

LOCATION MAP

T4S, R2E, SEC 35
CLACKAMAS COUNTY, OREGON

Scale in feet

AS-BUILT DRAWINGS

Contractor: Aquatic Contracting
Completion Date: September 2012
Inspectors: M. Walter (NRCS)
A. Beaver (NMFS)
D. Fenwick (District)

INDEX OF DRAWINGS

SHEET NO.	TITLE
1.	Cover Sheet
2.	As-Built Plan and Profile
3.	As-Built Vegetated Log Matrix
4.-6.	As-Built Cross Sections (3 sheets)
7.-11.	Vegetated Log Matrix Construction (5 sheets)
12.	Engineered Large Wood Structure
13.	Bank Shaping
14.	Planting Plan

ESTIMATED QUANTITIES

Vegetated Log Matrix Quantities	
Rootwads dbh = 10"-30" length = 18'-30' rootwad dia = 2'-6'; 4' avg	55 ea
Wood Fill dbh = 8"-18"	≈ 500 ea
Fringe Roughness	100 cy
On-site Boulders, estimated, avg dia 2.5'	52 tons
Delivered Boulders, avg dia 2.5'	108.7 tons
3"-6" Pit Run Angular Rock	321.5 tons
Top Soil, Yard Restoration	6 cy
Clump Plantings	13 ea
Willows	3000 ea
Seeding	137 lbs
Mulch	1 tons

Engineered Large Wood Structure Quantities	
24" dbh, 30' stem length w/5' min dia. rootwad	2 ea
18" dbh, 18' stem length w/3' min dia. rootwad	6 ea
18" dbh, 18' stem length, no rootwad	7 ea
ballast rock (2.5' min. dia.)	22 cy

AS-BUILT DRAWINGS APPROVED BY:

M. Walter, P.E.

12/2012
DATE

* This Project was designed to comply with the USACE's Slopes Programmatic Biological Opinion

MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT

CLACKAMAS COUNTY, OREGON

PREPARED BY:

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

FOR THE:

CLACKAMAS SOIL AND WATER CONSERVATION DISTRICT

GENERAL NOTES

1. Contour interval on all drawings is 1 foot.
2. Elevations and coordinate locations are based on horizontal datum NAD 83 and vertical datum NAVD 88.
3. All stationing refers to centerline of construction and is the measured horizontal distance.
4. Slopes designated as 2:1, 1.5:1, et cetera, are the ratios of horizontal distance to vertical distance.
5. All existing conditions are to be verified in the field prior to construction and any adjustments to the drawings shall be made as directed by the NRCS Engineer.
6. Dimensions are given in feet and tenths of a foot.
7. Topography and cross section ground lines are based on survey data using survey-grade GPS on July 11, 2011.
8. Existing private improvements, which lie within the construction limits, unless otherwise noted will be removed by the owner prior to construction, or abandoned in place.
9. Protect all trees and land areas not located within the project construction or earthwork limit. Exercise care in areas not so marked to avoid unnecessary damage to natural vegetation.
10. Construction shall meet the requirements of OSHA. Actual slopes shall not exceed the slopes as indicated on drawings.
11. NRCS makes no representations as to the existence or non-existence of utilities. It is the responsibility of land owners or operators to comply with the provisions of ORS 757.541 to 757.571. Land owners or operators and contractors will be liable for any damage resulting from disruption of service caused by construction activities.
12. The landowner is responsible for obtaining any and all permits required to successfully construct the project, including local, state, and federal permits.
13. Contractor is required to attend a pre-construction meeting with NRCS, the District and the landowner.

COVER SHEET - AS-BUILTS

MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT

JOB CLASS: V
LOWER WILLAMETTE BASIN

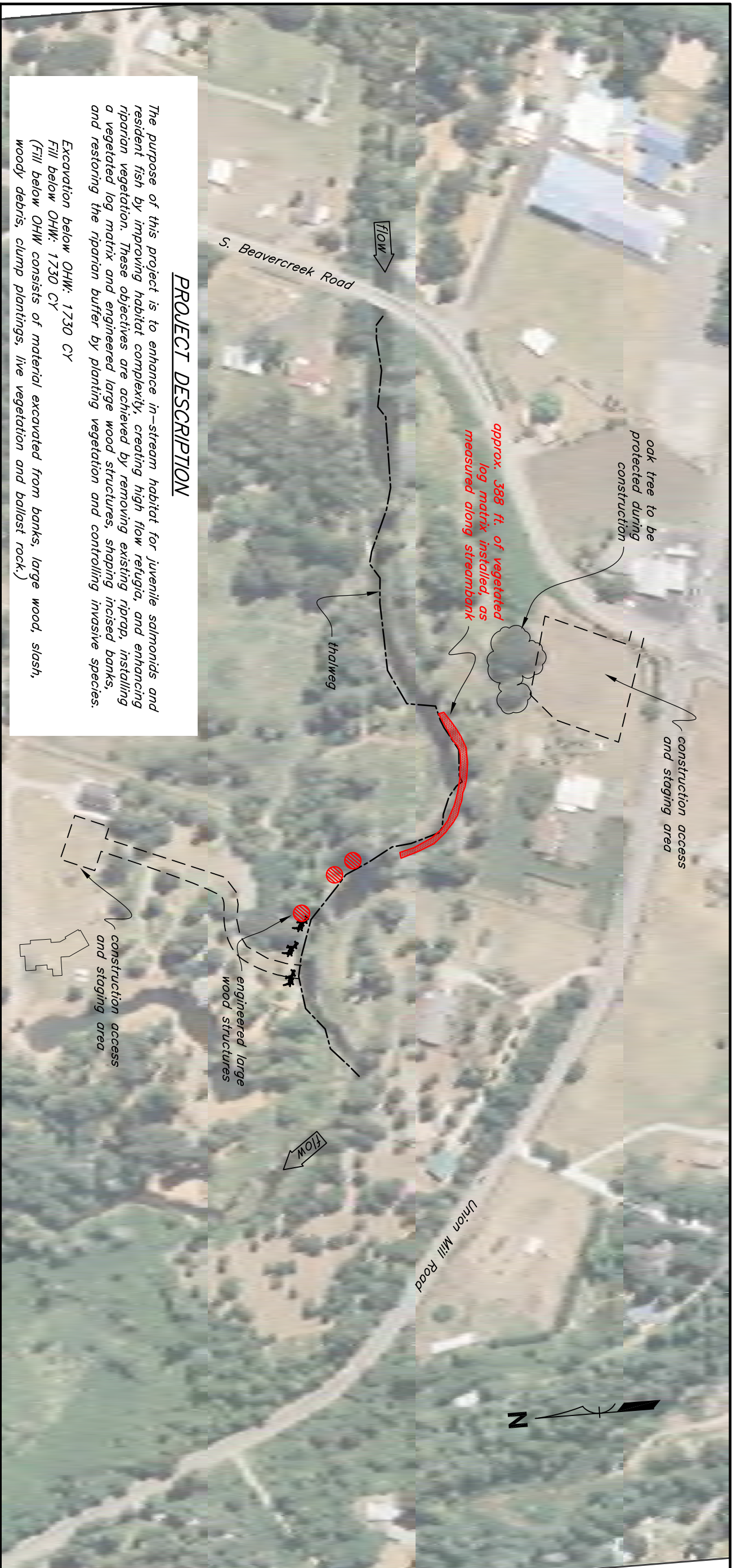
PRACTICE STANDARD: 580
CLACKAMAS COUNTY, OREGON



Natural Resources Conservation Service
United States Department of Agriculture

Date	
10/2012	Designed <u>M. Walter/A. Beavers</u>
10/2012	Drawn <u>KLY</u>
6/2012	Checked <u>J. Gillian</u>
12/2012	Approved _____
	Title <u>State Hydraulic Engineer</u>

File Name
milk_2012_asbuilt.dwg
Drawing No.
AS-BUILT DWG

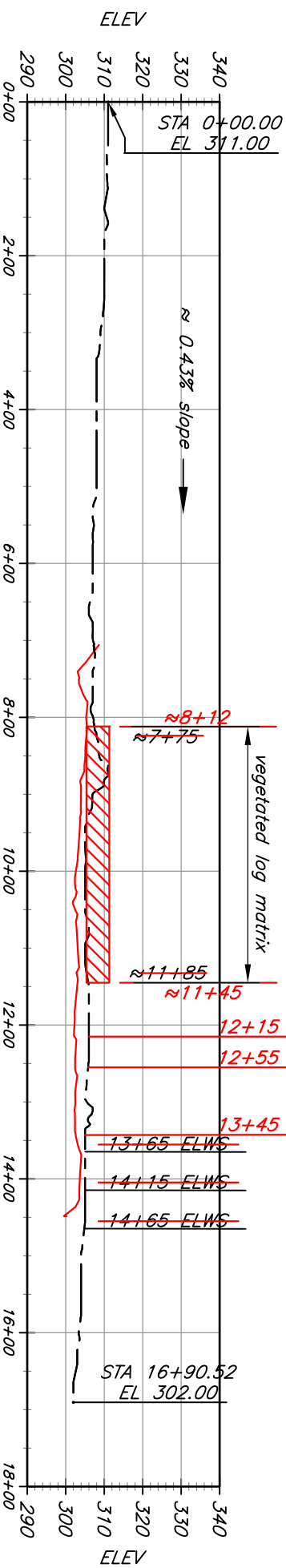


PROJECT DESCRIPTION

The purpose of this project is to enhance in-stream habitat for juvenile salmonids and resident fish by improving habitat complexity, creating high flow refugia, and enhancing riparian vegetation. These objectives are achieved by removing existing riprap, installing a vegetated log matrix and engineered large wood structures, shaping incised banks, and restoring the riparian buffer by planting vegetation and controlling invasive species.

Excavation below OHW: 1730 CY
 Fill below OHW: 1730 CY
 (Fill below OHW consists of material excavated from banks, large wood, slash, woody debris, clump plantings, live vegetation and ballast rock.)

PLAN VIEW



PROFILE ALONG REACH CENTERLINE

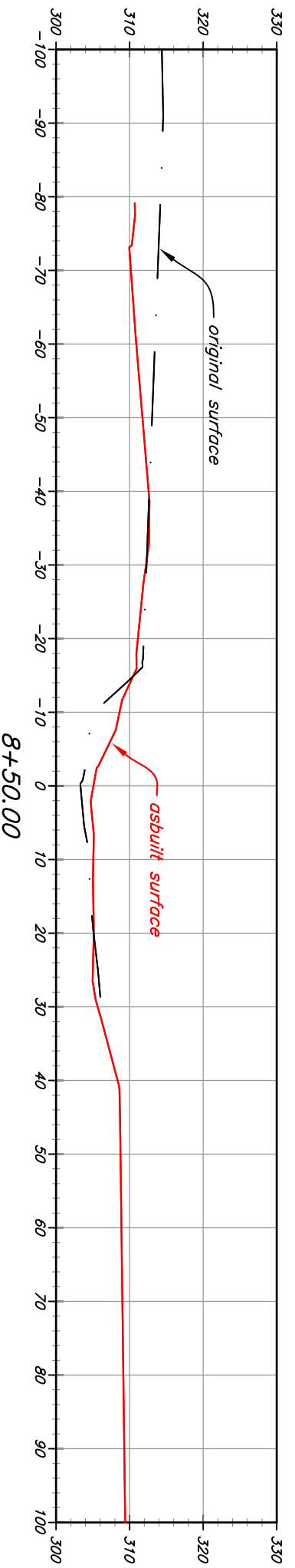
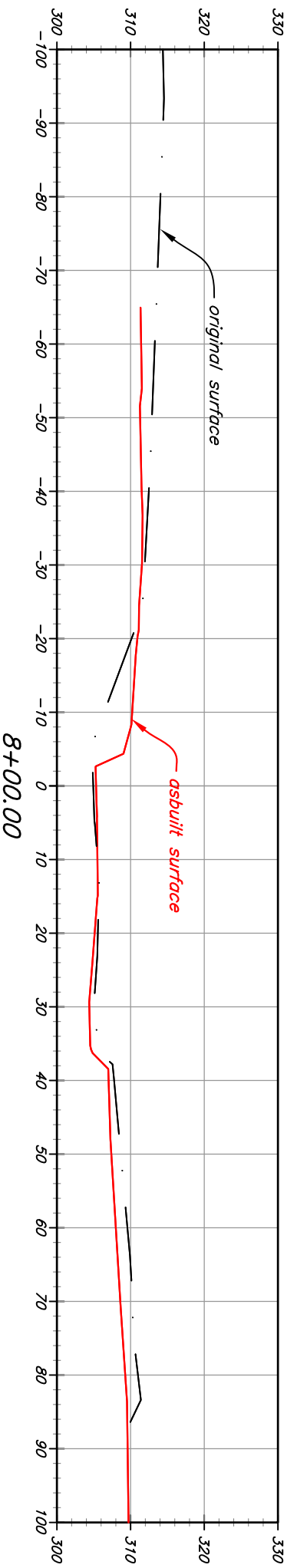
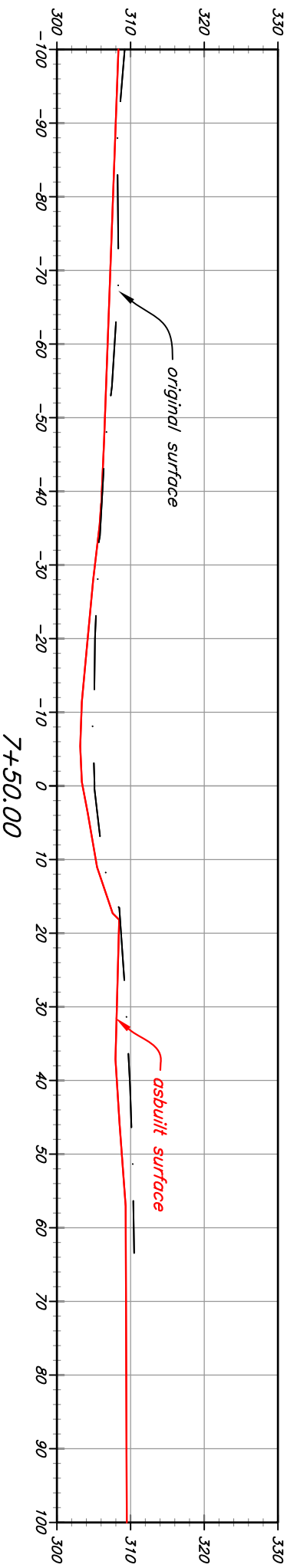
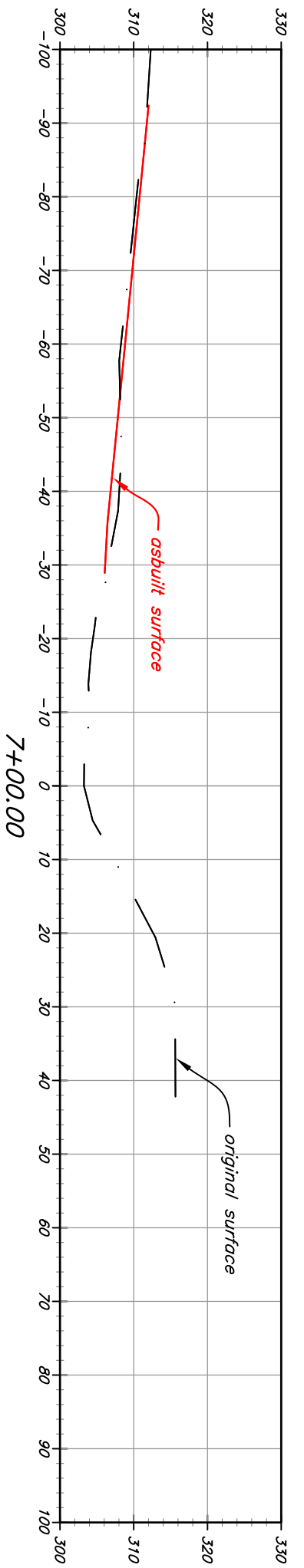
NOTE: All work around existing bank to be performed in a safe and conscientious manner with a minimum allowance for disturbed bank material entering river during construction activities. Contractor shall exercise extreme caution working around existing trees.



AS-BUILT PLAN AND PROFILE
MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT
 JOB CLASS: V
 LOWER WILLAMETTE BASIN
 PRACTICE STANDARD: 580
 CLACKAMAS COUNTY, OREGON

Designed	M. Walter/A. Beavers	Date	10/2012
Drawn	KLY	Date	10/2012
Checked			
Approved			
Title			

File Name: milk_2012_asbuilt.dwg
 Drawing No.: AS-BUILT DWG
 Sheet 2 of 14

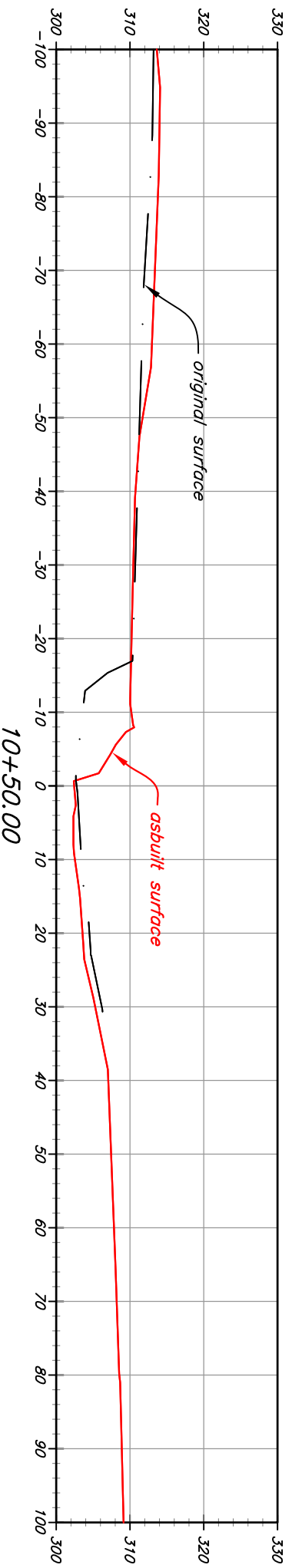
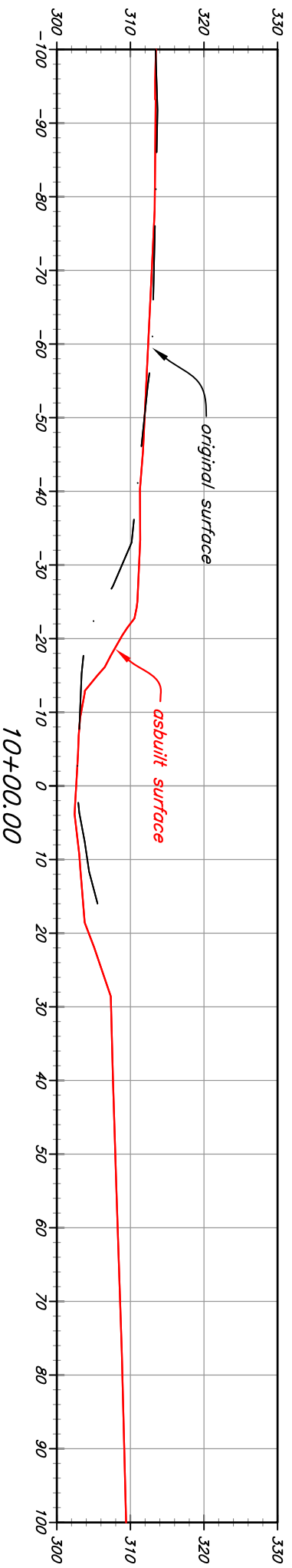
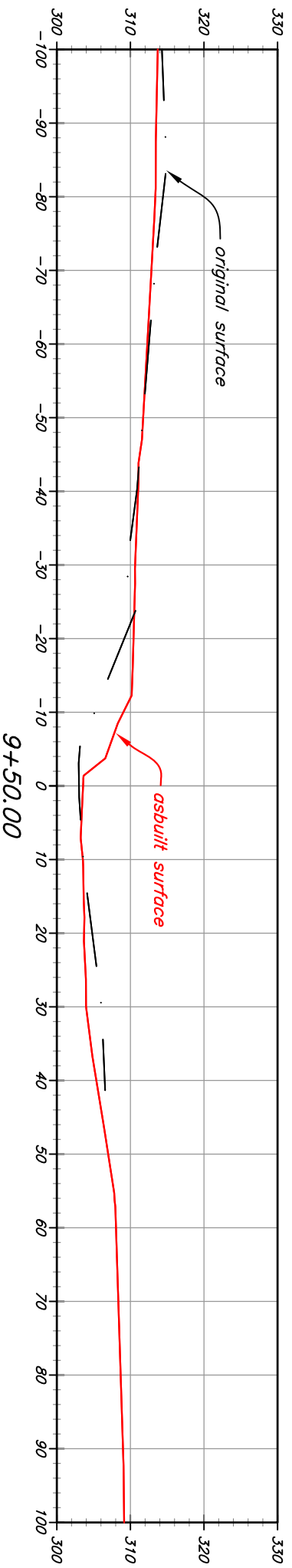
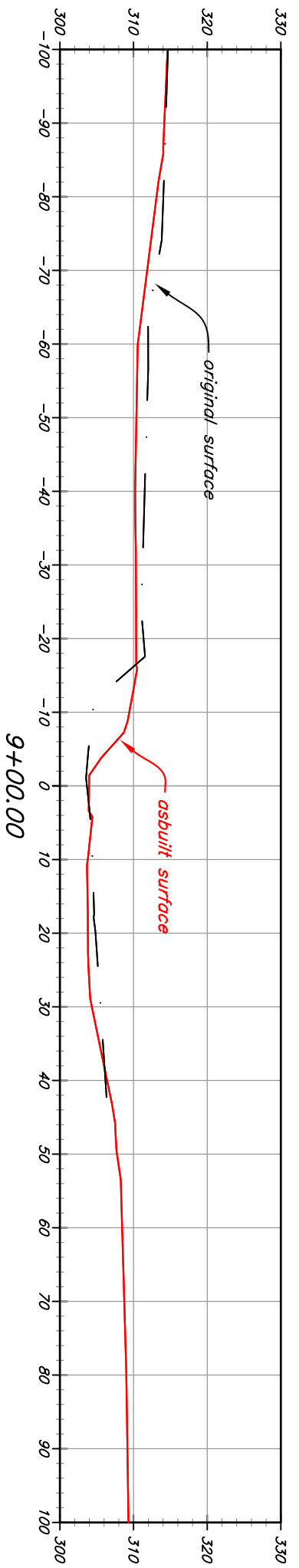


Designed	<u>M. Walter/A. Beavers</u>	Date	<u>10/2012</u>
Drawn	<u>KLY</u>		<u>10/2012</u>
Checked	_____		_____
Approved	_____		_____
Title	_____		_____

AS-BUILT CROSS SECTIONS
MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT
 JOB CLASS: V PRACTICE STANDARD: 580
 LOWER WILLAMETTE BASIN CLACKAMAS COUNTY, OREGON



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 Drawing No.: **AS-BUILT DWG**
 Sheet 4 of 14

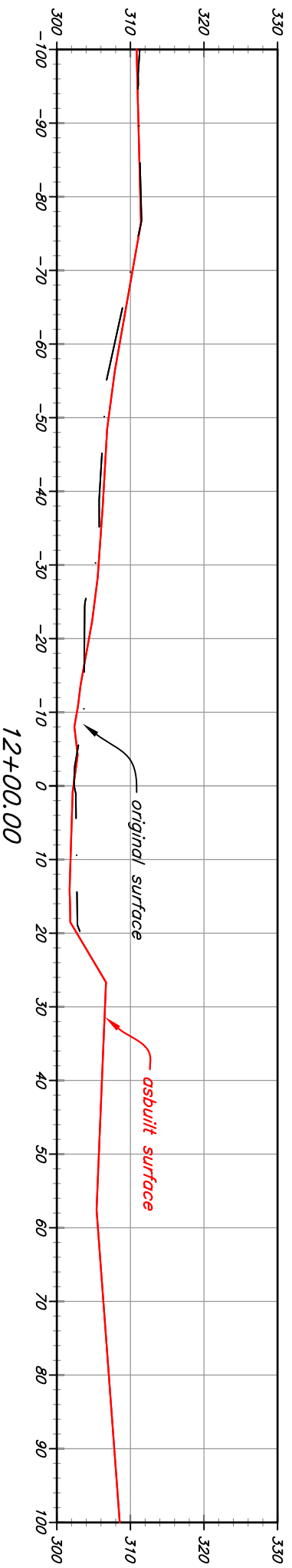
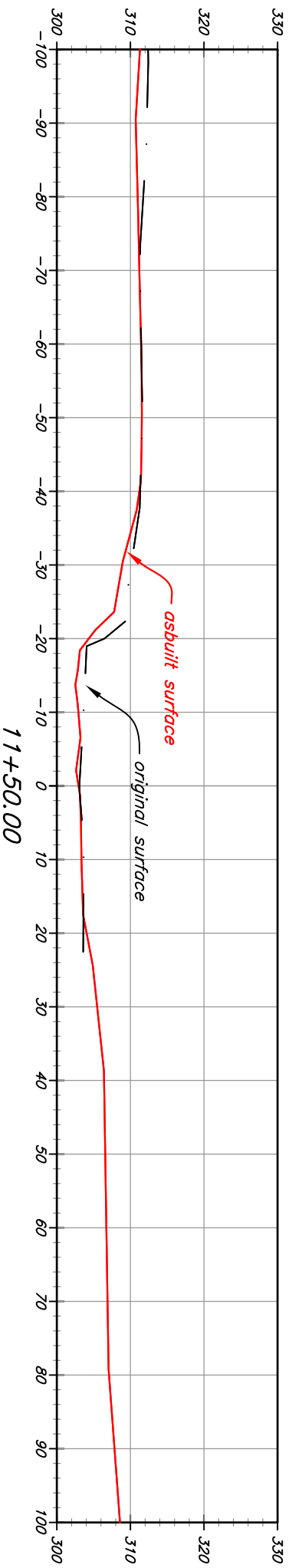
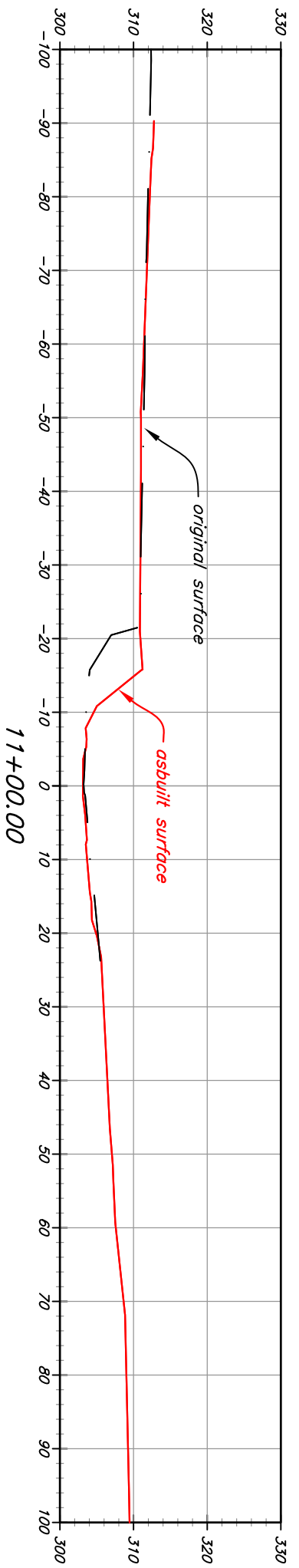


Date	10/2012
Designed	M. Walter/A. Beavers
Drawn	KLY
Checked	
Approved	
Title	

AS-BUILT CROSS SECTIONS
MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT
 JOB CLASS: V PRACTICE STANDARD: 580
 LOWER WILLAMETTE BASIN CLACKAMAS COUNTY, OREGON



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 Drawing No.: AS-BUILT DWG
 Sheet 5 of 14

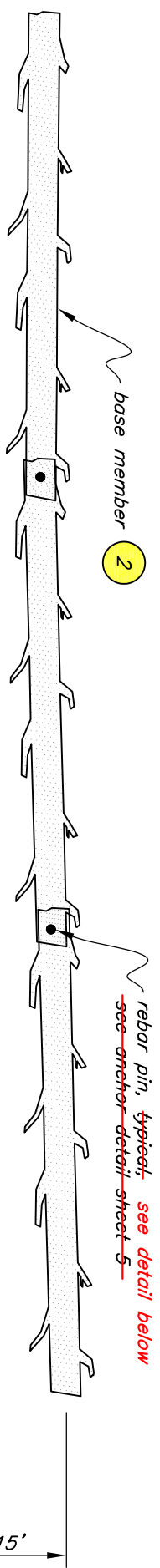


Date
 Designed M. Walter/A. Beavers 10/2012
 Drawn KLY 10/2012
 Checked _____
 Approved _____
 Title _____

AS-BUILT CROSS SECTIONS
 MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT
 JOB CLASS: V PRACTICE STANDARD: 580
 LOWER WILLAMETTE BASIN CLACKAMAS COUNTY, OREGON



File Name
milk_2012_asbuilt.dwg
 Drawing No.
AS-BUILT DWG
 Sheet 6 of 14



base member 2

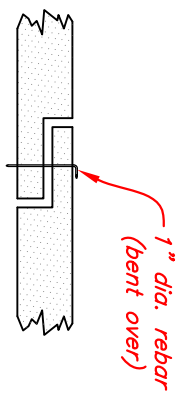
rebar pin, typical. see detail below
-see anchor detail sheet 5-

base member 1

changed base members to 24" dbh logs with no rootwads



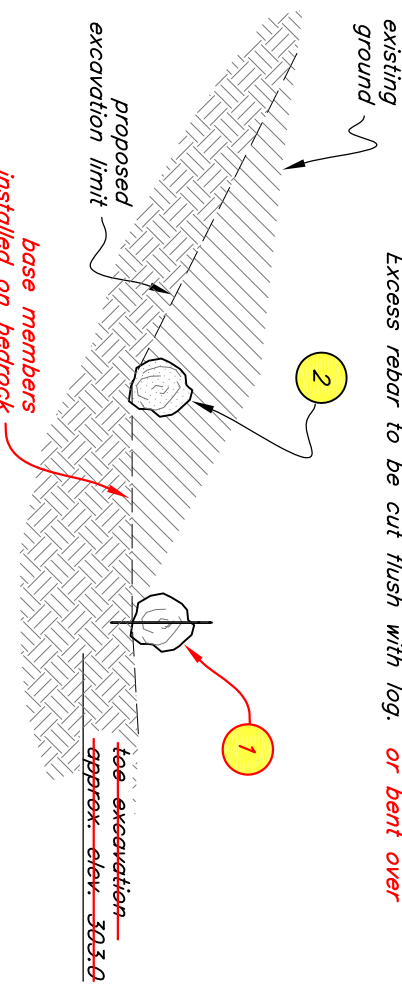
PLAN VIEW



BASE MEMBER PIN DETAIL

MEMBER NUMBER	ITEM	QUANTITY (EA)	DBH (INCHES)	LENGTH (FEET)	ROOTWAD DIA. (FEET)
1	Base Member	14	24	30 min	N/A
2	Base Member	14	24	30 min	N/A

LOG MATRIX TIER 1



SECTION

TIER 1 - CONSTRUCTION NOTES

Excavate structure footprint to specified design elevation. Stage excavated material in a nearby upland location that minimizes turbidity. Material excavated from structure footprint shall be used as ballast and backfill for log matrix structure. Structure footprint and bank-line excavation to conform to structure dimensions. Over excavation and disturbance of in-situ materials outside of structure footprint not allowed.

Place longitudinal base members within structure foundation footprint as shown in plan view with rootwads pointing upstream.

Anchor all large wood members together as shown in anchor detail on sheet 5 using 1" diameter rebar. Each member shall be connected at a minimum of 2 locations. Excess rebar to be cut flush with log. or bent over



Pinning deflector rootwads to base members



Placing base members



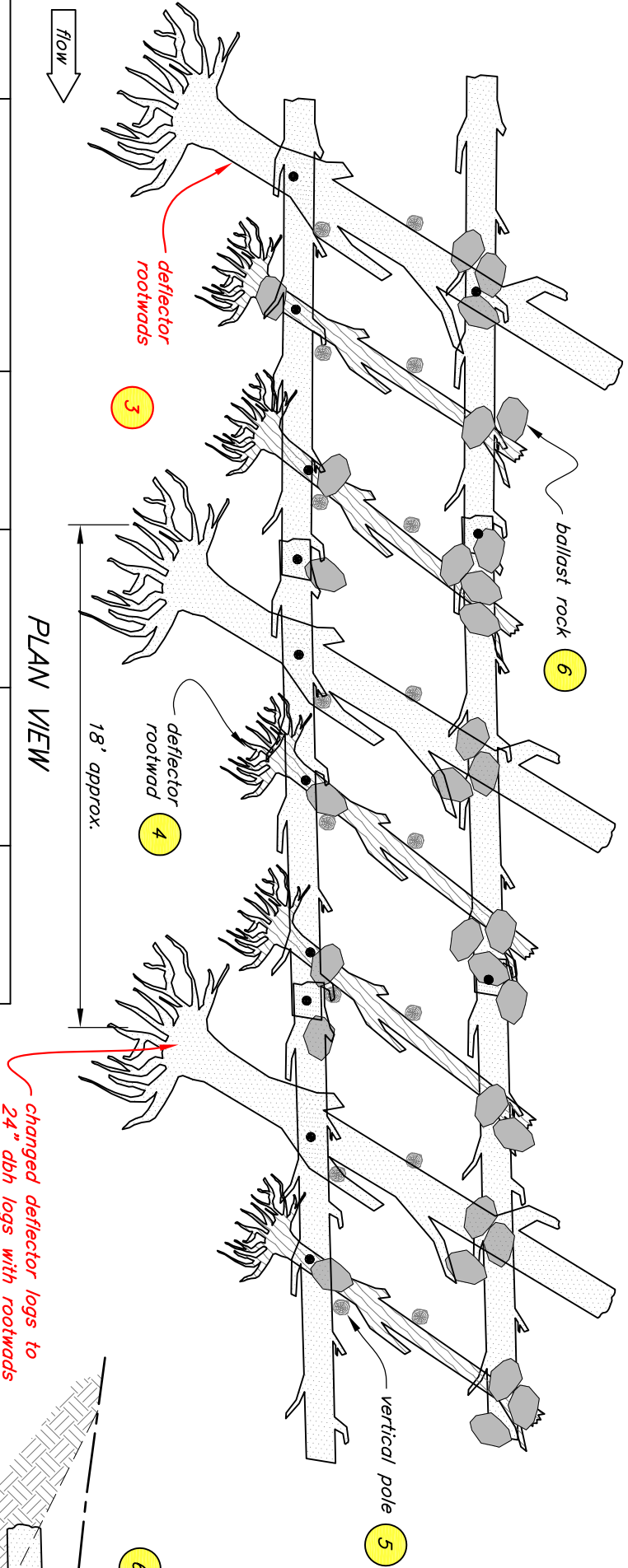
Base member pinning



VEGETATED LOG MATRIX CONSTRUCTION
MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT
JOB CLASS: V
LOWER WILLAMETTE BASIN
PRACTICE STANDARD: 580
CLACKAMAS COUNTY, OREGON

Designed	M. Walter/A. Beavers	Date	10/2012
Drawn	KLY	Date	10/2012
Checked			
Approved			
Title			

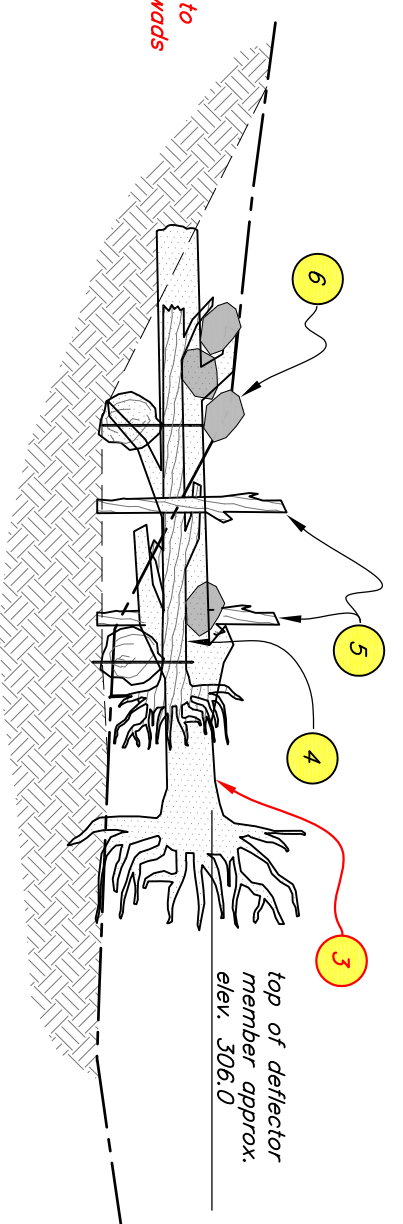
MEMBER NUMBER	ITEM	QUANTITY (EA)	DBH (INCHES)	LENGTH (FEET)	ROOTWAD DIA. (FEET)
3	Deflector Rootwad	14	24	30 min	5 min
4	Deflector Rootwad	26	12 min	18 min	N/A
5	Vertical Pole	90	12	12 min	N/A
6	Ballast Rock	150 CY	24 min	N/A	N/A



LOG MATRIX TIER 2

SECTION

NOT TO SCALE



TIER 2 – CONSTRUCTION NOTES

Place deflector rootwads. Pin to base members as shown in anchor detail on sheet 5. Weave vertical poles into base members and deflector members at various angles and positions to add surface and matrix complexity to structure. Embed vertical poles at minimum of 2 ft, unless bedrock prevents embedment. Exposed butt ends of deflector logs and vertical poles shall be roughened and broken. Exposed butt ends are not accepted. Place ballast rock around and on base members. Existing riprap on-site to be used as ballast rock.

bedrock prevented embedment



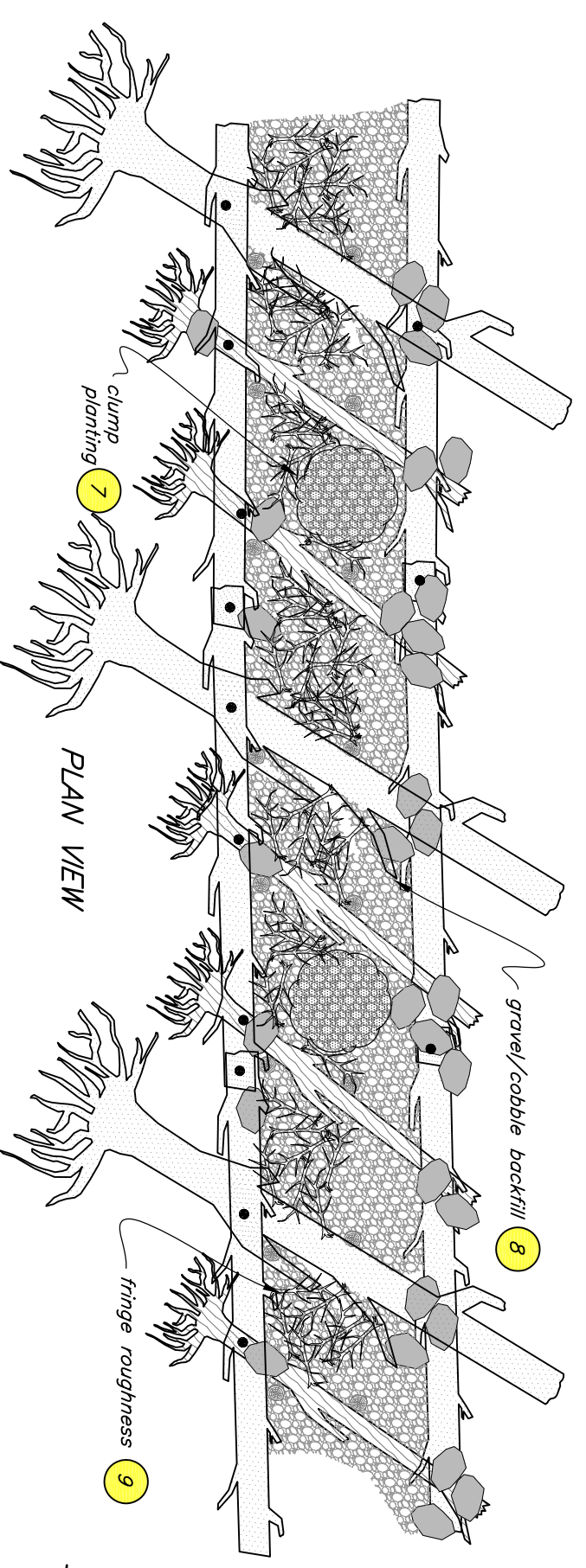
Pinning deflector rootwads to base members



Looking upstream at base members and deflector rootwads

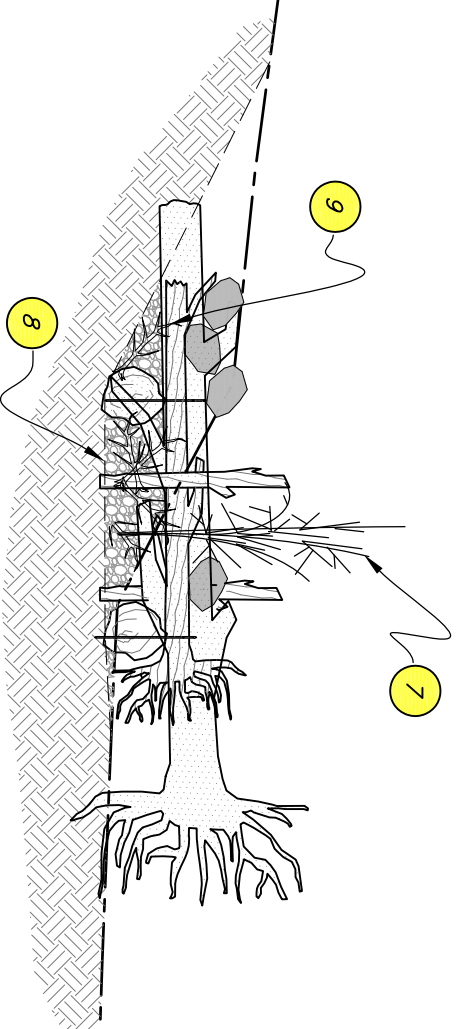


Looking downstream at base members and deflector rootwads



MEMBER NUMBER	ITEM	QUANTITY	DBH (INCHES)	LENGTH (FEET)	ROOTWAD DIA. (FEET)
7	Clump Planting	13 EA	N/A	N/A	N/A
8	Gravel/Cobble Backfill	315 CY	N/A	N/A	N/A
9	Fringe Roughness	315 CY	varies	varies	N/A

LOG MATRIX TIER 3



SECTION

NOT TO SCALE

TIER 3 – CONSTRUCTION NOTES

Place clump plantings within structure foundation. Backfill around the structure foundation up to the top top of the base members in alternating 6" lifts of excavated material and fringe roughness. Fringe roughness consists of slash, woody debris (including available on-site rootwad stumps), and live stakes. Live stakes to be provided by the District. Backfill material shall be placed between, around, and on members to fill voids and add structural mass to foundation. Backfill shall be compacted to a density equivalent to that of surrounding in-situ material.



Installing clump planting



Placing fringe roughness



Pressure washing matrix after placement of ballast and fringe roughness

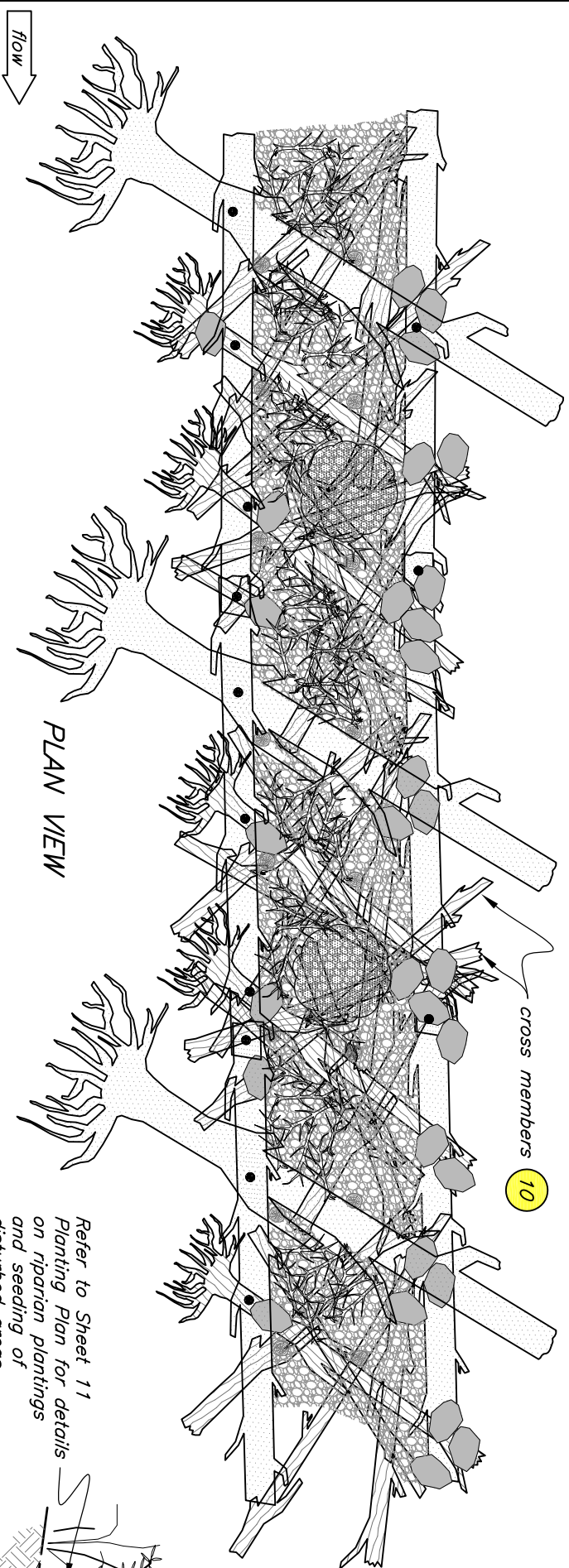
TIER 4 – CONSTRUCTION NOTES

Weave approximately 3 layers of cross members through vertical poles at various angles and positions. Exposed butt ends of cross members shall be roughened and broken. Exposed sawed butt ends are not accepted. Backfill between layers of cross members in alternating 6" lifts of excavated material and fringe roughness. Fringe roughness consists of slash, woody debris (including available on-site rootwad stumps), and live stakes. Live stakes to be provided by the District. Backfill material shall be placed between, around, and on members to fill voids and add structural mass to foundation. Backfill shall be compacted to a density equivalent to that of surrounding in-situ material. Refer to Sheet 10 Bank Shaping for details on bank shaping above log matrix. Grade bankline margins at upstream and downstream ends of structure to reduce potential for terminus scour and flanking at direction of NRCS Engineer.

6" minus angular rock imported as additional backfill

Refer to Sheet 11
Planting Plan for details
on riparian plantings
and seeding of
disturbed areas

PLAN VIEW



MEMBER NUMBER	ITEM	QUANTITY (EA)	DBH (INCHES)	LENGTH (FEET)	ROOTWAD DIA. (FEET)
8	Gravel/Cobble Backfill	210 CY	N/A	N/A	N/A
9	Fringe Roughness	210 CY	varies	varies	N/A
10	Cross Members	126	8-10	18	N/A
10	Cross Members	250	10-12	18	N/A
10	Cross Members	126	12-15	18	N/A

LOG MATRIX TIER 4

SECTION

NOT TO SCALE



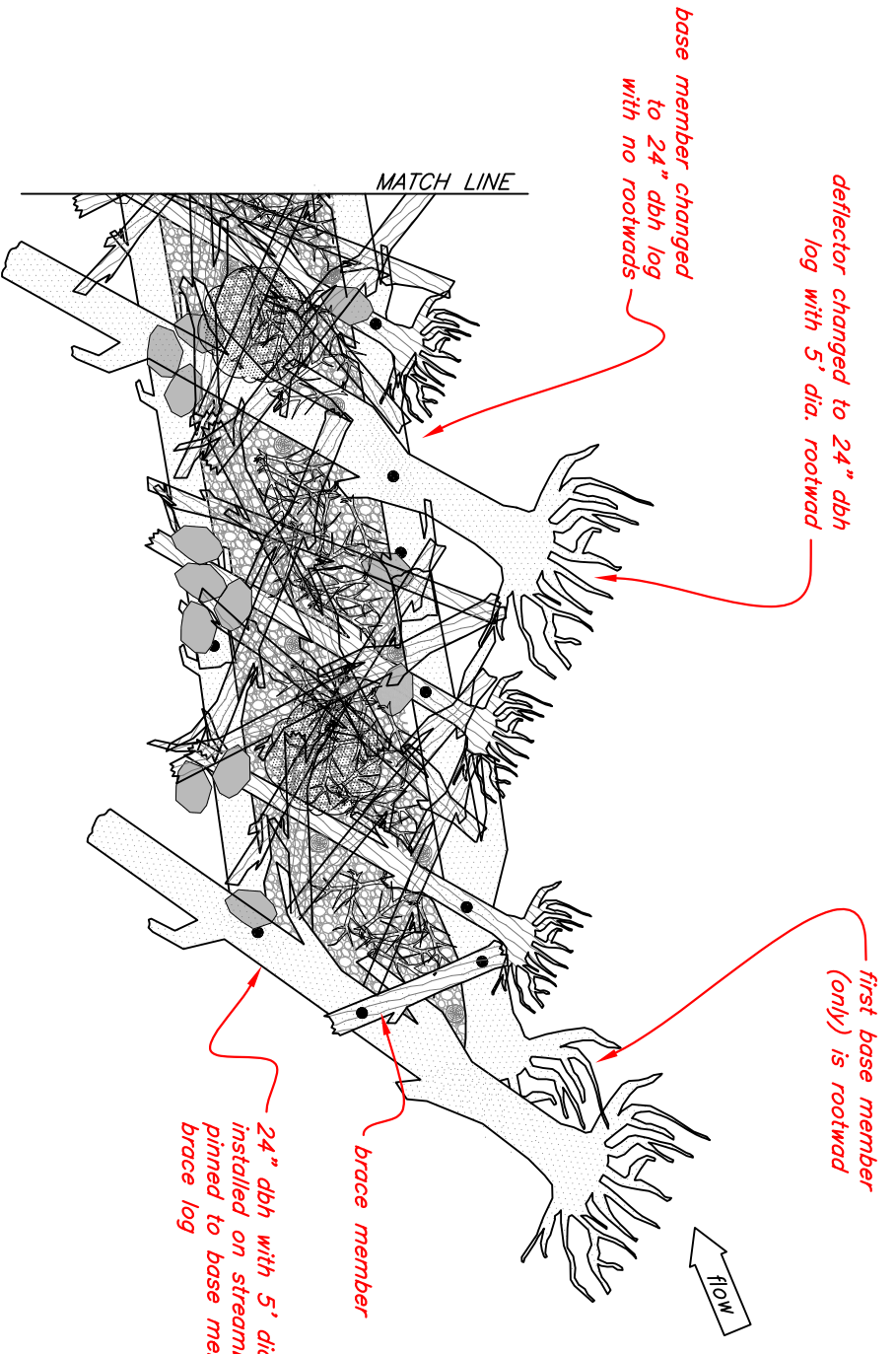
Completed matrix prior to backfill



Backfilling of matrix with 6" minus angular rock



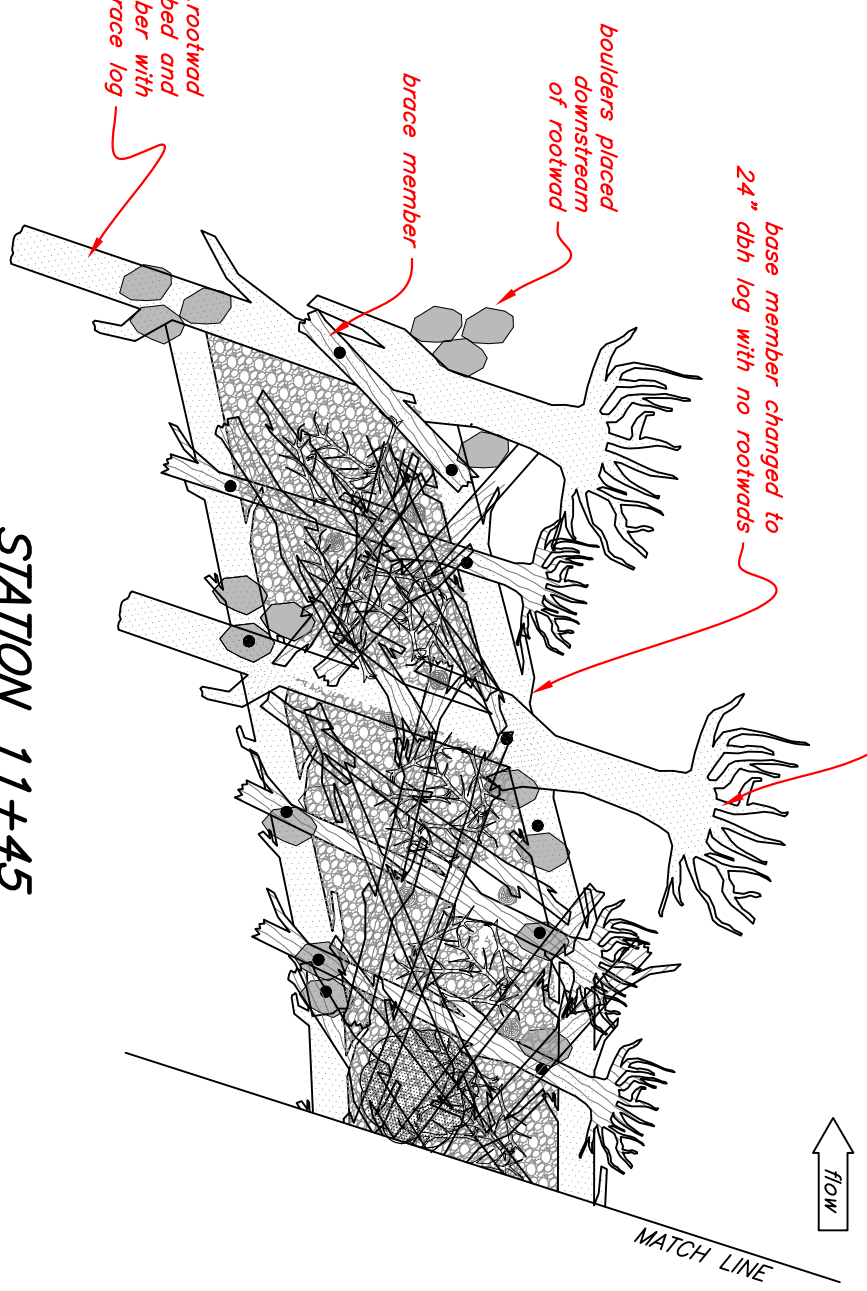
Completed log matrix



**STATION 8+12
UPSTREAM END OF MATRIX**



Looking upstream at start of log matrix



**STATION 11+45
DOWNSTREAM END OF MATRIX**



Pinning of brace member at downstream end of log matrix

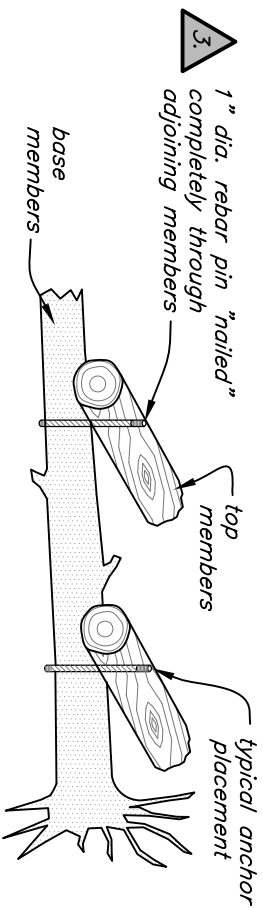
NOT TO SCALE



VEGETATED LOG MATRIX CONSTRUCTION
MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT
 JOB CLASS: V
 LOWER WILLAMETTE BASIN
 PRACTICE STANDARD: 580
 CLACKAMAS COUNTY, OREGON

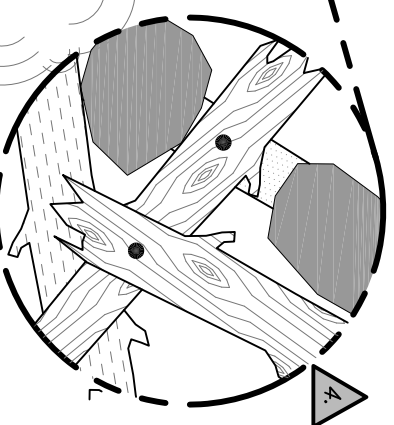
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Drawing No.	AS-BUILT DWG
Designed	M. Walter/A. Beavers 10/2012
Drawn	KLY 10/2012
Checked	
Approved	
Title	

Date



LOG TO LOG ANCHOR DETAIL

NOT TO SCALE

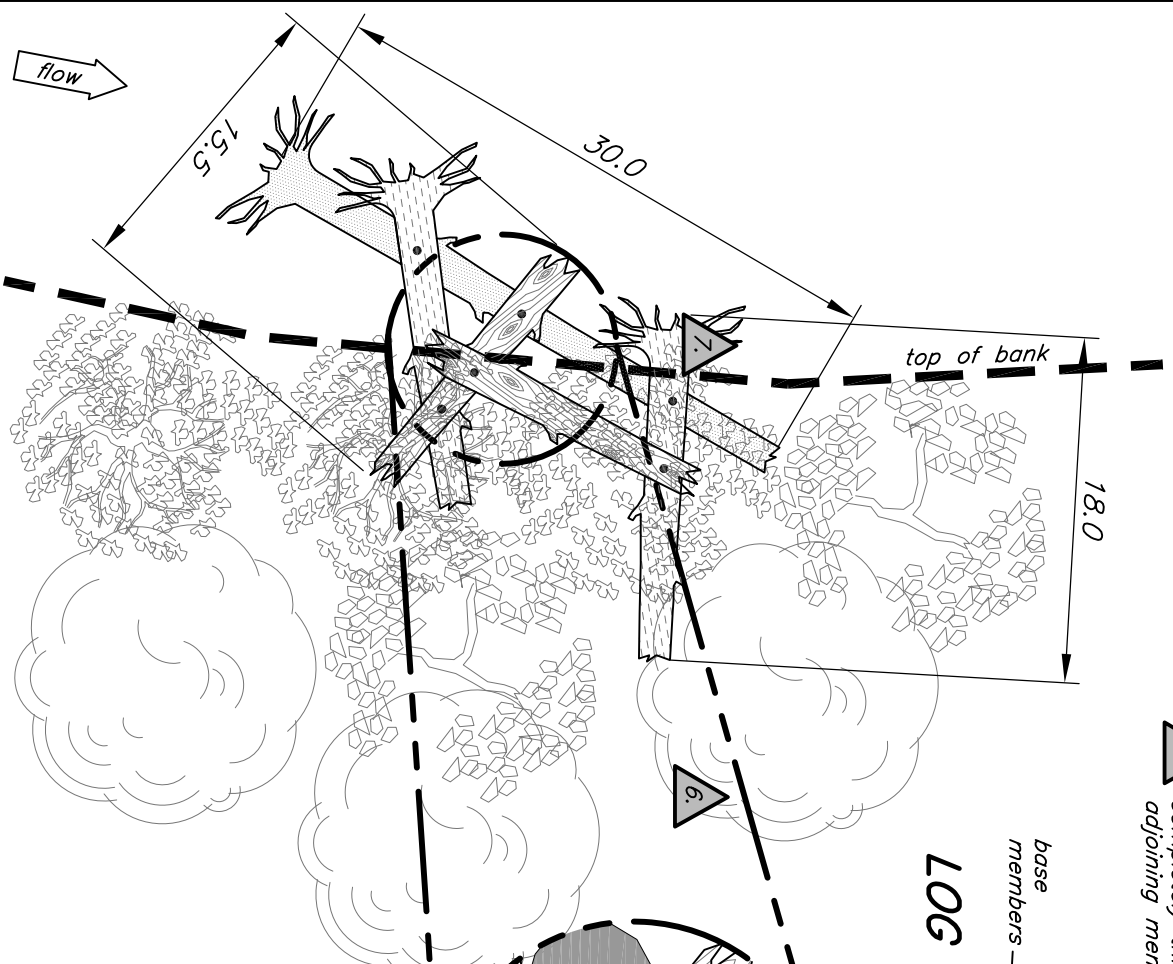


BALLAST DETAIL

NOT TO SCALE

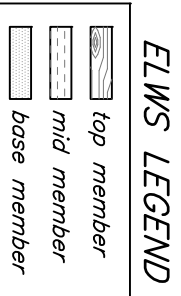
ELWS LOCATIONS*	
STRUCTURE #	RIVER RIGHT
1	+3+65- 12+15
2	+4+15- 12+55
3	+4+65- 13+45

PLAN VIEW

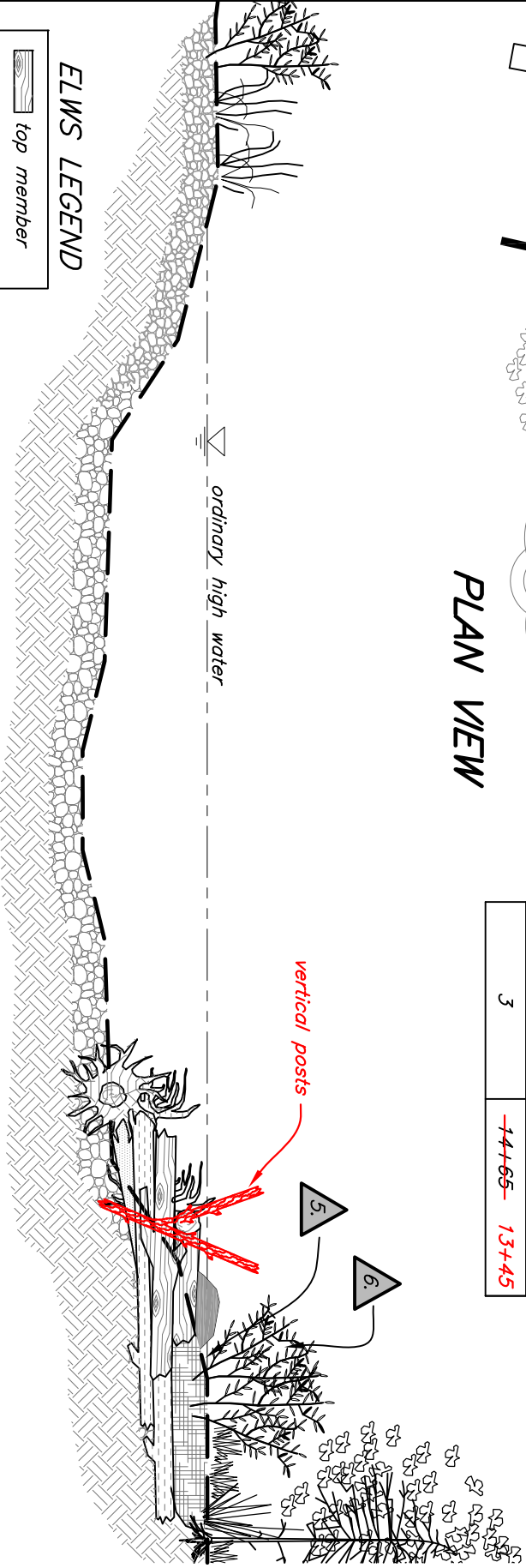


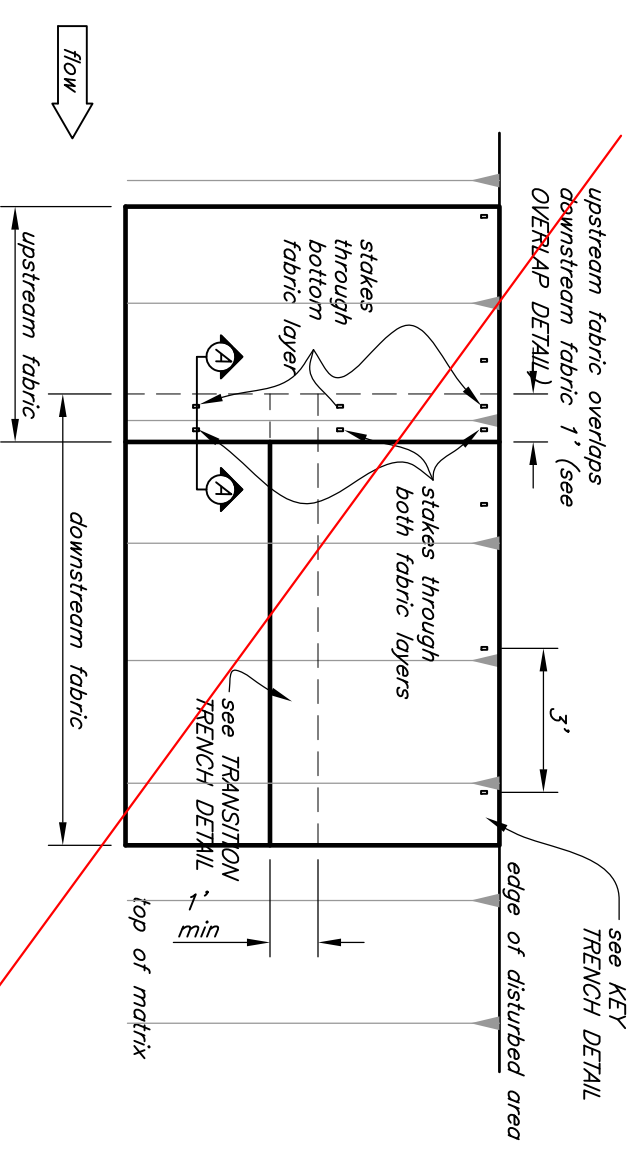
CONSTRUCTION NOTES:

- Construction activity to be supervised by the NRCS Engineer. Special attention shall be taken to operate equipment in a safe and efficient manner with a minimal disturbance outside of grading limits unless otherwise specified. Utmost care shall be employed to ensure excavated materials from bank shaping and wood structure construction do not enter river or increase ambient turbidity levels.
- Construct 3 Engineered Large Wood Structures (ELWS) for near-bank energy dissipation and fish habitat enhancement on Herrera property. Logs for the ELWS shall be cedar, spruce, pine or fir. Limbs and branches shall be intact to the fullest extent possible. Base members are to be a minimum of 2' stem diameter, with 5' effective diameter rootwad. Mid members are to be a minimum of 18" stem diameter with a 3' effective diameter rootwad. Top members are to be 18" stem diameter. Excavate base member of ELWS into the streambed to a minimum of 50% of effective rootwad dia., or 3'. Use excavated gravels to backfill around base members. CONSTRUCTION SPECIFICATIONS: CS-OR-202, Excavation, Common, CS-OR-206, Earthfill, Class U, CS-OR-208, Structural Backfill, CS-OR-237, Large Wood for Streambank Structures, MS-OR-523, Rock for Riprap apply.
- Anchor all large wood members together as shown in ANCHOR DETAIL. Each member shall be connected at a minimum of 2 locations as shown in the PLAN VIEW.
- Ballast structure with (25) 2.5' minimum diameter boulders. Boulder ballast shall be placed within and on top of ELWS in a stable position. Ballast not shown on plan view for clarity. Place largest ballast in framed ELWS chamber as shown in detail. Ballast placement to be supervised by NRCS Engineer. CONSTRUCTION SPECIFICATIONS: CS-OR-202, Excavation, Common, CS-OR-206, Earthfill, Class U, CS-OR-208, Structural Backfill, CS-OR-237, Large wood for Streambank Structures, and MS-OR-523, Rock for Riprap apply.
- Backfill compaction around-within and above ELWS shall be performed according to CS-OR-208, Structural Backfill. Shape bank above ELWS to stable slope. Refer to Sheet 10 Bank Shaping for details.
- ELWS - bankline interface and disturbed surrounding area to be planted with plantings and salvaged vegetation. Refer to Sheet 11 Planting Plan for details. CONSTRUCTION SPECIFICATIONS: CS-OR-214, Live Stakes, CS-OR-234, Erosion Control Blankets, apply.
- Exposed butt ends of all large wood shall be roughened and broken. Exposed sawed butt ends are not accepted.

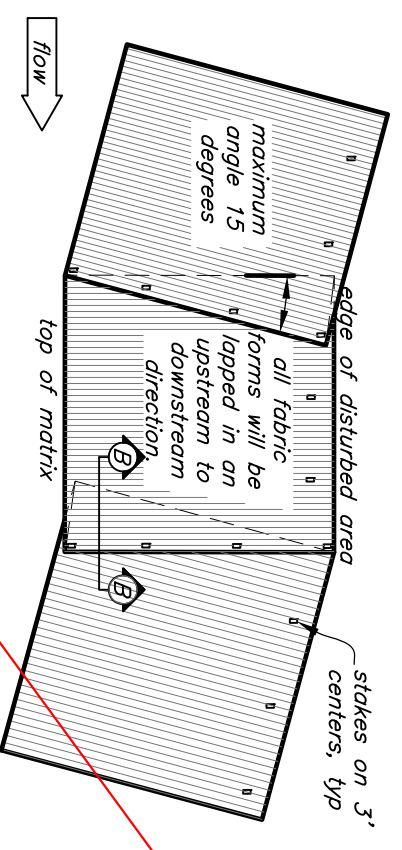


SECTION

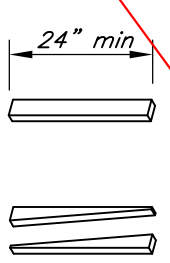




PLAN VIEW

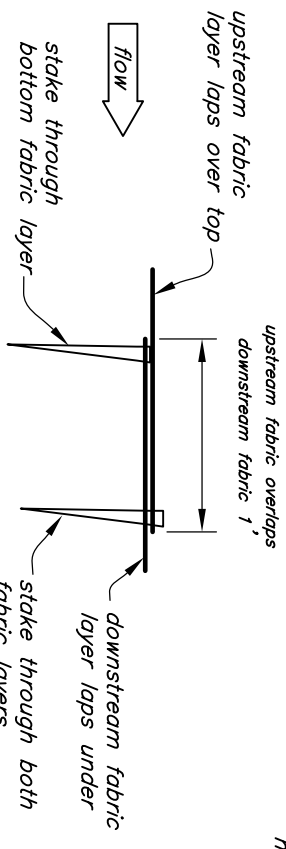


PLAN VIEW FOLDING FABRIC AT BENDS

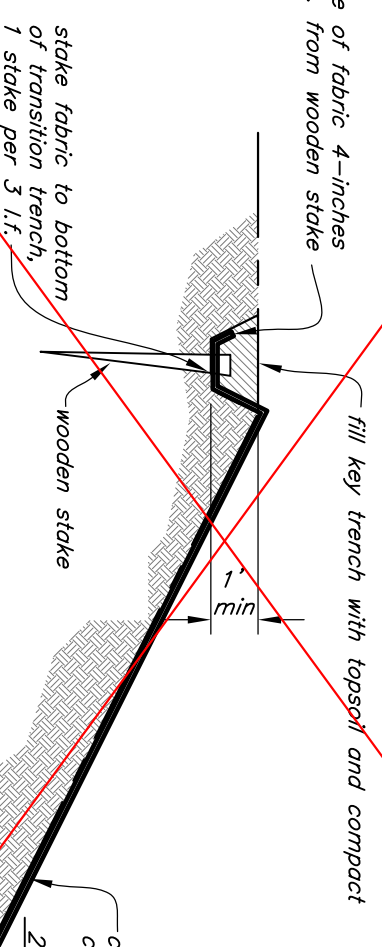


TYPICAL DETAIL STAKE

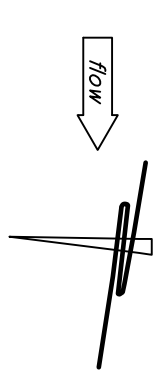
Saw a 2 x 4 diagonally to produce 2 Dead Stout Stakes.



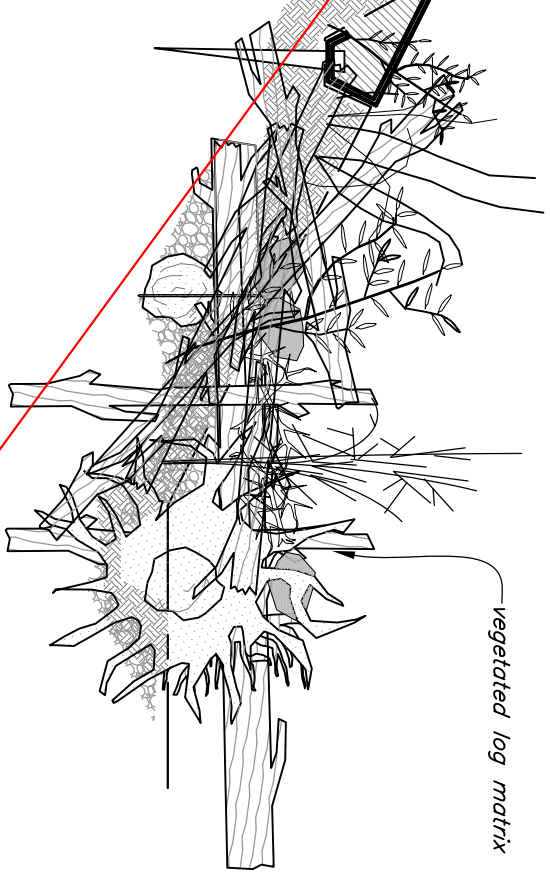
OVERLAP SECTION A



KEY TRENCH DETAIL



OVERLAP SECTION B



GENERAL NOTES:

1. Coconut erosion control blanket shall be 'geocor 700' or approved equal, able to withstand 10 fps water velocities and 4.46 psf shear stress.
2. Prepare soil before installing rolled erosion control products (RECP), including any necessary application of lime, fertilizer and seed. Refer to Sheet 11 Planting Plan for seeding details.
3. Begin at top of the slope by anchoring RECP's in a 1' deep by 6" wide trench with approximately 12" extended beyond the upslope portion of the trench. Anchor the RECP with a row of stakes approximately 3' apart in bottom of the trench. Backfill and compact the trench. Apply seed to compacted soil and fold remaining 12" portion of RECP back over seed and compacted soil. Secure RECP over compacted soil with a row of stakes spaced approximately 12" apart across the width of the RECP. The edges of RECP's must be overlapped a minimum of 1'.
4. Refer to CONSTRUCTION SPECIFICATION CS-OR-234, Erosion Control Blankets.

Bank shaping and erosion control fabric not needed.

NOT TO SCALE

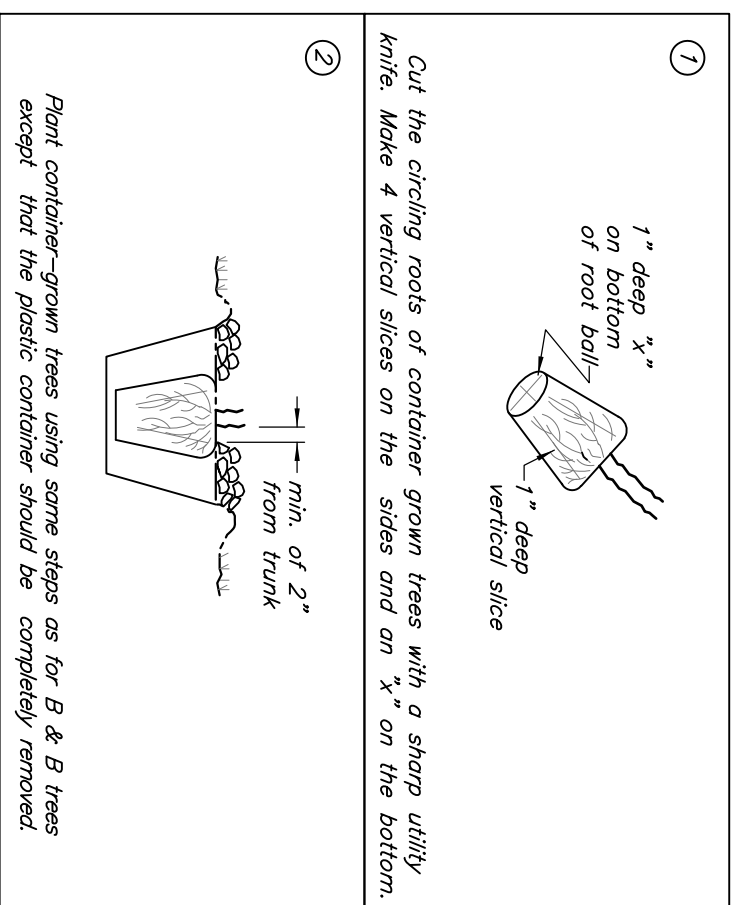


BANK SHAPING
 MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT
 JOB CLASS: V LOWER WILLAMETTE BASIN
 PRACTICE STANDARD: 580 CLACKAMAS COUNTY, OREGON

Designed	M. Walter/A. Beavers	Date	10/2012
Drawn	KLY	Date	10/2012
Checked			
Approved			
Title			

TREE PLANTING

TREES SHALL BE 2-YEAR STOCK SPECIES AND SPACING PER PLANS. INSTALL TREES PER DETAILS BELOW.



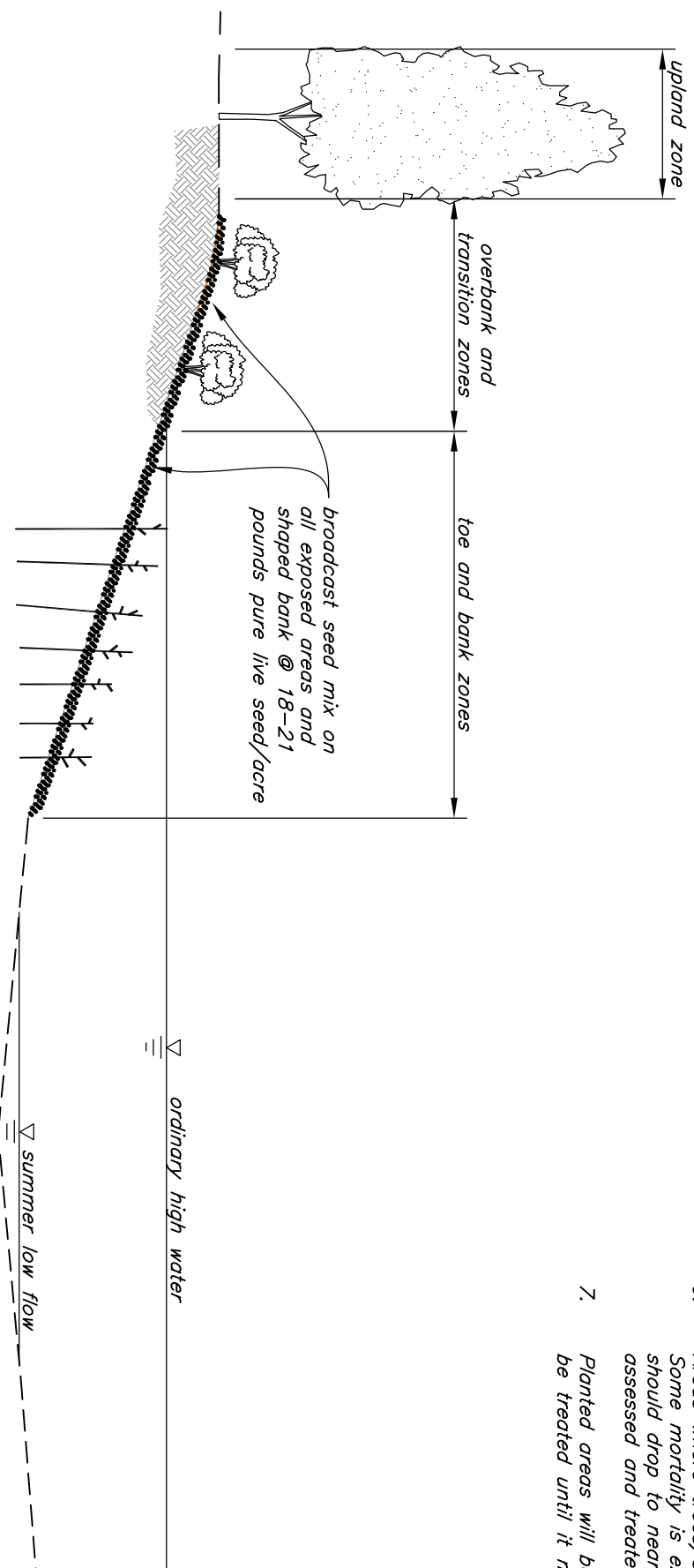
PLANTING PLAN:

1. Trees and shrubs will be planted between January and March 2013 by the District in a mix of native species according to the following plan:
Toe and Bank Zones: Red Osier Dogwood, Pacific Willow
Overbank and Transition Zones: Red Alder, Oregon Ash, Red Elderberry, Indian Plum, Douglas Spirea, Oceanspray, Western Red Cedar, Valley Pine
2. Trees shall be planted at a density of 350 tree per acre. Shrubs and forbs shall be planted at a density of 1200 plants per acre.
3. The following tree and shrub species shall be installed as floodplain enhancement on the Ashmore property: Red Osier Dogwood, Pacific Willow, Slough Sedge, Dagger-leaf Rush
4. The following tree and shrub species shall be installed in conjunction with large wood structures: Red Osier Dogwood, Pacific Willow, Red Alder, Oregon Ash, Slough Sedge, Bulrush.
5. All areas of disturbed soils were seeded with the following mix:

Summark Native E/C Mix

	Seed %	Variety
70 lbs	39.6	Meadow Barlow
	34.2	California Brome
	19.8	Native Red Fescue
	2.9	Tufted Hairgrass
	2.0	Spike Bentgrass
50 lbs		Regreen-sterile wheat
12 lbs		Blue wildrye (from PMC)
5 lbs		Tufted Hairgrass

6. Areas where trees/shrubs do not survive will be treated as soon as practical. Some mortality is expected; target survival rate is 75%. If the survival rate should drop to near or below that number, the reasons for the drop will be assessed and treated, where feasible.
7. Planted areas will be inspected annually at a minimum. Brush that regrows will be treated until it no longer threatens the survival of planted species.



PLANTING PLAN SECTION

PLANTING PLAN

MILK CREEK IN-STREAM AND RIPARIAN ENHANCEMENT

JOB CLASS: V
LOWER WILLAMETTE BASIN

PRACTICE STANDARD: 580
CLACKAMAS COUNTY, OREGON



Natural Resources Conservation Service
United States Department of Agriculture

Date
Designed M. Walter/A. Beavers 10/2012
Drawn KLY 10/2012
Checked _____
Approved _____
Title _____

File Name

milk_2012_asbult.dwg

Drawing No.

AS-BUILT DWG

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