

**Application Name:** Catherine Creek State Park Fish Habitat Restoration Project

**Application Number:** 218-8205-16560

**By:** Grande Ronde Model WS Foundation

**Offering Type:** Upper Grande Ronde Initiative

**Application Type:** Restoration

**OWEB Region:** Eastern Oregon

**County:** Union

**Coordinates:** 45.150856,-117.736933

**Applicant:**

Jeff Oveson  
1114 J Avenue  
La Grande OR 97850-2073  
(541) 663-0570  
jeff@grmw.org

**Payee:**

Mary Estes  
1114 J Avenue  
La Grande OR 97850  
(541) 663-0570  
mary@grmw.org

**Project Manager:**

Colleen Fagan  
107 20th Street  
La Grande OR 97850  
(541) 962-1835  
colleen.e.fagan@state.or.us

**Budget Summary:**

OWEB Amount Requested: \$0  
Total Project Amount: \$449,020

## **Administrative Information**

### **Abstract**

Provide an abstract statement for the project. Include the following information: 1) Identify the project location; 2) Briefly state the project need; 3) Describe the proposed work; 4) Identify project partners.

Catherine Creek State Park is located at RM 48.5-49.2 on Catherine Creek, tributary to the Grande Ronde River in Union County Oregon, within Catherine Creek Atlas Tier 1 BSR CCC3B1. The project reach supports all freshwater life stages of ESA listed spring Chinook salmon and summer steelhead. It is also a migration corridor for ESA listed bull trout. Spawning and rearing of spring Chinook salmon and summer steelhead annually occur in the project reach.

Habitat for all life stages of spring Chinook and summer steelhead is rated fair. Riffles are prevalent and the substrate is gravel with few fines, but little cobble. The project reach lacks suitable pool area, undercut banks, large wood, and cobble substrate. The historic channel has been blocked off by gravel upstream of the Park's day use area. The width to depth ratio is 22.8 and Catherine Creek is channelized throughout the reach. Limiting factors for salmon and steelhead in the project reach include a low abundance of pool habitat, a lack of LWD, floodplain condition, and water temperature.

Restoration funding will be used to increase habitat diversity and address limiting factors. A side channel and swale will be excavated to provide low velocity habitat, cover, and channel complexity. Both will intersect an existing spring complex enhancing cool-water thermal refuge. Large wood placements will occur to increase planform complexity, create and maintain scour pools, provide cover, increase deposition, rack wood, and form gravel bars. Wood will also be used to activate side channels and reconnect floodplains. Large boulders will be used to provide hydraulic complexity, encourage local scour, and brace large wood. Two gravel bars will be created to narrow the channel, provide planform complexity, facilitate lateral channel migration, and increase sinuosity. Willows will be planted and an interpretive trail will be constructed.

Project partners include OPRD, GRMW and BPA.

## **Location Information**

*What is the ownership of the project site(s)?*

*Public land (any lands owned by the Federal government, the State of Oregon, a city, county, district or municipal or public corporation in Oregon)*

What agency(ies) are involved?

Oregon Parks and Recreation Department

*Private (land owned by non-governmental entities)*

*This grant will take place in more than one county.*

## **Permits**

Other than the land-use form, do you need a permit, license or other regulatory approval of any of the proposed project activities?

Yes

No

For Details Go to Permit Page

## **Racial and Ethnic Impact Statement**

Racial and Ethnic Impact Statement

The proposed grant project policies or programs could have a disproportionate or unique POSITIVE impact on the following minority persons. (indicate all that apply)

The proposed grant project policies or programs could have a disproportionate or unique NEGATIVE impact on the following minority persons. (indicate all that apply)

The proposed grant project policies or programs WILL HAVE NO disproportionate or unique impact on minority persons.

## **Insurance Information**

- Working with hazardous materials (not including materials used in the normal operation of equipment such as hydraulic fluid)
- Earth moving work around the footprint of a well
- Aerial application of chemicals
- Removal or alteration of structures that hold back water on land or instream including dams, levees, dikes, tidegates and other water control devices (this does not include temporary diversion dams used solely to divert water for irrigation)
- Applicant's staff or volunteers are working with kids related to this project (DAS Risk assessment tool not required, additional insurance is required )
- Applicant's staff are applying herbicides or pesticides (DAS Risk assessment tool not required, additional insurance is required)

## **Additional Information**

- This project affects Sage-Grouse.

## Problem Statement

Describe the watershed problem(s) that this restoration project seeks to address.

Catherine Creek State Park is located within Catherine Creek Atlas Tier 1 BSR CCC3B1. This reach of Catherine Creek runs adjacent to Highway 203. The project reach supports all freshwater life stages of ESA listed spring Chinook salmon, summer steelhead and Oregon state sensitive species redband trout. It is also a migration corridor for ESA listed bull trout. Spring Chinook salmon and summer steelhead spawning and rearing occur annually in the project reach.

Water quality (high summer water temperature), water quantity (low summer flows), excess fine sediment, reduced habitat quantity/diversity (wetted widths, lack of pools and large wood), and impaired riparian conditions limit spring Chinook salmon and summer steelhead abundance and productivity in the Catherine Creek watershed (NPCC 2004, USBR2011). Habitat degradation has reduced flows and increased temperatures in the summer season and have significantly influenced adult and juvenile migration opportunity and availability of adult holding habitat. Habitat modifications have also reduced availability of summer and winter rearing habitat for juvenile spring Chinook salmon and summer steelhead. Past and present land use practices have contributed to these factors through wetland draining, water withdrawals, degradation of riparian areas and floodplain connectivity, removal of riparian vegetation, stream channel modification, and introduction of fine sediment and pollution to streams. Cumulatively, these changes have greatly reduced available salmon and steelhead habitat quantity and complexity in Catherine Creek.

Much of the decline in spring Chinook salmon abundance reflects the significant habitat changes that have occurred in Catherine Creek relative to historic conditions. Surveys conducted by McIntosh (1994) comparing historic and current stream habitat conditions found that pool frequency decreased by 67% in Catherine Creek, 43% in North Fork Catherine Creek, and 59% in South Fork Catherine Creek from 1934 to 1992. Recent studies by the Bureau of Reclamation also show the loss of habitat complexity and connectivity to support summer and winter juvenile rearing (USBR 2011).

The primary limiting factors and threats for spring Chinook salmon and summer steelhead in the project reach identified in the Recovery Plan are low summer flows; excess fine sediment; water quality (high summer temperatures, low dissolved oxygen levels); habitat diversity (low pool frequency and large wood, substandard streambank conditions); impaired riparian condition; and fish passage. These limiting factors affect all life stages and overall abundance and productivity. Causes include historic and some current agriculture and grazing practices; irrigation diversions; adjacent roads; and development and rural residences within the riparian area.

The project is located within and along Catherine Creek state park which includes, camping, day use, and picnic areas. The historic channel has been blocked off by gravel upstream of Catherine Creek State Park's day use area. There is a tributary draining into the old channel as well as a spring seep. Both of these water sources are backed up in area by beaver activity, wood, and sediment. Both of these water sources drain into the main creek channel through this old channel. There is no livestock grazing within the state park.

Catherine Creek Chinook are rated as being at high risk and non-viable in their current state. The most recent five-year geometric mean abundance is 139 natural-origin spawners, far below the "Large" size population threshold of 1,000 (NWFSC 2015). The five-year geometric mean productivity of 0.95 R/S, is significantly less than the 1.76 R/S required at the minimum abundance threshold and is in the higher risk end of the high-risk zone. Current spawning distribution is reduced substantially from historical ranges. Spring Chinook salmon once spawned in all of Catherine Creek. Today, they spawn only in the mainstem of Catherine Creek above the town of Union, and in the North and South Forks of Catherine Creek. The population has a significant level of direct hatchery supplementation. Upper Grande Ronde River steelhead are provisionally rated as viable (NWFSC 2015).

ODFW conducted an aquatic habitat survey on Catherine Creek in 2010, describing the channel morphology, riparian characteristics, and features and quality of instream habitat during summer flow. Results of the survey indicate that within the project reach, the channel is constrained by alternating high terraces and hillslopes in a

broad valley floor. The valley width index is 11.0 and there are 288 meters of secondary channel habitat. Land uses are greenway and old growth forest. The primary vegetation classes are hardwoods 3-15 cm and conifers 30-50 cm dbh. The average unit gradient is 1.0 percent. The stream habitat is mostly riffle (73%). Gravel (33%), fine sediments (32%), and cobble (28%) are the predominant stream substrates. The width to depth ratio is 22.8. Large wood debris volume was 5.8m<sup>3</sup>/100 m at the time of survey. The trees found most frequently in the riparian zones are hardwoods 3-15 cm dbh. Various sizes of conifers are also present. Shade averages 62%, ranging from 19-100% (ODFW AQI 2010).

ODFW (2010) used the HabRate model to assess overall habitat quality based on habitat attributes relative to the freshwater life stages of spring Chinook salmon and summer steelhead. Habitat quality was described for 1) spawning, egg survival, and emergence, 2) summer rearing, and 3) winter rearing. Within the project reach, spring Chinook salmon spawning habitat is fair. Riffles are prevalent and the substrate is gravel with few fines, but little cobble. For 0+ Summer Rearing and Overwintering, the project reach is fair. The project reach lacks suitable pool area, undercut banks, large wood, and cobble substrate.

Steelhead spawning habitat quantity and quality is fair in the project reach. Habitat quality for summer and winter rearing of age-0 and age-1 juvenile steelhead is fair. Summer Rearing habitat for 1+ summer steelhead is less widely available than overwintering habitat. Better winter rearing conditions for steelhead are present because of a combination of cover factors – boulders, undercut banks, and/or wood availability.

Abundance, productivity, and spatial distribution of Catherine Creek spring/summer Chinook salmon and Upper Grande Ronde River summer steelhead in the project reach are limited primarily by poor habitat quantity and diversity primarily the result of a low abundance of pool habitat, a lack of LWD and channelization throughout the reach. This project addresses these limiting factors.

#### How have past or current land management practices contributed to the problem?

The project area is owned and managed by Oregon State Parks and Recreation with infrastructure associated with the State Park and Highway 203 on river right. Campground and day use picnic area infrastructure is located primarily in the floodplain upstream of RM 49 and downstream of RM 48.6. Two pedestrian bridges over Catherine Creek are located at RM 48.6 and RM 49. Bridge abutments are currently located within the active floodplain. The project area is located within a moderately confined alluvial reach of Catherine Creek. Highway 203 on the north and east side of the valley constricts the floodplain, while the hillslope confines channel migration on the south and west sides of the valley. Channel migration towards the highway is possible in the future as evidenced by historical channel scars adjacent to the highway at RM 48.8.

Limiting factors (medium and high priority) for spring chinook and steelhead in the project reach of Catherine Creek include channel structure and form (instream structural complexity, lack of pool habitat); riparian condition (LWD recruitment); peripheral and transitional habitats (side channel and wetland conditions, floodplain condition); and water quality (temperature) in the area year-round.

Salmonid habitat quantity and diversity in the project reach is primarily limited by low abundance of pool habitat, a lack of LWD, and channelization throughout the reach.

Past impacts to the channel and floodplain within the project area include highway construction, riparian clearing, and development associated with Catherine Creek State Park. The current alignment of the mainstem is straighter and channel length is less than the historical alignment. Highway 203 has been in place since at least 1954 along the river right valley toe. A channel avulsion occurred after 1994 where Catherine Creek cut-off a meander bend between RM 49.0 and 48.7. This event straightened the main channel, increased the main channel slope by decreasing channel length, and likely reduced the frequency of floodplain inundation through channel incision. The old main channel now functions as a high flow channel.

Bank armoring within the project area has likely impaired geomorphic processes of channel migration and associated gravel sorting, bank erosion, and bar deposition. Channel banks have been armored with riprap,

concrete and gabions in several locations. The pedestrian bridges rest on concrete abutments that reduce channel migration potential. Recent wood inputs into the channel are starting to reinitiate these natural geomorphic processes, although the quantity of wood is less than that which would have been present historically. Channel migration on river left is limited by the hillslope.

Historical aerial images of the project area show historical (pre-1954) riparian clearing and vegetation alteration within the state park where roads, campsites, buildings, and the pedestrian path are located. These areas have revegetated over time and increased significantly in the last 65 years, returning more closely to natural conditions. Currently, uplands area dominated by ponderosa pine, Douglas fir and snowberry, while red alder and red osier dogwood dominate floodplain areas. In many locations, coniferous communities are adjacent to the existing main channel alignment.

Hydrologic connectivity of the floodplain is low compared to historical conditions. Channel straightening has reduced length and increased slope, leading to incision, which is likely exacerbated by natural and anthropogenic bank armoring in the vicinity of the project. Highway 203 has also reduced floodplain connectivity by occupying a portion of the valley bottom. The historical main channel on river right now provides limited off-channel connectivity during high flows.

*Does this project address one or both of the following:*

- Habitat needs for one or more Endangered Species Act-listed species and/or species of concern*
- Concerns identified on 303(d) listed streams*
- No*

## **Project History**

Continuation - Are you requesting funds to continue work on a project previously funded by OWEB where that work did not result in a completed project?

- Yes
- No

Resubmit - Have you submitted, but were not awarded an OWEB application for this project before?

- Yes
- No

Phased - Is proposed work in this application a phase of a comprehensive watershed restoration plan or project?

- Yes
- No

## Plans and Salmon

Is the proposed restoration activity(ies) identified in a local assessment or other plan?

Yes

No

Provide name of local plan, Watershed assessment or other locally relevant document.

Catherine Creek Atlas – A strategic, integrated, collaborative, and prioritized habitat restoration implementation plan for the Catherine Creek Watershed. Utilizing existing scientific data, current research evidence, and current knowledge of local biologists, the Atlas was developed by local biologists to strategically identify and prioritize targeted restoration actions and locations to improve aquatic habitat and increase the survival of ESA listed spring/summer Chinook salmon, summer steelhead, and bull trout. Project is in highest priority area.

Northeast Oregon Snake River Recovery Plan for Spring/Summer Chinook Salmon and Summer Steelhead - An ESA recovery plan for Snake River spring- and summer-run Chinook salmon and Snake River Basin steelhead. Currently, both fish species remain at risk of becoming endangered within 100 years. Multiple threats across their life cycles contribute to their current weakened status. These various threats need to be addressed to ensure that Snake River spring/summer Chinook salmon and steelhead can be self-sustaining in the wild over the long term. Recovery plan strategies are being utilized for this project.

Catherine Creek Tributary Assessment - Provide specific technical details and pertinent scientific information within reaches of Catherine Creek to regional and local implementers of habitat rehabilitation projects to help them prioritize future assessment and project action in salmon habitat planning and decision making, to increase the abundance and productivity of ESA listed steelhead and Spring Chinook.

The Grande Ronde Subbasin Plan – Identifies priority restoration and protection strategies for habitat and fish and wildlife populations in the Grande Ronde Subbasin. The plan guides implementation of the Council's Columbia River Basin Fish and Wildlife Program, which directs Bonneville electricity revenues to protect, mitigate and enhance fish and wildlife affected by hydropower dams. EDT analysis in the GR Subbasin Plan rated the middle Catherine Creek geographic area as an overwhelming priority for restoration for spring Chinook salmon and a high priority for steelhead.

The Oregon Plan for Salmon and Watersheds - A comprehensive state-led plan for the conservation of salmon and the protection of their habitat which coordinates the actions of all state agencies that affect aquatic resources. The Plan encompasses all native salmonids and all watersheds in the state. The Plan organizes specific actions around the factors that contribute to the decline in fish populations and watershed health. Most of these actions focus on improvement of water quality and quantity and habitat restoration. Landowners and other private citizens, community organizations, interest groups, and all levels of government have come together to organize, fund, and implement these measures.

The Oregon Conservation Strategy - An overarching state strategy for conserving fish and wildlife. It provides a shared set of priorities for addressing Oregon's conservation needs. The Conservation Strategy brings together the best available scientific information, and presents a menu of recommended voluntary actions and tools for all Oregonians to define their own conservation role. The goals of the Conservation Strategy are to maintain healthy fish and wildlife populations by maintaining and restoring functioning habitats, preventing declines of at-risk species, and reversing declines in these resources where possible.

Oregon's Native Fish Conservation Policy - Purpose is to ensure the conservation and recovery of native fish. Implemented through conservation plans to prevent the serious depletion of native fish and to maintain and restore naturally produced fish.

Will this project benefit salmon or steelhead?

- Yes
- No

- ✓ Snake River Basin - Steelhead
- ✓ Snake River Spring/Summer-run - Chinook Salmon

How will the resulting restoration project benefit salmon or steelhead or their habitat?

ESA-listed threatened species within the project area include Chinook salmon, steelhead, and bull trout. Chinook and steelhead use Catherine Creek for migration, spawning, and rearing. Chinook and steelhead spawning has been documented throughout the project area. Juveniles are found rearing in Catherine Creek year-round. Chinook outmigration typically occurs one year after emergence, with juvenile steelhead typically rearing in Catherine Creek for 2 years before out-migrating.

This project will improve in-stream and floodplain habitat for ESA-listed spring Chinook salmon, summer steelhead, and bull trout while enhancing natural channel morphology and in-stream processes in Catherine Creek. The habitat quality in this reach of Catherine Creek has been negatively affected by the development of infrastructure adjacent to the channel and the simplification and straightening of the channel.

Restoration funding will be used to increase habitat diversity and address limiting factors. Project components include installation of large wood and large wood structures within the main channel, side channels, and floodplain areas; pool excavation around large wood structures and increased abundance and depth of pools; side channel creation and side channel activation; boulder placements within the main channel; gravel placements within the main channel; willow planting; and an information and education component.

A side channel will be excavated along the historical channel scar. This new side channel will be active at low flows, providing low velocity habitat and cover. The side channel will intersect an existing spring complex enhancing cool-water thermal refuge. Large wood placements will occur to increase planform complexity, create and maintain scour pools, provide cover, increase deposition, rack wood, and form gravel bars. Wood will also be used to activate side channels and reconnect floodplains. Large boulders will also be used to provide hydraulic complexity, encourage local scour, and brace large wood. The existing alcove, located along the downstream portion of the main historical channel alignment, will be excavated to ensure hydrologic connectivity during low flows. Bank margin habitat wood will be placed to provide cover and habitat complexity. A high flow connection will be excavated in the alignment of an access route to provide additional conveyance and channel complexity during high flow events. The high flow channel will also provide additional discharge to the existing alcove for sediment flushing and alcove maintenance.

The project addresses the recovery strategies identified for this reach of Catherine Creek for spring Chinook salmon and summer steelhead. These include reducing mortalities during outmigration from overwintering habitats; improving the quantity and quality of currently used summer and winter rearing habitats; protecting and enhancing spawning and rearing areas in the middle and upper sections of Catherine Creek; and enhancing steelhead spawning areas and survival of eggs and alevins by reducing sediment in spawning gravels. The project will increase the abundance of pools, large wood, and off-channel habitat. Tributary habitat protection and restoration will improve population viability by moderating summer water temperatures, reducing sediment input, reconnecting floodplains, and improving riparian habitat and instream complexity. These will improve conditions for all life stages of ESA listed spring Chinook salmon and summer steelhead, and benefit ESA listed bull trout, state sensitive redband trout, lamprey, and other resident fish species.

Does the project address a restoration action identified in a regional assessment or recovery plan?

- Yes
- No

<b>Regional Assessments or Recovery Plans</b>
ESA Recovery Plan for Snake River Spring/Summer Chinook & Snake River Basin Steelhead

Northwest Power and Conservation Council Grande Ronde Subbasin Plan
Oregon's Native Fish Conservation Policy
Oregon Conservation Strategy
The Oregon Plan for Salmon and Watersheds

For each plan chosen above, describe how your project is consistent with specific recovery/restoration actions cited in that plan.

The project addresses the limiting factors in the Recovery Plan and the Grande Ronde Subbasin Plan and the recovery strategies identified in the Recovery Plan for ESA listed spring Chinook salmon and summer steelhead in this reach of Catherine Creek. Limiting factors include a lack of habitat diversity, riparian condition, and excess fine sediment. Recovery strategies include reducing mortalities during the outmigration from overwintering habitats to the mainstem Snake River; improving the quantity and quality of currently used summer and winter rearing habitats; and protecting and enhancing spawning and rearing areas in the middle and upper sections of Catherine Creek, and enhancing steelhead spawning areas and survival of eggs and alevins by reducing sediment in spawning gravels.

This project will improve in-stream and floodplain habitat for ESA-listed spring Chinook salmon, summer steelhead, and bull trout while enhancing natural channel morphology and in-stream processes in Catherine Creek. Project components include installation of large wood and large wood structures within the main channel, side channels, and floodplain areas; pool excavation around large wood structures and increased abundance and depth of pools; side channel creation and side channel activation; boulder placements within the main channel; gravel placements within the main channel; willow planting; and an information and education component.

The mission of the Oregon Plan for Salmon and Watersheds is "Restoring our native fish populations and the aquatic systems that support them to productive and sustainable levels that will provide substantial environmental, cultural, and economic benefits." The Oregon Plan organized specific actions - called "measures" - around the factors that contributed to the decline in fish populations and watershed health. Most of these focused on actions to improve water quality and quantity and habitat restoration. The project includes multiple habitat restoration and water quality improvement measures.

The project also addresses three major elements of the Plan: voluntary restoration actions by private landowners; coordinated state and federal agency and tribal actions to support private and voluntary restoration efforts, implement regulatory programs, manage public lands, and promote public education and awareness about watersheds and salmon; and monitoring watershed health, water quality, and salmon recovery to document existing conditions, track changes, and determine the impact of programs and actions.

The purpose of Oregon's Native Fish Conservation Policy is to ensure the conservation and recovery of native fish.

The Policy identifies three goals:

1. Prevent the serious depletion of native fish.
2. Maintain and restore naturally produced fish in order to provide substantial ecological, economic and cultural benefits to the citizens of Oregon.
3. Foster and sustain opportunities for fisheries consistent with the conservation of naturally produced fish and responsible use of hatcheries.

The project has been designed and will be implemented to ensure the conservation and recovery of native fish, supporting achievement of the first two goals.

The Oregon Conservation Strategy is an overarching plan to conserve Oregon's fish and wildlife, and their habitats. It combines the best available science and conservation priorities with recommended voluntary actions and tools for all Oregonians to define their own conservation role.

Conservation strategy species include Snake River spring Chinook salmon and summer steelhead, bull trout, and redband trout. Strategy Species are species of greatest conservation need that include wildlife, fish, invertebrates, plants, and algae. Information about special needs, limiting factors, data gaps, conservation actions, and available resources is provided for each of the 294 Strategy Species.

The project is in the Blue Mountains ecoregion. Within the Blue Mountain ecoregion, habitat loss in lower elevation valley bottom habitats, such as riparian areas and wetlands, has been identified as a conservation issue and priority. Key Conservation Issues of particular concern in the Blue Mountains include water quality and quantity and land use changes. The project has been designed to improve riparian habitat and water quality. The project has also be designed to address the limiting factors for strategy species.

## Proposed Solution

### Goal, Objectives, and Activities

State your project goal. A goal statement should articulate desired outcomes (the vision for desired future conditions) and the watershed benefit.

To improve spawning, rearing, and holding habitat for spring Chinook salmon and summer steelhead by addressing habitat limiting factors for each species.

**List specific and measurable objectives. Objectives support and refine the goal by breaking it down into steps for achieving the goal. (NOTE: If you quantify your objectives, ensure all numbers match the metrics listed in your selected habitat types.) Provide up to 7 objectives.**

#### Objective #1

##### Objective

Narrow mainstem Catherine Creek by 40% between RM 49 and 49.2 by 2024.

Describe the project activities. Activities explain how the objective will be implemented.

At two locations in the upstream portion of the project, gravel bars adjacent to the channel banks will be created to narrow and deepen the channel and provide planform complexity within a portion of the channel that currently has simplified plane-bed morphology. The gravel bars, and associated wood/boulder structure, will facilitate increased lateral channel migration allowing the channel to re-develop a more sinuous planform naturally over time. Willows will be planted in trenches during construction to enhance riparian establishment.

#### Objective #2

##### Objective

Increase low velocity rearing areas by 100% by 2024.

Describe the project activities. Activities explain how the objective will be implemented.

Side channel creation – A side channel will be excavated along a historical channel scar that has been abandoned by the channel avulsion at the site. This new side channel will be active at low flows, providing low velocity habitat and cover. The intersection with an existing spring complex has the potential to enhance cool-water thermal refuge.

Large wood placements will create pool habitat and low velocity rearing areas.

- Apex Large Wood - Bar apex jams will be located in mid-channel areas at the upstream end of areas prone to deposition, creating and maintaining a horseshoe-shaped scour pool at the face of the jam and increasing deposition behind the jam structure, as evident by existing large boulders with similar hydraulic response. These jams, designed to rack additional wood, would help to stabilize aggraded material into bars/islands that may become vegetated over time. These jams, and the split-flow conditions that result, would provide dynamic complexity and increase channel margin habitat. The jams, often in combination with margin jams, can also be used to facilitate activation of side-channels and reconnect floodplains.

- Bank Margin Habitat Cover Wood - The margin jams will be located adjacent to the thalweg along the bank of the mainstem of Catherine Creek as well as the reactivated side channel complex. These jams are meant to mimic natural log jams that form through tree fall as the stream erodes into forested banks. These jams are strategically

located in areas where riparian vegetation has been cleared or is less mature, such that bank strength and recruitment potential is impaired. Margin jams will also maintain scour pools and provide cover and complexity to juvenile salmonids during rearing and migration.

- Hillslope Wood – These jams will be located along the left bank of mainstem Catherine Creek. These jams are meant to mimic natural wood recruitment from the hillslope along with colluvial boulders, and subsequent racking of woody material transported from upstream. These jams are located to guide flows towards the side channel complex or river left and to encourage planform complexity in the main channel while providing instream habitat and cover for fish.

Alcove enhancement – The existing alcove, located along the downstream portion of the main historical channel alignment, will be excavated to ensure hydrologic connectivity during low flows. It will provide off-channel low velocity habitat. Bank margin habitat wood will be placed to provide cover and habitat complexity. The side channel outlet will be routed into the downstream portion of the alcove to provide enough velocity at high flows to minimize undesirable deposition of sand and fines near the downstream end of the alcove.

Gravel bar and pool enhancement – At two locations in the upstream portion of the project, gravel bars adjacent to the channel banks will be created to narrow and deepen the channel and provide planform complexity within a portion of the channel that currently has simplified plane-bed morphology. The gravel bars, and associated wood/boulder structure, will facilitate increased lateral channel migration allowing the channel to re-develop a more sinuous planform naturally over time. Willows will be planted in trenches during construction to enhance riparian establishment.

High flow swale – A high flow connection will be excavated in the alignment of an access route used to place large wood near Station 20+00 on the main channel. This swale will provide off-channel, low velocity rearing habitat during high flows. This route will also provide additional conveyance and channel complexity during high flow events. The high flow channel will also provide additional discharge to the existing alcove enabling periodic sediment flushing and physical alcove maintenance.

### **Objective #3**

#### **Objective**

Improve available spawning habitat by increasing gravel and cobble and decreasing fine sediments 10% by 2024.

#### **Describe the project activities. Activities explain how the objective will be implemented.**

Placement of large wood, creation of side channel and high flow swale habitat, and enhanced flood plain connection will facilitate sediment sorting and increase gravel and cobble deposition in Catherine Creek, thereby improving salmonid spawning habitat.

Apex Large Wood - Bar apex jams will be located in mid-channel areas at the upstream end of areas prone to deposition, creating (and maintaining) a horseshoe-shaped scour pool at the face of the jam and increasing deposition behind the jam structure, as evident by existing large boulders with similar hydraulic response. These jams, designed to rack additional wood, would help to stabilize aggraded material into bars/islands that will become vegetated over time.

Bank Margin Habitat Cover Wood - The margin jams will be located adjacent to the thalweg along the bank of the mainstem of Catherine Creek . These jams are configured to catch fluviially-transported wood from upstream, similar to natural jams. These jams are strategically located in areas where riparian vegetation has been cleared or

is less mature, such that bank strength and recruitment potential is impaired. Margin jams will also maintain scour pools and provide cover and complexity to juvenile salmonids during rearing and migration. These jams will also provide cover for holding adults and rearing juveniles.

Hillslope Wood – These jams will be located along the left bank of mainstem Catherine Creek. These jams are meant to mimic natural wood recruitment from the hillslope along with colluvial boulders, and subsequent racking of woody material transported from upstream. These jams are located to guide flows towards the side channel complex or river left and to encourage planform complexity in the main channel while providing in-stream habitat and cover for fish.

High flow swale – A high flow connection will be excavated in the alignment of an access route used to place large wood near Station 20+00 on the main channel. This route will provide additional conveyance and channel complexity during high flow events. The high flow channel will also provide additional discharge to the existing alcove enabling periodic sediment flushing and physical alcove maintenance.

Alcove enhancement – The existing alcove, located along the downstream portion of the main historical channel alignment, will be selectively excavated to ensure hydrologic connectivity during low flows. Bank margin habitat wood will be placed to provide cover and habitat complexity. The side channel outlet will be routed into the downstream portion of the alcove to provide enough velocity at high flows to minimize undesirable deposition of sand and fines near the downstream end of the alcove.

Gravel bar and pool enhancement – At two locations in the upstream portion of the project, gravel bars adjacent to the channel banks will be created to narrow the channel and provide planform complexity within a portion of the channel that currently has simplified plane-bed morphology. The gravel bars, and associated wood/boulder structure, will facilitate increased lateral channel migration allowing the channel to re-develop a more sinuous planform naturally over time. Willows will be planted in trenches during construction to enhance riparian establishment.

Floodplain creation and reconnection will facilitate sediment deposition.

## **Objective #4**

### **Objective**

Increase available pool habitat greater than 1 m deep by 100% by 2024.

### **Describe the project activities. Activities explain how the objective will be implemented.**

Large wood placements will create and maintain scour pools to facilitate sediment sorting.

Apex Large Wood - Bar apex jams will be located in mid-channel areas at the upstream end of areas prone to deposition, creating and maintaining a horseshoe-shaped scour pool at the face of the jam and increasing deposition behind the jam structure, as evident by existing large boulders with similar hydraulic response.

Bank Margin Habitat Cover Wood - The margin jams will be located adjacent to the thalweg along the bank of the mainstem of Catherine Creek as well as the reactivated side channel complex. These jams are meant to mimic natural log jams that form through tree fall as the stream erodes into forested banks. They will also catch fluvially-transported wood from upstream, similar to natural jams. Margin jams will maintain scour pools and provide cover and complexity to juvenile salmonids during rearing and migration and adults during holding.

Hillslope Wood – These jams will be located along the left bank of mainstem Catherine Creek. These jams are meant to mimic natural wood recruitment from the hillslope along with colluvial boulders, and subsequent racking of

woody material transported from upstream. These jams are located to guide flows towards the side channel complex or river left and to encourage planform complexity in the main channel while providing in-stream habitat and cover for fish.

Alcove enhancement – The existing alcove, located along the downstream portion of the main historical channel alignment, will be excavated to ensure hydrologic connectivity during low flows. Bank margin habitat wood will be placed to provide cover and provide pools and habitat complexity .

Gravel bar and pool enhancement – At two locations in the upstream portion of the project, gravel bars adjacent to the channel banks will be created to narrow and deepen the channel and provide planform complexity within a portion of the channel that currently has simplified plane-bed morphology. Pools will be dug at each gravel bar.

Large boulders provide an important element of existing pool habitat at the site. They maintain pools and low velocity habitat, particularly in the zone of avulsion that cutoff the historical meander bend at the center of the site. Large boulders also currently capture and retain woody debris. Large boulders will be used to provide hydraulic complexity, encourage local scour, and provide brace points for large wood placement.

## **Objective #5**

### Objective

Increase off-channel salmonid rearing habitat by 50% by 2024.

### Describe the project activities. Activities explain how the objective will be implemented.

Alcove enhancement – The existing alcove, located along the downstream portion of the main historical channel alignment, will be excavated to ensure hydrologic connectivity during low flows. Bank margin habitat wood will be placed to provide cover and provide pools and habitat complexity.

Side channel creation – A side channel will be excavated along a historical channel scar that has been abandoned by the channel avulsion at the site. This new side channel will be active at low flows, providing low velocity habitat and cover. The intersection with an existing spring complex has the potential to enhance cool-water thermal refuge.

High flow swale – A high flow connection will be excavated in the alignment of an access route used to place large wood near Station 20+00 on the main channel. This swale will provide off-channel, low velocity rearing habitat during high flows. This route will also provide additional conveyance and channel complexity during high flow events. The high flow channel will also provide additional discharge to the existing alcove enabling periodic sediment flushing and physical alcove maintenance.

## **Objective #6**

### **Objective**

Decrease riffle habitat by 25% in the project reach.

Describe the project activities. Activities explain how the objective will be implemented.

At two locations in the upstream portion of the project, gravel bars adjacent to the channel banks will be created to narrow and deepen the channel and provide planform complexity within a portion of the channel that currently has simplified plane-bed morphology. The gravel bars, and associated wood/boulder structure, will facilitate increased lateral channel migration allowing the channel to re-develop a more sinuous planform naturally over time. Willows will be planted in trenches during construction to enhance riparian establishment.

Large wood placements include apex large wood, bank margin habitat cover wood, and hillslope wood. Bar apex jams will be located in mid-channel areas at the upstream end of areas prone to deposition, creating and maintaining a horseshoe-shaped scour pool at the face of the jam and increasing deposition behind the jam structure, as evident by existing large boulders with similar hydraulic response. These jams, designed to rack additional wood, will help to stabilize aggraded material into bars/islands that will become vegetated over time. These jams, and the split-flow conditions that result, will provide dynamic complexity and increase channel margin habitat. The margin jams will be located adjacent to the thalweg along the bank of the mainstem of Catherine Creek as well as the re-activated side channel complex. These jams are meant to mimic natural log jams that form through tree fall as the stream erodes into forested banks. Hillslope Wood will be located along the left bank of mainstem Catherine Creek. These jams will guide flows towards the side channel complex or river left and to encourage planform complexity in the main channel while providing in-stream habitat and cover for fish.

## **Objective #7**

### **Objective**

Improve public education of the purpose and benefits of salmon habitat protection and restoration by 2020.

Describe the project activities. Activities explain how the objective will be implemented.

An interpretive trail with signboards highlighting the purpose and benefits of salmon habitat restoration on site will be installed.

List the major project activities and time schedule for each, including post project implementation.

Element	Description	Start Date	End Date
Side Channel Creation	A side channel will be excavated along a historical channel scar that been abandoned by a channel avulsion at the site.	7/2019	8/2019
Large Wood Placements	Apex large wood, bank margin habitat cover wood, and hillslope wood will be added to the mainstem, side channels, and floodplain.	7/2019	8/2019
Large Boulder Placement	Large boulders will be used selectively to provide hydraulic complexity, encourage local scour, and to provide brace points for large wood placement.	7/2019	8/2019
High Fow Swale	A high flow connection will be excavated near Station 20+00 on the main channel. This will provide additional conveyance and channel complexity during how flow events. It will also provide additional discharge to the existing alcove enabling periodic sediment flushing and physical alcove maintenance.	7/2019	8/2019
Alcove Enhancement	The existing alcove will be selectively excavated to ensure hydrologic connectivity during low flows. Bank margin habitat wood will be placed to provide cover and habitat complexity. The side channel outlet will be routed into the downstream portion of the alcove to provide enough velocity at high flows to minimize undesirable deposition of sand and fines near the downstream end of the alcove.	7/2019	8/2019
Gravel Bar and Pool Enhancement	At two location in the upstream portion of the project, gravel bars adjacent to the channel banks will be created to narrow the channel and provide planform complexity within a portion of the channel that currently has simplified plane-bed morphology. The gravel bars, and associated wood/boulder structure, will facilitate increased lateral channel migration allowing the channel to redevelop a more sinuous planform naturally over time. Willows will be planted in trenches during construction to enhance riparian establishment.	7/2019	8/2019
Interpretive Trail and Signage	Interpretive trail and signboards highlighting the purpose and benefits of salmon habitat restoration.	9/2019	8/2021

Element	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021
Side Channel Creation									
Large Wood Placements									
Large Boulder Placement									
High Fow Swale									
Alcove Enhancement									
Gravel Bar and Pool Enhancement									
Interpretive Trail and Signage									

## **Habitat Types**

*In which habitat type(s) are you proposing to work?*

- Instream Habitat: below the ordinary high water mark (includes in-channel habitat restoration, bank stabilization, flow, fish screening, and fish passage) -- Details will follow.*
- Riparian Habitat: above the ordinary high-water mark of the stream and within the stream's floodplain. -- Details will follow.*
- Upland Habitat: above the floodplain and improves native habitat and watershed function.*
- Wetland Habitat: land or areas covered, often intermittently, with shallow water or have soil saturated with moisture. -- Details will follow.*
- Estuarine Habitat: tidally influenced areas.*

## **Instream Habitat**

*Select all applicable Instream categories.*

- Bank stabilization**
- Fish passage improvement**
- Fish screening project**
- Instream Flow**

### **Instream habitat restoration**

*Select all the actions you propose to implement to address the problem.*

- Placement of materials in channel*
- Does the proposed project follow:*
  - ODFW Guidelines*
  - NOAA Guidelines*
  - Other*

*What types of instream habitat materials are you proposing to install? (select all that apply)*

- Large wood*

Number of structures.

45

Average number of logs per structure.

5

Average length of logs per structure (feet)

37

Average diameter of logs per structure (feet)

1.2

- Boulders*

- Combination log/boulder*

Number of structures

10

Average number of logs per structure.

2

Average length of logs per structure (feet)

50

Average diameter of logs per structure (feet)

1.3

Average number of boulders per structure.

1

Average size of boulders per structure (feet)

3

*Other materials: Materials that stabilize the streambed*

✓ *Channel reconfiguration and connectivity, including alcoves and side channel reconnection*

What type(s) of change are you proposing to the channel configuration and connectivity?

Primary project features include side channel and high flow swale creation; alcove enhancement; large wood placements within the main channel, side, channel, alcove, and floodplain areas; pool excavation around large wood structures; boulder placements within the main channel; and gravel placements within the main channel.

Side channel creation – A side channel will be excavated along a historical channel scar that has been abandoned by the channel avulsion at the site. This new side channel will be active at low flows, providing low velocity habitat and cover. The intersection with an existing spring complex has the potential to enhance cool-water thermal refuge. Under existing conditions some water flows into the primary historical channel alignment, including a portion which flows along the toe of Highway 203. Flow adjacent the Highway will continue to occur under proposed conditions. However, wood jam placements between Station 4+50 and 5+50 on the proposed side channel alignment will reduce the quantity and velocity of flow into this alignment in order to minimize future maintenance issues.

#### Large wood Placements

- Apex Large Wood - Bar apex jams will be located in mid-channel areas at the upstream end of areas prone to deposition, creating and maintaining a horseshoe-shaped scour pool at the face of the jam and increasing deposition behind the jam structure, as evident by existing large boulders with similar hydraulic response. These jams, designed to rack additional wood, will help stabilize aggraded material into bars/islands that will become vegetated over time. These jams, and the split-flow conditions that result, will provide dynamic complexity and increase channel margin habitat. These jams, in combination with margin jams, will be used to facilitate activation of side-channels and reconnect floodplains.
- Bank Margin Habitat Cover Wood - The margin jams will be located adjacent to the thalweg along the bank of the mainstem of Catherine Creek as well as the reactivated side channel complex. These jams mimic natural log jams that form through tree fall as the stream erodes into forested banks. They are configured to catch fluvially-transported wood from upstream, similar to natural jams. These jams are strategically located in areas where riparian vegetation has been cleared or is less mature, such that bank strength and recruitment potential is impaired. Margin jams will also maintain scour pools and provide cover and complexity to juvenile salmonids during rearing and migration.
- Hillslope Wood – These jams will be located along the left bank of mainstem Catherine Creek. These jams mimic natural wood recruitment from the hillslope along with colluvial boulders, and subsequent racking of woody material transported from upstream. These jams are strategically located to guide flows towards the side channel complex or river left and to encourage planform complexity in the main channel while providing instream habitat and cover for fish.

Large Boulder Placement – Large boulders currently provide important pool habitat at the site. They maintain pools and low velocity habitat, particularly in the zone of avulsion that cutoff the historical meander bend at the center of the site. Large boulders also currently capture and retain woody debris. Large boulders will be used to provide

hydraulic complexity, encourage local scour, and provide brace points for large wood placement.

High Flow Swale – A high flow connection will be excavated in the alignment of an access route used to place large wood near Station 20+00 on the main channel. This route will provide additional conveyance and channel complexity during high flow events. The high flow channel will also provide additional discharge to the existing alcove enabling periodic sediment flushing and physical alcove maintenance.

Alcove Enhancement – The existing alcove, located along the downstream portion of the main historical channel alignment, will be excavated to ensure hydrologic connectivity during low flows. Bank margin habitat wood will be placed to provide cover and habitat complexity. The side channel outlet will be routed into the downstream portion of the alcove to provide enough velocity at high flows to minimize undesirable deposition of sand and fines near the downstream end of the alcove.

Gravel bar and pool enhancement – At two locations in the upstream portion of the project, gravel bars adjacent to the channel banks will be created to narrow the channel and provide planform complexity within a portion of the channel that currently has simplified plane-bed morphology. The gravel bars, and associated wood/boulder structure, will facilitate increased lateral channel migration allowing the channel to re-develop a more sinuous planform naturally over time. Willows will be planted in trenches during construction to enhance riparian establishment.

Acres off-channel or floodplain habitat connected  
6

Number of pools created/added  
18

- Spawning gravel placement*
- Beaver reintroduction*
- Non-native plant control*
- Nutrient enrichment*
- Animal species removal*

Is the primary purpose of the instream habitat restoration treatment(s) to address water quality limiting factors?

- Yes
- No

Total miles of stream to be treated with all instream habitat restoration treatments  
1

**Stockpiling logs**

### **Riparian Habitat**

*Select all applicable Riparian categories.*

- Riparian road activities**
- Fencing and other materials for habitat protection**

## ✓Vegetation establishment or management

Select all the actions you propose to implement to address the problem.

### ✓Planting

For Details Go to Plant Page

### ✓Non-native plant control

#### Specify species

Will work with OPRD to identify non-native vegetation and noxious weeds requiring control.

#### *Treatment(s) to be applied*

✓Mechanical (cutting, mowing, girdling, etc.)

✓Chemical (pesticides, fungicides, etc.)

Biological (predators, herbivores, pathogens, etc.)

#### Acres to be treated

5.9

Prescribed burnings, stand thinning, stand conversions, silviculture

Juniper treatment

## Livestock management

## ✓Debris and Structure Removal

#### Describe activities

Channel banks have been armored with riprap, concrete and gabions in several locations. Concrete structures and riprap on river right upstream of the pedestrian bridge will be removed.

#### Acres treated

.02

Is an objective of the riparian treatment(s) to address water quality limiting factors?

Yes

No

✓Sediment

✓High Temperature

Total linear stream miles to be treated.

.1

Total riparian acres to be treated.

0.5

Left streambank miles to be treated.

.1

Right streambank miles to be treated.

.1

## Wetland Habitat

Are you working in artificial or historic wetland habitat? (select one or both)

Artificial wetland

Historic wetland

Select all applicable Wetland categories.

Wetland road activities

Channel modification including creation

Type of modification to channel

A side channel will be excavated along a historical channel scar that has been abandoned by the channel avulsion at the site. This new side channel will be active at low flows, providing low velocity habitat and cover. The intersection with an existing spring complex has the potential to enhance cool-water thermal refuge. Under existing conditions some water flows into the primary historical channel alignment, including a portion which flows along the toe of Highway 203. Flow adjacent the Highway will continue to occur under proposed conditions. However, wood jam placements between Station 4+50 and 5+50 on the proposed side channel alignment will reduce the quantity and velocity of flow into this alignment in order to minimize future maintenance issues.

A high flow connection will be excavated in the alignment of an access route used to place large wood near Station 20+00 on the main channel. This route will provide additional conveyance and channel complexity during high flow events. The high flow channel will also provide additional discharge to the existing alcove enabling periodic sediment flushing and physical alcove maintenance.

The existing alcove, located along the downstream portion of the main historical channel alignment, will be excavated to ensure hydrologic connectivity during low flows. Bank margin habitat wood will be placed to provide cover and habitat complexity. The side channel outlet will be routed into the downstream portion of the alcove to provide enough velocity at high flows to minimize undesirable deposition of sand and fines near the downstream end of the alcove.

Length of channel created or modified

0.38

Miles of wetland habitat treated

0.19

Acres of wetland habitat connected

5.25

Vegetation establishment or management

Fencing and other materials for habitat protection

Structure removal/modification/installation

Nonstructural removal and placement protection

Total wetland acres to be treated:

5.25

## Wrap-Up

### Public Awareness

Does this proposed project include public awareness activities?

- Yes  
 No

Describe these activities, as well as any related products, and explain how the proposed activities relate to the project's objectives.

An interpretive trail with signboards highlighting the purpose and benefits of salmon habitat restoration will be included in the project.

### Design

Were design alternatives considered?

- Yes  
 No

Describe the design alternatives that were considered and why the preferred alternative was selected.

Multiple site visits were conducted with members of the Catherine Creek Atlas Implementation Team, BPA, design engineers, and representatives of the Oregon Parks and Recreation Department. Project goals and objectives, constraints, and design elements were discussed and refined during site visits and design team meetings.

The project was designed to minimize both current and future interaction of the main channel of Catherine Creek with the Highway 203 road prism. It was also designed to minimize impacts to bridges and current and future park amenities.

Side channel and alcove creation was investigated on both banks, with the current design agreed to by the design team.

The design evolved from large wood placement to aggressive gravel bar creation and restoration.

Select the appropriate level of design for your project.

- No design is required.  
 10-30%: Conceptual design (evaluation of alternatives, concept-level plans, design criteria for project elements, rough cost estimates).  
 30-85%: Preliminary design (selection of the preferred alternative, draft plans, draft design report, preliminary cost estimates).  
 85-100%: Final design (final design report, plans, and specifications, contracting and bidding documents, monitoring plan, final cost estimate).

If work remains on the project's design, describe the work that remains to be done and when you expect to have it completed. If no design is required put "N/A"

Project design is funded and expected to be completed in January 2019.

Describe the steps you will take to minimize adverse impacts to the site and adjacent lands during and after project implementation.

All project activities are covered under HIP III. BPA's internal restoration review team will review and approve the design and ensure it is in compliance with HIP III. To minimize adverse impacts to the site and adjacent land during and after project implementation, the mandatory conservation measures included in HIP III will be implemented, including:

Project inspection. Construction and environmental compliance observation will occur during 100% of Project construction. Project components will be inspected during and after construction.

State and Federal Permits. All applicable regulatory permits and official project authorizations will be obtained before project implementation.

Timing of in-water work. Appropriate Oregon guidelines for timing of in-water work will be followed.

Site layout and flagging. Prior to construction, the action area will be clearly flagged to identify sensitive resource areas, equipment entry and exit points, road and stream crossing alignments, and staging, storage, and stockpile areas.

Temporary access roads and paths. Existing access roads and paths will be used whenever possible, and the number and length of temporary access roads and paths through riparian areas and floodplains will be minimized to lessen soil disturbance and compaction, and impacts to vegetation. At project completion, all temporary access roads and paths will be obliterated, and the soil will be stabilized and revegetated.

Temporary stream crossings. The number of temporary stream crossings will be minimized. No stream crossings will occur at active spawning sites, when holding adult listed fish are present, or when eggs or alevins are in the gravel. After project completion, temporary stream crossings will be obliterated and the stream channel and banks restored.

Staging, storage, and stockpile areas. Staging areas shall be a minimum of 150 feet or more from any natural water body or wetland. Natural materials used for implementation of aquatic restoration, such as large wood, may be staged within the 100-year floodplain at identified locations shown on the Designs. Any material not used in restoration, and not native to the floodplain, will be removed for disposal.

Equipment. Mechanized equipment and vehicles will be selected, operated, and maintained in a manner that minimizes adverse effects on the environment.

Erosion control. Erosion control measures will be prepared and carried out, as described in the environmental permits. Sediment barriers will be installed and maintained for the duration of project implementation.

Dust abatement. Dust control measures will be implemented.

Invasive species control. Prior to entering the site, all vehicles and equipment will be power washed, allowed to fully dry, and inspected to make sure no plants, soil, or other organic material adheres to the surface. Waders, boots, and any other gear to be used in or near water will be inspected for aquatic invasive species.

Work Area Isolation. Any work area within the wetted channel will be isolated from the active stream. The contractor shall provide a dewatering plan for approval prior to construction. Water discharged during dewatering shall be dispersed onto the floodplain at approved locations. Pumps will be screened to NMFS's criteria.

Fish Salvage. Work area isolation and fish capture activities will occur during periods of the coolest air and water temperatures possible. Salvage will not occur when water temperatures exceed 18oC, or 15oC if bull trout are

present. Salvage will be supervised by a qualified fisheries biologist. Fish capture and handling will be conducted to minimize risk of injury and fish released at a safe site as rapidly as possible.

Prior to salvage efforts, the area will be surveyed for the presence of adult salmon. If adults are present, they will be herded from the area. No electrofishing will occur with adults present.

Electrofishing. Electrofishing will be used only after other salvage methods have been employed. Salvage operations will be led by an experienced fisheries biologist and follow NMFS's electrofishing guidelines (NMFS 2000).

Dewater. Dewatering will be conducted over a sufficient period of time to allow species to naturally migrate out of the work area.

Fish passage. Fish passage will be provided for adult and juvenile fish during construction. Adequate precautions will be taken to prevent fish stranding.

Minimize time and extent of disturbance. Earthwork in which mechanized equipment is in stream channels and riparian areas will be completed as quickly as possible.

Cessation of work. Project operations will cease when allowable water quality impacts, as defined by the state CWA section 401 water quality certification or HIPIII Turbidity Monitoring Protocol, have been exceeded or when "incidental take" limitations have been reached.

Site restoration. When construction is complete, all streambanks, soils, and vegetation will be cleaned up and restored. All project related waste will be removed. All disturbed areas will be rehabilitated.

Revegetation. Long-term soil stabilization of disturbed sites will be accomplished with reestablishment of native vegetation.

## **Project Management**

List the key individuals, their roles, and qualifications relevant to project and post project implementation. At a minimum include the following: project management, project design, project implementation, and project inspection.

<b>Role</b>	<b>Name</b>	<b>Affiliation</b>	<b>Qualifications</b>	<b>Email</b>	<b>Phone</b>
Grande Ronde and Umatilla Fish Habitat Program Manager	Colleen Fagan	Oregon Department of Fish and Wildlife	M.S. in Fishery Resources. Has worked as a fishery biologist for ODFW for 20 years, with the primary focus on habitat mitigation and enhancement. Has been on multiple design teams and overseen project construction and environmental compliance.	colleen.e.fagan@state.or.us	(541) 962-1835

ODFW Project Manager	Winston Morton	Oregon Department of Fish and Wildlife	Fish habitat biologist for ODFW for 15 years. Extensive experience in project design and overseeing project construction and monitoring. Has been the Project Manager for ODFW on multiple fish habitat projects.	winston.h.morton@state.	(541) 962-1837
Project Oversight and Inspection	Jeff Oveson	Grande Ronde Model Watershed	Executive Director for the GRMW for 20 years. Instrumental in the establishment of watershed management partnerships among local residents, state and federal agencies, tribes, and others concerned with management of fish and wildlife resources.	jeff@grmw.org	(541) 663-0570
Project Design Lead	Matt Cox	Inter-Fluve	MS Bioresource Engineering, over 10 years experience researching river processes and designing and overseeing construction of restoration projects.	mcox@interfluve.com	(541) 490-1054
Project Design Technical Lead	Jeff Fealko	Rio ASE	MS Civil Engineering, over 12 years experience as a river engineer and engineer of record on numerous river restoration, fish passage, and habitat improvement projects.	jeff@rioase.com	(208) 866-8753
OPRD Project Lead	Matt Rippee	Oregon Parks and Recreation Department	OPRD Eastern District Manager	matt.ripee@state.or.us	(541) 786-4748

## Optional Monitoring

### OPTIONAL: Restoration Project Monitoring

- Salmonid Monitoring*
- Non-salmonid biological monitoring*
- Water (quantity) flow monitoring*
- Water quality monitoring*
- Rangeland monitoring*
- Onsite*
- Downstream*
- Upstream*
- Upslope*

Will effectiveness monitoring will be conducted for this project?

- Yes
- No

Please describe the monitoring activities and any additional sources of funding (amount and source) to support this effort.

Monitoring will be conducted by ODFW to conduct due diligence and evaluate project effectiveness at meeting objectives. Monitoring will include the following:

1. Pre-project photo points will be established in 2018 and photos taken prior to project construction. Photographs will be taken the first five years post project completion and then every subsequent three years to qualitatively document riparian and channel condition;
2. Aerial videos will be recorded pre-project and in years 1, 2, 3, 6, 10, and 15 years post construction;
3. Summer steelhead and spring Chinook salmon spawning ground surveys will be conducted 2-3 times annually to note presence or absence of spawning and to document redd locations;
4. Salmonid presence/absence surveys of juvenile rearing will be conducted post-project construction to document usage of project area;
5. Channel cross sections will be established along the restored channel to assess channel development and form over time. The number and location of cross-sections will be determined following project completion and will at a minimum be placed to characterize built features. Channel cross sections will be surveyed 1, 3, 5, 10, and 15 years post project completion.
6. Topographical surveys of the as built project will be conducted 1, 3, 5, 10, and 15 years post project completion to develop a longitudinal profile of the channel and determine changes in mainstem and side channel stream profiles and morphology; and
7. A final report documenting project implementation and monitoring will be submitted.

## Budget

Item	Unit Type	Unit Number	Unit Cost	OWEB Funds	External Cash	External In-Kind	Total Costs
<b>Salaries, Wages and Benefits</b>							
			\$0	\$0	\$0	\$0	\$0
<b>Category Sub-total</b>				<b>\$0</b>	<b>\$0</b>	<b>\$0</b>	<b>\$0</b>
<b>Contracted Services</b>							
Cultural Resource Surveys and Report, coordination with OPRD	Each	1	\$15,000.00	\$0	\$15,000	\$0	\$15,000
Mobilization and Demobilization	Each	1	\$25,000.00	\$0	\$25,000	\$0	\$25,000
Environmental Controls (SWPPP, hydraulic fluids, etc.)	Each	1	\$10,000.00	\$0	\$10,000	\$0	\$10,000
Cofferdams, Diversions, Dewatering, and Water Management	Each	1	\$25,000.00	\$0	\$25,000	\$0	\$25,000
Temporary Access including temporary stream crossing, haul roads, clearing and grubbing	Each	1	\$10,000.00	\$0	\$10,000	\$0	\$10,000
Side Channel Cut	Cubic yards	3000	\$9.00	\$0	\$27,000	\$0	\$27,000
High Flow Swale Cut	Cubic yards	250	\$9.00	\$0	\$2,250	\$0	\$2,250
Upstream Bars and Pools Cut	Cubic yards	400	\$9.00	\$0	\$3,600	\$0	\$3,600
Upstream Bars and Pools Fill	Cubic yards	600	\$9.00	\$0	\$5,400	\$0	\$5,400
Upstream Bars and Pools Logs With Rootwads	Each	4	\$700.00	\$0	\$2,800	\$0	\$2,800
Upstream Bars and Pools Large Whole Trees	Each	4	\$2,000.00	\$0	\$8,000	\$0	\$8,000
Upstream Bars and Pools Racking Wood	Each	12	\$220.00	\$0	\$2,640	\$0	\$2,640
Apex Log Jams Logs	Each	8	\$500.00	\$0	\$4,000	\$0	\$4,000
Apex Log Jams Logs with Rootwads	Each	21	\$700.00	\$0	\$14,700	\$0	\$14,700
Apex Logjams Vertical Snags	Each	29	\$800.00	\$0	\$23,200	\$0	\$23,200
Apex Logjams Racking Wood	Cubic yards	43	\$300.00	\$0	\$12,900	\$0	\$12,900
Hillslope Wood Logs with Rootwads	Each	9	\$700.00	\$0	\$6,300	\$0	\$6,300
Hillslope Wood Large Whole Trees	Each	9	\$2,000.00	\$0	\$18,000	\$0	\$18,000
Hillslope Wood Racking Wood	Each	27	\$250.00	\$0	\$6,750	\$0	\$6,750
Hillslope Wood Boulders	Each	10	\$300.00	\$0	\$3,000	\$0	\$3,000
Side Channel Logjam Logs	Each	6	\$500.00	\$0	\$3,000	\$0	\$3,000
Side Channel Logjam Logs with Rootwads	Each	24	\$700.00	\$0	\$16,800	\$0	\$16,800
Side Channel Logjam Racking Wood	Each	45	\$220.00	\$0	\$9,900	\$0	\$9,900
Bank Margin Habitat Wood Logs	Each	30	\$500.00	\$0	\$15,000	\$0	\$15,000
Bank Margin Habitat Wood Logs with Rootwads	Each	30	\$700.00	\$0	\$21,000	\$0	\$21,000
Bank Margin Habitat Wood Small Whole Trees	Each	30	\$700.00	\$0	\$21,000	\$0	\$21,000
Bank Margin Habitat Wood Racking Wood	Each	90	\$250.00	\$0	\$22,500	\$0	\$22,500
Revegetation Seed and Mulch	Acres	5.9	\$1,500.00	\$0	\$8,850	\$0	\$8,850
Revegetation Plantings	Acres	5.9	\$4,000.00	\$0	\$23,600	\$0	\$23,600

ODFW Project Management	Hours	80	\$40.00	\$0	\$0	\$3,200	\$3,200
ODFW Planting	Each	40	\$35.00	\$0	\$0	\$1,400	\$1,400
ODFW Project Construction Oversight	Hours	120	\$40.00	\$0	\$0	\$4,800	\$4,800
ODFW Fish Salvage	Hours	40	\$40.00	\$0	\$0	\$1,600	\$1,600
Engineering Construction Oversight, site visits, design support and field observation during construction,	Hours	60	\$120.00	\$0	\$7,200	\$0	\$7,200
ODFW Travel to Project Site - 45 miles round trip	Miles	1800	\$0.35	\$0	\$0	\$630	\$630
Interpretive Trail Sign Boards	Each	6	\$2,500.00	\$0	\$15,000	\$0	\$15,000
<b>Category Sub-total</b>				<b>\$0</b>		<b>\$389,390</b>	<b>\$11,630</b>
<b>Travel</b>							
			\$0	\$0	\$0	\$0	\$0
<b>Category Sub-total</b>				<b>\$0</b>		<b>\$0</b>	<b>\$0</b>
<b>Materials and Supplies</b>							
			\$0	\$0	\$0	\$0	\$0
<b>Category Sub-total</b>				<b>\$0</b>		<b>\$0</b>	<b>\$0</b>
<b>Equipment and Software</b>							
			\$0	\$0	\$0	\$0	\$0
<b>Category Sub-total</b>				<b>\$0</b>		<b>\$0</b>	<b>\$0</b>
<b>Other</b>							
Photopoints (Pre, 1,2,3,6,9,12,15 yrs post)	Hours	50	\$35.00	\$0	\$0	\$1,750	\$1,750
Aerial Photopoints (Pre, 1,2,3,6,9,12,15 yrs post)	Hours	50	\$45.00	\$0	\$0	\$2,250	\$2,250
Project Topo Survey (as built, 1,3,5,10,15 yrs post)	Hours	500	\$80.00	\$0	\$0	\$40,000	\$40,000
Salmonid presence/absence (annual redd counts, snorkel surveys)	Hours	100	\$40.00	\$0	\$0	\$4,000	\$4,000
<b>Category Sub-total</b>				<b>\$0</b>		<b>\$48,000</b>	<b>\$48,000</b>
<b>Modified Total Direct Cost Amounts</b>				<b>\$0</b>		<b>\$389,390</b>	<b>\$59,630</b>
<b>Indirect Costs</b>							
Federally Accepted 'de minimis' Indirect Cost Rate (up to 10%)	10%			<b>Indirect Cost Total: \$0</b>			
<b>Total</b>				<b>\$0</b>		<b>\$389,390</b>	<b>\$59,630</b>
						<b>\$449,020</b>	

If the budget includes unusually high costs and/or rates, provide justification for those costs and/or rates.

If the budget identifies a contingency amount for specific line item(s) within the Contracted Services and Materials and Supplies budget categories, explain the specific reasons a contingency is needed for each line item. Contingencies are line-item specific and cannot be used for other costs.

## Funding and Match

### Fund Sources and Amounts

Organization Type	Name	Source Note	Contribution Type	Amount	Description	Status
State	Oregon Department of Fish and Wildlife		In-Kind - Labor	\$59,630	ODFW will conduct project construction oversight and monitoring.	Secured
Federal	Bonneville Power Administration		Cash	\$389,390	Project implementation funding	Pending
<b>Fund Source Cash Total</b>			<b>\$389,390</b>	<b>Fund Source In-Kind Total</b>		<b>\$59,630</b>

### Match

Contribution Source-Type: Description	Amount
Oregon Department of Fish and Wildlife-In-Kind - Labor: ODFW will conduct project construction oversight and monitoring.	\$59,630
Bonneville Power Administration-Cash: Project implementation funding	\$0
<b>Match Total</b>	<b>\$59,630</b>

Do match funding sources have any restrictions on how funds are used, timelines or other limitations that would impact the portion of the project proposed for OWEB funding?

- Yes  
 No

Do you need state OWEB dollars (not Federal) to match the requirements of any other federal funding you will be using to complete this project?

- Yes  
 No

Does the non-OWEB funding include NOAA/PCSRF funds?

- Yes  
 No

## Uploads

Map: [CC Start Park Site Map.pdf - Project Location Map](#)

Secured Match Forms: [CC State Park Match Form Restoration 2018.pdf - ODFW Match](#)

Secured Match Forms: [CC State Park Match Form Restoration 2018.pdf - ODFW Match](#)

Project Design: [CatherineCreekStatePark\\_30pct\\_Drawings\\_10052018.pdf - 30% Design](#)

Photos: [CC State Park Aerials 1954-2017.pdf - Google Earth Aerial Pictures](#)

Photos: [CC State Park Photographs current conditions.pdf - Current project site photos](#)

Figures and Tables: [CC State Park Restoration Budget.pdf - BPA Budget Form](#)

## Plant Page

### Planting Questions

#### Relationship to other conservation programs

This project will use OWEB funds to increase the planting density on CREP acres.

### Planting Activities

Describe the current condition of the site(s) to be planted.

Historical aerial images of the project area show evidence of historical (pre-1954) riparian clearing and vegetation alteration within the state park where roads, campsites, buildings, and the pedestrian path are located. However, more recently, aerial photos suggest that vegetation density has increased significantly in the last 65 years, returning more closely to natural conditions. Current vegetation conditions were evaluated during site survey in May 2018. Uplands area dominated by ponderosa pine, Douglas fir and snowberry, while mountain alder and red osier dogwood dominate floodplain areas. In many locations, coniferous communities extend to be adjacent to the existing main channel alignment.

Describe how you will prepare the site(s) prior to planting and how those activities are appropriate considering the site conditions described in the previous question.

Prior to construction activities that disturb soil and vegetation, noxious weeds will be treated with chemical herbicides at the appropriate time (spring, summer, or fall spraying) dependent on the targeted weed species. The use of herbicides that break down and detoxify relatively rapidly is necessary to prevent adverse effects on germination and growth of reseeded species. Only approved, short-lived herbicides will be used for pre-treatment of noxious weeds.

Only approved herbicides will be used to control noxious weeds near water, wetlands, and riparian areas. Pre-spraying will be conducted prior to any clearing to reduce the spread of noxious weeds by equipment used during clearing. Treatment methods will vary due to site-specific conditions and the type of species that are encountered.

Methods used to reduce the spread and establishment of noxious weeds will be discussed with Oregon Parks and Recreation Department and Tri County Weed District employees.

Fill out the table below. Identify the vegetation communities you plan on planting in, the acres each vegetation community encompasses, and the density of your planting.

Vegetation Community	Acres	Density
Riparian	0.1	2000

Fill out the table below for each vegetation community listed in the table above, provide the common and scientific names of up to five plants that will be planted, the form(tree, shrub, grass), type of plant (bare root, cutting, etc) and

the planting timing.

Vegetation Community	Plants: Common Name	Plants: Scientific Name	Form	Type	Year	Month
Riparian	Willow	Salix sp.	Tree	Cutting	2019	August

## **Plant Stewardship**

After the plantings are installed, will you conduct plant stewardship (“free to grow”)?

- Yes
- No

Are you requesting OWEB funds for plant stewardship activities?

- Yes
- No

Explain how you plan to carry out activities to help the plantings survive and grow over time.

For a minimum of 15 years, duration of Inter Agency Agreement, yearly inspections will occur. The project will be inspected each spring with maintenance visits conducted as necessary for the remainder of the year.

For the first five years after project implementation, plant survival will be monitored. There is no use of the project area by domestic livestock. If necessary, protection from native ungulate browsing will be provided using hog panel cages and/or small enclosures.

The survival, growth and cover of desired woody species will be monitored every 3 years, for the duration of the IAA, using photopoints and annual on-site observation.

Local sources will be used as the source of cuttings. Willows will be planted in trenches on created gravel bars during construction.

All areas disturbed during construction will be re-seeded using native seed mixes

## **Measures of Planting Success**

Use the table below to explain how you will document and determine success for the plantings.

<b>Vegetation Community</b>	<b>Parameter</b>	<b>Percentages</b>
Riparian	Percent Survival	70

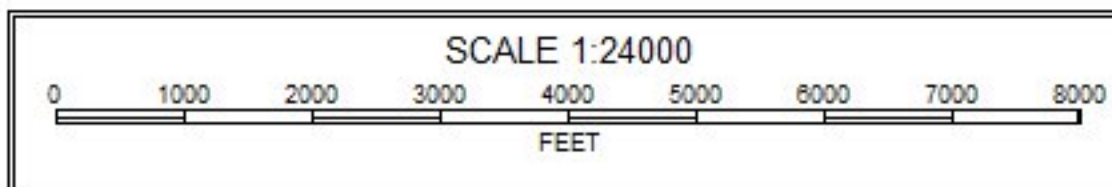
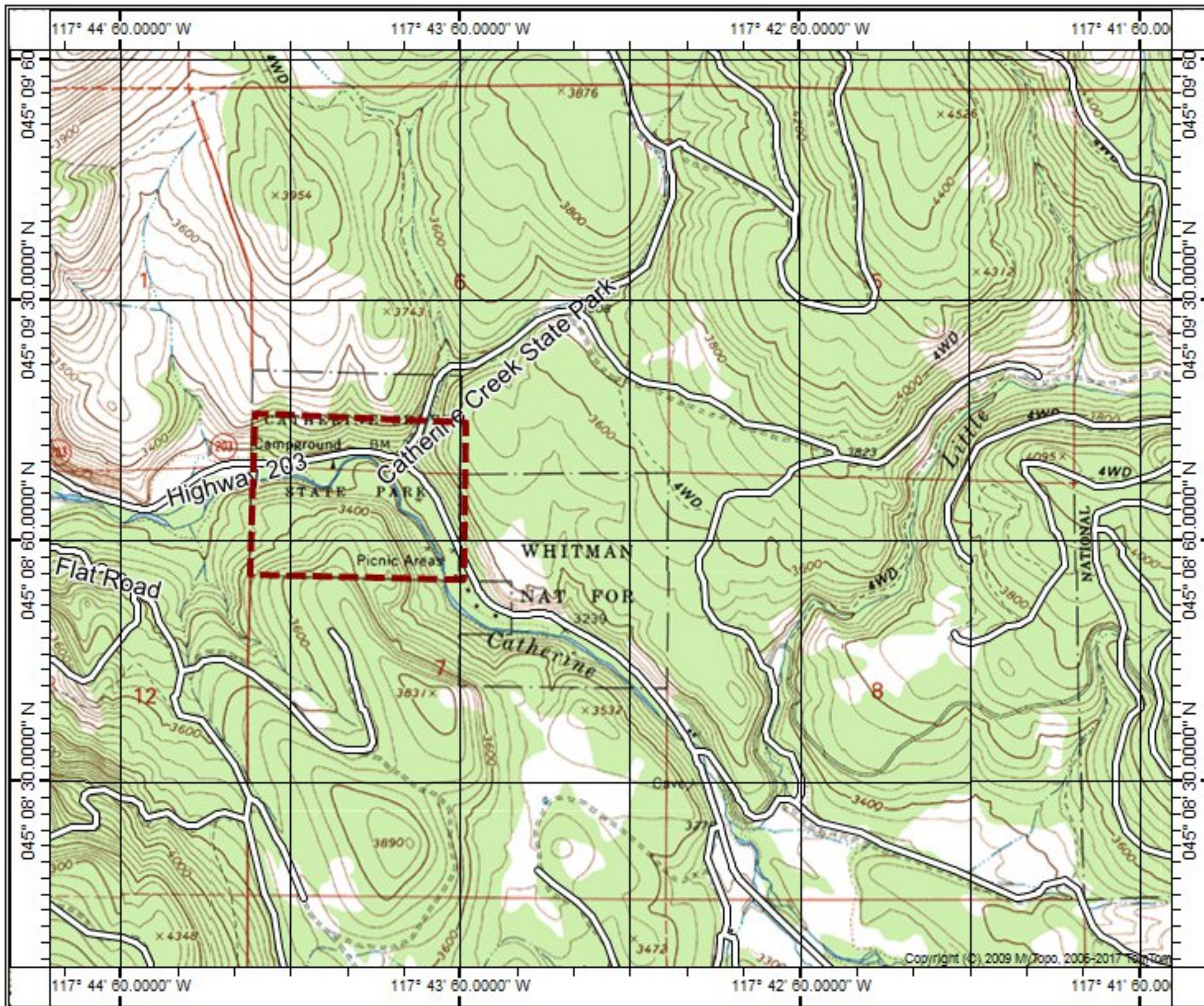
If, in the course of the 3-5 years following planting, the success rate falls below your standard, what is your plan?

In our experience, we should achieve 70% survival. It is important to wait at least two years before deciding if the planting was successful or a failure. Our experience shows that after initially slow growth, cuttings can grow 1 to 3 feet per year.

If survival is less than 70% in year 3, we will conduct additional planting in November. Replacement of dead plantings will occur until the riparian area is, or will progress to, a fully functional condition and meets success criteria.

## Permit Page

Project Activity Requiring a Permit or License	Name of Permit or License	Entity Issuing Permit or License	Status
Side Channel Excavation	HIP III 401 Cert Removal-Fill 404 Sec 106	NMFS & USFWS ODEQ ODSL COE SHPO	All in progress
Alcove Enhancement	HIP III 401 Cert Removal-Fill 404 Sec 106	NMFS & USFWS ODEQ ODSL COE SHPO	All in progress
High Flow Swale	HIP III 401 Cert Removal-Fill 404 Sec 106	NMFS USFWS ODEQ ODSL COE SHPO	All in progress
Gravel Bar and Pool Enhancement	HIP III 401 Cert Removal-Fill 404 Sec 106	NMFS USFWS ODEQ ODSL COE SHPO	All in progress
Large Wood and Boulder Structures	HIP III 401 Cert Removal-Fill 404 Sec 106 NMFS	NMFS USFWS ODEQ ODSL COE SHPO	All in progress





# MATCH FUNDING FORM

*Document here the match funding shown on the budget page of your grant application*

**OWEB accepts all non-OWEB funds as match.** An applicant may not use *another OWEB grant* to match an OWEB grant; this includes ODA Weed Board projects because they are funded through OWEB grants. However, an applicant who benefits from a pass-through OWEB agreement with another state agency, by receiving either staff expertise or a grant from that state agency, may use those benefits as match for an OWEB grant. (Example: A grantee may use as match the effort provided by ODFW restoration biologists because OWEB funding for those positions is the result of a pass-through agreement).

At the time of application, match funding for OWEB funds requested does not have to be *secured*, but you must show that at least 25% of match funding has been sought. On this form, you do not necessarily need to show authorized signatures (“secured match”), but the more match that is secured, the stronger the application. Identify the type of match (cash or in-kind), the status of the match (secured or pending), and either a dollar amount or a dollar value (based on local market rates) of the in-kind contribution.

If you have questions about whether your proposed match is eligible or not, see Allowable Match document in OGMS <http://apps.wrd.state.or.us/apps/oweb/fiscal/nologin.aspx> under Technical Assistance application or contact your local OWEB regional program representative (contact information available in the instructions to this application).

Project Name: Catherine Creek State Park Fish Habitat Restoration Project      Applicant: ODFW

Match Funding Source	Type (√ one)	Status (√ one)*	Dollar Value	Match Funding Source Signature/Date*
Oregon Department of Fish and Wildlife	<input type="checkbox"/> cash <input checked="" type="checkbox"/> in kind	<input checked="" type="checkbox"/> secured <input type="checkbox"/> pending	\$58,230.00	<i>Catherine Sugar</i>
Bonneville Power Administration	<input checked="" type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input checked="" type="checkbox"/> pending	\$393,890.00	
	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		

\* **IMPORTANT:** If you checked the “Secured” box in the Status Column for any match funding source, you must provide either the signature of an authorized representative of the match source in the final Column, or attach a letter of support from the match funding source that specifically mentions the dollar amount you show in the Dollar Value Column.



# MATCH FUNDING FORM

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Applicant: ODFW

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	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
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	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
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	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		
	<input type="checkbox"/> cash <input type="checkbox"/> in kind	<input type="checkbox"/> secured <input type="checkbox"/> pending		

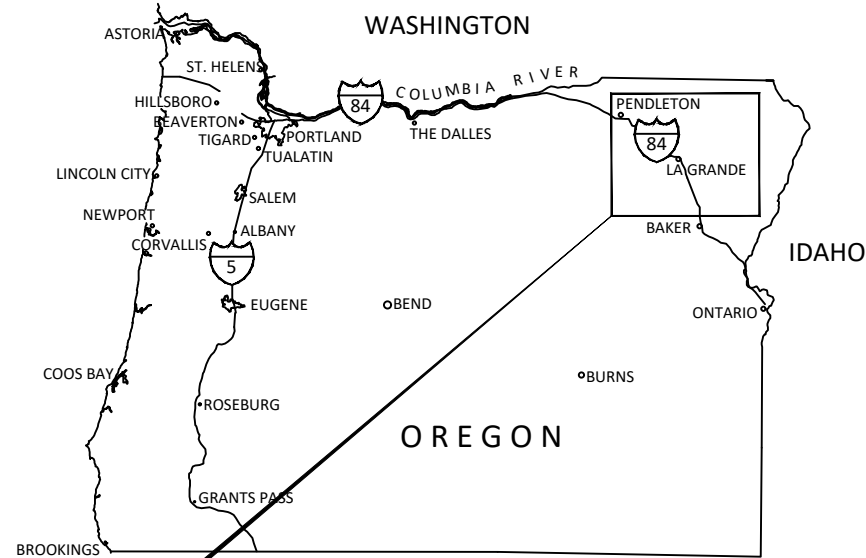
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# CATHERINE CREEK STATE PARK RESTORATION PROJECT

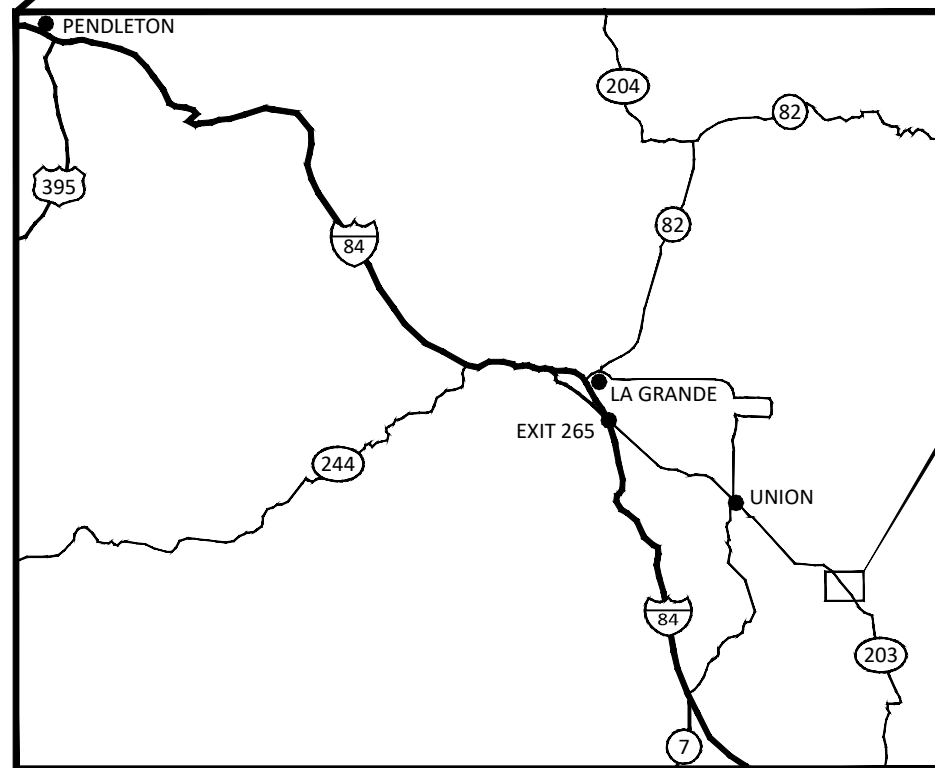
## PRELIMINARY (30%) DESIGNS

### UNION COUNTY, OREGON

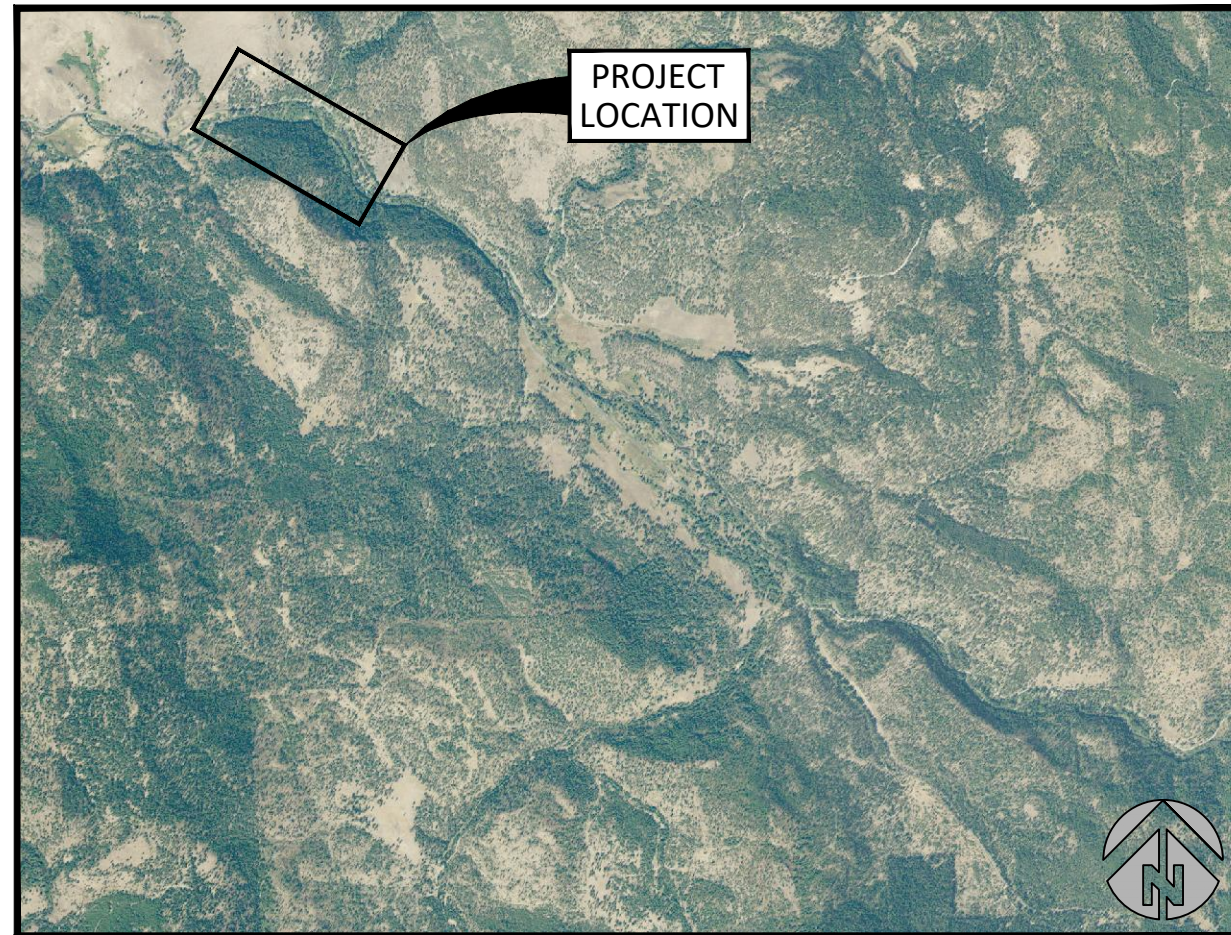
#### OCTOBER 2018



**LOCATION MAP**  
**STATE OF OREGON**  
NOT TO SCALE



**VICINITY MAP**  
NOT TO SCALE



**SITE MAP**  
NOT TO SCALE

#### PROJECT SPONSORS



OREGON DEPARTMENT  
OF FISH AND WILDLIFE  
4034 FAIRVIEW  
INDUSTRIAL DR SE  
SALEM, OR 97302



BONNEVILLE POWER  
ADMINISTRATION  
P.O. BOX 3621  
PORTLAND, OR 97208

#### COORDINATES

LATITUDE: 45° 09' 07" N  
LONGITUDE: 117° 44' 19" W

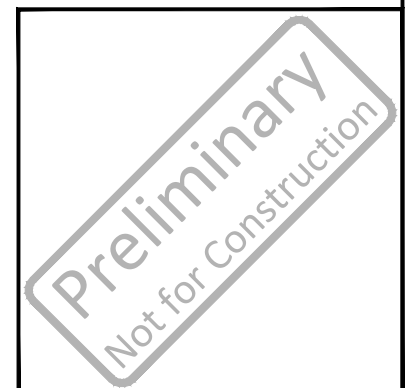
SECTIONS 6 & 7, TOWNSHIP 5S, RANGE 41E

WATERBODY: CATHERINE CREEK  
TRIBUTARY OF GRANDE RONDE RIVER

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

#### SHEET LIST

- 1 Title, Location and Sheet List
- 2 General Notes, Abbreviations and Quantities
- 3 HIP III Conservation Measures (1 of 2)
- 4 HIP III Conservation Measures (2 of 2)
- 5 Erosion and Sedimentation Control Details (1 of 2)
- 6 Erosion and Sedimentation Control Details (2 of 2)
- 7 Existing Conditions, Property Owners and Survey Control
- 8 Access, Stationing, and Erosion Control
- 9 Proposed Conditions Overview
- 10 Main Channel Enhancements, Sta 4+00 to Sta 12+00
- 11 Main Channel Enhancements, Sta 12+00 to Sta 27+00
- 12 Main Channel Enhancements, Sta 27+00 to Sta 40+00
- 13 Proposed Side Channel Plan and Profile
- 14 Proposed Backwater Alcove Plan and Profile
- 15 Proposed Side Channel and Backwater Alcove Cross Sections
- 16 Proposed High Flow Swale Plan, Profile and Cross Section
- 17 Downstream Constructed Bar and Pool Plan and Section
- 18 Upstream Constructed Bar and Pool Plan and Section
- 19 Typical Detail and Sequence - Side Channel Bank Jam
- 20 Typical Detail - Allee Jam, Side Channel Habitat Wood
- 21 Typical Detail - Hillslope Wood



NO.	BY	DATE	REVISION DESCRIPTION

DF	MC, JF, RR	
DRAWN	DESIGNED	CHECKED
	10/2018	18-02-02
APPROVED	DATE	PROJECT

CATHERINE CREEK STATE PARK RESTORATION PROJECT  
PRELIMINARY (30%) DESIGNS  
UNION COUNTY, OREGON



501 Portway Avenue, Suite 101  
Hood River, OR 97031  
541.386.9003  
www.interfluve.com



TITLE, LOCATION AND  
SHEET LIST

SHEET

1 OF 21

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

THE CONTRACTOR SHALL ATTEND A PRE-CONSTRUCTION MEETING WITH THE OWNER PRIOR TO BEGINNING CONSTRUCTION.

ALL WORK SHALL CONFORM TO THE CURRENT EDITIONS OF STANDARD PLANS AND SPECIFICATIONS OF THE OREGON DEPARTMENT OF TRANSPORTATION (ODOT), AND LOCAL STANDARDS UNLESS INDICATED OTHERWISE BY THE CONTRACT DOCUMENTS.

**EXISTING DATA**

TOPOGRAPHIC SURVEY DATA WAS COLLECTED BY INTER-FLUVE, INC USING RTK GPS EQUIPMENT ON MARCH 21, 2018. DATA ARE REFERENCED TO NAD83 OREGON STATE PLANE, NORTH ZONE, INTERNATIONAL FEET, NAVD 88.

LIDAR DATA OBTAINED FROM OREGON DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES (DOGAMI), COMMISSIONED BY US BUREAU OF RECLAMATION, FLOWN IN 2012, WAS USED TO SUPPLEMENT TOPOGRAPHIC SURVEY DATA TO DEVELOP DIGITAL ELEVATION MODELS.

PROPERTY BOUNDARIES SHOWN ARE FROM UNION COUNTY TAX LOT GIS LAYER.

**WATER BOUNDARIES**

ORDINARY HIGH WATER (OHW) BOUNDARIES DISPLAYED IN THIS PLANSET 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 JURISDICTIONAL BOUNDARIES AND REGULATIONS.

**SOILS**

THE CATHERINE CREEK STATE PARK SITE CONSISTS OF SOILS MAPPED AS VEALE-VOATS COMPLEX. THE SOIL IS CONSIDERED WELL DRAINED, AND MIXED ALLUVIUM IS THE PARENT MATERIAL.

**BPA HIP III**

THIS PROJECT WAS DESIGNED IN ACCORDANCE WITH THE BPA HABITAT IMPROVEMENT PROGRAM, PROGRAMMATIC BIOLOGICAL OPINION (HIP III). HIP III GENERAL CONSERVATION MEASURES (CMs) ARE INCLUDED ON SHEETS 3 AND 4. SITE SPECIFIC DIRECTION IS INCLUDED IN THE FOLLOWING GENERAL NOTES. A STAGING AREA VARIANCE HAS BEEN REQUESTED BY OWNER. 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 15TH, 2019.

**EROSION CONTROL**

CONTRACTOR SHALL BE SOLELY RESPONSIBLE AT OWN EXPENSE FOR PROVIDING AND MAINTAINING ALL NECESSARY EROSION CONTROL FACILITIES TO COMPLY WITH 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. SEE PROPOSED SEQUENCING NOTES FOR INITIAL GUIDANCE. ANY DEVIATION FROM FISH SALVAGE PLAN MUST BE APPROVED IN WRITING BY OWNER. OWNER WILL OBTAIN FISH SALVAGE PERMITS AND PROVIDE EXPERIENCED FISH BIOLOGIST, CONTRACTOR TO ASSIST.

**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 SCHMIDT	(503) 230-5015	(503) 804-1815

**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 DAMAGED 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 LINES 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**

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

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

**CONSTRUCTION ACCESS**

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.

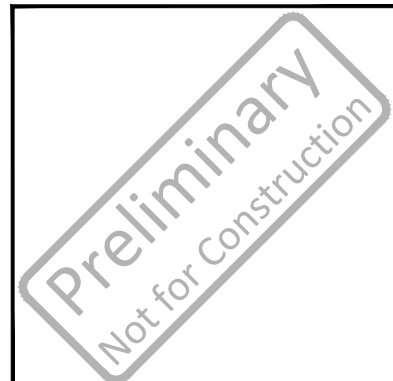
FOR DURATION OF PROJECT, CONTRACTOR SHALL KEEP ALL PRIVATE AND PUBLIC ROADS USED FOR ACCESS FREE OF DEBRIS AND MUD.

**ABBREVIATIONS**

APPROX	APPROXIMATE
AVE	AVERAGE
CMs	CONSERVATION MEASURES
CY	CUBIC YARDS
°	DEGREES
DIA or Ø	DIAMETER
EL or ELEV	ELEVATION
EXIST	EXISTING
FT or Ⓣ	FEET
HMT	HIGHEST MEASURED TIDE
HORI	HORIZONTAL
HWY	HIGHWAY
IN or "	INCH
INV	INVERT
LN	LANE
LWM	LARGE WOODY MATERIAL
MAX	MAXIMUM
MIN	MINIMUM
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NTS	NOT TO SCALE
ODOT	OREGON DEPARTMENT OF TRANSPORTATION
OHW	ORDINARY HIGH WATER
%	PERCENT
RD	ROAD
RM	RIVER MILE
SF	SQUARE FEET
STA	STATION
TBD	TO BE DETERMINED
TBM	TEMPORARY BENCHMARK
TYP	TYPICAL
USACE	UNITED STATES ARMY CORPS OF ENGINEERS
VERT	VERTICAL
WSE	WATER SURFACE ELEVATION
XS	CROSS-SECTION
YR	YEAR

**QUANTITIES**


Item	Unit	Ustream Bars/Pools	Side Channel	High Flow Swale	Area Jams	Hillslope wood	Side Channel Logjam	Bank Margin Habitat Cover Wood	Totals
Cut	CY	360	2620	230					3210
Fill	CY	590							590
Logs, 12" - 16" DBH, 35' to 40' Length	EA				8		6	30	44
Logs with Rootwads, 12" - 16" DBH, 35' to 40' Length	EA	4			21	9	24	30	88
Small Woody Trees, 10" DBH, 30' Length	EA							30	30
Large Woody Trees, 16" - 20" DBH, 50' to 60' Length	EA	4				9			13
Vertical Snags, 12" - 16" DBH, 20' Length	EA				29				29
Racine Wood, 6" to 10" DBH, 20' Length	EA	12			43	27	45	90	217
Boulders, 3' Diameter	EA					10			10




NO.	BY	DATE	REVISION DESCRIPTION

DF DRAWN	MC, JF, RR DESIGNED	CHECKED
APPROVED	10/2018 DATE	18-02-02 PROJECT

CATHERINE CREEK STATE PARK RESTORATION PROJECT  
 PRELIMINARY (30%) DESIGNS  
 UNION COUNTY, OREGON



501 Portway Avenue, Suite 101  
 Hood River, OR 97031  
 541.386.9003  
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GENERAL NOTES,  
 ABBREVIATIONS AND  
 QUANTITIES

**HIP 3 GENERAL AQUATIC CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS**

THE ACTIVITIES COVERED UNDER THE HIP III ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. TO MINIMIZE THESE SHORT-TERM ADVERSE EFFECTS AND MAKE THEM PREDICTABLE FOR THE PURPOSES OF PROGRAMMATIC ANALYSIS, BPA WILL INCLUDE IN ALL PROJECTS IMPLEMENTED UNDER THIS HIP III PROPOSED ACTION THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS).

**PROJECT DESIGN AND SITE PREPARATION.**

**1) STATE AND FEDERAL PERMITS.** ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, AND THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, USACE CLEAN WATER ACT (CWA) 404 PERMITS, AND CWA SECTION 401 WATER QUALITY CERTIFICATIONS.

**2) TIMING OF IN-WATER WORK.** 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 (MFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.

A) BULL TROUT - WHILE UTILIZING THE APPROPRIATE STATE DESIGNATED IN-WATER WORK PERIOD WILL LESSEN THE RISK TO BULL TROUT, THIS ALONE MAY NOT BE SUFFICIENT TO ADEQUATELY PROTECT LOCAL BULL TROUT POPULATIONS. THIS IS ESPECIALLY TRUE IF WORK IS OCCURRING IN SPAWNING AND REARING AREAS BECAUSE EGGS, ALEVIN, AND FRY ARE IN THE SUBSTRATE OR CLOSELY ASSOCIATED HABITATS NEARLY YEAR ROUND. SOME AREAS MAY NOT HAVE DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR IF THEY DO, THEY MAY CONFLICT WITH WORK WINDOWS FOR SALMON AND STEELHEAD. IF THIS IS THE CASE, OR IF PROPOSED WORK IS TO OCCUR WITHIN BULL TROUT SPAWNING AND REARING HABITATS, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE 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.

B) LAMPREY - THE PROJECT SPONSOR AND/OR THEIR CONTRACTORS WILL AVOID WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY FROM MARCH 1 TO JULY 1 IN LOW TO MID ELEVATION REACHES (<5,000 FEET). IN HIGH ELEVATION REACHES (>5,000 FEET), THE PROJECT SPONSOR WILL AVOID WORKING IN STREAM OR RIVER CHANNELS FROM MARCH 1 TO AUGUST 1. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES OUTLINED IN US FISH AND WILDLIFE SERVICE BEST MANAGEMENT PRACTICES TO MINIMIZE ADVERSE EFFECTS TO PACIFIC LAMPREY (2010).

C) EXCEPTIONS TO ODFW, WDFW, MFWP, OR IDFG IN-WATER WORK WINDOWS WILL BE REQUESTED THROUGH THE VARIANCE PROCESS (PAGE 2).

**3) CONTAMINANTS.** THE PROJECT SPONSOR WILL COMPLETE A SITE ASSESSMENT WITH THE FOLLOWING ELEMENTS TO IDENTIFY THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION FOR ANY ACTION THAT INVOLVES EXCAVATION OF MORE THAN 20 CUBIC YARDS OF MATERIAL:

- A) A REVIEW OF AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
- B) A SITE VISIT TO INSPECT THE AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES AND THE CONDITION OF THE PROPERTY;
- C) INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, AND OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
- D) A SUMMARY, STORED WITH THE PROJECT FILE THAT INCLUDES AN ASSESSMENT OF THE LIKELIHOOD THAT CONTAMINANTS ARE PRESENT AT THE SITE, BASED ON ITEMS 4(A) THROUGH 4(C).

**4) SITE LAYOUT AND FLAGGING.** PRIOR TO CONSTRUCTION, THE ACTION AREA WILL BE CLEARLY FLAGGED TO IDENTIFY THE FOLLOWING:

- A) SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;
- B) EQUIPMENT ENTRY AND EXIT POINTS;
- C) ROAD AND STREAM CROSSING ALIGNMENTS;
- D) STAGING, STORAGE, AND STOCKPILE AREAS; AND
- E) NO-SPRAY AREAS AND BUFFERS.

**5) TEMPORARY ACCESS ROADS AND PATHS.**

- A) EXISTING ACCESS 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 TO LESSEN SOIL DISTURBANCE AND COMPACTION, AND IMPACTS TO VEGETATION.
- B) 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.

C) 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).

D) AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.

E) TEMPORARY ROADS AND PATHS IN WET AREAS OR AREAS PRONE TO FLOODING WILL BE OBLITERATED BY THE END OF THE IN-WATER WORK WINDOW.

**6) TEMPORARY STREAM CROSSINGS.**

A) EXISTING STREAM CROSSINGS 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 WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR OVER WATER.

C) EQUIPMENT AND VEHICLES WILL CROSS THE STREAM IN THE WET ONLY WHERE:

- I. THE STREAMBED IS BEDROCK; OR
- II. MATS OR OFF-SITE LOGS ARE PLACED IN THE STREAM AND USED AS A CROSSING.

D) VEHICLES AND MACHINERY WILL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHEREVER POSSIBLE.

E) THE LOCATION OF THE TEMPORARY CROSSING WILL AVOID AREAS THAT MAY INCREASE THE RISK OF CHANNEL RE-ROUTING OR AVULSION.

F) POTENTIAL SPAWNING HABITAT (I.E., POOL TAILOUTS) AND POOLS WILL BE AVOIDED TO THE MAXIMUM EXTENT POSSIBLE.

G) NO STREAM CROSSINGS WILL OCCUR AT ACTIVE SPAWNING SITES, WHEN HOLDING ADULT LISTED FISH ARE PRESENT, OR WHEN EGGS OR ALEVINS ARE IN THE GRAVEL. THE APPROPRIATE STATE FISH AND WILDLIFE AGENCY WILL BE CONTACTED FOR SPECIFIC TIMING INFORMATION.

H) AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND THE STREAM CHANNEL AND BANKS RESTORED.

**7) STAGING, STORAGE, AND STOCKPILE AREAS.**

A) STAGING AREA (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE EQUIPMENT STORAGE, FUELING, SERVICING, AND HAZARDOUS WASTE MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND, OR ON AN ADJACENT, ESTABLISHED ROAD AREA IN A LOCATION AND MANNER THAT WILL PRECLUDE EROSION INTO OR CONTAMINATION OF THE STREAM OR FLOODPLAIN.

A1) ALL TEMPORARY STAGING AREAS SHALL BE LOCATED AT ELEVATION 12FT (NAVD88) 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 ABRASION RESISTANT OIL ABSORBENT MAT MATERIAL. THE MAT MATERIAL SHALL BE 3-PLY POLYPROPYLENE/POLYETHYLENE OR APPROVED EQUAL.

A2) 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 CARRIAGE AS A "DIAPER".

A3) ALL REFUELING SHALL TAKE PLACE IN DESIGNATED STAGING AREAS, WITH BOTH GROUND AND "DIAPER" CONTAINMENT IN PLACE.

B) NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN THE 100-YEAR FLOODPLAIN.

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 REMOVED TO A LOCATION OUTSIDE OF THE 100-YEAR FLOODPLAIN FOR DISPOSAL.

**8) EQUIPMENT.** 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-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS). ALL VEHICLES AND OTHER MECHANIZED EQUIPMENT WILL BE:

- A) STORED, FUELED, AND MAINTAINED IN A VEHICLE STAGING AREA PLACED 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND OR ON AN ADJACENT, ESTABLISHED ROAD AREA;
- B) REFUELED IN A VEHICLE STAGING AREA PLACED 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND, OR IN AN ISOLATED HARD ZONE, SUCH AS A PAVED PARKING LOT OR ADJACENT, ESTABLISHED ROAD (THIS MEASURE APPLIES ONLY TO GAS POWERED EQUIPMENT WITH TANKS LARGER THAN 5 GALLONS);
- C) BIODEGRADABLE LUBRICANTS AND FLUIDS SHALL BE USED ON EQUIPMENT OPERATING IN AND ADJACENT TO THE STREAM CHANNEL AND LIVE WATER.
- D) INSPECTED DAILY FOR FLUID LEAKS BEFORE LEAVING THE VEHICLE STAGING AREA FOR OPERATION WITHIN 150 FEET OF ANY NATURAL WATER BODY OR WETLAND; AND
- E) THOROUGHLY CLEANED BEFORE OPERATION BELOW ORDINARY HIGH WATER, AND AS OFTEN AS NECESSARY DURING OPERATION, TO REMAIN GREASE FREE.

**9) EROSION CONTROL.** EROSION CONTROL MEASURES WILL BE PREPARED AND CARRIED OUT, COMMENSURATE IN SCOPE WITH THE ACTION, THAT MAY INCLUDE THE FOLLOWING:

A) TEMPORARY EROSION CONTROLS.

I. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE.

II. 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.

III. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC.

IV. 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.

V. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL.

VI. 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:

- I. A SUPPLY OF SEDIMENT CONTROL MATERIALS AND
- II. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

**10) DUST ABATEMENT.** THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES. IN ADDITION, THE FOLLOWING CRITERIA WILL BE FOLLOWED:

A) WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.

B) DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING A 50:50 (LIGNINSULFONATE TO WATER) SOLUTION.

C) 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 WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).

D) SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.

E) PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.

**11) SPILL PREVENTION, CONTROL, AND COUNTER MEASURES.** THE USE OF MECHANIZED MACHINERY INCREASES THE RISK FOR ACCIDENTAL SPILLS OF FUEL, LUBRICANTS, HYDRAULIC FLUID, OR OTHER CONTAMINANTS INTO THE RIPARIAN ZONE OR DIRECTLY INTO THE WATER. ADDITIONALLY, UNCURED CONCRETE AND FORM MATERIALS ADJACENT TO THE ACTIVE STREAM CHANNEL MAY RESULT IN ACCIDENTAL DISCHARGE INTO THE WATER. THESE CONTAMINANTS CAN DEGRADE HABITAT, AND INJURE OR KILL AQUATIC FOOD ORGANISMS AND ESA-LISTED SPECIES. THE PROJECT SPONSOR WILL ADHERE TO THE FOLLOWING MEASURES:

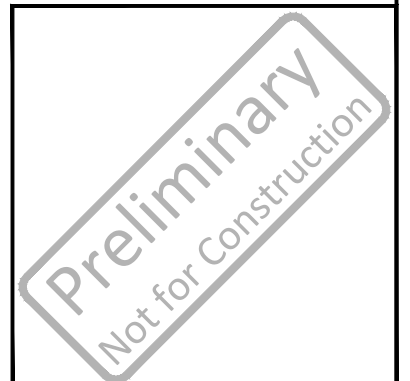
A) A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.

B) WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.

C) SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.

D) WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.

E) ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPAULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.



NO.	BY	DATE	REVISION DESCRIPTION

DF DRAWN	MC, JF, RR DESIGNED	CHECKED
APPROVED	10/2018 DATE	18-02-02 PROJECT

**CATHERINE CREEK STATE PARK RESTORATION PROJECT  
PRELIMINARY (30%) DESIGNS  
UNION COUNTY, OREGON**



501 Portway Avenue, Suite 101  
Hood River, OR 97031  
541.386.9003  
www.interfluve.com

**HIP III CONSERVATION  
MEASURES (1 OF 2)**

SHEET  
**3 OF 21**

**WORK AREA ISOLATION & FISH SALVAGE.**

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. WHEN WORK AREA ISOLATION IS REQUIRED, DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS, FISH RELEASE AREAS, AND, WHEN A PUMP IS USED TO DEWATER THE ISOLATION AREA AND FISH ARE PRESENT, A FISH SCREEN THAT MEETS NMFS'S FISH SCREEN CRITERIA (NMFS 2011, OR MOST CURRENT). 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.

- NATIONAL MARINE FISHERIES SERVICE. 2011. ANADROMOUS SALMONID PASSAGE FACILITY DESIGN. NORTHWEST REGION. AVAILABLE ONLINE AT: [HTTP://WWW.NWR.NOAA.GOV/SALMON-HYDROPOWER/FERC/UPLOAD/FISH-PASSAGE-DESIGN.PDF](http://www.nwr.noaa.gov/salmon-hydropower/ferc/upload/fish-passage-design.pdf)

- U.S. FISH AND WILDLIFE SERVICE. 2010. BEST MANAGEMENT PRACTICES TO MINIMIZE ADVERSE EFFECTS TO PACIFIC LAMPREY.

[HTTP://WWW.FWS.GOV/PACIFIC/FISHERIES/SPHABCON/LAMPREY/PDF/BEST%20MANAGEMENT%20PRACTICES%20FOR%20PACIFIC%20LAMPREY%20APRIL%202010%20VERSION.PDF](http://www.fws.gov/pacific/fisheries/sphabcon/lamprey/pdf/best%20management%20practices%20for%20pacific%20lamprey%20april%202010%20version.pdf)

FOR SALVAGE OPERATIONS IN KNOWN BULL TROUT SPAWNING AND REARING HABITAT, ELECTROFISHING SHALL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. BULL TROUT ARE VERY TEMPERATURE SENSITIVE AND GENERALLY SHOULD NOT BE ELECTROSHOCKED OR OTHERWISE HANDLED WHEN TEMPERATURES EXCEED 15 DEGREES CELSIUS. SALVAGE ACTIVITIES SHOULD TAKE PLACE 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 TO FISH SPECIES PRESENT.

SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODOLOGIES, AND CONSERVATION MEASURES SPECIFIED BELOW IN STEPS 1 THROUGH 6. STEPS 1 AND 2 WILL BE IMPLEMENTED FOR ALL PROJECTS WHERE WORK AREA ISOLATION IS NECESSARY ACCORDING TO CONDITIONS ABOVE. ELECTROFISHING (STEP 3) CAN BE IMPLEMENTED TO ENSURE ALL FISH HAVE BEEN REMOVED FOLLOWING STEPS 1 AND 2, OR WHEN OTHER MEANS OF FISH CAPTURE MAY NOT BE FEASIBLE OR EFFECTIVE. DEWATERING AND REWATERING (STEPS 4 AND 5) WILL BE IMPLEMENTED UNLESS WETTED IN-STREAM WORK IS DEEMED TO BE MINIMALLY HARMFUL TO FISH, AND IS BENEFICIAL TO OTHER AQUATIC SPECIES. DEWATERING WILL NOT BE CONDUCTED IN AREAS KNOWN TO BE OCCUPIED BY LAMPREY, UNLESS LAMPREYS ARE SALVAGED USING GUIDANCE SET FORTH IN US FISH AND WILDLIFE SERVICE (2010)3.

**1) ISOLATE.**

A) BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.

B) 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.

C) IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED TO THE BANKS AND FREE OF ORGANIC ACCUMULATION. IF THE PROJECT IS WITHIN BULL TROUT SPAWNING AND REARING HABITAT, THE BLOCK NETS MUST BE CHECKED EVERY FOUR HOURS FOR FISH IMPINGEMENT ON THE NET. LESS FREQUENT INTERVALS MUST BE APPROVED THROUGH A VARIANCE REQUEST.

D) NETS WILL BE MONITORED HOURLY ANYTIME THERE IS INSTREAM DISTURBANCE.

**2) SALVAGE.** AS DESCRIBED BELOW, FISH TRAPPED WITHIN THE ISOLATED WORK AREA WILL BE CAPTURED TO MINIMIZE THE RISK OF INJURY, THEN RELEASED AT A SAFE SITE:

A) REMOVE AS MANY FISH AS POSSIBLE PRIOR TO DEWATERING.

B) DURING DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.

C) SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.

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

E) IF BUCKETS ARE USED TO TRANSPORT FISH:

I. THE TIME FISH ARE IN A TRANSPORT BUCKET WILL BE LIMITED, AND WILL BE RELEASED AS QUICKLY AS POSSIBLE;

II. THE NUMBER OF FISH WITHIN A BUCKET WILL BE LIMITED BASED ON SIZE, AND FISH WILL BE OF RELATIVELY COMPARABLE SIZE TO MINIMIZE PREDATION;

III. AERATORS FOR BUCKETS WILL BE USED OR THE BUCKET WATER WILL BE FREQUENTLY CHANGED WITH COLD CLEAR WATER AT 15 MINUTE OR MORE FREQUENT INTERVALS.

IV. BUCKETS WILL BE KEPT IN SHADED AREAS OR WILL BE COVERED BY A CANOPY IN EXPOSED AREAS.

V. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.

F) AS RAPIDLY AS POSSIBLE (ESPECIALLY FOR TEMPERATURE-SENSITIVE BULL TROUT), FISH WILL BE RELEASED IN AN AREA THAT PROVIDES ADEQUATE COVER AND FLOW REFUGE. UPSTREAM RELEASE IS GENERALLY PREFERRED, BUT FISH RELEASED DOWNSTREAM WILL BE SUFFICIENTLY OUTSIDE OF THE INFLUENCE OF CONSTRUCTION.

G) SALVAGE WILL BE SUPERVISED BY A QUALIFIED FISHERIES BIOLOGIST EXPERIENCED WITH WORK AREA ISOLATION AND COMPETENT TO ENSURE THE SAFE HANDLING OF ALL FISH.

**3) ELECTROFISHING.** ELECTROFISHING WILL BE USED ONLY AFTER OTHER SALVAGE METHODS HAVE BEEN EMPLOYED OR WHEN OTHER MEANS OF FISH CAPTURE ARE DETERMINED TO NOT BE FEASIBLE OR EFFECTIVE. IF ELECTROFISHING WILL BE USED TO CAPTURE FISH FOR SALVAGE, THE SALVAGE OPERATION WILL BE LED BY AN EXPERIENCED FISHERIES BIOLOGIST AND THE FOLLOWING GUIDELINES WILL BE FOLLOWED:

A) THE NMFS'S ELECTROFISHING GUIDELINES (NMFS 2000).

B) ONLY DIRECT CURRENT (DC) OR PULSED DIRECT CURRENT (PDC) WILL BE USED AND CONDUCTIVITY MUST BE TESTED.

I. IF CONDUCTIVITY IS LESS THAN 100 MS, VOLTAGE RANGES FROM 900 TO 1100 WILL BE USED.

II. FOR CONDUCTIVITY RANGES BETWEEN 100 TO 300 MS, VOLTAGE RANGES WILL BE 500 TO 800.

III. FOR CONDUCTIVITY GREATER THAN 300 MS, VOLTAGE WILL BE LESS THAN 400.

C) ELECTROFISHING WILL BEGIN WITH A MINIMUM PULSE WIDTH AND RECOMMENDED VOLTAGE AND THEN GRADUALLY INCREASE TO THE POINT WHERE FISH ARE IMMOBILIZED.

D) THE ANODE WILL NOT INTENTIONALLY CONTACT FISH.

E) ELECTROFISHING SHALL NOT BE CONDUCTED WHEN THE WATER CONDITIONS ARE TURBID AND VISIBILITY IS POOR. THIS CONDITION MAY BE EXPERIENCED WHEN THE SAMPLER CANNOT SEE THE STREAM BOTTOM IN ONE FOOT OF WATER.

F) IF MORTALITY OR OBVIOUS INJURY (DEFINED AS DARK BANDS ON THE BODY, SPINAL DEFORMATIONS, DE-SCALING OF 25% OR MORE OF BODY, AND TORPIDITY OR INABILITY TO MAINTAIN UPRIGHT ATTITUDE AFTER SUFFICIENT RECOVERY TIME) OCCURS DURING ELECTROFISHING, OPERATIONS WILL BE IMMEDIATELY DISCONTINUED, MACHINE SETTINGS, WATER TEMPERATURE AND CONDUCTIVITY CHECKED, AND PROCEDURES ADJUSTED OR ELECTROFISHING POSTPONED TO REDUCE MORTALITY.

**4) DEWATER.** DEWATERING, WHEN NECESSARY, WILL BE CONDUCTED OVER A SUFFICIENT PERIOD OF TIME TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA AND WILL BE LIMITED TO THE SHORTEST LINEAR EXTENT PRACTICABLE.

A) DIVERSION AROUND THE CONSTRUCTION SITE MAY BE ACCOMPLISHED WITH A COFFER DAM AND A BY-PASS CULVERT OR PIPE, OR A LINED, NON-ERODIBLE DIVERSION DITCH. WHERE GRAVITY FEED IS NOT POSSIBLE, A PUMP MAY BE USED, BUT MUST BE OPERATED IN SUCH A WAY AS TO AVOID REPETITIVE DEWATERING AND REWATERING OF THE SITE. IMPOUNDMENT BEHIND THE COFFERDAM MUST OCCUR SLOWLY THROUGH THE TRANSITION, WHILE CONSTANT FLOW IS DELIVERED TO THE DOWNSTREAM REACHES.

B) ALL PUMPS WILL HAVE FISH SCREENS TO AVOID JUVENILE FISH IMPINGEMENT OR ENTRAINMENT, AND WILL BE OPERATED IN ACCORDANCE WITH NMFS'S CURRENT FISH SCREEN CRITERIA (NMFS 20114, OR MOST RECENT VERSION). IF THE PUMPING RATE EXCEEDS 3 CUBIC FEET SECOND (CFS), A NMFS HYDRO FISH PASSAGE REVIEW WILL BE NECESSARY.

C) DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO RIPARIAN VEGETATION OR STREAM CHANNEL.

D) SAFE REENTRY OF FISH INTO THE STREAM CHANNEL WILL BE PROVIDED, PREFERABLY INTO POOL HABITAT WITH COVER, IF THE DIVERSION ALLOWS FOR DOWNSTREAM FISH PASSAGE.

E) SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OR INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL OR TO FILTER THROUGH VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

4 NATIONAL MARINE FISHERIES SERVICE. 2011. ANADROMOUS SALMONID PASSAGE FACILITY DESIGN. NORTHWEST REGION. AVAILABLE ONLINE AT:

[HTTP://WWW.NWR.NOAA.GOV/SALMON-HYDROPOWER/FERC/UPLOAD/FISH-PASSAGE-DESIGN.PDF](http://www.nwr.noaa.gov/salmon-hydropower/ferc/upload/fish-passage-design.pdf)

**5) SALVAGE NOTICE.** MONITORING AND RECORDING OF FISH PRESENCE, HANDLING, AND MORTALITY MUST OCCUR DURING THE DURATION OF THE ISOLATION, SALVAGE, ELECTROFISHING, DEWATERING, AND REWATERING OPERATIONS. ONCE OPERATIONS ARE COMPLETED, A SALVAGE REPORT WILL DOCUMENT PROCEDURES USED, ANY FISH INJURIES OR DEATHS (INCLUDING NUMBERS OF FISH AFFECTED), AND CAUSES OF ANY DEATHS.

**CONSTRUCTION AND POST-CONSTRUCTION CONSERVATION MEASURES.**

**1) FISH PASSAGE.** FISH PASSAGE WILL BE PROVIDED FOR ANY ADULT OR JUVENILE FISH LIKELY TO BE PRESENT IN THE ACTION AREA DURING CONSTRUCTION, UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION OR THE STREAM IS NATURALLY IMPASSABLE AT THE TIME OF CONSTRUCTION. IF THE PROVISION OF TEMPORARY FISH PASSAGE DURING CONSTRUCTION WILL INCREASE NEGATIVE EFFECTS ON AQUATIC SPECIES OF INTEREST OR THEIR HABITAT, A VARIANCE CAN BE REQUESTED FROM THE NMFS BRANCH CHIEF AND THE FWS FIELD OFFICE SUPERVISOR. PERTINENT INFORMATION, SUCH AS THE SPECIES AFFECTED, LENGTH OF STREAM REACH AFFECTED, PROPOSED TIME FOR THE PASSAGE BARRIER, AND ALTERNATIVES CONSIDERED, WILL BE INCLUDED IN THE VARIANCE REQUEST.

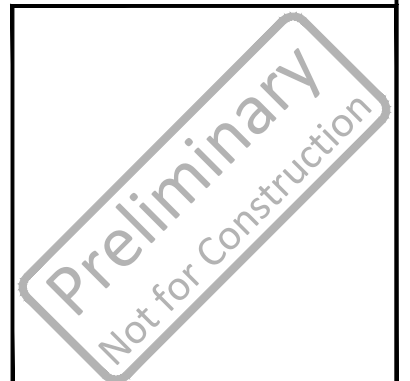
**2) CONSTRUCTION AND DISCHARGE WATER.**

A) SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS, BUT ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.

B) DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.

C) ALL CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED USING THE BEST AVAILABLE TECHNOLOGY APPLICABLE TO SITE CONDITIONS.

D) TREATMENTS TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS AND OTHER POLLUTANTS LIKELY TO BE PRESENT WILL BE PROVIDED.



NO.	BY	DATE	REVISION DESCRIPTION

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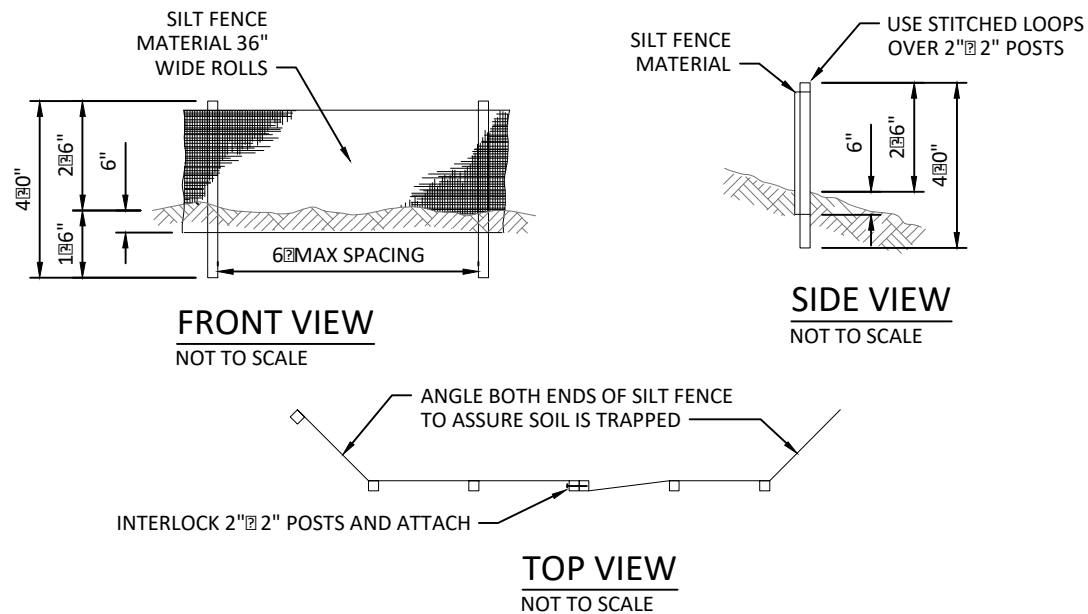
**CATHERINE CREEK STATE PARK RESTORATION PROJECT  
PRELIMINARY (30%) DESIGNS  
UNION COUNTY, OREGON**



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**HIP III CONSERVATION  
MEASURES (2 OF 2)**

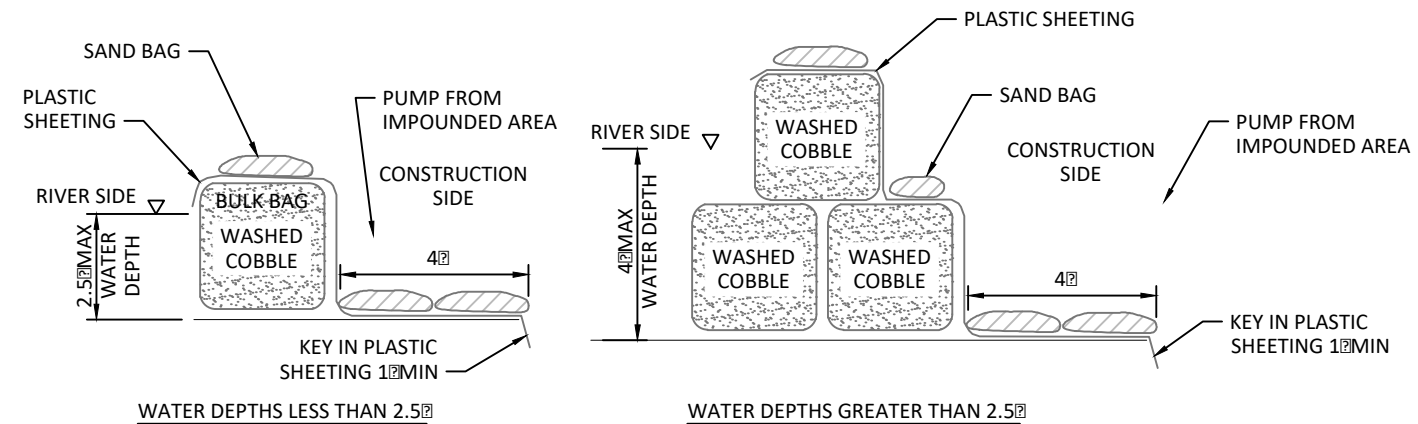
SHEET  
**4 OF 21**



**1**  
**5** TYPICAL DETAIL - SILT FENCE  
NOT TO SCALE

**SILT FENCE NOTES**

1. THE SILT FENCE SHALL BE PURCHASED IN A CONTINUOUS ROLL CUT TO THE LENGTH OF THE BARRIER TO AVOID USE OF JOINTS. WHEN JOINTS ARE NECESSARY, SILT FENCE SHALL BE SPliced TOGETHER ONLY AT A SUPPORT POST, WITH A MINIMUM 6 INCH OVERLAP, AND BOTH ENDS SECURELY FASTENED TO THE POST. ALTERNATIVELY, OVERLAP AND INTERLOCK TWO POSTS WITH ATTACHED FABRIC AS REQUIRED TO MEET APPLICABLE REGULATIONS.
2. FENCE POSTS SHALL BE SPACED A MAXIMUM OF 6 FEET APART AND DRIVEN SECURELY INTO THE GROUND A MINIMUM OF 24 INCHES.
3. THE SILT FENCE SHALL HAVE A MINIMUM VERTICAL BURIAL OF 6 INCHES. ALL EXCAVATED MATERIAL FROM SILT FENCE INSTALLATION SHALL BE BACK-FILLED AND COMPACTED ALONG THE ENTIRE DISTURBED AREA.
4. STANDARD OR HEAVY DUTY SILT FENCE SHALL HAVE MANUFACTURED STITCHED LOOPS FOR 2 INCHES X 2 INCHES POST INSTALLATION.
5. SILT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY PROTECTED AND STABILIZED, OR AS DIRECTED BY OWNER.



**2**  
**5** TYPICAL DETAIL - BULK BAG COFFERDAM  
NOT TO SCALE

**BULK BAG NOTES**

1. BULK BAG COFFERDAM SHALL BE CONSTRUCTED OF SEVERAL UNITS OF BULK BAGS FILLED WITH WASHED GRAVEL, AND ABUTTED SIDE BY SIDE TO CREATE A ROW THAT ISOLATES THE CONSTRUCTION SITE.
2. IF WATER DEPTH EXCEEDS 85% OF THE BULK BAG HEIGHT, AN ADDITIONAL TOP ROW OF BULK BAGS SHALL BE INSTALLED, SUPPORTED BY TWO BOTTOM ROWS OF BULK BAGS. BULK BAG COFFERDAM SHALL BE SEALED BY COVERING THE COFFERDAM WITH PLASTIC SHEETING HELD IN PLACE BY STANDARD SANDBAGS PLACED IN ROWS ON TOP OF COFFERDAM, AND AT TOE OF COFFERDAM.
3. THE PLASTIC SHEETING SHALL BE DRAPED ALONG THE CHANNEL BOTTOM ON BOTH SIDES OF THE COFFERDAM WITH OUTWARD EDGE OF SHEETING MINIMUM 4- FEET FROM TOE OF COFFERDAM. THE DRAPED PORTION OF PLASTIC SHEETING SHALL BE PINNED TO THE CHANNEL BED BY MINIMUM TWO ROWS OF STANDARD SANDBAGS.
4. THE CONSTRUCTION SIDE EDGE OF PLASTIC SHEETING SHALL BE TOED INTO THE CHANNEL BED MINIMUM 1- FT. TOEING IN THE OUTWARD EDGE OF PLASTIC SHEETING SHALL OCCUR AFTER THE COFFERDAM IS CLOSED TO PREVENT TURBIDITY RELEASE TO THE WATERWAY.
5. THE TERMINAL ENDS OF BULK BAG COFFERDAM, WHERE IT CONNECTS TO CHANNEL BANK OR HIGH GROUND, SHALL BE SEALED WITH PLASTIC SHEETING AND STANDARD SANDBAGS.
6. BULK BAGS SHALL BE CUBE-SHAPED POLYPROPYLENE WOVEN FABRIC BAGS WITH FULLY OPEN TOP, FLAT BOTTOM, FOUR LOOPS, MINIMUM 2-TON WEIGHT CAPACITY, MINIMUM 5:1 SAFETY FACTOR.
7. PLASTIC SHEETING SHALL BE MINIMUM 6-MIL THICKNESS. ROLL LENGTH SHALL BE LONG ENOUGH TO ENSURE THAT ENTIRE LENGTH OF COFFERDAM WILL BE COVERED WITHOUT A SEAM. MINIMUM 12- FT WIDE ROLL SHALL BE USED FOR SINGLE LAYER BULK BAG COFFERDAM. MINIMUM 16- FT WIDE ROLL SHALL BE USED FOR 2-LAYER STACKED BULK BAG COFFERDAM.
8. BULK BAG COFFERDAM SHALL BE COMPLETELY REMOVED AFTER CONSTRUCTION IS COMPLETED AND TURBIDITY HAS BEEN REMOVED.
9. MEASUREMENT AND PAYMENT FOR BULK BAG COFFERDAM, SAND BAGS, PLASTIC SHEETING, WASHED GRAVEL PLACEMENT, MAINTENANCE AND REMOVAL OF ALL MATERIALS SHALL BE INCIDENTAL TO THE LUMP SUM ALL INCLUSIVE COST FOR DIVERSION AND DEWATERING.
10. ALTERNATE COFFERDAM MATERIALS AND CONFIGURATIONS MAY BE ALLOWED BUT SHALL NOT BE IMPLEMENTED WITHOUT REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE. CONTRACTOR SHALL PROVIDE SHOP DRAWINGS AND/OR VENDOR CUT SHEETS FOR SUBSTITUTIONS.

Preliminary  
Not for Construction

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PRELIMINARY (30%) DESIGNS  
UNION COUNTY, OREGON

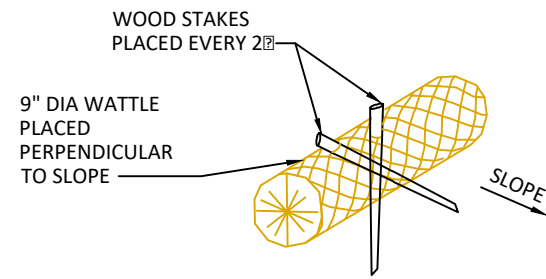


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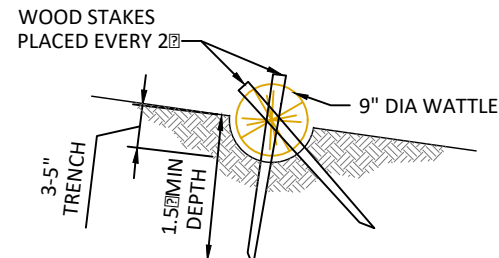


EROSION AND  
SEDIMENTATION CONTROL  
DETAILS (1 OF 2)

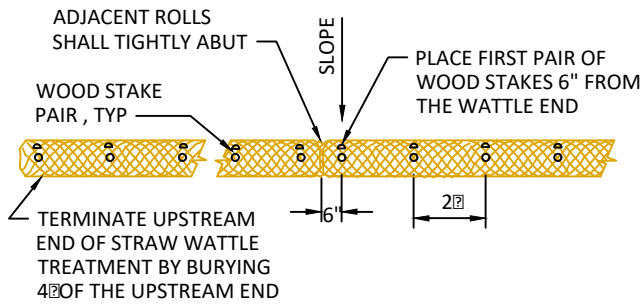
SHEET  
5 OF 21



**ISOMETRIC - STRAW WATTLE**



**SECTION - STRAW WATTLE**



**PLAN VIEW - STRAW WATTLE**

**1** **TYPICAL DETAIL - STRAW WATTLE INSTALLATION**  
**6** NOT TO SCALE

**NOTE**

INSTALL STRAW WATTLES ABOVE OHW IN ADDITION TO SEEDING IN CERTAIN LOCATIONS TO PROTECT SENSITIVE AREAS, PER OWNER OR OWNER'S REPRESENTATIVE.

**STRAW WATTLE INSTALLATION**

1. INSTALL WATTLES WITHIN TRENCH, SO THAT NO GAPS EXIST BETWEEN THE SOIL AND THE BOTTOM OF THE WATTLE. THE ENDS OF ADJACENT WATTLES SHALL TIGHTLY ABUT 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 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-FT 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.
5. 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 OWNER, AT THE CONTRACTOR'S EXPENSE.
7. 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'

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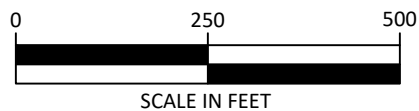


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**EROSION AND  
 SEDIMENTATION CONTROL  
 DETAILS (2 OF 2)**

SHEET  
**6 OF 21**



NOTE: PROPERTY BOUNDARY LINES OBTAINED FROM UNION COUNTRY GIS, AND SHOULD BE CONSIDERED APPROXIMATE.

AERIAL PHOTOGRAPH FROM 2011.



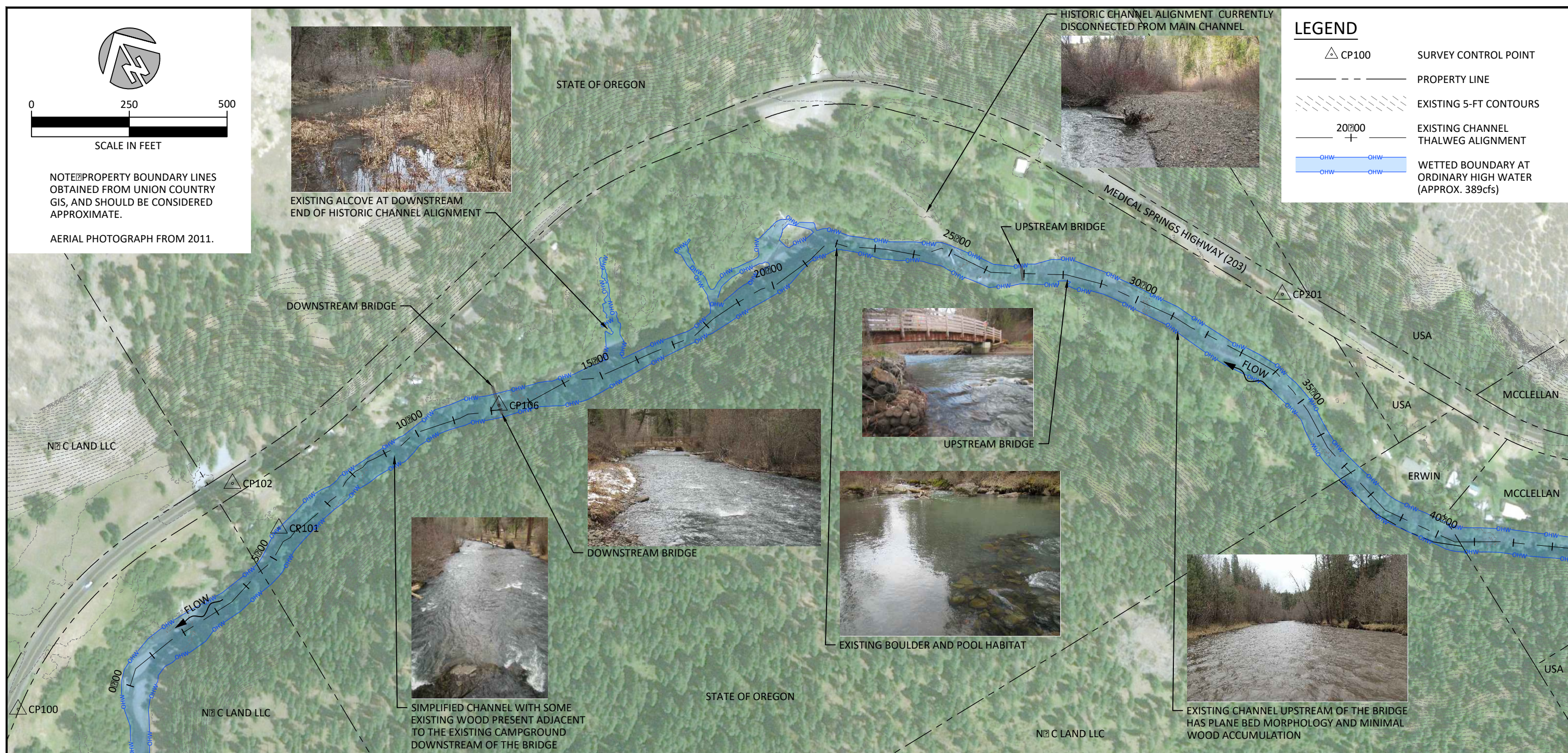
EXISTING ALCOVE AT DOWNSTREAM END OF HISTORIC CHANNEL ALIGNMENT



HISTORIC CHANNEL ALIGNMENT CURRENTLY DISCONNECTED FROM MAIN CHANNEL

**LEGEND**

- CP100 SURVEY CONTROL POINT
- PROPERTY LINE
- EXISTING 5-FT CONTOURS
- 20'±00 EXISTING CHANNEL THALWEG ALIGNMENT
- WETTED BOUNDARY AT ORDINARY HIGH WATER (APPROX. 389cfs)



UPSTREAM BRIDGE



EXISTING BOULDER AND POOL HABITAT



EXISTING CHANNEL UPSTREAM OF THE BRIDGE HAS PLANE BED MORPHOLOGY AND MINIMAL WOOD ACCUMULATION

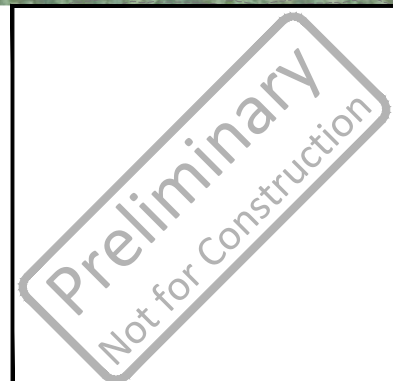


SIMPLIFIED CHANNEL WITH SOME EXISTING WOOD PRESENT ADJACENT TO THE EXISTING CAMPGROUND DOWNSTREAM OF THE BRIDGE

**PLAN**

**SURVEY CONTROL POINTS**

POINT	NORTHING	EASTING	ELEVATION
CP100	553597.38	8912050.10	3183.52
CP101	553665.06	8912859.42	3189.54
CP102	553823.51	8912813.56	3192.20
CP106	553655.77	8913503.52	3203.98
CP201	552900.17	8915380.12	3223.75



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**EXISTING CONDITIONS,  
PROPERTY OWNERSHIP AND  
SURVEY CONTROL**

SHEET  
**7 OF 21**

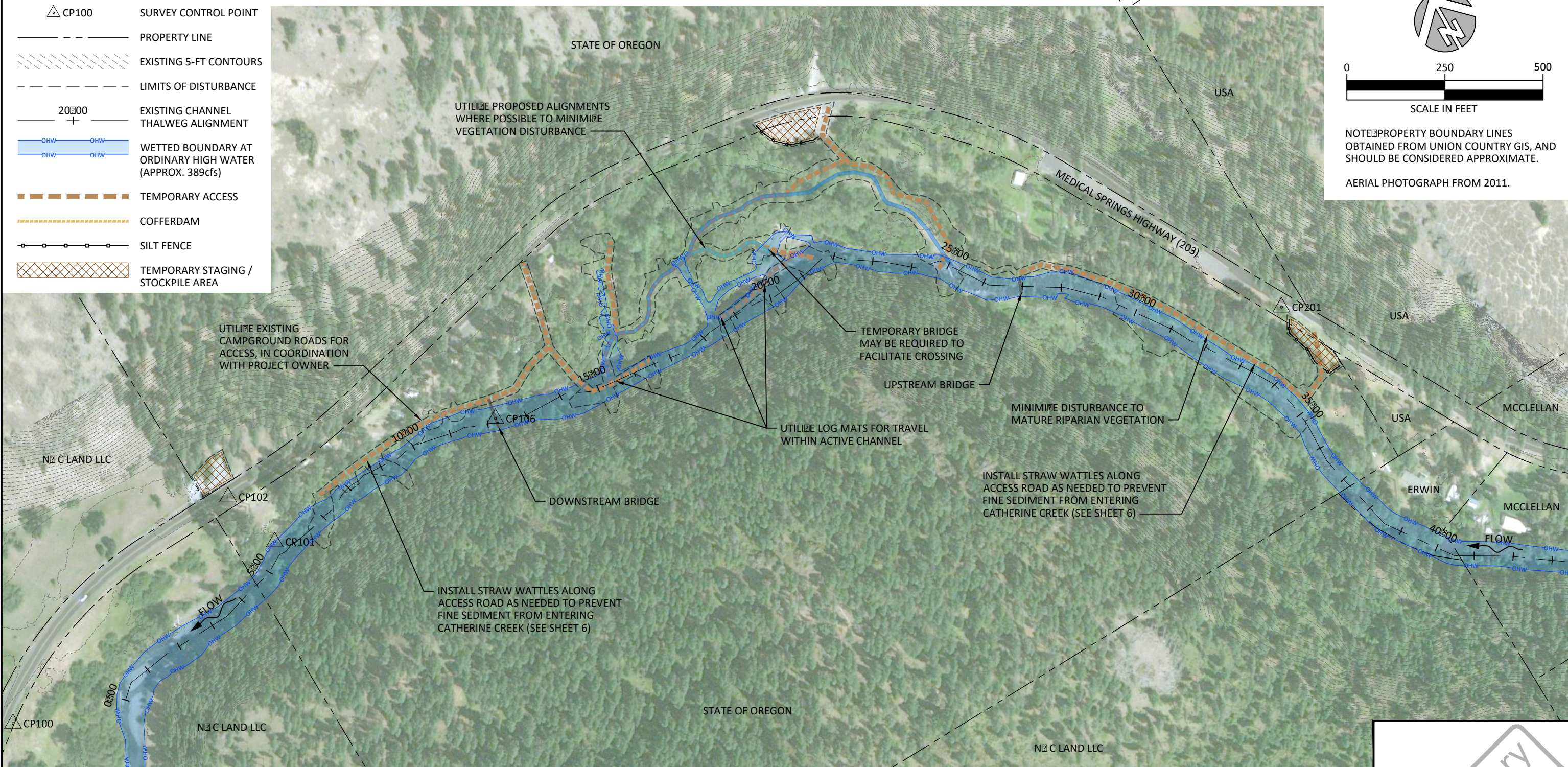
**LEGEND**

-  CP100 SURVEY CONTROL POINT
-  PROPERTY LINE
-  EXISTING 5-FT CONTOURS
-  LIMITS OF DISTURBANCE
-  20'00' EXISTING CHANNEL THALWEG ALIGNMENT
-  WETTED BOUNDARY AT ORDINARY HIGH WATER (APPROX. 389cfs)
-  TEMPORARY ACCESS
-  COFFERDAM
-  SILT FENCE
-  TEMPORARY STAGING / STOCKPILE AREA



NOTE: PROPERTY BOUNDARY LINES OBTAINED FROM UNION COUNTY GIS, AND SHOULD BE CONSIDERED APPROXIMATE.

AERIAL PHOTOGRAPH FROM 2011.



**PLAN**

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APPROVED		

**CATHERINE CREEK STATE PARK RESTORATION PROJECT**  
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**UNION COUNTY, OREGON**



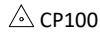
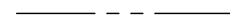



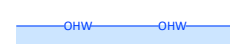
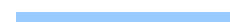



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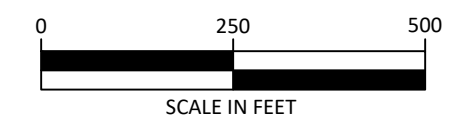


**ACCESS, STAGING, AND**  
**EROSION CONTROL**

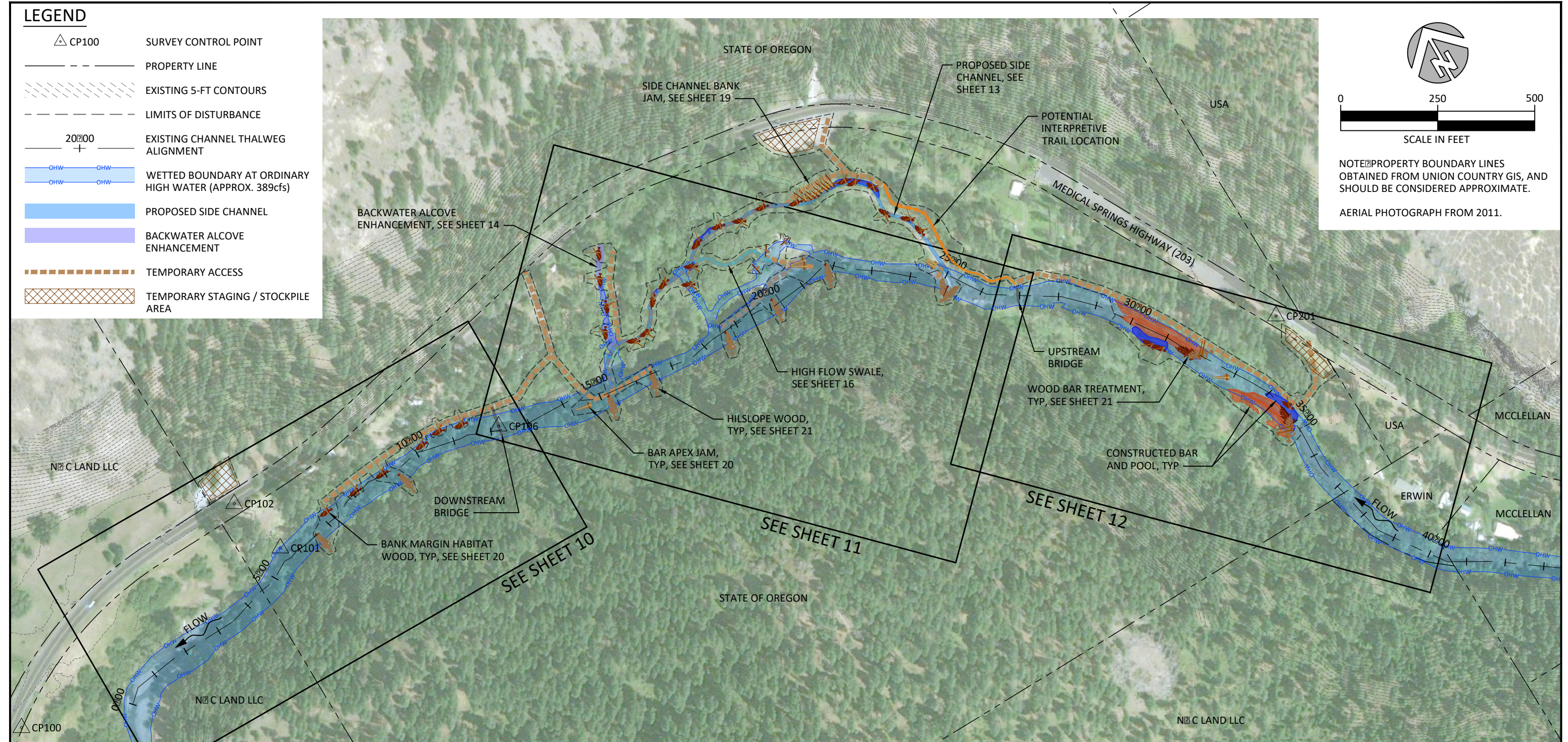
SHEET  
**8 OF 21**

**LEGEND**

-  CP100 SURVEY CONTROL POINT
-  PROPERTY LINE
-  EXISTING 5-FT CONTOURS
-  LIMITS OF DISTURBANCE
-  20200 EXISTING CHANNEL THALWEG ALIGNMENT
-  OHW OHW WETTED BOUNDARY AT ORDINARY HIGH WATER (APPROX. 389cfs)
-  PROPOSED SIDE CHANNEL
-  BACKWATER ALCOVE ENHANCEMENT
-  TEMPORARY ACCESS
-  TEMPORARY STAGING / STOCKPILE AREA



NOTE: PROPERTY BOUNDARY LINES OBTAINED FROM UNION COUNTY GIS, AND SHOULD BE CONSIDERED APPROXIMATE.  
AERIAL PHOTOGRAPH FROM 2011.



**PLAN**

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UNION COUNTY, OREGON**

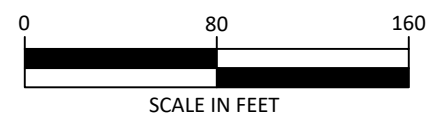


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**PROPOSED CONDITIONS  
OVERVIEW**

SHEET  
**9 OF 21**



N C LAND LLC

MEDICAL SPRINGS HIGHWAY (203)

CP102

CP101

CP106

N C LAND LLC

STATE OF OREGON

BANK MARGIN HABITAT WOOD, TYP, SEE SHEET 20

HILSLOPE WOOD, TYP, SEE SHEET 21

DOWNSTREAM BRIDGE

**LEGEND**

- CP100 SURVEY CONTROL POINT
- PROPERTY LINE
- EXISTING 1-FT CONTOURS
- LIMITS OF DISTURBANCE
- 20±00 EXISTING CHANNEL ALIGNMENT
- WETTED BOUNDARY AT ORDINARY HIGH WATER (APPROX. 389cfs)
- TEMPORARY STAGING / STOCKPILE AREA
- TEMPORARY ACCESS

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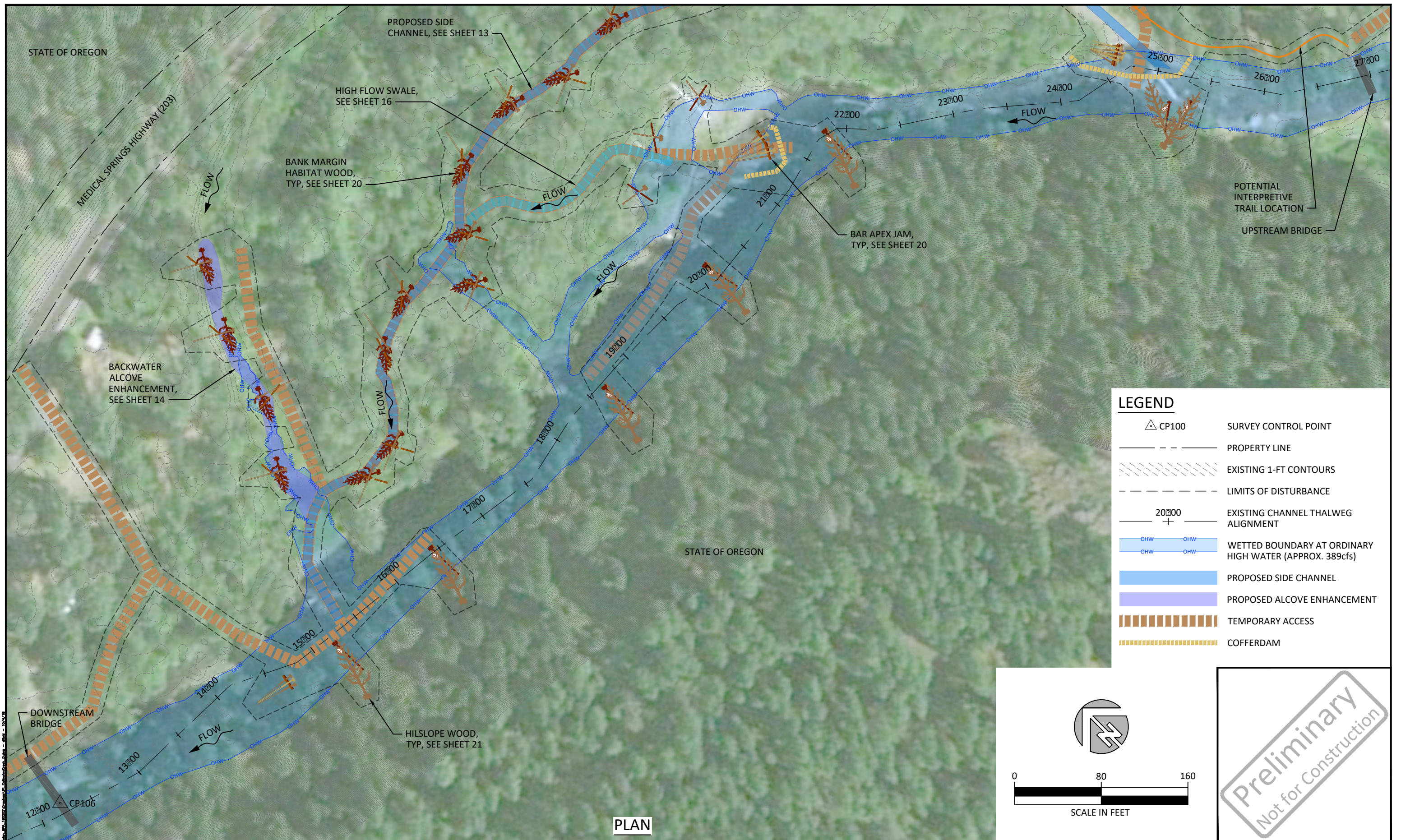


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MAIN CHANNEL  
 ENHANCEMENTS, STA 4±00  
 TO STA 12±00


SHEET  
 10 OF 21




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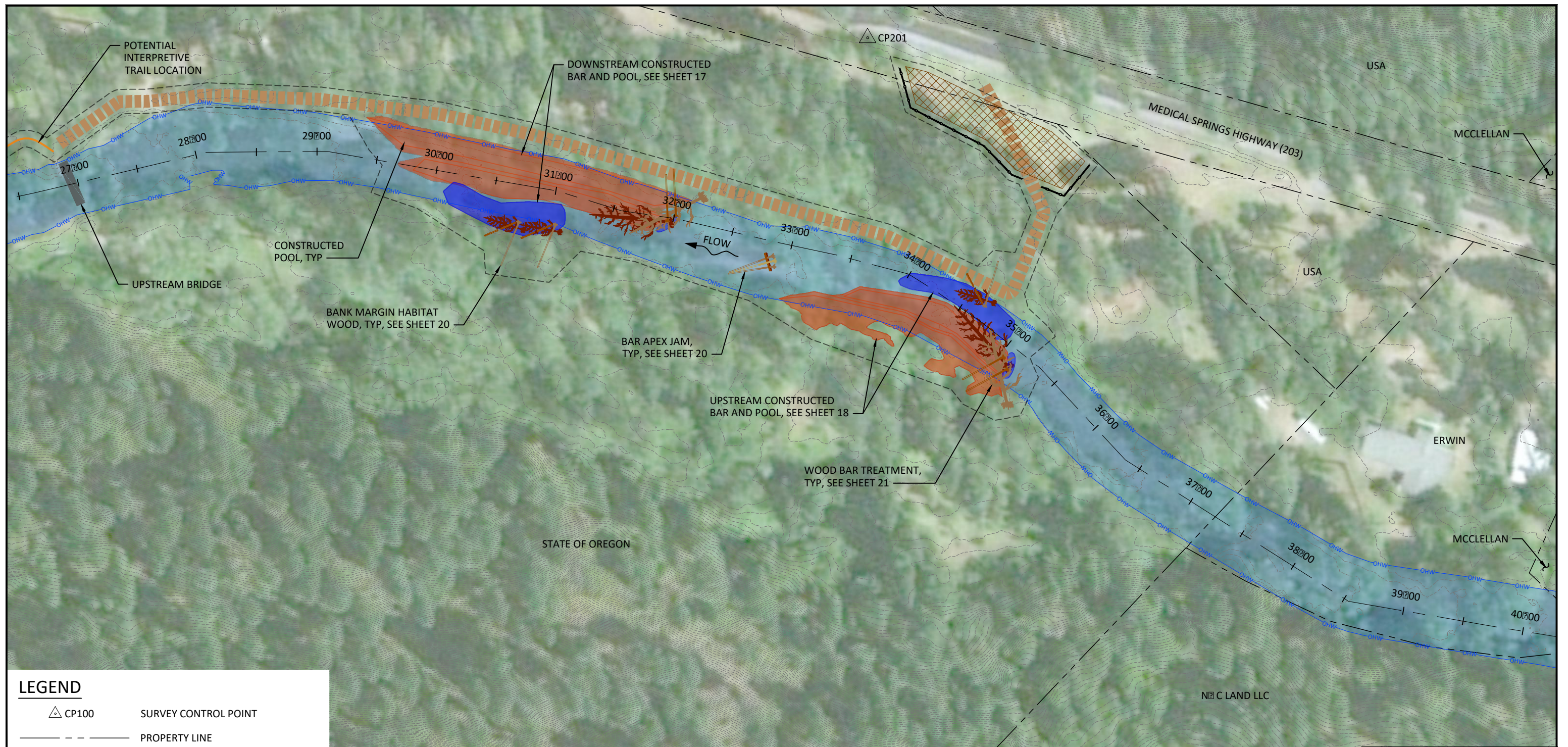
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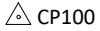
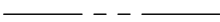



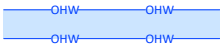


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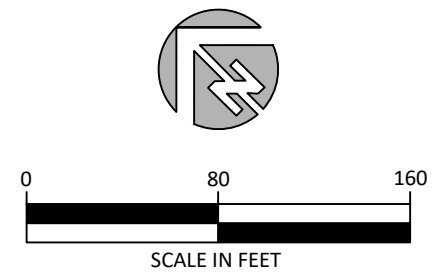
**MAIN CHANNEL**  
**ENHANCEMENTS, STA 12+00**  
**TO STA 27+00**



**LEGEND**

-  CP100 SURVEY CONTROL POINT
-  PROPERTY LINE
-  EXISTING 1-FT CONTOURS
-  LIMITS OF DISTURBANCE
-  20+00 EXISTING CHANNEL THALWEG ALIGNMENT
-  WETTED BOUNDARY AT ORDINARY HIGH WATER (APPROX. 389cfs)
-  TEMPORARY ACCESS
-  TEMPORARY STAGING / STOCKPILE AREA

**PLAN**



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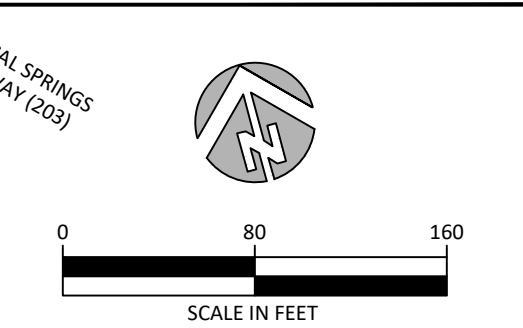
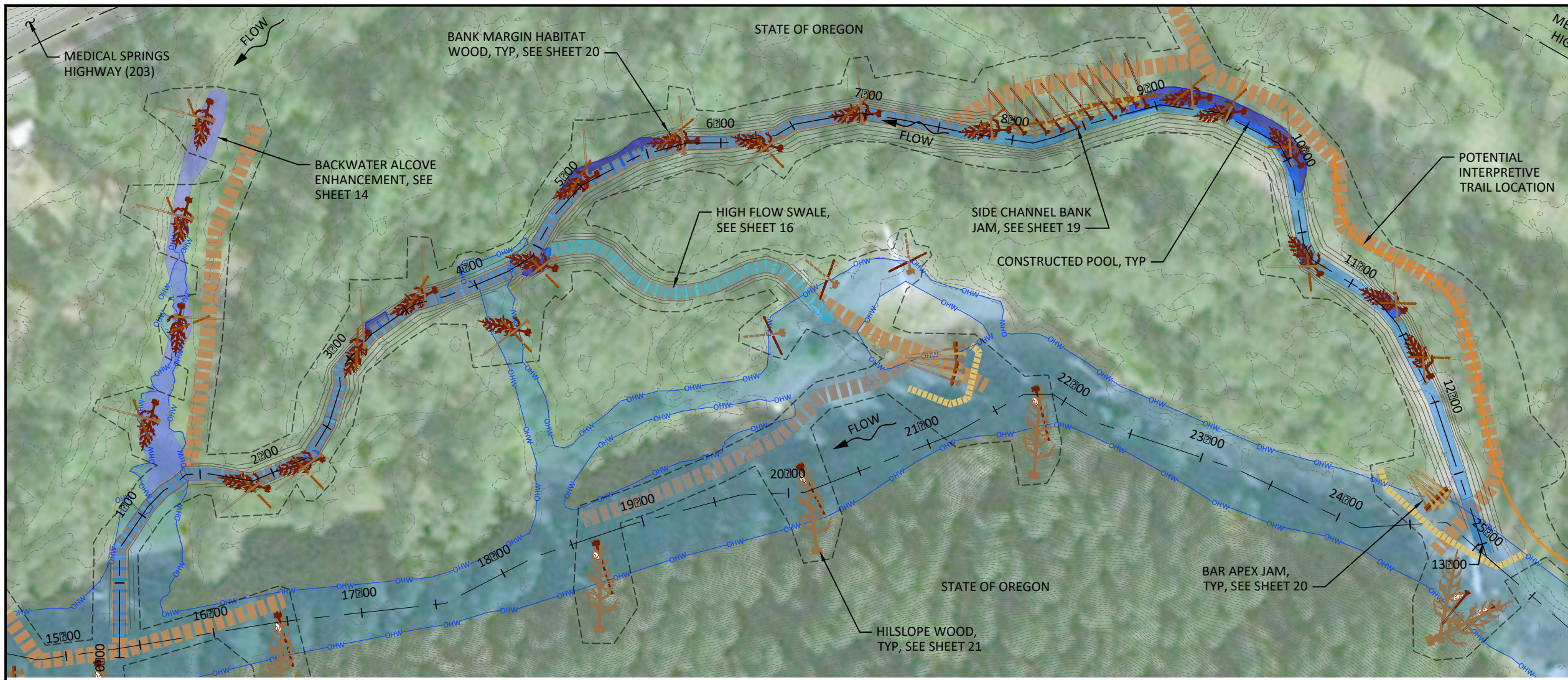


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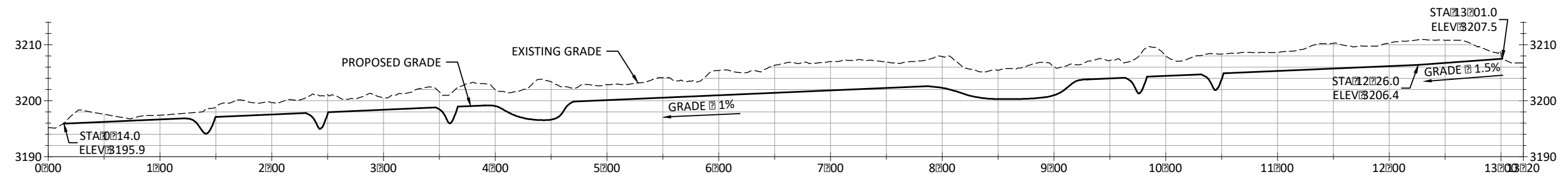
**MAIN CHANNEL  
ENHANCEMENTS, STA 27+00  
TO STA 40+00**

SHEET  
**12 OF 21**



- LEGEND**
- CP100 SURVEY CONTROL POINT
  - PROPERTY LINE
  - EXISTING 1-FT CONTOURS
  - LIMITS OF DISTURBANCE
  - EXISTING CHANNEL ALIGNMENT
  - PROPOSED SIDE CHANNEL ALIGNMENT
  - WETTED BOUNDARY AT ORDINARY HIGH WATER (APPROX. 389cfs)
  - PROPOSED SIDE CHANNEL
  - PROPOSED BACKWATER ALCOVE ENHANCEMENT
  - TEMPORARY ACCESS
  - COFFERDAM

**PLAN - PROPOSED SIDE CHANNEL**



**PROFILE - PROPOSED SIDE CHANNEL**

5' VERTICAL EXAGGERATION  
 SCALE: 1" = 100'

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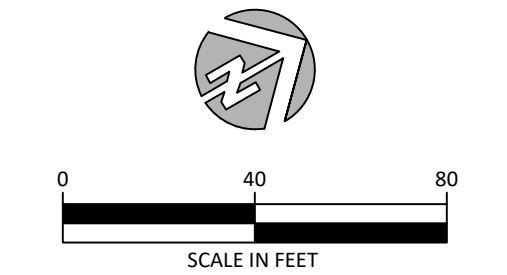
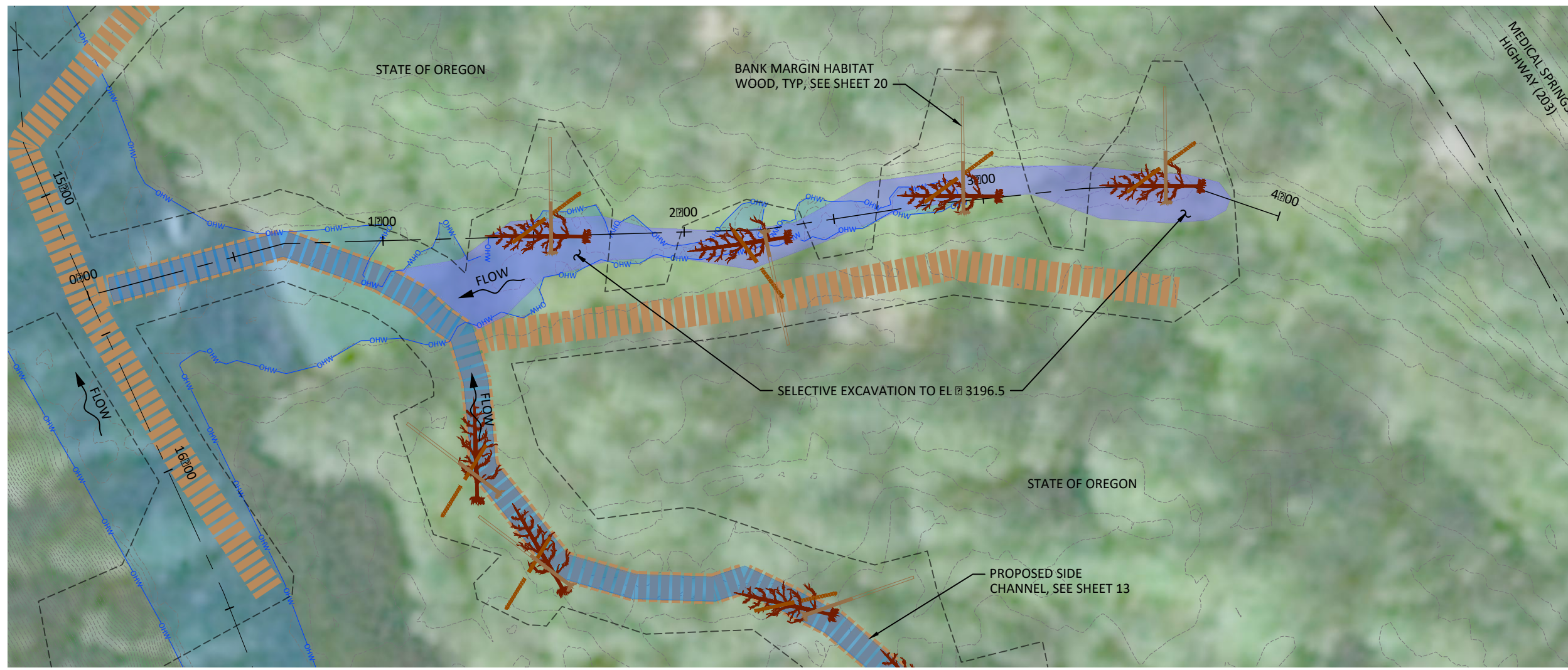
**CATHERINE CREEK STATE PARK RESTORATION PROJECT  
 PRELIMINARY (30%) DESIGNS  
 UNION COUNTY, OREGON**



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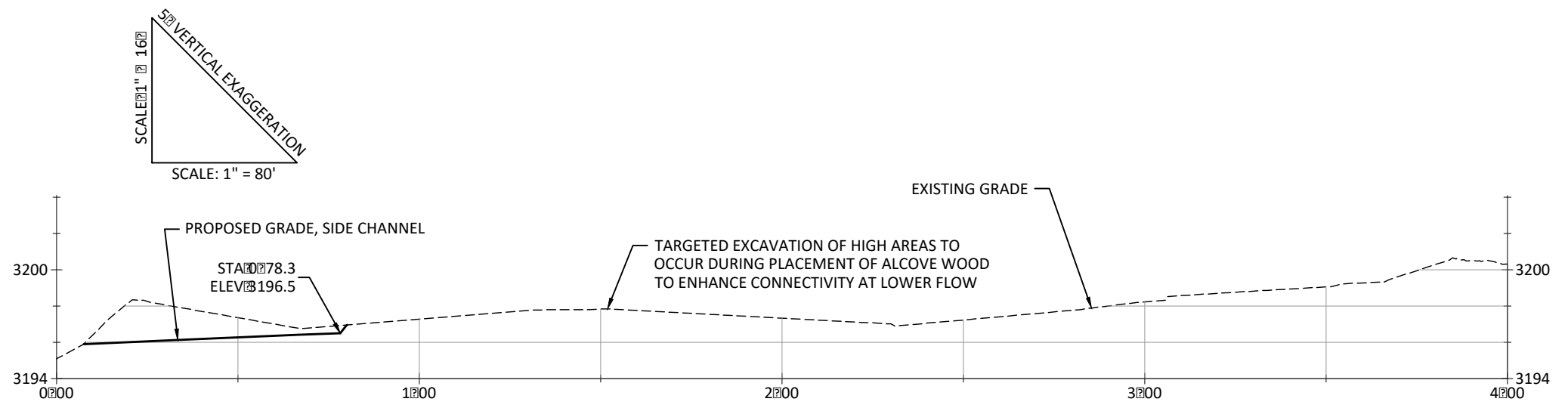
**PROPOSED SIDE CHANNEL  
 PLAN AND PROFILE**

SHEET  
**13 OF 21**



- LEGEND**
- CP100 SURVEY CONTROL POINT
  - PROPERTY LINE
  - EXISTING 5-FT CONTOURS
  - LIMITS OF DISTURBANCE
  - 20+00 EXISTING CHANNEL THALWEG ALIGNMENT
  - 1+00 BACKWATER ALCOVE ALIGNMENT
  - WETTED BOUNDARY AT ORDINARY HIGH WATER (APPROX. 389cfs)
  - PROPOSED SIDE CHANNEL
  - PROPOSED BACKWATER ALCOVE ENHANCEMENT
  - TEMPORARY ACCESS

**PLAN - PROPOSED BACKWATER ALCOVE**



**PROFILE - PROPOSED BACKWATER ALCOVE**

Preliminary  
Not for Construction

NO.	BY	DATE	REVISION DESCRIPTION

DF DRAWN	MC, JF, RR DESIGNED	
	10/2018 DATE	18-02-02 PROJECT

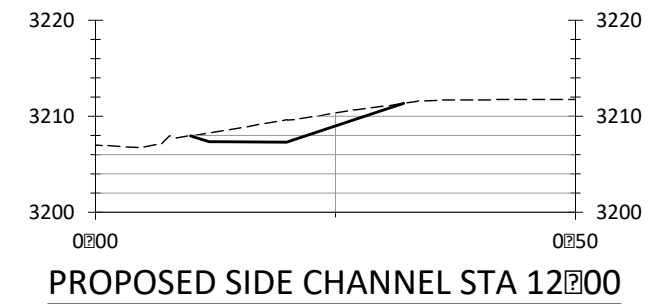
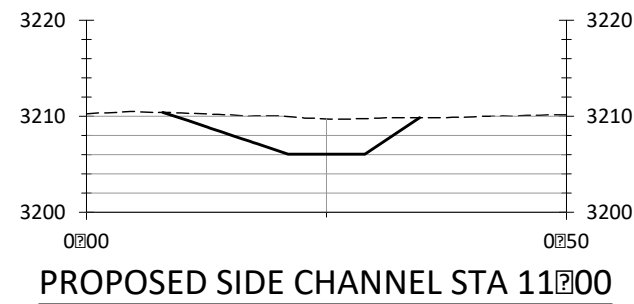
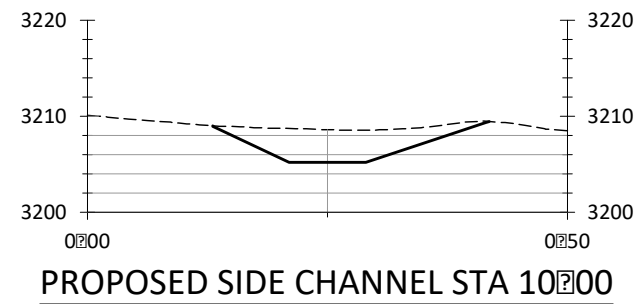
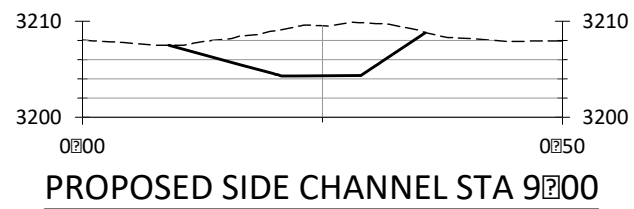
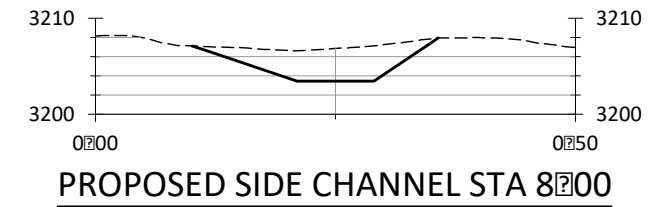
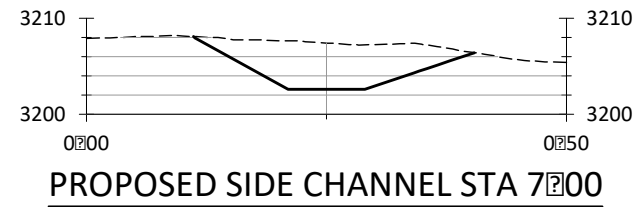
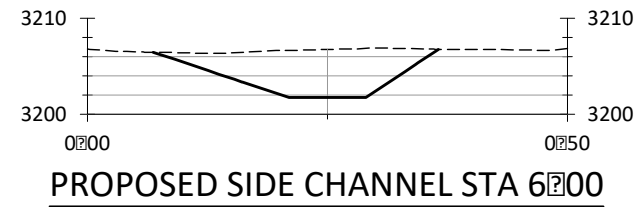
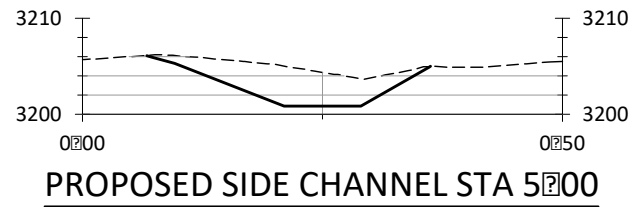
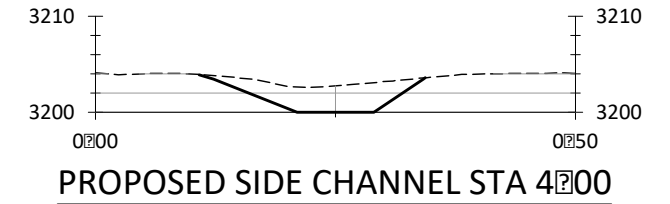
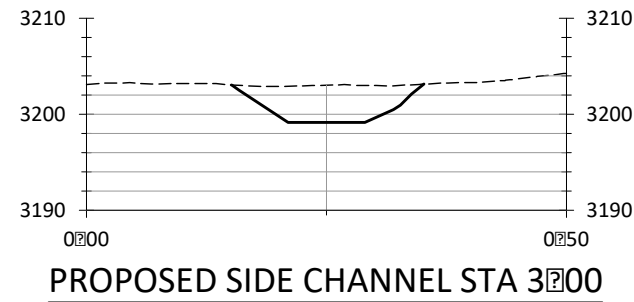
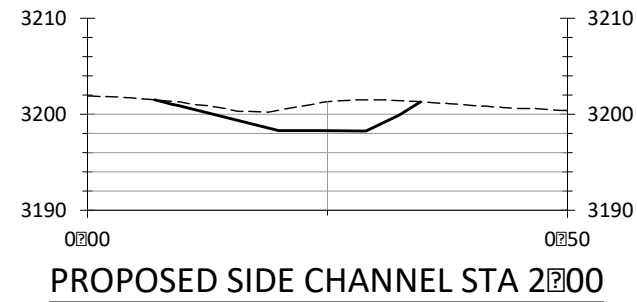
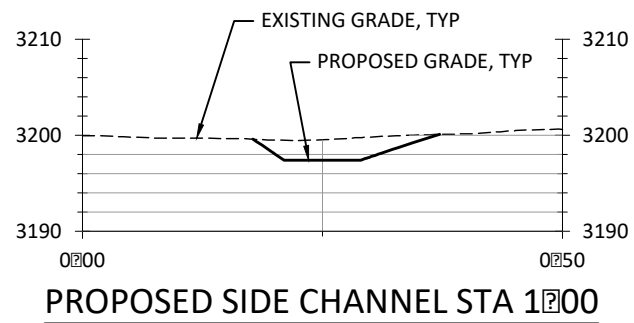
**CATHERINE CREEK STATE PARK RESTORATION PROJECT  
PRELIMINARY (30%) DESIGNS  
UNION COUNTY, OREGON**



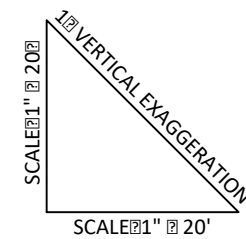
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**PROPOSED BACKWATER  
ALCOVE PLAN AND PROFILE**

SHEET  
**14 OF 21**



NOTE  
CROSS SECTIONS ARE  
ORIENTED LEFT TO RIGHT,  
LOOKING DOWNSTREAM.



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NO.	BY	DATE	REVISION DESCRIPTION

DF	MC, JF, RR	CHECKED
DRAWN	DESIGNED	
APPROVED	DATE	PROJECT
	10/2018	18-02-02

CATHERINE CREEK STATE PARK RESTORATION PROJECT  
PRELIMINARY (30%) DESIGNS  
UNION COUNTY, OREGON

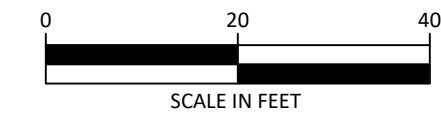
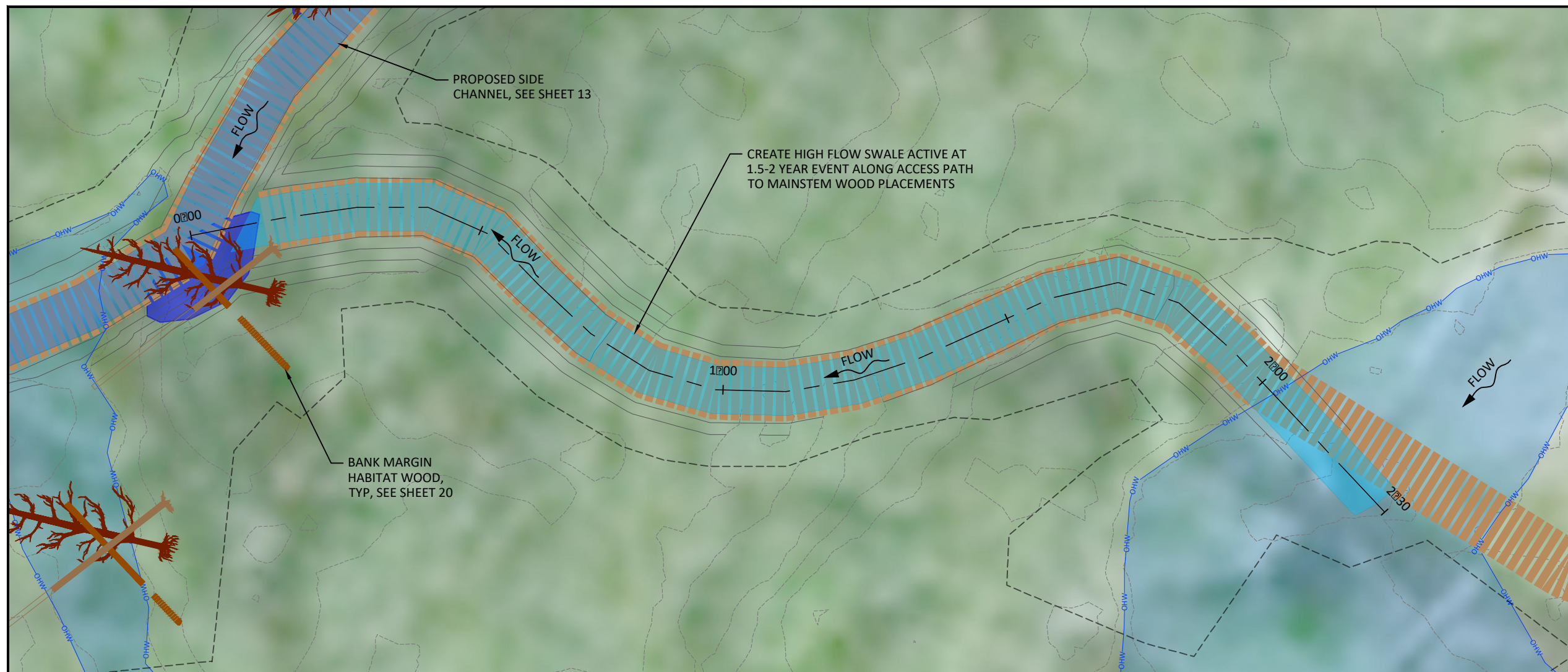


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PROPOSED SIDE CHANNEL  
AND BACKWATER ALCOVE  
CROSS SECTIONS

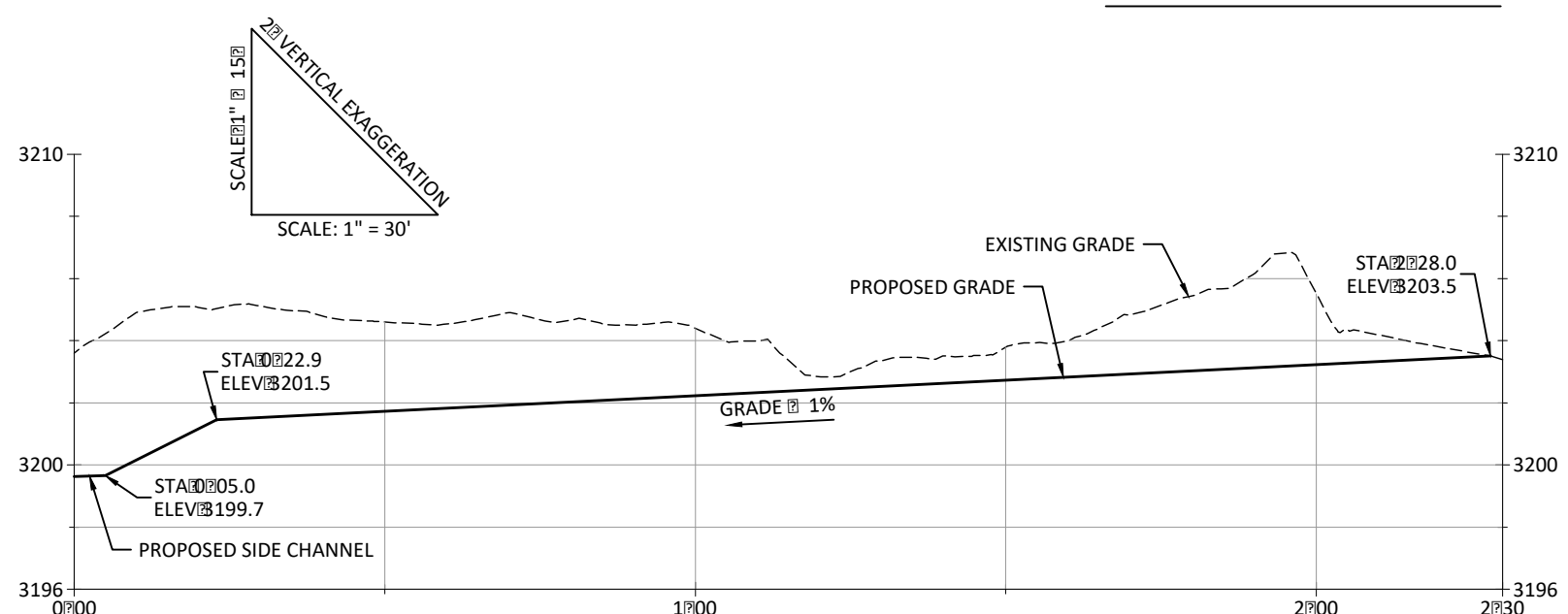
SHEET  
15 OF 21



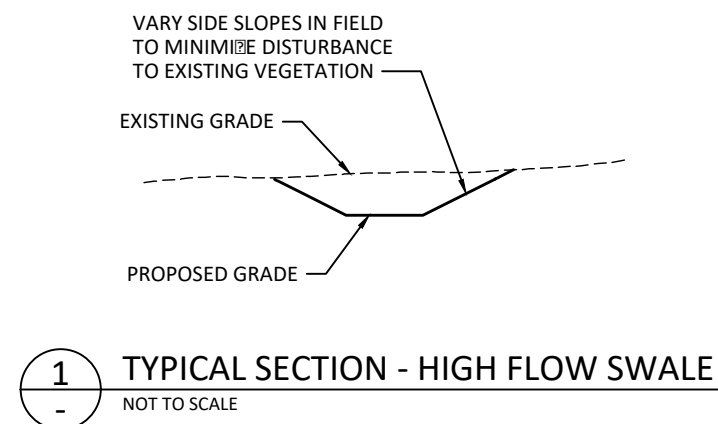
**LEGEND**

- CP100 SURVEY CONTROL POINT
- PROPERTY LINE
- EXISTING 1-FT CONTOURS
- LIMITS OF DISTURBANCE
- EXISTING CHANNEL ALIGNMENT
- PROPOSED SIDE CHANNEL ALIGNMENT
- WETTED BOUNDARY AT ORDINARY HIGH WATER (APPROX. 389cfs)
- PROPOSED SIDE CHANNEL
- TEMPORARY ACCESS

**PLAN - HIGH FLOW SWALE**



**PROFILE - HIGH FLOW SWALE**



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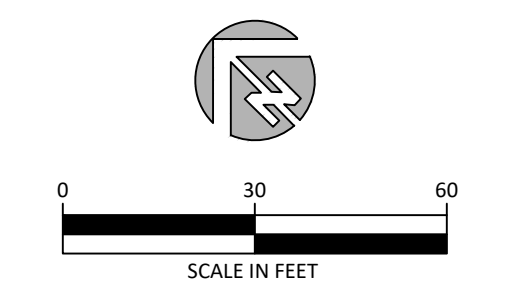
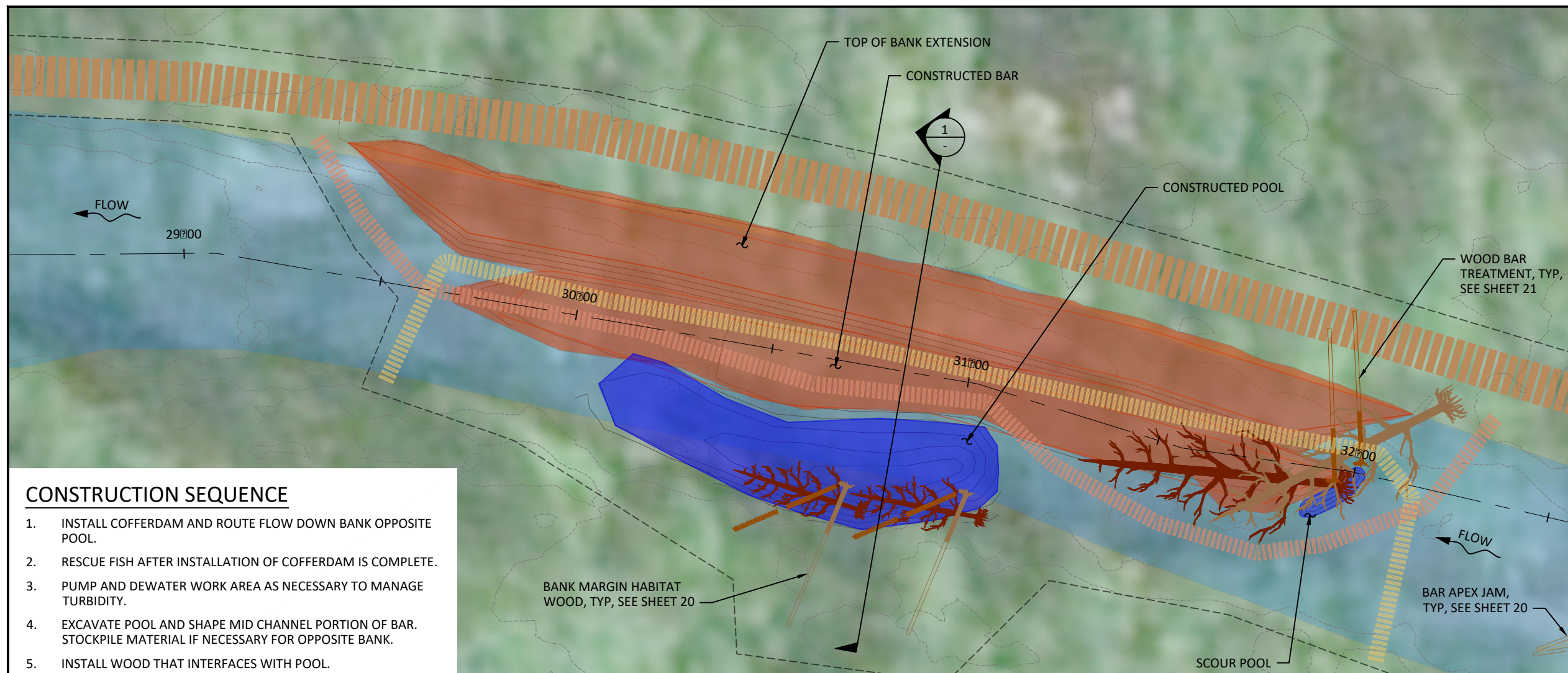
NO.	BY	DATE	REVISION DESCRIPTION

DF	MC, JF, RR	
DRAWN	DESIGNED	CHECKED
	10/2018	18-02-02
APPROVED	DATE	PROJECT

**CATHERINE CREEK STATE PARK RESTORATION PROJECT**  
**PRELIMINARY (30%) DESIGNS**  
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**PROPOSED HIGH FLOW SWALE PLAN, PROFILE AND CROSS SECTION**



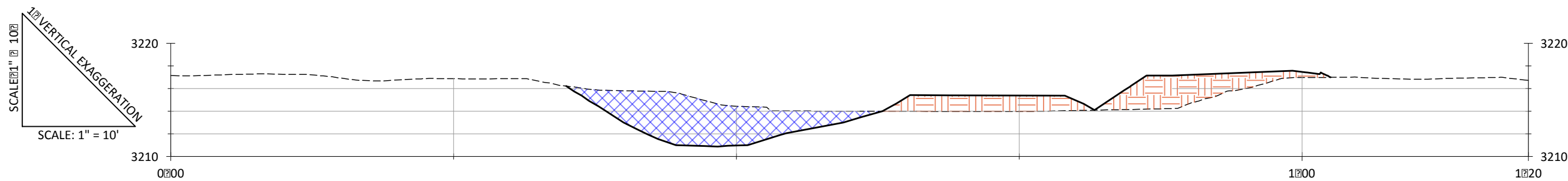
**LEGEND**

	SURVEY CONTROL POINT
	PROPERTY LINE
	EXISTING 1-FT CONTOURS
	LIMITS OF DISTURBANCE
	EXISTING CHANNEL ALIGNMENT
	PROPOSED SIDE CHANNEL ALIGNMENT
	EXISTING CHANNEL (APPROX. 389cfs)
	TEMPORARY ACCESS
	COFFERDAM PHASE 1
	COFFERDAM PHASE 2

**CONSTRUCTION SEQUENCE**

1. INSTALL COFFERDAM AND ROUTE FLOW DOWN BANK OPPOSITE POOL.
2. RESCUE FISH AFTER INSTALLATION OF COFFERDAM IS COMPLETE.
3. PUMP AND DEWATER WORK AREA AS NECESSARY TO MANAGE TURBIDITY.
4. EXCAVATE POOL AND SHAPE MID CHANNEL PORTION OF BAR. STOCKPILE MATERIAL IF NECESSARY FOR OPPOSITE BANK.
5. INSTALL WOOD THAT INTERFACES WITH POOL.
6. REMOVE AND REBUILD THE COFFERDAM, CONNECTING TO THE OPPOSITE BANK.
7. PUMP AND DEWATER WORK AREA AS NECESSARY TO MANAGE TURBIDITY.
8. COMPLETE BAR GRADING AND WOOD PLACEMENT.
9. REMOVE COFFERDAM.

**PLAN - CONSTRUCTED BAR AND POOL**



**CROSS SECTION - PROPOSED DOWNSTREAM BAR AND POOL**

Preliminary  
Not for Construction

NO.	BY	DATE	REVISION DESCRIPTION

DF DRAWN	MC,JF,RR DESIGNED	CHECKED
APPROVED	10/2018 DATE	18-02-02 PROJECT

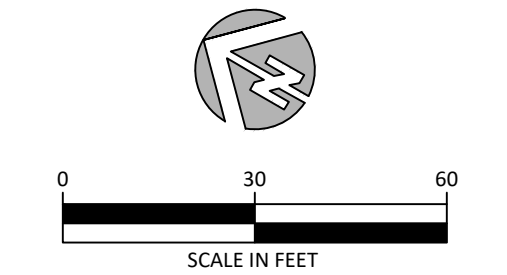
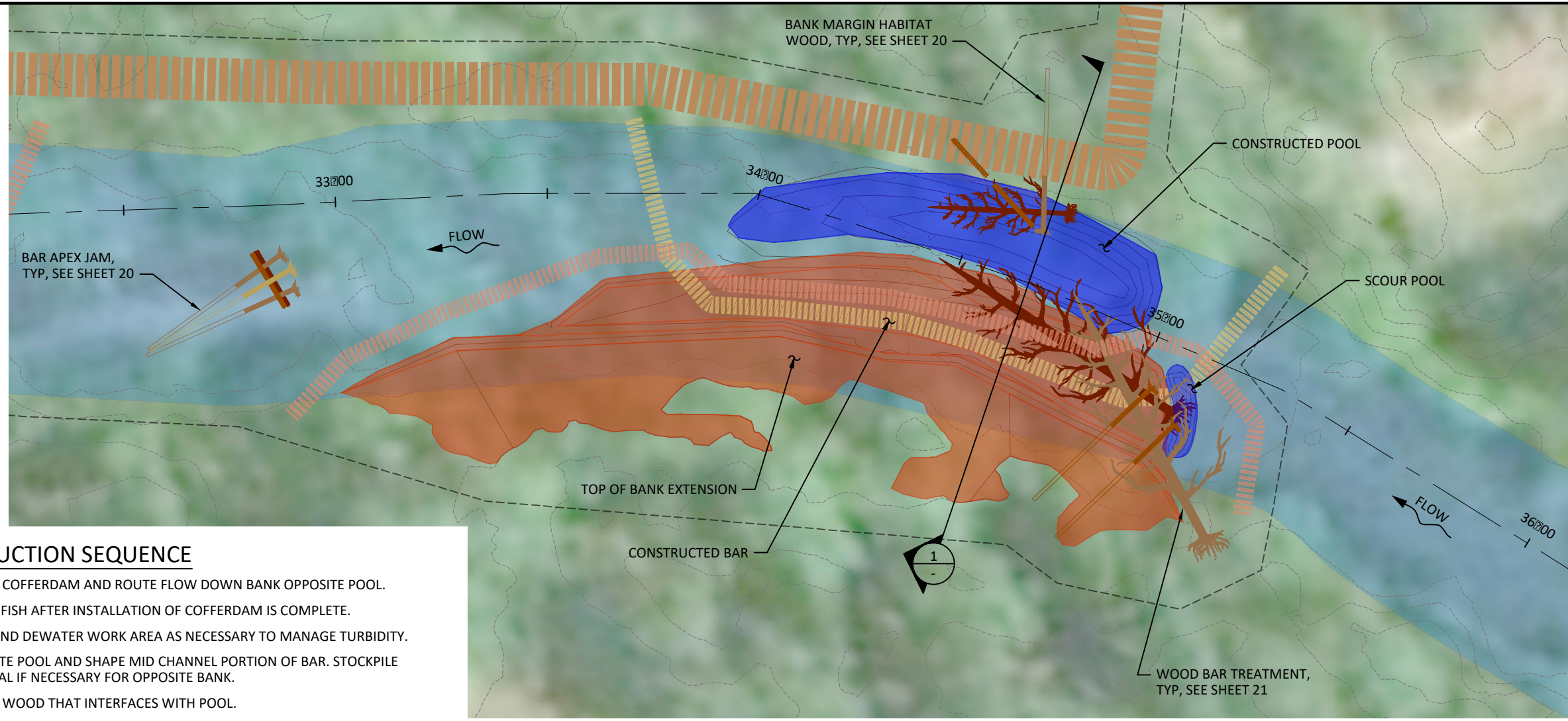
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**DOWNSTREAM  
CONSTRUCTED BAR AND  
POOL PLAN AND SECTION**

SHEET  
**17 OF 21**



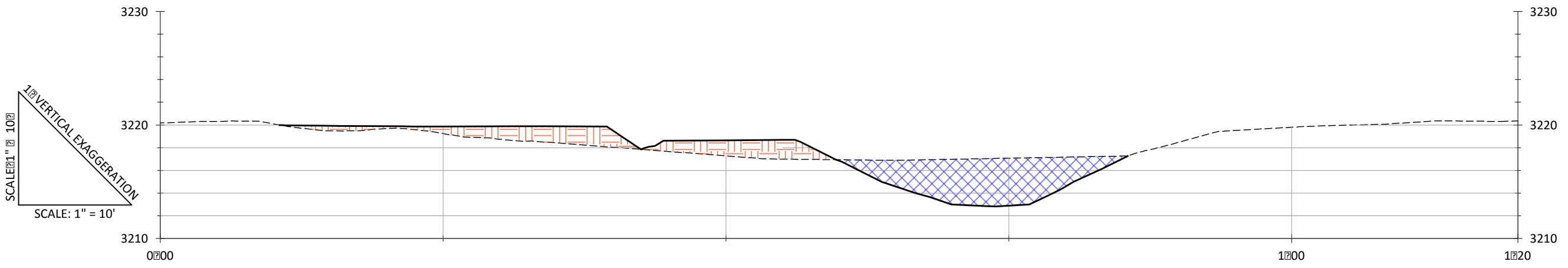
**LEGEND**

	SURVEY CONTROL POINT
	PROPERTY LINE
	EXISTING 1-FT CONTOURS
	LIMITS OF DISTURBANCE
	EXISTING CHANNEL ALIGNMENT
	PROPOSED SIDE CHANNEL ALIGNMENT
	EXISTING CHANNEL (APPROX. 389cfs)
	TEMPORARY ACCESS
	COFFERDAM PHASE 1
	COFFERDAM PHASE 2

**CONSTRUCTION SEQUENCE**

1. INSTALL COFFERDAM AND ROUTE FLOW DOWN BANK OPPOSITE POOL.
2. RESCUE FISH AFTER INSTALLATION OF COFFERDAM IS COMPLETE.
3. PUMP AND DEWATER WORK AREA AS NECESSARY TO MANAGE TURBIDITY.
4. EXCAVATE POOL AND SHAPE MID CHANNEL PORTION OF BAR. STOCKPILE MATERIAL IF NECESSARY FOR OPPOSITE BANK.
5. INSTALL WOOD THAT INTERFACES WITH POOL.
6. REMOVE AND REBUILD THE COFFERDAM, CONNECTING TO THE OPPOSITE BANK.
7. PUMP AND DEWATER WORK AREA AS NECESSARY TO MANAGE TURBIDITY.
8. COMPLETE BAR GRADING AND WOOD PLACEMENT.
9. REMOVE COFFERDAM.

**PLAN - CONSTRUCTED BAR AND POOL**



**CROSS SECTION - PROPOSED UPSTREAM BAR AND POOL**

Preliminary  
Not for Construction

NO.	BY	DATE	REVISION DESCRIPTION

DF DRAWN	MC,JF,RR DESIGNED	CHECKED
APPROVED	10/2018 DATE	18-02-02 PROJECT

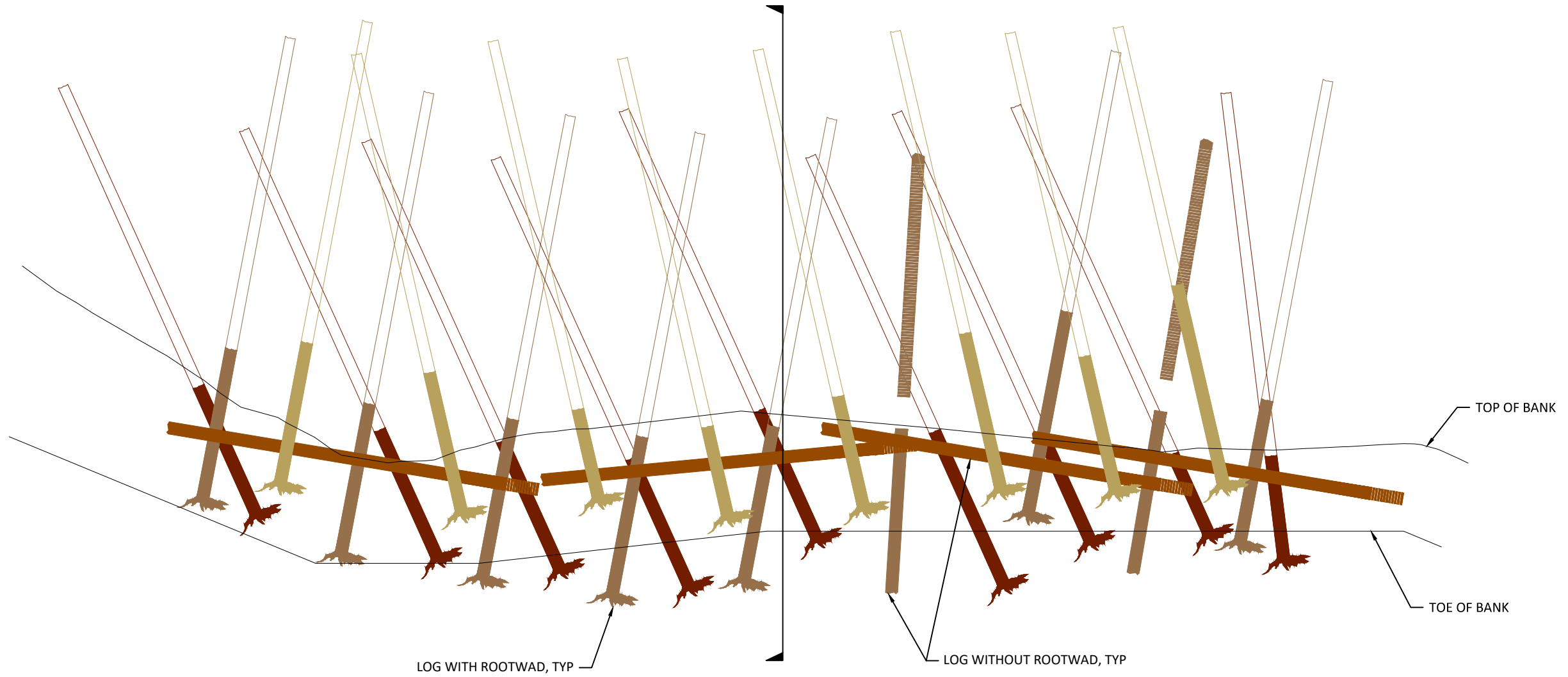
**CATHERINE CREEK STATE PARK RESTORATION PROJECT  
PRELIMINARY (30%) DESIGNS  
UNION COUNTY, OREGON**



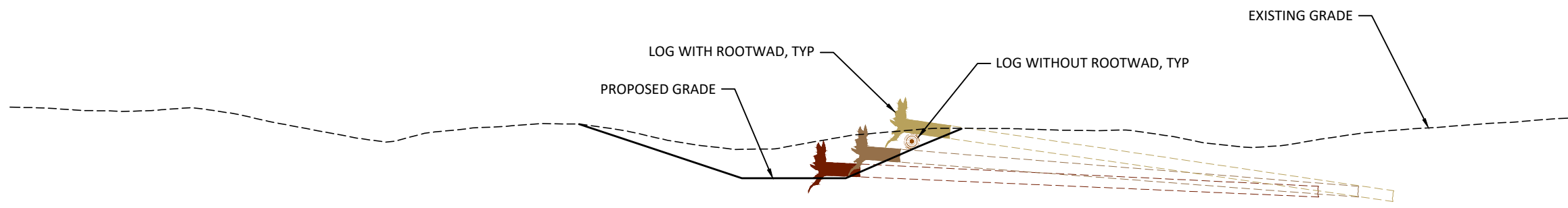
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**UPSTREAM CONSTRUCTED BAR  
AND POOL PLAN AND SECTION**

SHEET  
**18 OF 21**



**PLAN VIEW - SIDE CHANNEL BANK JAM**  
NOT TO SCALE



**SECTION VIEW - SIDE CHANNEL BANK JAM**  
NOT TO SCALE

Preliminary

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NO.	BY	DATE	REVISION DESCRIPTION

DF	MC,JF,RR	
DRAWN	DESIGNED	CHECKED
	10/2018	18-02-02
APPROVED	DATE	PROJECT

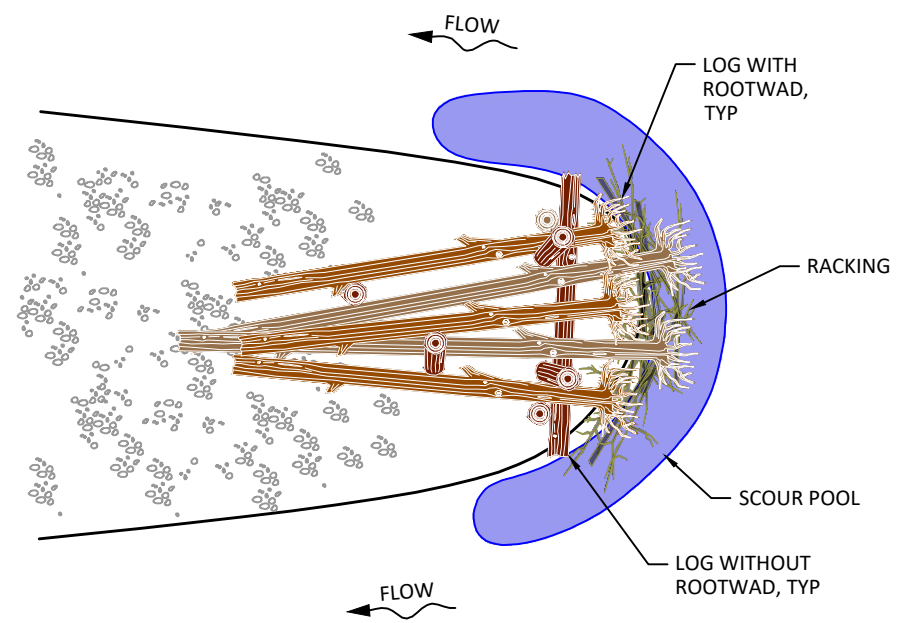
**CATHERINE CREEK STATE PARK RESTORATION PROJECT**  
**PRELIMINARY (30%) DESIGNS**  
**UNION COUNTY, OREGON**



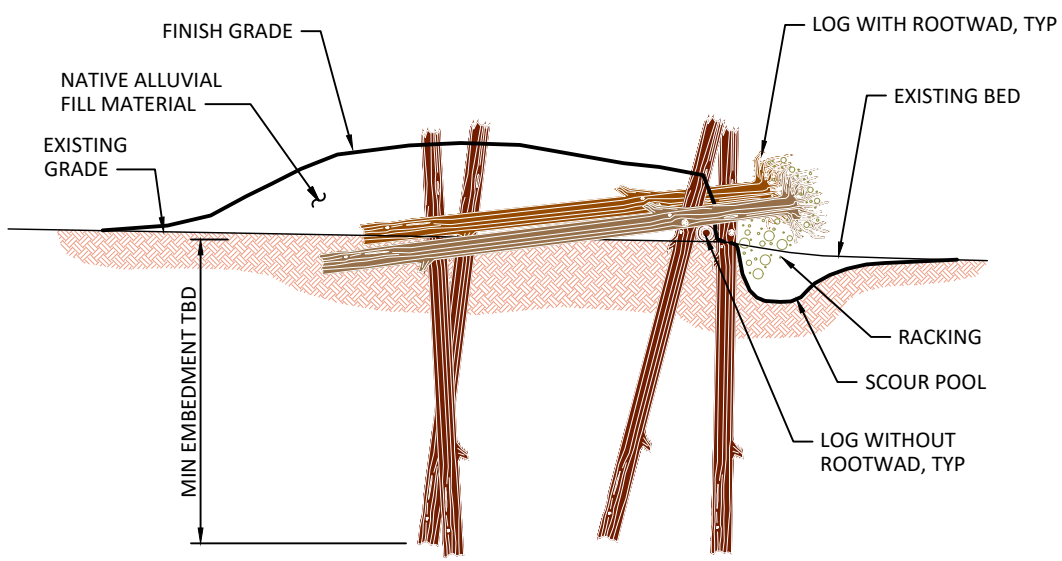
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**TYPICAL DETAIL AND SEQUENCE**  
**- SIDE CHANNEL BANK JAM**

SHEET  
**19 OF 21**



**TYPICAL PLAN VIEW  
BAR APEX JAM**  
NOT TO SCALE

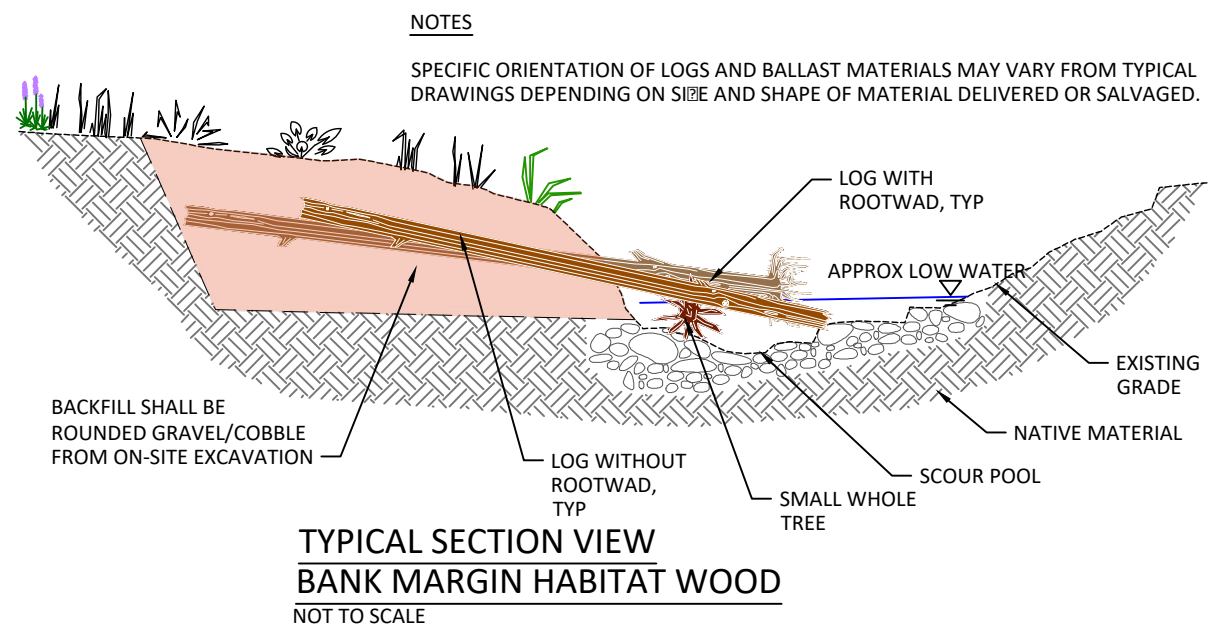


**TYPICAL SECTION VIEW  
BAR APEX JAM**  
NOT TO SCALE

**NOTES**

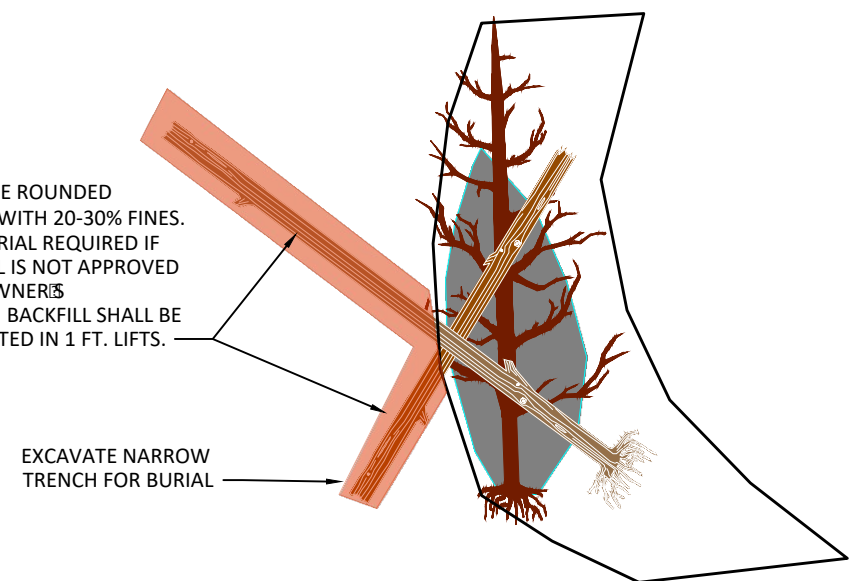
SPECIFIC ORIENTATION OF LOGS AND BALLAST MATERIALS MAY VARY FROM TYPICAL DRAWINGS DEPENDING ON SIZE AND SHAPE OF MATERIAL DELIVERED OR SALVAGED.

BOULDERS, PILES, OR A COMBINATION WILL BE UTILIZED FOR BALLAST. DETAILS TO BE DETERMINED.

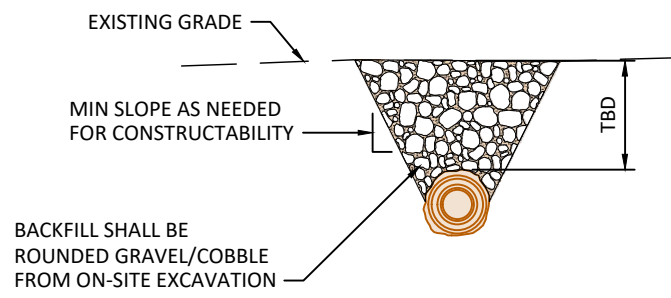


**TYPICAL SECTION VIEW  
BANK MARGIN HABITAT WOOD**  
NOT TO SCALE

BACKFILL SHALL BE ROUNDED GRAVEL/COBBLE WITH 20-30% FINES. IMPORTED MATERIAL REQUIRED IF NATIVE MATERIAL IS NOT APPROVED BY OWNER OR OWNER'S REPRESENTATIVE. BACKFILL SHALL BE BUCKET COMPACTED IN 1 FT. LIFTS.



**TYPICAL PLAN VIEW  
BANK MARGIN HABITAT WOOD**  
NOT TO SCALE



**TYPICAL SECTION  
LOG BURIAL**  
NOT TO SCALE

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TYPICAL DETAIL - APEX JAM,  
SIDE CHANNEL HABITAT WOOD

**HILLSLOPE WOOD NOTES**

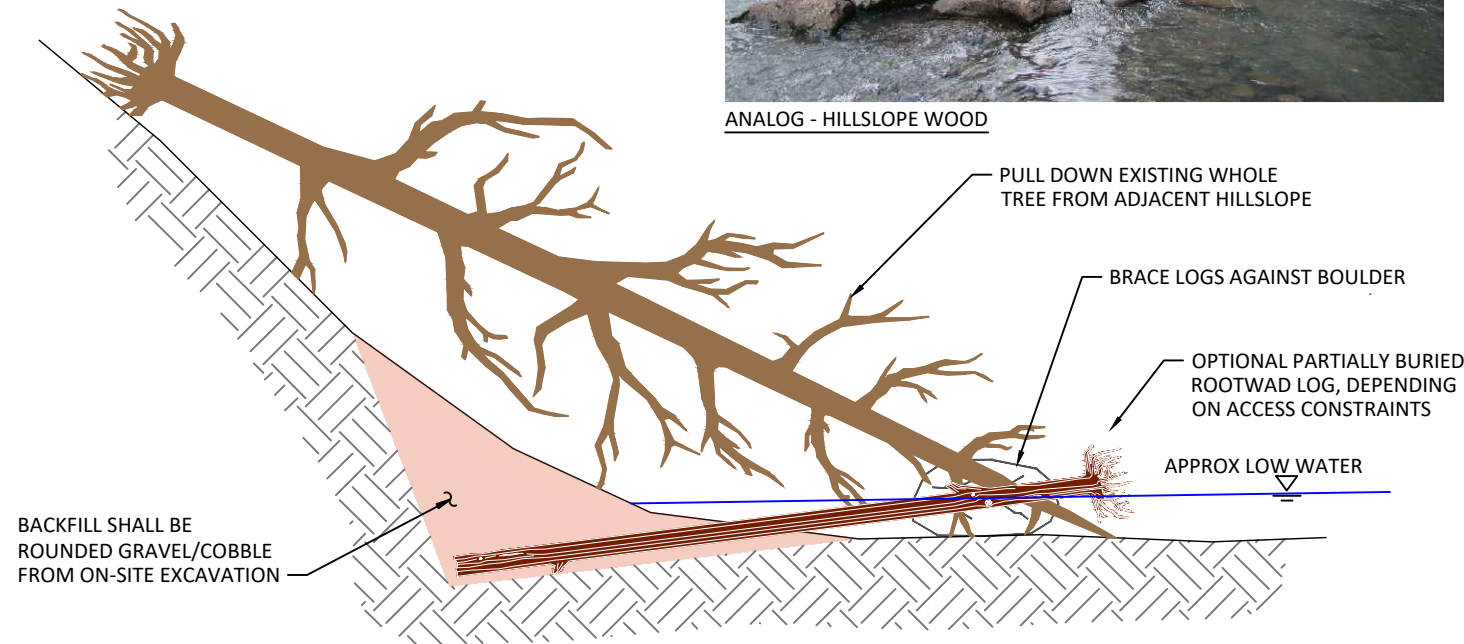
HILLSLOPE WOOD PROVIDES COVER HABITAT, MAINTAINS SCOUR POOLS, AND PROVIDES ROUGHNESS TO HELP RETAIN SMALL AND LARGE WOOD.

SPECIFIC ORIENTATION OF LOGS AND BALLAST MATERIALS MAY VARY FROM TYPICAL DRAWINGS DEPENDING ON SIZE AND SHAPE OF MATERIAL DELIVERED OR SALVAGED.

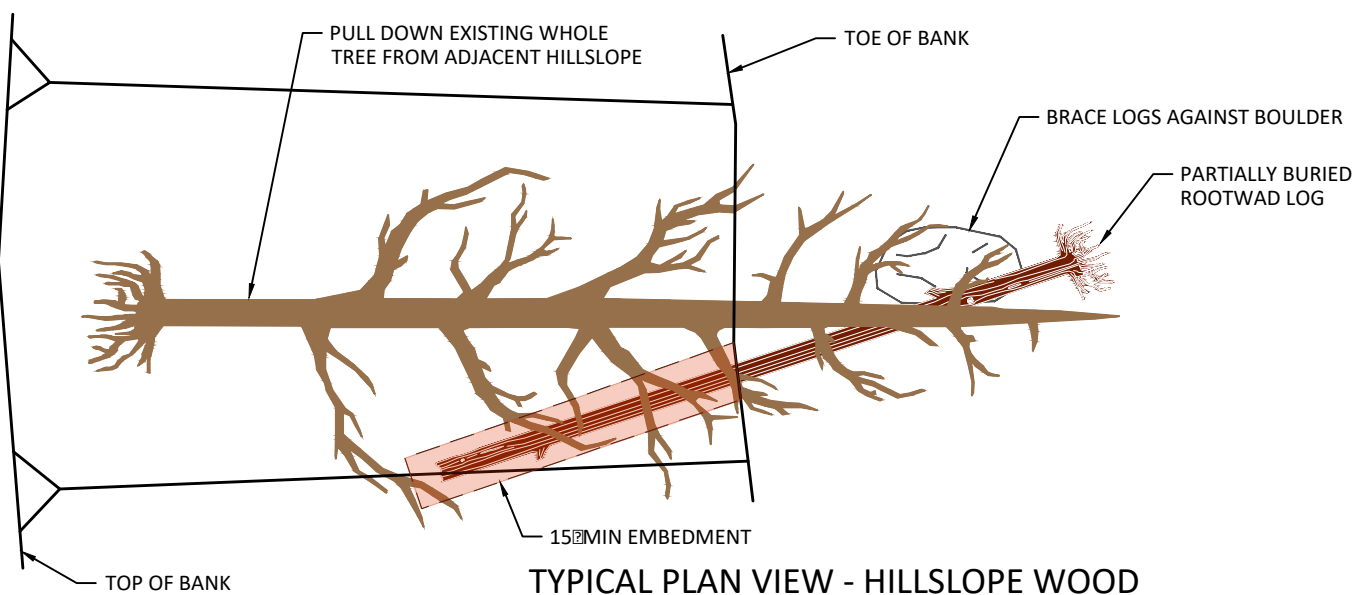
ACCESS ACROSS CREEK TO PLACE HILLSLOPE WOOD USING LOGS TO PREVENT TRACKS FROM CONTACTING LIVE WATER.



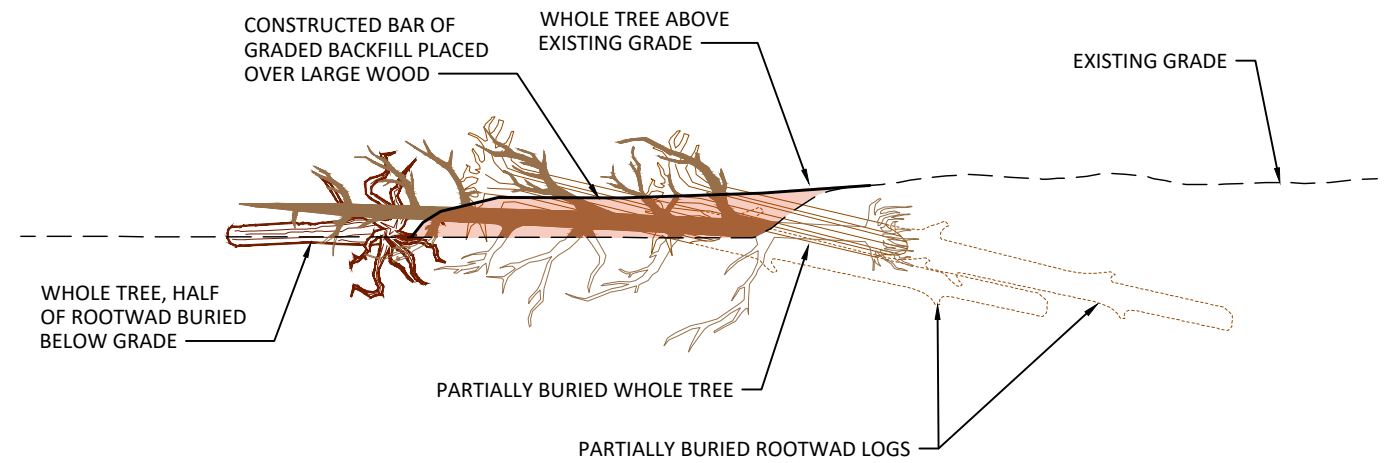
ANALOG - HILLSLOPE WOOD



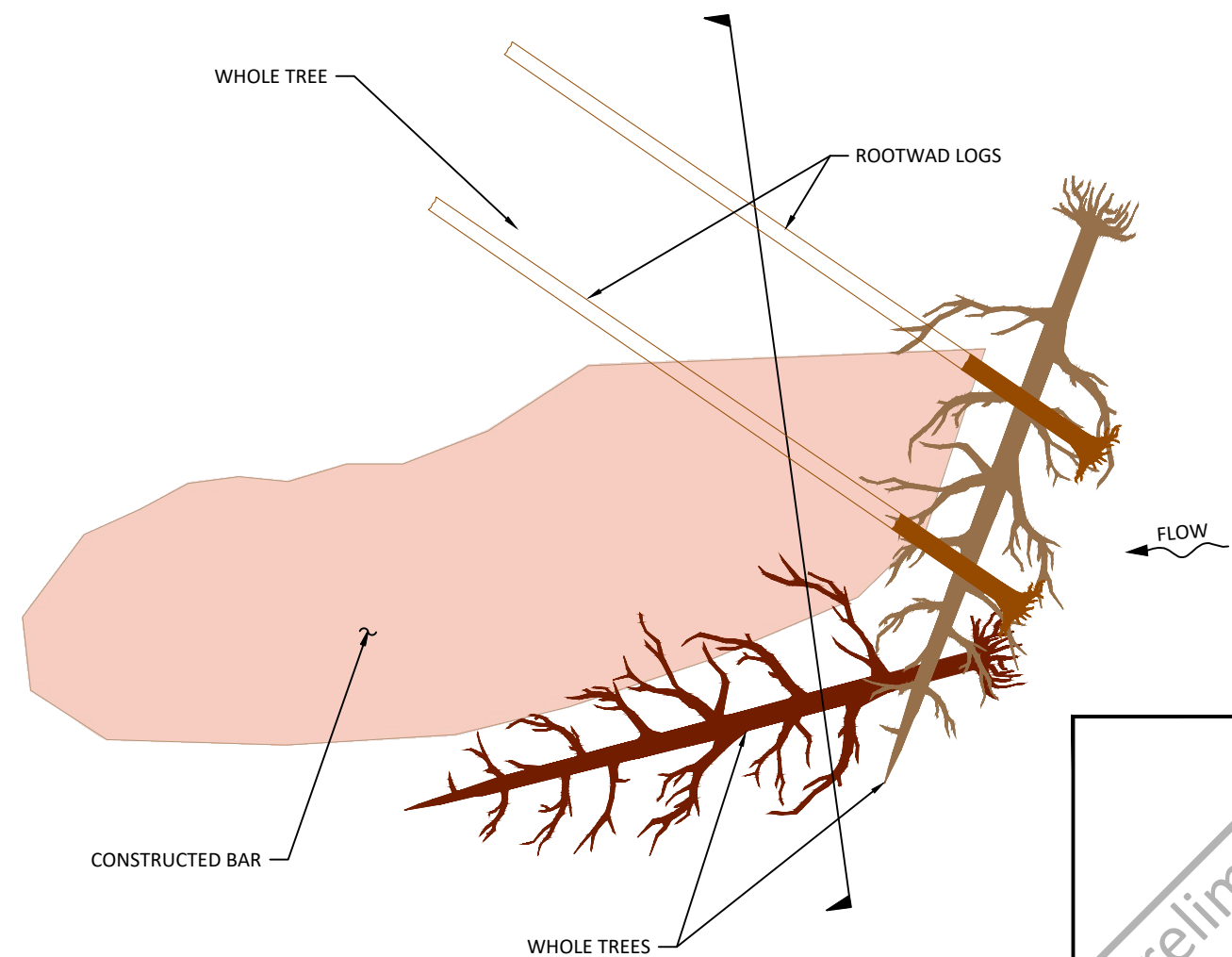
TYPICAL SECTION VIEW - HILLSLOPE WOOD  
NOT TO SCALE



TYPICAL PLAN VIEW - HILLSLOPE WOOD  
NOT TO SCALE



TYPICAL SECTION VIEW - WOOD BAR TREATMENT  
NOT TO SCALE



TYPICAL PLAN VIEW - WOOD BAR TREATMENT  
NOT TO SCALE

Preliminary  
Not for Construction

NO.	BY	DATE	REVISION DESCRIPTION

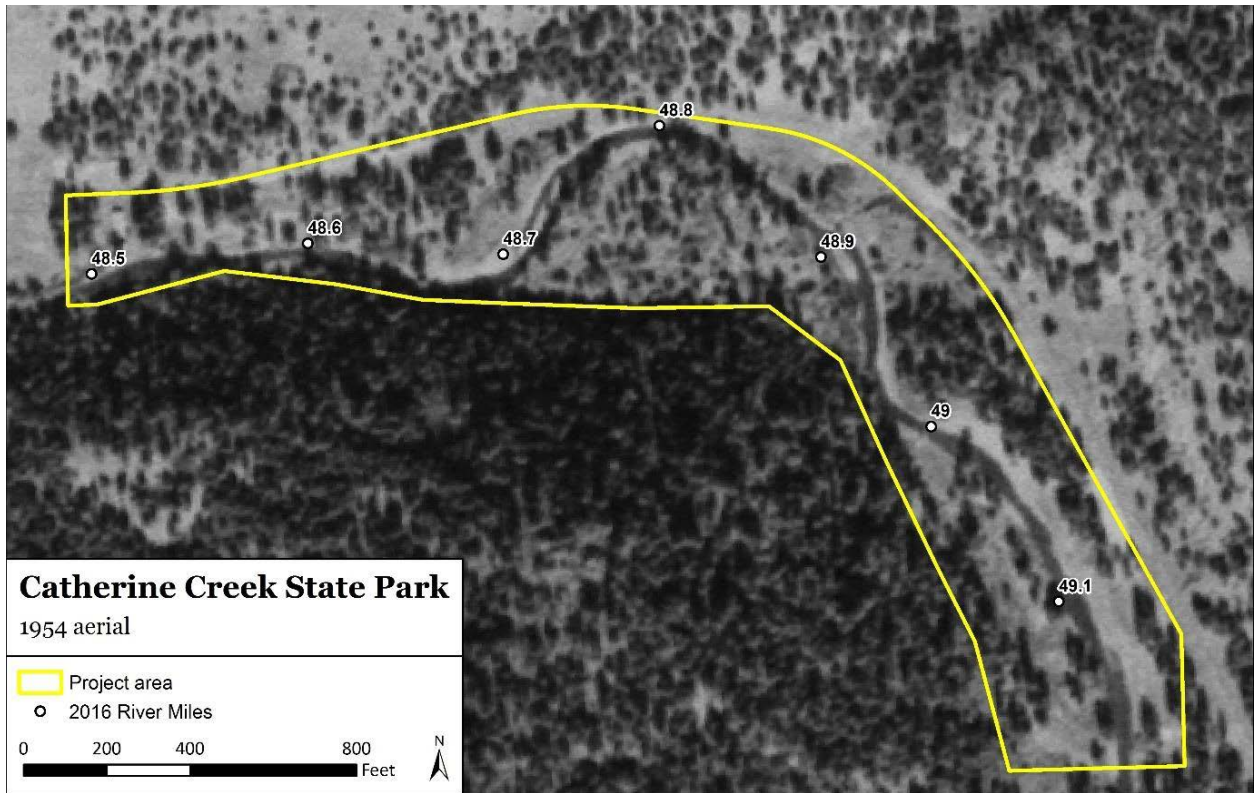
DF	MC,JF,RR	
DRAWN	DESIGNED	CHECKED
	10/2018	18-02-02
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CATHERINE CREEK STATE PARK RESTORATION PROJECT  
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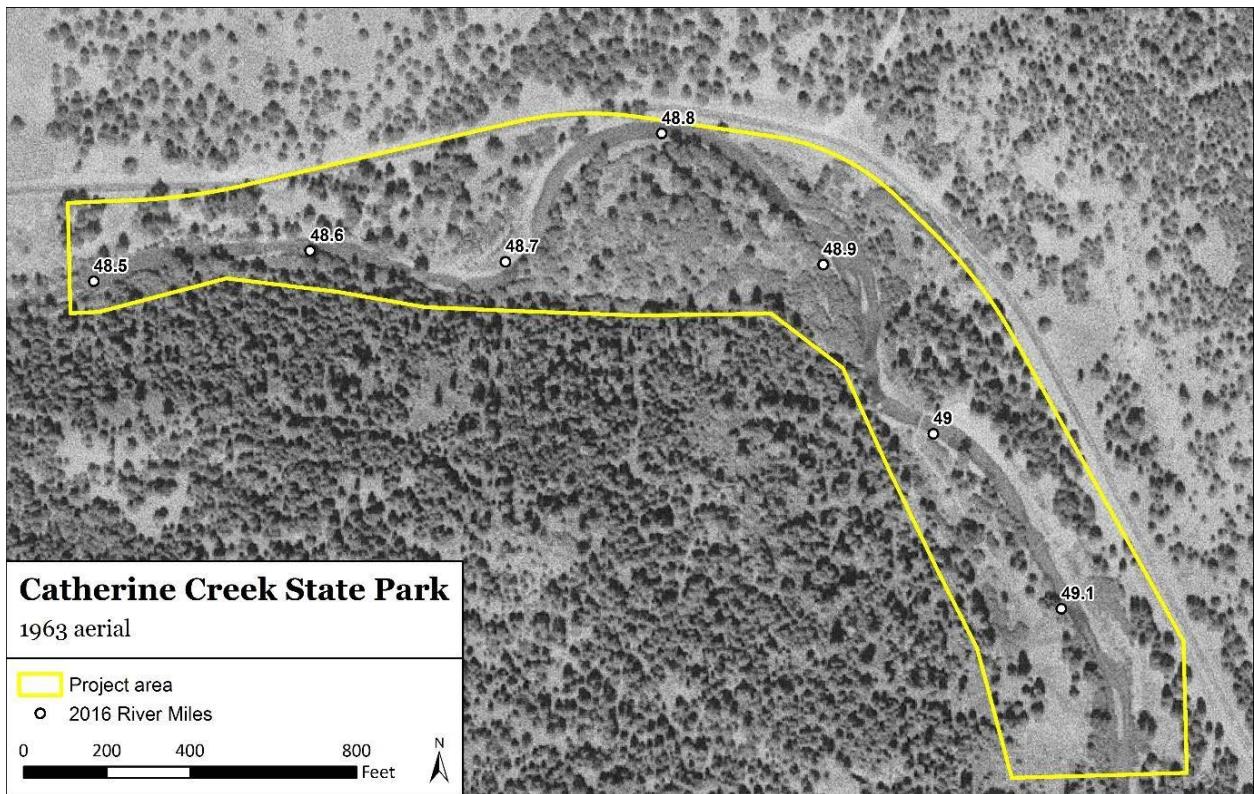


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TYPICAL DETAIL - HILLSLOPE  
WOOD



**Figure 1.** Historical imagery from 1954 in the Catherine Creek State Park project area.



**Figure 2.** Historical imagery from 1963 in the Catherine Creek State Park project area.



**Figure 3.** Historical Google Earth imagery from 1994 in the Catherine Creek State Park project area.



**Figure 4.** Historical Google Earth imagery from 2005 in the Catherine Creek State Park project area.



**Figure 5.** Historical Google Earth imagery from 2011 in the Catherine Creek State Park project area.



**Figure 6.** Historical Google Earth imagery from 2013 in the Catherine Creek State Park project area.



Figure 7. Historical Google Earth imagery from 2014 in the Catherine Creek State Park project area.

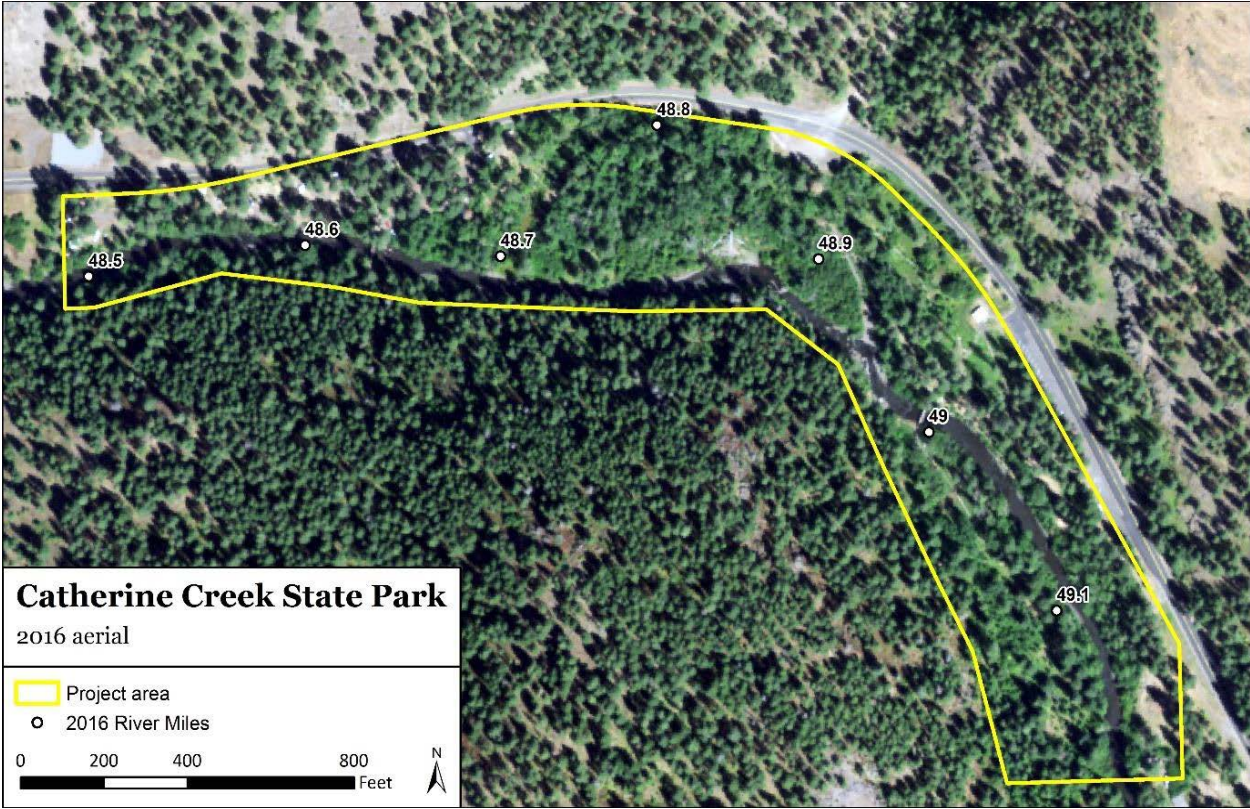


Figure 8. Historical imagery from 2016 in the Catherine Creek State Park project area.



**Figure 9.** Historical imagery from 2017 in the Catherine Creek State Park project area.



Pedestrian bridge and concrete abutments at Catherine Creek State Park, RM 48.6.



Catherine Creek State Park picnic area infrastructure located downstream of the pedestrian bridge near RM 48.6.



Historical Catherine Creek alignment at Catherine Creek State Park, located along the toe of the Highway 203 road prism.



Typical riparian conditions within the Catherine Creek State Park project reach, with mountain alder along channel margins and conifers in the uplands.



Boulders in the Catherine Creek State Park project reach.



Catherine Creek riffle habitat prevalent in the Catherine Creek State Park project reach.



Historic Catherine Creek channel on river right that was cut off after 1994.



Historic mainstem Catherine Creek and off-channel area.



Downstream connection location of historic and current mainstem Catherine Creek.

**BUDGET**

Totals automatically round to the nearest dollar

A	B	C	D	E	F	G	H
Itemize projected costs under each of the following categories:	Unit Type	Unit Number	Unit Cost	BPA Funds	Cash Match	In-Kind Match	Total Costs
	(e.g., # of hours)	(e.g., hourly rate)					(add columns D, E, F)
<b>SALARIES, WAGES AND BENEFITS.</b> List position titles, include only costs of employees charged to this grant.							
ODFW Project Management	Hours	80	\$40.00	\$0	\$0	\$3,200	\$3,200
ODFW Planting	Each	40	\$35.00	\$0	\$0	\$1,400	\$1,400
ODFW Project Construction Oversight	Hours	120	\$40.00	\$0	\$0	\$4,800	\$4,800
ODFW Fish Salvage	Hours	40	\$40.00	\$0	\$0	\$1,600	\$1,600
Photopoints (Pre.1,2,3,6,9,12,15 yrs post)	Hours	50	\$35.00	\$0	\$0	\$1,750	\$1,750
Aerial Photopoints (Pre.1,2,3,6,9,12,15 yrs post)	Hours	50	\$45.00	\$0	\$0	\$2,250	\$2,250
Project Topo Survey (as built,1,3,5,10,15 yrs post)	Hours	500	\$80.00	\$0	\$0	\$40,000	\$40,000
Salmonid presence/absence (annual redd counts, snorkel surveys)	Hours	100	\$40.00	\$0	\$0	\$4,000	\$4,000
<b>SUBTOTAL (1)</b>						\$59,000	\$59,000
<b>CONTRACTED SERVICES.</b> Labor, supplies, and materials to be provided by non-staff for project implementation.							
Cultural Resource Surveys and Report, coordination with OPRD	Each	1	\$15,000.00	\$0	\$15,000	\$0	\$15,000
Mobilization and Demobilization	Each	1	\$25,000.00	\$0	\$25,000	\$0	\$25,000
Environmental Controls (SWPPP, hydraulic fluids, etc.)	Each	1	\$10,000.00	\$0	\$10,000	\$0	\$10,000
Cofferdams, Diversions, Dewatering, and Water Management	Each	1	\$25,000.00	\$0	\$25,000	\$0	\$25,000
Temporary Access including temporary stream crossing, haul roads, clearing and grubbing	Each	1	\$10,000.00	\$0	\$10,000	\$0	\$10,000
Side Channel Cut	Cubic yards	3000	\$9.00	\$0	\$27,000	\$0	\$27,000
High Flow Swale Cut	Cubic yards	250	\$9.00	\$0	\$2,250	\$0	\$2,250
Upstream Bars and Pools Cut	Cubic yards	400	\$9.00	\$0	\$3,600	\$0	\$3,600
Upstream Bars and Pools Fill	Cubic yards	600	\$9.00	\$0	\$5,400	\$0	\$5,400
Upstream Bars and Pools Logs With Rootwads	Each	4	\$700.00	\$0	\$2,800	\$0	\$2,800
Upstream Bars and Pools Large Whole Trees	Each	4	\$2,000.00	\$0	\$8,000	\$0	\$8,000
Upstream Bars and Pools Racking Wood	Each	12	\$220.00	\$0	\$2,640	\$0	\$2,640
Apex Log Jams Logs	Each	8	\$500.00	\$0	\$4,000	\$0	\$4,000
Apex Log Jams Logs with Rootwads	Each	21	\$700.00	\$0	\$14,700	\$0	\$14,700
Apex Logjams Vertical Snags	Each	29	\$800.00	\$0	\$23,200	\$0	\$23,200
Apex Logjams Racking Wood	Cubic yards	43	\$300.00	\$0	\$12,900	\$0	\$12,900
Hillslope Wood Logs with Rootwads	Each	9	\$700.00	\$0	\$6,300	\$0	\$6,300
Hillslope Wood Large Whole Trees	Each	9	\$2,000.00	\$0	\$18,000	\$0	\$18,000
Hillslope Wood Racking Wood	Each	27	\$250.00	\$0	\$6,750	\$0	\$6,750
Hillslope Wood Boulders	Each	10	\$300.00	\$0	\$3,000	\$0	\$3,000
Side Channel Logjam Logs	Each	6	\$500.00	\$0	\$3,000	\$0	\$3,000
Side Channel Logjam Logs with Rootwads	Each	24	\$700.00	\$0	\$16,800	\$0	\$16,800
Side Channel Logjam Racking Wood	Each	45	\$220.00	\$0	\$9,900	\$0	\$9,900
Bank Margin Habitat Wood Logs	Each	30	\$500.00	\$0	\$15,000	\$0	\$15,000
Bank Margin Habitat Wood Logs with Rootwads	Each	30	\$700.00	\$0	\$21,000	\$0	\$21,000
Bank Margin Habitat Wood Small Whole Trees	Each	30	\$700.00	\$0	\$21,000	\$0	\$21,000
Bank Margin Habitat Wood Racking Wood	Each	90	\$250.00	\$0	\$22,500	\$0	\$22,500
Revegetation Seed and Mulch	Acres	5.9	\$1,500.00	\$0	\$8,850	\$0	\$8,850
Revegetation Plantings	Acres	5.9	\$4,000.00	\$0	\$23,600	\$0	\$23,600
Engineering Construction Oversight, site visits, design support and field observation during construction.	Hours	60	\$120.00	\$0	\$7,200	\$0	\$7,200
Interpretive Trail Sign Boards	Each	6	\$2,500.00	\$0	\$15,000	\$0	\$15,000
<b>SUBTOTAL (2)</b>				0	\$389,390	\$0	\$389,390
<b>TRAVEL.</b> Mileage, per diem, lodging, etc. Must use current State of Oregon rates.							
ODFW Travel to Project Site - 45 miles round trip	Miles	1800	\$0.35	\$0	\$0	\$630	\$630
<b>SUBTOTAL (3)</b>				\$0	\$0	\$630	\$630
<b>MATERIALS/SUPPLIES.</b> Refers to items that are "used up" in the course of the project. Costs to OWEB must be directly related to the implementation of this grant.							
<b>SUBTOTAL (4)</b>				0	0	0	0
<b>EQUIPMENT/SOFTWARE.</b> List portable equipment costing \$300 or more per unit. Must remain property of a governmental entity, tribe, watershed council, SWCD, institution of higher learning or school district.							
<b>SUBTOTAL (5)</b>				0	0	0	0
<b>OTHER.</b> Costs must be necessary and reasonable for successful completion of this grant.							
<b>SUBTOTAL (6)</b>				0	0	0	0
<b>[Add subtotals above] MODIFIED TOTAL DIRECT COSTS (7)</b>			0	0	389,390	59,630	449,020