

Anderson NF Lewis River Restoration Design

Lower Cowlitz Fish Recovery Board (Small Grants Program #2019-02)



Goal: To design a river restoration project within the project reach that addresses local resource concerns.

Objectives:
To obtain financial assistance to assist landowners with implementation of a project designed to address local resource concerns and state and federal natural resource mandates.

Address limiting factors influencing critical life stages for all species of fish within the project area according to the Lower Cowlitz Fish Recovery Board Salmon and Steelhead and Fish and Wildlife Plan.

Address water quality concerns within the project reach which will add to the cumulative benefit of the North Fork Lewis River.

Address community resource concerns and address river geomorphic factors resulting in the observed symptoms in the project reach.

RESOURCE CONCERNS
The salmon recovery plan identifies key limiting factors as habitat quantity, habitat diversity, flow, and predation. Priority life stages are primarily rearing, some spawning, and adult migration. Species of concern include Chinook, Steelhead, Coho, and Gum.

There are no listings on the 303(d) list for this reach of the Lewis River. Locally there are concerns for river temperatures and increased fine sediment delivery from the river bank within the project reach.

Opportunity to Improve 0-age Rearing Habitat

Topographic Survey
Control Points
Irc = Iron Rod Control
Ht = Hub & Tick

ohw = 152 ft

Grading River Bank
WQ/Riparian Concern

ohw = 200 ft

Leavesque 6045202

Lewis River
RM 13.5

Project Location
The project site encompasses seven tax parcels owned by three owners within the Lewis River in Cowlitz County, Washington including: Stadings (Lewis River Golf Course), 3209 Old Lewis River Rd, Woodland, WA 98674; Parcels 6044804, 6278902, 62795, 62790, and 6044501; Anderson, Curt, 3447 Old Lewis River Rd, Woodland, WA 98674; parcel 6045201; Leavesque, Gerald; 1823 N 2nd Avenue; Upland, CA 91784; parcel 9043202

The project is located in EDT reach 5 (tier 1) at approximately river mile 13.5 in the North Fork Lewis River in the Watershed Resource Inventory Area 27 in Cowlitz County Washington.

Legal Description
ME& Section 10, Township 5 North, Range 1 East NW& Section 11, Township 5 North, Range 1 East

Latitude / Longitude
45.930568 / -122.854682

Driving Directions
I-5 to Woodland Washington, travel East on Lewis River Rd (503) about 5 miles; turn right onto Old Lewis River Rd; turn right onto gravel driveway bounding the golf course on the east.

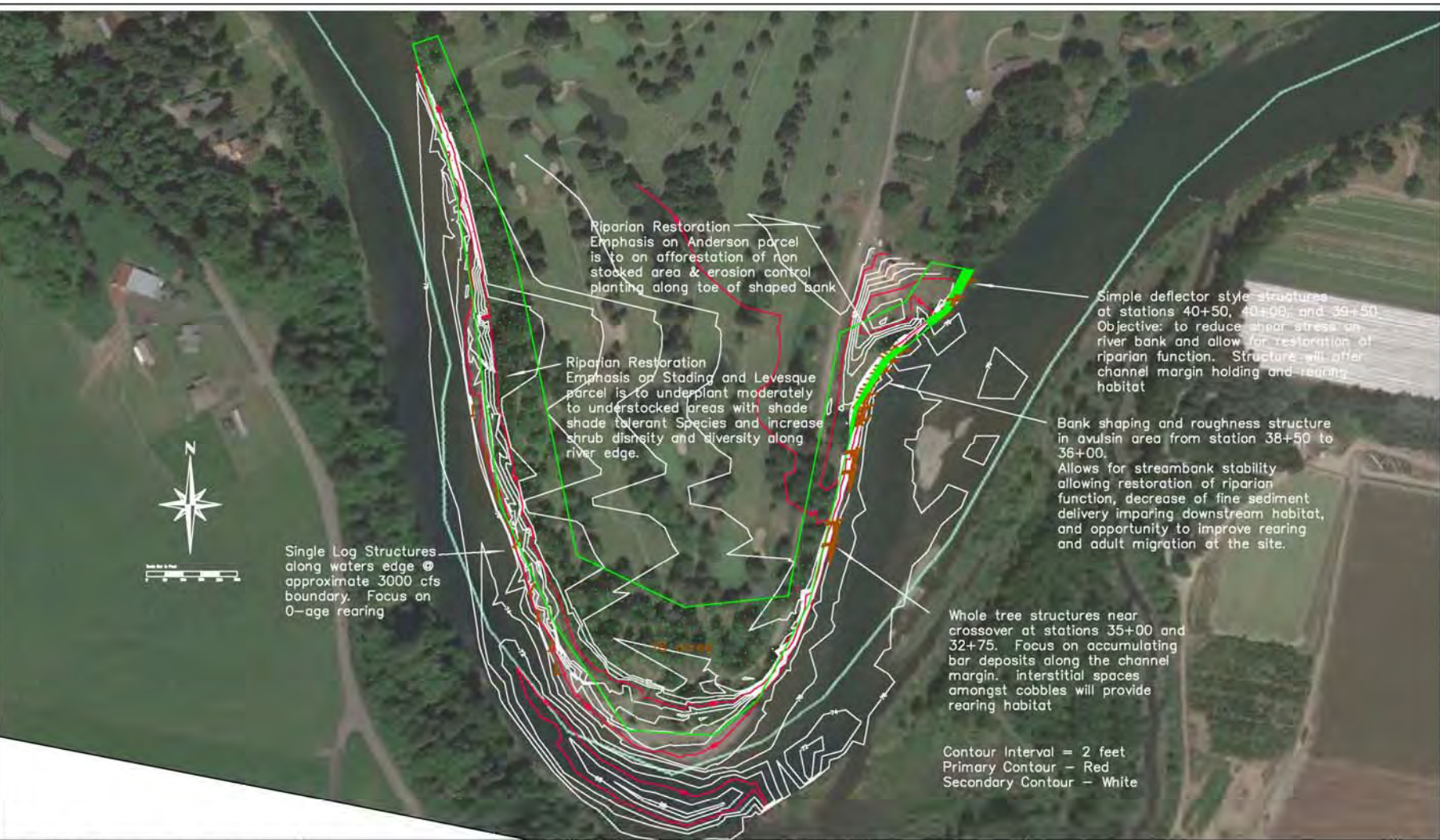
Cowlitz Conservation District
2125 8th Avenue
Longview, WA 98632
360-425-1880

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SCALE :			
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Anderson NF Lewis River Restoration Project

Detail Sheet
Existing Plan View

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Riparian Restoration
Emphasis on Anderson parcel
is to an afforestation of non
stocked area & erosion control
planting along toe of shaped bank

Riparian Restoration
Emphasis on Stading and Levesque
parcel is to underplant moderately
to understocked areas with shade
tolerant species and increase
shrub density and diversity along
river edge.

Simple deflector style structures
at stations 40+50, 40+00, and 39+50
Objective: to reduce shear stress on
river bank and allow for restoration of
riparian function. Structure will offer
channel margin holding and rearing
habitat

Bank shaping and roughness structure
in avulsion area from station 38+50 to
36+00.
Allows for streambank stability
allowing restoration of riparian
function, decrease of fine sediment
delivery impairing downstream habitat,
and opportunity to improve rearing
and adult migration at the site.

Whole tree structures near
crossover at stations 35+00 and
32+75. Focus on accumulating
bar deposits along the channel
margin. interstitial spaces
amongst cobbles will provide
rearing habitat

Contour Interval = 2 feet
Primary Contour - Red
Secondary Contour - White

Single Log Structures
along waters edge @
approximate 3000 cfs
boundary. Focus on
0-age rearing



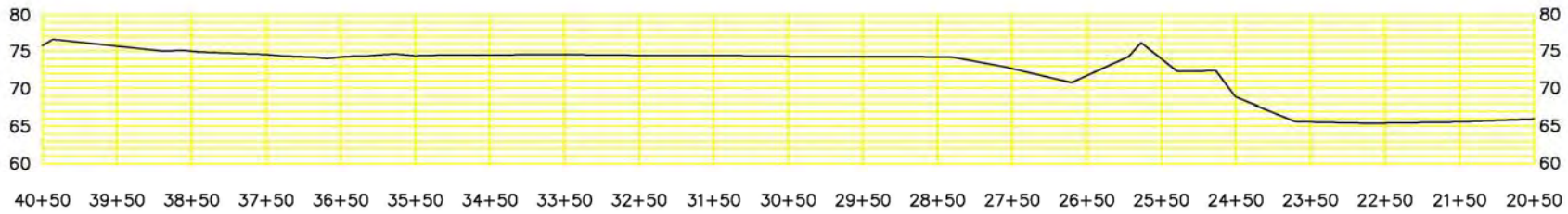
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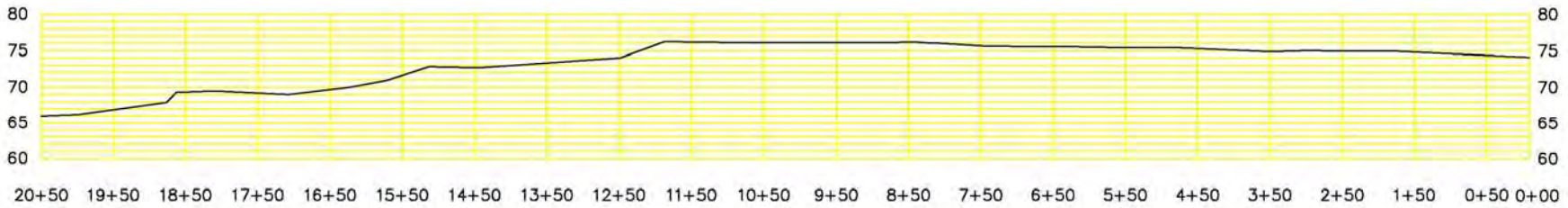
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Detail Sheet
Proposed Plan View

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Small deflectors 40+50, 40+00, & 39+50 Bank Shaping & Roughness Structure 38+50 to 36+00 Whole Tree Structure 35+00 and 32+75 Meander Scour Pool



Single Log or Log with Rootwad Structure along channel margin at 3000cfs stage
From Approximate station 17+00 to 8+00

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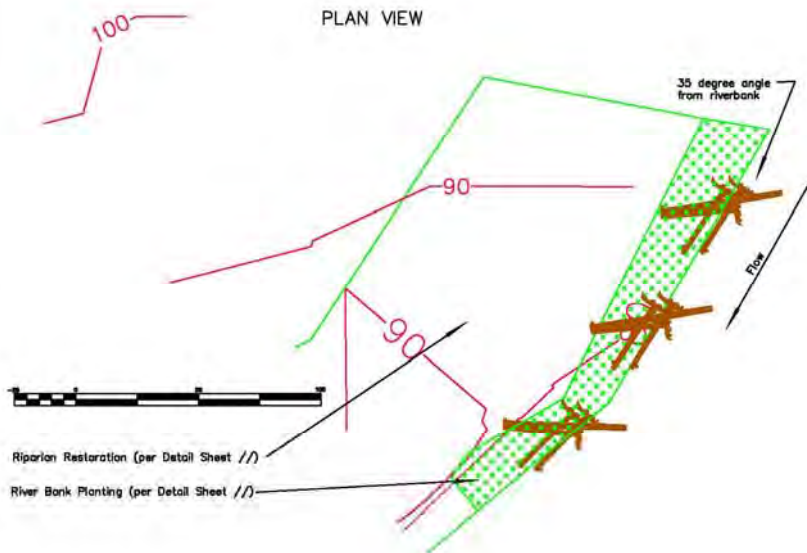
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Detail Sheet
Longitudinal Profile

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SMALL DEFLECTOR STRUCTURE

PLAN VIEW

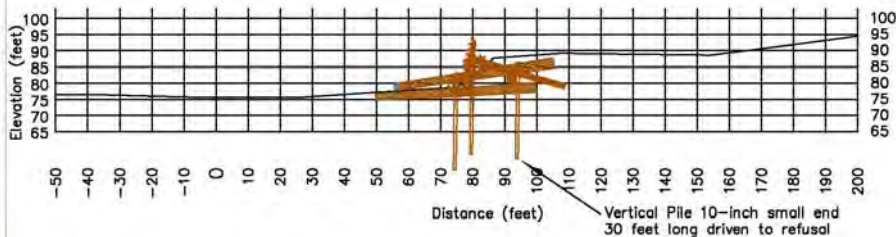


All-thread Anchor Detail



CROSS SECTION VIEW

Small Deflector (stations 40+50, 40+00, & 39+50)



CONSTRUCTION NOTES

Structure Objective:

- Retain substrate upstream of structure to provide rearing habitat matrix in interstitial spaces.
- Reduce shear stress on river bank allowing establishment of root strength function of riparian buffer
- Shift energy slot 20-30 feet off of toe of river bank

Construction oversight provided by Cowlitz Conservation District to ensure:

- Intent of design is met and structure stability is achieved
- Adherence to all applicable Federal, State, and Local permit requirements
- Structure construction documented to allow for as-built stability analysis
- Structure is field fit to ensure protection of highly erodible layers

As-built structure may vary slightly based on size and form of wood delivered to the site and the site conditions encountered during installation.

Structure stability based upon

- Direct burial of logs and logs with rootwads
- Use of vertical pile
- Use of 1-inch diameter all-thread and heavy duty plate washers and nuts to secure key pieces of lwd to vertical pile as guided by Cowlitz Conservation District staff.

All bare soil will be seeded with a suitable erosion control seed mix with major components including annual ryegrass, perennial ryegrass, creeping red fescue, white clover, and red clover at a rate of 30 lbs / acre. All seeded areas will be mulched with weed-free hay or straw at a rate of 1-ton / acre.

Riparian restoration per design sheet ?? and installed by others

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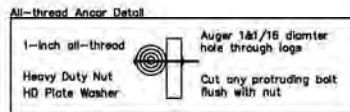
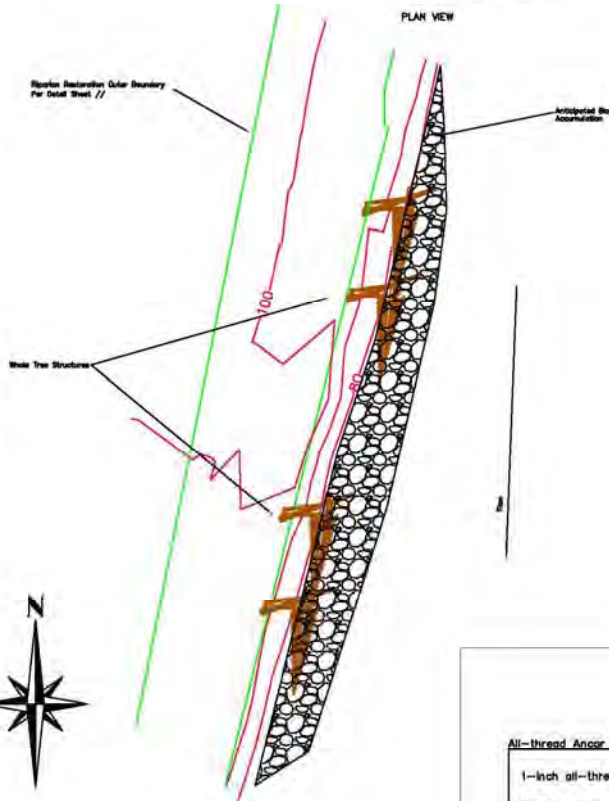
Detail Sheet
Small Deflector Structure

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Whole Tree Roughness Structures

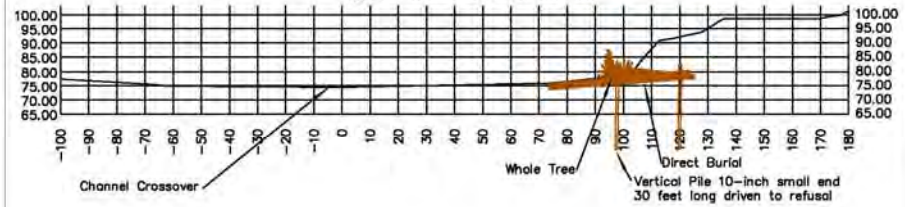
Station 35+00 - 34+50 and
Station 33+00 - 32+50

PLAN VIEW



CROSS SECTION VIEW

Typical Cross Section 35+00



CONSTRUCTION NOTES

Structure Objective:

- Accumulate bar deposits along toe of river bank and provide rearing habitat matrix in interstitial spaces.
- Reduce shear stress on river bank allowing establishment of root strength function of riparian buffer
- Accumulated substrate along river margin will constrict cross section resulting in slight scour of river crossover.

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- Structure is field fit to ensure protection of highly erodible layers

As-built structure may vary slightly based on size and form of wood delivered to the site and the site conditions encountered during installation. Whole tree component consists of Sitka Spruce, Noble Fir, or Western Red Cedar depending on local available and or ability to transport material.

Structure stability based upon

- Direct burial of logs and logs with rootwads
- Use of vertical pile
- Use of 1-inch diameter all-thread and heavy duty plate washers and nuts to secure key pieces of wood to vertical pile as guided by Cowlitz Conservation District staff.

All bare soil will be seeded with a suitable erosion control seed mix with major components including annual ryegrass, perennial ryegrass, creeping red fescue, white clover, and red clover at a rate of 30 lbs / acre. All seeded areas will be mulched with weed-free hay or straw at a rate of 1-ton / acre.

Riparian restoration per design sheet ?? and installed by others

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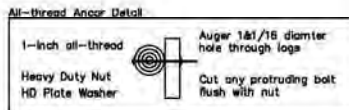
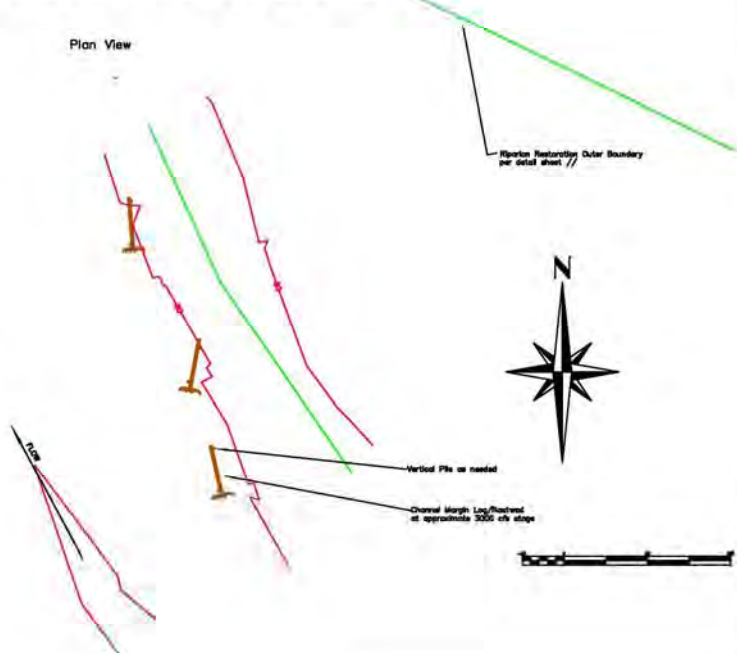
Detail Sheet
Whole Tree Structure

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CHANNEL MARGIN LOGS/ROOTWADS

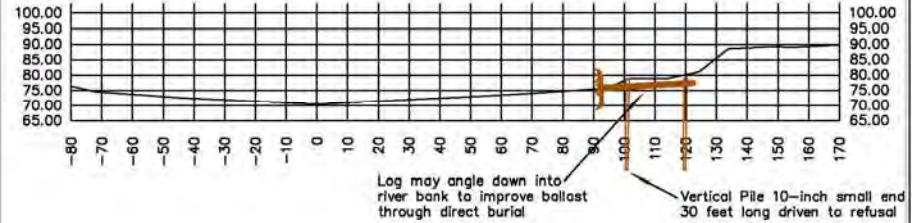
From Stations 18+00 to 9+00 about 70 feet apart as flagged in field

Plan View



CROSS SECTION VIEW

Typical Cross Section (16+00)



CONSTRUCTION NOTES

Structure Objective:

- Accumulate bar deposits along toe of river bank and provide rearing habitat matrix in interstitial spaces.
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Structure stability based upon

- Direct burial of logs and logs with rootwads
- Use of vertical pile
- Use of 1-inch diameter all-thread and heavy duty plate washers and nuts to secure key pieces of lwd to vertical pile as guided by Cowlitz Conservation District staff.

All bare soil will be seeded with a suitable erosion control seed mix with major components including annual ryegrass, perennial ryegrass, creeping red fescue, white clover, and red clover at a rate of 30 lbs / acre. All seeded areas will be mulched with weed-free hay or straw at a rate of 1-ton / acre.

Riparian restoration per design sheet ?? and installed by others

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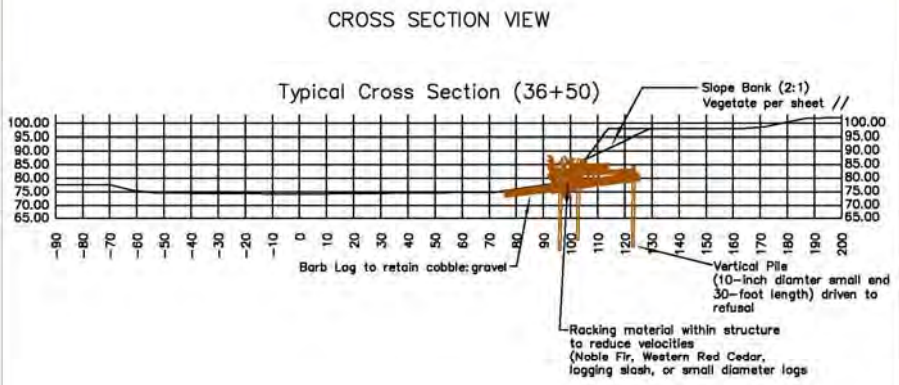
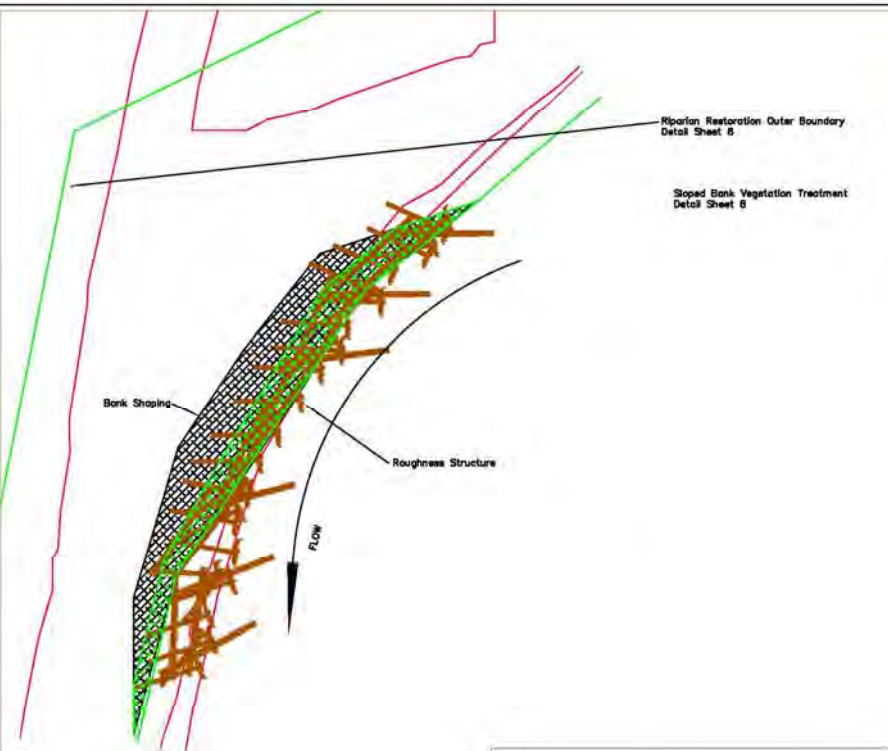
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Detail Sheet
Channel Margin Logs / Rootwads

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CONSTRUCTION NOTES

Install wood roughness structure consisting of logs, logs with rootwads, and racking material (whole trees and logging slash) along the right river bank from approximate station 38+50 through 36+00. River bank above roughness structure will be laid back to an approximate 2:1 slope, protected by installation of erosion control fabric, and planted with both herbaceous and woody vegetation.

Structure Objective:

- Reduce accelerated erosion of river bank by protecting erosive layers, minimizing velocity and shear stress acting on bank, and restoring root strength in the soil.
- Retain substrate through use of barb logs oriented upstream and slope to maintain existing substrate to provide rearing habitat matrix in interstitial spaces.
- Provide both rearing and adult migration habitat amongst structure element interacting with river flows.
- Reduce shear stress on river bank allowing establishment of root strength function of riparian buffer.
- Shift energy slot 20-30 feet off of toe of river bank.

Construction oversight provided by Cowlitz Conservation District to ensure:

- Intent of design is met and structure stability is achieved
- Adherence to all applicable Federal, State, and Local permit requirements
- Structure construction documented to allow for as-built stability analysis
- Structure is field fit to ensure protection of highly erodible layers

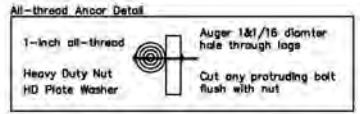
As-built structure may vary slightly based on size and form of wood delivered to the site and the site conditions encountered during installation.

Structure stability based upon:

- Direct burial of logs and logs with rootwads
- Use of vertical pile
- Use of 1-inch diameter all-thread and heavy duty plate washers and nuts to secure key pieces of wood to vertical pile as guided by Cowlitz Conservation District staff.
- Use of erosion control fabric to resist anticipated velocities during flood flows.

All bare soil will be seeded with a suitable erosion control seed mix with major components including annual ryegrass, perennial ryegrass, creeping red fescue, white clover, and red clover at a rate of 30 lbs / acre. All seeded areas will be mulched with weed-free hay or straw at a rate of 1-ton / acre.

Riparian restoration per design sheet ?? and installed by others



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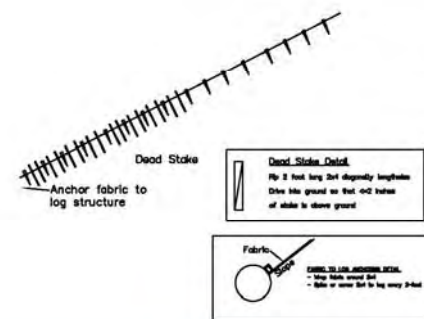
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Detail Sheet 7
Bank Erosion Treatment

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- EROSION CONTROL BANKS**
1. Seed slope (30#/acre erosion control mix)
 2. Mulch slope either 1 ton/acre weed free straw or mulch fabric (cotton thread mesh - no plastic)
 3. Install jute erosion control grid (Dekrowe 700 or equivalent); single downstream to upstream; Secure toe & top of erosion control fabric in cup trench ~12inch deep; secure fabric with dead stake every 3 feet. (Stake = 2' long 2x4 cut diagonally)
 4. Summer plant willow livestock on lower 1/2 of project slope. Plant on approximate 1-foot spacing. Stakes will be >=36 inch long 1/2 - 1 inch in diameter and planted 30 inches deep.
 5. Livestokes will angle slightly upstream to facilitate anchoring the fabric. Angle with the slope will maximize root soil moisture interaction.



RIPARIAN RESTORATION
 Two treatment areas are defined on the plan view. The first is the river bank treatment area, the second the general riparian restoration area. Both treatment areas will be installed through a subcontractor under separate contract.

River Bank Treatment
Objectives:
 Establish root strength as quickly as possible to protect river bank soils from continued erosion
 Utilize plant materials as alternatives to add in anchoring erosion control fabric(s).

Treatment consists of summer planting cuttings and winter planting bare root stock into the erosion control fabric installed over the steeped river bank. Planting density, species, and material specifications will vary with elevation above the toe of slope. Planting amongst the large woody material will be opportunistic. Cuttings will be approximately 16-inch diameter and 2 feet in length. Cutting will be directly pushed into the river bank or installed using a cutting planting bar. Cuttings will be installed nearly horizontal at the bottom of the slope and with an increasing slope with increasing elevation. The intent is to ensure that root establishment is not unduly influenced by local water table. Target spacing will be about 1.5 feet between cuttings (10,000 stems per acre). Cuttings will be planted on a 1-foot spacing for four planting rows immediately above the wood structure or in the first three feet of the erosion control fabric. Cuttings will be staggered between planting rows. Cuttings will be installed on a slight downstream angle to facilitate effectiveness of the cutting to serve as a livestock to help anchor erosion control fabric. Cuttings will consist of local willow species. Cuttings will be planted on a 1-foot spacing between cuttings and between planted rows (43,000 stems per acre). Cutting will be less than 1-inch diameter and will consist of both 3 and 4 foot cutting length.

The remainder of the slope will be summer planted with cuttings consisting of red oak droopwood, blue alderberry, and local willow species on an approximate 3-foot spacing (4,840 stems per acre). Cuttings will be planted in groups to mimic low communities of a single species land to establish in nature.

Survival will be assessed in the fall so that plans can be made to restock the site. Additional cuttings will be installed amongst the large woody material and within the four rows of willow on the lower portion of the erosion control fabric. On the upper portion of the slope any mortality will be replaced with bare root species which will allow for incorporation of additional plant diversity.

General Riparian Restoration
 Treatment varies between revegetation and interplanting amongst existing woody vegetation.

Site preparation:
 The site will be reviewed by Cowlitz County Nonpoint Source Program. Invasive species will be documented and an integrated pest management plan (IPM) will be prepared. The IPM will be implemented prior to construction to avoid spreading invasive species at the site.

Areas target for revegetation will have planting sites prepared by construction activity and spot spraying grass on an approximate 10-foot spacing (436 stems per acre). A tank mix of glyphosate and sulfometuron will used to treat grass.

In areas targeted for interplanting amongst existing trees planting spots will be prepared either through mechanical weeding/clearing at the time of planting or through the use of a chemical spot spray to manage competing vegetation. The herbicide of choice is triclopyr.

Planting
 The site will be planted with bare root seedling consisting of 1-1 stock or better during winter months following construction.
 In revegetation areas species shall include:
 Red Alder (Alnus Rubra) 100
 Camrose (Sideroxylon Purpureum) 50
 Douglas Fir (Pseudotsuga Menziesii) 100
 Western Red Cedar (Thuja Plicata) 100
 Shrub:
 Elderberry (Sambucus), Current (Ribes), Indian Plum (Oenothera Canadensis), Strawberry (Fragaria Vesca)
 In areas to be interplanted the focus will be on local shade tolerant species including:
 Western Red Cedar (Thuja Plicata)
 Grand Fir (Abies Grandis)
 Willow spp (Salix) - understated areas along rivers edge

Maintenance
 Site will be inspected in the spring and fall each year to assess establishment. Factors impacting establishment will be assessed and maintenance prescriptions applied. Anticipated concerns including vegetative competition and wildlife damage.

Cowlitz Conservation District 2125 8th Avenue Longview, WA 98632 360-425-1880	DATE: 12/4/2019	REVISIONS	DATE	BY	PREPARED FOR: Anderson NF Lewis River Restoration Project	Detail Sheet 8 Riparian Restoration Treatment	SHEET OF 8
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