UPPER WALLOWA RIVER

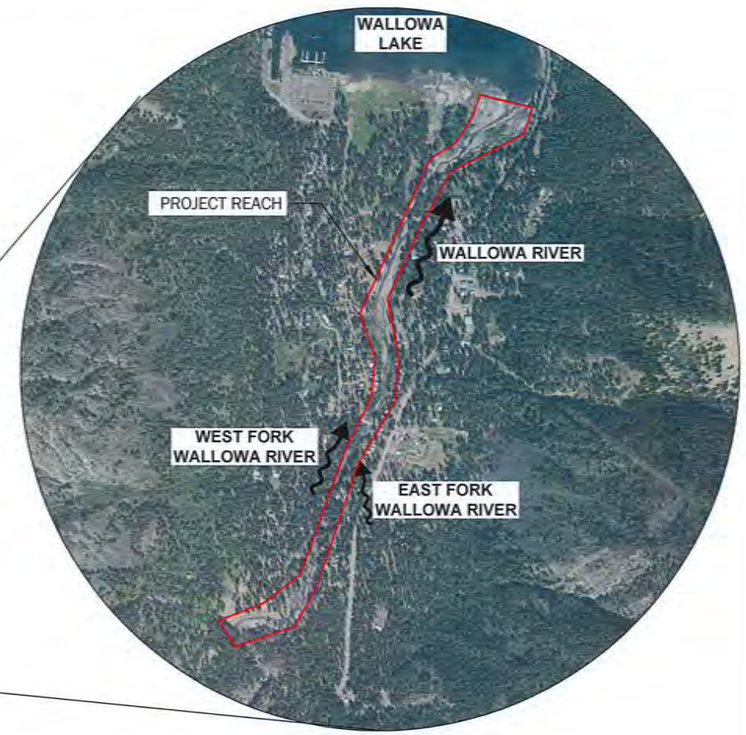
RESTORATION DESIGN

FINAL DESIGN DRAWINGS

STATE MAP
NTS

REGION MAP
NTS

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.



VICINITY MAP
NTS

CONTACT INFORMATION

GEOENGINEERS INC.
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

Expires: 12/31/2017

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

COVER SHEET

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 1.1

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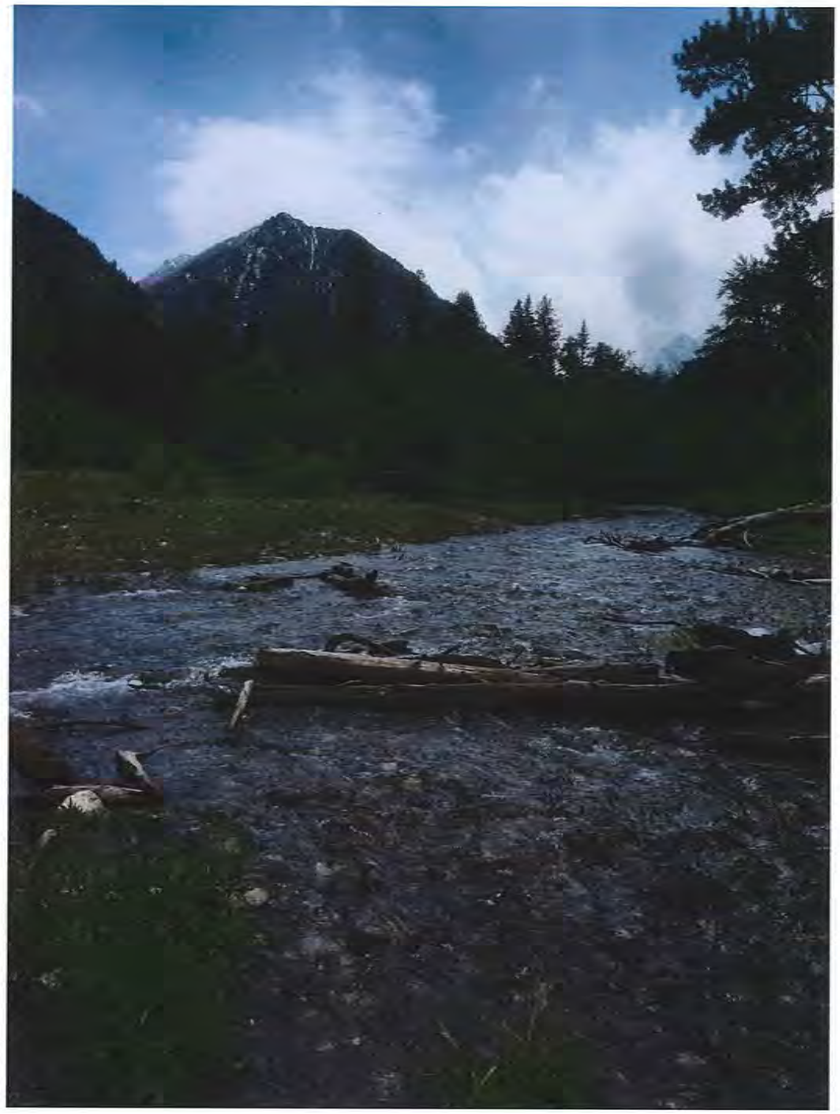

PROJECT GOAL

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
NOVEMBER 12, 2008
RYAN S. CARNIE

Expires: 12/31/2017

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WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
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GEOENGINEERS
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PENDLETON, OR 97801

GOAL AND OBJECTIVES

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 1.2

GENERAL NOTES:

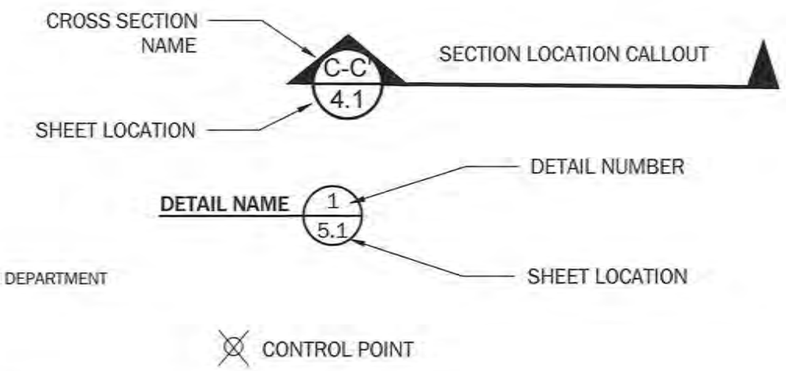
1. These designs and drawings have been prepared for the exclusive use of the Wallowa Resources and their authorized agents. These documents are for planning purposes only and cannot be used for construction.
2. The drawings contained within should not be applied for any purpose or project except the 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.

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.

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



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				Project No: 21860-001-00

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
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GENERAL NOTES

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 1.3

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DOWNSTREAM LIMITS OF HYDRAULIC MODEL

REACH 1 | REACH 2 | REACH 3 | REACH 4

WALLOWA LAKE

WALLOWA LAKE STATE RECREATION AREA
RIVERSIDE DAY-USE AREA

AMPHITHEATER

RIVER PARKING AREA

WALLOWA LAKE MARINA

MARINA LANE PARKING AREA

WALLOWA LAKE GROUP CAMPGROUNDS

MARINA LANE

POWERHOUSE ROAD

EXISTING CHANNEL ALIGNMENT

WALLOWA RIVER

BAILEY LANE

EAST FORK WALLOWA RIVER CONFLUENCE

POWER HOUSE ROAD

PACIFICORP TAILRACE CONFLUENCE

B C CREEK CONFLUENCE

10+00 12+00 14+00 16+00 18+00 20+00 22+00 24+00 26+00 28+00 30+00 32+00 34+00 36+00 38+00 40+00 42+00 44+00 46+00 48+00 50+00 52+00 54+00 56+00 58+00 60+00 62+00 64+00 66+00 68+00 70+00 72+00 74+00 76+00 78+00 80+00 82+00 84+00 86+00 88+00

N W E S

500 0 500
Feet

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 AQUIRED BY QUANTAM SPATIAL JULY, 2015.
6. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES PROVIDED BY OREGON PARKS AND RECREATION DEPARTMENT SEPTEMBER, 2016.

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CANNIE

Expires: 12/31/2017

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Date: 02-17-2017
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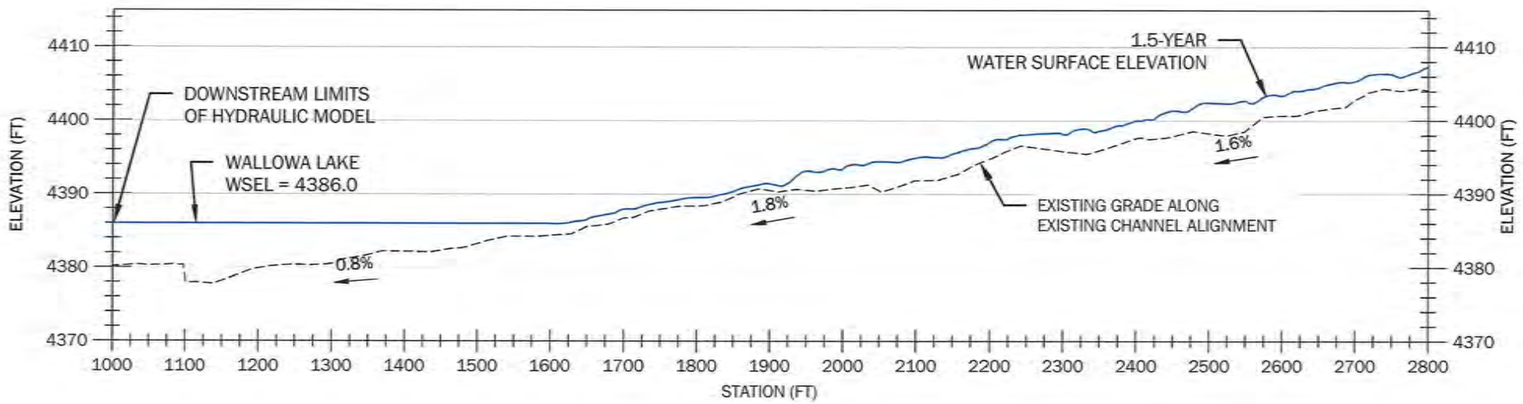
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

EXISTING CONDITIONS AERIAL

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 2.1



REACH 1 - PROFILE VIEW

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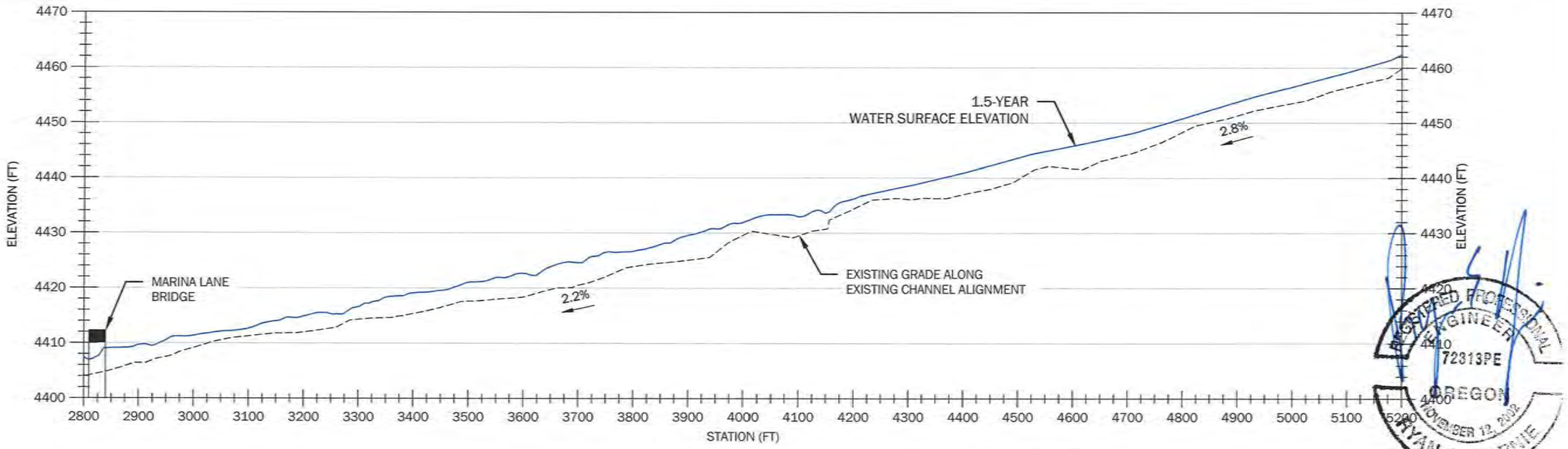
Feet
VERTICAL EXAGGERATION = 10X
VERTICAL SCALE 1" = 20'



REACH 2 - PROFILE VIEW

200 0 200
Feet
VERTICAL EXAGGERATION = 10X
VERTICAL SCALE 1" = 20'

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
RYAN S. CARNILL
Expires: 12/31/2017

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129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 AND REACH 2
EXISTING CHANNEL PROFILE

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
2.2

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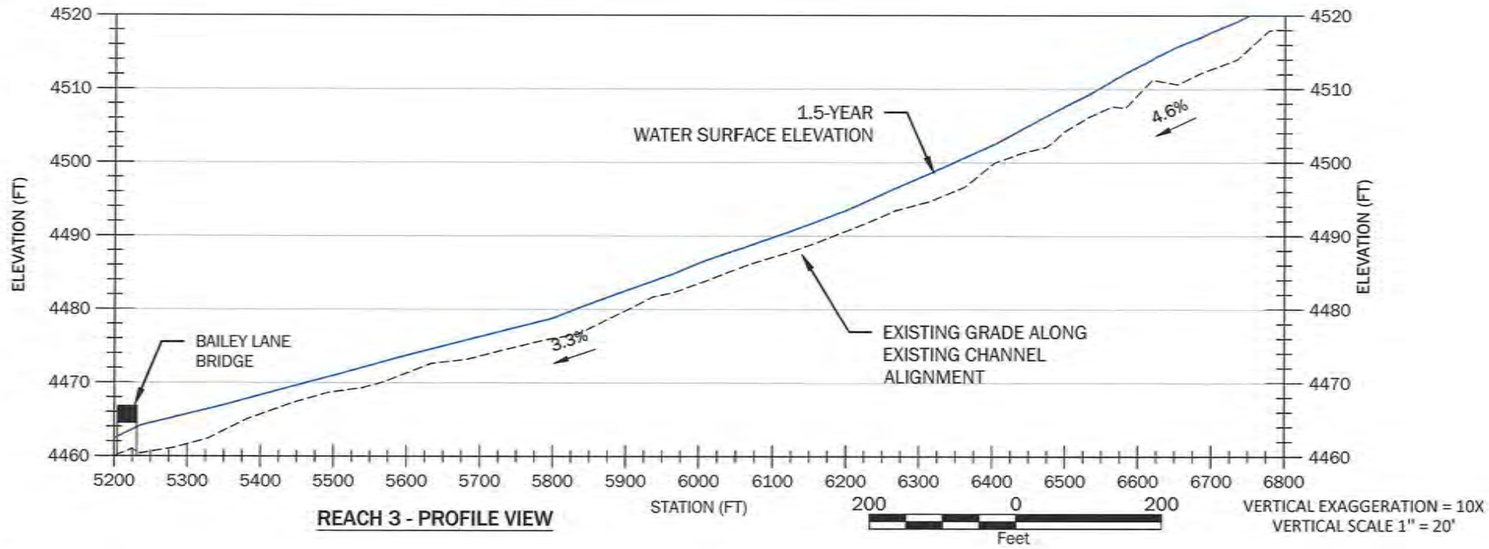
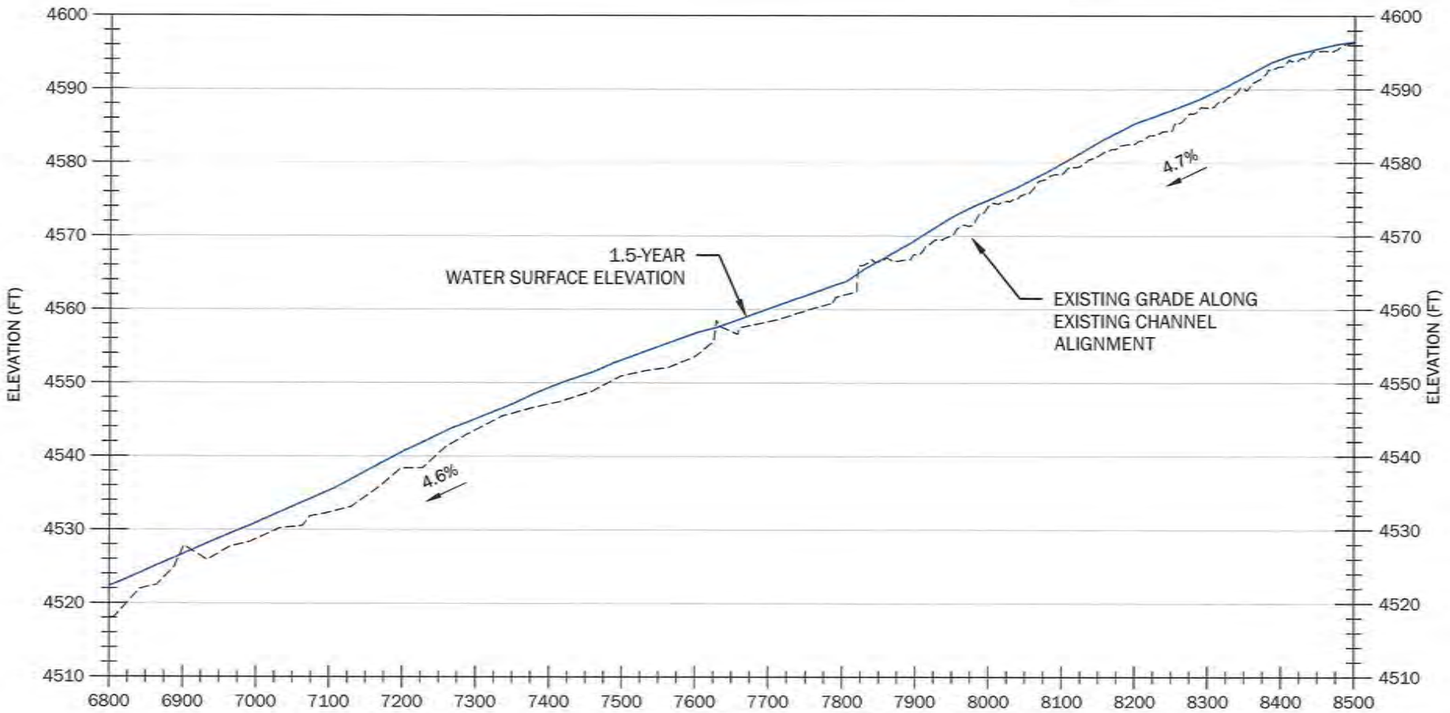


REACH 3 - PROFILE VIEW



REACH 4 - 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.

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

REACH 3 AND REACH 4
EXISTING CHANNEL PROFILE

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
2.3

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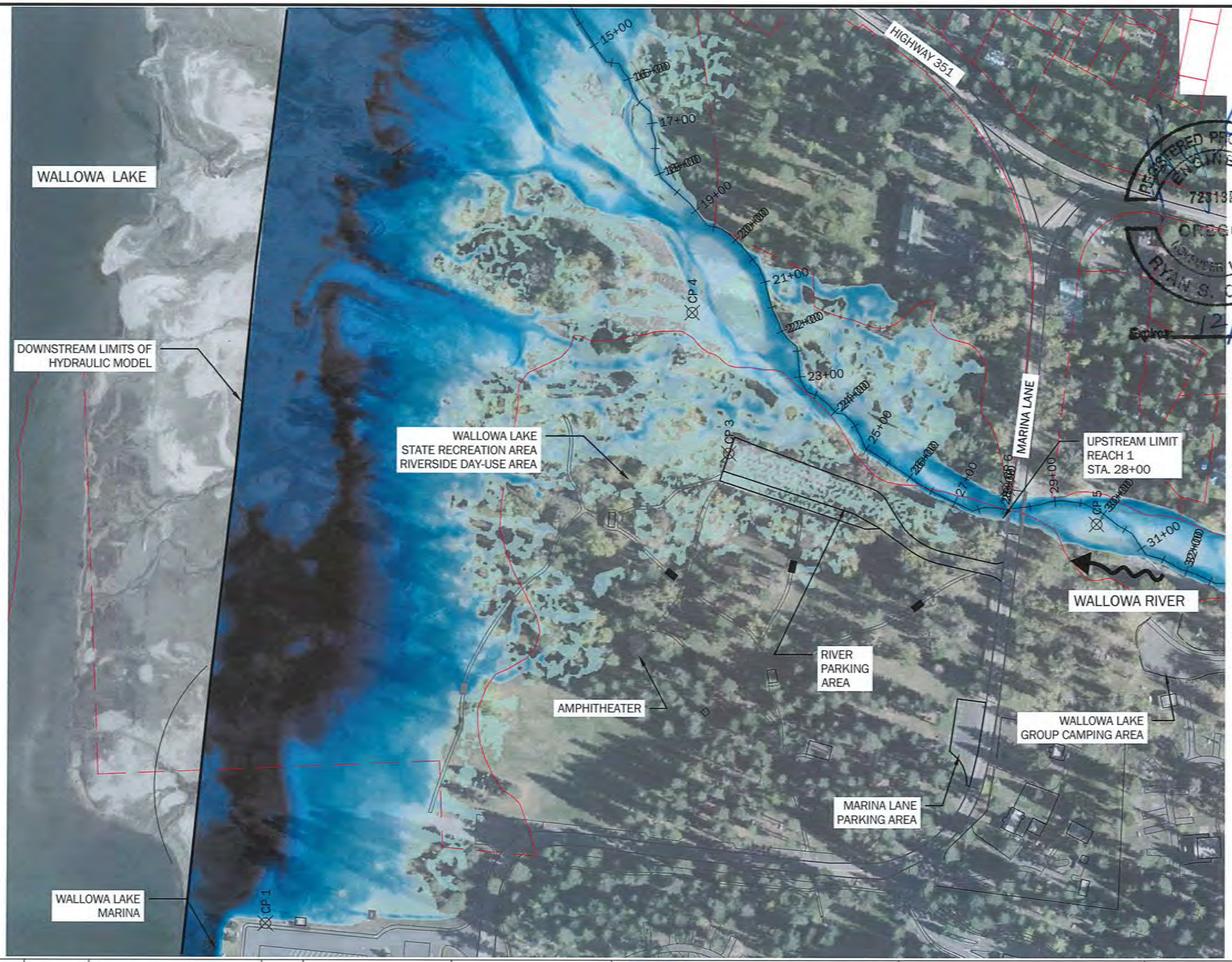

N E S W

200 0 200
Feet

Legend

- >10 FT
- 5 FT
- 0 FT

1.5-YEAR INUNDATION WATER DEPTH

EXISTING CHANNEL ALIGNMENT

TAX LOT

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

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.
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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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WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

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

Sheet
2.4

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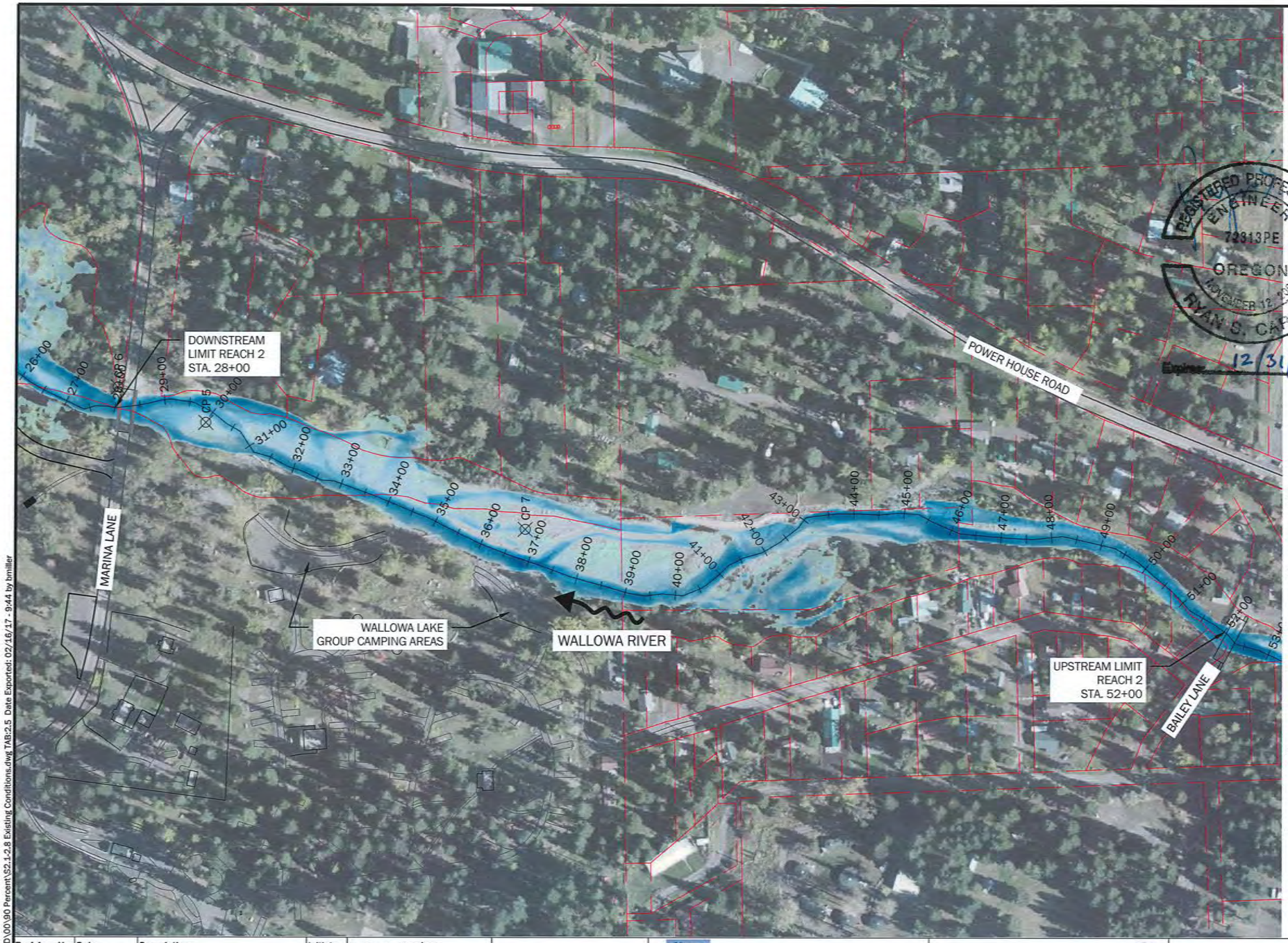

N E S W

200 0 200
Feet

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

Legend

- >10 FT
- 5 FT
- 1 FT
- 0 FT

1.5-YEAR INUNDATION WATER DEPTH

EXISTING CHANNEL ALIGNMENT

TAX LOT

NOTES:

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

Sheet
2.5

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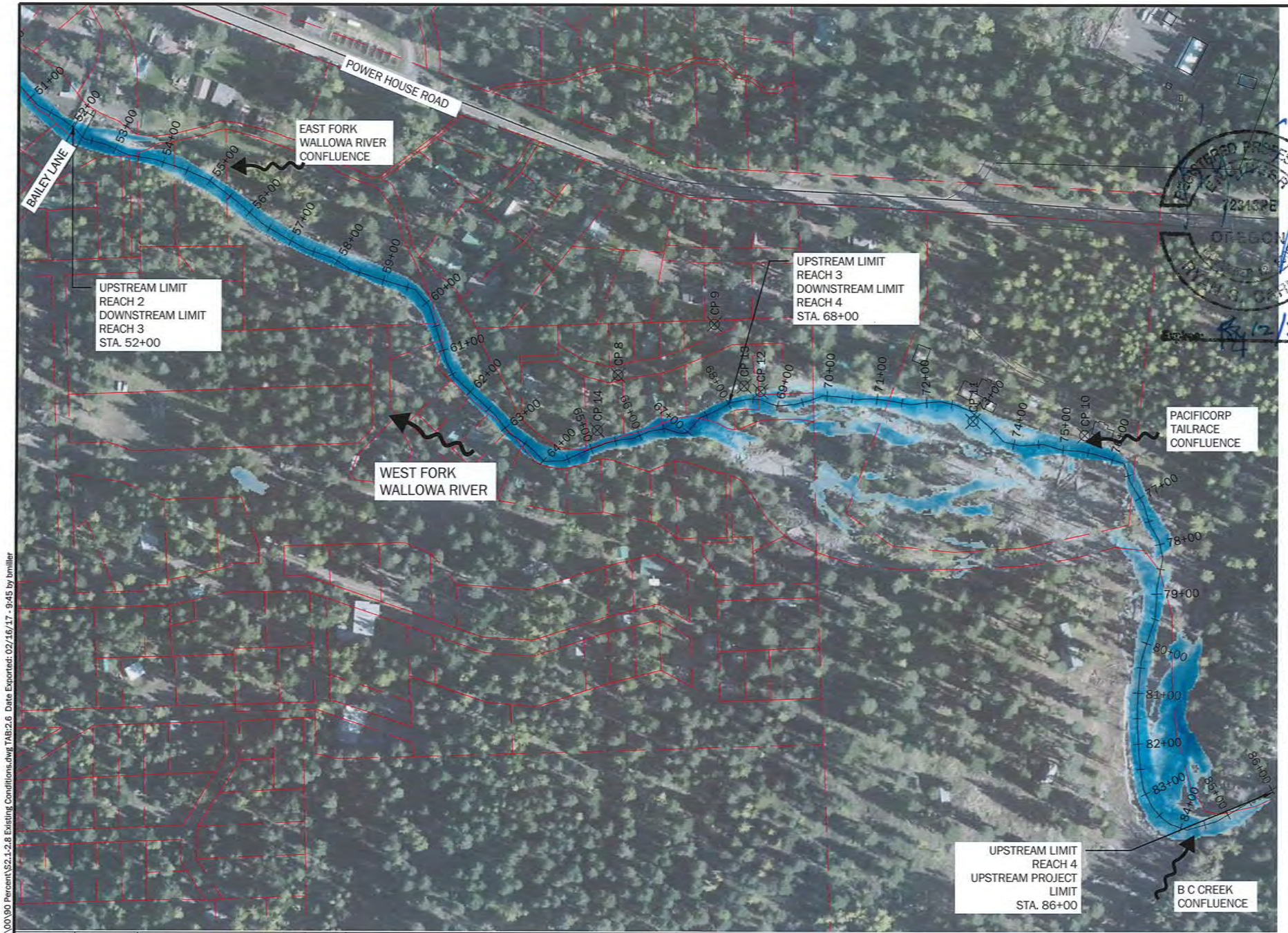

N E S W

200 0 200
Feet

Legend

- >10 FT
- 5 FT
- 1 FT
- 0 FT

1.5-YEAR INUNDATION WATER DEPTH

EXISTING CHANNEL ALIGNMENT

TAX LOT

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

REGISTERED PROFESSIONAL ENGINEER 12313PE OREGON BRIAN H. GRENNE

12/31/17

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				Project No: 21860-001-00

20 years WR WALLOWA RESOURCES

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 3 AND REACH 4
1.5-YEAR INUNDATION WATER DEPTH

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
2.6

MARINA LANE BRIDGE
SHEET 5-SERIES

REACH 1
SHEET
4-SERIES

REACH 2
SHEET
6-SERIES

REACH 3 AND REACH 4
SHEET 7-SERIES

WALLOWA
LAKE

WALLOWA RIVER

MARINA LANE

BAILEY LANE

POWER HOUSE ROAD

10+00 12+00 14+00 16+00 18+00 20+00 22+00 24+00 26+00 28+00 30+00 32+00 34+00 36+00 38+00 40+00 42+00 44+00 46+00 48+00 50+00 52+00 54+00 56+00 58+00 60+00 62+00 64+00 66+00 68+00 70+00 72+00 74+00 76+00 78+00 80+00 82+00 84+00 86+00 88+00

N
W E
S

500 0 500
Feet

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 NAVD 1988.
4. AERIAL IMAGERY FROM ESRI NAIP 2013 DATED 08/28/2014.

OREGON
72313PE
RENEWS: 12/31/2017
RYAN S. CARNIE
NOVEMBER 12, 2002

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WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

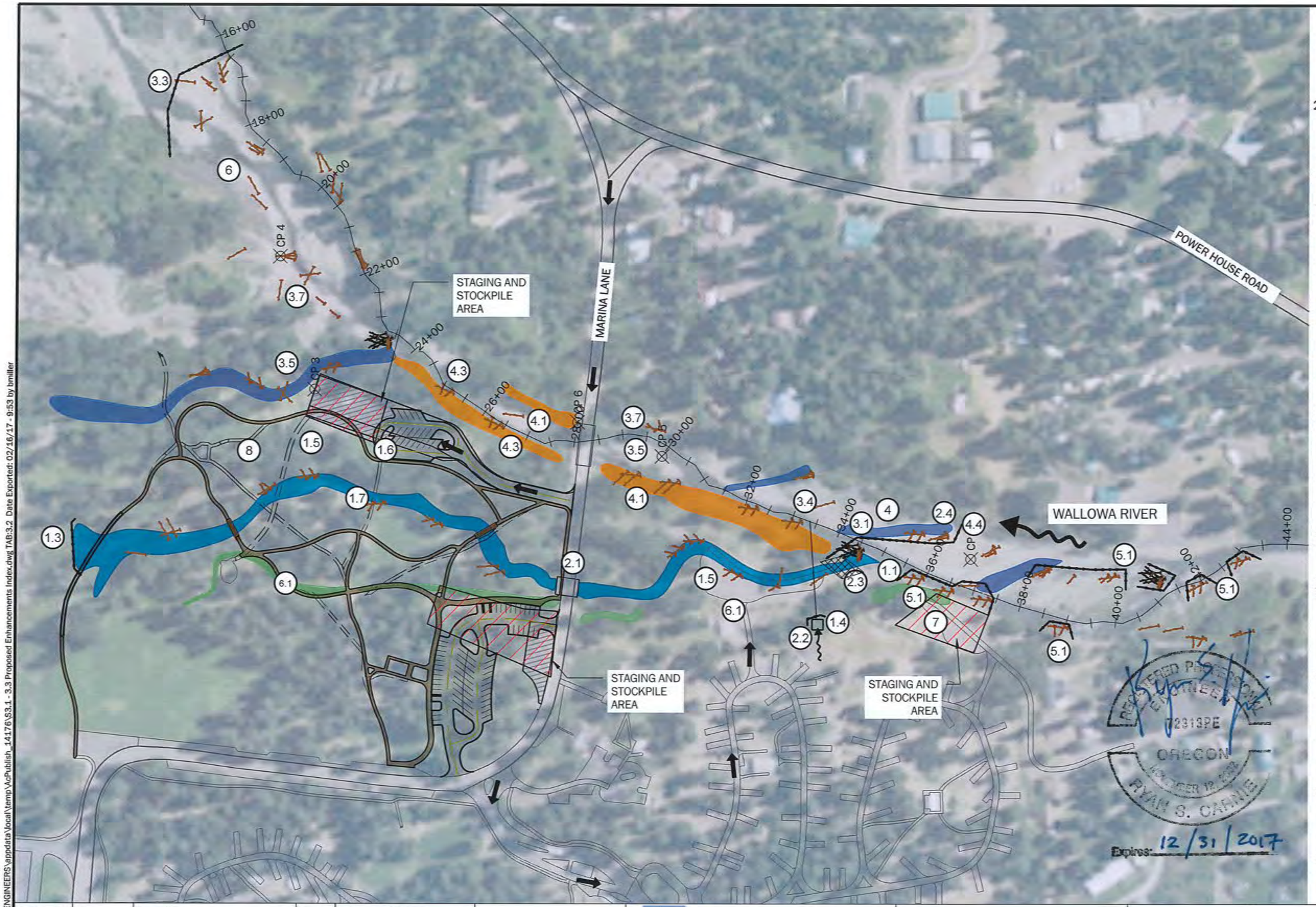
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

PROPOSED ENHANCEMENTS INDEX

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
3.1

C:\Users\bmiller.GEOENGINEERS\appdata\local\temp\AcPublish_14176\S3.1 - 3.3 Proposed Enhancements Index.dwg TAB:3.1 Date Exported: 02/16/17 - 9:53 by bmiller



N
W
E
S

200 0 200
Feet

Legend

- CHANNEL ALIGNMENT
- STAGING/STOCKPILE AREA
- 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
- TEMPORARY STREAM DIVERSION STRUCTURE
- ACCESS ROUTE
- 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.
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
72313PE
OREGON
RYAN S. CARNILL
Expires: 12/31/2017

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

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 AND REACH 2 CONSTRUCTION SEQUENCING PLAN

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 3.2

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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. INSTALL CULVERTS AT MARINA LANE

2.1. INSTALL CULVERT AT MARINA LANE ACCORDING TO PLANS.

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

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
RYAN S. CAPLES
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

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 AND REACH 2 CONSTRUCTION SEQUENCING NOTES

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 3.3

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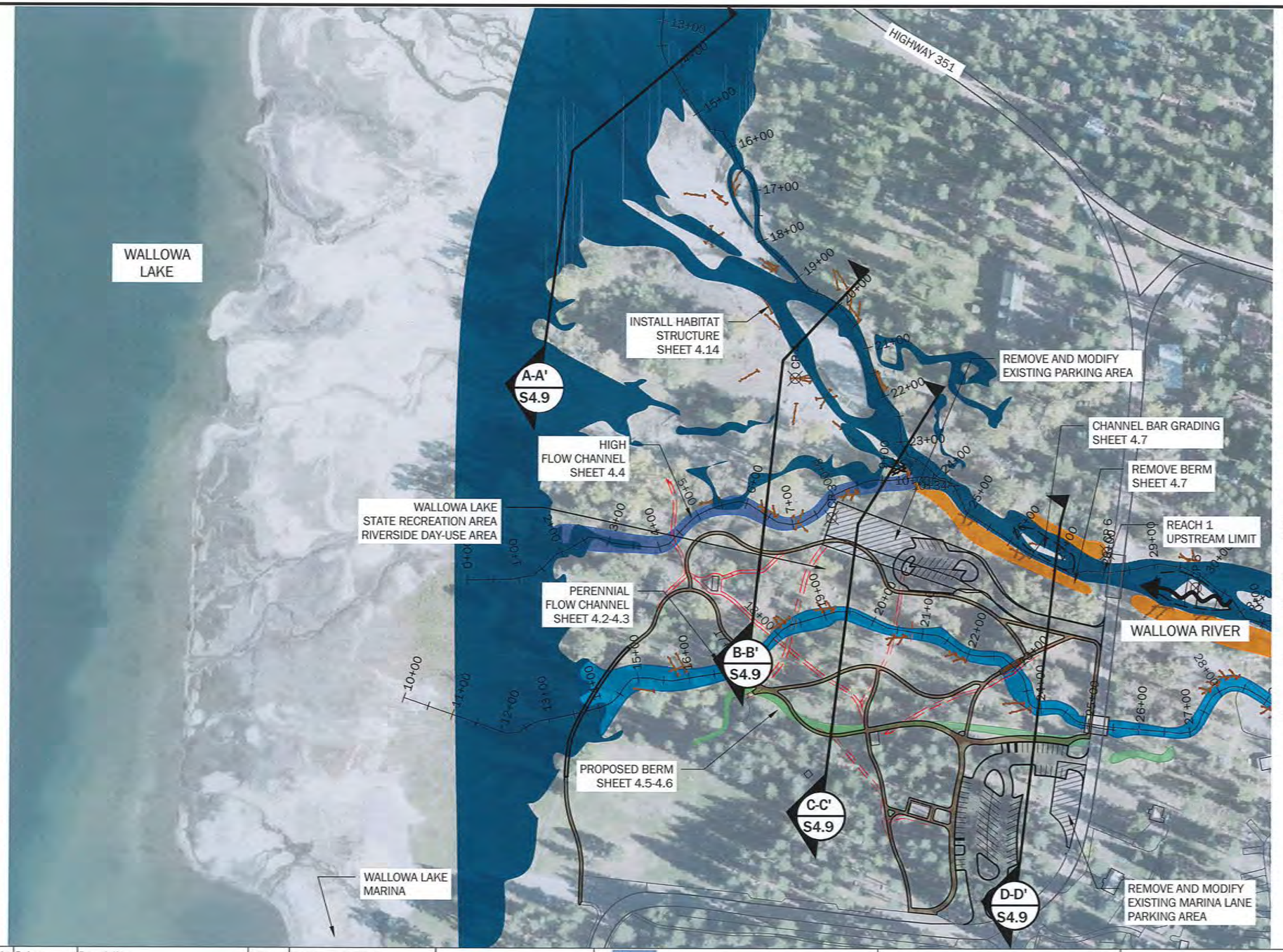

N W E S

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 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
72313PE
OREGON
NOVEMBER 12, 2009
RYAN S. CARNIE

Expires: 12/31/2017

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Date: 02-17-2017
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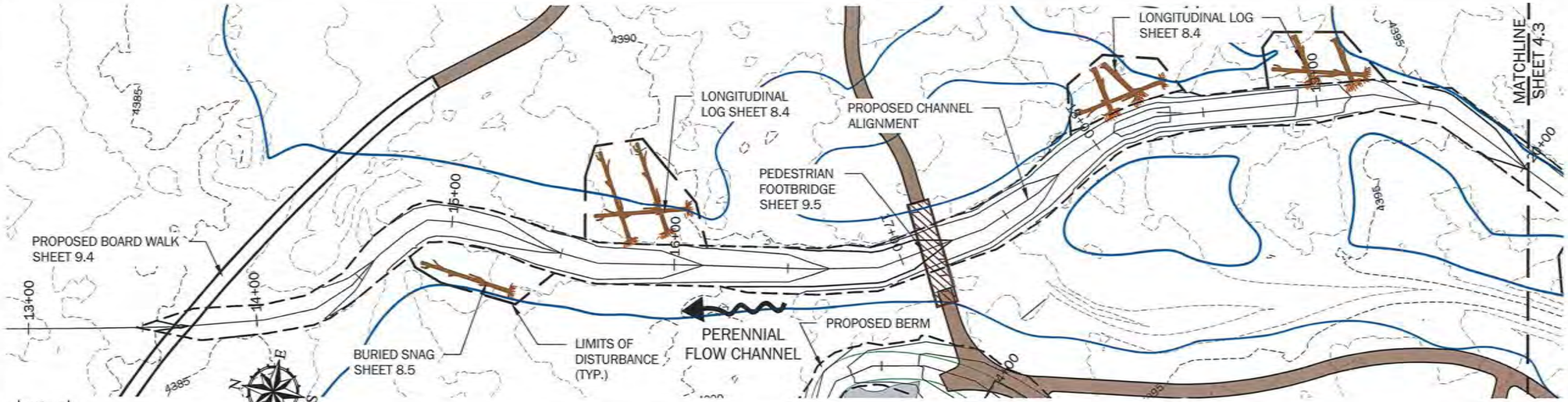
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 PROPOSED ENHANCEMENTS OVERVIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.1

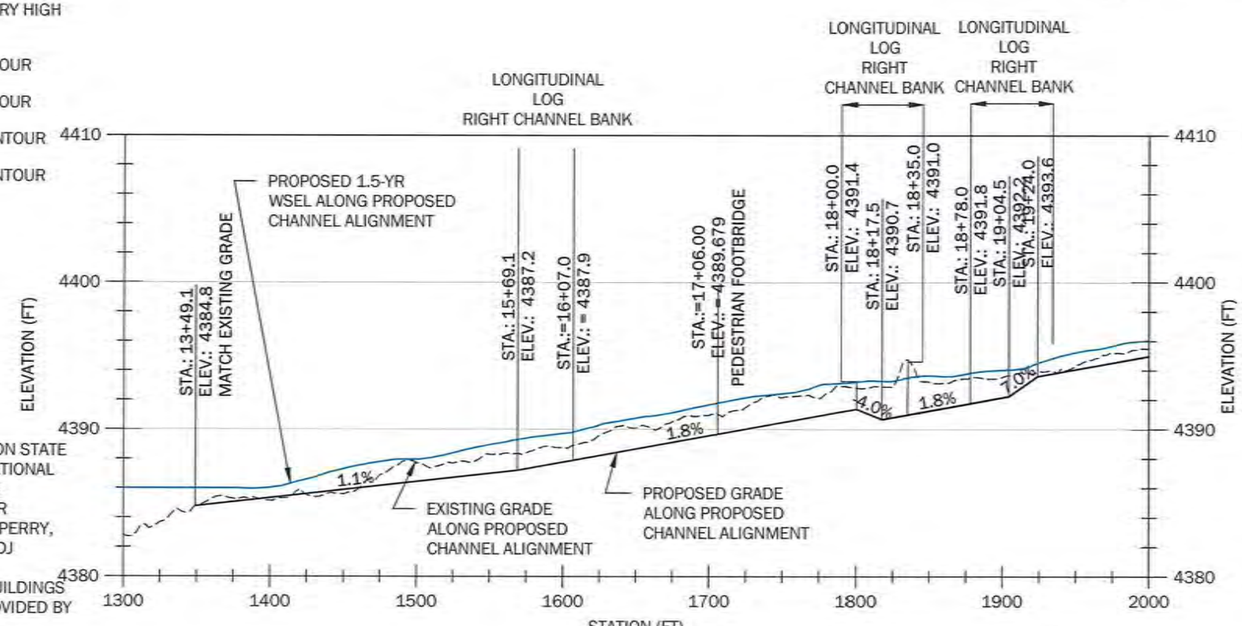


PERENNIAL FLOW CHANNEL PLAN VIEW

50 0 50 Feet

Legend

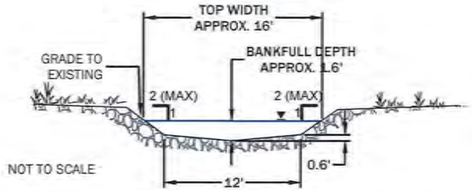
- CHANNEL ALIGNMENT
- APPROXIMATE ORIDNARY HIGH WATER
- 3980 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 3980 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- GRADING LIMITS
- PROPOSED PATH



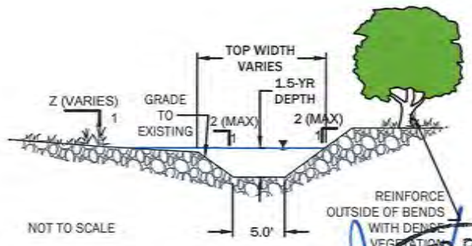
PERENNIAL FLOW CHANNEL PROFILE

100 0 100 Feet

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



TYPICAL PERENNIAL CHANNEL RUN GEOMETRY



TYPICAL PERENNEAL 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

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.

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

Revision No:	Date:	Description:	Initials:

Designed: RSC/BHM
Drawn: BHM
Checked: JGW/JRS
Date: 02-17-2017
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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 4.2

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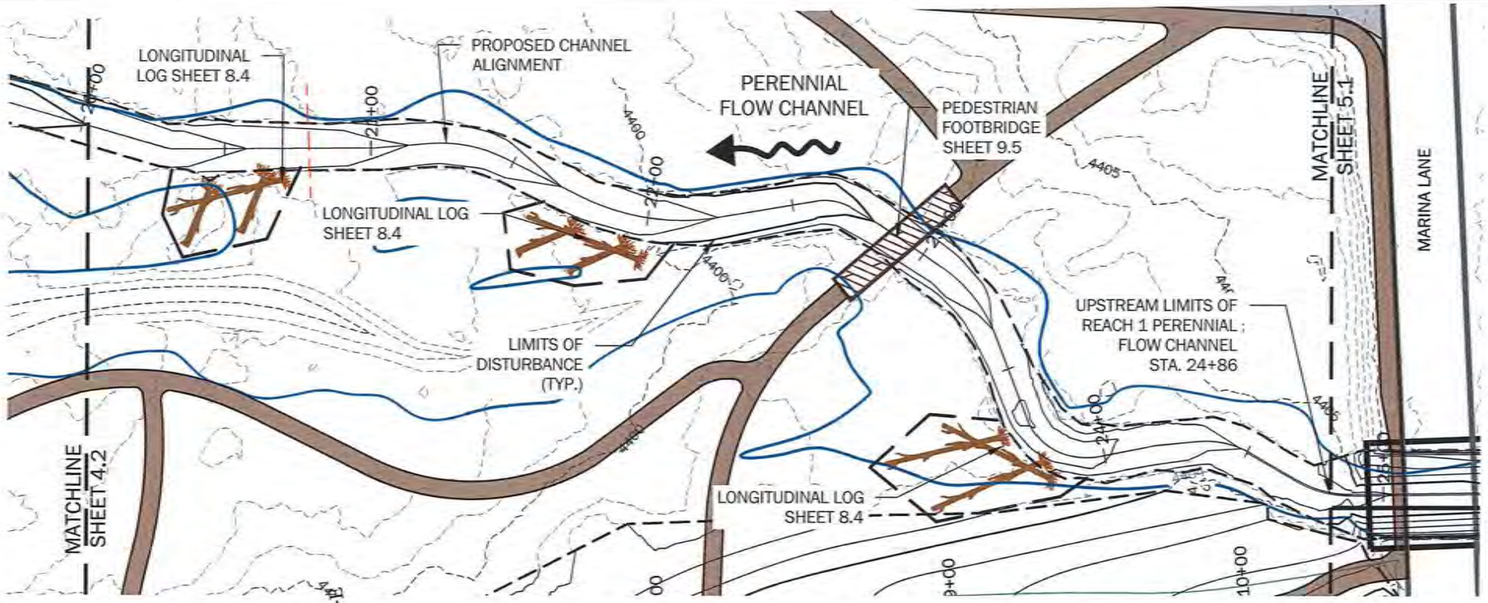
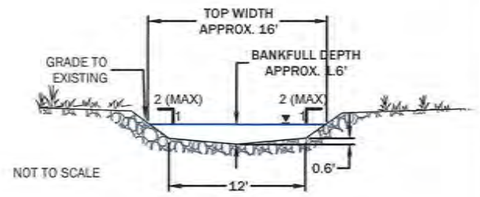


PERENNIAL FLOW CHANNEL PLAN VIEW

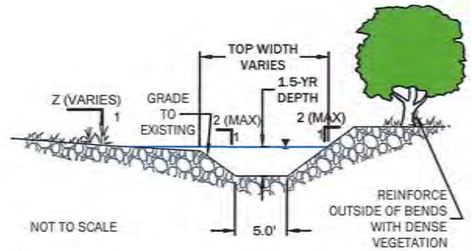
50 0 50
Feet

Legend

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



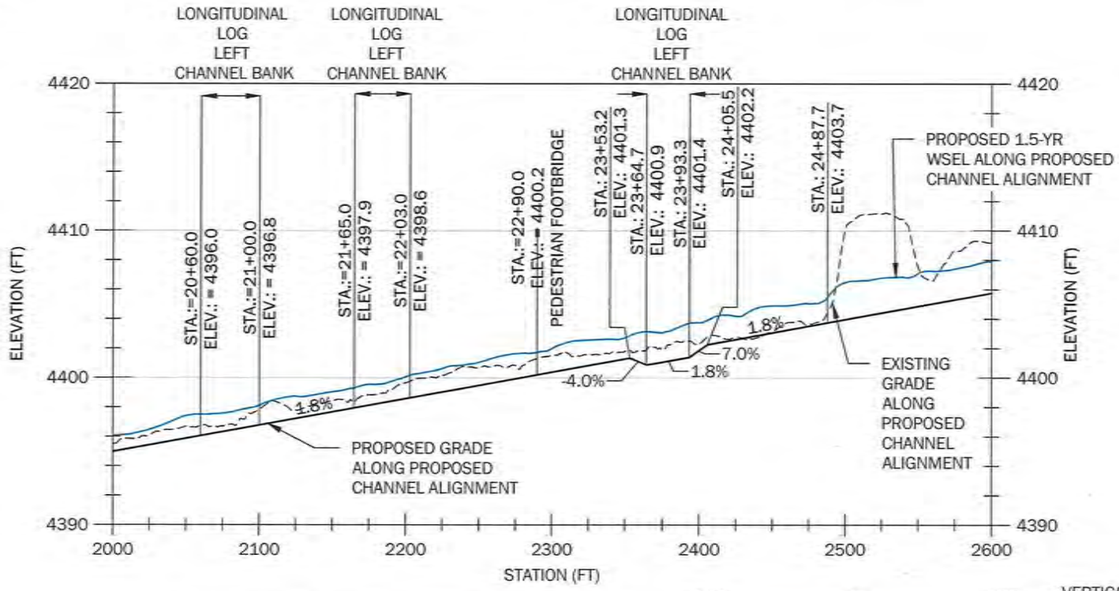
TYPICAL PERENNIAL CHANNEL RUN GEOMETRY



TYPICAL PERENNEAL 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

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

100 0 100
Feet

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

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

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WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

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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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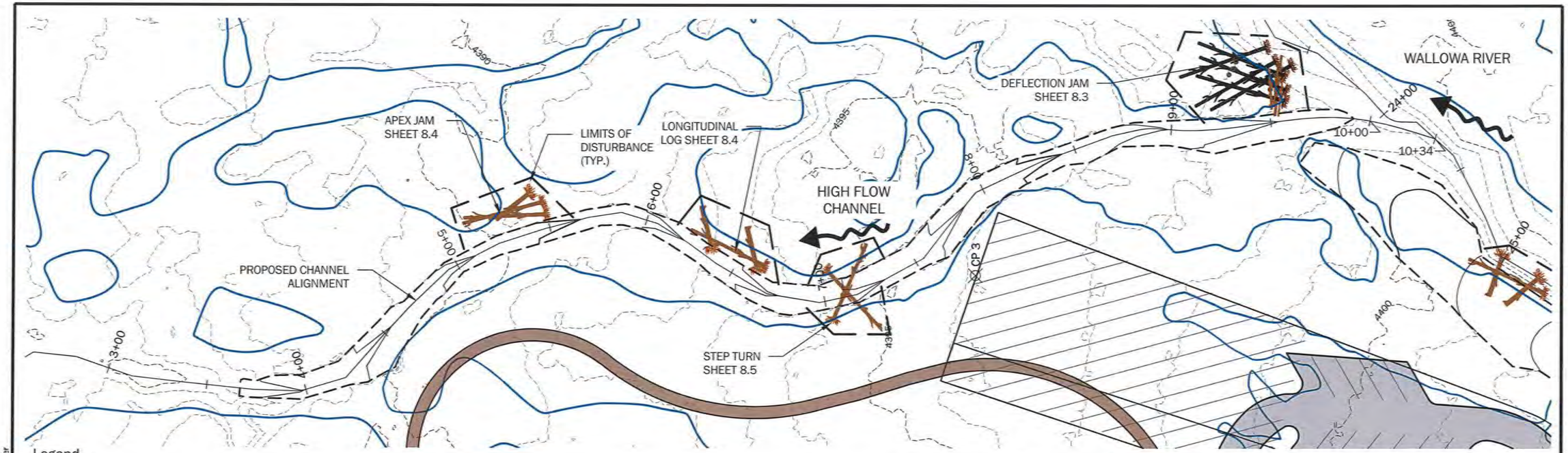


Legend

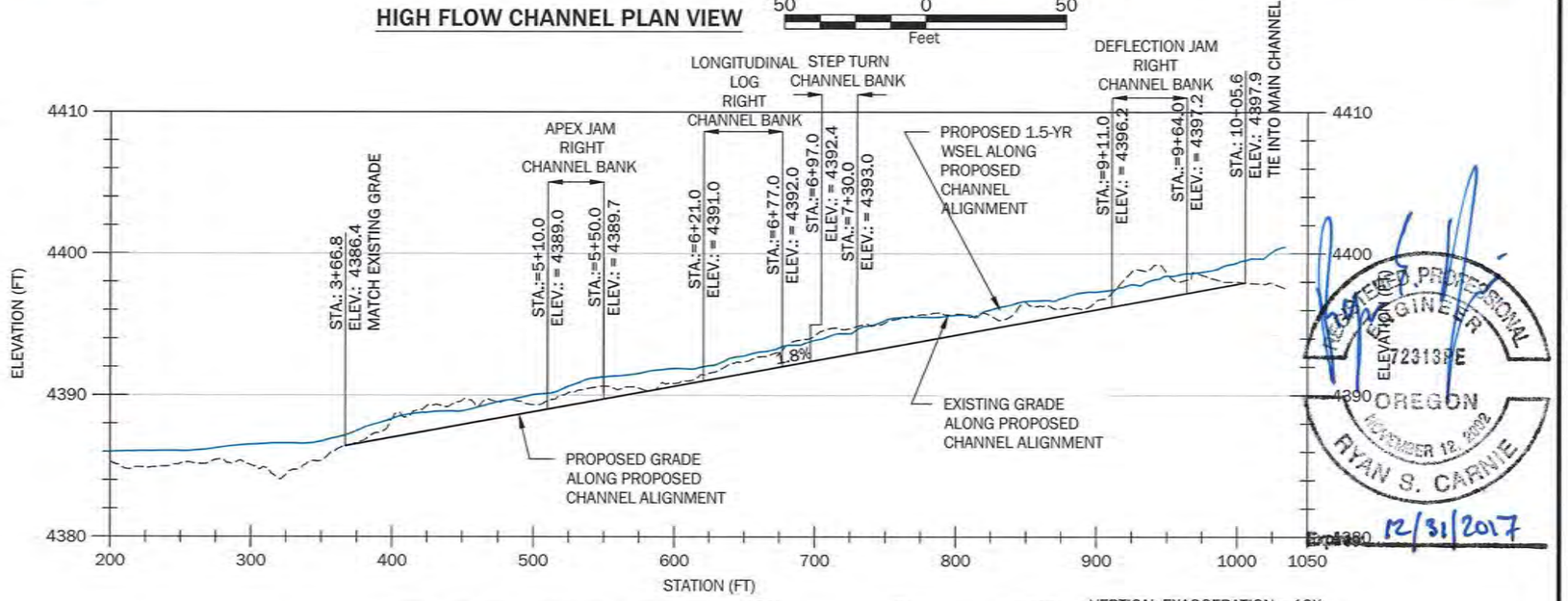
- CHANNEL ALIGNMENT
- APPROXIMATE ORIDNARY HIGH WATER
- 3980 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 3980 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- GRADING LIMITS
- PROPOSED PATH
- PROPOSED PARKING AREA

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'

REGISTERED PROFESSIONAL ENGINEER
12313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE
Expires: 12/31/2017

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WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
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REACH 1 HIGH FLOW CHANNEL PLAN AND PROFILE

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.4

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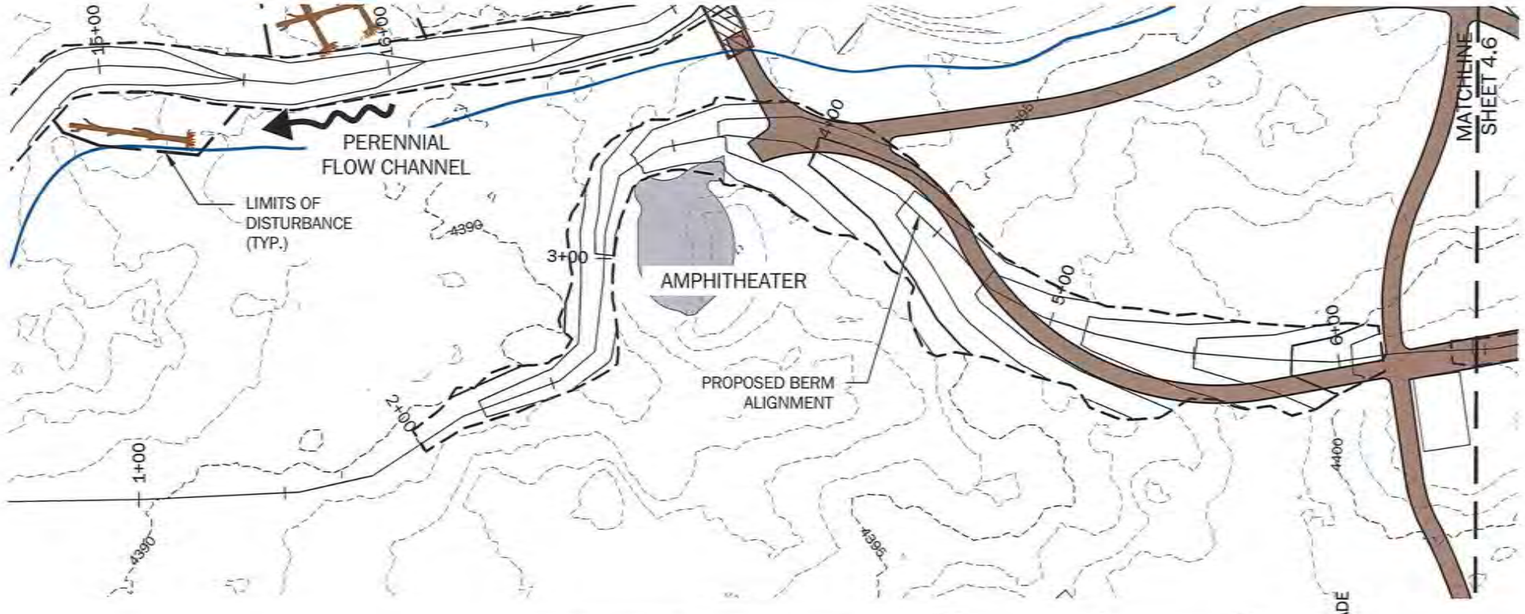
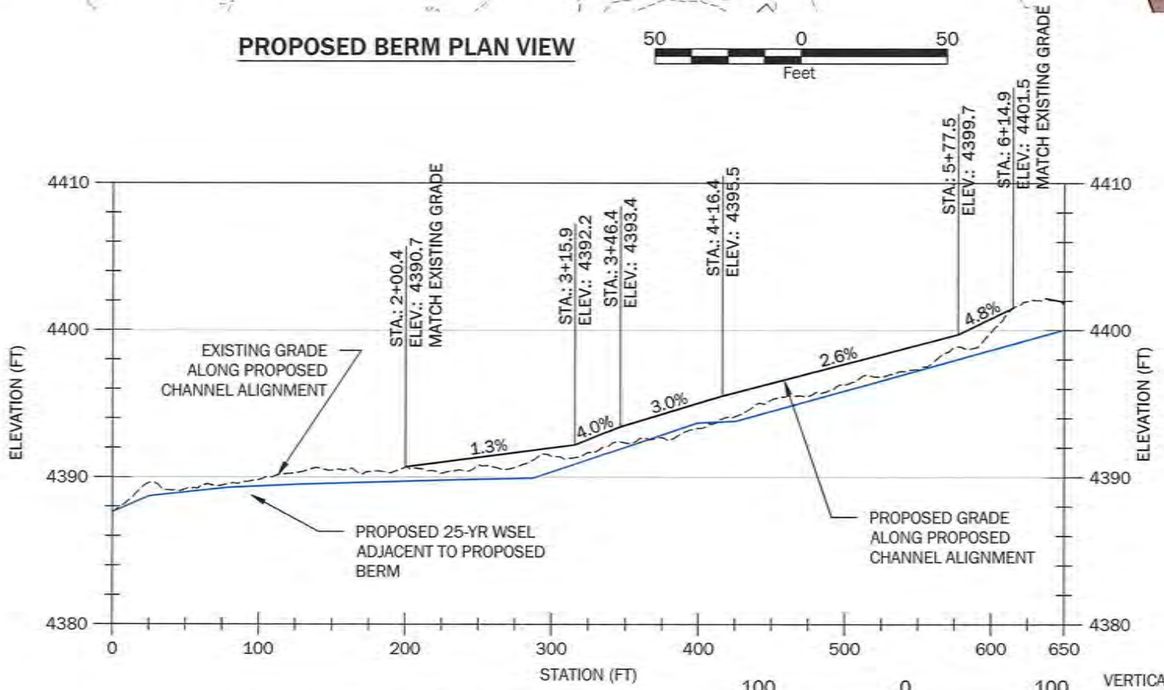


PROPOSED BERM PLAN VIEW

50 0 50
Feet



PROPOSED BERM PROFILE

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. 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

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

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

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WALLOWA RESOURCES
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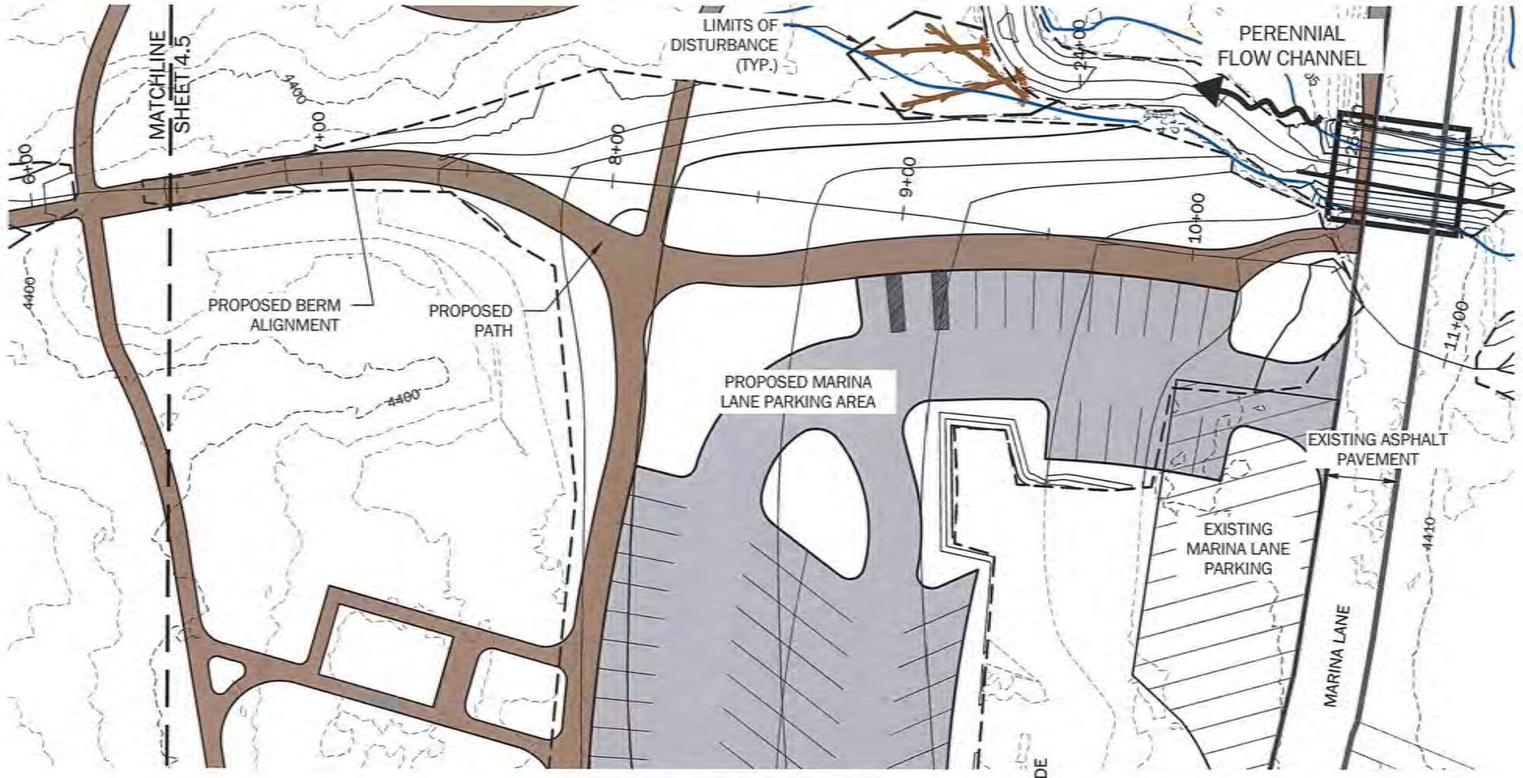
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 PROPOSED BERM PLAN AND PROFILE

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.5

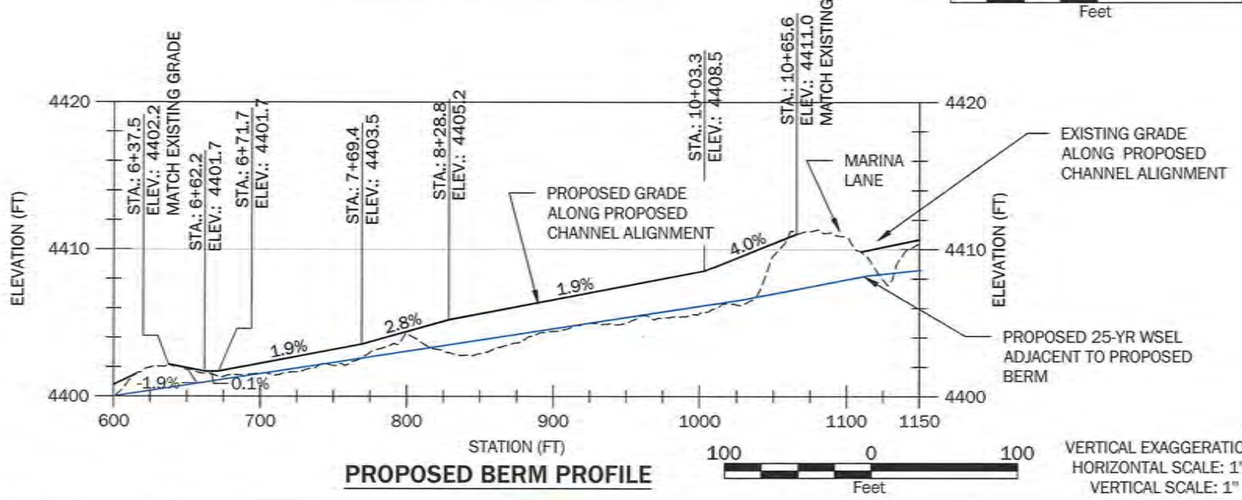


PROPOSED BERM PLAN VIEW

50 0 50
Feet

Legend

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



PROPOSED BERM PROFILE

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. 1.5-YR WSEL BASED ON PROPOSED CONDITIONS HYDRAULIC MODEL, MODELED USING RIVERFLOW2D V.4, APPROXIMATELY 666 CFS.
5. PATH DEMOLITION AND CONSTRUCTION PER PARKS FACILITIES DESIGN AND DETAILS PROVIDED UNDER A SEPARATE COVER

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2014
RYAN S. CARNIE
Expires: 12/31/2017

Revision No:	Date:	Description:	Initials:

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

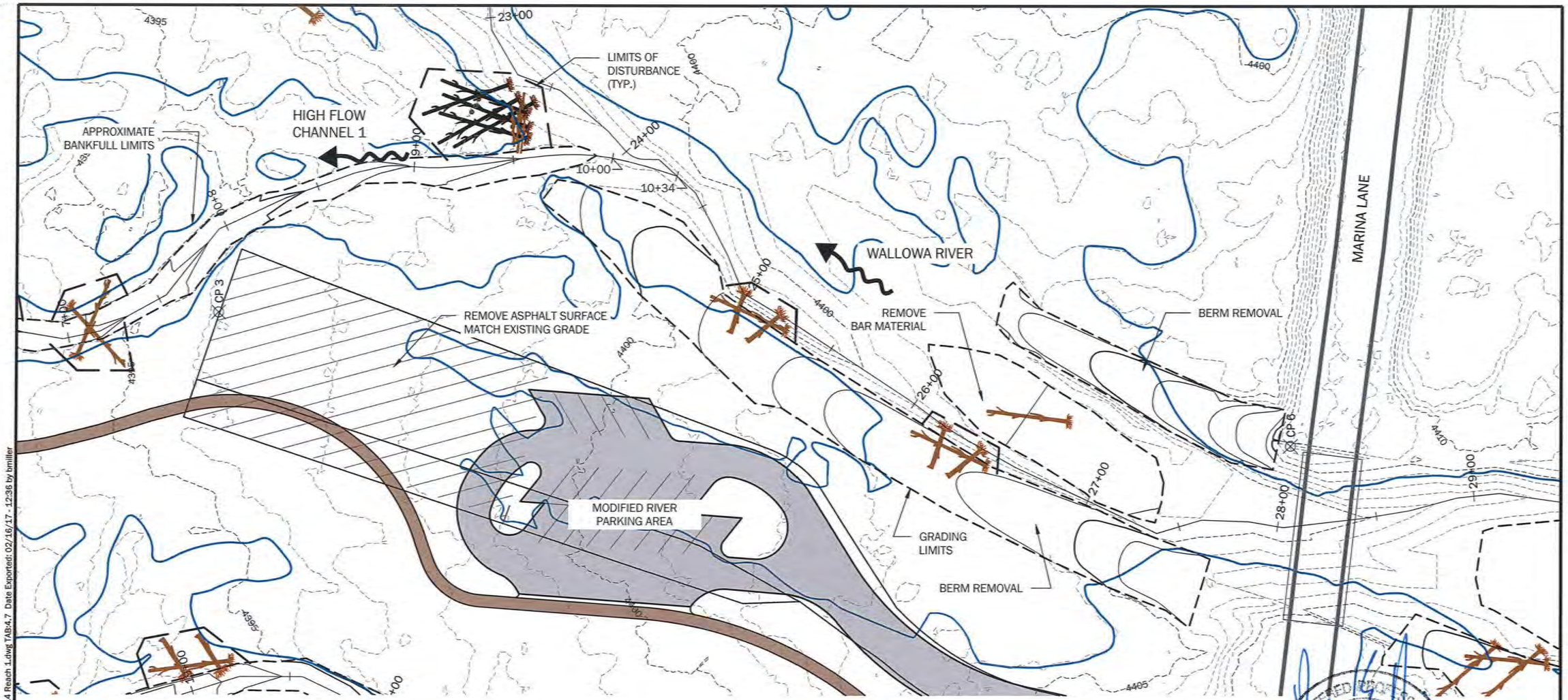
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 PROPOSED BERM PLAN AND PROFILE

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.6



Legend

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

50 0 50
Feet

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, 2002
RYAN S. CARNIE
Expires: 12/31/2017

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

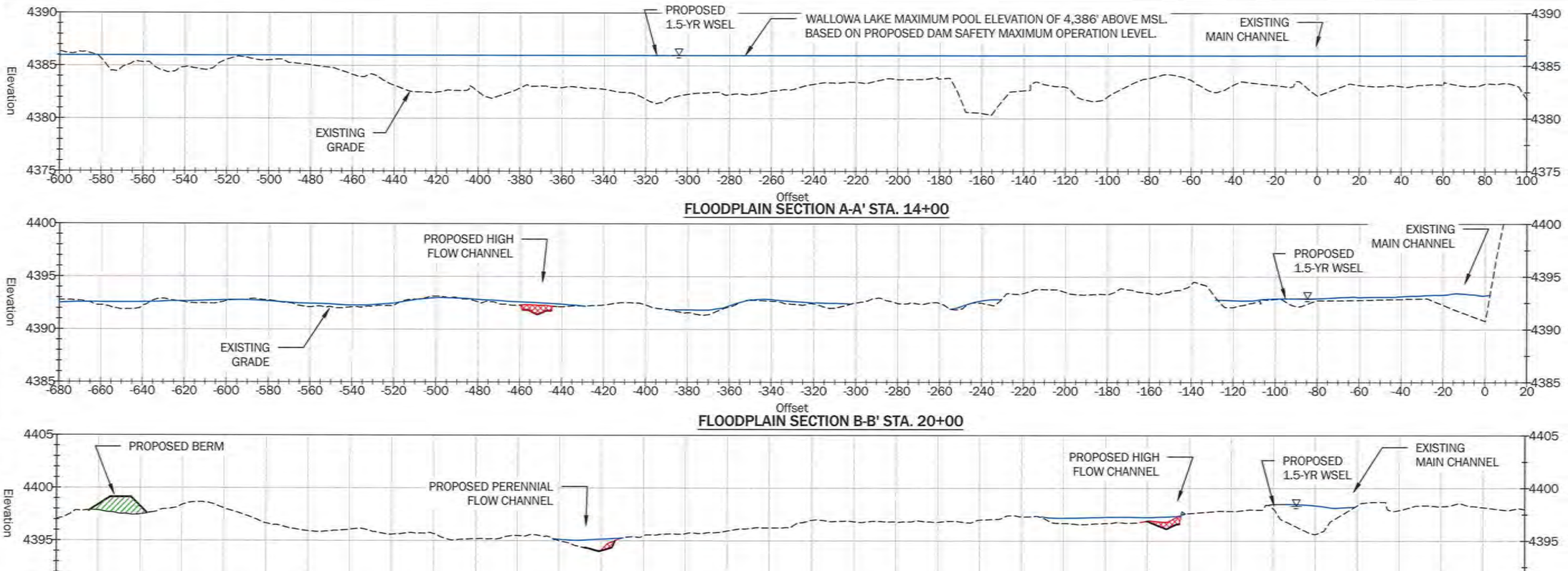
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 MAIN CHANNEL BERM REMOVAL AND GRADING PLAN

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.7

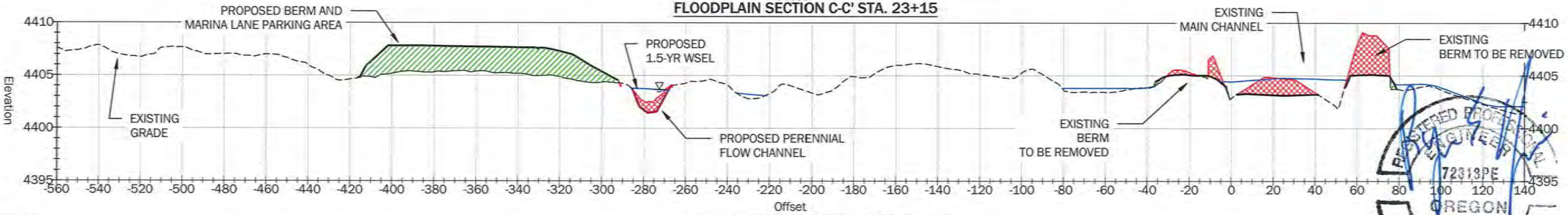
G:\Users\bmiller.GEOENGINEERS\appdata\local\temp\AcPublish_10128\S4.1-4.14 Reach 1.dwg TAB:4.7 Date Exported: 02/16/17 - 12:36 by bmiller



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:

1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

100 0 100
Feet

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, 2014
RYAN S. CARNIE
Expires: 12/31/2017

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
VALLEY CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
4.8

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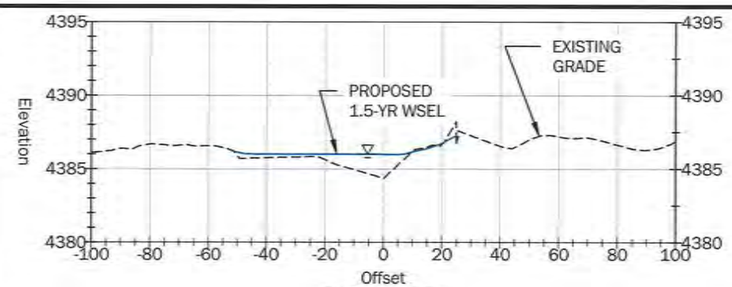

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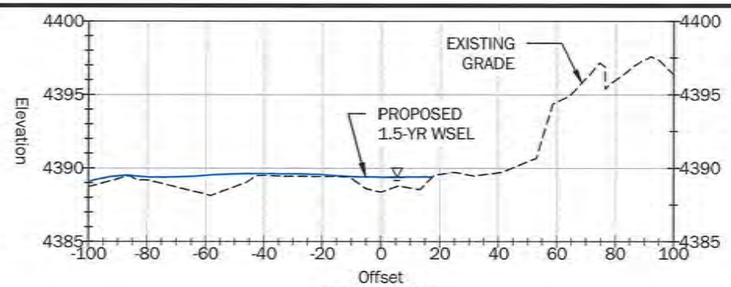

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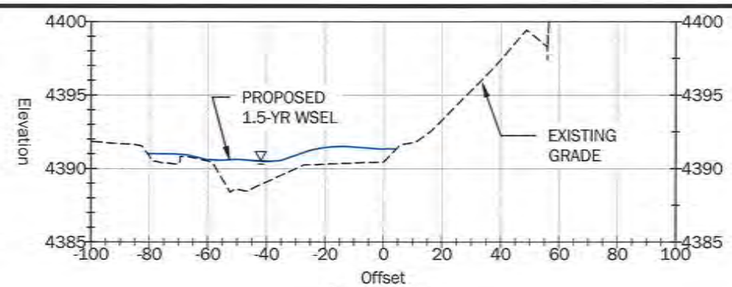

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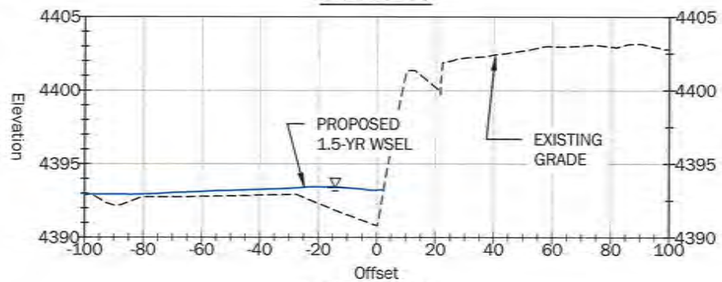

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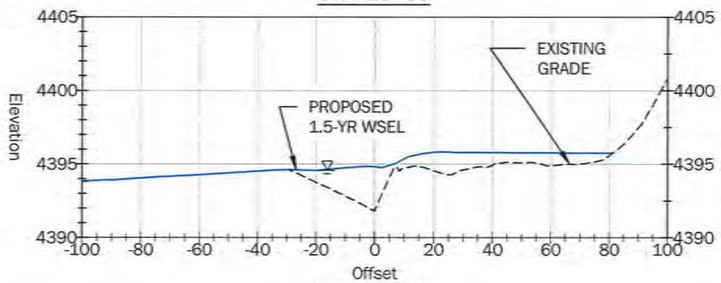

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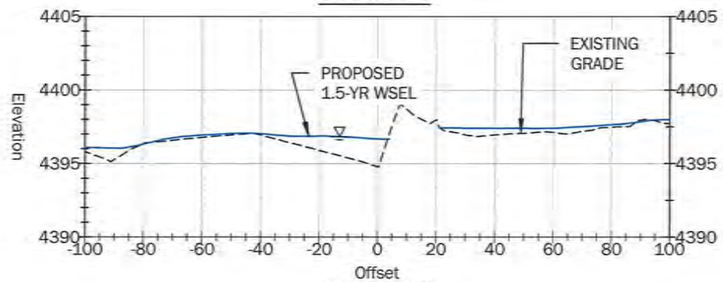

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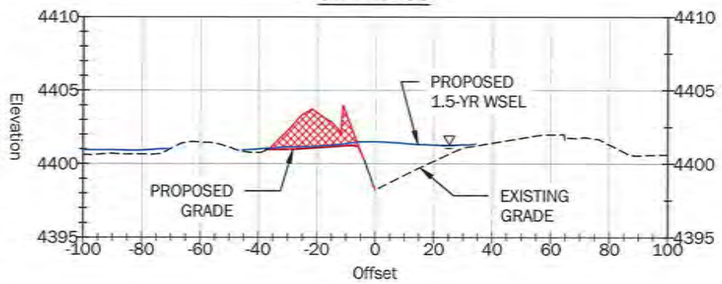

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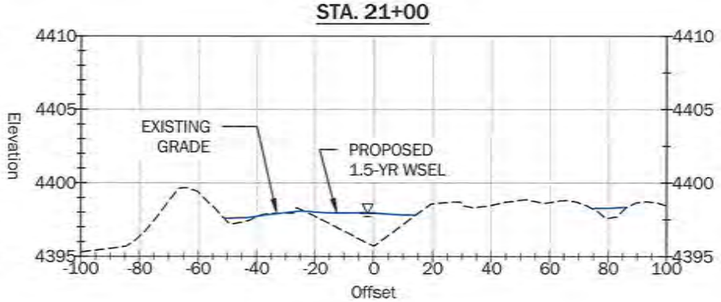

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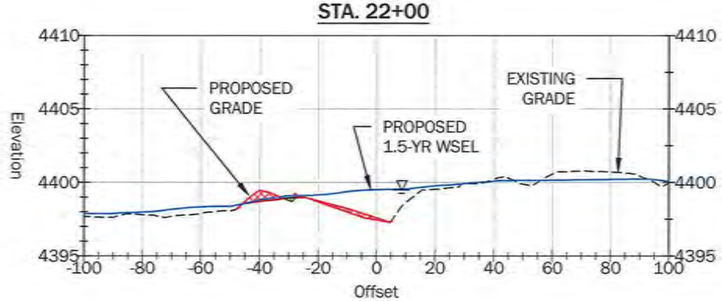

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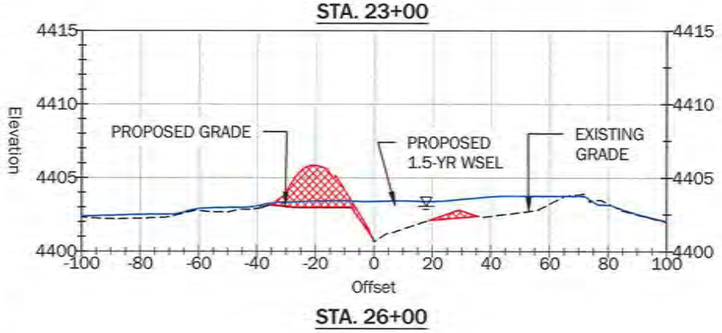

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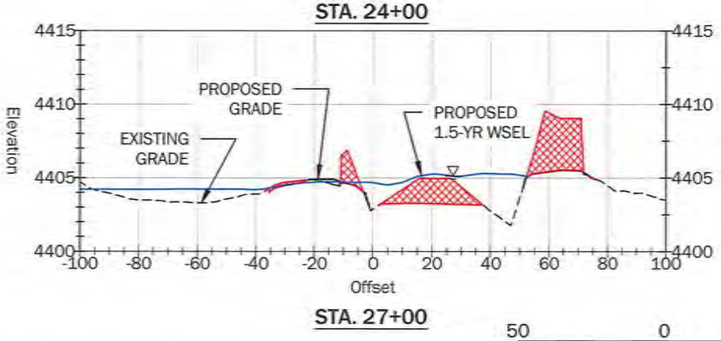

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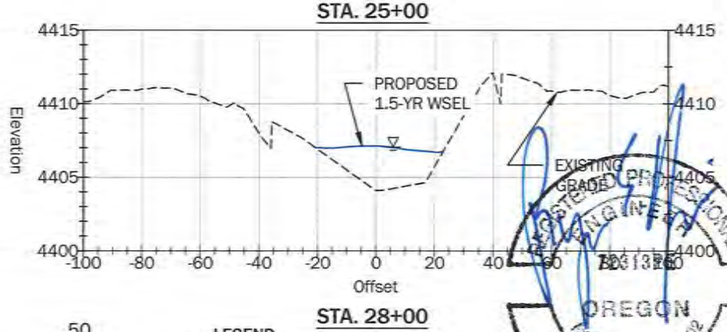


STA. 28+00

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

50 0 50
Feet

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

LEGEND
PROPOSED FILL AREAS
PROPOSED CUT AREAS

REGISTERED PROFESSIONAL ENGINEER
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE
82313PE
Expires: 12/31/2017

Revision No:	Date:	Description:	Initials:

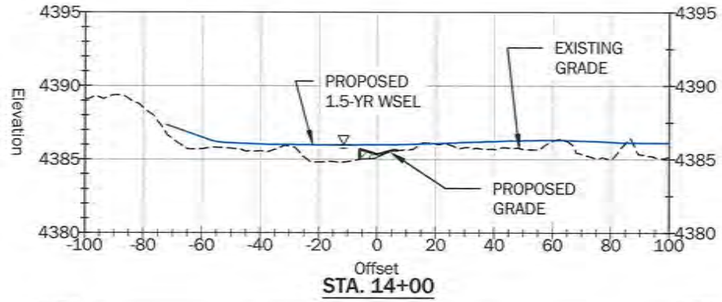
Designed: RSC/BHM
Drawn: BHM
Checked: JGW/JRS
Date: 02-17-2017
Project No: 21860-001-00

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



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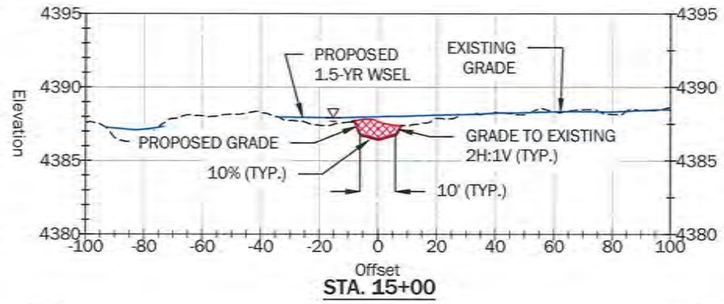

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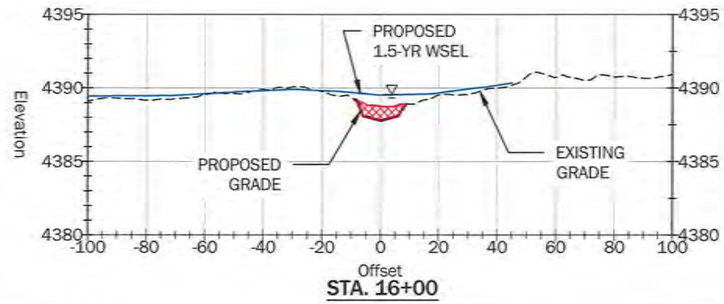

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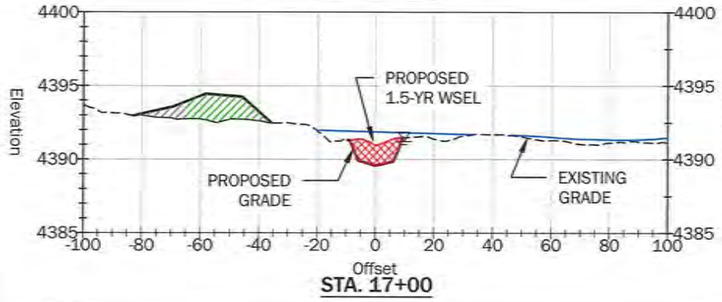

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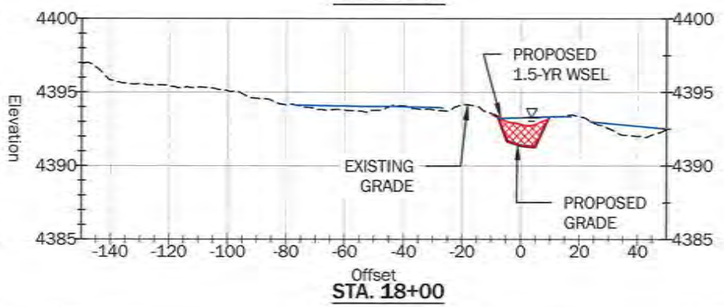

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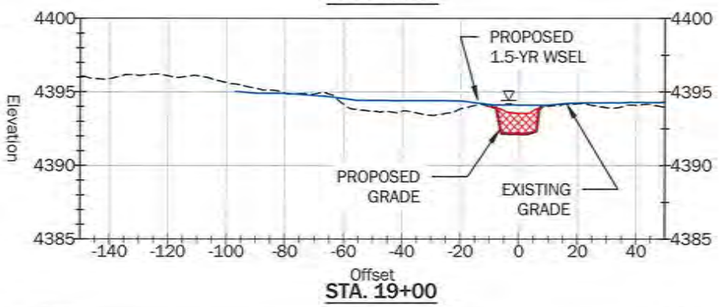

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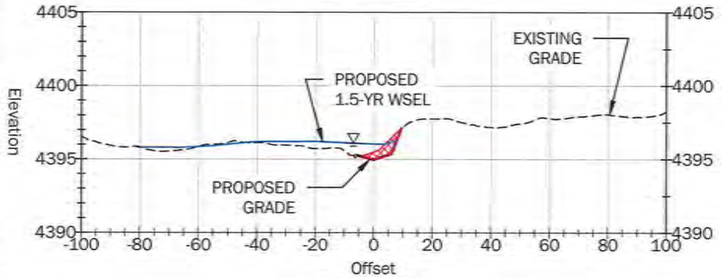

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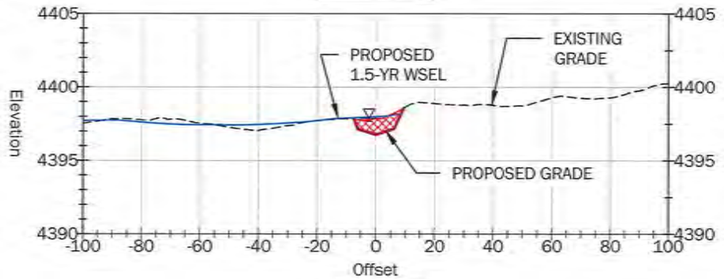

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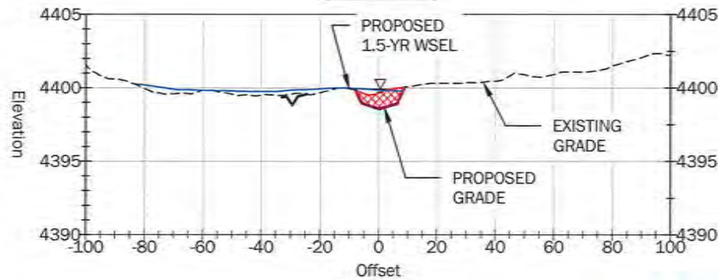

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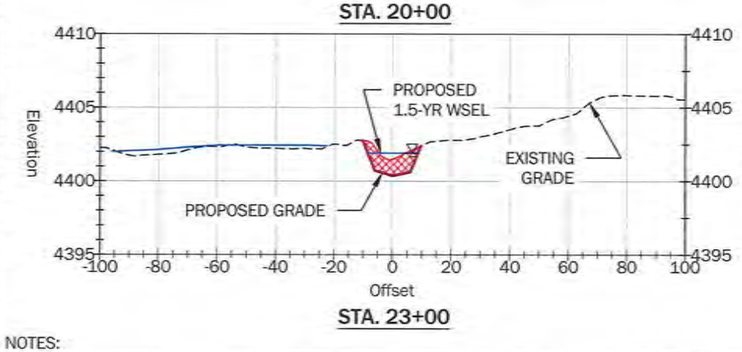

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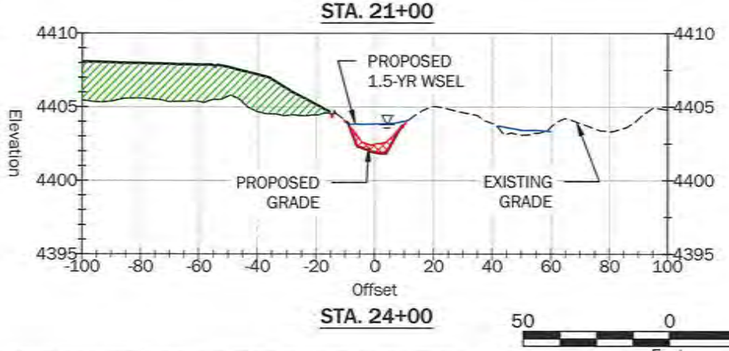

STA. 24+00

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED PERENNIAL FLOW CHANNEL ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

50 0 50
Feet

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

LEGEND
PROPOSED FILL AREAS
PROPOSED CUT AREAS

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2004
RYAN S. CARNIE
Expires: 12/31/2017

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 PERENNIAL FLOW CHANNEL CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.10

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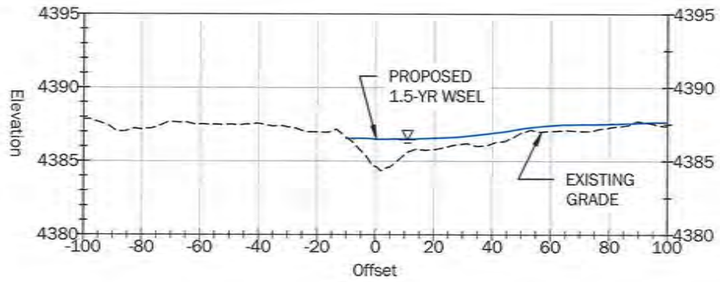

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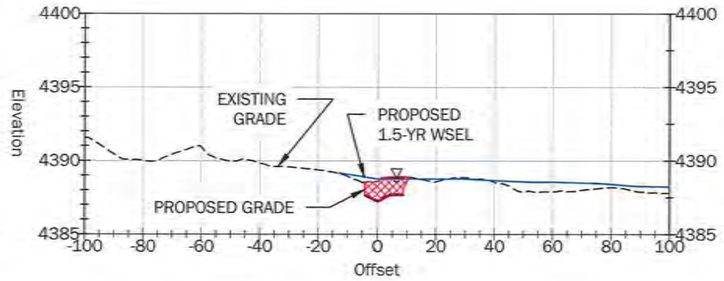

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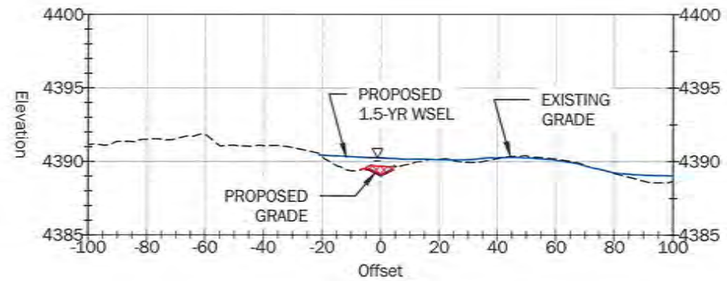

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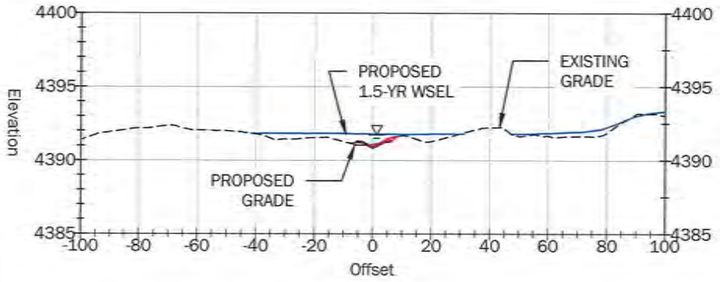

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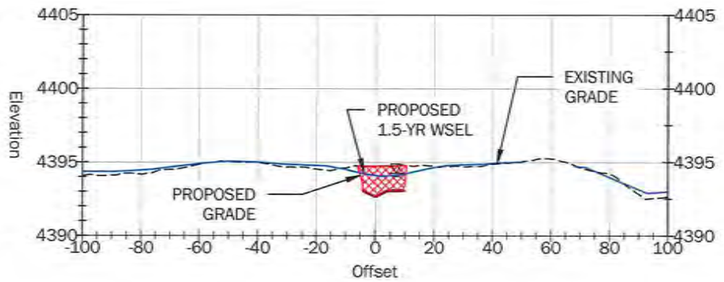

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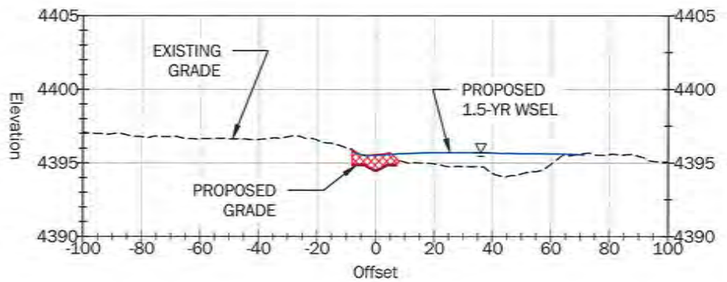

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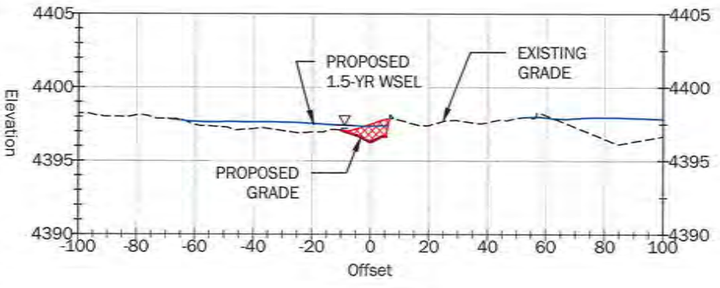

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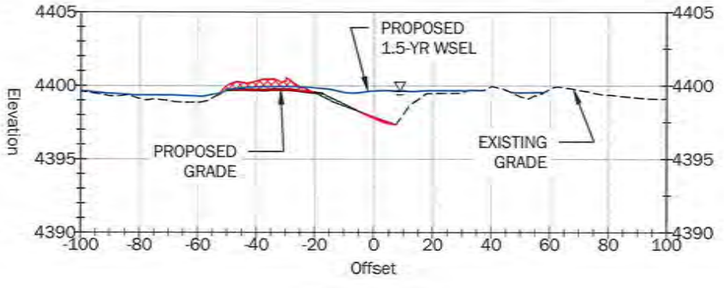

STA. 10+00

Expires: 12/31/2017

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED HIGH FLOW CHANNEL ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

50 0 50
Feet

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 HIGH FLOW CHANNEL CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.11

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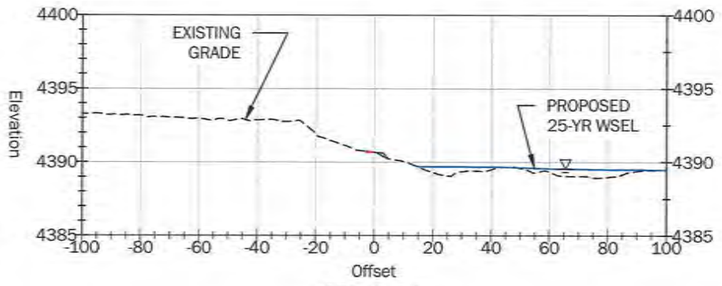

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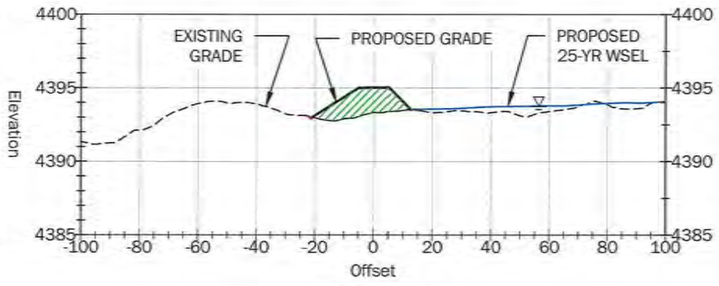
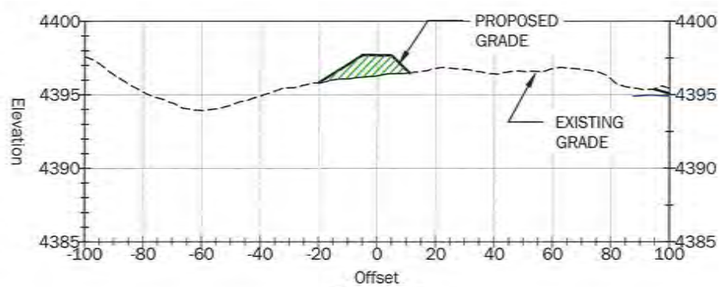
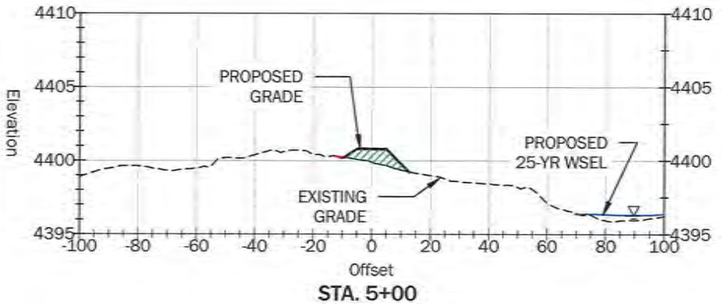


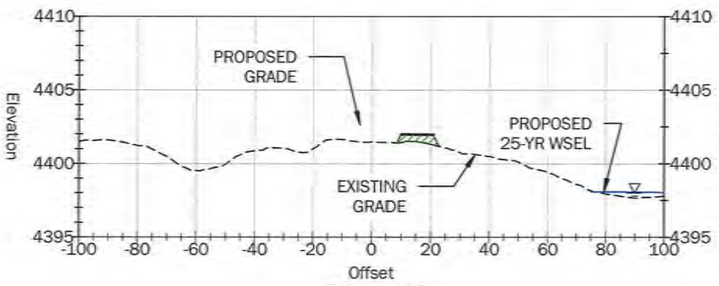
STA. 3+00



STA. 4+00



STA. 5+00



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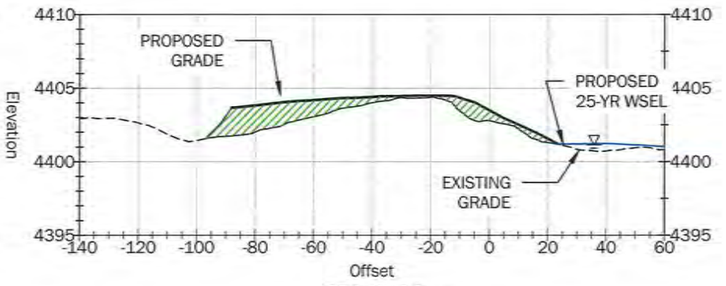

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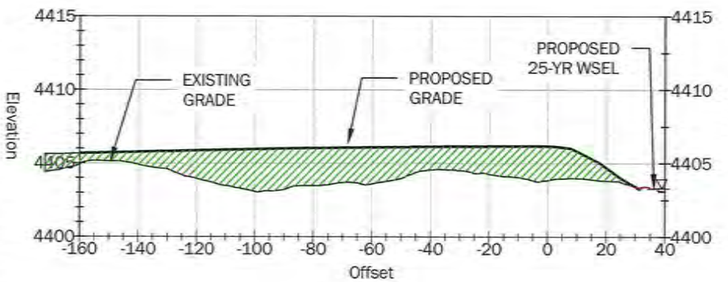

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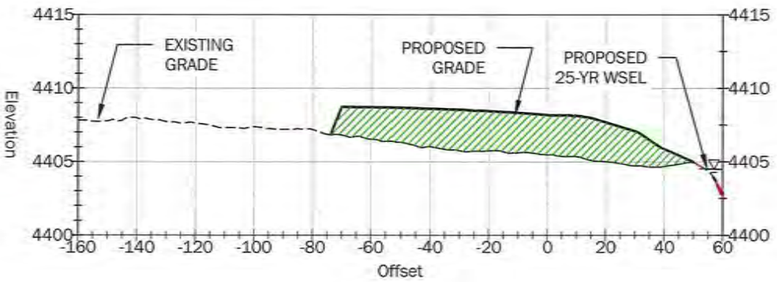


STA. 9+00

Expires: 12/31/2017

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED BERM ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

50 0 50
Feet

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

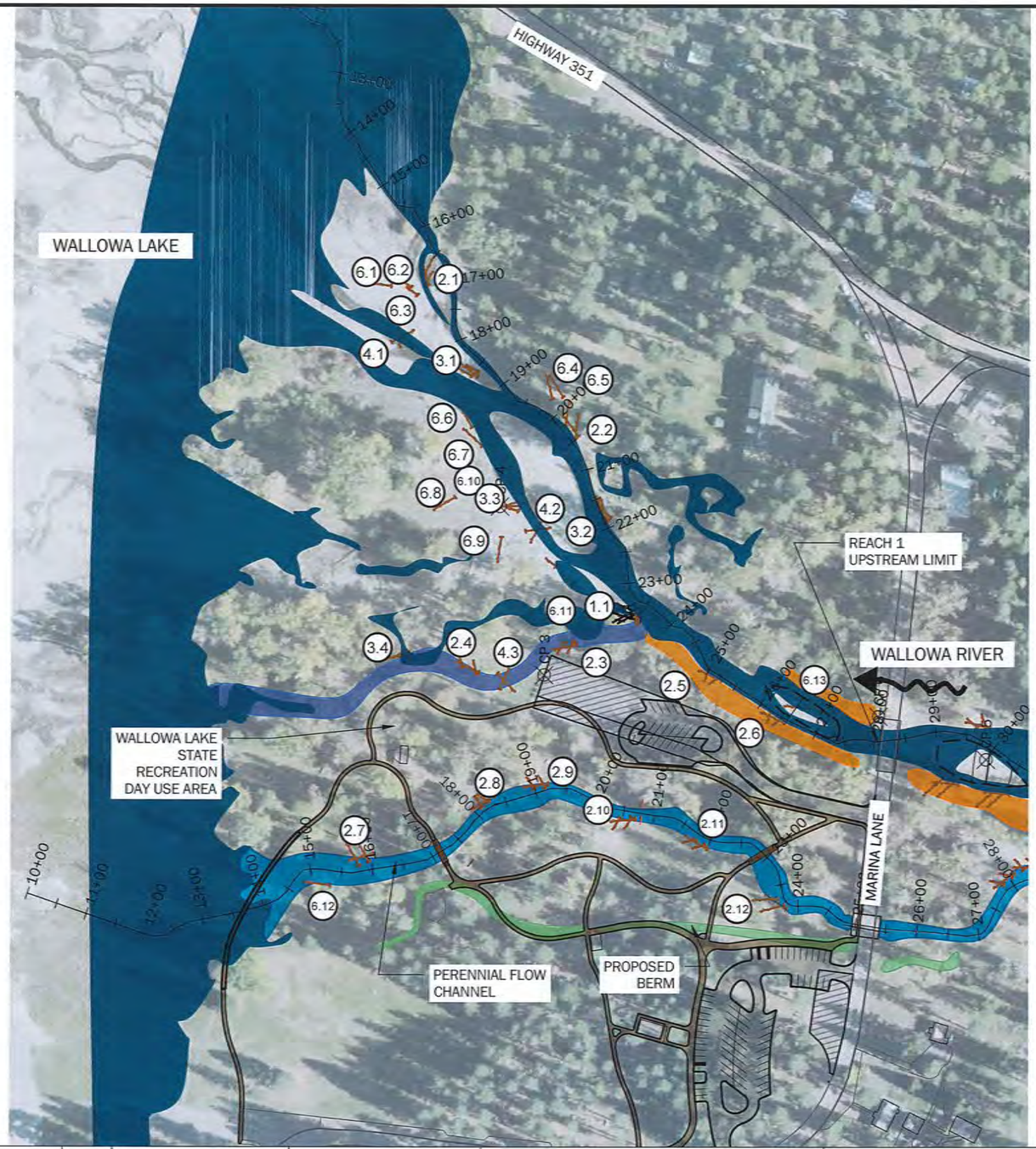
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 PROPOSED BERM CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 4.12

P:\21\21860001\CAD\00\90 Percent\S4.1-4.14 Reach 1.dwg TAB:4.12 Date Exported: 02/18/17 - 16:34 by bmiller



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 E S 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 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

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE

Expires: 12/31/2017

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

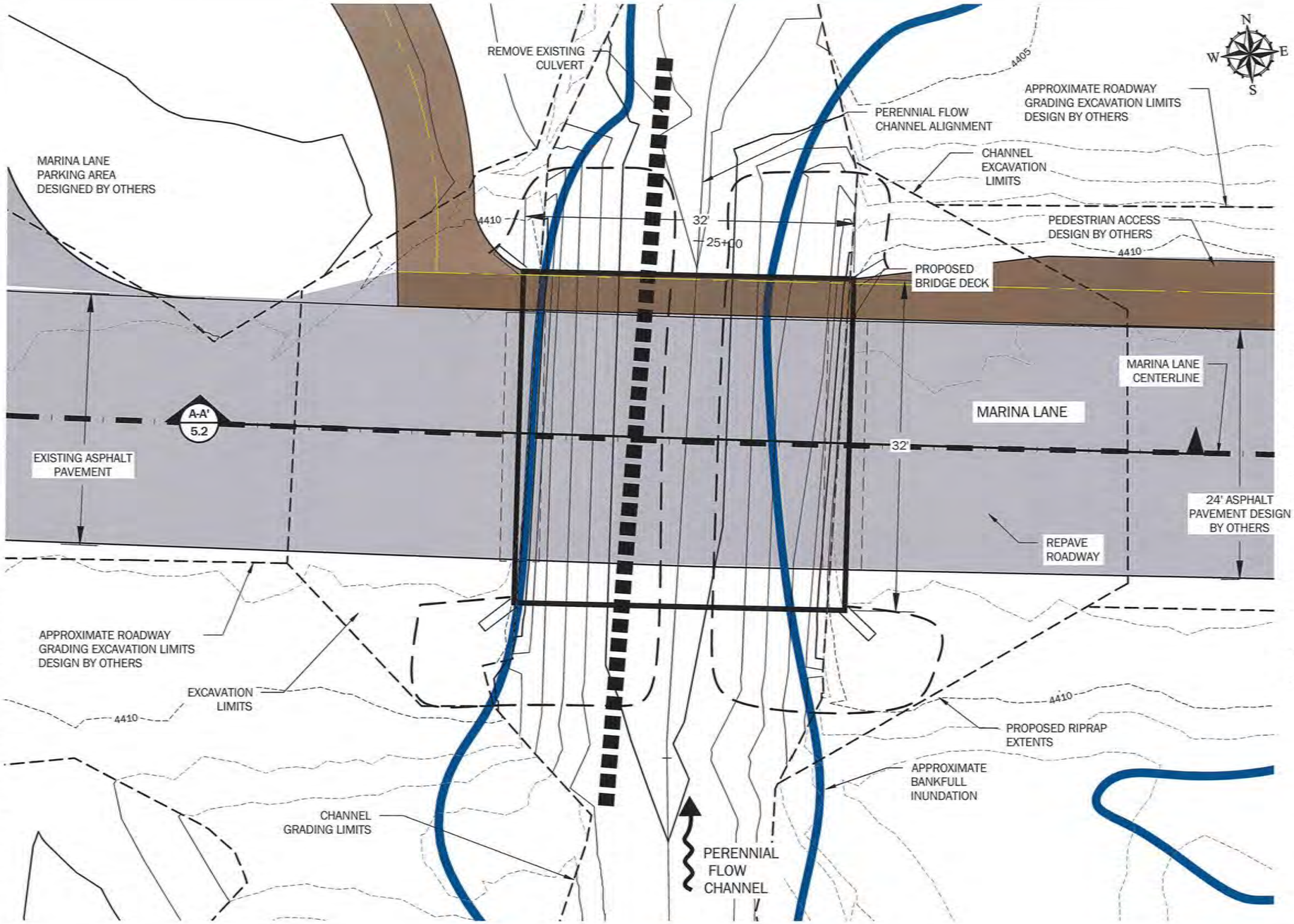
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1
HABITAT STRUCTURES

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
4.13



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, 2004
RYAN S. CARNIE
Expires: 12/31/2017

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

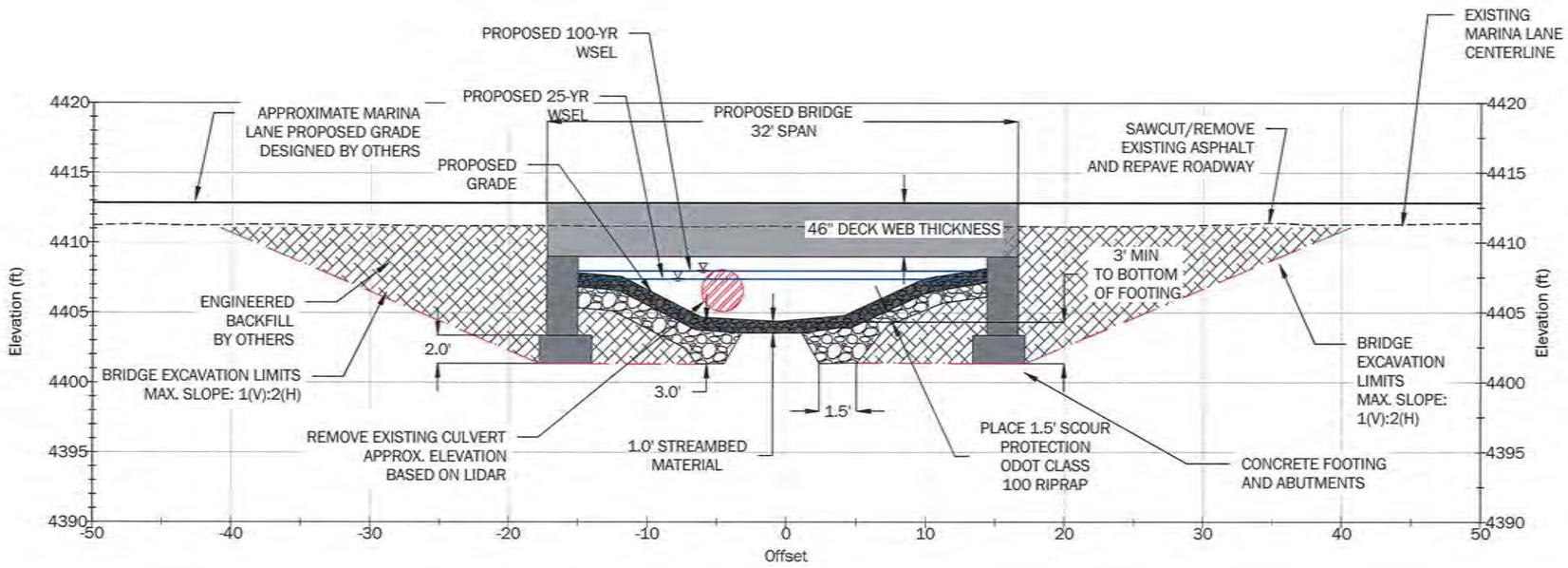
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

MARINA LANE CROSSING
PLAN VIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
5.1

P:\21\21860001\CAD\00\90 Percent\S5.1-5.2 Marina Bridge.dwg TAB5.1 Date Exported: 02/17/17 - 15:52 by bmiller



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
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNILL
Expires: 12/31/2017

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

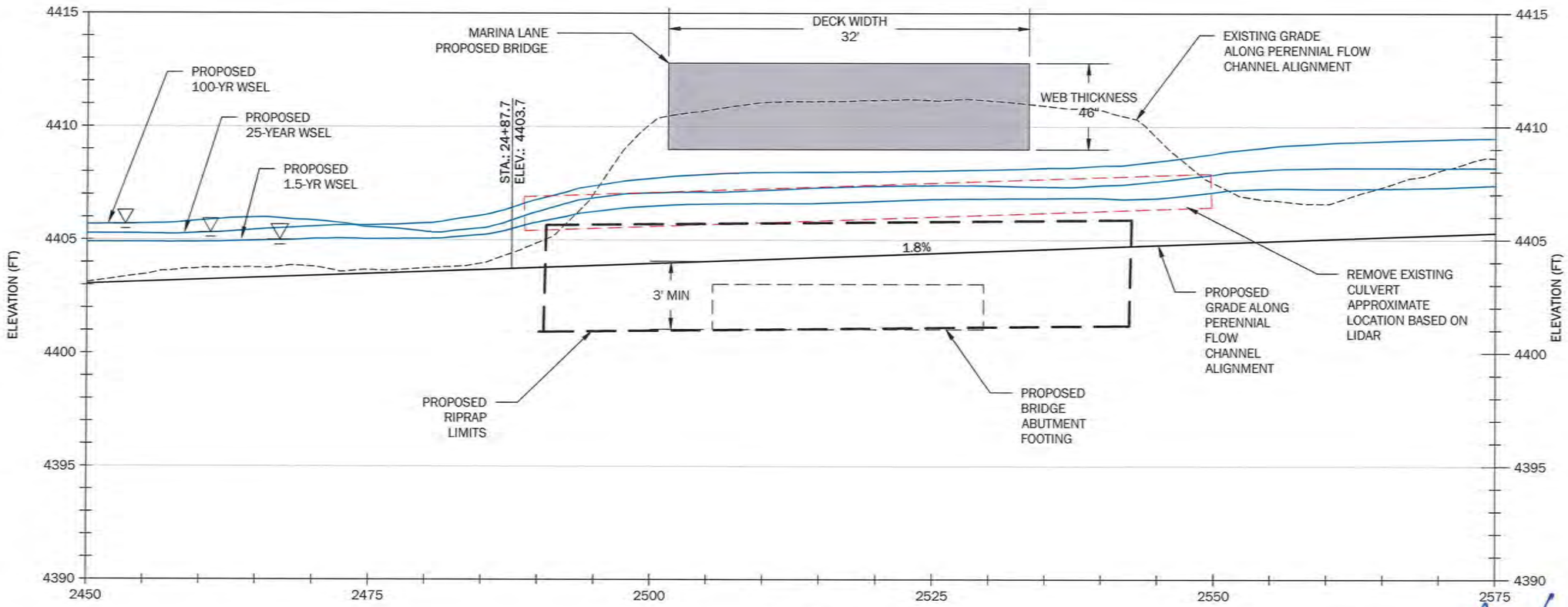
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

MARINA LANE CROSSING
SECTION VIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
5.2

P:\21\21860001\CAD\00\90 Percent\S5.1-5.2 Marina Bridge.dwg TAB:5.2 Date Exported: 02/16/17 - 10:27 by bmiller



10 0 10
Feet

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

PERENNIAL FLOW CHANNEL PROFILE VIEW

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.

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE

Expires: 12/31/2017

P:\21\21860001\CAD\00\90 Percent\S5.1-5.2 Marina Bridge.dwg TAB:5.3 Date Exported: 02/16/17 - 10:27 by bmiller

Revision No:	Date:	Description:	Initials:

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

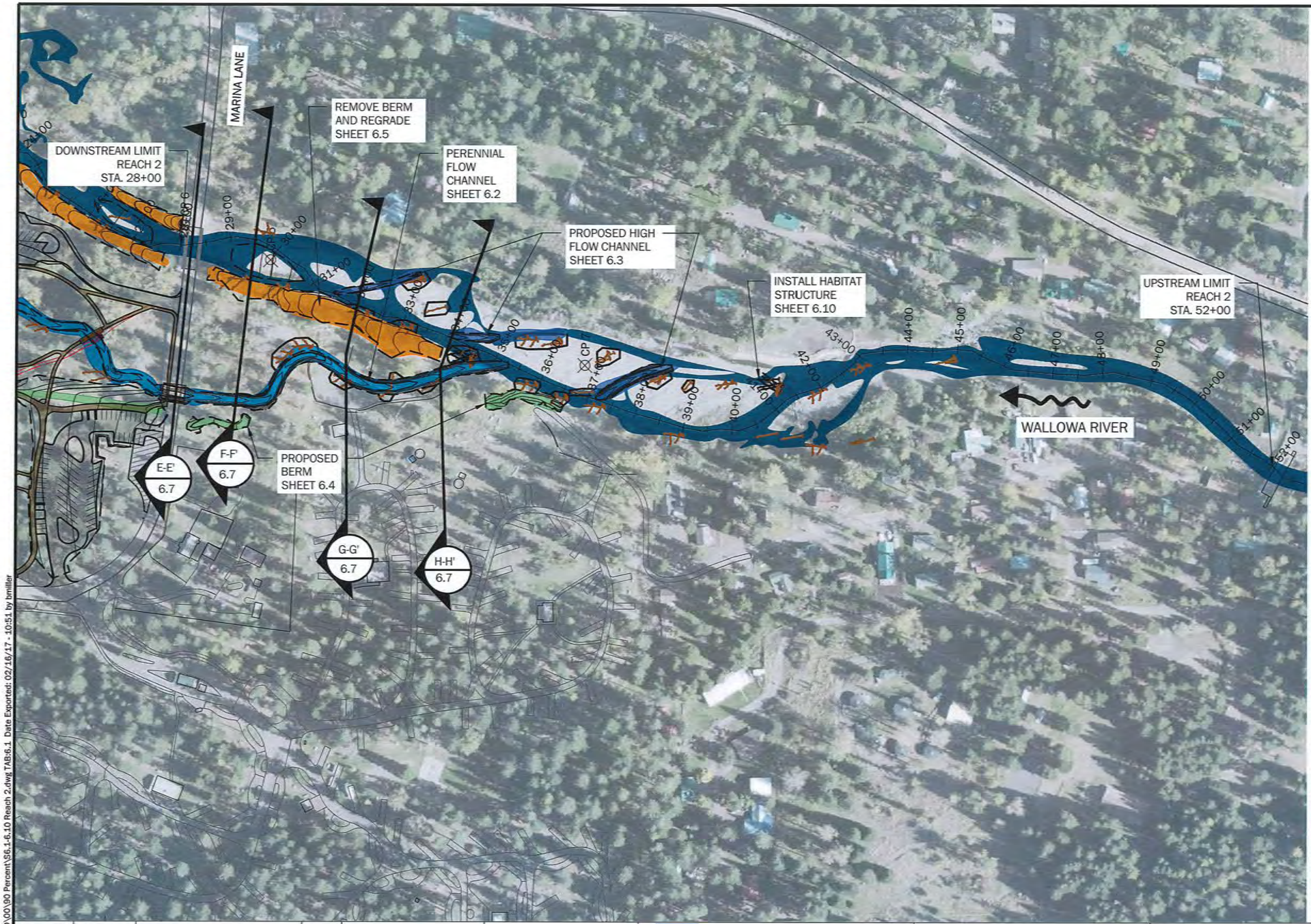
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

MARINA LANE CROSSING
PROFILE VIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
5.3



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.
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.

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE

Expires: 12/31/2017

P:\21\21860001\CAD\00\90 Percent\S6.1-6.10 Reach 2.dwg TAB:6.1 Date Exported: 02/16/17 - 10:51 by bmiller

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

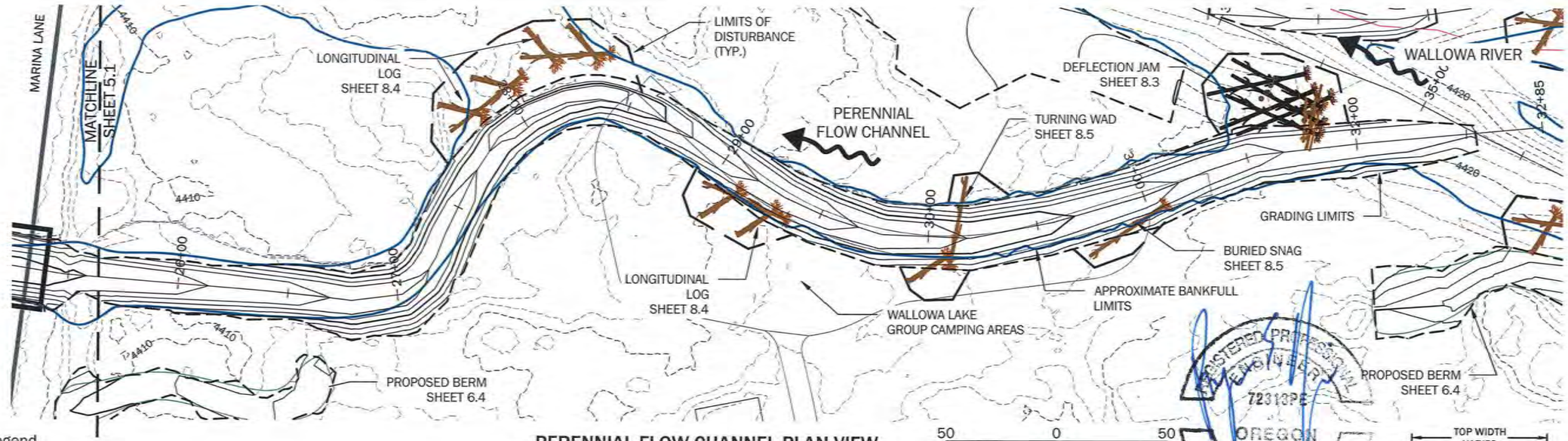
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 2 PROPOSED ENHANCEMENTS OVERVIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 6.1



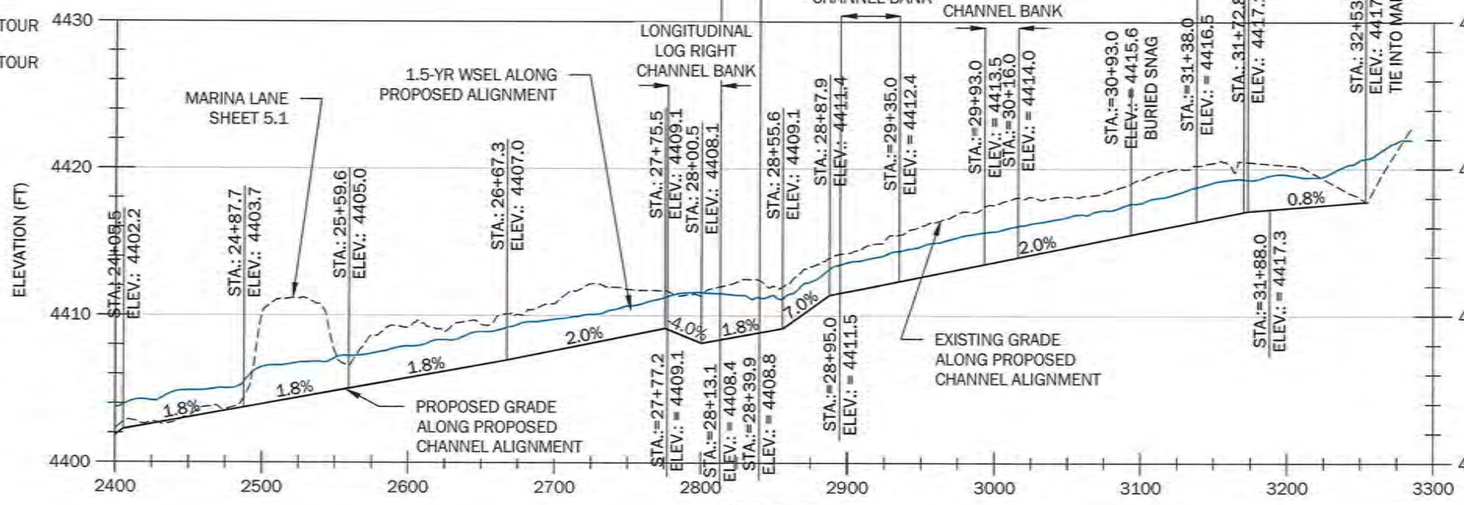
PERENNIAL FLOW CHANNEL PLAN VIEW

50 0 50
Feet

Legend

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

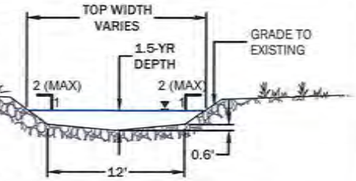
NOTES:
1. SHEET PROJECTION IS SET TO OREGON STATE PLANE NORTH, NAD 1983, INTERNATIONAL FEET, VERTICAL DATUM NAVD 1988
2. TOPOGRAPHY BASED ON 2015 LIDAR COMBINED WITH 2009 ANDERSON PERRY, INC. GROUND SURVEY AND 2016 HDJ GROUND SURVEY.
3. PROPERTY BOUNDARIES, ROADS, BUILDINGS AND STATE PARK BOUNDARIES 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.



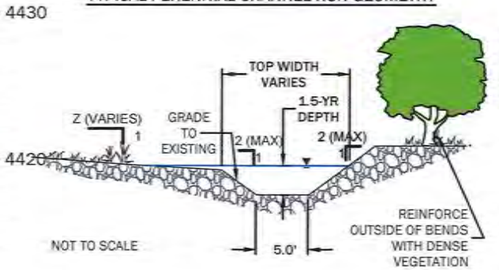
PERENNIAL FLOW CHANNEL PROFILE VIEW

100 0 100
Feet

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



TYPICAL PERENNIAL CHANNEL RUN GEOMETRY



TYPICAL PERENNEAL 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

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

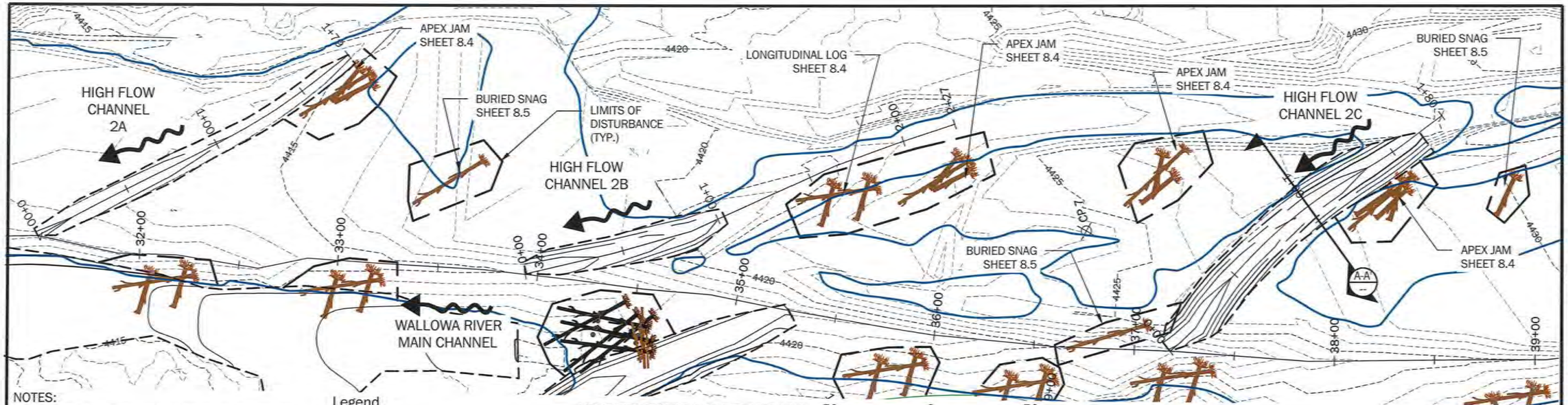
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 2 PROPOSED PERENNIAL FLOW CHANNEL PLAN AND PROFILE

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 6.2

P:\21\21860001\CAD\00\90 Percent\S6.2-6.10 Reach 2.dwg TAB:6.2 Date Exported: 02/16/17 - 10:53 by bmiller

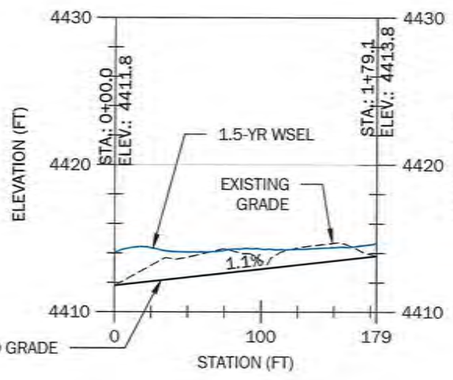


HIGH FLOW CHANNELS PLAN VIEW

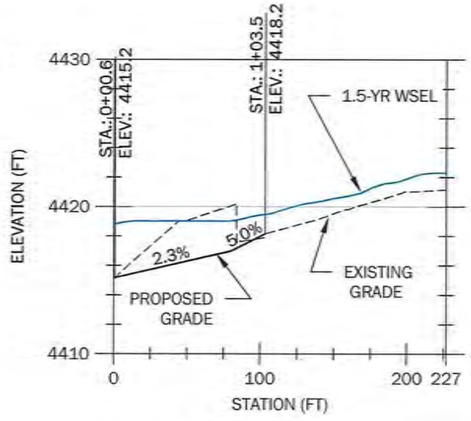
50 0 50
Feet

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.

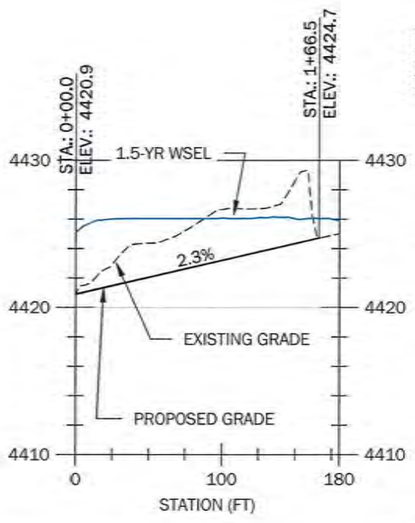
Legend
- CHANNEL ALIGNMENT
- APPROXIMATE ORIDNARY HIGH WATER
- 3980 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 3980 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- GRADING LIMITS



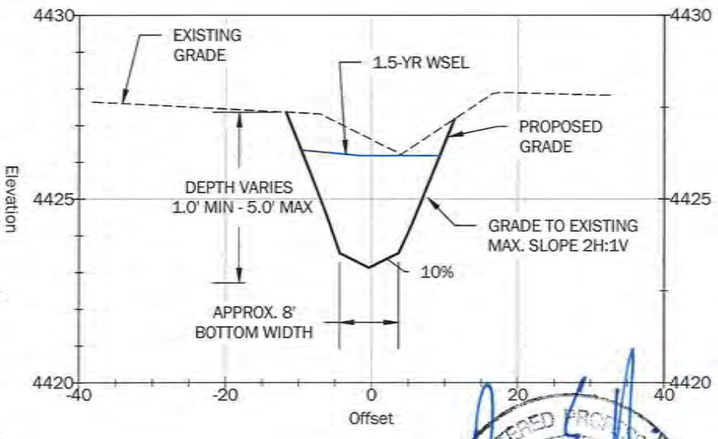
HIGH FLOW CHANNEL 2A PROFILE



HIGH FLOW CHANNEL 2B PROFILE



HIGH FLOW CHANNEL 2C PROFILE



SECTION A-A'

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

100 0 100
Feet

REGISTERED PROFESSIONAL ENGINEER
72319PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE

Expires: 12/31/2017

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

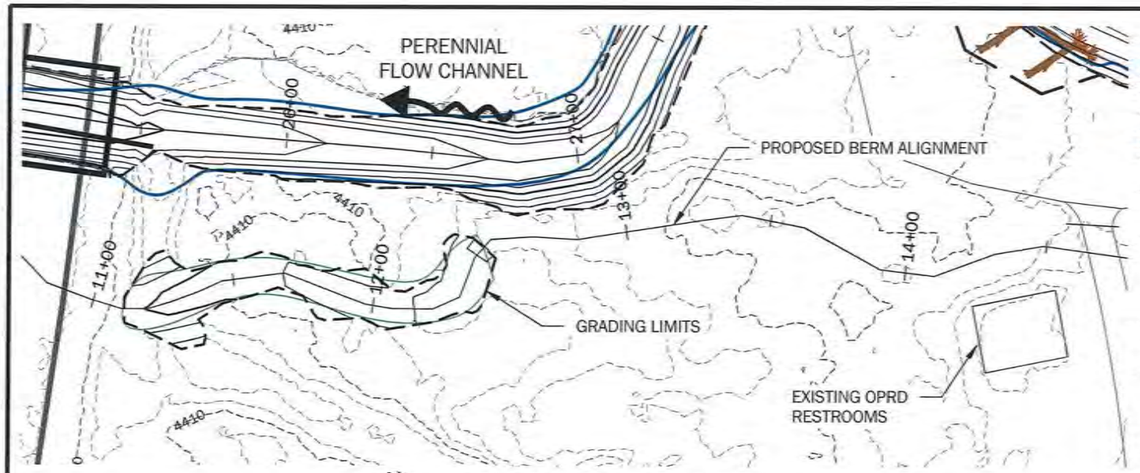
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 2 HIGH FLOW CHANNELS PLAN AND PROFILE

UPPER WALLOWA RIVER RESTORATION DESIGN

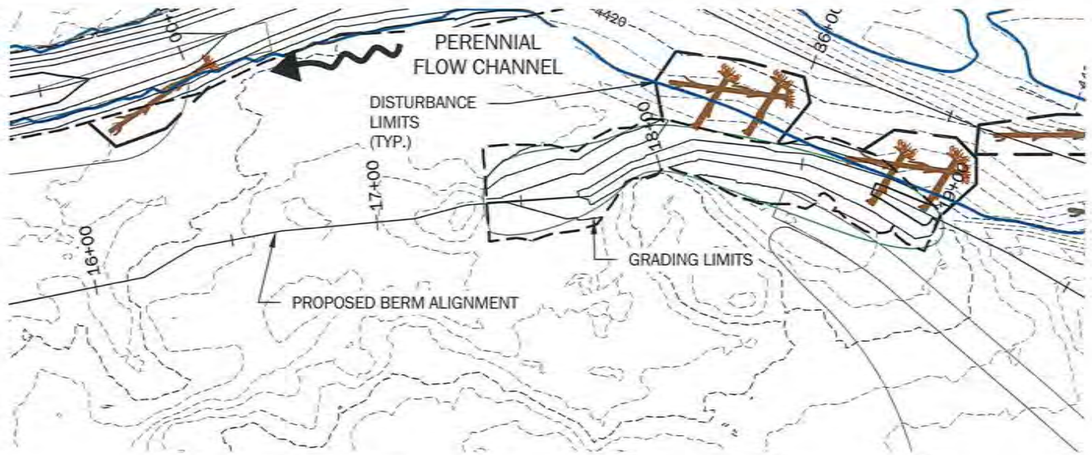
Sheet 6.3

P:\21\21860001\CAD\00\90 Percent\S6.1-6.10 Reach 2.dwg TAB:6.3 Date Exported: 02/16/17 - 10:57 by bmiller



PROPOSED BERM PLAN VIEW

50 0 50
Feet

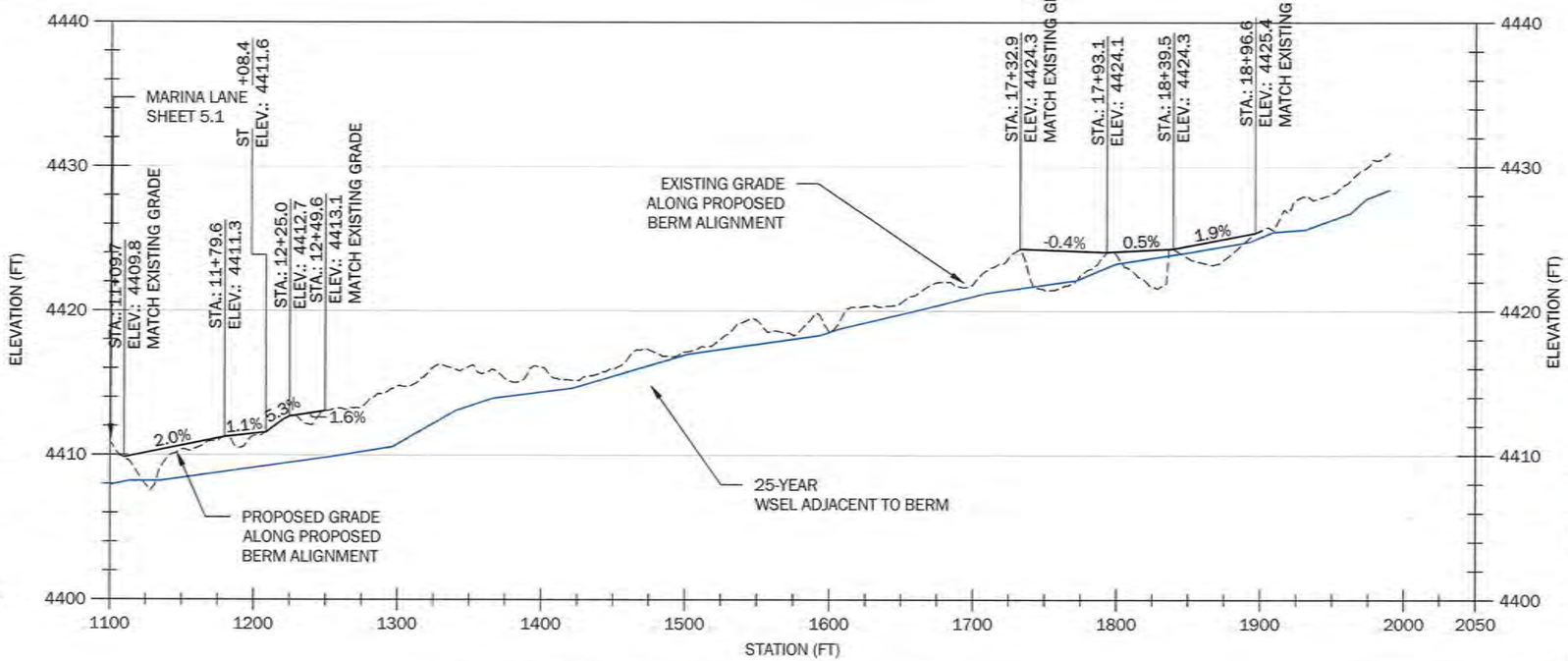


PROPOSED BERM PLAN VIEW

50 0 50
Feet

Legend

- CHANNEL ALIGNMENT
- APPROXIMATE ORIDNARY HIGH WATER
- 3980 — EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 3980 — PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- GRADING LIMITS



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.

P:\21\21860001\CAD\00\90 Percent\S6.1-6.10 Reach 2.dwg TAB:6.4 Date Exported: 02/16/17 - 10:59 by bmiller

Revision No:	Date:	Description:	Initials:

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

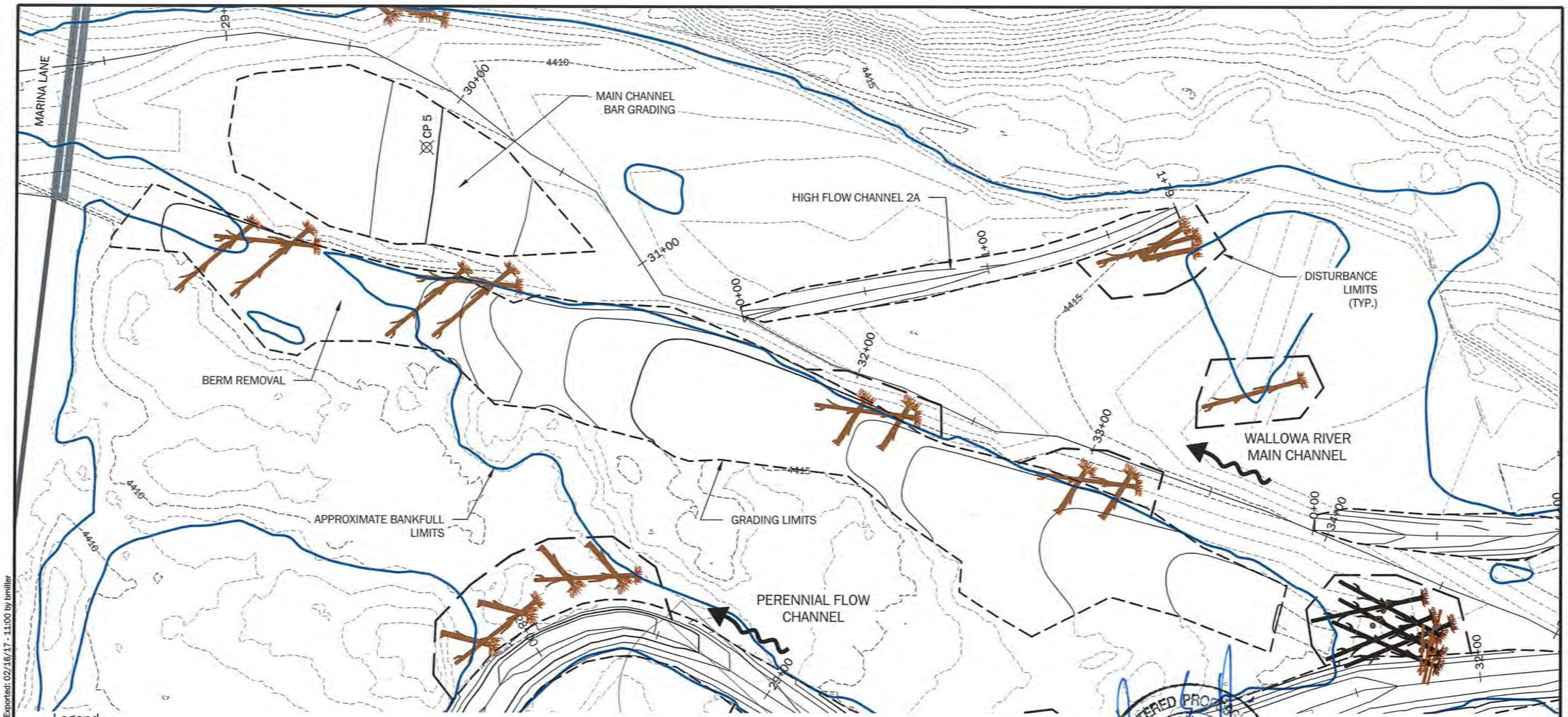
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 2 PROPOSED BERM PLAN AND PROFILE

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.4



Legend

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

N E S W

50 0 50
Feet

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.

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

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 -MAIN CHANNEL BERM REMOVAL AND GRADING PLAN

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 6.5

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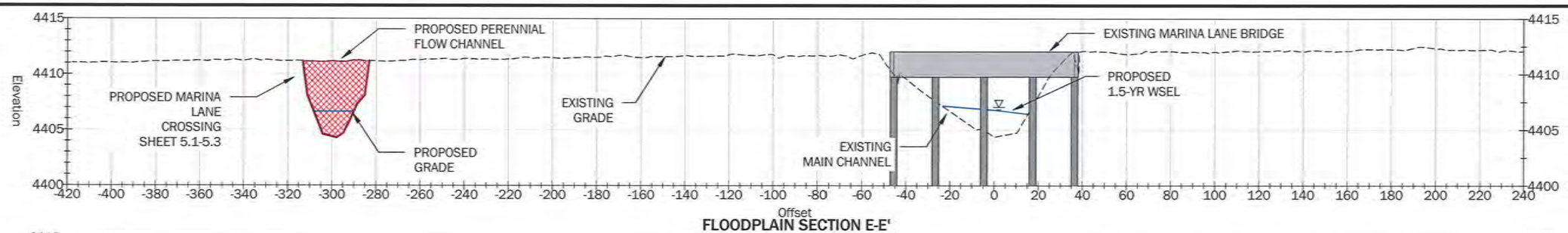
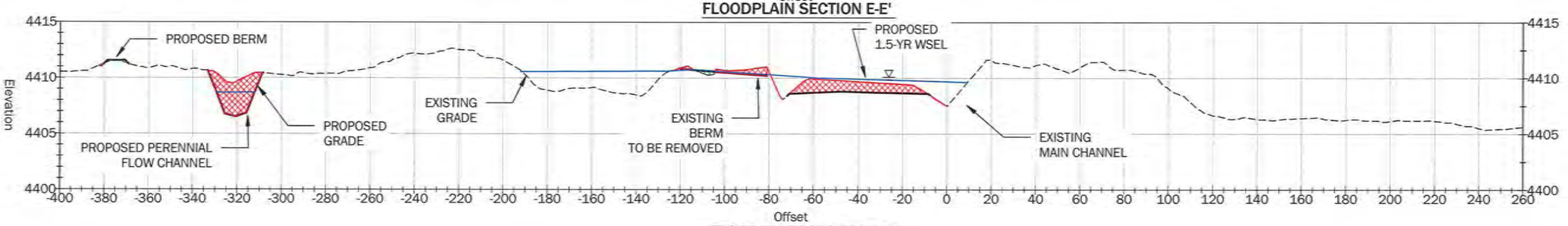
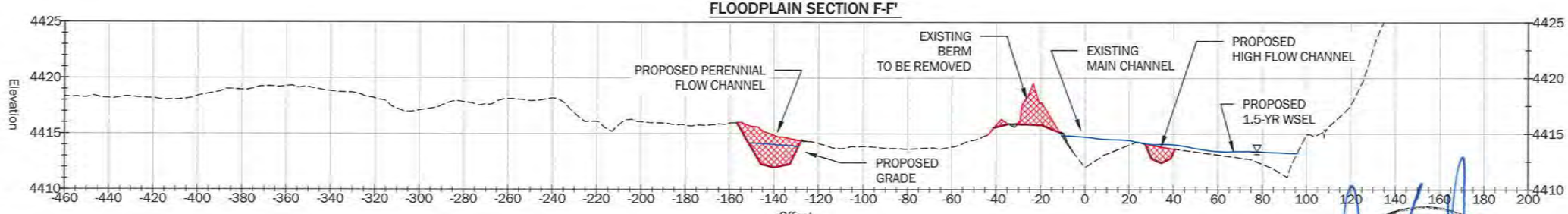


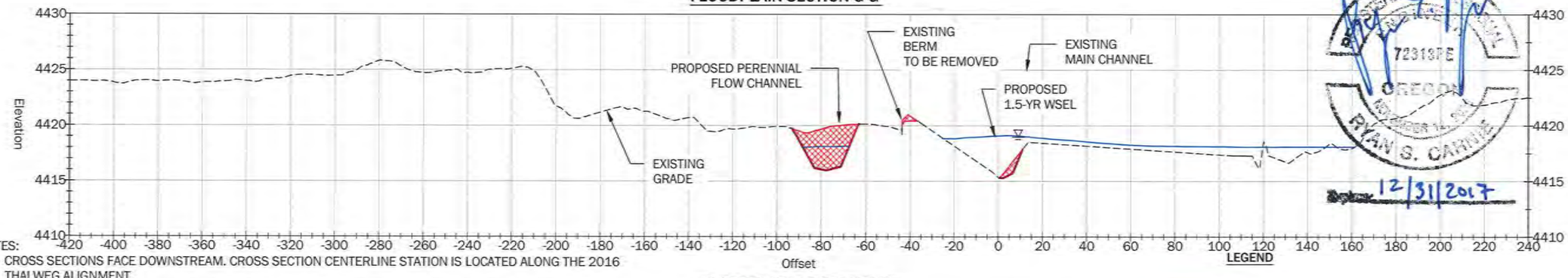
FLOODPLAIN SECTION E-E'



FLOODPLAIN SECTION F-F'



FLOODPLAIN SECTION G-G'



FLOODPLAIN SECTION H-H'

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

100 0 100
Feet

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

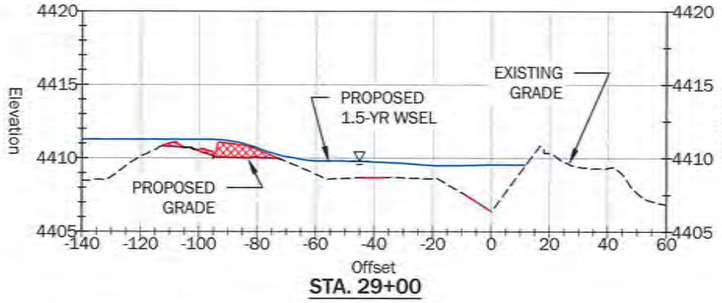
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 2
VALLEY CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.6



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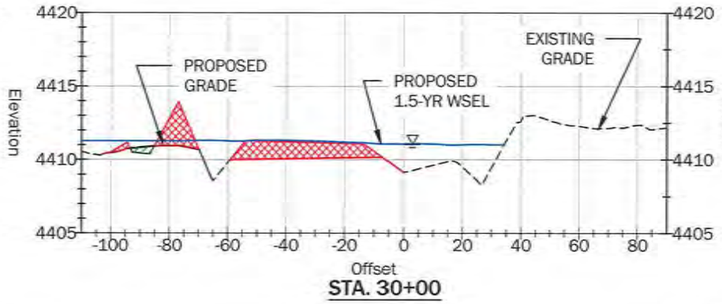

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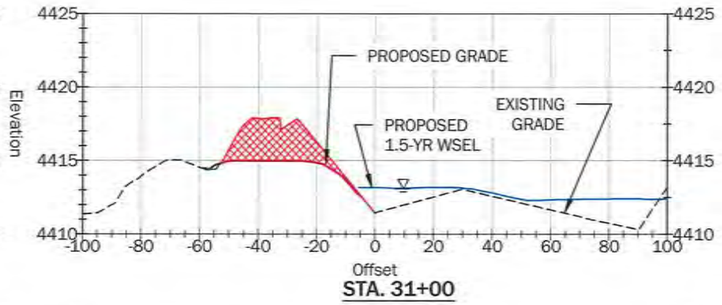

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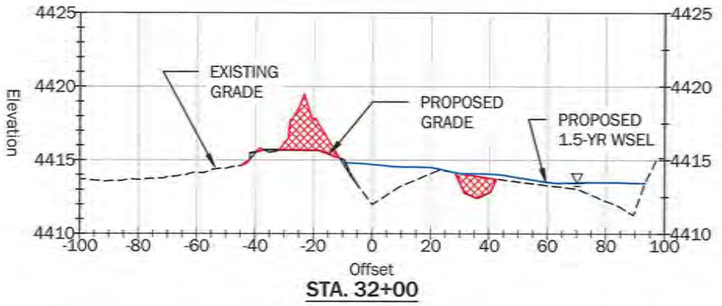

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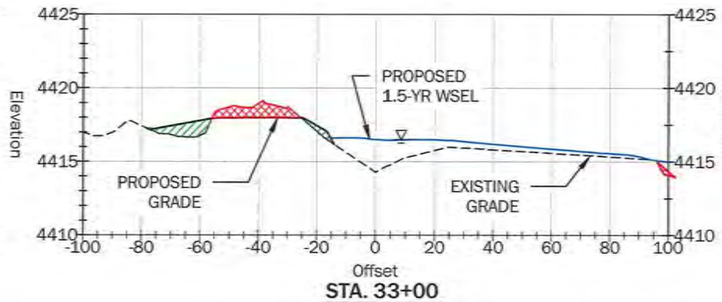

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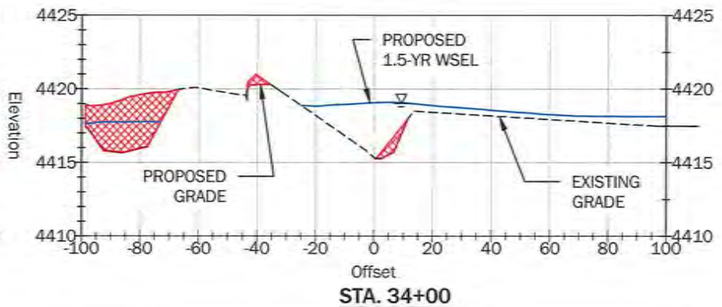

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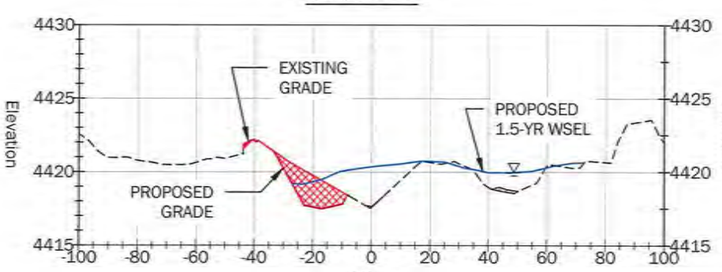

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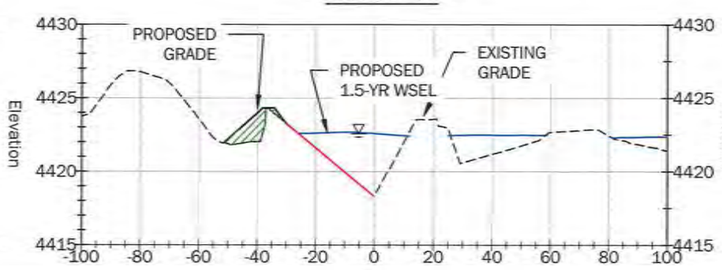

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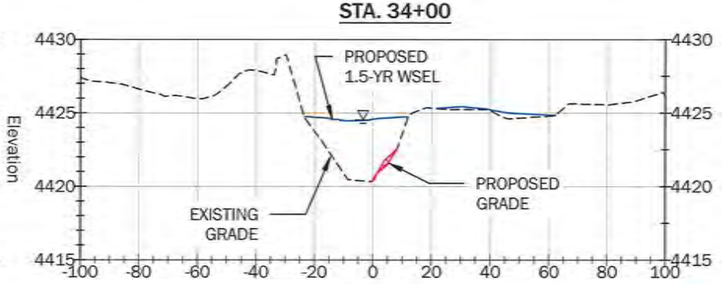

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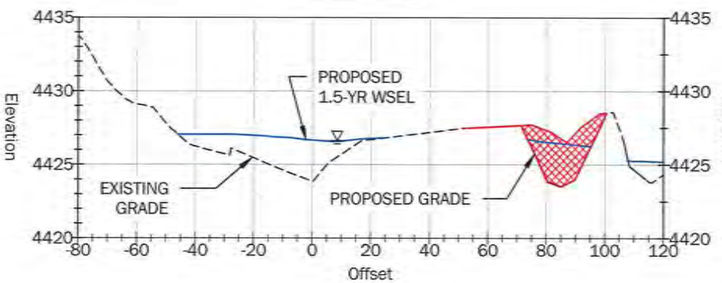

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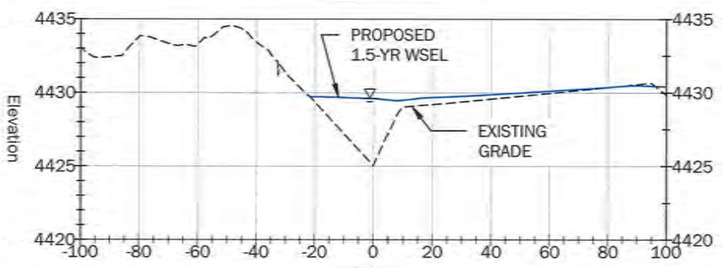


STA. 39+00

50 0 50
Feet

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

LEGEND

PROPOSED FILL AREAS

PROPOSED CUT AREAS

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

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

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

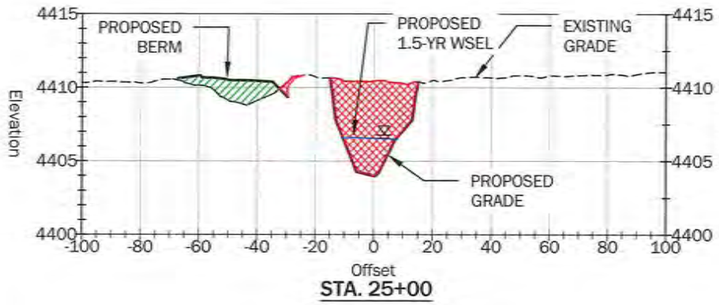
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 2
MAIN CHANNEL CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.7

P:\21\21860001\CAD\00\90 Percent\S6.1-6.10 Reach 2.dwg TAB:6.7 Date Exported: 02/16/17 - 11:01 by bmiller



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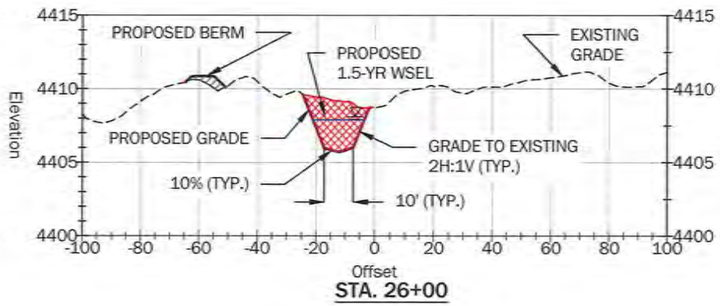

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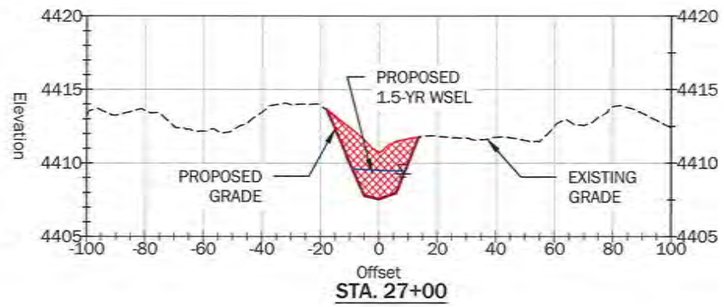

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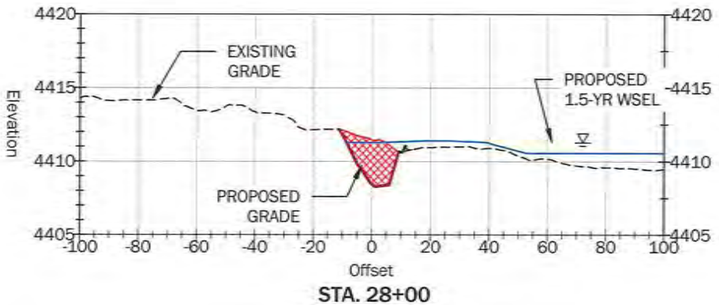

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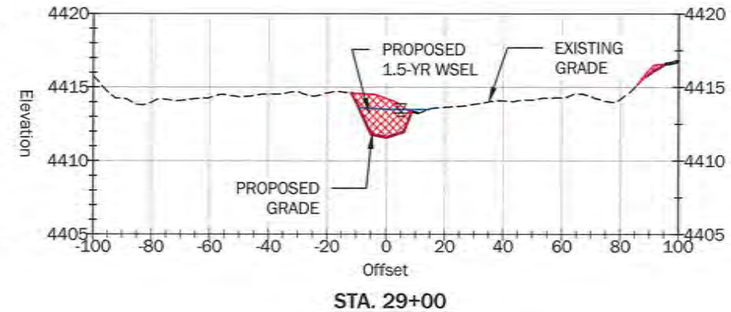

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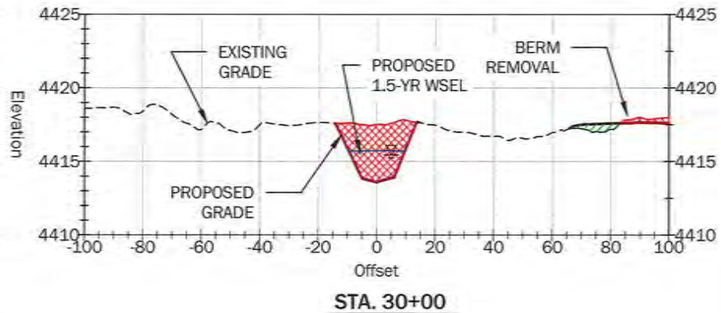

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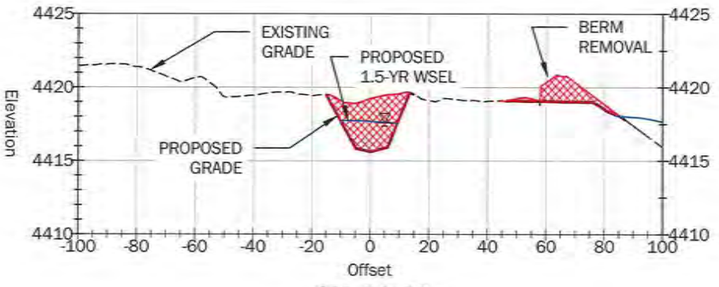

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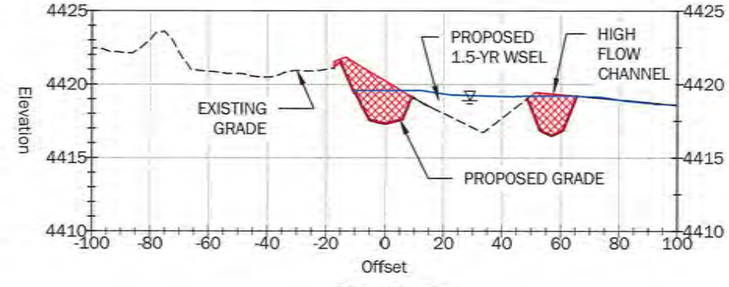

STA. 32+00

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED PERENNIAL FLOW CHANNEL ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

50 0 50
Feet

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

LEGEND

PROPOSED FILL AREAS

PROPOSED CUT AREAS

REGISTERED PROFESSIONAL ENGINEER
72315PE
OREGON
RENEWAL DATE: DECEMBER 31, 2017
RYAN S. CARNIE
Date: 12/31/2017

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 PERENNIAL FLOW CHANNEL CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 6.8

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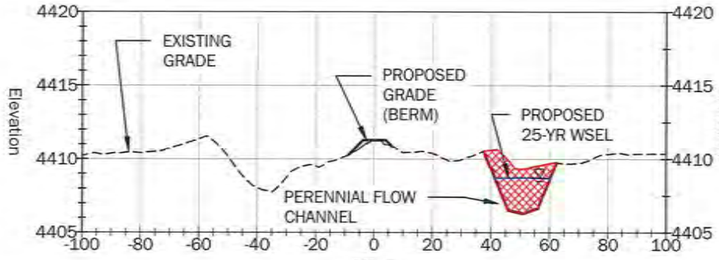

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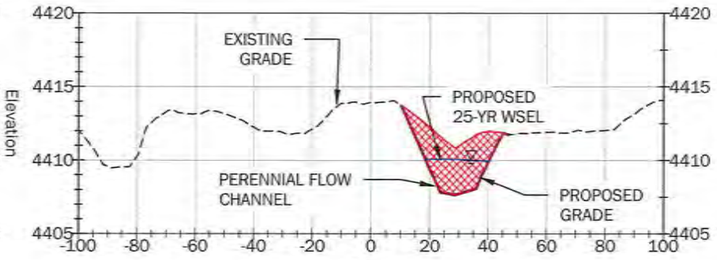

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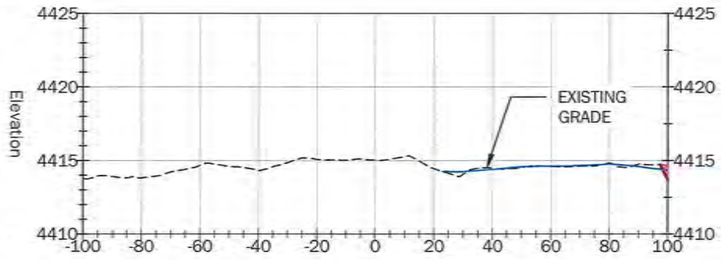

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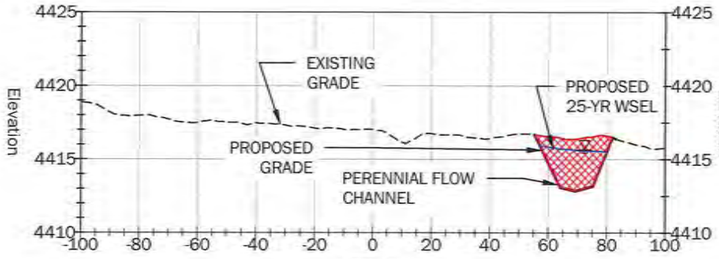

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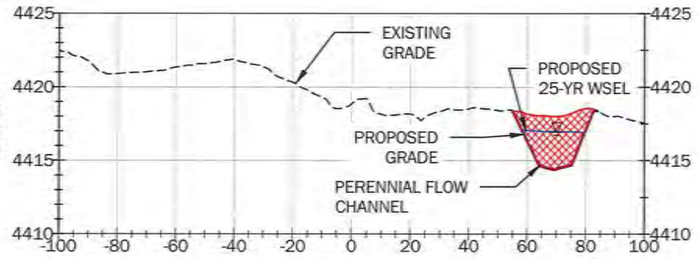

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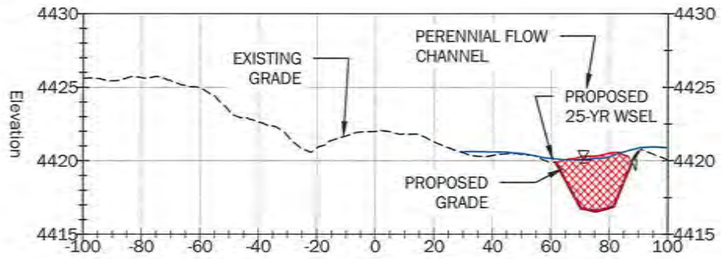

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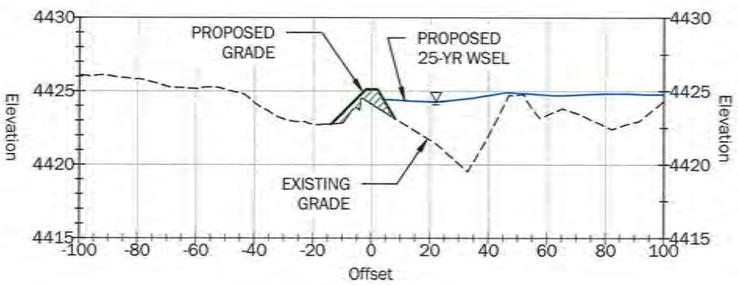

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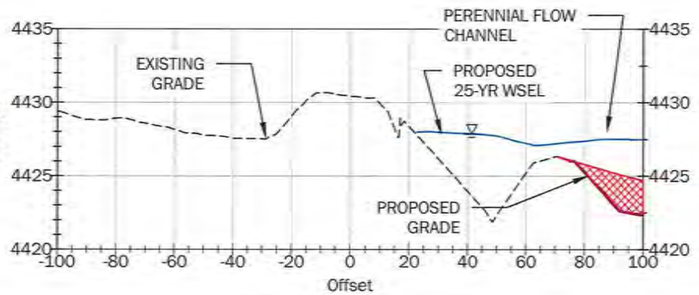


STA. 19+00

12/31/2017

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE PROPOSED BERM ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

50 0 50
Feet

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 2 PROPOSED BERM CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 6.9

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

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

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

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 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
NOVEMBER 12, 2002
RYAN S. CARNIE

Date: 12/31/2017

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

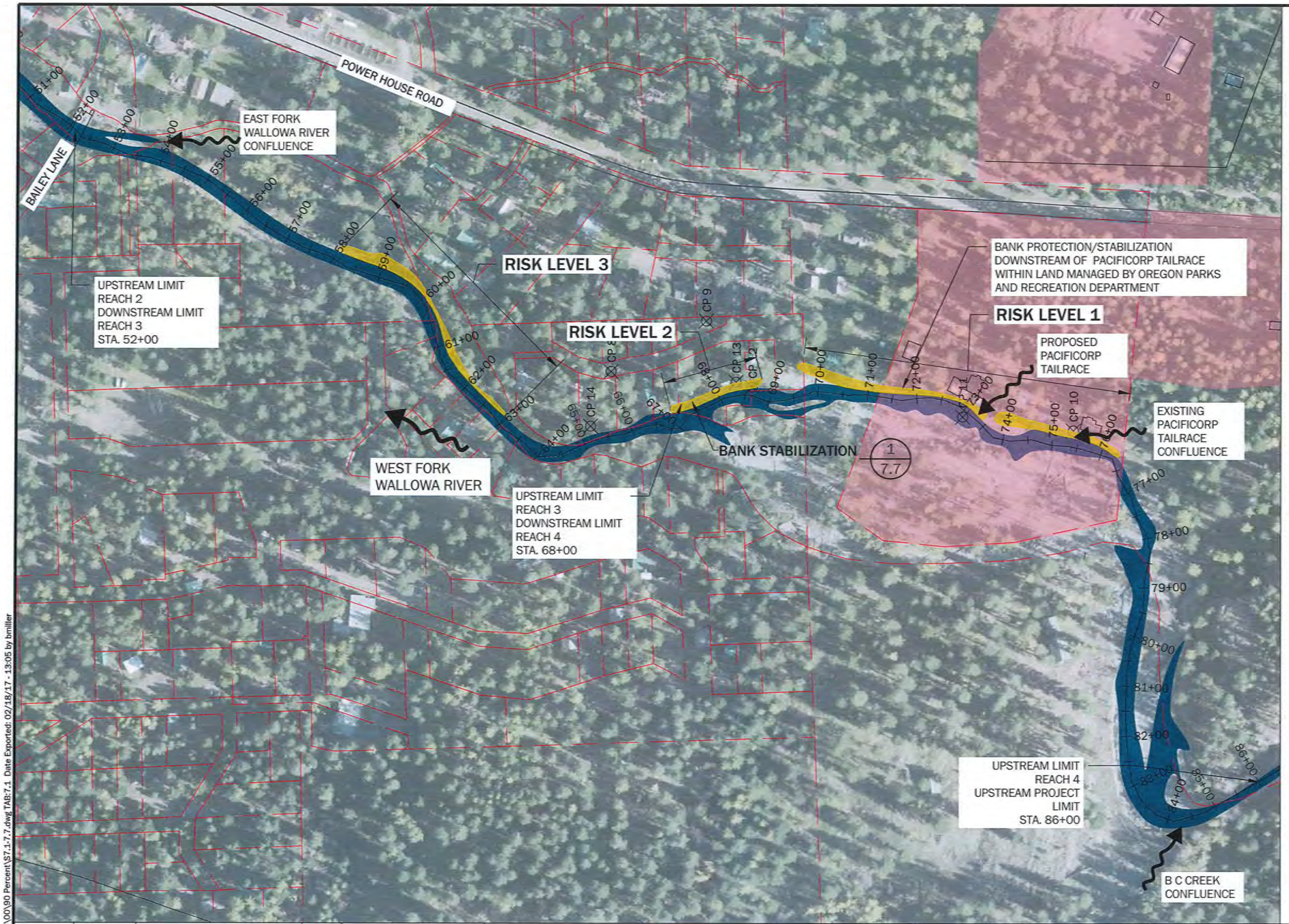
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 2
HABITAT STRUCTURES

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
6.10

P:\21\21860001\CAD\00\90 Percent\S6.1-6.10 Reach 2.dwg TAB:6.10 Date Exported: 02/16/17 - 11:04 by bmiller



N E S W

200 0 200
Feet

Legend

- CHANNEL ALIGNMENT
- APPROXIMATE BANKFULL EXISTING MAIN CHANNEL
- PROPOSED BANK STABILIZATION
- LAND MANAGED BY OREGON PARKS AND RECREATION DEPARTMENT
- TAX LOTS
- CONTROL POINT

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 SHALL BE VIEWED IN TO THE BANK AS DEPICTED ON SHEET 7.7.

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE

Expires: 12/31/2017

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

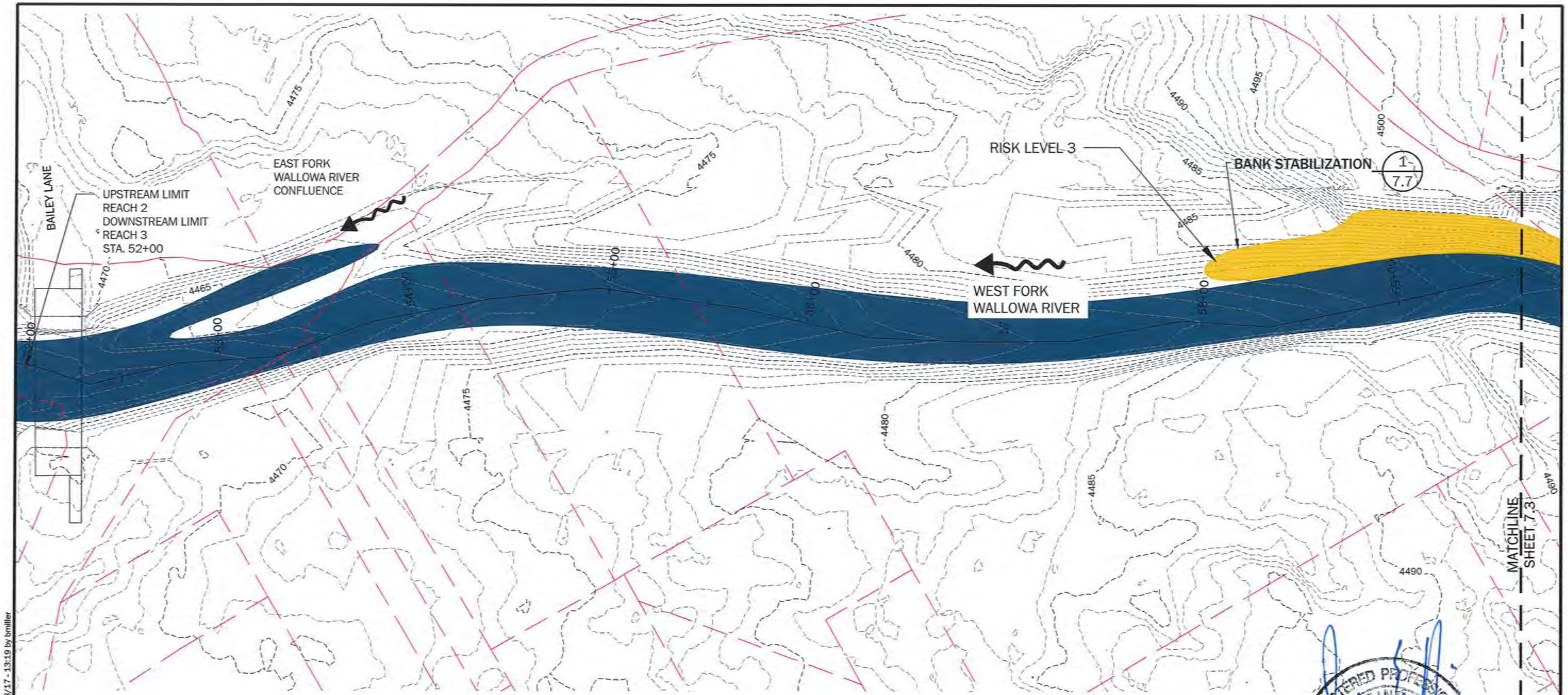
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 3 AND REACH 4 PROPOSED ENHANCEMENTS OVERVIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 7.1



MAIN CHANNEL PLAN VIEW

NOTES:
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Legend
- CHANNEL ALIGNMENT
- APPROXIMATE BANKFULL EXISTING MAIN CHANNEL
- PROPOSED BANK STABILIZATION
- TAX LOTS
- CONTROL POINT

50 0 50
Feet

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2015
RYAN S. CARNIE
Expires: 12/31/2017

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WALLOWA RESOURCES
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ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 3 AND REACH 4
PROPOSED ENHANCEMENTS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
7.2

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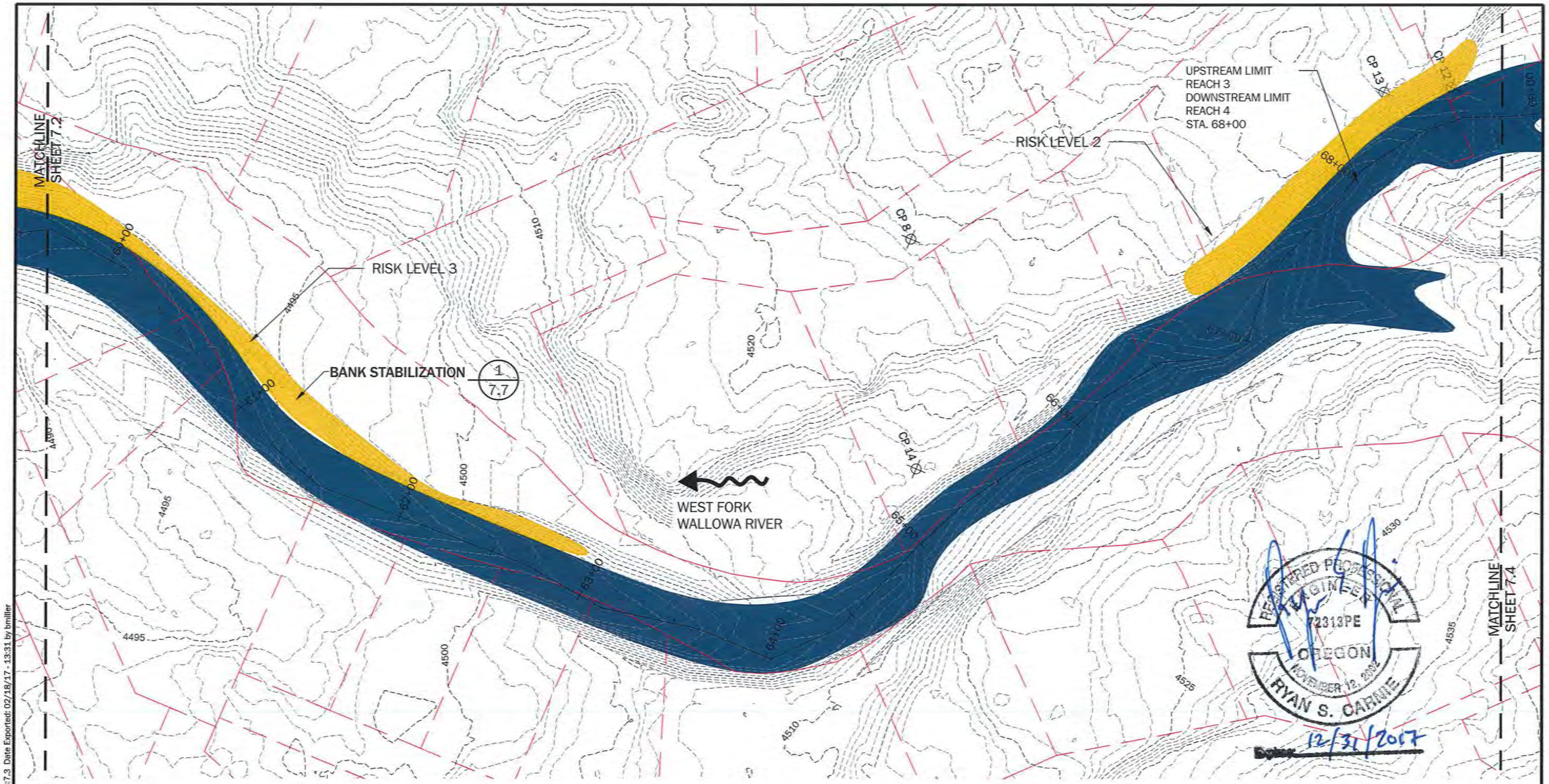

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE
Date: 12/31/2017

NOTES:
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MAIN CHANNEL PLAN VIEW

50 0 50
Feet

Legend
- CHANNEL ALIGNMENT
- APPROXIMATE BANKFULL EXISTING MAIN CHANNEL
- PROPOSED BANK STABILIZATION
- TAX LOTS
- CONTROL POINT

Revision No:	Date:	Description:	Initials:	
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				Drawn: BHM
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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 3 AND REACH 4
PROPOSED ENHANCEMENTS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 7.3

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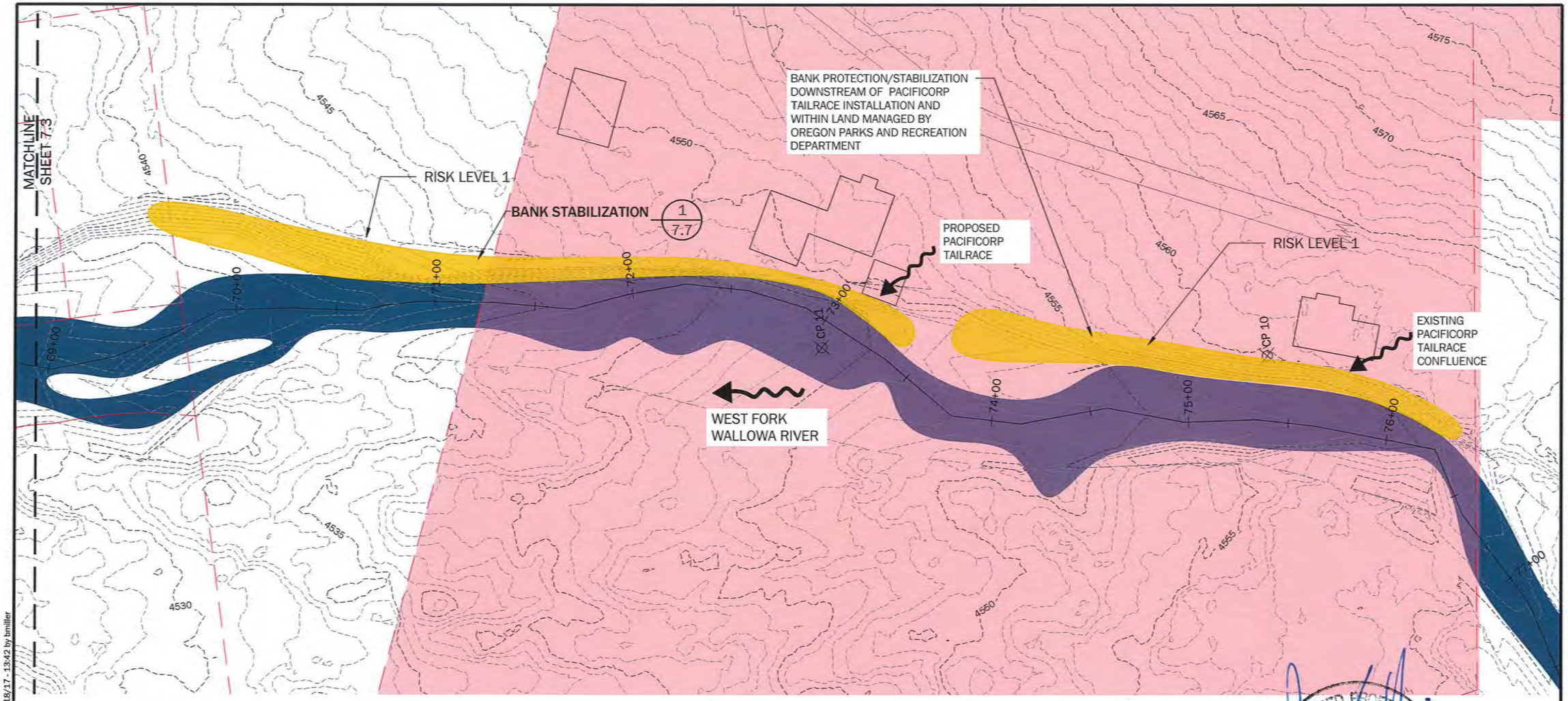

MAIN CHANNEL PLAN VIEW

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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N E S W

50 0 50
Feet

Legend
- CHANNEL ALIGNMENT
- APPROXIMATE BANKFULL EXISTING MAIN CHANNEL
- PROPOSED BANK STABILIZATION
- LAND MANAGED BY OREGON PARKS AND RECREATION DEPARTMENT
- TAX LOTS
- CONTROL POINT

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2004
RYAN S. CARNIE
Expires: 12/31/2017

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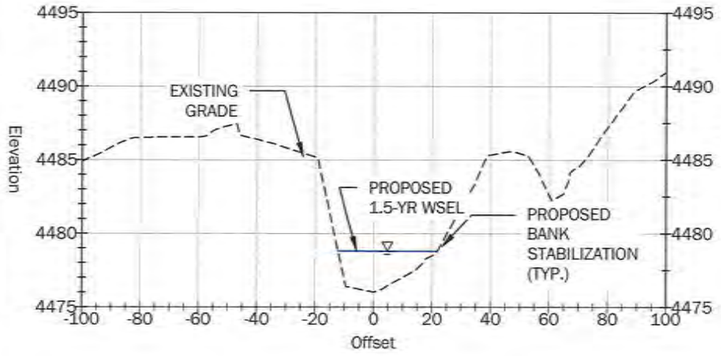
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 3 AND REACH 4
PROPOSED ENHANCEMENTS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
7.4



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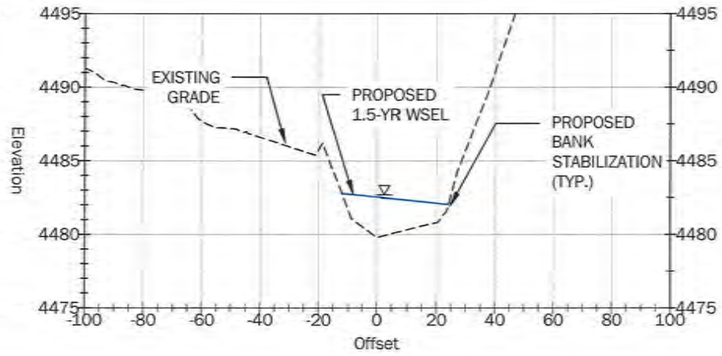

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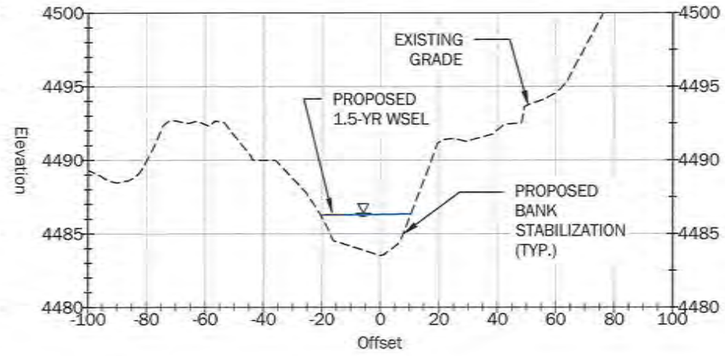

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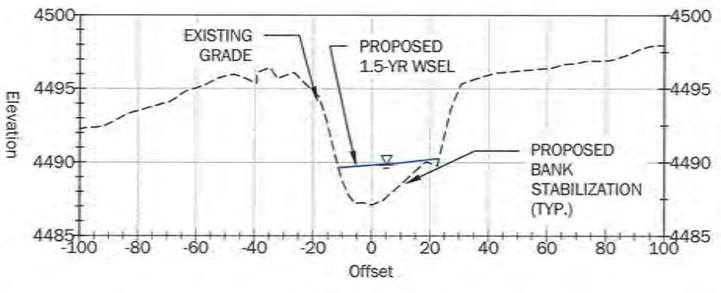

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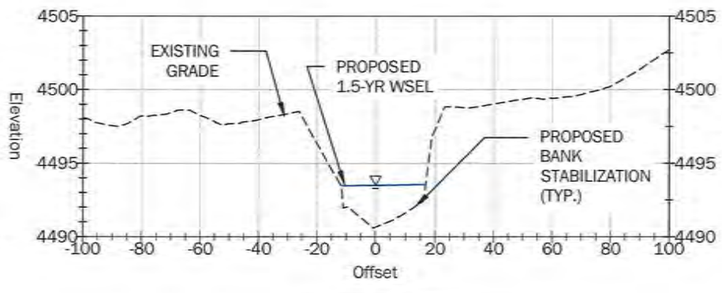

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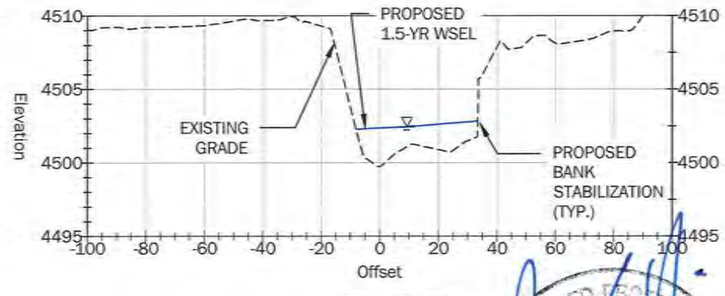

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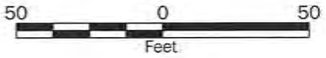
Expires: 12/31/2017



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

NOTES:
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE 2016 THALWEG ALIGNMENT.
2. 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.
3. ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

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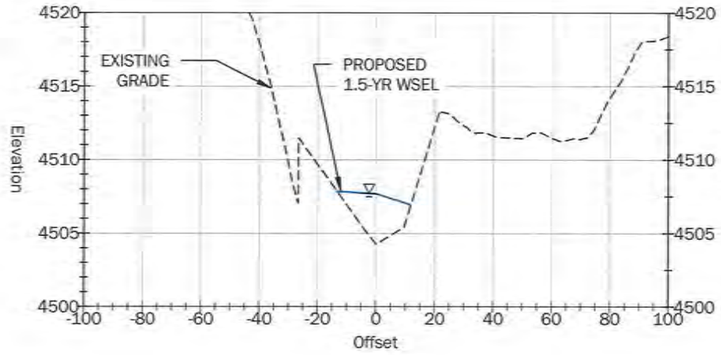
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 3 AND REACH 4
CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
7.5



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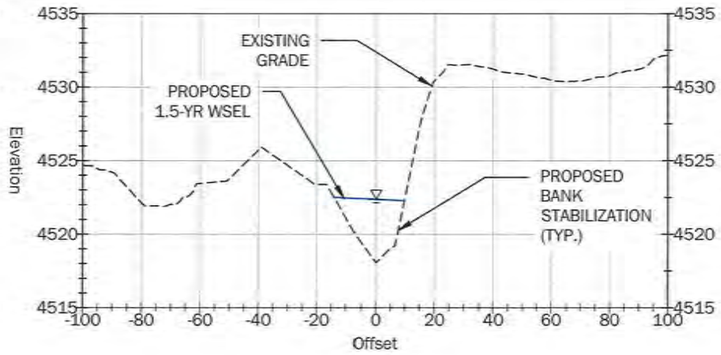

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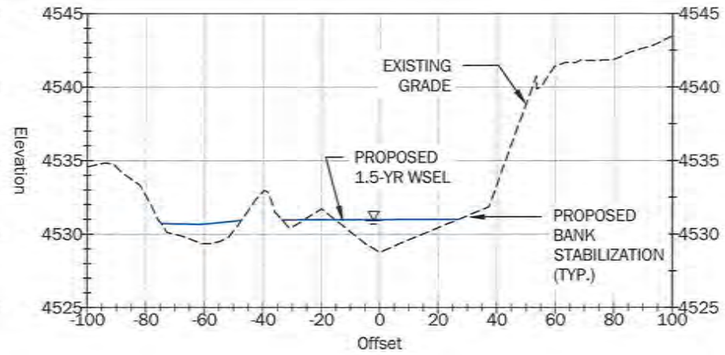

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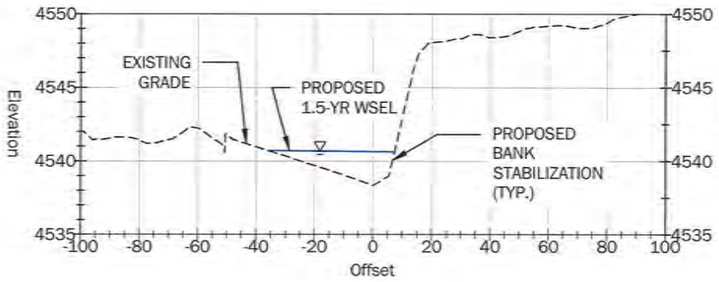

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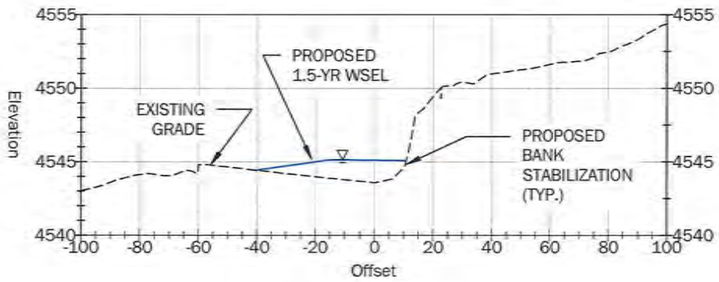

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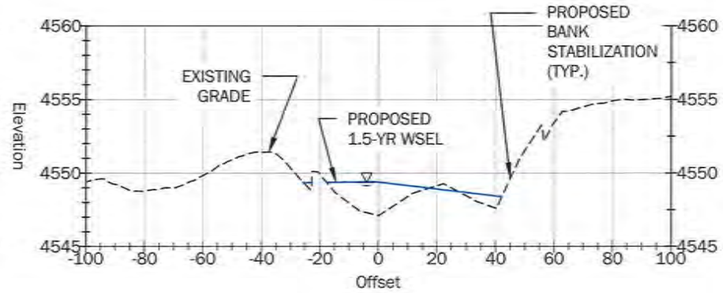

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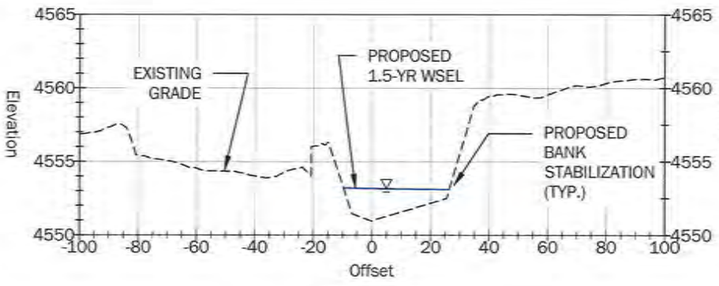

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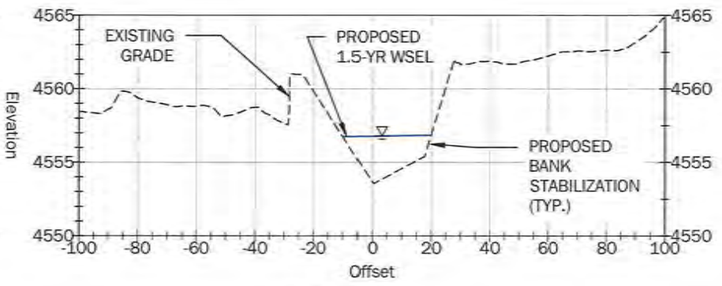

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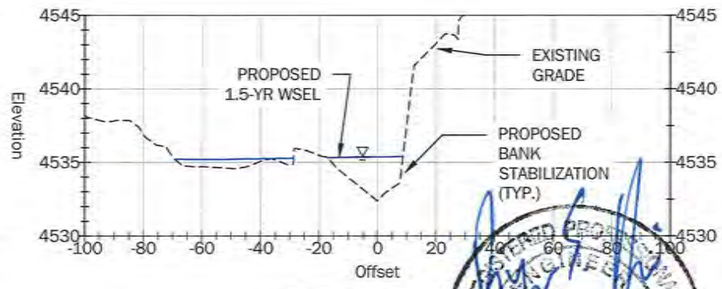

STA. 76+00

50 0 50
Feet

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

NOTES:
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REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CAPNIE
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WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 3 AND REACH 4
CROSS SECTIONS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
7.6

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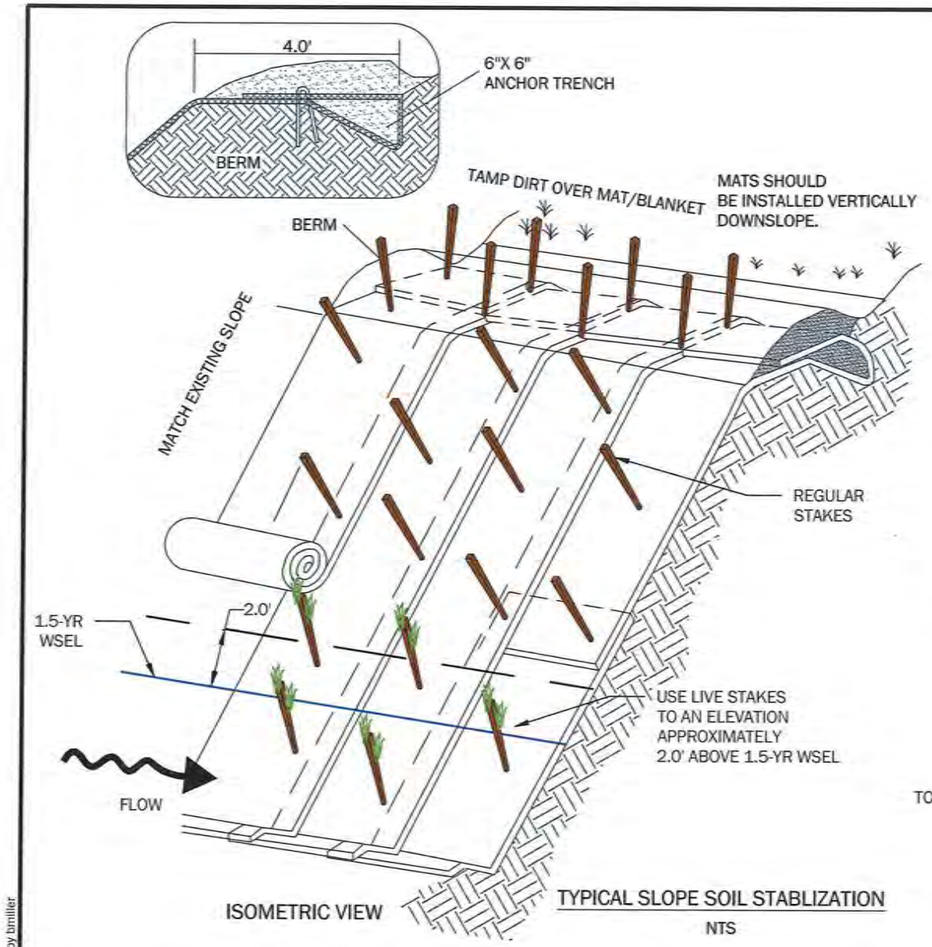
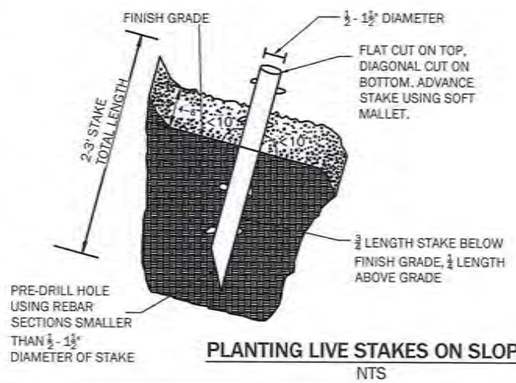


ISOMETRIC VIEW

TYPICAL SLOPE SOIL STABLIZATION

NTS



PLANTING LIVE STAKES ON SLOPES

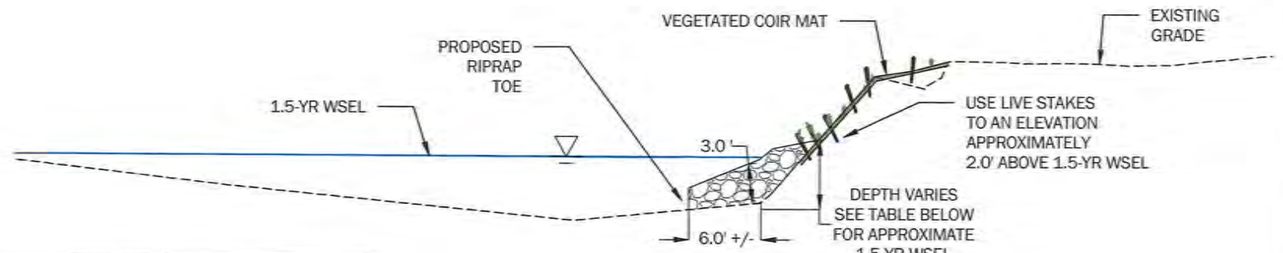
NTS

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.

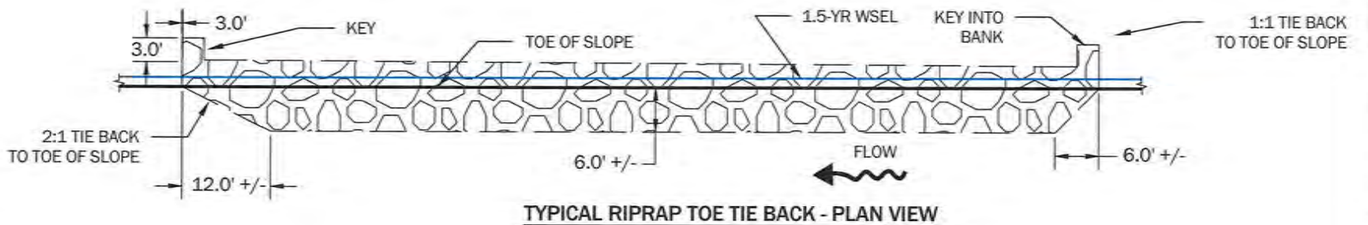


ODOT CLASS 700 RIP RAP GRADATION LIMITS		
PERCENT GRADATION SMALLER THAN	MINIMUM DIAMETER (FT)	MAXIMUM DIAMETER (FT)
100	1.90	2.26
80	1.61	1.85
50	1.32	1.50
15	0.61	0.77

TYPICAL RIPRAP TOE AND VEGETATED COIR MAT

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

10 0 10
Feet



TYPICAL RIPRAP TOE TIE BACK - PLAN VIEW

NTS

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
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

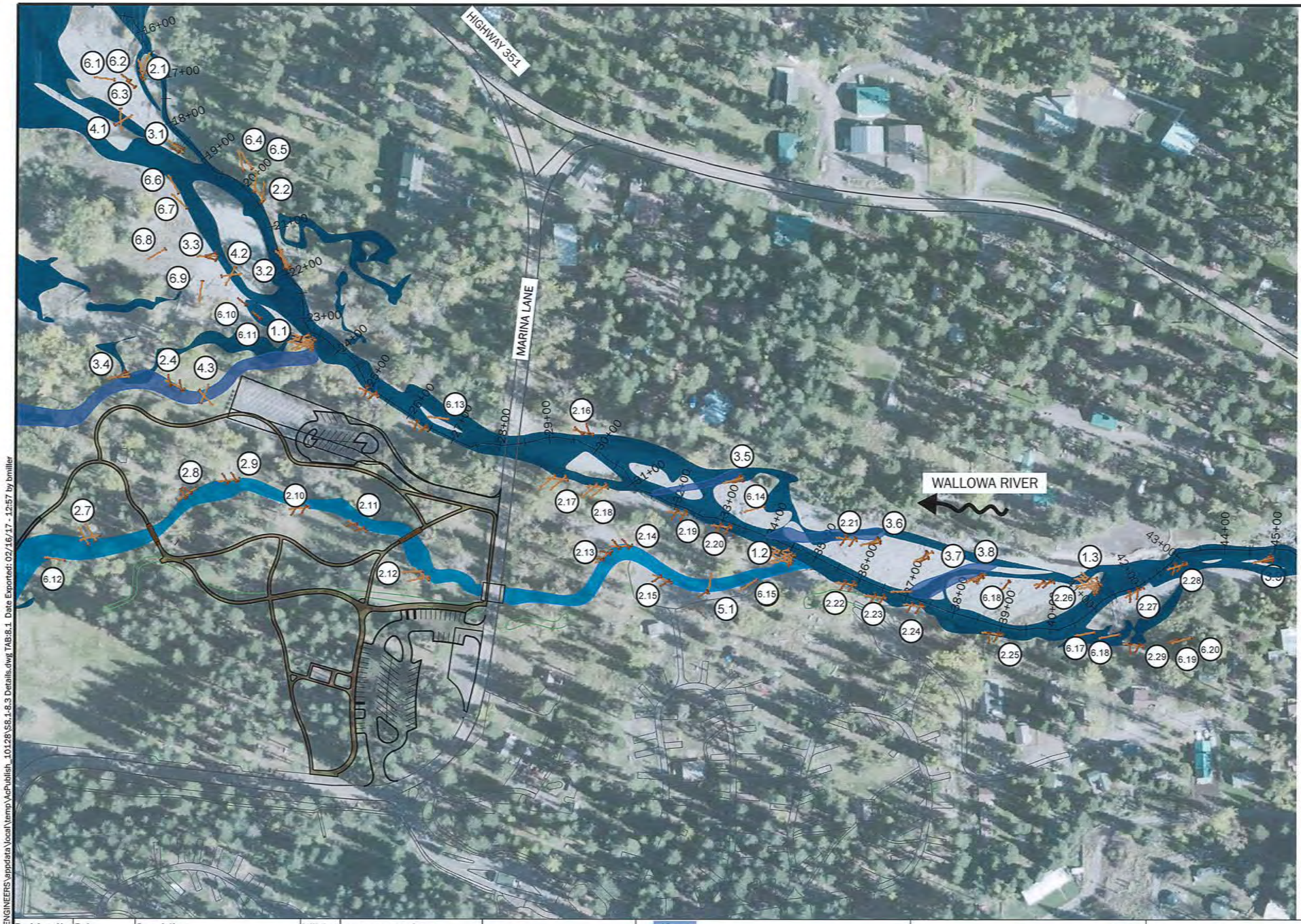
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

BANK STABILIZATION DETAIL

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 7.7

P:\21\21860001\CAD\00\90 Percent\S7.1-7.7.dwg TAB:7.7 Date Exported: 02/18/17 - 14:56 by bmiller



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:

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4. STRUCTURE CONTROL POINTS LISTED ON HABITAT DETAILS SHEET 8.2

REGISTERED PROFESSIONAL ENGINEER
72319PE
OREGON
NOVEMBER 13, 2015
RYAN S. CARNIE

Expires: 12/31/2017

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HABITAT STRUCTURES PLAN VIEW

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet **8.1**

HABITAT STRUCTURE CONTROL POINTS

Structure Type	Control Point	Easting	Northing
1	1a	9049054.6	606125.7
	1b	9049040.9	606117.0
	1c	9049028.2	606116.8
	2a	9048626.6	605159.9
	2b	9048611.9	605152.6
	2c	9048599.1	605154.0
	3a	9048570.3	604541.1
	3b	9048554.3	604536.5
	3c	9048542.7	604540.7
2	1a	9049582.4	606465.6
	1b	9049570.0	606462.7
	1c	9049565.8	606459.4
	2a	9049342.1	606237.0
	2b	9049320.4	606221.6
	2c	9049324.4	606217.0
	3a	9048992.6	606239.4
	3b	9048992.9	606223.3
	3c	9048989.3	606218.7
	4a	9048955.8	606402.6
	4b	9048945.4	606379.7
	4c	9048946.6	606375.9
	5a	9048949.5	606006.7
	5b	9048939.3	605989.0
	5c	9048932.6	605986.7
	6a	9048883.0	605906.4
	6b	9048872.1	605888.3
	6c	9048865.6	605886.5
	7a	9048637.0	606566.9
	7b	9048643.9	606551.7
	7c	9048654.6	606545.0
	8a	9048730.9	606370.3
	8b	9048739.6	606360.3
	8c	9048747.5	606351.4
	9a	9048761.0	606286.6
	9b	9048763.2	606268.6
	9c	9048767.3	606264.2

Structure Type	Control Point	Easting	Northing
2	10a	9048711.0	606148.2
	10b	9048712.3	606129.3
	10c	9048710.0	606123.7
	11a	9048678.2	606028.7
	11b	9048668.5	606012.8
	11c	9048663.5	606007.9
	12a	9048583.5	605895.5
	12b	9048572.8	605883.0
	12c	9048566.4	605881.0
	13a	9048607.5	605532.8
	13b	9048619.6	605518.0
	13c	9048624.3	605515.2
	14a	9048631.5	605499.9
	14b	9048632.8	605480.1
	14c	9048635.2	605475.2
	15a	9048573.3	605416.0
	15b	9048564.9	605399.7
	15c	9048560.7	605395.3
	16a	9048858.9	605574.6
	16b	9048859.9	605559.9
	16c	9048857.4	605553.6
	17a	9048774.8	605629.6
	17b	9048772.2	605607.6
	17c	9048766.0	605604.6
	18a	9048756.6	605544.8
	18b	9048756.4	605526.3
	18c	9048750.5	605523.3
	19a	9048704.5	605383.6
	19b	9048703.0	605366.2
	19c	9048698.1	605363.9
	20a	9048677.0	605295.3
	20b	9048675.0	605277.4
	20c	9048670.8	605274.4
	21a	9048652.8	605044.8
	21b	9048650.9	605027.0
	21c	9048646.3	605024.3

Structure Type	Control Point	Easting	Northing
2	22a	9048562.7	605045.4
	22b	9048560.6	605027.9
	22c	9048556.6	605025.5
	23a	9048537.3	604985.6
	23b	9048535.2	604967.6
	23c	9048530.4	604964.7
	24a	9048519.1	604911.4
	24b	9048517.2	604892.9
	24c	9048513.7	604889.0
	25a	9048461.0	604756.2
	25b	9048460.5	604736.9
	25c	9048456.5	604731.6
	26a	9048564.1	604648.1
	26b	9048565.4	604634.1
	26c	9048561.9	604626.8
	27a	9048542.5	604474.1
	27b	9048548.3	604457.3
	27c	9048550.7	604446.9
	28a	9048597.1	604382.5
	28b	9048599.7	604365.9
	28c	9048598.4	604359.9
	29a	9048438.6	604473.0
	29b	9048438.2	604453.0
	29c	9048434.7	604447.3
3	1a	9049419.6	606380.8
	2a	9049206.6	606170.1
	3a	9049210.9	606311.5
	4a	9048977.0	606488.6
	5a	9048770.4	605251.1
	6a	9048646.3	604976.9
	7a	9048621.9	604871.6
	8a	9048575.6	604769.3
	9a	9048611.3	604186.7
4	1a	9049480.7	606505.2
	2a	9049174.1	606282.2
	3a	9048932.5	606335.1
5	1a	9048541.5	605320.1

Structure Type	Control Point	Easting	Northing
6	1a	9049564.0	606520.2
	2a	9049562.9	606488.6
	3a	9049550.3	606478.3
	4a	9049384.4	606259.5
	5a	9049387.5	606241.7
	6a	9049338.8	606388.8
	7a	9049309.1	606372.7
	8a	9049225.4	606415.3
	9a	9049160.6	606339.8
	10a	9049115.4	606253.0
	11a	9049088.8	606223.0
	12a	9048604.9	606614.3
	13a	9048887.4	605844.3
	14a	9048712.9	605209.5
	15a	9048567.0	605223.8
	16a	9048562.9	604717.1
	17a	9048462.6	604545.4
	18a	9048458.1	604496.0
	19a	9048449.0	604378.9
	20a	9048451.1	604351.3

1. DEFLECTION JAM

2. LONGITUDINAL LOG

3. APEX JAM

4.STEP TURN

5. TURNING WAD

6. BURIED SNAG

Survey Control Points

Point Number	Easting	Northing	Point Elevation	Description
1	9048037.05	607161.18	4389.94	CP/RBR
2	9047581.51	607532.20	4388.07	CP/PK
3	9048941.06	606270.29	4396.81	CP/HT
4	9049211.15	606342.27	4394.51	CP/HT
5	9048805.64	605559.50	4410.91	CP/HT
6	9048874.83	605732.51	4412.13	CP/HT
7	9048596.92	604929.03	4425.57	CP/HT 43+37
8	9047909.96	602466.61	4524.54	CP/PROP COR
9	9048010.48	602275.65	4537.03	CP/HT
10	9047792.35	601542.00	4560.14	CP/HT
11	9047820.00	601763.66	4545.51	CP/HT
12	9047878.52	602183.70	4524.87	CP/HT
13	9047888.95	602216.25	4533.85	CP/PROP COR
14	9047801.30	602507.21	4511.95	CP/HT

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

Revision No:	Date:	Description:	Initials:

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

20 years
WR WALLOWA RESOURCES

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

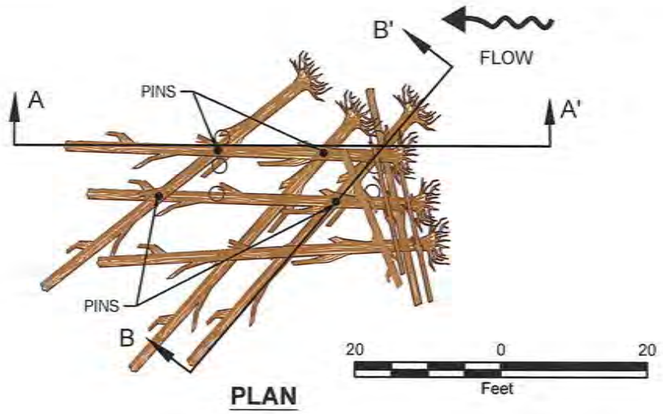
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

HABITAT STRUCTURES CONTROL POINTS

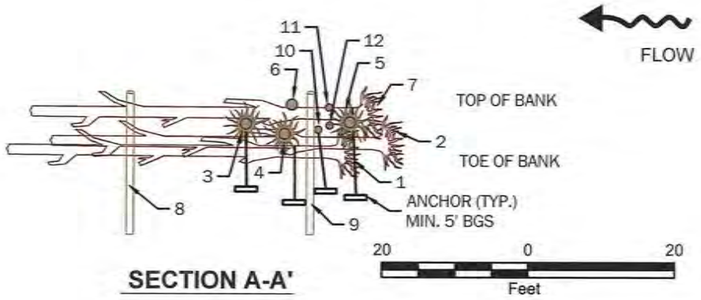
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 8.2

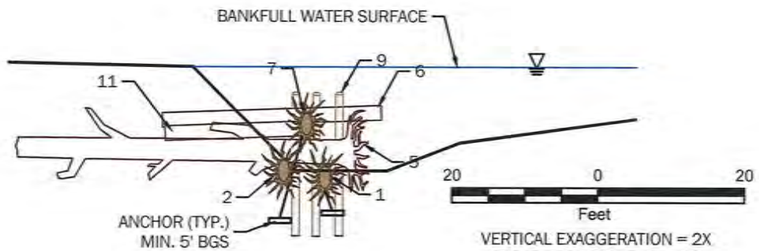
C:\Users\bmiller.GEOENGINEERS\appdata\local\temp\AcPublish_10128\S8.1-8.3 Details.dwg TAB:8.2 Date Exported: 02/16/17 - 12:59 by bmiller



PLAN



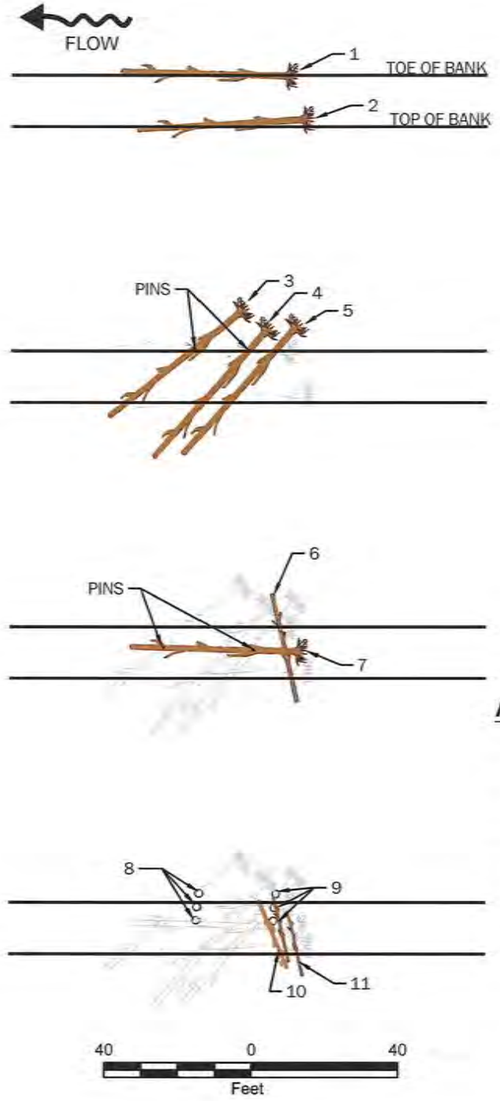
SECTION A-A'

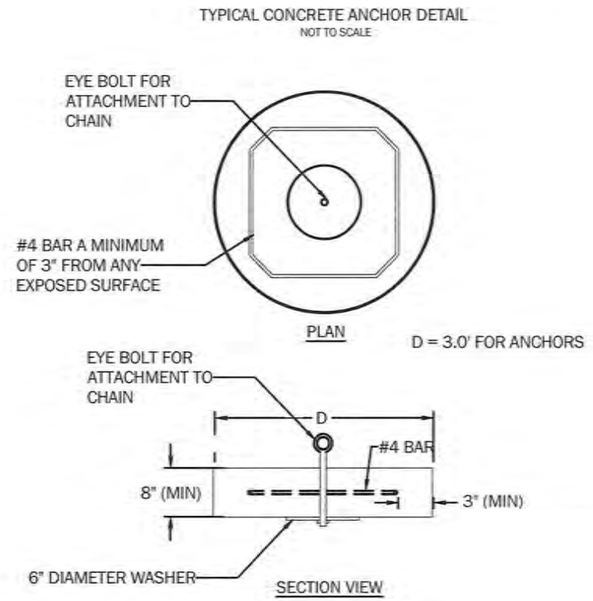


VERTICAL EXAGGERATION = 2X
HORIZONTAL SCALE: 1" = 10'
VERTICAL SCALE: 1" = 20'

SECTION B-B'

FLOW DEFLECTION JAM





ASSEMBLY SEQUENCE

WOOD PLACEMENT ORDER:

1. 45' LOG WITH ROOTWAD WITH ANCHOR
2. 45' LOG WITH ROOTWAD
3. 45' LOG WITH ROOTWAD WITH ANCHOR
4. 45' LOG WITH ROOTWAD
5. 45' LOG WITH ROOTWAD
6. 30' LOG WITHOUT ROOTWAD
7. 45' LOG WITH ROOTWAD WITH ANCHOR
8. 3 PILES
9. 3 PILES
10. 20' LOG WITHOUT ROOTWAD WITH ANCHOR
11. 20' LOG WITHOUT ROOTWAD
12. 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

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2009
RYAN S. CARNES

Expires: 12/31/2017

Revision No:	Date:	Description:	Initials:

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

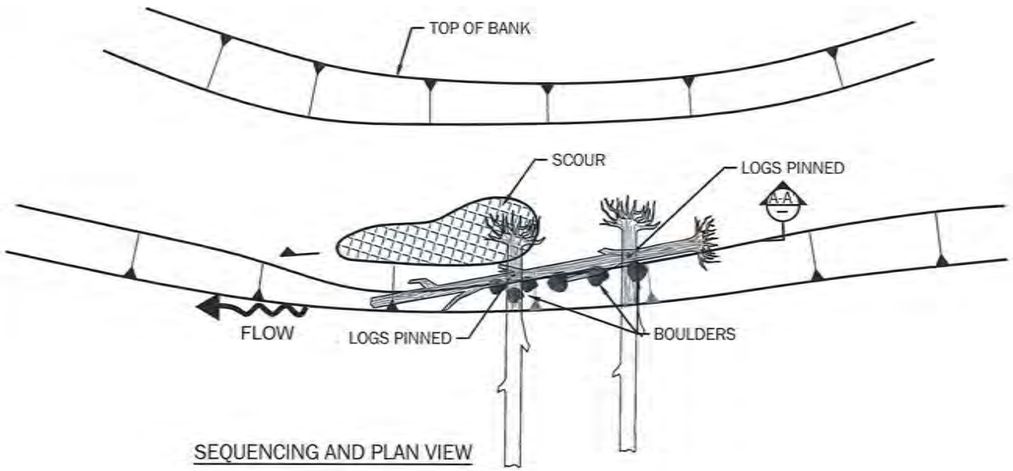
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

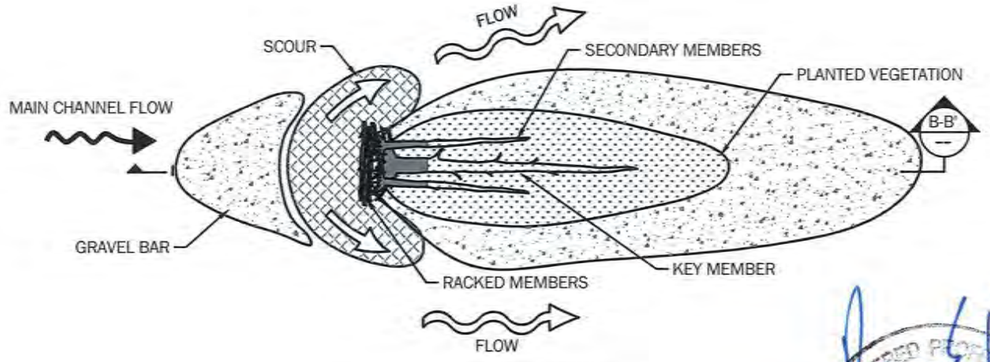
HABITAT STRUCTURES - DETAILS

UPPER WALLOWA RIVER RESTORATION DESIGN

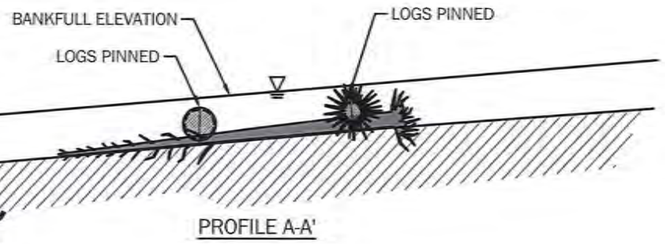
Sheet 8.3



SEQUENCING AND PLAN VIEW



EXAMPLE PLAN VIEW



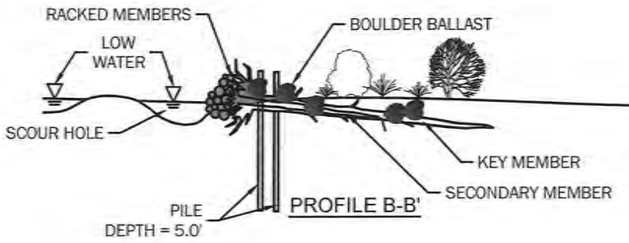
PROFILE A-A'

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



PROFILE B-B'

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

REGISTERED PROFESSIONAL ENGINEER
82313PE
OREGON
NOVEMBER 12, 2015
RYAN S. CARNIE

Expires: 12/31/2017

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

HABITAT STRUCTURES - DETAILS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 8.4

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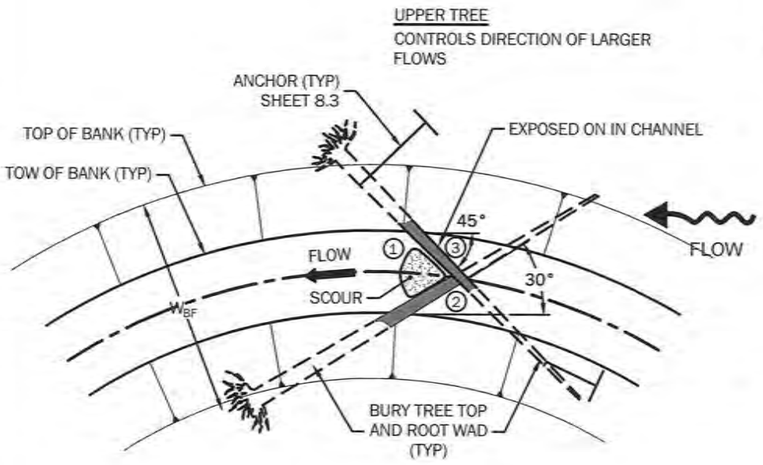
WOOD QUANTITIES		
45' LOG WITH ROOTWAD, MIN. 24" DBH	10'-20' RACKING MATERIAL 6"-10" DIA (EA)	ANCHOR
2	6	2



$L = 2xW_{BF}$
W_{BF} = BANKFULL WIDTH

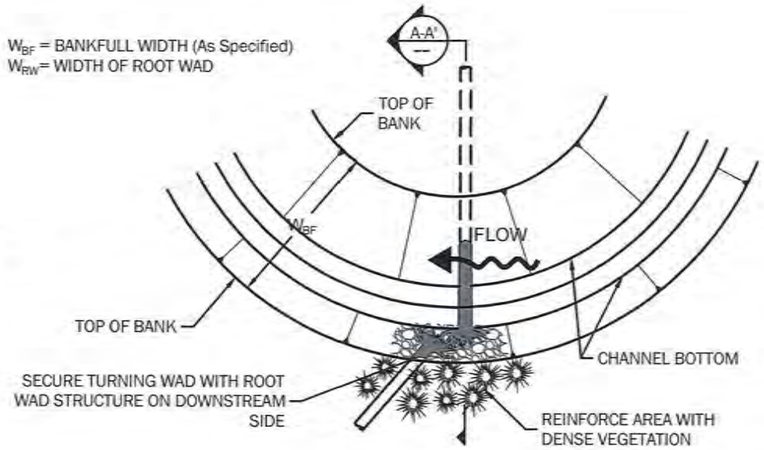
PLAN

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

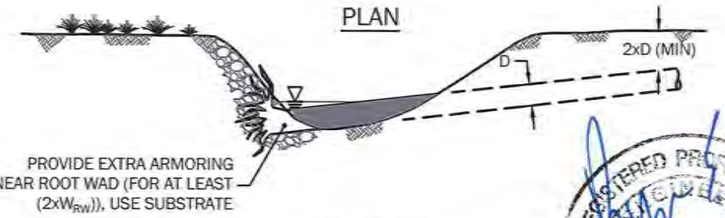
DESIGN SPECIFICS:
- STEP 1 IS A PLUNGE POOL.
- STEP 1 IS LOWER THAN STEP 2 (6" MAX)
- STEP 2 IS LOWER THAN STEP 3 (6" MAX)
- NOTCH INTERSECTION OF TREES AND SECURE WITH #10 REBAR PIN AS NEEDED
- EXPOSED PORTION OF TREE IS EQUAL TO ¼ TREE LENGTH
- SECURE TREES WITH ANCHORS. SEE SHEET 8.3 FOR TYPICAL ANCHOR 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

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



PLAN



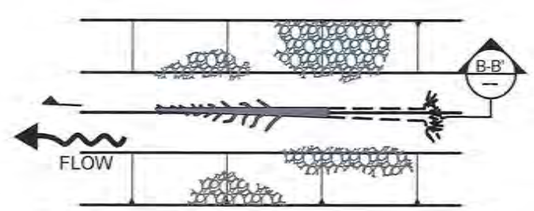
SECTION A-A'

PURPOSE:
- REDIRECTS FLOW.
- CREATES DIVERSE FISH HABITAT.

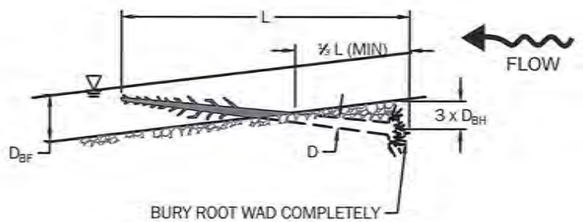
DESIGN SPECIFICS:
- PLACE TURNING WAD AT UPSTREAM END OF BEND.
- PLACE ROOTWAD ON/IN BANK.
- TREE SHOULD NOT BLOCK MORE THAN 50 PERCENT OF CHANNEL CROSS SECTIONAL AREA AT BASE FLOW.
- TREE MAY BE INSTALLED AT, NEAR OR BELOW LOW POOL ELEVATION.
- SLOPE TREE INTO THE CHANNEL.
- TREE MAY ALSO BE PLACED 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

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



PLAN



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

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2004
RYAN S. CARNILL
12/31/2017

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

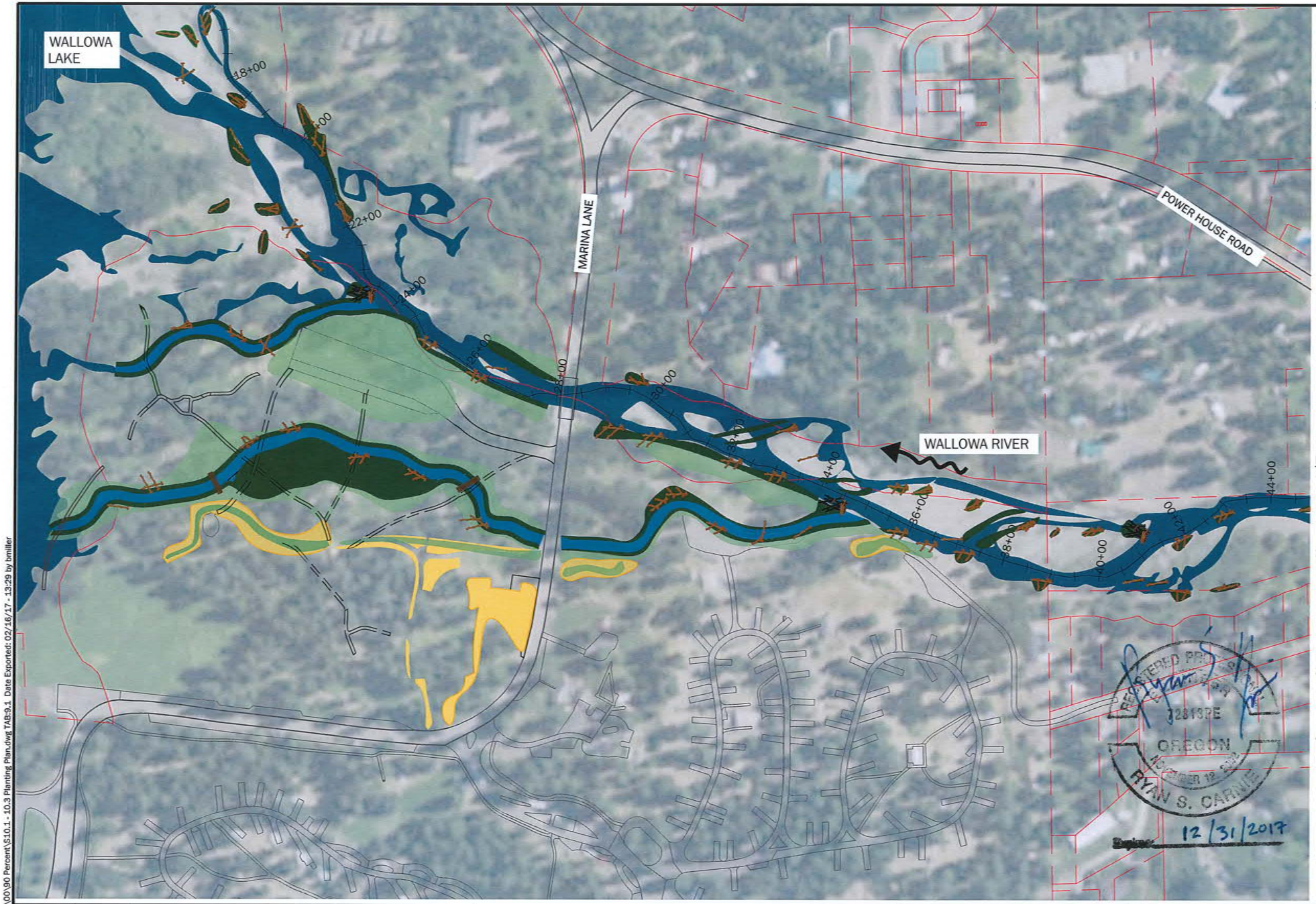
WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

HABITAT STRUCTURES - DETAILS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 8.5



N E S W

200 0 200
Feet

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
12813PE
OREGON
RYAN S. CARNIE
Expires: 12/31/2017

Revision No:	Date:	Description:	Initials:

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

20 years WR WALLOWA RESOURCES

WALLOWA RESOURCES
401 NORTHEAST FIRST STREET
ENTERPRISE, OR 97828

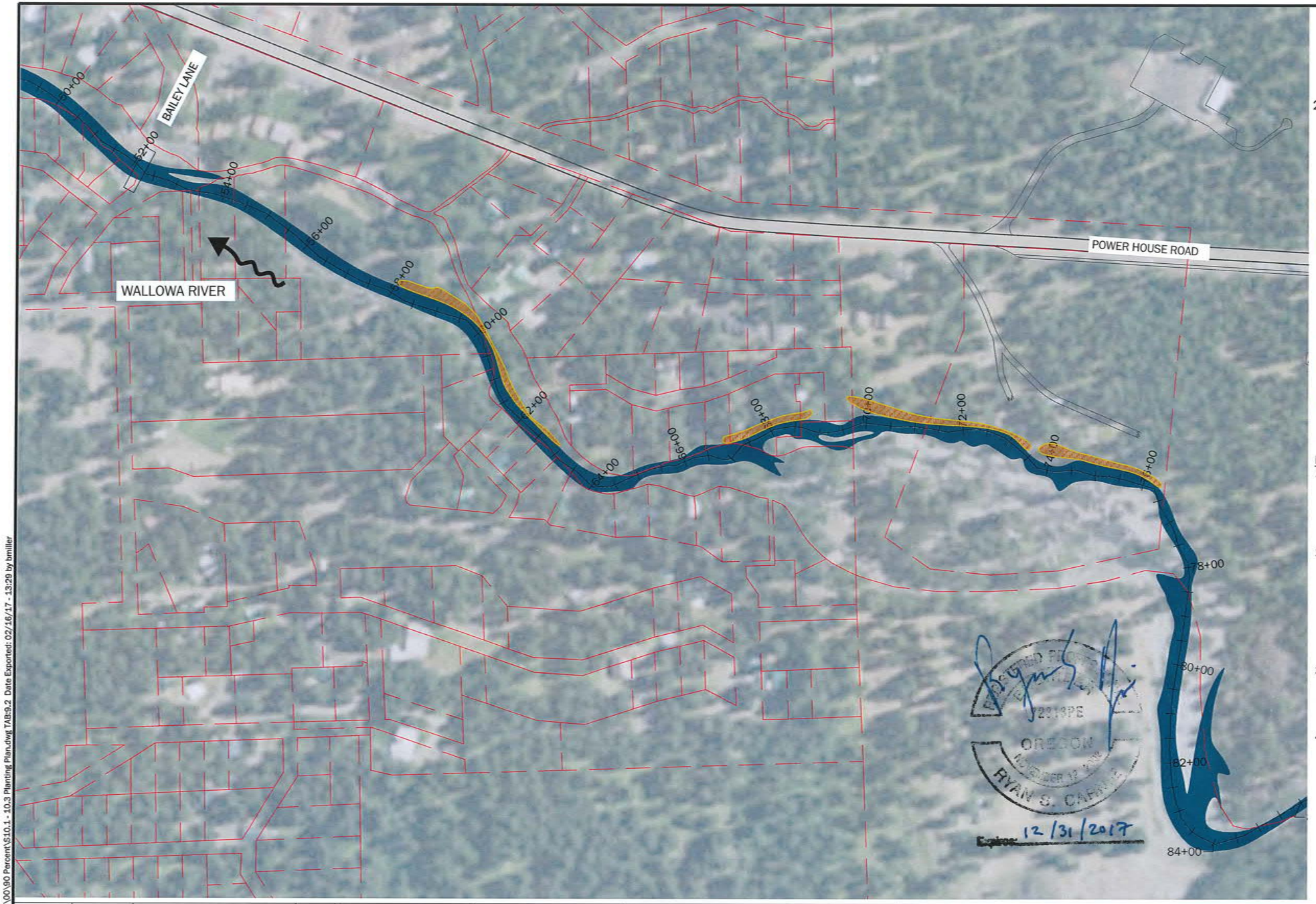
GEOENGINEERS
129 SOUTH MAIN STREET
PENDLETON, OR 97801

REACH 1 AND REACH 2
PLANTING PLAN

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
9.1

P:\21\21860001\CAD\00\90 Percent\S10.1 - 10.3 Planting Plan.dwg TAB:9.1 Date Exported: 02/16/17 - 13:29 by bmiller



200 0 200
Feet

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.

Revision No:	Date:	Description:	Initials:	
				Designed: RSC/BHM
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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 3 AND REACH 4
PLANTING PLAN

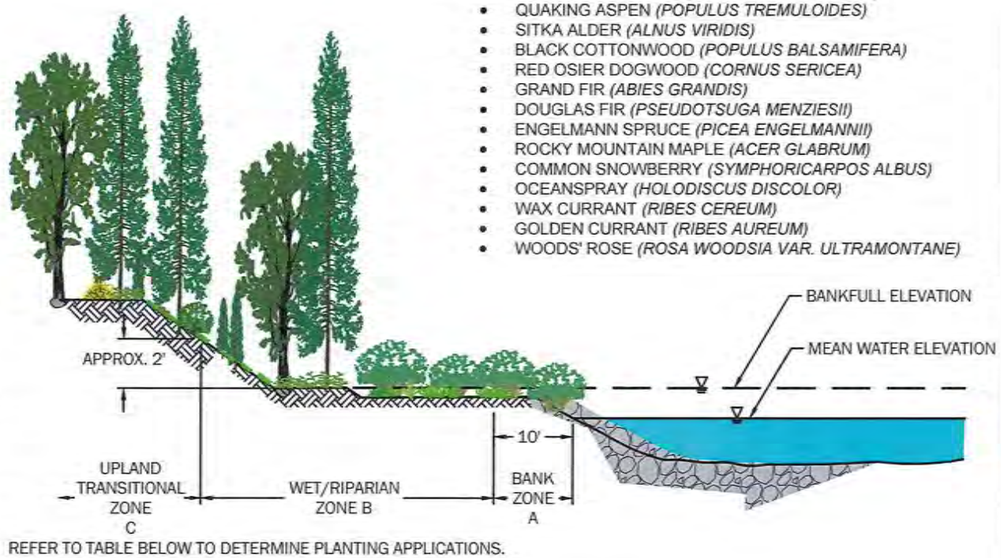
UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet
9.2

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 (Salix interoir)	OBL	1-gal	4	15%	858
Sandbar Willow (Salix amygdaloides)	FACW	1-gal	4	15%	858
Black cottonwood (Populus balsamifera)	FACW	2-gal	10	10%	92
Redosier dogwood (Cornus sericea)	FACW	1-gal	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 (Salix sp)	OBL/FACW	1-gal	6	20%	581
Black cottonwood (Populus balsamifera)	FACW	2-gal	15	10%	47
Golden Currant (Ribes aureum)	FAC	1-gal	25	10%	17
Sitka Alder (Alnus viridis)	FACW	1-gal	15	20%	93
Redosier dogwood (Cornus sericea)	FACW	1-gal	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 (Pinus ponderosa)	FACU	2-gal	35	20%	7
Douglas Fir (Pseudotsuga menziesii)	NL	2-gal	35	15%	5
Woods' rose (Rosa woodsia var. ultramontane)	FACU	1-gal	15	25%	44
Englemann Spruce (picea engelmannii)	FAC	2-gal	35	10%	4
Mountain hemlock (tsuga mertensiana)	FACU	2-gal	35	10%	4
Common Snowberry (Symphoricarpos albus)	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 (Pinus ponderosa)	FACU	2-gal	35	30%	5
Douglas Fir (Pseudotsuga menziesii)	NL	2-gal	35	20%	3
Woods' rose (Rosa woodsia var. ultramontane)	FACU	1-gal	15	25%	20
Common Snowberry (Symphoricarpos albus)	FACU	1-gal	15	20%	20

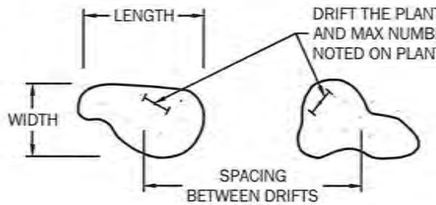
OBSERVED VEGETATION

- 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



DRIFT THE PLANT SPACING DIMENSIONS TO MIN AND MAX NUMBER OF PLANTS PER DRIFT AS NOTED ON PLANTING PLAN OR PLANT LIST

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.

REGISTERED PROFESSIONAL ENGINEER
72313PE
OREGON
NOVEMBER 12, 2002
RYAN S. CARNIE

Expires: 12/31/2017

Revision No:	Date:	Description:	Initials:

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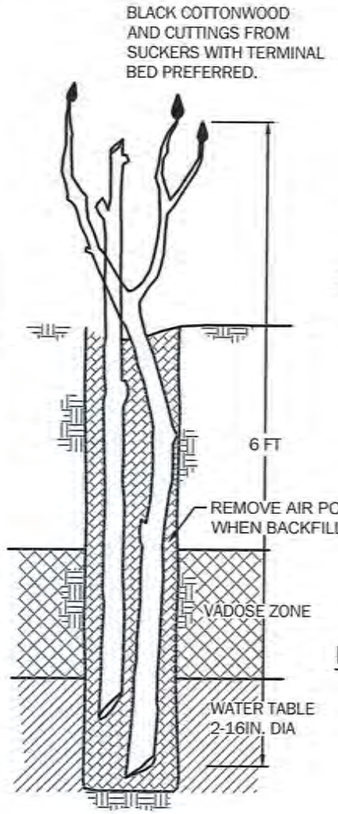
PLANTING NOTES AND QUANTITIES

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 9.3

P:\21\21860001\CAD\00\90 Percent\S10.1 - 10.3 Planting Plan.dwg TAB:9.3 Date Exported: 02/16/17 - 13:30 by bmiller

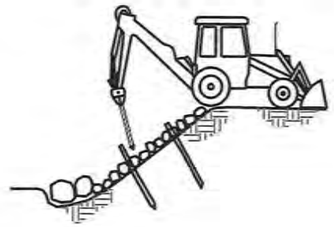


TYPICAL POLE PLANTING DETAIL

NOT TO SCALE

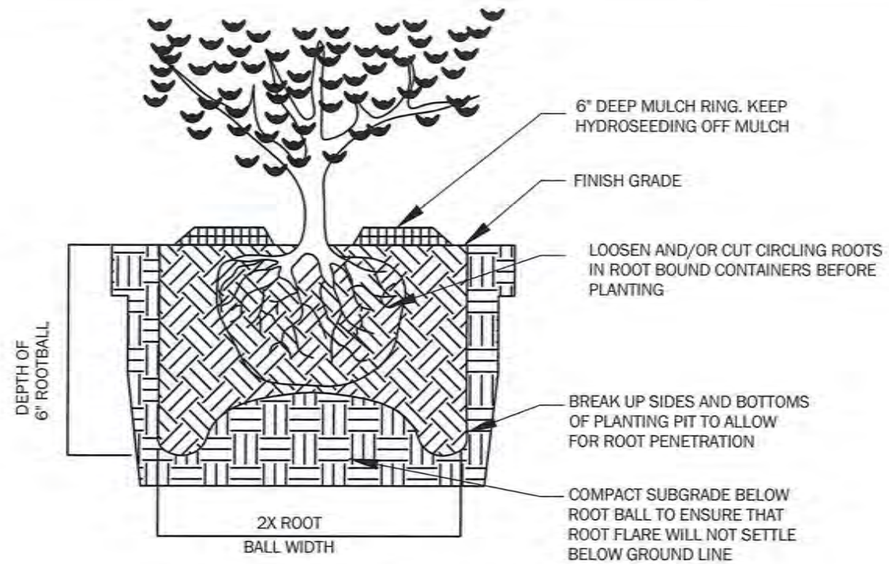
NOTES:

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 ½ TO ⅔ 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. ½ TO ⅔ CUTTING LENGTH (3 FT) SHOULD BE BURIED.



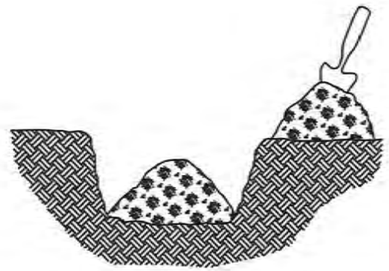
POLE PLANTING WITH "STINGER"

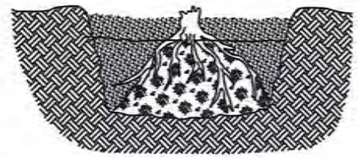
ROOT WAD WITH POLE PLANTING



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, FIRMING 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.

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PLANTING DETAILS

UPPER WALLOWA RIVER RESTORATION DESIGN

Sheet 9.4