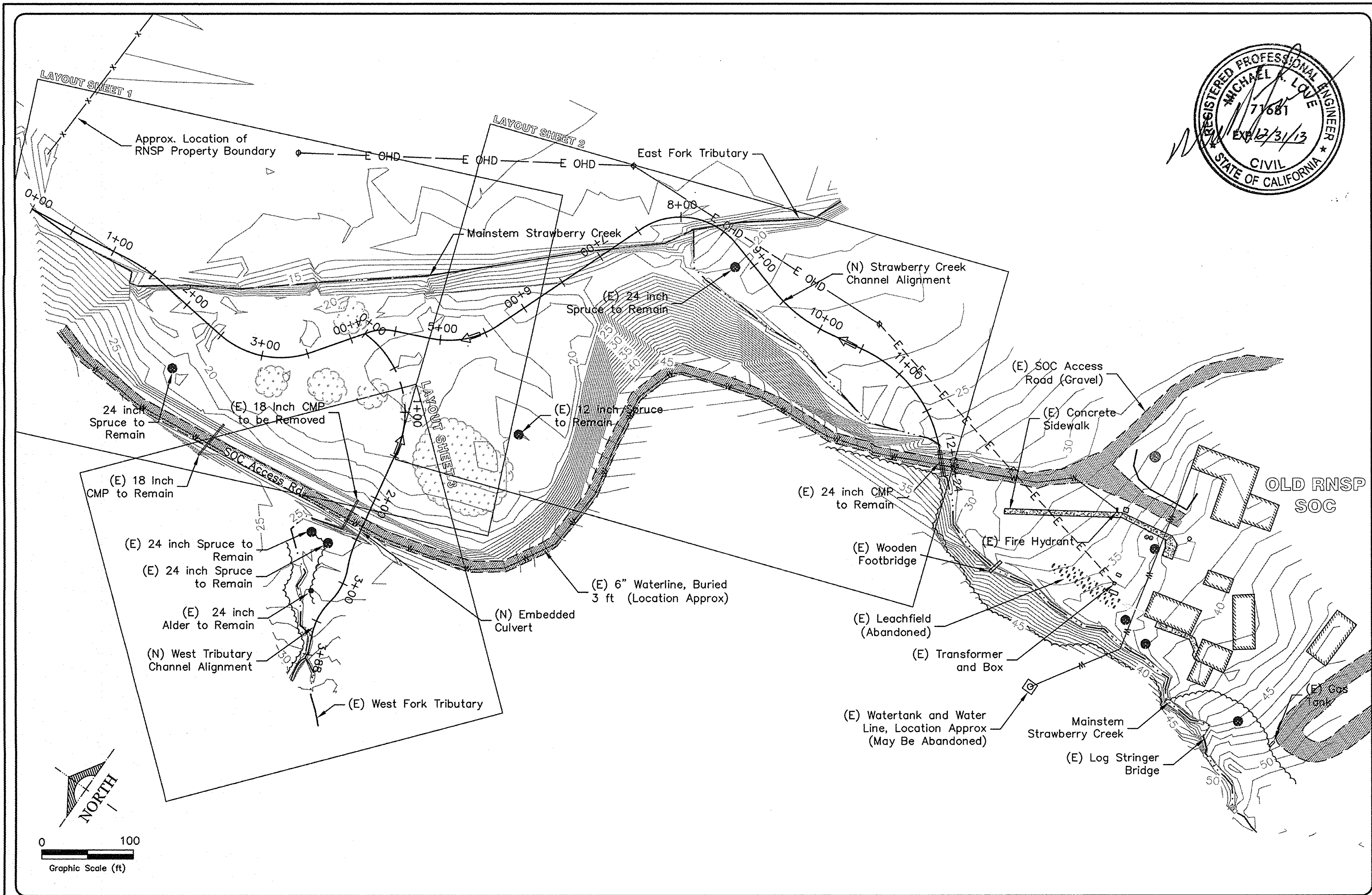
*Michael A. Love* 3/31/2012  
DESIGNED— Michael A. Love  
Michael Love & Associates



LOCATION MAP  
NOT TO SCALE

SHEET No.	DESCRIPTION
1	TITLE SHEET
2	ABBREVIATIONS, LEGEND AND GENERAL NOTES
3	SITE OVERVIEW PLAN
4	NOTES
5	EROSION CONTROL AND WATER MANAGEMENT PLAN
6	WATER MANAGEMENT DETAILS
7	LAYOUT SHEET 1
8	LAYOUT SHEET 2
9	LAYOUT SHEET 3
10	STRAWBERRY CREEK PROFILE SHEET 1
11	STRAWBERRY CREEK PROFILE SHEET 2
12	STRAWBERRY CREEK PROFILE SHEET 3
13	WEST FORK TRIBUTARY PROFILE
14	STRAWBERRY CREEK TYPICAL CROSS SECTIONS
15	STRAWBERRY CREEK GRADING CROSS SECTIONS 1
16	STRAWBERRY CREEK GRADING CROSS SECTIONS 2
17	STRAWBERRY CREEK GRADING CROSS SECTIONS 3
18	STRAWBERRY CREEK GRADING CROSS SECTIONS 4
19	WEST FORK TRIBUTARY TYPICAL CROSS SECTIONS
20	WEST FORK TRIBUTARY GRADING CROSS SECTIONS 1
21	WEST FORK TRIBUTARY GRADING CROSS SECTIONS 2
22	WEST FORK TRIBUTARY CULVERT DETAILS 1
23	WEST FORK TRIBUTARY CULVERT DETAILS AND NOTES
24	PLANTING MOUND DETAILS
25	ROCK WEIR DETAIL
26	LOG STEP POOL DETAILS
27	LOG WEIR AND POOL DETAILS
28	LOG STRUCTURE NOTES AND ANCHORING DETAIL
29	LOG CRIB WALL DETAILS
30	LOG HABITAT STRUCTURE DETAILS
31	PLANTING PLAN
32	PLANTING DETAILS AND NOTES 1
33	PLANTING DETAILS AND NOTES 2





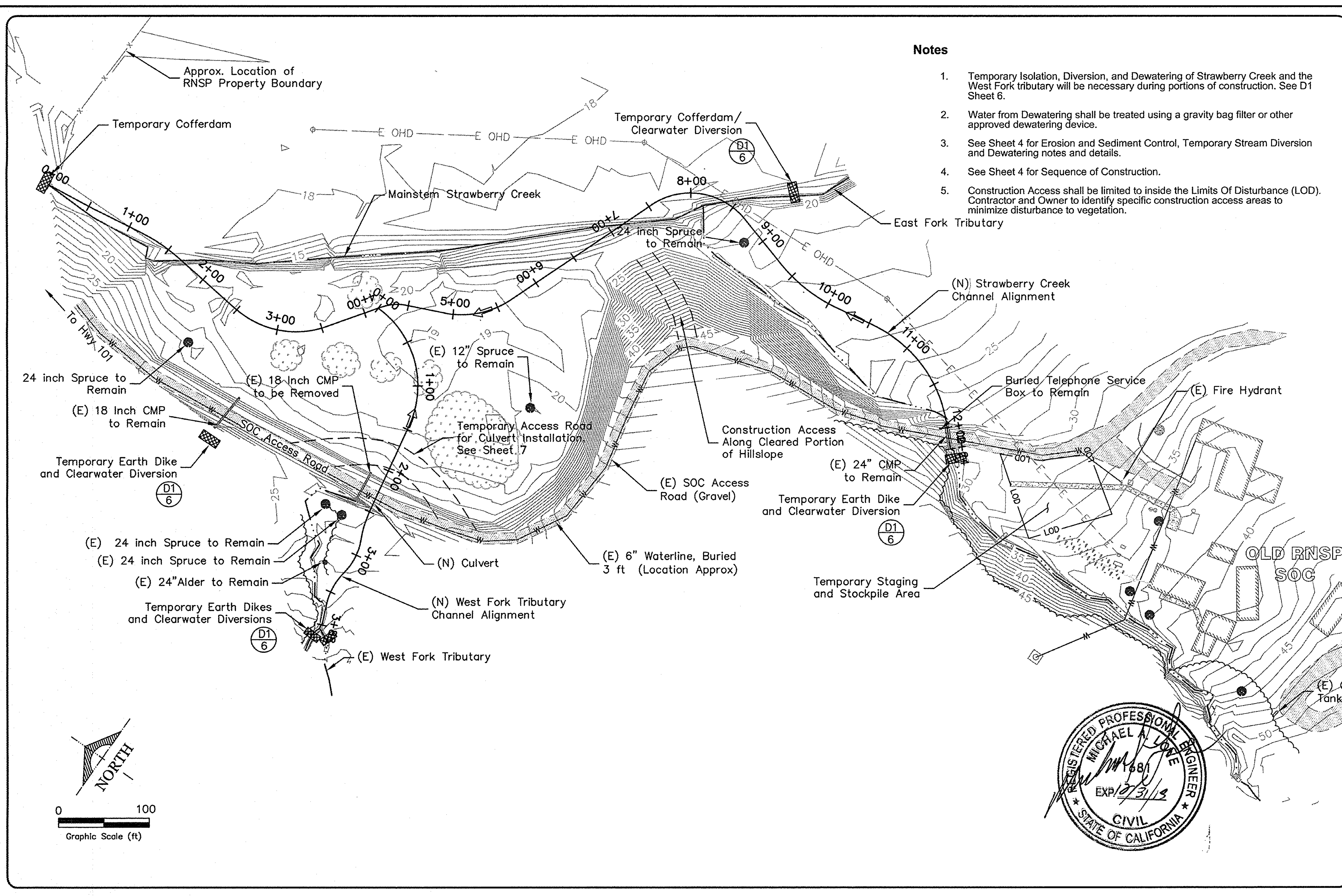
**Michael Love & Associates**  
 PO Box 4477 • Arcadia, CA 91709 • (707) 476-8938  
 PROJECT: Pacific Coast Fish, Wildlife and Wetlands Restoration Assoc.  
 MANAGEMENT:

REDWOOD NATIONAL PARK  
 Strawberry Creek  
 Restoration Project

# SITE OVERVIEW PLAN

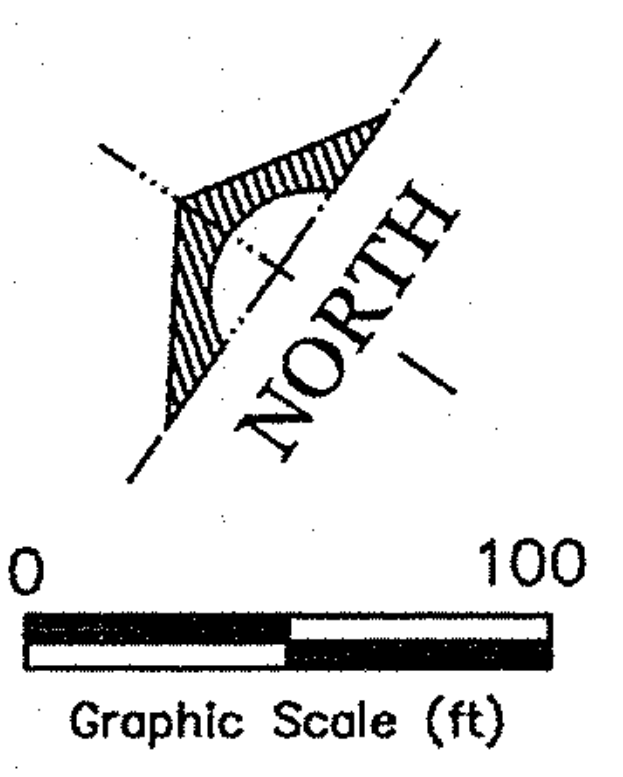
DATE: March 2012  
 SUBMITTAL: FINAL  
 DESIGN: ML / RS / AL  
 DRAWN: Llanos  
 SHEET:





Notes

1. Temporary Isolation, Diversion, and Dewatering of Strawberry Creek and the West Fork tributary will be necessary during portions of construction. See D1 Sheet 6.
2. Water from Dewatering shall be treated using a gravity bag filter or other approved dewatering device.
3. See Sheet 4 for Erosion and Sediment Control, Temporary Stream Diversion and Dewatering notes and details.
4. See Sheet 4 for Sequence of Construction.
5. Construction Access shall be limited to inside the Limits Of Disturbance (LOD). Contractor and Owner to identify specific construction access areas to minimize disturbance to vegetation.



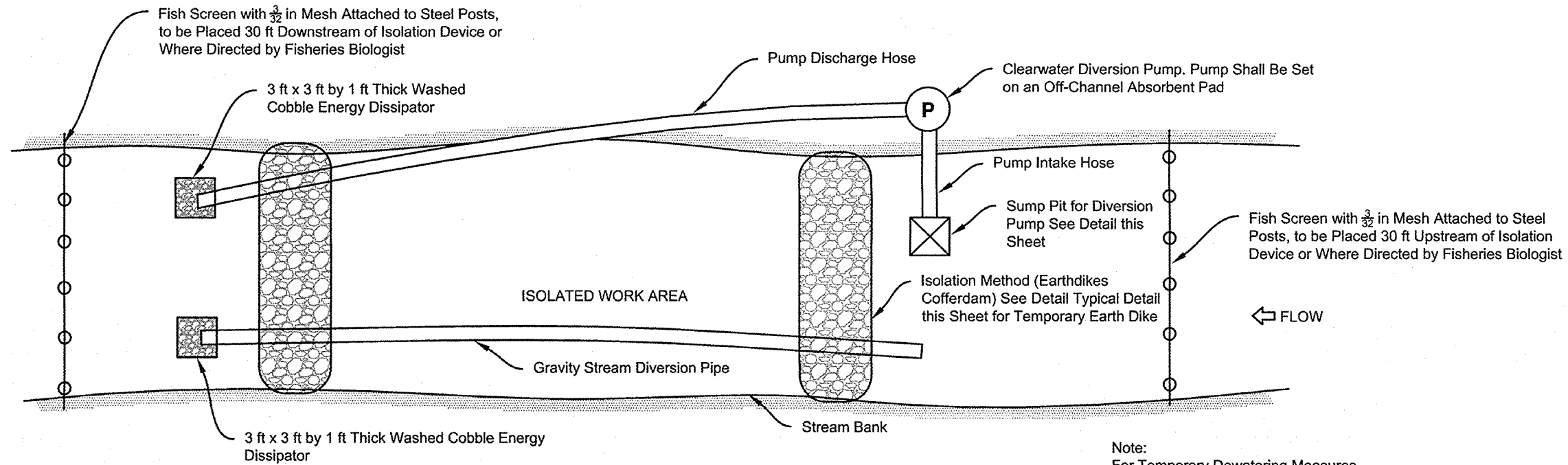
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REDWOOD NATIONAL PARK  
 Strawberry Creek  
 Restoration Project

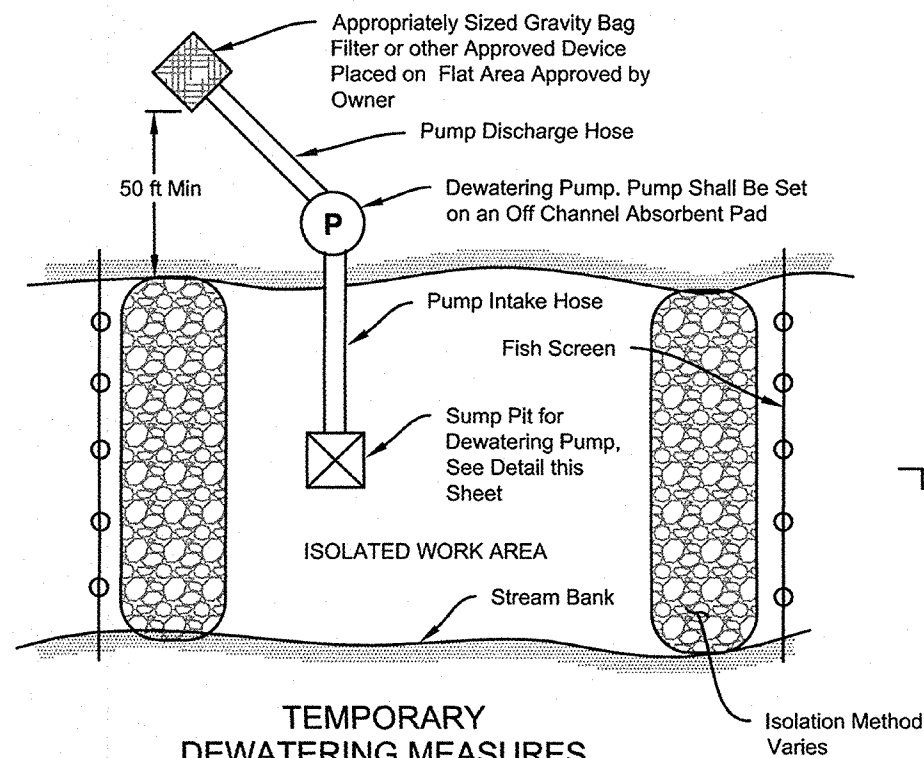
**EROSION CONTROL AND WATER MANAGEMENT PLAN**

DATE: March 2012  
 SUBMITTAL: FINAL  
 DESIGN: ML / RS / AL  
 DRAWN: Llanos  
 SHEET: 5 of 33

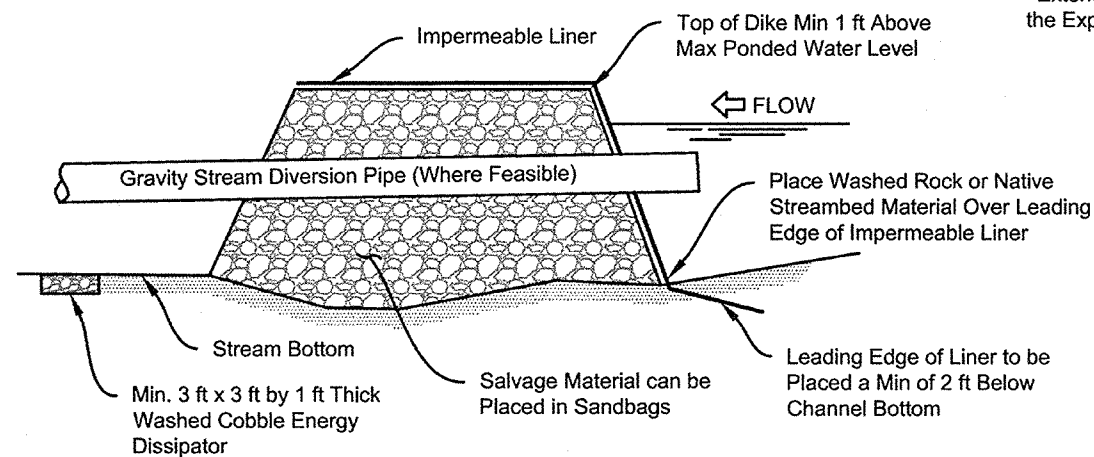




**TEMPORARY CLEAR WATER DIVERSION**  
Plan (NTS)

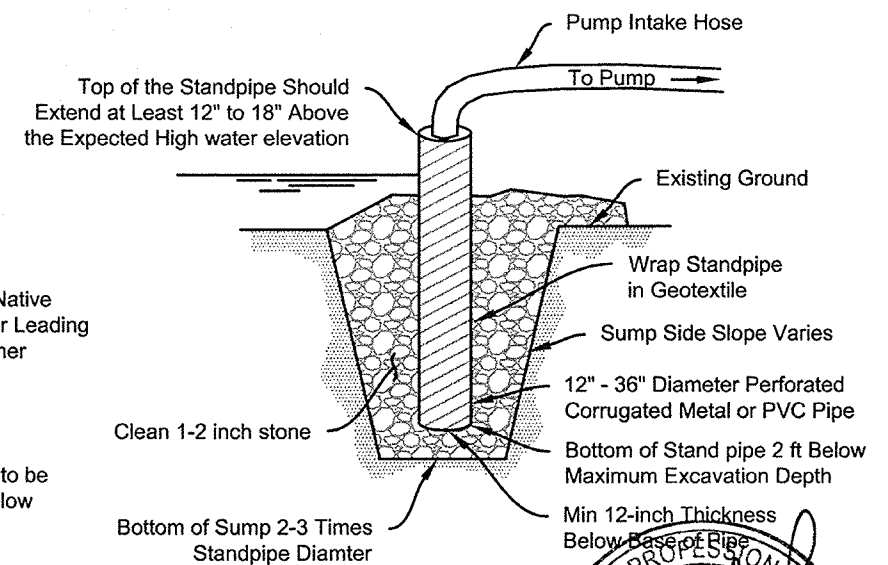


**TEMPORARY DEWATERING MEASURES**  
Plan (NTS)



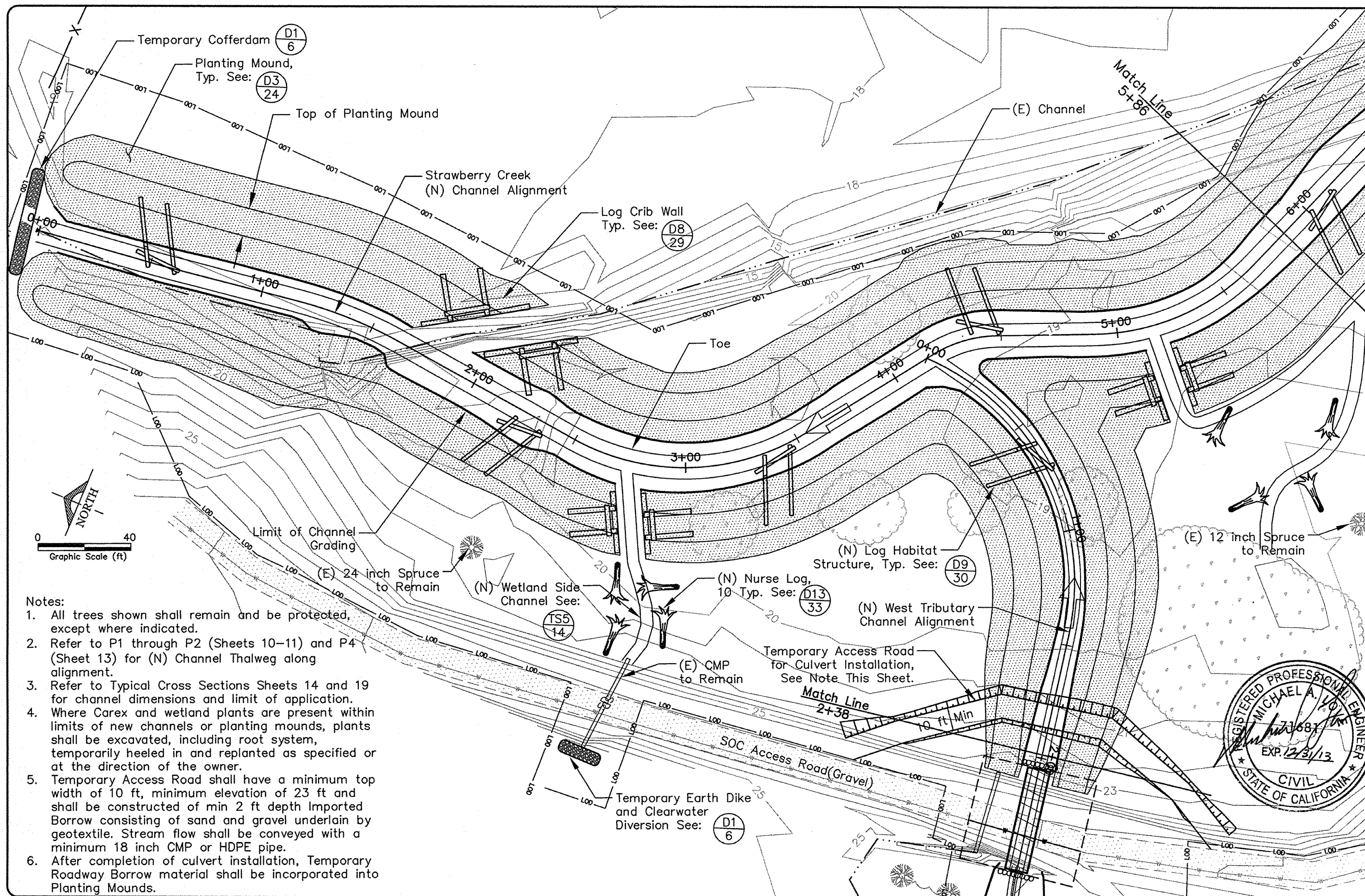
**TEMPORARY EARTH DIKE**  
Profile (NTS)

D1 WATER MANAGEMENT  
4,5,7,8,9 Details



**SUMP PIT**  
Cross Section (NTS)

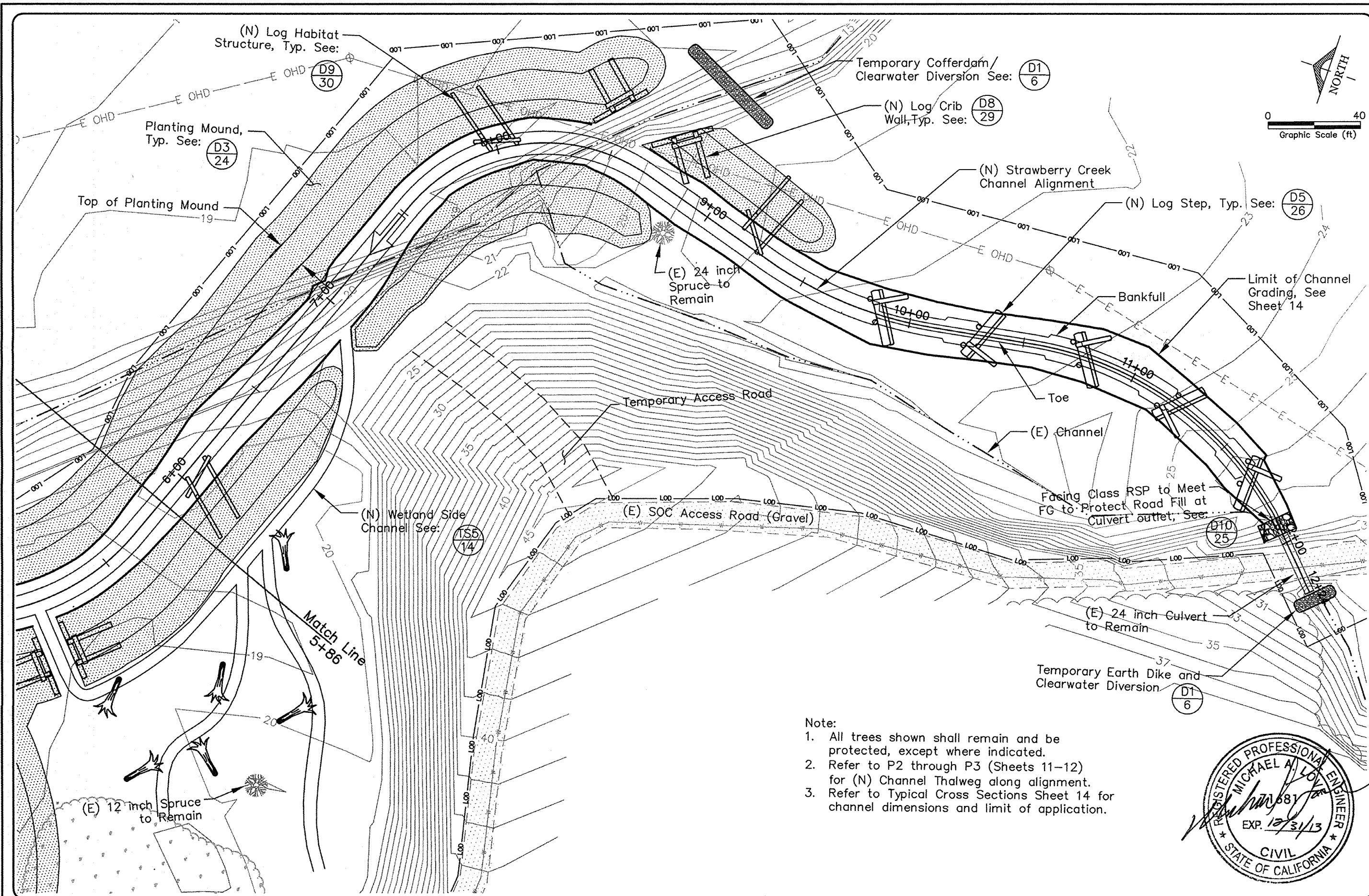




Notes:

1. All trees shown shall remain and be protected, except where indicated.
2. Refer to P1 through P2 (Sheets 10-11) and P4 (Sheet 13) for (N) Channel Thalweg along alignment.
3. Refer to Typical Cross Sections Sheets 14 and 19 for channel dimensions and limit of application.
4. Where Carex and wetland plants are present within limits of new channels or planting mounds, plants shall be excavated, including root system, temporarily heeled in and replanted as specified or at the direction of the owner.
5. Temporary Access Road shall have a minimum top width of 10 ft, minimum elevation of 23 ft and shall be constructed of min 2 ft depth Imported Borrow consisting of sand and gravel underlain by geotextile. Stream flow shall be conveyed with a minimum 18 inch CMP or HDPE pipe.
6. After completion of culvert installation, Temporary Roadway Borrow material shall be incorporated into Planting Mounds.





- Note:
1. All trees shown shall remain and be protected, except where indicated.
  2. Refer to P2 through P3 (Sheets 11-12) for (N) Channel Thalweg along alignment.
  3. Refer to Typical Cross Sections Sheet 14 for channel dimensions and limit of application.

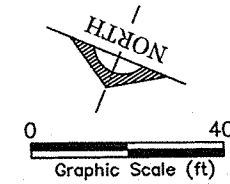


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Strawberry Creek  
Restoration Project

LAYOUT SHEET 2

DATE: March 2012  
SUBMITTAL: FINAL  
DESIGN: ML / RS / AL  
DRAWN: Llanos  
SHEET:



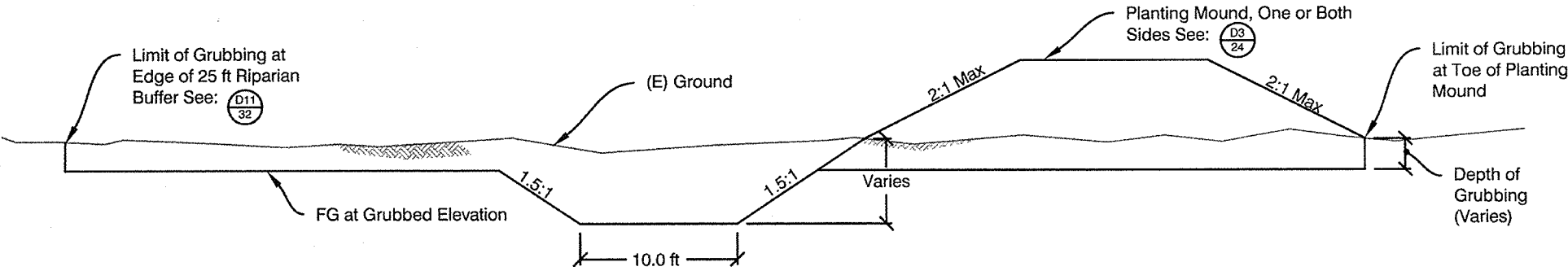
- 
- REGISTERED PROFESSIONAL ENGINEER  
MICHAEL A. PORE  
681  
EXP. 12/31/13  
CIVIL  
STATE OF CALIFORNIA



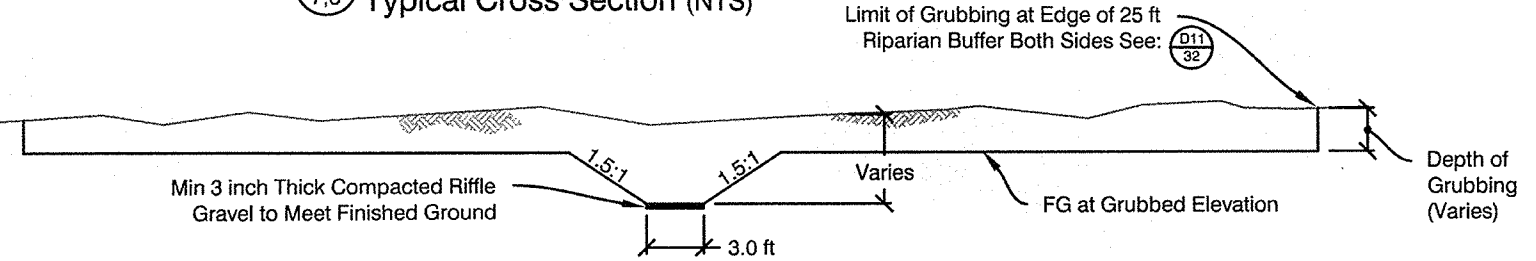
TABLE OF TYPICAL CROSS SECTION APPLICATION  
ALONG STRAWBERRY CREEK ALIGNMENT

Station	to	Station	Applied Cross Section	
0+00	to	9+85	TS1	Slough Channel
9+85	to	--	DS 26	Log Step
9+85	to	10+10	TS4	Riffle
10+15	to	10+30	TS3	Pool
10+30	to	--	DS 26	Log Step
10+30	to	10+55	TS4	Riffle
10+60	to	10+75	TS3	Pool
10+75	to	--	DS 26	Log Step
10+75	to	11+00	TS4	Riffle
11+05	to	11+20	TS3	Pool
11+20	to	--	DS 26	Log Step
11+20	to	11+45	TS4	Riffle
11+50	to	11+65	TS3	Pool
11+65	to	--	DS 26	Log Step
11+65	to	11+96	TS2	Culvert Outlet Channel

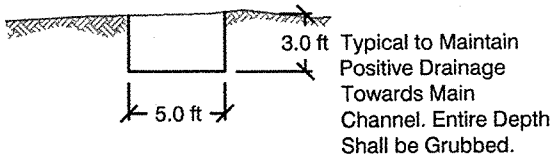
Notes:  
1. All cross sections are oriented looking up-station.  
2. At stations where Typical Sections are not defined, transition gradually between defined sections upstream and downstream.  
3. See Sheets 15 to 18 for detailed Grading Cross Sections.



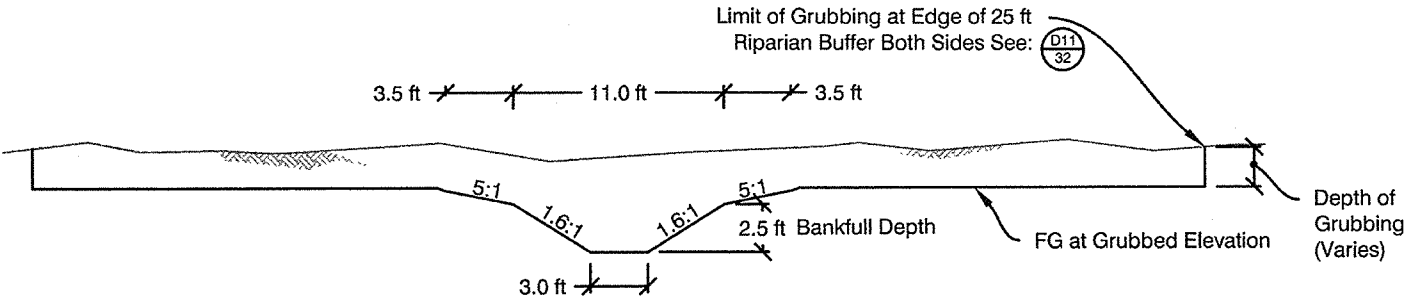
TS1 7.8 SLOUGH CHANNEL  
Typical Cross Section (NTS)



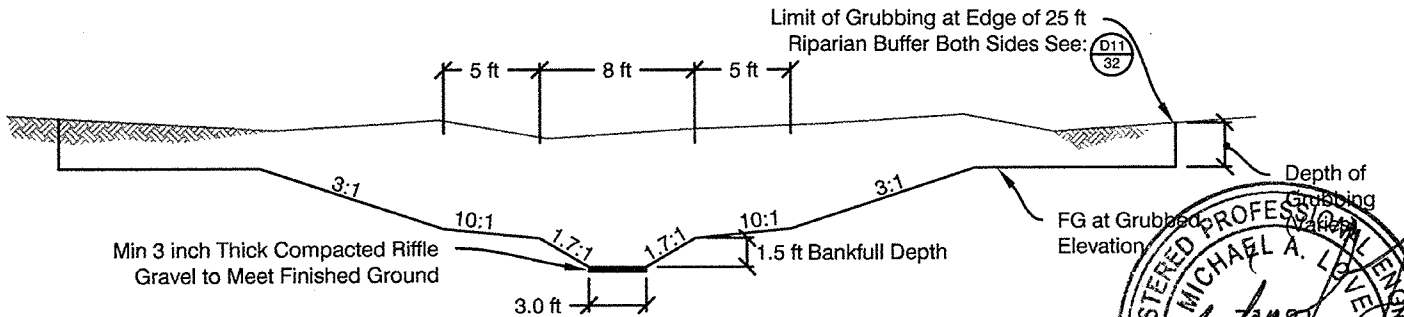
TS2 8 CULVERT OUTLET CHANNEL  
Typical Cross Section (NTS)



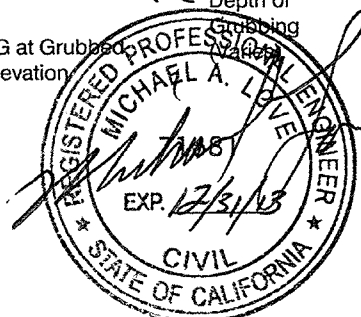
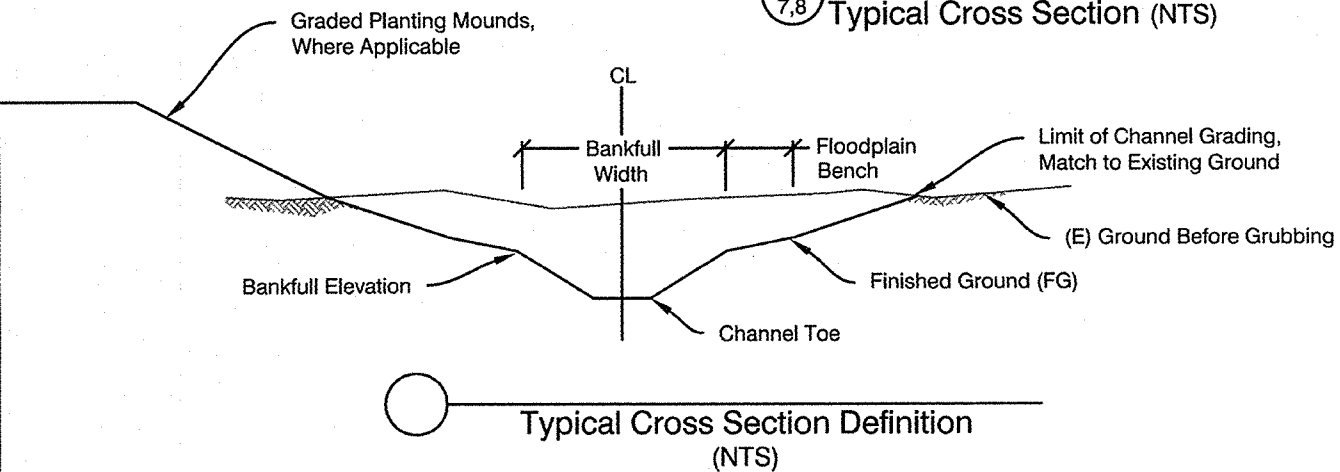
TS5 7.8 WETLAND SIDE CHANNEL  
Typical Cross Section (NTS)



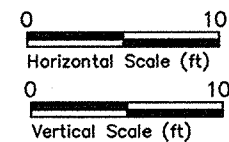
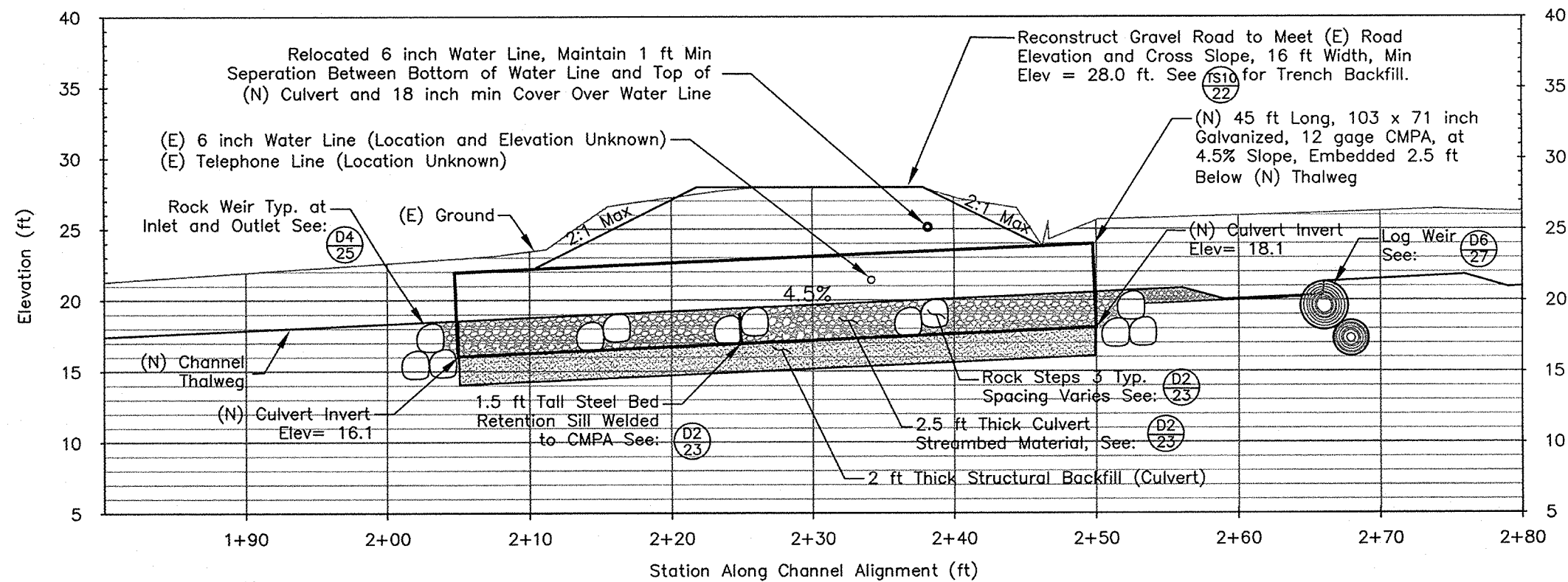
TS3 8 POOL  
Typical Cross Section (NTS)



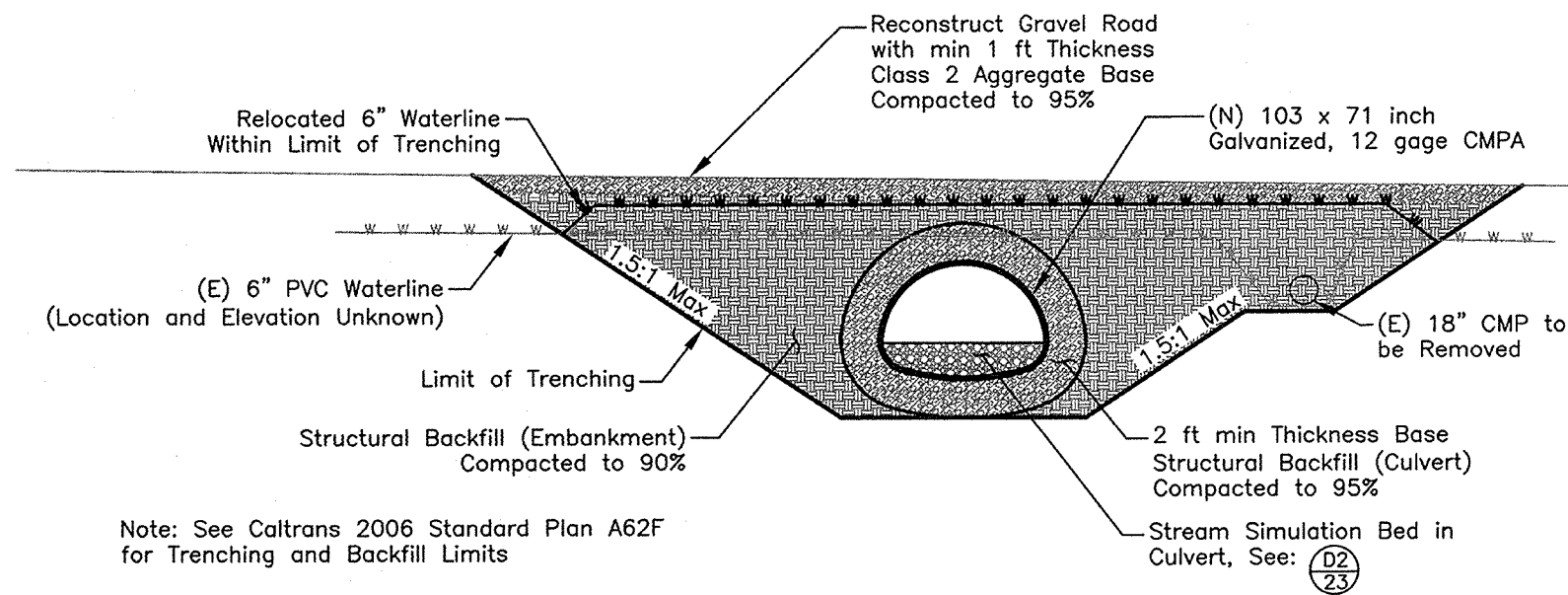
TS4 8.26 RIFFLE  
Typical Cross Section (NTS)







**P5 WEST FORK TRIBUTARY CULVERT**  
9 Detail Profile



**TS10 WEST FORK TRIBUTARY CULVERT**  
9,22 Typical Section (NTS)



**West Fork Tributary Culvert Replacement Specifications**

Material Specifications

1. Structural Backfill (Culvert) shall conform to Section 19-3.06 of Caltrans, 2006. Shall have no less than 20% sand, and shall conform to the following gradation:

Sieve Size	Percent Passing
3"	100%
No. 4	35-100%
No. 30	20-100%

2. Structural Backfill (Embankment) shall conform to Section 19-3.06 for backfill material to be compacted to a relative compaction of no less than 90%.
3. Suitable salvaged materials for Structural Backfill (Embankment) shall be separated and stockpiled for re-use.

Installation Specifications

1. Installation of the West Fork Tributary Culvert replacement shall be installed as specified in the contract documents and in accordance with Section 19 of Caltrans 2006.
2. During Structural Excavation, suitable materials shall be separated and stockpiled for re-use as structural backfill (Embankment).
3. Structural Backfill (Culvert) shall be compacted to a relative compaction of no less than 95%.
4. Structural Backfill (Embankment) shall be compacted to a relative compaction of no less than 90%.

**Temporary and Permanent Re-Routing of Existing Water Line**

Material Specifications

1. Materials and work shall conform to ASTM, American Water Works, Chapter 16 Article 4 of the Title 22 of the California Code of Regulations (2010), and other relevant standards. All methods and materials shall be approved by the Orick Community Services district prior to installation.
2. All temporary pipe material shall be Schedule 80 PVC, HDPE, or steel pipe.
3. Bedding and backfill material for pipelines shall consist of Class  $\frac{3}{4}$  inch max Class 2 Aggregate Base as specified in Section 25 of Caltrans, 2006.

Installation Specifications

1. Contractor shall maintain an in-service water supply line to SOC buildings during the project. If continuous water service to the work area will be interrupted during portions of the work, the Contractor shall notify the Owner a minimum of one week in advance of anticipated water shutdowns. The maximum duration for a water shutdown is eight (8) hours.
2. Contractor shall be responsible for verifying pipe sizes, particularly the Outside Diameter (O.D.) of all pipes at connection points, to ensure that commonly available coupling hardware and gaskets will accommodate the existing pipes PRIOR to cutting into any pipe.
3. Water main and service pipe shall be installed in conformance with AWWA C600, and pipe manufacturer's recommendation.
4. All pipe shall be centered in the trench and laid on compacted bedding.
5. Water main and service pipe ends and service hardware shall be thoroughly cleaned before the pipe is joined. Whenever work ceases for any reason, all exposed pipe ends and hardware shall be closed with a watertight fitting, plug, or cover. The interior of the pipe shall be kept free from dirt and debris as the work progresses.
6. Pressure and bacteria testing and disinfection of new water mains and services shall be successfully performed in accordance with AWWA C600 and C651 and accepted by the Owner prior to placing the new pipeline and services into service.
7. Bedding and backfill shall be installed a minimum thickness of 1-foot completely surrounding the pipe and compacted to 95%.

**Specification for Culvert Streambed Material**

Material Specifications

1. Culvert Streambed Material shall meet the following gradations and shall be approved by Owner prior to Installation:
- a. 2/3 by weight Riffle Gravel, as specified in the Contract Documents
- b. 1/3 by weight 4 to 6 inch diameter angular rock

Installation Specifications

1. Culvert Streambed Material shall be installed as specified on the Contract Documents and where directed by the Owner.
2. Culvert Streambed Material shall be uniformly mixed and installed such that it does not segregate during installation.
3. Fill voids with smaller material and compact using construction equipment and flooding to obtain a compact, low-permeability mass.
4. After installation, material shall be flooded and further compacted. Continue flooding and compacting until voids are filled and water remains flowing on the surface across the entire length of the installed material.
5. No water used during the flooding process shall be allowed to discharge into the live stream, but may be reused.
6. Fine material washed downstream resulting from flooding shall be fully removed prior to releasing streamflow into project area.

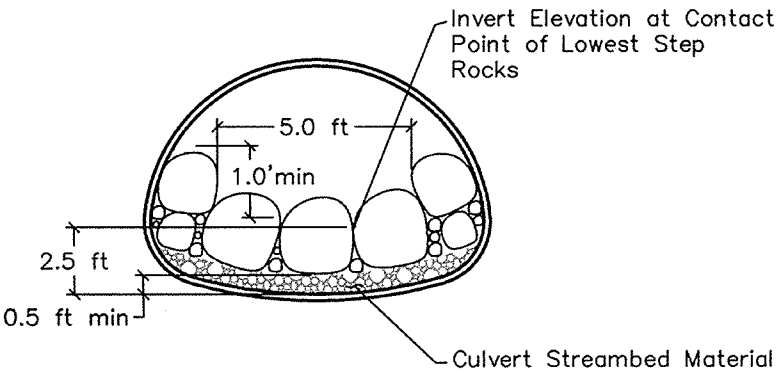
**Specification for Rock Steps in Culvert**

Material Specifications

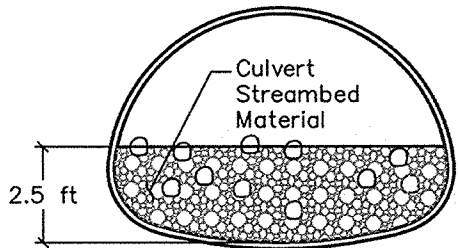
1. Rock Step rock shall meet gradations as follows:
- a.  $\frac{1}{4}$  Ton RSP
2. All rock diameters (D) are measured along the intermediate axis. The least dimension (minor axis) of an individual rock fragment shall not be less than one-third the greatest dimension of the fragment.

Installation Specifications

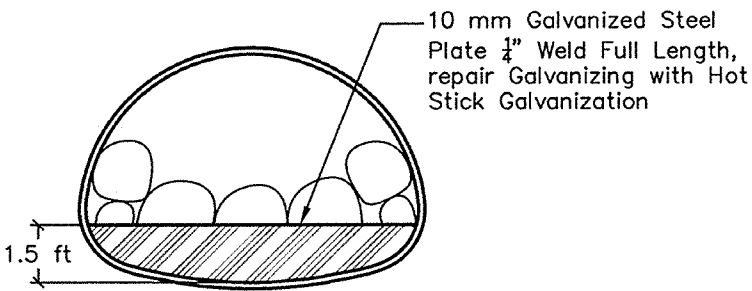
1. Rock Steps shall be installed as specified on the Contract Documents, and where directed by the Owner.
2. Rock shall be placed in accordance with Caltrans, 2006 Section 72 and using "Method A" placement as specified in Caltrans, 2006 Section 72-2.03. No filter cloth shall be installed.
3. All large rock shall be placed individually and secured by machine tamping. Rocks shall have a minimum of four contact points and be securely supported. Rocks shall not be cabled together.
4. Invert elevation of Rock Steps shall be measured at contact point between two lowest step rocks.
5. Crests of rocks shall not protrude more than 0.75 feet beyond finished grade.
6. Footer rocks shall be installed downstream of each Step rock.
7. Where bed retention sill is specified, the footer rock shall be installed downstream of the bed retention sill.



a ROCK STEP

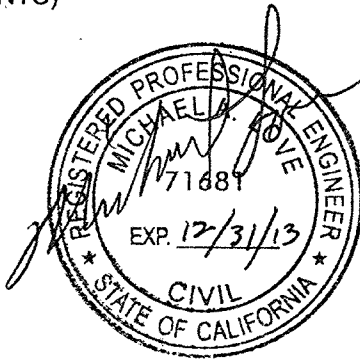


b CULVERT STREAMBED MATERIAL

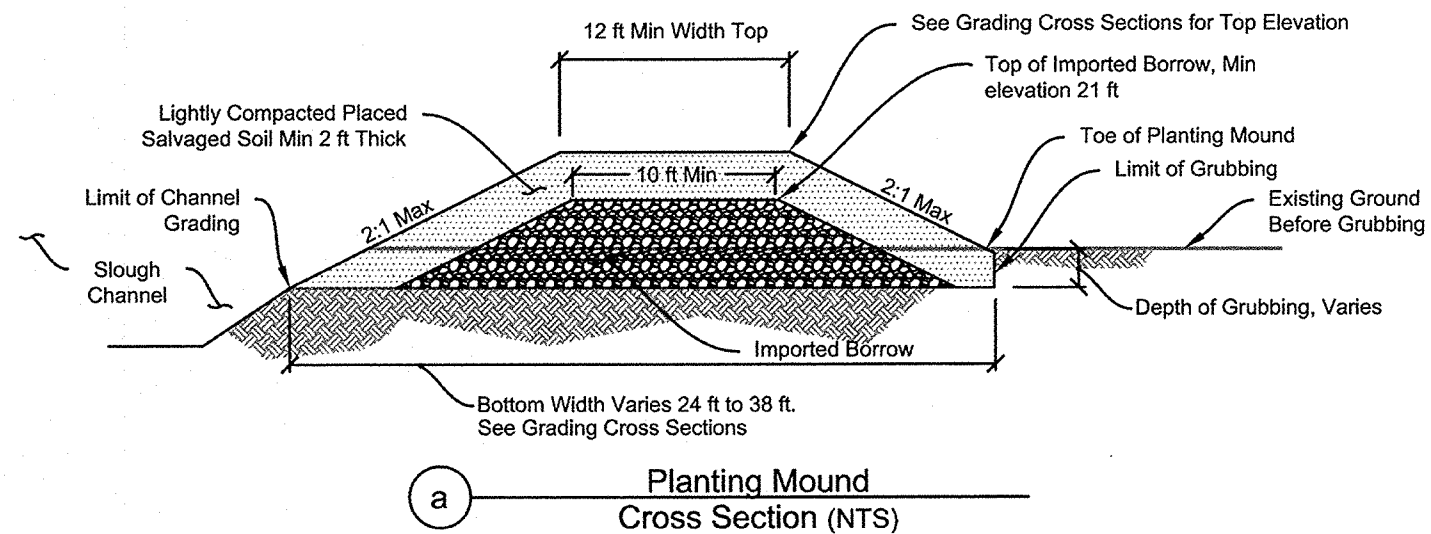
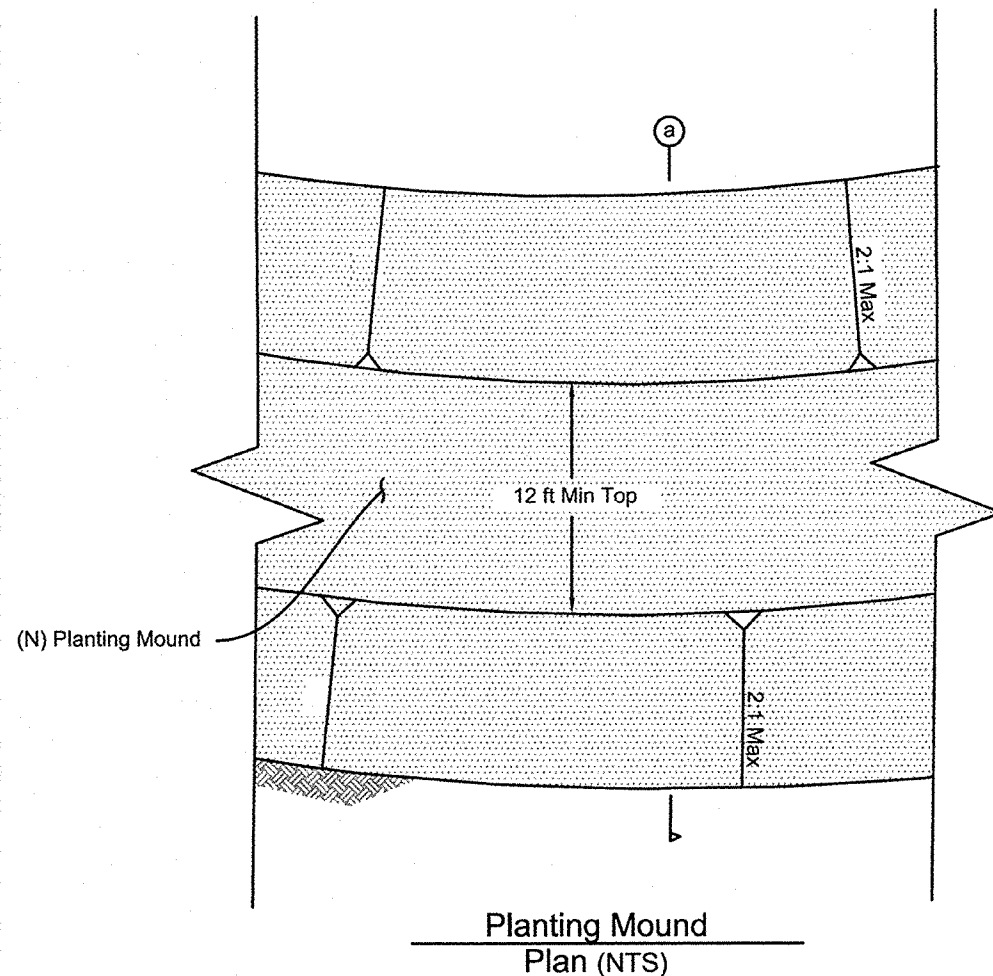


c BED RETENTION SILL

D2 22 Culvert Stream Simulation Channel  
Typical Cross Section (NTS)







D3  
7, 8, 14, 19, 29, 32

### PLANTING MOUND Details

## Planting Mound Specification

### Material Specifications

1. Salvaged Soil shall be soil salvaged from project-related excavation activities. Manmade materials excavated will be considered unsuitable and will become the property of the contractor for offsite disposal. Grubbed Material is considered unsuitable. Other organic material will be considered suitable for use. Excavated material may require dewatering before use.
2. Imported Borrow shall conform to Section 19-7 of Caltrans, 2006 and consist of a natural sand or gravel, with no individual fragments larger than 3 inches in diameter, no manmade materials, and a minimum of organic materials. After installation, the material shall remain permeable. Imported Borrow shall be approved by the Owner at the point of origin.

### Installation Specifications

1. Planting Mounds shall be installed as specified on the Contract Documents, and where directed by the Owner.
2. Invasive grasses within the footprint of the Planting Mounds shall be grubbed to fully remove grass roots, as directed by Owner.
3. Contractor shall place Imported Borrow within the footprint of Planting Mounds for construction access. Placement of temporary Imported Borrow or salvaged soil outside the limit of the Planting Mounds is acceptable if the material is fully underlain by a material that protects wetland vegetation and if all materials are fully removed at the completion of work.
4. Before placement of salvaged soil, the top surface of the Imported Borrow shall be constructed to the elevation specified.
5. Place and lightly compact Salvaged Soil to meet finished grade on the Planting Mounds. Reworking of the soil after dewatering may be necessary to meet finished grade. Once soil is placed, area of placement shall not be used for construction equipment access.
6. Mound top width and elevation may vary  $\pm 0.5$  ft or as directed by Owner.



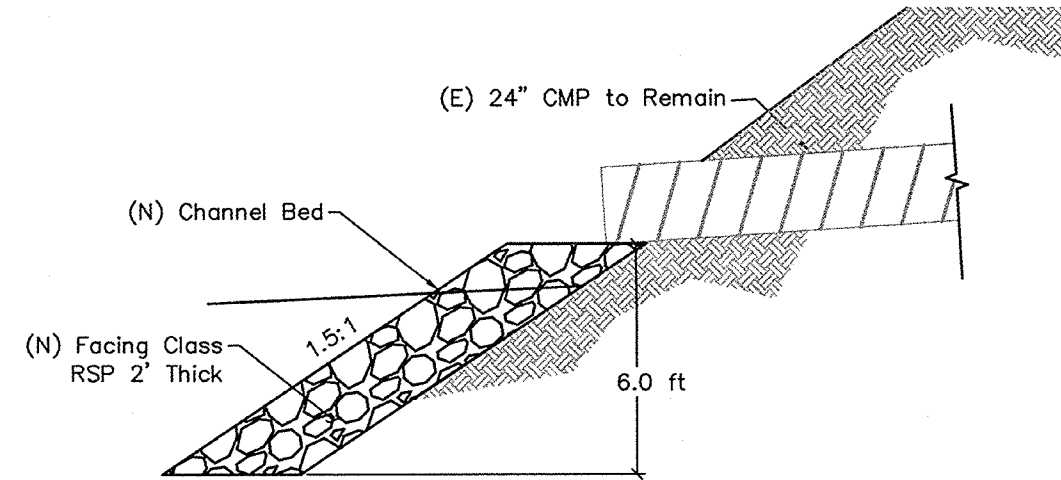
Specification for Rock Slope Protection (RSP)

Material Specifications

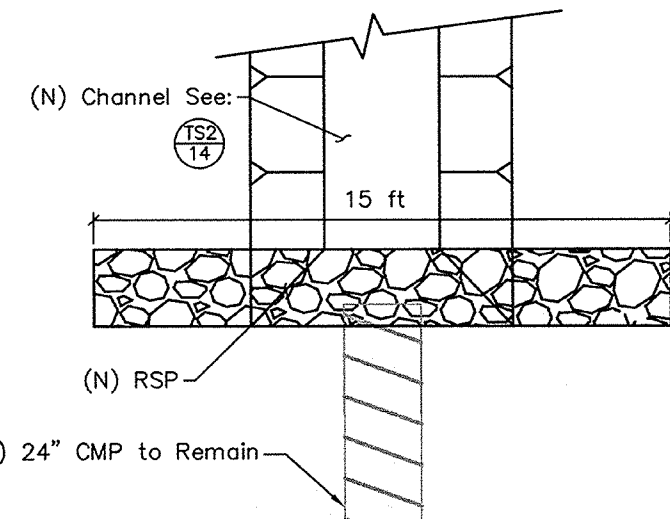
- 1. Rock shall be Caltrans (2006) Facing Class.
- 2. Rock shall be placed in accordance with Caltrans, 2006 Section 72 and using "Method A" placement as specified in Caltrans, 2006. No RSP Fabric shall be installed.

Installation Specifications

- 1. RSP shall be installed where specified.
- 2. Install RSP as specified to the line and grade specified on the construction documents.
- 3. All large rock shall be placed individually and secured by machine tamping. Rocks shall have a minimum of four contact points and be securely supported.
- 4. Rocks shall be placed in one-foot lifts and soil placed to fill the voids between rocks. Soil shall be placed to not hinder rock-to-rock contacts.
- 5. Place smaller rocks and salvaged streambed material to fill voids between larger rocks.



PROFILE



PLAN

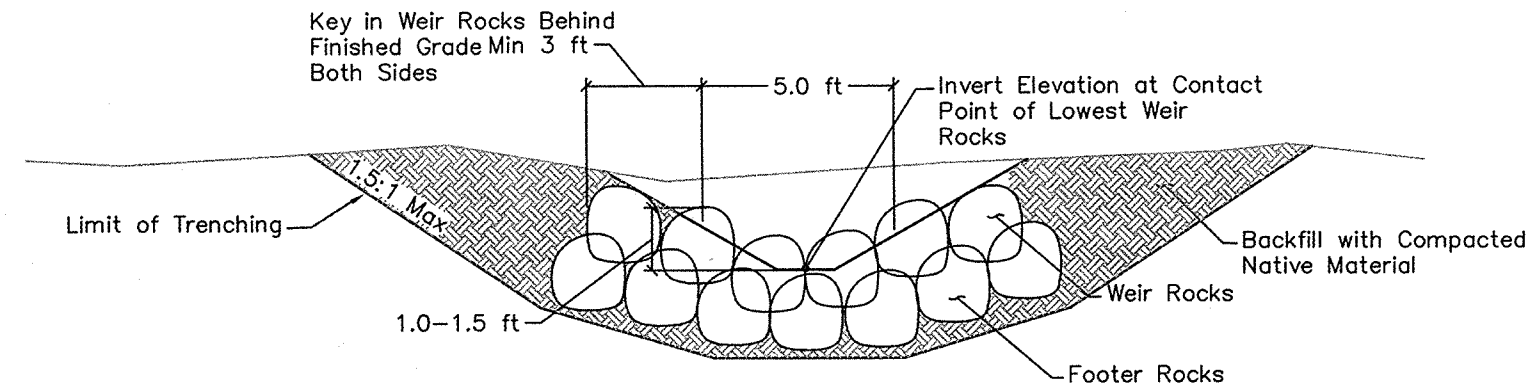
Specification for Rock Weirs

Material Specifications

- 1. Rock Weir rock shall meet gradations as follows:
  - a. 1/4 Ton RSP
  - b. Riffle Gravel Shall be as specified in the Contract documents
- 2. All rock diameters (D) are measured along the intermediate axis. The least dimension (minor axis) of an individual rock fragment shall not be less than one-third the greatest dimension of the fragment.

Installation Specifications

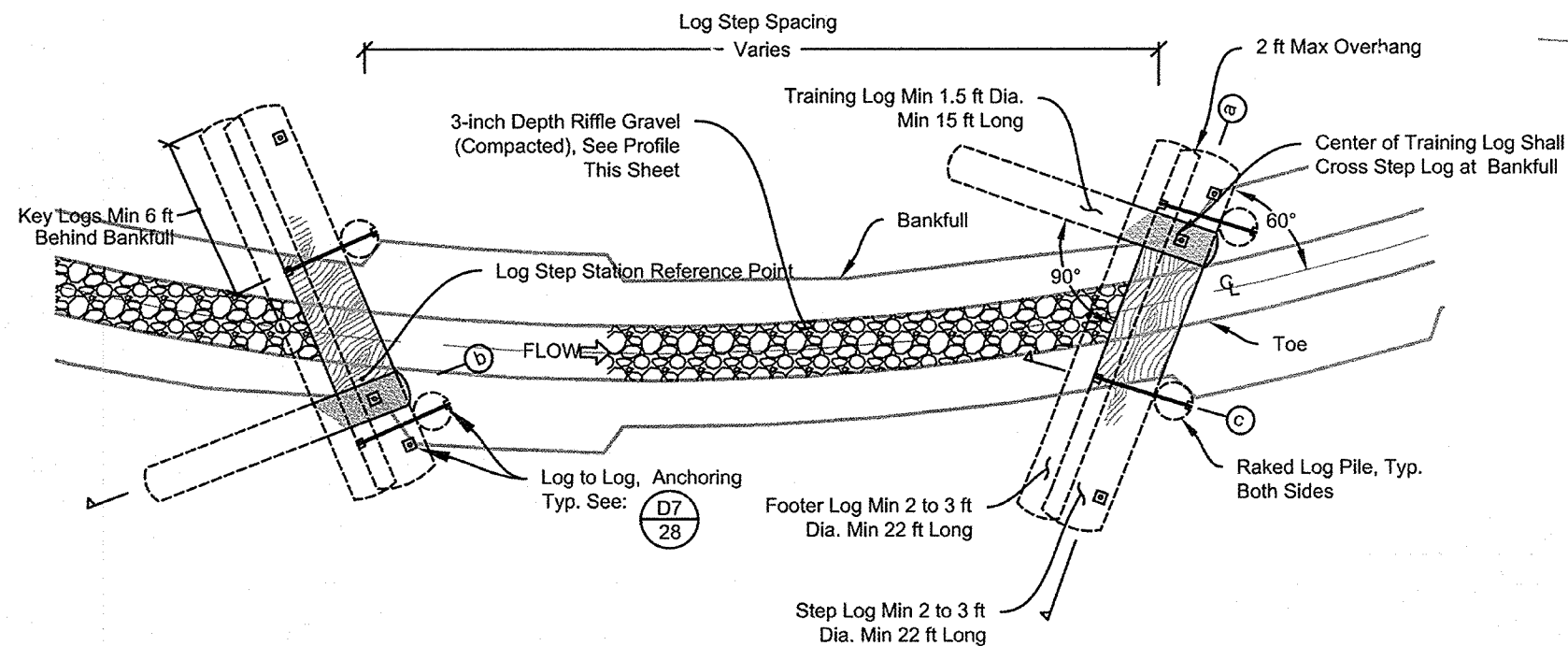
- 1. Rock weirs shall be installed as specified on the Contract Documents, and where directed by the Owner.
- 2. Excavate trench to the specified minimum depth for the entire Rock Weir length.
- 3. Rock shall be placed in accordance with Caltrans, 2006 Section 72 and using "Method A" placement as specified in Caltrans, 2006 Section 72-2.03. No filter cloth shall be installed.
- 4. All large rock shall be placed individually and secured by machine tamping. Rocks shall have a minimum of four contact points and be securely supported.
- 5. Invert elevation of Rock Weirs shall be measured at contact point between two lowest Weir Rocks.
- 6. Crests of rocks shall not protrude more than 0.75 feet beyond finished grade. Rocks shall not be cabled together.
- 7. Fill voids with smaller material to obtain a compact, low-permeability mass.
- 8. Backfill channel bottom with compacted Riffle Gravel.
- 9. Backfill streambanks with compacted native material.



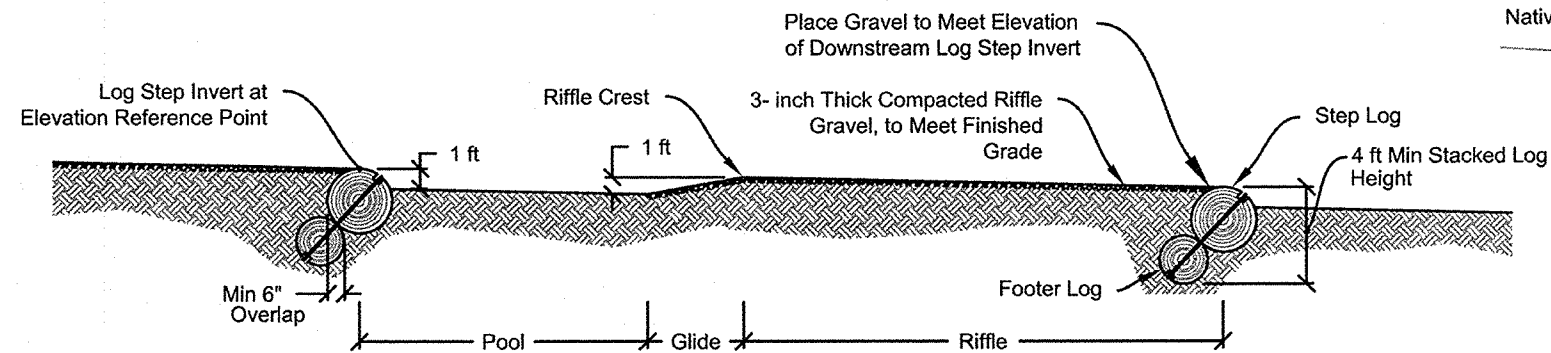
D4 9.22 ROCK WEIR Typical Cross Section (NTS)







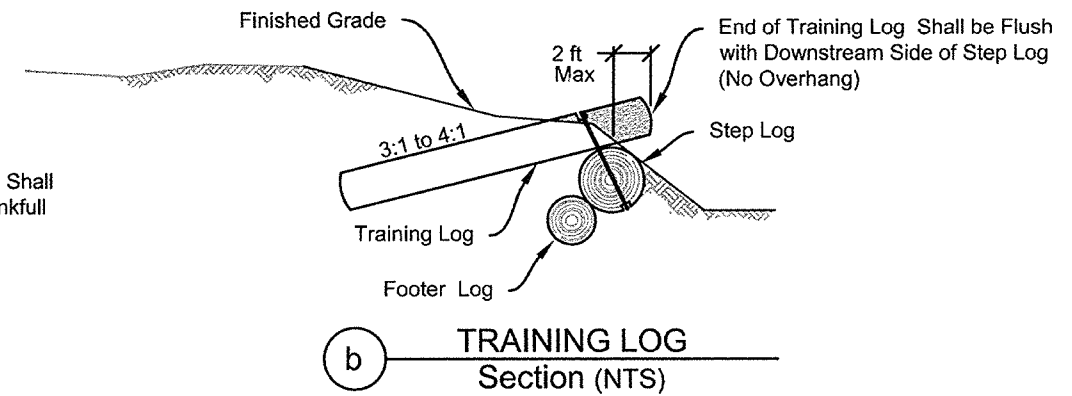
LOG STEP POOL  
Plan (NTS)



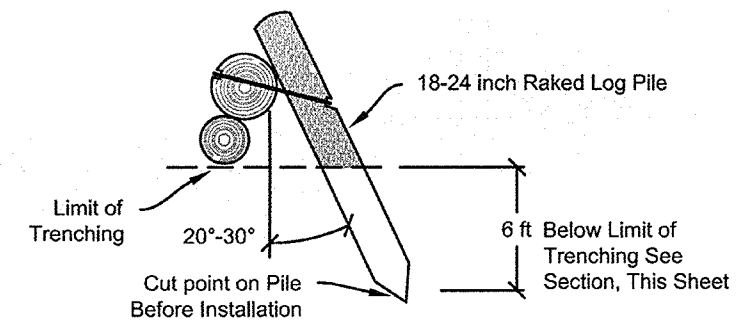
LOG STEP POOL  
Profile Through Log Step  
Invert (NTS)

D5  
8,9,19,12,13,14

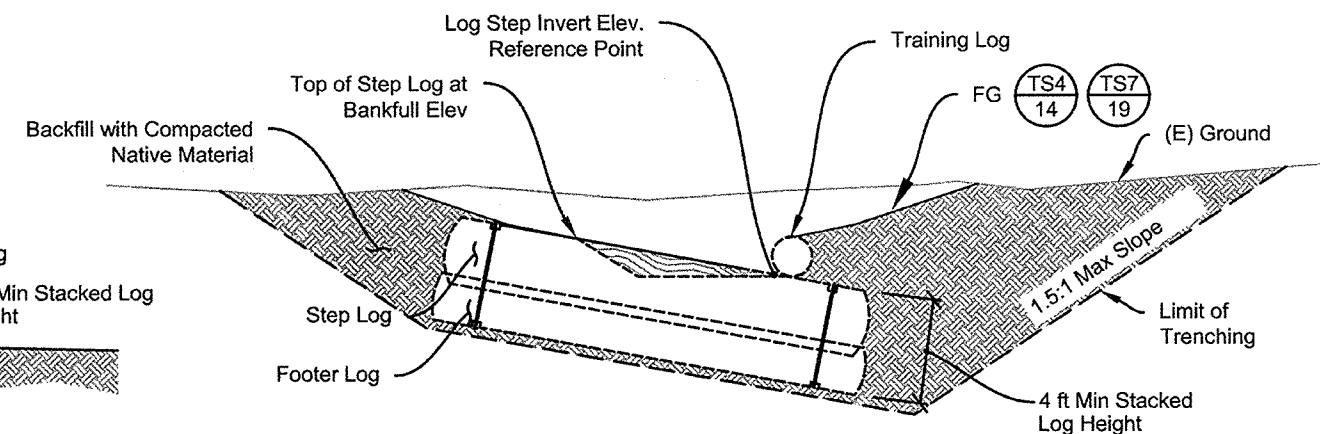
LOG STEP POOL  
Details



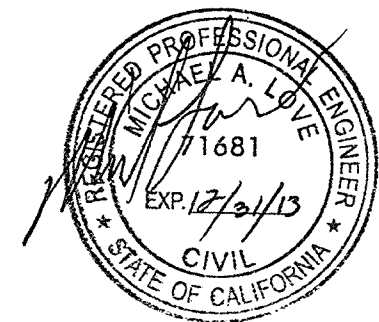
b TRAINING LOG  
Section (NTS)

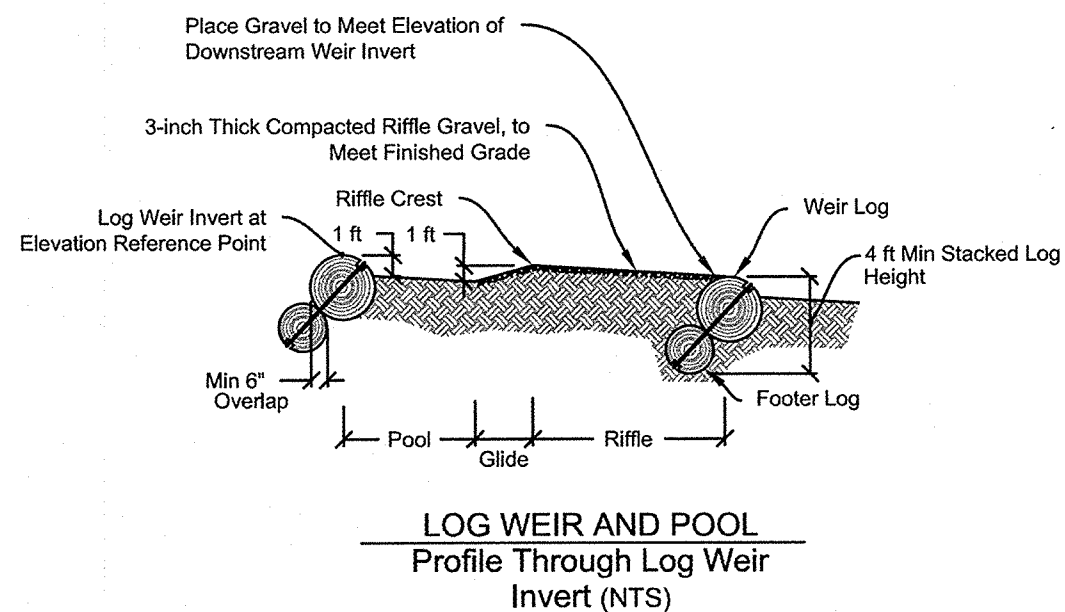
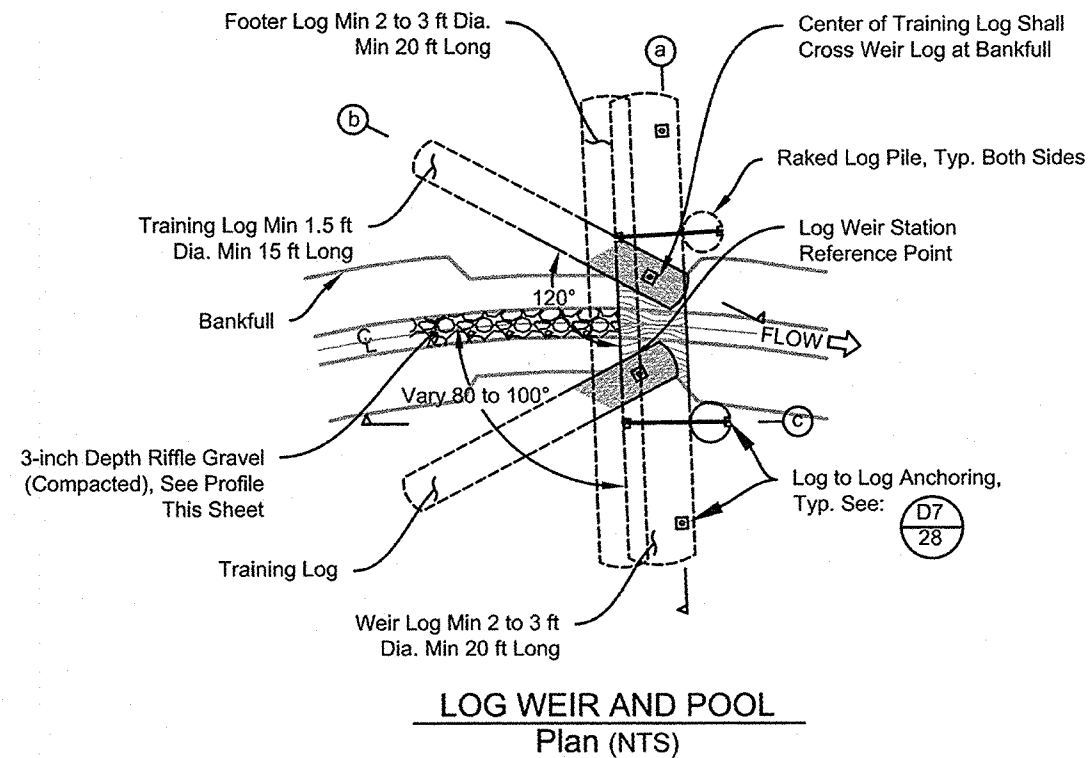


c RAKED LOG PILE  
Section (NTS)



a LOG STEP  
Section (NTS)

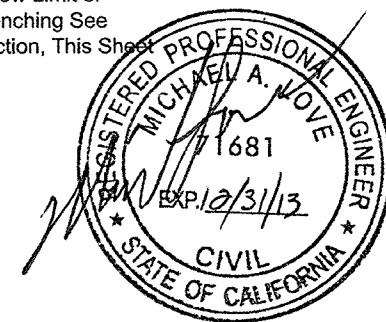
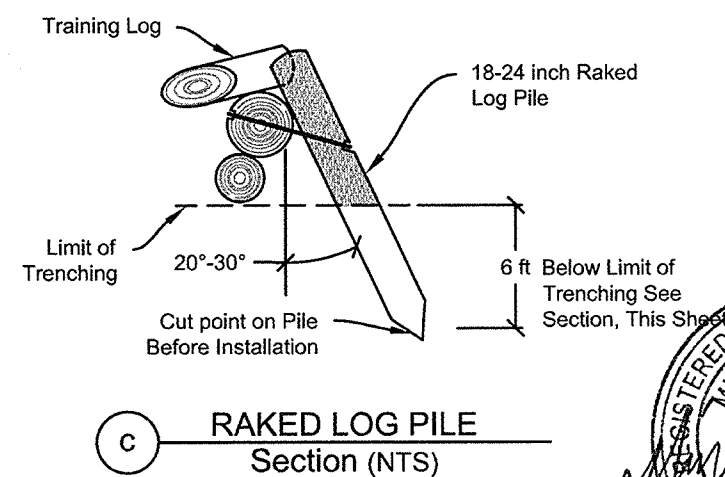
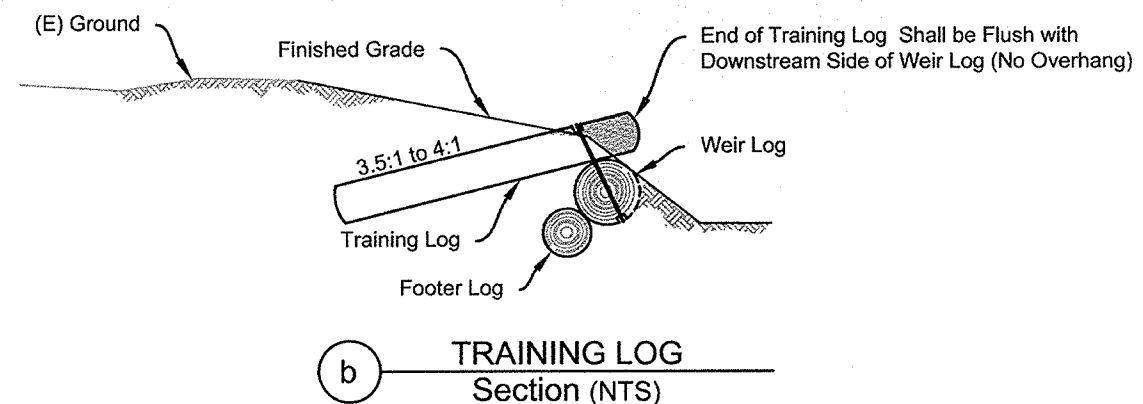
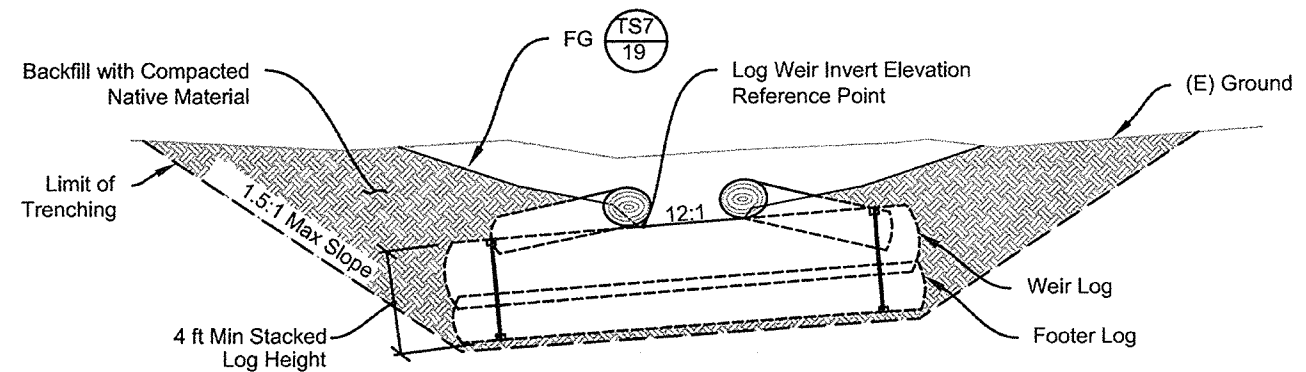




Note:  
For Channel Profile Stations and  
Elevations See Sheet 13

D6  
9,13,19,22

**LOG WEIR AND POOL  
Details**





Specification for Log Steps and Log Weirs

Material Specifications

- 1. Contractor shall use logs provided on site. Logs shall not be cut unless at the direction of the Owner.
- 2. Logs shall meet the dimensions specified in the Contract Documents. Log length shall not be accomplished with joining of multiple logs.
- 3. Pile Logs shall have bark removed.
- 4. Anchoring shall conform to Contract Documents.

Installation Specifications

- 1. Log Step and Log Weirs shall be installed as specified on the Contract Documents, and where directed by the Owner.
- 2. Excavate trench to the specified minimum depth for the entire structure.
- 3. Install logs such that the top of the Step or Weir Log forms the channel invert at the specified station, elevation, and location on the channel cross section.
- 4. The stacked log height shall be a minimum of 4 feet, measured vertically.
- 5. All logs shall be anchored where specified.
- 6. Cut point on tip of Pile Log and drive Pile Logs the specified length into the undisturbed subgrade at the specified pitch. Cut top of pile below finished grade.
- 7. Auger pilot hole may be used to facilitate driving of Raked Pile Logs. Pilot hole shall be at least 8 inches smaller than the Raked Pile Log diameter to ensure adequate skin friction is obtained.
- 8. Backfill channel bottom with compacted Riffle Gravel.
- 9. Backfill streambanks with compacted native material. Backfill under training Logs shall be hand compacted to the satisfaction of the Owner.

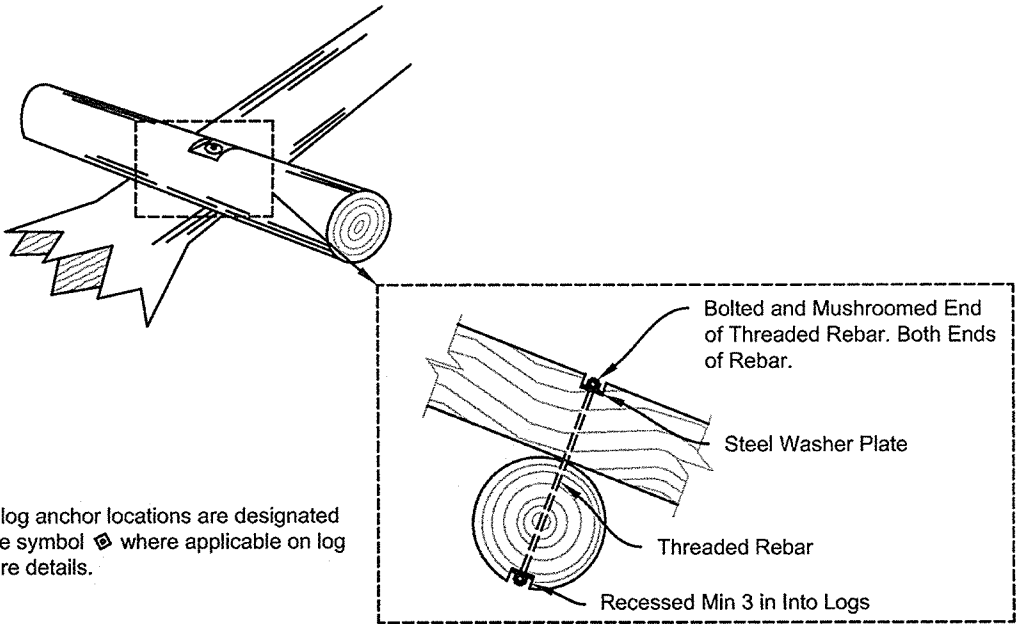
Specification for Riffle Gravel

Material Specifications

- 1. Riffle Gravel shall be rounded gravels meeting the following gradations and shall be approved by Owner prior to Installation:
  - a. 80% to 95% finer than 2 inches
  - b. 40% to 60% finer than 0.5 inches
  - c. 5% to 15% finer than #10 Sieve

Installation Specifications

- 1. Riffle Gravel shall be installed as specified in the Contract Documents and where directed by the Owner.
- 2. Riffle Gravel shall be uniformly mixed and installed such that it does not stratify during installation. Do not contaminate the Riffle Gravel with soil.
- 3. Fill voids with smaller material and compact using vibratory methods to obtain a compact, low-permeability mass.
- 4. After installation, material shall be flooded and further compacted. Continue flooding and compacting until voids are filled and water remains flowing on the surface across the entire length of the installed material.
- 5. No water used during the flooding process shall be allowed to discharge into the live stream, but may be reused.
- 6. Fine material washed downstream resulting from flooding shall be fully removed prior to releasing streamflow into project area.



D7 LOG TO LOG ANCHORING  
26,27,29,30 Detail Elevation (NTS)

Specification for Anchoring Log Structures

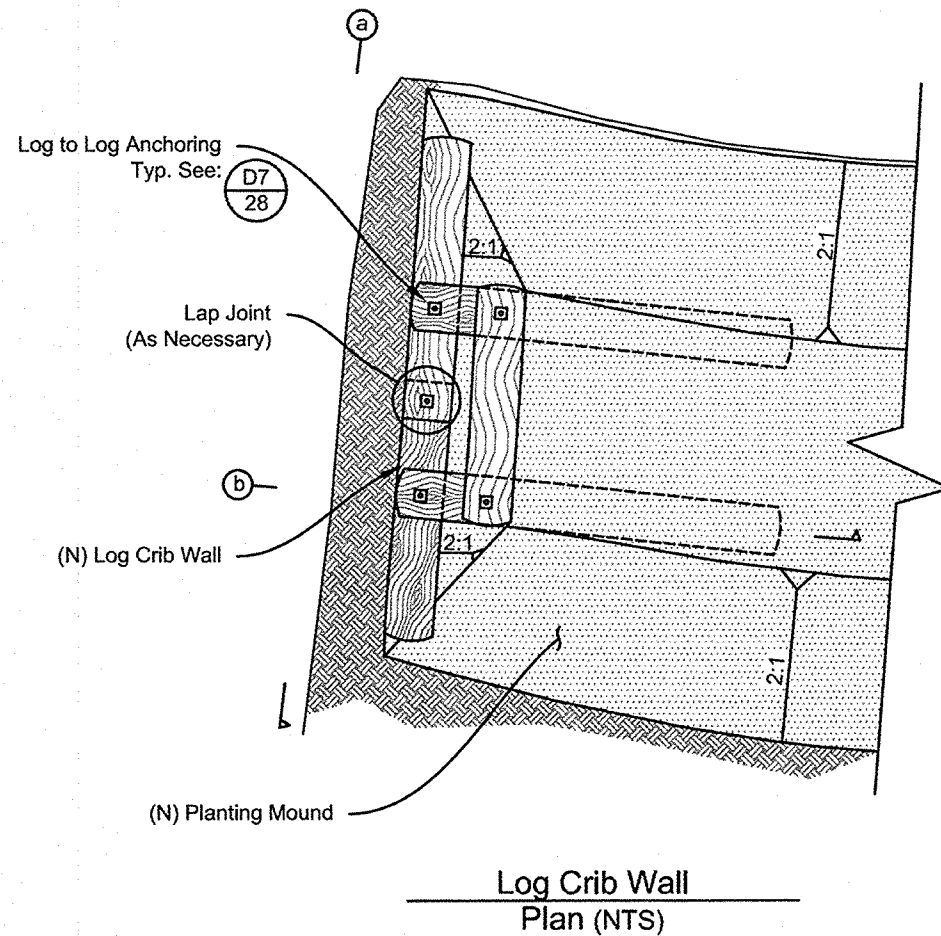
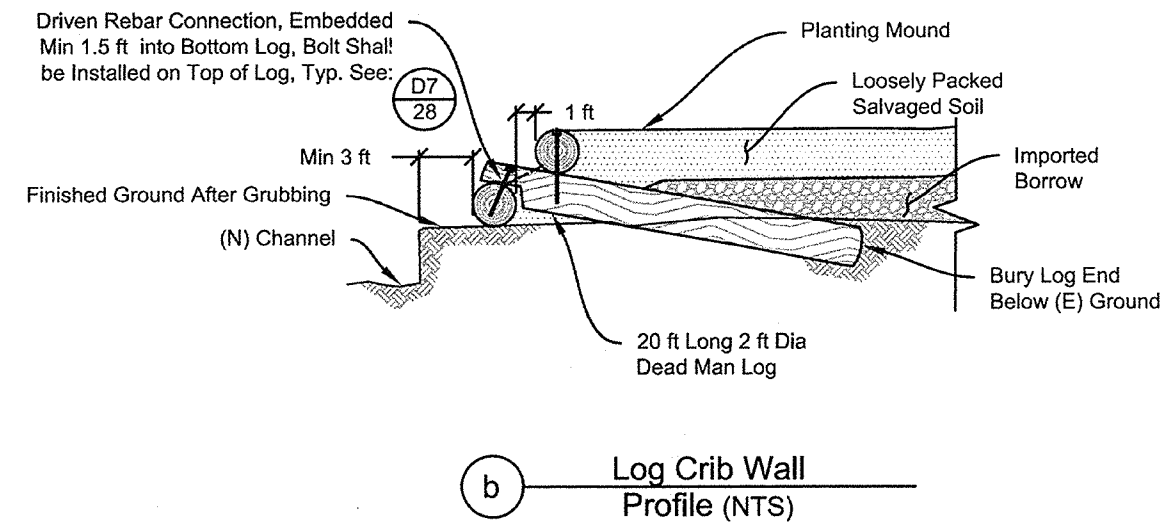
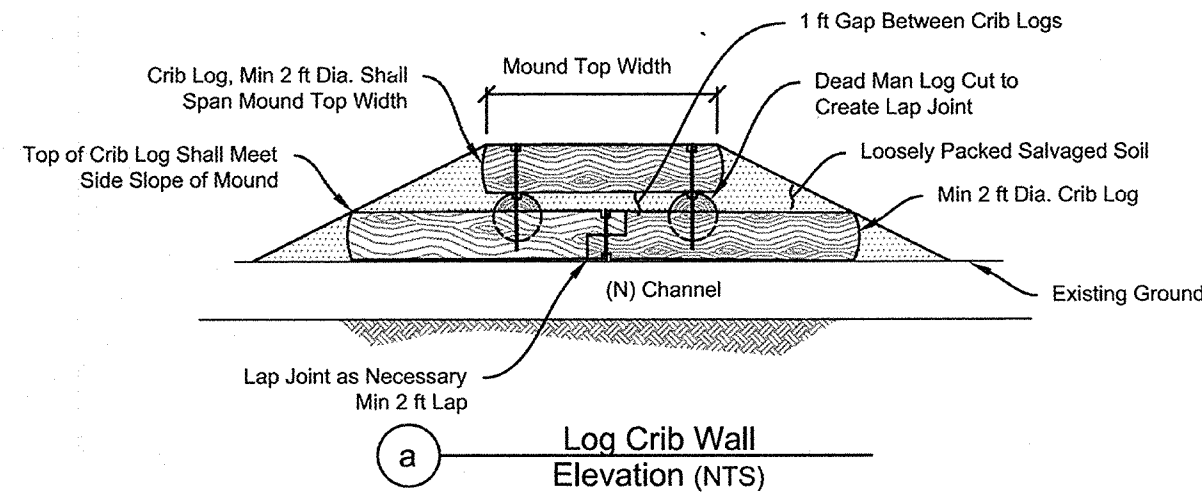
Material Specifications

- 1. Log anchoring shall be in accordance with Contract Documents.
- 2. Threaded rebar, washer and nut shall be steel.
- 3. Threaded rebar shall be a minimum diameter of 1 inch with min 4-inch x 4-inch x 3/8 or 5/16-inch thick steel washer plate with bolt.

Installation Specifications

- 1. Log Anchoring shall be installed as specified on the Contract Documents, and where directed by the Owner.
- 2. All logs shall be anchored where specified.
- 3. Rebar shall be inserted through the center of the log and bolted on both ends. Rebar, washer, and nut, shall be fully recessed within the log.
- 4. Anchor shall be located a minimum of 2 feet from the end of the log.
- 5. If a through-connection cannot be made with rebar, threaded rebar can be driven a minimum of 1.5-feet into an undersized hole in the bottom log. One washer and nut shall be installed so that the uppermost log cannot move vertically.
- 6. Driven rebar shall be installed where specified or with the permission of the Owner.
- 7. To minimize movement of logs, anchoring shall be installed such that connections are tight.





### Specification for Log Crib Walls

#### Material Specifications

1. Contractor shall use logs provided on site. Logs shall not be cut unless at the direction of the Owner.
2. Logs shall meet the dimensions specified on the Contract Documents.
3. No single log shall be less than 12 feet in length.
4. Anchoring shall conform to Contract Documents.

#### Installation Specifications

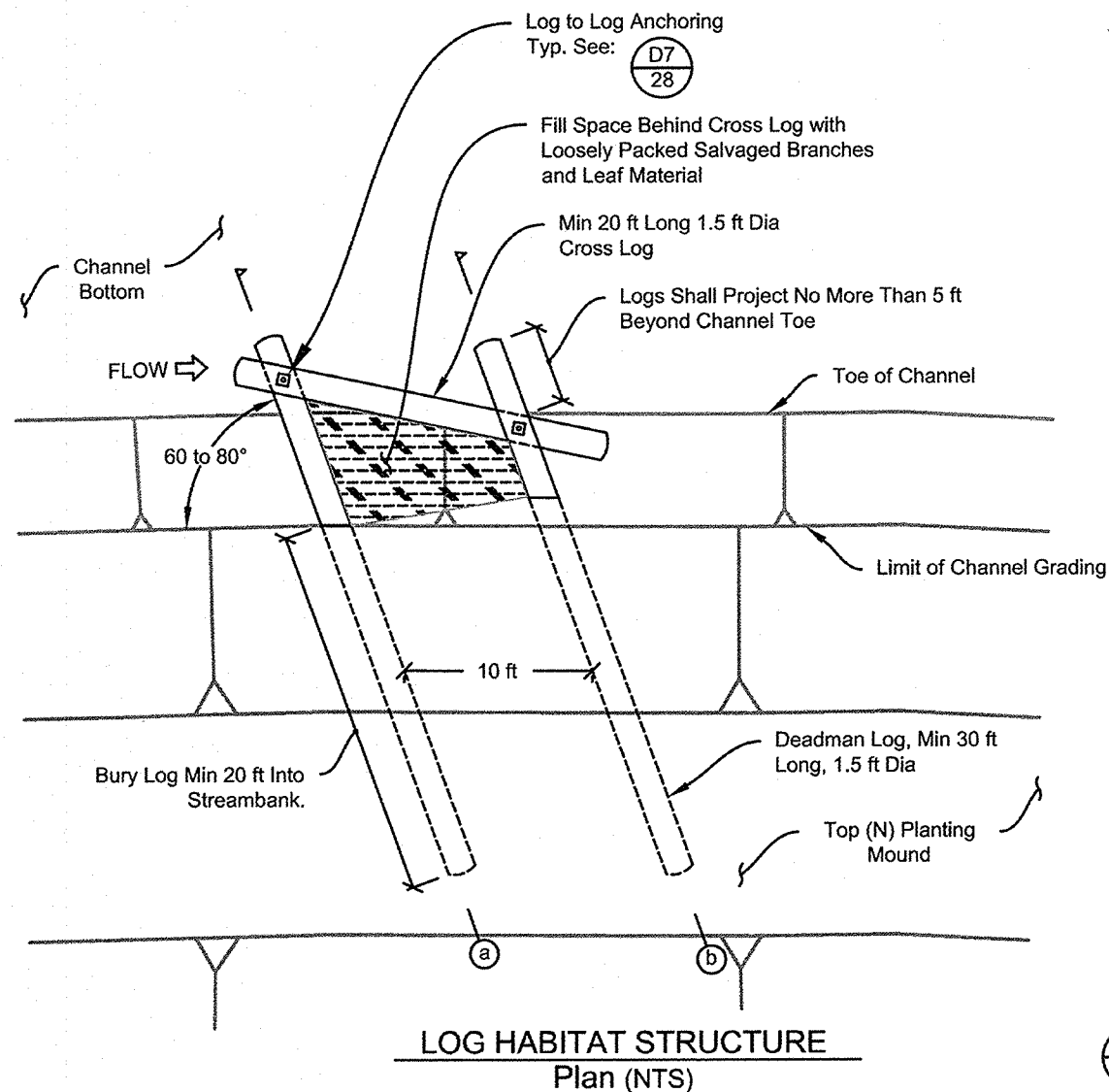
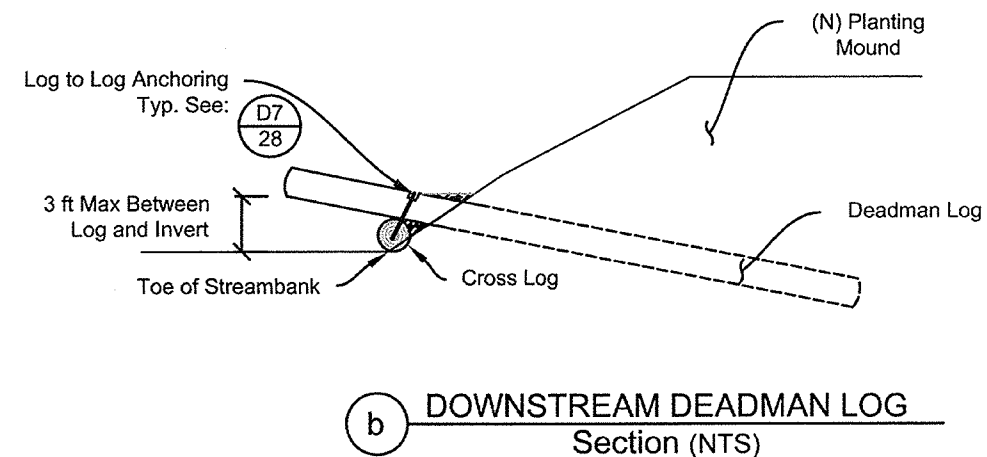
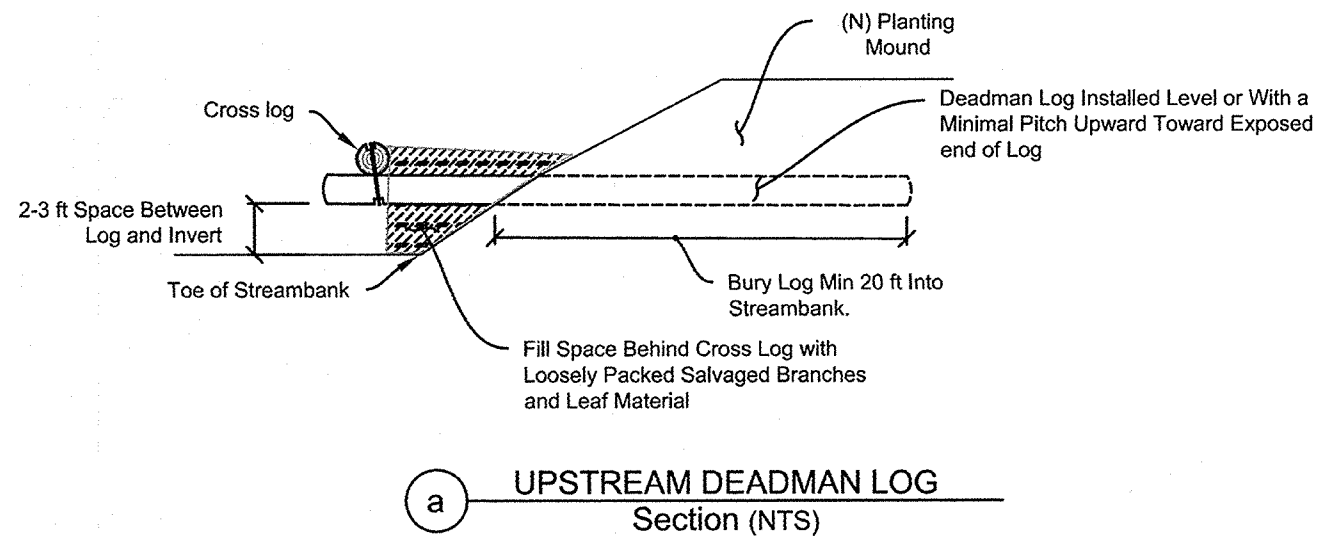
1. Log Crib Walls shall be installed as specified on the Contract Documents, and where directed by the Owner.
2. Install bottom Crib Logs on the existing ground surface at the locations specified.
3. Cut deadman logs to form a lap joint with a minimum of 2 feet overlap with the bottom crib log. Deadman log shall be cut to create an approximately 1-foot high gap between bottom and top crib logs.
4. Secure deadman to bottom crib log using a driven rebar connection, with bolt located on top of deadman log.
5. Install top crib log as specified, with a driven rebar connection with bolt located on top of crib log.
6. The cribwall height shall be a minimum of 5 feet, measured vertically.
7. All logs shall be anchored where specified.
8. If lap joints are necessary, joint shall overlap a minimum of 2 feet, anchored with Log to Log Anchoring. The surface of the lap joint shall be installed parallel to the ground surface such that the rebar connection is oriented vertically.
9. Backfill crib wall in accordance with Planting Mound Detail, D3/24.

D8  
7,8,33

### LOG CRIB WALL Details







D9 7.8 LOG HABITAT STRUCTURE  
Details

### Specification for Habitat Logs

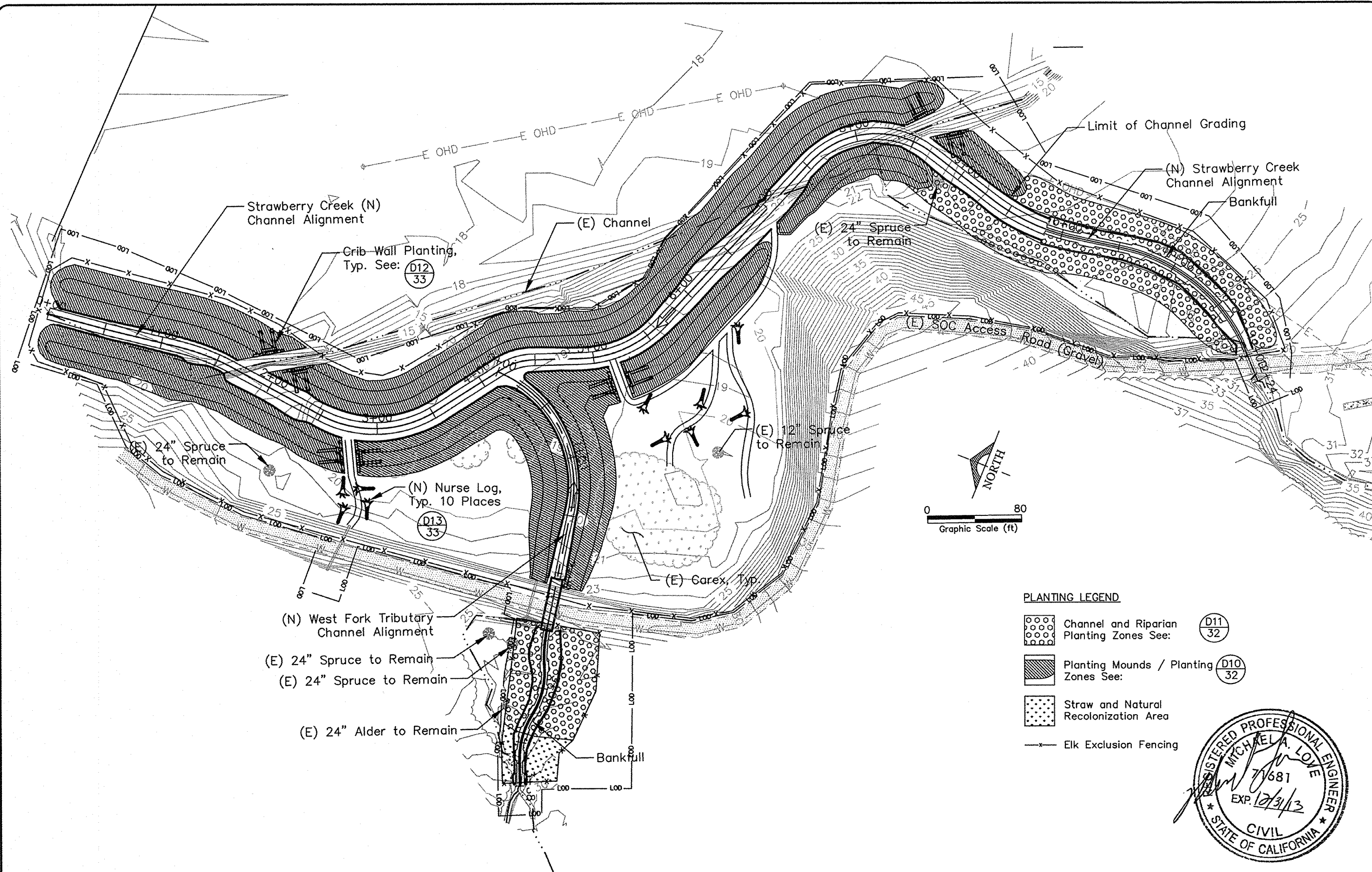
#### Material Specifications

1. Contractor shall use logs provided on site. Logs shall not be cut unless at the direction of the Owner.
2. Logs shall be a single log meeting the dimensions specified on the Contract Documents
3. Salvaged branches and leaves shall consist of limbs, branches and leaves savaged from clearing and grubbing operations.
4. Anchoring shall conform to Contract Documents.





#### Installation Specifications

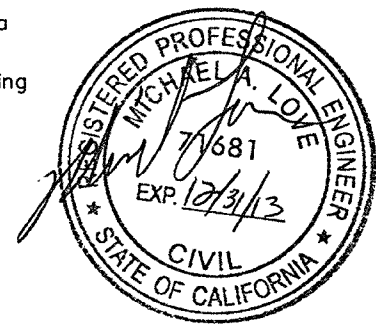
1. Habitat Logs shall be installed as specified on the Contract Documents, and where directed by the Owner.
2. Deadman logs can be installed by either trench excavation or driving them into the streambank. Logs shall be installed so that they are roughly parallel, approximately 10 feet apart, and oriented upstream at an angle of 60 to 80 degrees from the streambank.
3. Downstream Deadman Log shall be installed sloping into the streambank at an approximately 10H:1V pitch.
4. If rootwad is present, rootwad shall face upstream.
5. Cross log shall be placed under the downstream Deadman Log near the channel bottom.
6. Where installed logs cross, provide a minimum of 1 foot overhang.
7. All logs shall be anchored where specified.
8. Backfill excavated trench with compacted native material. Loosely pack area between Cross-Log and streambank with salvaged branches, sticks and leaves.



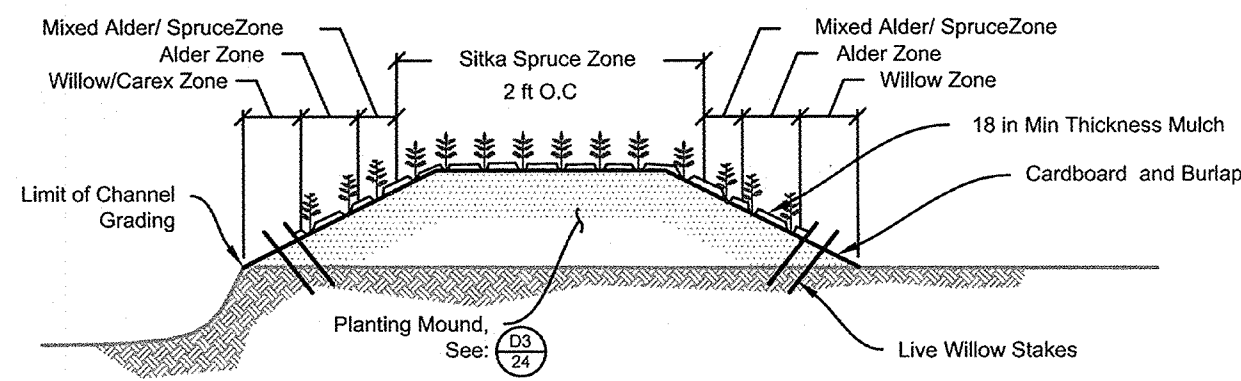


**PLANTING LEGEND**

-  Channel and Riparian Planting Zones See: D11  
32
-  Planting Mounds / Planting Zones See: D10  
32
-  Straw and Natural Recolonization Area
-  Elk Exclusion Fencing



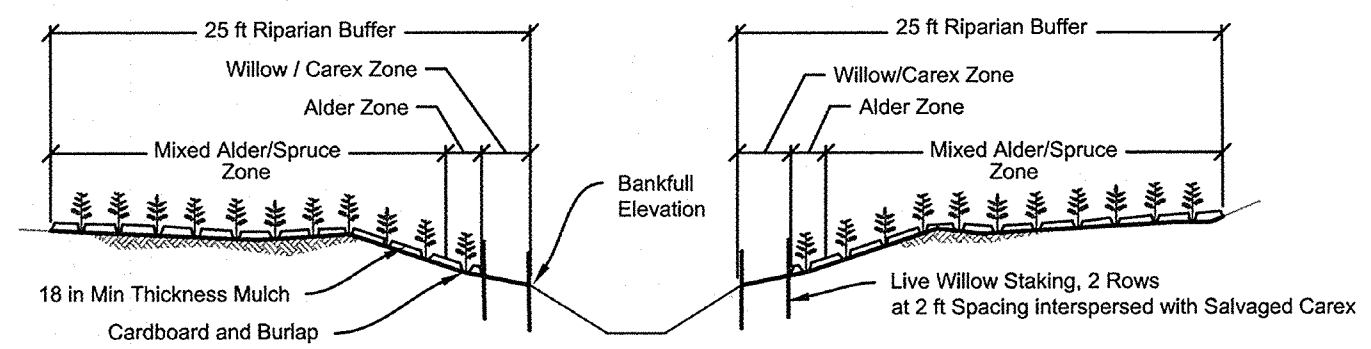




**Mound Planting Zones**  
Detail Cross Section (NTS)

PLANTING ZONE	PLANTING DENSITY	ELEVATIONS ON PLANTING MOUNDS
Sitka Spruce Zone	Sitka Spruce at 2 ft O.C.	Elev. 23 ft and higher
Mixed Alder/Spruce Zone	70% Red Alder, 30% Sitka Spruce at 2 ft O.C.	Elev. 22 ft to 23 ft
Alder Zone	Red Alder at 2 ft O.C.	Elev. 20.5 ft to 22 ft
Willow / Carex Zone	Live Willow Stakes at 2 ft O.C. Interspersed with Salvaged Carex	Elev. 19.5 ft to 20.5 ft

Note:  
Mulch shall not be installed in the Willow/Carex Zone



**Channel and Riparian Planting Zones**  
Detail Cross Section (NTS)

### Specification for Planting Mound and Riparian Area Planting Zones

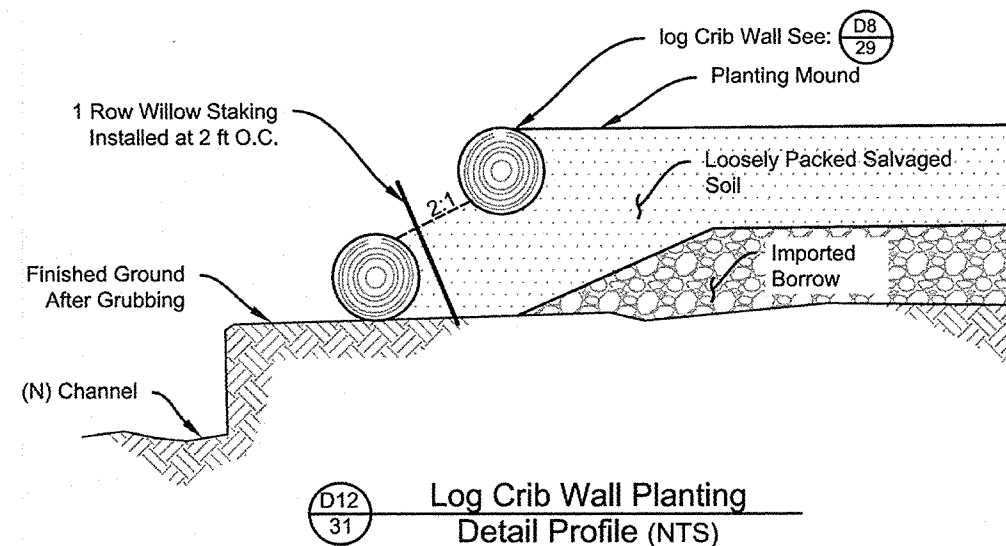
#### Material Specifications

1. Plantings shall consist of 2-year old potted Sitka Spruce and Red Alder provided by Owner. Live willow stakes shall be as specified in these Contract Documents.
2. Carex shall consist of plants salvaged from the work areas and broken into clumps that contain approximately 1 quart of roots.
3. Cardboard shall consist of corrugated cardboard rolled or fanfolded with cornstarch glues. Minimum width shall be 60 inches.
4. Burlap shall consist of 10-ounce natural fibers with a minimum width of 60 inches.
5. Mulch shall consist of shredded redwood wood and bark. Mulch shall be manufactured from clean wood and shall have a particle size between 1/8 inch and 1 1/2 inches in thickness and one inch to 8 inches in length; and shall be free of salt and deleterious materials such as clods, coarse objects and rocks.
6. Staples shall be 6 inch minimum length and biodegradable.
7. No soil amendments shall be installed.
8. Owner shall be responsible for watering and maintenance after installation.

#### Installation Specifications

1. Invasive grasses within the limit of planting area shall be grubbed to fully remove grass roots, or to a maximum depth of 3 feet below existing grade. Grubbed material shall be disposed of on-site at the direction of the owner.
2. Where existing Carex grasses are present within the limits of excavation of planting mounds, plants shall be excavated to preserve root mat. Grasses shall be stored in a moist, sunny location, with roots covered with soil. Carex shall be replanted along new channel edge and bottom of planting mounds at the direction of the Owner.
3. Place cardboard on finished ground surface the full length and width of the planting zone. Cardboard shall overlap a minimum of one foot.
4. Place burlap over cardboard the full length and width of the planting zone. Burlap shall overlap a minimum of one foot. Overlaps shall be located a minimum of 3 feet away from cardboard overlaps. Install staples through cardboard and burlap at 5 ft O.C.
5. Plantings shall be installed as specified on the Contract Documents, and where directed by the Owner.
6. To install plant, cut a small hole, slightly larger than the planting stem through the cardboard and burlap.
7. Installation and mulching of plants shall conform to Caltrans, 2006 Section 20 and at the spacing and mulch depth indicated on the Contract Documents. Installed mulch shall not touch stems or branches of planting.
8. Stakes, root, or foliage protectors shall not be installed.





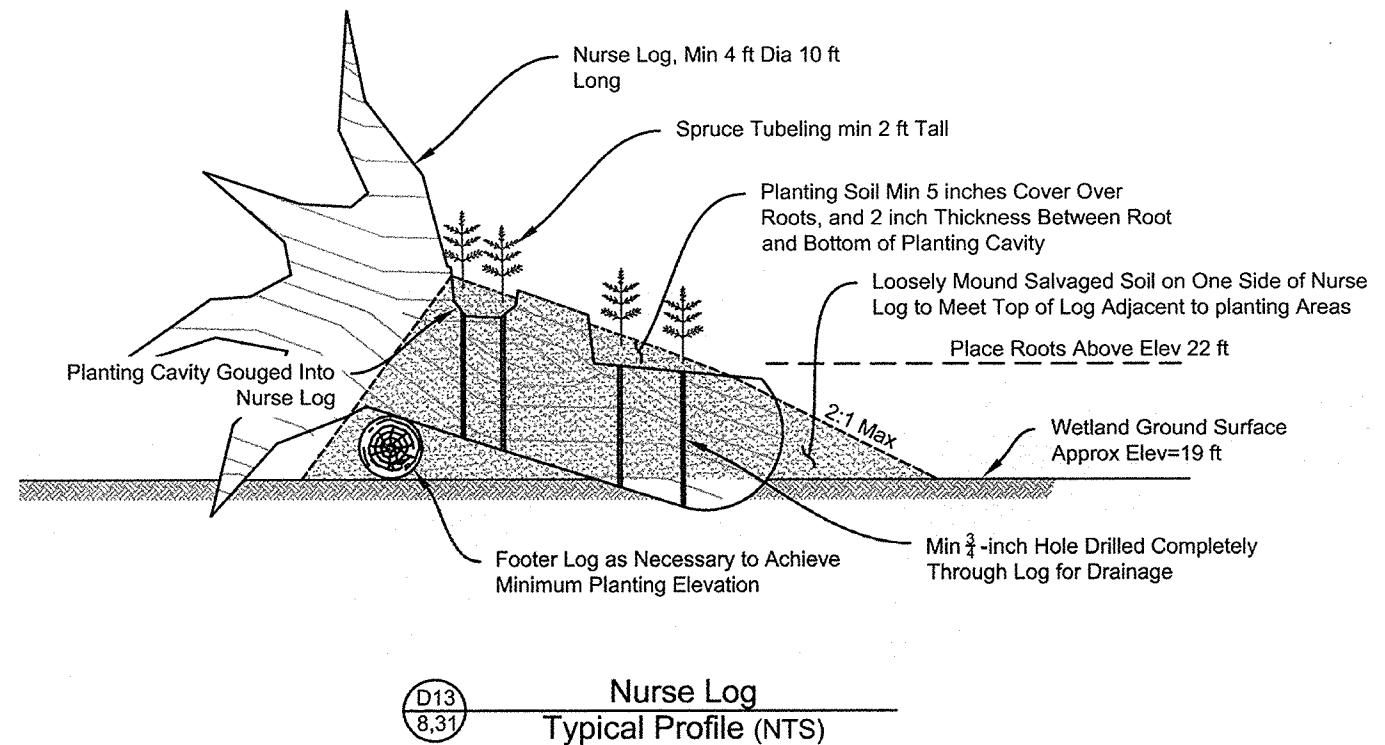
### Specification for Live Willow Stakes

#### Material Specifications

1. Live Willow Stakes shall consist of live willow branches harvested locally at the direction of the Owner.
2. Stakes shall be straight and no shorter than 4 feet in length and ½ to 3 inches in diameter.
3. Harvested material shall be live, freshly cut, and dormant. The plant material shall be free from disease and harmful insects. Basal ends shall be cut cleanly at an angle to facilitate easy insertion into the soil. The tops shall be cut square or blunt.
4. Plant materials shall not be stored greater than 48 hours after harvesting. Plant material shall be protected from drying by means of covering with canvas, burlap or straw and shall be kept moist.
5. No soil amendments shall be installed.
6. Owner shall be responsible for watering and maintenance after installation.

#### Installation Specifications

1. Live Willow Stakes shall be installed as specified on the Contract Documents, and where directed by the Owner.
2. Create pilot holes to the full depth of the stake installation.
3. Stakes shall be installed at the spacing indicated on the Contract Documents, with approximately 1-foot of stake extending beyond finished grade after installation. Leaf buds shall point up.
4. Stakes shall be pushed or driven into the bank in a method that minimizes crushing and splitting of the top of the cutting. The tops of the cuttings shall be trimmed as necessary to remove split and crushed wood.



### Specification for Nurse Logs

1. Contractor shall use logs provided on-site. Logs shall not be cut unless at the direction of the Owner.
2. Owner shall select logs to be used as Nurse Logs. Logs will typically be the following dimensions:
  - a. Nurse Log: 5 to 12-foot long, 4 to 6-foot diameter log
  - b. Footer Log: 5 to 15-foot long, 1.5 to 2-foot diameter logs.
3. Sitka Spruce tubelings shall have a minimum rooting depth of 5 inches and a minimum of 5 inches of healthy stem and branch growth.
4. Planting Soil shall be acidic with a uniform mix of equal quantities of sand, soil and humus or peat.
5. Soil stabilization matting shall be biodegradable woven coir matting with an open area of 39 to 50%, and a minimum weight of 20 oz/sy.
6. Logs shall not be anchored together.

#### Installation Specifications

1. Nurse Logs shall be installed as specified on the Contract Documents and / or directed by Owner.
2. Install logs to facilitate use of natural planting areas in logs such as rotten area, splits, or junctions between roots.
3. Cut planting shelves or trenches in nurse log that provide positive drainage. Cut areas shall be a minimum of 8 inches deep and 8 inches wide.
4. Drill drainage holes.
5. Loosely place Planting Soil in cut area.
6. Cover entire area of Planting Soil with double layer soil stabilization matting stapled to wood. Staples shall be placed every 2 inches.
7. Create pilot hole and place tubelings such that roots are covered with a minimum of 5 inches of soil and 2 inches of soil thickness between roots, wood or soil stabilization matting.
8. Plant up to 10 tubelings per nurse logs.
9. Loosely mound Salvaged Soil on one side of Nurse Log adjacent to planting areas to provide additional space for rooting.

