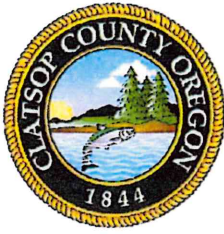


EXHIBIT 1:

Application Materials



Clatsop County
Community Development
800 Exchange Street, Suite 100
Astoria, Oregon 97103
Phone 503 325-8611 Fax 503 338-3606
comdev@co.clatsop.or.us www.co.clatsop.or.us

Conditional Use Permit

Fee: Type II \$1,200 Type IIa-III: \$1,500

(Double if a violation exists)

Owner: Oregon Dept. of Transportation (Agency & Warren)

Email: jennifer.sellers@odot.oregon.gov

Mail Address: 355 Capitol Street, NE, MS11

City/State/Zip: Salem, OR, 97301-3871

Phone: 503-480-5556

Phone: _____

Owner: Agency Creek Management Company dba Hampton Lumber (Agency)

Email: LindsayDavis@hamptonlumber.com

Mail Address: 9600 SW Barnes Rd Ste # 200

City/State/Zip: Portland, OR 97225-6666

Phone: 503-741-5084

Phone: _____

Other: Oregon Department of Forestry (Agency)

Email: brad.e.catton@oregon.gov

Mail Address: 92219 OR-202

City/State/Zip: Astoria, OR, 97103

Phone: 971-395-0149

Phone: _____

Property Address: There is no address, it is floodplain wetland adjacent to the Columbia River Mainstem. The RR Row has no taxlot associated.

Proposed Use: Habitat Restoration

Comprehensive Plan Designation: Goals 4, 5, 6, 7, 16 and 17

Existing Zoning: Agency: AN & F-80, Warren: NS, AN

Overlay District: FHO, SO, and Statewide Wetlands Inventory

Property Description – Map ID: Floodplain wetlands with RR bisecting the landscape. See Project Location Maps

Directions to the property from Astoria: Agency Creek: From Astoria head east onto US-30/Leif Erikson Drive (13.1mi), Turn left onto Old US Hwy 30 (0.1mi)

Turn right onto Knappa Dock Rd (1.2mi) arrive at nearest parking. Warren Slough: From Knappa Dock Rd turn right onto Ziak-Gnat Creek Ln (1.5mi) to arrive at nearest parking

What is the nearest "Community" (i.e. Svensen, Arch Cape, Westport)? Knappa, OR

General description of the property:

Existing Use: Floodplain wetlands with an inactive RR bisecting the site. The RR has not operated since 2003.

Topography: Mostly Flat. There are forested hillsides to the south of the proposed project areas.

Proposed Development: Breach the railroad to restore natural hydrology and fish access. Improve/restore estuarine process and fish and wildlife habitat

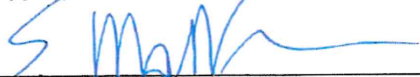
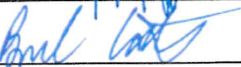
General description of adjoin property:

Existing Use: Agency Creek: Adjoining property is primarily used for forest practices. Warren: Adjoining property is a combination of conservation, county road, and private/residential/farming

Topography: At both project areas the adjoining topography is fairly steep, mostly consisting of hillsides, or the Columbia River

Attach a site plan of the property showing lot dimensions, sizes, and location of all existing and proposed structures setbacks of existing and proposed structures to all property lines, access to the site, parking area layout that includes the space sizes and location and the width of any parking aisles. Also, identify the location of any stream, wetland, lake or other resource on or adjacent to the property.

SIGNATURES: All owners of record, per Clatsop County Assessment records, must sign the application. Representatives of public agencies, corporations, trusts, etc. must provide documentation of signing authority. The information contained in this application is in all respects true, complete and correct to the best of my knowledge.

Signature  Date: 1/23/23
Signature  Date: 2/7/2024

The following sections are from the Clatsop County Land and Water Development and Use Ordinance #20-03.

Section 2.4000. Conditional Development and Use.

Section 2.4010. General. Although each zoning district is primarily intended for a predominate type of use and development, there are a number of uses which may or may not be appropriate in a particular district depending upon all the circumstances of the individual case. For example, the location, nature of the proposed use, character of the surrounding development, traffic capacities of adjacent streets, and potential environmental effects, all may indicate that the circumstances of the development and use needs to be individually reviewed. It is the intent of this section to provide a system of review of such uses so that the community is assured that the uses are compatible with their locations and with surrounding land uses, and will further the purpose of this ordinance and the objectives of the comprehensive plan.

Section 2.4020. Application for a Conditional Development and Use. If a development and use is classified as conditional in a zone, it is subject to approval under Sections 2.4000 to 2.4050. An applicant for a proposed conditional development and use shall provide facts and evidence and a site plan in compliance with Section 2.9400 sufficient to enable the Community Development Director or hearing body to make a determination.

Section 2.4030. Authorization of a Conditional Development and Use.

- (1) A new, enlarged or otherwise altered development classified by this Ordinance as a conditional development and use may be approved by the Community Development Director under a Type II procedure except that the following conditional developments and uses may be approved by the Hearings Officer under a Type Ila procedure:
 - (A) Dog kennel or Kennel;
 - (B) Airport;
 - (C) Bed & Breakfast over 3 units;
 - (D) Golf courses;
 - (E) Automobile service station or repair shop, including body work, used car sales, wrecking yard;
 - (F) Public or private recreation such as riding stable, fishing or boating docks or ramps, gun club, golf course, or resort type establishment in association with recreation;
 - (G) Non-farm partition;
 - (H) Non-farm dwelling;
 - (I) Farm help relative dwelling;
 - (J) Home occupations related to auto/machinery repair or painting;
 - (K) Firearms training facility;
 - (L) Solid waste disposal site;
 - (M) Small scale, light industrial developments such as assembly, fabricating, processing, compounding, packing and similar operations within an enclosed building;
 - (N) Automobile wrecking yard;
 - (O) Amusement enterprises such as games of skill and science, thrill rides, penny arcades, and shooting galleries.
- (2) Where the proposed development involves a non-water dependent use or activity in the Marine Industrial Shoreland Zone, Section 4.1900, mailed notice shall also be provided to any interested party who has submitted a written request concerning the proposed development, and to state and federal agencies with statutory planning and permit issuance authority in aquatic areas. Including the Oregon Division of State Lands, Department of Fish and Wildlife, U.S. Fish and Wildlife Service, National Marine Fisheries Service, Corps of Engineers, and the Environmental Protection Agency.
- (3) In addition to the other applicable standards of this ordinance, the hearing body must determine that the development will comply with the following criteria to approve a conditional development and use.

- (A) The proposed use does not conflict with any provision, goal, or policy of the Comprehensive Plan.
- (B) The proposed use meets the requirements and standards of is Ordinance.
- (C) The site under consideration is suitable for the proposed use considering:
 - 1) The size, design, and operating characteristics of the use, including but not limited to off-street parking, fencing/buffering, lighting, signage, and building location.
 - 2) The adequacy of transportation access to the site, including street capacity and ingress and egress to adjoining streets.
 - 3) The adequacy of public facilities and services necessary to serve the use.
 - 4) The natural and physical features of the site such as topography, natural hazards, natural resource values, and other features.
- (D) The proposed use is compatible with existing and projected uses on surrounding lands, considering the factors in (C) above.
- (E) The proposed use will not interfere with normal use of coastal shorelands.
- (F) The proposed use will cause no unreasonably adverse effects to aquatic or coastal shoreland areas, and
- (G) The use is consistent with the maintenance of peripheral and major big game habitat on lands identified in the Comprehensive Plan as Agricultural Lands or Conservation Forest Lands. In making this determination, consideration shall be given to the cumulative effects of the proposed action and other development in the area on big game habitat.
- (H) In addition to compliance with the criteria as determined by the hearing body and with the requirements of Sections 1.1040 and 1.1050, the applicant must accept those conditions listed in Section 2.4040 that the hearing body finds are appropriate to obtain compliance with the criteria.

Please address the following standards on a separate sheet of paper. Be as specific as possible. "Yes" and "No" responses are not sufficient.

- (1) In addition to the other applicable standards of this ordinance, the hearing body must determine that the development will comply with the following criteria to approve a conditional development and use.
 - (A) The proposed use does not conflict with any provision, goal, or policy of the Comprehensive Plan.
 - (B) The proposed use meets the requirements and standards of the Clatsop County Land and Water Development and Use Ordinance (Ordinance 20-03).
 - (C) The site under consideration is suitable for the proposed use considering:
 - 1) The size, design, and operating characteristics of the use, including but not limited to off-street parking, fencing/buffering, lighting, signage, and building location.
 - 2) The adequacy of transportation access to the site, including street capacity and ingress and egress to adjoining streets.
 - 3) The adequacy of public facilities and services necessary to serve the use.
 - 4) The natural and physical features of the site such as topography, natural hazards, natural resource values, and other features.
 - (D) The proposed use is compatible with existing and projected uses on surrounding lands, considering the factors in (C) above.
 - (E) The proposed use will not interfere with normal use of coastal shorelands.
 - (F) The proposed use will cause no unreasonably adverse effects to aquatic or coastal shoreland areas and;
 - (G) The use is consistent with the maintenance of peripheral and major big game habitat on lands identified in the Comprehensive Plan as Agricultural Lands or Conservation Forest Lands. In making this determination, consideration shall be given to the cumulative effects of the proposed action and other development in the area on big game habitat.
- (2) In addition to compliance with the criteria as determined by the hearing body and with the requirements of Sections 1.1040 and 1.1050, the applicant must accept those conditions listed in Section 2.4040 that the hearing body finds are appropriate to obtain compliance with the criteria.

Section 2.4040. Requirements for Conditional Development and Use. In permitting a conditional development and use, the hearing body may impose any of the following conditions as provided by Section 2.4030:

- (1) Limit the manner in which the use is conducted, including restricting the time an activity may take place and restraints to minimize such environmental effects as noise, vibration, air pollution, glare and odor.
- (2) Establish a special yard or other open space or lot area or dimension.
- (3) Limit the height, size or location of a building or other structure.

- (4) Designate the size, number, location or nature of vehicle access points.
- (5) Increase the amount of street dedication, roadway width or improvements within the street right-of-way.
- (6) Designate the size, location, screening, drainage, surfacing or other improvement of a parking or truck loading areas.
- (7) Limit or otherwise designate the number, size, location, height or lighting of signs.
- (8) Limit the location and intensity of outdoor lighting or require its shielding.
- (9) Require diking, screening, landscaping or another facility to protect adjacent or nearby property and designate standards for installation or maintenance of the facility.
- (10) Designate the size, height, location or materials for a fence.
- (11) Require the protection of existing trees, vegetation, water resources, wildlife habitat or other significant natural resources.
- (12) Require provisions for public access (physical and visual) to natural, scenic and recreational resources.
- (13) Specify other conditions to permit the development of the County in conformity with the intent and purpose of the classification of development.

Section 2.4050. Time Limit of Permit for Conditional Use.

- (1) Authorization of a conditional use shall be void after two years unless substantial construction or action pursuant thereto has taken place as defined in Section 1.0500. However, the County may, at the discretion of the Community Development Director, extend authorization for an additional one year upon request, provided such request is submitted in writing at least 10 days and not more than 30 days prior to expiration of the permit. The County may grant conditional use approvals for activities such as dike maintenance for a period of time up to five years; such approvals will normally correspond with parallel state and/or federal permits.
- (2) Authorization of a conditional use dwelling in the AF, EFU and F-80 zones shall be void after four years unless substantial construction or action pursuant thereto has taken place as defined in Section 1.0500. However, the County may, at the discretion of the Community Development Director, extend authorization for an additional two years upon request, provided such request is submitted in writing at least 10 days and not more than 30 days prior to expiration of the permit

Jason Pollack

From: Jason Smith <JSmith@columbiaestuary.org>
Sent: Wednesday, February 7, 2024 11:43 AM
To: Jason Pollack
Subject: RE: Follow Up: Agency Creek/ Warren Slough
Attachments: ODF_CUP_Signature Page.pdf

CAUTION: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Hi Jason,

Attached is the signature page including ODF's Brad Cattons signature.

Please let me know if you have any additional information requests.

Thanks for your time.

Best,

Jason

JASON R. SMITH
HE/HIM/HIS
HABITAT RESTORATION PROGRAM MANAGER
COLUMBIA RIVER ESTUARY STUDY TASKFORCE
818 COMMERCIAL STREET, SUITE 203
ASTORIA, OREGON 97103
JSMITH@COLUMBIAESTUARY.ORG
(503) 325-0435 EXTENSION 219

From: Jason Pollack <jpollack@clatsopcounty.gov>
Sent: Tuesday, February 6, 2024 1:26 PM
To: Jason Smith <JSmith@columbiaestuary.org>
Subject: RE: Follow Up: Agency Creek/ Warren Slough

Thank you for providing the documentation and explaining.

Keep me updated on ODF and their timeline. I have a public notice ready once we deem the application complete.



Jason Pollack

Planner

Clatsop County

Clatsop County – Land Use
800 Exchange St., Suite 100
Astoria, OR

Statement of Signing Authority:

This document hereby affirms that Mark Vroman holds signing authority on behalf of Agency Creek Management Co., also known as Hampton Lumber, specifically for the Agency Creek Restoration project being proposed on Taxmap 807180000101. Mark Vroman serves as the Timberland Manager responsible for Hampton's properties located in Oregon and Washington.

Mark Vroman

Hampton Lumber Timberland Manager

markvroman@hamptonlumber.com

PO Box 2315

Salem, OR 97301

Salem Office: 503.365.8400

Chehalis Office: 360.748.4566

Cell: 503.559.4079



Oregon

Kate Brown, Governor

Department of Transportation

Public Transportation Division

555 13th Street NE, Suite 2

Salem, OR 97301

Transit Phone: (503) 986-3300

Rail Phone: (503) 986-4321

Fax: (503) 986-4189

January 12, 2024

Clatsop County Community Development
Jason Pollack, Land Use Planning Division
800 Exchange Street, Suite 100
Astoria, OR 97103

USACE Portland District
ATTN: CENWP-ODG-P
PO Box 2946
Portland, OR 97208-2946

Katie Blauvelt
Department of State Lands
775 Summer Street NE, Suite 100
Salem, OR 97301-1279

DEQ 401 Certification Program
Water Quality
700 NE Multnomah St, Suite 600
Portland, OR 97232

RE: Proposed Work upon the Astoria Line Railroad Corridor in Clatsop County, OR

Dear Colleagues,

Jason Smith of Columbia River Estuary Study Taskforce (CREST) has notified us that his efforts to progress in environmental permitting with your agencies is on hold until he can provide evidence that the property owners approve of CREST's proposed project.

Portland & Western Railroad (PNWR) owns the railroad tracks and possesses a permanent exclusive rail service easement over the railroad corridor. The state of Oregon, through the Oregon Department of Transportation (ODOT), owns the railroad corridor, but ODOT's ownership is subject to PNWR's rail service easement. Due to this arrangement, both PNWR and ODOT must approve of work done on the Astoria Line railroad corridor.

We are well aware of CREST's aim to restore habitat by installing new bridges at Agency Creek and Warren Slough. We have previously permitted CREST and its consultants site access for surveying and geotechnical work. Currently, CREST is working with PNWR's consultant on the final design process for these bridges. They recently passed 90% design review and are awaiting approval on the 100% design.


The project design continues apace, and our expectation is that the parties will reach agreement on 100% design in the coming months. At that time, we would grant CREST permission to construct the proposed bridges.

Meanwhile, we have no objection with your agencies working with CREST to complete your local, state, and federal permitting requirements.

Sincerely,


Jennifer Sellers (Jan 12, 2024 14:01 PST)

Jennifer Sellers
ODOT Rail Operations and Statewide
Multimodal Network Unit Manager


Ryan Englebright (Jan 11, 2024 18:32 PST)

Ryan Englebright
General Manager
Portland & Western Railroad

cc: Jason Smith, CREST
Jason Sims, PNWR

Astoria Line - Project Location Map



0 0.5 1 2 Miles

Legend

- ★ Project_Location_Warren_Slough_46.192843/-123.575492
- ★ Project_Location_Agency_Creek_46.185818/-123.608037
- +—+— railroads_OR_2008



Application Narrative: Agency Creek and Warren Slough Restoration **Project: Clatsop County Type II Conditional Use Application**

Given the close proximity of the Agency Creek and Warren Slough sites, along with the similarity in the project scope, CREST is requesting that Clatsop County consider reviewing the Agency Creek and Warren Slough restoration projects as a single Conditional Use Application.

Executive Summary:

The application narrative encompasses two functionally similar habitat restoration projects: Agency Creek and Warren Slough. The projects aim to enhance mainstem-adjacent habitat divided by a railroad line owned by Portland & Western Railroad Inc (PNWR), specifically for the benefit of ESA-listed salmonids. These projects are located within hydrogeomorphic reach B at approximately river miles (RM) 23 of the Columbia River Estuary (CRE), in Clatsop County, Oregon (refer to Figure 1).

Sponsored by the Columbia River Estuary Study Taskforce (CREST), the land for these projects is owned by the following entities:

Agency Creek:

1. Oregon Department of Transportation (ODOT, with a permanent lease agreement to PNWR)
2. Oregon Department of Forestry
3. Hampton Lumber (Agency Creek Forest Management)

Warren Slough:

1. Oregon Department of Transportation (ODOT, with a permanent lease agreement to PNWR)



Figure 1. Project Location Map for Agency Creek (left) and Warren Slough (right).

The Agency Creek and Warren Slough restoration projects will reestablish and improve juvenile salmonid access to wetland habitat along the Oregon shoreline of the Lower Columbia River Estuary. Reconnecting these floodplain habitats will provide multiple new access points for migrating and rearing fish traveling along the Oregon shoreline, reducing the distances between existing open habitat patches. The project will create new openings in the railroad prism to provide access to approximately 44 total acres of wetland habitat for migrating and rearing juvenile salmonids. Strategic breaches in the Railroad prism, channel excavation, and breaching an abandoned/failed levee (at Agency Creek only) will increase wetland capacity and improve hydrologic connectivity. Native wetland plantings along with restored hydrology will increase wetland plant diversity, improve edge habitat complexity along channel margins, and create a variety of prey resources and foraging interface.

The purpose of this project is to enhance tidal marsh ecosystem function and access to critical rearing habitat for ESA listed juvenile salmonids. The projects will improve access to tidal marsh habitat where infrastructure has limited hydrologic connectivity.

In a regional planning context, through the restoration of hydrologic connectivity, this project will work towards recovery goals and objectives of the Columbia Estuary Ecosystem Restoration Program (CEERP), and Lower Columbia Fish Recovery Board Subbasin Plan biological and physical objectives (NOAA 2014, LCFRB 2010). Further, the project will seek to address habitat and food web limiting factors for estuary habitat as listed in the 2011 Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead (Lower Columbia Estuary Partnership and PC Trask 2011).

Project elements will provide immediate habitat benefit as well as enhance the longer-term trajectory of functioning tidal habitat. The collective project elements include the removal of five undersized (fish barrier) culverts, and the construction of two channel spanning bridges. Additional project elements include channel excavation to connect existing channels through/under the new bridges at Agency Creek and Warren Slough, and levee removal around an abandoned/failed levee at Agency Creek. Specifics for each of the projects include:

- **Agency Creek:** Remove three perched undersized culverts and replace them with one channel spanning bridge (approx. 36 ft). Provide additional marshplain access for fish use through the removal of approximately 500 ft of levee. Excavate a channel to connect existing channel networks on each side of the new bridge.
- **Warren Slough:** Remove two undersized, perched culverts, and replace them with one channel spanning bridge (approx. 60 ft).

The projects are currently at the final design level. Construction of the habitat restoration projects is being proposed for the summer of 2024.

Subject Property:

AGENCY CREEK PROJECT SITE:

- The railroad/track owned by Genesee & Wyoming, Inc.
- Township 8N, Range 07W, Section 18, Tax Lot 101, owned by Agency Creek Management Co.
 - AN Zone [Project Area]
 - F-80 Zone [Outside Project Area]
- The State of Oregon owns the railroad right-of-way.
 - AN Zone [Project Area]
 - F-80 Zone [Project Area]

Zoning

- Forest-80 Zone (F-80), LAWDUC 4.3500
- Aquatic Natural Zone (AN), LAWDUC 4.4600

Overlays & Layers

- Floodplain Overlay (FHO), A-100-year zone, LAWDUC 5.1010 [Project Area]
- Shoreland Overlay (SO), LAWDUC 5.4100
- Statewide Wetlands Inventory (NRCS Predominantly Hydric Soils)

WARREN SLOUGH PROJECT SITE:

- The railroad/track is owned by Genesee & Wyoming, Inc.
- The State of Oregon owns the railroad right-of-way.
 - NS Zone [Project Area]
 - AN Zone [Project Area]

Adjacent Properties:

- Township 8N, Range 07W, Section 8, Tax Lot 500, owned by North Coast Land Conservancy, Inc.
 - NS Zone
- Township 8N, Range 07W, Section 8, Tax Lot 600, owned by Jerry and Noreen Lebo
 - AN Zone
 - AF Zone
- Township 8N, Range 07W, Section 9, Tax Lot 700, owned by Richard and Linda Olsen
 - AN Zone
 - AF Zone
 - EFU Zone [Staging and Natural Material Stockpile Site]

Adjacent Road:

- Right-of-way for Ziak-Gnat Creek, a Clatsop County Major Collector

Zoning

- Exclusive Farm Use Zone (EFU), LAWDUC 4.3300
- Agriculture Forestry Zone (AF), LAWDUC 4.3400
- Forest-80 Zone (F-80), LAWDUC 4.3500
- Aquatic Natural Zone (AN), LAWDUC 4.4600
- Natural Shorelands Zone (NS), LAWDUC 4.4700

Overlays & Layers

- Floodplain Overlay (FHO), A-100-year zone, LAWDUC 5.1010 [Outside Project Area]
- Shoreland Overlay, LAWDUC 5.4100
- Statewide Wetlands Inventory (NRCS Predominantly Hydric Soils)

Land Use Applications & Criteria:

The proposed projects can be permitted pursuant to the following provisions of the LAWDUC:

- For a staging and natural material stockpile site within the EFU Zone [Warren Slough]:
 - Section 4.3320(4), Development and Use Permitted subject to a Type I procedure.
 - (4) Creation of, restoration of, or enhancement of wetlands.
- For activities within the F-80 Zone [Agency Creek]:
 - Section 4.3530(1), Development and Use Permitted subject to a Type I procedure.
 - (1) Uses to conserve soil, air and water quality and to provide for wildlife and fisheries resources.
- For activities within the AN Zone [Agency Creek and Warren Slough]:
 - Section 4.4640(1), Conditional Development subject to a Type II procedure.
 - (1) Active restoration of fish and wildlife habitat or water quality.
 - *Subject to the procedures in Sections 6.3060- 6.3080 Resource Capability Determination.*
- For activities within the NS Zone [Warren Slough]:
 - Section 4.4740(2), Conditional Development subject to a Type II procedure.
 - (2) Restoration, mitigation.
 - *Subject to the provisions of Section 4.4750, Development Standards.*

Pursuant to Section 2.1110, applications are required to be processed under the highest numbered procedure required for any part of the development proposal. Therefore, each project will be reviewed under a Type II Conditional Use procedure.

As part of the Type II Conditional Use applications, the approval criteria and development standards within the following sections will need to be addressed (as applicable considering the location and scope for each project):

Clatsop County Land and Water Development and Use Code #20-03 (LAWDUC):

As part of the Type II Conditional Use applications, the approval criteria and development standards within the following sections will be addressed.

- a) Section 2.0200. State and Federal Permit Requirements
- b) Section 2.4000. Conditional Development and Use
- c) Section 2.7000. Coastal Zone Consistency Review

- d) Section 3.2000. Erosion Control Development Standards
- e) Section 4.3500. Forest-80 Zone (F-80)
- f) Section 4.4600. Aquatic Natural Zone (AN)
- g) Section 4.4700. Natural Shorelands Zone (NS)
- h) Section 5.1000. Flood Hazard Overlay (FHO)
- i) Section 5.4100 Shoreland Overlay District (SO)
- j) Section 6.3000. Columbia River Estuary Impact Assessment and Resource Capability Determination
- k) Section 6.3010. Impact Assessment
- l) Section 6.4000. Columbia River Estuary Shoreland and Aquatic Use and Activity Standards
- m) Section 6.5000. Protection of Riparian Vegetation
- n) Section 6.7000. Development of Historic and/or Archeological Sites

Land and Water Development and Use Code (LAWDUC) #20-03

(a) Section 2.0200. State and Federal Permit Requirements

Copies of all required state and federal permits required for this project will be submitted to the Planning Division prior to issuance of a development permit or action.

(b) Section 2.4000 Conditional Development and Use

Section 2.4030(3) lists seven standards for conditional uses that are addressed below:

(A) The proposed use does not conflict with any provision, goal, or policy of the Comprehensive Plan.

The proposed Agency Creek and Warren Slough projects are consistent with all applicable goals and policies of Clatsop County's Comprehensive Plan. Specifically, this restoration project is designed to improve physical and biological resources associated with the Columbia River Estuary. Restoration of riparian vegetation around wetlands and waterways in the Columbia River Estuary is considered a high priority under Goals 16 and 17 of the Clatsop County Comprehensive Plan. Additionally, The Northeast Regional Plan encourages the increase of fish runs in the project area (Fish and Wildlife Policy 5).

(B) The proposed use meets the requirements and standards of the Clatsop County Land and Water Development Land Use Ordinance (Ordinance 20-03).

The proposed Agency Creek and Warren Slough projects are consistent with the requirements and standards of the Clatsop County Land and Water Development and Use regulations. Specifically, this project is listed as a Conditional Use in the Aquatic Natural (AN) zone, Natural Shorelands Zone (NS), and Forest-80 (F-80) Zone and can be permitted pursuant to the appropriate provisions of the LAWDUC.

(C) The site under consideration is suitable for the proposed use considering:

- 1. The size, design, and operating characteristics of the use, including but not limited to off-street parking, fencing/buffering, lighting, signage, and building location.**
- 2. The adequacy of transportation access to the site, including street capacity and ingress and egress to adjoining streets.**
- 3. The adequacy of public facilities and services necessary to serve the use.**
- 4. The natural and physical features of the site such as topography, natural hazards, natural resource values, and other features.**

No parking, fencing/buffering, lighting, signage, or permanent buildings are proposed for either the Agency Creek or Warren Slough projects. No permanent transportation facilities are proposed for this project. Access to and from the site will only occur during the construction phase. No continued vehicle access will be needed once the project is completed. Each site is currently isolated and subject to Columbia River tides, re-establishing access along the railroad will be required. The projects do not require use of public facilities and services long-term. For the Warren Slough site there is a request to use a County gravel lot for a temporary parking/staging area. CREST acknowledges that such project activities within a County road right-of-way, including staging materials and equipment, will require an Application and Permit to Occupy or Perform Operations Upon a County or Public Road. CREST will submit the appropriate application to Clatsop County Public Works department well in advance of the proposed project.

This project seeks to improve connectivity between the mainstem - Columbia River and the Agency Creek and Warren Slough sites. Habitat connectivity is listed as a limiting factor impacting the survival of ESA listed salmonids. These projects seek to restore access to critical habitat types, that are currently isolated due to the continued presence of a derelict railroad. See additional information provided in Section 6.3000. Columbia River Estuary Impact Assessment and Resource Capability Determination.

(D) The proposed use is compatible with existing and projected uses on surrounding lands, considering the factors in (C) above.

The projects are largely bordered by other aquatic natural lands and natural shoreland areas. See Figure 2 in Section 5.4100. Shoreland Overlay District (SO) below). The adjacent lands will not be impacted by construction or the outcome of the projects. The proposed projects are compatible with existing and projected uses on the surrounding lands.

(E) The proposed use will not interfere with normal use of coastal shorelands.

The projects are consistent with the normal use of coastal shorelands and several of the criteria that drive the coastal shorelands designation, particularly parts 1) Areas subject to ocean flooding and lands within 100 feet of the ocean shore or within 50 feet of an estuary or coastal lake; (5) Natural or man-made riparian resources, especially vegetation necessary to stabilize the shoreline and to maintain water quality and temperature necessary for the maintenance of fish habitat and spawning areas; 6) Areas of significant shoreland and wetland biological habitats whose habitat quality is primarily derived from or related to the association with coastal water areas; 7) Areas necessary for water-dependent and water-related uses including areas of recreational importance which utilize coastal water or riparian resources; areas appropriate for navigation and port facilities, dredged material disposal and mitigation sites, and areas having characteristics suitable for aquaculture; 8) Areas of exceptional aesthetic or scenic quality, where the quality is primarily derived from or related to the association with coastal water areas; 9) Coastal headlands; 10) Dikes and their associated inland toe drains; and 11) Locations of archaeological or historical importance associated with the estuary.

The proposed projects will not change or interfere with the current use of the shorelands. Instead, the proposed projects will improve the condition of significant shoreland and wetland biological habitats and the associated natural resources within shorelands. The projects will do so by restoring and enhancing hydrologic connectivity and sediment accretion processes to 44 (22 acres at each the Agency Creek and Warren Slough sites) acres of off-channel floodplain wetlands, provide improved access to quality habitat for ESA-listed salmonids (possibly also benefit Columbian white-tailed deer), and restore diverse native vegetation communities through approximately a half-acre of native seeding and planting. Water quality is the major benefactor of improved hydrologic connectivity, as stagnant water is reduced, the site will see an increase in dissolved oxygen and reduction in water temperature (a key limiting factor to salmonids). Additionally, the proposed restoration efforts will increase the flux (ingress/egress) of macrodetritus macroinvertebrates that fall-out into the water column, transporting those key nutrients and foodweb elements into the greater Columbia River Estuary. Collectively these elements provide a greater benefit beyond the 22 acres of improved habitat provided by each of the sites themselves.

The projects each propose to breach the railroad levee in one discrete location and place a bridge (a 36-foot span bridge at Agency Creek and a 60-foot span bridge at

Warren Slough) over the railroad prism breaches to vastly improve the connection between the interior floodplain wetlands at Agency Creek and Warren Slough and the mainstem Columbia River. Agency Creeks connectivity will be further improved by breaching an abandoned and failing levee in three locations (referred to as Levee Scrapedown Areas A-C in the plan set). Currently a series of undersized and perched culverts serve as the only connection between the Columbia River and interior wetlands at each site, presenting significant fish passage barriers. The wetlands at each project site were historically connected prior to the establishment of the railroad (and the abandoned levee at Agency Creek), and the projects seek to voluntarily mitigate adverse effects of past development. The character of the site and the shorelands will remain intact, as the project will have a minimal footprint. Additionally, all applicable Erosion and Sediment Control Best Management Practices will be in place to ensure that the project will not cause any adverse effects.

The cumulative impact of implementing these restoration projects will result in increased fish and wildlife access to 44 acres of quality wetland habitat that will have major, long-term benefits for both terrestrial and aquatic wildlife that currently have limited access to the project area. See section 6.3000 Columbia River Estuary Impact Assessment and Resource Capability Determination for further information describing the impacts and benefits of the proposed project.

(F) The proposed use will cause no unreasonably adverse effects to aquatic or coastal shoreland areas, and

The proposed projects will not cause any adverse effects to aquatic environments. These wetlands were historically connected prior to the establishment of the railroad (and abandoned levee at Agency Creek), and the project seeks to voluntarily mitigate adverse effects of past development. The character of each site and the shorelands will remain intact, as the projects will have a minimal footprint. Strict Erosion and Sediment Control Best Management Practices will be put in place prior to the arrival of large equipment to ensure that the project will not cause any adverse effects. The sites will be immediately stabilized upon completion, and seeded and planted with thousands of native plants appropriate for the area. All necessary local, state, and federal permits (environmental and cultural) required to perform the work will be secured prior to implementation. There will be a net zero loss of aquatic areas. Project elements for the Agency Creek and Warren Slough restoration projects have been proposed for their ability to enhance tidal marsh ecosystem function, rearing habitat for ESA-listed juvenile salmonids, and historic habitat types for Columbian white-tailed deer (*Odocoileus virginianus leucurus*). Elements have been proposed that will provide immediate habitat benefit as well as support the longer-term trajectory of functioning habitat.

The purpose of these projects is to enhance overall marsh ecosystem function including enhancing habitat for Endangered Species Act listed juvenile salmonids and also potentially benefit Columbia White-tailed Deer. These projects will seek to address

habitat and food web limiting factors for estuary habitat as listed in the 2011 Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead. This project will also work towards recovery goals of the 2014 Opinion of Federal Columbia River Power System Operations Biological Opinion, as well as the Lower Columbia Fish Recovery Board Sub-Basin Plan biological and physical objectives.

The landforms visible at today's project areas have been altered by a variety of anthropogenic impacts including vast flood control systems (Bonneville Dam has altered the Columbia River hydrology), dredging navigation corridors, infrastructure development (roads and railroads), and surrounding Columbia River agricultural development (diking, ditching, draining, and subsidence). Within the project area, floodplain wetlands and tributary valleys have been isolated by road and railroad construction, levees, and nearby dredging has altered Columbia River channel morphology. Disconnecting the floodplain surface from regular flood inundation has resulted in the associated loss of inundation benefits including sediment deposition, reduction in contributions to the vegetation seed bank, reduction in particulate and nutrient exchange, and a lack of scouring flood flows that result in loss of habitat complexity. Additionally, construction of railroads has limited tidal backwater influences and disconnected much of the areas which historically contributed sediment food web resources (macrodetritus/nutrients, and macroinvertebrates) to not only within the project areas, but the greater Columbia River Estuary.

The cumulative impact of implementing this restoration project will result in increased fish and wildlife access to quality wetland habitat that will have major, long-term benefits for both terrestrial and aquatic wildlife that currently have limited access to the project area. See section 6.3000 Columbia River Estuary Impact Assessment and Resource Capability Determination for further information describing the impacts and benefits of the proposed project.

(G) The use is consistent with the maintenance of peripheral and major big game habitat on lands identified in the Comprehensive Plan as Agricultural Lands or Conservation Forest Lands. In making this determination, consideration shall be given to the cumulative effects of the proposed action and other development in the area on big game habitat.

The proposed projects are located outside of Big Game Habitat. The proposed projects will not result in cumulative effects that create or add to existing negative impacts associated with other projects in the area or as a result of the project. The projects will result in a net increase of wetland function and fish and wildlife habitat for each of the project sites.

(H) In addition to compliance with the criteria as determined by the hearing body and with the requirements of Sections 1.1041 and 1.1050, the applicant must accept those

conditions listed in Section 2.4040 that the hearing body finds are appropriate to obtain compliance with the criteria.

The projects shall comply with the requirements of Sections 1.1041 and 1.1050, and the applicant accepts the appropriate imposed conditions listed in Section 2.4040.

(c) Section 2.7000. Coastal Zone Consistency Review

Agency Creek and Warren Slough project activities meet Section 2.7010 (1) applicability standards. The projects will require federal permits for construction.

Section 2.7020. Consistency Review Procedure for Activities Requiring State or Federal Permits or Licenses

The projects shall comply with the requirements of Sections 2.7020.

(d) Section 3.2000. Erosion Control Development Standards

The objective of this section is to manage development activities including clearing, grading, excavation, and filling of the land, which can lead to soil erosion and the sedimentation of watercourses, wetlands, riparian areas, public and private roadways. The intent of this section is to protect the water quality of surface water, improve fish habitat, and preserve topsoil by developing and implementing standards to help reduce soil erosion related to land disturbing activities. In addition, these standards are to serve as guidelines to educate the public on steps to take to reduce soil erosion.

The proposed Agency Creek and Warren Slough projects are consistent with the requirements and standards Section 3.2000. An Erosion Control Plan that meets the standards and requirements listed in Section 3.2030 (1-2) Erosion Control Plan, and Section 3.2040 Design and Operation Standards and Requirements has been produced and is included in the each of the Erosion Control Plans titled Agency Creek 1200-c and Warren Slough 1200-c. The Erosion Control Plan contains all the elements listed in Section 3.2030 (C) 1-3.

(e) Forest-80 Zone (F-80), LAWDUC 4.3500.

The Forest-80 Zone is only present within the Agency Creek project area only. The associated information contained within this section below is therefore only applicable to the Agency Creek project.

The purpose of the Forest (F-80) Zone is to protect and maintain forest lands for grazing, and rangeland use and forest use, consistent with existing and future needs for agricultural and forest products. The F-80 zone is also intended to allow other uses that are compatible with agricultural and forest activities, to protect scenic resources and fish and wildlife habitat, and to maintain and improve the quality of air, water and land resources of the county.

The proposed Agency Creek project is consistent with the purpose and intent of the F-80 Zone in that the project seeks to protect and restore fish and wildlife habitat, maintain and improve the quality of the air, water, and land resources of the County. Furthermore, the proposed project at Agency Creek does not in any way risk the ability of forest lands use of grazing, and rangeland use and forest use consistent with existing and future needs for agriculture and forest products.

Section 4.3530. Development and Use Permitted

The following uses and activities and their accessory uses may be permitted under a Type I procedure subject to applicable development standards:

1) Uses to conserve soil, air and water quality and to provide for wildlife and fisheries resources.

The proposed Agency Creek habitat restoration project is consistent with the requirements and standards of this subsection. The restoration proposed at Agency Creek will restore and enhance hydrologic connectivity and sediment accretion processes to approximately 22 acres of off-channel floodplain wetlands, provide improved access to quality habitat for ESA-listed salmonids (possibly also benefit Columbian white-tailed deer), and restore diverse native vegetation communities through native seeding and planting. Water quality is the major benefactor of improved hydrologic connectivity, as stagnant water is reduced, the site will see an increase in dissolved oxygen and reduction in water temperature (a key limiting factor to salmonids). Additionally, the restoration will increase the flux (ingress/egress) of macrodetritus macroinvertebrates that fall-out into the water column, transporting those key nutrients and foodweb elements into the greater Columbia River Estuary. Collectively these elements provide a greater benefit beyond the 22 acres of improved habitat provided by the Agency Creek site.

The cumulative impact of implementing this restoration project will result in increased fish and wildlife access to quality wetland habitat that will have major, long-term benefits for both terrestrial and aquatic wildlife that currently have limited access to the project area. See section 6.3000 Columbia River Estuary Impact

Assessment and Resource Capability Determination for further information describing the impacts and benefits of the proposed project.

Section 4.3560. Development Standards [Ord. 18-02]

All dwellings and structures approved pursuant to Section 4.3500 shall be sited in accordance with this Section.

(1) Lot Size Standards. Lot size shall be consistent with the requirements of Section 4.3570.

(2) Setbacks. (A) Front Yard: All buildings or structures with the exception of fences shall be setback a minimum of 30 feet from the property line. **(B) Side and Rear Yard:** 30 feet

(3) Maximum building height: 45 feet

The proposed project is a voluntary habitat restoration project that is consistent with the above listed requirements of this subsection. The proposed restoration effort/development will not alter the lot sizes which the applicant (CREST) assumes currently meet the standards, setbacks, and the proposed structure (bridge) will not exceed the maximum building height of 45 feet. The Agency Creek project designs do not propose to significantly raise the railroad elevation beyond its current height. Slight adjustments (approximately 0-6 inches) may be required to align the bridge girders, and ensure the low-chord of the girders provides adequate freeboard under normal tidal conditions.

Section 4.3570. Land Divisions [Ord. 18-02]

The requirements of this subsection are not applicable to the project. There are no adjustments to the parcel size, or divisions of the existing parcels.

(f) Aquatic Natural Zone (AN), LAWDUC 4.4600

The Aquatic Natural Zone (AN) is present within both the Agency Creek and Warren Slough project areas. The associated information contained within this section below is therefore applicable to both the Agency Creek and Warren Slough project. These projects both have similar actions and objectives and the associated responses to the standards within this section have been combined to assist in the review process.

The purpose of the AN zone designation is to assure the preservation and protection of significant fish and wildlife habitats; continued biological productivity of the Columbia River estuarine resources; and scientific research and educational opportunities. These areas are managed to preserve natural resources in recognition of dynamic, natural, geological and evolutionary processes. The AN zone includes all tidal marshes, tidal flats, and seagrass and algae beds. AN zones may also include ecologically important subtidal areas. This designation is intended to preserve those natural aquatic resource systems existing relatively free of human influence.

The proposed projects at Agency Creek and Warren Slough are consistent with the purpose and intent of the AN zone as these projects both seek to preserve and protect significant fish and wildlife habitat through habitat restoration and stewardship actions. The projects also seek to improve the biological productivity of the Columbia Rivers estuarine resources through restoring natural processes and functions to the project areas that have been impacted by past land use practices. Furthermore the project will contribute to scientific research and educational opportunities through a rigorous monitoring program conducted at each of the sites for a period of 5 years post-project, with the possibility to extend this period to 10 years. Data collected will include water surface elevation and temperature, vegetation species composition and abundance, sediment accretion, and photo points. The site may also be selected for fish sampling by NOAA.

Section 4.4620. Permitted Developments

The following uses and activities, and their accessory uses and activities, are permitted in the AN zone under a Type I procedure, Section 2.1010, and subject to the provisions of Section 4.4650, Development Standards.

- (2) Passive restoration measures.
- (4) Vegetative shoreline stabilization.
- (7) Projects for the protection of habitat, nutrient, fish, wildlife and aesthetic resources
- (8) Piling in conjunction with permitted uses (1) through (7) listed above, pursuant to the applicable standards in Section 6.4080.

Section 4.4630. Review Developments

The following uses and activities, and their accessory uses and activities, may be permitted as Review Uses in the AN zone under a Type II procedure, Section 2. 1020, when authorized in accordance with Sections 2.5000-2.5040 Developments and Uses Permitted and Review. These

uses and activities area also subject to the provisions of sections 4.4650, Development Standards.

(3) Bridge crossings.

It must be determined that the following review uses and activities and their accessory uses and activities, meet the resource capability of the Aquatic Natural zone, subject to the procedures in Sections 6.3060-6.3080 Resource Capability Determination.

(8) Estuarine enhancement.

(10) Bridge crossing support structures.

(12) Piling in conjunction with review use (10) listed above, pursuant to the applicable standards in Section 6.4080.

(14) Filling in conjunction with review uses (8) through (10) listed above, pursuant to the applicable standards in Section 6.4210.

The projects are consistent with Section 3.4630. See Resource Capability Determination section within the narrative below and the associated responses.

Section 4.4640 Conditional Developments (under a Type II permit)

The following uses and activities, and their accessory uses and activities, may be permitted as Conditional Uses in the AN zone under a Type II procedure, Section 2.1020, when authorized in accordance with Sections 2.4000-2.4050 Conditional Development and Use. These uses and activities are also subject to the provisions of Section 4.4650, Development Standards. It must also be determined if these uses and activities meet the resource capability of the Aquatic Natural zone, subject to the procedures in Sections 6.3060-6.3080 Resource Capability Determination.

(1) Active restoration of fish and wildlife habitat or water quality.

(3) Piling in conjunction with conditional uses (1) and (3) listed above pursuant to the applicable standards in Section 6.4080

The proposed Agency Creek and Warren Slough projects are consistent with the conditional developments (under a Type II permit) as outlined in this section. The purpose of these projects is to enhance overall marsh ecosystem function including enhancing rearing habitat for Endangered Species Act listed juvenile salmonids by restoring hydrologic connectivity, including floodplain and tidal processes between the Columbia River and the Agency Creek and Warren Slough project areas. Project efforts will directly improve fish and wildlife habitat as well as

improve water quality within the project area. Pilings are a necessary component of bridge construction at each site given the geotechnical findings required to support the bridge structure and the anticipated loading.

Section 4.4650 Development Standards

- (1) All uses and activities shall satisfy applicable regional policies contained in the Comprehensive Plan, Estuarine Resources and Coastal Shorelands element.**

The proposed projects are consistent with this standard. The projects seek to restore Estuarine habitat that has been degraded. Restoring ecosystem functions and services has been found to provide a net benefit to the associated terrestrial aquatic resources (fish, vegetation, benthic/aquatic macro invertebrates, water quality, etc.) See section 6.3000 Columbia River Estuary Impact Assessment and Resource Capability Determination for further information describing the impacts and benefits of the proposed project.

- (2) All uses and activities shall satisfy applicable Columbia River Estuary Shoreland and Aquatic Use and Activity Standards contained in the Land and Water Development and Use Code.**

See above part (b) Section 2.4000 Conditional Development and Use. A-H provide information regarding how the project meets the applicable standards.

- (3) All other applicable ordinance requirements shall be adhered to.**

The proposed projects are believed to be consistent with this requirement.

- (4) A proposal which requires dredging, fill, in-water structures, riprap, new log storage areas, application of pesticides and herbicides, water intake or withdrawal and effluent discharge, in-water disposal of dredged material, beach nourishment or other activities which could affect the estuary's physical processes or biological resources is subject to an Impact Assessment, Sections 6.3000-6.3050.**

Please see section 6.3000 Columbia River Estuary Impact Assessment and Resource Capability Determination for further information describing the impacts and benefits of the proposed projects.

- (5) **Uses that are water-dependent must meet the criteria in Section 6.4270(1). Uses that are water-related must meet the criteria in Section 6.4270(2).**

The proposed projects do not meet the criteria for a water-dependent use or water-related use as defined in Section 6.4270 (2). However, the proposed restoration projects do not conflict with existing or probable future water-dependent uses on site or within the vicinity of the project. The projects propose to restore natural tidal signatures and hydrology, providing additional fish access from the mainstem Columbia River to the existing habitat in the Agency Creek and Warren Slough project areas.

- (6) **Uses and activities permitted under Section 4.4620 of this zone, Permitted Developments, are subject to the public notice provisions of Section 2.2040, if an impact assessment is required pursuant to Sections 6.3010 through 6.3050; or if a resource capability determination is required pursuant to Sections 6.3060-6.3070; or if a determination of consistency with the purpose of the AN zone is required pursuant to Section 6.3080; or if the Community Development Director determines that the permit decision will require interpretation or the exercise of factual, policy, or legal judgment.**

The applicant acknowledges this requirement. Please see section 6.3000 Columbia River Estuary Impact Assessment and Resource Capability Determination for further information describing the impacts and benefits of the proposed Agency Creek and Warren Slough projects.

- (7) **Uses and activities permitted under Section 4.4620 of this zoned, Permitted Developments, are subject to the public notice provisions of Section 2.2040, if an impact assessment is required pursuant to Sections 6.3010 through 6.3050; or if a resource capability determination is required pursuant to Sections 6.3060- 6.3070; or if a determination of consistency with the purpose of the AN zone is required pursuant to Section 6.3080; or if the Community Development Director determines that the permit decision will require interpretation or the exercise of factual, policy, or legal judgment.**

The applicant acknowledges the public notice provisions of Section 2.2040.

(g) Natural Shorelands Zone (NS) LAWDUC 4.4700.

The Natural Shorelands Zone (NS) is present within the Warren Slough project area only. The associated information contained within this section below is therefore only applicable to the Warren Slough project.

Section 4.4710. Purpose

This zone is for Columbia River Estuary shoreland areas which should be managed for resource protection, preservation, restoration, and recreation, with severe restrictions on the intensity and types of uses permitted. Natural Shorelands zone includes areas of unique vegetative or wildlife habitat, and critical habitat of endangered or threatened species. This designation is intended to preserve those natural resource systems existing relatively free of human influence.

- (1) The Warren Slough project is consistent with the allowed uses and the purpose of the Natural Shoreland Zone, as it proposes to restore natural processes and access to critical habitats for endangered or threatened species, primarily ESA listed salmonids. The Warren Slough restoration project seeks to remove a known fish barrier within the railroad prism and replace it with a channel spanning bridge to provide unrestricted access to critical habitats for ESA listed salmonids. The efforts of the project will offset past anthropogenic influences that degraded these critical habitats, with the goal to further protect/preserve natural resource systems. The North Coast Land Conservancy is the adjacent landowners to the project area. Their mission statement closely mirrors the purpose and intent of the Natural Shorelands Zone and will help steward the project area. Furthermore, CREST will have the ability to perform supplemental planting efforts and stewardship for a period of no less than 5 years to ensure that the composition and trajectory of the native seeding and planting for all disturbed areas is restored post project.

Section 4.4720. Permitted Developments

The following uses and activities, and their accessory uses and activities, are permitted in the NS zone under a Type I procedure, Section 2.1010, and subject to the provisions of Section 4.4750, Development Standards.

- (1) Navigational aids
 - a. Not applicable. This Warren Slough project is not intended to provide additional, nor manipulate existing navigational aids.
- (2) Low intensity recreation
 - a. Applicable. Warren Slough is frequently used by recreational kayakers. Under existing conditions, the railroad is not passable due to the undersized culverts. Under proposed conditions kayakers will be able to safely paddle under the bridge to the habitats beyond.
- (3) Vegetative shoreline stabilization

- a. Applicable. An extensive native seeding and planting effort is being proposed within the Warren Slough project footprint that is intended to reduce erosion and stabilize the shoreline.
- (4) Emergency repair to existing functional and serviceable dikes
 - a. Applicable. The railroad prism at Warren Slough acts as both a functional and serviceable dike. While the proposed Warren Slough project is not an emergency repair, the existing culverts the project proposes to replace with a channel spanning bridge are well past their expected lifespan. The culverts are already showing signs of failure, and the proposed project will drastically reduce that risk of failure.
- (5) Research and educational observation
 - a. Applicable. The Warren Slough project will be included as part of the Columbia Estuary Ecosystem Restoration Program (CEERP), and as a result will have funding to allow monitoring of several metrics (water temperature, vegetation, sediment accretion, and fish use*) for a period of five to ten years.
 - i. ** Not all CEERP sites are selected for fish sampling. The program selects a subset of all the restoration sites that occur in a given year for fish sampling. Every site receives at a minimum monitoring for water temperature, vegetation, and sediment accretion.*
- (6) Land transportation facilities as specified in Section 4.0300
 - a. Applicable. Per Section 4.0300, the proposed Warren Slough project qualifies as a permitted outright use/activity.

Section 4.4730. Review Developments

The following uses and activities, and their accessory uses and activities, may be permitted as Review Uses in the NS zone under a Type II procedure, Section 2.1020, when authorized in accordance with Sections 2.5000-2.5040 Development and Use Permitted with Review, and subject to the provisions of Section 4.4750, Development Standards:

- (1) Maintenance and repair of existing structures and facilities, including dikes.
- (2) Structural shoreline stabilization limited to riprap.

The proposed Warren Slough project is consistent with the above-listed uses and activities. The proposed project proposes to repair an existing structure (the railroad), by replacing undersized and failing culverts and replacing them with a channel spanning bridge. This activity includes structural shoreline stabilization through the use of riprap necessary to protect the proposed bridge abutments.

Section 4.4740. Conditional Developments

The following uses and activities, and their accessory uses and activities, may be permitted as Conditional Uses in the NS zone under a Type II procedure, Section 2.1020, when authorized in accordance with Sections 2.4000-2.4050 Conditional Development and Use, and subject to the provisions of Section 4.4750, Development Standards:

- (1) Marine research and/or education facilities.
- (2) Restoration, mitigation.

The proposed project is consistent with the conditional developments 1 of Section 4.4740. The Warren Slough habitat restoration project will contribute to marine research and/or education as part of the Columbia Estuary Ecosystem Restoration Program (CEERP). As a CEERP project, the Warren Slough site will have funding to allow monitoring of several metrics (water temperature, vegetation, sediment accretion, and fish use*) for a period of five to ten years. Monitoring is a required component of this program. It is worth noting that not all CEERP sites are selected for fish sampling. The program selects a subset of all the restoration sites that occur in a given year for fish sampling. Every site receives at a minimum monitoring for water temperature, vegetation, and sediment accretion. This research will be analyzed and made available to the public, as well as inform future habitat restoration work in the Columbia River estuary through lessons learned.

The proposed project is also consistent with conditional development 2 of Section 4.4740, restoration, mitigation. The proposed project is a voluntary restoration project that seeks to restore access to critical habitats for ESA listed salmonids.

Section 4750. Development Standards

- (1) All uses and activities shall satisfy applicable regional policies contained in the Comprehensive Plan, Estuarine Resources and Coastal Shorelands element.
- (2) All uses and activities shall satisfy Columbia River Estuary Shoreland and Aquatic Use and Activity Standards contained in the Land and Water Development and Use Code.
- (3) All other applicable ordinance requirements shall be satisfied.
- (4) Shoreline setbacks shall meet the requirements of development standard 6.4220, Riparian Vegetation Protection.

(h) Flood Hazard Overlay (FHO)

The proposed Agency Creek and Warren Slough projects are within the A-100 year Flood Hazard Zone.

If required, and prior to issuance of the development permit, a registered professional civil engineer can provide a no-rise memo, demonstrating through hydrologic and hydraulic analyses performed in accordance with engineering practice that the associated projects proposed developments will not result in any increase in base flood or floodway elevations when compared to pre-project conditions.

Section 5.1000. Flood Hazard Overlay (FHO)

The purpose of the flood hazard overlay district is to identify those areas of the County subject to the hazards of periodic flooding and establish standards and regulations to reduce flood damage or loss of life in those areas. This district shall apply to all areas of special flood hazards within the unincorporated areas of Clatsop County as identified on Flood Insurance Rate Maps (FIRM) and Flood Boundary and Floodway Maps. In advancing these principles and the general purposes of the Clatsop County Comprehensive Plan, the specific objectives are:

- (1) To promote the general health, welfare and safety of the County;
- (2) To prevent the establishment of certain structures and land uses unsuitable for human habitation because of the danger of flooding, unsanitary conditions or other hazards;
- (3) To minimize the need for rescue and relief efforts associated with flooding;
- (4) To help maintain a stable tax base by providing for sound use and development in flood-prone areas and to minimize prolonged business interruptions;
- (5) To minimize damage to public facilities and utilities located in flood hazard areas;
- (6) To insure that potential home and business buyers are notified that property is in a flood area.

The proposed Agency Creek and Warren Slough projects areas are within the FHO, and it is therefore important to acknowledge that the proposed project actions are in line with the purpose and objectives outlined Section 5.1000. Flood Hazard Overlay. The proposed projects are consistent with the objectives 1-5. In summary, the projects indirectly promotes the general health, welfare and safety of the County by restoring floodplain connectivity and capacity in a safe manner that does not put added risk to any adjacent infrastructure. The projects do not seek the further establishment of infrastructure where they do not belong, instead the projects help to retrofit past infrastructure to meet current fish passage standards while improving flood conveyance.

Section 5.1130. Development Standards

The proposed projects are consistent with the applicable development standards as outlined in this section.

1. General Standards

(E) Construction Materials and Methods: The construction materials and methods have been carefully considered to ensure that the materials and equipment are resistant to flood damage. The proposed design of the Agency Creek and Warren Slough bridges utilize precast concrete spans and substructure components. Precast concrete is able to accommodate occasional wetting and drying cycles without causing excessive corrosion to the reinforcing steel since the concrete provides a chloride barrier between any water and the steel. The infrequent occurrence of the additional flood/wetting events should not cause a measurable reduction to the service life of the bridge.

(G) Anchoring: The proposed construction methods and materials will be anchored to prevent flotation, collapse, or lateral movement of the bridge structure.

(I) Foundation Protection: The project and associated structural design, specs, and plans for the foundation of the bridge (pilings and abutments) has been designed by a registered professional civil engineer. Their stamp certifies that the design and methods of construction are in accordance with accepted practices to withstand flotation, collapse, lateral movement, erosion and scour, undermining, and the effects of water and wind acting simultaneously on all building components, including during the base flood.

Section 5.1140. Development in Floodways

- (1) The proposed projects are consistent with this section's requirements for development within floodways. The project area is currently tidal under pre-project conditions. The existing culverts at Agency Creek and Warren Slough do not have any tide-gates on them, and there is no documentation of them being present historically. As a result, the projects will not increase flood conditions beyond those that are existing, it will only serve to alter the frequency and duration to mirror natural tidal signatures, versus the current lag time imposed by the smaller sized openings (culverts). Prior to issuance of the development permit, a registered professional civil engineer can provide a no-rise memo if required, demonstrating through hydrologic and hydraulic analyses performed in accordance with engineering practice that the associated project development will not result in any increase in base flood or floodway elevations when compared to pre-project conditions.
- (2) Proposed placement of fill within the floodway to create topographic complexity mounds is consistent with the requirements outlined in this section. Material placed has been designed to be stable under flood conditions, including rapid rise and rapid drawdown of floodwaters, prolonged inundation, and flood-related erosion and scour. The topographic complexity mounds are subtle rises in elevation, that will be heavily vegetated (stable), and will not have erosion prone slopes or edges as their purpose is to

provide gentle transitions in elevation to support a diverse suite of native species tolerant to natural tidal regimes (and flooding) of the Columbia River.

Section 5.1160. Zones Without Base Flood Elevations

The proposed projects are consistent with this section. FEMA documents flood risk by delineating land areas within the inundation zones from floods of one and 0.2 percent annual chance floods (100-year and 500-year events, respectively). As a means of providing a national standard for flood risk assessment, the one-percent annual chance flood has been adopted as the base flood for floodplain management purposes. The Agency Creek and Warren Slough project areas are located within an A zone (subject to inundation from one-percent annual chance flood), as indicated in the FIRM Panel 41007C0280E, provided by FEMA.

The base flood elevation (BFE) for the project area is unknown. The nearest BFE identified in the project vicinity appears to be for Big Creek and is listed as approximately 13 feet NAVD88 (FEMA 2010). The hydraulic analyses used to demarcate the FEMA flood zones at the project site were performed by the USACE (USACE 1979; FEMA 2010). Columbia River discharges in 1955, 1964, 1971, 1972, and 1975 were used to calibrate and develop the HEC-2 computer model. This was then used to predict stages for the one-percent annual chance flood event at various locations in Clatsop County along the Columbia River (FEMA 2010).

(i) Shoreland Overlay District (SO)

The project area is not shown on the SO layer on the County Web maps because the layer is incomplete. Youngs Bay is currently the only area shown. As a result, we have to look at Section 5.4120 as well as a very old CREST resource base maps. See figure 2. and figure 3. photos below, which show the Shoreland Overlay boundary and indicates Goal 17 Significant Riparian Vegetation, which bumps this up to Category 1 Coastal Shorelands.

Section 5.4100. Shoreland Overlay District (SO)

The purpose of this district is to manage uses and activities in coastal shoreland areas which are not designated as a Shoreland Zone in a manner consistent with the resources and benefits of coastal shorelands and adjacent estuarine aquatic areas.

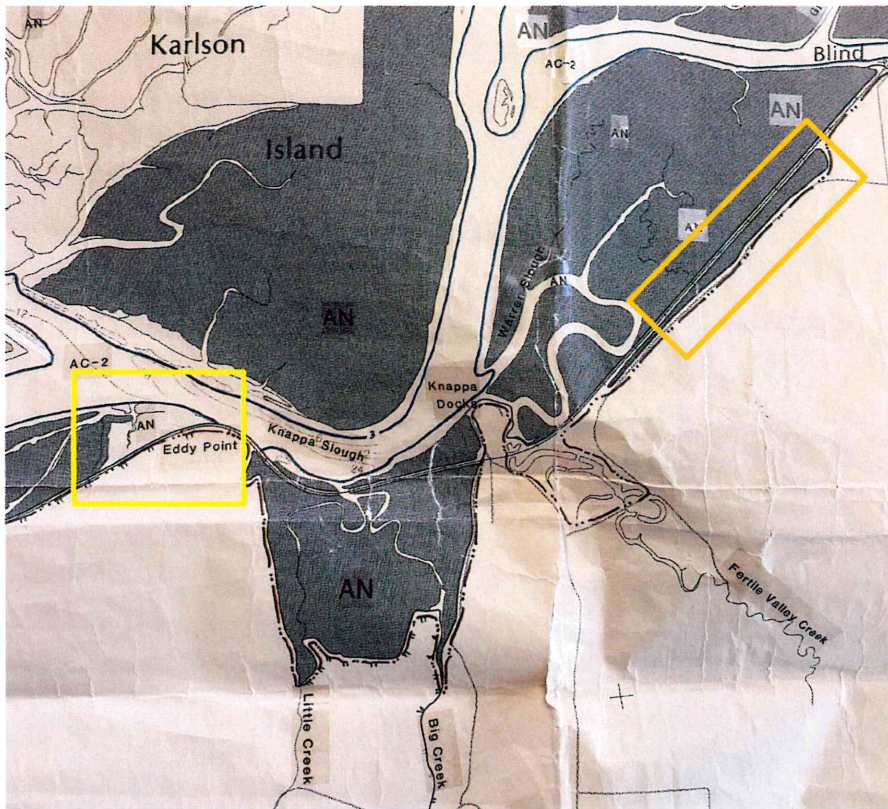


Figure 2. CREST resource base map. This map, along with the key in Figure 3. below illustrates the Shoreland Overlay boundary and indicates Goal 17 Significant Riparian Vegetation for the Agency Creek (Yellow Box), and Warren Slough (Orange Box) project sites.

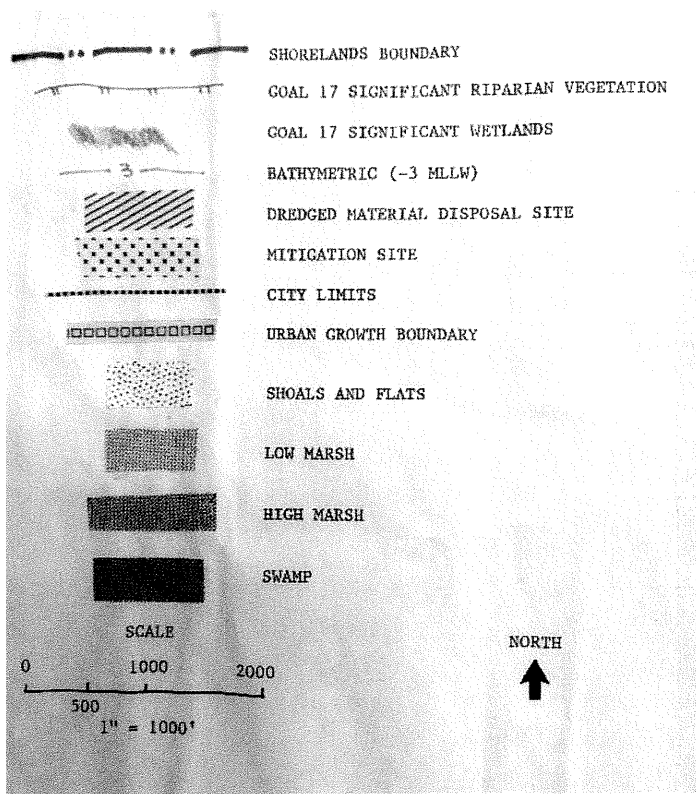


Figure 3. The key/legend for Figure 1.

Section 5.4140. Categories of Coastal Shorelands

There are two categories of Coastal Shorelands. The Agency Creek and Warren Slough project site best fits under Category 1, (A) 1-5 based on the “significant” riparian resources (vegetation), and fish and wildlife habitat. For these projects we seek to classify the projects as “vegetative shoreline stabilization”.

Section 5.4150. Developments Permitted with Category 1 Coastal Shorelands

Only the following uses and activities are permitted under a Type 1 procedure (Section 2.1010) within shorelands defined in Section 5.4140(1)(A)(1-5):

6) Vegetative shoreline stabilization.

Vegetative shoreline stabilization is defined as, “protection from erosion and sloughing of ocean and estuary shorelines and the banks of tidal or non-tidal streams, rivers or lakes by vegetative means. Vegetative shoreline stabilization is the use of plants that anchor the soil to prevent shoreline erosion and sloughing.”

The purpose of these projects are to enhance overall marsh ecosystem function including enhancing access to rearing habitat for Endangered Species Act listed juvenile salmonids by restoring hydrologic connectivity, including floodplain and tidal processes between the Columbia River and the Agency Creek and Warren Slough project areas. However, one aspect of the projects purpose that is critical to the success of the project is maintaining access to these habitats through vegetative shoreline stabilization. The projects propose to create new openings in the railroad prism, excavating new channel connections between the mainstem Columbia River and the Agency and Warren Slough sites, and creating several topographic complexity mounds to promote native wetland/scrub-shrub plant assemblages. The new mounds and channel, along with the surrounding existing channels that they tie into will be heavily planted with native species to ensure bank stability, while also providing a diverse native plant community capable of supporting a diverse community of insects that support the foodweb for salmonids as well as other aquatic organisms. Maintaining channel banks through vegetative shoreline stabilization is critical to ensuring salmon continue to have access to these important habitat types. See the attached plan sets and refer to the associated planting plans for further information. Pay particular attention to the Proposed Levee Shoulder Vegetation Complexity Zones (buffer planting zones). The projects will be protecting shorelines, and tidal channels (tidal streams) by vegetative means. The planting plans will be specifically using native plants to anchor the soil to prevent shoreline erosion and sloughing.

The projects will follow all applicable development standards. The projects are voluntary habitat restoration projects that will both protect and enhance riparian vegetation and wildlife habitats. The proposed projects will not cause any adverse effects to aquatic environments. Strict sediment and erosion controls will be implemented during the construction phase and the site will be stabilized upon completion. All necessary state and federal permits required to perform the work will be secured prior to implementation. There will be a net zero loss of aquatic areas. Elements have been proposed that will provide immediate habitat benefit as well as support the longer-term trajectory of functioning tidal habitat.

(i) Section 6.3000. Columbia River Estuary Impact Assessment and Resource Capability Determination

Impact Assessment

Section 6.3010. Impact Assessment.

The purpose of this section is to provide an assessment process for development alterations which could potentially alter the estuarine ecosystem. Oregon Statewide Planning Goal 16,

Estuarine Resources, requires that actions which would potentially alter the Columbia River estuarine ecosystem be preceded by an assessment of potential impacts. The Impact Assessment need not be lengthy and complex, but it should enable reviewers to gain a clear understanding of the impacts expected.

Section 6.3020. Impact Assessment Requirements

(Note: Sections not applicable to the project were not addressed.)

The following uses and activities are applicable to the project:

- 2) Aquatic area fill
- 3) In-water structures
- 4) Riprap
- 11) Other uses or activities which could affect estuarine physical or biological resources
- 12) Uses or activities that require a Resource Capability Determination

Section 6.3040. Information to be Provided in the Impact Assessment.

Information needed to complete the Impact Assessment should be obtained from sources other than the permit application (i.e. environmental impact statements, Columbia River Estuary Data Development Program data, other reports or data applicable to the Columbia River Estuary). An assessment of impacts of aquatic area pesticide and herbicide application may be provided by the Oregon Department of Agriculture and the Oregon Department of Environmental Quality. An assessment of the impacts of new point-source wastewater discharges into the Columbia River Estuary may be provided through the National Pollution Discharge Elimination System (NPDES) permit program.

A complete Impact Assessment includes the following information:

- (1) Aquatic life forms and habitat, including information on both the extent of and impacts on: habitat type and use, species present (including threatened or endangered species), seasonal abundance, sediments, and vegetation.**

Proposed restoration measures include removal of approximately 36 LF of railroad levee segment (one 36 LF opening with a bridge) at Agency Creek, and one 60 LF of railroad levee segment (one 60 LF opening with a bridge) at Warren Slough, excavation of approximately 120 LF of tidal channel (approximately 60 LF at Agency and 60 LF at Warren) connecting into existing tidal channel networks, excavation of three (3) abandoned levee breaches at Agency Creek (outlined as Levee Scrapedown A-C in the plan set), and the placement of all native soils (rock will be re-used on the rail prism or hauled off-site if unsuitable for re-use) generated from these excavations over approximately 1.1 AC at Agency Creek and 0.5 AC at Warren Slough to create topographic complexity mounds to promote re-establishment of a diverse riparian

community. The projects will restore and enhance hydrologic connectivity and sediment accretion processes to 44 acres, provide improved access to quality habitat for ESA-listed salmonids (possibly also benefit Columbian white-tailed deer), and to restore diverse native vegetation communities through nearly an acre of native seeding and planting.

The anadromous fish that are present or anticipated to be present, at the site are described below:

- **Coho Salmon (*Oncorhynchus kisutch*)**
 - Lower Columbia River ESU Coho salmon (Endangered)
 - Oregon Coast ESU Coho salmon (Threatened)
- **Chinook Salmon (*Oncorhynchus tshawytscha*)**
 - Snake River ESU, fall run Chinook salmon (Threatened)
 - Snake River ESU, spring/summer run Chinook salmon (Threatened)
 - Upper Columbia River ESU summer run Chinook salmon (Endangered)
 - Lower Columbia River ESU, fall run Chinook salmon (Threatened)
 - Upper Willamette River ESU, spring run Chinook salmon (Threatened)
- **Steelhead Trout (*Oncorhynchus mykiss*)**
 - Lower Columbia River, summer run Steelhead (Threatened)
 - Lower Columbia River ESU, winter run Steelhead (Threatened)
 - Middle Columbia River ESU, winter run Steelhead (Threatened)
 - Upper Willamette River ESU, winter run Steelhead (Threatened)
 - Oregon Coast ESU, winter run Steelhead (Species of Concern)
 - Snake River Basin ESU Steelhead (Threatened)
- **Chum Salmon (*Oncorhynchus keta*)**
 - Columbia River ESU Chum salmon (Endangered)

The purpose of these projects is to enhance overall tidal marsh ecosystem function and rearing habitat for ESA listed juvenile salmonids, including all of the species listed above. These projects seek to increase tidal marsh habitat for each of these species in the Agency Creek and Warren Slough project areas and associated watershed where past and present infrastructure has limited hydrologic connectivity and fish access. Potential minor, short-term adverse effects will be mitigated through implementation of erosion control methods and adherence to in-water work recommendations provided by regulatory agencies.

In a regional planning context, through the restoration of hydrologic connectivity, this project will work towards recovery goals of the 2014 Opinion of Federal Columbia River Power System Operations Biological Opinion (BiOp) and Lower Columbia Fish Recovery

Board Subbasin Plan biological and physical objectives (NOAA 2014, LCFRB 2010). Further, the project will seek to address habitat and food web limiting factors for estuary habitat as listed in the 2011 Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead (Estuary Partnership and PC Trask 2011). These limiting factors are outlined below.

➤ *Habitat and Food Web Limiting Factors for Juvenile Salmonids in the Columbia River Estuary (CRE):*

- Reduced in-channel habitat opportunity: flow related habitat changes and altered sediment and nutrient conditions/cycling.
- Reduced off channel habitat opportunity: flow changes reduce access to off channel habitat, changes in bankfull elevations
- Elevated water temperatures
- Food source changes; characterized by reduced macrodetrital inputs and increased microdetrital inputs
- Competition and predation issues

Juvenile fish sampling in the area has indicated that juvenile salmonids were generally abundant from March through July, and fish use of these tidal habitats can vary from year to year (Sagar et al. 2010, Roegner et al. 2010). This data informs the fish use timing, and consequently the types of habitats required in the project area. The two life histories observed in the project vicinity, Ocean type and Stream type salmonids, inform the desired habitat types for restoration within the project area. Ocean type salmonids, here fall Chinook and chum salmon, migrate downstream within days to months of emergence from gravel, and are typically associated with low velocity, nearshore habitats such as marshes and riparian/wetland habitats in the estuary (LCFRB 2010). Stream type salmonids, here Chinook, are typically associated with water column habitats within 18 feet from the top of the water column and avoid low velocity areas (LCFRB 2010). Above each project area and the larger Agency and Warren Slough sites, the small ephemeral streams are not actively used by salmonids due to the existing undersized culverts within the railroad prism. In the case of Warren Slough Ziak-Gnat Creek Lane does not provide suitable passage to upstream habitats (Streamnet 2016).

The preferred temperature range for Chinook in nearby tidal sites appears to be between 11-15° C, while peak chum abundance is between 9-12° C, and peak Coho abundance is between 16-18° C. The upper thermal limit where Chinook and coho at were found is 23° C, and chum salmon were found up to 16° C (Roegner et al 2010). The Warren Slough restoration project area has been monitored for water temperature dating back as far as 2016. The average temperatures observed during that timeframe were found to be within the above-mentioned preferred temperature ranges for Chinook, Coho, and chum salmon.

Estuary habitats produce large amounts of food for juvenile fish that migrate through the estuary. Even if estuary wetland habitats are not actively used by juveniles, these

wetlands often are home to species that become future prey to juvenile salmonids. Juvenile fish have relatively empty stomachs when they are passing through the John Day and Bonneville Dams on the Columbia River, indicating that only a small proportion of these fish are actively feeding. Juvenile fish in the CRE, however, are actively feeding with high stomach fullness containing significant amounts of insects associated with floodplain wetlands. It has been demonstrated that restored estuary habitats are highly productive environments and export prey items (dipterans and amphipods) that are consumed by migrating juveniles in the mainstem Columbia River (Diefenderfer et al. 2012). Fish at restoration sites typically have high stomach fullness and are in better condition compared to those in unrestored areas (USACE and BPA 2013). Restoration of estuary habitats can have positive impacts for all juvenile salmonids that migrate through the CRE and not just ocean types that use these habitats directly.

(2) Shoreland life forms and habitat, including information on both the extent of and impacts on: habitat type and use, species present (including threatened or endangered species), seasonal abundance, soil types and characteristics, and vegetation present.

In addition to aquatic fish species listed above, the wetlands in the Agency Creek and Warren Slough project sites likely provide habitat for a variety of terrestrial and amphibian wildlife currently. While there is no known wildlife surveys available for the project area, mammals likely inhabiting this wetland area include raccoons, elk, deer, coyotes, weasels, river otters, muskrats, and bats. A large number of birds and waterfowl have also been observed in and around the project areas. Birds commonly observed in the area include several species of waterfowl, marsh wrens, kinglets, red wing black birds, and jays. Eagles and several species of hawks are also commonly observed within this area of the Columbia River. Amphibian species likely inhabiting the area and associated wetland areas include Northern red-legged frog, Pacific chorus frog, rough-skinned newt, and Northwestern salamander. ODFW, USFWS, and NOAA have all been consulted as part of the two previous phases of this restoration project (including Wolf Bay and Aldrich Point) to determine the appropriate work-window to minimize potential impact to shoreland life forms.

CREST consulted with USFWS about these railroad projects for the two previous phases at Wolf Bay and Aldrich Point. USFWS does not anticipate that the projects will have adverse effects on the ESA listed Columbian white-tailed deer (CWTD). In the pre-project condition, nearly all the project area at both the Agency Creek and Warren Slough sites is currently tidal. The only areas within the project sites that are not currently inundated at MHHW are located on the abandonend levee and railroad prism at Agency Creek, and on the Ziak-Gnat Creek Lane, the southwest hillside, and the railroad prism at Warren Slough. These areas currently provide some upland habitat, but they are densely vegetated and covered with non-native blackberry, which likely acts as a deterrent to CWTD.

The projects have been designed in a manner that will result in a balanced cut/fill. Balanced cut/fill will be achieved through the excavation (cut) of levees and channel creation, and the creation (fill) of topographic complexity/habitat mounding. Topographic complexity/habitat mounding is intended to offset site subsidence and simplification resulting from past diking, ditching, and draining. Additionally, topographic complexity/habitat mounding is intended to help regain some of the spruce swamp that historically occurred in the area. These mounds are designed in a clustered fashion and with a range of elevations, to promote a more diverse scrub/shrub and spruce community which will out-compete the current near monoculture of non-native reed canarygrass.

As a result of the existing conditions and the balanced cut/fill approach, the projects are not expected to cause additional and/or excessive flooding of CWTD habitat; nor is it expected to flood out individual CWTD fawns. Overall, ODFW and USFWS did not think that the projects will have any negative impacts because the site is already fully tidal and really wet. In fact, the projects are likely to result in an improvement to CWTD habitat over the long term, because of the proposed balanced cut/fill to recover topographic diversity and the associated historic spruce swamp habitat. To further reduce the projects impacts, construction is planned to take place outside of the CWTD fawning season.

There is a potential for minor, short-term fish and wildlife displacement during the implementation phase of these projects. Precautionary measures such as fish exclusion/salvage and completing all work elements during the period recommended by the Oregon Department of Fish and Wildlife (ODFW) and other state agencies would further ensure that the least amount of terrestrial and aquatic wildlife will be displaced. The cumulative impact of implementing these restoration projects will result in increased fish and wildlife access to quality wetland habitat that will have major, long-term benefits for terrestrial and aquatic wildlife that currently have limited access to the project areas.

The majority of the soils within the tidally influenced portion of the study areas are mapped by the NRCS as Coquille-Clatsop complex, hydric poorly drained. Soils will experience both temporary and long-term impacts. The main impact from treatment actions is the creation of habitat features using material placement. This will change the soil. Relief and roughness have both been shown to slow water velocity

The plant communities present are typical for the wetland type and location, dominated by Reed canarygrass and *Myosotis* with percent cover depending on microtopographic changes in the marsh surface. The majority of the existing site elevations are too low for Sitka spruce (*Picea sitchensis*) establishment but does facilitate small shrub/scrub zones on the edges as elevation starts to increase. This is mostly due to the fact that spruce have historically been cleared from the project areas to create the abandoned levee at Agency Creek and the railroad prism at both the Agency Creek and Warren Slough

project areas. Clearing spruce has interrupted successional process, and in the case of tidal spruce swamp, fallen spruce create nurse logs for the next generation of spruce. Patches of cattail (*Typha latifolia*) offer structural habitat for amphibians and egg laying. The existing channel networks are naturally winding, with a delay in water transport resulting from the railroad. Non-native blackberry and other invasive shrubs exist along the railroad and abandoned levee embankment at Agency Creek and along the Ziak-Gnat Creek Lane road embankment and railroad prism at Warren Slough.

Vegetation cover will be decreased short term during construction activities at each site. Habitat features are being focused near the railroad (and adjacent to the abandoned levee at Agency Creek) to limit driving heavy equipment over wetland soils and plants. This will prevent unnecessary compaction and further short-term vegetation loss. Short term vegetation impacts can result in long term adverse conditions in allowing invasives to establish in disturbed areas. Keeping treatment actions as close to the railroad (and abandoned levee at Agency Creek) as possible reduces short- and long-term adverse impacts.

Long term the areas where material is placed will undergo a favorable change in native vegetation cover and species composition. Topographic diversity on the micro scale (elevation differences of approximately ≤ 6 inches) is believed to increase plant species evenness resulting in numerous generalists as opposed to niche wetland species (Moser et al 2007). Unfortunately, this will prove true of invasives like *Phalaris arundinacea* and *Lythrum salicaria*, as well as natives such as *Carex obnupta* and *Myosotis scorpioides*. In an attempt to reduce the percent cover of *P. arundinacea* we propose heavily replanting habitat features with *Spirea douglasii* and specifically using *C. obnupta* as an understory for *Salix* species; *S. douglasii* would be planted around the toe of slope or in lower elevations, with sedges planted thickly beneath the willows as is often seen at undisturbed sites. While willow species will be heavily utilized in revegetation, we also aim to increase the diversity of native woody species onsite at both the Agency Creek and Warren Slough sites.

- (3) **Water quality, including information on: sedimentation and turbidity, dissolved oxygen, biochemical oxygen demand, contaminated sediments, salinity, water temperatures, and expected changes due to the proposed use or activity.**

Sedimentation and Turbidity

Within the project areas today, the elevated railroad prism (and abandoned levee at Agency Creek) interrupts the connection between the project areas tidal marsh habitat and the Columbia River. The railroad and the existing culverts represent a major constriction, which greatly impacts hydrologic connectivity and tidal channel development within the disconnected marsh areas at each site. The reduced hydrologic connectivity impacts sediment and nutrient exchange as well as fish access to the sites. Over time, reduced hydrologic connectivity (like that caused by the presence of the

railroad prism) results in once complex tidal channels becoming filled in with sediment, becoming simplified and straightened over time, drastically simplifying the sites. The proposed projects will result in short-term limited duration events of turbidity that are contained within the local site using the designated Erosion and Sediment Control BMP's listed in the Agency Creek and Warren Slough 1200c Erosion and Sediment Control Plans. However, once completed the projects will restore each sites hydrologic connectivity to a more natural state, carving out complex tidal channels, and restoring natural sediment transport processes beneficial to the sites and the greater Columbia River Estuary. The projects will each have DEQ 401 WQC and a 1200-c permits. Those permits, along with US Army Corps 404 permit and DSL's fill removal permit will all have language and guidelines intended to regulate and minimize sedimentation and turbidity.

Dissolved Oxygen

Dissolved oxygen (DO) is a measurement of the amount of oxygen dissolved in water as a result of the mixing of atmospheric oxygen with waters through wind and stream current actions. Water temperature levels are instrumental to and have many fundamental effects on water chemistry. For instance, warmer water cannot hold as much dissolved oxygen as colder water. An incredibly important water quality parameter, DO is essential to fish and other aquatic life forms. DO is a critical component to the characterization of the health of an aquatic system.

The optimal DO level for salmonids is 9mg/l. A level of 7-8 mg/l is generally considered acceptable, while 3.5-6 mg/l is considered poor. Levels below 3.5 mg/l are likely fatal to salmon. A level below 3 mg/l is stressful to most vertebrates and other forms of aquatic life (Bjornn).

Dissolved Oxygen is not one of the metrics that our water loggers capture in the planning and design phase, nor is it a metric that we monitor post restoration. The loggers capable of collecting continuous DO data are significantly more expensive, and therefore prohibitive to leave out at the project area for any extended periods of time. The lack of continuous DO data set previous to and post restoration represses our ability to analyze the result of restoration on the channels DO levels. However, we know anecdotally (based on the current literature) that the decline in water temperature (cooler water) resulting from restoring hydrologic connectivity would translate to higher levels of DO at the site.

There is a lot of literature available supporting water temperature as a key indicator of DO. Water temperature, a critical component influencing fish fitness and utilization of shallow-water areas, reacts to the re-establishment of natural tidal hydrodynamics. CREST as part of the project design process installed a temperature sensor inside the Warren Slough site, as well as a second outside (on the Columbia River side) of the railroad prism. The temperatures inside Agency Creek and Warren Slough were generally warmer than those in mainstem previous to restoration, which indicated

restricted connection with water from the Columbia River. Higher water temperatures indicate that the water held in the Warren Slough site probably was stagnant at times because of the disrupted connection. Dissolved oxygen (DO) was not accurately measured before restoration but we suspect that stagnation would result in lower DO levels at times. And this will be reversed once the sites hydrology are restored through the channel excavation and new bridges.

Biochemical Oxygen Demand

The sites cumulative Biochemical Oxygen Demand is unknown. But in general, the greater the BOD, the more rapidly oxygen is depleted in the stream, and vice versa. This means less oxygen is available to higher forms of aquatic life. The consequences of high BOD are the same as those for low dissolved oxygen: aquatic organisms become stressed, suffocate, and die. To my knowledge, none of the federal permits regulate BOD, nor do they require monitoring and/or reporting on the sites BOD. That being said, there are Best Management Practices that can limit a projects impact on BOD. For the Agency Creek and Warren Slough projects, all project actions are anticipated to occur in the dry, isolated from adjacent waterways, or occurring at low tide only. As a result, we anticipate temporary impacts to biochemical oxygen demand to be minimal. There will be some vegetation removal in the footprint of the channel excavation to tie the new bridges/connection into existing channel networks. Removing vegetation may have short term impacts on the biochemical oxygen levels, however the proposed planting efforts will at a minimum return conditions back to normal, and likely better than existing “normal” conditions within a year post-construction after the vegetation has become established at each site.

Contaminated Sediments

There are currently no known contaminated sediments at the location of the proposed Agency Creek and Warren Slough restoration sites. However, there is language within the plan sets that includes the Habitat Improvement Programmatic (HIP) general conservation measures applicable to each of the projects proposed elements. The activities covered under the HIP are intended to protect and restore fish and wildlife habitat with long-term benefits to ESA-listed species. As part of BPA’s environmental compliance programmatic review they conduct a site assessment to evaluate the condition of the property, and identify any areas used for various industrial processes. They also search available records, such as former site use, building plans, and records of any prior contamination events. Conduct interviews with knowledgeable people, such as site owners, operators, occupants, neighbors, or local government officials; and investigate the type, quantity and extent of any potential contaminant sources.

Salinity

The Agency Creek and Warren Slough site is well above the maximum salinity intrusion point of the Columbia River mainstem. As a result the proposed project will not have any impact on the existing or proposed conditions salinity levels.

Water temperatures

See Dissolved Oxygen above for additional information. Water temperature has been collected at each site pre-construction. In general water temperatures were cooler outside (on the mainstem Columbia) than those observed within the Agency Creek and Warren Slough sites. This is likely attributed to the decreased hydrologic connectivity resulting from the railroad prism and the undersized existing culverts. Decreased connectivity causes stagnant water that is typically warmer as it has more opportunity for solarization and development of emergent aquatic vegetation. For each project site, all project actions are anticipated to occur in the dry, isolated from adjacent waterways, or at low tide only, and therefore will have minimal impacts on the sites water temperature, if any during construction. Post construction, the increased hydrologic connectivity should result in improved water temperature conditions or at a minimum will return water temperatures back to normal immediately after the projects are complete.

Summary

The Proposed Actions at the Agency Creek and Warren Slough restoration project sites are designed to have a long-term beneficial effect on water quality. The railroad breaching, bridge placements, abandoned levee breaching (at Agency only) and channel connections would allow for improved water quality as well as nutrient and detritus exchange due to improved interchange between the sites floodplains and water with the Columbia River.

The railroad breaches at Agency Creek and Warren Slough, and additional openings in the abandoned levee at Agency Creek only, are intended to allow for improved sediment and nutrient exchange. No long-term sediment quality effects are anticipated because no new sediments are being introduced to the site. Existing on-site sediments are expected to be scoured in the area of the additional openings during ebb tides, exposing previously accumulated coarse-grained native sediments. The Proposed Actions would not introduce sources of contaminated sediment nor expose contaminated sediment. Under the Proposed Action Alternative, sediment quality would likely improve or remain unchanged.

- (4) Hydraulic characteristics, including information on: water circulation, shoaling patterns, potential for erosion or accretion in adjacent areas, changes in flood levels, flushing capacity, and water flow rates.**

A total of two HOBO U-20 pressure sensors were deployed at each of the project areas. One HOBO sensor was placed inside (south of the railroad prism) each of the Agency Creek and Warren Slough sites within the floodplain wetlands isolated behind the railroad prism and the southern hillsides. A second sensor was placed outside (north) of the railroad prism on the Columbia River side of each project site to capture unimpaired hydrologic conditions of the Columbia River Estuary. A fifth hobo was placed in a tree within the project area to collect atmospheric pressure data, allowing for the correction of the water pressure sensors for atmospheric pressure. These data were used to calibrate the hydraulic model, to establish baseline hydrologic conditions, and to establish a relationship with the NOAA gage at Tongue Point to apply long term Tongue Point tidal datums to the project area.

Flows and stage at the project areas are subject to diurnal and season tidal fluctuations, as well as some small levels of discharge from two ephemeral creeks that flow off the hillsides and into the project area. Tidal gauges used for hydrologic analysis are located on the Columbia River at Tongue Point, Astoria OR (NOAA #9439040). This data was used to assist hydrologic and hydraulic analyses. The verified stage record for the Tongue Point Gauge extends from February 1925 through present, with a gap between 1945 and 1946. The tide cycle at the project sites was interpolated from this gauge's tidal datum. For both the Agency Creek and Warren Slough sites, the tidal datums are approximately as follows: Mean higher high water (MHHW) is 8.89 feet, mean lower low water (MLLW) is 0.86 feet, and mean tide level (MTL) is 5.04 feet. High water can occasionally reach above 12 feet, while extreme low water can drop below -2 feet. All water levels discussed are relative to NAVD88 vertical datum. The Columbia River tidal cycle dominates hydrology at both Agency Creek and Warren Slough.

The impacts of restoration actions on hydrologic conditions within the project areas have been investigated using unique two-dimensional (2D) hydraulic models for each project site. While changes to the patterns and depths of inundation within the sites are expected, no changes in maximum water surface elevations upstream or downstream of the projects are expected post-construction. Based on the hydraulic model results and the minimal amount of net fill within the 100-year floodplain, it is not expected that proposed restoration efforts will result in a rise in water surface elevations that will impact existing infrastructure.

Hydrology won't be significantly impacted in the short term, with the only changes occurring over the long term as the railroad breaches (with bridges), and associated channel connections are increased at each site post project. Hydrology is currently restricted at each of the two sites by severely undersized and perched culverts as the only connections to the mainstem Columbia River. The result is a delay in water transport in and out of each site, and high velocity during seasonal and tidal high-water events. This creates passability issues for juvenile salmonids and develops deep unnatural scour holes around the existing culverts. The new proposed openings/bridges

have been designed to slow water velocity based on juvenile salmon passage criteria. Slowing water velocity will positively impact soil and organic matter transport and deposition; this is expected in both the channel with reduced scour holes at the existing openings and with the larger floodplain wetlands receiving an influx of nutrients and sediment while also contributing detrital matter to the larger estuary system. Establishing appropriately sized hydrologic connections through the railroad prism will change how water moves in and out of the site, which in turn will alter the way sediment, detritus, and nutrients are transported and deposited at each site. Historically the sites would have had numerous tidal sloughs, as opposed to these constricted culverts as the only openings, allowing more of the wetland surface to interact with tidal hydrology. This will increase the amount of organic material that the wetland contributes to the overall estuarine food web.

(5) Air quality, including information on quantities of particulates and expected airborne pollutants.

The Oregon Department of Environmental Quality (DEQ) regulates air quality related concerns in this state. The proposed restoration projects would have no long-term effect on air quality or noise. Project construction may result in a localized increase of regulated air pollutants and may result in increased noise generation. The construction of the projects would not exceed National Ambient Air Quality Standards (NAAQS) standards. There would be a temporary and localized reduction in air quality during construction due to emissions from equipment used at the project site; however, these emissions will not exceed the standards set by NAAQS. There also would be temporary and localized increases in noise levels from this equipment. These impacts would be minor and temporary in nature and would cease once the projects are completed.

(6) Public access to the estuary and shoreline, including information on: proximity to publicly owned shorelands and public street ends; effect of public boat launches, marinas and docks; and impact on inventoried public access opportunities.

The Proposed Action Alternative would have no effect on public access to the estuary and shoreline. Agency Creek and Warren Slough construction would not change uses on the railroad, Columbia River waterway, or in the case of Warren Slough on the adjacent public road (Ziak-Gnat Creek Lane). Limited access currently exists to each of the project areas. Access via kayak through the current PNWR Astoria-Line railroad culverts is not feasible for the public, as the openings are too small. The new openings and reduced velocities through the proposed bridge/opening resulting from the projects may increase recreational access into the project area in the long-term.

(7) Navigation, including information on: distance from navigation channels, turning basins and anchorages; proximity to range markers.

The Agency Creek and Warren Slough projects will not affect navigation channels,

turning basins, and anchorage locations. No range markers are within the vicinity of the project sites.

(8) Demonstration that proposed structures or devices are properly engineered.

The proposed projects (removal and fill) designs have been designed by a registered professional engineer employed by InterFluve Incorporated. Additionally, a hydraulic analysis and modeling has been conducted by InterFluve Incorporated to determine the impacts of the proposed projects on adjacent areas. The results of the modeling are described in Section 3 of the Basis of Design Reports.

(9) Demonstration that the project's potential public benefits will equal or exceed expected adverse impacts.

The proposed Agency Creek and Warren Slough restoration projects will result in overall positive impact to the public by providing increased access for fish and wildlife to quality estuarine wetland within the Columbia River Estuary Ecosystem. Fish and wildlife fuel local economies, ecosystems, provide recreational opportunities, and nourishment.

As a result of the proposed projects there will be minor short-term/temporary impacts such as increased noise during construction. These impacts will be short term during the designated work window and will have no overall adverse impact to the public.

(10) Demonstration that non-water dependent uses will not preempt existing or future water- dependent utilization of the area.

The proposed projects will not affect non-water dependent uses, nor will they affect future water-dependent utilization within the project vicinity. The project sites are currently surrounded bisected by a defunct/inactive railroad line/berm that separates the Agency Creek and Warren Slough project areas and thier tidal wetlands from the larger Columbia River Estuary. The project seeks to reconnect the floodplain wetlands to provide access to salmonids and other species. No change in use of the sites will result with the completion of this project. These sites are currently tidal, but site conditions (the railroad at both sites, and the abandoned/failed levee at Agency) limit fish access and natural hydrology to some extent.

(11) Determination of methods for mitigation and accommodation of the proposed development, based on items (1) through (10) above, in order to avoid or minimize preventable adverse impacts.

The Agency Creek and Warren Slough projects are voluntary restoration projects and are not anticipated to require mitigation based on our conversations with regulatory agencies. Best Management Practices will be implemented during the construction of these projects to minimize impacts to the waterway. Impacts resulting from

construction will be limited by operating during the in-water work window and operating on a relatively small scale. This includes but is not limited to utilizing the ODFW approved in-water work window, as well as an approved DEQ Erosion and Sediment Control Plan. The projects have been specifically designed to avoid and minimize adverse impacts while providing the greatest benefit to migrating juvenile salmonids, and wildlife in the Columbia River Estuary. Design considerations focused on maximizing the habitat benefits while minimizing the overall project footprints.

Any existing resources that are temporarily disturbed will be restored to their original condition, or better, than they were before completion of the project. The Agency Creek and Warren Slough project will involve temporary short-term disturbance that will ultimately improve the natural hydrology to 44-acres (approximately 22-acres per site), improve native plant diversity, and vastly expand ingress/egress points for fish access.

CREST proposes to achieve these goals by removing one section of existing railroad prism at each site, placing a 36-foot bridge at the Agency Creek site, and a 60-foot bridge within the opening at the Warren Slough site. Each site will strategically be excavating a channel to connect through each of the new openings, connecting into existing tidal channel networks. Unique to the Agency Creek site, CREST proposes to create three (3) additional breaches (termed Levee Scrapedown Areas A-C in the Agency Creek Plan set) in an abandoned and failed levee structure to further increase floodplain connectivity and fish access. At each site CREST will be implementing a large native planting and seeding plan. As a result, natural hydrology and channel forming processes will return to the site. Fish access will be enhanced by creating a new opening and increasing the available edge habitat. Greater food web connectivity and nutrient exchange will occur as natural hydrology, topographic diversity, and native plant diversity is restored to the marsh plain at the Agency Creek and Warren Slough sites.

The Agency Creek and Warren Slough sites have experienced significant changes since the placement of the railroad in the late 1800's that are contributing to habitat loss. Each of the proposed restoration elements are designed to reduce the past anthropogenic impacts to the maximum extent feasible to help recover and restore the degraded habitat.

Habitat loss associated with increased development in the coastal zones is one of the most significant threats to estuarine health from a future perspective. Anthropogenic activities associated with estuarine habitat loss specific to the project area include diking, dredging, filling, industrial, commercial, and residential development, agriculture, and deforestation, among others. Habitat losses in the range of 68%-70% have been noted for vegetated tidal wetlands in the Columbia River Estuary. While a

majority of the losses in vegetated tidal wetlands are not recoverable, the tidal spruce swamp and shrub/scrub habitat that once existed at each of the project sites is recoverable.

All work will be completed in the dry (during low tides) to reduce impacts to wetlands. Best Management Practices will be implemented to minimize the impacts to the waterway and associated riparian habitat. Unique erosion control plans for each site will be installed prior to any earthwork taking place. The erosion control plans have been developed in accordance with the regulations specified by the Oregon Department of Environmental Quality (DEQ). Clearing and grading will be limited to minimum practicable extent. Erosion control measures will be installed around the breach locations to isolate turbidity and minimize sediment transport during construction. All proposed excavation will be completed strictly during the low tide cycle, to minimize risk of turbidity, and to allow earth work to be accomplished during dry conditions. All disturbed areas will be immediately seeded and revegetated with native wetland and riparian plants upon completion of each work element.

Equipment will be selected, operated, and maintained in a manner that minimizes adverse effects on the environment. Equipment will be minimally sized, using low ground pressure tracks. Access routes have been minimized to the maximum extent practicable and are mostly on top of existing roadways or railroads. At the Agency Creek site access will also be required along the existing abandoned/failed levee. Where equipment must leave the roads/railroad prism, they will utilize temporary wood mats or plates within wet areas or on sensitive soils. All equipment operating within and around the wetlands will be fitted with biodegradable lubricants and fluids and inspected daily.

All construction activities will be phased to the maximum extent possible, so each area within the project footprint is completed before the next phase is started. Phasing is intended to minimize the duration of impact to the least amount of time necessary to complete the given phase of the project.

Short term stabilization measures may include the use of sterile seed mix, weed-free certified straw, jute matting, hydro-seeding/tackifier and other similar techniques during any periods of inactivity or between phases until the planting and seeding plan is implemented.

Native woody species such as Willows, sedge and rush mats, that currently exist on or adjacent to the railroad prism and the marshplain within the construction footprint will be avoided and/or salvaged to the maximum extent possible and re-planted on site.

CREST has had a lot of success salvaging and “hot planting” (quickly transplanting) existing high quality native vegetation during the construction of several restoration projects in the past.

Immediately following project construction, all affected resources will be restored to original condition or better. The entirety of each project area will be heavily seeded and replanted with native vegetation. Monitoring of the sites will occur for five years following construction to ensure successful restoration of the resources. Parameters monitored will include water temperature and water surface elevation, sediment accretion, photo points, and vegetation composition and planting survival. Follow-up planting efforts will occur in the event that the planting effort doesn’t achieve 80% survival at the Agency Creek and Warren Slough sites.

Section 6.3050. Impact Assessment Conclusion.

Based on the information and analysis in Section 6.3040, one of the following four conclusions shall be reached:

- (1) The proposed uses and activities do not represent a potential degradation or reduction of estuarine resource.
- (2) The proposed uses and activities represent a potential degradation or reduction of estuarine resources. The Impact Assessment identifies reasonable alterations or conditions that will eliminate or minimize to an acceptable level expected adverse impacts.
- (3) The proposed uses and activities will result in unacceptable losses. The proposed development represents irreversible changes and actions and unacceptable degradation or reduction of estuarine resource properties will result.
- (4) Available information is insufficient for predicting and evaluating potential impacts. More information is needed before the project can be approved.

RESPONSE: CREST anticipates that conclusion 1 will be determined, as the each of the projects have been specifically designed to offset past degradation of estuarine resources through direct habitat restoration measures that seek to restore natural estuarine processes and functions.

Resource Capability Determination

Section 6.3060. Resource Capability Determination.

Some uses and activities in Columbia River Estuary Natural and Conservation Aquatic zones are allowed only if determined to meet the resource capabilities of the area and if determined to be consistent with the purpose of the affected zone. Some uses and activities in Development Aquatic zones are allowed only if determined to be consistent with the purpose of the zone.

Section 6.3070. Resource Capability Procedure.

A completed Resource Capability Determination consists of the following elements:

- (1) Identification of the affected area's zone, and its purpose.
- (2) Identification of the types and extent of estuarine resources present and expected adverse impacts. This information is included in the Impact Assessment, Section 6.3040.
- (3) A determination of whether the use or activity is consistent with the resource capabilities of the affected zone. A use or activity is consistent with the resource capabilities of the area when either:
 - (A) Impacts on estuarine resources are not significant; or
 - (B) Resources of the area will be able to assimilate the use and activity and their affects and continue to function in a manner which:
 - 1) In Aquatic Natural designations, protects significant fish and wildlife habitats, natural biological productivity, and values for scientific research and education; or
 - 2) In Aquatic Conservation designations, conserves long term use of renewable resources, natural biological productivity, recreation and aesthetic values and aquaculture.
 - (C) For temporary alterations, the Resource Capability Determination must also include:
 - (D) Determination that potential short-term damage to estuary and shoreland resources is consistent with the resource capabilities of the area; and
 - (E) Determination that the area and affected resources can be restored to their original condition.

RESPONSE: (1) The Agency Creek project will take place in the following zones: F-80, and AN zones. The Warren Slough project will take place in the following zones: NS, and AN zones. These projects are being considered as a consolidated application.

The purpose of the Natural Shorelands (NS) zone is for Columbia River Estuary shoreland areas which should be managed for resource protection, preservation, restoration, and recreation, with severe restrictions on the intensity and types of uses permitted. Natural Shorelands zone includes areas of unique vegetative or wildlife habitat, and critical habitat of endangered or threatened species. This designation is intended to preserve those natural resource systems existing relatively free of human influence.

NS Zone (Warren Slough only): The Warren Slough project is consistent with the allowed uses and the purpose of the Natural Shoreland Zone, as it proposes to restore natural processes and access to critical habitats for endangered or threatened species, primarily

ESA listed salmonids. The Warren Slough restoration project seeks to remove a known fish barrier within the railroad prism and replace it with a channel spanning bridge to provide unrestricted access to critical habitats for ESA listed salmonids. The efforts of the project will offset past anthropogenic influences that degraded these critical habitats, with the goal to further protect/preserve natural resource systems. The North Coast Land Conservancy is the adjacent landowners to the project area. Their mission statement closely mirrors the purpose and intent of the Natural Shorelands Zone and will help steward the project area. Furthermore, CREST will have the ability to perform supplemental planting efforts and stewardship for a period of no less than 5 years to ensure that the composition and trajectory of the native seeding and planting for all disturbed areas is off to a great start before handing everything over to NCLC for further stewardship needs.

The purpose of the AN zone designation is to assure the preservation and protection of significant fish and wildlife habitats; continued biological productivity of the Columbia River estuarine resources; and scientific research and educational opportunities.

The purpose of the AN zone designation is to assure the preservation and protection of significant fish and wildlife habitats; continued biological productivity of the Columbia River estuarine resources; and scientific research and educational opportunities. These areas are managed to preserve natural resources in recognition of dynamic, natural, geological and evolutionary processes. The AN zone includes all tidal marshes, tidal flats, and seagrass and algae beds. AN zones may also include ecologically important subtidal areas. This designation is intended to preserve those natural aquatic resource systems existing relatively free of human influence.

The proposed projects at Agency Creek and Warren Slough are consistent with the purpose and intent of the AN zone as these projects both seek to preserve and protect significant fish and wildlife habitat through habitat restoration and stewardship actions. The projects also seek to improve the biological productivity of the Columbia Rivers estuarine resources through restoring natural processes and functions to the project areas that have been impacted by past land use practices. Furthermore the project will contribute to scientific research and educational opportunities through a rigorous monitoring program conducted at each of the sites for a period of 5 years post-project, with the possibility to extend this period to 10 years. Data collected will include water surface elevation and temperature, vegetation species composition and abundance, sediment accretion, and photo points. The sites may also be selected for fish sampling by NOAA.

The purpose of the Forest-80 (F-80) Zone is to protect and maintain forest lands for grazing, and rangeland use and forest use, consistent with existing and future needs for agricultural and forest products. The F-80 zone is also intended to allow other uses that are compatible with agricultural and forest activities, to protect scenic resources and fish and wildlife habitat, and to maintain and improve the quality of air, water and land resources of the county.

F-80 Zone (Agency Creek only): The proposed Agency Creek project is consistent with the purpose and intent of the F-80 Zone in that the project seeks to protect and restore fish and wildlife habitat, maintain and improve the quality of the air, water, and land resources of the County. Furthermore, the proposed project at Agency Creek does not in any way risk the ability of forest lands use of grazing, and rangeland use and forest use consistent with existing and future needs for agriculture and forest products.

(2) Reference the Impact Assessment for a complete description of types and extent of estuarine resources present. Examples of resources that will be impacted include: anadromous fish; wetland habitat; Columbia white-tailed deer, which may utilize the area; soil and shoreline vegetation; and increased water quality.

(3) (A) Long-term impacts on estuarine resources are not significant. The Agency Creek and Warren Slough projects will have short-term limited duration impacts to estuarine resources during the construction period, but will immediately result in long-term improvements to estuarine resources that will have result in significant improvements to natural processes and functions. Restored natural hydrology, improved native vegetation composition and species diversity, improved access for fish and wildlife, improved food web dynamics, improved sediment and nutrient exchange, and improved connectivity of the Columbia River to its floodplain.

(3) (B) The purpose of this project is to enhance overall marsh ecosystem function to promote habitat, nutrient, fish, wildlife, and aesthetic resources. This project will protect and enhance estuarine resources. Research conducted at the project site will be low-impact and align with the Action Effectiveness Monitoring and Research (AEMR) program as directed by the Bonneville Power Administration (BPA).

(3) (C-E) Any existing resources that are temporarily disturbed will be restored to their original condition before completion of the project. The Warren Slough project will involve temporary short-term disturbance that will ultimately improve the natural hydrology to 22 acres, improve native plant diversity, and vastly expand ingress/egress points for fish access.

CREST proposes to achieve these goals by removing a section of railroad prism at each of the project sites, placing a channel spanning bridge over each proposed breach/removals, and strategically excavating channels to connect existing tidal channel through the new railroad opening, and implementing a large native planting and seeding plan. Unique to the Agency Creek site is an abandoned and failed levee, the project proposes to remove three (3) sections of the failed levee (referred to a levee scrapedown areas A-C in the plan set), to further improve floodplain connectivity, natural hydrology, and fish access to the site. Cumulatively, project actions will result in natural hydrology and channel forming processes returning to the site. Fish access will be enhanced by creating multiple new openings and increasing the available edge habitat. Greater food web connectivity and nutrient exchange will occur as

natural hydrology, topographic diversity, and native plant diversity is restored to the marsh plain at Agency Creek and Warren Slough.

The Agency Creek and Warren Slough sites have experienced significant changes since the placement of the railroad in the late 1800's that are contributing to habitat loss. Each of the proposed restoration elements are designed to reduce the past anthropogenic impacts to the maximum extent feasible to help recover and restore the degraded habitat.

Habitat loss associated with increased development in the coastal zones is one of the most significant threats to estuarine health from a future perspective. Anthropogenic activities associated with estuarine habitat loss specific to the project area include diking, dredging, filling, industrial, commercial, and residential development, agriculture, and deforestation, among others. Habitat losses in the range of 68%-70% have been noted for vegetated tidal wetlands in the Columbia River Estuary. While a majority of the losses in vegetated tidal wetlands are not recoverable, the tidal spruce swamp and shrub/scrub habitat that once existed at the Agency Creek and Warren Slough project sites is recoverable.

All work will be completed in the dry (during low tides) to reduce impacts to wetlands. Best Management Practices will be implemented to minimize the impacts to the waterway and associated riparian habitat. An erosion control plan will be installed prior to any earth work taking place. The erosion control plan will be developed in accordance with the regulations specified by the Oregon Department of Environmental Quality (DEQ). Clearing and grading will be limited to minimum practicable extent. Erosion control measures will be installed around the breach locations to isolate turbidity and minimize sediment transport during construction. Excavation will be completed strictly during the low tide cycle, to minimize risk of turbidity, and to allow earth work to be accomplished during dry conditions. All disturbed areas will be immediately seeded and revegetated with native wetland and riparian plants upon completion of each work element.

Equipment will be selected, operated, and maintained in a manner that minimizes adverse effects on the environment. Equipment will be minimally sized, using low ground pressure tracks. Access routes have been minimized to the maximum extent practicable and are mostly on top of existing roadways, railroads, or in the case of Agency Creek also on the top of the abandoned levee. Where equipment must leave the roads/railroad prism (or abandoned levee), they will be required to utilize temporary wood mats or plates within wet areas or on sensitive soils. Areas of sensitive native vegetation will be flagged in the field and avoided to the maximum extent practicable to minimize impacts. All equipment operating within and around the wetlands will be fitted with biodegradable lubricants and fluids and inspected daily.

All construction activities will be phased to the maximum extent possible, so each area within the project footprint is completed before the next phase is started. Phasing is intended to minimize the duration of impact to the least amount of time necessary to complete the given phase of each project.

Short term stabilization measures may include the use of sterile seed mix, weed-free certified straw, jute matting, hydro-seeding/tackifier and other similar techniques during any periods of inactivity or between phases until the planting and seeding plan is implemented.

Native woody species such as Willows, sedge and rush mats, that currently exist on or adjacent to the railroad prism and the marshplain within the construction footprint will be avoided and/or salvaged to the maximum extent possible and re-planted on site. CREST has had a lot of success salvaging and “hot planting” (quickly transplanting) existing high quality native vegetation during the construction of several restoration projects in the past.

Immediately following project construction at each site, all affected resources will be restored to original condition or better. The entire project area will be heavily seeded and replanted with native vegetation. Monitoring of the site will occur for five years following construction to ensure successful restoration of the resources. Parameters monitored will include water temperature and water surface elevation, sediment accretion, photo points, and vegetation composition and planting survival. Follow-up planting efforts will occur for a period of up to five years in the event that the planting effort at either site doesn’t achieve 80% survival.

Section 6.3080. Determining Consistency with the Purpose of the Zone.

Certain uses in Aquatic Development, Aquatic Conservation and Aquatic Natural zones may be permitted only if they are consistent with the purpose of the aquatic zone in which they occur. A Consistency Determination consists of the following elements:

- (1) Identification of the affected zone and its purpose.
- (2) Description of the proposed project's potential impact on the purposes of the affected zone. Determination that the proposal is either:
 - (A) Consistent with the purpose of the affected zone;
 - (B) Conditionally consistent with the purpose of the affected zone; or
 - (C) Inconsistent with the purpose of the affected zone.

RESPONSE: Habitat restoration is a conditionally permitted activity within the NS, AN and F-80 zones; the Agency Creek and Warren Slough projects are conditionally consistent with the purpose of the affected zones.

(j) Section 6.4000. Columbia River Estuary Shoreland and Aquatic Use and Activity Standards

(Note: Sections not applicable to the project were not addressed.)

Section 6.4030 General Development Zone Standards

(1) Shoreland and aquatic area uses and activities that are not water-dependent shall not preclude or unduly conflict with existing, proposed or potential future water-dependent uses or activities on the site or in the vicinity.

The proposed wetland restoration projects do not unduly conflict with existing, proposed or potential future water-dependent uses or activities on site or within the vicinity of the project. The proposed project will improve the environmental values of the Columbia River Estuary, through restoring fish access, natural hydrology, and native plant diversity. This project will either not result in any change nor hinder the ability to protect the unique economic and social values of the Columbia River Estuary. As a result, the project is consistent with this requirement.

(2) Uses will be designed and located so as not to unduly interfere with adjacent uses (particularly adjacent historic structures). Appropriate landscaping, fencing, and/or other buffering techniques shall be used to protect the character of adjacent uses.

A railroad (PNWR Astoria-Bradbury line) exists on each site, but it will not be adversely impacted by this project. The railroad must be returned in as good or better condition, which is a direct requirement from the landowner to allow these restoration efforts to occur. A full Archaeological Survey and report has been completed for each site in order to comply with Section 106 of the National Historic Preservation Act (See the attached Agency Creek and Warren Slough Cultural Resources Reports). An archaeological monitor will be on site during construction to document any discoveries found during the project. Of particular interest to archaeologists is any information that could further inform how the railroad was built.

No structures will be impacted by the construction of this project. The proposed use has been designed and located so that it will not interfere with adjacent uses. As a result, no landscaping, fencing, and/or other buffering techniques are proposed for this project. The proposed projects are consistent with this requirement.

(3) Waterfront access for the public, such as walkways, trails, waterfront seating or landscaped areas, shall be provided except when proven to be inconsistent with security and safety factors. Industrial and port facilities should designate public viewing points, for viewing waterfront and/or port operations in areas which would not interfere with operations. Provisions of public access shall not result in enlargement of development areas requiring dredge or fill activities or other alteration of estuarine resources.

The projects do not propose to place walkways, trails, waterfront seating or landscaping within the project site as these elements would not be consistent with the project goals (restoring fish and wildlife habitat, through restoration of hydrology and vegetation), nor would it be allowed by the landowners (primarily the railroad) due to safety concerns. Additionally, to accomplish additional waterfront access for the public it would require fill activities or other alteration of estuarine resources which item 3 specifically precludes.

The Agency Creek and Warren Slough sites are located within relatively hard-to-access areas. The railroad prism is entirely overgrown with vegetation, most of which is non-native blackberry in areas of high sun exposure, so walking along the railroad is difficult. The nearest access point to Agency Creek is from the Knappa Dock Road, or by boat. The nearest access point to Warren Slough is from Ziak-Gnat Creek road, and it would require access across private property to access the railroad (which is also not accessible to the public without a Right of Entry Permit). Public boat ramps in the vicinity of the project area are limited. From the Columbia River, you would be able to access and view the majority of the proposed work at Agency Creek and Warren Slough during a high tide. The bridges, failed levee breaching (at Agency only), and the associated channel connection will connect the interior of each site to the adjacent Columbia River estuary through the new bridge openings. The new channels will be passable via a small watercraft (like a kayak), but it is not designed nor intended to provide additional public access. Fish access is the main goal. The new channels and the bridges will be passable by kayak during mean high tide or higher. The project does require some filling activity for the benefit of fish habitat and native marshplain vegetation establishment. Alteration of estuarine resources will not be negatively affected as a result of this project, they will improve beyond existing conditions.

(4) Joint use of parking, moorage and other commercial support facility is encouraged where feasible and where consistent with local ordinance requirements.

Parking, moorage or other commercial support facilities are not feasible for the projects, nor are they consistent with the goals of the projects.

(5) In some locations maintenance, placement or replacement of riparian vegetation may be required to enhance visual attractiveness or assist in bank stabilization.

Some existing riparian areas (on top of the railroad prism and abandoned levee) will be impacted to establish access to work areas; however, existing mature riparian vegetation will be salvaged and “hot planted” (transplanted in a timely manner) to the maximum extent practicable. Project designs were carefully considered to minimize the impact to native and mature vegetation as much as possible. All riparian areas disturbed will be heavily seeded and replanted with native species appropriate for the area and associated elevation and tidal regimes. Planting efforts will be closely monitored for a period of five years to ensure that the survivorship of native plantings is high. If additional planting is needed CREST has funding secured

Section 6.4040. Agriculture and Forestry

This section is largely not applicable to the proposed Agency Creek and Warren Slough projects. The agency Creek project has a small component that is zoned F-80, but none of the project related proposed uses involve agricultural and/or Forestry uses. While they are not specifically forestry uses, the proposed Agency Creek project is consistent with the purpose and intent of the F-80 Zone in that the project seeks to protect and restore fish and wildlife habitat, maintain and improve the quality of the air, water, and land resources of the County. Furthermore, the proposed project at Agency Creek does not in any way risk the ability of forest lands use of grazing, and rangeland use and forest use consistent with existing and future needs for agriculture and forest products.

Section 6.4080. Estuarine Construction

(1) When land use management practices and vegetative shoreline stabilization are shown to be infeasible (in terms of cost, effectiveness or other factors), structural means may be approved subject to applicable policies, standards, and designation use restrictions.

There will be no new structural bank protection in areas that haven’t had bank protection in the past. The locations of the new bridges will each have an element of shoreline stabilization to protect the bridge abutments, however this will be within the footprint of the current railroad berm (which already has bank armoring) and will re-use a lot of that rock material if suitable (as determined by the engineering team). There will be vegetative shoreline stabilization in each of the areas where channel excavation and topographic complexity mounding occurs. This seeding vegetation will ensure that the channels remain present, minimizing risk of erosion/scour, while providing hydrologic connections between the Agency Creek and Warren Slough embayments and the Columbia River, and will also help provide shade, nutrients, and support the foodweb.

(2) Where structural shoreline stabilization is shown to be necessary because of the infeasibility of vegetative means, the choice among various structural means shall be made on a case-by-case basis. Factors to be considered include, but are not limited to:

(A) Hydraulic features;

The consulting engineers analyzed potential hydraulic impacts associated with this project. This hydraulic analysis confirmed that the project will not result in undesirable hydraulic conditions. Please refer to sections 3.3 and 3.5 of the basis of design report for further information regarding the hydraulic analysis of the proposed project. Section 6.3040. Information to be Provided in the Impact Assessment, part 4 describes the impacts identified during the hydraulic analysis.

The bridge placed as part of this project will improve the sites hydrology, reducing overall velocities to improve fish passage to critical habitat types. To maintain structural integrity, shoreline stabilization of the bridge and channels is required. The bridge will be stabilized by re-using and possibly importing additional riprap as needed. There will be a net loss of riprap, as the abutments only require armoring whereas the existing conditions have riprap along the entire bank. The channel excavation will have vegetative shoreline stabilization, plantings. See the project plan set and basis of design report for justifications and methodology.

(F) Engineering feasibility;

A feasibility analysis was completed for this project. A key component of this analysis included constructability considerations. Additionally, several options were analyzed including locations of breaches, size of openings, structures to be placed within the openings (bridge, open cut, culverts), etc.. The analysis found that a bridge would be feasible to construct at this site, and would be similar cost to that of culverts, while providing a greater benefit (larger opening). The bridge placed as part of this project will improve the sites hydrology, reducing overall velocities to improve fish passage to critical habitat types. To maintain structural integrity, shoreline stabilization of the bridge abutments is required. See the project plan set and basis of design report for justifications and methodology.

(G) Navigation;

The project is outside of any navigation channels, therefore navigation will not be impacted by this project.

(3) Jetties, groins and breakwaters shall be constructed of clean, erosion-resistant materials from upland sources. In-stream gravels shall not be used, unless part of an approved mining project. Material size shall be appropriate for predicted wave, tide and current conditions.

Not Applicable.

(4) Where a jetty, groin, breakwater or other in-water structure is proposed for erosion or flood control, the applicant shall demonstrate that non-structural solutions, such as land use

management practices, or other structural solutions, such as riprap, will not adequately address the problem.

Not Applicable.

(5) Piling or dolphin installation, structural stabilization, and other structures not involving a dredge or fill, but which could alter the estuary may be allowed only if the following criteria are met:

The project is proposing to take out one relatively large section of derelict railroad, and replacing it with a channel spanning bridge (a 60 foot bridge) to improve hydrologic connectivity and fish passage between the Columbia River mainstem and the Warren Slough project area. Pre-railroad, this site would have had several channels connecting the site from various locations allowing unrestricted hydrology and fish access. The new bridge will re-use some of the material removed from the railroad prism to provide and return the riprap armoring to protect the railroad and the new bridge abutments. The imported materials will be the bridge itself, the pilings, and the bridge abutments (which will be pre-cast), and copious amounts of native seed and plants.

The project meets the following criteria:

(A) If a need (i.e. a substantial public benefit) is demonstrated.

The proposed Warren Slough restoration project will result in overall positive impact to the public by providing increased access for fish and wildlife to quality estuarine wetland within the Columbia River Estuary Ecosystem. Fish and wildlife fuel local economies, ecosystems, provide recreational opportunities, and nourishment.

As a result of the proposed project there will be minor short-term/temporary impacts such as increased noise during construction. These impacts will be short term during the designated work window and will have no overall adverse impact to the public.

(B) The proposed use does not unreasonably interfere with public trust rights.

The proposed use will not unreasonably interfere with public trust rights.

(C) Feasible alternative upland locations do not exist.

Feasible alternative upland locations were investigated, and they are not feasible. The only uplands within the project footprint is the railroad itself, and some adjacent hillsides with private landowners. The railroad owners would not allow materials to be placed on the railroad tracks, and nearby landowners were not particularly interested in taking material. Even though

the railroad is inactive, they strive to maintain a contiguous rail line, that could be made accessible if the need arose.

The project is specifically designed to benefit ESA listed salmonids by increasing access to critical habitats. These habitats are in aquatic and floodplain environments. As a result, there are no feasible alternative upland locations existing that could provide the same benefits. The bridge placed as part of this project will improve the sites hydrology, reducing overall velocities to improve fish passage to critical habitat types. To maintain structural integrity, shoreline stabilization of the bridge abutments is required. See the project plan set and basis of design report for justifications and methodology.

(D) Potential adverse impacts, as identified in the impact assessment, are minimized.

All efforts have been made during the design process to minimize adverse impacts. The locations of the breaches have been strategically selected to minimize the need for additional channel excavation to “connect” the new bridge to adjacent channel networks. Sensitive vegetation communities have been identified and will be avoided throughout construction, and the timing and duration of the project has been strategically selected to minimize impacts to aquatic and terrestrial fish and wildlife. An Erosion and Sediment Control plan has been produced and will be followed to ensure that all Best Management Practices are implemented.

(6) Jetties, groins, breakwaters and piers requiring aquatic fill may be allowed only if all of the following criteria are met:

Not Applicable.

(7) Proposals for new bulkheads may be approved only if it is demonstrated that sloped riprap will not adequately fulfill the projects objectives.

There will be no bulkheads installed.

(8) Proposals for new bulkheads or for new riprap bank line slopes steeper than 1.5 to 1 (horizontal to vertical) must demonstrate that adequate shallow areas will be available for juvenile fish shelter, or that the area is not typically used for juvenile fish shelter.

There will be no bulkheads installed. Riprap will be installed around the bridge abutments to ensure structural integrity, however there is already rip rap present and there will be no net gain in rip rap embankment (there will be a reduction as there will not be riprap where the bridge openings will be). The slope of the railroad prism/bank will not be greater than 1.5:1. Rip rap in the vicinity of the channel under the bridge will be buried in native material to not adversely impact juvenile fish per plans (See sheet 12 and 14 of 34 for examples).

(9) Plant species utilized for vegetative stabilization shall be selected on the basis of potential sediment containment and fish and wildlife habitat values. Trees, shrubs and grasses native to the region should be considered for vegetative stabilization; however, plant species and vegetation stabilization techniques approved by the Soil Conservation Service, the U.S. Army Corps of Engineers and other participating federal and state resource agencies are also appropriate. Stabilization of dike slopes must not include vegetation (particularly trees) which jeopardizes the dike.

Native riparian vegetation will be planted as part of this project. Invasive plants will be removed from the site. The planting plan is provided on Sheets 20 and 21 of the attached plan set. Species include: Sitka Spruce, Pacific Willow, Sitka Willow, Red osier dogwood, Douglas spirea, Pacific ninebark, and Twinberry. Grasses include Quick Guard Sterile Triticale, Native grasses American Slough grass, Tufted Hairgrass, Meadow Barley, and Western Mannagrass. These species will serve to stabilize the soils (the seed mix has some rapid colonizers such as the sterile triticale) and mimic the surrounding reference site native vegetation communities. Providing a diverse dense native population of plantings will allow the site to compete against non-native colonization in both the short and long-term. Once established the plantings will serve provide additional benefits beyond soil stabilization, such as shade (for cooler water temperatures), and host a variety of prey species that will benefit the larger food web.

(10) Riprap bank protection must be appropriately designed with respect to slope, rock size, placement, underlying material and expected hydraulic conditions. Project design by licensed engineer shall meet the requirement. Riprap projects designed by other individuals, such as experienced contractors, soil conservation service personnel or other, may meet this standard.

The project has been designed by a licensed engineer and has been reviewed by ODFW. Sheets 12, 14, 16, and 18 of the attached plan set provide details on where the riprap is proposed to be placed. Sheet 12 and 16 specifically notes the placement details for riprap.

(11) New shoreline stabilization project shall not restrict existing public access to public shorelines.

Vegetative shoreline stabilization is defined as, “protection from erosion and sloughing of ocean and estuary shorelines and the banks of tidal or non-tidal streams, rivers or lakes by vegetative means. Vegetative shoreline stabilization is the use of plants that anchor the soil to prevent shoreline erosion and sloughing.”

The purpose of this project is to enhance overall marsh ecosystem function including enhancing access to rearing habitat for Endangered Species Act listed juvenile salmonids by restoring hydrologic connectivity, including floodplain and tidal processes between the Columbia River

and the Warren Slough project area. However, one aspect of the projects purpose that is critical to the success of the project is maintaining access to these habitats through vegetative shoreline stabilization. The project proposes to create one new openings in the railroad prism, and excavate a new channel connection between the Columbia River estuary and the Warren Slough site. This newly excavated channel, and the surrounding channels that they will tie into will be heavily planted with native species to ensure bank stability, while also providing a diverse native plant community capable of supporting a diverse community of insects that support the foodweb for salmonids as well as other aquatic organisms. Maintaining channel banks through vegetative shoreline stabilization is critical to ensuring salmon continue to have access to these important habitat types. See the attached plan set and refer to the planting plan on Sheets 20 and 21 for further information. Pay particular attention to the Riparian Buffer Planting zone on sheet 20. The project will be protecting estuary shorelines, and tidal channels (tidal streams) by vegetative means. The planting plan will be specifically using plants to anchor the soil to prevent shoreline erosion and sloughing. The topographic complexity mounding will offset some of the subsidence and simplification that the site has experienced.

The project will follow all applicable development standards. The project is a voluntary habitat restoration project that will both protect and enhance riparian vegetation and wildlife habitat. The proposed project will not cause any adverse effects to aquatic environments. Strict sediment and erosion controls will be implemented during the construction phase and the site will be stabilized upon completion. All necessary state and federal permits required to perform the work will be secured prior to implementation. There will be a net zero loss of aquatic areas. Elements have been proposed that will provide immediate habitat benefit as well as support the longer-term trajectory of functioning tidal habitat.

While there is shoreline stabilization that will occur as part of the project, the stabilization will not impact or restrict public access to the site.

(12) Shoreline stabilization shall not be used to increase land surface area. Where an avulsion has occurred, fill may be used to restore the previous bankline, so long as the corrective action is initiated within one year of the date of the avulsion. Any other extension of the bankline into aquatic areas shall be subject to the policies and standards for fill.

The bankline will not be extended as a result of the project.

(13) Structural shoreline stabilization measures shall be coordinated with state and federal agencies to minimize adverse effects on aquatic and shoreline resources and habitats.

No shoreline stabilization measures are proposed for the project beyond the channel excavation plantings, and the rip rap for bridge abutments themselves which will be located in a location that currently has shoreline stabilization measures. If additional shoreline stabilization

is necessary, all measures will be done within permit conditions of state and federal agencies as applicable.

(14) Bulkheads installed as a shore land stabilization and protective measure shall be designed and constructed to minimize adverse physical effects (i.e. erosion, shoaling, reflection of wave energy or interferences with sediment transport in adjacent shoreline areas) resulting from their placement.

No bulkheads are proposed for this project.

(15) Emergency maintenance, for the purpose of making repairs or for the purpose of preventing irreparable harm, injury or damage to persons, property or shoreline stabilization facilities is permitted, notwithstanding the other requirements in these standards, but subject to those regulations imposed by the Corps of Engineers and the Division of State Lands.

Not Applicable.

(16) Re-vegetated shoreline areas shall be protected from excessive livestock grazing or other activities that would prevent development of effective stabilizing plant cover.

There is not any agricultural activity near the project site. Vegetation that is planted as part of this project will not need to be protected from grazing.

(17) This size and shape of a dock or pier shall be the minimum required for the intended use.

Not Applicable.

(18) Proposals for new docks and piers may be approved only after consideration of alternatives such as mooring buoys, dryland storage, and boat ramps.

Not applicable.

(19) Individual single-user docks and piers are discouraged in favor of community moorage facilities common to several users and interest.

Not Applicable.

(20) With regards to excavation of shore lands to create new estuarine aquatic surface area, the surface area shall be excavated as an upland site, behind protective berms. The new aquatic area shall be connected to adjacent water areas as the excavation is completed. Excavation in this manner shall not result in channelization of the waterway.

The railroad levee structure currently acts as a hydraulic barrier that partially separates the Warren Slough project area from natural tidal and riverine influence, but due to an existing set of culverts, the levee is permeable to hydraulic influences. As a result, the levee interrupts the movement of water but does not totally exclude the exchange between the adjacent river and the floodplain making it impossible for the project to operate behind a protective berm. With this in mind, project design was formulated to minimize impacts with existing wetlands and the associated aquatic resources by requiring all excavation activities to occur out of water, during low tidal cycles.

(21) Sediments and materials generated by the excavation to create new estuarine water surface area shall be deposited on land in an appropriate manner.

Excavated material will be placed on-site to create topographic diversity in an effort to counteract subsidence and simplification of the project area that has resulted due to the railroad interrupting natural processes (sediment, and hydrology). The topographic mounds are designed to add complexity to the landscape and will help restore native riparian vegetative communities and improve the foodweb function. No new uplands will be created; all material will be placed below the two-year flood elevation to ensure that it is still has hydric soils and other wetland characteristics (vegetation).

(22) Water quality degradation due to excavation to create new estuarine water surface area shall be minimized. Adverse effects on water circulation and exchange, increased in erosion and shoaling conditions and introduction of contaminants to adjacent aquatic areas resulting from excavation of the area and presence of the new aquatic area will be minimized to the extent feasible.

The railroad breaches and bridge placement are intended to allow for improved sediment and nutrient exchange in addition to improved fish passage. No long-term sediment quality effects are anticipated because no new sediments are being introduced to the site. Existing on-site sediments are expected to be scoured in the area of the additional openings during ebb tides, exposing previously accumulated coarse-grained native sediments. The Proposed Action would not introduce sources of contaminated sediment nor expose contaminated sediment. Under the Proposed Action Alternative, sediment quality would likely remain unchanged.

Strict sediment and erosion controls will be implemented during the construction phase and the site will be stabilized upon completion. All necessary state and federal permits required to perform the work will be secured prior to implementation.

Section 6.4100. Land Transportation Systems

(1) New or relocated land transportation routes shall be designed and sited so as to:

(A) Enhance areas in the Marine Industrial Shorelands zone when possible

Not applicable. The railroad levee structure is already in place and currently acts as a hydraulic barrier that partially separates the Warren Slough project area from natural tidal and riverine influence. Project actions will not add additional or new shoreline disruption, it will replace and existing structure to improve natural processes and promote fish access to the site.

All efforts have been made during the design process to minimize adverse impacts. The locations of the breaches have been strategically selected to minimize the need for additional channel excavation to “connect” the new bridge to adjacent channel networks. Sensitive vegetation communities have been identified and will be avoided throughout construction, and the timing and duration of the project has been strategically selected to minimize impacts to aquatic and terrestrial fish and wildlife. An Erosion and Sediment Control plan has been produced and will be followed to ensure that all Best Management Practices are implemented.

(B) Direct urban expansion toward areas identified as being suitable for development

Not applicable. The railroad levee structure is already in place and currently acts as a hydraulic barrier that partially separates the Warren Slough project area from natural tidal and riverine influence. Project actions will not add additional or new shoreline disruption, it will replace and existing structure to improve natural processes and promote fish access to the site.

(C) Take maximum advantage of the natural topography and cause minimum shoreline disruption

Not applicable. The railroad levee structure is already in place and currently acts as a hydraulic barrier that partially separates the Warren Slough project area from natural tidal and riverine influence. Project actions will not add additional or new shoreline disruption, it will replace and existing structure to improve natural processes and promote fish access to the site.

(D) Preserve or improve public estuary access where existing or potential access sites are identified

Not applicable. The railroad levee structure is already in place and currently acts as a hydraulic barrier that partially separates the Warren Slough project area from natural tidal and riverine influence. Project actions will not add additional or new shoreline disruption, it will replace and existing structure to improve natural processes and promote fish access to the site.

(E) Avoid isolating high-intensity waterfront use areas of water-dependent development areas from water access.

Not applicable. The railroad levee structure is already in place and currently acts as a hydraulic barrier that partially separates the Warren Slough project area from natural tidal and riverine influence. Project actions will not add additional or new shoreline disruption, it will replace and existing structure to improve natural processes and promote fish access to the site.

Section 6.4150. Mitigation and Restoration

(1) Any fill activities that are permitted in estuarine aquatic areas or dredging activities in intertidal and shallow to medium depth estuarine subtidal areas shall be mitigated through project design and/or compensatory mitigation (creation, restoration or enhancement of another area) to ensure that the integrity of the estuary ecosystem is maintained. The Comprehensive Plan shall designate or protect specific sites for mitigation which generally correspond to the types and quantity of aquatic area proposed for dredging or filling.

We are not proposing a compensatory mitigation plan. Since the project will be restoring natural tidal processes, enhancing fish access to the site, and enhancing existing adjacent floodplain habitat, it should not require any mitigation plans. The work, as proposed, will provide a net lift in habitat function by restoring habitat forming processes (tidal action), and allowing aquatic species such as salmon to access the site for refuge or feeding. There will be no permanent loss of wetland area or function. The project will expand access to critical wetland habitats.

Standards 2 – 25 are not applicable as this project does not result in any impacts which require mitigation. This restoration project increases fish access to quality wetland habitat, will improve water quality by increasing circulation in and out of the basins and is consistent with the protection of the sites natural values.

Section 6.4180. Bankline and Streambed Alteration

(1) Alterations to stream banks or streambeds shall:

(A) Maintain stream surface area where feasible.

Stream surface area will be maintained under the scope of this project.

(B) Make maximum use of natural or existing deep-water channels.

Deep water channels will not be affected as a result of this project.

(C) Avoid creation of undesirable hydraulic conditions.

The consulting engineers analyzed potential hydraulic impacts associated with this project. This hydraulic analysis confirmed that the project will not result in undesirable hydraulic conditions. See sections 3.3 and 3.5 of the basis of design report.

(D) Minimize impacts on estuarine aquatic and Shoreland resources.

Impacts with this project on estuarine aquatic and Shoreland resources will be controlled to the maximum extent feasible. Any negative impacts will be of a limited duration and restored to a better state than pre-project. Post-restoration results will be a net gain, returning the site closer to a natural state.

(2) Excavation activities in stream bank lined areas resulting in expansion of existing aquatic areas shall comply with standards regulating excavation of shorelines for the creation of new water surface areas in Estuarine Construction, Section 6.4080.

See Section 6.4080

Section 6.4210. Filling of Aquatic Areas and Non-Tidal Wetlands

This is expected to result in no net gain or loss in overall aquatic habitat. The proposed project would have both immediate and long-term beneficial effects on aquatic areas.

Section 6.4220. Riparian Vegetation Protection

The proposed wetland restoration project does not have long term negative effects on riparian vegetation within the project site. Minimal native riparian vegetation will be removed within the riparian zone. Any riparian vegetation removed will be salvaged and “hot planted” to the maximum extent practicable. All disturbed areas will be heavily seeded and replanted with native vegetation immediately following project completion. The project is consistent with this section and does not propose a use that would require a 50 foot setback from identified wetlands or shoreline habitats.

Section 6.4230. Fish and Wildlife Habitat

(1) The project will result in immediate and long-term net benefits as access to quality wetland habitat will increase with the installation of one new bridge (opening in the railroad levee). The project will enhance approximately 22 acres of habitat on the Columbia River. This project is compliant with all local, state, and federal requirements.

(2) DSL and ODFW have provided a conditional approval that the project may be constructed during the summer in-water work window (July 15- September 30, 2022) in order to avoid impacts to fish and wildlife species during construction.

(3) Impacts to fish and wildlife habitat have been avoided and/or minimized to the maximum extent feasible for the project. Short term/temporary impacts to subtidal habitats are anticipated but have been minimized through the design process so that the project has a minimum footprint while providing a maximum lift in habitat quantity and quality. The locations in which excavated materials being placed in topographic complexity mounds have been selected to avoid native vegetation and to bury patches of non-native/invasive Reed canarygrass. While these habitats will be temporarily impacted, this is a relatively small area (<0.5 acres total) while the benefits of the project will provide increased access for fish and wildlife species and improve the quality/function of approximately 22 acres of quality intertidal and subtidal habitat.

(4) Impacts are the result of the construction of a restoration project that will increase fish access into the Warren Slough project area (floodplain wetlands). As a result, the project mitigates for these impacts through its own project design. The project design also has minimized the footprint to approximately <1 acres.

Section 6.420. Public Access to Estuary and its Shoreline

The proposed project would not affect existing public access and is located on a railroad structure that is currently difficult for the public to get to and does not currently have any public access amenities. There is a nearby wildlife viewing platform, however this is outside of the project footprint and will not be impacted during or after construction.

Section 6.4250. Significant Areas

The project site is not listed as being “Significant” under Planning Goal 17. This section is not applicable.

Section 6.4260. Water Quality Maintenance

The proposed project is consistent with the applicable general standards of this section. Potential water quality impacts associated with the project are minimal, localized and temporary. Potential impacts can be managed using erosion control methods during implementation of the project. Unavoidable impacts, such as turbidity. Turbidity generated as a result of the construction may not be discernible when compared to surrounding conditions. Turbidity will be isolated to the site using straw wattles, silt fencing, and silt curtains and is

expected to return to ambient conditions before leaving the project site. Localized turbidity is expected to return to ambient conditions when final site stabilization occurs.

(k) Section 6.5000. Protection of Riparian Vegetation

The project area includes areas of riparian vegetation. Channel excavation to tie in the new railroad breach (opening with a bridge), and placement of topographic complexity mounds will be the only project elements that will take place off of the railroad prism itself and within areas that have riparian vegetation. These project elements have been specifically designed to avoid and protect areas of sensitive native emergent and riparian vegetation. Channel excavation at the Warren Slough project area is minimal, connecting existing channels on the Columbia River (north) side of the railroad with existing channels on the Warren Slough site (south) side of the railroad. The channel excavation required will occur in areas dominated by non-native Reed canarygrass (*Phalaris arundinacea*) and will avoid areas with native riparian vegetation. The channel excavation alignment will be staked out by a Professional Land Surveyor, and afterwards CREST will walk the staked-out channel footprint and flag off any sensitive areas with native vegetation. If necessary the channel connection will be realigned to avoid sensitive native vegetation communities. Similarly, topographic complexity mounds will be placed on the north side of the railroad prism in areas currently dominated by non-native vegetation (mostly Reed canarygrass). Prior to construction, this area will be staked out by a Professional Land Surveyor and CREST and the contractor will walk the work area and identify areas of sensitive vegetation that needs to be avoided. The North Coast Land Conservancy will also be assisting in this area as they have been managing the site for over a decade and have a lot of familiarity with the site. Once identified, sensitive vegetation areas will be flagged off and all construction activities will be excluded from those areas. Post restoration, all areas will be heavily planted with native emergent and riparian vegetation.

The proposed wetland restoration project does not have long term negative effects on riparian vegetation within the project site. Minimal native riparian vegetation will be removed within the riparian zone. Any riparian vegetation removed will be salvaged and “hot planted” to the maximum extent practicable. All disturbed areas will be heavily seeded and replanted with native vegetation immediately following project completion. The project is consistent with this section and does not propose a use that would require a 50 foot setback from identified wetlands or shoreline habitats.

(l) Section 6.7000. Development of Historic and/or Archeological Sites

The Bonneville Power Administration is the lead federal agency directing the environmental and cultural compliance effort. CREST being the project sponsor put out a request for proposal for archaeological services and reporting for the Warren Slough Restoration Project to comply with Section 106 of the National Historic Preservation Act. CREST contracted with Harris Environmental Group (HEG) to perform the following tasks: literature review and research, securing a SHPO permit to work on properties of the state, conducting a field investigation, and reporting. HEG authored a technical report that included, the following sections: project introduction and background, including an explanation of the federal nexus; an environmental, ethnographic, historic and archaeological context statement; a summary of the survey, inventory and documentation methodology, results of the fieldwork, and recommendations on NRHP eligibility for all resources identified, and recommendations about the effect of the proposed project on those resources.

Harris Environmental conducted the survey for CREST in February of 2022. The investigations consisted of a pedestrian survey and shovel test excavations of selected high-probability areas of the APE. The project area was examined and no new cultural resources were identified. The existing railroad track and berm within the project area were surveyed and evaluated for inclusion on the National Register of Historic Places (NRHP). The railroad as a whole is locally significant under Criterion A, for its association with the history of railroad expansion in the north coastal area, and, by extension, with the history and development of Astoria, and it is the opinion of Harris Environmental the portion within the project area is eligible for listing on the NRHP. While there is always a possibility of buried cultural materials that were not observed during a survey, **Harris Environmental recommends that the proposed Agency Creek and Warren Slough Restoration projects will have No Adverse Effect on historic properties listed on, or eligible for listing on the NRHP.** While no further subsurface testing work is recommended for the Agency Creek and Warren Slough Habitat Restoration Projects, Harris Environmental does recommend an archaeological monitor be on-call in case historic pilings are identified during construction.

Bonneville Power Administration as the Lead Federal Agency has agreed with HEG's recommendation and has submitted HEG's Cultural Resource Report (attached) to the Oregon State Historical Preservation Office (SHPO). The SHPO review period is currently underway.

Clatsop County Comprehensive Plan- Goals and Policies

- a. Goal 4 – Forest Lands
- b. Goal 5 – Open Space, Scenic and Historic Areas and Natural Resources
- c. Goal 6 – Air, Water and Land Resources Quality

- d. Goal 7 – Areas Subject to Natural Disasters and Hazards
- e. Goal 16 – Estuarine Resources
- f. Goal 17 – Coastal Shorelands

a. Goal 4 – Forest Lands

The Agency Creek and Warren Slough project will not impact forest lands. The Agency Creek project takes place within the F-80 zone, but is not directly within forest lands, as it is within the Columbia River floodplain. The Warren Slough project is adjacent to forest lands, but not within the F-80 Zone. Both projects will not directly or indirectly affect forest lands in any negative way. The proposed projects seek to improve fish access, natural hydrology, channel forming processes, and food web processes to the Agency Creek and Warren Slough floodplains which has been greatly impacted by the construction of the Railroad. The proposed projects will each breach the railroad in one location, and place a 36-foot channel spanning bridge over the breach at Agency Creek and a 60-foot channel spanning bridge over the breach Warren Slough, excavate a channel to connect existing channel network that currently flows through a set of undersized culverts. The project also involves the placement of materials to restore topographic complexity and native plant diversity in the vicinity of the railroad breach. The projects are consistent with Clatsop County Goal 4 – Forest Lands, as it will not impact the ability to conserve forest lands for forest uses.

b. Goal 5 - Open Spaces, Scenic & Historic Areas and Natural Resources

The Agency Creek and Warren Slough projects will not impact open space or natural and scenic resources. The proposed projects will remove one large segment of the railroad berm at each site, breach an abandoned levee in three (3) locations at Agency Creek (referred to as Levee Scrapedown Area A-C in the plan sets), and strategically excavate tidal channels through the railroad breaches connecting into existing tidal channel networks so natural hydrology and channel forming processes can return to the sites. The projects are not seeking to alter underlying zoning regulations, so they will not affect any of the standards under the subsection of Fish and Wildlife Areas and Habitats.

As stated in the Comprehensive Plan under Wetlands “the County will protect identified significant freshwater wetlands, for which no conflicting uses have been identified, from incompatible uses”. The proposed projects do not conflict with uses that occur on or around the sites as most is inundated for significant portions of the year.

In accordance with the Natural Area section, the proposed projects will enhance important ecological functions (via food-web connections). As a result, the proposed projects would restore and preserve significant natural resource functions in the Columbia River Estuary. A large portion of the wetland complexes associated with the Columbia River Estuary, important to aquatic species, such as salmonids, have been diked, ditched and drained for other uses. These projects will thereby increase unique habitat availability for fish and wildlife that is not found as abundantly throughout the region.

With completion of these projects, water resources in the Columbia River Estuary will be enhanced aquatic species access to quality wetland habitats in the project area will be enhanced and does not conflict with this provision of the Comprehensive Plan. The actions proposed in these projects are not in conflict with the objectives of this goal by seeking to improve fish access to quality habitat and therefore meets the objectives of Goal 5.

c. Goal 6 - Air, Water and Land Quality

This goal seeks to maintain and improve the quality of the air, water, and land resources of the state. The proposed projects seek to improve fish access to quality wetland habitat. Water quality would likely improve within the site in the long-term as the new openings would allow for natural tidal processes, improved sediment and nutrient exchange. Access to tidally influenced wetland habitat is necessary for juvenile salmonid species that inhabit the Columbia River Estuary and therefore meets the intent of Goal 6.

d. Goal 7 – Areas Subject to Natural Disasters and Hazards

This goal seeks to protect people and property in Clatsop County from natural hazards. The proposed Agency Creek and Warren Slough projects are consistent with the objectives and policies of Goal 7, and has considered Natural Disasters and Hazards, as well as habitat and community resiliency to changing climatic conditions as part of the design for each of the sites.

The Agency Creek and Warren Slough projects seek to improve floodplain connectivity. Improving floodplain connectivity can offer several benefits in protecting people and property from natural hazards, particularly flooding. There are many ways in which enhancing floodplain connectivity can contribute to hazard mitigation:

1. Natural Flood Control:
 - Floodplains act as natural buffers during heavy rainfall or storm events. Allowing water to spread across floodplains helps to slow down and absorb excess water, reducing the peak flow downstream.
2. Reduced Flood Velocities:
 - By increasing connectivity, water can flow more gradually across the floodplain. This helps to reduce the velocity of the floodwaters, minimizing erosion and the risk of structural damage downstream.
3. Floodwater Storage:
 - Floodplains act as natural reservoirs that can store excess water during flood events. This storage capacity helps to regulate water levels, preventing sudden and severe flooding downstream.
4. Protecting Infrastructure:
 - Improved floodplain connectivity can safeguard critical infrastructure such as roads, bridges, and buildings by distributing and dissipating floodwaters more effectively. This reduces the risk of infrastructure damage and disruption.
5. Preserving Ecosystem Services:
 - Floodplains are often rich ecosystems that provide various services, including water filtration, habitat for wildlife, and recreational opportunities. Protecting

and restoring these ecosystems can enhance their ability to mitigate flood impacts while providing additional benefits to the community.

In summary, improving floodplain connectivity is a holistic approach to flood hazard mitigation that leverages the natural functions of ecosystems to protect people and property from the adverse impacts of flooding.

The Agency Creek and Warren Slough projects also provide a climate resilience element that is consistent with Goal 7. With the increasing frequency and intensity of extreme weather events associated with climate change, maintaining and enhancing floodplain connectivity becomes even more critical for building resilience to these hazards. Strategically breaching the railroad in new locations and replacing undersized and perched culverts with bridges at each project site will help increase subsurface water storage and flow, which may help provide some resilience to projected decreases in summer flows in the future (Beechie et al. 2013 and Belsky et al. 1999). The hydraulic constrictions (the railroad at both sites and abandoned levee at Agency) at each site across their corresponding floodplains limit lateral and longitudinal connectivity that impact physical and biological functions of the watershed. It is well known that levee construction in tidal areas limit ecosystem connectivity, greatly reducing natural ecosystem function both physically and biologically. Geomorphic and ecological processes impacted by the railroad levee include: storm surge and flood tide access to sites, sediment deposition/export, large wood deposition/export, detritus mobilization/export, tidal channel counts, tidal channel development, lateral migration of channels, marshplain elevation, potential vegetation community diversity, aquatic organism habitat diversity, shoreline and shallow water migration for aquatic and terrestrial organisms.

Additionally, the lack of access to diverse habitats for the multiple salmonid life stages has a negative effect on life history diversity. Projected climatic scenarios will further lower survival potential as instream and floodplain conditions are expected to change (Beechie et al. 2006 and Waples et al. 2009). The project proposes to increase habitat resiliency by improving longitudinal and lateral connectivity, increasing access to diverse habitats. This includes removing fish access barriers and other constrictions to quality upstream foraging and rearing habitat that will have a positive effect on life history diversity. Increasing habitat connectivity and diversity has been linked to increased population resilience for salmonids (Greene et al. 2010 and Schindler et al. 2010). In addition to fish habitat and life history diversity, the project will improve natural sediment transport processes, food-web connectivity and nutrient exchange, making natural watershed processes more resilient to a changing climate.

Lastly, the bridge designs for the Agency Creek and Warren Slough site will provide 1.1 foot of freeboard above the current 100-year flood. SLR probabilities based on work reported by Miller et al. (2018), suggest that during the lifespan of the bridges (approximately 75 years), Sea Level Rise may increase water surface elevations up to one foot, which the proposed freeboard accounts for.

e. Goal 16 and 17 - Estuarine Resources and Coastal Shorelands

The proposed sites are an appropriate site to complete restoration activities as it will not conflict with adjacent uses or current uses on the properties. The projects will improve fish access to the unique characteristic of the estuary (tidally influenced habitats) where many of these areas have been lost through filling, development, diking, ditching, and draining. Enhancing ecological functions and improving food-web connections in these creeks through this project would improve aquatic ecosystems as a whole. This will benefit fish and wildlife while also creating long-term benefits such as environmental, economic, and increasing social values. The proposed Agency Creek and Warren Slough project actions meet the intent of Goals 16 and 17.

Acknowledgements:

CREST acknowledges that there are additional Conditions Of Approval for this type of project. Those include, but are potentially not limited to, the following requirements prior to commencing work:

- Floodplain Development Permit
- Development Permit
- Grading, Drainage and Erosion Control Plan Review

Additionally, CREST acknowledges that any project activities within a County road right-of-way, including staging materials and equipment, an Application and Permit to Occupy or Perform Operations Upon a County or Public Road will be required.

CREST will complete each of the above applications, as well as any additional applications determined necessary in the review process and await for a Notice of Decision prior to commencing any of the proposed work.

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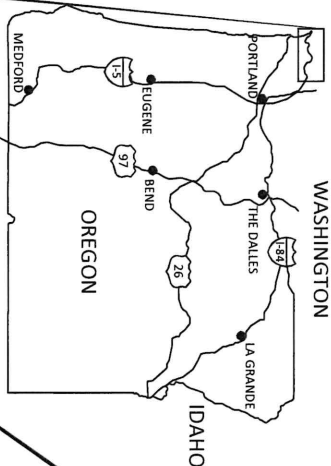
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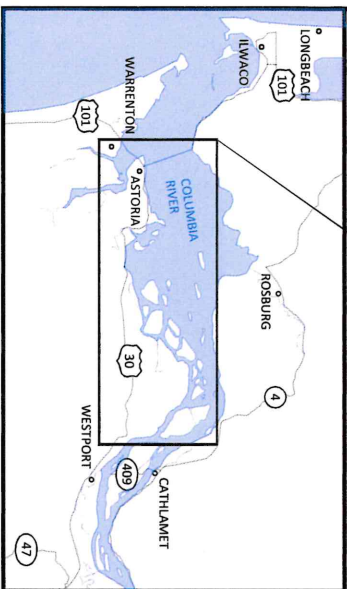
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LOCATION MAP
STATE OF OREGON
NOT TO SCALE



VICINITY MAP
NOT TO SCALE



SITE MAP
NOT TO SCALE

Sheet List Table

- | | | | |
|----|---|----|---|
| 1 | COVER, VICINITY MAP, AND SHEET INDEX | 18 | SITE ACCESS & DETAILS |
| 2 | GENERAL NOTES (1 OF 2) | 19 | TEMPORARY FILL ACCESS DETAILS |
| 3 | GENERAL NOTES & QUANTITIES (2 OF 2) | 20 | REVEGETATION PLAN |
| 4 | HIP GENERAL CONSERVATION MEASURES (1 OF 3) | 21 | REVEGETATION DETAILS (1 OF 2) |
| 5 | HIP GENERAL CONSERVATION MEASURES (2 OF 3) | 22 | REVEGETATION DETAILS (2 OF 2) |
| 6 | HIP GENERAL CONSERVATION MEASURES (3 OF 3) | 23 | BRIDGE STANDARDS - TITLE PAGE |
| 7 | EROSION CONTROL DETAILS | 24 | BRIDGE STANDARDS - GENERAL NOTES |
| 8 | EXISTING CONDITIONS & SURVEY CONTROL | 25 | BRIDGE STANDARDS - TYPICAL ELEVATIONS |
| 9 | TEMPORARY ACCESS | 26 | BRIDGE STANDARDS - BENT CAP |
| 10 | PROPOSED CONDITIONS OVERVIEW & INDEX | 27 | BRIDGE STANDARDS - ABUTMENT CAP |
| 11 | PROPOSED CONDITIONS LEVEL A | 28 | BRIDGE STANDARDS - 20 INCH WING WALL |
| 12 | PROPOSED CONDITIONS LEVEL B | 29 | BRIDGE STANDARDS - WINGWALL |
| 13 | PROPOSED CONDITIONS LEVEL C | 30 | BRIDGE STANDARDS - 20 INCH SLAB BEAM |
| 14 | PROPOSED CONDITIONS OPENING | 31 | BRIDGE STANDARDS - 30 INCH SLAB BEAM |
| 15 | BRIDGE SPAN PROFILE AND BANK PROTECTION SECTION | 32 | BRIDGE STANDARDS - 30 INCH DOUBLE CELL BOX BEAMS |
| 16 | BRIDGE PLAN AND ELEVATION | 33 | BRIDGE STANDARDS - SLOPED CURB AND STRAND PATTERN |
| 17 | BRIDGE TYPICAL DETAILS | 34 | BRIDGE STANDARDS - HAND RAIL STANDARDS |
| | | 35 | BRIDGE STANDARDS - PILE SPLICE |
| | | 36 | BRIDGE STANDARDS - PILE SPLICE |
| | | 37 | BRIDGE STANDARDS - EMBEDDED PLATES |
| | | 38 | BRIDGE STANDARDS - DECK AND CURB PLATES |
| | | 39 | BRIDGE STANDARDS - CURB AND WALK MISC. |
| | | 40 | BRIDGE STANDARDS - REAR BENDING DIAGRAM |

THIS PROJECT WAS DESIGNED IN ACCORDANCE WITH THE BPA HABITAT IMPROVEMENT PROGRAM, PROGRAMMATIC BIOLOGICAL OPINION (HBP).

RAILROAD RESTORATION AGENCY CREEK DRAFT FINAL DESIGN

Clatsop County, Oregon
September, 2023

COORDINATES:

AGENCY CREEK
LATITUDE : 46°11'10" N
LONGITUDE 123°36'27" W
TOWNSHIP 8N, RANGE 7W,
SECTION 7 & TOWNSHIP 8N,
RANGE 8W, SECTION 12

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
AGENCY CREEK - FINAL DESIGN



COVER, VICINITY MAP, AND
SHEET INDEX

SHEET
1 OF 40

ABBREVIATIONS

APPROX	APPROXIMATE
AVE	AVERAGE
CMP	CORRUGATED METAL PIPE
CREST	COLUMBIA RIVER ESTUARY STUDY TASKFORCE
CV	CUBIC YARDS
DEPT	DEGREES
DIA	DIAMETER
ELEV	ELEVATION
EXIST	EXISTING
FLD	FIELD
HORIZ	HORIZONTAL
HWW	HIGHWAY
IN or "	INCHES
INV	INVERT
MAX	MAXIMUM
MHHW	MEAN HIGHER HIGH WATER
MHW	MEAN HIGH WATER
MIN	MINIMUM
MLW	MEAN LOWER LOW WATER
NCAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
ODOT	OREGON DEPARTMENT OF TRANSPORTATION
%	PERCENT
RD	ROAD
RWA	RIGHT OF WAY
STA	STATION
STR	STRUCTURE
TBM	TEMPORARY BENCHMARK
TYP	TYPICAL
VERT	VERTICAL
WSE	WATER SURFACE ELEVATION
YR	YEAR

ITEM	PROJECT TOTALS	QUANTITY	UNIT
PERMANENT REMOVALS			
TOTAL REMOVAL		1357	CY
TOTAL REMOVAL BELOW HIGH ST. MEASURED TIDE (HMT)		1342	CY
TOTAL REMOVAL BELOW ORDINARY HIGH WATER (OHW)		223	CY
TOTAL REMOVAL BELOW HIGH TIDE LINE (MHHW)		0	CY
TOTAL REMOVAL BELOW MEAN HIGH WATER (MHW)		0	CY
PERMANENT FILLS			
TOTAL FILL (1357 CY NATIVE MATERIAL = 140 CY IMPORTED)		140	CY
IMPORTED FILL BELOW HMT		1397	CY
TOTAL FILL BELOW HMT		1397	CY
TOTAL FILL BELOW OHW		42	CY
TOTAL FILL BELOW MHHW		236	CY
TOTAL FILL BELOW MHW		175	CY
TEMPORARY REMOVALS			
TOTAL REMOVAL		0	CY
TEMPORARY REMOVAL BELOW HMT		0	CY
TEMPORARY REMOVAL BELOW OHW		0	CY
TEMPORARY REMOVAL BELOW MHHW		0	CY
TEMPORARY REMOVAL ABOVE MHW		0	CY
TEMPORARY FILLS			
TOTAL FILL		396	CY
TEMPORARY FILL BELOW HMT		396	CY
TEMPORARY FILL BELOW OHW		236	CY
TEMPORARY FILL BELOW MHHW		168	CY
TEMPORARY FILL BELOW MHW		127	CY
REVEGETATION AREA			
REVEGETATION AREA		1.1	AC

ITEM	TOTALS BY PROJECT AREA	QUANTITY	UNIT
LEVEE SCARPEDOWN A			
EXCAVATION VOLUME		689	CY
CUT BELOW HMT		689	CY
CUT BELOW OHW		323	CY
CUT BELOW MHHW		0	CY
CUT BELOW MHW		0	CY
AREA OF CUT BELOW OHW		10759	SF
TOPOGRAPHIC COMPLEXITY A			
ONSITE MATERIALS PLACEMENT VOLUME		689	CY
FILL BELOW HMT		689	CY
FILL BELOW OHW		410	CY
FILL BELOW MHHW		32	CY
FILL BELOW MHW		0	CY
AREA OF FILL BELOW OHW		3406	SF
LEVEE SCARPEDOWN B			
EXCAVATION VOLUME		88	CY
CUT BELOW HMT		88	CY
CUT BELOW OHW		40	CY
CUT BELOW MHHW		0	CY
CUT BELOW MHW		0	CY
AREA OF CUT BELOW OHW		1542	SF
TOPOGRAPHIC COMPLEXITY B			
ONSITE MATERIALS PLACEMENT VOLUME		88	CY
FILL BELOW HMT		88	CY
FILL BELOW OHW		63	CY
FILL BELOW MHHW		3	CY
FILL BELOW MHW		0	CY
AREA OF FILL BELOW OHW		3227	SF
LEVEE SCARPEDOWN C			
EXCAVATION VOLUME		285	CY
CUT BELOW HMT		285	CY
CUT BELOW OHW		181	CY
CUT BELOW MHHW		0	CY
CUT BELOW MHW		0	CY
AREA OF CUT BELOW OHW		6844	SF
TOPOGRAPHIC COMPLEXITY C			
ONSITE MATERIALS PLACEMENT VOLUME		285	CY
FILL BELOW HMT		285	CY
FILL BELOW OHW		169	CY
FILL BELOW MHHW		9	CY
FILL BELOW MHW		0	CY
AREA OF FILL BELOW OHW		9216	SF
RAILROAD PRISM OPENING			
EXCAVATION VOLUME		285	CY
CUT BELOW HMT		285	CY
CUT BELOW OHW		250	CY
CUT BELOW MHHW		223	CY
CUT BELOW MHW		203	CY
AREA OF CUT BELOW OHW		2113	SF
RIPRAP PLACEMENT - RAILROAD PRISM OPENING			
IMPORTED RIPRAP		140	CY
FILL BELOW HMT		140	CY
FILL BELOW OHW		140	CY
FILL BELOW MHHW		140	CY
FILL BELOW MHW		140	CY
TOPOGRAPHIC COMPLEXITY - RAILROAD PRISM OPENING			
ONSITE MATERIALS PLACEMENT VOLUME		285	CY
FILL BELOW HMT		285	CY
FILL BELOW OHW		124	CY
FILL BELOW MHHW		77	CY
FILL BELOW MHW		35	CY
AREA OF FILL BELOW OHW		4813	SF

NO.	BY	DATE	REVISION DESCRIPTION
1	CM	09/20/23	DESIGNED
2	MC	09/20/23	CHECKED
3	CA	09/20/23	PROJECT

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
AGENCY CREEK - FINAL DESIGN



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HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIP ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS) WILL BE APPLIED TO ALL ACTIONS OF THIS PROJECT.

PROJECT DESIGN AND SITE PREPARATION

- A. ALL APPLICABLE REGULATION, PERMITS, AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION.
- B. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, CLEAN WATER ACT (CWA), 404 PERMITS, CWA SECTION 401 WATER QUALITY CERTIFICATIONS, AND FEMA NO-RISE ANALYSES.
- C. 2. TIMING OF IN-WATER WORK:
 - A. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MTFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.
 - B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S EC LEAD.
 - C. BULL TROUT FOR AREAS WITH DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR SMALL TROUT WILL BE CONDUCTED IN WATERSHEDS WITH DESIGNATED IN-WATER WORK WINDOWS. USFWS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.
 - D. LAMPREY, WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY WILL BE AVOIDED FROM MARCH 1 TO JULY 1 FOR REACHES <5,000 FEET IN ELEVATION AND FROM MARCH TO AUGUST 1 FOR REACHES >5,000 FEET. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF NESTS OR LAMPREY ARE PRESENT. IF THE TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES AND SALVAGE PROCEDURES (SEE FISH SALVAGE AND ELECTROFISHING SECTIONS) TO MINIMIZE ADVERSE EFFECTS.
 - E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.
- F. 3. CONTAMINANTS:
 - A. EXCAVATION OF MORE THAN 20 CUBIC YARDS WILL REQUIRE A SITE VISIT AND DOCUMENTED PHOTOGRAPHY OF THE EXCAVATION. ALL EXCAVATION MATERIAL WILL BE STORED WITH PROJECT FILES OR AS AN APPENDIX TO THE BASIS OF DESIGN REPORT.
 - B. THE SITE ASSESSMENT WILL SUMMARIZE:
 1. THE SITE VISIT, CONDITION OF THE PROPERTY, AND IDENTIFICATION OF ANY AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES;
 2. AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
 3. INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
 4. THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION SOURCES.
 - C. 4. SITE LAYOUT AND FLAGGING:
 - A. CONSTRUCTION AREAS TO BE CLEARLY FLAGGED PRIOR TO CONSTRUCTION.
 - B. AREAS TO BE FLAGGED WILL INCLUDE:
 1. SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;
 2. EQUIPMENT ENTRY AND EXIT POINTS;
 3. ROAD AND STREAM CROSSING ALIGNMENTS;
 4. STAGING, STORAGE, AND STOCKPILE AREAS; AND
 5. NO-SPRAY AREAS AND BUFFERS.

5. TEMPORARY ACCESS ROADS AND PATHS

- A. EXISTING STAGING ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED.
 B. VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING, IN AREAS OCCUPIED BY TERRESTRIAL, EA-LISTED SPECIES WILL BE MINIMIZED.
 C. TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
 D. THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
 E. AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED TO THE POINT OF BEING UNRECOGNIZABLE. ALL EXISTING AND OBLITERATED ROADS PERTAINING TO THE PROJECT WILL BE REINTEGRATED TO THE CONDITION OF THE ORIGINAL ROAD, INCLUDING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND REPAIRING TO MATCH THE ORIGINAL CONTOUR.
 F. HELICOPTER FLIGHT PATTERNS WILL BE ESTABLISHED IN ADVANCE AND LOCATED TO AVOID TERRESTRIAL, EA-LISTED SPECIES AND THEIR OCCUPIED HABITAT DURING SENSITIVE LIFE STAGES.
 G. TEMPORARY STREAM CROSSINGS
 1. EXISTING STREAM CROSSINGS OR BEDROCK WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.
 2. TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOOD SHALL BE USED FOR TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR DIRECTLY OVER WATER.
 3. FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WET:
 a. THE LOCATION AND NUMBER OF ALL WET CROSSINGS SHALL BE APPROVED BY THE BRA EC LEAD AND DOCUMENTED IN THE CONSTRUCTION PLANS;
 b. VEHICLES AND MACHINERY SHALL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHENEVER POSSIBLE;
 c. NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100 FEET DOWNSTREAM OF AN EXISTING MEAD OR SPANNING FISH; AND
 d. AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND BANKS RESTORED.
 H. STAGING, STORAGE, AND STOCKPILE AREAS:
 1. STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY ~~NATURAL WATERBODIES OR WETLANDS~~ ~~STAGING AREAS~~ ~~OR OTHER~~ ~~WATERBODIES~~ ~~150 FEET WILL BE~~ ~~APPROVED BY THE EC LEAD~~.
 2. NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND Boulders, MAY BE STAGED WITHIN 150 FEET IF CLEARLY INDICATED IN THE PLANS THAT AREA IS FOR NATURAL MATERIALS ONLY.
 3. ANY LARGE WOOD, TORSOL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.
 4. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE DISPOSED OF OUTSIDE THE 100-YEAR FLOODPLAIN.
 I. EQUIPMENT:
 1. MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G. MINIMALLY SIZED LOW PRESSURE TIRES, MINIMAL HARD-TIRE PATHS OR TRACKED VEHICLES, TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS).
 2. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN AN CLEARLY IDENTIFIED STAGING AREA THAT MEETS STAGING AREA CONSERVATION MEASURES.

9. EROSION CONTROL

- A. TEMPORARY EROSION CONTROL MEASURES INCLUDE:
 1. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ADJACENT EROSION MATERIALS OR EROSION DIVERSIFICATION IS COMPLETE, WITHIN THE RIPARIAN BUFFER AREAS UNTIL SITE REHABILITATION IS COMPLETE;
 2. IF THERE IS A POTENTIAL FOR EXPOSED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION;
 3. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE ERGE MATS, FIBER MATTES, SLIT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC;
 4. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION;
 5. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL; AND
 6. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.
- B. EMERGENCY EROSION CONTROLS: THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
 1. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
 2. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.
- C. DUST ABATEMENT:
 1. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY EROSION AND SEDIMENT CONTROL MEASURES.
 2. WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
 3. DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNOSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL, OR WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS; APPLICATIONS OF LIGNOSULFONATE WILL BE ASSIGNED MINED SOILS WITH WATER.
 4. APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHENEVER VEGETATION IS SPARSE ON SLOPES, OR STEEP).
 5. SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
 6. PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

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11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES

11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES

- A. PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWDER WASHED, ALLOWED TO DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
- B. WATERGRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.
- C. MAKING BOOTS WITH FEET SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR ABRASION. THE TRANSFER OF INVASIVE SPECIES UNLESS DECONTAMINATION PROCEDURES HAVE BEEN APPROVED BY THE EC LEAD.

1. WORK AREA ISOLATION

- B. WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES WILL COMPLY WITH THE IN-WATER WORK WINDOW.

- D. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

A. MONITORING AND

- C. SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODS, AND CONSERVATION MEASURES SPECIFIED BELOW:

- ## 6. CAPTURE FISH THROUGH SEINING AND RELOCATE TO STREAMS

9. MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.

12. COLLECT ANY REMAINING FISH IN COLD-WATER BUCKETS AND RELOCATED TO THE STREAM

- #### 14. MINIMIZE PREDATION BY TRANSPORTING COMPARABLE SIZES IN BUCKETS

17. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT IN THE WATER TO AVOID MORTALITY COUNTING ERRORS.

2. PRE-SELECT SITE(S) FOR RELEASE AND/OR MUSSEL BED RELOCATION

4. IF DRAWDOWN LESS THAN 48 HOURS, SALVAGE OF LAMPREY AND MUSSELS MAY NOT BE NECESSARY IF TEMPERATURES SUPPORT SURVIVAL IN SEDIMENTS.

6. SALVAGE LAMPREY BY ELECTROFISHING (SEE ELECTROFISHING FOR LARVAL LAMPREY SETTINGS AND LARVAL LAMPREY DRY SHOCKING SETTINGS).

8. REGULARLY INSPECT DEWATERED SITE SINCE LAMPREY LIKELY TO EMERGE AFTER DEWATERING AND MUSSELS MAY BECOME VISIBLE.

10. MUSSELS WILL BE PLACED INDIVIDUALLY TO ENSURE ABILITY TO BURROW INTO NEW HABITAT

1. IDENTIFY SPAWNING ADULTS AND ACTIVE REDDS TO AVOID

3. IF POSSIBLE, A BLOCK NET WILL BE PLACED DOWNSTREAM AND CHECKED REGULARLY TO CAPTURE STUNNED FISH THAT DRIFT DOWNSTREAM.

5. RECORDS FOR CONDUCTIVITY, WATER TEMPERATURE, AIR TEMPERATURE, ELECTROFISHING

- MORTALITIES, AND TOTAL CAPTURE RATES WILL BE INCLUDED IN THE SALVAGE LOG BOOK**

1. SAMPLING WILL BEGIN USING STRAIGHT DC. POWER WILL REMAIN ON UNTIL THE FISH IS NETTED WHEN USING

3. IF FISH CAPTURE IS NOT SUCCESSFUL USING STRAIGHT DC, THE ELECTROFISHER WILL BE SET TO INITIAL VOLTAGE FOR PDC. VOLTAGE, PULSE WIDTH, AND PULSE FREQUENCY WILL BE GRADUALLY INCREASED WITHIN

4. MAXIMUM PULSE WIDTH IS 5 MILLISECONDES. MAXIMUM PULSE RATE IS 70 HERTZ

6. THE ANODE WILL NOT INTENTIONALLY COME INTO CONTACT WITH FISH. THE ZONE FOR POTENTIAL INJURY OF 0.5 M FROM THE ANODE WILL BE AVOIDED.

- OF THE STREAM).

- ### C. SAMPLE PROCESSING.

2. SAMPLERS WILL REGULARLY CHECK CONDITIONS OF FISH HOLDING CONTAINERS, AIR PUMPS, WATER TRANSFERS, ETC.

4. EACH FISH WILL BE COMPLETELY REVIVED BEFORE RELEASE. ESA-LISTED SPECIES WILL BE PRIORITIZED FOR SUCCESSFUL RELEASE.

1. ELECTROFISHING FOR BULL TROUT WILL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL

2. ELECTROFISHING OF BULL TROUT WILL NOT OCCUR WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.

1. PERMISSION FROM EC LEAD WILL BE OBTAINED IF LARVAL LAMPREY ELECTROFISHER IS NOT ONE OF FOLLOWING PRE-APPROVED MODELS: ABP-2, "WISCONSIN", SMITH-ROOT LR-24, OR SMITH-ROOT APEX

3. FIRST STAGE: USE 125 VOLT DC WITH A 25 PERCENT DUTY CYCLE APPLIED AT A SLOW RATE OF 3 PULSES

4. SECOND STAGE (OPTIONAL FOR EXPERIENCED NETTERS): IMMEDIATELY AFTER LAMPREY EMERGE, USE PULSE SETTING OF 30 PULSES PER SECOND.

- DOWNSTREAM.

- BE PLACED ONE METER APART TO SAMPLE ONE SQUARE METER AT A TIME FOR AT LEAST 60 SECONDS. TEMPERATURES LESS THAN 10 DEGREES CELSIUS, MAXIMUM VOLTAGE MAY BE GRADUALLY INCREASED.



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HIP GENERAL CONSERVATION
MEASURES (2 OF 3)

SHEET

5 OF 40

WORK AREA ISOLATION AND FISH SALVAGE (CONTINUED).

4. DEWATERING.

- DEWATERING WILL OCCUR AT A RATE SLOW ENOUGH TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA.
- WHERE A GRAVITY FEED DIVERSION IS NOT POSSIBLE, A PUMP MAY BE USED. PUMPS WILL BE INSTALLED TO AVOID REPETITIVE DEWATERING AND REWATERING.
- WHEN FISH ARE PRESENT, PUMPS WILL BE SCREENED IN ACCORDANCE WITH NMFS FISH SCREEN CRITERIA. NMFS ENGINEERING REVIEW AND APPROVAL WILL BE OBTAINED FOR PUMPS EXCEEDING 3 CUBIC FEET PER SECOND.
- DISAPPROPRIATE FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO THE STREAM CHANNEL AND RIPARIAN VEGETATION.
- SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OF INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL AND VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

CONSTRUCTION AND POST CONSTRUCTION CONSERVATION MEASURES.

1. FISH PASSAGE.

- FISH PASSAGE WILL BE PROVIDED FOR ADULT AND JUVENILE FISH LIKELY TO BE PRESENT DURING CONSTRUCTION UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION. THE STREAM IS NATURALLY IMPASSABLE, OR PASSAGE WILL NEGATIVELY IMPACT ESA-LISTED SPECIES OR THEIR HABITAT.
- FISH PASSAGE ALTERNATIVES WILL BE APPROVED BY THE BPA EC LEAD UNDER ADVICE BY THE NMFS HABITAT BIOLOGIST.

2. CONSTRUCTION AND DISCHARGE WATER.

- SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.
- DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.

- CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS, AND OTHER POLLUTANTS.

3. TIME AND EXTENT OF DISTURBANCE.

- EARTHWORK REQUIRING IN-STREAM MECHANIZED EQUIPMENT (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING, AND COMPACTING) WILL BE COMPLETED AS QUICKLY AS POSSIBLE.
- MECHANIZED EQUIPMENT WILL WORK FROM TOP OF BANK UNLESS WORK FROM ANOTHER LOCATION WILL RESULT IN LESS HABITAT DISTURBANCE (TURBIDITY, VEGETATION DISTURBANCE, ETC.).

4. CESSATION OF WORK.

- PROJECT OPERATIONS WILL CEASE WHEN HIGH FLOW CONDITIONS MAY RESULT IN INUNDATION OF THE PROJECT AREA (FLOOD EFFORTS TO DECREASE DAMAGES TO NATURAL RESOURCES PERMITTED).

- WATER QUALITY LEVELS EXCEEDED. SEE CWA SECTION 401 WATER QUALITY CERTIFICATION AND TURBIDITY MEASURES.

5. SITE RESTORATION.

- DISTURBED AREAS, STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED TO IMPROVED OR PRE-PROJECT CONDITIONS.
- PROJECT-RELATED WASTE WILL BE REMOVED.
- TEMPORARY ACCESS ROADS AND STAGING WILL BE DECOMPACTED AND RESTORED. SOILS WILL BE LOOSENEED IF NEEDED FOR REVEGETATION OR WATER INFILTRATION.
- THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE TO MONITOR AND MAINTAIN THE SITE OVER THE LIFE OF THE PROJECT.

6. REVEGETATION.

- PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.

TURBIDITY MONITORING.

- RECORD THE READING, LOCATION, AND TIME FOR THE BACKGROUND READING APPROXIMATELY 100 FEET UPSTREAM OF THE PROJECT AREA USING A RECENTLY CALIBRATED TURBIDIMETER OR VIA VISUAL OBSERVATION (SEE THE HIP HANDBOOK TURBIDITY MONITORING SECTION FOR A VISUAL OBSERVATION KEY).
- RECORD THE TURBIDITY READING, LOCATION, AND TIME AT THE MEASUREMENT COMPLIANCE LOCATION POINT.
 - 50 FEET DOWNSTREAM FOR STREAMS LESS THAN 30 FEET WIDE.
 - 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE.
 - 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE.
 - 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SOILS.
- TURBIDITY SHALL BE MEASURED (BACKGROUND LOCATION AND COMPLIANCE POINTS) EVERY 4 HOURS WHILE WORK IS BEING IMPLEMENTED.
- IF THERE IS A VISIBLE DIFFERENCE BETWEEN A COMPLIANCE POINT AND THE BACKGROUND, THE EXCEEDANCE WILL BE NOTED IN THE PROJECT COMPLETION FORM (PCF). ADJUSTMENTS OR CORRECTIVE MEASURES WILL BE TAKEN IN ORDER TO REDUCE TURBIDITY.
- IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (AFTER 8 HOURS), THE ACTIVITY WILL STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND. THE BPA EC LEAD WILL BE NOTIFIED OF ALL EXCEEDANCES AND CORRECTIVE ACTIONS AT PROJECT COMPLETION.
- IF TURBIDITY CONTROLS (COFFER DAMS, WADDLES, FENCING, ETC.) ARE DETERMINED INEFFECTIVE, CREWS WILL BE MOBILIZED TO MODIFY AS NECESSARY. OCCURRENCES WILL BE DOCUMENTED IN THE PROJECT COMPLETION FORM (PCF).
- FINAL TURBIDITY READINGS, EXCEEDANCES, AND CONTROL FAILURES WILL BE SUBMITTED TO THE BPA EC LEAD USING THE PROJECT COMPLETION FORM (PCF).

STAGED REWATERING PLAN.

- WHEN REINTRODUCING WATER TO DEWATERED AREAS AND NEWLY CONSTRUCTED CHANNELS, A STAGED REWATERING PLAN WILL BE APPLIED.
- THE FOLLOWING WILL BE APPLIED TO ALL REWATERING EFFORTS. COMPLEX REWATERING EFFORTS MAY REQUIRE ADDITIONAL NOTES ON A DEDICATED SHEET IN THE CONSTRUCTION DETAILS.
 - TURBIDITY MONITORING PROTOCOL WILL BE APPLIED TO REWATERING EFFORTS.
 - PRE-WASH THE AREA BEFORE REWATERING. TURBID WASH WATER WILL BE DEFAMED AND PUMPED TO THE FLOODPLAIN OR SEDIMENT CAPTURE AREAS RATHER THAN DISCHARGING TO FISH-BEARING STREAMS.
 - INSTALL SEINE NETS AT UPSTREAM END TO PREVENT FISH FROM MOVING DOWNSTREAM UNTIL 2/3 OF TOTAL FLOW IS RESTORED TO THE CHANNEL.
 - STARTING IN EARLY MORNING, INTRODUCE 1/3 OF NEW CHANNEL FLOW OVER PERIOD OF 1-2 HOURS.
 - INTRODUCE SECOND THIRD OF FLOW OVER NEXT 1 TO 2 HOURS AND BEGIN FISH SALVAGE OF BYPASS CHANNEL IF FISH ARE PRESENT.
 - REMOVE UPSTREAM SEINE NETS ONCE 2/3 FLOW IN REWATERED CHANNEL AND DOWNSTREAM TURBIDITY IS WITHIN ACCEPTABLE RANGE (LESS THAN 40 NTU OR LESS THAN 10% BACKGROUND).
 - INTRODUCE FINAL THIRD OF FLOW ONCE FISH SALVAGE EFFORTS ARE COMPLETE AND DOWNSTREAM TURBIDITY VERIFIED TO BE WITHIN ACCEPTABLE RANGE.
 - INSTALL PLUG TO BLOCK FLOW INTO OLD CHANNEL OR BYPASS. REMOVE ANY REMAINING SEINE NETS.
 - IN LAMPREY SYSTEMS, LAMPREY SALVAGE AND DRY SHOCKING MAY BE NECESSARY.

NO.	BY	DATE	REVISION DESCRIPTION	25. CM	MC, CA, MB	CA
				DESIGNED	DESIGNED	CHECKED
				MC	09/20/23	1902/20
				APPROVED	DATE	PROJECT

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
AGENCY CREEK - FINAL DESIGN



HIP GENERAL CONSERVATION
MEASURES (3 OF 3)

SHEET

6 OF 40

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1. INSTALL WATTLE WITHIN TRENCH, SO THAT NO GAPS EXIST BETWEEN THE SOIL AND THE BOTTOM OF THE WATTLE. THE ENDS OF ADJACENT WATTLES SHALL BE TIGHTLY ABUTTED SO THAT NO OPENING EXISTS FOR WATER OR SEDIMENT TO PASS THROUGH.
 2. WOOD STAKES SHALL BE USED TO FASTEN THE WATTLES TO THE SOIL. WHEN CONDITIONS WARRANT, A STRAIGHT METAL BAR CAN BE USED TO DRIVE A "PILOT HOLE" THROUGH THE WATTLE AND INTO THE SOIL.
 3. PAIRS OF WOOD STAKES SHALL BE PLACED AT THE WATTLE END, ANGLED SUCH THAT ONE STAKE IS PERPENDICULAR TO GRADE AND ONE IS AT A 45° ANGLE TO GRADE. WOOD STAKE PAIRS SHALL BE SPACED AT 2-FEET CENTERS LEAVING LESS THAN 1-2 INCHES OF STAKE EXPOSED ABOVE THE WATTLE.
 4. AT TERMINAL ENDS OF WATTLES, EXCAVATE MIN. 2' DEEP KEY TRENCH AND BURY A MIN. 4' OF WATTLE END. CARE SHALL BE TAKEN DURING INSTALLATION SO AS TO AVOID DAMAGE OCCURRING TO THE WATTLE AS A RESULT OF THE INSTALLATION PROCESS. SHOULD THE WATTLE BE DAMAGED DURING INSTALLATION, A WOODEN STAKE SHALL BE PLACED EITHER SIDE OF THE DAMAGED AREA TERMINATING THE WATTLE SEGMENT.
 6. ANY WATTLE DAMAGED DURING PLACEMENT SHALL BE REPLACED AS DIRECTED BY AGENCY STAFF, AT THE CONTRACTOR'S EXPENSE.
- INSTALL WATTLES IN FILL LOCATIONS ACCORDING TO THE FOLLOWING GUIDELINES:

STRAW WATTLE: VERTICAL SPACING	
SLOPE	SPACING
2:1	10'
2:1 - 5:1	25'
< 5:1	50'

Draft
Not for Construction



SURVEY CONTROL

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
101	933852.32	7415483.64	12.52	NAIL
100	933693.34	7415178.59	12.24	NAIL
999	933568.67	7414938.24	12.45	NAIL

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Not for Construction

LEGEND

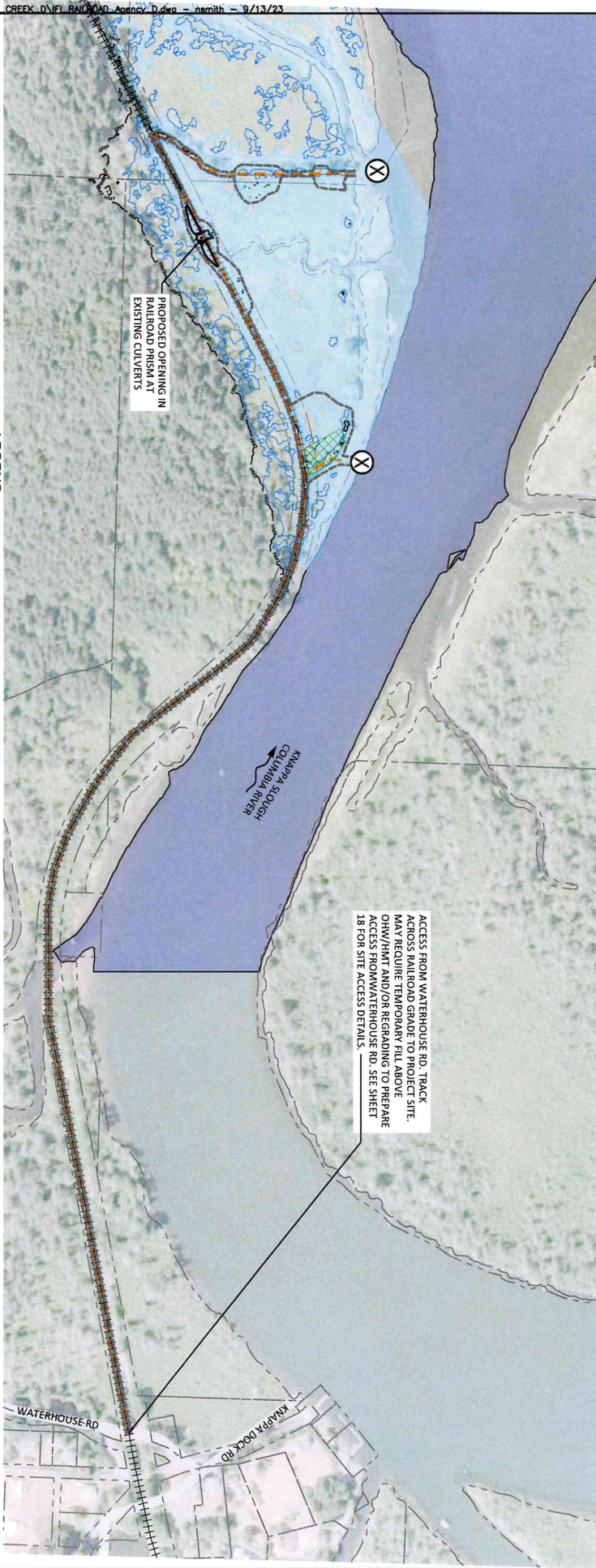
- EXISTING CONTOURS (1 FT)
- TAX LOTS (FROM CLATSOP COUNTY GIS)
- EXISTING RAILROAD TRACKS
- ORDINARY HIGH WATER (9.9 FT)
- HIGHEST MEASURED TIDE (12.56 FT)
- MEAN HIGHER HIGH WATER INUNDATION (8.88 FT)
- MEAN LOWER LOW WATER INUNDATION (0.73 FT)
- NWI WETLAND
- CONTROL POINT

NOTE:

INUNDATION EXTENTS ARE BASED ON EXISTING TOPOGRAPHIC CONTOURS. ACTUAL SITE INUNDATION MAY VARY DUE TO IMPAIRED CONNECTIVITY.



NO.	BY	DATE	REVISION DESCRIPTION	ZS, CM DRAWN MC	MC, CA, MB DESIGNED 09/20/23	CA CHECKED 1902/20	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION AGENCY CREEK - FINAL DESIGN	 301 Broadway Avenue, Suite 101 Portland, Oregon 97201 503.541.3863 www.crestinc.com	 301 Broadway Avenue, Suite 101 Portland, Oregon 97201 503.541.3863 www.interfluv.com	EXISTING CONDITIONS & SURVEY CONTROL	SHEET 8 OF 40
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NOTES:

ACCESS MAY REQUIRE MINOR EARTHWORK TO FACILITATE MOVEMENT OF EQUIPMENT FROM BARGE TO LEVEL.

VARIATION IN ACCESS LOCATION(S) MAY BE REQUIRED BASED ON LOCAL BED TOPOGRAPHY AT TIME OF CONSTRUCTION.

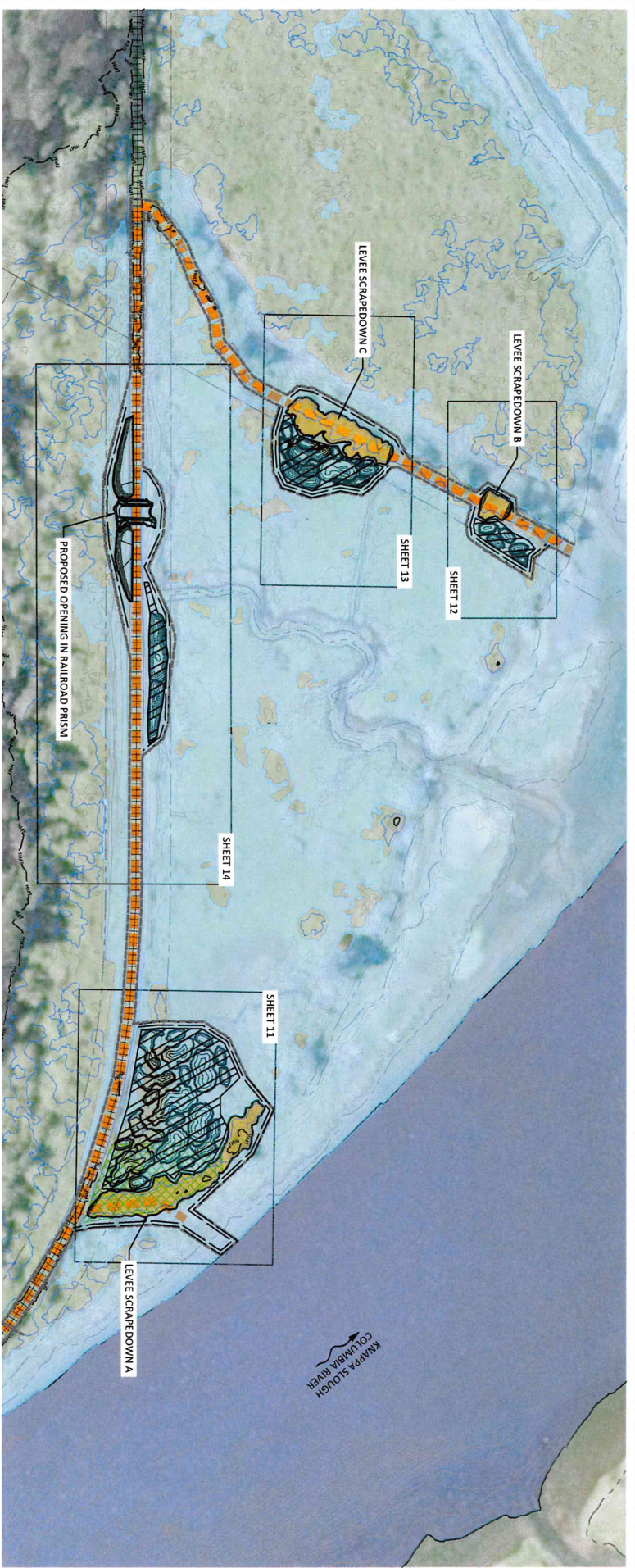
SEE DETAIL 1, SHEET 18 FOR RAILROAD OVERLAND ACCESS ALTERNATIVES.

LIMITS OF DISTURBANCE WILL BE MARKED IN THE FIELD APPROXIMATELY EVERY 20 FEET. FLAGGING WILL BE ATTACHED TO THE HIGHEST POINT POSSIBLE IN EXISTING VEGETATION TO FACILITATE VISIBILITY.

TOTAL DATUMS ARE SHOWN FOR THE PROJECT AREA ONLY.



NO.	BY	DATE	REVISION DESCRIPTION	ZS, CM DRAWN	MC, CA, MB DESIGNED	CA CHECKED	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION AGENCY CREEK - FINAL DESIGN	301 Broadway Avenue, Suite 101 Astoria, OR 97103 541.386.8003 www.intertive.com	TEMPORARY ACCESS	SHEET 9 OF 40
				MC	09/20/23	190220				
				APPROVED	DATE	PROJECT				

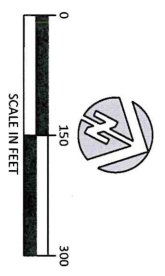


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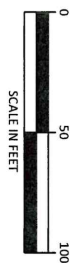
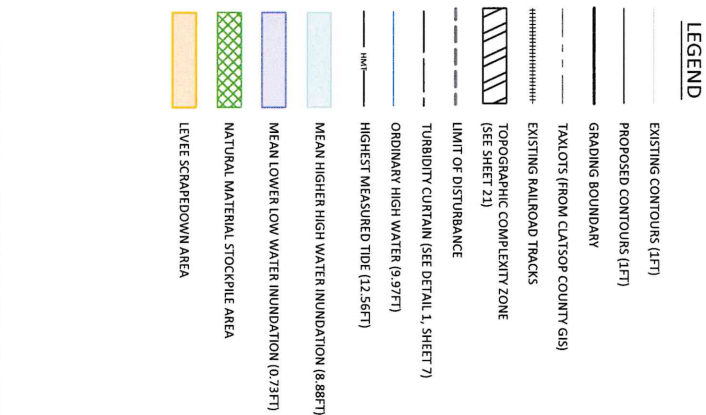
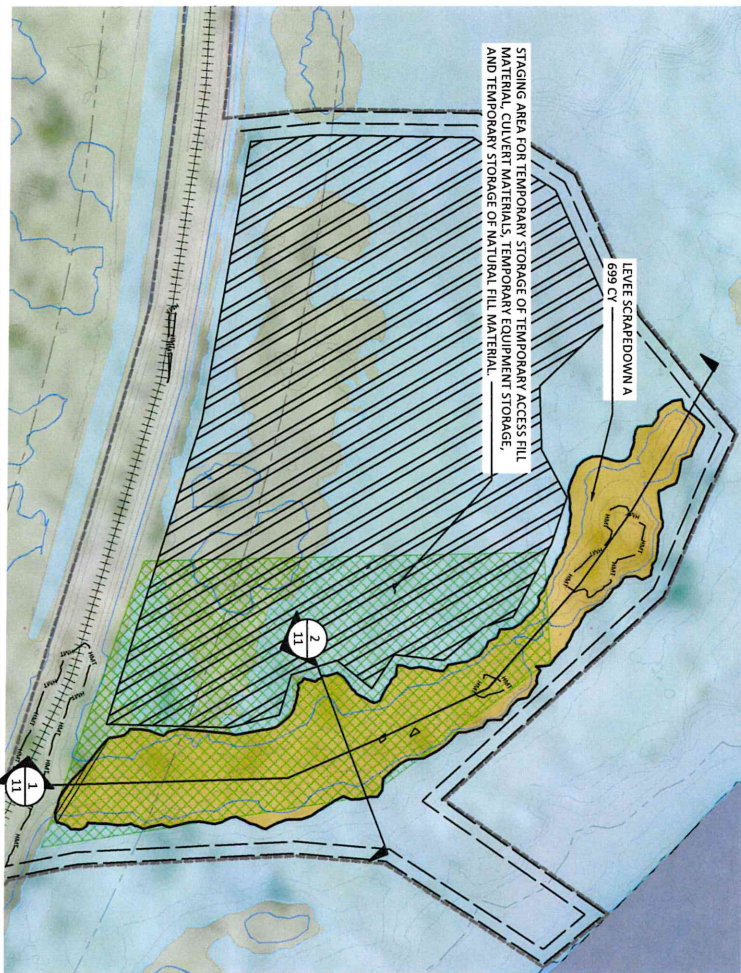
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|-------------------|---|-------------------|---|
| --- (dashed line) | EXISTING CONTOURS (1 FT) | --- (dashed line) | LIMIT OF DISTURBANCE |
| --- (dashed line) | PROPOSED CONTOURS (1 FT) | --- (dashed line) | TURBIDITY CURTAIN (SEE DETAIL 1, SHEET 7) |
| --- (solid line) | GRADING BOUNDARY | --- (dashed line) | ORDINARY HIGH WATER (9.97 FT) |
| --- (dashed line) | TALLOTS (FROM CLATSOP COUNTY GIS) | --- (dashed line) | HIGHEST MEASURED TIDE (12.56 FT) |
| --- (dashed line) | EXISTING RAILROAD TRACKS | --- (dashed line) | MEAN HIGHER HIGH WATER INUNDATION (8.88 FT) |
| --- (dashed line) | TEMPORARY ACCESS ROUTE | --- (dashed line) | MEAN LOWER LOW WATER INUNDATION (0.73 FT) |
| --- (dashed line) | TOPOGRAPHIC COMPLEXITY ZONE (SEE SHEET 21) | --- (dashed line) | LEVEE SCRAPEDOWN AREA |
| --- (dashed line) | PROPOSED LEVEE SHOULDER VEGETATION COMPLEXITY ZONE (SEE DETAIL 1, SHEET 22) | --- (dashed line) | |
| --- (dashed line) | NATURAL MATERIAL STOCKPILE AREA | --- (dashed line) | |

NOTES:

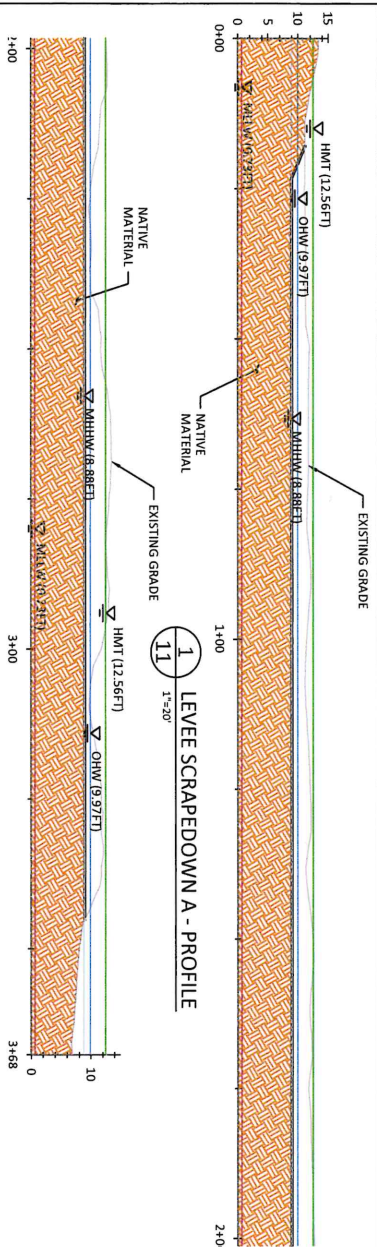
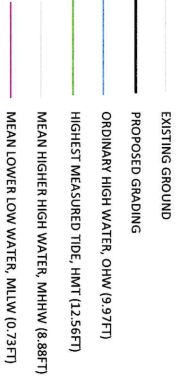
- PLACE NATURAL MATERIALS TO MINIMIZE DISTURBANCE TO NATIVE VEGETATION.
- SEE SHEET 15 FOR PROPOSED OPENING PROFILE
- SEE SHEET 18 FOR SITE ACCESS DETAILS
- INUNDATION EXTENTS ARE BASED ON EXISTING TOPOGRAPHIC CONTOURS. ACTUAL SITE INUNDATION MAY VARY DUE TO IMPAIRED CONNECTIVITY.



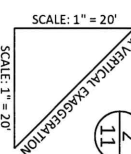
COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION AGENCY CREEK - FINAL DESIGN		PROPOSED CONDITIONS OVERVIEW & INDEX	
25. CM DRAWN MC 09/20/23 APPROVED	MC, CA, MB DESIGNED 09/20/23 DATE	CA CHECKED 190220 PROJECT	SHEET 10 of 40



DATUM LINE LEGEND

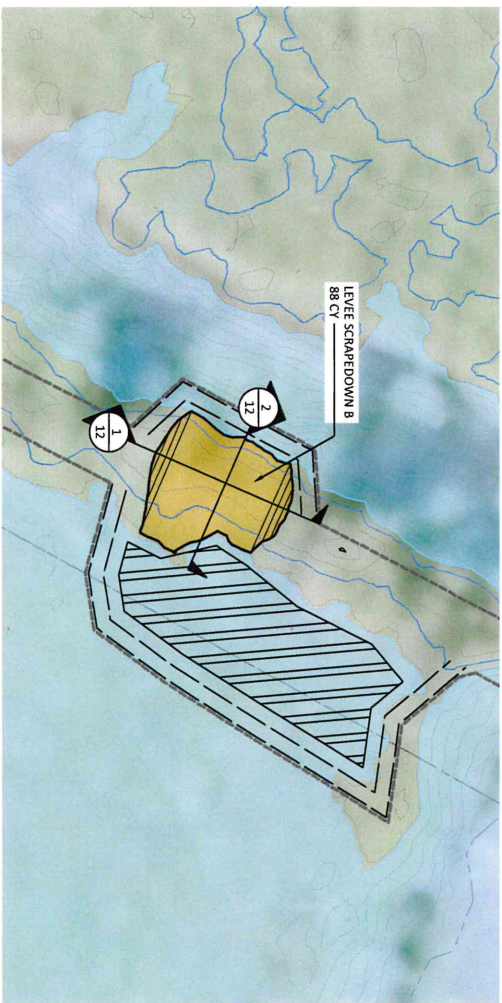


2 LEVEE SCRAPEDOWN A - SECTION

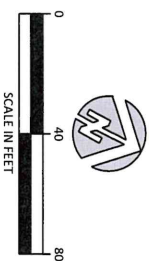


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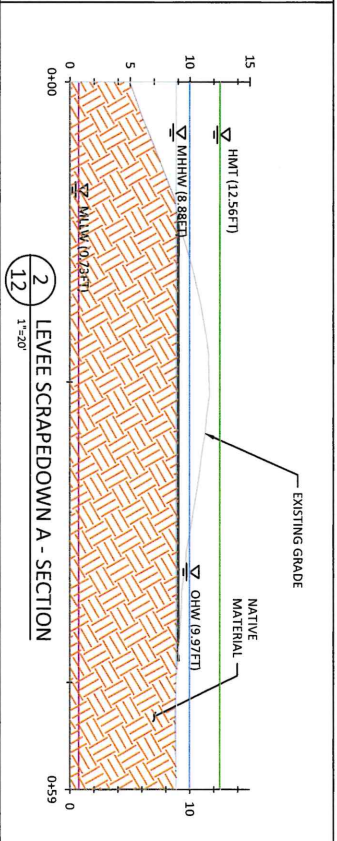
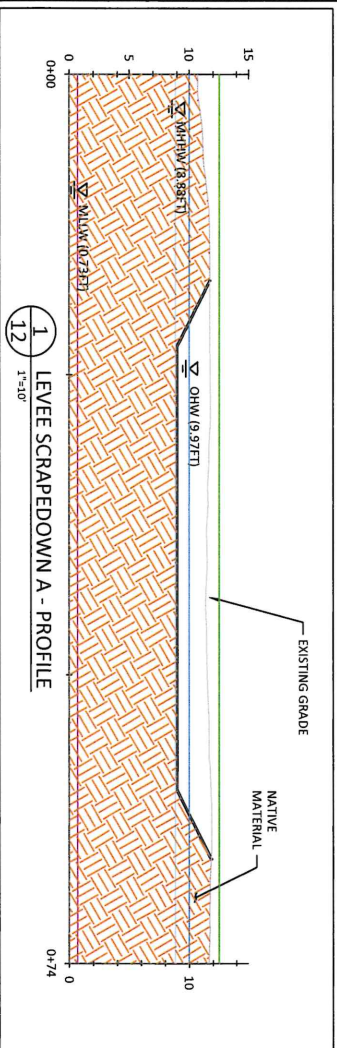
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- LEGEND**
- EXISTING CONTOURS (1 FT)
 - PROPOSED CONTOURS (1 FT)
 - GRADING LIMIT
 - TAX LOTS (FROM CLATSOP COUNTY GIS)
 - TOPOGRAPHIC COMPLEXITY ZONE (SEE SHEET 21)
 - LIMIT OF DISTURBANCE
 - TURBIDITY CURTAIN (SEE DETAIL 1, SHEET 7)
 - ORDINARY HIGH WATER (9.97 FT)
 - HIGHEST MEASURED TIDE (12.56 FT)
 - HMT
 - MEAN HIGHER HIGH WATER INUNDATION (8.88 FT)
 - MEAN LOWER LOW WATER INUNDATION (0.73 FT)
 - LEVEE SCRAPEDOWN AREA



- DATUM LINE LEGEND**
- EXISTING GROUND
 - PROPOSED GRADING
 - ORDINARY HIGH WATER, OHW (9.97 FT)
 - HIGHEST MEASURED TIDE, HMT (12.56 FT)
 - MEAN HIGHER HIGH WATER, MHHW (8.88 FT)
 - MEAN LOWER LOW WATER, MLW (0.73 FT)

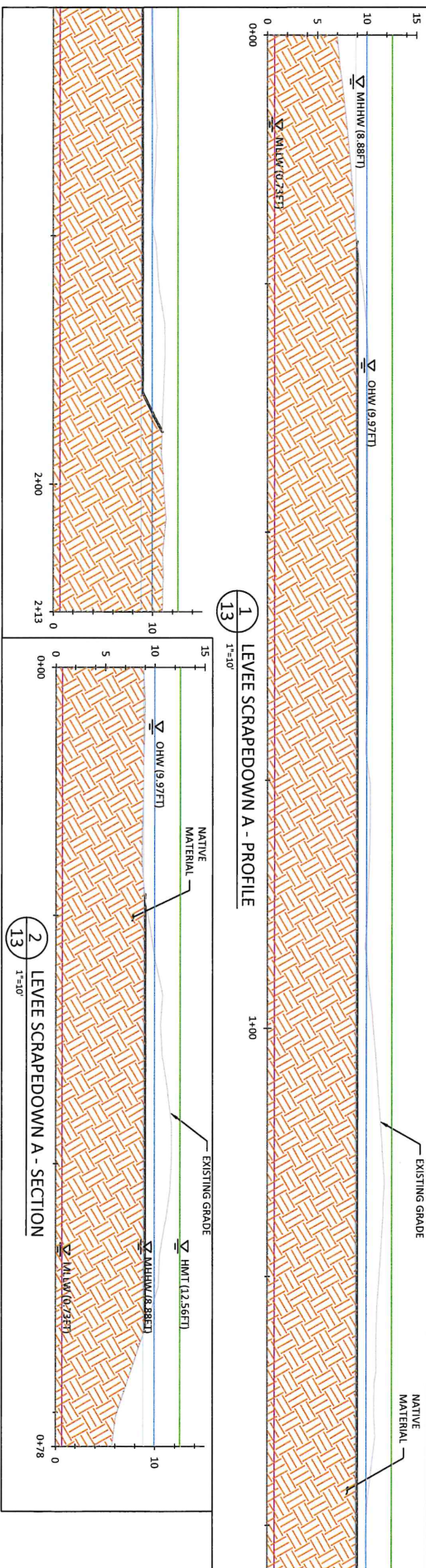
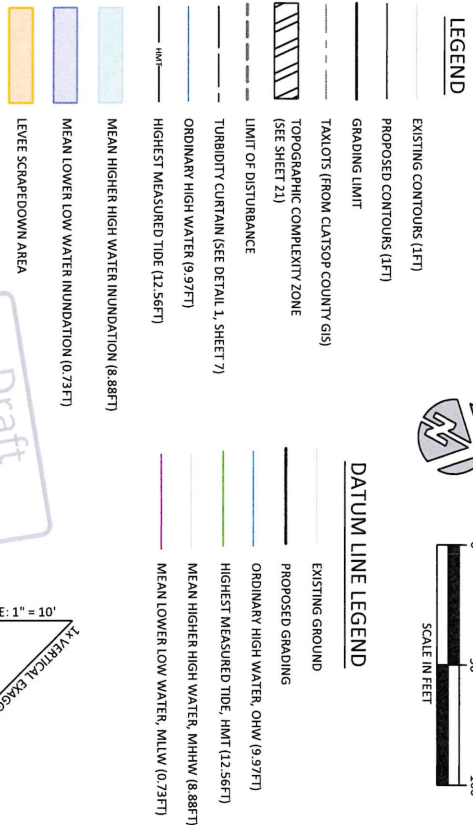
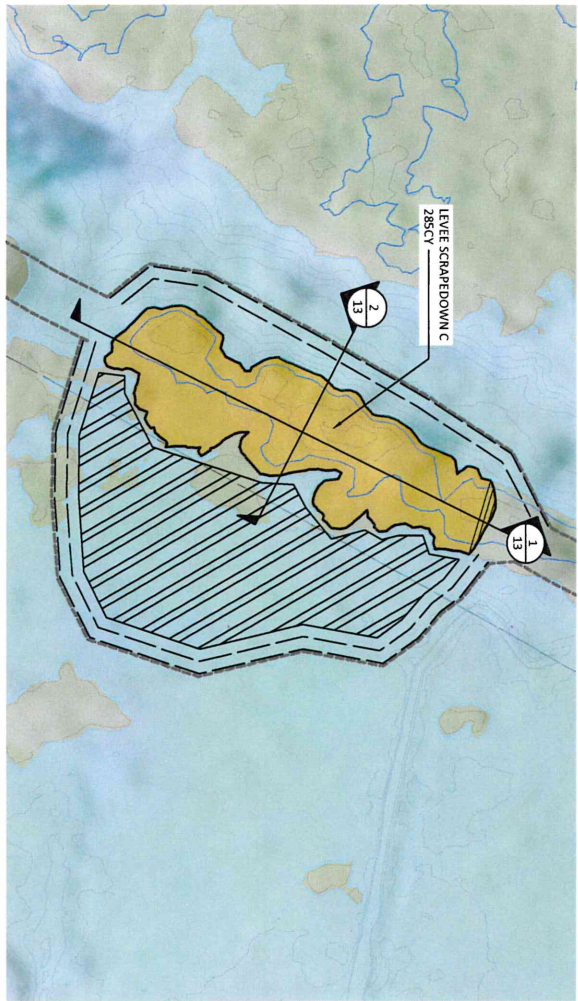


SCALE: 1" = 10'
1X VERTICAL EXAGGERATION
SCALE: 1" = 10'

NO.	BY	DATE	REVISION DESCRIPTION	DRAWN	MC CA MB	CHECKED	CA
				MC	09/20/23	190220	
				APPROVED			
COLUMBIA RIVER ESTUARY STUDY TASKFORCE				RAILROAD RESTORATION			
AGENCY CREEK - FINAL DESIGN				PROPOSED CONDITIONS			
LEVEE B				12 OF 40			



Draft
Not for Construction

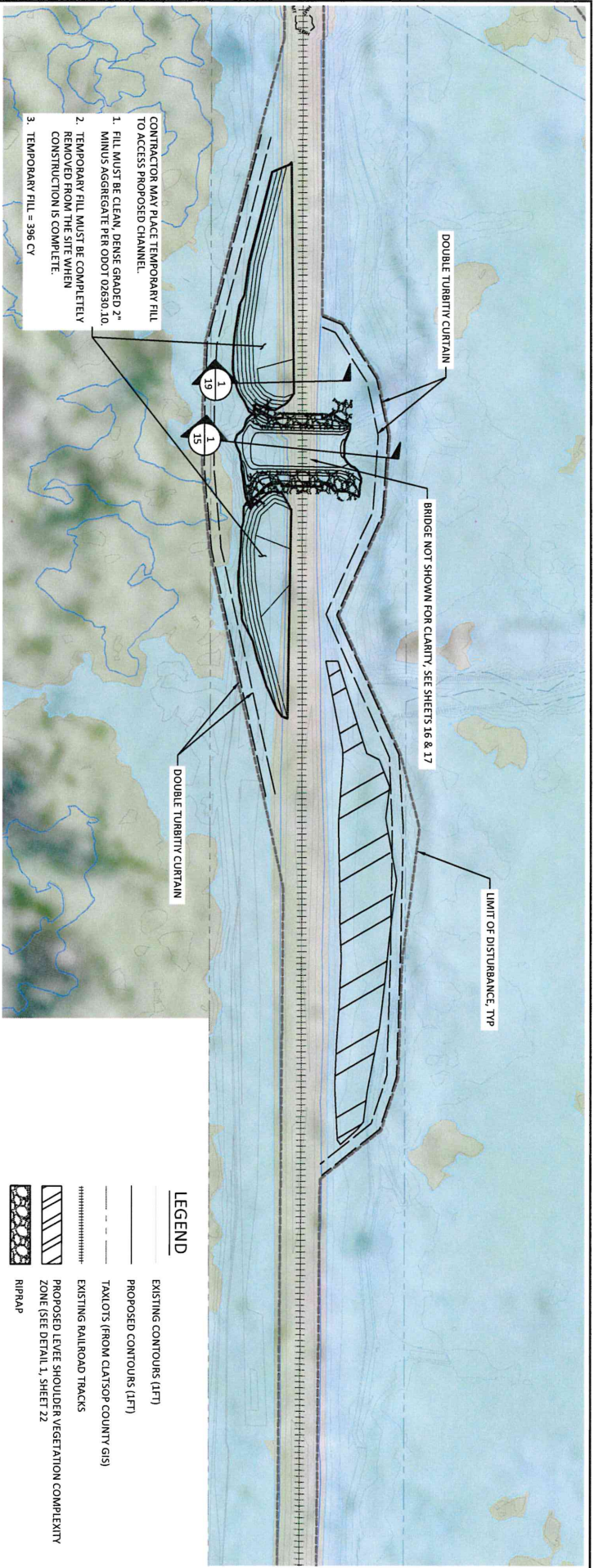


NO.	ST.	DATE	REVISION DESCRIPTION	DESIGNED	CHECKED	PROJECT	SHEET
				ZS, CM	MC, CA, MB	CA	13 OF 40
				MC	09/20/23	190220	
				APPROVED	DATE	PROJECT	

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
AGENCY CREEK - FINAL DESIGN



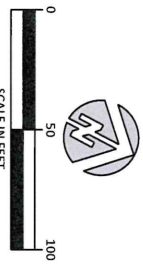
PROPOSED CONDITIONS
LEVEE C



- CONTRACTOR MAY PLACE TEMPORARY FILL TO ACCESS PROPOSED CHANNEL.
1. FILL MUST BE CLEAN, DENSE GRADED 2" MINUS AGGREGATE PER ODOT 02530.10.
 2. TEMPORARY FILL MUST BE COMPLETELY REMOVED FROM THE SITE WHEN CONSTRUCTION IS COMPLETE.
 3. TEMPORARY FILL = 396 CY

PROPOSED SEQUENCING PLAN

1. ACCESS SITE ALONG RAILROAD, STAGE MATERIAL IN APPROVED SITE.
2. REMOVE RAILS IN ZONE OF EXCAVATION.
3. INSTALL TURBIDITY CURTAINS ON INTERIOR AND EXTERIOR OF THE BREACH LOCATION.
4. PREPARE GROUND AS NECESSARY TO ALLOW FOR INSTALLATION OF H-PILES AND PILEUAPS
5. INSTALL H-PILES.
6. INSTALL PILE CAPS.
7. EXCAVATE REMAINDER OF CHANNEL, AND APPLY BANK ARMOR.
8. INSTALL BRIDGE DECK (MAY BE INSTALLED CONCURRENTLY IN STEP 7, DEPENDING ON PREFERENCE OF CONTRACTOR.
9. REMOVE TEMPORARY ACCESS FILL.
10. REPLACE RAILS.
11. DEMOBILIZE.



NOTES:
CONTRACTOR SHALL HAVE STRAW WATTLES AVAILABLE ON SITE FOR PLACEMENT IN ADDITIONAL LOCATIONS WHERE RUNOFF FROM DISTURBED GROUND MAY CONTACT SURFACE WATERS, IN COORDINATION WITH PROJECT OWNER.

SEE SHEET 18 FOR SITE ACCESS DETAILS.

MATERIAL EXCAVATED FROM WITHIN THE G AND W ROW SHALL BE PLACED WITHIN THE ROW, NO EXPORT OF MATERIAL FROM THE ROW TO ADJACENT PROPERTY SHALL BE ALLOWED.

LEGEND

- EXISTING CONTOURS (LFT)
- PROPOSED CONTOURS (LFT)
- TAXLOTS (FROM CLATSOP COUNTY GIS)
- EXISTING RAILROAD TRACKS
- PROPOSED LEVEE SHOULDER VEGETATION COMPLEXITY ZONE (SEE DETAIL 1, SHEET 22)
- RIPPAP
- LIMIT OF DISTURBANCE
- TURBIDITY CURTAIN (SEE DETAIL 1, SHEET 7)
- ORDINARY HIGH WATER (9.97FT)
- HIGHEST MEASURED TIDE (12.56FT)
- MEAN HIGHER HIGH WATER INUNDATION (8.88FT)
- MEAN LOWER LOW WATER INUNDATION (0.73FT)

NO.	DATE	REVISION DESCRIPTION
25	CM	MC CA, MB
MC	DESIGNED	CA
09/2023	190220	
APPROVED	DATE	PROJECT

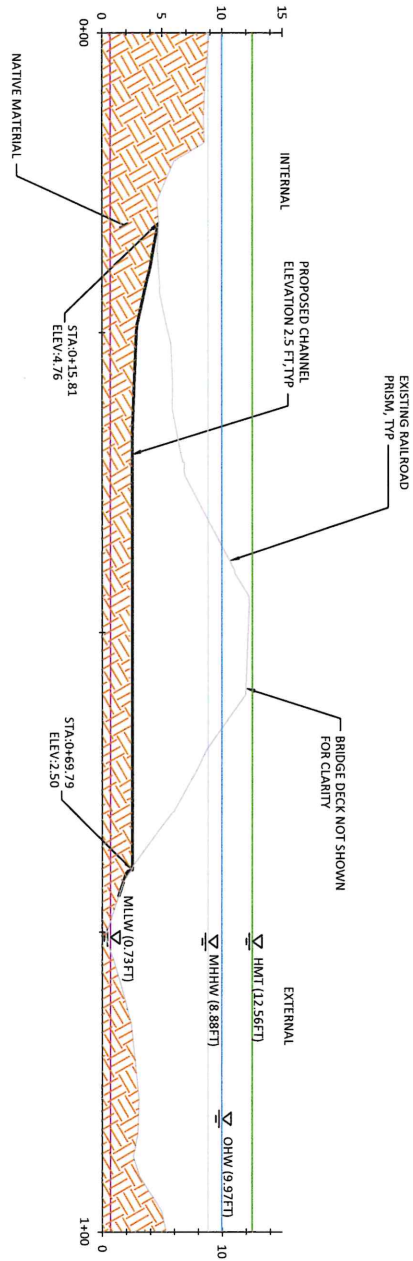
COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
AGENCY CREEK - FINAL DESIGN



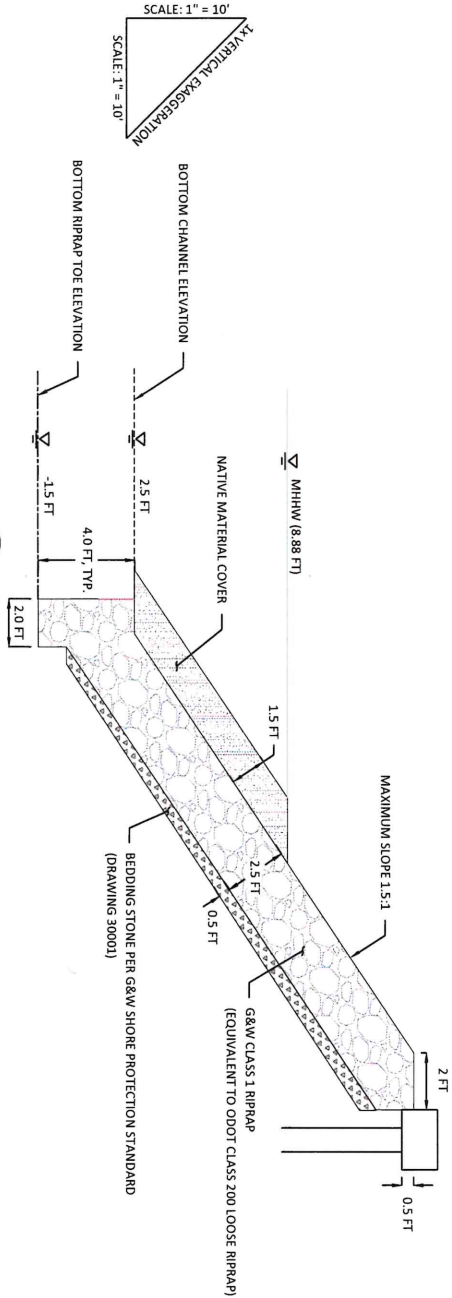
PROPOSED CONDITIONS
OPENING

SHEET
14 OF 40

Draft
Not for Construction



1
15
1" = 10'



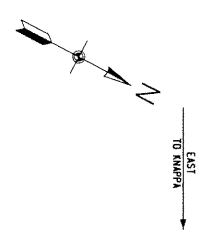
2
15
NOT TO SCALE

DATUM LINE LEGEND

- EXISTING GROUND
- PROPOSED GRADING
- ORDINARY HIGH WATER, OHW (9.97 FT)
- HIGHEST MEASURED TIDE, HMT (12.56 FT)
- MEAN HIGHER HIGH WATER, MHHW (8.88 FT)
- MEAN LOWER LOW WATER, MLW (0.73 FT)

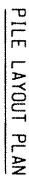
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Not for Construction

NO.	BY	DATE	REVISION DESCRIPTION	DESIGNED	CHECKED	PROJECT	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION AGENCY CREEK - FINAL DESIGN	BRIDGE SPAN PROFILE AND BANK PROTECTION SECTION	SHEET 15 OF 40
				ZS, CM	MC, CA, MB	CA			
				MC	09/20/23	190220			
				APPROVED	DATE	PROJECT			



LOCATION	TOP/1/E	TOP/CLP	PILE CUTOFF	T/1 TO PILE CUTOFF
ABUT. 1	12.00	9.02	7.02	4'-11 3/4"
BENT 2	12.00	9.02	6.35	5.35
ABUT. 3	12.00	9.02	7.02	4'-11 3/4"

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Not for Construction



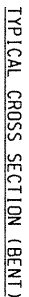
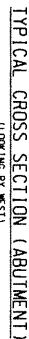
ATTENTION :

INFORMATION SHOWN ON THESE PLANS CONCERNING TYPE AND LOCATION OF UNDERGROUND AND ABOVE GROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE.

THE SUPERVISOR OF STRUCTURES ON THE FOREMAN IN CHARGE WILL VERIFY THE LOCATION OF UNDERGROUND AND OVERHEAD UTILITIES BEFORE BEGINNING CONSTRUCTION.

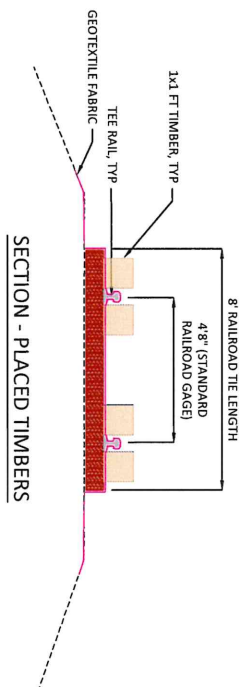
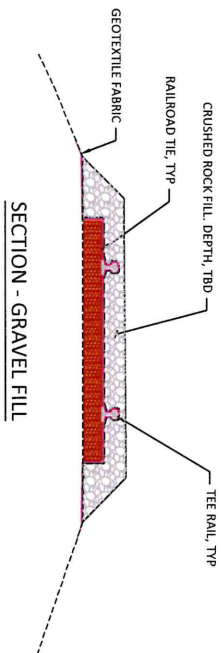
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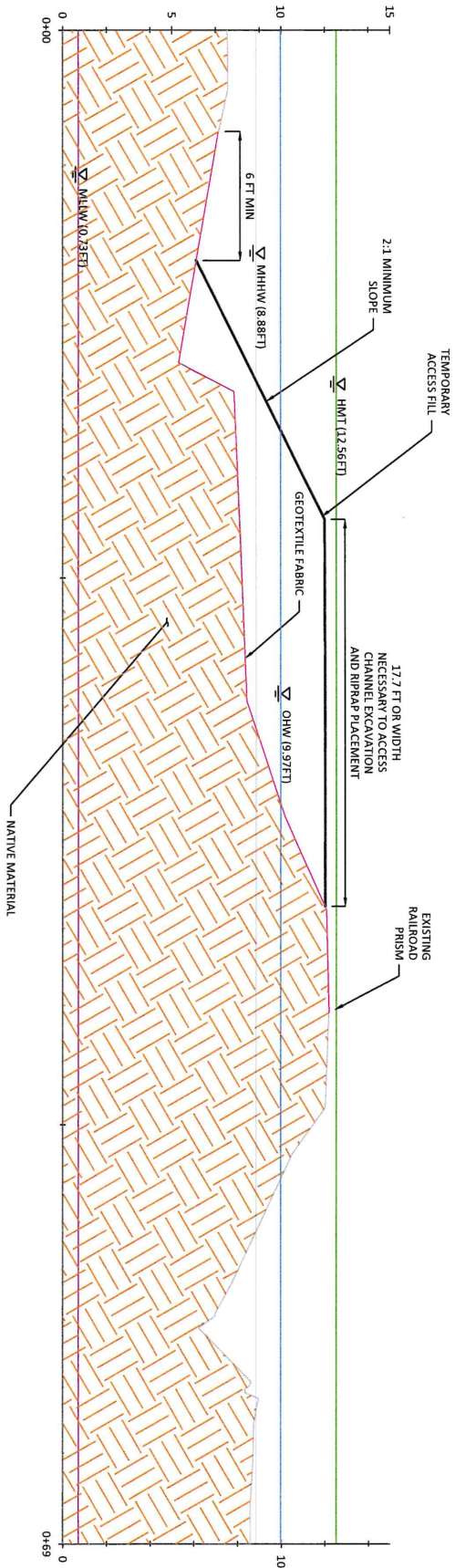
Draft Final
Not for Construction

NO.	BY	DATE	REVISION DESCRIPTION	25. CM DRAWN MC	MC, CA, MB DESIGNED 09/2023	CA CHECKED 190220	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION AGENCY CREEK - FINAL DESIGN	 3021 Parkway Avenue, Suite 101 Portland, Oregon 97201 541.386.9003 www.districtfive.com	SITE ACCESS & DETAILS	SHEET 18 of 40
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- NOTE:
1. GEOTEXTILE TO PROTECT BALLAST FROM EROSION IN ACCESS AREAS IS REQUIRED PER G&W PUBLIC PROJECT MANUAL.
 2. ACCESS ACROSS RAIL MAY BE REQUIRED. RAILS MUST BE LEFT IN A SIMILAR OR BETTER CONDITION POST-CONSTRUCTION. PLACED TIMBERS OR GRAVEL FILL MAY BE USED TO PROTECT RAIL, AND ALLOW ACCESS BY EQUIPMENT. ACCESS METHODS TO BE APPROVED BY CREST AND GENESEE AND WYOMING PRIOR TO CONSTRUCTION.

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Not for Construction

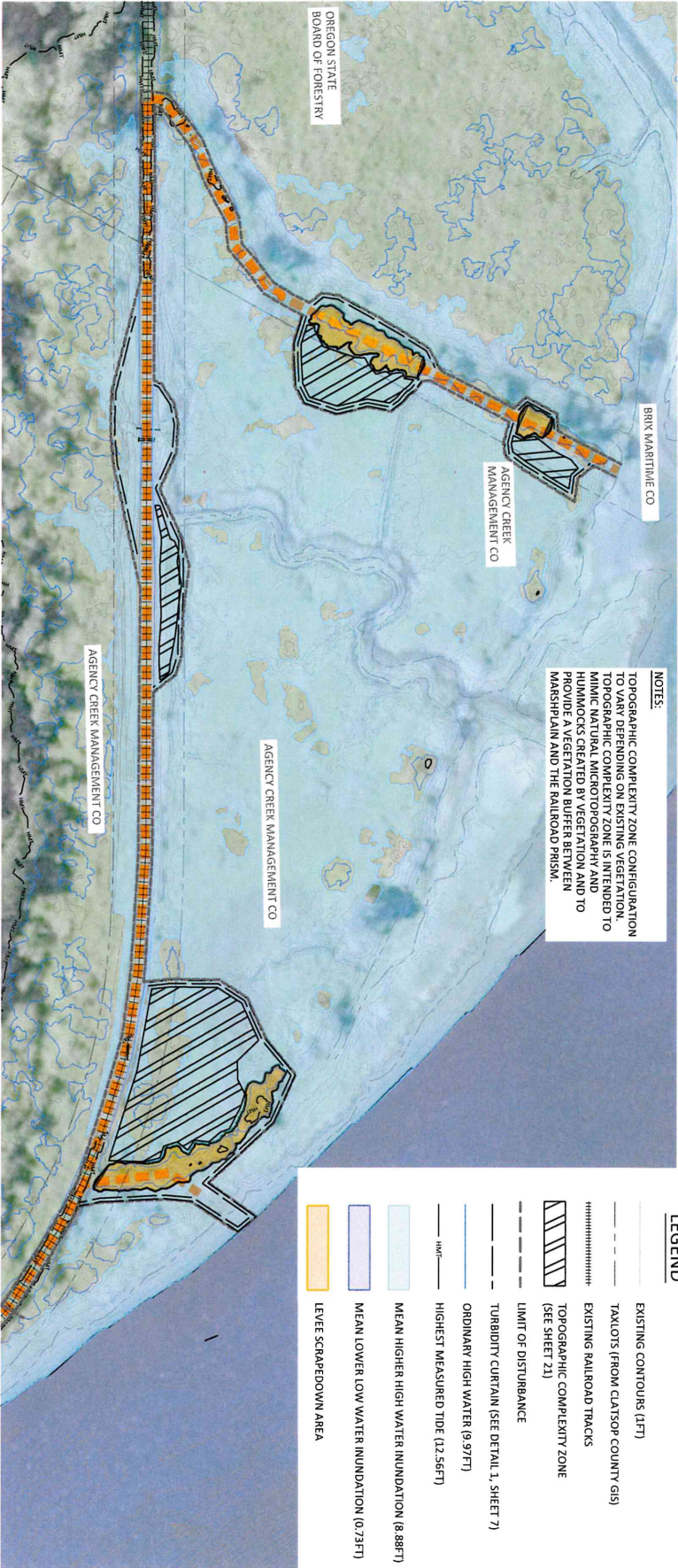


1
19 TEMPORARY FILL PLACEMENT
NOT TO SCALE

NO.	BY	DATE	REVISION DESCRIPTION	DESIGNED	CHECKED	PROJECT	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION AGENCY CREEK - FINAL DESIGN	TEMPORARY FILL ACCESS DETAILS	SHEET 19 of 40
				ZS CM	MC CA MB	CA			
				MC	09/20/23	190220			
				APPROVED	DATE				



Draft
Not for Construction



Botanical Name	Common Name	Stock Type	Stock Size	Average Spacing (on center)	Total Plants
<i>Cornus sericea</i>	Red osier dogwood	plug	16 cu. in.	4'	800
<i>Spiraea douglasii</i>	Douglas spirea	plug	16 cu. in.	4'	800
<i>Physocarpus capitatus</i>	Pacific ninebark	plug	16 cu. in.	4'	800
<i>Leonicea involucrata</i>	Twiberry	plug	16 cu. in.	4'	800
<i>Salix lasioandra</i>	Pacific willow	live cutting	5', 1-1.5" dia	4'	1600
<i>Salix sitchensis</i>	Sitka willow	live cutting	5', 1-1.5" dia	4'	1600
<i>Picea sitchensis</i>	Sitka spruce	potted plant	24"	See Note	200

Botanical Name	Common Name	Percent Composition
<i>Sericea cereale</i>	Cereal Rye (Cover Crop)	30%
<i>Glyceria occidentalis</i>	Western Mannagrass	25%
<i>Hordeum brachyantherum</i>	Meadow Barley	20%
<i>Beckmannia syzigachne</i>	American Sloughgrass	15%
<i>Deschampsia caespitosa</i>	Tufted Hairgrass	10%

- NOTES:**
- ALL DISTURBED AREAS ABOVE 8.8 FT ELEVATION, EXCLUDING RAILROAD SURFACE, SHALL BE REVEGETATED WITH SEEDS AS SOON AS POSSIBLE AFTER CONSTRUCTION.
 - SITKA SPRUCE (PCEA SITCHENSIS) SHALL BE PLANTED AT TOP ELEVATIONS OF TOPOGRAPHIC COMPLEXITY MOUNDS.

25 CM
DRAWN
MC
APPROVED

MC CA, MB
DESIGNED
09/2023
DATE

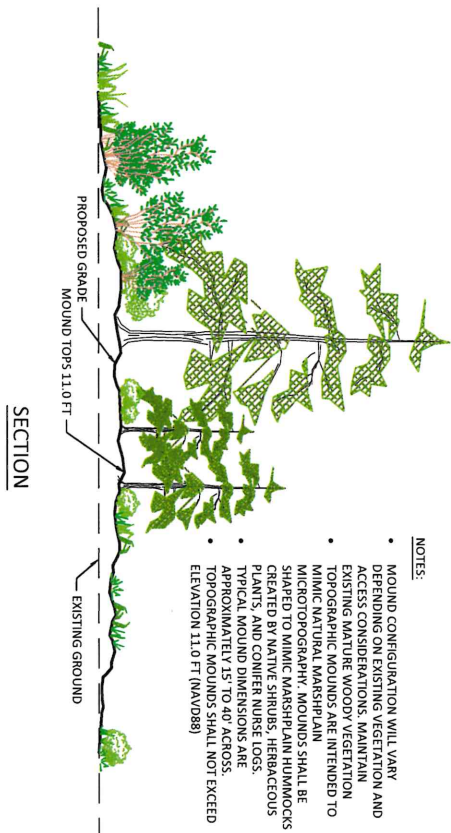
CA
CHECKED
190220
PROJECT

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
AGENCY CREEK - FINAL DESIGN

507 Perryway Avenue, Suite 101
Hood, WA 98040
Phone: 425.566.5003
www.interfluv.com

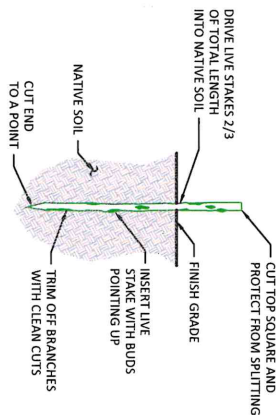
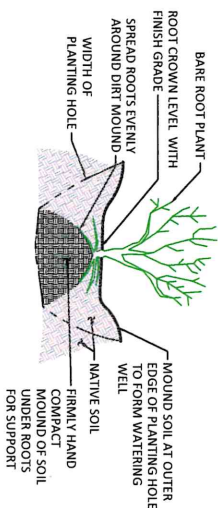
REVEGETATION PLAN

SHEET
20 of 40



- NOTES:
- MOUND CONFIGURATION WILL VARY DEPENDING ON EXISTING VEGETATION AND ACCESS CONSIDERATIONS. MAINTAIN EXISTING MATURE WOODY VEGETATION TO MIMIC NATURAL MARSH PLANT MICROTOPOGRAPHY. MOUNDS SHALL BE SHAPED TO RESEMBLE NATURAL MOUNDS CREATED BY NATIVE SHRUBS, HERBACEOUS PLANTS, AND CONIFER NURSE LOGS. TYPICAL MOUND DIMENSIONS ARE APPROXIMATELY 15' TO 40' ACROSS. TOPOGRAPHIC MOUNDS SHALL NOT EXCEED ELEVATION 11.0 FT (NAVD83)

1
21
TYPICAL DETAIL - TOPOGRAPHIC COMPLEXITY MOUND
NOT TO SCALE



COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
AGENCY CREEK - FINAL DESIGN



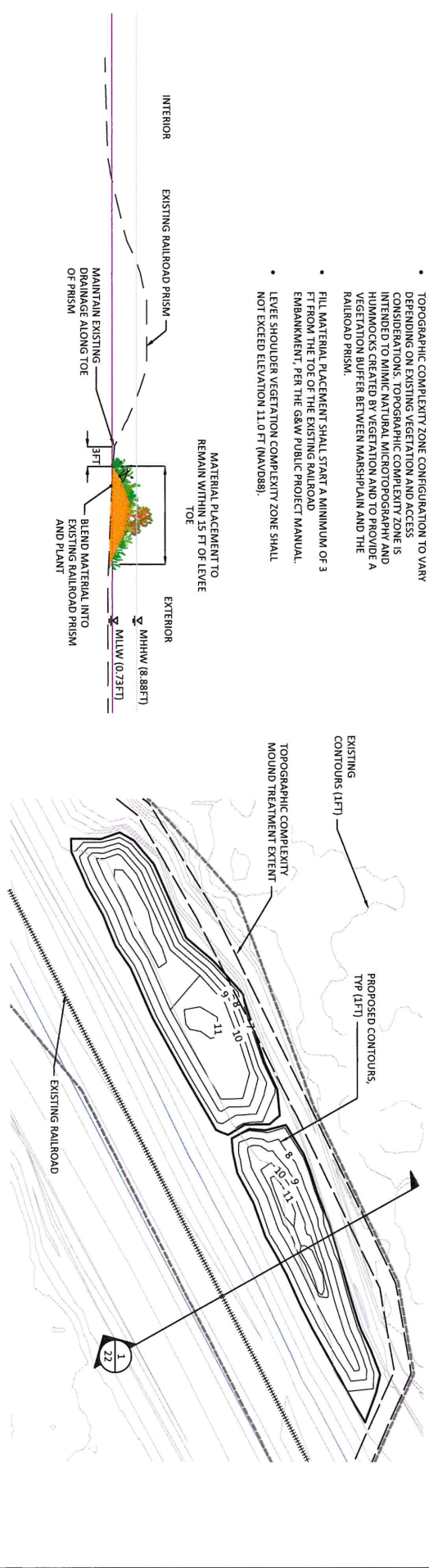
REVEGETATION DETAILS (1 OF 2)

21 OF 40

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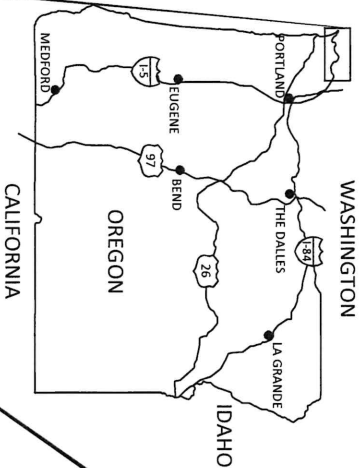
NO.	BY	DATE	REVISION/DESCRIPTION	25. CM DRAWN MC APPROVED	MC CA MB DESIGNED 09/20/23 DATE	CA CHECKED 190220 PROJECT	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION AGENCY CREEK - FINAL DESIGN	 501 Parkway Avenue, Suite 101 Woodbury, NJ 07095 841.386.0003 www.interfive.com	REVEGETATION DETAILS (2 OF 2)	SHEET 22 OF 40
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1
22
TYPICAL DETAIL - PROPOSED LEVEE SHOULDER VEGETATION COMPLEXITY ZONE
NOT TO SCALE

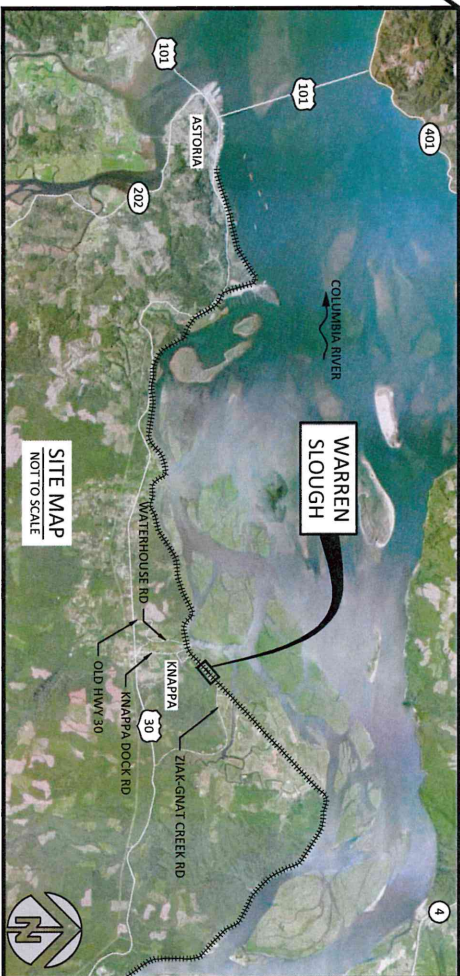
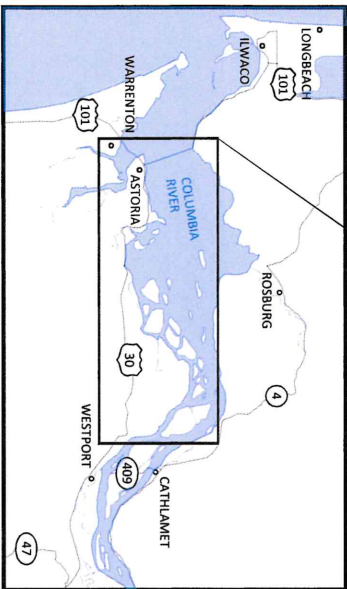


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LOCATION MAP
STATE OF OREGON
NOT TO SCALE



VICINITY MAP
NOT TO SCALE



RAILROAD RESTORATION WARREN SLOUGH DRAFT FINAL DESIGN

Clatsop County, Oregon
September, 2023

COORDINATES:

WARREN SLOUGH
LATITUDE: -46°11'42" N
LONGITUDE: 123°34'21" W
TOWNSHIP 8N, RANGE 7W,
SECTION 8

Sheet List Table

1	Cover, Vicinity Map, & Sheet Index	18	Bridge Standards - Title Page
2	General Notes	19	Bridge Standards - General Notes
3	HIP General Conservation Measures (1 of 3)	20	Bridge Standard - Typical Elevation
4	HIP General Conservation Measures (2 of 3)	21	Bridge Standard - Bent Cap
5	HIP General Conservation Measures (3 of 3)	22	Bridge Standard - Abutment Cap
6	Erosion Control Details	23	Bridge Standard - 20 inch Wing Wall
7	Existing Conditions & Survey Control	24	Bridge Standard - Wingwall
8	Temporary Access & Proposed Conditions	25	Bridge Standard - 20 in Slab Beam
9	Proposed Opening - Plan, Sequence & Erosion Control	26	Bridge Standard - 30 inch Double Cell Box Beams
10	Bridge Span Profile and Bank Protection Section	27	Bridge Standard - Sloped Curb And Stand Pattern
11	Bridge General Plan & Elevation	28	Bridge Standard - Handrail Details
12	Bridge Pile Layout Plan & Typical Section	29	Bridge Standard - Lifting Details
13	13-DNU	30	Bridge Standard - Pile Splice
14	Temporary Fill Access Details	31	Bridge Standard - Embed Plates
15	Access Details	32	Bridge Standard - Deck and Curb Plates
16	Revegetation Plans	33	Bridge Standard - Curb and Walk Misc
17	Revegetation Details & Tables	34	Bridge Standard - Rebar Bending Diagram
		35	

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH - FINAL DESIGN



COVER, VICINITY MAP, &
SHEET INDEX

SHEET
1 OF 35

THIS PROJECT WAS DESIGNED IN ACCORDANCE
WITH THE BPA HABITAT IMPROVEMENT PROGRAM,
PROGRAMMATIC BIOLOGICAL OPINION (HBP).

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THE CONTRACTOR SHALL ATTEND A MANDATORY PRE-BID SITE MEETING.

THE CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH COLUMBIA RIVER ESTUARY STUDY TASKFORCE (CREST, OWNER) PRIOR TO BEGINNING CONSTRUCTION.
ALL WORK SHALL BE GOVERNED BY THE GENESEE AND WYOMING STANDARD SPECIFICATIONS AND PUBLIC PROJECT MANUAL.

ADDITIONAL WORK ON THIS PROJECT SHALL BE ACCOMPLISHED IN ACCORDANCE WITH THE 2021 OREGON DEPARTMENT OF TRANSPORTATION (ODOT) STANDARD SPECIFICATIONS.

IF ANY PORTION OF THESE REFERENCE CONDITIONS ARE IN CONFLICT WITH EACH OTHER, THE DOCUMENTS THAT GOVERN SHALL ADHERE TO THE FOLLOWING ORDER OF PRECEDENCE:

1. GENESEE AND WYOMING STANDARD CONSTRUCTION SPECIFICATIONS
2. AMERICAN RAILWAY ENGINEERING AND MAINTENANCE OF WAY ASSOCIATION MANUAL FOR RAILWAY ENGINEERING (AREA MANUAL)
3. ODOT (2021) STANDARD SPECIFICATION AND SPECIAL CONDITIONS MODIFYING THE STANDARD SPECIFICATIONS.

EXISTING DATA

TOPOGRAPHIC AND HYDROGRAPHIC SURVEY DATA WERE COLLECTED BY INTER-FLUVE, INC. & CREST STAFF USING TOTAL STATION, RTX GPS AND ECOLOGICAL SONAR EQUIPMENT ON JUNE 18 & 19, 2019, AND APRIL 29 2021. THESE DATA ARE REFERENCED TO:
HORIZONTAL DATUM: NAD83 OREGON STATE PLAN, NORTH ZONE
VERTICAL DATUM: NAVD83
UNITS: INTERNATIONAL FEET

LIDAR DATA OBTAINED FROM THE LOWER COLUMBIA ESTUARY PARTNERSHIP, COMMISSIONED BY THE US ARMY CORPS OF ENGINEERS, FLOWN BETWEEN DECEMBER 2, 2009 AND FEBRUARY 22, 2010 WAS USED TO SUPPLEMENT TOPOGRAPHIC SURVEY DATA TO DEVELOP DIGITAL ELEVATION MODELS.

PROPERTY BOUNDARIES SHOWN ARE FROM THE CLATSOP COUNTY TAXLOT GIS LAYER.

TIDAL DATUMS AND WATERS BOUNDARIES

TIDAL DATUMS DISPLAYED IN THIS PLANSET ARE REFERENCED TO NAVD83.

HIGHEST MEASURED TIDE (HMT) = 12.56' - RECORDED AT THE TONGUE POINT STATION (#9439040).

THE DATUMS BELOW ARE CALCULATED BY INTERPOLATION BETWEEN THE TONGUE POINT STATION (#9439040) & THE WAUNA STATION (#9439029) BASED ON LOCATION OF PROJECT SITE AS REFERENCED BY NAUTICAL MILE MILE (NM) ALONG THE COLUMBIA RIVER.

WARREN SLOUGH

ORDINARY HIGH WATER (OHW) = 10.24'

MEAN HIGHER HIGH WATER (MHHW)/ HIGH TIDE LINE = 8.89'.

MEAN HIGH WATER (MHW) = 8.24'.

MEAN LOWER LOW WATER (MLLW) = 0.86'.

THESE DO NOT NECESSARILY REPRESENT JURISDICTIONAL BOUNDARIES, WITHIN THE STATE OF OREGON, THE ARMY CORPS OF ENGINEERS, AND THE DEPARTMENT OF STATE LANDS HAVE THE FINAL AUTHORITY IN DETERMINING WATERS AND WETLANDS BOUNDARIES AND REGULATIONS.

SOILS

SOILS WITHIN THE PROJECT SITE CONSIST MAINLY OF COQUILLE-CLATSOP COMPLEX, 0 TO 1 PERCENT SLOPES. SOME HUMITROPEPETS, 25 TO 60 PERCENT SLOPES ARE ALSO PRESENT ALONG THE RAILROAD PRISM AS MAPPED BY NRCS.

BPA HIP

THIS PROJECT WAS DESIGNED IN ACCORDANCE WITH THE BPA HABITAT IMPROVEMENT PROGRAM. PROGRAMMATIC BIOLOGICAL OPINION (BIO), HIP GENERAL CONSERVATION MEASURES (GCM) ARE INCLUDED ON SHEETS 3 & 4 AND 5. SITE SPECIFIC DIRECTION IS INCLUDED IN THE FOLLOWING GENERAL NOTES. IN CASE OF A CONFLICT BETWEEN THE REGULATORY STANDARDS OR SPECIFICATIONS, THE MORE STRINGENT WILL PREVAIL, UNLESS SPECIFIED IN WRITING BY THE OWNER.

CONSTRUCTION TIMING

ALL CONSTRUCTION WORK SHALL OCCUR WITHIN THE DESIGNATED IN WATER WORK WINDOW, ANTICIPATED TO OCCUR JULY 15TH THROUGH SEPTEMBER 30TH, 2023.

EROSION CONTROL

CONTRACTOR SHALL BE SOLELY RESPONSIBLE AT OWN EXPENSE FOR PROVIDING AND MAINTAINING ALL NECESSARY EROSION CONTROL MEASURES WITHIN APPLICABLE EROSION CONTROL PERMITS, REGULATIONS, AND TO MAINTAIN CLEAN ACCESS ROUTES.

FISH SALVAGE

PRIOR TO BEGINNING WORK THE SITE SHALL BE ISOLATED AND DE-FISHED. FISH RESCUE TO BE COMPLETED BY EXPERIENCED FISH BIOLOGIST AND COORDINATED WITH OWNER. ADDITIONAL FISH SALVAGE MAY BE REQUIRED IF OVERLAND FLOW ENTERS THE PROJECT AREA DURING A HIGH TIDE.

CULTURAL RESOURCES

IF YOUR WORK BRINGS YOU INTO CONTACT WITH ANY OF THE FOLLOWING CULTURAL RESOURCES: -NATIVE AMERICAN CULTURAL ARTIFACTS (EXAMPLE: FLAKES, ARROWHEADS, STONE TOOLS, BONE TOOLS, POTTERY, ETC.)
-HISTORIC ERA ARTIFACTS (EXAMPLE: BUILDING FOUNDATIONS, HOMESTEADS, SHIPWRECKS, MINING CAMPS, ETC.)
-HUMAN SKELETAL REMAINS AND BONE FRAGMENTS
YOU MUST IMMEDIATELY DISCONTINUE ALL GROUND-DISTURBING ACTIVITY. DO NOT TOUCH OR MOVE THE OBJECTS AND MAINTAIN THE CONFIDENTIALITY OF THE SITE. FOLLOW THE PROCEDURES LISTED IN THE BPA INADVERTENT DISCOVERY PROCEDURE AND AWAIT FURTHER DIRECTION FROM BPA'S CULTURAL RESOURCES STAFF.

NAME	OFFICE #	CELL #
JENNA PETERSON	(503) 230-3018	N/A
KURT PERKINS	(503) 230-4454	(503) 459-0436
SUNSHINE SCAMIDT	(503) 230-5015	(503) 804-1815

ENVIRONMENTAL PROTECTION

ALL TEMPORARY STAGING AREAS SHALL BE LOCATED AT ELEVATION 12FT (NAVD83) OR HIGHER. ADD FILL TO DESIGNATED STAGING AREAS AS NECESSARY PRIOR TO USE.

THE FOOTPRINT OF FUEL STORAGE AND EQUIPMENT PARKING WITHIN DESIGNATED STAGING AREAS SHALL BE COVERED WITH AN IMBARIATION RESISTANT OIL ABSORBENT MAT MATERIAL. THE MAT MATERIAL SHALL BE 3-PLY POLYPROPYLENE/POLYETHYLENE OR APPROVED EQUAL.

EQUIPMENT SHALL REMAIN IN DESIGNATED STAGING AREAS AT ANY TIME THE CONTRACTOR IS NOT ON SITE, AND SHALL HAVE A SECOND OIL ABSORBENT MAT INSTALLED UNDER THE DAMAGE AS A "DIAPER". ALL REFUELING SHALL TAKE PLACE IN DESIGNATED STAGING AREAS, WITH BOTH GROUND AND "DIAPER" CONTAINMENT IN PLACE.

UTILITIES

THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR HAVING UTILITIES LOCATED PRIOR TO CONSTRUCTION ACTIVITIES. THE CONTRACTOR SHALL CALL (800-424-5555) FOR UTILITY LOCATE PRIOR TO CONSTRUCTION.

THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE AFFECTED UTILITY SERVICE TO REPORT ANY DAMAGE OR DESTROYED UTILITIES. THE CONTRACTOR SHALL PROVIDE EQUIPMENT AND LABOR TO AID THE AFFECTED UTILITY SERVICE IN REPAIRING DAMAGED OR DESTROYED UTILITIES AT NO ADDITIONAL COST.

CONSTRUCTION STAKING

STAKING OF PROJECT LIMITS, GRADE STAKES, AND ELEVATION CONTROL POINTS BY OTHERS. SOME FIELD ADJUSTMENTS TO THE LIMITS AND GRADES ARE TO BE EXPECTED.

CONTRACTOR SHALL MEET WITH THE OWNER TO DEFINE AND MARK ACCESS ROUTES AND LIMITS OF DISTURBANCE PRIOR TO MOBILIZATION OF EQUIPMENT OR MATERIALS ONTO THE SITE.

THE CONTRACTOR SHALL REPLACE DAMAGED OR DESTROYED CONSTRUCTION STAKES AT NO ADDITIONAL COST.

EQUIPMENT

EXCAVATIONS SHALL BE FITTED WITH NON-TOXIC HYDRAULIC FLUIDS AT NO ADDITIONAL COST.

CONTRACTORS SHALL UTILIZE CONSTRUCTION EQUIPMENT WHICH MINIMIZES IMPACTS TO TIDAL MARSHES - MATS, LOGS, LOW PRESSURE EQUIPMENT OR APPROVED EQUAL.

CONSTRUCTION ACCESS

CONTRACTOR TO NOTIFY G&W PUBLIC PROJECTS DEPARTMENT 30 DAYS PRIOR TO STARTING CONSTRUCTION. G&W FLAGGING SERVICES WILL BE REQUIRED FOR ALL WORK WITHIN G&W RIGHT OF WAY OR ANY WORK THAT HAS A "POTENTIAL TO FOUT".

PRIOR TO REVIEW OF ANY SITE ACCESS ON OR ADJACENT TO THE TRACK, PROVIDE EQUIPMENT SPECIFICATIONS TO UTILIZE EQUIPMENT ACCESS ROUTES.

CONTRACTOR SHALL SUBMIT AN ACCESS, STAGING, AND STOCKPILE PLAN TO THE OWNER FOR APPROVAL.

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR PROVIDING ANY REQUIRED TRAFFIC CONTROL INCLUDING, BUT NOT LIMITED TO, SIGNAGE AND FLAGGERS, AND FOR OBTAINING ANY REQUIRED ACCESS PERMITS.

FOR DURATION OF PROJECT, CONTRACTOR SHALL KEEP ALL PRIVATE AND PUBLIC ROADS USED FOR ACCESS FREE OF DEBRIS AND MUD.

ACCESS WILL INCLUDE TRAVERSING EXISTING UN-UTILIZED RAILROAD GRADE. CONTRACTOR SHALL RETURN THE RAIL LINE AND RAIL CORRIDOR (SOFT ON EITHER SIDE OF THE RAILROAD CENTERLINE) TO EXISTING OR BETTER CONDITION, AS APPROVED BY RAIL LINE OWNER.

ITEM	QUANTITY	UNIT
TOTAL REMOVAL BELOW ORDINARY HIGH WATER	685	CV
TOTAL REMOVAL ABOVE ORDINARY HIGH WATER	115	CV
TOTAL REMOVAL BELOW HIGHEST MEASURED TIDE	780	CV
TOTAL REMOVAL BELOW HIGH TIDE LINE	20	CV
TOTAL REMOVAL BELOW MEAN HIGH WATER TIDAL ELEVATION	585	CV
TOTAL FILL BELOW ORDINARY HIGH WATER	710	CV
TOTAL FILL BELOW HIGHEST MEASURED TIDE	800	CV
TOTAL FILL BELOW HIGH TIDE LINE	780	CV
TOTAL FILL BELOW MEAN HIGH WATER TIDAL ELEVATION	2	CV
TEMPORARY REMOVAL BELOW OHW	0	CV
TEMPORARY REMOVAL ABOVE OHW	0	CV
TEMPORARY FILL BELOW OHW	230	CV
TEMPORARY FILL ABOVE OHW	60	CV
EXCAVATION VOLUME	800	CV
NATIVE FILL VOLUME	800	CV
IMPORTED RIPRAP VOLUME	150	CV
IMPORTED COVER FILL VOLUME	0	CV
IMPORTED CLVERT BEDDING VOLUME	0	CV
ONSITE SPOILS PLACEMENT VOLUME	800	CV
REVEGETATION AREA	0.5	AC

NO.	BY	DATE	REVISION DESCRIPTION
1	MC	09/20/23	DESIGNED
2	MC	09/20/23	CHECKED
3	MC	09/20/23	PROJECT

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH - FINAL DESIGN



GENERAL NOTES

Draft
Not for Construction

HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIP ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USEFAS AND NIMFS) WILL BE APPLIED TO ALL ACTIONS OF THIS PROJECT.

PROJECT DESIGN AND SITE PREPARATION.

- A. ALL APPLICABLE REGULATION PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION.
- B. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, THE APPROPRIATE STATE AGENCY REMEDIATION, AND FILL PERMIT; USACE CLEAN WATER ACT (CWA) 404 PERMITS, CWA SECTION 401 WATER QUALITY CERTIFICATIONS, AND PERMA NO-RIDE ANALYSIS.
- C. 3. TIMING OF IN-WATER WORK.
 - A. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MTFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (MWW) WILL BE FOLLOWED.
 - B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S ECLD.
 - C. BULL TROUT: FOR AREAS WITH DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR AREAS KNOWN TO HAVE BULL TROUT, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.
 - D. LAMPREY: WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY WILL BE AVOIDED FROM MARCH 1 TO JULY 1 FOR REACHES <5,000 FEET IN ELEVATION AND FROM MARCH TO AUGUST 1 FOR REACHES >5,000 FEET. IF EITHER INTERPANE IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SAVED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES (SEE FISH SALVAGE AND ELECTROFISHING SECTIONS) TO MINIMIZE ADVERSE EFFECTS.
 - E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.
- C. 3. CONTAMINANTS.
 - A. EXCAVATION OF MORE THAN 20 CUBIC YARDS WILL REQUIRE A SITE VISIT AND DOCUMENTED ASSESSMENT FOR POTENTIAL CONTAMINANT SOURCES. THE SITE ASSESSMENT WILL BE STORED WITH PROJECT FILES OR AS AN APPENDIX TO THE BASIS OF DESIGN REPORT.
 - B. THE SITE ASSESSMENT WILL SUMMARIZE:
 1. THE SITE VISIT, CONDITION OF THE PROPERTY, AND IDENTIFICATION OF ANY AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES;
 2. AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
 3. INTERVIEWS WITH KNOWN ENGAGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
 4. THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION SOURCES.
 - C. 4. SITE LAYOUT AND FLAGGING.
 - A. CONSTRUCTION AREAS TO BE CLEARLY FLAGGED PRIOR TO CONSTRUCTION.
 - B. AREAS TO BE FLAGGED WILL INCLUDE:
 1. SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;
 2. EQUIPMENT ENTRY AND EXIT POINTS;
 3. ROAD AND STREAM CROSSING ALIGNMENTS;
 4. STAGING, STORAGE, AND STOCKPILE AREAS; AND
 5. NO-SPRAY AREAS AND BUFFERS.

- 5. TEMPORARY ACCESS ROADS AND PATHS.**

 - A. EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE. AREAS AND FLOODPLAINS WILL BE MINIMIZED.
 - B. VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING, IN AREAS OCCUPIED BY TERRESTRIAL, EA-LISTED SPECIES WILL BE MINIMIZED.
 - C. TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON LOSES WHERE GRASS, SOIL OR OTHER VEGETATION IS PRESENT. THE LOCATION OF EACH ROAD OR PATH SHOULD BE AS STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
 - D. THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
 - E. AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH INVOLVED DECOMPACTION TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND ANnuALS DECOMPACTION TO THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPE TO MATCH THE ORIGINAL COURSE.
- 6. TEMPORARY STREAM CROSSINGS**

 - A. EXISTING STREAM CROSSINGS OR BEDROCK WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.
 - B. TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOODS SHALL BE USED ONLY FOR TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR DIRECTLY OVER WATER.
 - C. FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WEET:
 1. THE LOCATION AND NUMBER OF ALL WEET CROSSINGS SHALL BE APPROVED BY THE BPA EC LEAD AND DOCUMENTED IN THE CONSTRUCTION PLANS;
 2. VEHICLES AND MACHINERY SHALL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHENEVER POSSIBLE;
 3. NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100 FEET DOWNSTREAM OF AN EXISTING REDD OR SPAWNING FISH; AND
 4. AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND BANKS RESTORED.
- 7. STAGING, STORAGE, AND STOCKPILE AREAS.**

 - A. STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE ~~LOCATED OUTSIDE THE FLOODPLAIN~~ ~~NATURAL WATERBODIES OR FLOOD-PRONE AREAS~~ ~~LOCATED WITHIN 100 FEET OF ANY~~ ~~ADJACENT WATERBODIES OR FLOOD-PRONE AREAS~~.
 - B. NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BouldERS, MAY BE STAGED WITHIN 150 FEET IF CLEARLY INDICATED IN THE PLANS THAT AREA IS FOR NATURAL MATERIALS ONLY.
 - C. ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.
 - D. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE DISPOSED OF OUTSIDE THE 100-YEAR FLOODPLAIN.
- 8. EQUIPMENT.**

 - A. MECHANIZED EQUIPMENT AND SERVICES WILL BE SELECTED OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT E.G., MINIMALLY-SIZED LOW PRESSURE TIRES, MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES, TEMPORARY MATS OR PLATES WITHin WEET AREAS OR ON SENSITIVE SOILS).
 - B. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN A CLEARLY IDENTIFIED STAGING AREA THAT MEETS STORAGE, CONSERVATION MEASURES.

- D. BODGEABLE LUBRICANTS AND FLUIDS WILL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL, AND LIVE WATER.
- E. EQUIPMENT WILL BE INSPECTED DAILY FOR FUEL LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND.
- F. EQUIPMENT WILL BE THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMOVE GREASE FREE EROSION CONTROL.
- G. TEMPORARY EROSION CONTROL MEASURES INCLUDE:
 1. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE CHANNEL BED OR BANKS OCCURS. EROSION PREVENTION ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE;
 2. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION;
 3. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE SEDGE MATS, FIBER MATTES, GEOTEXTILES, COIR LOGS, LOGGING, WOOD FIBER MULCH AND SOIL BONDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC;
 4. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND JACKPINE (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL. IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION;
 5. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL, AND
 6. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.
- H. EMERGENCY EROSION CONTROLS: THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
 1. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
 2. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.
- I. DUST ABATEMENT.
 - A. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USE, THE PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES.
 - B. WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
 - C. DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF ANY WATERBODIES OR STREAM CHANNELS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING MIXED 50:50 WITH WATER.
 - D. APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING ON JUST BEFORE WET WEATHER, AND AT STREETAM CROSSINGS ON OTHER AREAS THAT COULD RESULT IN UNLIMITED TRAFFIC ON THE ROADWAY. APPLICATIONS OF DUST-ABATEMENT CHEMICALS TO WATERBODIES OR AREAS WITHIN 25 FEET A WATERBODIES OR STREAM CHANNEL, DISTANCES MAY BE GREATER WHEN VEGETATION IS SPARSE ON SLOPES ARE STEEP).
 - E. SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
 - F. PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH - FINAL DESIGN



HIP GENERAL CONSERVATION
MEASURES (1 OF 3)

SHEET

3 OF 35

Draft
Not for Construction

NO.		BY	DATE	REVISION DESCRIPTION	ZS	MC	CA	MB	CA	DESIGNED	DATE	PROJECT	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION WARREN SLOUGH - FINAL DESIGN				HIP GENERAL CONSERVATION MEASURES (2 OF 3)	SHEET 4 OF 35
<p>PROJECT DESIGN AND SITE PREPARATION (CONTINUED).</p> <p>11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES:</p> <p>A. A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES FOR BE AVAILABLE ON-SITE.</p> <p>B. WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.</p> <p>C. SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) APPLICABLE FOR THE SITE AND QUANTITY OF HAZARDOUS MATERIAL USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.</p> <p>D. WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.</p> <p>E. ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARP, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.</p> <p>F. PUMPS USED ADJACENT TO WATER SHALL USE SPILL CONTAINMENT SYSTEMS.</p> <p>12. INVASIVE SPECIES CONTROL:</p> <p>A. PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.</p> <p>B. WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.</p> <p>C. WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES UNLESS DECONTAMINATION PROCEDURES HAVE BEEN APPROVED BY THE EC LEAD.</p> <p>WORK AREA ISOLATION AND FISH SALVAGE.</p> <p>1. WORK AREA ISOLATION:</p> <p>A. ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300-FEET UPSTREAM FROM KNOWN SPawning HABITATS.</p> <p>B. WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES WILL COMPLY WITH THE IN-WATER WORK WINDOW.</p> <p>C. DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS AND AREAS (COFFER DAMS, PUMPS, DISCHARGE AREAS, FISH SCREENS, FISH RELEASE AREAS, ETC.).</p> <p>D. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING (EITHER BEFORE 06:00 AM OR AFTER 04:00 PM), AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.</p> <p>2. FISH SALVAGE:</p> <p>A. MONITORING AND RECORDING WILL TAKE PLACE FOR DURATION OF SALVAGE. THE SALVAGE REPORT WILL BE COMMUNICATED TO AGENCIES VIA THE PROJECT COMPLETION FORM (PCF).</p> <p>B. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING CONDITIONS TO MINIMIZE STRESS TO FISH SPECIES, VERSUS LATE IN THE DAY.</p> <p>C. SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODS, AND CONSERVATION MEASURES SPECIFIED BELOW:</p> <ol style="list-style-type: none">1. SLOWLY REDUCE WATER FROM THE WORK AREA TO ALLOW SOME FISH TO LEAVE VOLUNTARILY.2. BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.3. BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH AS LONG AS PASSAGE REQUIREMENTS ARE MET.4. NETS WILL BE MONITORED HOURLY DURING IN-STREAM DISTURBANCE. <p>5. IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED AND FREE OF ORGANIC ACCUMULATION. IF BULL TROUT ARE PRESENT, NETS ARE TO BE CHECKED EVERY 4 HOURS FOR FISH IMPINGEMENT.</p> <p>6. CAPTURE FISH THROUGH SEINING AND RELOCATE TO STREAMS.</p> <p>7. WHILE DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.</p> <p>8. SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.</p> <p>9. MANNING TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.</p> <p>10. ELECTROFISH CAPTURE AND RELOCATED FISH NOT CAUGHT DURING SEINING PER ELECTROFISH CONSERVATION MEASURES.</p> <p>11. CONTINUE TO SLOWLY DEWATER STREAM REACH.</p> <p>12. COLLECT ANY REMAINING FISH IN COLD-WATER BUCKETS AND RELOCATED TO THE STREAM.</p> <p>13. LIMIT THE TIME FISH ARE IN A TRANSPORT BUCKET.</p> <p>14. MINIMIZE PREDATION BY TRANSPORTING COMPARABLE SIZES IN BUCKETS.</p> <p>15. BUCKET WATER TO BE CHANGED EVERY 15 MINUTES OR AERATED.</p> <p>16. BUCKETS WILL BE KEPT IN SHADED AREAS OR COVERED.</p> <p>17. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.</p> <p>D. SALVAGE GUIDELINES FOR BULL TROUT, LAMPREY, MUSSELS, AND NATIVE FISH:</p> <ol style="list-style-type: none">1. CONDUCT SITE SURVEY TO ESTIMATE SALVAGE NUMBERS.2. PRE-SELECT SITES FOR RELEASE AND/OR MUSSEL BED RELOCATION.3. SALVAGE OF BULL TROUT WILL NOT TAKE PLACE WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.4. IF DRAWDOWN LESS THAN 48 HOURS, SALVAGE OF LAMPREY AND MUSSELS MAY NOT BE NECESSARY IF TEMPERATURES SUPPORT SURVIVAL IN SEDIMENTS.5. SALVAGE MUSSELS BY HAND, LOCATING BY SNORKELING OR WADING.6. SALVAGE LAMPREY BY ELECTROFISHING (SEE ELECTROFISHING FOR LARVAL LAMPREY SETTINGS AND LARVAL LAMPREY DRY SHOCKING SETTINGS).7. SALVAGE BROWN FISH AFTER LAMPREY WITH NETS OR ELECTROFISHING (SEE ELECTROFISHING FOR APPROPRIATE SETTINGS).8. REGULARLY INSPECT DEWATERED SITE SINCE LAMPREY LIKELY TO EMERGE AFTER DEWATERING AND MUSSELS MAY BECOME VISIBLE.9. MUSSELS MAY BE TRANSFERRED IN COOLERS.10. MUSSELS WILL BE PLACED INDIVIDUALLY TO ENSURE ABILITY TO BURROW INTO NEW HABITAT. <p>3. ELECTROFISHING:</p> <p>A. INITIAL SITE SURVEY AND INITIAL SETTINGS.</p> <ol style="list-style-type: none">1. IDENTIFY SPawning ADULTS AND ACTIVE REDDS TO AVOID.2. RECORD WATER TEMPERATURE. ELECTROFISHING WILL NOT OCCUR WHEN WATER TEMPERATURES ARE ABOVE 18 DEGREES CELSIUS.3. IF POSSIBLE, A BLOCK NET WILL BE PLACED DOWNSTREAM AND CHECKED REGULARLY TO CAPTURE STUNNED FISH THAT DRIFT DOWNSTREAM.4. INITIAL SETTINGS WILL BE 100 VOLTS, PULSE WIDTH OF 500 MICRO SECONDS, AND PULSE RATE OF 30 HERTZ.5. RECORDS FOR CONDUCTIVITY, WATER TEMPERATURE, AIR TEMPERATURE, ELECTROFISHING SETTINGS, ELECTROFISHER MODEL, ELECTROFISHER CALIBRATION, FISH CONDITIONS, FISH MORTALITIES, AND TOTAL CAPTURE RATES WILL BE INCLUDED IN THE SALVAGE LOG BOOK. <p>B. ELECTROFISHING TECHNIQUE:</p> <ol style="list-style-type: none">1. SAMPLING WILL BEGIN USING STRAIGHT DC. POWER WILL REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. GRADUALLY INCREASE VOLTAGE WHILE REMAINING BELOW MAXIMUM LEVELS.2. MAXIMUM VOLTAGE WILL BE 1100 VOLTS WHEN CONDUCTIVITY IS <100 MILLISECONDS, 800 VOLTS WHEN CONDUCTIVITY IS BETWEEN 100 AND 300 MILLISECONDS, AND 400 VOLTS WHEN CONDUCTIVITY IS >300 MILLISECONDS.3. IF FISH CAPTURE IS NOT SUCCESSFUL USING STRAIGHT DC, THE ELECTROFISHER WILL BE SET TO INITIAL VOLTAGE FOR 30 SECONDS, THEN PULSE FREQUENCY WILL BE GRADUALLY INCREASED WITHIN MAXIMUM VALUES UNTIL CAPTURE IS SUCCESSFUL.4. MAXIMUM PULSE WIDTH IS 5 MILLISECONDS, MAXIMUM PULSE RATE IS 70 HERTZ.5. ELECTROFISHING WILL NOT OCCUR IN ONE AREA FOR AN EXTENDED PERIOD.6. THE ANODE WILL NOT INTENTIONALLY COME INTO CONTACT WITH FISH. THE ZONE FOR POTENTIAL INJURY OF 0.5M FROM THE ANODE WILL BE AVOIDED.7. SETTINGS WILL BE LOWERED IN SHALLOWER WATER SINCE VOLTAGE GRADIENTS LIKELY TO INCREASE.8. ELECTROFISHING WILL NOT OCCUR IN TURBID WATER WHERE VISIBILITY IS POOR (I.E. UNABLE TO SEE THE BED OF THE STREAM).9. OPERATIONS WILL IMMEDIATELY STOP IF MORTALITY OR OBVIOUS FISH INJURY IS OBSERVED. ELECTROFISHING SETTINGS WILL BE REEVALUATED.10. SAMPLE PROCESSING. <p>C. SAMPLE PROCESSING:</p> <ol style="list-style-type: none">1. FISH SHALL BE SORTED BY SIZE TO AVOID PREDATION DURING CONTAINMENT.2. SAMPLERS WILL REGULARLY CHECK CONDITIONS OF FISH HOLDING CONTAINERS, AIR PUMPS, WATER TRANSFERS, ETC.3. FISH WILL BE OBSERVED FOR GENERAL CONDITIONS AND INJURIES4. EACH FISH WILL BE COMPLETELY REVIVED BEFORE RELEASE. ESA-LISTED SPECIES WILL BE PRIORITIZED FOR SUCCESSFUL RELEASE. <p>D. BULL TROUT ELECTROFISHING:</p> <ol style="list-style-type: none">1. ELECTROFISHING FOR BULL TROUT WILL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. IN RHO HABITATS ELECTROFISHING MAY OCCUR ANY TIME.2. ELECTROFISHING OF BULL TROUT WILL NOT OCCUR WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS. <p>E. LARVAL LAMPREY ELECTROFISHING:</p> <ol style="list-style-type: none">1. PERMISSION FROM EC LEAD WILL BE OBTAINED IF LARVAL LAMPREY ELECTROFISHER IS NOT ONE OF FOLLOWING PRE-APPROVED MODELS: ABP-2 "WISCONSIN", SMITH-ROOT LR-24, OR SMITH-ROOT APEX BACKPACK.2. LARVAL LAMPREY SAMPLING WILL INCORPORATE 2-STAGE METHOD: "TICKLE" AND "STUN".3. FIRST STAGE: USE 125 VOLT DC WITH A 25 PERCENT DUTY CYCLE APPLIED AT A SLOW RATE OF 3 PULSES PER SECOND. IF TEMPERATURES ARE BELOW 10 DEGREES CELSIUS, VOLTAGE MAY BE INCREASED GRADUALLY (NOT TO EXCEED 200 VOLTS), BUNSTED PULSES (THREE SLOW AND ONE SHARP) RECOMMENDED TO INCREASE ENERGENCE.4. SECOND STAGE (OPTIONAL FOR EXPERIENCED NETTERS): IMMEDIATELY AFTER LAMPREY EMERGE, USE A FAST PULSE SETTING OF 30 PULSES PER SECOND.5. USE DIP NETS FOR VISIBLE LAMPREY, SEINES AND FINE MESH NET SWEEPS MAY BE USED IN POOR VISIBILITY.6. SAMPLING WILL OCCUR SLOWLY (>60 SECONDS PER METER) STARTING AT UPSTREAM AND WORKING DOWNSTREAM.7. MULTIPLE SWEEPS TO OCCUR WITH 15 MINUTES BETWEEN SWEEPS.8. POST-DRAWDOWN "DRY-SHOCKING" WILL BE APPLIED IF LARVAL LAMPREY CONTINUE TO EMERGE. ANODES TO BE PLACED ONE METER APART TO SAMPLE ONE SQUARE METER AT A TIME FOR AT LEAST 60 SECONDS. FOR TEMPERATURES LESS THAN 10 DEGREES CELSIUS, MAXIMUM VOLTAGE MAY BE GRADUALLY INCREASED TO 400 VOLTS (DRY-SHOCKING ONLY).																		

WORK AREA ISOLATION AND FISH SALVAGE (CONTINUED).

4. DEWATERING.

- DEWATERING WILL OCCUR AT A RATE SLOW ENOUGH TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA.
- WHERE A GRADITY FEED DIVERSION IS NOT POSSIBLE A PUMP MAY BE USED. PUMPS WILL BE INSTALLED TO AVOID REPETITIVE DEWATERING AND REWATERING.
- WHEN FISH ARE PRESENT, PUMPS WILL BE SCREENED IN ACCORDANCE WITH NMFS FISH SCREEN CRITERIA. NMFS ENGINEERING REVIEW AND APPROVAL WILL BE OBTAINED FOR PUMPS EXCEEDING 3 CUBIC FEET PER SECOND.
- DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO THE STREAM CHANNEL AND RIPARIAN VEGETATION.
- SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OF INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL AND VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

CONSTRUCTION AND POST CONSTRUCTION CONSERVATION MEASURES.

1. FISH PASSAGE.

- FISH PASSAGE WILL BE PROVIDED FOR ADULT AND JUVENILE FISH LIKELY TO BE PRESENT DURING CONSTRUCTION UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION. THE STREAM IS NATURALLY IMPASSABLE, OR PASSAGE WILL NEGATIVELY IMPACT ESA-LISTED SPECIES OR THEIR HABITAT.
- FISH PASSAGE ALTERNATIVES WILL BE APPROVED BY THE BPA EC LEAD UNDER ADVICE BY THE NMFS HABITAT BIOLOGIST.

2. CONSTRUCTION AND DISCHARGE WATER.

- SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.
- DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.
- CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS, AND OTHER POLLUTANTS.
- TIME AND EXTENT OF DISTURBANCE.
 - EARTHWORK REQUIRING IN-STREAM MECHANIZED EQUIPMENT (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING, AND COMPACTING) WILL BE COMPLETED AS QUICKLY AS POSSIBLE.
 - MECHANIZED EQUIPMENT WILL WORK FROM TOP OF BANK UNLESS WORK FROM ANOTHER LOCATION WILL RESULT IN LESS HABITAT DISTURBANCE (TURBIDITY, VEGETATION DISTURBANCE, ETC.).

4. CESSATION OF WORK.

- PROJECT OPERATIONS WILL CEASE WHEN HIGH FLOW CONDITIONS MAY RESULT IN INUNDATION OF THE PROJECT AREA (FLOOD EFFORTS TO DECREASE DAMAGES TO NATURAL RESOURCES PERMITTED).
- WATER QUALITY LEVELS EXCEEDED. SEE CWA SECTION 401 WATER QUALITY CERTIFICATION AND TURBIDITY MEASURES.
- SITE RESTORATION.
 - DISTURBED AREAS, STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED TO IMPROVED OR PRE-PROJECT CONDITIONS.
 - PROJECT-RELATED WASTE WILL BE REMOVED.
 - TEMPORARY ACCESS ROADS AND STAGING WILL BE DECOMPACTED AND RESTORED. SOILS WILL BE LOOSESED IF NEEDED FOR REVEGETATION OR WATER INFILTRATION.
 - THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE TO MONITOR AND MAINTAIN THE SITE OVER THE LIFE OF THE PROJECT.

- PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.
- REVEGETATION.

TURBIDITY MONITORING.

- RECORD THE READING, LOCATION, AND TIME FOR THE BACKGROUND READING APPROXIMATELY 100 FEET UPSTREAM OF THE PROJECT AREA USING A RECENTLY CALIBRATED TURBIDIMETER OR VIA VISUAL OBSERVATION (SEE THE HIP HANDBOOK TURBIDITY MONITORING SECTION FOR A VISUAL OBSERVATION KEY).
- RECORD THE TURBIDITY READING, LOCATION, AND TIME AT THE MEASUREMENT COMPLIANCE LOCATION POINT.
 - 50 FEET DOWNSTREAM FOR STREAMS LESS THAN 30 FEET WIDE.
 - 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE.
 - 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE.
 - 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR.
- TURBIDITY SHALL BE MEASURED (BACKGROUND LOCATION AND COMPLIANCE POINTS) EVERY 4 HOURS WHILE WORK IS BEING IMPLEMENTED.
- IF THERE IS A VISIBLE DIFFERENCE BETWEEN A COMPLIANCE POINT AND THE BACKGROUND, THE EXCEEDANCE SHALL BE NOTED IN THE PROJECT COMPLETION FORM (PCF). ADJUSTMENTS OR CORRECTIVE MEASURES WILL BE TAKEN IN ORDER TO REDUCE TURBIDITY.
- IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (AFTER 8 HOURS), THE ACTIVITY WILL STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND. THE BPA EC LEAD WILL BE NOTIFIED OF ALL EXCEEDANCES AND CORRECTIVE ACTIONS AT PROJECT COMPLETION.
- IF TURBIDITY CONTROLS (COFFER DAMS, WADDLES, FENCING, ETC.) ARE DETERMINED INEFFECTIVE, CREWS WILL BE MOBILIZED TO MODIFY AS NECESSARY. OCCURRENCES WILL BE DOCUMENTED IN THE PROJECT COMPLETION FORM (PCF).
- FINAL TURBIDITY READINGS, EXCEEDANCES, AND CONTROL FAILURES WILL BE SUBMITTED TO THE BPA EC LEAD USING THE PROJECT COMPLETION FORM (PCF).

STAGED REWATERING PLAN.

- WHEN REINTRODUCING WATER TO DEWATERED AREAS AND NEWLY CONSTRUCTED CHANNELS, A STAGED REWATERING PLAN WILL BE APPLIED.
- THE FOLLOWING WILL BE APPLIED TO ALL REWATERING EFFORTS. COMPLEX REWATERING EFFORTS MAY REQUIRE ADDITIONAL NOTES OR A DEDICATED SHEET IN THE CONSTRUCTION DETAILS.
 - TURBIDITY MONITORING PROTOCOL WILL BE APPLIED TO REWATERING EFFORTS.
 - PRE-WASH THE AREA BEFORE REWATERING. TURBID WASH WATER WILL BE DETAINED AND PUMPED TO THE FLOODPLAIN OR SEDIMENT CAPTURE AREAS RATHER THAN DISCHARGING TO FISH-BEARING STREAMS.
 - INSTALL SEINE NETS AT UPSTREAM END TO PREVENT FISH FROM MOVING DOWNSTREAM UNTIL 2/3 OF TOTAL FLOW IS RESTORED TO THE CHANNEL.
 - STARTING IN EARLY MORNING INTRODUCE 1/3 OF NEW CHANNEL FLOW OVER PERIOD OF 1-2 HOURS.
 - INTRODUCE SECOND THIRD OF FLOW OVER NEXT 1 TO 2 HOURS AND BEGIN FISH SALVAGE OF BYPASS CHANNEL IF FISH ARE PRESENT.
 - REMOVE UPSTREAM SEINE NETS ONCE 2/3 FLOW IN REWATERED CHANNEL AND DOWNSTREAM TURBIDITY IS WITHIN ACCEPTABLE RANGE (LESS THAN 40 NTU OR LESS THAN 10% BACKGROUND).
 - INTRODUCE FINAL THIRD OF FLOW ONCE FISH SALVAGE EFFORTS ARE COMPLETE AND DOWNSTREAM TURBIDITY VERIFIED TO BE WITHIN ACCEPTABLE RANGE.
 - INSTALL PLUG TO BLOCK FLOW INTO OLD CHANNEL OR BYPASS. REMOVE ANY REMAINING SEINE NETS.
 - IN LAMPREY SYSTEMS, LAMPREY SALVAGE AND DRY SHOCKING MAY BE NECESSARY.

NO.	BY	DATE	REVISION DESCRIPTION	ZS	MC, CA, MB	CA
				DRAWN	DESIGNED	CHECKED
				MC	09/0023	190220
				APPROVED	DATE	PROJECT

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH - FINAL DESIGN

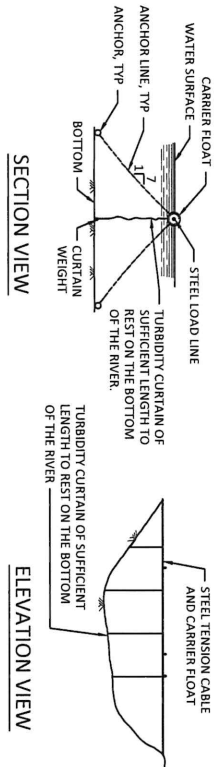


HIP GENERAL CONSERVATION
MEASURES (3 OF 3)

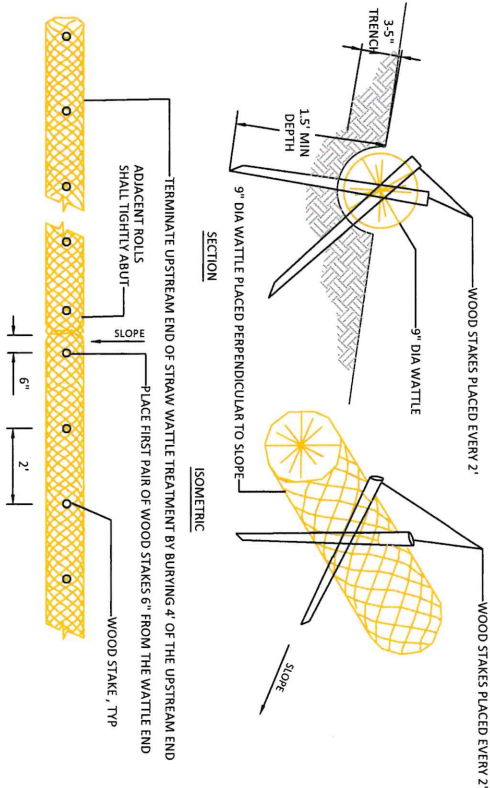
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NO.	BY	DATE	REVISION DESCRIPTION	ZS DRAWN	MC, CA, MB DESIGNED	CA CHECKED	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION WARREN SLOUGH - FINAL DESIGN	 301 Technology Avenue, Suite 101 Westborough, MA 01581 www.intertive.com	EROSION CONTROL DETAILS	SHEET 6 OF 35
				MC	09/2023	190220				
				APPROVED	DATE	PROJECT				

- ONLY TURBIDITY CURTAINS OF TYPE II OR GREATER STRENGTH SHALL BE ACCEPTED. THE TURBIDITY CURTAIN IS TO BE INSTALLED AT LOCATIONS SHOWN ON THE PLANS.
- THE TURBIDITY CURTAIN SHALL BE OF SUFFICIENT LENGTH TO REST ON THE BOTTOM OF THE RIVER.
- THE TURBIDITY CURTAIN SHALL BE A CONTINUOUS ROLL OF CURTAIN MATERIAL SUFFICIENT TO ENCLOSE THE ENTIRE WORK AREA AND PREVENT A VISUALLY DETECTABLE DIFFERENCE IN TURBIDITY BETWEEN THE BACKGROUND AND COMPLIANCE TURBIDITY MONITORING SITES. IF ADDITIONAL FABRIC IS NEEDED TO ENCLOSE WORK AREA, SEE "PANEL CONNECTORS".
- CURTAIN MATERIAL - WITHIN NAVIGABLE WATERS, THE CURTAIN MATERIAL SHALL BE A BRIGHT COLOR (YELLOW OR ORANGE) TO ATTRACT THE ATTENTION OF ANY BOATERS OR SWIMMERS. THE CURTAIN MATERIAL SELECTION SHALL TAKE INTO ACCOUNT THE EXPECTED POLLUTANT PARTICLE SIZE BASED ON THE PRIMARY SEDIMENT IDENTIFIED.
- PANEL CONNECTORS - IF ADDITIONAL FABRIC PANELS ARE NEEDED THE SEAMS OF THE FABRIC SHALL BE GLUED, WELDED, OR SEWN AND SHALL HAVE 90% OF THE STRENGTH CHARACTERISTICS OF THE FABRIC. IF ADJACENT PANELS ARE NECESSARY, THEY SHALL BE CONNECTED USING ONE OF THE FOLLOWING METHODS: A) SEW THE PANELS TOGETHER USING TWO STITCH LINES PER SEAM AND A STITCH DENSITY OF SIX TO TEN STITCHES PER INCH; B) JOIN THE PANELS OF FABRIC USING GROMMETED HOLES AND ROPE LACING. THE HOLES SHALL BE ONLY SLIGHTLY LARGER THAN THE ROPE TO MINIMIZE LEAKAGE. C) USE COMMERCIALY AVAILABLE ALUMINUM SLIDE-CONNECTORS.
- FLOTATION - FLOTATION SEGMENTS SHALL BE RETAINED INTO A SEWN OR HEAT WELDED SEAM ALONG THE ENTIRE TOP OF THE TURBIDITY CURTAIN TO FORM A CONTINUOUS FLOAT. POSSIBLE FLOTATION MATERIAL INCLUDES EXPANDED POLYSTYRENE FLOATS OR CLOSED CELL SOLID PLASTIC FOAM FLOATS.
- LOAD LINE - TURBIDITY CURTAINS SHALL REQUIRE A LOAD LINE. THE LOAD LINE SHALL BE A MINIMUM 5/16" STEEL CABLE INSTALLED IN THE SLEEVE WITH THE FLOTATION SEGMENTS OR JUST BELOW THE FLOATS IF IN ITS OWN SLEEVE.
- CURTAIN WEIGHT - TURBIDITY CURTAINS SHALL REQUIRE A CURTAIN WEIGHT. THE CURTAIN WEIGHT SHALL BE A MINIMUM 5/16 CHAIN BALLAST INSTALLED IN THE BOTTOM SLEEVE.
- MOORING - THE TURBIDITY CURTAIN SHALL BE PROPERLY ANCHORED BOTH ONSHORE AND IN THE WATER. THE TURBIDITY CURTAIN SHALL EXTEND ONTO SHORE AND BE TIED TO A POST OR STABLE LARGE DIAMETER TREE (8" DBH OR GREATER). THE ANCHORING SYSTEM SHALL BE DESIGNED BASED ON THE ANTICIPATED CONDITIONS. THE IN-WATER ANCHOR SYSTEM SHALL CONSIST OF AN ANCHOR, ANCHOR LINE, BUOY, CROWN BUOY, AND MOORING CABLE. AS NEEDED, THE TURBIDITY CURTAIN SHALL BE ANCHORED EVERY 100 FEET AT A MINIMUM. FOR HIGHER FLOW SITUATIONS, WHERE THE TURBIDITY APPROACHES 5 FPS AND/OR WAVES OVER 1 FT ARE ANTICIPATED, THE TURBIDITY CURTAIN SHALL BE ANCHORED EVERY 50 FT. TURBIDITY CURTAINS SUBJECT TO REVERSING CURRENTS, WAVES, OR FLOW FROM BOTH SIDES SHALL BE ANCHORED ON BOTH SIDES. THE ANCHORS SHALL BE PLACED SUCH THAT THE STRESS OF THE CURTAIN AND ANCHOR LINE IS 7H:1V. THIS WILL MINIMIZE THE STRESS ON THE TURBIDITY CURTAIN AND INCREASE THE HOLDING POWER OF THE ANCHOR. A MINIMUM 1/2" DIA ROPE OR 1/4" DIA CABLE SHALL BE USED FOR THE ANCHOR LINE.
- REMOVAL - THE TURBIDITY CURTAIN SHALL ONLY BE REMOVED WHEN THERE IS NO VISUALLY DETECTABLE DIFFERENCE IN TURBIDITY BETWEEN THE BACKGROUND AND COMPLIANCE TURBIDITY MONITORING SITES.



1
6
TYPICAL DETAIL - TURBIDITY CURTAIN
NOT TO SCALE



2
6
TYPICAL DETAIL - STRAW WATTLE
NOT TO SCALE

GENERAL NOTES ON INSTALLING STRAW WATTLES

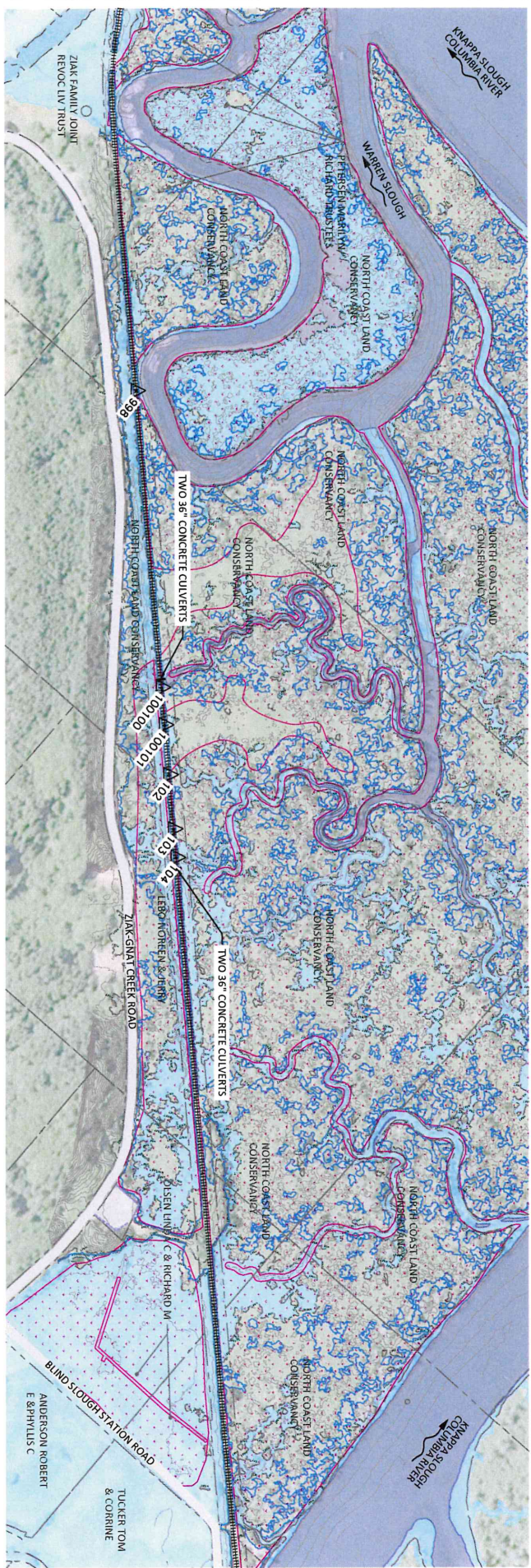
- INSTALL WATTLES WITHIN TRENCH, SO THAT NO GAPS EXIST BETWEEN THE SOIL AND THE BOTTOM OF THE WATTLE. THE ENDS OF ADJACENT WATTLES SHALL BE TIGHTLY ABUTTED SO THAT NO OPENING EXISTS FOR WATER OR SEDIMENT TO PASS THROUGH.
- WOOD STAKES SHALL BE USED TO FASTEN THE WATTLES TO THE SOIL. WHEN CONDITIONS WARRANT, A STRAIGHT METAL BAR CAN BE USED TO DRIVE A PILOT HOLE THROUGH THE WATTLE AND INTO THE SOIL.
- PAIRS OF WOOD STAKES SHALL BE PLACED 6" FROM THE WATTLE END, ANGLED SUCH THAT ONE STAKE IS PERPENDICULAR TO GRADE AND ONE IS AT A 45° ANGLE TO GRADE. WOOD STAKE PAIRS SHALL BE SPACED AT 2 FEET CENTERS LEAVING LESS THAN 1.2 INCHES OF STAKE EXPOSED ABOVE THE WATTLE.
- AT TERMINAL ENDS OF WATTLES, EXCAVATE MIN 2' DEEP KEY TRENCH AND BURY A MIN 4' OF WATTLE END.
- CARE SHALL BE TAKEN DURING INSTALLATION SO AS TO AVOID DAMAGE OCCURRING TO THE WATTLE AS A RESULT OF THE INSTALLATION PROCESS. SHOULD THE WATTLE BE DAMAGED DURING INSTALLATION, A WOODEN STAKE SHALL BE PLACED EITHER SIDE OF THE DAMAGED AREA TERMINATING THE WATTLE SEGMENT.
- ANY WATTLE DAMAGED DURING PLACEMENT SHALL BE REPLACED AS DIRECTED BY AGENCY STAFF, AT THE CONTRACTOR'S EXPENSE.
- INSTALL WATTLES IN HIL LOCATIONS ACCORDING TO THE FOLLOWING GUIDELINES:

STRAW WATTLE VERTICAL SPACING	
SLOPE	SPACING
2:1	10'
2.1:5:1	25'
<5:1	50'

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NOTE:
INUNDATION EXTENTS ARE BASED ON EXISTING TOPOGRAPHIC CONTOURS. ACTUAL SITE INUNDATION MAY VARY DUE TO IMPAIRED CONNECTIVITY.

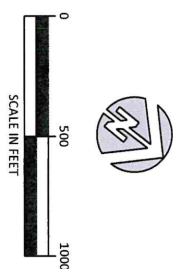


LEGEND

-
- Legend:
- Existing Contours (5ft)
 - Existing Railroad Tracks
 - Taxlots (From Clatsop County GIS)
 - NWI Wetlands
 - Highest Measured Tide (12.56ft)
 - Ordinary High Water (10.24ft)
 - Mean Higher High Water (8.89ft)
 - Mean Lower Low Water (0.86ft)
 - Survey Control Point

SURVEY CONTROL

POINT #	NORTHING	ELEVATION	DESCRIPTION
100100	935880.72	702377.81	MAIL
100011	936011.41	7023516.52	12.57 MAIL
102	936186.05	7023700.78	12.66 MAIL
103	936376.61	7023900.24	12.63 MAIL
104	936477.87	7024005.19	12.61 MAIL
998	934862.41	7022282.83	13.49 MAIL



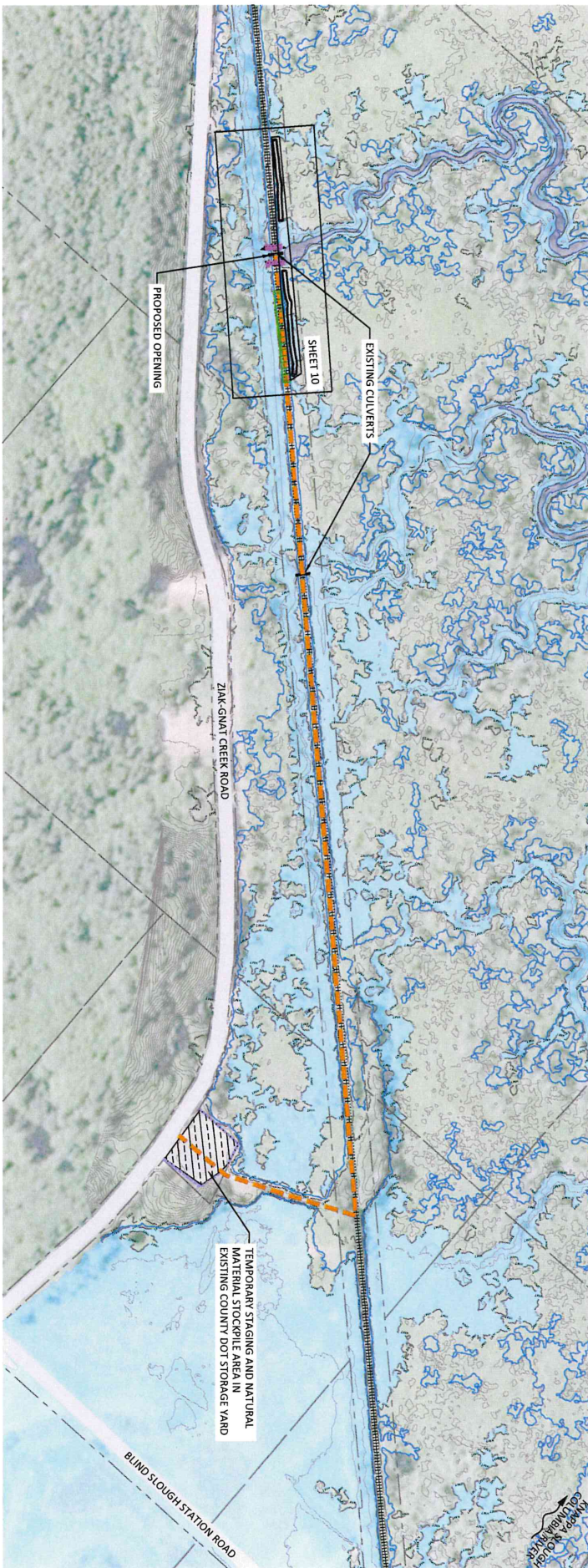
COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH - FINAL DESIGN



501 Portway Avenue, Suite 101
Hood River, OR 97031
S41.386.9003
www.interfluvive.com

EXISTING CONDITIONS & SURVEY CONTROL

SHEET



LEGEND

- EXISTING CONTOURS (5FT)
- PROPOSED CONTOUR (1 FT)
- EXISTING RAILROAD TRACKS
- TAXLOTS (FROM CLATSOP COUNTY GIS)
- TEMPORARY ACCESS ROUTE
- STRAW WATTLES
- HIGHEST MEASURED TIDE (12.56FT)
- ORDINARY HIGH WATER (10.24FT)
- MEAN HIGHER HIGH WATER (8.89FT)
- MEAN LOWER LOW WATER (0.86FT)
- TEMPORARY STAGING / NATURAL MATERIAL STOCKPILE AREA

NOTES:
PREPARE ACCESS TO MINIMIZE DISTURBANCE TO MATURE EXISTING VEGETATION.

SEE DETAIL 1, SHEET ## FOR RAILROAD OVERLAND ACCESS ALTERNATIVES.
INUNDATION EXTENTS ARE BASED ON EXISTING TOPOGRAPHIC CONTOURS.
ACTUAL SITE INUNDATION MAY VARY DUE TO IMPAIRED CONNECTIVITY.



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COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH - FINAL DESIGN



TEMPORARY ACCESS &
PROPOSED
CONDITIONS

SHEET
8 OF 35

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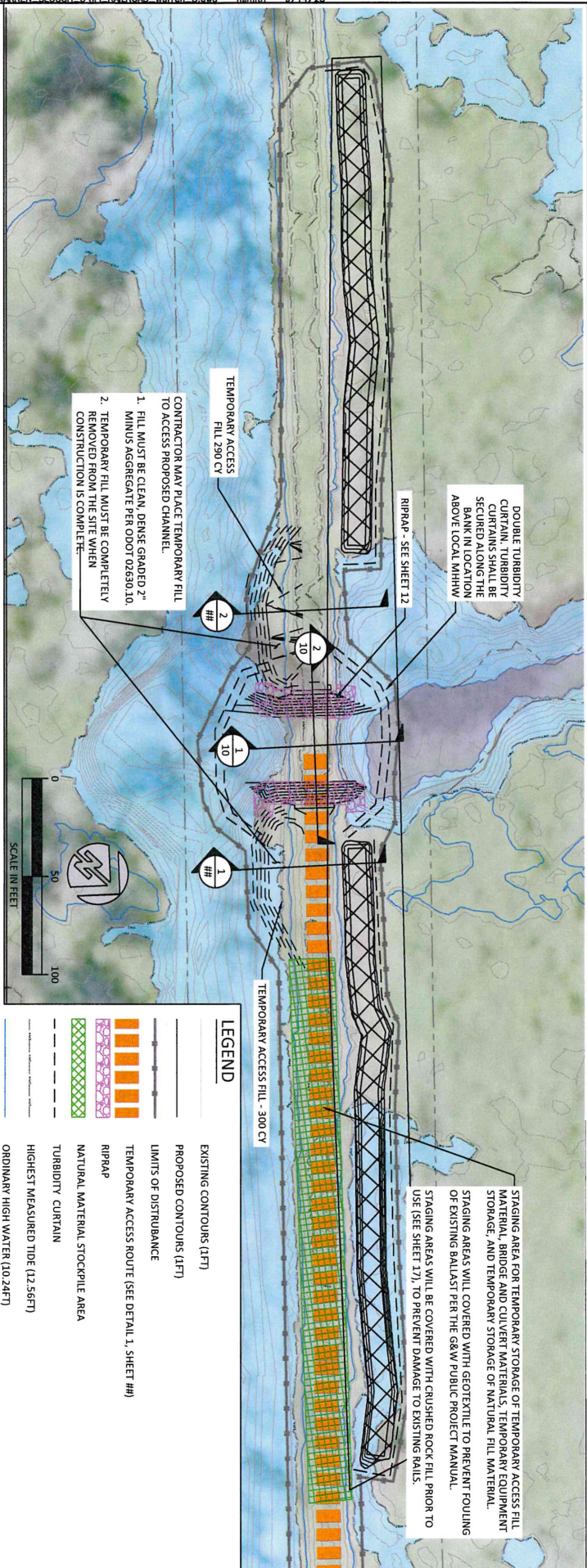
COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
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PROPOSED OPENING - PLAN,
SEQUENCE & EROSION
CONTROL

SHEET

9 OF 35



PROPOSED SEQUENCING PLAN

1. ACCESS SITE ALONG RAILROAD, STAGE MATERIAL IN APPROVED SITE.
2. REMOVE RAILS IN ZONE OF EXCAVATION.
3. INSTALL TURBIDITY CURTAINS ON INTERIOR AND EXTERIOR OF THE BREACH LOCATION.
4. PREPARE GROUNDS AS NECESSARY TO ALLOW FOR INSTALLATION OF H-PILES AND PILE CAPS.
5. INSTALL PILE CAPS.
6. INSTALL PILE CAPS.
7. INSTALL TEMPORARY ACCESS FILL, IF NECESSARY.
8. EXCAVATE REMAINDER OF CHANNEL AND APPLY BANK ARMOR.
9. INSTALL BRIDGE DECK (MAY BE INSTALLED CONCURRENTLY IN STEP 7, DEPENDING ON PREFERENCE OF CONTRACTOR).
10. REMOVE TEMPORARY ACCESS FILL.
11. REPLACE RAILS.
12. DEMOBILIZE.

NOTES:

THE IN-SLOPES TO VARY TO MATCH VARIATION IN EXISTING BANKS TO THE EAST AND WEST.

CONTRACTOR SHALL HAVE STRAIN WATERS AVAILABLE ON SITE FOR PLACEMENT IN ADDITIONAL LOCATIONS WHERE RUNOFF FROM DISTURBED GROUND MAY CONTACT SURFACE WATERS, IN COORDINATION WITH PROJECT OWNER.

SEE SHEET 8 FOR SITE ACCESS DETAILS.

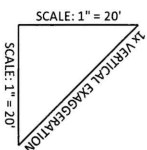
MATERIAL EXCAVATED FROM WITHIN THE G & W ROW SHALL BE PLACED WITHIN THE ROW. NO EXPORT OF MATERIAL FROM THE ROW TO ADJACENT PROPERTY SHALL BE ALLOWED.

LEGEND

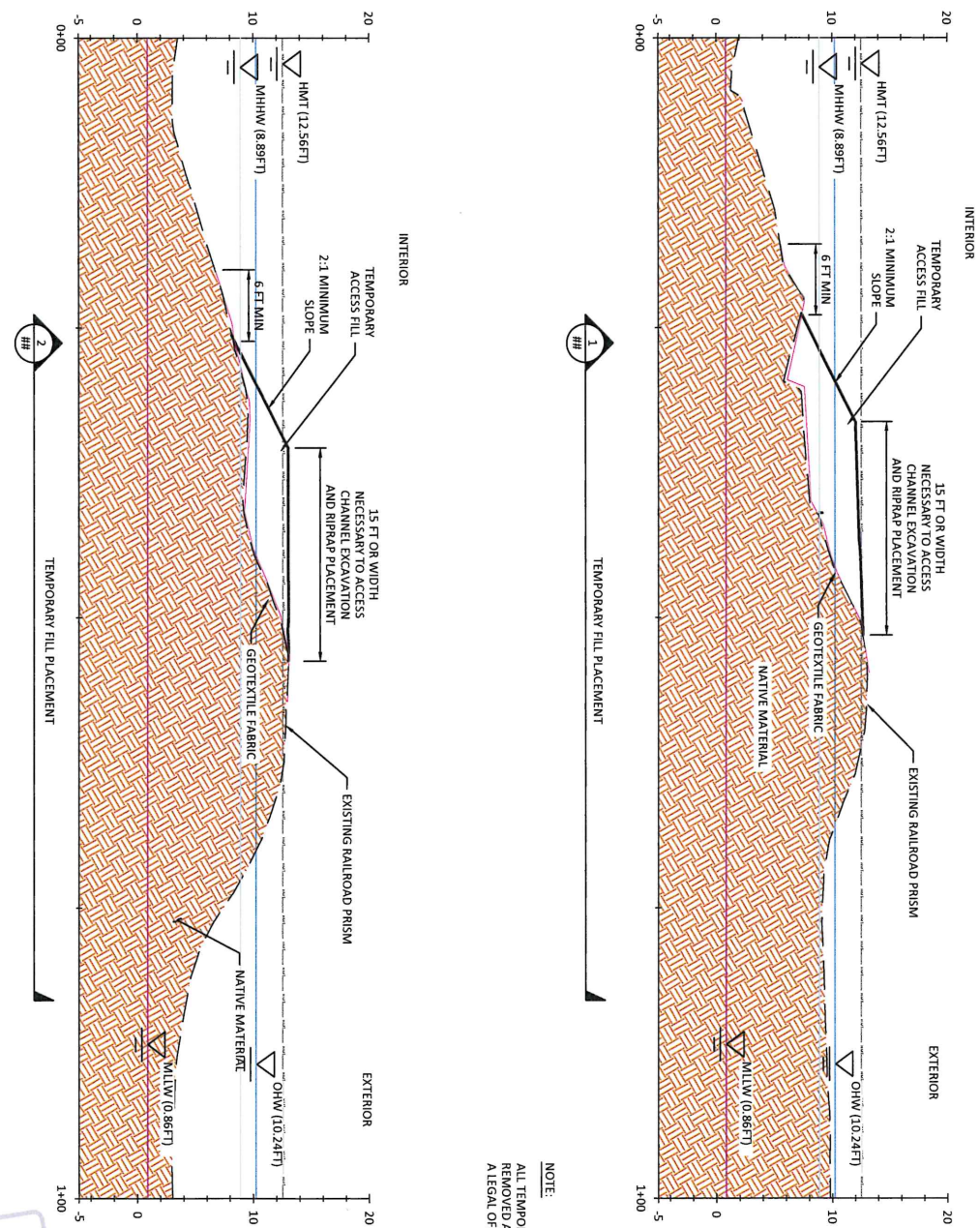
- EXISTING CONTOURS (1 FT)
- PROPOSED CONTOURS (1 FT)
- LIMITS OF DISTURBANCE
- TEMPORARY ACCESS ROUTE (SEE DETAIL 1, SHEET ##)
- RIPRAP
- NATURAL MATERIAL STOCKPILE AREA
- TURBIDITY CURTAIN
- HIGHEST MEASURED TIDE (12.56FT)
- ORDINARY HIGH WATER (10.24FT)
- MEAN HIGHER HIGH WATER (8.89FT)
- MEAN LOWER LOW WATER (0.86FT)
- PROPOSED LEVEE SHOULDER VEGETATION COMPLEX
- EXISTING DISTURBED VEGETATION
- PROPOSED DISTURBED VEGETATION

PROPOSED LEVEE SHOULDER VEGETATION COMPLEXITY ZONE (SEE DETAIL 1, SHEET 17)

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NOTE:
ALL TEMPORARY ACCESS FILL MUST BE REMOVED AFTER USE AND HAULED TO A LEGAL OFF-SITE DISPOSAL LOCATION

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ITEM	MARK NO.	ESTIMATED WEIGHT (LBS.)
PRECAST P/S CONC. DBL. CELL BOX BEAM	B30-2910-DL	50,120
PRECAST CONC. ABUTMENT CAP	A30-15B	25,910
PRECAST CONC. WINDMILL	W30-S	5,120
PRECAST CONCRETE PILE CAP	COO-1	20,060

LOCATION	TOP/ITE	TOP/CAP	PILE CUTOFF	1/1 TO PILE CUTOFF
ABUT. 1	13.00	9.19	7.19	5'-9 $\frac{3}{4}$ "
BENT 2	13.00	9.19	6.52	6'-5 $\frac{3}{4}$ "
ABUT. 3	13.00	9.19	7.19	5'-9 $\frac{3}{4}$ "

NOTE: ELEVATIONS ARE BASED OFF OF LIDAR SURVEY. ELEVATIONS MAY NEED TO BE ADJUSTED FOR SITE CONDITIONS.

BENCH MARK:

SEE CIVIL PLANS

LEGEND:

T/T = TOP OF TIE
RY = RAILWAY
B.S. = BOTH SIDES
W = WITH WALK

GENERAL NOTES:

DESIGN CRITERIA AND CONSTRUCTION SPECIFICATIONS SHALL BE PER THE 2022 EDITION OF THE AREA MANUAL FOR RAILWAY ENGINEERING AND THE G&W STANDARD CONSTRUCTION SPECIFICATIONS. DOT SPECIFICATIONS MAY ALSO APPLY. IN THE EVENT OF ANY CONFLICTS, THE MOST RESTRICTIVE SPECIFICATION SHALL APPLY.

LOCATE BRIDGE BASED ON CHANNEL CENTERLINE FROM CIVIL PLANS.

EXPRESS PORTION OF PILE PLATES, EXPOSED PORTIONS OF PILING BETWEEN BOTTOM OF CAP AND ONE FOOT BELOW ORIGIN LINE, ANGLE HANDRAIL AND BRASSINGS OR CLIPS ON PAINTED STEEL SHALL BE PAINTED WITH CARBOLINE, CARBOCLASTIC 615, FEDERAL STANDARD 595 COLOR - FS6413 AIRCRAFT GRAY, APPLIED PER THE MANUFACTURER'S REQUIREMENTS.

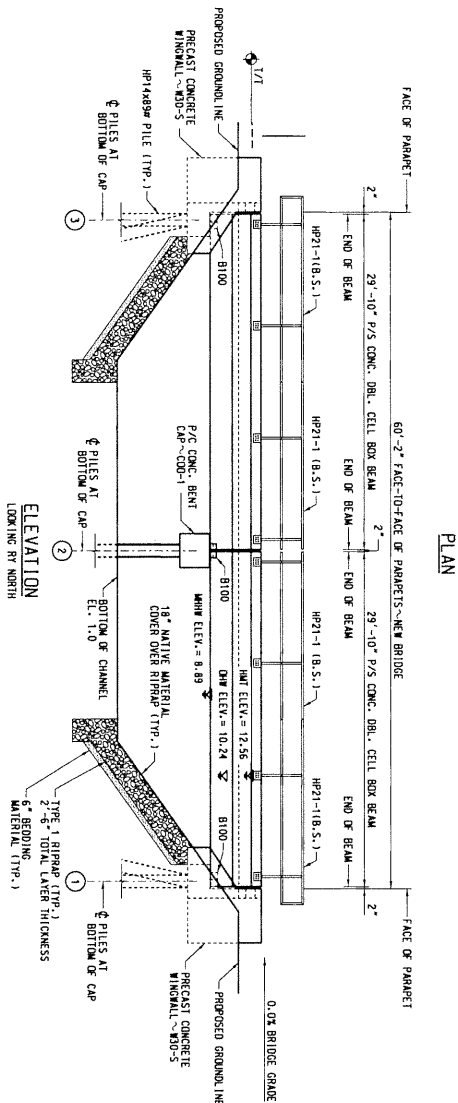
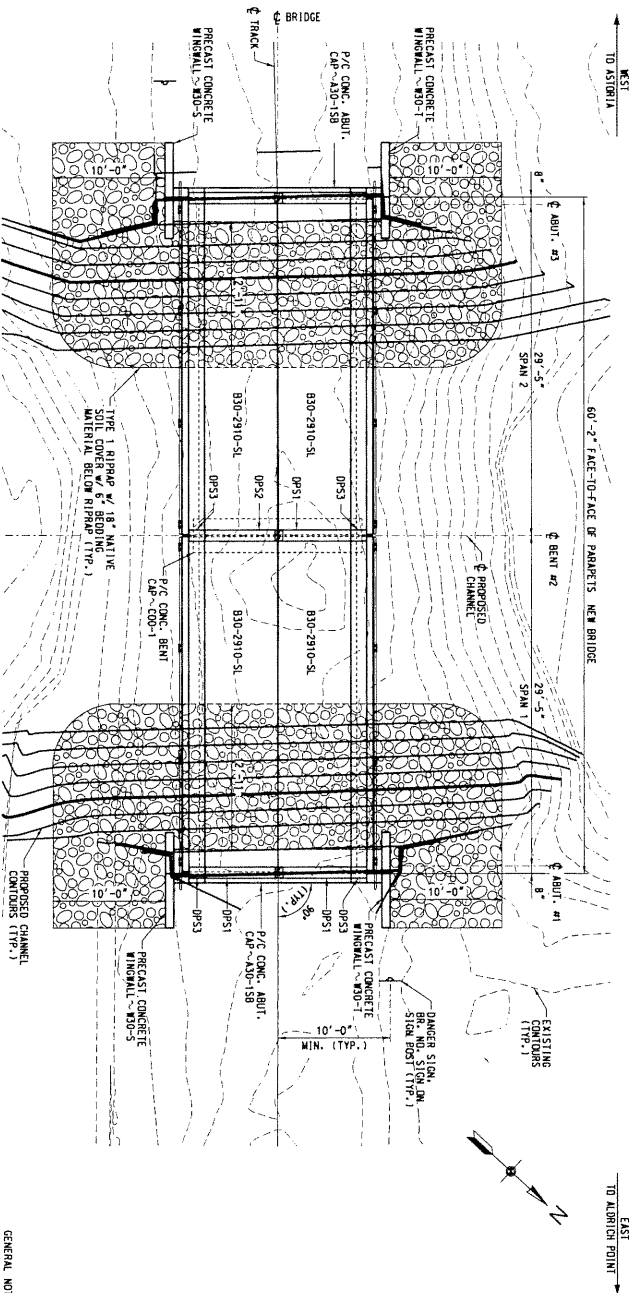
BEFORE BACKFILLING ADJUTMENTS, APPLY A COATING OF PETROLATUM TO PILE PLATES AND TOP ONE FOOT OF PILES.

RIPRAP SHALL BE PLACED IN SUCH A MANNER AS TO AVOID SEGREGATION OF VARIOUS SIZES OF ROCK AND DISTRIBUTED TO THAT THERE WILL BE NO LARGE ACCUMULATION OF EITHER THE LARGER OR SMALLER SIZES OF STONE. INDIVIDUAL ROCKS SHALL BE PLACED IN TIGHT CONTACT WITH ONE ANOTHER IN SUCH A WAY TO PRODUCE THE LARGEST AMOUNT OF VOID SPACES. RIPRAP SHALL BE SLOWLY UNSTRUCTURED ROCK, BULKY IN SHAPE WITH SHARP ANGULAR EDGES. THE ENTIRE MASS OF RIPRAP SHALL BE WELL DISTRIBUTED WITHIN THE LIMITS SPECIFIED.

DESIGN DATA:

2020 A.R.E.M.A. DESIGN SPECIFICATIONS
LOADING: COOPER E 80 W/ DIESEL IMPACT

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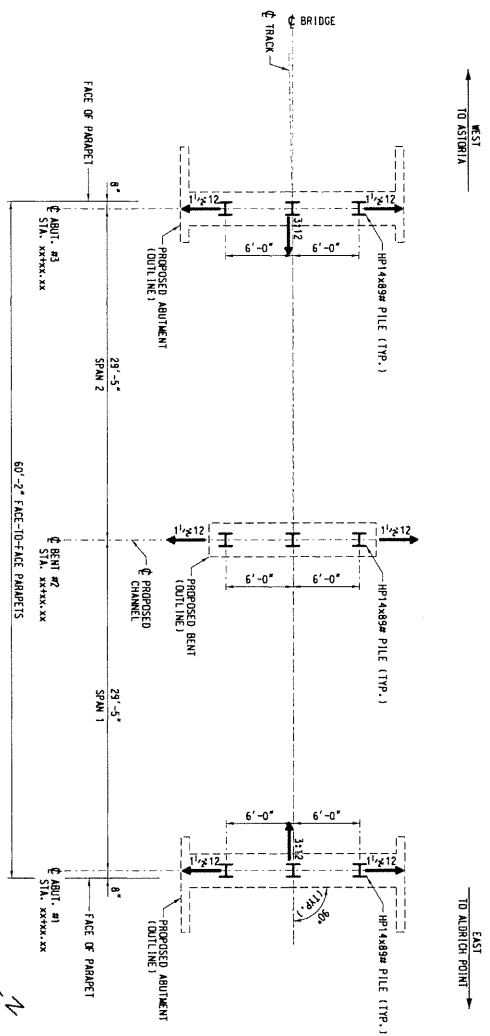


COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH

BRIDGE GENERAL PLAN
& ELEVATION

SHEET

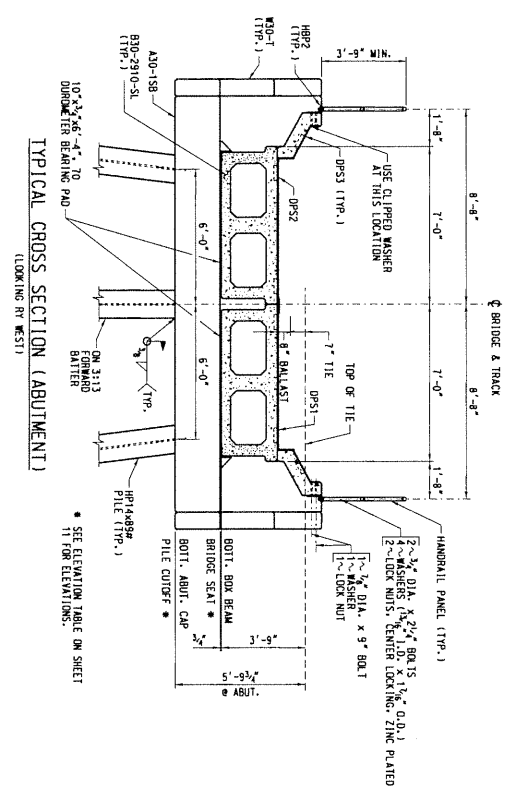
11 OF 41



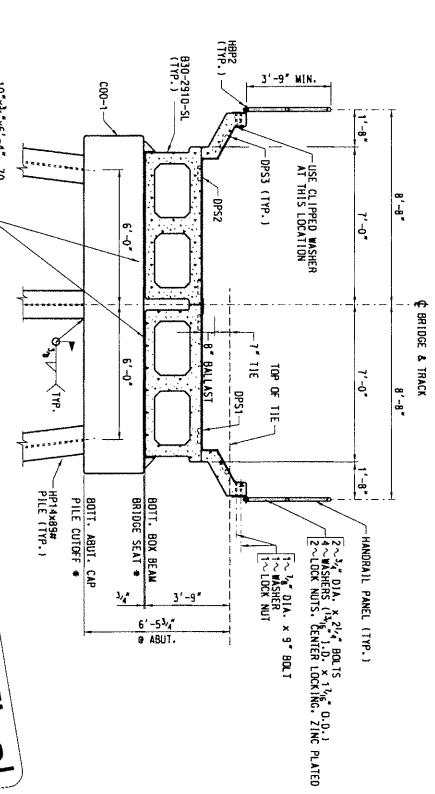
PILE LAYOUT PLAN



ATTENTION !
 INFORMATION SHOWN ON THESE PLANS CONCERNING TYPE AND LOCATION OF STRUCTURES AND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE SUPERVISOR OF STRUCTURES OR THE ENGINEER IN CHARGE WILL VERIFY THE LOCATION OF UNDERGROUND AND OVERHEAD UTILITIES BEFORE BEGINNING CONSTRUCTION.



TYPICAL CROSS SECTION (ABUTMENT)



TYPICAL CROSS SECTION (BENT)

• SEE ELEVATION TABLE ON SHEET 11 FOR ELEVATIONS.

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PILE NOTES:
 PILES SHALL BE DRIVEN TO REFUSE, IF POSSIBLE OR TO A MINIMUM ULTIMATE RESISTANCE OF 250 TONS.
 ALL PILES ARE TO BE DRIVEN WITH REINFORCED TIPS (PILE POINTS).
 ESTIMATED PILE LENGTH BELOW CUTOFF = XX'.
 PILE SPACING SHOWN ARE AT PILE CUTOFF ELEVATIONS.
 SYMBOL X112 DENOTES DIRECTION AND AMOUNT OF PILE BATTER.

NO.	BY	DATE	REVISION DESCRIPTION
1	BR	09/05/2023	2024.04

CDP	DDO	TDP
DRAWN	DESIGNED	CHECKED
09/05/2023	20/02/2024	20/02/2024
DATE	PROJECT	

NO.	DATE	BY	30% PRELIMINARY	DESIGNED	CHECKED	TYPED
				09/05/2023	20.0241	
				DATE	PROJECT	
DESIGN REVISION HISTORY			APPROVED			
2-20-23 PM						

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH



BILL OF MATERIAL

SHEET

13 of 41

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BILL OF MATERIAL - BR. 85.71, WARREN SLOUGH							
LINE	QTY.	UNIT	DESCRIPTION	MARK	SIZE	LENGTH	REMARKS
1	4	EA.	PRESSRESSED CONC. DBL. BOX BEAM w/ SLOPED CURB	810-2810-SL	2'-5.5"x7'-0"	29'-10"	PER PLAN 0000-1121-01
2	1	EA.	PRESSRESSED CONC. CURB/ABUTMENT	130-150	2'-0"x5'-6"x4"	18'-4"	PER PLAN 0000-1121-01
3	1	EA.	PRESSRESSED CONC. BENT CAP	CD-1	3'-0"x2'-8"	15'-0"	PER PLAN 0000-1000-06
4	4	EA.	PRESSRESSED CONC. MINORAL	W30-5	9'x6'-4"x2'	8'-6"	PER PLAN 0000-1121-04
5							
6	48,060	LBS.	STEEL W-PILES (9 PIECES)	HP14x69 1/2	60'-0"		NOT PER ASTM A512, GR 50
7							
8	16	EA.	WASHER, GALVANIZED	W100	3/4"x4"	4"	PER PLAN 0000-1000-06
9	3	EA.	DECK PLATE, GALVANIZED	DP51	3/4"x2"	6'-5 1/2"	PER PLAN 0000-1910-04
10	3	EA.	DECK PLATE, GALVANIZED	DP52	3/4"x2"	6'-5 1/2"	PER PLAN 0000-1910-04
11	3	EA.	DECK PLATE, GALVANIZED	DP53	3/4"x2"	1'-5"	PER PLAN 0000-1910-04
12							
13	6	EA.	RESTRAINER BRACKET	B100	PC OF HP14x69 1/2		PER PLAN 0000-1910-04
14							
15	4	EA.	HANDRAIL PANEL, GALVANIZED	HP20-1	1 1/2" DIA. PIPE	14'-10 1/4"	PER PLAN 0000-1221-01
16	4	EA.	HANDRAIL PANEL, GALVANIZED	HP21-1	1 1/2" DIA. PIPE	16'-5 1/4"	PER PLAN 0000-1221-01
17							
18	32	EA.	BOLT, HEX HEAD, GALVANIZED		3/4" DIA.	9"	HANDRAIL PANEL BRACKET
19	32	EA.	STANDARD WASHER FOR 3/4" DIA. BOLT, GALV.		3/4" DIA.		HANDRAIL PANEL BRACKET
20	16	EA.	CLIPPED WASHER FOR 3/4" DIA. BOLT, GALV.		3/4" DIA.		PER PLAN 0000-1910-06
21	32	EA.	LOCK NUT FOR 3/4" DIA. BOLT, GALV.		3/4" DIA.		HANDRAIL PANEL BRACKET
22	32	EA.	HANDRAIL PANEL BRACKET	HPB2			PER PLAN 0000-1910-06
23							
24	8	EA.	BEARING PAD, URETHANE (70 DUROHETER)		3/4"x10"	6'-4"	PER PLAN 0000-1000-06
25	24	EA.	PREFABRICATED JOINT FILLER, ASPH. IMREG.		3/4"x28"	6'-4"	PER PLAN 0000-1000-06
26							

CONTRACTOR TO SUPPLY ALL MATERIAL NECESSARY TO COMPLETE THE BRIDGE AS SHOWN.

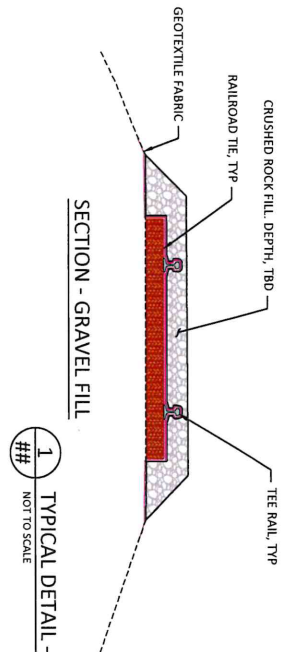
ZS	MC, CA, MB	CA
DRAWN	DESIGNED	CHECKED
MC	09/2023	190220
APPROVED	DATE	PROJECT

COLUMBIA RIVER ESTUARY STUDY TASKFORCE
RAILROAD RESTORATION
WARREN SLOUGH - FINAL DESIGN



ACCESS DETAILS

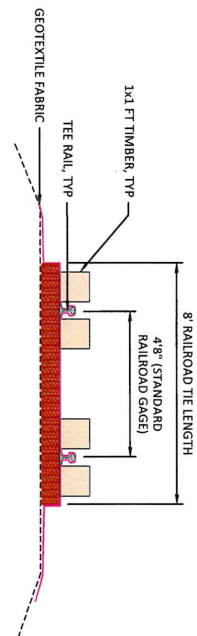
SHEET
15 OF 35



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TYPICAL DETAIL - RAILROAD OVERLAND ACCESS OPTIONS

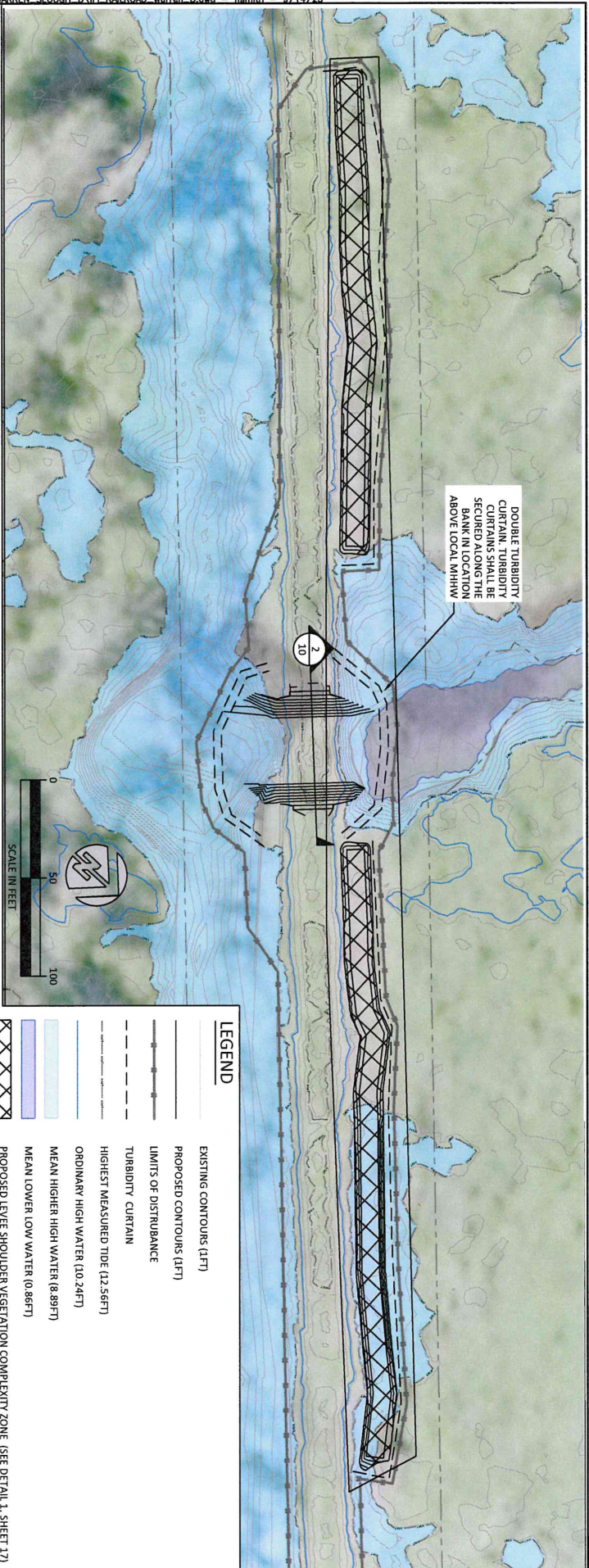
NOT TO SCALE



SECTION - PLACED TIMBERS

1. GEOTEXTILE TO PROTECT BALLAST FROM FOULING IN ACCESS AREAS IS REQUIRED PER G&W PUBLIC PROJECT MANUAL
2. REQUIRED ACCESS RAIL MAY BE REQUIRED. RAILS MUST BE LEFT IN A SIMILAR OR BETTER CONDITION POST-CONSTRUCTION. PLACED TIMBERS OR GRAVEL FILL MAY BE USED TO PROTECT RAIL, AND ALLOW ACCESS TO EQUIPMENT. ACCESS METHODS TO BE APPROVED BY G&W AND GENESSEE AND WILKINSON PRIOR TO CONSTRUCTION.

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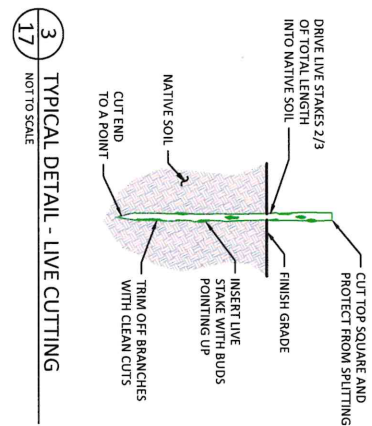
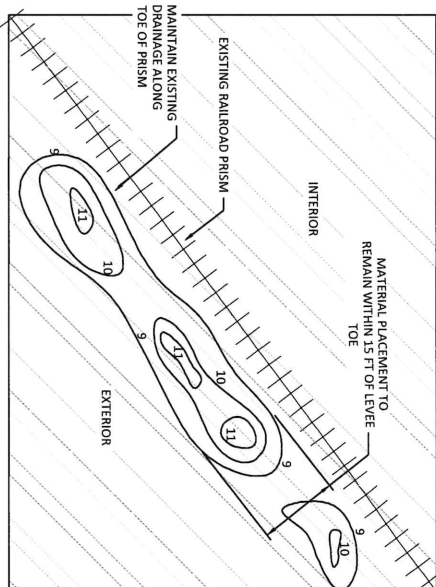


NOTE:

- SITKA SPRUCE (*PICEA SITCHENSIS*) SHALL BE PLANTED AT TOP ELEVATIONS OF TOPOGRAPHIC COMPLEXITY MOUNDS.
- MOUND CONFIGURATION WILL VARY DEPENDING ON EXISTING VEGETATION AND ACCESS CONSIDERATIONS. MAINTAIN EXISTING MATURE WOODY VEGETATION.
- TOPOGRAPHIC MOUNDS ARE INTENDED TO MIMIC NATURAL MARSHPLAIN MICROTOPOGRAPHY. MOUNDS SHALL BE SHAPED TO MIMIC MARSHPLAIN HUMMOCKS CREATED BY NATIVE SHRUBS, HERBACEOUS PLANTS, AND CONIFER NURSE LOGS.
- TYPICAL MOUND DIMENSIONS ARE APPROXIMATELY 15' TO 40' ACROSS.
- TOPOGRAPHIC MOUNDS SHALL NOT EXCEED ELEVATION 11.0 FT (NAVD83)

NO.	BY	DATE	REVISION DESCRIPTION	ZS DRAWN MC APPROVED	MC CA MB DESIGNED 09/2023 DATE	CA CHECKED 190220 PROJECT	COLUMBIA RIVER ESTUARY STUDY TASKFORCE RAILROAD RESTORATION WARREN SLOUGH - FINAL DESIGN	 501 Beverly Avenue, Suite 101 Hood River, OR 97031 Phone: 503.686.0033 www.interfluv.com	REVEGETATION PLANS	SHEET 16 of 35
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Botanical Name	Percent Composition
Secale cereale	30%
Glyceria occidentalis	25%
Hordeum brachyanthrum	20%
Beckmannia syzigachne	15%
Pectochloa caespitosa	10%

TOPOGRAPHIC COMPLEXITY PLANTING (above 8 feet elevation, NAVD83)					
Botanical Name	Common Name	Stock Type	Stock size	Average Spacing (on center)	Total Plants
<i>Cornus sericea</i>	Rice cutter dogwood	plug	16 cu. in.	4'	380
<i>Spirea douglasii</i>	Douglas spirea	plug	16 cu. in.	4'	380
<i>Physocarpus opulifolius</i>	Physocarpus	plug	16 cu. in.	4'	380
<i>Hamamelis mollis</i>	Hamamelis	plug	16 cu. in.	4'	380
<i>Salix lasioandra</i>	Pacific willow	live cutting	5", 1-1.5" dia	4'	750
<i>Salix sitchensis</i>	Sitka willow	live cutting	5", 1-1.5" dia	4'	750
<i>Spirea alba</i>	White spirea	potter plant	24"	See Note	100