Upper Wallowa River Restoration

Final Report – Including Engineered Designs and Project Cost Estimates

December 2017

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Wallowa Resources

Enterprise, OR

Project Overview / Background

The Upper Wallowa River project area (project area) encompasses approximately 1½ miles of the Wallowa River and West Fork Wallowa River, beginning near the confluence of BC Creek, including the confluence of East Fork Wallowa River and flowing into Wallowa Lake. This section of the river is primarily managed for recreation with a mix of small property ownership, private houses and cabins, public and private camping areas, small businesses, and Wallowa Lake State Park (Park). This area is a large attraction for tourists during summer months and important to the Wallowa County economy. The project area includes the Wallowa Lake State Park and lies below the Eagle Cap Wilderness.

The project area provides important spawning and rearing area for salmonid species, as a direct input to Wallowa Lake. Kokanee salmon (Oncorhynchus nerka) inhabit the lake and use the river for spawning. Bull trout (Salvelinus confluentus) have also been observed, primarily in the East Fork Wallowa River, but may access the mainstem Wallowa River during the winter. Natural floodplain function along the reach has been degraded by encroachment and development, thereby reducing the opportunity for side and flood channel habitats. The downstream portion of the project that was historically an alluvial fan with multiple and braided channels as it enters the lake, has been simplified and aquatic habitat has been reduced. In addition, the project reach continues to be influenced by a large debris flow that occurred in BC Creek in 2002 and encroached on the West Fork Wallowa River. The resulting bedload material deposited by the slide has influenced the entire project area and is observed throughout the project reach.

A steering committee was created to address the risk management challenge and restoration opportunity presented by this project. The steering committee consisted of the following core partners:

- Wallowa Resources
- Oregon Parks and Recreation Department
- Wallowa County Lake Service District (administered by Wallowa County)
- Nez Perce Tribe
- Oregon Department of Fish and Wildlife

The steering committee agreed on the need to develop restoration project goals and objectives must balance sustainable ecological resources with current land use and management. They sought a feasible design that would enhance natural geomorphic processes to shape and maintain improved aquatic habitat conditions over the long-term, while considering and addressing land management needs and private landowner concerns. The following goal and objectives were identified by the steering committee to drive the development of design actions.

Project Goals and Objectives

The goal of the project is to 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) while protecting private and public property from the effects of catastrophic flooding by maintaining or improving bank stability.

Objectives

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

Contract Award and Work Plan

Wallowa Resources initiated a competitive bid for this design work in March 2016 to nine qualified firms. Six firms participated in a mandatory pre-bid site visit conducted on April 7 with support from both OPRD and ODFW. Four complete bids were received by April 30, 2016. These were reviewed and scored by OPRD, Wallowa County and Wallowa Resources. The three parties mutually agreed on rankings, and the contract award was offered to Geo-Engineers in May 2016. The work was executed as follows:

2016

June 16:	Project Initiation – Kick-off Meeting and start of field surveys
July 21:	15% Design Review – Project Partners, Stakeholders and Landowners[1]
August 16:	Conference Call on Lake Level Impacts to Design
August 22:	30% Design Review (Design Alternatives) – Project Partners
September 1:	Change Order #1: Additional Assessment of Wallowa Lake Level Impacts
September 28:	Conference Call on Marina Lane Parking Design
September 30:	60% Design Submission – Conference Call Review
November 15:	80% Design Review – Project Partners, Stakeholders and Landowners
November 22:	Change Order #2: Extended Time Frame to complete project.
November 29:	Conference Call on Marina Lane Bridge Options
December 16:	Conference Call on In-water Work Window

2017

January 6:	Response to Comments on 80% Design
February 2:	Conference Call on Interpretive Channel Design Options
February 3:	90% Design Submission – Conference Call Review
February 22:	Final Design Submission

[1] Stakeholders and Landowners included members of the Wallowa Lake Homeowners Association, owners of the Wallowa Lake Lodge LLC, Pacific Power, and other interested parties from the general public.

Following receipt of the final design and report from GeoEngineers, Wallowa Resources and its partners held a series of meetings to review the plans, conduct outreach with other stakeholders, and develop and implement a fundraising plan to allow the project to move into implementation. More details on outreach activities are provided later in this report.

PROPOSED ENHANCEMENTS

Wallowa Lake Future Operations and Modifications

GeoEngineers performed a desktop study of future operations of Wallowa Lake. The intent of the study was to estimate current and future maximum pool elevations in Wallowa Lake and describe the associated potential affects to the project reach and Wallowa Lake State Park. Pool elevation of Wallowa Lake was evaluated because it is the downstream water surface boundary for the hydraulic modeling used in the project design.

GeoEngineers considered the Wallowa Lake pool elevation identified in the Wallowa County, Oregon and Incorporated Areas Flood Insurance Study (FIS) (FEMA 1988). To provide current pool elevations of Wallowa Lake, GeoEngineers considered the flood profiles depicted in the FIS. The FIS depicts water surface elevation plots for the 10-yr, 50-yr, 100-yr, and 500-yr floods at the mouth of the Wallowa River. Lake water surface elevations were approximated based on these figures.

GeoEngineers considered decisions made in the 1961 court case identified as: 227 Or. 457, 363 P.2d 202 between the Milton Box Company and the Associated Ditch Companies to establish the future maximum pool elevation in Wallowa Lake. The case findings limit the maximum pool elevation of Wallowa Lake to 25 vertical feet above the low-water mark at the outlet on the north end of the lake. The low water mark was established as 3.4 feet above the existing sill of the outlet gate at this location. The Associated Ditch Company is currently designing a modified dam at the outlet of Wallowa Lake. Based on email correspondence with the design engineer, McMillen Jacobs Associates on September 19, 2016, the dam will be designed to provide a maximum pool elevation of 4386.0 feet above MSL. McMillen Jacobs and Associates has not prepared an operation plan for the modified dam to date. Therefore, anticipated pool elevations for discharges below the probable maximum flood or the 100-year discharge were not identified.

GeoEngineers used this information to prepare hydraulic modeling as described below and to prepare inundation boundary mapping.

Reach 1

Proposed restoration actions in Reach 1 are focused on achieving project objectives by restoring natural geomorphic processes associated with an alluvial fan. Habitat quality and quantity for kokanee can also be improved by increasing the opportunity for multiple channels to form with a diversity in flow velocity and substrate size. Proposed actions in this reach 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.

The features of this design convert a larger portion of the Park to a more natural condition, and may be a welcomed change in use and aesthetic value. These changes also coincide with an interpretive learning

effort promoted by OPRD with signage that describes the function of the alluvial fan and associated ecological conditions.

A conservation easement is being established along the east and southeast edge of the Wallowa River within Reach 1. The easement is associated with the Wallowa Lake Lodge property and is managed by the Nez Perce Tribe for permanent protection of approximately 10 acres for fish and wildlife habitat restoration. The objectives of the Upper Wallowa River Restoration Design complement the purpose for establishing the easement, as both projects intend to restore and protect natural ecological processes and conditions.

Proposed actions in Reach 1, shown on the Final Construction Drawings, enhance connectivity between the Wallowa River channel and surrounding floodplain. A berm approximately 450 feet in length is currently located along the left hydraulic bank and a berm approximately 250 feet long is located along the right hydraulic bank downstream of Marina Lane. The River Parking Area and surrounding property is lower in elevation than the current main channel, therefore high flows will likely continue to be directed toward the west and northwest. We propose the removal of the levee and restoration of the left streambank to a more natural contour to increase floodplain access by the river and allow more natural side channels to form and remain active. The berm along the right bank protects an existing wetland and side channel area. We propose regrading the right berm to an elevation slightly higher than the bankfull discharge, which allows overbank flow from the main channel without degrading the existing wetland and side channel features.

To reduce the risk of flood damage to the River Parking Area and impacts to natural floodplain function, the north portion of the asphalt lot will be removed and restored to a more natural floodplain condition. The Marina Lane Parking Area will be modified and expanded to maintain parking capacity.

A perennial flow channel is proposed in the floodplain west of the main Wallowa River channel and will flow directly into Wallowa Lake. We designed the perennial flow channel to convey approximately 25 to 30 percent of total discharge throughout the year. This channel will depart from the main channel in Reach 2 at approximately Station 35+25, flow through a proposed crossing structure in Marina Lane roadbed (described below), and will be constructed by enhancing an existing channel aligned with low elevation areas. Discharge will be controlled by the streambed elevation at the perennial channel inlet (invert elevation) and the angle of inlet flow direction. Changes to the invert elevation and geometry are likely in the future as channel-forming flows occur. Although these changes may be within an acceptable range of geomorphic stability in a natural setting, it is beneficial to maintain flow in the proposed side channel. Project proponents should evaluate conditions at the inlet periodically and be prepared to make physical adjustments to engineered features. By taking advantage of historic channel locations and existing low elevation areas, west of the main channel, construction activity will be efficient and minimize site disturbance. The substrate material that makes up the alluvial fan formation was deposited under natural hydraulic sorting and sediment routing processes, and is expected to provide appropriate aquatic habitat conditions after reactivation of the channel without mechanical sorting or importation of material. The perennial flow channel is designed to promote natural sediment sorting consistent with historic conditions of the project site. Routing a portion of perennial flow through this secondary channel is expected to provide additional flow conveyance past the Marina Lane roadway and provide the necessary hydraulic conditions and substrate sizes for kokanee spawning habitat.

A small side channel associated with the perennial flow channel was originally proposed as an in-water interpretive learning opportunity. The intent of this channel was to provide an area for Park visitors to access the water and interact with natural features without disturbing important spawning grounds and aquatic biota. This feature was intended to also be part of the interpretive learning effort proposed by OPRD and provide examples of geomorphic and fish habitat enhancements. The design for inlet and outlet features needs further engineering development to provide a hydraulic connection to the perennial channel while restricting fish access. A preliminary level design was included in draft versions of Basis of Design reports and drawing sheets, but have been removed from the Final Design package as actual construction will likely not be completed until funding is secured specifically for final design.

The existing high-flow side channel, located northeast of the River Parking Area, will be enhanced by improving the geomorphic form and adding large woody habitat features. This channel formed because of a breach in the existing berm and is active on relatively frequent high-flow events. This channel will activate at flows higher than the base level and will provide refuge for aquatic biota at times when flow velocities are high in the main river channel.

We designed an elevational limitation to flood flows and channel development along the west portion of the floodplain to maintain and protect existing Park features and assets. A consistent and level berm feature will be constructed parallel to the Wallowa River, west of the proposed perennial flow channel, and extend from the Marina Lane roadbed to the location of the existing amphitheater. This elevation feature will take advantage of an existing terrace and be built as a subtle formation of soil and rock material to an elevation that reduces the potential for future westward channel migration. We designed the berm to provide flood protection at a minimum of the 25-year peak annual discharge. Once vegetation is reestablished on the berm surface, the structure should blend into the park landscape. An expansion of the Marina Lane Parking Area will be combined with the berm and an interpretive trail providing access to restrooms and the amphitheater, will be constructed on the berm surface.

Vegetation planting will take place in appropriate areas lacking native vegetation or disturbed by construction activities. The need for planting vegetation in the alluvial fan setting of reaches 1 and 2 is minimal because disturbance to existing vegetation will be limited and there is a high potential for natural recruitment. We designed construction and staging activities to limit disturbance and maintain existing mature vegetation to the extent practical. The priority for planting is to provide 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. Revegetation extents and species are included in the Final Construction Drawings.

The addition of several habitat structures is proposed in the floodplain at strategic locations. These structures consist of arrangements of large woody material and oversized boulders to enhance diversity in channel formation, promote substrate deposition, promote stable and favorable conditions for riparian plants, and increase fish habitat complexity. Down large trees and pieces of woody material are already present in the floodplain and creating desirable habitat and floodplain conditions, but many are aging, breaking down or being managed in a manner that reduces habitat quality. We propose locating new additional complexes at key positions to enhance existing processes in the floodplain to improve

geomorphic diversity and fish habitat quality and quantity. The habitat structures are identified in two categories in the cost and quantities estimate in Appendix D: (1) structures necessary for geomorphic stability and floodplain function; and (2) bid alternate structures that add habitat value, and are not necessary for geomorphic stability. Wood complexes will be located at channel splits to promote multiple channel development and on point bars to enhance sediment deposition and meander development. Additional wood complexes are designed along the channel and in the floodplain to provide fish habitat cover, general channel and floodplain roughness, and resistance to erosion from overbank flows.

Marina Lane Crossing

GeoEngineers collaborated with WR and OPRD to investigate potential alternatives for a new stream crossing structure in Marina Lane for the proposed perennial flow channel. Based on relative effectiveness of the alternatives against multiple performance criteria, a steel bridge with concrete abutments was selected as the preferred alternative. The bridge structure is proposed to span 32 feet with a width of 32 feet, allowing for pedestrian paths on both sides of the traffic lanes. The deck web thickness will be 46 inches and the bottom chord height will be approximately 5 feet, providing conveyance for the estimated 100-year recurrence interval discharge. Bridge abutments will be installed to an elevation below the calculated scour depth, and streambanks upstream and downstream will be protected by riprap aprons.

Reach 2

The berm along the left streambank from main channel station 34+00 to Marina Lane Bridge at station 28+00, will be removed and restored to a more natural contour. This berm limits overbank flow and constricts the channel from accessing the west floodplain. Removing this berm and implementing changes to the perennial channel crossing of Marina Lane should allow the formation of a more natural geomorphic condition and balanced sediment transport.

The perennial flow channel, described for Reach 1, will be initiated within Reach 2 and depart from the main channel at approximate station 34+25, and flow through the Marina Lane road prism. This channel will be constructed through the floodplain along the west side of the main river channel by enhancing portions of an existing channel and low elevation area. Modifications to the group camping areas at this location are proposed to provide space for the new channel. A berm will be constructed at various locations along the west part of the floodplain, beginning at approximate main channel station 37+00 and extending approximately 800 feet to Marina Lane, to an elevation that will provide flood and channel migration protection to Group Camping Area “C.” Group Camping Areas “A” and “B” may potentially be used during summer low flow periods, but will be located on the east side of the protective berm.

Additional flood channels are proposed for construction across the surface of the large deposition area in the lower portion of Reach 2 with the expectation that their exact locations may change as bedload material is sorted and moved in future flow events.

Habitat structure features in the form of large woody material and oversized rock will be added in the floodplain at strategic locations, similar to the description for Reach 1. As was described for Reach 1, habitat structures are identified in two categories in the cost and quantities estimate: (1) structures necessary for geomorphic stability and floodplain function; and (2) bid alternate structures that add

habitat value, and are not necessary for geomorphic stability. Large wood complexes will enhance diversity in substrate deposition, promote stable conditions for riparian plants, and increase fish habitat complexity. The number of existing logs and trees in Reach 2 is much less than in Reach 1, and the benefits for floodplain stability and habitat creation are lacking. By locating new complexes at key positions to enhance existing processes in the floodplain, we propose an increase in geomorphic stability and habitat diversity. Wood complexes will be located at channel splits, such as Station 41+25 to promote multiple channel development and on gravel bars to enhance sediment deposition and meander development. Additional wood complexes will be located in the floodplain to provide general roughness and resistance to erosion from overbank flows. Of note, the existing side channel located along the west floodplain near Station 41+00 will also be enhanced. Collectively, these features will provide more spawning habitat for kokanee and resting/rearing habitat for bull trout.

Reach 3

Implementation of actions in Reach 3 will be supported and informed by this project design, but will be the responsibility of individual landowners. Restoration activities in this reach focus on maintaining fish passage for kokanee and bull trout and improving bank stability to protect private property and structures. Adding additional material in the channel for improving fish habitat or activating more floodplain will further reduce channel capacity and only exacerbate bank erosion and flood risk. Large substrate in the channel currently provides diversity in flow velocity and opportunities for fish to move and rest. We propose boulder and structure placement along this portion of the reach as shown on the in the final design drawings.

Design actions in Reach 3 are developed in a context that assesses channel conditions and processes throughout the reach, both upstream and downstream of areas at risk for erosion or failure. The intent of the design, as presented to the landowners, is to provide enough analysis and design detail for individual owners to implement actions that address erosion and channel stability. Actions are designed with the intent of providing enough detail for: (1) obtaining necessary permits and satisfying regulations; (2) providing a unit cost estimate; and (3) implementing actual construction. In addition, a prioritization of the streambank areas is displayed as risk level 1 through 3, and the risk of implementing actions at independent locations on separate timelines is evaluated. The design drawings define bank stabilization segments to be installed in their entirety to limit detrimental channel response.

The proposed bank stabilization actions should be applied along the streambanks in a consistent and continuous manner to be most effective and reduce the potential of unintended negative impacts to other landowners. GeoEngineers advises each landowner to willingly implement actions prescribed by this design, and use the associated reach assessment and analyses for support. There are advantages for landowners to work together and complete implementation in a unified manner for entire sections recommended for stabilization (e.g. coordinated implementation of desired stream improvements, cost savings due to economies of scale, potentially simplified permitting process). If a landowner decides to implement a different design, this assessment and analyses may not provide support and the landowner may be required to develop site-specific designs and address regulatory requirements on their own accord.

The design drawings include information that explain and display support for implementation. The Geomorphic and Stability Analysis contains analyses results for bank erosion, shear stress, and bank slope, and provide spatial information for determining the areas at high risk for erosion. These results

relate to the proposed bank stabilization in the drawings, provide cross section details at 100-foot intervals. The bank stabilization detail includes detail for installation of riprap toe material and vegetated coir mat. Cost estimates for implementing this bank stabilization action are provided on a unit basis.

Reach 4

Proposed restoration actions in Reach 4 are focused on providing a stable streambank condition for key areas. The right streambank, between main channel station 70+00 and 76+00, is exposed, unstable, and appears to be migrating to the east. We propose bank stabilization actions to protect the lower portion of the bank and bank toe from erosion and undermining. Riprap revetment are proposed along the right hydraulic bank and will create continuous longitudinal stabilization. The upper portion of the bank will be protected by the installation of vegetated coir mat, with additional planting of native riparian species along the bank surface. Any bank stabilization implemented by private landowners downstream of the OPRD and PacifiCorp properties should be consistent with the treatments implemented by WR and OPRD.

PacifiCorp is currently in the process of applying for a new operation license with the Federal Energy Regulatory Commission (FERC). As part of the application, PacifiCorp has developed a new conceptual tailrace design consisting of a concrete weir to be located downstream of the current tailrace channels located at approximate main channel station 76+00. By moving the tailrace confluence downstream and constructing a concrete outfall, access for bull trout will be blocked. If PacifiCorp agrees to the new FERC license requirements and the new tailrace is constructed, the existing tailrace channels will be rehabilitated and restored to a more natural condition. However, because the tailrace alignment and license requirements have not been finalized, restoration treatments in this location are conceptual in detail.

Hydraulic Model Results

Inundation Boundary and Water Surface Elevation

GeoEngineers used the hydraulic model results to approximate the inundation extents of the existing 1.5-year event. The proposed conditions were modeled in Reach 1 and Reach 2 for the 1.5-year, 25-year and 100-year events. Existing and proposed water surface elevations and inundation boundaries are depicted in the drawings.

Channel Stability and Sediment Transport

GeoEngineers specified material gradation for the bank stabilization in Reach 3 and Reach 4 using a 25-year design discharge. We calculated a material gradation using criteria identified in the Federal Highway Administration's Hydraulic Engineering Circular Number 11 (HEC-11) and the Oregon Department of Transportation (ODOT) Hydraulics Manual (FHWA 1989; ODOT 2011). A similar analysis was completed to size scour countermeasure for the abutments at the proposed Marina Lane crossing, using a 100-year design discharge. We identified ODOT class 700 riprap for the bank stabilization in the Reach 3 and Reach 4 and ODOT Class 100 riprap for the abutment scour protection at the proposed Marina Lane Crossing.

Perennial Channel Flow Distribution

GeoEngineers used the results of the two-dimensional hydraulic model to indicate anticipated flow distribution at the confluence of the existing main channel and the proposed perennial channel within Reaches 1 and 2. The percentages of the total and approximate discharges are included in Table 4.

TABLE 4. PERENNIAL CHANNEL FLOW DISTRIBUTION

Recurrence Interval	Total Discharge (cfs)	Perennial Channel Percentage	Perennial Channel Discharge (cfs)
1.5-Year	666	31	206
25-Year	1692	25	423
100-Year	2150	24	516

Instream Habitat Structures Analysis

GeoEngineers performed a risk assessment of proposed Large Wood Material (LWM) structures for the project reach. We followed risk assessment criteria published by the US Bureau of Reclamation (BOR) in the Pacific Northwest Region Resource & Technical Services Large Woody Material—Risk Based Design Guidelines (BOR 2014). We qualitatively assessed the potential public safety risk considering the use of the project reach, sight distance, location relative to bends and hydraulic conditions. We also qualitatively assessed the potential property damage risk considering the stream type, potential channel response, adjacent land use and in channel structures. Based on our qualitative analysis, a 100-year design discharge is appropriate for the LWM structures proposed in the project reach (BOR 2014).

GeoEngineers evaluated the proposed Deflection Jams, Longitudinal Log and Apex Jam wood habitat structures for buoyancy and resistance to sliding. We used the output from the proposed conditions 2D hydraulic model of the 100-year design discharge for maximum velocity and maximum depth values. We evaluated resistance to buoyancy by following the standard force balance approach (D'Aoust & Millar 2000). We compared the uplift forces using the volume of wood and wood density with the weight of the structure including the weight of the wood, the weight of soil ballast and the weight of boulder ballast. We used wood characteristics for Ponderosa Pine including specific gravity and shear stress for our analysis. We assumed the structures act as a fully connected structure, and uplift forces due to water velocity to be zero. We selected a minimum factor of safety (FOS) of 2.0 for buoyancy considerations. We evaluated resistance to sliding by comparing the horizontal drag forces exerted on the structures to the horizontal resistance provided by soil friction and timber piles (D'Aoust & Millar 2000). We also included an evaluation of the resistance to horizontal motion provided by timber piles. We selected a minimum FOS of 1.75 for sliding resistance. Results of the wood habitat structures stability analyses and details of the proposed habitat structures are in the final drawings.

CONSTRUCTION QUANTITIES AND CONSTRUCTION COST ESTIMATE

GeoEngineers calculated construction quantities and applied unit costs based on recent project experiences, engineering judgment and published documentation (RS Means 2015). The summary includes a list of bid items, an estimate of unit costs, an estimate of construction quantities, a bid sheet without the engineering estimate of unit costs and a summary sheet with a construction total. We accounted for LWM necessary for geomorphic stability and LWM designed for habitat enhancement as a bid alternate at the request of WR. We included a summary of the anticipated construction costs for the project reach in the final report.

Outreach

Wallowa Resources and Oregon Parks and Recreation Department collaborated in a series of outreach events including presentations to the Wallowa Lake Homeowners Associations meetings over the Memorial Day and Labor Day weekends in 2016, and again at the Memorial Day weekend in 2017.

An open public meeting was hosted by Wallowa Resources on November 15, 2016 to present the goals and objectives of the project, review the 80% design plans and seek questions and feedback on those plans.

Subsequent to this meeting, one on one meetings were held with individual landowners living above Wallowa Lake, and the ownership of the Wallowa Lake Lodge.

As work shifted from design to fundraising for implementation, we met with potential funding partners and worked with the Wallowa County Chieftain to get a front-page story on this project. A copy of the story is included as an attachment.

Financial Statement

Project Costs		Sources of Revenue and Final Costs						
Budget Items	**Original Budget**	**OWEB Funds**	**OPRD**	**OPRD Supplement**	**WCLSD**	**WLHOA**	**Burning Foundation**	**Final Expenditure**
WR Project Management	$ 6,825.00	$ 3,825.00	$ -	$ 1,615.00	$ -	$ -	$ 1,385.00	$ 6,825.00
Contractor (GeoEngineers)	$ 92,023.00	$44,675.00	$25,000.00	$ 8,418.00	$10,000.00	$ -	$ 8,615.00	$ 96,708.00
WR Travel	$ 84.00	$ -	$ -	$ 52.00	$ -	$ -	$ -	$ 52.00
WR Finance and Administration	$ 4,017.00	$ 1,500.00	$ -	$ -	$ -	$2,500.00	$ -	$ 4,000.00
TOTAL	**$ 102,949.00**	**$50,000.00**	**$25,000.00**	**$10,085.00**	**$10,000.00**	**$2,500.00**	**$10,000.00**	**$107,585.00**

Other Sources of Funds:
OWEB: Oregon Watershed Enhancement Board
OPRD: Oregon Parks and Recreation Department – with supplement covering additional analysis requested by the Department.
WCLSD: Wallowa County Lake Service District
WLHOA: Wallowa Lake Homeowners Association

Next Steps:
The Steering Committee is working on a development plan to raise the funds required for full implementation of the restoration project on reaches 1 and 2 – the alluvial fan area above and through the Wallowa Lake State Park. A key component involves negotiations with the Oregon Department of Transportation regarding funding to replace the Marina Lane Bridge with a free-span bridge – as this will improve the overall restoration impact, and provide significant matching funding. The Steering Committee has briefed landowners about the designs and costs for restoration and protection of their property in reaches 3 and 4, and the permitting and cost advantages if they pursue such work collectively. Further assistance to these landowners will be limited to coordination and technical assistance to line up the required permits and contractors.

Lessons Learned and Recommendations

Regular and repeated communication with core partners and stakeholders helped alleviate concerns and misconceptions about the project and ensure timely guidance was provided into the design process. Many stakeholders lacked appreciation of the dynamic nature of riparian systems which influenced their assessment of risk and reward from this project.

Maintaining clear and consistent communication with the landowner community above the lake was complicated by shifting participation in landowner meetings – and by misunderstanding by some landowners being shared with other landowners. This was most evident in the misconception that the project proponents would fully fund the streambank protection element in the project design. Considerable time was spent to clarify the benefit that the project provided to each landowner by completing a full system design but that the landowners themselves were responsible for the costs of implementing those elements pertinent to their own properties.

Attachments:

- Upper Wallowa River Restoration Design – Primary Sheets depicting main design elements (14 pages)
  A full set of the drawings and final report from Geo-Engineers is available upon request
- Upper Wallowa River Restoration Design – Cost Estimate (2 pages)
- Wallowa County Chieftain – October 4, 2017 – "River Plan would boost fish habitat, prevent erosion" (3 pages)

UPPER WALLOWA RIVER

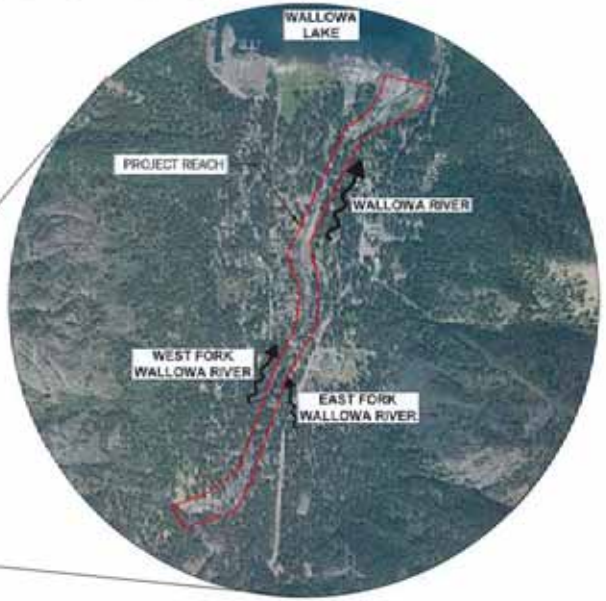
RESTORATION DESIGN

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.

STATE MAP
NTS

REGION MAP
NTS



VICINITY MAP
NTS

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SHEET INDEX

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
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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.

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
RYAN S. CARVER

Expires: 12/31/2017

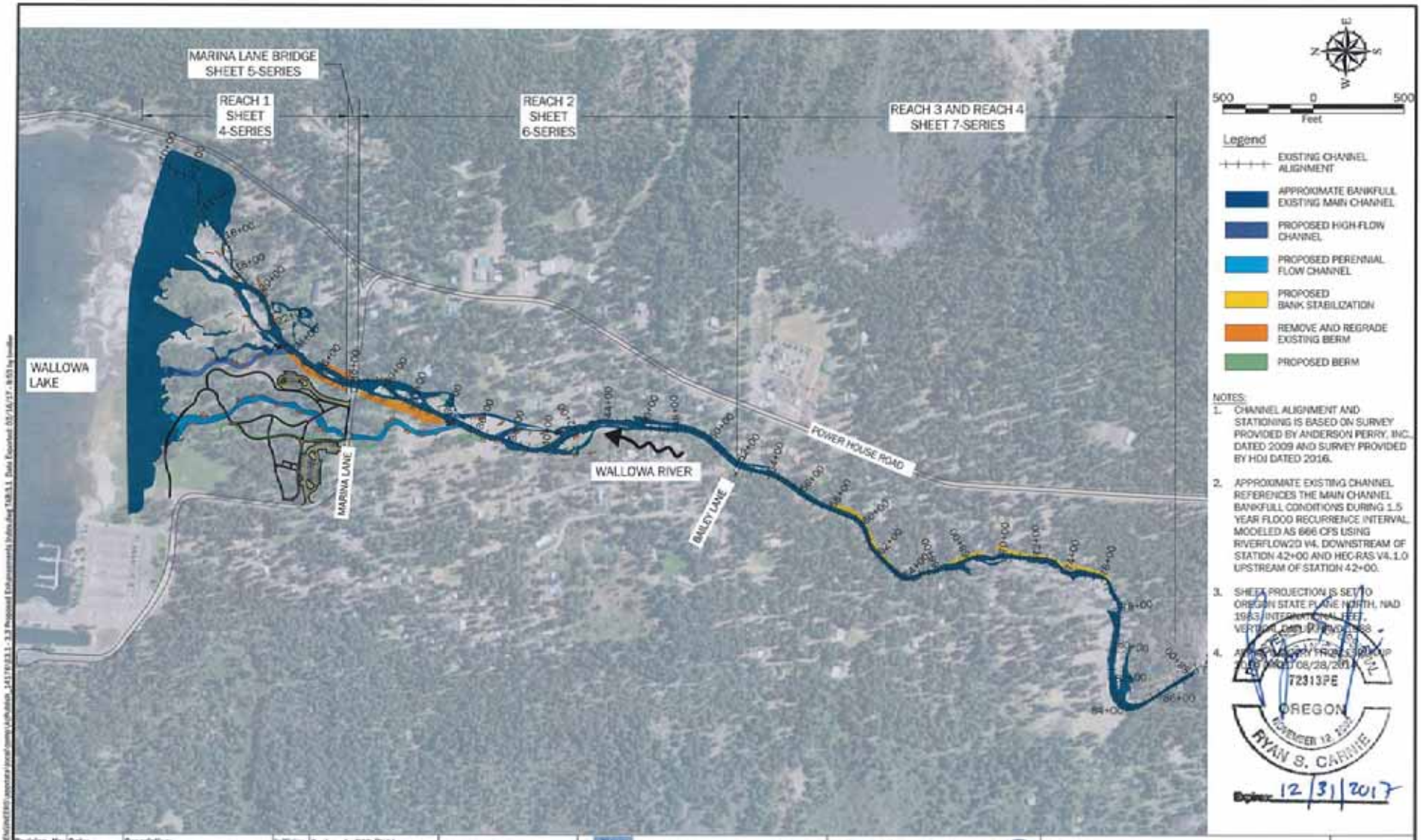
Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JDW/JRS
				Date: 02-17-2017
				Project No: 21880-001-00

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

GOAL AND OBJECTIVES

UPPER WALLOWA RIVER RESTORATION DESIGN



NOTES:

1. CHANNEL ALIGNMENT AND STATIONING IS BASED ON SURVEY PROVIDED BY ANDERSON PERRY, INC., DATED 2009 AND SURVEY PROVIDED BY HDI 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 NAVD88.
4. ALL WORK WITHIN TROUT CREEK GROUP [illegible] 08/28/2018.

72313PE
OREGON
EXPIRES: 12/31/2017
RYAN S. CARNIE

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
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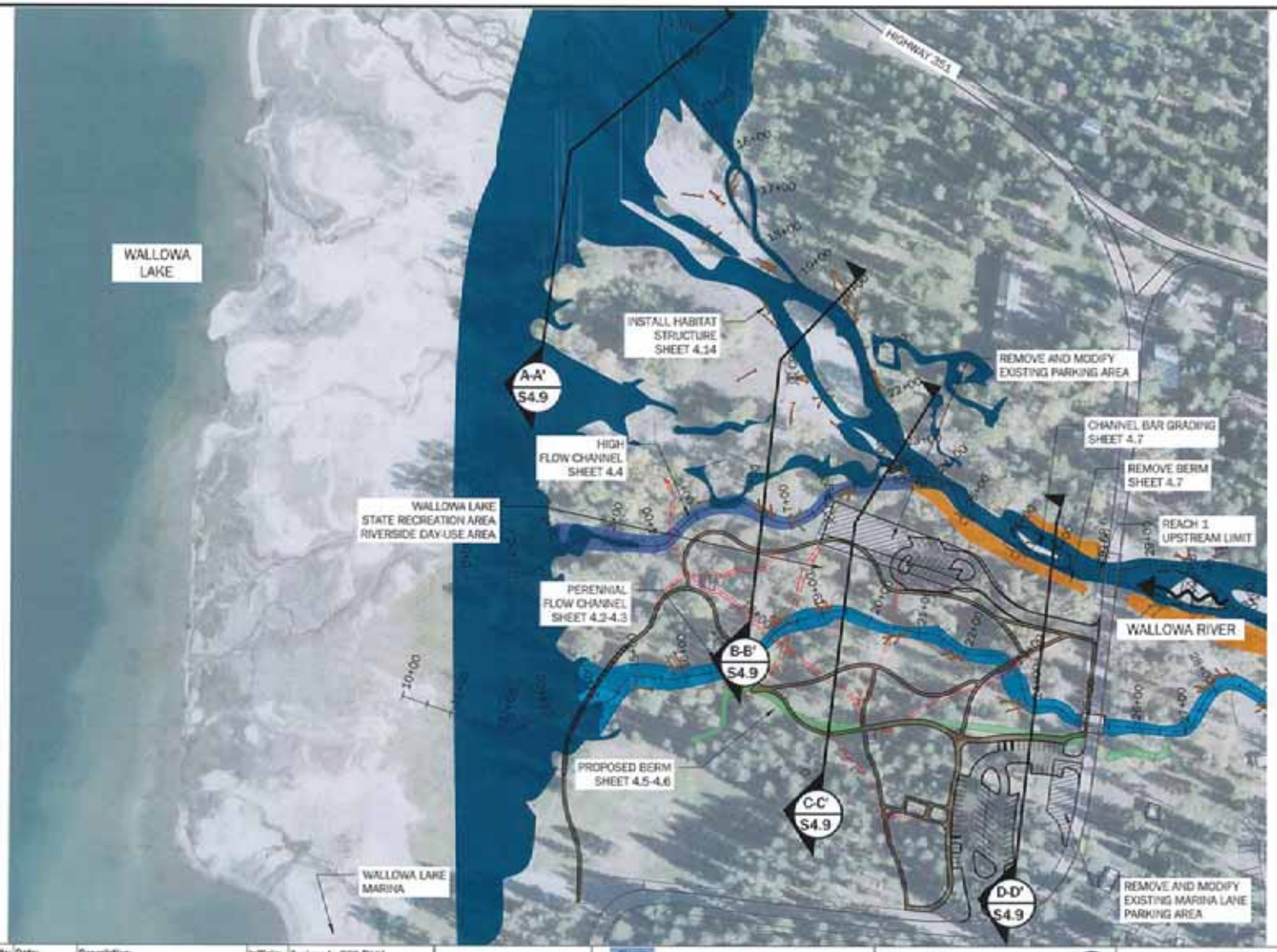
129 SOUTH MAIN STREET
PENDLETON, OR 97801

PROPOSED ENHANCEMENTS INDEX

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
3.1



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. PARKS FACILITIES DESIGN AND DETAILS PROVIDED UNDER A SEPARATE COVER

REGISTERED PROFESSIONAL ENGINEER
72315PE
OREGON
RYAN S. CARNIE
Expires: 12/31/2017

Revision No:	Date:	Description:	Initials:	Designed: RSC/BHM
				Drawn: BHM
				Checked: JGM/JRS
				Date: 02-17-2017
				Project No: 21560-001-00

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
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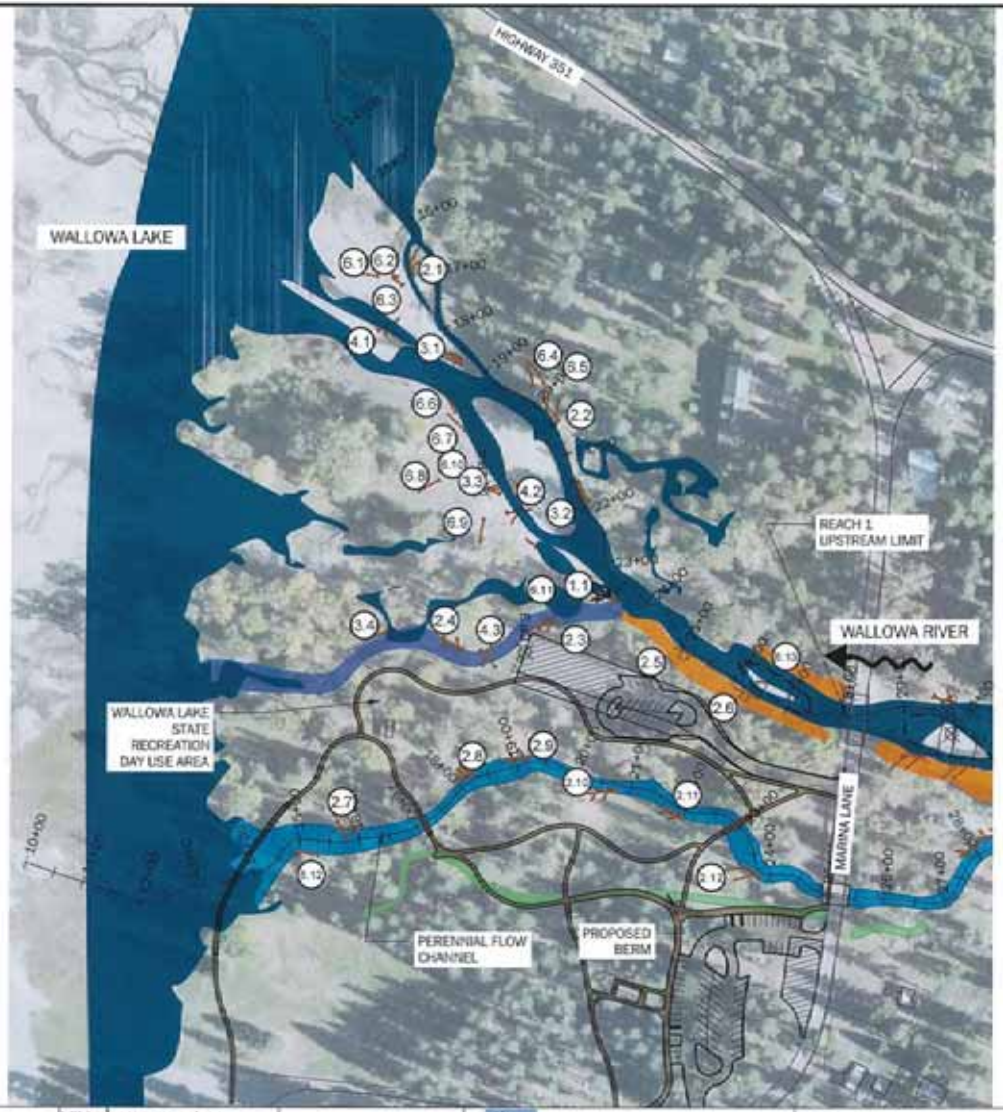
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 PROPOSED ENHANCEMENTS OVERVIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.1



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

N S E W

200 0 200
Feet

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 06/28/2014.
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

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

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Designed: RSC/BHM
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Date: 02-17-2017
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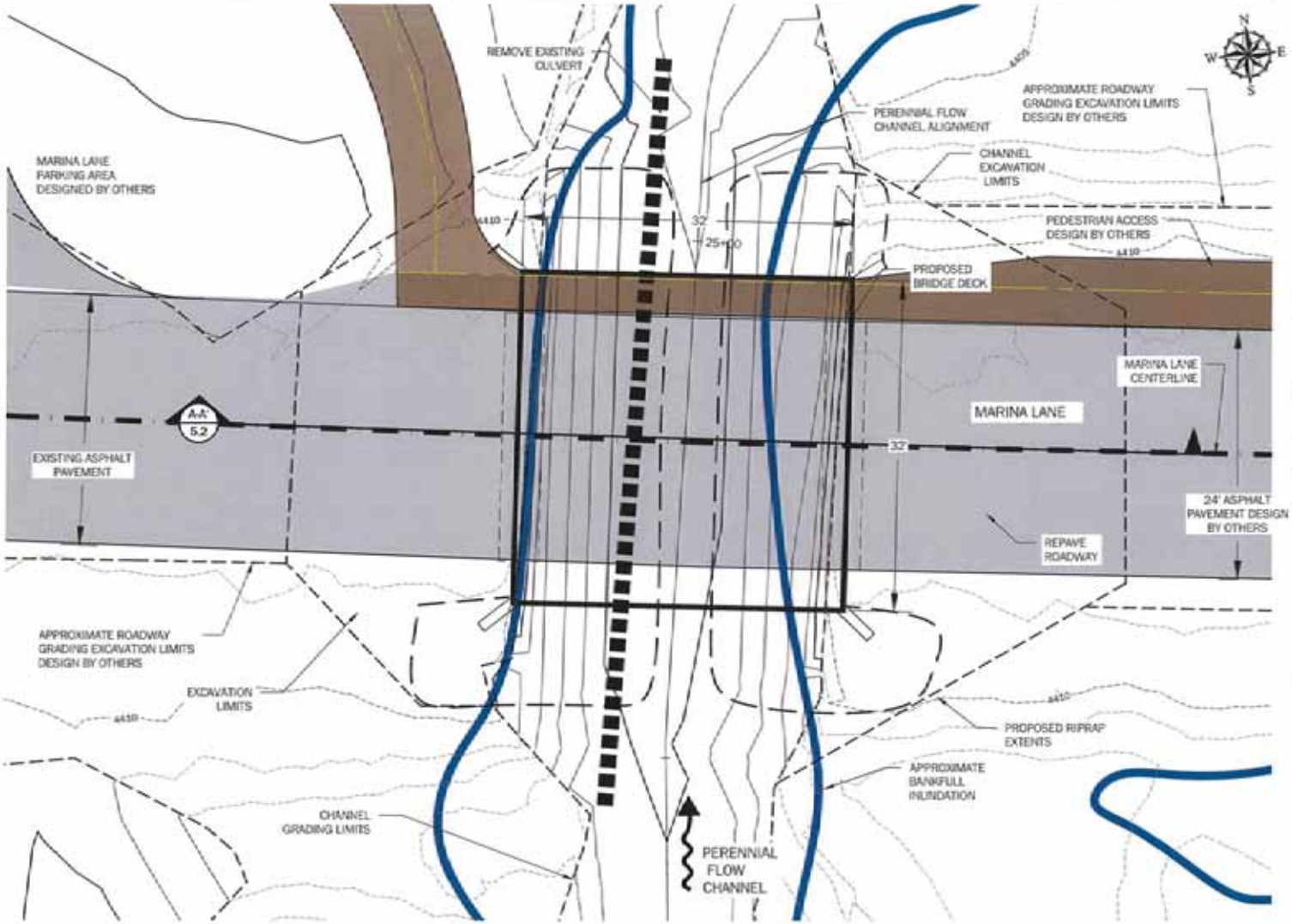
REACH 1
HABITAT STRUCTURES

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
4.13



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

Expires: 12/31/2017

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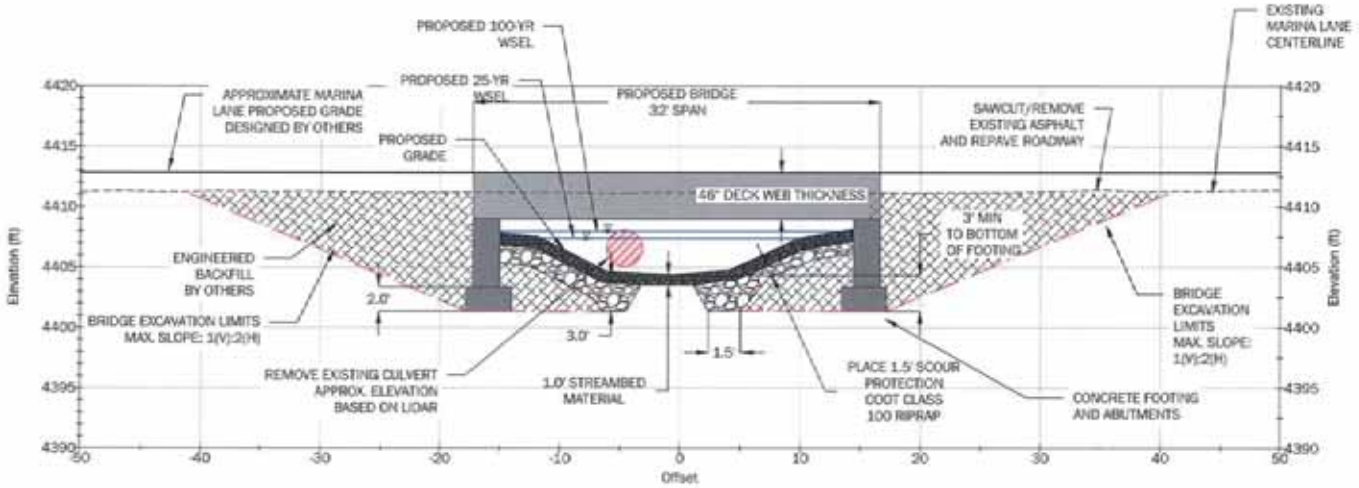
MARINA LANE CROSSING
PLAN VIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
5.1



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

10 0 10
Feet

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

REGISTERED PROFESSIONAL ENGINEER
72215PE
OREGON
RYAN S. CARNIE

Expires: 12/31/2017

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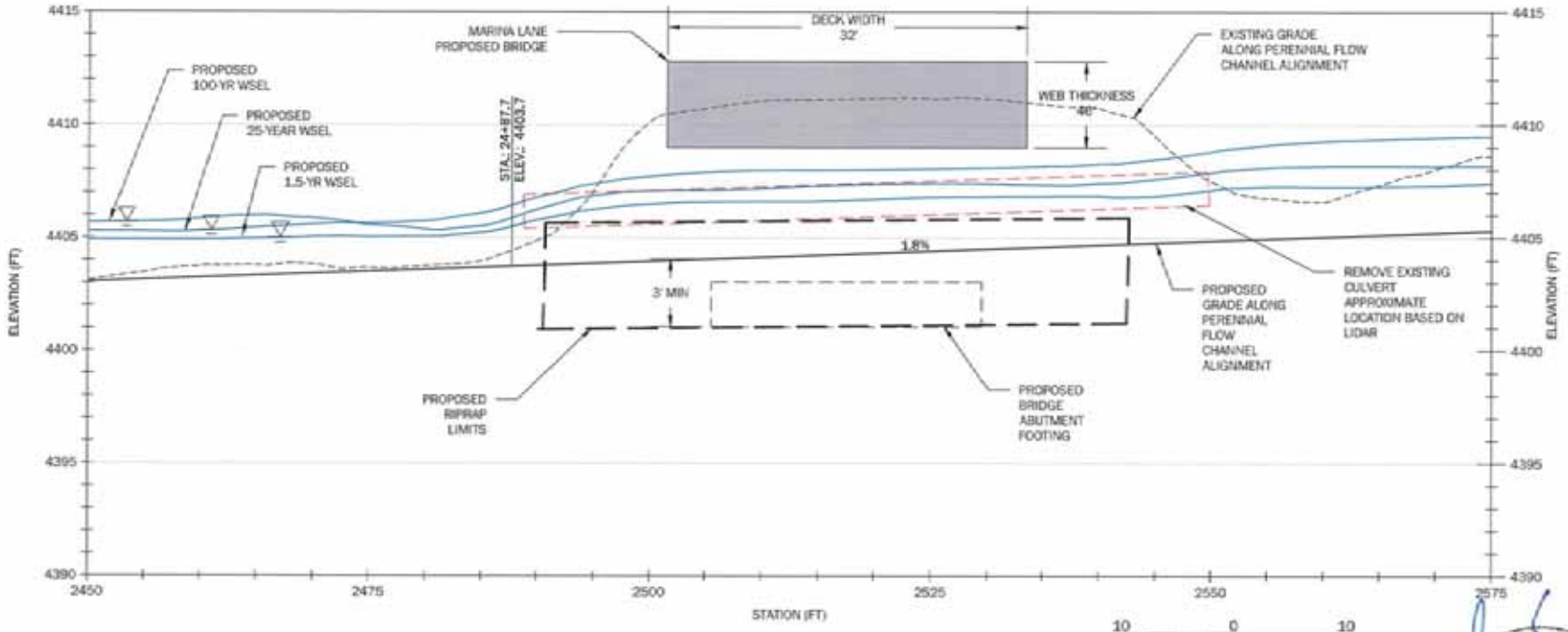
MARINA LANE CROSSING
SECTION VIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
5.2



PERENNIAL FLOW CHANNEL PROFILE VIEW

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

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.

Revision No:	Date:	Description:	Initials:

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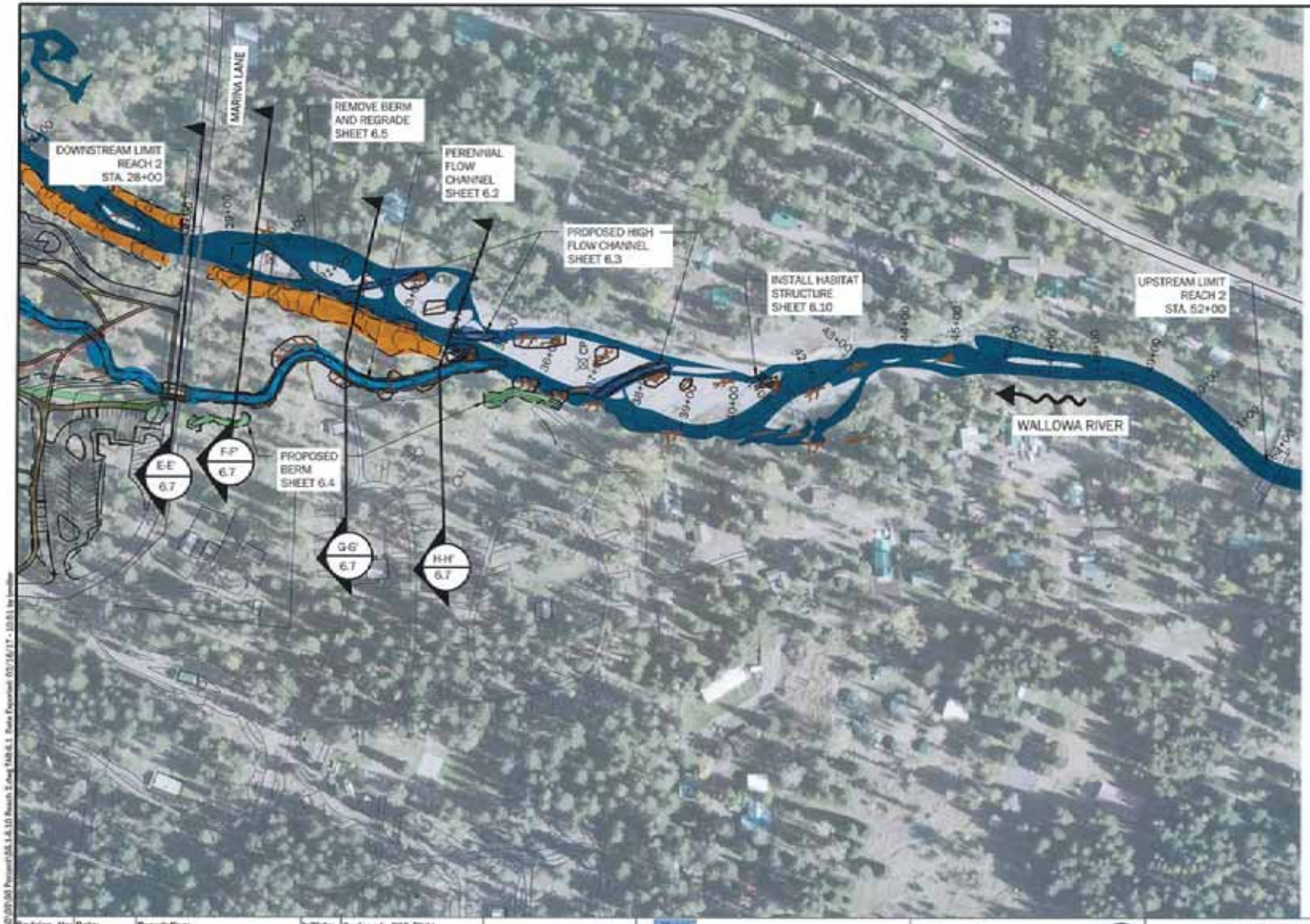
PENDLETON, OR 97801

MARINA LANE CROSSING
PROFILE VIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
5.3

P:\21\21860001\Admin\Design Research\5.1-5.3 Marina Bridge.dwg 5.3-5.3 Data Flowsheet 02/16/17 - 10:27 by jwalker



N
W
E
S

200 0 200
Feet

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.
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4. PROPOSED BANKFULL CONDITIONS BASED ON THE 1.5-YR EVENT, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.

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

Revision No:	Date:	Description:	Initials:

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Date: 02-17-2017
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WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
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GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 2 PROPOSED ENHANCEMENTS OVERVIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 6.1

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

200 0 200
Feet

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

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4. PROPOSED BANKFULL CONDITIONS BASED ON THE 1.5-YR EVENT, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.
5. 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

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
RENEWAL 12-31-2018
RYAN S. CARNIE

Expires: 12/31/2017

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

WALLOWA RESOURCES
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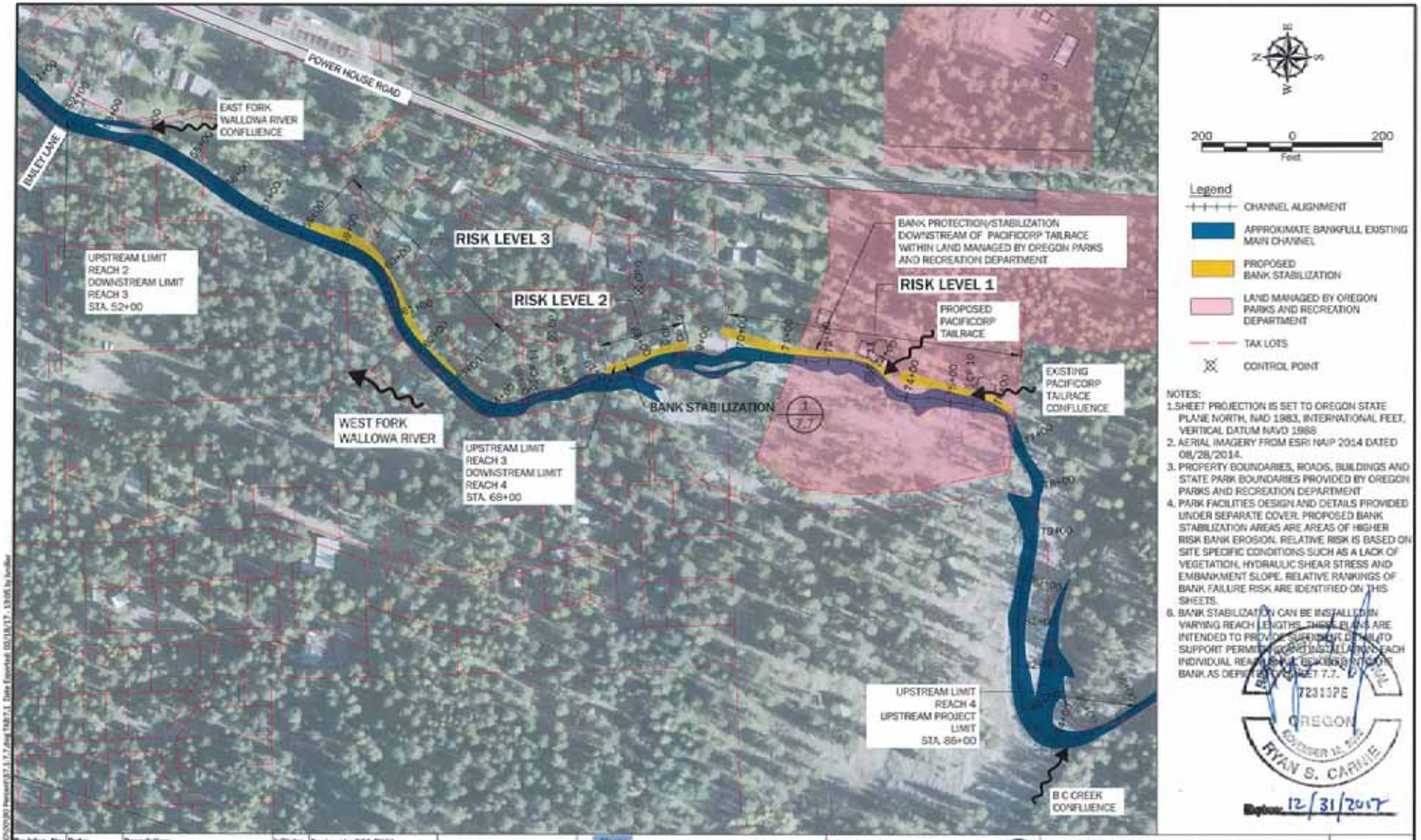
PENDLETON, OR 97801

REACH 2
HABITAT STRUCTURES

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.10



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. PARK FACILITIES DESIGN AND DETAILS PROVIDED UNDER SEPARATE COVER. PROPOSED BANK STABILIZATION AREAS ARE AREAS OF HIGHER RISK BANK EROSION. RELATIVE RISK IS BASED ON SITE SPECIFIC CONDITIONS SUCH AS A LACK OF VEGETATION, HYDRAULIC SHEAR STRESS AND EMBANKMENT SLOPE. RELATIVE RANKINGS OF BANK FAILURE RISK ARE IDENTIFIED ON THIS SHEETS.
6. BANK STABILIZATION CAN BE INSTALLED IN VARYING REACH LENGTHS. THESE PLANS ARE INTENDED TO PROVIDE SUFFICIENT DETAIL TO SUPPORT PERMITTING AND INSTALLATION. EACH INDIVIDUAL REACH MAY BE BROKEN INTO BANK AS DEPICTED ON SHEET 7.7.

72313PE
OREGON
NOVEMBER 14, 2014
RYAN S. CARNIE

Expires: 12/31/2017

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WALLOWA RESOURCES
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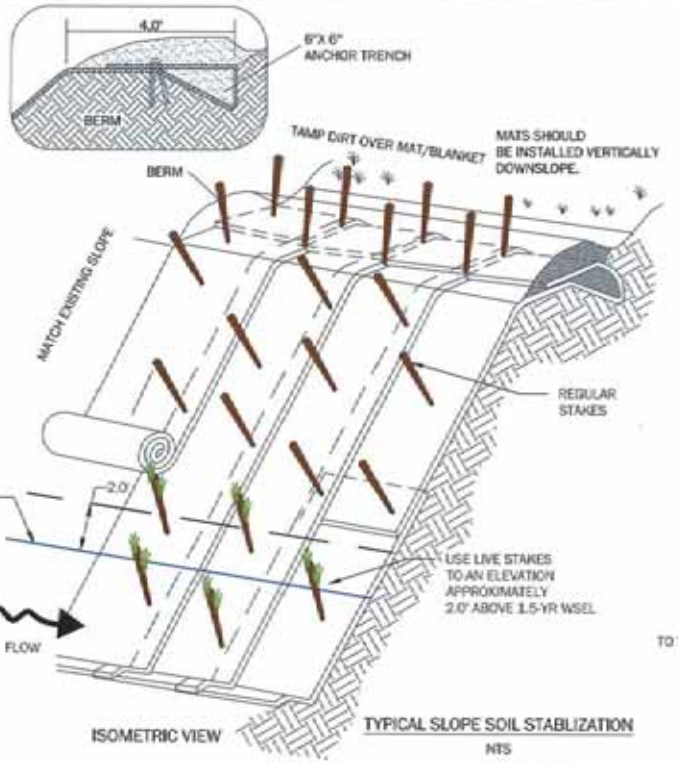
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 3 AND REACH 4 PROPOSED ENHANCEMENTS OVERVIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

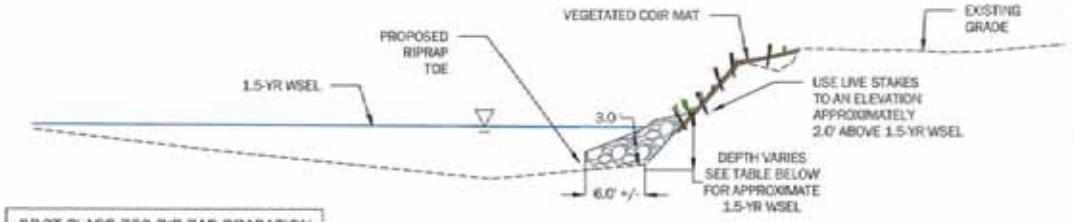
Sheet 7.1



ISOMETRIC VIEW

TYPICAL SLOPE SOIL STABLIZATION

NTS

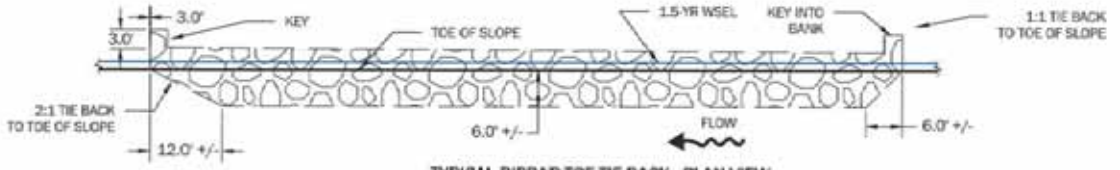


TYPICAL RIPRAP TOE AND VEGETATED COIR MAT

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

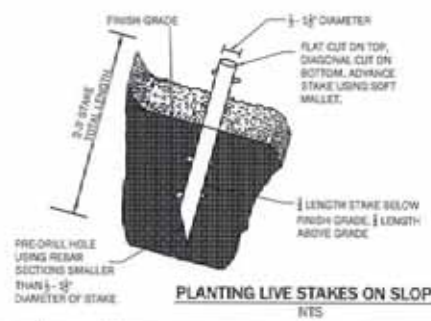
10 0 10
Feet

ODOT CLASS 700 RIP RAP GRADATION LIMITS		
PERCENT GRADATION SMALLER THAN	MINIMUM DIAMETER (FT)	MAXIMUM DIAMETER (FT)
100	1.90	2.26
80	1.61	1.85
50	1.32	1.50
15	0.61	0.77



TYPICAL RIPRAP TOE TIE BACK - PLAN VIEW

NTS



PLANTING LIVE STAKES ON SLOPES

NTS

PURPOSE:

- BANK STABILIZATION.
- ENCOURAGES VEGETATION GROWTH.
- REDUCES THE OCCURRENCE OF BANK EROSION.

DESIGN SPECIFICS:

- SLOPE SURFACE SHOULD BE FREE OF ROCKS, STICKS AND GRASS.
- INSTALL MATTING BEGINNING WITH THE DOWNSTREAM MAT AND WORKING UPSTREAM.
- OVERLAP UPSTREAM MAT OVER DOWNSTREAM MAT BY A MINIMUM OF 5 FEET.
- SECURE MATTING WITH 10" U-NAILS EVERY 1 SQUARE YARD. INSTALL LIVE WILLOW AND/OR DOGWOOD STAKES AT ELEAVTIONS WITHIN 2.0' ABOVE THE 1.5-YR WSEL.
- SECURE ENDS OF MAT IN TRENCHES BACKFILLED AND COMPACTED WITH LOCAL MATERIAL.
- INSTALL RIPRAP TOE FOR ADDITIONAL PROTECTION AS NEEDED.
- SEE SHEET 10.3, UPLAND PLANTING ZONE FOR PLANTING PLAN.

Station	Approximate 1.5-yr WSEL (FT, NAVD 88)	Top of Riprap Placement Elevation (FT, NAVD 88)
76+00	4556.8	4558.8
74+90	4552.7	4554.7
73+50	4547.2	4549.2
72+00	4541.1	4543.1
71+00	4535.7	4537.7
70+00	4531.6	4533.6
68+00	4522.2	4524.2
66+20	4514.3	4516.3
64+00	4502.4	4504.4
62+00	4493.6	4495.6
60+00	4486.2	4488.2
58+00	4478.8	4480.8

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WALLOWA RESOURCES
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GEOENGINEERS
129 SOUTH MAIN STREET
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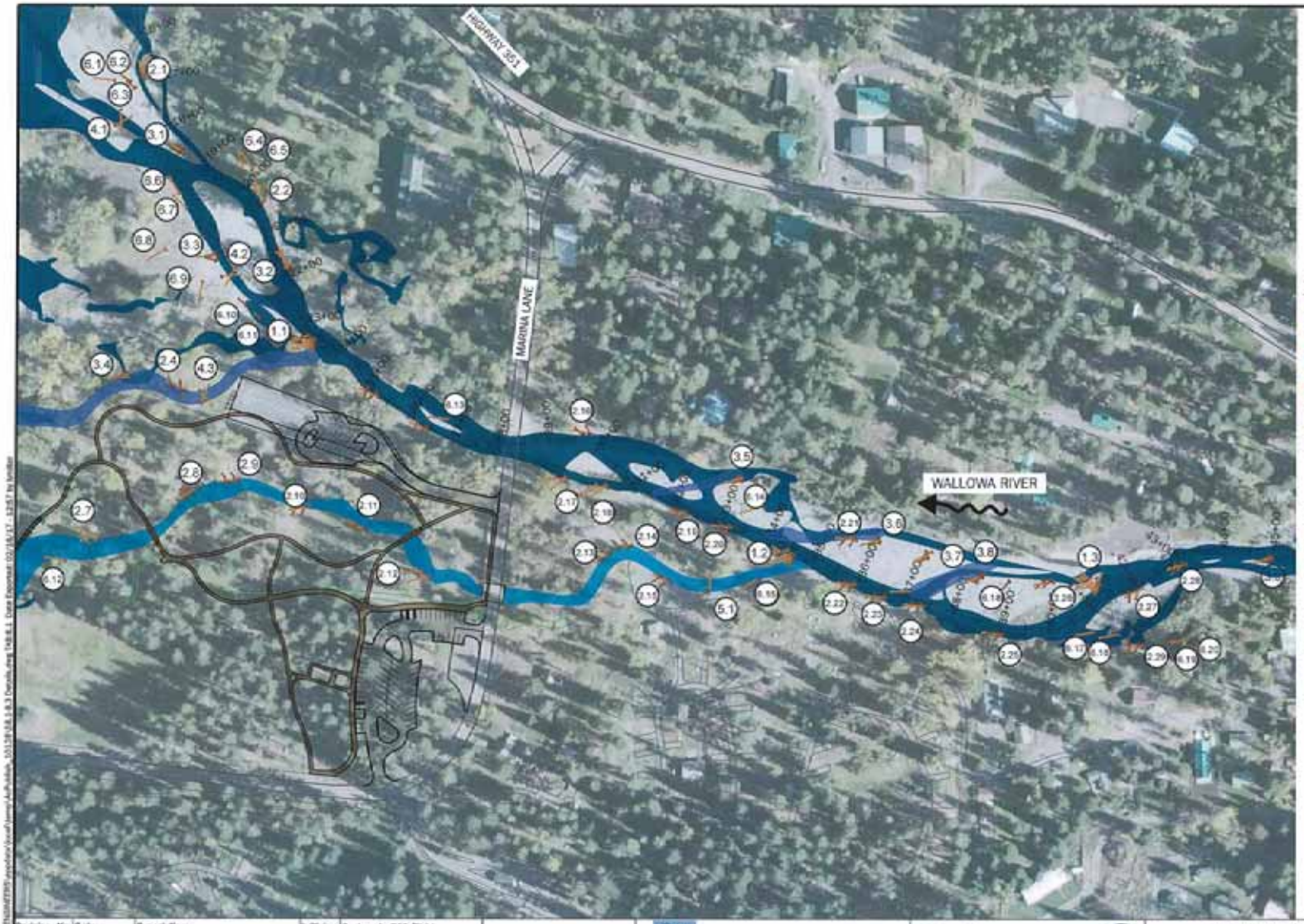
BANK STABILIZATION DETAIL

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 7.7



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 PATH
- PROPOSED PARKING AREA

N E S W

200 0 200
Feet

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 COUNTS PER REACH LISTED ON HABITAT DETAIL SHEET 8.2

PROFESSIONAL ENGINEER
72313PE
OREGON
RYAN S. CARNIE

Expires: 12/31/2017

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				Checked: JDW/JRS
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WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
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129 SOUTH MAIN STREET
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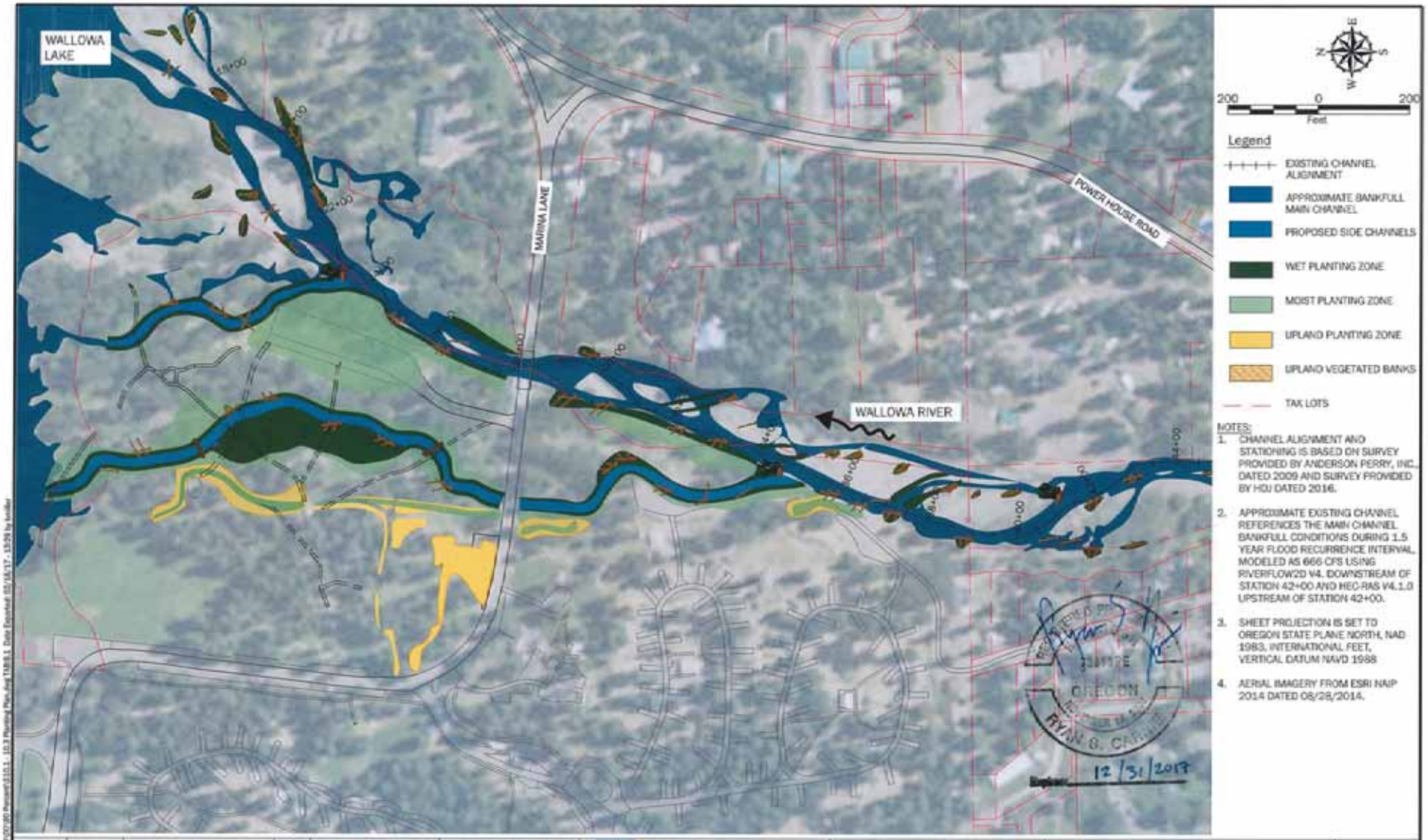
HABITAT STRUCTURES PLAN VIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 8.1



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WALLOWA RESOURCES
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GEOENGINEERS
129 SOUTH MAIN STREET
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REACH 1 AND REACH 2
PLANTING PLAN

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
9.1

Cost Summary Reaches 1 & 2

Project: Upper Wallowa Restoration Design
Project No: 21861-001-00

Analyst: BHM/RSC
Latest Revision: 2/14/2017

- This spreadsheet summarizes the costs for construction of the in channel habitat and stabilization measures.

Summary Table					
Specification #	**Item Description**	**Units**	**Unit Cost ($)**	**No. of Units**	**Total Cost ($)**
2100	Environmental Controls - Permit Compliance-Best Management Practices	LS	7000.00	1.0	$7,000
3110	Mobilization and Demobilization	LS	70000.00	1.0	$70,000
3120	Construction Staking	Day	1183.84	2.0	$2,368
3130	Temporary Traffic Control	LS	6000.00	1.0	$6,000
3210	Clearing, Grubbing, Stockpile and Disposal	AC	2096.38	2.7	$5,660
3240, 3250	Temporary Stream Diversion, Dewatering	EA	400.00	41.0	$16,400
3310	Berm Excavation and Stockpile	CY	11.94	1368.0	$16,330
3320	Channel Excavation and Stockpile	CY	11.94	2302.0	$27,479
3330	Sawcut and Remove Asphalt Pavement	SY	5.75	18296.0	$105,246
3340	Remove Existing Pedestrian Bridge	SF	13.61	480.0	$6,535
3350	Haul and Dispose Asphalt and Curbing	CY	30.00	340.0	$10,200
3410	New Predestrian Bridge	EA	47374.56	2.0	$94,749
3430	Place Material - Proposed Berm	CY	15.00	4227.0	$63,405
3440	Fine Grade Proposed Channel and Berm	SY	0.47	2015.0	$953
3510	Install Large Wood Structures (Per Log)	EA	1100.00	72.0	$79,200
3510	Install Large Wood Structures - Bid Alternate (Per Log)	EA	1100.00	104.0	$114,400
3520	Install Ballast Boulders - (Per Boulder)	EA	175.00	134.0	$23,450
3520	Install Ballast Boulders - Bid Alternate (Per Boulder)	EA	175.00	176.0	$30,800
3530	Bank Protection - Vegetated Coir Mat	LF	40.00	0.0	$0
3540	Install Riprap Revetment	TON	32.77	171.0	$5,604
3610	Pavement Subbase	TON	23.64	665.0	$15,721
3620	Asphalt Pavement - Path	TON	88.79	81.0	$7,192
3630	Asphalt Pavement - Parking Lot and Roadway	TON	88.79	594.0	$52,740
3640	Unpaved Path	SY	3.91	595.0	$2,324
3650	Boardwalk Path	SF	55.00	281.0	$15,455
3720	Marina Lane Bridge	LS	74800.00	1.0	$74,800
3730	Marina Lane Bridge Abutments	LS	40000.00	1.0	$40,000
3810	Seeding	AC	1285.00	2.1	$2,699
3820	Planting	EA	1.83	3600.0	$6,596
3910	Site Cleanup and Repair	LS	5000.00	1.0	$5,000
SUBTOTAL CONSTRUCTION COST					$908,304
CONSTRUCTION OBSERVATION ESTIMATE					$72,000
TOTAL CONSTRUCTION COSTS					$980,304

Cost Summary Reaches 3 & 4

Project: Upper Wallowa Restoration Design
Project No: 21861-001-00

Analyst: BHM/RSC
Latest Revision: 2/14/2017

- This spreadsheet summarizes the costs for construction of the in channel habitat and stabilization measures.

Summary Table					
Specification #	**Item Description**	**Units**	**Unit Cost ($)**	**No. of Units**	**Total Cost ($)**
3120	Construction Staking	LF	3.95	1.0	$3.95
3210	Clearing, Grubbing, Stockpile and Disposal	LF	0.63	1.0	$0.63
3240, 3250	Temporary Stream Diversion, Dewatering	LF	4.00	1.0	$4.00
3530	Bank Protection - Vegetated Coir Mat	LF	40.00	1.0	$40.00
3540	Install Riprap Revetment	LF	44.90	1.0	$44.90
3810	Seeding	LF	0.39	1.0	$0.39
3820	Planting	LF	1.83	1.0	$1.83
3910	Site Cleanup and Repair	LF	4.00	1.0	$4.00
SUBTOTAL CONSTRUCTION COST					$100
MOBILIZATION AND ENVIRONMENTAL CONTROLS				**15%**	$15
CONSTRUCTION COST PER FOOT OF EMBANKMENT					$115

Wallowa County CHIEFTAIN

Wallowa River restoration plan would boost fish habitat, prevent erosion

Published on October 3, 2017 3:59PM

Paul Wahl/Chieftain Most kokanee are considerably smaller than this specimen photographed in the Wallowa River in late September.

Million-dollar project could begin next fall

By Paul Wahl

Wallowa County Chieftain

Around the time the invasion of two-legged visitors to Wallowa County begin leaving, a red legless species arrived.

Kokanee salmon have been spawning in the Wallowa River for several weeks in large numbers.

Their presence could grow significantly with the implementation of the Upper Wallowa Restoration project. Increasing the amount of Kokanee and Bull Trout spawning grounds is one aspect of the plan, which was released in February.

The goal is to restore the alluvial fan where the river meets the lake, splitting it into multiple and braided channels as it enters the lake for fish habitat and assisting with erosion control on 1 1/2 miles of the river and West Fork Wallowa River.

Funding to implement the plan likely won't be in place until next spring or summer, according to Matt King, who has been shepherding the project for its sponsor, Wallowa Resources, the past two years.

The project will also undergo a federal permit process required for stream restoration under Section 404 of the Clean Water Act, King said.

In addition, a state Removal/Fill Permit issued by the Department of State Lands, will also be required.

The initial study cost $100,000. The project itself will cost a million dollars. Funding will come from public and private sources, according to King.

Conditions on the stretch of the river have been deteriorating for years. According to one report, to prevent flooding of Wallowa Lake Park, riprap was installed along portions of the stream bank. "This solution did not correct the flooding problem but shifted the stream bank erosion problem to the other side of the river," the report said. "From the late '60s and onward, OPRD would bulldoze the river to dike the gravel deposits and deepen the channel."

Things went along fairly well until July 18, 2002, when a flash flood raged out of the mountains destroying a Boy Scout mess hall and rerouting the West Fork of the Wallowa River, isolating two summer residences. Estimated damage was pegged at $1 million.

Thirty-two individuals narrowly escaped with their lives.

The first push to provide a longterm solution on the river began with a study in 2010. Later Oregon Parks and Recreation approached Wallowa Resources in a bid to move the project forward.

More study was completed in 2014-15 leading up to the final plan.

Fish habitat and erosion control are the highest priorities.

How much habitat will be expanded is unknown.

"There is a lot of variables associated with that," said Jeff Yanke, District Fish Biologist at Oregon Department of Fish and Wildlife in Enterprise.

While Kokanee and Bull Trout are mentioned specifically in the plan, there is a possibility other species may use the repurposed portion of the river in years to come.

"There has been a long-running interest in reintroducing sockeye salmon to Wallowa Lake," Yanke said. "Fish passage at the dam is the lynchpin."

Pending reconstruction of the Wallowa Dam would likely include a "fish ladder" that would allow additional species to enter the project area.

Yanke said while future sockeye use is possible, he called it "speculative."

"Since sockeye spawn in lakes as well as rivers, it will all depend on the stock used and what the fish consider suitable habitat," he said.

Controlling erosion is of particular concern to the owners of the Wallowa Lake Lodge.

James Monteith was the leader of a group of investors who purchased the lodge from private owners in 2016.

“We’ve been aware of erosion in the east channel as it goes through the lodge property and pondering what to do about it,” Monteith said.

He added that his group was also concerned about preserving the area as a draw for visitors, important to the future viability of the lodge.

Private property owners in the area were also brought into the planning process, King said.

A third benefit of the plan would include providing a closer look at fish habitat without interrupting the spawning process.

In an update of the Wallowa Lake Park Plan revealed recently by the state, one of the channels created would be used for that purpose.

Wallowa County Commissioners have also expressed support for the project.

Commissioner Susan Roberts said although concerns remain as to the cost and final responsibility for reconstruction of the bridge on Marina Lane remain, it appeared to be an acceptable plan.

Roberts said it would be pleasing for her personally to see the river restored.

“That would be the Wallowa River I remember as a child visiting the area,” Roberts said. “I’m excited.”

King said the bridge is jointly owned by ODOT and OPRD who are attempting to resolve future responsibility.