

Application Name: Upper Willowa River Restoration Project

Application Number: 000-0000-16673

By: Willowa Resources

Offering Type: Open Solicitation

Application Type: Restoration

OWEB Region: Eastern Oregon

County: Willowa

Coordinates: 45.279523,-117.209727

Applicant:

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Payee:

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Project Manager:

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Budget Summary:

OWEB Amount Requested: \$250,726
Total Project Amount: \$1,109,741

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.

The Upper Wallowa River Restoration (UWRR) Project encompasses 1 1/2 miles of the Wallowa River and the West Fork Wallowa River, beginning near the confluence of BC Creek and flowing into Wallowa Lake. This section of the river is primarily managed for recreation with a mix of small property ownership, small businesses, and Wallowa Lake State Park. This area is a large attraction for tourists and important to the Wallowa County economy.

This grant covers the first two reaches of the four-reach project area, from Wallowa Lake upstream to the Bailey Lane Bridge. Natural floodplain function along the reach has been degraded by encroachment and development, thereby reducing the habitat quality and quantity.

The planned habitat improvements will:

- 1) enhance and restore spawning and rearing area habitat for kokanee salmon and bull trout;
- 2) improve habitat while protecting private and public property from the effects of flooding by maintaining or improving bank stability;
- 3) capitalize on its location to create significant opportunities for outreach to the general public; Wallowa Lake State Park hosts over half a million people per year; and
- 4) serve as a model for floodplain restoration in semi-developed areas that is FEMA and NOAA compliant.

The combined habitat and social benefits provide a profound opportunity to showcase a constructive win/win example for the coexistence of people and nature. Project partners include ODFW, OPRD, the Nez Perce Tribe, Wallowa Resources, and several private parties. This creates an opportunity for significant outreach to a diverse group of Oregonians.

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)*

Please select one of the following Landowner Contact Certification statements:

I certify that I have informed all participating private landowners involved in the project of the existence of the application, and I have advised all of them that all monitoring information obtained on their property is public record.

I certify that contact with all participating private landowners was not possible at the time of application for the following reasons: Furthermore, I understand that should this project be awarded, I will be required by the terms of the OWEB grant agreement to secure cooperative landowner agreements with all participating private landowners prior to expending Board funds on a property.

Please include a complete list of participating private landowners

The Wallowa Lake Lodge owns stream-side property in the reach closest to the lake, an area that is

slated for a conservation easement. The owners of the Wallowa Lake Lodge have been provided a project design, and that reach is included in this project.

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.

This application seeks to address the deleterious, anthropogenic alteration of the form and function of the Upper Wallowa River above Wallowa Lake resulting from years of stream alteration meant to channelize the river and avoid private property damage. By restoring natural function in this stream reach, habitat for fish and other wildlife will be enhanced. Additionally, the project will provide significant outreach opportunities due to its highly visible location, unlike many existing restoration projects. Lastly, the project will be a showcase for how habitat can be enhanced in a developed area.

The Wallowa River above Wallowa Lake originates as the West Fork and East Fork, in the Eagle Cap Wilderness in Wallowa County. Leaving the Wilderness, it passes through a developed area of private and state property before reaching the south end of Wallowa Lake. Development between the lake and the Wilderness traces back more than a century, in an area that was historically riparian and alluvial floodplain. Over the years, many efforts have been made to control river flooding to protect anthropogenic changes in the river corridor, with varying degrees of success. These efforts have included bank hardening and channelization, severely altering the quality and quantity of fish habitat in the river. Nevertheless, this section of the river still provides spawning habitat to an existing kokanee (*Oncorhynchus nerka*) fishery and historically hosted a Sockeye salmon (*O. nerka*) population, now extinct, and bull trout (*Salvelinus confluentus*), which are listed as threatened under the Endangered Species Act (ESA).

The current conditions also pose risks of catastrophic flooding to public (Wallowa Lake State Park) and private property. Restoring the area to its natural condition is unfeasible; the community is well established and provides a significant contribution to Wallowa County's economy during the vacation season. Leaving landowners to design and implement their own property protection measures in the midst of a flooding event typically results in bank hardening as emergency measures. If nothing is done to restore the river while protecting property, it is almost inevitable that the individual landowners would further hardening the banks throughout the area and virtually eliminate of any opportunity to enhance fish habitat.

We also anticipate restoration of Wallowa Lake Dam, which will raise lake water levels and exacerbate the current situation above the lake. The dam restoration is likely to result in the reintroduction of Sockeye (Cramer and Witty 1998)– increasing the importance of this upstream habitat restoration effort. Oregon law requires that any significant (more than 30%) construction at a dam that currently impedes passage where migratory fish were historically present is required to provide fish passage upon completion of construction. In the case of Wallowa Lake, unless they manage to retrofit the dam and limit the reconstruction to less than 30%, fish passage will be included with the new structure.'

Wallowa Lake once supported a native population of kokanee, but experienced a population collapse in the early 1960's. The lake was then stocked periodically, with the last supplementation occurring in 1982. While the native kokanee population is considered to have been eliminated, the current population is believe to be self-sustaining (Cramer and Witty 1998) and still serves important ecological and economic roles. A recent survey by PacifiCorp found that Reaches 1 and 2 of the UWRR project area supported 86% of the total number of spawning kokanee within the West Fork Wallowa River (PacifiCorp 2015). This project would increase spawning and rearing habitat according to specifications provided by ODFW (Yanke pers. comm. 2016) by creating favorable substrate, water depth, water velocities and additional habitat complexity.

Fluvial and resident bull trout are present in the East Fork Wallowa River. The fluvial bull trout migrate to Wallowa Lake through the UWRR project area. These bull trout are part of the Wallowa River-Minam River Recovery Plan Core Area (USFWS 2015). The Mid-Columbia Recovery Unit Implementation Plan (USFWS 2015) prescribes actions to aid in the species' recovery. Key steps recommended for the Wallowa/Minam Core Area include, "increasing instream habitat complexity, off-channel habitat, and high flow refugia by adding large wood; increasing sinuosity; managing riparian areas for a future supply of large wood, adequate shade [...]." All of these actions are included in the UWRR Project.

The regional significance of the project is that it would be an example solution for developed floodplains throughout the Columbia River watershed, particularly where the river intersects incorporated towns and settlements. FEMA is developing new rules on 100-year flood plains in response to pressure from NOAA-Fisheries to ensure ESA listed fish are protected. These new rules could have significant economic consequences in rural communities across Oregon – wherever ESA-listed fish are present. The work we are doing above Wallowa Lake is a potential model for resolving similar issues across a much larger geography.

The project has state-wide educational significance to raise public awareness and understanding of stream restoration activities. Wallowa Lake State Park is visited by more than half a million visitors each year. It is very unusual to have a project completed in such a highly-visible and highly-visited area. This will amplify the effect of the planned education and outreach opportunities. OPRD offers interpretive programs at the park and plans to make this project a major focus. The restoration plans also include interpretive signage and Nature Play opportunities where children can interact with the creek without detrimental effects to fish habitat.

The anticipated benefits of this project are multifaceted. They will have immediate as well as long-term and far-reaching educational, ecological, and economic impacts. To summarize, the project will:

- Enhance and restore habitat for all life stages of kokanee salmon and bull trout consistent with the Wallowa County-Nez Perce Tribe Salmon Habitat Recovery Plan (Revised 1999) and the Bull Trout Recovery Plan (USFWS 2015).
- Enhance river floodplain form and function in the reach adjacent to the State Park, which is of highest value for spawning and rearing, and poses the greatest risk of flooding to the State Park.
- Help protect State Park and Wallowa Lake Lodge property from the effects of catastrophic flooding by providing a significant side channel in high flows and by maintaining or improving bank stability.
- Increase public awareness of the value of restoration through a highly-visible and highly-visited project including an educational interpretive site with Nature Play area.
- Provide a model for how ecological and economic interests can both be preserved along the more developed sections of the Wallowa River.

References:

Cramer, S. P. and K. L. .Witty. 1998, The Feasibility for Reintroducing Sockeye and Coho Salmon in the Grande Ronde Basin. Report to the U.S. Department of Energy.

Yanke, J. 2016. ODFW and NPT feedback on 80% design plans: Guidance on suitable habitat for kokanee spawning. Memo to the Upper Wallowa River Project Team dated December 12, 2016.

PacifiCorp Energy. 2015. Wallowa Falls Hydroelectric Project (FERC No. P-308), Final License Application for Minor Water Power Project with Modification to Proposed Action, Volume II (Exhibit E – Environmental Report). Report to the U.S. Federal Energy Regulatory Commission.

U.S. Fish and Wildlife Service. 2015. Recovery plan for the coterminous United States population of bull trout (*Salvelinus confluentus*). Portland, Oregon.

Wallowa County and Nez Perce Tribe (1993; revised in 1999). Salmon Habitat Recovery Plan with Multi-Species Habitat Strategy. Nez Perce Tribe, Lapwai, Idaho.

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

A history of stream alterations and channelization meant to protect public and private property, combined with a significant deposition event following a flood from a tributary, BC Creek, have severely limited natural stream processes. When the property was managed by Oregon Department of Transportation (ODOT), the stream channel was dredged to prevent flooding of park infrastructure. The resulting levees still exist and limit the river's ability to access its floodplain. The lack of natural processes has negatively impacted available spawning and rearing habitat for kokanee and bull trout and limited the natural stream function.

For the last several decades the bridge over Willowa River has caused aggradation of river cobble behind the bridge supports. The additional river cobble exacerbates flooding at the State Park by diverting water towards the park. ODOT and Oregon Parks and Recreation Department (OPRD) have recognized and struggled with this issue for decades. Early in the design of this project, the team recognized that replacing the bridge was going to take significant time and resources from OPRD and ODOT. The team decided to move forward with the project without including the bridge replacement; all subsequent project modeling and designs, including hydrologic and sediment transport modeling, as well as the maintenance plan, assumed the bridge would remain in place.

While the bridge will not be replaced as part of this project phase, the development of a perennial side-channel will be completed. The perennial side channel will minimize the flooding risk and the related damage to State Park infrastructure while maintaining and enhancing fish habitat. This new channel will divert 25% to 30% of the river's annual volume. The current, aggradated river cobble will be removed and utilized in this phase of the project or hauled off site.

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

Provide OWEB Grant #(s)

This project has received a TA grant for the engineering and design of the restoration project. The OWEB grant number was 216-5016.

What was completed with previous OWEB grants?

The Final design and engineering for the restoration project, including construction drawings and cost estimates, with significant collaboration from project partners.

Why is additional OWEB funding needed?

Additional OWEB funding is required to move the project into implementation.

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

- Yes
- No

Provide OWEB Application #

219-5017-16398

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.

The Willowa County- Nez Perce Tribe Salmon Habitat Recovery Plan with Multi-Species Habitat Strategy specifically references the stream degradation associated with channelization of the river as a direct cause of the collapse of Kokanee stocks in between 1957-1963. The plan prioritizes the development of “a coordinated plan to address property protection needs while maintaining spawning areas,” one of the main goals of this project.

Will this project benefit salmon or steelhead?

- Yes
 No

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.

This project aims to return the Upper Wallowa River to its natural condition as much as possible, and to elucidate the public on the process, function, and value of restoration.

This restoration project will:

- 1) enhance and restore habitat for Kokanee salmon spawning and all life stages of bull trout consistent with the Wallowa County—Nez Perce Tribe Salmon Habitat Recovery Plan (revised 1999) and the Bull Trout Recovery Plan (USFWS 2015);
- 2) improve habitat while protecting private and public property from the effects of catastrophic flooding by maintaining or improving bank stability;
- 3) capitalize on its location to create significant opportunities for outreach to the general public; Wallowa Lake State Park hosts over half a million people per year (the potential outreach of this project is consistent with Goal number 3 of the OWEB strategic plan); and
- 4) serve as a model for floodplain restoration in semi-developed areas that is FEMA and NOAA compliant.

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

Increase quantity and quality of areas suitable for adult kokanee and bull trout spawning and rearing.

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

This project would increase kokanee spawning and rearing habitat according to specifications provided by ODFW (Yanke pers. comm. 2016) by creating favorable substrate, water depth, water velocities and additional habitat complexity. The following spawning habitat recommendations were provided by ODFW and NPT and were incorporated into the project design:

- Substrate: a study of artificial spawning channels found gravels between 2.1 and 64.0 mm are typically the most frequently used substrate, followed by gravel-rubble mixtures
- Depth: kokanee can spawn in a wide variety of water depth, but in general fisheries literature suggest water depths from 10-50 cm in streams are suitable for spawning.
- Velocities: kokanee were observed spawning in water velocities that ranged from 10-140 cm/s, but averaged between 60 to 70 cm/s.

Fluvial and resident bull trout are present in the East Fork Wallowa River. The fluvial bull trout migrate to Wallowa Lake through the UWRR project area. These bull trout are part of the Wallowa River-Minam River Recovery Plan Core Area (USFWS 2015). The Mid-Columbia Recovery Unit Implementation Plan (USFWS 2015) prescribes actions to aid in the species' recovery. Key steps recommended for the Wallowa/Minam Core Area include, "increasing instream habitat complexity, off-channel habitat, and high flow refugia by adding large wood; increasing sinuosity; managing riparian areas for a future supply of large wood, adequate shade [...]." All of these actions are included in the UWRR Project.

Objective #2

Objective

Improve channel and bank stability to reduce flood and erosion damage to private and public property and existing infrastructure.

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

The project includes numerous channel and bank stability elements as well as element to reduce flooding of private and park property. Log and boulder structures are included for habitat as well as to increase bank stability. The project includes adding a perennial side channel and seasonal high flow channel to direct water away from private property and public park infrastructure.

Objective #3

Objective

Increase channel complexity, aquatic habitat diversity and floodplain connectivity

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

The project includes numerous elements to increase channel complexity and aquatic habitat diversity. 67 log and boulder structures are included for habitat as well as to increase aquatic habitat diversity. The project removing park infrastructure in the floodplain, adding a perennial side channel and adding a seasonal high flow channel to increase channel complexity and the river's ability to access its floodplain .

Objective #4

Objective

Increase riparian function with site-appropriate native vegetation

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

To increase riparian function, thousands of native riparian trees and shrubs will be planted within the project area. These will be fenced from local herbivores as well as watered to ensure establishment.

Objective #5

Objective

Increase public awareness of the value of restoration through a highly-visible and highly-visited project including an educational interpretive site

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

OPRD will design and construct a new path system and interpretive signage for the project, including an educational interpretive site with Nature Play area. The interpretive elements will increase public awareness of the history of the site and the value of restoration. With over half a million visitors to Willowa Lake State Park each year, the project has the opportunity to reach many Oregonians as well as visitors from across the country.

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

Element	Description	Start Date	End Date
Request for Bids	Solicit bids for project construction	1/2019	2/2019
Contractor selection	Analyze bid proposals and select contractor	2/2019	4/2019
Construction	See attached Sheet 3.3 for the construction sequence.	5/2019	11/2019
Plant maintenance	Maintain fences and water plantings as needed	11/2019	12/2022
Monitoring	Monitor project and adjust perennial side channel as necessary.	11/2019	12/2022

Element	Q1 2019	Q2 2019	Q3 2019	Q4 2019	Q1 2020	Q2 2020	Q3 2020	Q4 2020	Q1 2021	Q2 2021	Q3 2021	Q4 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Request for Bids																
Contractor selection																
Construction																
Plant maintenance																
Monitoring																

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. -- Details will follow.*
- Wetland Habitat: land or areas covered, often intermittently, with shallow water or have soil saturated with moisture.*
- Estuarine Habitat: tidally influenced areas.*

Instream Habitat

Select all applicable Instream categories.

✓Bank stabilization

How will the bank stabilization improve water quality and/or native fish or wildlife habitat?

This restoration project design aimed to enhance bank stability and provide additional side channel capacity in a way that increases the natural function of the river while protecting State Park and Wallowa Lake Lodge infrastructure.

Proposed actions in the State Park include removal of floodplain constrictions, enhancement and construction of a perennial side channel, enhancement of existing flood channels, addition of large woody material and floodplain complexity features, and construction of an offset protection berm to reduce the risk of flooding damage to park features and structures. In addition, changes to features in the Park are proposed to function within a more active floodplain. These are not strict "bank stabilization efforts," but collectively, allowing the river more room to move will have a stabilizing effect on the river corridor through the park. The additional side channel, floodplain connectivity and large woody material will all enhance wildlife habitat by providing cover and additional, more varied habitat.

How do the bank stabilization activities relate to and increase the ecological benefit of the other restoration activities proposed in the application?

The bank stabilization activities included in the project design relate to the other restoration activities proposed by limiting the impact of potential future emergency placements of rip-rap and increasing the connectivity of suitable habitat between the upper and lower reaches.

Bank Stabilization Materials
Rocks/Boulders
Vegetation
Logs

Stream Side Information

Are you proposing to treat one or both sides of the streambank?

- One side
- Both sides

Miles treated
0.3

Total miles treated
0.3

- 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

Boulders

✓ Combination log/boulder

Number of structures

67

Average number of logs per structure.

2

Average length of logs per structure (feet)

30

Average diameter of logs per structure (feet)

1.5

Average number of boulders per structure.

3

Average size of boulders per structure (feet)

2

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?

The final project design includes improving and creating multiple side channels, for perennial and high flows. The project also include removal of park infrastructure from the floodplain. Lastly, it provides for the relocation of the berms that currently exist along the main river channel. The berms will be moved back so that the river can access more of its historic floodplain.

Acres off-channel or floodplain habitat connected

2

Number of pools created/added

0

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
0.5

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

Prescribed burnings, stand thinning, stand conversions, silviculture

Juniper treatment

Livestock management

Debris and Structure Removal

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

Yes

No

Total linear stream miles to be treated.
.5

Total riparian acres to be treated.
3

Left streambank miles to be treated.
.5

Right streambank miles to be treated.
.5

Upland Habitat

Select all applicable Upland categories.

Upland road activities

Vegetation establishment or management

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

Restoration of historic upland habitats

Fuels reduction

Juniper treatment

Invasive species control

Forest stand health

Planting

For Details Go to Plant Page

Livestock management

Agricultural practices for conservation including erosion control

Non-Agriculture practices for conservation including erosion control

Urban impact reduction

Total upland acres to be treated:

1

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.

The development of an outreach opportunity is an essential piece of this project. Partners, including the Department of Fish and Wildlife, the Nez Perce, OPRD, and Wallowa Resources, intend to create an educational interpretive site that address the impacts of anthropogenic manipulation of natural ecosystems, the history of those impacts in the Wallowa River and the broader region, and the enormous importance and potential of restoring ecosystems that have been adversely affected. This project is unique in that the location makes for a very high profile project, with nearly half a million people visiting the project area each year.

Design

Were design alternatives considered?

- Yes
 No

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

Design alternatives were considered during the collaborative design process, although the alternatives were relatively limited due to the immediate proximity of a diverse group of landowners. The two main alternatives considered were one that included only such habitat placements as to improve the hydrologic function of the river and one that included additional placements specifically for additional habitat creation. The final design includes only log placements essential for hydrologic function, although if additional funding can be squared habitat only features will be installed as well.

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"

N/A

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

The main steps that will be taken to minimize adverse impacts will include timing the project within the in-stream work window determined by the ODFW district biologist to avoid any impacts on spawning Kokanee, minimizing

disturbance of vegetation as much as possible during construction to maintain existing plant communities, and construction work outside of the stream in the shoulder season to minimize impact on visitors and landowners in the area.

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.

Role	Name	Affiliation	Qualifications	Email	Phone
Project Manager	Nils Christoffersen	Executive Director, Wallowa Resources	Decades of experience in watershed restoration activities and project management.	nils@wallowaresources.org	(541) 426-4100
Assistant Project Manager/Implementation	Matt King	Program Advisor, Wallowa Resources	Many years of experience in project fundraising, management, and design, with projects ranging from restoration to renewable energy.	matt@wallowaresources.org	(541) 426-4100
Project Management/ Implementation Assistance	Jean Jancaitis	Watershed Stewardship Program Director, Wallowa Resources	B.A. in Biology from The College of William and Mary and an M.S. in Environmental Studies from the University of Oregon. Experience includes 15 years as a botanist, ecologist, and stewardship manager.	jean@wallowaresources.org	(541) 221-5179
Fisheries Biologist Observation oversight and quality control	Jason Scott	GeoEngineers	Over the course of his 25 year career, Jason has performed and overseen construction observation services on dozens of stream/floodplain restoration projects. Most recently, Jason provided construction observation oversight on the Dry Creek project.	jscott@geoengineers.com	(509) 209-2816
Senior Geomorphologist Construction observation	Tim Hanrahan, CFM, Ph.D	GeoEngineers	Over 25 years of research, analysis and design of river channels with a focus on channel processes and aquatic habitat impacts. Tim has conducted habitat restoration construction observation services on many restoration projects.	thanrahan@geoengineers.com	(509) 209-2821
Senior Water Resources Engineer Project management and construction observation	Ryan Carnie, CFM, PE	GeoEngineers	Licensed civil engineer in Oregon with more than 20 years experience in project design and observation as civil / hydraulics engineer. Ryan is the Engineer of Record for this Wallowa Restoration project.	rcarnie@geoengineers.com	(208) 258-8326

Water Resources Engineer Project management and construction observation	Becca Miller, PE	GeoEngineers	Licensed civil engineer in Oregon with more than 5 years experience in project design and observation as civil / hydraulics engineer. Becca was a key member of the design team for this Willowa Restoration project.	bmiller@geoengineers.co m	(208) 258-8320
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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.

The perennial side channel will be monitored to ensure that it functions properly and the plantings will be monitored to ensure establishment. \$800 is requested from OWEB for this effort.

Budget

Item	Unit Type	Unit Number	Unit Cost	OWEB Funds	External Cash	External In-Kind	Total Costs
Salaries, Wages and Benefits							
WR Restoration Project Management	Hours	105	\$50.25	\$2,277	\$3,000	\$0	\$5,277
Category Sub-total				\$2,277	\$3,000	\$0	\$5,277
Contracted Services							
Environmental Controls - Permit	Each	1	\$7,000.00	\$5,000	\$2,000	\$0	\$7,000
Mobilization and Demobilization	Each	2	\$6,250.00	\$0	\$12,500	\$0	\$12,500
Construction Survey and Staking, Tolerance Class C	Each	2	\$1,183.84	\$1,868	\$500	\$0	\$2,368
Temporary Traffic Control (high due to park visitation number)	Each	1	\$8,000.00	\$2,000	\$6,000	\$0	\$8,000
Vegetation Clearing, Grubbing, Stockpile or Disposal	Acres	3	\$2,096.38	\$4,194	\$2,096	\$0	\$6,290
Temporary Stream Diversion/Dewatering	Each	41	\$400.00	\$5,400	\$11,000	\$0	\$16,400
Remove current berm (excavate and stockpile)	Cubic yards	1368	\$8.50	\$9,103	\$2,525	\$0	\$11,628
Rough channel construction/reconstruction of main river channel, perennial side channel and high-flow channel (excavate and stockpile)	Cubic yards	2302	\$8.50	\$8,959	\$10,608	\$0	\$19,567
Sawcut and remove asphalt pavement of the riverside parking area ("Each" units = square yard)	Each	180	\$45.00	\$0	\$0	\$8,100	\$8,100
Remove existing pedestrian bridges ("Each" = square foot)	Each	480	\$13.61	\$0	\$0	\$6,533	\$6,533
Haul and dispose of asphalt and curbing	Cubic yards	340	\$20.00	\$6,800	\$0	\$0	\$6,800
Interpretive stream habitat channel with interpretive trail, plaza, and interpretive panels (from OPRD Master Plan update)	Each	1	\$200,000.00	\$0	\$200,000	\$0	\$200,000
New pedestrian bridges (from OPRD Master Plan update)	Each	2	\$30,000.00	\$0	\$60,000	\$0	\$60,000
Construct new berm (haul and place material to engineering standards)	Cubic yards	4227	\$8.50	\$7,807	\$28,123	\$0	\$35,930
Fine grade proposed channel and berm ("Each" unit = square yard)	Each	2015	\$0.47	\$0	\$948	\$0	\$948
Large wood and ballast boulder structures - materials and installation ("Each" unit = per structure)	Each	67	\$1,203.43	\$28,780	\$51,850	\$0	\$80,630
Riprap revetment - material and installation	Tons	171	\$32.77	\$1,305	\$4,299	\$0	\$5,604

Pavement subbase for the new reduced-size riverside parking area and paved paths (from OPRD Master Plan update)	Tons	665	\$23.64	\$0	\$15,721	\$0	\$15,721
Asphalt pavement for paths (from OPRD Master Plan update)	Feet	7000	\$20.00	\$0	\$140,000	\$0	\$140,000
Asphalt pavement - new reduced size riverside parking lot and roadway over new box culvert (from OPRD Master Plan update) ("Each" units = square feet)	Each	10000	\$7.00	\$0	\$70,000	\$0	\$70,000
Boardwalk over new high-flow channel (from OPDR Master Plan update)	Feet	400	\$250.00	\$0	\$100,000	\$0	\$100,000
Marina Lane New Perennial Channel Bridge (Sheets 5.1-5.3, span 32' long by 32' wide, pedestrian paths on both sides, deck 46" thick)	Each	1	\$87,000.00	\$72,000	\$15,000	\$0	\$87,000
Marina Lane New Perennial Channel Bridge abutments	Each	1	\$40,000.00	\$30,000	\$10,000	\$0	\$40,000
Revegetation: purchase and install seed	Acres	2.1	\$1,285.00	\$0	\$2,699	\$0	\$2,699
Revegetation: plants (willow, dogwood, cottonwood)	Each	3504	\$1.15	\$0	\$4,030	\$0	\$4,030
Revegetation: plants (2-gal trees)	Each	20	\$15.00	\$0	\$300	\$0	\$300
Revegetation: plants (1-gal shrubs)	Each	189	\$7.50	\$0	\$1,418	\$0	\$1,418
Revegetation: all plant installation	Each	3713	\$0.75	\$0	\$2,785	\$0	\$2,785
Revegetation: planting straw mulch	Tons	8	\$165.00	\$0	\$1,320	\$0	\$1,320
Revegetation: plant watering	Hours	96	\$15.00	\$0	\$0	\$1,440	\$1,440
Revegetation: exclusion fence materials (T-posts and 16' by 50" hog panels)	Feet	3500	\$1.25	\$4,375	\$0	\$0	\$4,375
Revegetation: exclusion fence construction	Hours	160	\$15.00	\$0	\$0	\$2,400	\$2,400
Site cleanup and repair	Each	1	\$5,000.00	\$3,000	\$2,000	\$0	\$5,000
Archaeology surveys	Each	1	\$22,000.00	\$0	\$22,000	\$0	\$22,000
Fisheries Biologist	Hours	44	\$95.00	\$2,180	\$2,000	\$0	\$4,180
Senior Geomorphologist	Hours	62	\$115.00	\$5,130	\$2,000	\$0	\$7,130
Senior Water Resources Engineers	Hours	144	\$135.00	\$12,440	\$7,000	\$0	\$19,440
Water Resources Engineer	Hours	166	\$95.00	\$13,770	\$2,000	\$0	\$15,770
OPRD Recreation Planner and Engineer (prepare interpretive designs, prepare final recreation infrastructure designs, oversee recreational infrastructure construction)	Hours	332	\$135.00	\$0	\$0	\$44,820	\$44,820
Category Sub-total				\$224,111	\$792,722	\$63,293	\$1,080,126
Travel							

Travel to Wallowa Lake State Park	Miles	332	\$0.55	\$181	\$0	\$0	\$181
Category Sub-total				\$181	\$0	\$0	\$181
Materials and Supplies							
			\$0	\$0	\$0	\$0	\$0
Category Sub-total				\$0	\$0	\$0	\$0
Equipment and Software							
			\$0	\$0	\$0	\$0	\$0
Category Sub-total				\$0	\$0	\$0	\$0
Other							
			\$0	\$0	\$0	\$0	\$0
Category Sub-total				\$0	\$0	\$0	\$0
Modified Total Direct Cost Amounts				\$226,569	\$795,722	\$63,293	\$1,085,584
Indirect Costs							
Federally Accepted 'de minimis' Indirect Cost Rate (up to 10%)	10%			Indirect Cost Total: \$22,657			
Post Grant							
Status Reporting Amount	Status Reporting	2	\$350.00	\$700	\$0	\$0	\$700
Effectiveness Monitoring Amount	Effectiveness Monitoring	1	\$800.00	\$800	\$0	\$0	\$800
Total				\$250,726	\$795,722	\$63,293	\$1,109,741

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

The above budget does include costs associated with changes to OPRD infrastructure that will result from the restoration. It does not include the possible replacement of the Marina Lane bridge over the main channel of the Wallowa River. While OPRD , ODOT and the Governor are committed the bridge's replacement, it will happen in a subsequent phase.

Budget items that are entirely associated with OPRD interpretive or recreational infrastructure will be funded by OPRD. If the items is mix of OPRD infrastructure and restoration, the cost of the item is split proportionally. Where cost estimates were generated by OPRD, specific items include the tag "(from OPRD Master Plan Update)". It is important to not that the changes to OPRD infrastructure and the culvert replacement support and enhance the restoration. The park is abandoning some park property to allow for greater river movement and connection to its historic floodplain/alluvial fan. Repair and replacement of infrastructure, including trails and small bridges, will be necessary.

The cost estimates presented above were largely generated by GeoEngineers using the website RSMeans (<https://www.rsmeansonline.com/>) and actual costs from other projects they have led; however, other sources were used. WR obtained some cost estimates from other project managers, contractors, and recently-completed projects such as the Lick Creek bridge replacement. If there are questions about where a specific number came from, we can supply a reference.

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
Tribe	Wildhorse Foundation		Cash	\$15,000	can be used for restoration materials	Pending
Private organization	Reser Family Foundation		Cash	\$50,000	can be used for any aspect of the restoration work	Secured
Private organization	Maybelle Clark Macdonald Foundation		Cash	\$45,000	can be used for any aspect of the restoration work	Pending
Private organization	Jubitiz Family Foundation		Cash	\$10,000	can be used for any aspect of the restoration work	Pending
State	Oregon Parks and Recreation Department		In-Kind - Labor	\$63,293	Labor for plant enclosure fence construction, plant watering, as well as the design and engineering of all new and replacement recreational and interpretive infrastructure.	Secured
State	Oregon Parks and Recreation Department		Cash	\$50,000	2017-2019 Biennium funds that can be used for any aspect of the restoration work	Secured
State	Oregon Parks and Recreation Department		Cash	\$130,000	2019-2021 Biennium funds for recreational and interpretive infrastructure	Pending
State	Oregon Parks and Recreation Department		Cash	\$40,000	2019-2021 Biennium Salmon Plate Funds for all aspects of the restoration	Pending
State	Oregon Parks and Recreation Department		Cash	\$455,722	Recreational Trails Program (RTP) Grant	Pending
Fund Source Cash Total				\$795,722	Fund Source In-Kind Total	\$63,293

Match

Contribution Source-Type: Description	Amount
Wildhorse Foundation-Cash: can be used for restoration materials	\$15,000
Reser Family Foundation-Cash: can be used for any aspect of the restoration work	\$50,000
Maybelle Clark Macdonald Foundation-Cash: can be used for any aspect of the restoration work	\$45,000
Jubitiz Family Foundation-Cash: can be used for any aspect of the restoration work	\$10,000
Oregon Parks and Recreation Department-In-Kind - Labor: Labor for plant enclosure fence construction, plant watering, as well as the design and engineering of all new and replacement recreational and interpretive infrastructure.	\$63,293
Oregon Parks and Recreation Department-Cash: 2017-2019 Biennium funds that can be used for any aspect of the restoration work	\$50,000

Oregon Parks and Recreation Department-Cash: 2019-2021 Biennium funds for recreational and interpretive infrastructure	\$130,000
Oregon Parks and Recreation Department-Cash: 2019-2021 Biennium Salmon Plate Funds for all aspects of the restoration	\$40,000
Oregon Parks and Recreation Department-Cash: Recreational Trails Program (RTP) Grant	\$455,722
Match Total	\$859,015

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

Support Letters: [TFT Letter of Support.pdf -](#)

Support Letters: [OPRD LOS.pdf -](#)

Secured Match Forms: [OPRD LOS.pdf -](#)

Support Letters: [GRMW WR WallowaRiverSupportLetter.pdf - From Grand Ronde Model Watershed](#)

Support Letters: [USFWS Letter of support Wallowa Resource's_Upper Wallowa River Restoration Project.pdf - From USFWS re: bull trout](#)

Support Letters: [Nez Perce LoS.pdf - From Nez Perce Tribe](#)

Project Design: [Diagrams to Submit.pdf - For full design and diagrams, please contact Jean](#)

Map: [Map.pdf - to satisfy map requirement to submit application](#)

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.

Existing vegetation is well established with a mix of native and non-native species and high potential for natural recruitment. Construction and staging activities are designed to minimize disturbance of currently vegetated areas.

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.

The priority for planting will be to provide a relatively quick cover for disturbed surfaces after the removal of features, such as berms or asphalt, and the construction of new features. Willow (*Salix* sp.) and Cottonwood (*Populus* sp.) will be the primary species planted in areas with finer soils and available groundwater. In areas with coarser substrate and available water, alder (*Alnus* sp.) are proposed species for planting. Additional tree and shrub species supplement the planting in areas with less available water. As a general ground cover, a native grass seed mixture is specified in areas where a more natural environment is expected.

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	2.4	~300 stem/acre
Upland	1	10 lbs/acre with scattered trees
Wetland	2	~200 stems/acre

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
Wetland	Willow	<i>Salix</i> sp	Shrub	Bareroot	2019	October
Riparian	Dogwood	<i>Cornus sericea</i>	Shrub	Bareroot	2019	October
Upland	Douglas-fir	<i>Pseudotsuga menziesii</i>	Tree	Rooted	2019	October

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.

The plantings will be within the Wallowa State Park or adjacent to the Wallowa Lake Lodge, and will be maintained by these landowners. This includes caging from browse and periodic watering to ensure establishment.

Measures of Planting Success

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

Vegetation Community	Parameter	Percentages
Riparian	Percent Survival	80

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

The associated landowners will be responsible for ensuring planting success, and will provide replacements should success fall below acceptable levels.

Permit Page

Project Activity Requiring a Permit or License	Name of Permit or License	Entity Issuing Permit or License	Status
In-Stream Restoration	Removal-Fill Permit	Department of State Lands	Not Yet Applied
In-Stream Restoration	Section 404 Permit	Army Corps of Engineers	Not Yet Applied
Soil disturbance	Archaeology survey (SHPO concurrence)	State Historic Preservation Office (SHPO)	In Progress

To the Oregon Watershed Enhancement Board,

The Freshwater Trust would like to express our full support for the Upper Wallowa River Restoration Project proposed by Wallowa Resources. The project addresses whole ecosystem function to provide habitat benefits for Bull Trout and Kokanee in a State park where more than 400,000 visitors a year will be able to learn about and enjoy the benefits of restoration.

Like many waterways in Oregon, anthropogenic impacts on the project reach have altered natural fluvial processes resulting in a simplified channel and severely degraded habitat. Development along the project reach puts the channel at risk of future negative alterations to protect private property. By comprehensively restoring the stream reach, both fish and property owners would benefit.

The project will have the unique benefit of raising public awareness of the importance of river restoration for a broad range of visitors and locals alike, and could spur more support for such efforts locally and regionally. By addressing both habitat and property concerns the project will bring together a diverse group of stakeholders and illustrate how restoration work is for the benefit of all Oregonians.

In summary, The Freshwater Trust recommends that the Oregon Watershed Enhancement Board fully fund Wallowa Resources' Restoration Grant application for the Upper Wallowa River Restoration Project. The Freshwater Trust will continue to collaboratively support the project as it moves ahead and looks forward to its completion.

Sincerely,

A handwritten signature in black ink, appearing to read 'Jessica Humphreys', written in a cursive style.

Jessica Humphreys
Restoration Project Manager
The Freshwater Trust
Enterprise, Oregon



Oregon

Kate Brown, Governor

Parks and Recreation Department

Eastern District Office
61323 Highway 203
Union, OR 97883
541.562-5427 Office
541.786.4748 Cell



November 2, 2017

To the Oregon Watershed Enhancement Board,

The Oregon Parks and Recreation Department (OPRD) would like to express our full support for the Upper Wallowa River Restoration Project proposed by Wallowa Resources. The project represents a unique opportunity to provide real benefits to fish habitat, particularly for Kokanee and Bull Trout in a high profile and well-visited location at the head of Wallowa Lake, with over 400,000 visitors every year.

The stream reach included in the project has been subject to significant anthropogenic and natural alterations in the past that have severely degraded or eliminated suitable fish habitat. This project could simultaneously enhance or create fish habitat and mitigate the possibility of any future detrimental changes to the channel. By comprehensively restoring the stream reach, both fish and property owners would benefit.

Beyond the individual project, a successful restoration effort here would greatly increase public awareness of the importance of river restoration for a broad range of visitors and locals alike, and could spur more support for such efforts locally and regionally. By bringing together a diverse, and sometimes conflicting, group of stakeholders to collaboratively find a solution, the project could also serve as an example of how to overcome some of the challenging social and environmental issues associated with restoration efforts.

In summary, OPRD recommends that the Oregon Watershed Enhancement Board fully fund Wallowa Resources' Restoration Grant application for the Upper Wallowa River Restoration Project. OPRD will continue to collaboratively support the project as it moves ahead, pledges financial support of \$50,000 and looks forward to its completion.

Sincerely,

Matt Rippee
Oregon Parks and Recreation Department
Eastern District Manager



Oregon

Kate Brown, Governor

Parks and Recreation Department

Eastern District Office
61323 Highway 203
Union, OR 97883
541.562-5427 Office
541.786.4748 Cell



November 2, 2017

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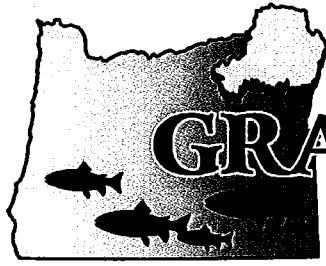
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In summary, OPRD recommends that the Oregon Watershed Enhancement Board fully fund Wallowa Resources' Restoration Grant application for the Upper Wallowa River Restoration Project. OPRD will continue to collaboratively support the project as it moves ahead, pledges financial support of \$50,000 and looks forward to its completion.

Sincerely,

Matt Rippee
Oregon Parks and Recreation Department
Eastern District Manager



GRANDE RONDE MODEL WATERSHED

April 17, 2018

1114 J Ave.
La Grande, Oregon 97850

(541) 663-0570
Fax: (541) 962-1585

<http://www.grmw.org>

Board of Directors

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Jeff Oveson
Jesse Steele
Connor Stone

Re: Upper Willowa River Restoration Design

Grande Ronde Model Watershed (GRMW) supports the restoration concepts described in the Upper Willowa River Restoration Design, Final Basis of Design report. The goal of the project is to enhance and restore habitat for kokanee salmon and all life stages of bull trout, consistent with the Willowa county-Nez Perce Tribe Salmon Habitat Recovery Plan (1999) and Bull Trout Recovery Plan (USFWS 2015) in the project area at the south end of Willowa Lake, Willowa County, Oregon. In support of this goal the project has the following objectives:

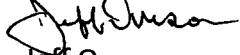
1. Improve channel and bank stability to reduce flood and erosion damage to private and public property and existing infrastructure.
2. Increase quantity and quality of areas suitable for kokanee and bull trout spawning.
3. Increase quantity and quality of areas suitable for kokanee and bull trout rearing.
4. Where appropriate and possible restore the river and floodplain to a more natural geomorphic form and function.
5. Increase channel complexity and aquatic habitat diversity.
6. Improve sediment sorting and routing to achieve a more geomorphically expected and functional condition.
7. Increase floodplain connectivity and frequency of inundation in appropriate areas.
8. Increase riparian function with site-appropriate native vegetation.

GRMW understands that if implemented this project will occur on public land managed by Oregon State Parks and possibly private ownerships south of Willowa Lake State Park should they choose. The majority of the restoration actions will occur on public land and includes dyke removal, side channel construction, instream large woody debris structures, floodplain enhancement, and a diverse planting plan. Each of these actions are consistent with aquatic habitat restoration and will help the project achieve objectives 2 – 8 listed above.

Objective #1 will improve channel and bank stability to minimize flood and erosion damage. This is an important project objective in an area of diverse land use including recreation, residential, and business uses and is a necessary consideration in order gain landowner support for the proposed actions.

Wallowa Lake State Park is visited annually by people from Oregon, the United States, and the world. For this reason, the proposed project has a very unique opportunity to implement and showcase aquatic habitat restoration actions as implemented in the Pacific Northwest. As such, the project must be implemented, managed and monitored for success according to those objectives listed above. GRMW feels that the partnership of Wallowa Resources, Oregon State Parks, and the landowner association guided by the restoration professionals at GeoEngineers is a good team to realize project success.

Sincerely,



Jeff Oveson

Executive Director



United States Department of the Interior



FISH AND WILDLIFE SERVICE

La Grande Field Office

3502 Highway 30

La Grande, Oregon 97850

Phone: (541) 962-8584 FAX: (541) 962-8581

File Name: FWS support_ Upper Wallowa River Restoration Project.doc
TS Number: 19-47

Oregon Watershed Enhancement Board
State Land Building, Third Floor
775 Summer Street NE, Ste 360
Salem, Oregon 97301-1290

Subject: Letter of support for Upper Wallowa River Restoration Project

Dear Review Committee:

I am writing to support Wallowa Resource's application to fund implementation of the Upper Wallowa River Restoration Project. The Fish and Wildlife Service's (Service) La Grande Field Office is collaborating on this project with Wallowa Resources, Oregon Parks and Recreation Department, Oregon Department of Fish and Wildlife, Wallowa County, and the Nez Perce tribe.

The project area is located on the West Fork and East Forks of the Wallowa River above the south end of Wallowa Lake. This portion of the Wallowa River has been highly impacted by bank hardening and channelization to protect private and other properties lining its banks. As a result of these efforts, the river lacks suitable spawning habitat for bull trout and kokanee. The selected alternative should safeguard adjacent property while restoring the stream to a more natural condition, benefiting local fish species.

The Upper Wallowa River Restoration Project has the potential to protect and improve bull trout habitat in the Wallowa River system above Wallowa Lake while also protecting private property. Bull trout are listed as threatened under the Endangered Species Act and both adult bull trout as well as redds have been observed in the vicinity of the project. Pacific Power located 9 bull trout and 3 redds in September of 2017 in the East Fork Wallowa River near the confluence with the West Fork Wallowa River (PacifiCorp 2017).

Fluvial and resident size bull trout inhabit the East Fork Wallowa River, and these fluvial fish migrate between the East Fork Wallowa River and Wallowa Lake, passing through the project area. These bull trout are part of the Wallowa River-Minam River Recovery Plan Core Area (USFWS 2015). The Mid-Columbia Recovery Unit Implementation Plan (USFWS 2015) prescribes actions to aid in the species' recovery. A recommendation for the Wallowa/Minam Core Area includes; "Restoration activities should focus on: increasing instream habitat complexity, off-channel habitat, and high flow refugia by adding large wood; increasing sinuosity; managing riparian areas for a future supply of large wood, adequate shade"... These restoration objectives are proposed in the Upper Wallowa River Restoration Project.

We appreciate your consideration of Wallowa Resource's Upper Wallowa River Restoration Project. If you have any questions regarding this letter of support, please contact Gretchen Sausen on my staff at (541) 962-8695.

Sincerely,



Marisa Meyer
Field Supervisor

Literature Cited:

PacifiCorp Energy. 2017. Appendix C. 2017 Draft Bull Trout Redd Monitoring Report, Wallowa Falls Hydroelectric Project FERC Project No. 308. In the 2017 Annual Operational Compliance Report for Wallowa Falls Hydroelectric Project-Draft. Jeremiah Doyle, PacifiCorp Energy, Portland, OR. November 2017.

U.S. Fish and Wildlife Service. 2015. Recovery plan for the coterminous United States population of bull trout (*Salvelinus confluentus*). Portland, Oregon. xii + 179 pages.

U.S. Fish and Wildlife Service. 2015. Mid-Columbia Recovery Unit Implementation Plan for Bull Trout (*Salvelinus confluentus*). Portland, Oregon. 303 pages.



NEZ PERCE TRIBE

Department of Fisheries Resources Management

Administration • Enforcement • Harvest • Production • Research • Resident Fish • Watershed



ADMINISTRATION DIVISION

104 Lolo Street • P.O. Box 365 • Lapwai, Idaho 83540

Phone: (208) 843-7320 • Fax: (208) 843-7322

April 30, 2018

Oregon Watershed Enhancement Board
State Land Building, Third Floor
775 Summer Street NE, Ste 360
Salem, OR 97301-1290

Dear Project Reviewers:

On behalf of the Nez Perce Tribe's Department of Fisheries Resources Management, I would like to take this opportunity to express our support for implementation funding on the Upper Wallowa River Restoration Project. The Nez Perce Tribe is a co-manager of fisheries resources in the northeast Oregon, including the Wallowa River. Since time immemorial, the Nez Perce Tribe lived, fished, hunted and gathered along the banks of streams within the Wallowa River. Salmon, steelhead, and other fish species continue to be critically important to Nez Perce religion and culture.

This project is a collaborative effort of Wallowa Resources, Oregon Parks and Recreation Department (OPRD), Oregon Department of Fish and Wildlife (ODFW), US Fish and Wildlife Services (USFW), Wallowa County, and the Nez Perce Tribe. The Nez Perce Tribe participated in the project's design review in a technical capacity, specifically on those aspects related to fisheries. The project area is located on the West Fork and East Forks of the Wallowa River, above the south end of Wallowa Lake, in Wallowa County, Oregon which lies approximately five miles south of the town of Joseph. This stretch of river traverses a heavily developed area of private and state property between where it exits the Eagle Cap Wilderness further to the south and where it empties into the lake.

Over the past century this portion of the Wallowa River has been highly impacted by anthropogenic efforts to control its historically alluvial floodplain (e.g. bank hardening and channelization) to protect the properties lining its banks. As a result of these efforts, the river now lacks suitable spawning habitat for existing kokanee and bull trout populations, with an added potential of limiting habitat for sockeye which the Tribe anticipates helping reintroduce to Wallowa Lake. This grant will fund the stakeholder selected alternative which ensures the most valuable combination of restoration techniques are applied. The selected alternative will safeguard adjacent property while restoring the stream towards the natural condition, benefiting a host of aquatic species.

This project is a positive step forward to protect and improve key aquatic habitat for existing and future native fish populations while protecting private property. Therefore, the Nez Perce Tribe supports the implementation of the project as it can achieve riverine stability while simultaneously achieving fisheries habitat benefits.

Sincerely,

A handwritten signature in blue ink, appearing to read 'D.B. Johnson', with a long horizontal line extending to the right.

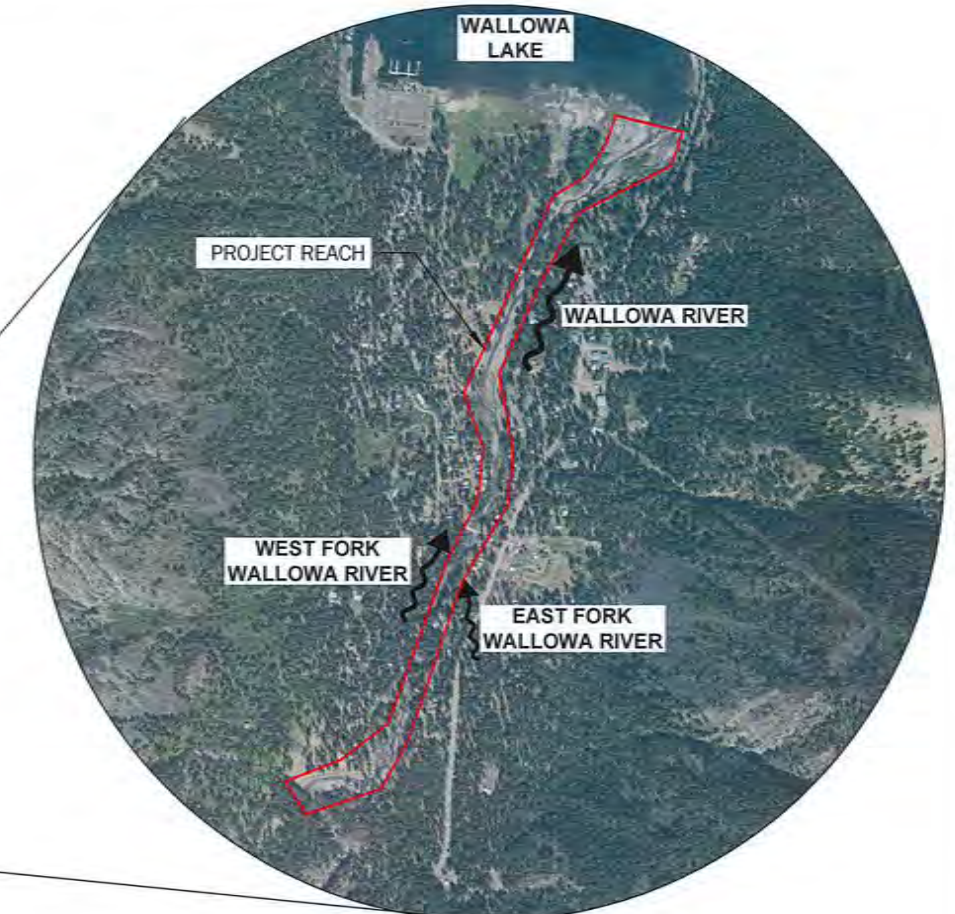
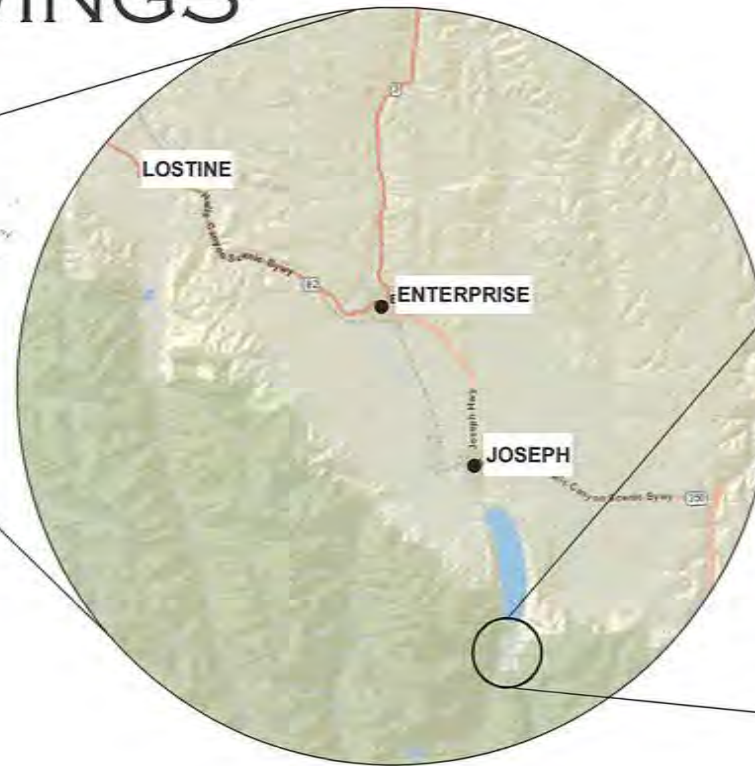
David B. Johnson
Manager

UPPER WALLOWA RIVER

RESTORATION DESIGN

FINAL DESIGN DRAWINGS

PROJECT LOCATION:
 PROJECT SITE IS LOCATED ON THE WALLOWA RIVER UPSTREAM OF WALLOWA LAKE. FROM JOSEPH, OREGON FOLLOW HIGHWAY 351 SOUTH TO WALLOWA LAKE. CONTINUE ONTO MARINA DRIVE UNTIL YOU CROSS THE WALLOWA RIVER. THE PROJECT REACH EXTENDS DOWNSTREAM FROM MARINA DRIVE TO WALLOWA LAKE AND UPSTREAM FROM WALLOWA LAKE APPROXIMATELY 1.5 MILES.



CONTACT INFORMATION

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 JAMES G. WEBSTER
 129 SOUTH MAIN STREET
 PENDLETON, OREGON 97801
 PH: 541.276.1716
 FAX: 208.433.8092

WALLOWA RESOURCES
 NILS D. CHRISTOFFERSEN
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OREGON 97828
 PH: 541.426.8053 EXT.25

SHEET INDEX

NUMBER	SHEET TITLE	NUMBER	SHEET TITLE	NUMBER	SHEET TITLE	NUMBER	SHEET TITLE	NUMBER	SHEET TITLE	NUMBER	SHEET TITLE	NUMBER	SHEET TITLE
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2.6	Reach 3 and Reach 4 - 1.5 Year Inundation Water Depth								Reach 3 and Reach 4 - Proposed Enhancements				

72819PE
 OREGON
 DECEMBER 15, 2017
 Expires: 12/31/2017

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				Project No: 21860-001-00



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 129 SOUTH MAIN STREET
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COVER SHEET
 UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
1.1



PROJECT GOAL

The goal of the project is to enhance and restore habitat for all life stages of Kokanee Salmon and Bull Trout consistent with the Wallowa County - Nez Perce Tribe Salmon Habitat Recovery Plan (revised 1999) and the Bull Trout Recovery Plan (USFWS 2015) while protecting private and public property from the effects of catastrophic flooding by maintaining or improving bank stability.

PROJECT OBJECTIVES:

1. Improve channel and bank stability to reduce flood and erosion damage to private and public property and existing infrastructure.
2. Increase quantity and quality of areas suitable for adult Kokanee and bull trout spawning.
3. Increase quantity and quality of areas suitable for Kokanee and bull trout rearing.
4. Where appropriate and possible restore the river and floodplain to a more natural geomorphic form and function.
5. Increase channel complexity and aquatic habitat diversity.
6. Improve sediment sorting and routing to achieve a more geomorphically expected and functional condition.
7. Increase floodplain connectivity and frequency of inundation in appropriate areas.
8. Increase riparian function with site-appropriate native vegetation.



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GOAL AND OBJECTIVES
 UPPER WALLOWA RIVER RESTORATION DESIGN

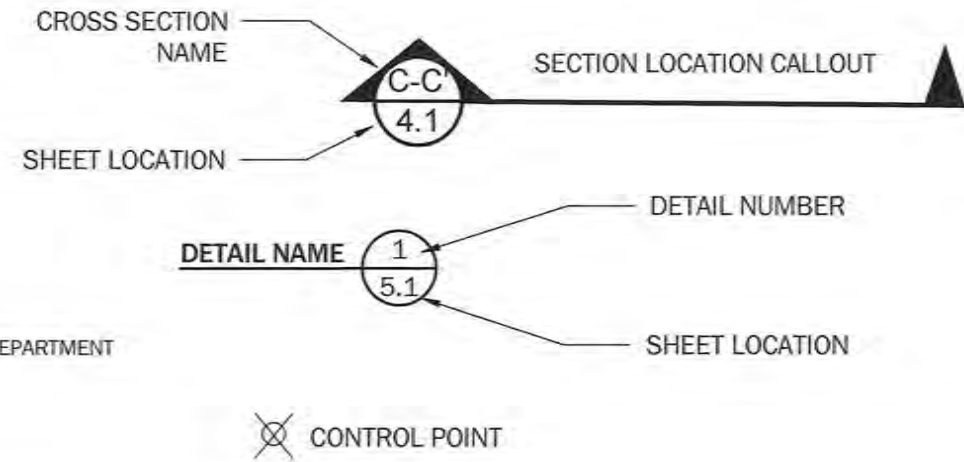
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GENERAL NOTES:

1. These designs and drawings have been prepared for the exclusive use of the Wallowa Resources and their authorized agents. These documents are for planning purposes only and cannot be used for construction.
2. The drawings contained within should not be applied for any purpose or project except the Upper Wallowa River Restoration Design of the Wallowa River (Project Reach) as shown in the Project Area located on Sheet 1.1.
3. These designs and drawings are copyrighted by GeoEngineers, Inc. Any use, alteration, deletion, or editing of this document without explicit written permission from GeoEngineers, Inc. is strictly prohibited. Any other unauthorized use of this document is prohibited.
4. Geomorphic conditions can change and these designs are based on conditions that existed at the time the design was performed. The results of these designs may be affected by the passage of time, by manmade events such as construction on or adjacent to the site, or by natural events such as floods, earthquakes, slope instability or groundwater fluctuations.
5. All rivers, streams, rocks and woody habitat structures are potentially dangerous. These proposed improvements are intended to address a wide variety of constraints which target more naturally functioning stream systems and habitat. Wallowa Resources, Oregon Parks and Recreation Department and the private property owners should address safety concerns appropriately.
6. In general, the proposed enhancements are intended to result in more stable streambeds, banks and floodplains. However, channel erosion, channel migration and/or avulsions can be expected to occur over time. These channel processes are natural and appropriate for this site.
7. These figures were originally produced in color.

ABBREVIATIONS:

- AC ACRES
- ACW ACTIVE CHANNEL WIDTH
- AP ANDERSON PERRY, INC.
- CY CUBIC YARDS
- ELEV ELEVATION
- FT FEET
- Horiz. HORIZONTAL
- MAX MAXIMUM
- MIN MINIMUM
- NTS NOT TO SCALE
- OHW ORDINARY HIGH WATER
- OPRD OREGON PARKS AND RECREATION DEPARTMENT
- SQ-FT SQUARE FEET
- TYP TYPICAL
- Vert. VERTICAL
- WSEL WATER SURFACE ELEVATION



GENERAL CONSTRUCTION NOTES:

1. All contractors working within the project boundaries are responsible for compliance with all applicable safety laws. The contractor shall be responsible for all barricades, safety devices and control of traffic within and around the construction area.
2. All material and workmanship furnished on or for the project must meet the minimum requirements of project permits, approving agencies, specifications as set forth herein, or whichever is more restrictive.
3. Contractor shall not work within any wetland area until they have obtained a 404 permit from the United States Army Corps of Engineers. All work within or adjacent to any wetland area shall comply with the conditions of the 404 permit.
4. All federal, state and local permits shall be obtained by the Client prior to construction activity commencement.
5. The contractor shall install and maintain appropriate erosion and sediment control devices throughout the whole project site, including those associated with construction access, staging and stockpile areas throughout the project's construction period. Temporary construction and permanent erosion control measures shall be designed, constructed and maintained in accordance with all applicable local, state and federal regulations.
6. Construction activity shall be limited to the construction areas and access routes to minimize disturbance of the existing vegetation and landscape. All public and private property either inside or outside the construction limits impacted by construction shall be restored to a condition equal to or better than that which existed prior to the construction. No construction-related materials, debris, garbage, equipment, fuel, provisions of any kind shall remain on site after construction. No stockpiles or excavations are to remain after construction unless authorized by the landowner. The site will be graded to appear natural and conform to the natural topography.
7. Construction shall minimize disturbance to, and maximize reuse of, existing riparian vegetation to remain and salvage.
8. Only appropriate approved native riparian vegetation shall be used for cuttings and transplanting. Vegetation cutting, transplanting, planting and irrigation shall be managed by an appropriate professional.
9. Construction records and as-built information shall be accurately recorded by the contractor and supplied to the owner and GeoEngineers for future use, reference and monitoring. Submittal of record information is a condition of final acceptance.
10. This design has been performed and these plans have been prepared with the express understanding that GeoEngineers will provide guidance to the contractor during construction.
11. The long-term success of this project relies upon the success of the proposed vegetation. The vegetation and disturbed project site must be monitored and maintained to promote vigorous revegetation.



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				Project No: 21860-001-00



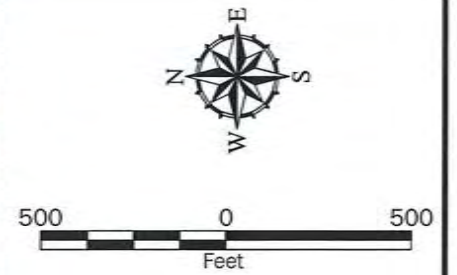
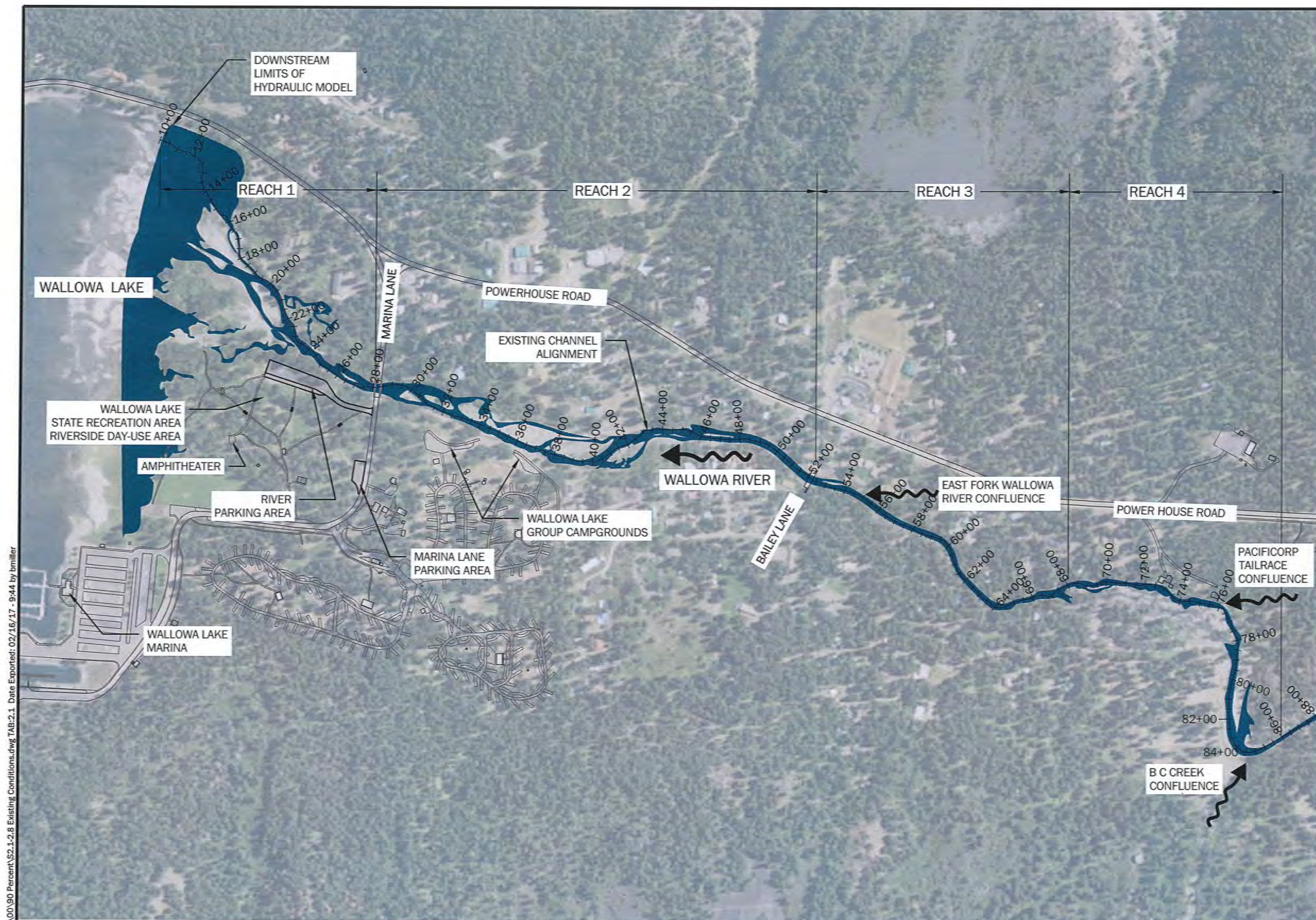
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PENDLETON, OR 97801

GENERAL NOTES
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
1.3




- Legend**
- +---+---+ EXISTING CHANNEL ALIGNMENT
 - █ APPROXIMATE EXISTING CHANNEL INUNDATION BOUNDARY


- NOTES:**
1. CHANNEL ALIGNMENT AND STATIONING IS BASED ON SURVEY PROVIDED BY ANDERSON PERRY, INC., DATED 2009 AND SURVEY PROVIDED BY HDJ DATED 2016.
 2. APPROXIMATE EXISTING CHANNEL REFERENCES THE MAIN CHANNEL BANKFULL CONDITIONS DURING 1.5 YEAR FLOOD RECURRENCE INTERVAL, MODELED AS 666 CFS USING RIVERFLOW2D V4. DOWNSTREAM OF STATION 42+00 AND HEC-RAS V4.1.0 UPSTREAM OF STATION 42+00.
 3. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 4. AERIAL IMAGERY FROM ESRI NAIP 2014 DATED 08/28/2014.
 5. LIDAR SURVEY ACQUIRED BY QUANTAM SPATIAL JULY, 2015.
 6. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT SEPTEMBER, 2016.



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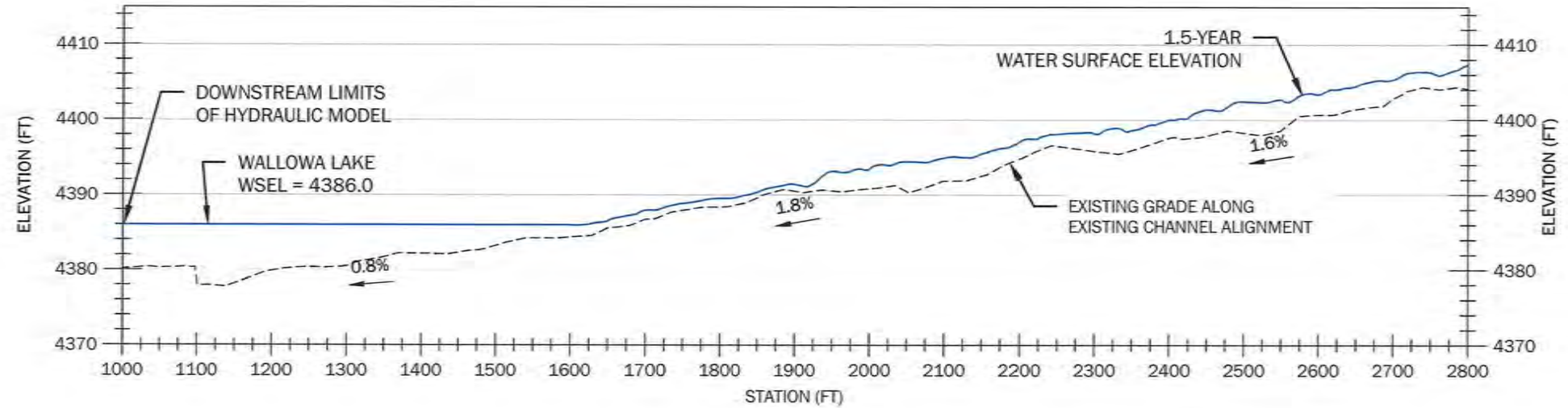
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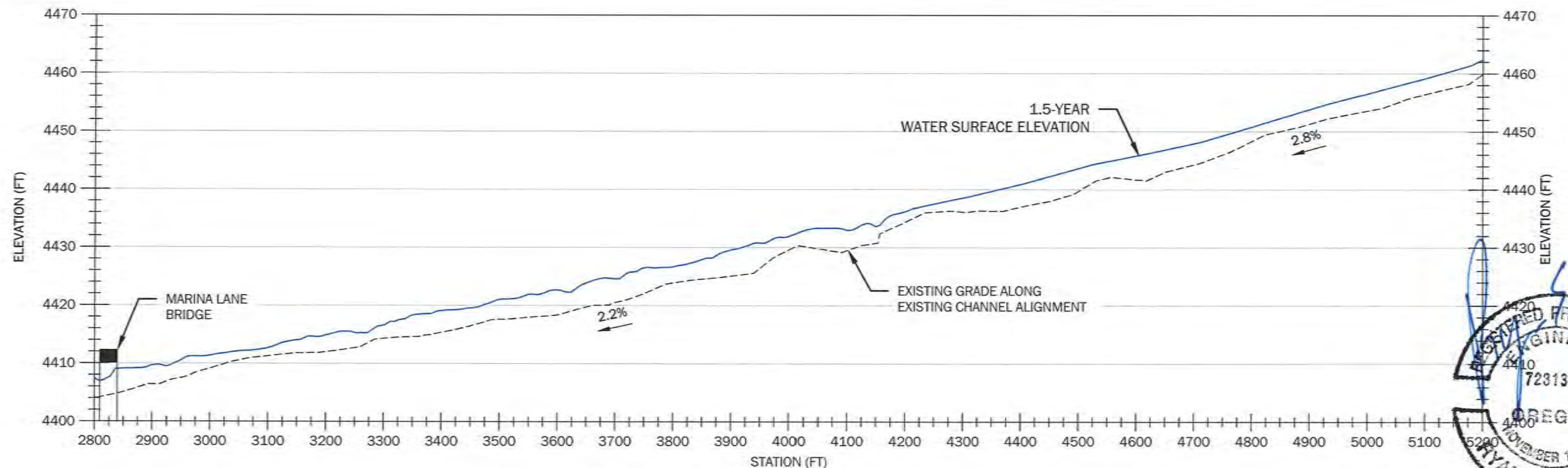
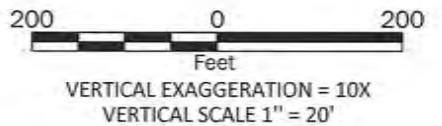

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EXISTING CONDITIONS AERIAL
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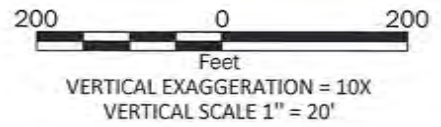
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REACH 1 - PROFILE VIEW



REACH 2 - PROFILE VIEW



- NOTES:
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE, NORTH, NAD 1983, VERTICAL DATUM NADV 1988
 2. CHANNEL PROFILE BASED ON 2009 ANDERSON PERRY AND 2016 HDJ GROUND SURVEY.
 3. WATER SURFACE ELEVATION REFERENCES THE 1.5 YEAR FLOOD RECURRENCE INTERVAL, MODELED AT 666 CFS USING RIVERFLOW 2D UPSTREAM OF STATION 42+00 AND HEC-RAS V4.1.0 DOWNSTREAM OF STATION 42+00.
 4. WALLOWA LAKE MAXIMUM POOL ELEVATION OF 4386.0 FT ABOVE MSL IS BASED ON THE PROPOSED DAM SAFETY MAXIMUM OPERATING LEVEL.

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
BRYAN S. CARNIE
Expires: 12/31/2017

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				Project No: 21860-001-00

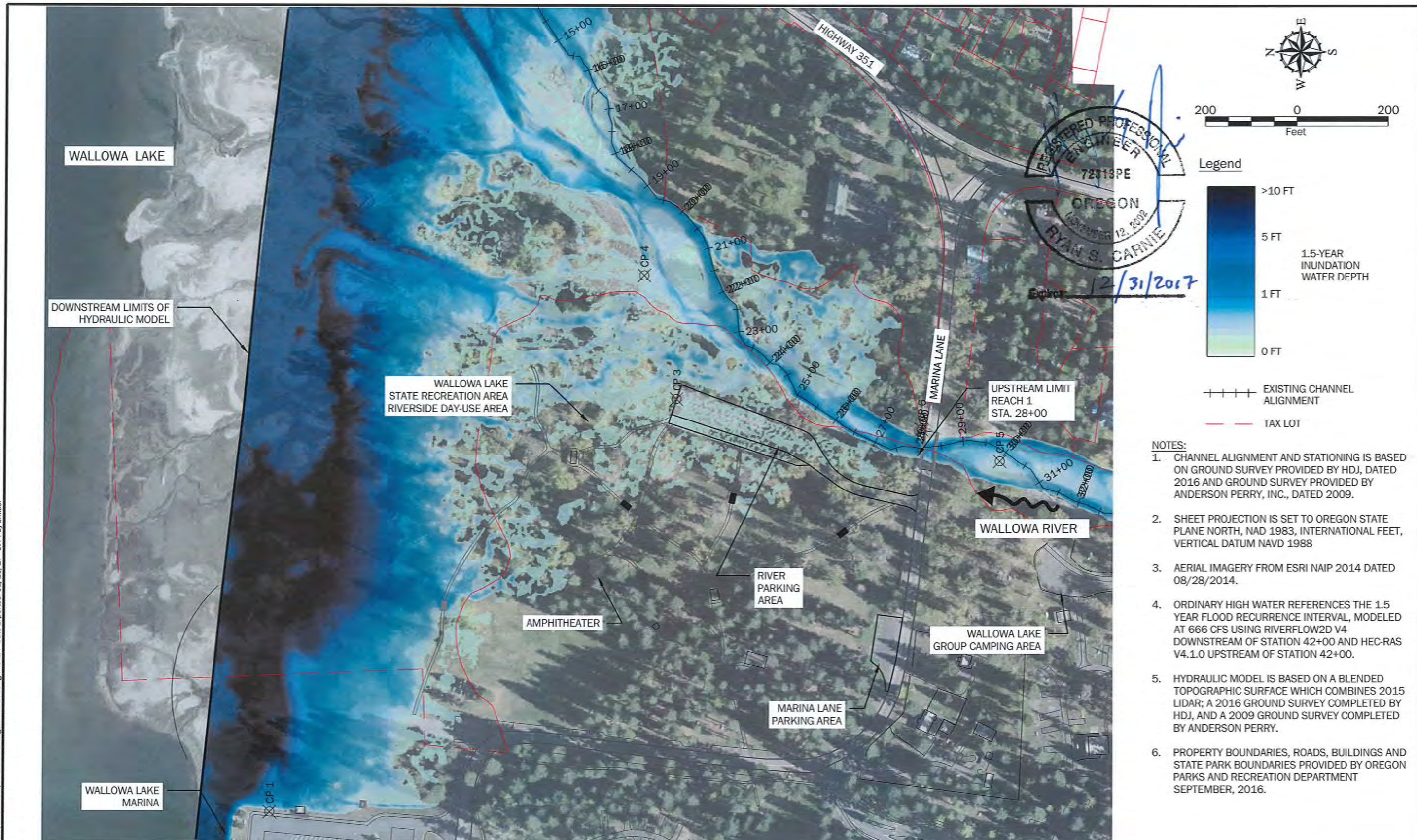
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REACH 1 AND REACH 2
EXISTING CHANNEL PROFILE
UPPER WALLOWA RIVER RESTORATION DESIGN

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2.2

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- NOTES:**
1. CHANNEL ALIGNMENT AND STATIONING IS BASED ON GROUND SURVEY PROVIDED BY HDJ, DATED 2016 AND GROUND SURVEY PROVIDED BY ANDERSON PERRY, INC., DATED 2009.
 2. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 3. AERIAL IMAGERY FROM ESRI NAIP 2014 DATED 08/28/2014.
 4. ORDINARY HIGH WATER REFERENCES THE 1.5 YEAR FLOOD RECURRENCE INTERVAL, MODELED AT 666 CFS USING RIVERFLOW2D V4 DOWNSTREAM OF STATION 42+00 AND HEC-RAS V4.1.0 UPSTREAM OF STATION 42+00.
 5. HYDRAULIC MODEL IS BASED ON A BLENDED TOPOGRAPHIC SURFACE WHICH COMBINES 2015 LIDAR; A 2016 GROUND SURVEY COMPLETED BY HDJ, AND A 2009 GROUND SURVEY COMPLETED BY ANDERSON PERRY.
 6. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT SEPTEMBER, 2016.

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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00



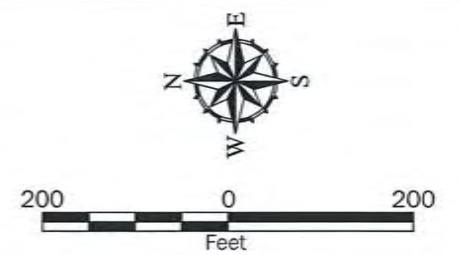
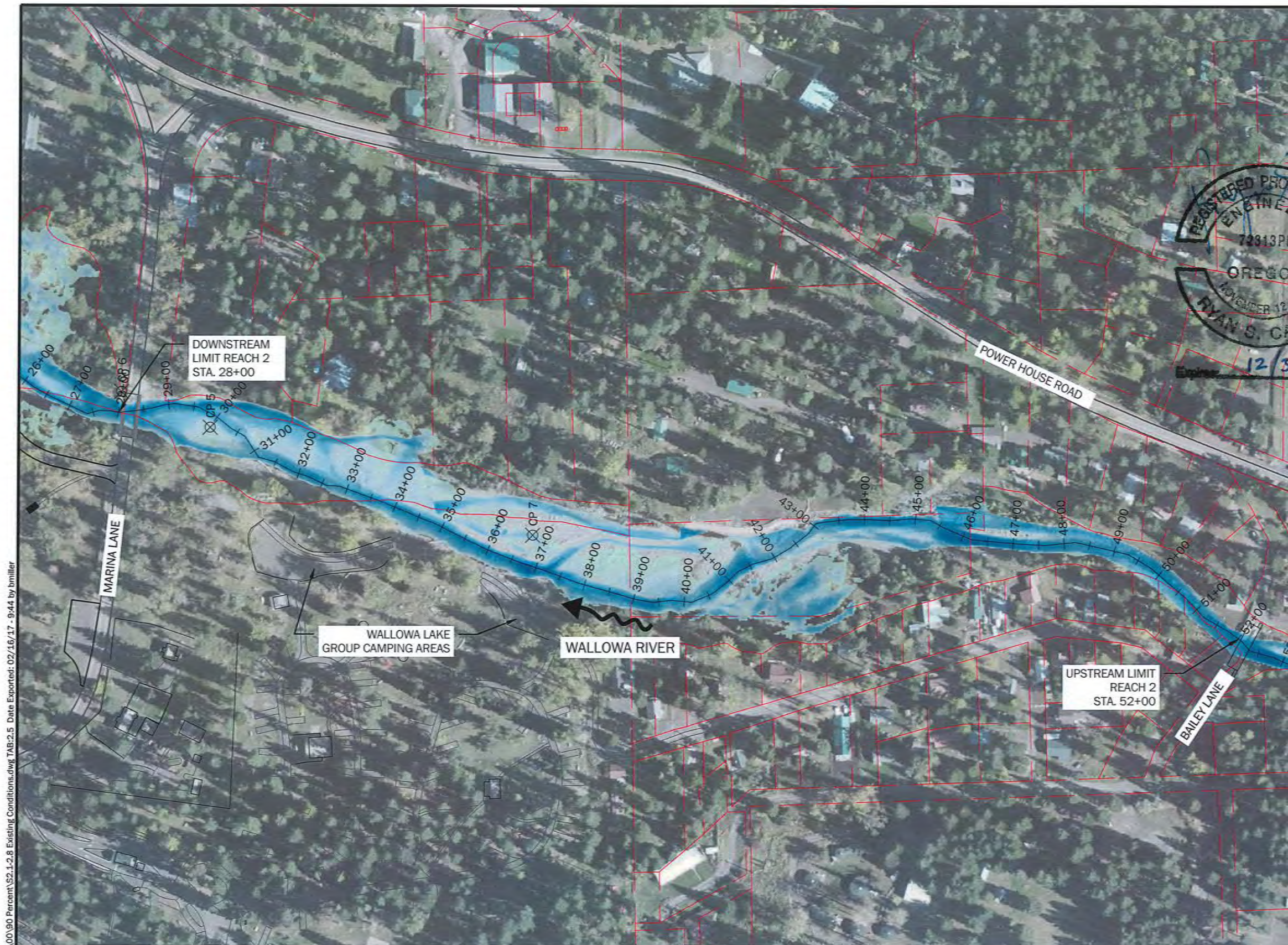
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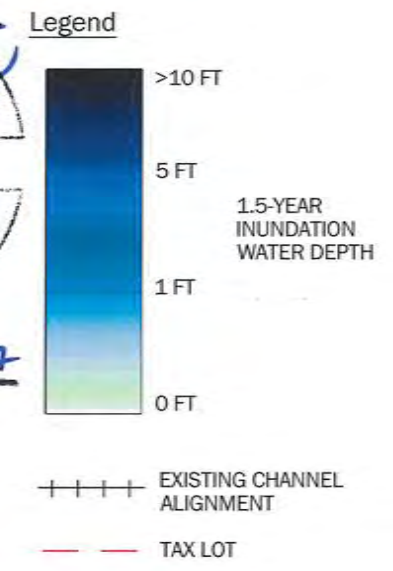
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REACH 1
1.5-YEAR INUNDATION WATER DEPTH
UPPER WALLOWA RIVER RESTORATION DESIGN

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REGISTERED PROFESSIONAL ENGINEER
 73313 PE
 OREGON
 NOVEMBER 12, 2002
 RYAN S. CARNIE
 12/31/2017



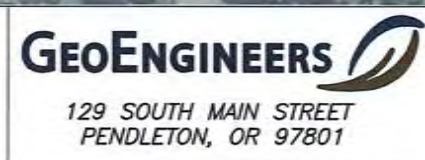
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 6. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT SEPTEMBER, 2016.

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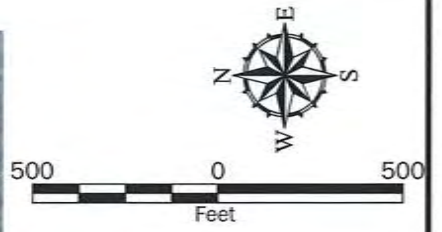
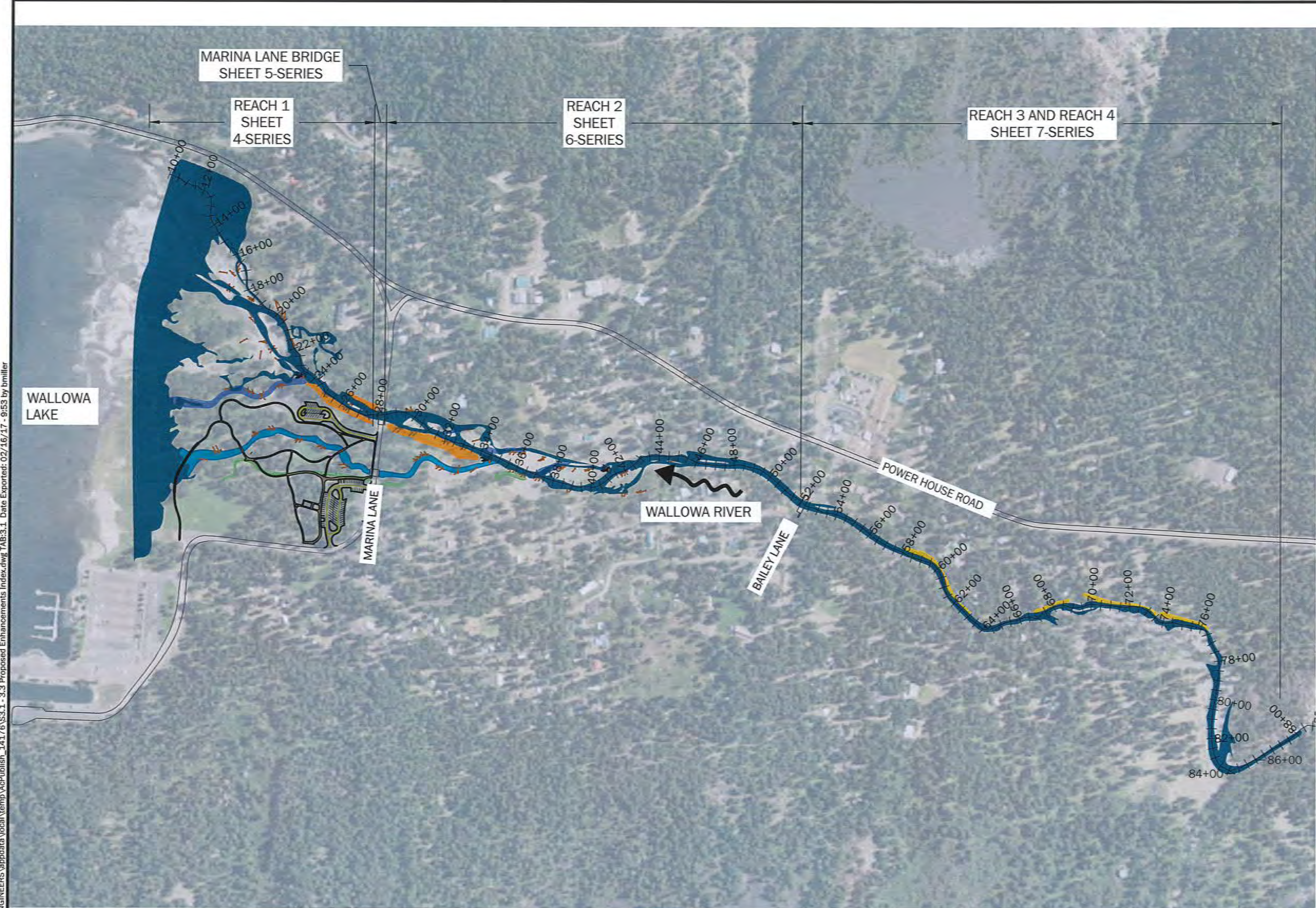


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REACH 2
1.5-YEAR INUNDATION WATER DEPTH
UPPER WALLOWA RIVER RESTORATION DESIGN

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2.5

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- Legend**
- EXISTING CHANNEL ALIGNMENT
 - APPROXIMATE BANKFULL EXISTING MAIN CHANNEL
 - PROPOSED HIGH-FLOW CHANNEL
 - PROPOSED PERENNIAL FLOW CHANNEL
 - PROPOSED BANK STABILIZATION
 - REMOVE AND REGRADE EXISTING BERM
 - PROPOSED BERM

- NOTES:**
1. CHANNEL ALIGNMENT AND STATIONING IS BASED ON SURVEY PROVIDED BY ANDERSON PERRY, INC., DATED 2009 AND SURVEY PROVIDED BY HDJ DATED 2016.
 2. APPROXIMATE EXISTING CHANNEL REFERENCES THE MAIN CHANNEL BANKFULL CONDITIONS DURING 1.5 YEAR FLOOD RECURRENCE INTERVAL, MODELED AS 666 CFS USING RIVERFLOW2D V4. DOWNSTREAM OF STATION 42+00 AND HEC-RAS V4.1.0 UPSTREAM OF STATION 42+00.
 3. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAD 1988
 4. AERIAL IMAGERY FROM ESRI MAP TOPO DATED 08/28/2014

Professional Engineer Seal for Ryan S. Carnie, Oregon, License No. 72313PE, expires 12/31/2017.

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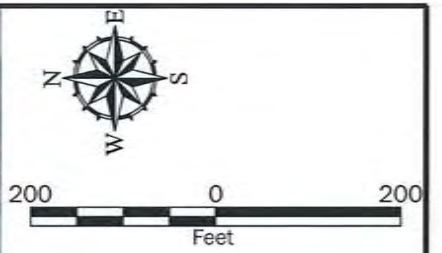
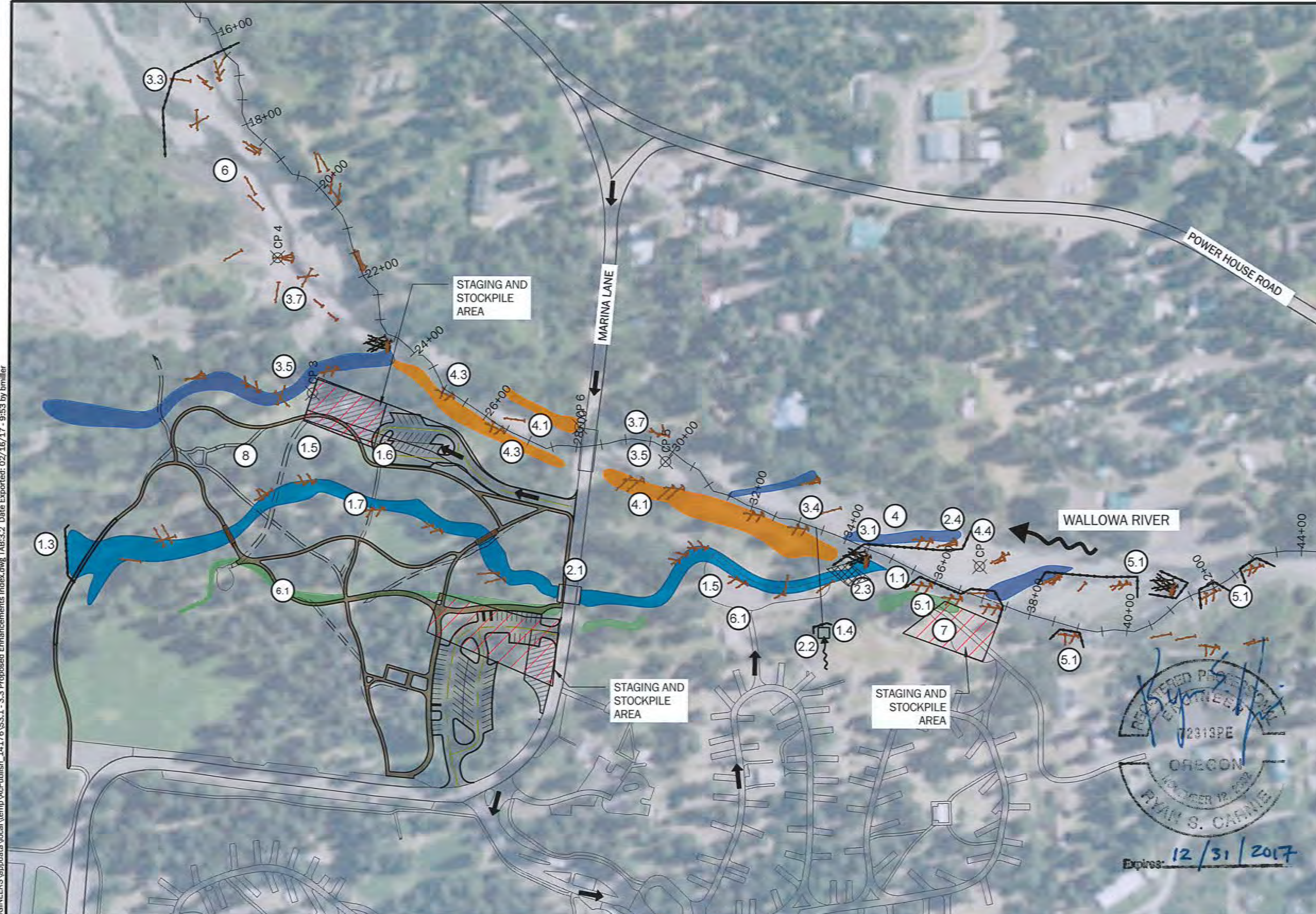
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PROPOSED ENHANCEMENTS INDEX
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 3.1


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- Legend**
- +---+--- CHANNEL ALIGNMENT
 - [Red Hatched Box] STAGING/STOCKPILE AREA
 - [Dark Blue Box] PROPOSED HIGH-FLOW CHANNEL
 - [Light Blue Box] PROPOSED PERENNIAL FLOW CHANNEL
 - [Yellow Box] PROPOSED BANK STABILIZATION
 - [Orange Box] REMOVE AND REGRADE EXISTING BERM
 - [Green Box] PROPOSED BERM
 - [Brown Box] PROPOSED PATH
 - [Grey Box] PROPOSED PARKING AREA
 - PATH TO BE REMOVED
 - [Zigzag Line] TEMPORARY STREAM DIVERSION STRUCTURE
 - [Arrow] ACCESS ROUTE
 - [X in Circle] SURVEY CONTROL POINT

- NOTES:**
1. CHANNEL ALIGNMENT AND STATIONING IS BASED ON SURVEY PROVIDED BY ANDERSON PERRY, INC. DATED 2009 AND SURVEY PROVIDED BY HDJ DATED 2016.
 2. APPROXIMATE EXISTING CHANNEL REFERENCES THE MAIN CHANNEL BANKFULL CONDITIONS DURING 1.5 YEAR FLOOD RECURRENCE INTERVAL, MODELED AS 666 CFS USING RIVERFLOW2D V4. DOWNSTREAM OF STATION 42+00 AND HEC-RAS V4.1.0 UPSTREAM OF STATION 42+00.
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**REACH 1 AND REACH 2
 CONSTRUCTION SEQUENCING PLAN**
UPPER WALLOWA RIVER RESTORATION DESIGN

**Sheet
 3.2**

REACHS 1 AND 2 CONSTRUCTION SEQUENCING

WORK IN THE RIVER BELOW THE ORDINARY HIGH WATER MARK (OHWM) SHALL ONLY OCCUR DURING THE ALLOWABLE IN-WATER WORK WINDOW, OR AS OTHERWISE SPECIFIED IN PROJECT-SPECIFIC ENVIRONMENTAL PERMITS. WORK ABOVE AND BEYOND THE OHWM MAY OCCUR ANY TIME OF THE YEAR AS WEATHER, SITE CONDITIONS AND PERMITS ALLOW.

CONSTRUCTION SHALL OCCUR IN THE FOLLOWING GENERAL STEPS, WHICH CORRESPOND NUMERICALLY TO THOSE SHOWN ON SHEETS 3.2. NOT ALL NUMBERS ARE REPRESENTED ON SHEET 3.2.

GENERAL SITE PREPARATION

1. INSTALL AND MAINTAIN NECESSARY EROSION AND SEDIMENTATION CONTROLS, INCLUDING A CONSTRUCTION SITE ENTRANCE AND ALL BMPs IDENTIFIED IN THE STATE OF OREGON 1200-C PERMIT PREPARED BY THE CONTRACTOR.
2. REMOVE UNNECESSARY/UNDESIRABLE UNDERBRUSH IN AREAS TO BE DISTURBED.
3. ESTABLISH SURVEY CONTROL.
4. ESTABLISH LIMITS OF EXCAVATION/FILL, STOCKPILE AREAS, STAGING AREAS, HAUL ROADS AND SIGNAGE.
5. MARK ALL TREES TO REMAIN. PROVIDE PROTECTIVE BARRIERS MEETING REQUIREMENTS OF THE PROJECT SPECIFICATIONS FOR TREE AND PLANT PROTECTION AND SALVAGE.

1. CONSTRUCT PERENNIAL FLOW CHANNEL

- 1.1. INSTALL BLOCK NETS AT THE UPSTREAM END OF THE WORK AREA ADJACENT TO WALLOWA RIVER.
- 1.2. REMOVE FISH FROM THE PERENNIAL FLOW CHANNEL DOWNSTREAM OF THE INSTALLED BLOCK NETS.
- 1.3. INSTALL BLOCK NETS IN THE PERENNIAL FLOW CHANNEL AT THE DOWNSTREAM LIMITS OF THE WORK AREA ADJACENT TO WALLOWA LAKE.
- 1.4. INSTALL TEMPORARY DAM AND PUMP TO DEWATER EXISTING SIDE CHANNEL, OUTLET PIPE TO MAIN CHANNEL DOWNSTREAM OF PROPOSED PERENNIAL CHANNEL SPLIT.
- 1.5. REMOVE EXISTING PATHS, PEDESTRIAN BRIDGES AND LOWER WALLOWA PARKING AREA ACCORDING TO PLANS.
- 1.6. PARKING AREA MAY BE USED AS TEMPORARY STOCKPILE AND STORAGE AREA.
- 1.7. GRADE THE PERENNIAL FLOW CHANNEL ACCORDING TO PLANS. INCLUDE A TEMPORARY EARTHEN PLUG AT UPSTREAM END OF PERENNIAL FLOW CHANNEL AS SHOWN ON SHEET 3.2.
- 1.8. TEMPORARILY STOCKPILE SUITABLE CHANNEL BED MATERIAL (GRAVEL, COBBLES & BOULDERS). STOCKPILED MATERIAL WILL BE USED IN THE CONSTRUCTED TERRACE. SORT STOCKPILED GRADATION RANGES ACCORDINGLY. NO STOCKPILED MATERIAL IN TEMPORARY STOCKPILE AREAS SHALL REMAIN ON SITE AFTER PROJECT IS COMPLETED.
- 1.9. INSTALL LARGE WOOD MATERIAL AS INDICATED ON THE CONSTRUCTION DRAWINGS.

#2 SHOULD BE TITLED
"INSTALL BRIDGE OVER NEW PERENNIAL CHANNEL AT MARINA LANE"

2. INSTALL CULVERTS AT MARINA LANE

- 2.1. INSTALL CULVERT AT MARINA LANE ACCORDING TO PLANS. **INSTALL BRIDGE, NOT CULVERT**
- 2.2. REMOVE THE DAM AND PUMP IN THE EXISTING SIDE CHANNEL.
- 2.3. REMOVE EARTHEN PLUG AT THE UPSTREAM END OF THE PERENNIAL CHANNEL.
- 2.4. INSTALL WORK ZONE ISOLATION STRUCTURE WITHIN THE MAIN CHANNEL. MAINTAIN A MINIMUM OF HALF THE MAIN CHANNEL DISCHARGE IN THE MAIN CHANNEL.
- 2.5. REMOVE BLOCK NETS FROM NEWLY CONSTRUCTED PERENNIAL FLOW CHANNEL.

3. MODIFY MAIN CHANNEL, CONSTRUCT HIGH FLOW CHANNEL, INSTALL LARGE WOOD MATERIAL

- 3.1. INSTALL BLOCK NETS IN THE WALLOWA RIVER MAIN CHANNEL DIRECTLY DOWNSTREAM OF THE NEWLY CONSTRUCTED PERENNIAL FLOW CHANNEL.
- 3.2. REMOVE FISH FROM THE MAIN CHANNEL DOWNSTREAM OF THE INSTALLED BLOCK NETS.
- 3.3. INSTALL BLOCK NETS IN THE MAIN CHANNEL AT THE DOWNSTREAM LIMITS OF THE WORK AREA.
- 3.4. DIVERT ALL OF THE MAIN CHANNEL DISCHARGE INTO THE NEWLY CONSTRUCTED PERENNIAL FLOW CHANNEL.
- 3.5. GRADE THE MAIN CHANNEL AND HIGH FLOW CHANNEL ACCORDING TO PLANS.
- 3.6. TEMPORARILY STOCKPILE SUITABLE CHANNEL BED MATERIAL (GRAVEL, COBBLES & BOULDERS). STOCKPILED MATERIAL WILL BE USED IN THE CONSTRUCTED TERRACE. SORT STOCKPILED GRADATION RANGES ACCORDINGLY. NO STOCKPILED MATERIAL IN TEMPORARY STOCKPILE AREAS SHALL REMAIN ON SITE AFTER PROJECT IS COMPLETED.
- 3.7. INSTALL LARGE WOOD MATERIAL AS INDICATED ON THE CONSTRUCTION DRAWINGS.

4. REMOVE AND REGRADE EXISTING BERMS AND BUILD PROPOSED BERMS

- 4.1. GRADE THE BERM REMOVAL AREA ACCORDING TO PLANS.
- 4.2. TEMPORARILY STOCKPILE SUITABLE CHANNEL BED MATERIAL (GRAVEL, COBBLES & BOULDERS). STOCKPILED MATERIAL WILL BE USED IN THE PROPOSED BERMS. SORT STOCKPILED GRADATION RANGES ACCORDINGLY. NO STOCKPILED MATERIAL IN TEMPORARY STOCKPILE AREAS SHALL REMAIN ON SITE AFTER PROJECT IS COMPLETED.
- 4.3. INSTALL LARGE WOOD MATERIAL AS INDICATED ON THE CONSTRUCTION DRAWINGS.
- 4.4. REMOVE DIVERSION STRUCTURE FROM THE MAIN CHANNEL
- 4.5. REMOVE BLOCK NETS FROM THE MAIN CHANNEL

4.6. INSTALL REMAINING HABITAT STRUCTURES IN WALLOWA RIVER

- 4.1. INSTALL WORK ZONE ISOLATION STRUCTURES.
- 4.2. INSTALL LARGE WOOD MATERIAL AS INDICATED ON THE CONSTRUCTION DRAWINGS.
- 4.3. REMOVE THE ISOLATION STRUCTURES.
- 4.4. MINIMIZE AREA OF DISTURBANCE TO ACCESS STRUCTURES AND USE EROSION CONTROL BMPs AS NEEDED TO MINIMIZE TURBIDITY.

5. CONSTRUCT PROPOSED WALLOWA STATE PARK STRUCTURES

- 5.1. CONSTRUCT PROPOSED BERMS ACCORDING TO PLANS.

6. CONSTRUCT PROPOSED WALLOWA STATE PARK STRUCTURES

- 6.1. GRADE PROPOSED MARINA LANE PARKING AREA ACCORDING TO PLANS.
- 6.2. INSTALL MARINA LANE PARKING AREA.
- 6.3. INSTALL PROPOSED PATHS, PEDESTRIAN BRIDGES AND BOARD WALKS ACCORDING TO PLANS.

7. REPAIR STOCKPILE, STAGING AND ACCESS AREAS.

8. PLANT AS INDICATED IN PLANTING PLAN

9. REMOVE TEMPORARY EROSION CONTROL MEASURES

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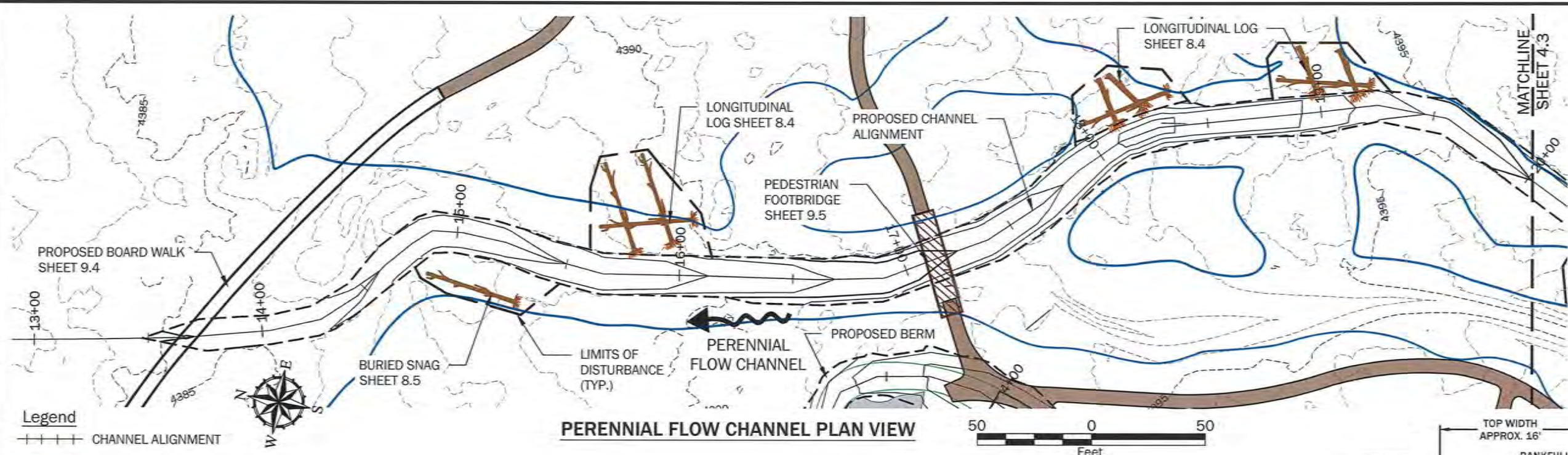
Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

REACH 1 AND REACH 2
 CONSTRUCTION SEQUENCING NOTES
 UPPER WALLOWA RIVER RESTORATION DESIGN

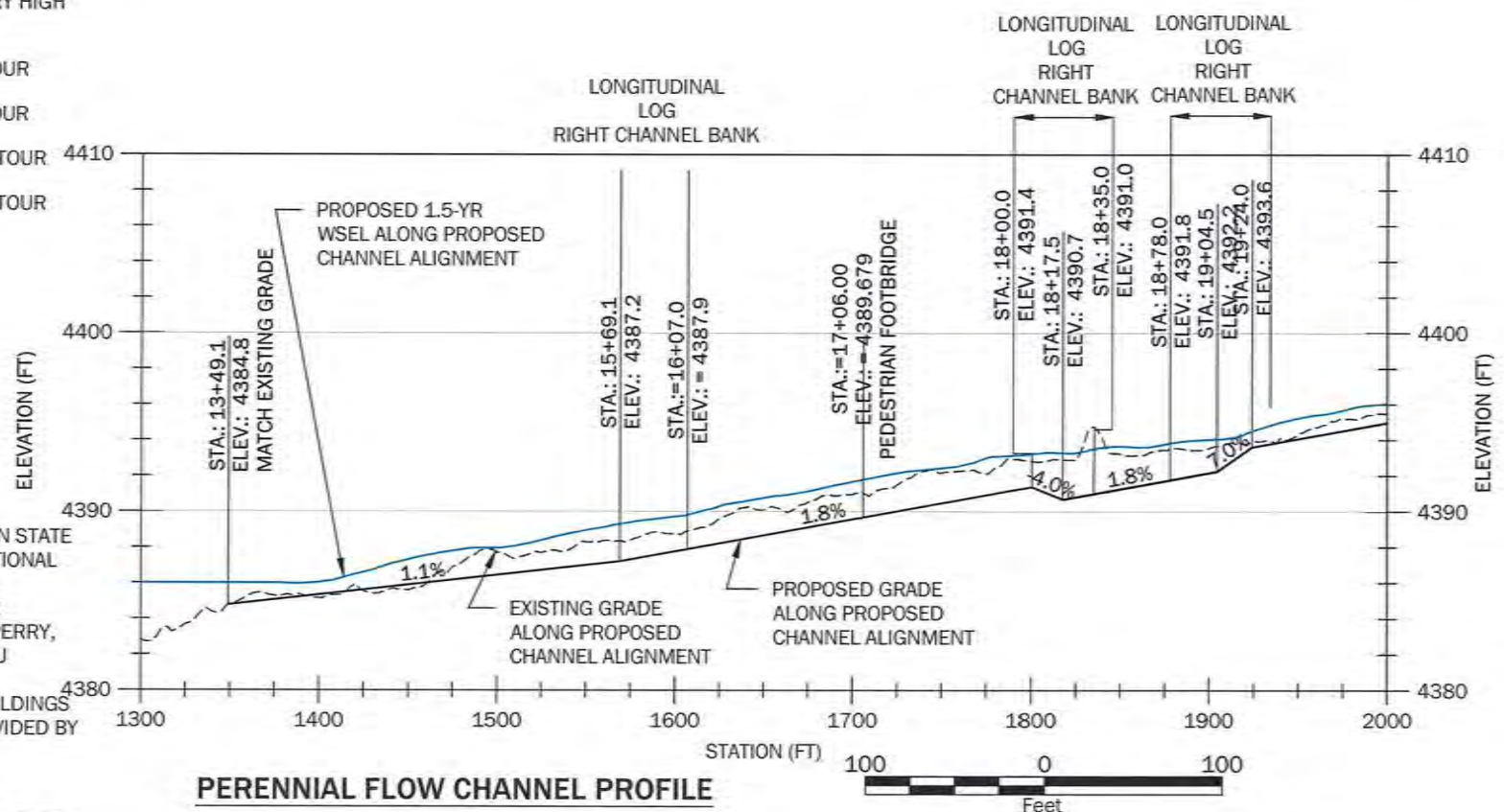
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PERENNIAL FLOW CHANNEL PLAN VIEW

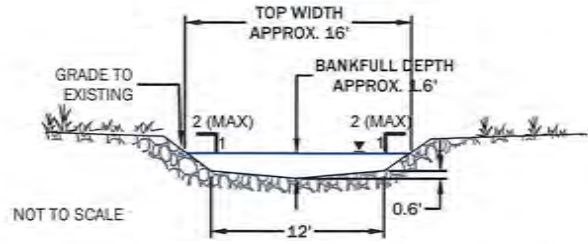
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- CHANNEL ALIGNMENT
 - APPROXIMATE ORDINARY HIGH WATER
 - 3980 --- EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - 3980 --- PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - GRADING LIMITS
 - PROPOSED PATH

- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.

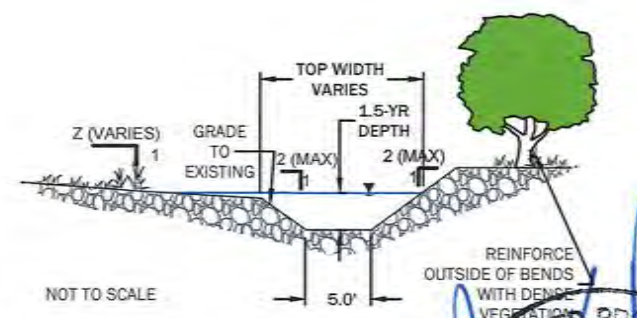


PERENNIAL FLOW CHANNEL PROFILE

VERTICAL EXAGGERATION = 10X
 HORIZONTAL SCALE: 1" = 100'
 VERTICAL SCALE: 1" = 10'



TYPICAL PERENNIAL CHANNEL RUN GEOMETRY



TYPICAL PERENNIAL CHANNEL POOL GEOMETRY

CHANNEL GEOMETRY AT MAX POOL

STATION	GRADE TO EXISTING TOP WIDTH, FT	1.5-YR DEPTH, FT
18+17.5	16.8	2.5
23+64.7	19.6	2.4
28+00.5	22.6	3.4

Professional Engineer
 72313PE
 OREGON
 NOVEMBER 12, 2012
 RYAN S. CARNIE
 Expires: 12/31/2017

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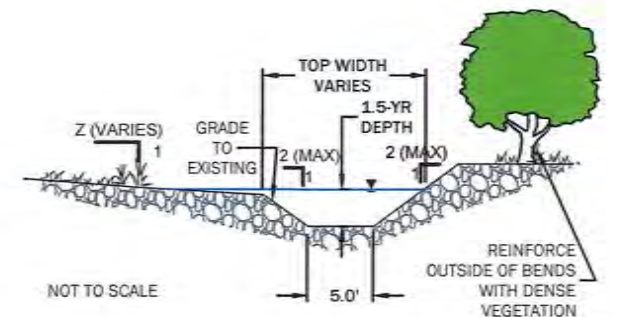
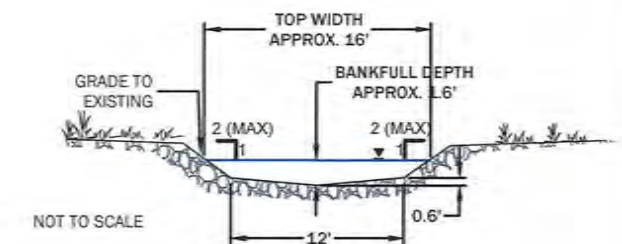
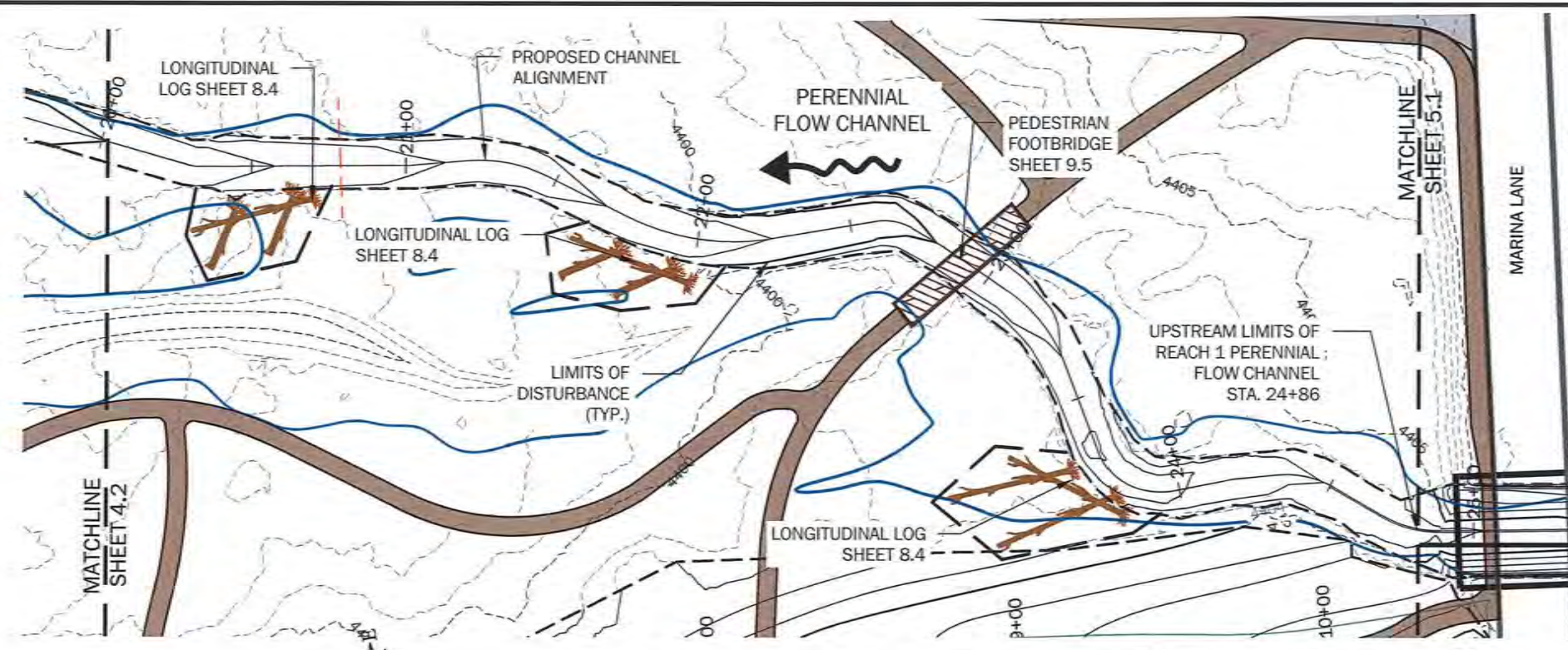
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				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

20 years
WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

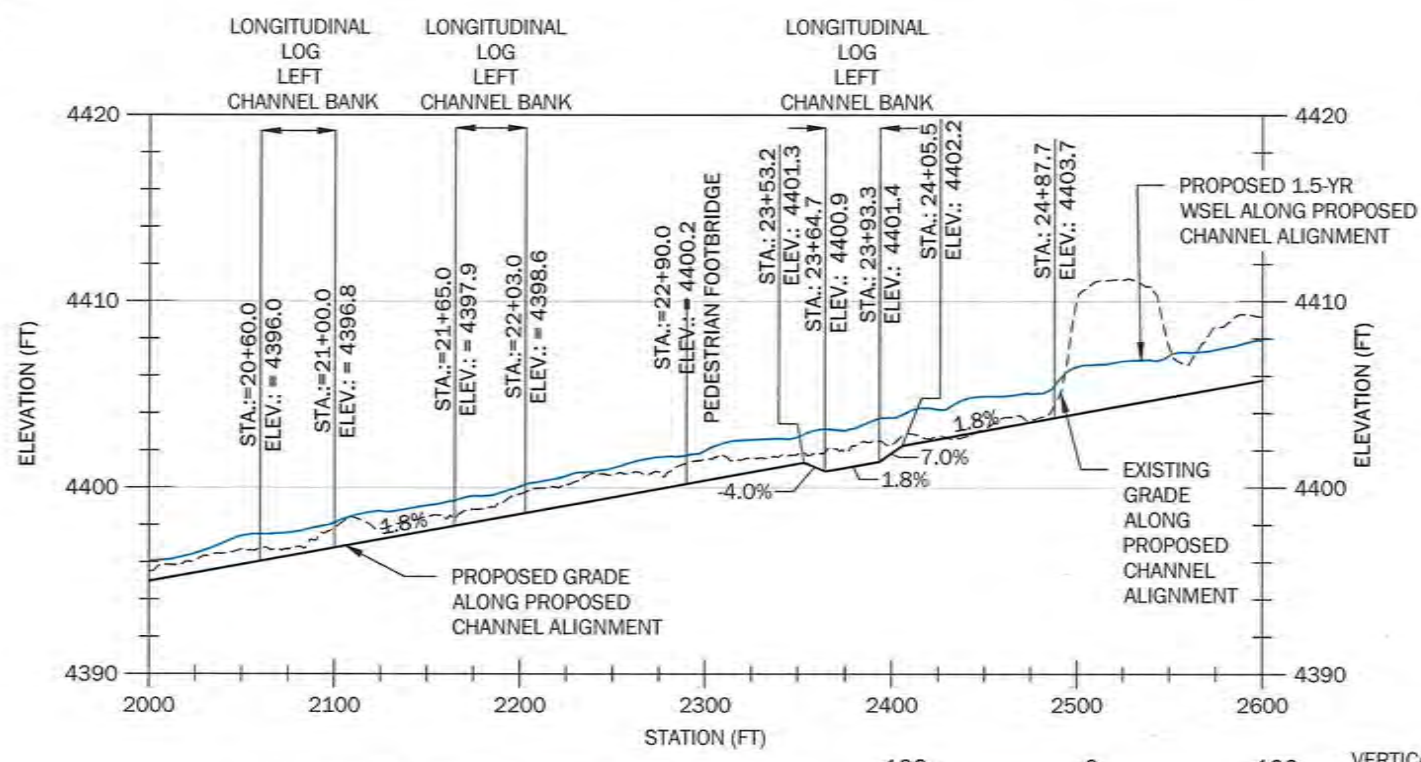
REACH 1 PROPOSED PERENNIAL FLOW CHANNEL PLAN AND PROFILE
UPPER WALLOWA RIVER RESTORATION DESIGN

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- Legend**
- CHANNEL ALIGNMENT
 - APPROXIMATE ORDINARY HIGH WATER
 - 3980 --- EXISTING MAJOR CONTOUR
 - --- EXISTING MINOR CONTOUR
 - 3980 --- PROPOSED MAJOR CONTOUR
 - --- PROPOSED MINOR CONTOUR
 - GRADING LIMITS
 - PROPOSED PATH

- NOTES:**
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 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.



CHANNEL GEOMETRY AT MAX POOL

STATION	GRADE TO EXISTING TOP WIDTH, FT	1.5-YR DEPTH, FT
18+17.5	16.8	2.5
23.64.7	19.6	2.4
28+00.5	22.6	3.4



Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

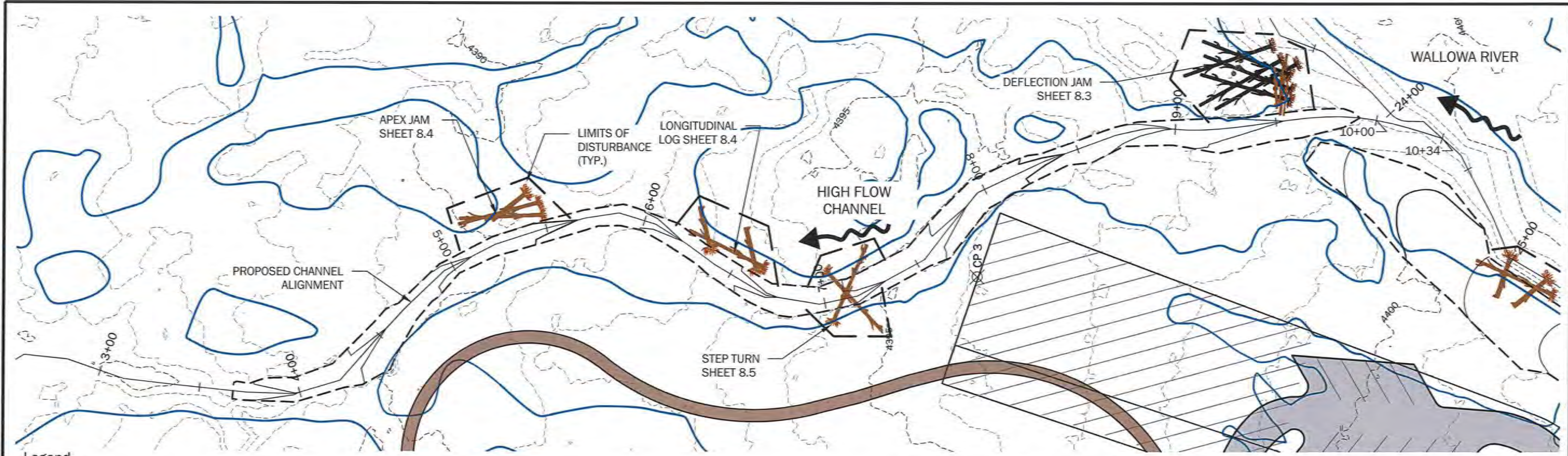
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 PROPOSED PERENNIAL FLOW CHANNEL PLAN AND PROFILE
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
4.3

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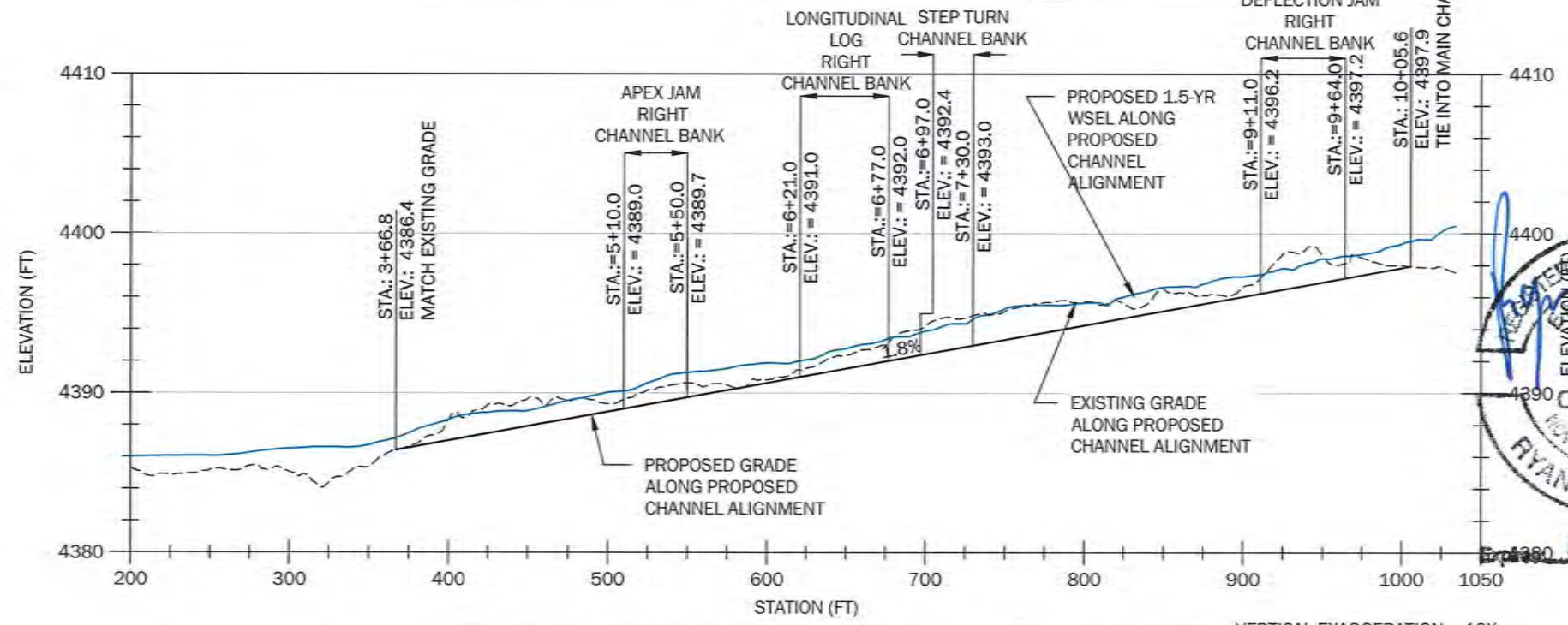


- Legend**
- +---+--- CHANNEL ALIGNMENT
 - APPROXIMATE ORDINARY HIGH WATER
 - 3980 --- EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - 3980 --- PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - GRADING LIMITS
 - PROPOSED PATH
 - PROPOSED PARKING AREA



- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.

HIGH FLOW CHANNEL PLAN VIEW 50 0 50 Feet



HIGH FLOW CHANNEL PROFILE 100 0 100 Feet
VERTICAL EXAGGERATION = 10X
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 10'

PROFESSIONAL ENGINEER
ELEVATION 72313FE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE
12/31/2017

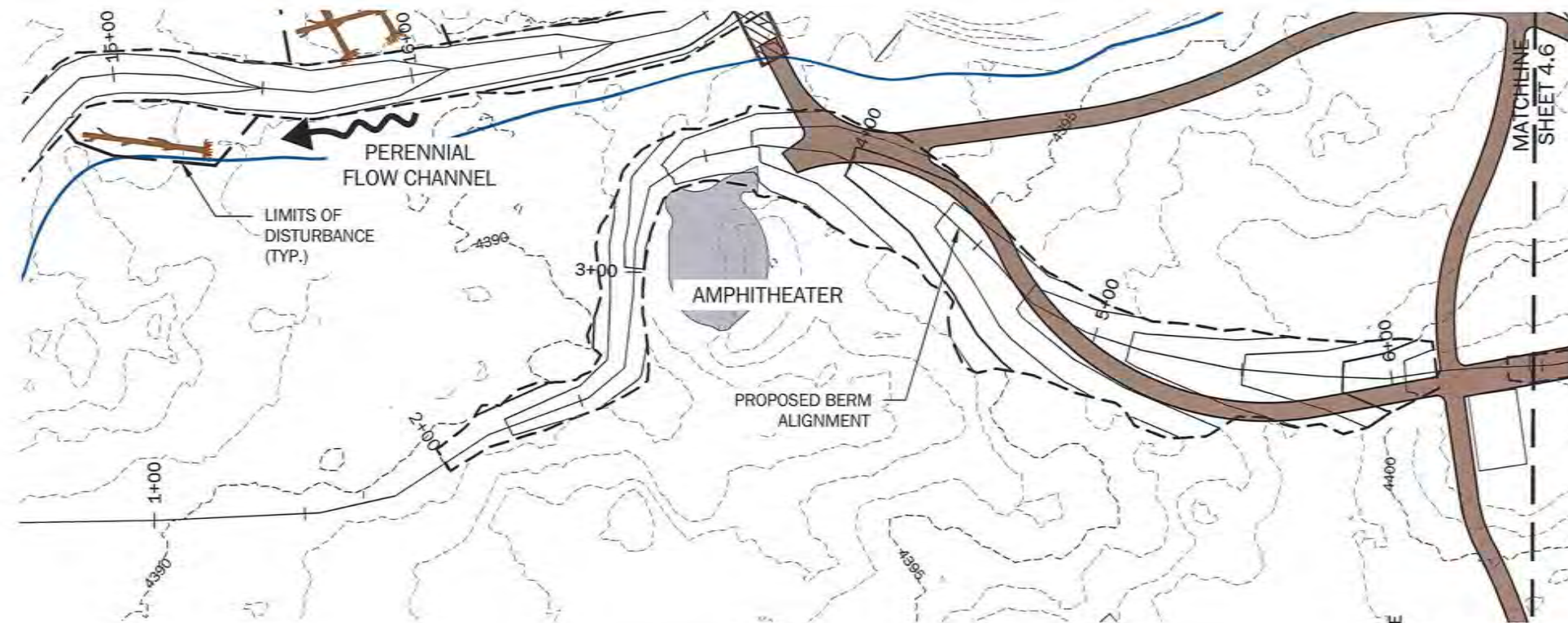
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				Project No: 21860-001-00

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

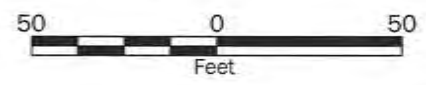
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

**REACH 1 HIGH FLOW CHANNEL
PLAN AND PROFILE**
UPPER WALLOWA RIVER RESTORATION DESIGN

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4.4



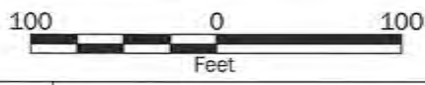
PROPOSED BERM PLAN VIEW



- Legend**
- +---+---+ BERM ALIGNMENT
 - APPROXIMATE ORDINARY HIGH WATER
 - - - 3980 EXISTING MAJOR CONTOUR
 - - - EXISTING MINOR CONTOUR
 - 3980 PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - - - GRADING LIMITS
 - PROPOSED PATH



PROPOSED BERM PROFILE



VERTICAL EXAGGERATION = 10X
 HORIZONTAL SCALE: 1" = 100'
 VERTICAL SCALE: 1" = 10'

- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.
 5. PATH DEMOLITION AND CONSTRUCTION PER PARK DETAILS SHEET 9.1-9.5



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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

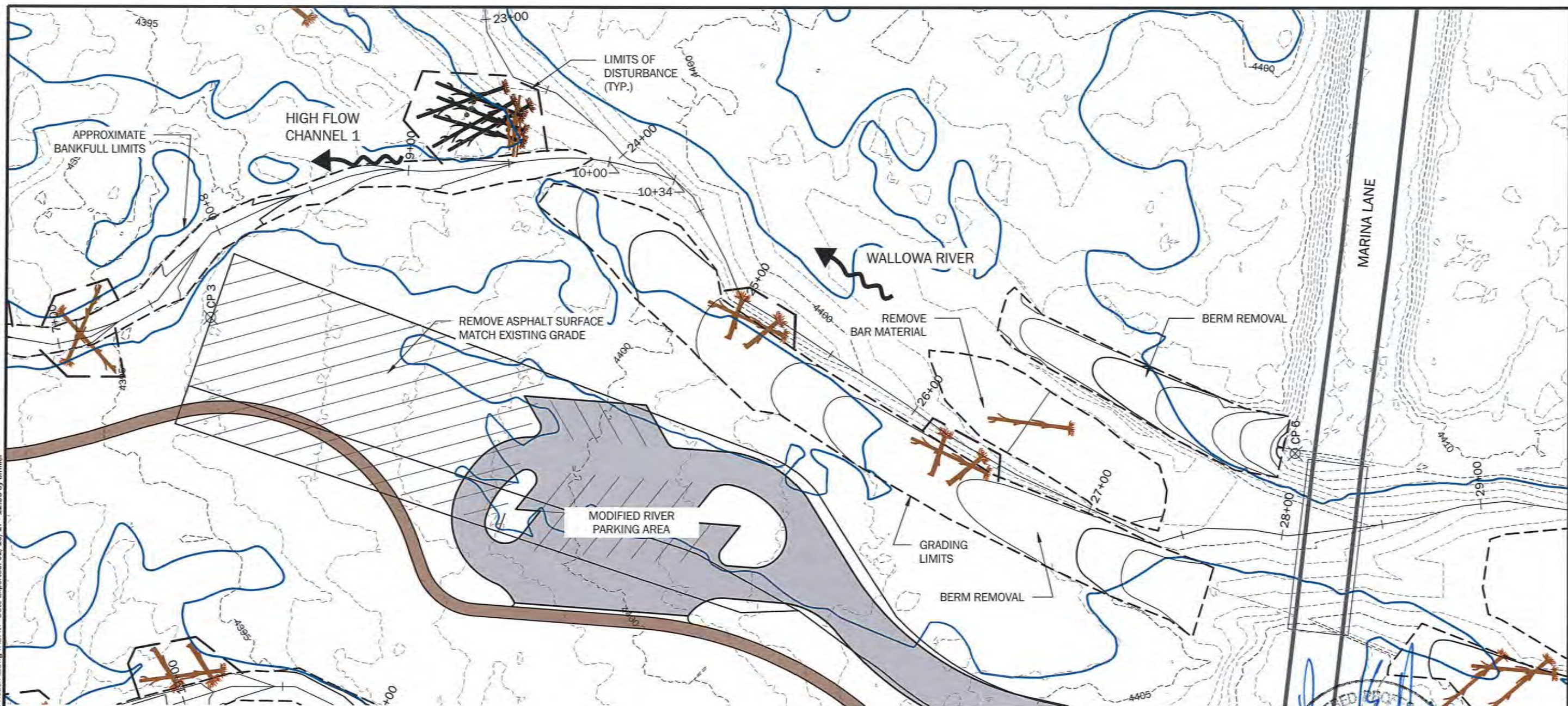
WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

**REACH 1 PROPOSED BERM
 PLAN AND PROFILE**
 UPPER WALLOWA RIVER RESTORATION DESIGN

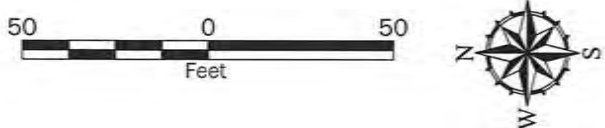
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Legend

- CHANNEL ALIGNMENT
- APPROXIMATE ORDINARY HIGH WATER
- 3980 - EXISTING MAJOR CONTOUR
- - - EXISTING MINOR CONTOUR
- 3980 - PROPOSED MAJOR CONTOUR
- - - PROPOSED MINOR CONTOUR
- - - GRADING LIMITS
- PROPOSED PATH
- PROPOSED PARKING AREA



- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.
 5. PARKING DEMOLITION PER PARKS FACILITIES DESIGN AND DETAILS PROVIDED UNDER A SEPARATE COVER

REGISTERED PROFESSIONAL ENGINEER
 72313PE
 OREGON
 NOVEMBER 12, 2012
 RYAN S. CARNIE
 12/31/2017

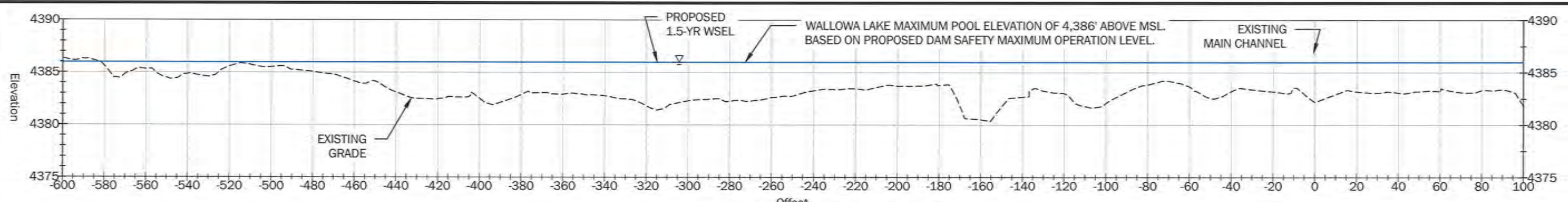
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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

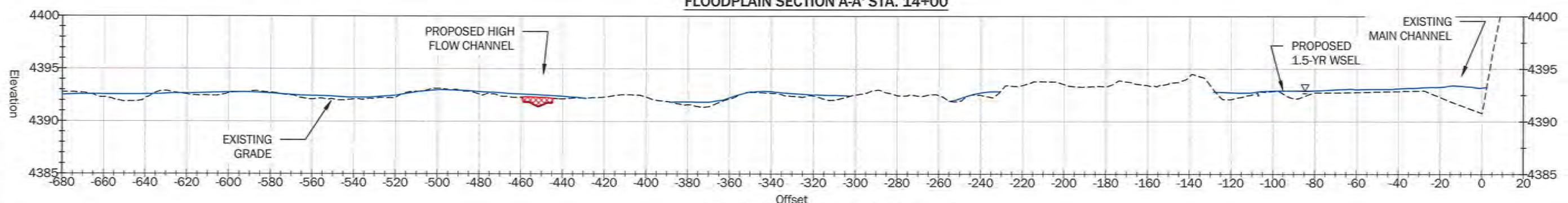
GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

**REACH 1 MAIN CHANNEL BERM
 REMOVAL AND GRADING PLAN**
 UPPER WALLOWA RIVER RESTORATION DESIGN

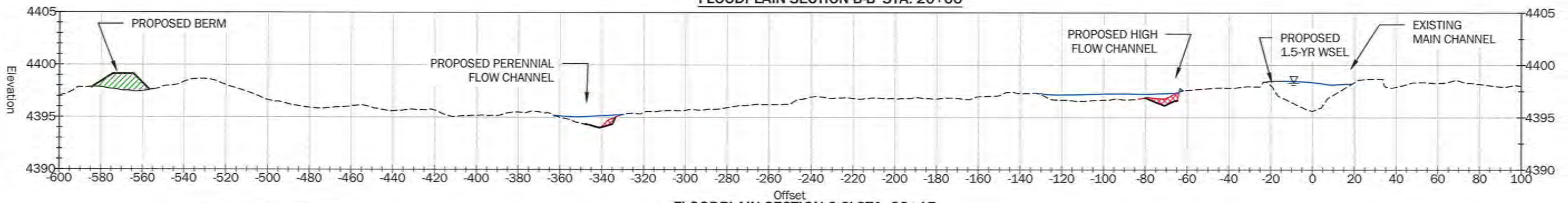
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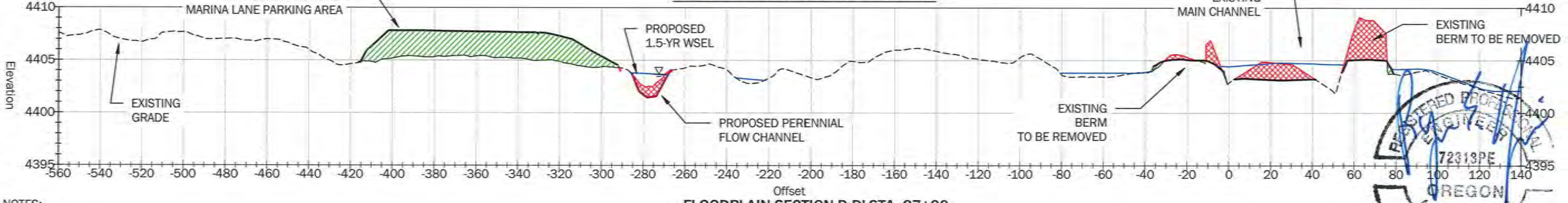
FLOODPLAIN SECTION A-A' STA. 14+00



FLOODPLAIN SECTION B-B' STA. 20+00

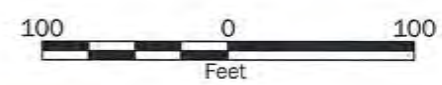


FLOODPLAIN SECTION C-C' STA. 23+15



FLOODPLAIN SECTION D-D' STA. 27+00

- NOTES:
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.



VERTICAL EXAGGERATION = 5X
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 20'

- LEGEND
- PROPOSED FILL AREAS
 - PROPOSED CUT AREAS

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2011
RYAN S. CARNIE

Expos: 12/31/2017

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Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

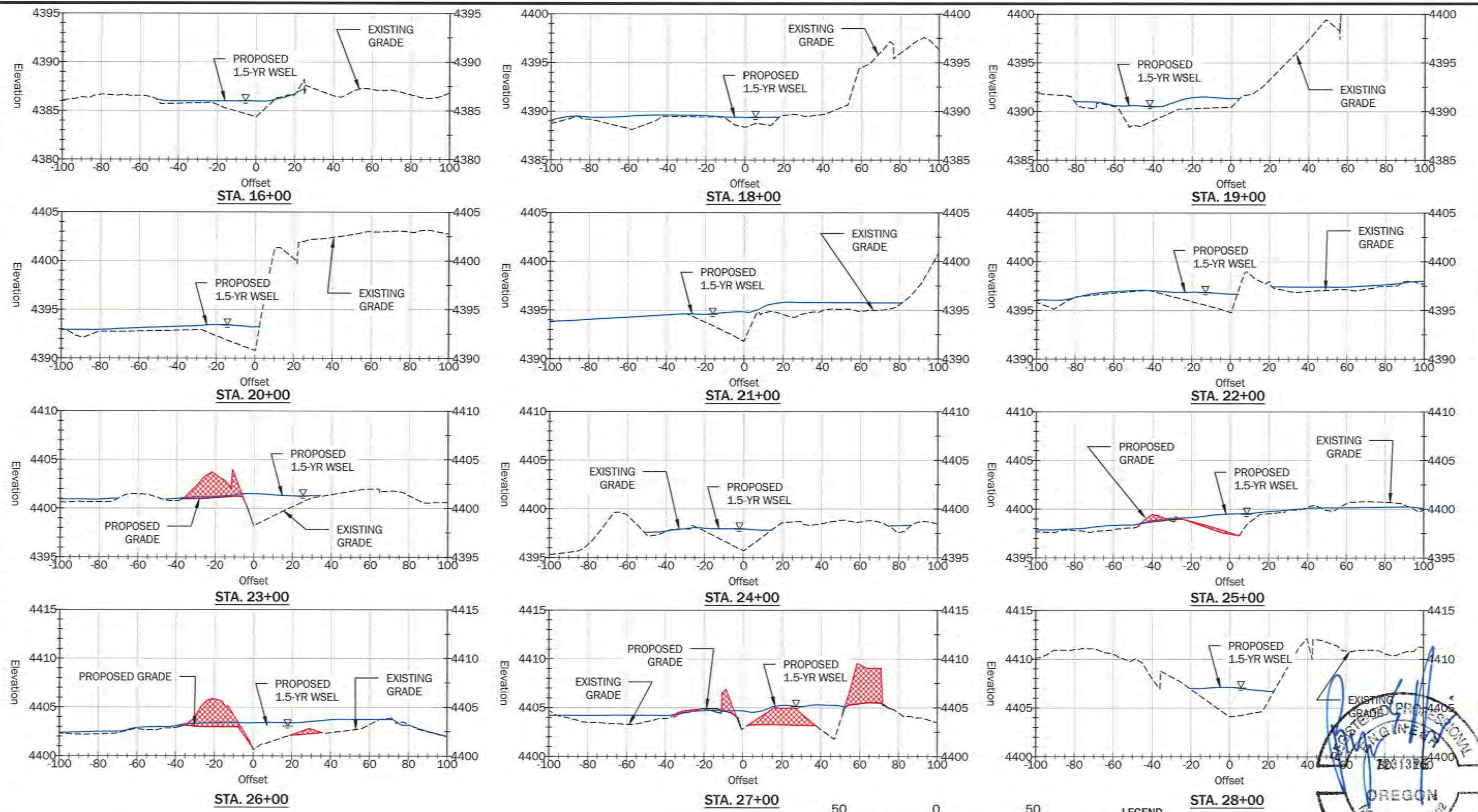
20 years
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1
VALLEY CROSS SECTIONS
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
4.8

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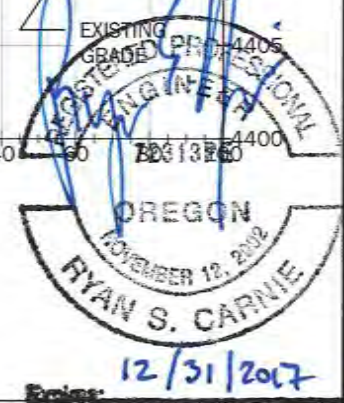
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- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
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VERTICAL EXAGGERATION = 5X
 HORIZONTAL SCALE: 1" = 50'
 VERTICAL SCALE: 1" = 10'

LEGEND

PROPOSED FILL AREAS

PROPOSED CUT AREAS



Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES

401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

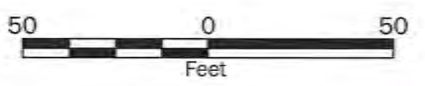
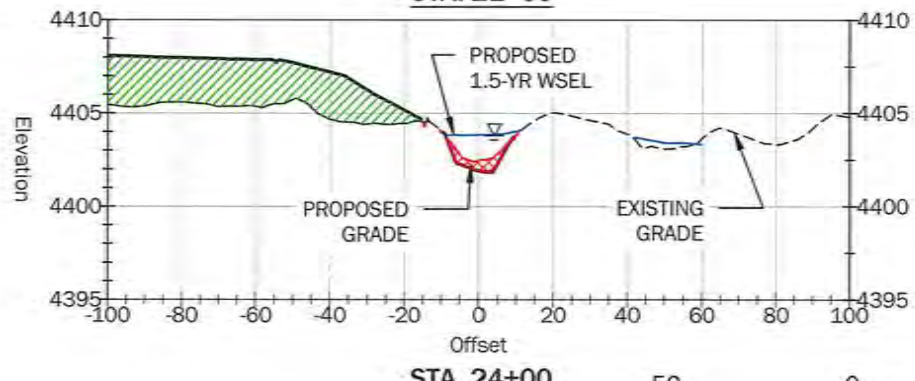
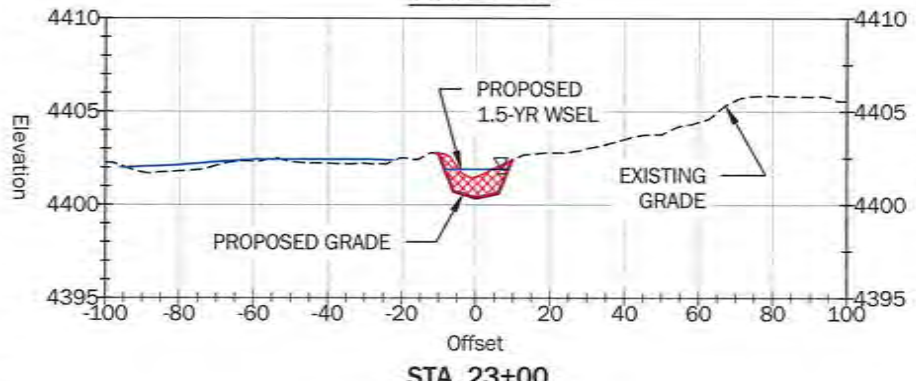
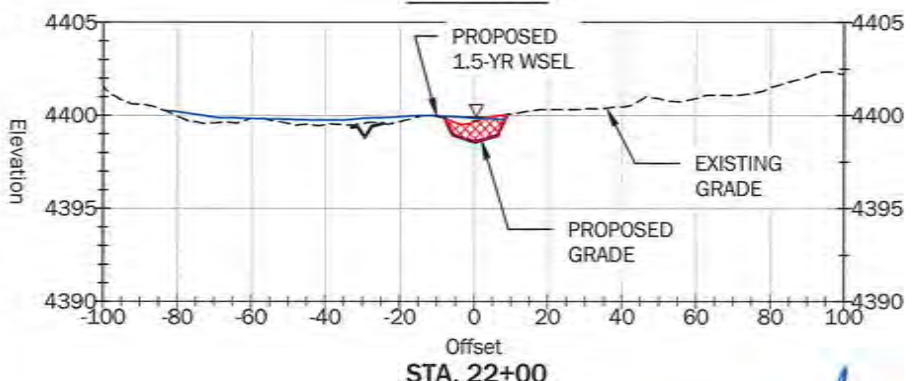
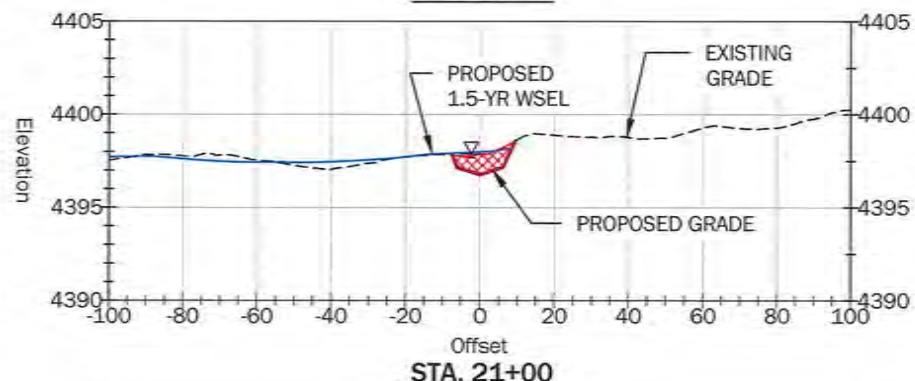
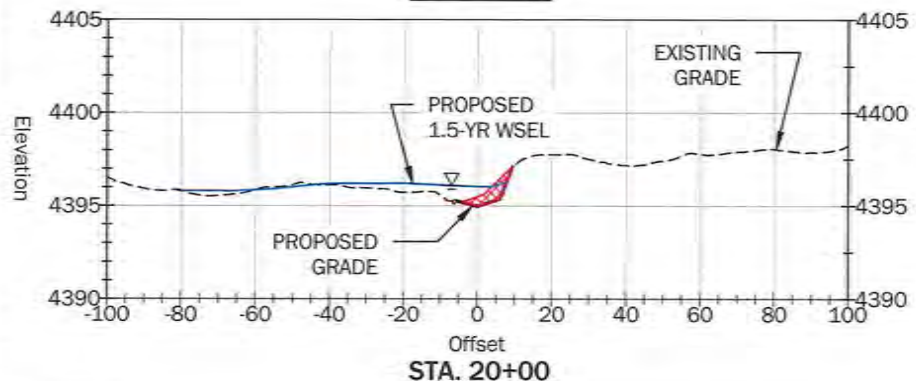
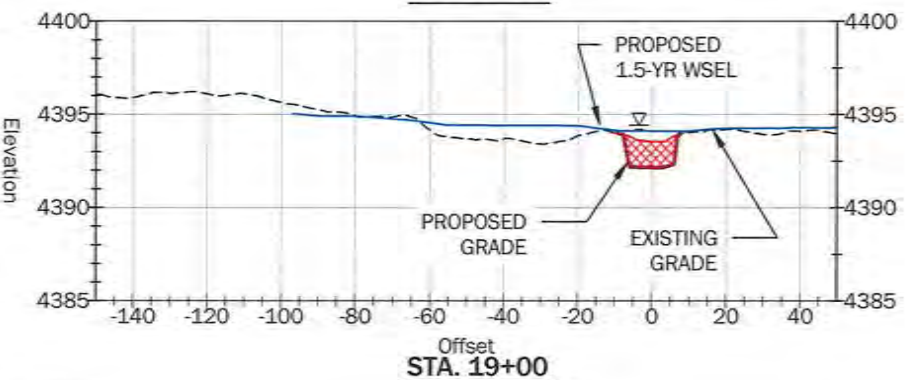
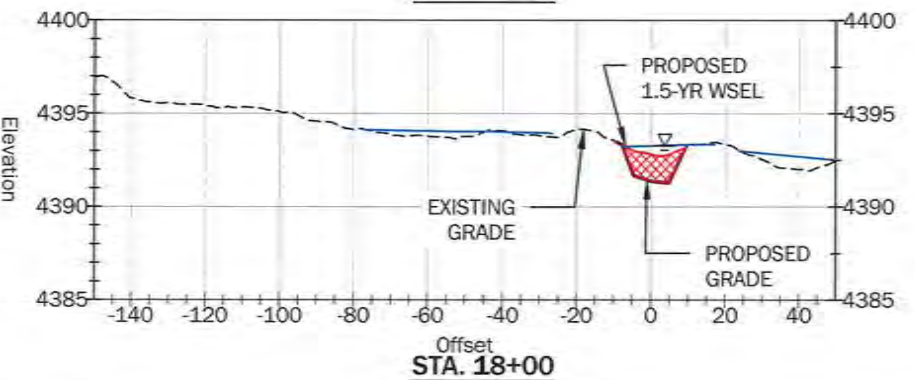
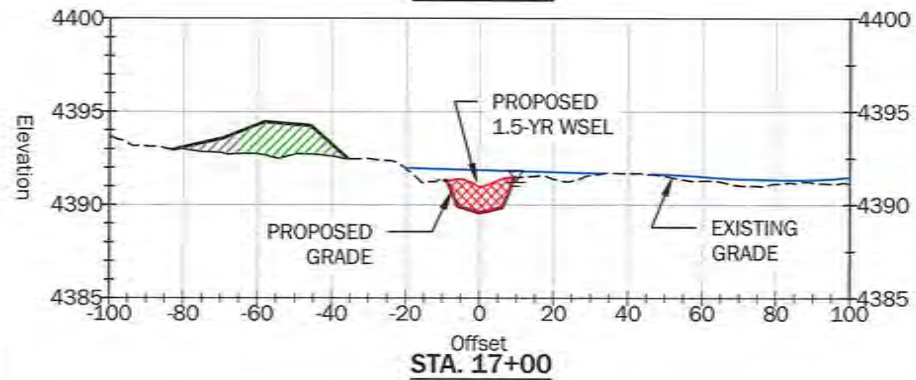
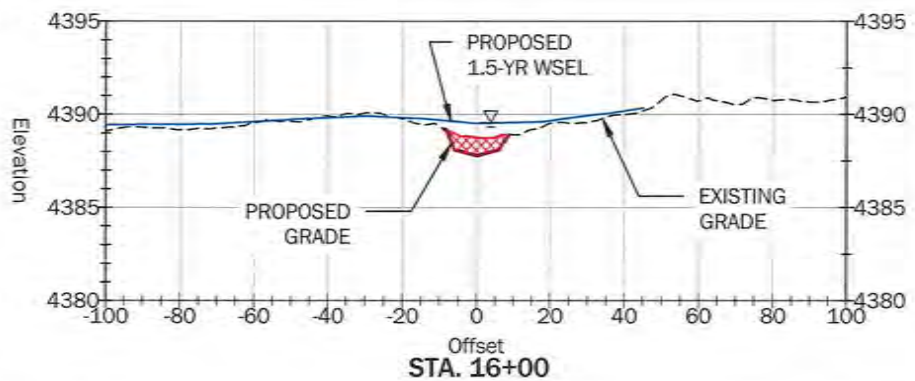
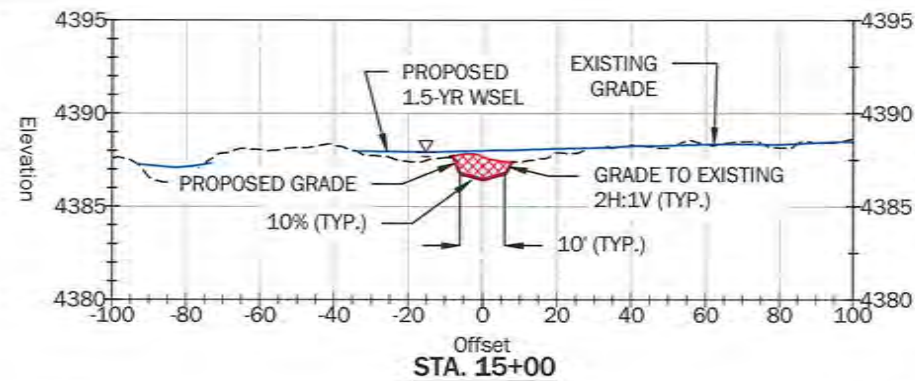
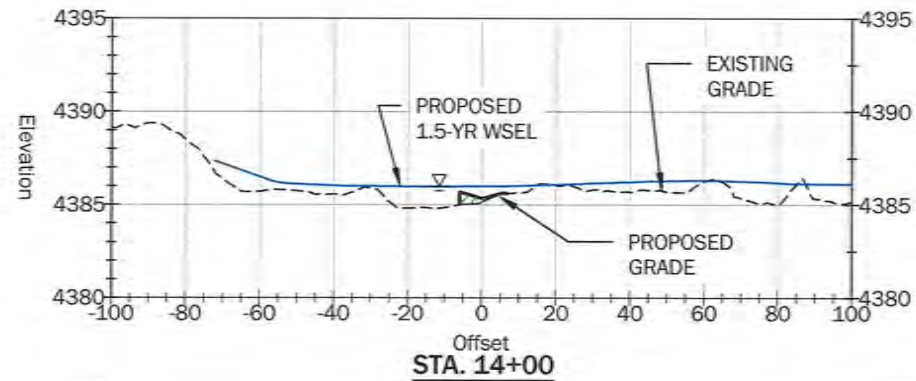
GEOENGINEERS

129 SOUTH MAIN STREET
 PENDLETON, OR 97801

**REACH 1
 MAIN CHANNEL CROSS SECTIONS**

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
4.9



LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

VERTICAL EXAGGERATION = 5X
 HORIZONTAL SCALE: 1" = 50'
 VERTICAL SCALE: 1" = 10'

Expires: 12/31/2017

- NOTES:**
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED PERENNIAL FLOW CHANNEL ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

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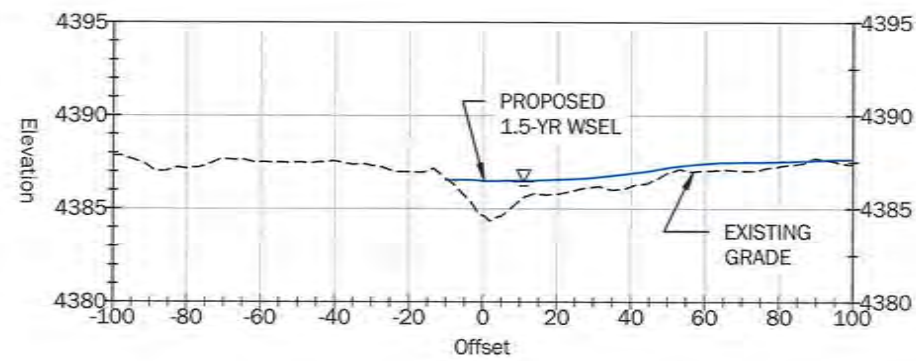
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				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

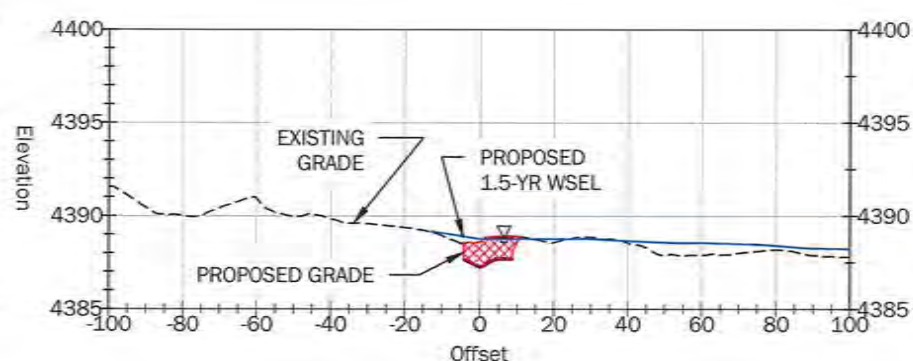
GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

**REACH 1 PERENNIAL FLOW
 CHANNEL CROSS SECTIONS**
UPPER WALLOWA RIVER RESTORATION DESIGN

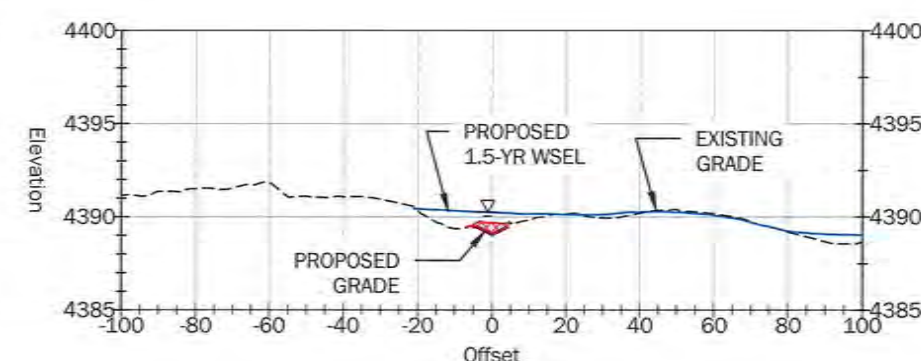
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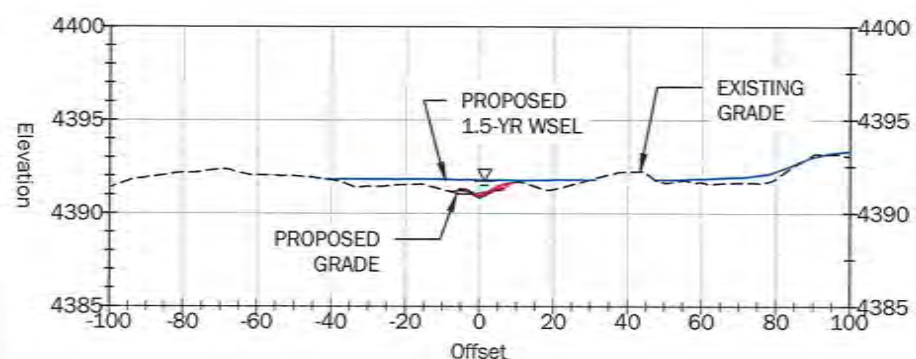
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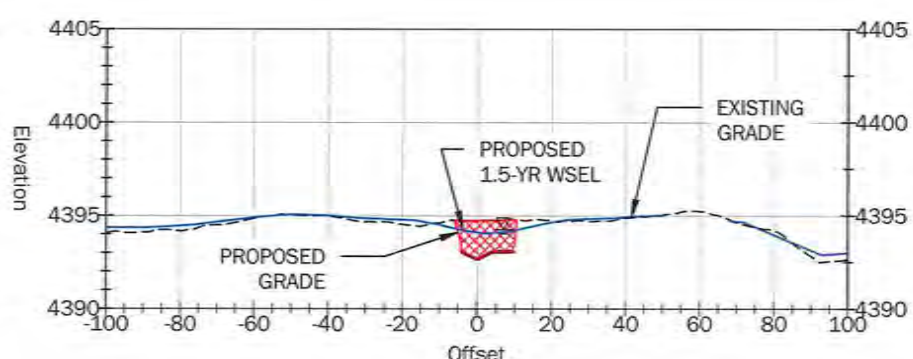
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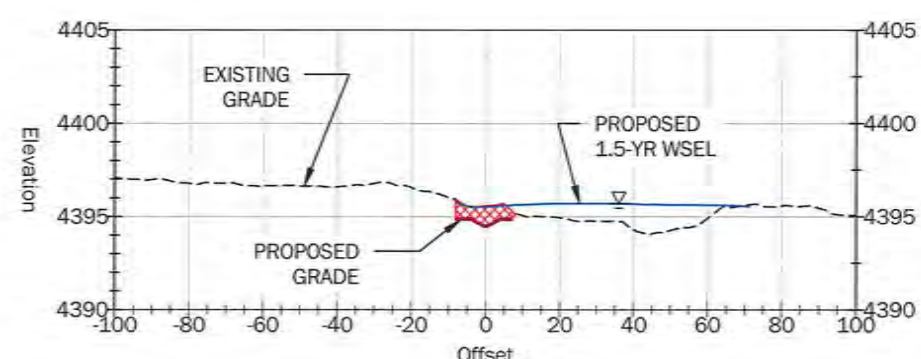
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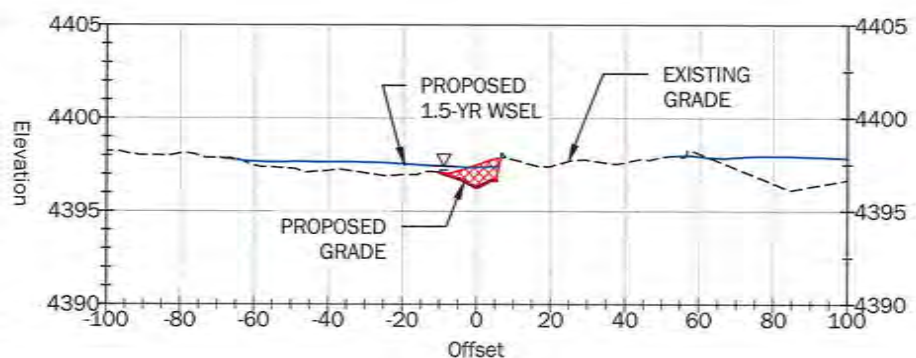
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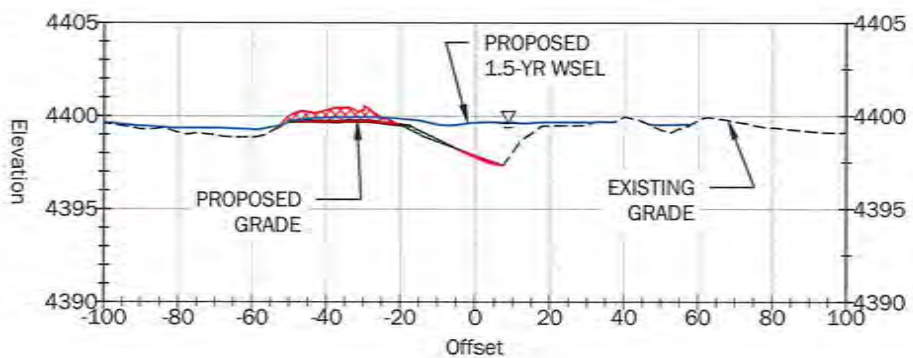
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STA. 8+00



STA. 9+00

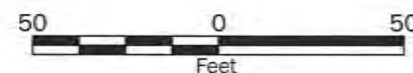


STA. 10+00



Expires: 12/31/2017

- NOTES:
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED HIGH FLOW CHANNEL ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.



VERTICAL EXAGGERATION = 5X
HORIZONTAL SCALE: 1" = 50'
VERTICAL SCALE: 1" = 10'

LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00



WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

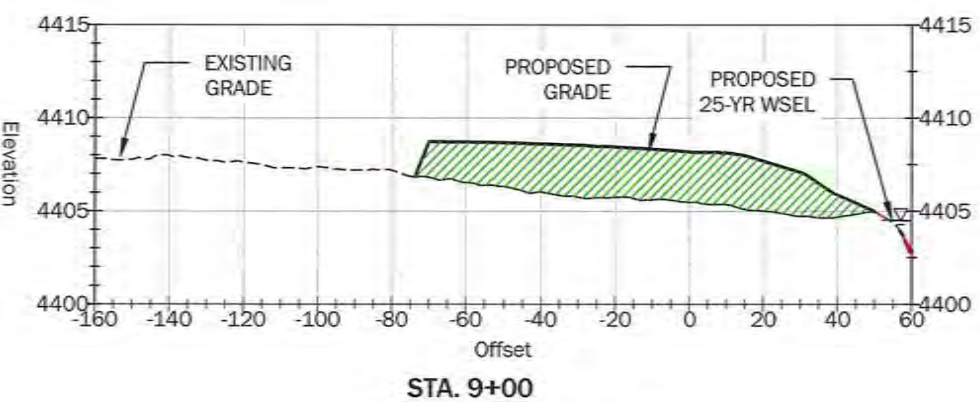
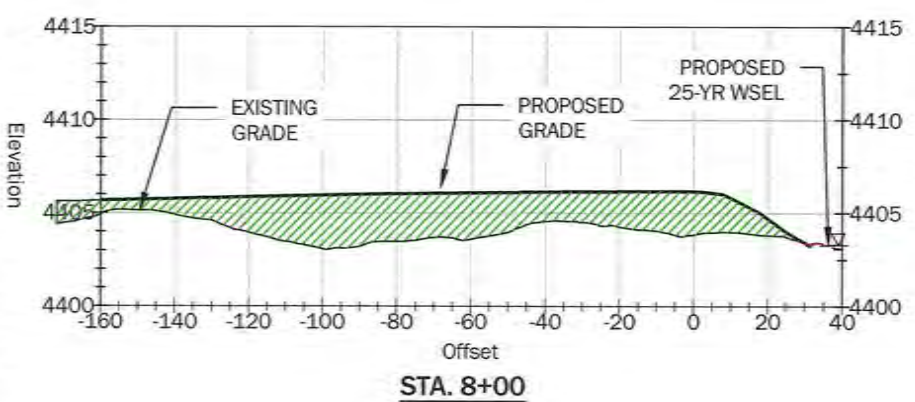
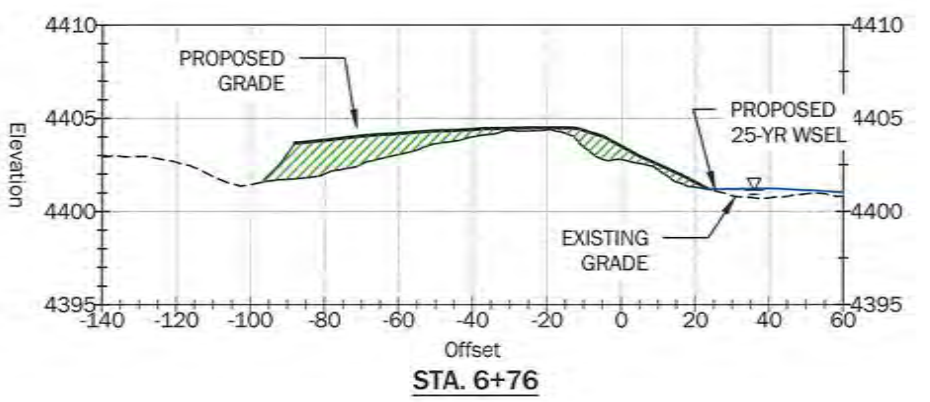
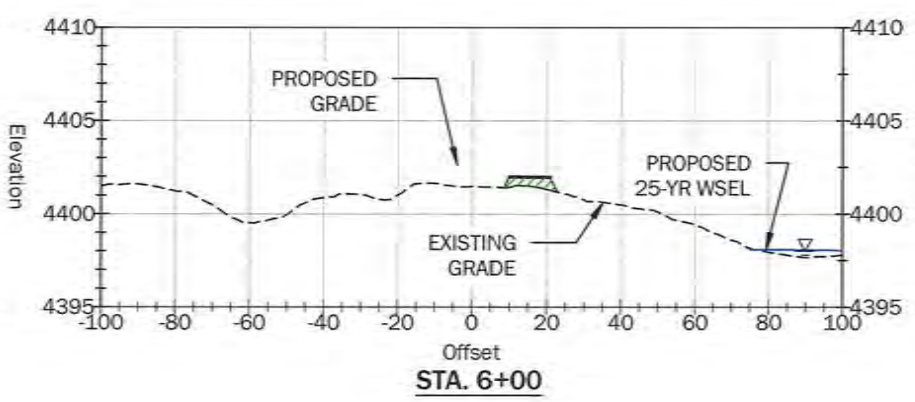
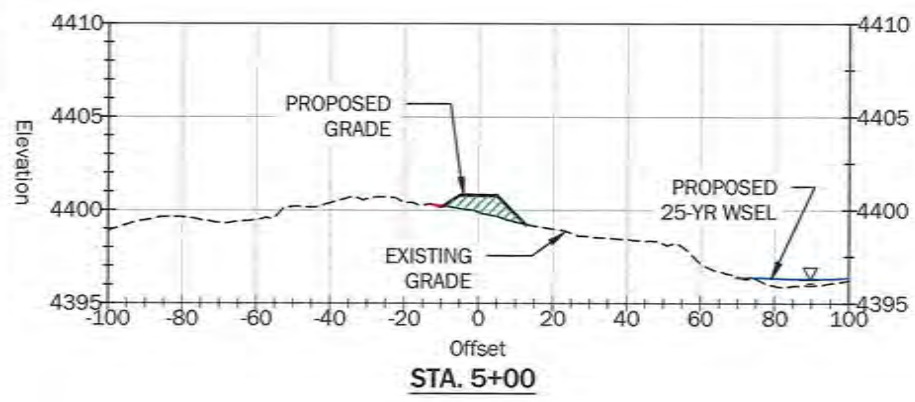
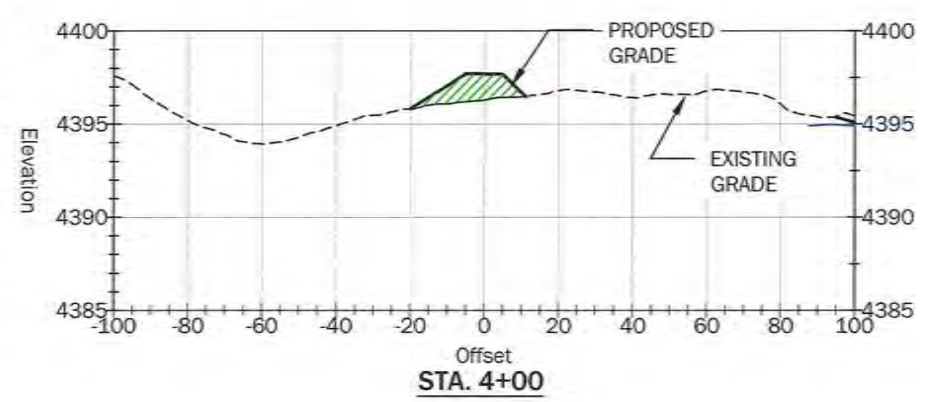
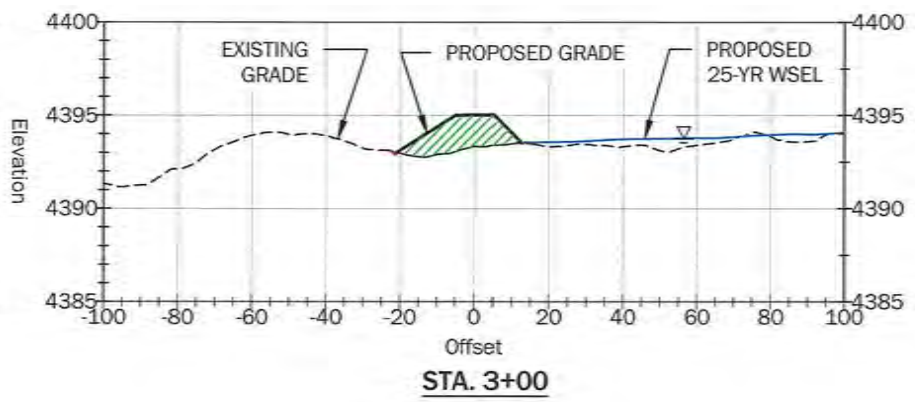
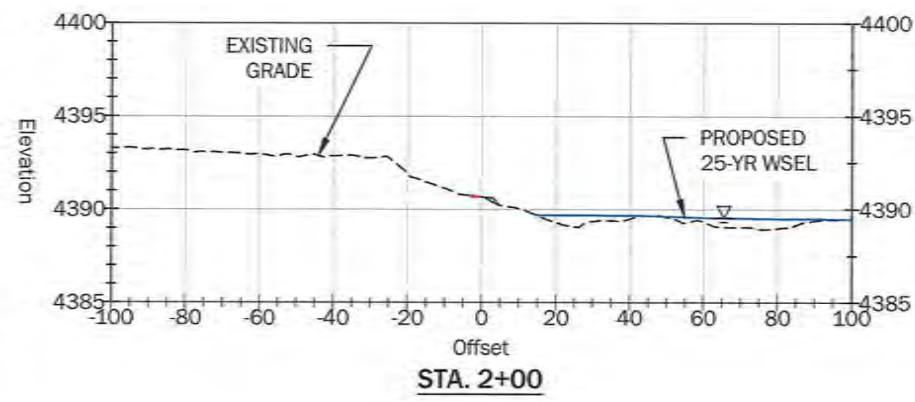


129 SOUTH MAIN STREET
PENDLETON, OR 97801

**REACH 1 HIGH FLOW
CHANNEL CROSS SECTIONS**
UPPER WALLOWA RIVER RESTORATION DESIGN

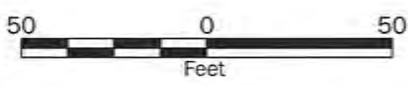
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REGISTERED PROFESSIONAL
 ENGINEER
 72813PE
 OREGON
 NOVEMBER 12, 2009
 RYAN S. CARNIE
 12/31/2017

- NOTES:
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED BERM ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.



VERTICAL EXAGGERATION = 5X
 HORIZONTAL SCALE: 1" = 50'
 VERTICAL SCALE: 1" = 10'

LEGEND

PROPOSED FILL AREAS

PROPOSED CUT AREAS

Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

20 years
WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

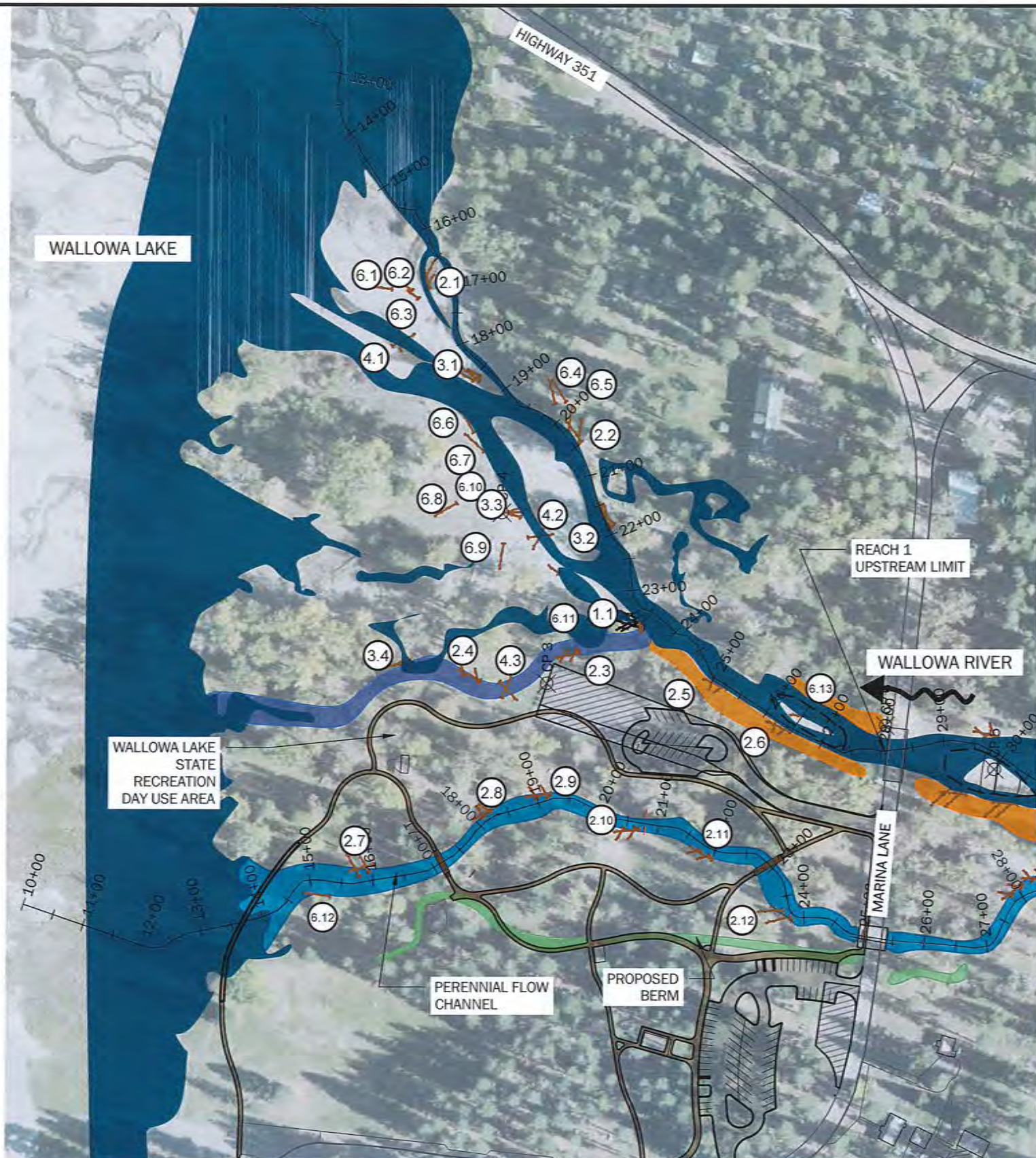
GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

REACH 1 PROPOSED
 BERM CROSS SECTIONS
 UPPER WALLOWA RIVER RESTORATION DESIGN

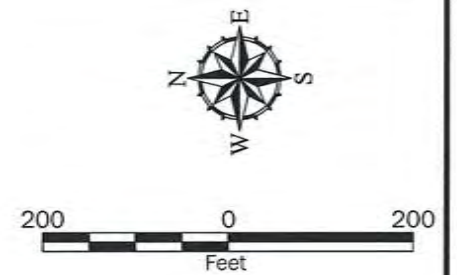
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REACH 1 HABITAT QUANTITIES	
DEFLECTION JAM	1
LONGITUDINAL LOG	12
APEX JAM	4
STEP TURN	3
TURNING WAD	0
BURIED SNAG	15



HABITAT STRUCTURES

- ① DEFLECTION JAM - SHEET 8.3
- ② LONGITUDINAL LOG - SHEET 8.4
- ③ APEX JAM - SHEET 8.4
- ④ STEP TURN - SHEET 8.5
- ⑤ TURNING WAD - SHEET 8.5
- ⑥ BURIED SNAG - SHEET 8.5

- Legend**
- ++++ CHANNEL ALIGNMENT
 - APPROXIMATE BANKFULL EXISTING MAIN CHANNEL
 - PROPOSED HIGH-FLOW CHANNEL
 - PROPOSED PERENNIAL FLOW CHANNEL
 - PROPOSED BANK STABILIZATION
 - REMOVE AND REGRADE EXISTING BERM
 - PROPOSED BERM
 - PROPOSED PATH
 - PROPOSED PARKING AREA
 - PATH TO BE REMOVED

NOTES:

1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988.
2. AERIAL IMAGERY FROM ESRI NAIP 2014 DATED 08/28/2014.
3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
4. PROPOSED BANKFULL CONDITIONS BASED ON THE 1.5-YR EVENT, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.
5. REACH 1 HABITAT QUANTITIES TABLE INCLUDES HABITAT STRUCTURES (BID ALTERNATE) AND STABILITY STRUCTURES. THE FOLLOWING STRUCTURES ARE INCLUDED AS STABILITY STRUCTURES:

- 1.1
- 2.2
- 2.5
- 2.6
- 2.8
- 2.9
- 3.2



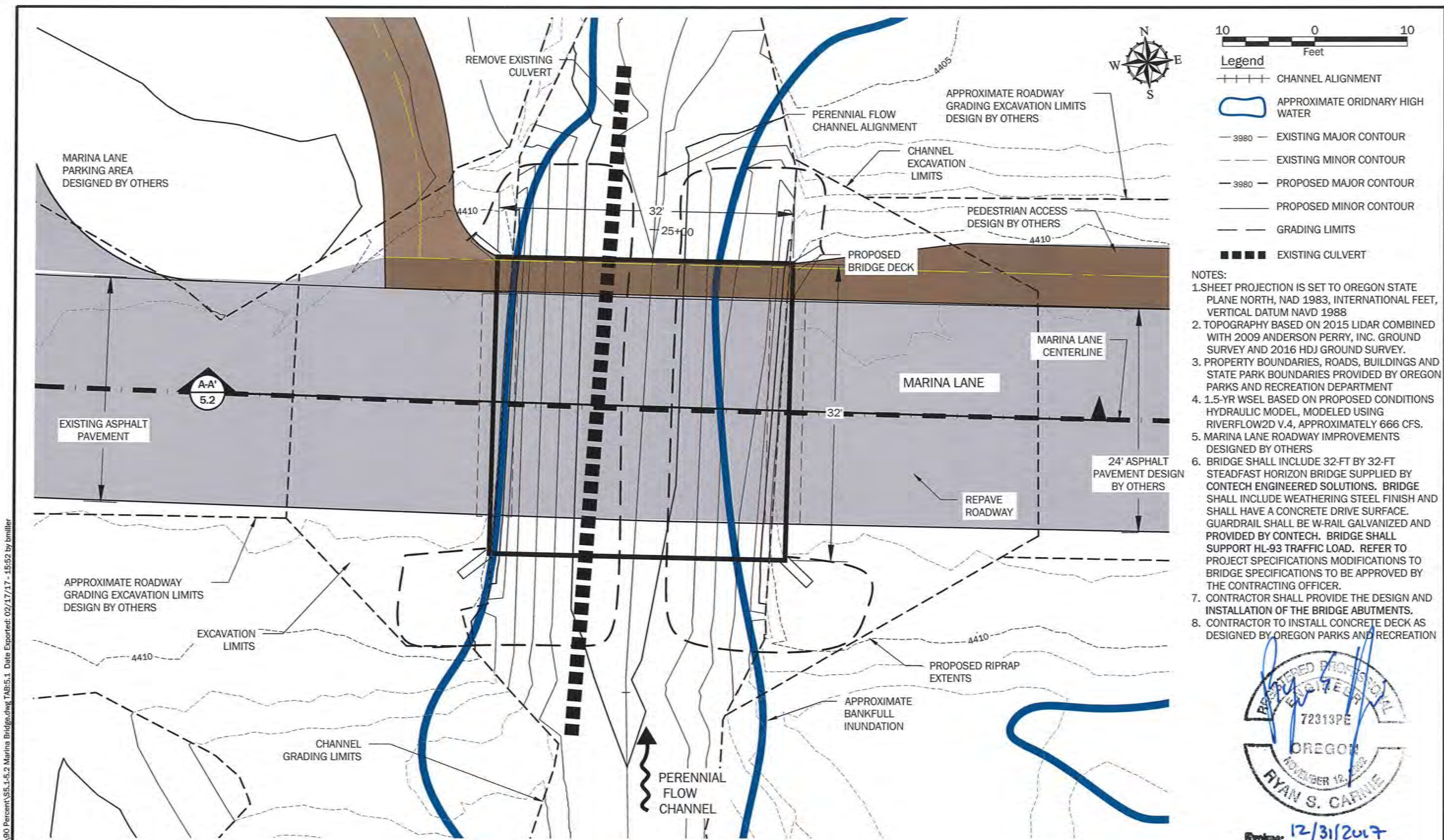
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				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

**REACH 1
 HABITAT STRUCTURES**
 UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
4.13



- 10 0 10
Feet
- Legend**
- ++++ CHANNEL ALIGNMENT
 - APPROXIMATE ORDINARY HIGH WATER
 - 3980 - EXISTING MAJOR CONTOUR
 - - - - EXISTING MINOR CONTOUR
 - 3980 - PROPOSED MAJOR CONTOUR
 - - - - PROPOSED MINOR CONTOUR
 - GRADING LIMITS
 - EXISTING CULVERT

- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.
 5. MARINA LANE ROADWAY IMPROVEMENTS DESIGNED BY OTHERS
 6. BRIDGE SHALL INCLUDE 32-FT BY 32-FT STEADFAST HORIZON BRIDGE SUPPLIED BY CONTECH ENGINEERED SOLUTIONS. BRIDGE SHALL INCLUDE WEATHERING STEEL FINISH AND SHALL HAVE A CONCRETE DRIVE SURFACE. GUARDRAIL SHALL BE W-RAIL GALVANIZED AND PROVIDED BY CONTECH. BRIDGE SHALL SUPPORT HL-93 TRAFFIC LOAD. REFER TO PROJECT SPECIFICATIONS MODIFICATIONS TO BRIDGE SPECIFICATIONS TO BE APPROVED BY THE CONTRACTING OFFICER.
 7. CONTRACTOR SHALL PROVIDE THE DESIGN AND INSTALLATION OF THE BRIDGE ABUTMENTS.
 8. CONTRACTOR TO INSTALL CONCRETE DECK AS DESIGNED BY OREGON PARKS AND RECREATION

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2009
RYAN S. CARNIE
Expires: 12/31/2017

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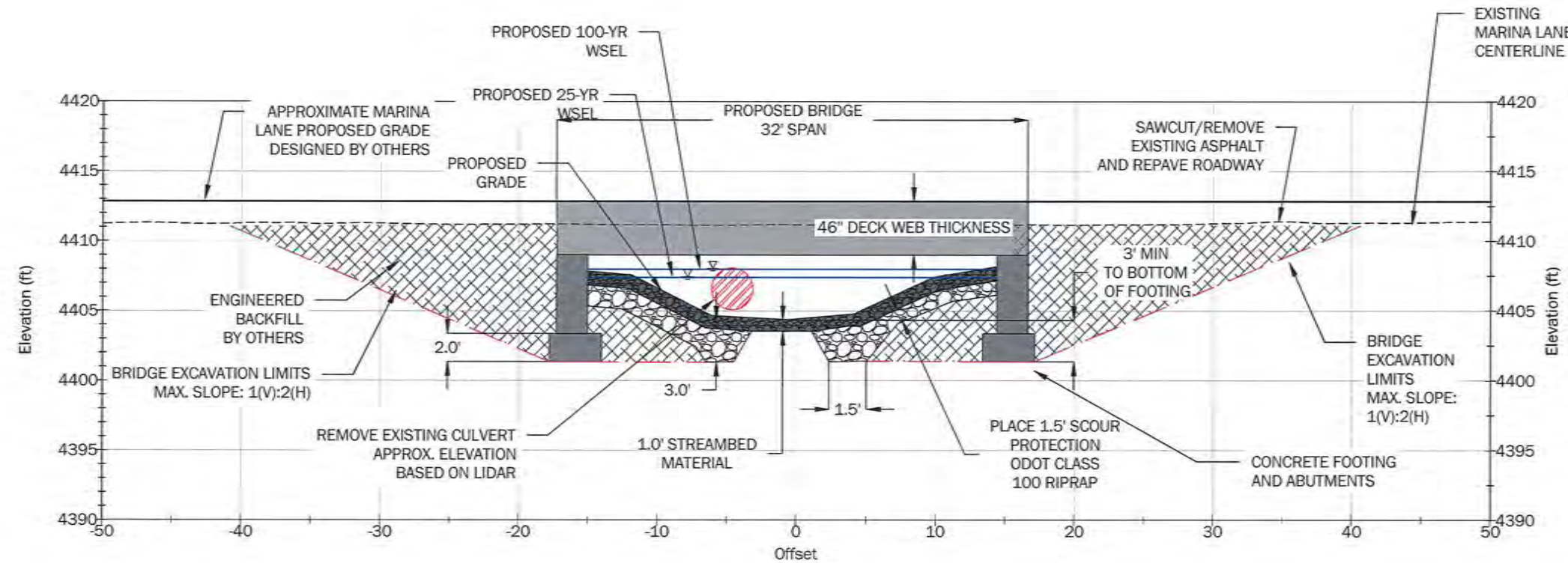
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				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

20 years
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

**MARINA LANE CROSSING
PLAN VIEW**
UPPER WALLOWA RIVER RESTORATION DESIGN

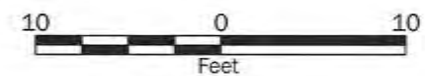
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ODOT CLASS 100 RIPRAP GRADATION

PERCENT GRADATION SMALLER THAN	MINIMUM (FT)	MAXIMUM (FT)
D100	0.95	1.13
D80	0.83	0.92
D50	0.66	-0.62
D15	0.30	0.38

SECTION A-A' SHEET 5.1



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

Professional Engineer
 72313PE
 OREGON
 NOVEMBER 13, 2002
 RYAN S. GAFNIE
 Expires: 12/31/2017

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				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00



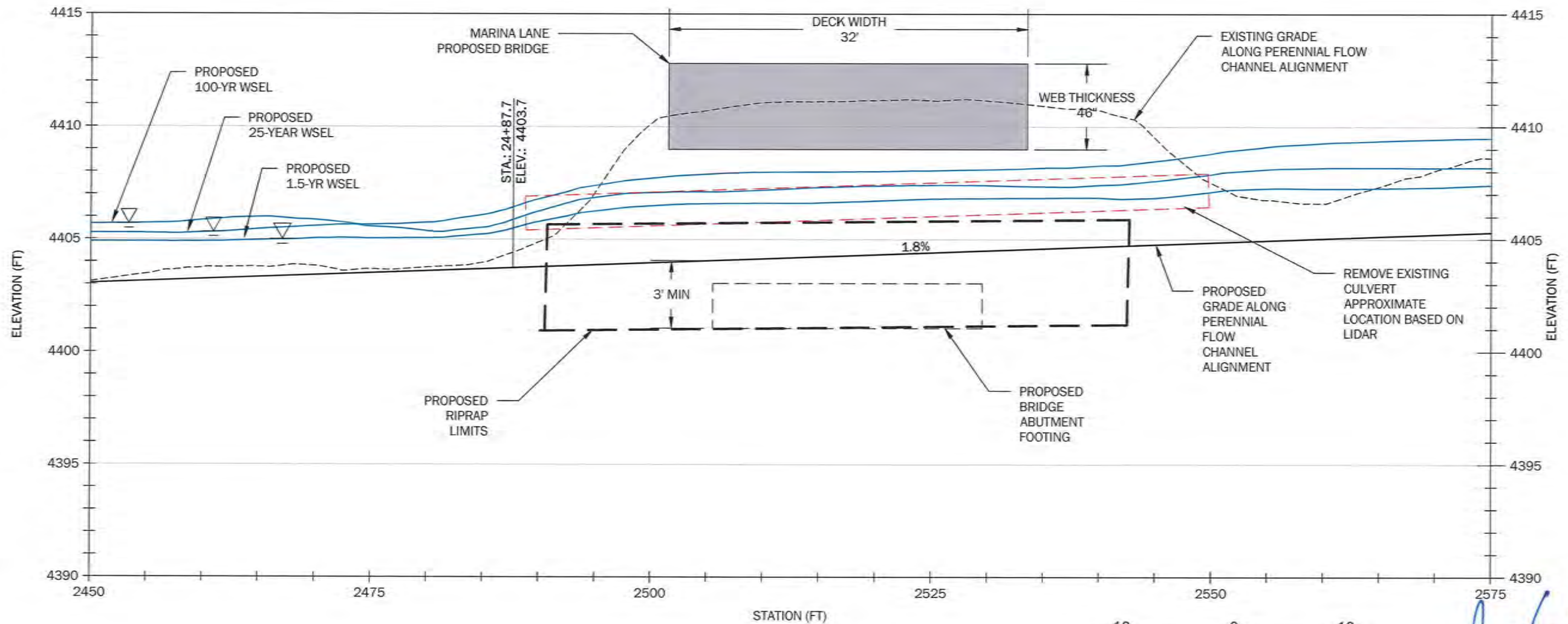
WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828



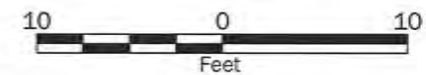
129 SOUTH MAIN STREET
 PENDLETON, OR 97801

MARINA LANE CROSSING
 SECTION VIEW
 UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
 5.2



PERENNIAL FLOW CHANNEL PROFILE VIEW



VERTICAL EXAGGERATION = 2X
 HORIZONTAL SCALE: 1" = 10'
 VERTICAL SCALE: 1" = 5'

REGISTERED PROFESSIONAL ENGINEER
 72013PE
 OREGON
 NOVEMBER 12, 2012
 RYAN S. CARNIE
 Expires: 12/31/2017

NOTES:

1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.
5. 25-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 1692 CFS.

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Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00



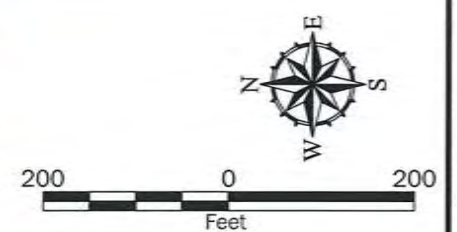
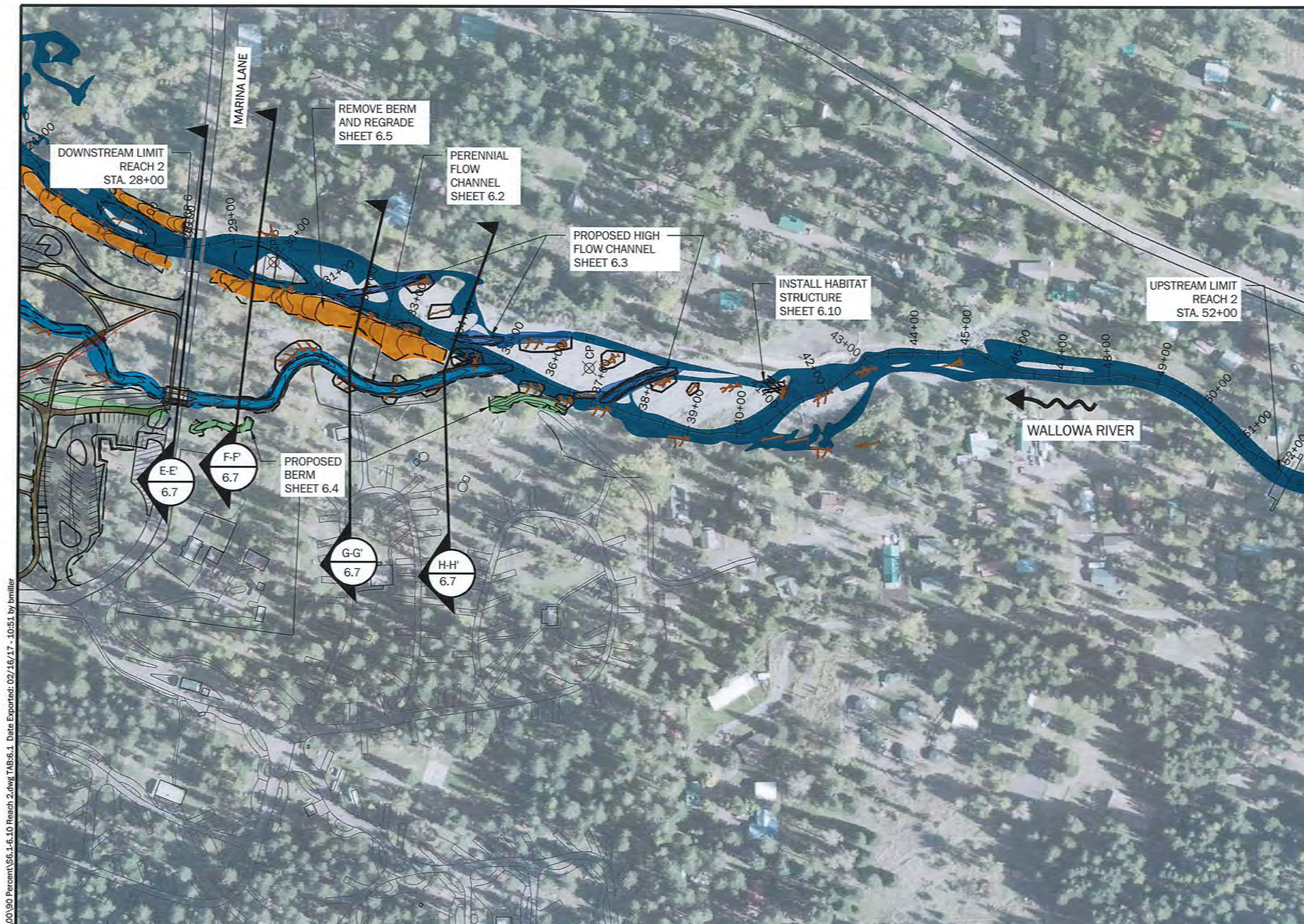
WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828



129 SOUTH MAIN STREET
 PENDLETON, OR 97801

MARINA LANE CROSSING
 PROFILE VIEW
 UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
 5.3



- Legend**
- CHANNEL ALIGNMENT
 - APPROXIMATE BANKFULL MAIN CHANNEL
 - PROPOSED HIGH-FLOW CHANNEL
 - PROPOSED PERENNIAL FLOW CHANNEL
 - PROPOSED BANK STABILIZATION
 - REMOVE AND REGRADE EXISTING BERM
 - PROPOSED BERM
 - PROPOSED PATH
 - PROPOSED PARKING AREA
 - PATH TO BE REMOVED
 - GRADING LIMITS

- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. AERIAL IMAGERY FROM ESRI NAIP 2014 DATED 08/28/2014.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. PROPOSED BANKFULL CONDITIONS BASED ON THE 15-YR EVENT, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.



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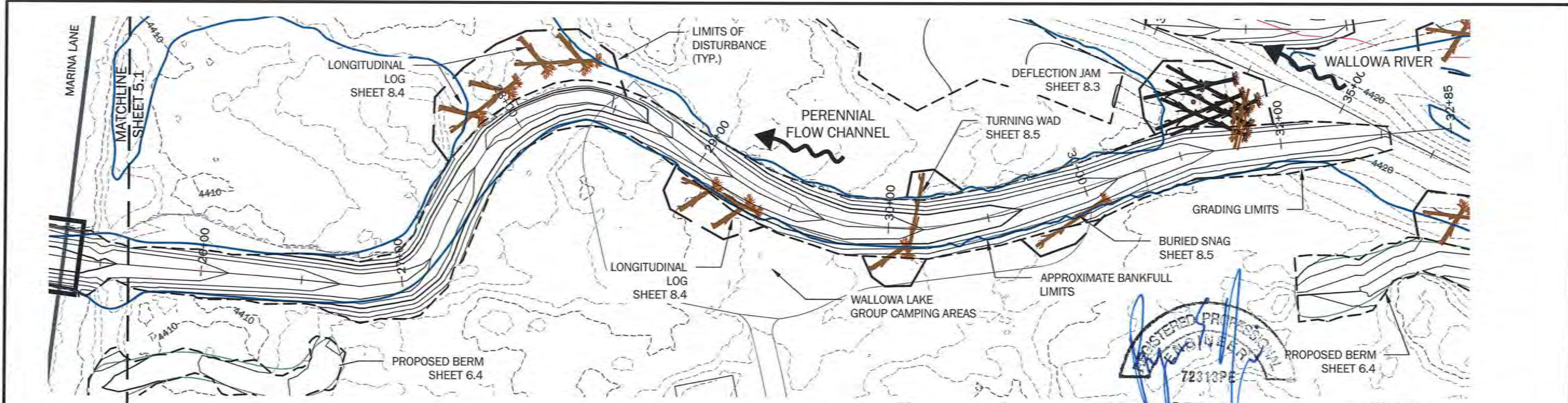
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				Drawn: BHM
				Checked: JGW/JRS
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				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

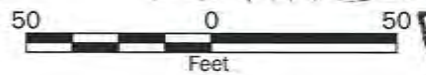
GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

REACH 2 PROPOSED ENHANCEMENTS OVERVIEW
 UPPER WALLOWA RIVER RESTORATION DESIGN

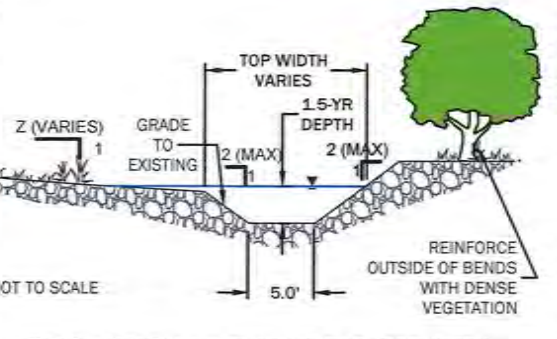
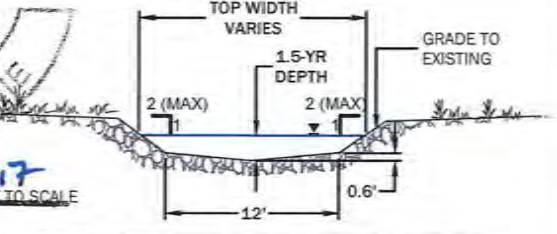
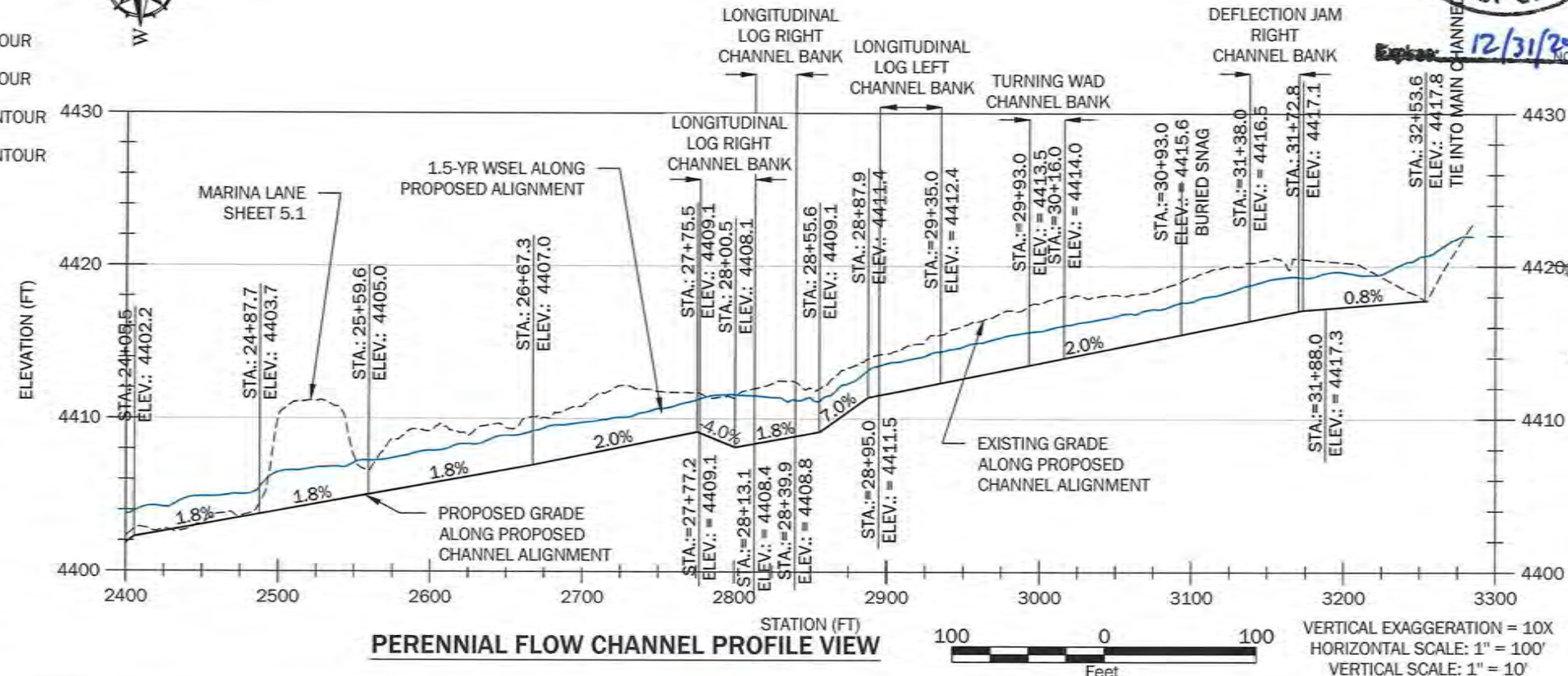
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- Legend**
- ++++ CHANNEL ALIGNMENT
 - APPROXIMATE ORDINARY HIGH WATER
 - 3980--- EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - 3980--- PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - GRADING LIMITS



- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.



CHANNEL GEOMETRY AT MAX POOL

STATION	GRADE TO EXISTING TOP WIDTH, FT	1.5-YR DEPTH, FT
18+17.5	16.8	2.5
23.64.7	19.6	2.4
28+00.5	22.6	3.4

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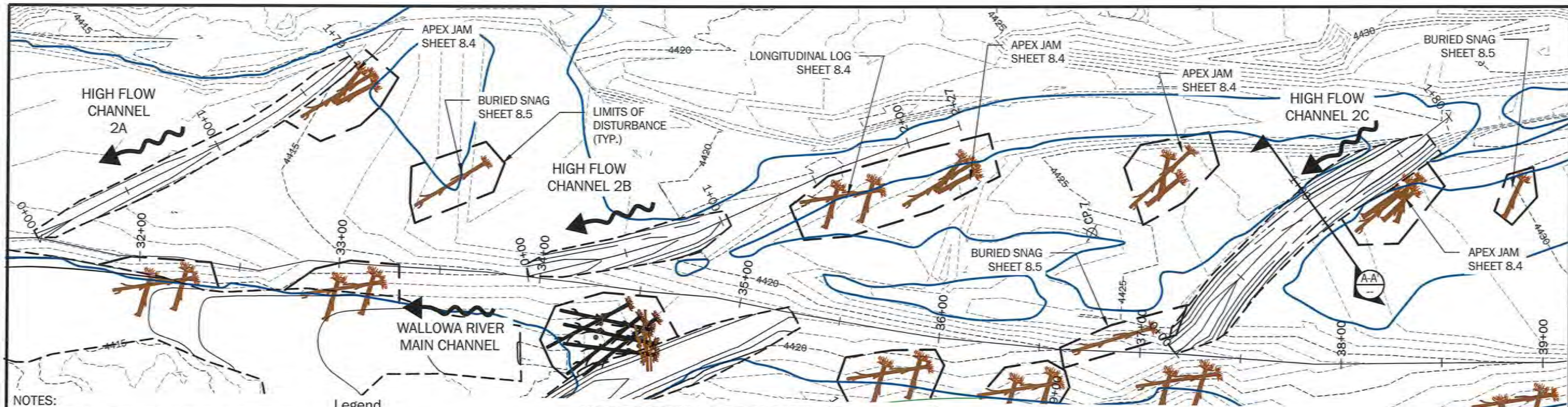
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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

REACH 2 PROPOSED PERENNIAL FLOW CHANNEL PLAN AND PROFILE
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 6.2

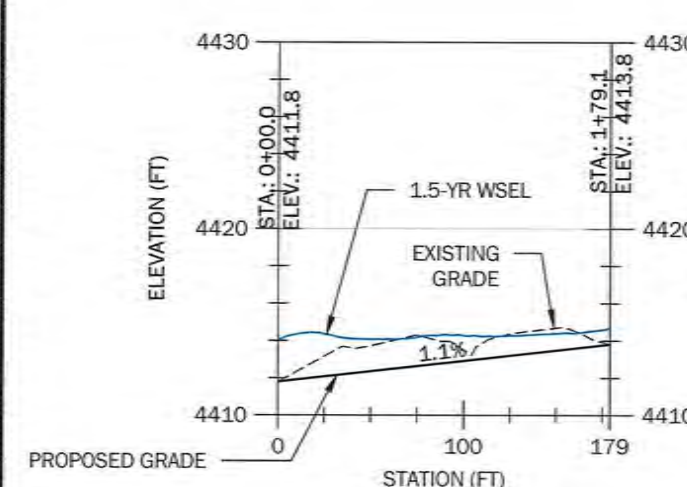


- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
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 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.

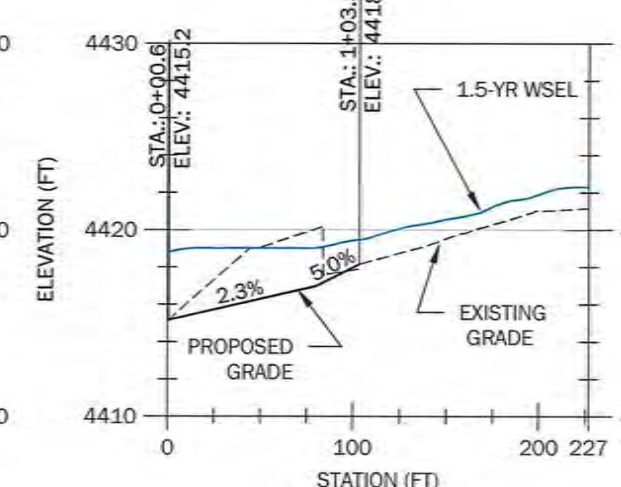
Legend

- Channel Alignment
- Approximate Ordinary High Water
- Existing Major Contour
- Existing Minor Contour
- Proposed Major Contour
- Proposed Minor Contour
- Grading Limits

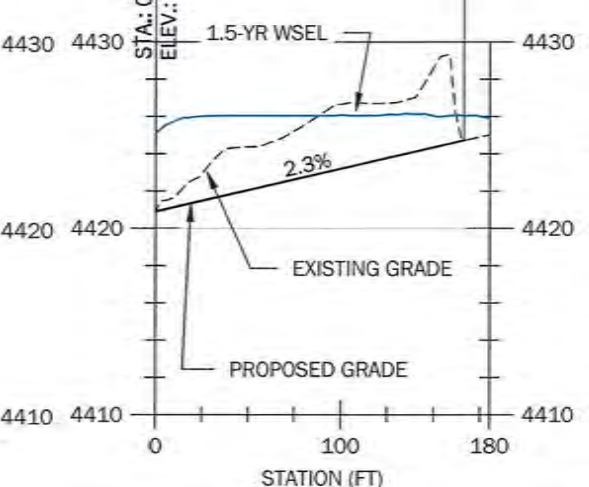
HIGH FLOW CHANNELS PLAN VIEW



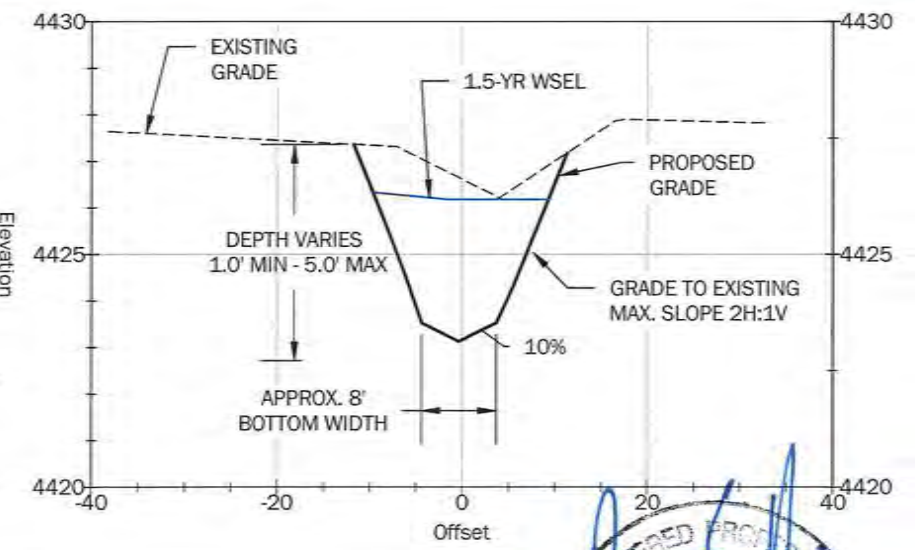
HIGH FLOW CHANNEL 2A PROFILE



HIGH FLOW CHANNEL 2B PROFILE



HIGH FLOW CHANNEL 2C PROFILE



SECTION A-A'

VERTICAL EXAGGERATION = 10X
 HORIZONTAL SCALE: 1" = 100'
 VERTICAL SCALE: 1" = 10'

Professional Engineer Seal:
 RYAN S. CARNIE
 7231SPE
 OREGON
 NOVEMBER 12, 2012
 Date: 12/31/2017

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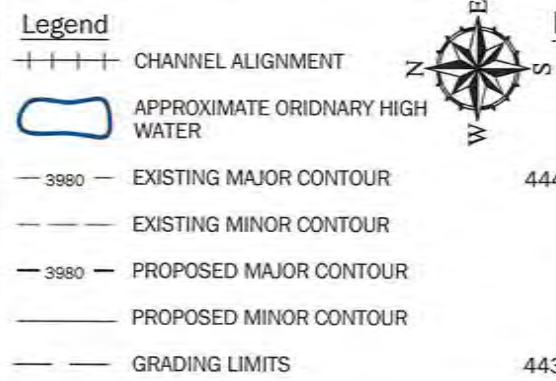
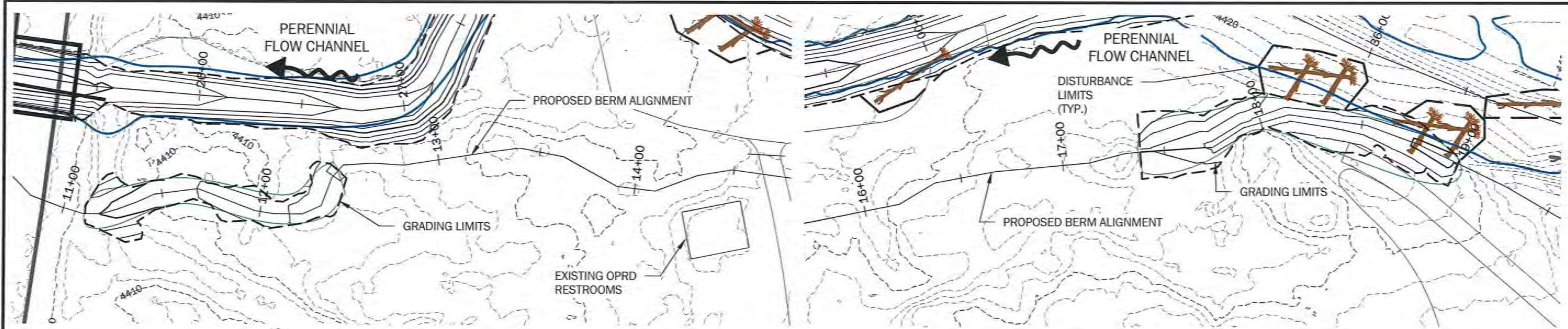
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				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

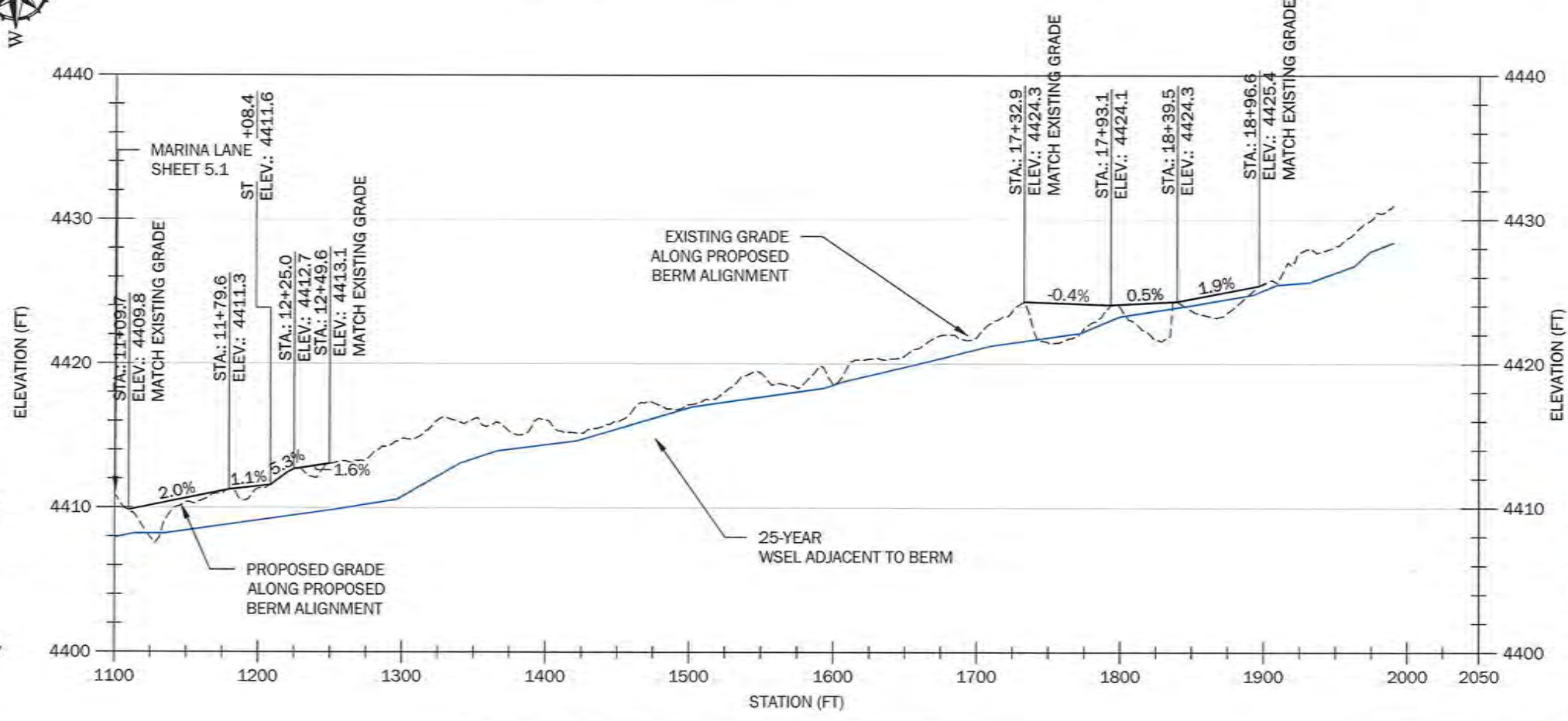
**REACH 2 HIGH FLOW CHANNELS
 PLAN AND PROFILE**
 UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.3



PROPOSED BERM PLAN VIEW 50 0 50 Feet

PROPOSED BERM PLAN VIEW 50 0 50 Feet



PERENNIAL FLOW CHANNEL PROFILE VIEW 100 0 100 Feet

VERTICAL EXAGGERATION = 10X
HORIZONTAL SCALE: 1" = 100'
VERTICAL SCALE: 1" = 10'

- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 25-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.

REGISTERED PROFESSIONAL ENGINEER
72310PE
OREGON
DECEMBER 12 2011
RYAN S. CARNIE
12/31/2017

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				Project No: 21860-001-00

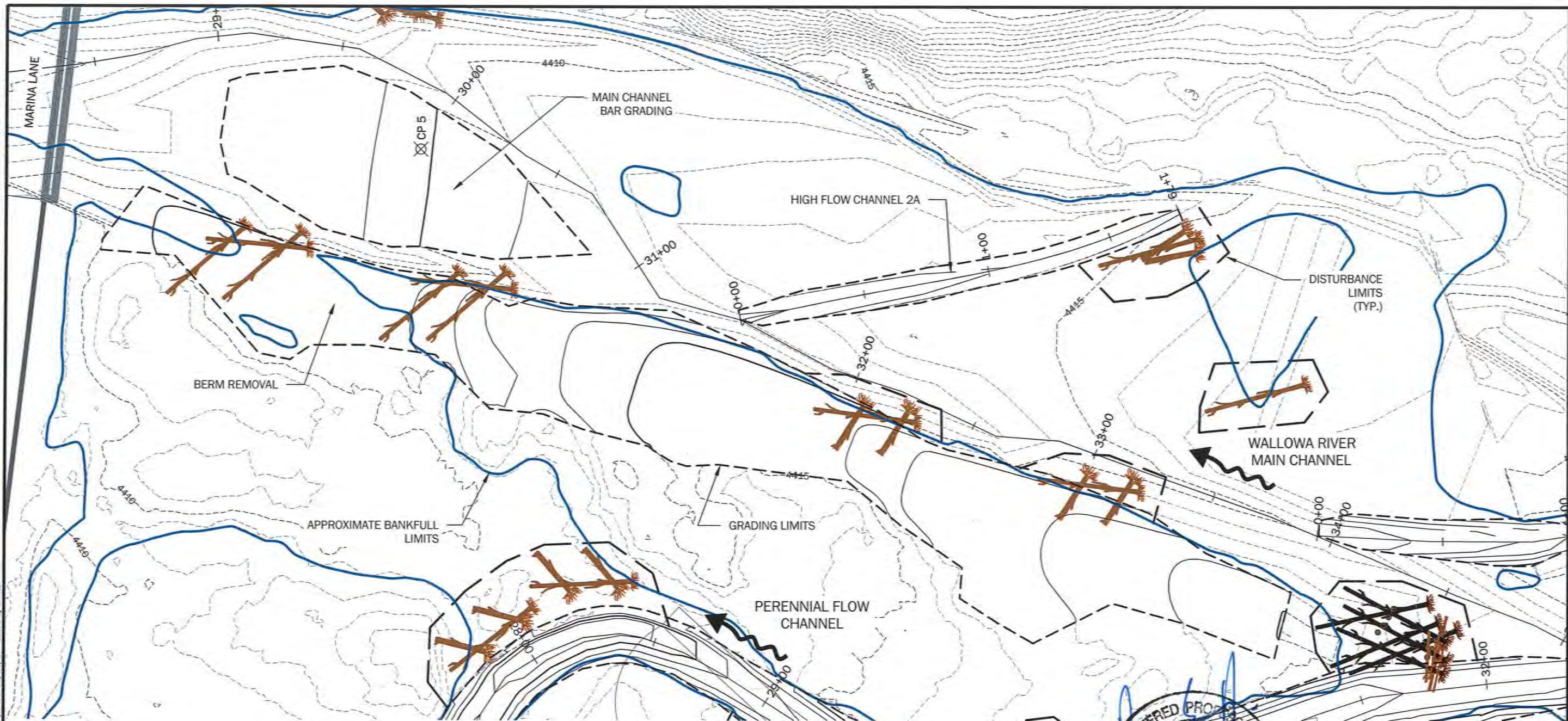
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

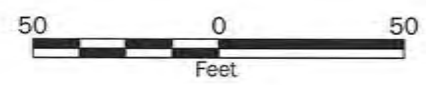
REACH 2 PROPOSED BERM PLAN AND PROFILE
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.4

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- Legend**
- CHANNEL ALIGNMENT
 - APPROXIMATE ORDINARY HIGH WATER
 - - - 3980 - EXISTING MAJOR CONTOUR
 - - - EXISTING MINOR CONTOUR
 - - - 3980 - PROPOSED MAJOR CONTOUR
 - - - PROPOSED MINOR CONTOUR
 - - - GRADING LIMITS



NOTES:
 1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.



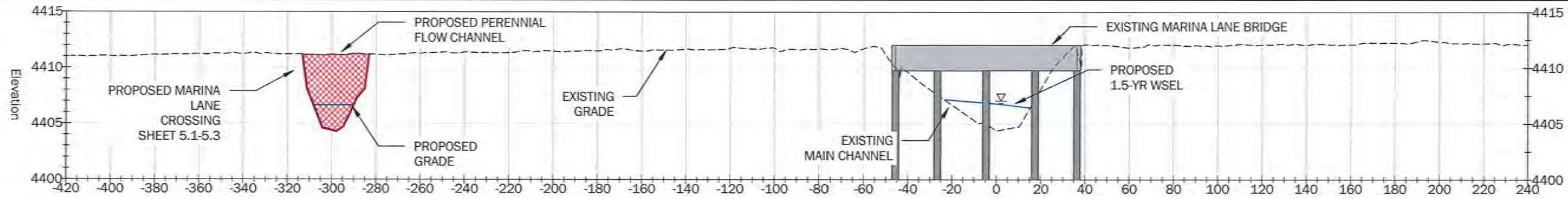
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				Drawn: BHM
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				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

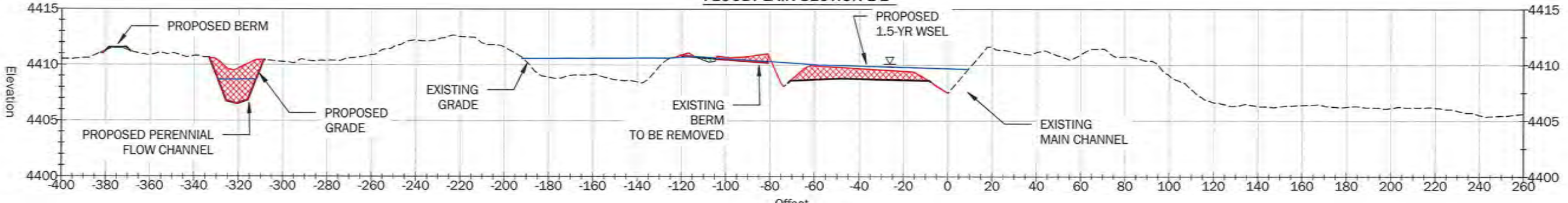
GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

**REACH 2 - MAIN CHANNEL BERM
 REMOVAL AND GRADING PLAN**
 UPPER WALLOWA RIVER RESTORATION DESIGN

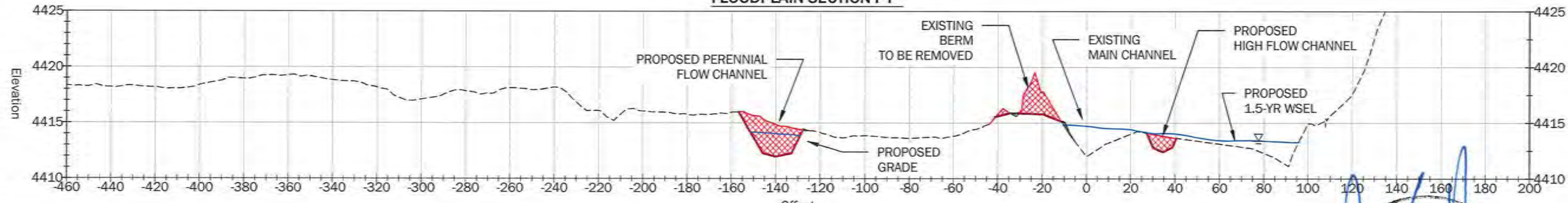
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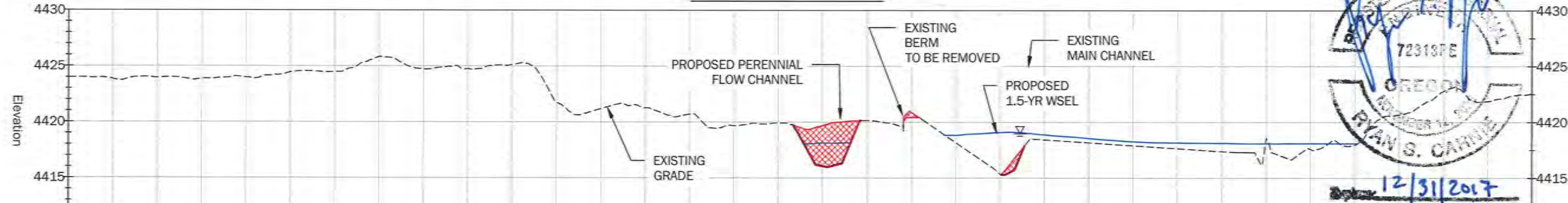
FLOODPLAIN SECTION E-E'



FLOODPLAIN SECTION F-F'



FLOODPLAIN SECTION G-G'



FLOODPLAIN SECTION H-H'



- NOTES:
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.



VERTICAL EXAGGERATION = 5X
 HORIZONTAL SCALE: 1" = 100'
 VERTICAL SCALE: 1" = 20'

LEGEND

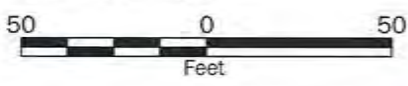
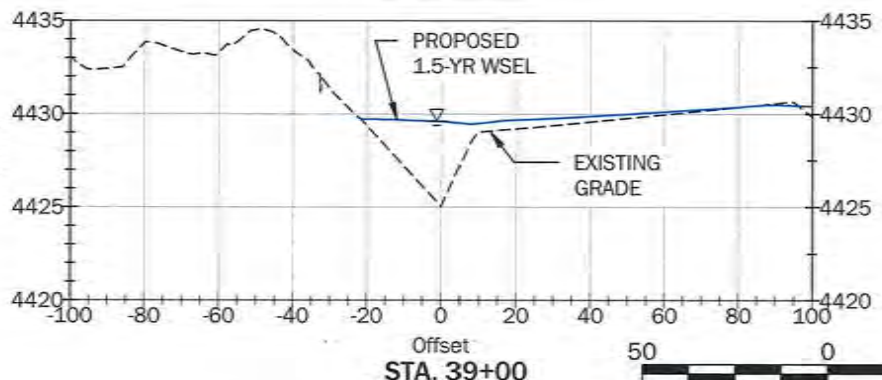
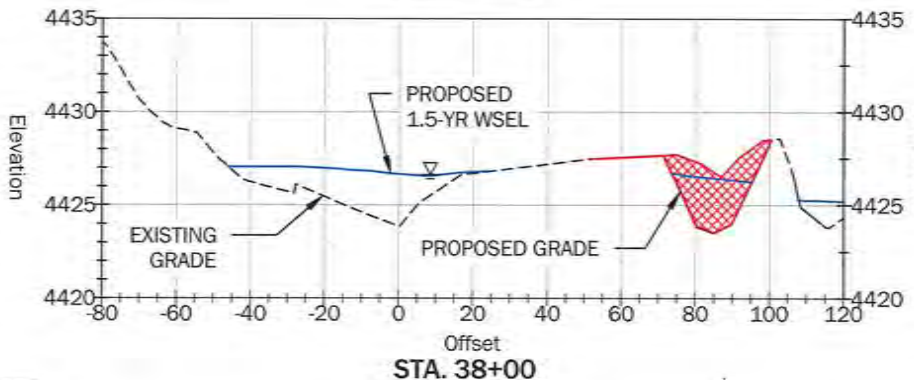
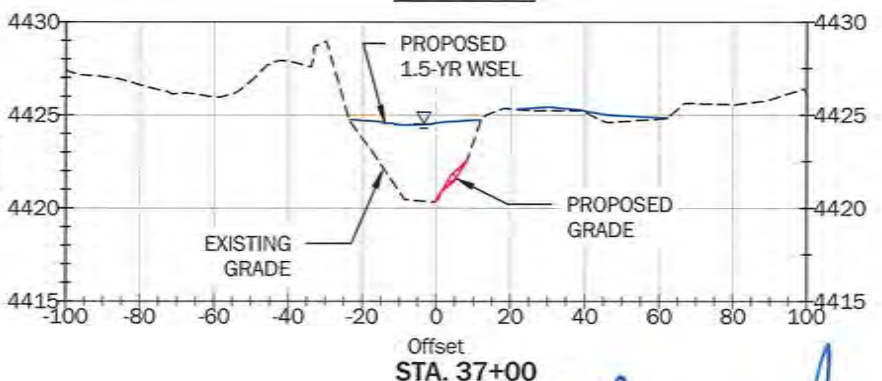
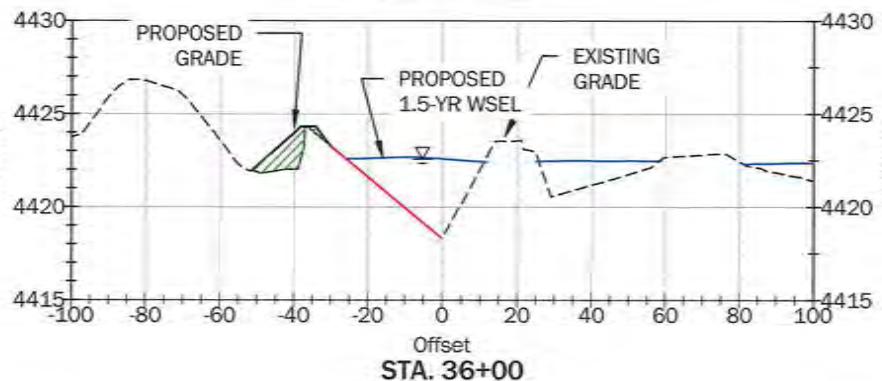
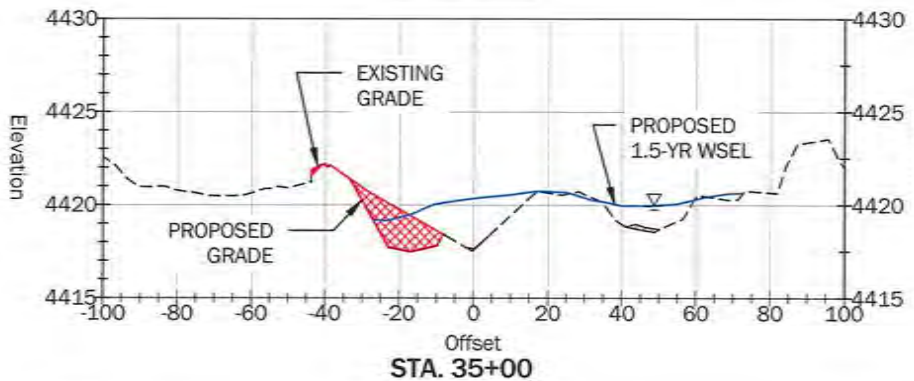
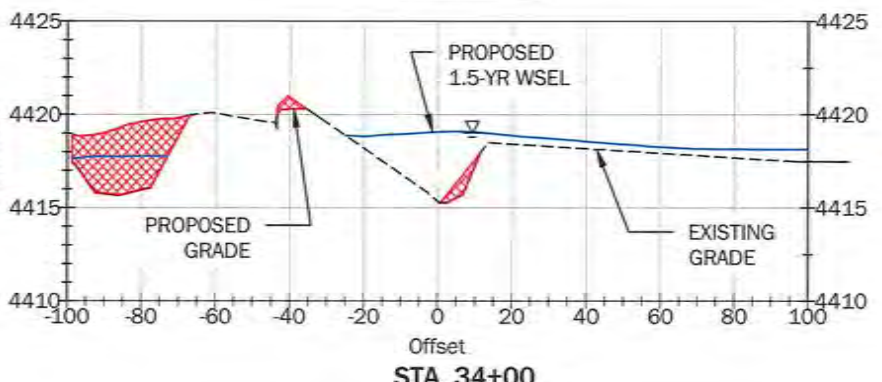
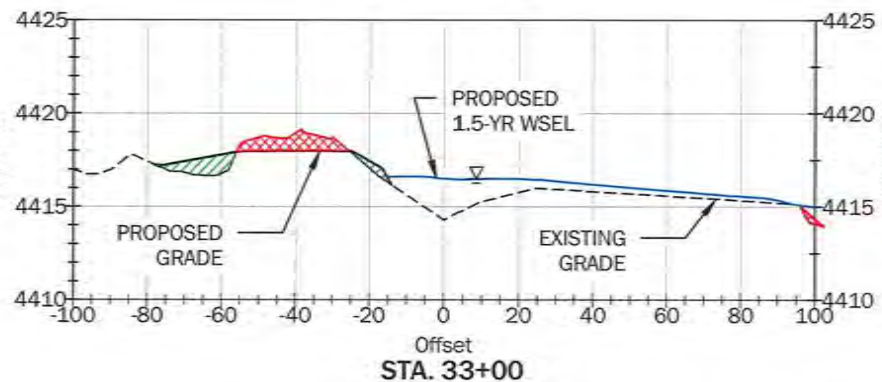
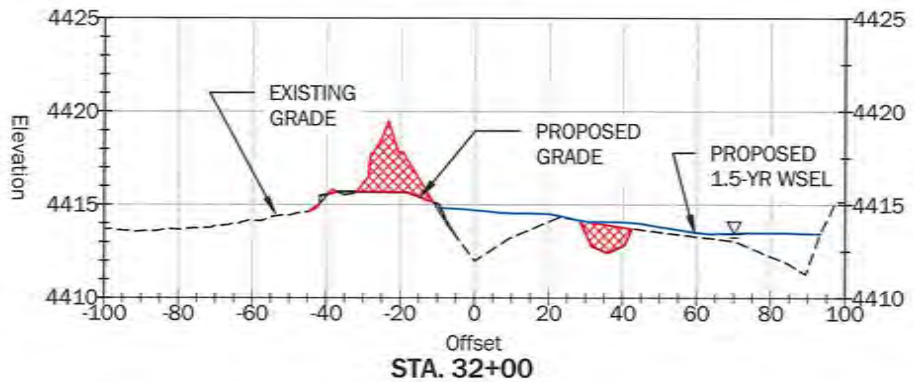
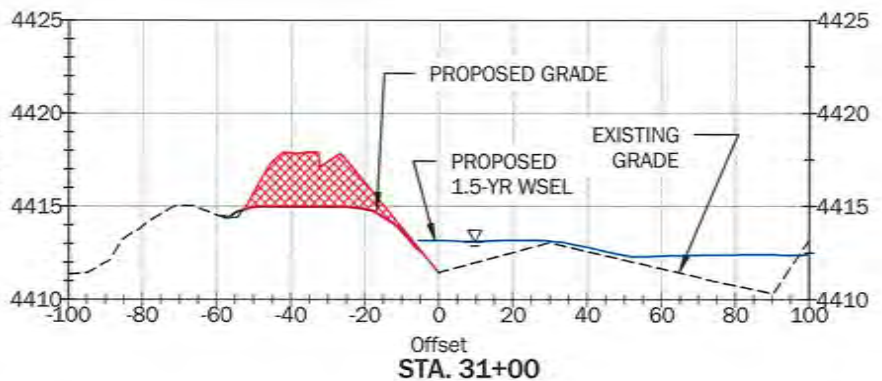
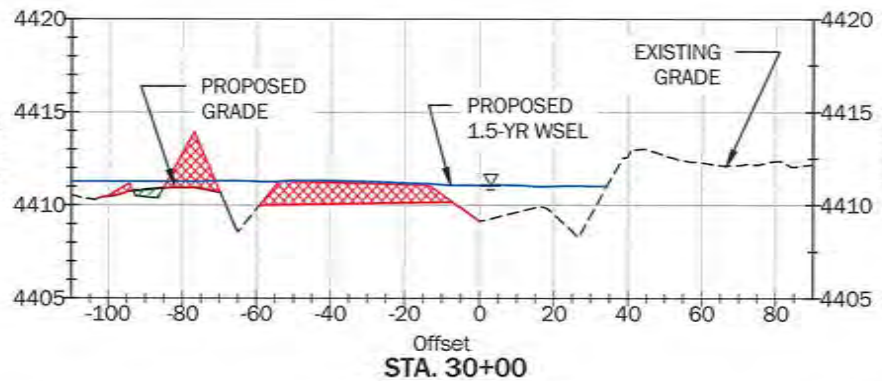
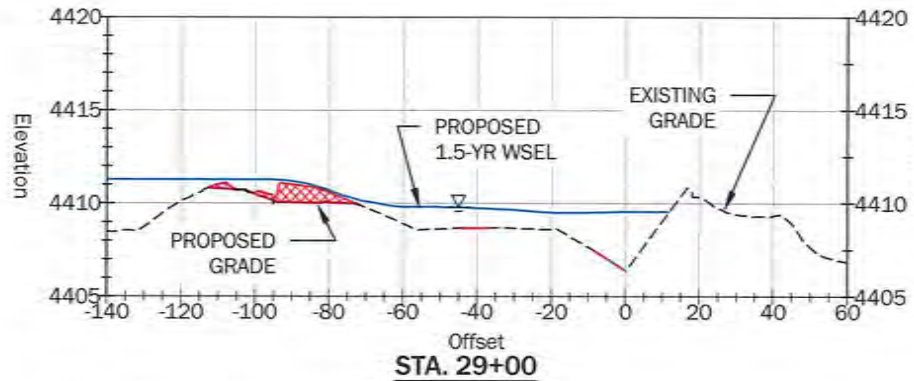
- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

REACH 2
 VALLEY CROSS SECTIONS
 UPPER WALLOWA RIVER RESTORATION DESIGN



LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

VERTICAL EXAGGERATION = 5X
 HORIZONTAL SCALE: 1" = 50'
 VERTICAL SCALE: 1" = 10'



- NOTES:**
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

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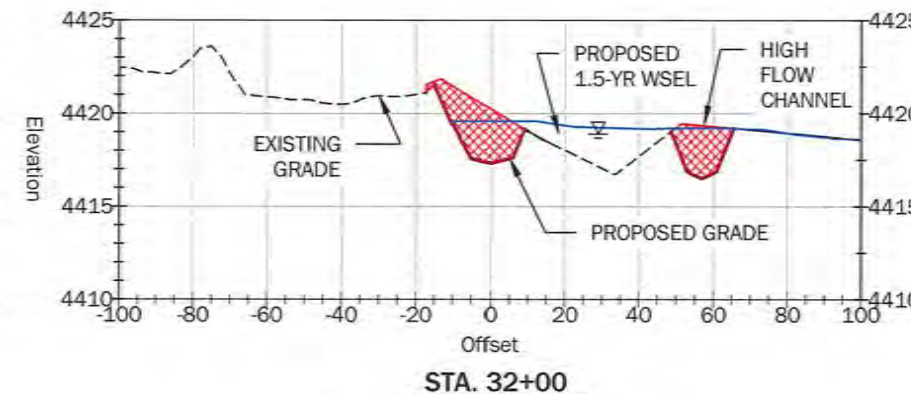
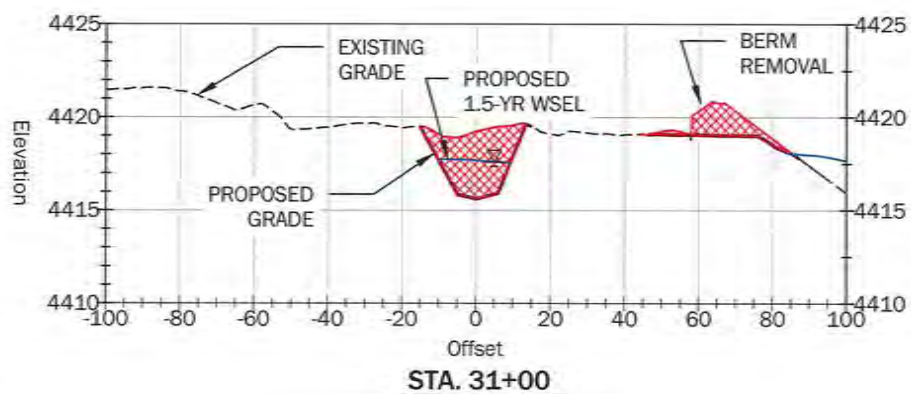
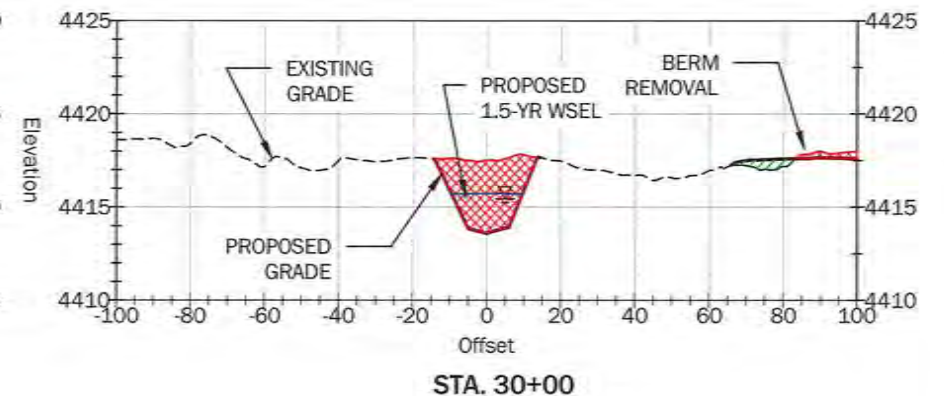
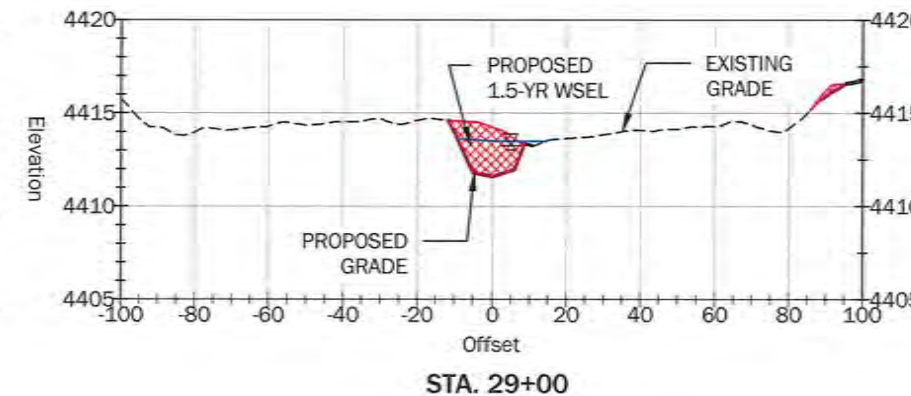
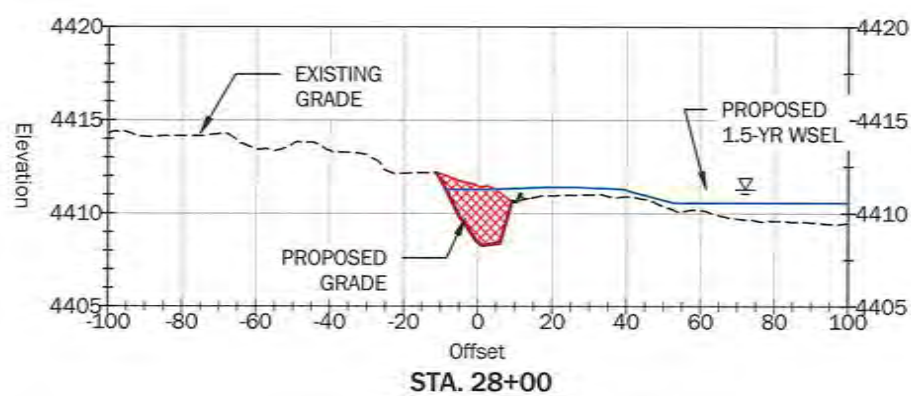
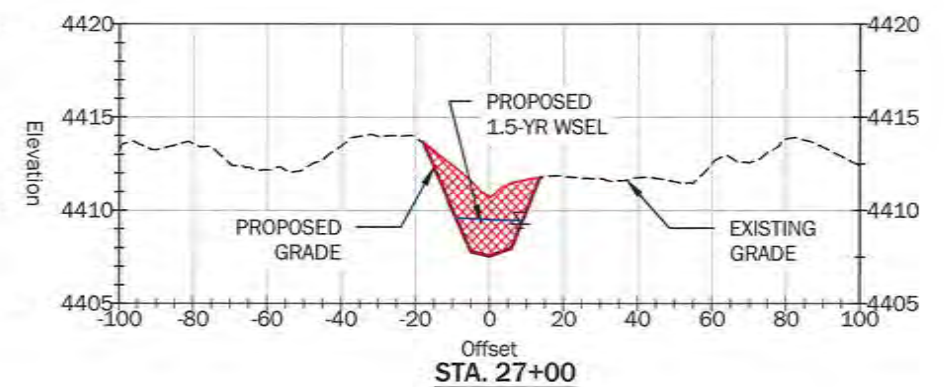
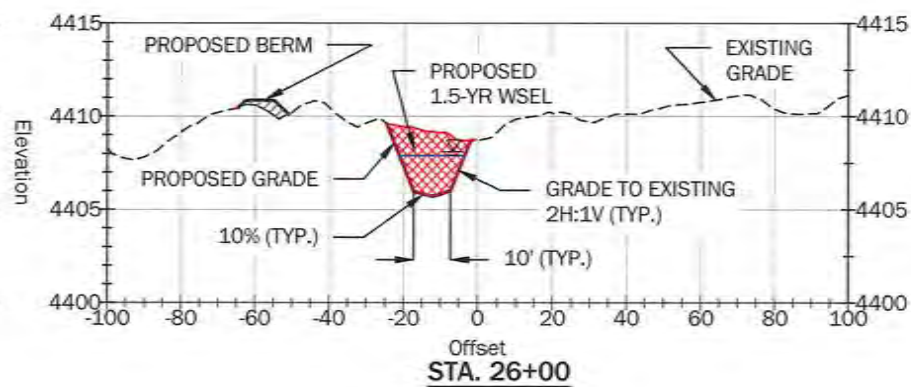
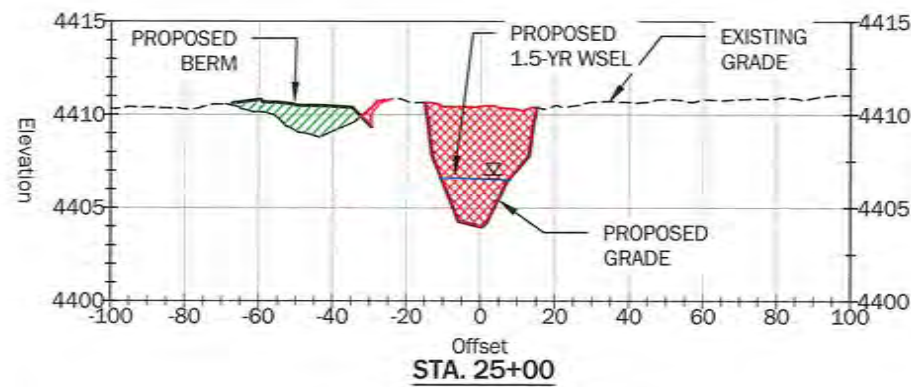
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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

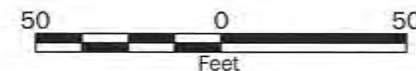
**REACH 2
 MAIN CHANNEL CROSS SECTIONS
 UPPER WALLOWA RIVER RESTORATION DESIGN**

**Sheet
 6.7**



12/31/2017

- NOTES:
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED PERENNIAL FLOW CHANNEL ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.



VERTICAL EXAGGERATION = 5X
 HORIZONTAL SCALE: 1" = 50'
 VERTICAL SCALE: 1" = 10'

LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00



WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

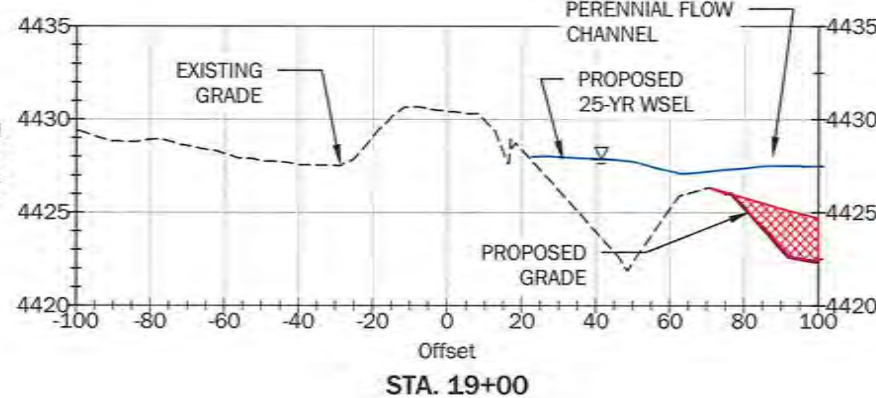
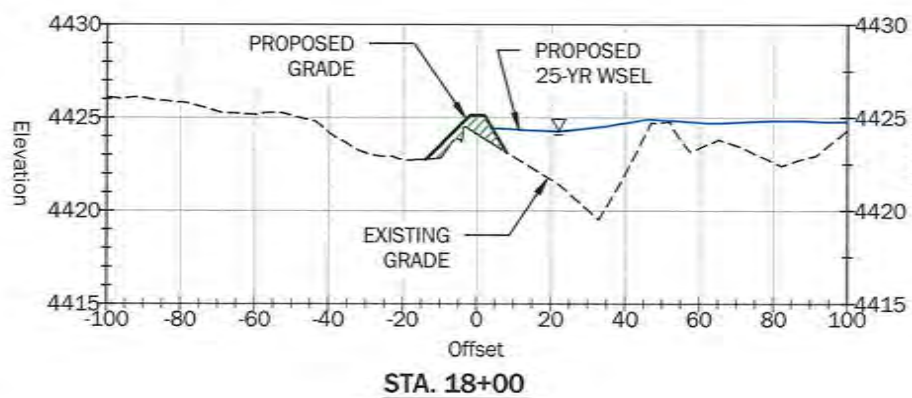
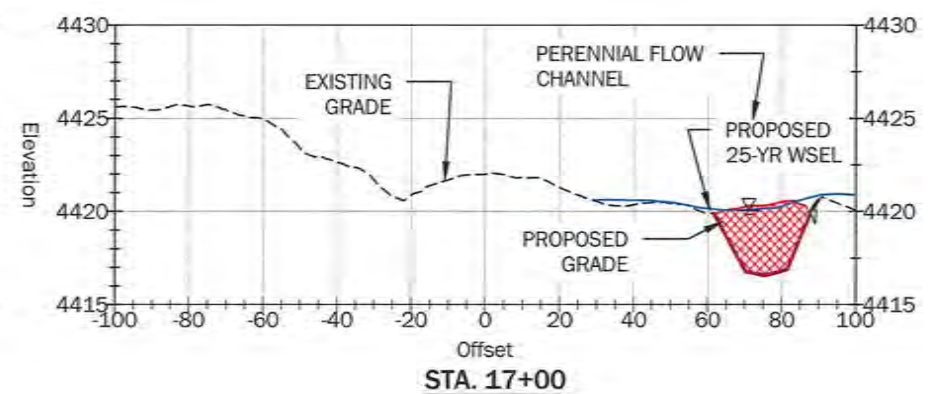
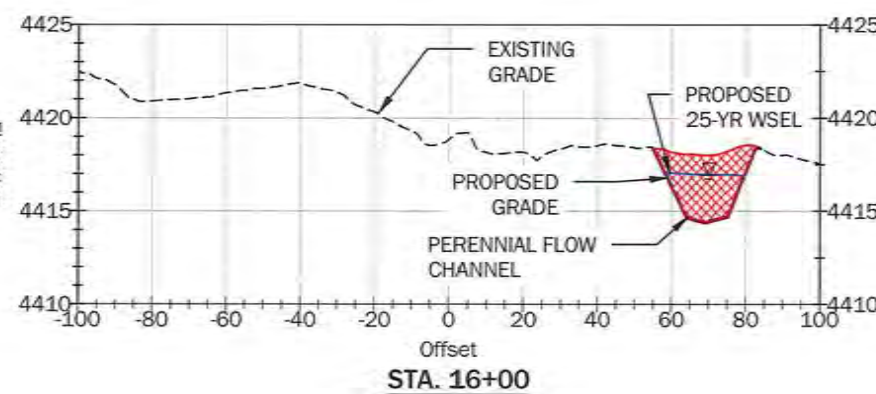
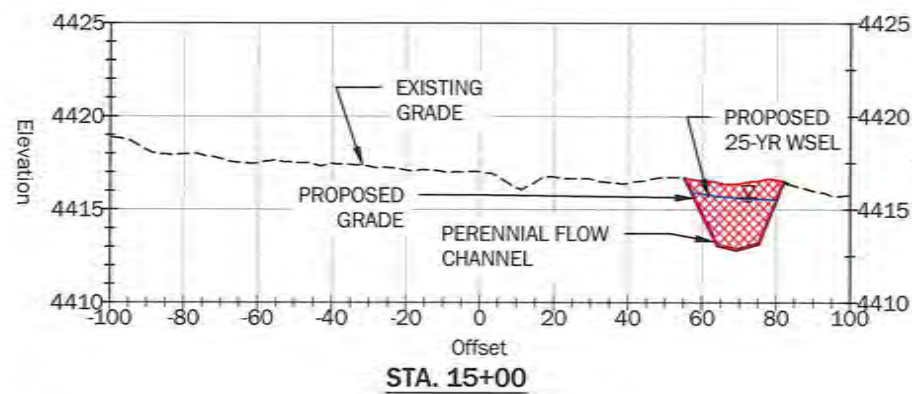
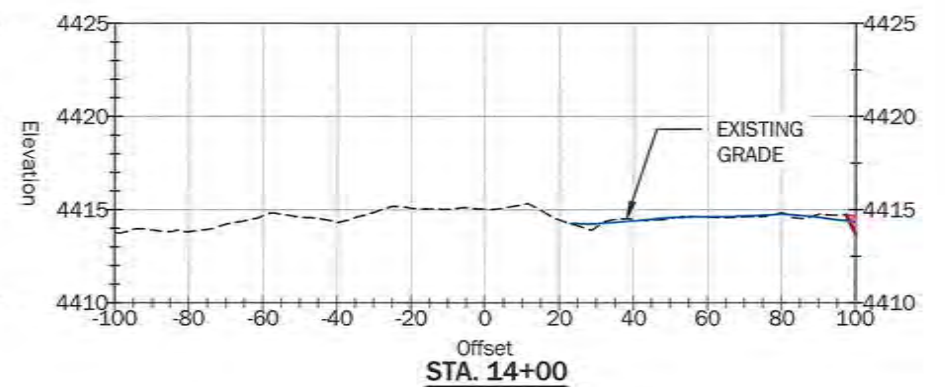
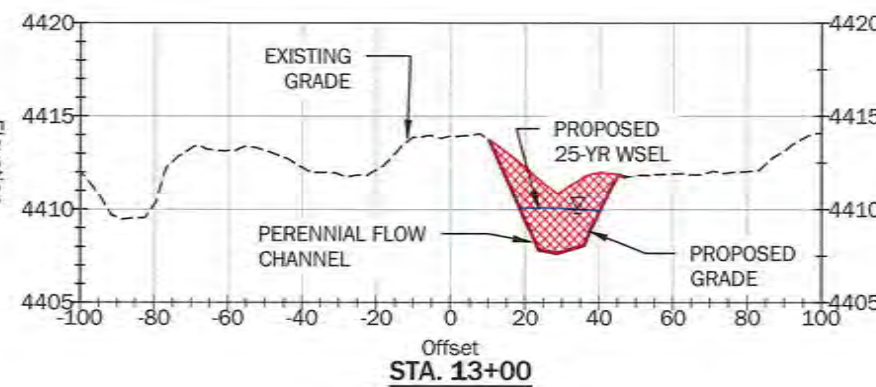
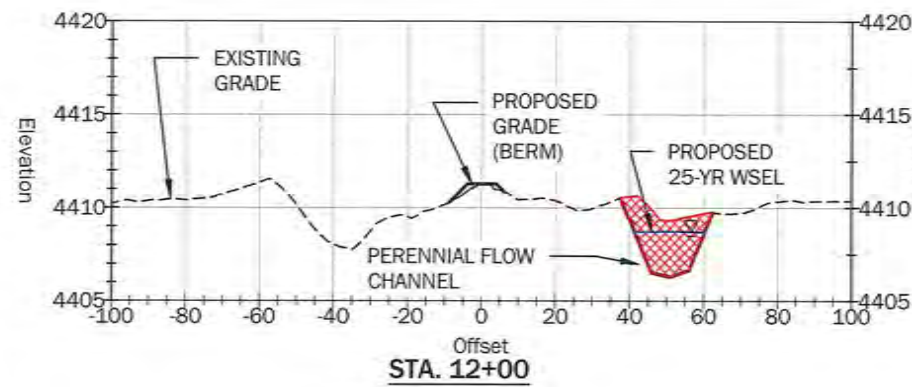


129 SOUTH MAIN STREET
 PENDLETON, OR 97801

**REACH 2 PERENNIAL FLOW
 CHANNEL CROSS SECTIONS**
UPPER WALLOWA RIVER RESTORATION DESIGN

**Sheet
 6.8**

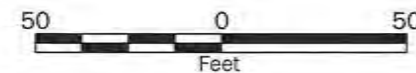
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REGISTERED PROFESSIONAL
 ENGINEER
 72513PE
 OREGON
 RYAN S. GARDNER
 12/31/2017

NOTES:

- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED BERM ALIGNMENT.
- Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY QUANTAM SPATIAL, DATED JULY, 2015 AND GROUND SURVEYS COMPLETED BY HDJ IN 2016 AND ANDERSON PERRY, INC. IN 2009.
- ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.



LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

VERTICAL EXAGGERATION = 5X
 HORIZONTAL SCALE: 1" = 50'
 VERTICAL SCALE: 1" = 10'

Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00



WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

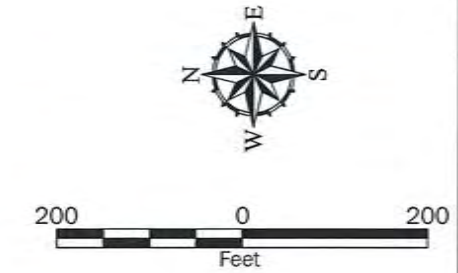
**REACH 2 PROPOSED
 BERM CROSS SECTIONS**
 UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.9

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REACH 2 HABITAT QUANTITIES	
DEFLECTION JAM	2
LONGITUDINAL LOG	17
APEX JAM	5
STEP TURN	0
TURNING WAD	1
BURIED SNAG	7



- HABITAT STRUCTURES**
- ① DEFLECTION JAM - SHEET 8.3
 - ② LONGITUDINAL LOG - SHEET 8.4
 - ③ APEX JAM - SHEET 8.4
 - ④ STEP TURN - SHEET 8.5
 - ⑤ TURNING WAD - SHEET 8.5
 - ⑥ BURIED SNAG - SHEET 8.5

- Legend**
- ++++ CHANNEL ALIGNMENT
 - APPROXIMATE BANKFULL EXISTING MAIN CHANNEL
 - PROPOSED HIGH-FLOW CHANNEL
 - PROPOSED PERENNIAL FLOW CHANNEL
 - PROPOSED BANK STABILIZATION
 - REMOVE AND REGRADE EXISTING BERM
 - PROPOSED BERM
 - PROPOSED PATH
 - PROPOSED PARKING AREA
 - PATH TO BE REMOVED

NOTES:

- SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988.
- AERIAL IMAGERY FROM ESRI NAIP 2014 DATED 08/28/2014.
- PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT.
- PROPOSED BANKFULL CONDITIONS BASED ON THE 1.5-YR EVENT, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.
- REACH 2 HABITAT QUANTITIES TABLE INCLUDES HABITAT STRUCTURES (BID ALTERNATE) AND STABILITY STRUCTURES. THE FOLLOWING STRUCTURES ARE INCLUDED AS STABILITY STRUCTURES:
 - 1.2
 - 1.3
 - 2.13
 - 2.14
 - 2.16
 - 2.17
 - 2.21
 - 2.22
 - 2.23
 - 2.24



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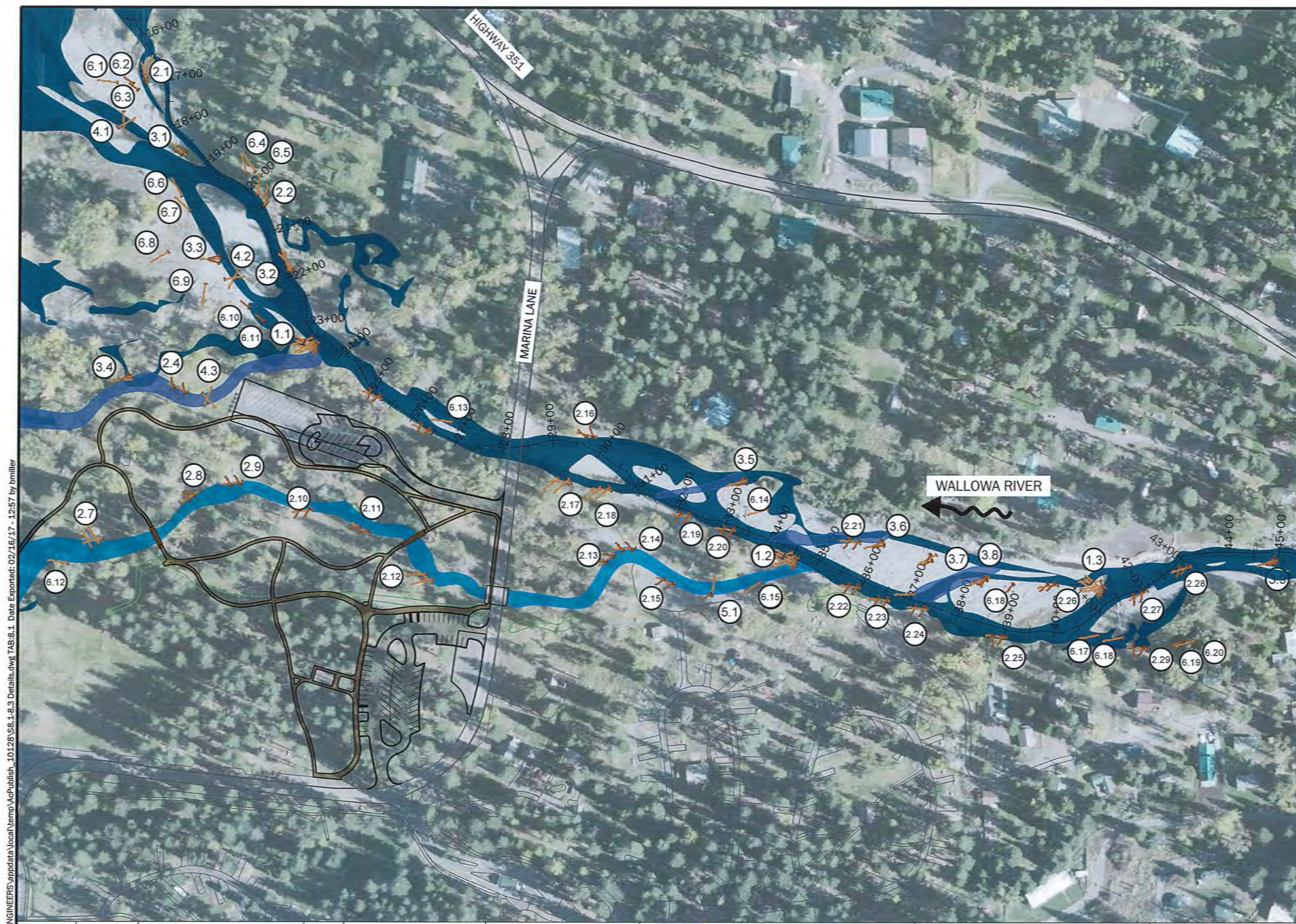
Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828

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 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

**REACH 2
 HABITAT STRUCTURES**
 UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.10

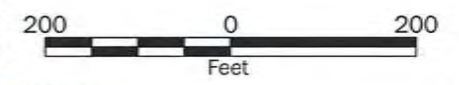


HABITAT STRUCTURES

- ① DEFLECTION JAM - SHEET 8.3
- ② LONGITUDINAL LOG - SHEET 8.4
- ③ APEX JAM - SHEET 8.4
- ④ STEP TURN - SHEET 8.5
- ⑤ TURNING WAD - SHEET 8.5
- ⑥ BURIED SNAG - SHEET 8.5

Legend

- CHANNEL ALIGNMENT
- █ APPROXIMATE BANKFULL EXISTING MAIN CHANNEL
- █ PROPOSED HIGH-FLOW CHANNEL
- █ PROPOSED PERENNIAL FLOW CHANNEL
- █ PROPOSED PATH
- █ PROPOSED PARKING AREA



- NOTES:**
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 2. AERIAL IMAGERY FROM ESRI NAIP 2014 DATED 08/28/2014.
 3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT
 4. STRUCTURE CONTROL POINTS LISTED ON HABITAT DETAILS SHEET 8.2



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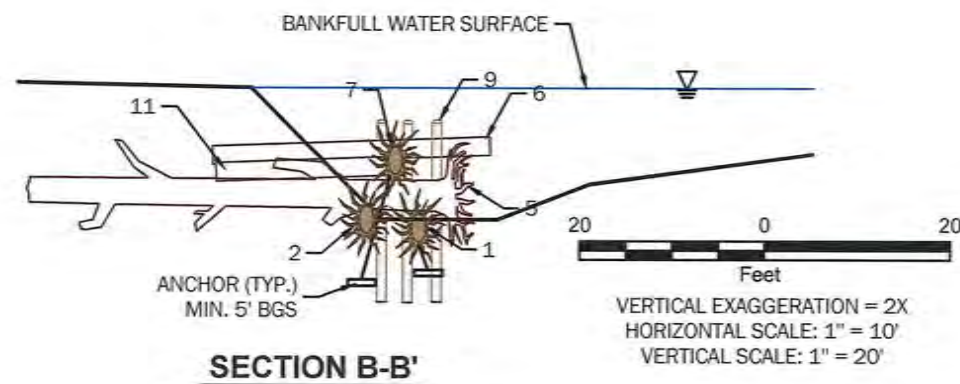
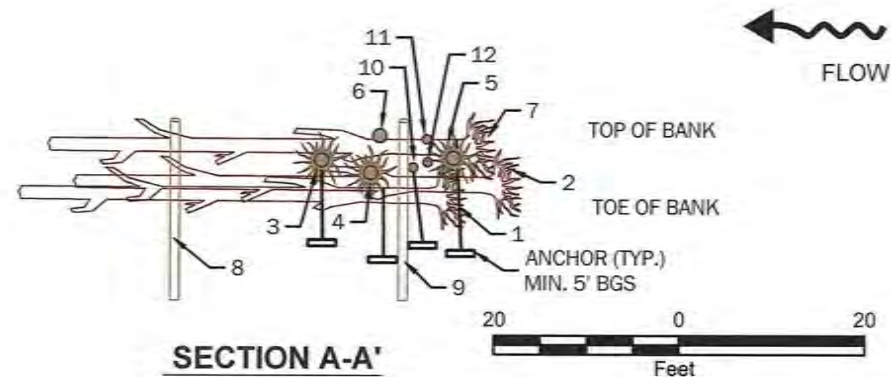
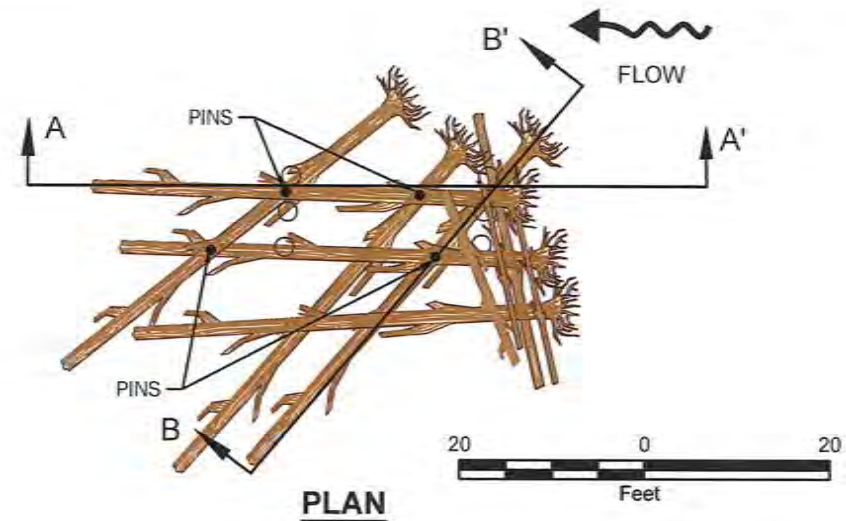
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				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
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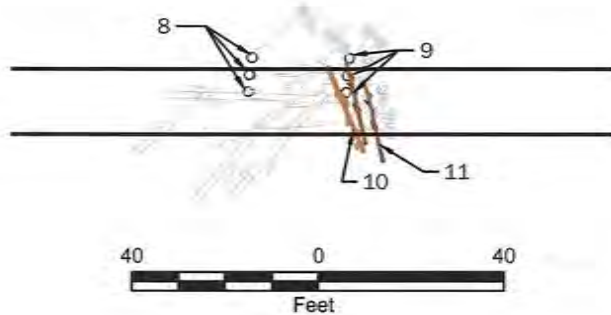
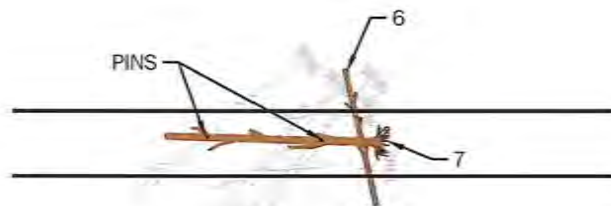
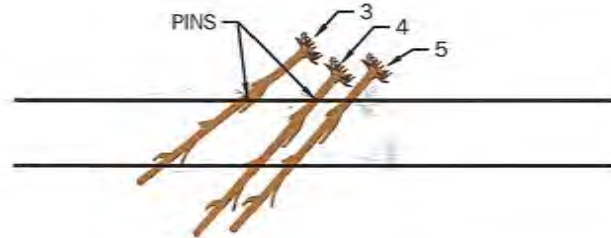
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**HABITAT STRUCTURES
 PLAN VIEW**
 UPPER WALLOWA RIVER RESTORATION DESIGN

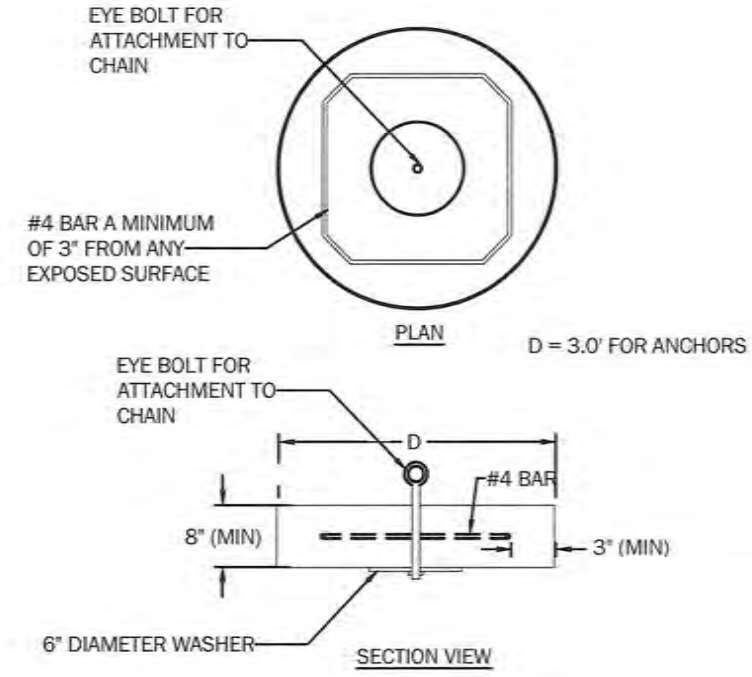
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FLOW DEFLECTION JAM



TYPICAL CONCRETE ANCHOR DETAIL
NOT TO SCALE



ASSEMBLY SEQUENCE

- WOOD PLACEMENT ORDER:**
- 45' LOG WITH ROOTWAD WITH ANCHOR
 - 45' LOG WITH ROOTWAD
 - 45' LOG WITH ROOTWAD WITH ANCHOR
 - 45' LOG WITH ROOTWAD
 - 45' LOG WITH ROOTWAD
 - 30' LOG WITHOUT ROOTWAD
 - 45' LOG WITH ROOTWAD WITH ANCHOR
 - 3 PILES
 - 3 PILES
 - 20' LOG WITHOUT ROOTWAD WITH ANCHOR
 - 20' LOG WITHOUT ROOTWAD
 - 20' LOG WITHOUT ROOTWAD

DESIGN SPECIFICATIONS:

- ORIENT ROOT WADS PERPENDICULAR TO FLOW.
- TOP OF ROOT WAD SHOULD NOT EXTEND MORE THAN 1/2-FT ABOVE TOP OF BANK.
- MEMBERS SHALL EXTEND BELOW CALCULATED SCOUR DEPTH
- PLACE ROOT WADS ALONG OUTSIDE OF BENDS
- PLACE ANCHORS PRIOR TO PLACING ROOTWADS.
- ANCHORS SHALL BE MIN. 3' DIAMETER CONCRETE AND BURIED MIN. 5' DEEP.
- PLACE BOULDERS THROUGHOUT JAM ON TOP LAYER OF LOGS.
- INSTALL VEGETATION AMONG ARMORING AND ROOT WADS WHILE INSTALLING ROOT WADS
- EXPOSED ROOT WAD DEPTH EQUALS POOL DEPTH

WOOD QUANTITIES

45' LOG WITH ROOTWAD (EA)	30' LOG WITHOUT ROOTWAD (EA)	20' LOG WITHOUT ROOTWAD (EA)	10' PILES 12" DIA (EA)	30" BOULDER BALLAST	10' RACKING MATERIAL 6"-10" DIA (EA)	3' CONCRETE ANCHOR
6	1	3	6	8	20	4



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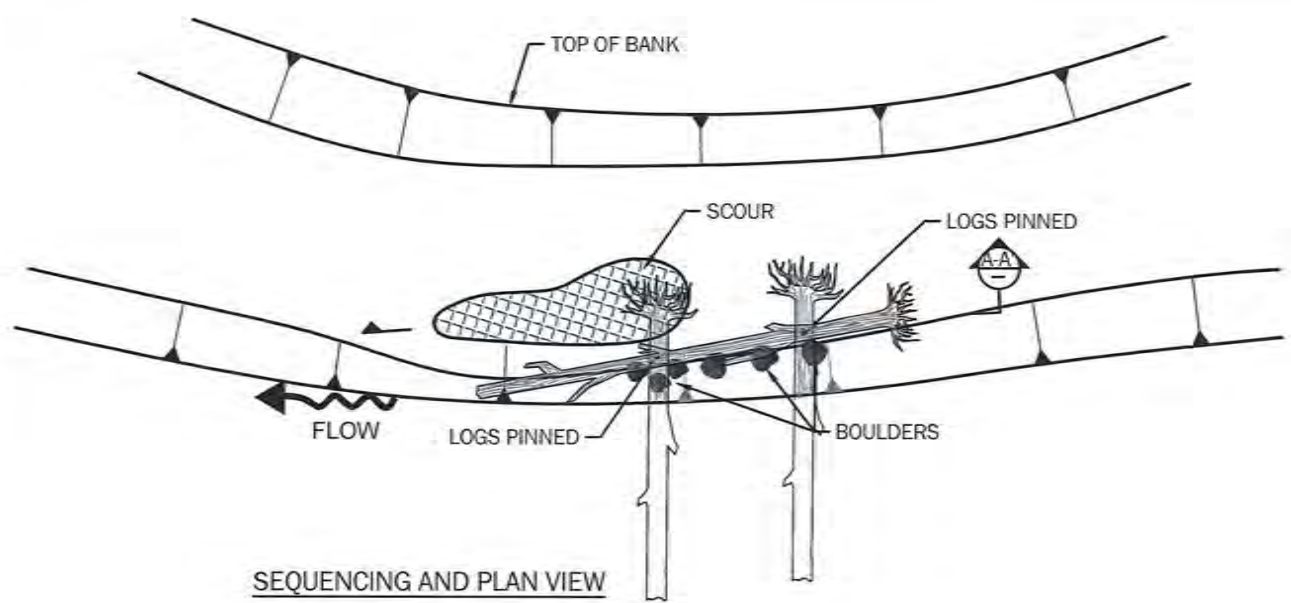
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				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

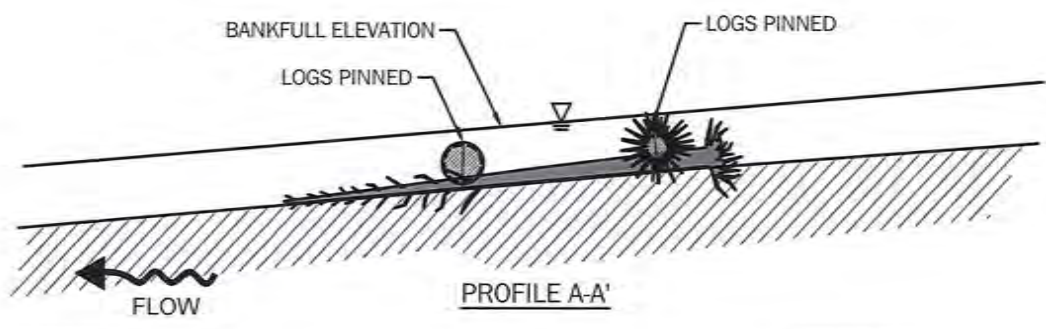
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HABITAT STRUCTURES - DETAILS
UPPER WALLOWA RIVER RESTORATION DESIGN

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SEQUENCING AND PLAN VIEW



PROFILE A-A'

DESIGN SPECIFICS:

- PLACE AS INDICATED ON HABITAT PLANS.
- PLACE ROOT WAD ON OR IN STREAM BED.
- TREES WITH BRANCHES OR MULTIPLE TRUNKS PREFERRED.
- SECURE KEY MEMBERS BY PINNING TO PREVENT BOUNCING OF TREES DURING FLOODS.
- BALLAST SHALL BE INSTALLED ON KEY MEMBERS BURIED INTO BANK.
- SEE QUANTITY TABLE FOR MEMBER SIZES
- PLACE LOGS IN NUMERIC ORDER

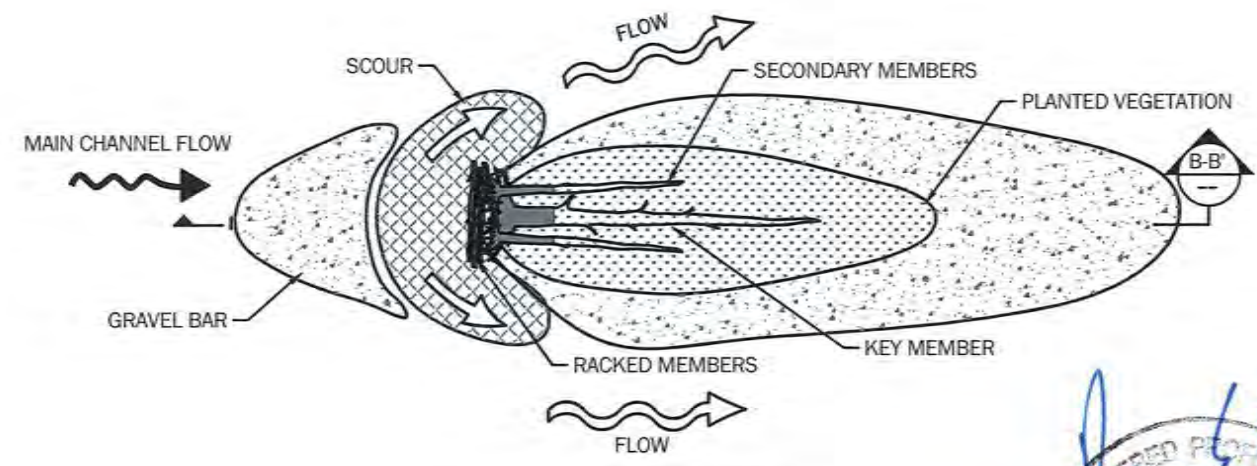
PURPOSE:

- CREATES LATER SCOUR POOL.
- PROMOTES GRAVEL BAR FORMATION.
- CREATES DIVERSE FISH HABITAT.
- PROVIDES COVER.

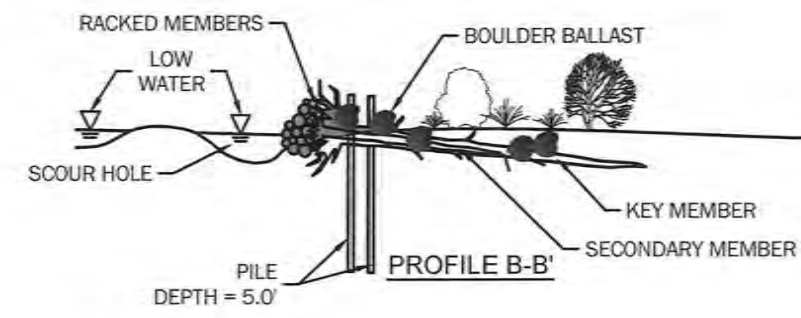
WOOD QUANTITIES		
MAIN CHANNEL	45' LOG WITH ROOTWAD (EA), MIN 24" DBH	24" DIA. BALLAST BOULDERS (EA)
	3	8

LONGITUDINAL LOG

NOT TO SCALE



EXAMPLE PLAN VIEW



PROFILE B-B'
PILE DEPTH = 5.0'

DESIGN SPECIFICS:

- PLACED ON CONSTRUCTED MID-STREAM GRAVEL BARS.
- NARROW END OF LARGE KEY MEMBERS, AND SECONDARY MEMBERS, ARE BURIED INTO THE BAR IN A DOWNWARD SLOPING MANNER TO REINFORCE STRUCTURE. SMALLER RACKED MEMBERS PLACED AMONG KEY MEMBERS.
- FILL AND DENSE VEGETATION PLACED AND PLANTED ON TOP OF STRUCTURE.
- FLOW THROUGH NEW SIDE CHANNEL MAY BE ENCOURAGED BY EXCAVATION.
- MINIMUM LENGTH OF KEY MEMBERS IS 50 FEET.

PURPOSE:


- CREATES MID-STREAM GRAVEL BARS, PROMOTES SIDE CHANNEL FORMATION
- PRINCIPAL MECHANISM FOR FORMATION OF ANASTOMOSING CHANNEL SYSTEMS.
- CREATES DIVERSE HABITAT AND GRAVEL CONDITIONS


WOOD QUANTITIES				
45' LOG WITH ROOTWAD, MIN. 24" DBH	30' LOG WITH ROOTWAD, MIN. 18" DBH	10'-20' RACKING MATERIAL 6"-10" DIA (EA)	24" BOULDER BALLAST (EA)	12" DIA. 7.5' PILE
1	2	9	6	2

APEX JAM

NOT TO SCALE

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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00


WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
 ENTERPRISE, OR 97828


GEOENGINEERS
 129 SOUTH MAIN STREET
 PENDLETON, OR 97801

HABITAT STRUCTURES - DETAILS
 UPPER WALLOWA RIVER RESTORATION DESIGN

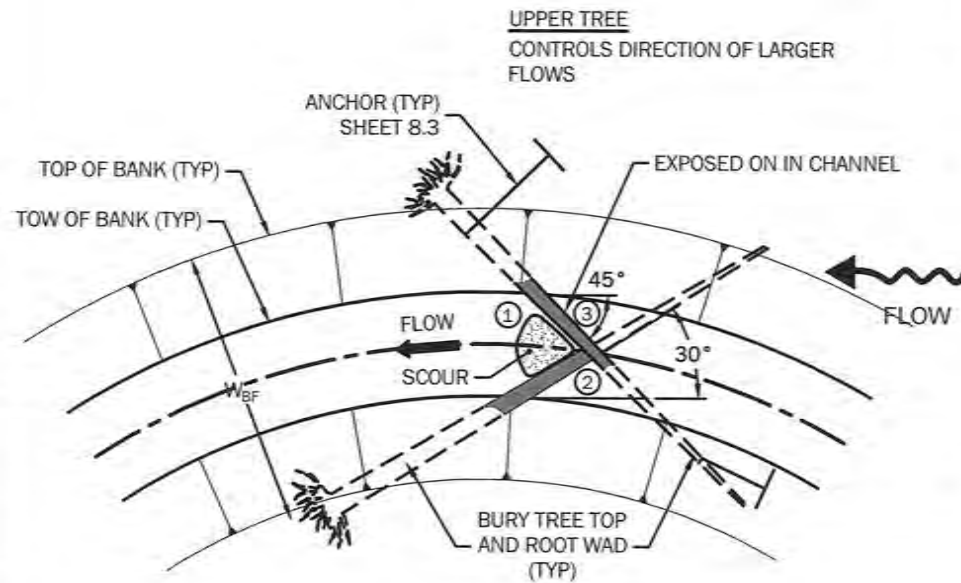
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WOOD QUANTITIES		
45' LOG WITH ROOTWAD, MIN. 24" DBH	10'-20' RACKING MATERIAL 6"-10" DIA (EA)	ANCHOR
2	6	2

WOOD QUANTITIES		
45' LOG WITH ROOTWAD, MIN. 24" DBH	30' LOG WITH ROOTWAD, MIN. 18" DBH	10'-20' RACKING MATERIAL 6"-10" DIA (EA)
1	1	6

WOOD QUANTITIES
45' LOG WITH ROOTWAD, MIN. 24" DBH
1



$L = 2 \times W_{BF}$
 $W_{BF} =$ BANKFULL WIDTH

PLAN

PURPOSE:

- REDIRECTS FLOW.
- CREATES SCOUR.
- APPROPRIATE IN STEEPER REACHES.

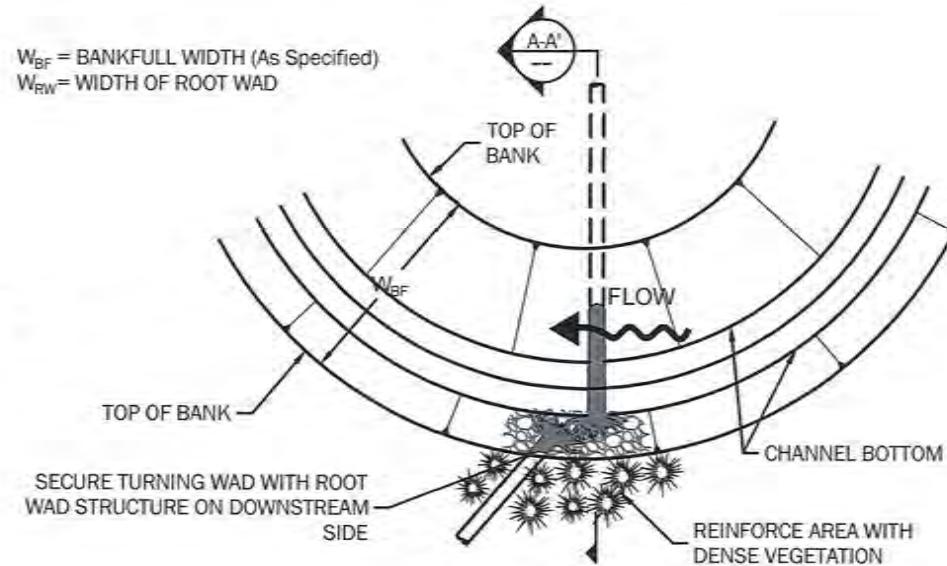
DESIGN SPECIFICS:

- STEP 1 IS A PLUNGE POOL
- STEP 1 IS LOWER THAN STEP 2 (6" MAX)
- STEP 2 IS LOWER THAN STEP 3 (6" MAX)
- NOTCH INTERSECTION OF TREES AND SECURE WITH #10 REBAR PIN AS NEEDED
- EXPOSED PORTION OF TREE IS EQUAL TO 1/2 TREE LENGTH
- SECURE TREES WITH ANCHORS. SEE SHEET 8.3 FOR TYPICAL ANCHOR DETAIL.
- BACKFILL UPSTREAM PORTIONS OF STRUCTURE (STEPS 2 AND 3) WITH LARGER ROCK, SLASH AND RACKING MATERIAL TO PREVENT FLOW UNDER TREES.
- MAXIMUM TOTAL STEP HEIGHT = 1.0'
- BURY UPSTREAM PORTION OF TREES DEEPER INTO CHANNEL BED (DOWNWARD SLOPING IN UPSTREAM DIRECTION).
- PLACE TURNING STEP AT UPSTREAM END OF POOL/BEND.
- ORIENTATION RELATIVE TO FLOW DIRECTION CAN BE REVERSED AT THE DISCRETION OF THE ENGINEER.

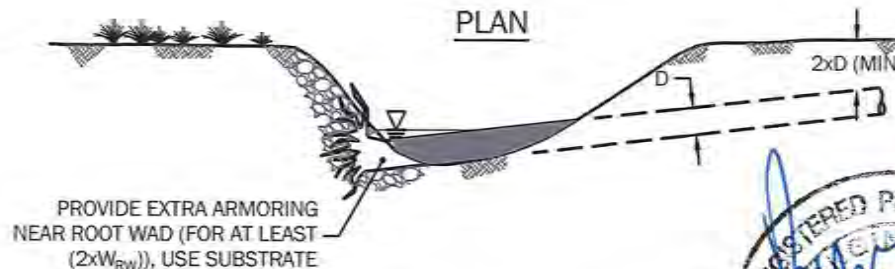
TYPICAL STEP TURN DETAIL

NOT TO SCALE

$W_{BF} =$ BANKFULL WIDTH (As Specified)
 $W_{RW} =$ WIDTH OF ROOT WAD



PLAN



SECTION A-A'

PURPOSE:

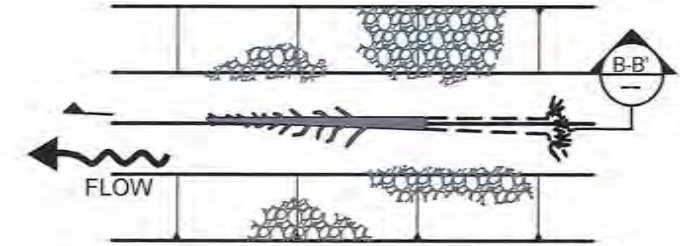
- REDIRECTS FLOW.
- CREATES DIVERSE FISH HABITAT.

DESIGN SPECIFICS:

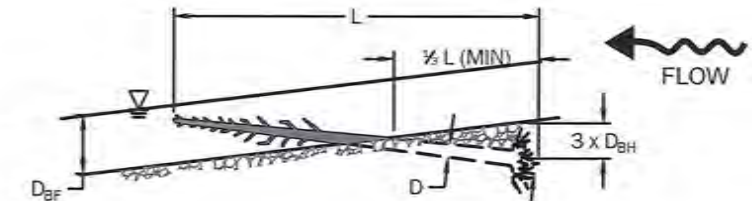
- PLACE TURNING WAD AT UPSTREAM END OF BEND.
- PLACE ROOTWAD ON/IN BANK.
- TREE SHOULD NOT BLOCK MORE THAN 50 PERCENT OF CHANNEL CROSS-SECTIONAL AREA AT BASE FLOW.
- TREE MAY BE INSTALLED AT, NEAR OR BELOW LOW POOL ELEVATION.
- SLOPE TREE INTO THE CHANNEL.
- TREE MAY ALSO BE PLACED IN CHANNEL BED TO CREATE A PLUNGE POOL DOWNSTREAM.
- PLACE TREES, BRNACHES, GRAVEL AND COBBLES ON UPSTREAM OF TREE TO PREVENT WATER FROM FLOWING BENEATH THE LOG.
- USE ONLY IN SIDE CHANNEL

TYPICAL TURNING WAD DETAIL

NOT TO SCALE



PLAN



BURY ROOT WAD COMPLETELY

SECTION B-B'

PURPOSE:

- REDUCES STREAM VELOCITY.
- CREATES DIVERSE HABITAT AND COVER.
- ENCOURAGES SEDIMENT SORTING.
- CREATES FLOODPLAIN ROUGHNESS.

DESIGN SPECIFICS:

- TREE LENGTH (L) AND DIAMETER (D) MAY VARY.
- PLACE/LOCATE LOGS AS SHOWN ON PLANS AND/OR AS DIRECTED IN FIELD.
- LOGS MAY BE PARALLEL OR ANGLED TO FLOW.
- TREES WITH BRANCHES AND/OR MULTIPLE TRUNKS PREFERRED.
- SEE QUANTITY TABLE FOR MEMBER SIZES.
- ROOT WADS MAY BE PLACED ABOVE GRADE IF THEY ARE BEING USED FOR FLOODPLAIN ROUGHNESS AND A MINIMUM OF 2/3 TRUNK LENGTH IS BURIED.

TYPICAL BURIED SNAG DETAIL

NOT TO SCALE



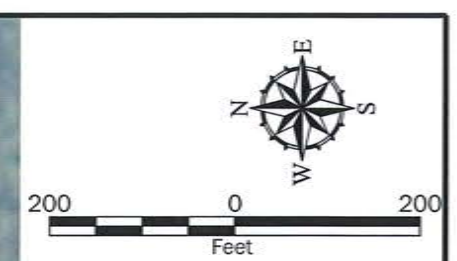
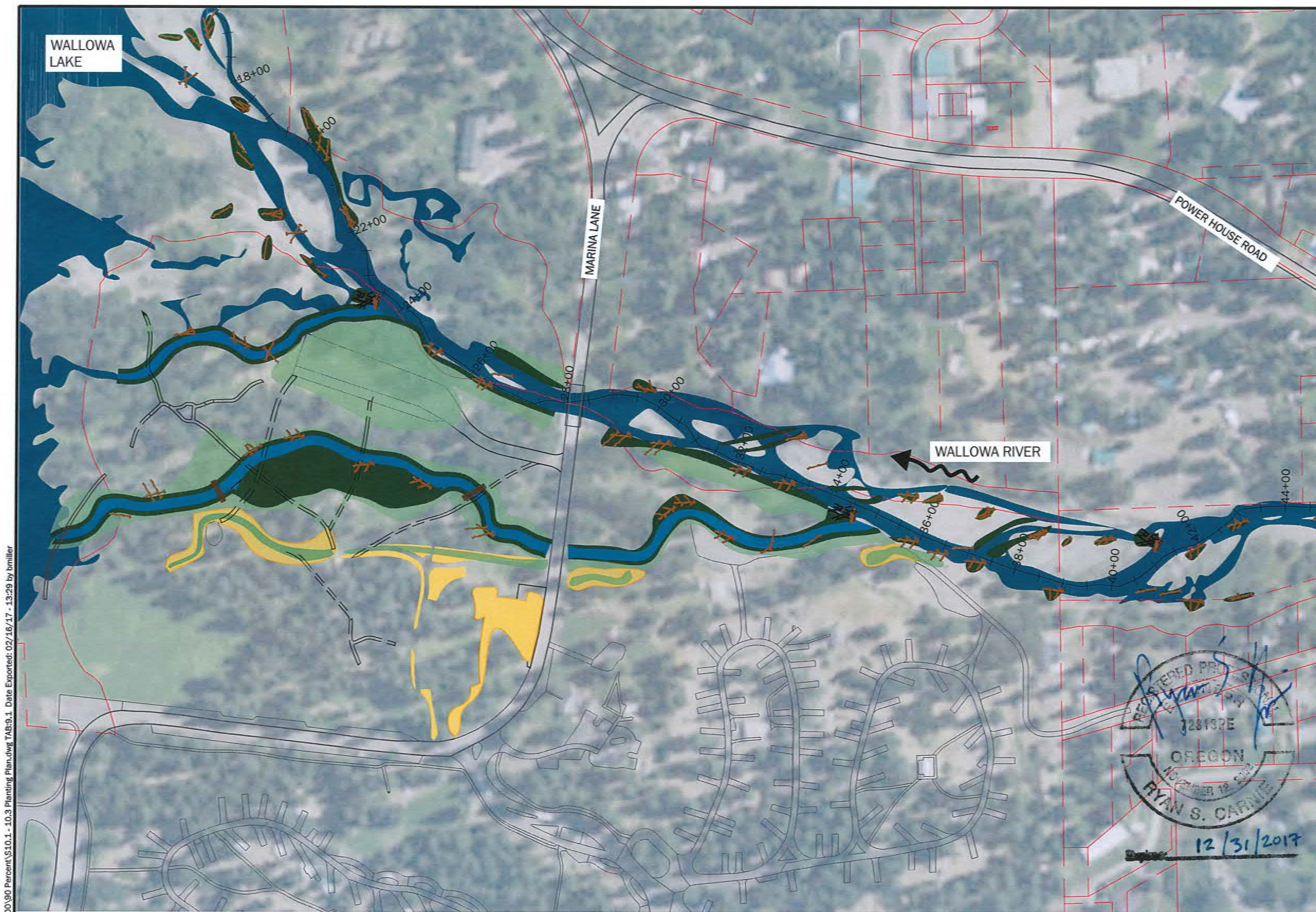
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				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00

20 years
WALLOWA RESOURCES
 401 NORTHEAST FIRST STREET
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HABITAT STRUCTURES - DETAILS
 UPPER WALLOWA RIVER RESTORATION DESIGN



- Legend**
- +---+---+ EXISTING CHANNEL ALIGNMENT
 - █ APPROXIMATE BANKFULL MAIN CHANNEL
 - █ PROPOSED SIDE CHANNELS
 - █ WET PLANTING ZONE
 - █ MOIST PLANTING ZONE
 - █ UPLAND PLANTING ZONE
 - █ UPLAND VEGETATED BANKS
 - - - - TAX LOTS

- NOTES:**
1. CHANNEL ALIGNMENT AND STATIONING IS BASED ON SURVEY PROVIDED BY ANDERSON PERRY, INC., DATED 2009 AND SURVEY PROVIDED BY HDJ DATED 2016.
 2. APPROXIMATE EXISTING CHANNEL REFERENCES THE MAIN CHANNEL BANKFULL CONDITIONS DURING 1.5 YEAR FLOOD RECURRENCE INTERVAL, MODELED AS 666 CFS USING RIVERFLOW2D V4. DOWNSTREAM OF STATION 42+00 AND HEC-RAS V4.1.0 UPSTREAM OF STATION 42+00.
 3. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
 4. AERIAL IMAGERY FROM ESRI NAIP 2014 DATED 08/28/2014.

REGISTERED PROFESSIONAL ENGINEER
 328137E
 OREGON
 NOVEMBER 12, 2013
 RYAN S. CARNIE
 12/31/2017

P:\21\21860001\CAD\00\90 Percent\510.1-10.3 Planting Plan.dwg TABS:9.1 Date Exported: 02/16/17 - 13:29 by jmillar

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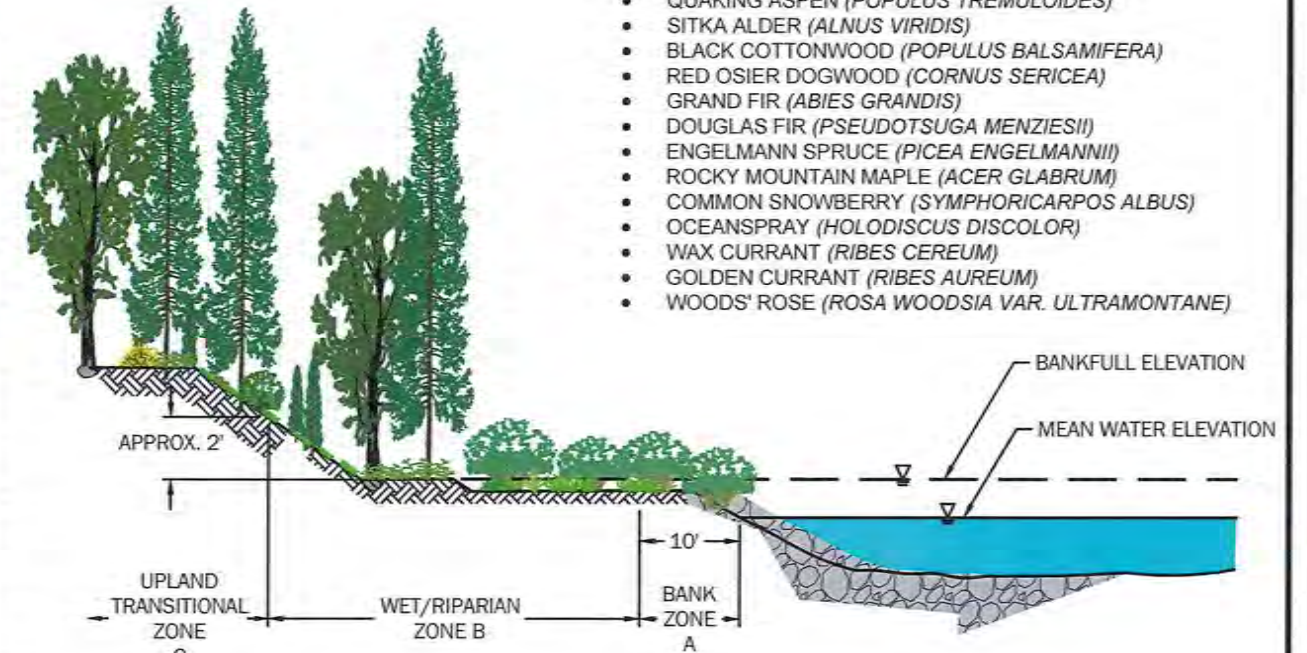
WALLOWA RESOURCES
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REACH 1 AND REACH 2
 PLANTING PLAN
 UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
9.1

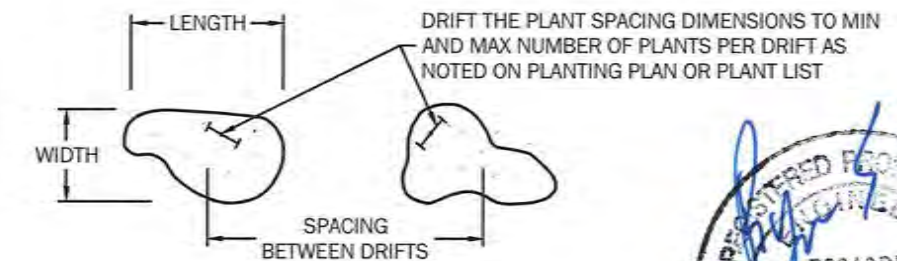
Reach 1/2 - Bank Zone A (Wet)					
Area (AC)					2.1
Species	Indicator Status	Size	Avg. Spacing (ft.)	Percent of Zone	Units*
Peach-Leaf Willow (<i>Salix interoir</i>)	OBL	stake	4	15%	858
Sandbar Willow (<i>Salix amygdaloides</i>)	FACW	stake	4	15%	858
Black cottonwood (<i>Populus balsamifera</i>)	FACW	stake	10	10%	92
Redosier dogwood (<i>Cornus sericea</i>)	FACW	stake	4	15%	858
Reach 1/2 - Riparian Zone B (Moist - Wet)					
Area (AC)					2.4
Species	Indicator Status	Size	Avg. Spacing (ft.)	Percent of Zone	Units**
Willow (<i>Salix</i> sp)	OBL/FACW	stake	6	20%	581
Black cottonwood (<i>Populus balsamifera</i>)	FACW	stake	15	10%	47
Golden Currant (<i>Ribes aureum</i>)	FAC	1-gal	25	10%	17
Sitka Alder (<i>Alnus viridis</i>)	FACW	1-gal	15	20%	93
Redosier dogwood (<i>Cornus sericea</i>)	FACW	stake	10	20%	210
Reach 1/2 - Upland Zone C (Upland)					
Area (AC)					0.9
Species	Indicator Status	Size	Avg. Spacing (ft.)	Percent of Zone	Units**
Ponderosa Pine (<i>Pinus ponderosa</i>)	FACU	2-gal	35	20%	7
Douglas Fir (<i>Pseudotsuga menziesii</i>)	NL	2-gal	35	15%	5
Woods' rose (<i>Rosa woodsia</i> var. <i>ultramontane</i>)	FACU	1-gal	15	25%	44
Englemann Spruce (<i>picea engelmannii</i>)	FAC	2-gal	35	10%	4
Mountain hemlock (<i>tsuga mertensiana</i>)	FACU	2-gal	35	10%	4
Common Snowberry (<i>Symphoricarpos albus</i>)	FACU	1-gal	15	20%	35
Reach 3/4 - Vegetated Banks (Upland)					
Area (AC)					0.4
Species	Indicator Status	Size	Avg. Spacing (ft.)	Percent of Zone	Units**
Ponderosa Pine (<i>Pinus ponderosa</i>)	FACU	2-gal	35	30%	5
Douglas Fir (<i>Pseudotsuga menziesii</i>)	NL	2-gal	35	20%	3
Woods' rose (<i>Rosa woodsia</i> var. <i>ultramontane</i>)	FACU	1-gal	15	25%	20
Common Snowberry (<i>Symphoricarpos albus</i>)	FACU	1-gal	15	25%	20



- OBSERVED VEGETATION**
- MOUNTAIN HEMLOCK (*TSUGA MERTENSIANA*)
 - NORTHWEST SANDBAR WILLOW (*SALIX SESSILIFOLIA*)
 - PEACHLEAF WILLOW (*SALIX AMYGDALOIDES*)
 - QUAKING ASPEN (*POPULUS TREMULOIDES*)
 - SITKA ALDER (*ALNUS VIRIDIS*)
 - BLACK COTTONWOOD (*POPULUS BALSAMIFERA*)
 - RED OSIER DOGWOOD (*CORNUS SERICEA*)
 - GRAND FIR (*ABIES GRANDIS*)
 - DOUGLAS FIR (*PSEUDOTSUGA MENZIESII*)
 - ENGELMANN SPRUCE (*PICEA ENGELMANNII*)
 - ROCKY MOUNTAIN MAPLE (*ACER GLABRUM*)
 - COMMON SNOWBERRY (*SYMPHORICARPOS ALBUS*)
 - OCEANSPRAY (*HOLODISCUS DISCOLOR*)
 - WAX CURRANT (*RIBES CEREUM*)
 - GOLDEN CURRANT (*RIBES AUREUM*)
 - WOODS' ROSE (*ROSA WOODSIA* VAR. *ULTRAMONTANE*)

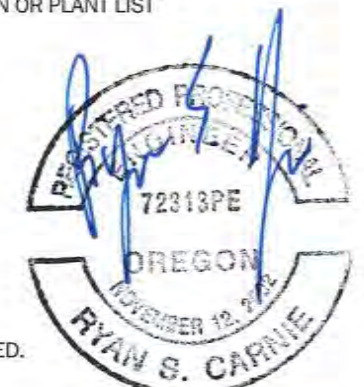
REFER TO TABLE BELOW TO DETERMINE PLANTING APPLICATIONS.

TYPICAL PLANTING ZONES
NOT TO SCALE



TYPICAL DRIFT PATTERN
NOT TO SCALE

- NOTES:
1. THIS TABLE IDENTIFIED THE PLANT SPECIES AND QUANTITIES FOR THE PROJECT NOTED.
 2. SEEDS ARE MEASURED BY POUND. POTTED PLANTS AND CUTTING MEASURED BY INDIVIDUAL PIECE.
 3. REFER TO SHEET 10.1 FOR PLANTING ZONE DESIGNATIONS AND LOCATIONS
 4. TRANSPLANTED MATERIALS AND LIVE CUTTING INTEGRAL WITH WOOD HABITAT STRUCTURES SHALL BE INSTALLED CONCURRENTLY WITH STRUCTURE PLACEMENT
 5. NATIVE VEGETATION ESTABLISHED THROUGHOUT THE RIPARIAN AREAS SHALL BE MAINTAINED TO THE BEST EXTENT POSSIBLE
 6. INDICATOR STATUS BASED ON U.S. ARMY CORPS OF ENGINEERS STATE OF OREGON 2016 WETLAND PLANT LIST.



Date: 12/31/2017

P:\21\21860001\CAD\00\90\Percent\5.10.1 - 10.3 Planting Plan.dwg TAB9.3 Date Exported: 02/16/17 - 13:30 by jbniller

Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGW/JRS
				Date: 02-17-2017
				Project No: 21860-001-00



WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828



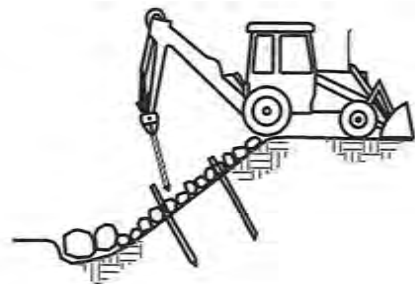
129 SOUTH MAIN STREET
PENDLETON, OR 97801

**PLANTING NOTES
AND QUANTITIES**

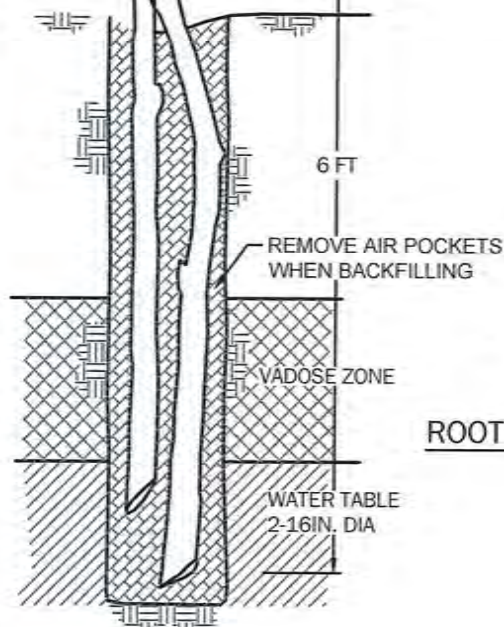
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
9.3

BLACK COTTONWOOD AND CUTTINGS FROM SUCKERS WITH TERMINAL BED PREFERRED.



POLE PLANTING WITH "STINGER"



ROOT WAD WITH POLE PLANTING

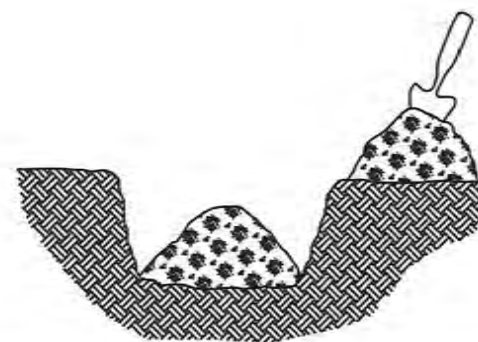
TYPICAL POLE PLANTING DETAIL
NOT TO SCALE

NOTES:

1. POLE CUTTINGS OF WILLOW OR COTTONWOOD ARE LONGER AND HAVE A LARGER DIAMETER THAN BRANCH CUTTINGS OR LIVE STAKES.
2. LARGER DIAMETER CUTTING HAVE A GREATER SUPPLY OF STORED ENERGY (STORED PHOTOSYNTHESIS) THAN SMALLER DIAMETER CUTTINGS.
3. POLE CUTTINGS ARE BETTER SUITED FOR HIGHLY ERODIBLE AREAS AND SITES WITH FLUCTUATING WATER LEVELS.
4. THE POLE CUTTINGS SHOULD EXTEND THROUGH THE VADOSE ZONE AND INTO THE PERMANENT WATER TABLE. AT LEAST $\frac{1}{2}$ TO $\frac{2}{3}$ OF THE POLE SHOULD BE BELOW THE GROUND, AT LEAST 3 FT, AND LONG ENOUGH TO EMERGE ABOVE ADJACENT VEGETATION.
5. "MUDDYING" - FILLING THE HOLE WITH WATER AND THEN SOIL TO MAKE A MUD SLURRY CAN REMOVE AIR POCKETS.
6. $\frac{1}{2}$ TO $\frac{2}{3}$ CUTTING LENGTH (3 FT) SHOULD BE BURIED.



TYPICAL SHRUB PLANTING DETAIL
NOT TO SCALE



TYPICAL BARE ROOT PLANTING DETAIL
NOT TO SCALE

NOTES:

1. REMOVE PLANTS FROM THEIR PACKING MATERIAL AND PRUNE OFF DAMAGED OR EXTRA LONG ROOTS. SOAK THE ROOTS IN A PAIL OF WARM WATER SET IN THE SHADE FOR 3-6 HOURS.
2. DETERMINE THE DEPTH OF THE PLANTING HOLE. EXCAVATE A HOLE TO THE DEPTH OF THE ORIGINAL SOIL LINE, IF VISIBLE, OR SUCH THAT THE ROOT CROWN SITS AT OR JUST BELOW THE SOIL LINE. THE WIDTH OF THE PLANTING HOLE SHOULD BE ONE AND ONE HALF TIMES THE ROOT SPREAD.
3. BUILD A CONE OF SOIL IN THE BOTTOM OF THE PLANTING HOLE. DO NOT ADD FERTILIZER TO THE PLANTING HOLE.
4. INSERT PLANT INTO HOLE, SPREADING THE ROOTS AROUND THE SURFACE OF THE CONE. GENTLY BACKFILL THE HOLE, FIRING THE SOIL. LEAVE A SLIGHT DEPRESSION AROUND THE PLANT TO HOLD WATER. WATER THE PLANT, SATURATING THE SOIL.
5. ONCE ESTABLISHED, LAY A 3' - 6' DIAMETER THICK LAYER OF MULCH AROUND, BUT NOT TOUCHING, THE PLANT TO CONSERVE MOISTURE AND DETER WEEDS.



12/31/2017

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PLANTING DETAILS
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
9.4

This page is an excerpt from Oregon Parks and Recreation Department's newly-updated Wallowa Lake Management Unit Master Plan (<https://wallowastateparksplan.com/>). It is provided to help illustrate OPRD's commitment to the project and show where some cost estimates were developed.

Project	Status	Description / Standards	Reviews/ Approvals	Amount	Units	Unit Cost	Subtotal	Total (+35%)
							\$2,620,000	\$3,500,000
Riverside Parking	Rehab	redesign existing parking; total of 19 spaces (2 ADA); remove small restroom in conjunction with parking improvements	Wallowa County, DEQ	20,000	SF	\$7	\$140,000	
Lakeview Parking	Enhancement	paved; 32 standard spaces (3 ADA); one-way circulation; picnic shelter drop off	Wallowa County, DEQ	20,000	SF	\$20	\$400,000	
Entrance Road Parking	Rehab	paved; 31 angled standard spaces along entrance road (2 ADA)	Wallowa County, DEQ	10,000	SF	\$7	\$70,000	
Pedestrian Walkways	Rehab	realigned circulation; paved, 5'-10' wide	Wallowa County	7,000	LF	\$20	\$140,000	
Pedestrian Bridges	Enhancement	30' - 60' long depending on secondary channel design	Wallowa County	2	EA	\$30,000	\$60,000	
Boardwalk	Enhancement	Boardwalk over new stream channel	Wallowa County	400	LF	\$250	\$100,000	
Welcome Center	Enhancement	permanent structure with indoor meeting & interpretive space	Wallowa County	1	EA	\$250,000	\$250,000	
Picnic Pavilion + Plaza	Enhancement	covered picnic plaza; ADA access	Wallowa County	1	ALLOW	\$200,000	\$200,000	
Picnic Shelter Upgrades	Rehab			1	ALLOW	\$60,000	\$60,000	
Bathroom Replacement	Rehab	expand existing restroom and upgrade to ADA standards; 12 toilets	Wallowa County	1	ALLOW	\$500,000	\$500,000	
Interpretive Stream Channel	Enhancement	interpretive stream habitat channel with interpretive trail, plaza, and habitat interpretation stops	Wallowa County, DSL	1	ALLOW	\$200,000	\$200,000	
Secondary Stream Channel and Associated Improvements	Enhancement	new secondary stream channel with protective berm along north side, and overflow channels- requires a new bridge where the channel crosses the entrance road	Wallowa County, DSL	1	ALLOW	\$500,000	\$500,000	

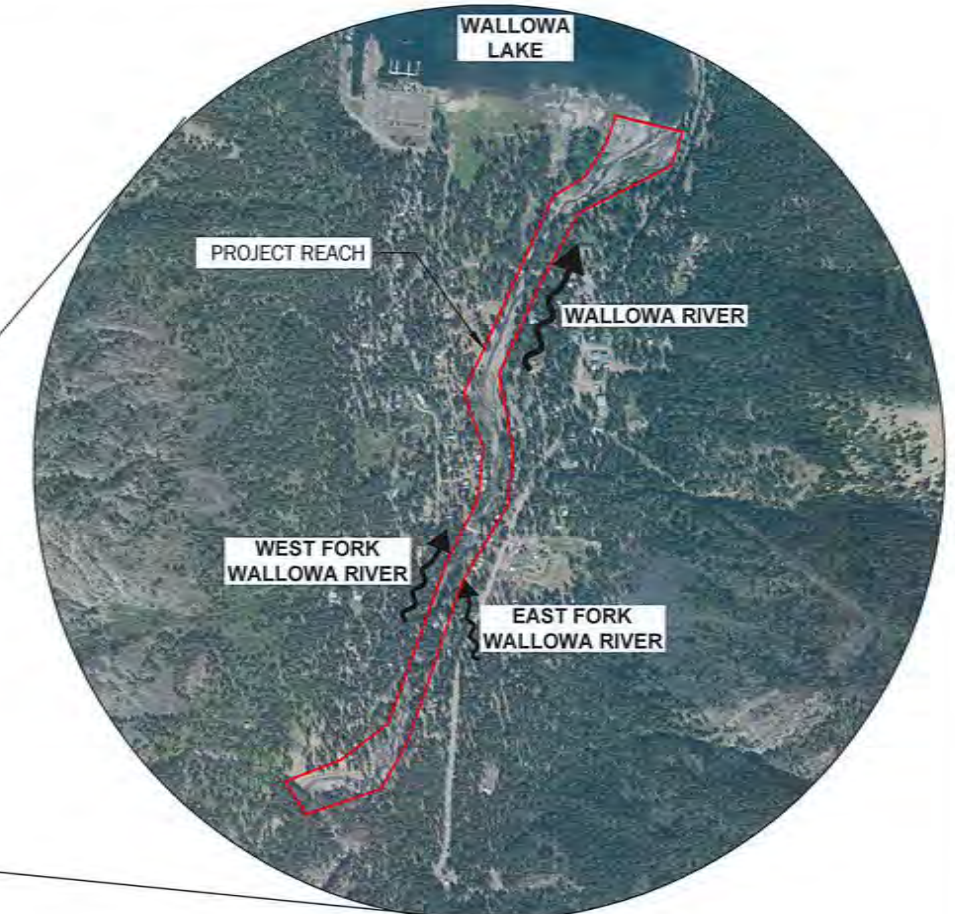
Highlighted costs were included in the project budget; however, they will be covered by OPRD.

UPPER WALLOWA RIVER

RESTORATION DESIGN

FINAL DESIGN DRAWINGS

PROJECT LOCATION:
 PROJECT SITE IS LOCATED ON THE WALLOWA RIVER UPSTREAM OF WALLOWA LAKE. FROM JOSEPH, OREGON FOLLOW HIGHWAY 351 SOUTH TO WALLOWA LAKE. CONTINUE ONTO MARINA DRIVE UNTIL YOU CROSS THE WALLOWA RIVER. THE PROJECT REACH EXTENDS DOWNSTREAM FROM MARINA DRIVE TO WALLOWA LAKE AND UPSTREAM FROM WALLOWA LAKE APPROXIMATELY 1.5 MILES.



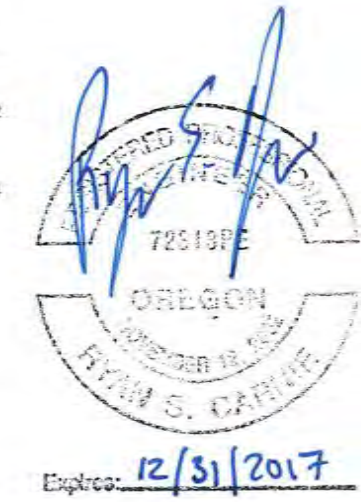
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SHEET INDEX

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2.6	Reach 3 and Reach 4 - 1.5 Year Inundation Water Depth								Reach 3 and Reach 4 - Proposed Enhancements				



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				1.1					