

APPENDIX A
Design Drawings

BRIDGE TO BRIDGE

WALLA WALLA RIVER ENHANCEMENT

DESIGN DRAWINGS



PROJECT LOCATION

THE PROJECT SITE IS LOCATED APPROXIMATELY 10 MILES WEST OF WALLA WALLA, WASHINGTON. TO GET TO THE EAST (UPSTREAM) END OF THE PROJECT SITE FROM WALLA WALLA HEAD WEST ON HIGHWAY 12 FOR APPROXIMATELY 10.7 MILES AND THEN TURN SOUTH ON MCDONALD ROAD. CONTINUE SOUTH ON MCDONALD ROAD FOR APPROXIMATELY 0.4 MILES UNTIL YOU CROSS THE WALLA WALLA RIVER. THE MCDONALD ROAD BRIDGE CROSSING THE WALLA WALLA RIVER IS THE EAST END OF THE PROJECT AND THE PROJECT CONTINUES DOWNSTREAM FOR APPROXIMATELY 2.0 MILES. MCDONALD ROAD IS APPROXIMATELY 1.5 MILES EAST OF THE TOWN OF LOWDEN, WASHINGTON.

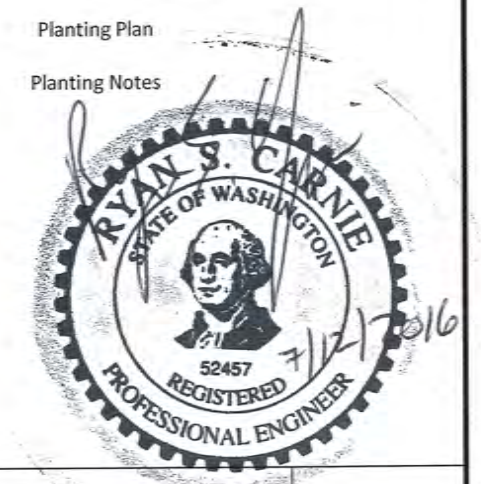
CONTACT INFORMATION

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SHEET INDEX

SHEET NUMBER	SHEET TITLE	SHEET NUMBER	SHEET TITLE	SHEET NUMBER	SHEET TITLE	SHEET NUMBER	SHEET TITLE	SHEET NUMBER	SHEET TITLE	SHEET NUMBER	SHEET TITLE	SHEET NUMBER	SHEET TITLE
1.1	Cover Sheet	4.3	Phase 2 Construction Sequencing and Dewatering	6.1	Floodplain Sections	7.7	Proposed Main Channel Plan and Profile Sta. 61+00 - 42+00	9.4	Proposed Side Channel 3 Plan and Profile	10.2	Proposed Habitat Structures	11.9	Details - Burried Snag and Rootwad
1.2	General Notes and Quantities	4.4	Phase 2 Construction Sequencing Notes	6.2	Floodplain Sections	7.8	Proposed Main Channel Plan and Profile Sta. 42+00 - 23+50	9.6	Proposed Side Channel 5 Plan and Profile	10.3	Proposed Habitat Structures	11.10	Details - Beaver Dam Analog
1.3	Project Goals and Objectives	4.5	Phase 3 Construction Sequencing and Dewatering	7.1	Proposed Main Channel Plan and Profile Sheet Index	8.1	Main Channel Sections	9.7	Proposed Side Channel 6 Plan and Profile	11.1	Details - Longitudinal Stone Toe	11.11	Habitat Structures Quantities
2.1	Existing Conditions Aerial	4.6	Phase 3 Construction Sequencing Notes	7.2	Proposed Main Channel Plan and Profile Sta. 130+00 - 116+00	8.2	Main Channel Sections	9.8	Proposed Side Channel 7 Plan and Profile	11.2	Details - Terrace 1	12.1	Planting Plan
2.2	Existing Conditions Aerial	4.7	Phase 4 Construction Sequencing and Dewatering	7.3	Proposed Main Channel Plan and Profile Sta. 116+00 - 94+00	8.3	Main Channel Sections	9.10	Proposed Side Channel 8 Plan and Profile	11.3	Details - Terrace 2	12.2	Planting Notes
2.3	Existing Conditions Topography	4.8	Phase 4 Construction Sequencing Notes	7.4	Proposed Main Channel Plan and Profile Sta. 94+00 - 79+50	8.4	Main Channel Sections	9.11	Proposed Side Channel 9 Plan and Profile	11.4	Details - Terrace 3		
2.4	Existing Conditions Topography	5.1	Proposed Grading	7.5	Proposed Main Channel Plan and Profile Sta. 79+50 - 72+00	8.5	Main Channel Sections	9.12	Proposed Side Channel 10 Plan and Profile	11.5	Details - Terrace 4		
3.1	Proposed Conditions	5.2	Proposed Grading	7.6	Proposed Main Channel Plan and Profile Sta. 72+00 - 61+00	8.6	Main Channel Sections	10.1	Proposed Side Channel 11 Plan and Profile	11.6	Details - Meander Jam		
4.1	Project Phasing, Access and Staging	5.3	Proposed Grading			9.1	Proposed Side Channel Plan and Profile Sheet Index	10.12	Proposed Side Channel 11 Plan and Profile	11.7	Details - Flow Deflection Jam		
4.2	Phase 2 Construction Sequencing and Dewatering	5.4	Proposed Grading			9.2	Proposed Side Channel 1 Plan and Profile	10.1	Proposed Habitat Structures	11.8	Details - Longitudinal Toe and Apex Jam		
		5.5	Proposed Grading			9.3	Proposed Side Channel 2 Plan and Profile						



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC	Walla Walla River near Lowden, Washington Tri-State Steelheaders		GEOENGINEERS 3501 West Elder Street, Suite 300 Boise, Idaho 83705	Cover Sheet Walla Walla River Bridge-to-Bridge Design Drawings	Sheet 1.1
				Drawn: BHM					
				Checked: RSC, IRS					
				Date: 07/15/2016					
				Project No: 11281-005-03					

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GENERAL NOTES:

1. These designs and drawings have been prepared for the exclusive use of the Tri-State Steelheaders (TSS) and their authorized agents. No other party may rely on the product of our services unless GeoEngineers Inc. (GeoEngineers) agrees in writing in advance of such use.
2. The drawings contained within should not be applied for any purpose or project except the Bridge-to-Bridge reach of the Walla Walla 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. TSS is advised to confirm that all necessary permits and approvals have been obtained prior to construction.
5. 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. Always contact GeoEngineers before applying these designs to determine if they remain applicable.
6. 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. TSS and the property owner should address safety concerns appropriately.
7. Potential regulatory changes to flood elevations and flood extents resulting from the proposed enhancements have not been addressed by GeoEngineers as part of this project.
8. Channel erosion, channel migration and/or avulsions can be expected to occur over time. These channel processes are natural and appropriate for these stream systems.
9. Design specifics for structures shall be confirmed and/or verified by a qualified engineer prior to or during construction at each proposed structure location.
10. These figures were originally produced in color.

BID ITEM LIST

Item #	Item Description	Units	No. of Units
2100	Environmental Controls - Best Management Practices	LS	1
3110	Mobilization and Demobilization	LS	1
3120	Construction Staking	Day	9
3130	Temporary Traffic Control	LS	1
3210	Clearing, Grubbing, Stockpile and Disposal	AC	2.4
3240, 3250	Temporary Stream Diversion, Dewatering	LF	6609
3310	Excavation and Stockpile	CY	18272
3410	Place Material Within Channel and Floodplain	CY	12353
3510	Install Large Wood Structures (Per Log)	EA	624
3520	Install Beaver Dam Analog (Per Post)	EA	162
3530	Install Flood Fencing	EA	225
3540	Install Ballast Boulders	EA	520
3610	Import and Stockpile Enhanced Gradation Material	CY	184
3710	Seeding	AC	11.9
3720	Planting	EA	11085
3710	Site Cleanup and Repair	LS	1

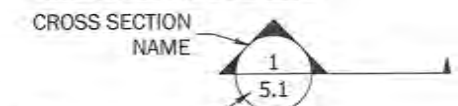
GENERAL CONSTRUCTION NOTES:

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.

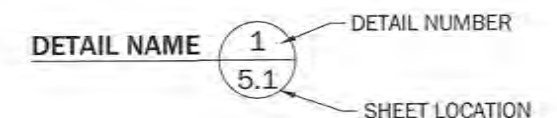
ABBREVIATIONS:

WSEL	WATER SURFACE ELEVATION
TYP	TYPICAL
FT	FEET
ELEV	ELEVATION
Horiz.	HORIZONTAL
Vert.	VERTICAL
MIN	MINIMUM
MAX	MAXIMUM
NTS	NOT TO SCALE
AC	ACRES
BGS	BELOW GROUND SURFACE
ACW	ACTIVE CHANNEL WIDTH
OHW	ORDINARY HIGH WATER
SQ-FT	SQUARE FEET
CY	CUBIC YARDS

SECTION LOCATION CALLOUT



SHEET LOCATION



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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General Notes and Quantities

Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
1.2

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Project Goals

The ultimate goal of this project is to increase, enhance and diversify aquatic, riparian and upland habitat while increasing floodplain connectivity and minimizing excessive erosion of the terraces within a reasonable period of time by implementing geomorphically appropriate design techniques within the practical limits of the project constraints.

Project Objectives

Increase, Enhance and Diversify Aquatic Habitat
Multiple Habitat Types Close Together
Primary Pool Habitat
Substrate Diversification
Habitat Structure and Cover
Side Channel/Off Channel Habitat
Benefits Include:
Multiple Species and Life Stages
Spawning, Rearing, Holding, Refuge

Increase, Enhance and Diversify Riparian and Upland Habitat
Diverse Vegetation Consisting of Native Plants
Benefits Include:
Overhead cover for Fish
Overall Habitat Complexity
Bird and Wildlife Habitat
LWD Recruitment
Bank Stability
Shade/Reduce Thermal Loading

Minimize Bank Erosion Along Upper Terraces
Maintain Main Channel Within Limits of Existing Terraces
Benefits Include:
Maintains Existing Acreage and Land Use Along Upper Terraces
Reduces Fine Sediment Inputs
Geomorphically Appropriate Planform Alignment
Riparian Vegetation Establishment
Holding and Refugia Habitat for Fish

Increase Floodplain Connectivity
Excavate and/or Encourage More Flow Through Side Channels
Layback Steep Slopes
Benefits Include:
Reduced Flood Elevations and Velocities
Increased Flood Storage
Bed and Bank Stability
Overall Habitat Complexity
Hyporheic Exchange
Wetland Development

Geomorphic Stability
Self-Sustaining, Self-Maintaining
Use of Natural Materials (Woody Habitat Structures, Rock Structures, Vegetation)
Benefits Include:
Reduce Long-Term Maintenance
Bed and Bank Stability
Habitat Maturation
Reduce Risk of Severe Erosion and/or Incision
Improve Sediment Transport

Rapid Recovery Time
Channel, Vegetation and Habitat Establishment
Limited Construction Seasons (Years)
Not Dependent upon Long-Term Channel Migration



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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

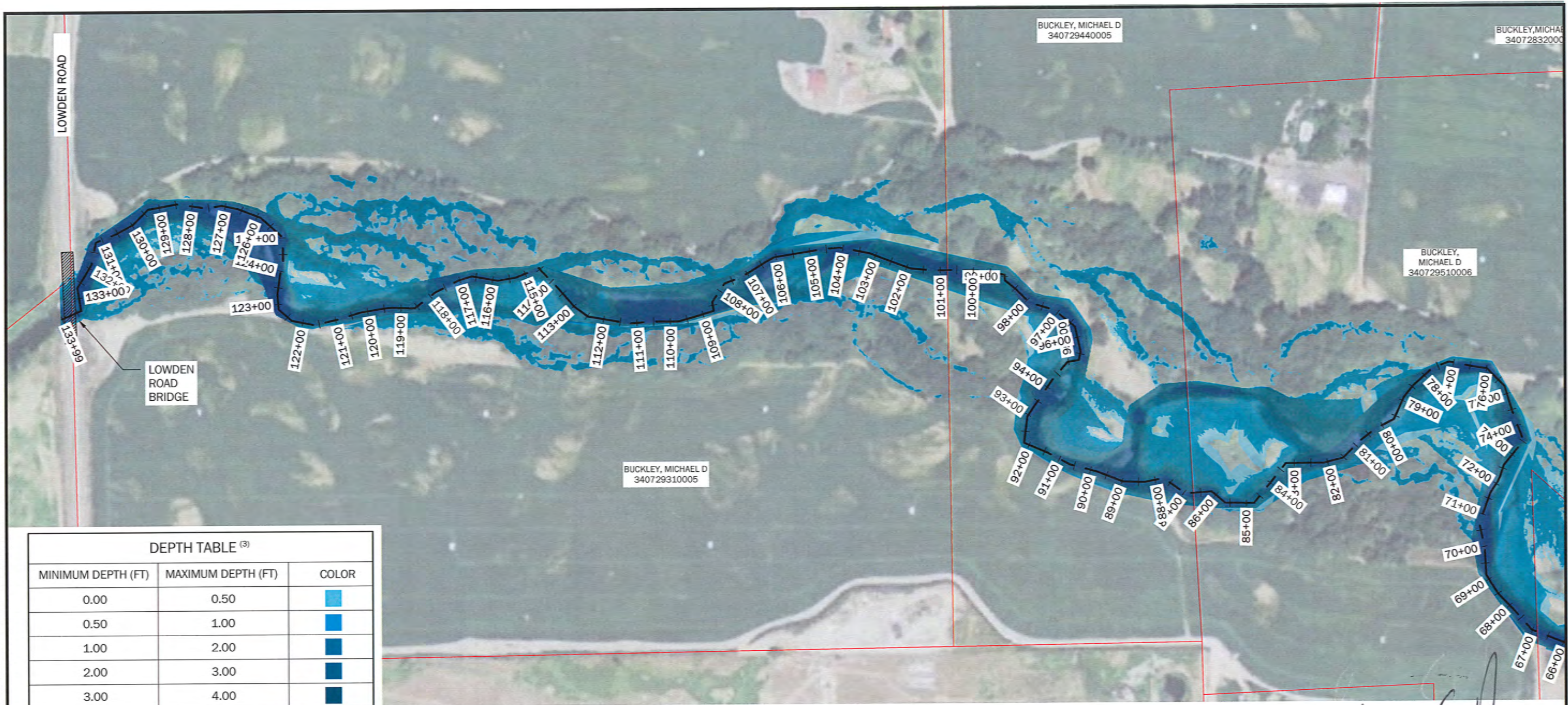


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Project Goals and Objectives
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
1.3

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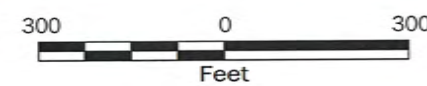


DEPTH TABLE ⁽³⁾		
MINIMUM DEPTH (FT)	MAXIMUM DEPTH (FT)	COLOR
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0.50	1.00	Medium Blue
1.00	2.00	Dark Blue
2.00	3.00	Very Dark Blue
3.00	4.00	Dark Blue
4.00	5.00	Very Dark Blue
5.00	7.00	Dark Blue
7.00	9.00	Very Dark Blue
9.00	11.00	Dark Blue
11.00	12.00	Very Dark Blue

- NOTES:
- TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.
 - 1.5YR WSEL DEPTH AT 1,982 CFS
 - AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.

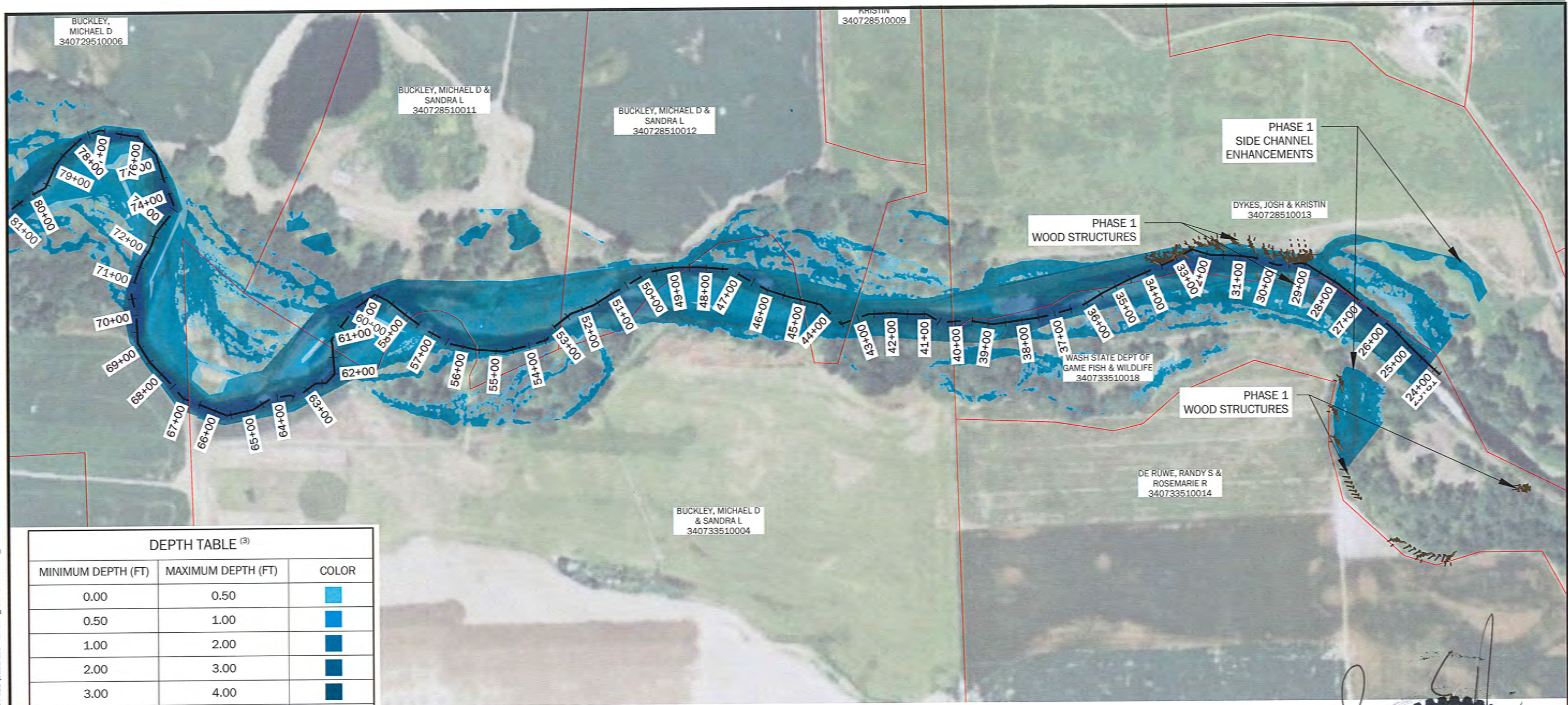
LEGEND:

- Channel Alignment
- Property Boundary



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				Drawn: BHM					
				Checked: RSC, JRS					
				Date: 07/15/2016					
				Project No: 11281-005-03					

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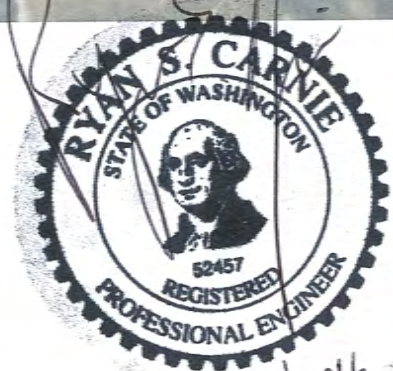


DEPTH TABLE ⁽³⁾		
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0.50	1.00	
1.00	2.00	
2.00	3.00	
3.00	4.00	
4.00	5.00	
5.00	7.00	
7.00	9.00	
9.00	11.00	
11.00	12.00	

LEGEND:

—+—+—+— EXISTING CHANNEL ALIGNMENT

— PROPERTY BOUNDARY

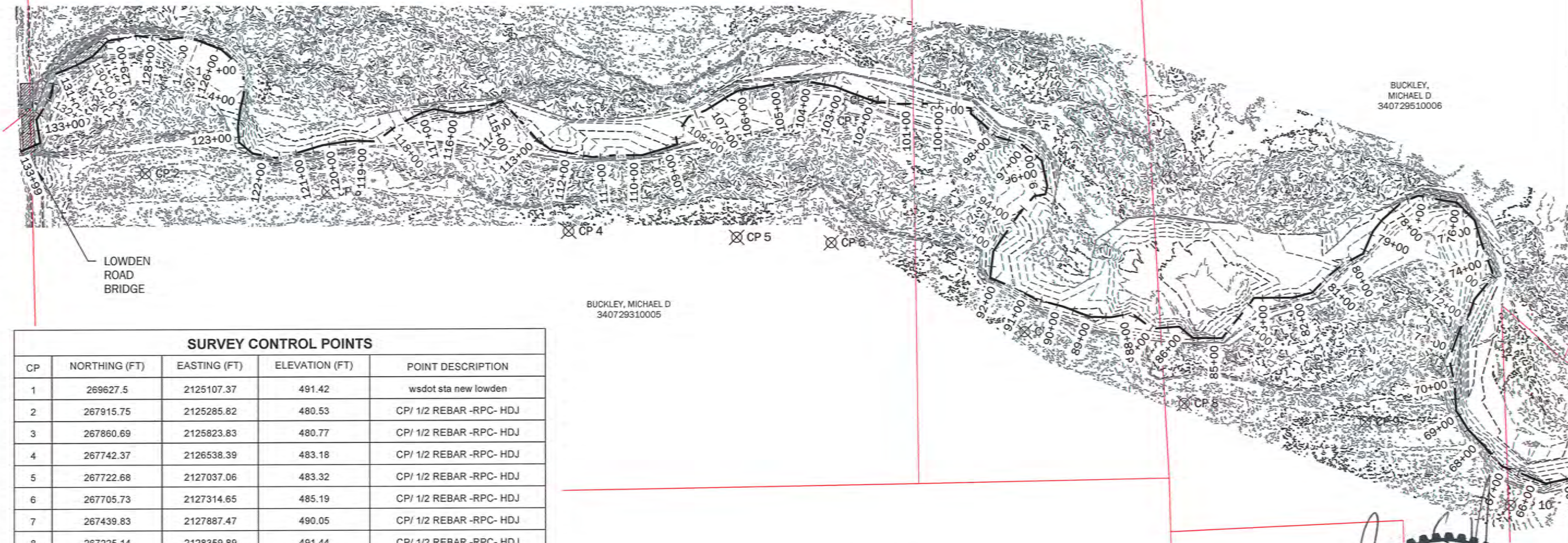


- NOTES:
1. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
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 3. 1.5YR WSEL DEPTH AT 1,982 CFS
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LOWDEN ROAD



BUCKLEY, MICHAEL D
340729440005

BUCKLEY, MICHAEL D
340728320009

BUCKLEY,
MICHAEL D
340729510006

BUCKLEY, MICHAEL D
340729310005

SURVEY CONTROL POINTS

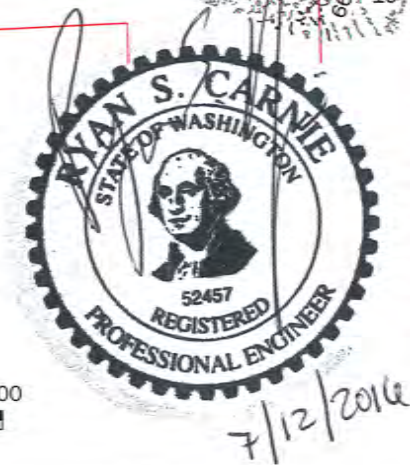
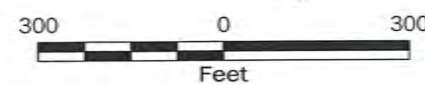
CP	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)	POINT DESCRIPTION
1	269627.5	2125107.37	491.42	wsdot sta new lowden
2	267915.75	2125285.82	480.53	CP/ 1/2 REBAR -RPC- HDJ
3	267860.69	2125823.83	480.77	CP/ 1/2 REBAR -RPC- HDJ
4	267742.37	2126538.39	483.18	CP/ 1/2 REBAR -RPC- HDJ
5	267722.68	2127037.06	483.32	CP/ 1/2 REBAR -RPC- HDJ
6	267705.73	2127314.65	485.19	CP/ 1/2 REBAR -RPC- HDJ
7	267439.83	2127887.47	490.05	CP/ 1/2 REBAR -RPC- HDJ
8	267225.14	2128359.89	491.44	CP/ 1/2 REBAR -RPC- HDJ
9	267167.2	2128896.23	493.69	CP/ 1/2 REBAR -RPC- HDJ
10	266918.84	2129325.89	498.52	CP/ 1/2 REBAR -RPC- HDJ
11	266902.9	2129996.47	496.12	CP/ 1/2 REBAR -RPC- HDJ
12	266881.25	2130670.6	500.12	CP/ 1/2 REBAR -RPC- HDJ
13	266899.82	2131305.17	499.77	CP/ 1/2 REBAR -RPC- HDJ
14	266926.38	2131702.72	503.05	CP/ 1/2 REBAR -RPC- HDJ
15	266954.19	2132435.07	506.24	CP/ 1/2 REBAR -RPC- HDJ
16	266729.99	2132775.37	508.74	MON/3-1/4IN AC
50	268063.61	2127302.86	482.51	CP/HT
51	268124.82	2127339.9	482.12	CP/HT

NOTES:

1. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
2. ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.

LEGEND:

- +—+—+— EXISTING CHANNEL ALIGNMENT
- PROPERTY BOUNDARY
- - - - - EXISTING MAJOR CONTOUR
- - - - - EXISTING MINOR CONTOUR
- ⊗ CONTROL POINT



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Walla Walla River
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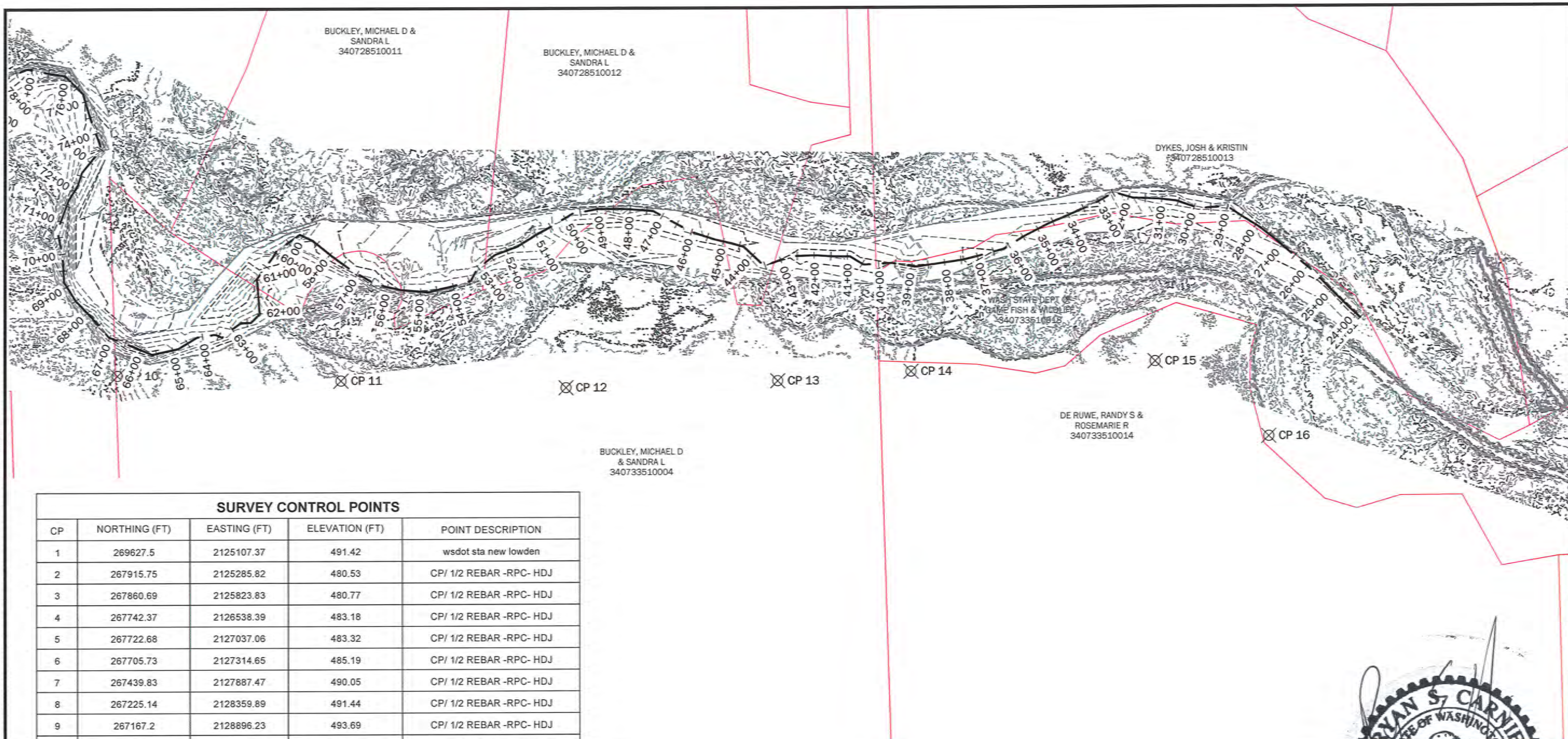


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Existing Conditions Topography
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
2.3

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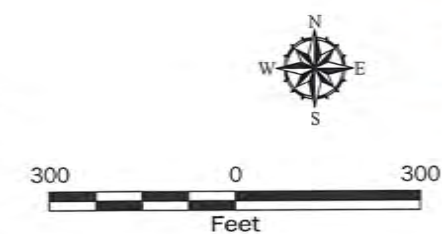


SURVEY CONTROL POINTS

CP	NORTHING (FT)	EASTING (FT)	ELEVATION (FT)	POINT DESCRIPTION
1	269627.5	2125107.37	491.42	wslot sta new lowden
2	267915.75	2125285.82	480.53	CP/ 1/2 REBAR -RPC- HDJ
3	267860.69	2125823.83	480.77	CP/ 1/2 REBAR -RPC- HDJ
4	267742.37	2126538.39	483.18	CP/ 1/2 REBAR -RPC- HDJ
5	267722.68	2127037.06	483.32	CP/ 1/2 REBAR -RPC- HDJ
6	267705.73	2127314.65	485.19	CP/ 1/2 REBAR -RPC- HDJ
7	267439.83	2127887.47	490.05	CP/ 1/2 REBAR -RPC- HDJ
8	267225.14	2128359.89	491.44	CP/ 1/2 REBAR -RPC- HDJ
9	267167.2	2128896.23	493.69	CP/ 1/2 REBAR -RPC- HDJ
10	266918.84	2129325.89	498.52	CP/ 1/2 REBAR -RPC- HDJ
11	266902.9	2129996.47	496.12	CP/ 1/2 REBAR -RPC- HDJ
12	266881.25	2130670.6	500.12	CP/ 1/2 REBAR -RPC- HDJ
13	266899.82	2131305.17	499.77	CP/ 1/2 REBAR -RPC- HDJ
14	266926.38	2131702.72	503.05	CP/ 1/2 REBAR -RPC- HDJ
15	266954.19	2132435.07	506.24	CP/ 1/2 REBAR -RPC- HDJ
16	266729.99	2132775.37	508.74	MON/3-1/4IN AC
50	268063.61	2127302.86	482.51	CP/HT
51	268124.82	2127339.9	482.12	CP/HT

- NOTES:
1. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
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- LEGEND:
- EXISTING CHANNEL ALIGNMENT
 - PROPERTY BOUNDARY
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - CONTROL POINT



7/12/2016

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Walla Walla River
near Lowden, Washington

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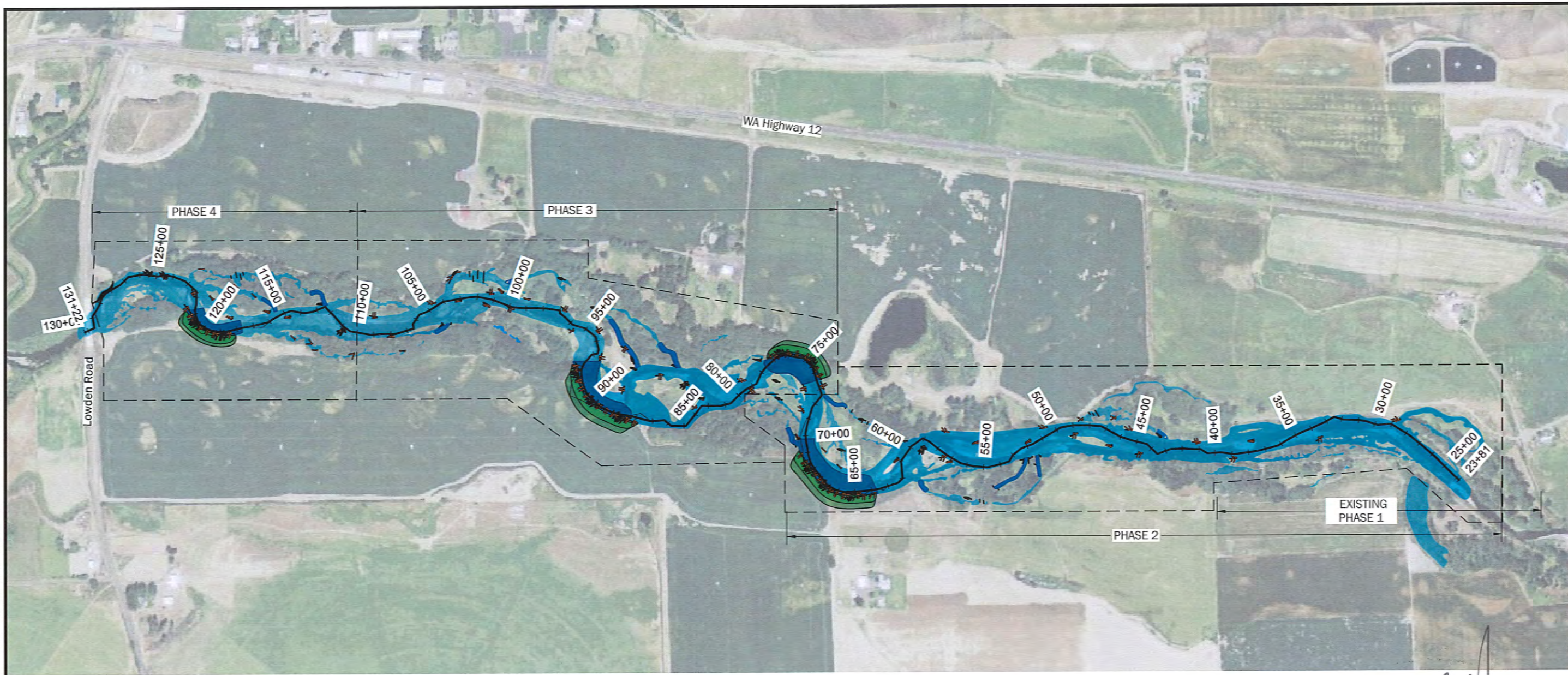
3501 West Elder Street, Suite 300
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Existing Conditions Topography

Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
2.4

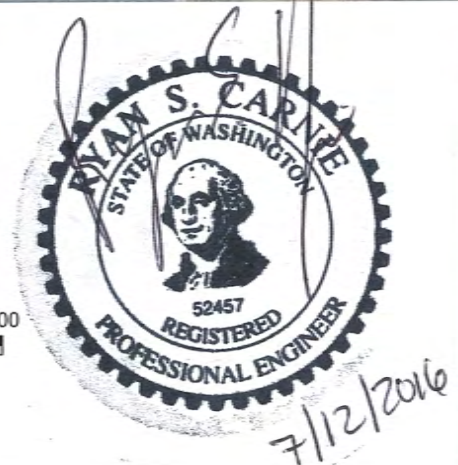
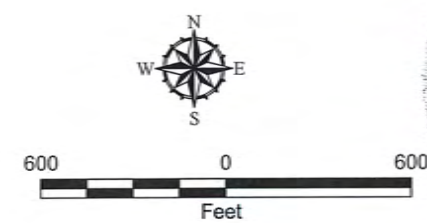
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LEGEND:

- EXISTING BANKFULL CHANNEL INUNDATION
- PROPOSED CHANNEL ENHANCEMENT
- TERRACE
- EXISTING CHANNEL ALIGNMENT
- PROPOSED CHANNEL ALIGNMENT
- PHASE BOUNDARY
- LARGE WOOD

- NOTES
- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.
 - 1.5YR WSEL ELEVATION EQUALS 1,982 CFS
 - AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

GEOENGINEERS

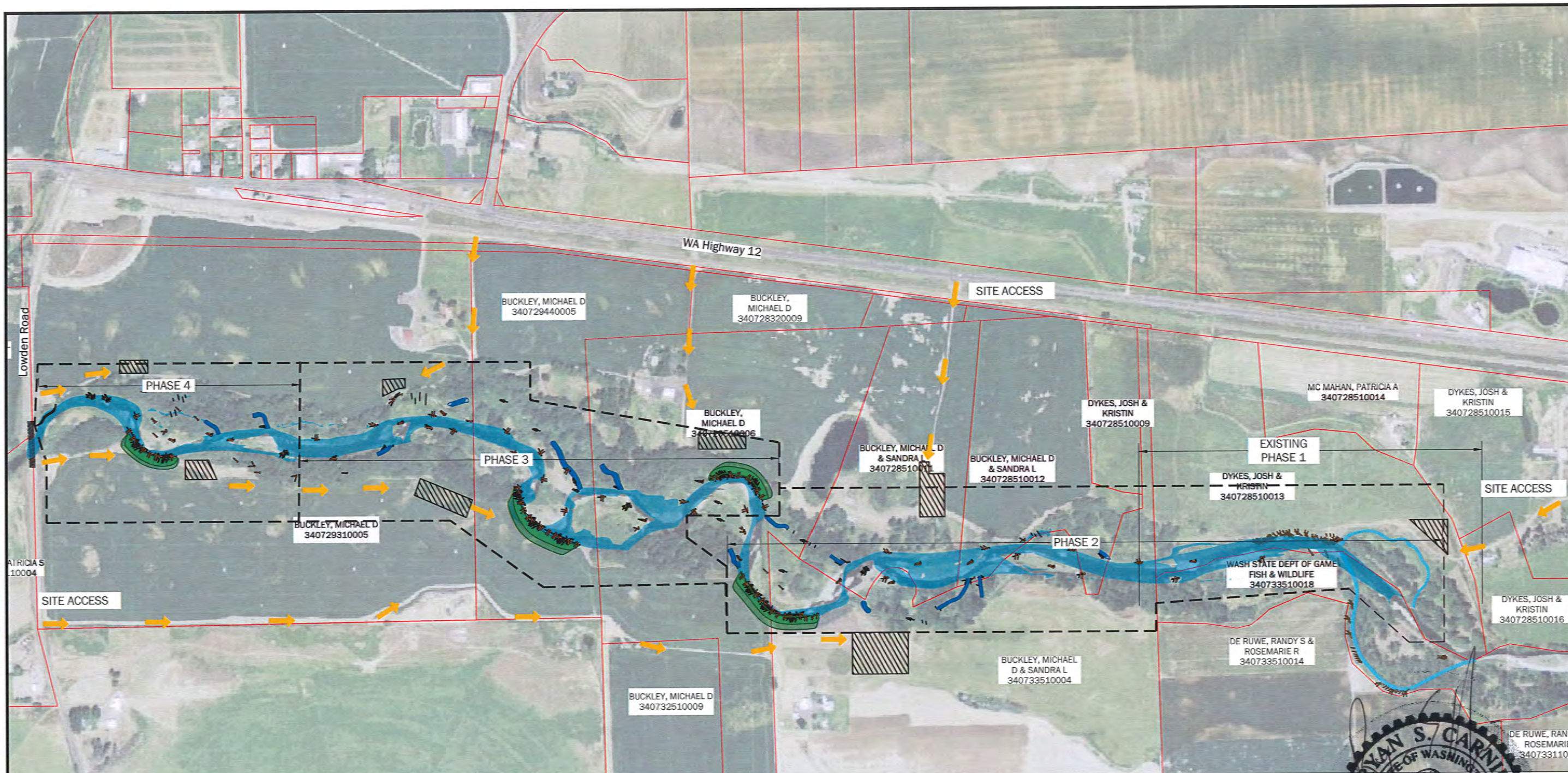
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Boise, Idaho 83705

Proposed Conditions

Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
3.1

Dwg name: P:\11\1128\005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\SA-1-4-4 - Construction Sequencing.dwg TAB:4.1 User: bmliller Plot time: Jul-11-15 @ 9:38am



NOTES:

- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.
- MEAN ANNUAL INUNDATION EQUAL 301 CFS
- AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.

LEGEND:

	EXISTING MEAN ANNUAL CHANNEL INUNDATION		LARGE WOOD
	PROPOSED CHANNEL ENHANCEMENT		PROPERTY BOUNDARY
	TERRACE		CHANNEL ALIGNMENT
	STAGING AREA		PHASE BOUNDARY
			APPROXIMATE DISTURBANCE LIMITS
			ACCESS ROUTE

600 0 600
Feet

Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC	Walla Walla River near Lowden, Washington Tri-State Steelheaders		GEOENGINEERS 3501 West Elder Street, Suite 300 Boise, Idaho 83705	Project Phasing, Access and Staging Walla Walla River Bridge-to-Bridge Design Drawings	Sheet 4.1
				Drawn: BHM					
				Checked: RSC, JRS					
				Date: 07/15/2016					
				Project No: 11281-005-03					

Dwg name: P:\11281-005\03 CAD\80 Percent - Preliminary Design\03_Sheet Files\04.1-4.4 - Construction Sequencing.dwg TAB:4.3 User: bmliller Plot time: Jul-11-16 @ 9:38am

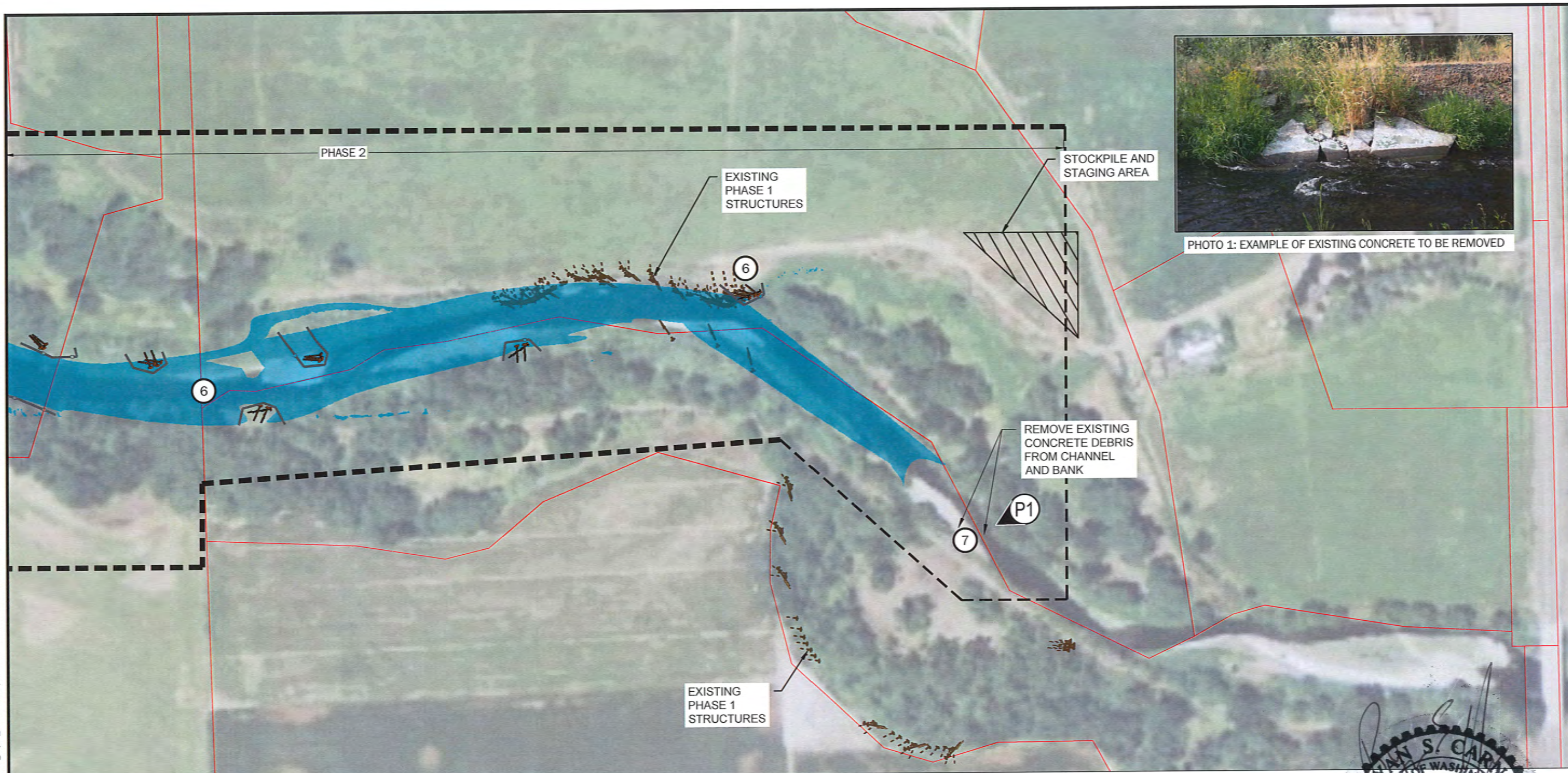


PHOTO 1: EXAMPLE OF EXISTING CONCRETE TO BE REMOVED

LEGEND:



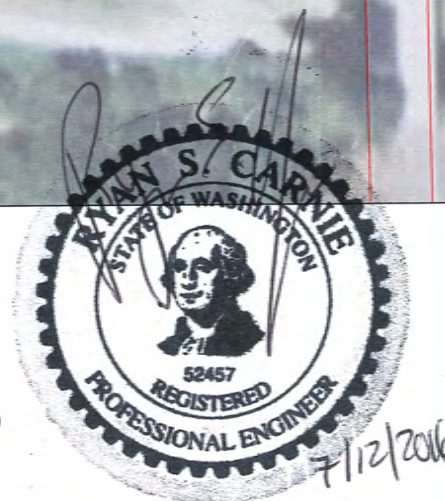
EXISTING MEAN ANNUAL
CHANNEL INUNDATION
TERRACE
STAGING AREA
SEQUENCING

PROPERTY BOUNDARY
PHASE BOUNDARY
APPROXIMATE
DISTURBANCE LIMITS
TEMPORARY DIVERSION
STRUCTURE
TEMPORARY DIVERSION
CHANNEL

LARGE WOOD
MAIN CHANNEL ALIGNMENT
SIDE CHANNEL ALIGNMENT



- NOTES:
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 - MEAN ANNUAL INUNDATION EQUAL 301 CFS
 - AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.



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				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders



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**Construction Sequencing and
Dewatering**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
4.3

Dwg name: P:\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\04.1-4.4 - Construction Sequencing.dwg TAB:4.4 User: bmliller Plot time: Jul-11-16 @ 9:38am

Phase 2 Construction Sequencing and Fish Management Plan

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 4.2-4.3. Not all numbers are represented on Sheet 4.2-4.3.

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 Washington Construction Stormwater General 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 TERRACE

- 1.1. Install the first phase of channel diversion structures to route flow into temporary bypass. Leave the downstream diversion structures out of the channel to allow fish removal.
- 1.2. Install block nets at the upstream limits of the main channel diversion.
- 1.3. Seine and/or shock fish from the removal area.
- 1.4. Install block nets and diversion structure at the downstream limits of the first phase of channel construction.
- 1.5. Temporarily stockpile suitable channel bed material (gravel, cobbles & boulders). Stockpiled material will be used as enhanced gradation in the terrace structure. Sort stockpiled gradation ranges accordingly. No stockpiled material in temporary stockpile areas shall remain on site after project is completed.
- 1.6. Place material within the channel and build up the terrace bank as indicated in plans.
- 1.7. Install large wood material within the terrace as indicated on the construction drawings.
- 1.8. Install flood fencing along upper terrace.
- 1.9. Plant terraces as indicated on the planting plan.
- 1.10. Remove block nets from upstream and downstream of the diversion. Remove diversion structure.

2. CONSTRUCT SIDE CHANNEL 7 ENHANCEMENTS

- 2.1. Install block nets at the upstream end of the removal area and downstream of the temporary channel bypass inlet.
- 2.2. Install temporary diversion structures.
- 2.3. Seine and/or shock fish from the removal area.
- 2.4. Install block nets in the main channel at the downstream limits of the side channel enhancement.
- 2.5. Grade the upstream side channel inlet according to plans.
- 2.6. 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.
- 2.7. Install large wood material as indicated on the construction drawings.
- 2.9. Reconstruct the side channel inlet as indicated on the plans.
- 2.10. Remove block nets from upstream and downstream of the diversion.
- 2.11. Remove diversion structure.

3. CONSTRUCT SIDE CHANNEL 9 AND 10 ENHANCEMENTS

- 3.1. Install block nets at the upstream end of the removal area and downstream of the temporary channel bypass inlet.
- 3.2. Install temporary diversion structures.
- 3.3. Seine and/or shock fish from the removal area.
- 3.4. Install block nets in the main channel at the downstream limits of the side channel enhancement.
- 3.5. Grade the upstream side channel inlet 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.
- 3.8. Install Beaver Dam Analogues as indicated on the construction drawings.
- 3.9. Reconstruct the side channel inlet as indicated on the plans.
- 3.10. Remove block nets from upstream and downstream of the diversion.
- 3.11. Remove diversion structure.

4. CONSTRUCT SIDE CHANNEL 8 ENHANCEMENTS

- 4.1. Install block nets at the upstream end of the removal area and downstream of the temporary channel bypass inlet.
- 4.2. Install temporary diversion structures.
- 4.3. Seine and/or shock fish from the removal area.
- 4.4. Install block nets in the main channel at the downstream limits of the side channel enhancement.
- 4.5. Grade the upstream side channel inlet according to plans.
- 4.6. 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.
- 4.7. Install large wood material as indicated on the construction drawings.
- 4.8. Reconstruct the side channel inlet as indicated on the plans.
- 4.9. Remove block nets from upstream and downstream of the diversion.
- 4.10. Remove diversion structure.

5. CONSTRUCT SIDE CHANNEL 11 ENHANCEMENTS

- 5.1. Install block nets at the upstream end of the removal area and downstream of the temporary channel bypass inlet.
- 5.2. Install temporary diversion structures.
- 5.3. Seine and/or shock fish from the removal area.
- 5.4. Install block nets in the main channel at the downstream limits of the side channel enhancement.
- 5.5. Grade the upstream side channel inlet according to plans.
- 5.6. 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.
- 5.7. Install large wood material as indicated on the construction drawings.
- 5.8. Reconstruct the side channel inlet as indicated on the plans.
- 5.9. Remove block nets from upstream and downstream of the diversion.
- 5.10. Remove the diversion structures.

6. INSTALL REMAINING MAIN CHANNEL WOOD STRUCTURES

- 6.1. Install large wood material as indicated on the construction drawings.
- 6.2. Minimize area of disturbance to access structures and use erosion control BMPs as needed to minimize turbidity.

7. REMOVE CONCRETE DEBRIS FROM MAIN CHANNEL

8. FINE GRADE THE REMAINING FLOODPLAIN IN DISTURBED AREAS

9. REPAIR STOCKPILE, STAGING and ACCESS AREAS.

10. PLANT FLOODPLAINS AS INDICATED IN PLANTING PLAN

11. REMOVE TEMPORARY EROSION CONTROL MEASURES

Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



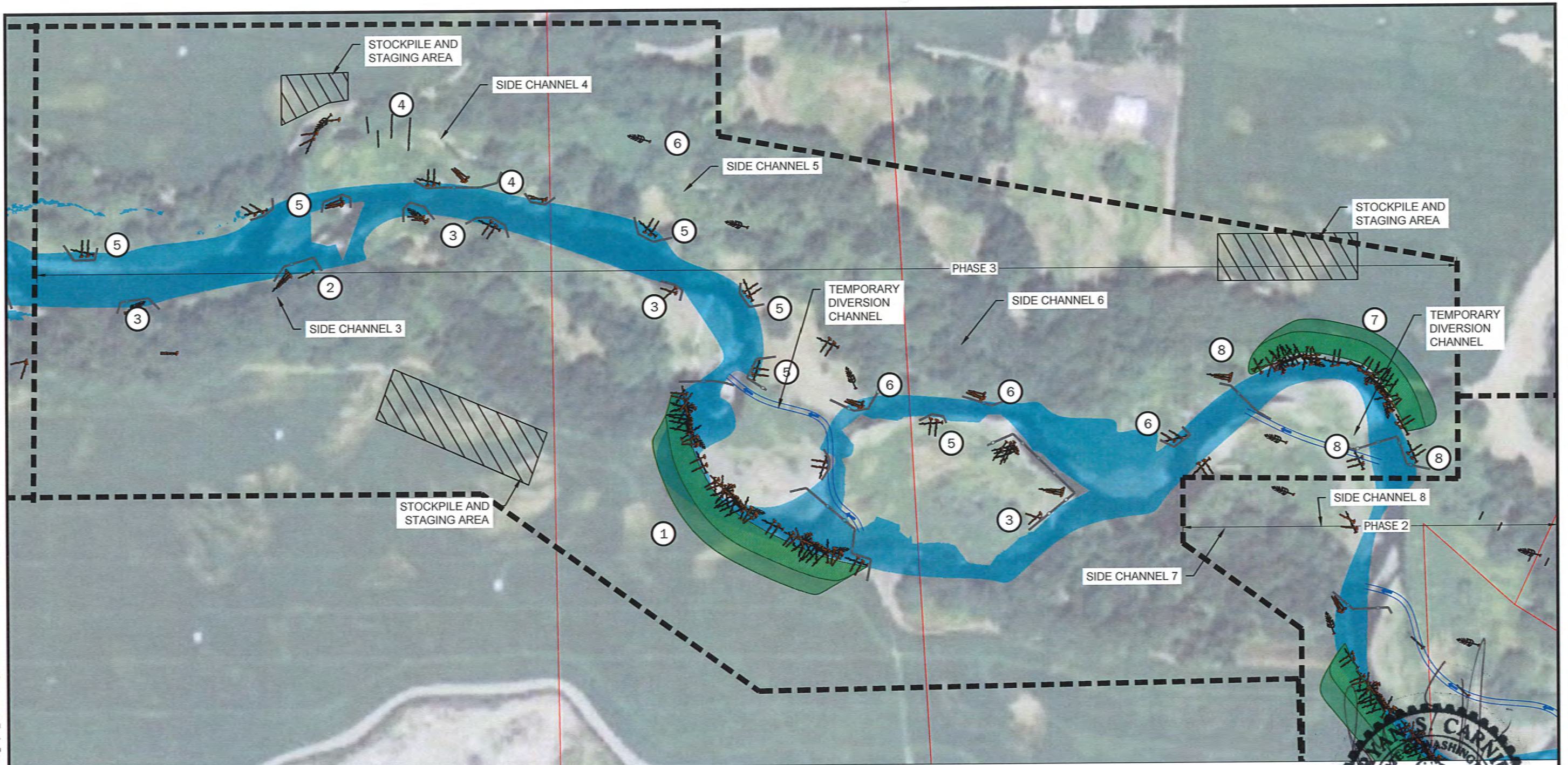
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Phase 2
Construction Sequencing Notes
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
4.4



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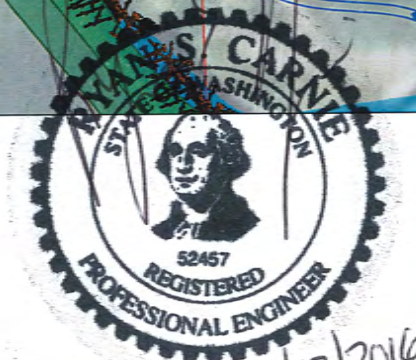
LEGEND:



EXISTING MEAN ANNUAL
CHANNEL INUNDATION
TERRACE
STAGING AREA
SEQUENCING

PROPERTY BOUNDARY
PHASE BOUNDARY
APPROXIMATE
DISTURBANCE LIMITS
TEMPORARY DIVERSION
STRUCTURE
TEMPORARY DIVERSION
CHANNEL

LARGE WOOD
MAIN CHANNEL ALIGNMENT
SIDE CHANNEL ALIGNMENT



7/12/2016

- NOTES:
- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.
 - MEAN ANNUAL INUNDATION EQUAL 301 CFS
 - AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.

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				Drawn: BHM
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				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders



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**Phase 3 Construction Sequencing
and Dewatering**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
4.5

Dwg name: P:\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\54-1-4-4 - Construction Sequencing.dwg TAB:4.6 User: bmliller Plot time: Jul-11-16 @ 9:38am

Phase 3 Construction Sequencing and Fish Management Plan

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 4.5. Not all numbers are represented on Sheet 4.5.

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 Washington Construction Stormwater General 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 TERRACE ON SOUTH BANK

- 1.1. Install the first phase of channel diversion structures to route flow into temporary bypass. Leave the downstream diversion structures out of the channel to allow fish removal.
- 1.2. Install block nets at the upstream limits of the main channel diversion.
- 1.3. Seine and/or shock fish from the removal area.
- 1.4. Install block nets and diversion structure at the downstream limits of the first phase of channel construction.
- 1.5. Temporarily stockpile suitable channel bed material (gravel, cobbles & boulders). Stockpiled material will be used as enhanced gradation in the terrace structure. Sort stockpiled gradation ranges accordingly. No stockpiled material in temporary stockpile areas shall remain on site after project is completed.
- 1.6. Place material within the channel and build up the terrace bank as indicated in plans.
- 1.7. Install large wood material within the terrace as indicated on the construction drawings.
- 1.8. Install flood fencing along upper terrace.
- 1.9. Plant terraces as indicated on the planting plan.
- 1.10. Remove block nets from upstream and downstream of the diversion. Remove diversion structure.

2. CONSTRUCT SIDE CHANNEL 3 ENHANCEMENTS

- 2.1. Install block nets at the upstream end of the removal area.
- 2.2. Install temporary diversion structures.
- 2.3. Seine and/or shock fish from the removal area.
- 2.4. Install block nets in the main channel at the downstream limits of the side channel enhancement.
- 2.5. Grade the upstream side channel inlet according to plans.
- 2.6. 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.
- 2.7. Install large wood material as indicated on the construction drawings.
- 2.8. Reconstruct the side channel as inlet as indicated on the plans.
- 2.9. Remove block nets from upstream the diversion.
- 2.10. Remove diversion structures.

3. INSTALL REMAINING MAIN CHANNEL WOOD STRUCTURES ON SOUTH BANK

- 3.1. Install large wood material as indicated on the construction drawings.
- 3.2. Minimize area of disturbance to access structures and use erosion control BMPs as needed to minimize turbidity.

4. CONSTRUCT SIDE CHANNEL 4 ENHANCEMENTS

- 4.1. Install block nets at the upstream end of the removal area.
- 4.2. Install temporary diversion structures.

- 4.3. Seine and/or shock fish from the removal area.
- 4.4. Install block nets in the main channel at the downstream limits of the side channel enhancement.
- 4.5. Install large wood material as indicated on the construction drawings.
- 4.6. Remove block nets from upstream the diversion.
- 4.7. Remove diversion structures.

5. INSTALL SELECT MAIN CHANNEL WOOD STRUCTURES ON NORTH BANK

- 5.1. Install large wood material as indicated on the construction drawings.
- 5.2. Minimize area of disturbance to access structures and use erosion control BMPs as needed to minimize turbidity.

6. CONSTRUCT SIDE CHANNEL 5 AND 6 ENHANCEMENTS

- 6.1. Install block nets at the upstream end of the removal area.
- 6.2. Install diversion structures.
- 6.3. Seine and/or shock fish from the removal area.
- 6.4. Install block nets in the main channel at the downstream limits of the side channel enhancement.
- 6.5. Grade the upstream side channel inlet according to plans.
- 6.6. 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.
- 6.7. Install large wood material as indicated on the construction drawings.
- 6.8. Reconstruct the side channel inlet as indicated on the plans.
- 6.9. Remove block nets from upstream the diversion.
- 6.10. Remove diversion structures.

7. CONSTRUCT TERRACE ON NORTH BANK

- 7.1. Install the first phase of channel diversion structures to route flow into temporary bypass. Leave the downstream diversion structures out of the channel to allow fish removal.
- 7.2. Install block nets at the upstream limits of the main channel diversion.
- 7.3. Seine and/or shock fish from the removal area.
- 7.4. Install block nets and diversion structure at the downstream limits of the first phase of channel construction.
- 7.5. Temporarily stockpile suitable channel bed material (gravel, cobbles & boulders). Stockpiled material will be used as enhanced gradation in the terrace structure. Sort stockpiled gradation ranges accordingly. No stockpiled material in temporary stockpile areas shall remain on site after project is completed.
- 7.6. Place material within the channel and build up the terrace bank as indicated in plans.
- 7.7. Install large wood material within the terrace as indicated on the construction drawings.
- 7.8. Install flood fencing along upper terrace.
- 7.9. Plant terraces as indicated on the planting plan.
- 7.10. Remove block nets from upstream and downstream of the diversion. Remove diversion structure.

8. INSTALL REMAINING MAIN CHANNEL WOOD STRUCTURES ON NORTH BANK

- 8.1. Install large wood material as indicated on the construction drawings.
- 8.2. Minimize area of disturbance to access structures and use erosion control BMPs as needed to minimize turbidity.

9. FINE GRADE THE REMAINING FLOODPLAIN IN DISTURBED AREAS

10. REPAIR STOCKPILE, STAGING and ACCESS AREAS.

11. PLANT FLOODPLAINS AS INDICATED IN PLANTING PLAN

12. REMOVE TEMPORARY EROSION CONTROL MEASURES



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

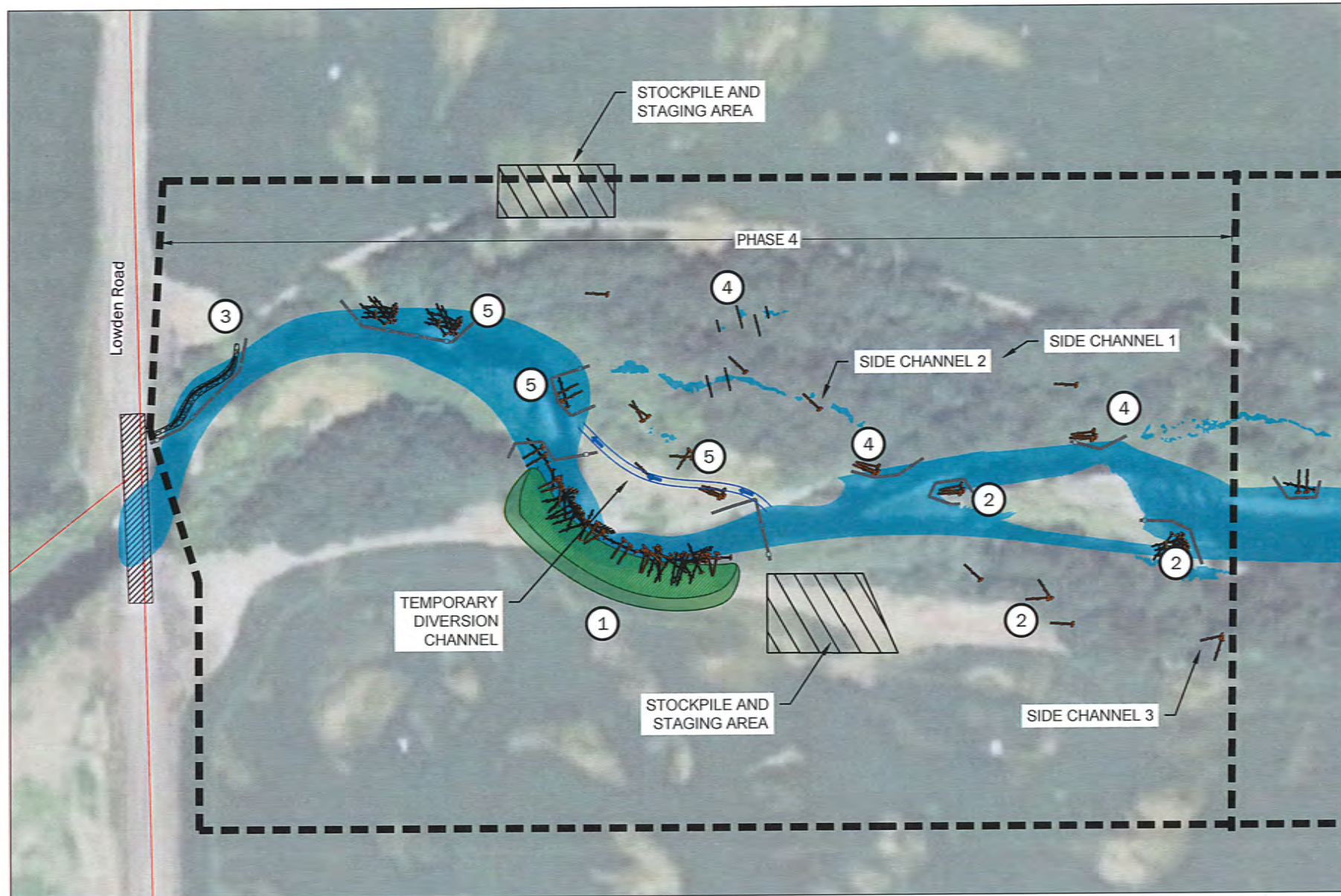


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Phase 3
Construction Sequencing Notes
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
4.6

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- NOTES:
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 - MEAN ANNUAL INUNDATION EQUAL 301 CFS
 - AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.

LEGEND:



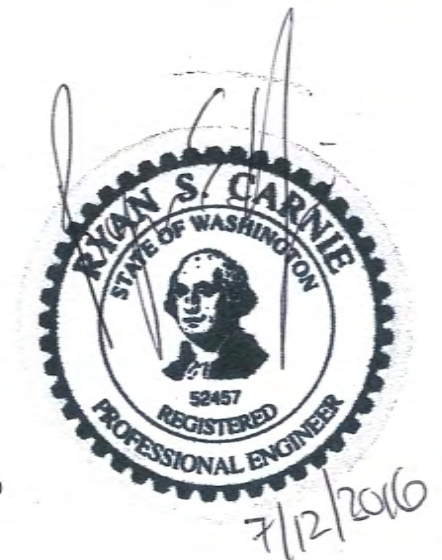
EXISTING MEAN ANNUAL CHANNEL INUNDATION
TERRACE
STAGING AREA
SEQUENCING

PROPERTY BOUNDARY
PHASE BOUNDARY
APPROXIMATE DISTURBANCE LIMITS
TEMPORARY DIVERSION STRUCTURE
TEMPORARY DIVERSION CHANNEL

LARGE WOOD
MAIN CHANNEL ALIGNMENT
SIDE CHANNEL ALIGNMENT



200 0 200
Feet



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders



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**Phase 4 Construction Sequencing
and Dewatering**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
4.7

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Phase 4 Construction Sequencing and Fish Management Plan

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 4.7. Not all numbers are represented on Sheet 4.7.

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 Washington Construction Stormwater General 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 TERRACE ON SOUTH BANK

- 1.1. Install the first phase of channel diversion structures to route flow into temporary bypass. Leave the downstream diversion structures out of the channel to allow fish removal.
- 1.2. Install block nets at the upstream limits of the main channel diversion.
- 1.3. Seine and/or shock fish from the removal area.
- 1.4. Install block nets and diversion structure at the downstream limits of the first phase of channel construction.
- 1.5. Temporarily stockpile suitable channel bed material (gravel, cobbles & boulders). Stockpiled material will be used as enhanced gradation in the terrace structure. Sort stockpiled gradation ranges accordingly. No stockpiled material in temporary stockpile areas shall remain on site after project is completed.
- 1.6. Place material within the channel and build up the terrace bank as indicated in plans.
- 1.7. Install large wood material within the terrace as indicated on the construction drawings.
- 1.8. Install flood fencing along upper terrace.
- 1.9. Plant terraces as indicated on the planting plan.
- 1.10.Remove block nets from upstream and downstream of the diversion. Remove diversion structure.

2. INSTALL MAIN CHANNEL AND SIDE CHANNEL WOOD STRUCTURES ON SOUTH BANK

- 2.1. Install large wood material as indicated on the construction drawings.
- 2.2. Minimize area of disturbance to access structures and use erosion control BMPs as needed to

minimize turbidity.

3. CONSTRUCT LONGITUDINAL STONE TOE

- 1.1. Install the first phase of channel diversion structures. Leave the downstream diversion structures out of the channel to allow fish removal.
- 1.2. Install block nets at the upstream limits of the main channel diversion.
- 1.3. Seine and/or shock fish from the removal area.
- 1.4. Install block nets and diversion structure at the downstream limits of the first phase of toe construction.
- 1.5. Place enhanced gradation material as indicated on the construction drawings.
- 1.6. Key the longitudinal stone toe into the banks as indicated on the construction drawings.
- 1.7. Place stockpiled material within the channel behind the stone toe as indicated in the construction drawings. Add willow cutting while placing material.
- 1.8. Minimize area of disturbance to access structures and use erosion control BMPs as needed to minimize turbidity.
- 1.9. Plant as indicated on the planting plan.
- 1.10.Remove block nets from upstream and downstream of the diversion. Remove diversion structure.

2. CONSTRUCT SIDE CHANNEL 1 AND 2 ENHANCEMENTS

- 2.1. Install block nets at the upstream end of the removal area.
- 2.2. Install temporary diversion structures.
- 2.3. Seine and/or shock fish from the removal area.
- 2.4. Install block nets in the main channel at the downstream limits of the side channel enhancement.
- 2.5. Grade the upstream side channel inlet according to plans
- 2.6. 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.
- 2.7. Install large wood material as indicated on the construction drawings.
- 2.8. Reconstruct the side channel inlet as indicated on the plans.
- 2.9. Remove block nets from upstream the diversion.
- 2.10.Remove diversion structure.

3. INSTALL REMAINING MAIN CHANNEL WOOD STRUCTURES ON NORTH BANK

- 3.1. Install large wood material as indicated on the construction drawings.
- 3.2. Minimize area of disturbance to access structures and use erosion control BMPs as needed to minimize turbidity.

- 4. FINE GRADE THE REMAINING FLOODPLAIN IN DISTURBED AREAS
- 5. REPAIR STOCKPILE, STAGING and ACCESS AREAS.
- 6. PLANT FLOODPLAINS AS INDICATED IN PLANTING PLAN
- 7. REMOVE TEMPORARY EROSION CONTROL MEASURES



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked:RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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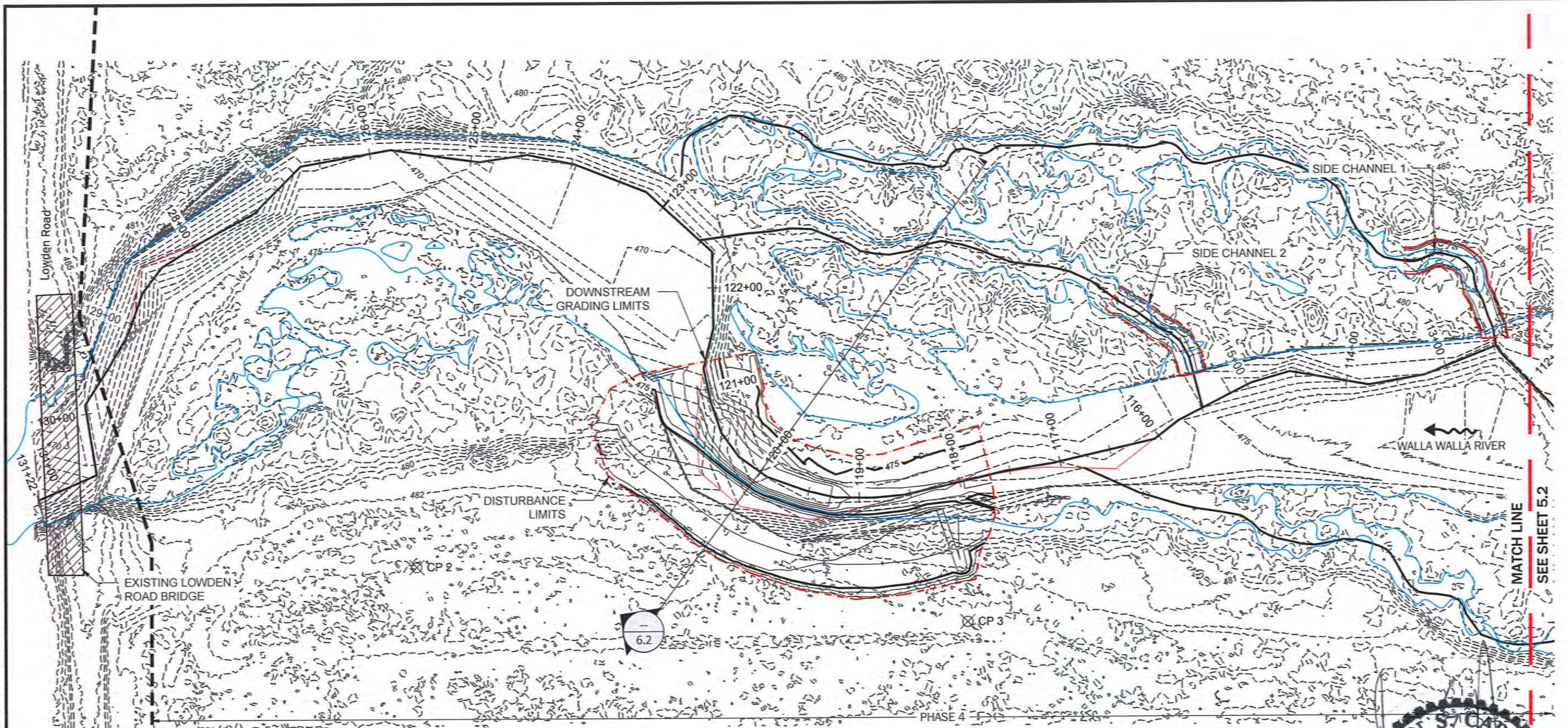
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Boise, Idaho 83705

Phase 4
Construction Sequencing Notes

Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
4.8

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\5.1-5.3 - Proposed Grading.dwg TAB:5.1 User: bmliller Plot time: Jul-11-16 @ 9:40am



LEGEND:

- | | | | |
|------------|--------------------------------|-----|---------------------------------------|
| — | EXISTING CHANNEL ALIGNMENT | --- | PHASE BOUNDARY |
| —+—+—+— | PROPOSED CHANNEL ALIGNMENT | --- | PROPOSED BANKFULL INUNDATION BOUNDARY |
| - - - - - | APPROXIMATE DISTURBANCE LIMITS | ⊗ | CONTROL POINT |
| —1260— | PROPOSED MAJOR CONTOUR | | |
| — | PROPOSED MINOR CONTOUR | | |
| - - -1260- | EXISTING MAJOR CONTOUR | | |
| - - - - - | EXISTING MINOR CONTOUR | | |

NOTES:

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- BANKFULL, 1.5YR WSEL ELEVATION EQUALS 1,982 CFS

Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



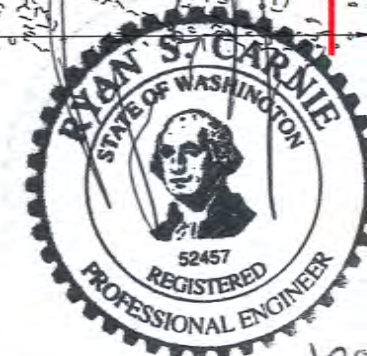
GEOENGINEERS

3501 West Elder Street, Suite 300
Boise, Idaho 83705

Proposed Grading

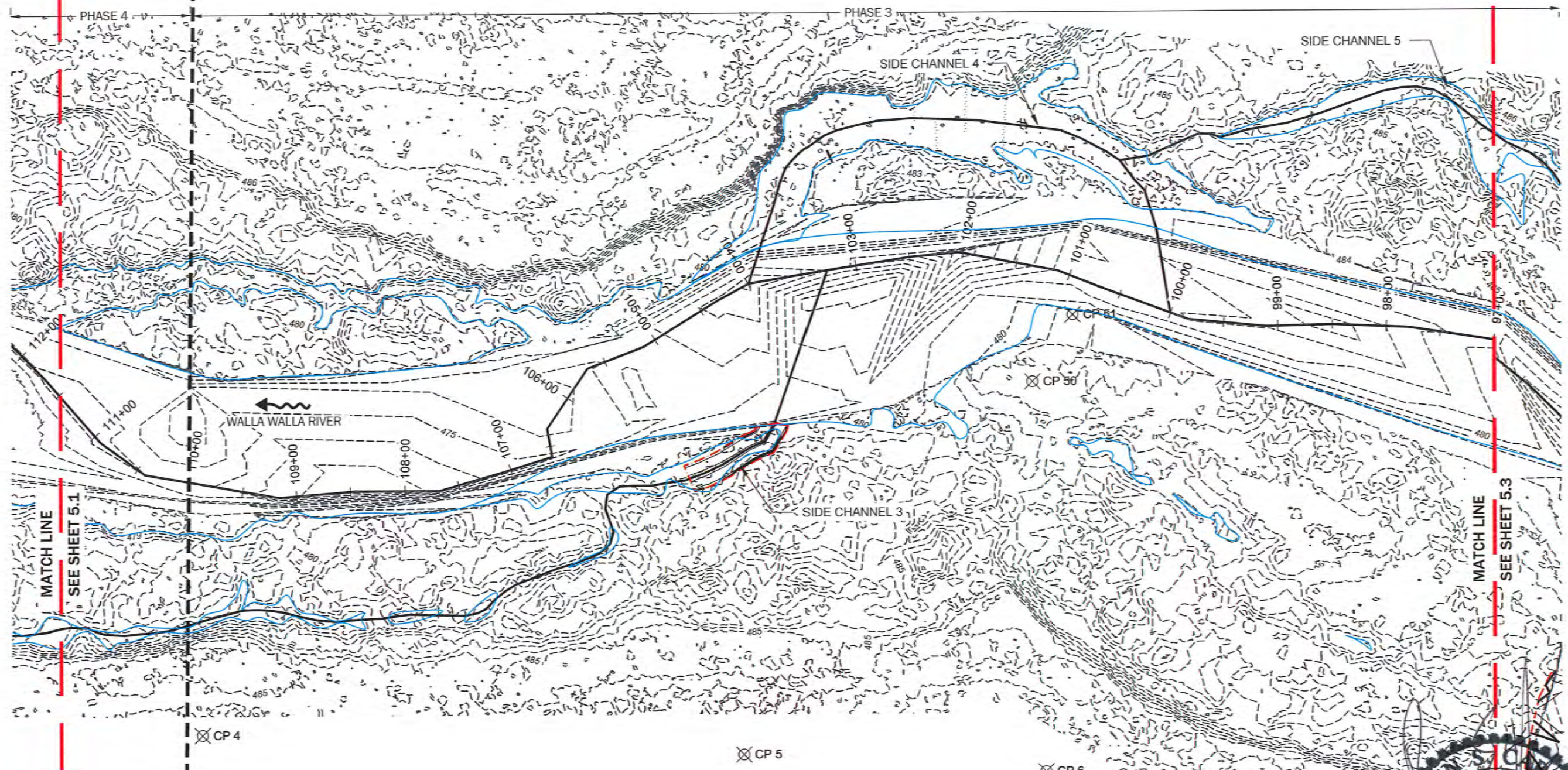
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
5.1



7/12/2016

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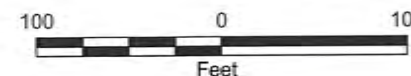


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LEGEND:

- | | | | |
|------------|--------------------------------|-----|---------------------------------------|
| — | EXISTING CHANNEL ALIGNMENT | --- | PHASE BOUNDARY |
| —+—+—+— | PROPOSED CHANNEL ALIGNMENT | --- | PROPOSED BANKFULL INUNDATION BOUNDARY |
| --- | APPROXIMATE DISTURBANCE LIMITS | ⊗ | CONTROL POINT |
| —1260— | PROPOSED MAJOR CONTOUR | | |
| — | PROPOSED MINOR CONTOUR | | |
| ---1260--- | EXISTING MAJOR CONTOUR | | |
| --- | EXISTING MINOR CONTOUR | | |



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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

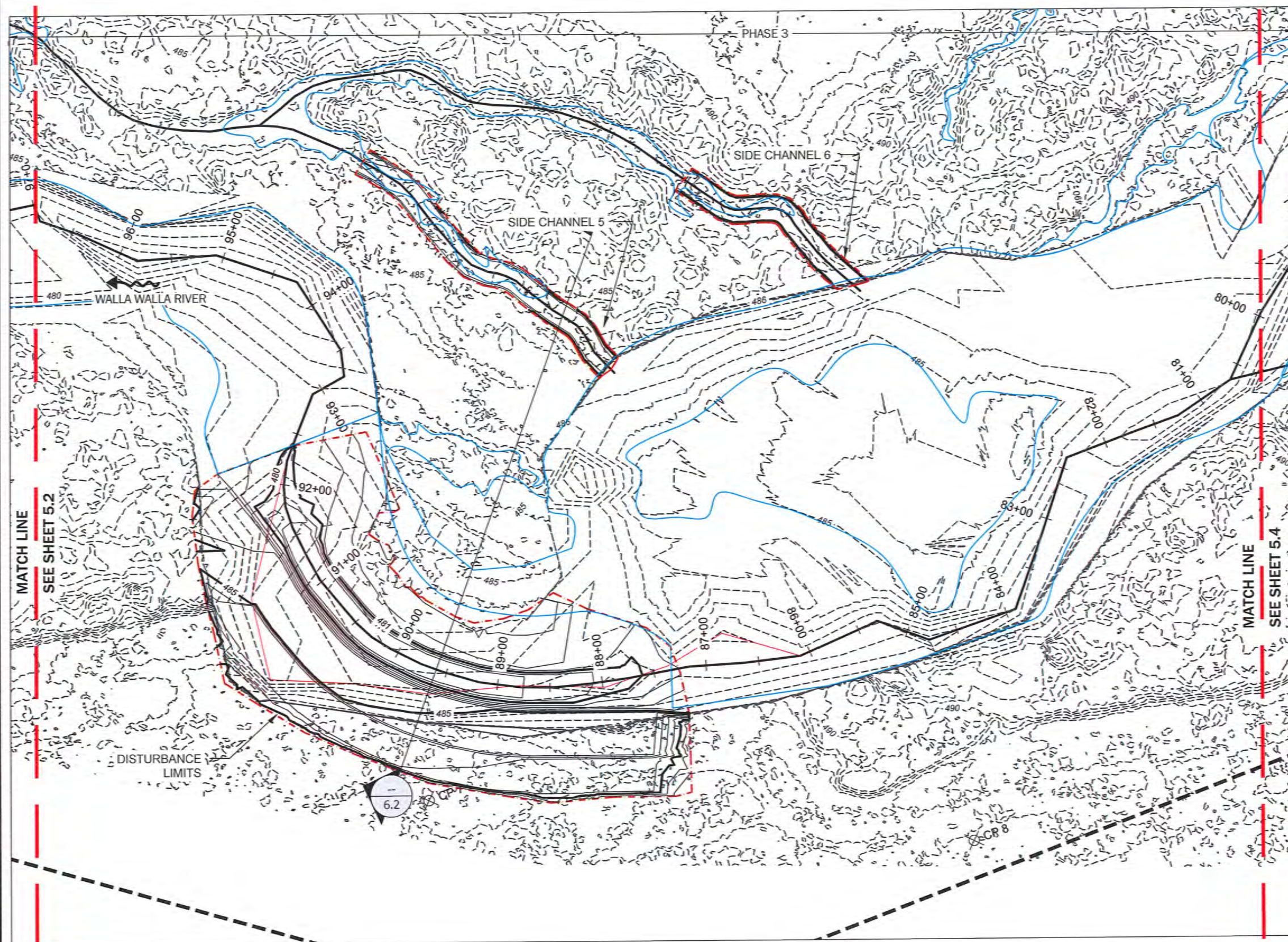


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Proposed Grading
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
5.2

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LEGEND:

- EXISTING CHANNEL ALIGNMENT
- + + + + PROPOSED CHANNEL ALIGNMENT
- - - - APPROXIMATE DISTURBANCE LIMITS
- 1260— PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- - -1260- - EXISTING MAJOR CONTOUR
- - - EXISTING MINOR CONTOUR
- - - - PHASE BOUNDARY
- PROPOSED BANKFULL INUNDATION BOUNDARY
- ⊗ CONTROL POINT

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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



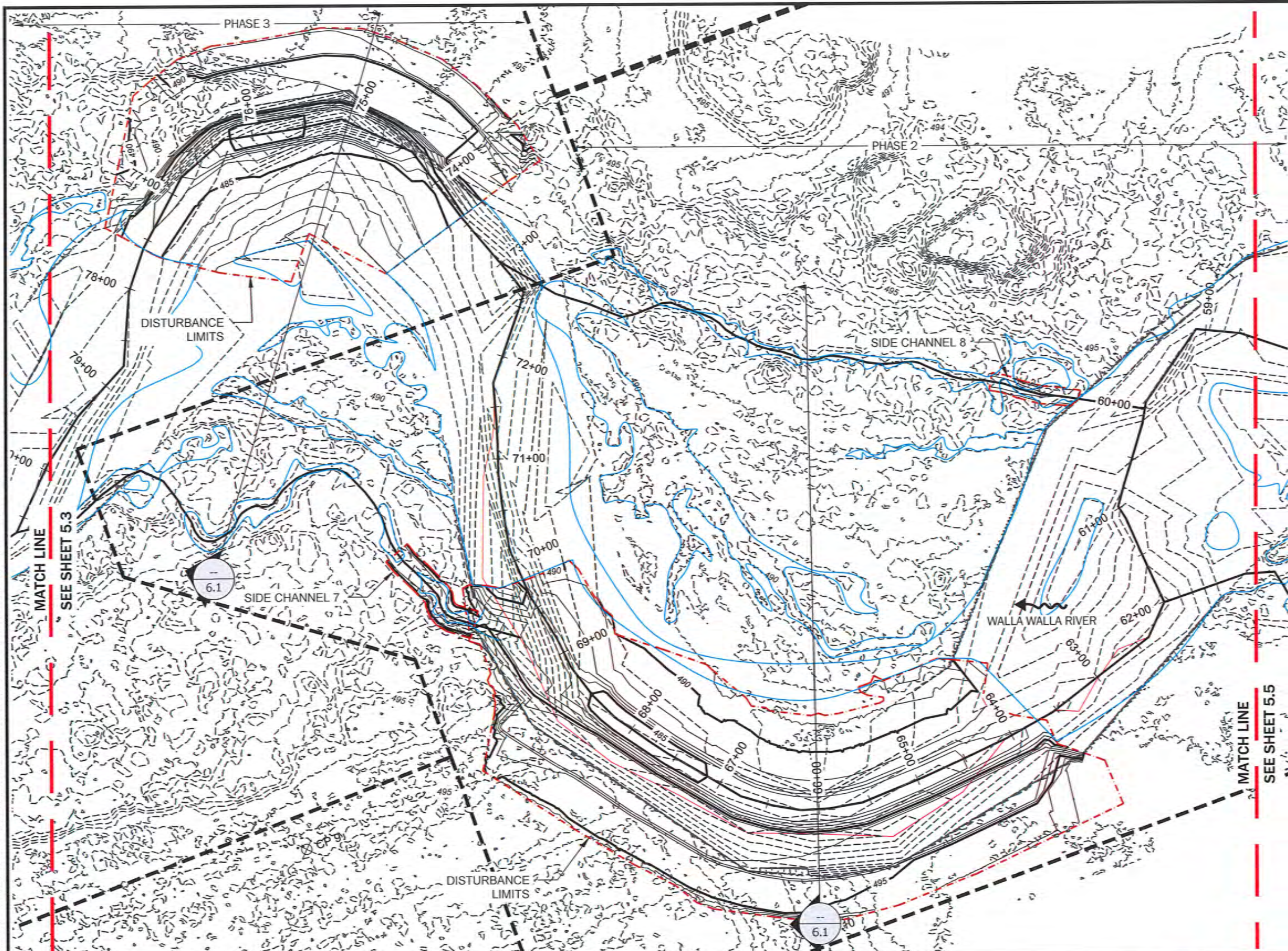
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Boise, Idaho 83705

Proposed Grading

Walla Walla River Bridge-to-Bridge
Design Drawings

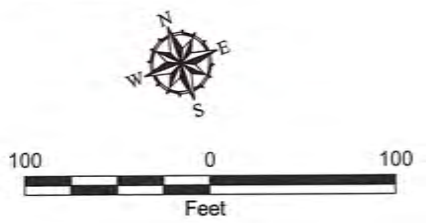
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- LEGEND:**
- EXISTING CHANNEL ALIGNMENT
 - PROPOSED CHANNEL ALIGNMENT
 - APPROXIMATE DISTURBANCE LIMITS
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - PHASE BOUNDARY
 - PROPOSED BANKFULL INUNDATION BOUNDARY
 - CONTROL POINT

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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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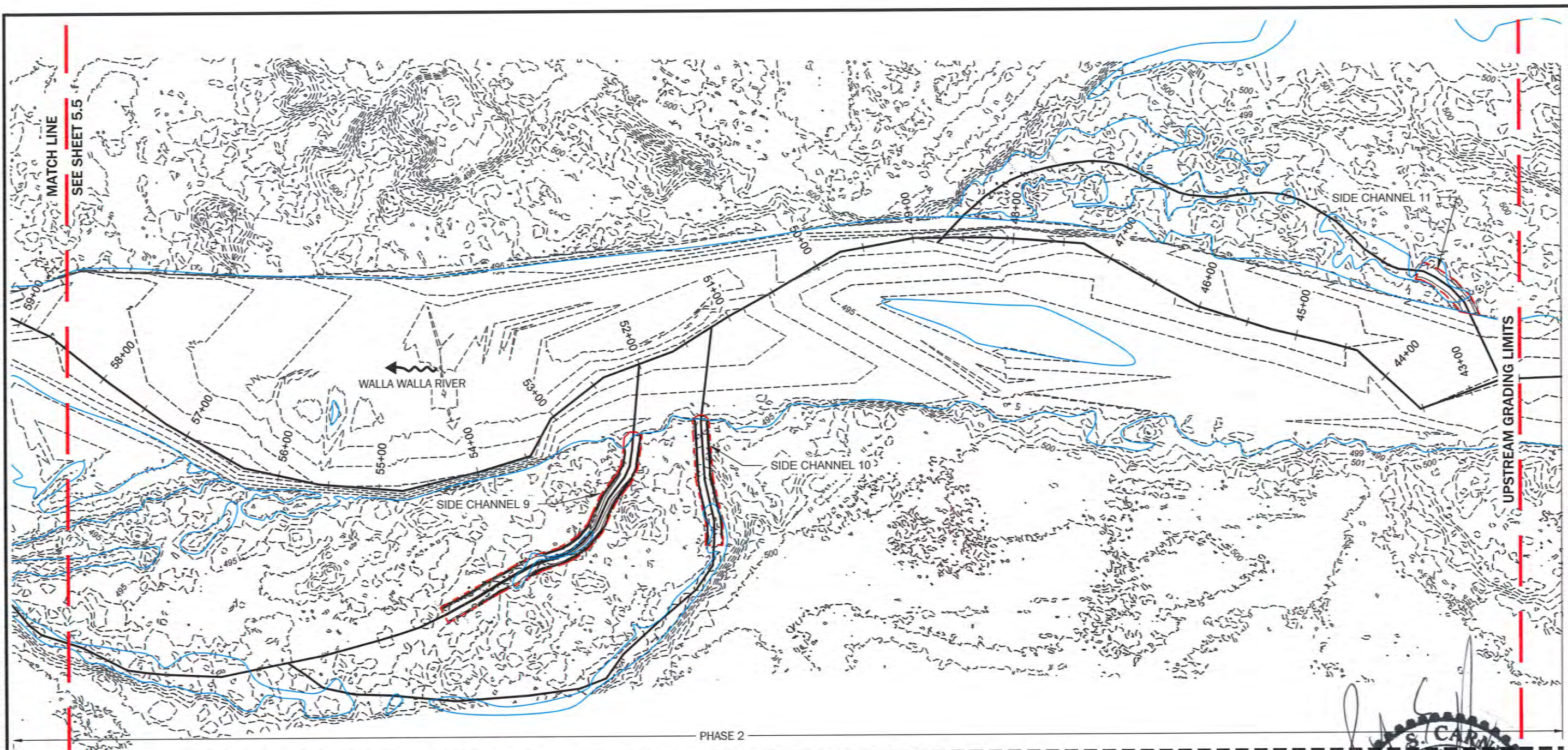
3501 West Elder Street, Suite 300
Boise, Idaho 83705

Proposed Grading

Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
5.4

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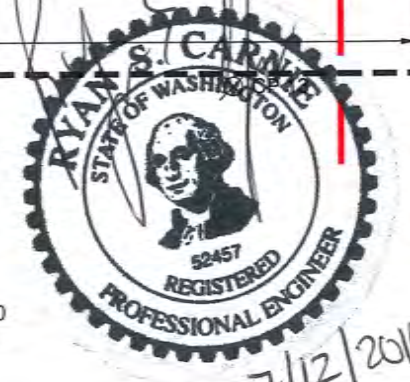


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LEGEND:

- | | | | |
|---------------|--------------------------------|------------------|---------------------------------------|
| — | EXISTING CHANNEL ALIGNMENT | - - - 1260 - - - | EXISTING MAJOR CONTOUR |
| + + + + + | PROPOSED CHANNEL ALIGNMENT | - - - - - | EXISTING MINOR CONTOUR |
| - . - . - . - | APPROXIMATE DISTURBANCE LIMITS | - - - - - | PHASE BOUNDARY |
| — 1260 — | PROPOSED MAJOR CONTOUR | — — — — — | PROPOSED BANKFULL INUNDATION BOUNDARY |
| — — — — — | PROPOSED MINOR CONTOUR | ⊗ | CONTROL POINT |



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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

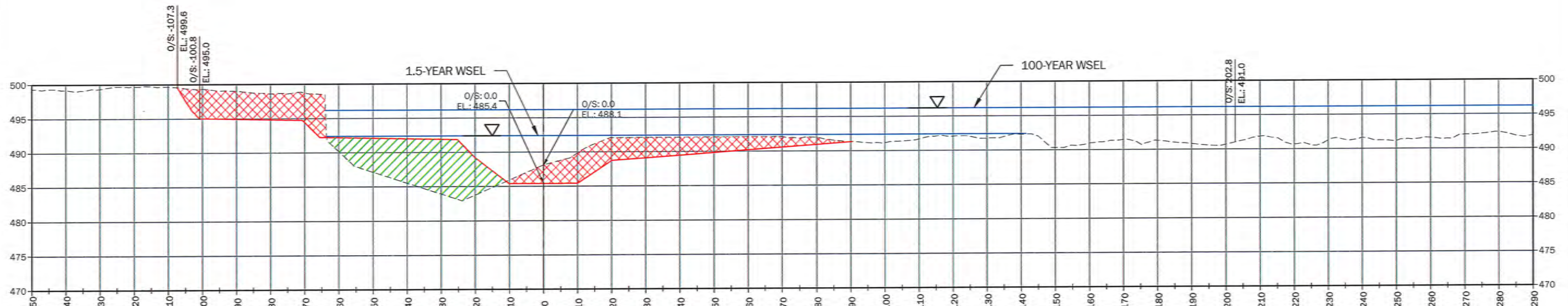


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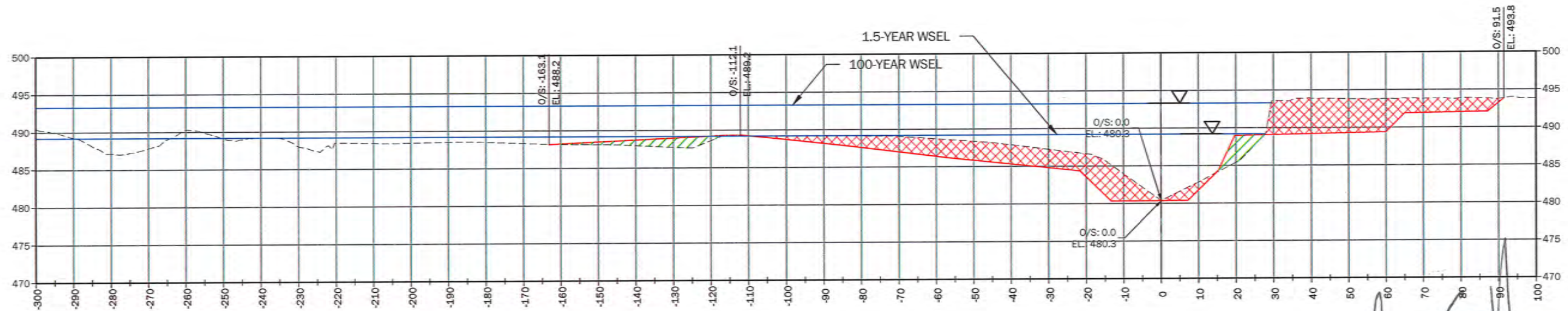
Proposed Grading
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
5.5

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\56.1- 6.2 - Valley Sections.dwg TAB:6.1 User: bmiller Plot time: Jul-11-16 @ 9:41am



FLOODPLAIN CROSS SECTION
MAIN CHANNEL STATION 66+01



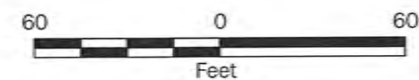
FLOODPLAIN CROSS SECTION
MAIN CHANNEL STATION 75+13

NOTES:

1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE THALWEG ALIGNMENT.
2. Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. THE ZERO STATION SHOWN ON THESE CROSS SECTIONS REPRESENTS THE PROPOSED THALWEG ALIGNMENT.
3. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
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LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS



VERTICAL EXAGGERATION = 2X
HORIZONTAL SCALE: 1" = 60'
VERTICAL SCALE: 1" = 30'



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Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

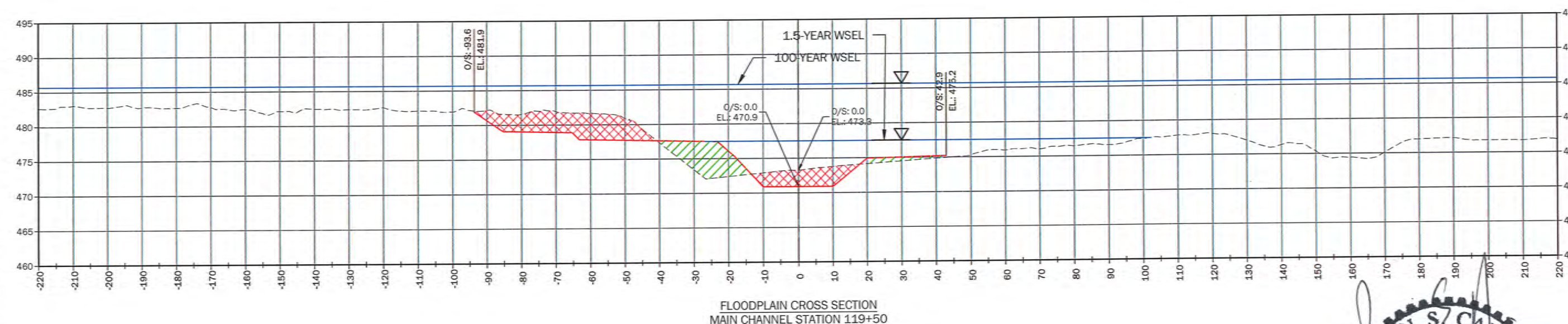
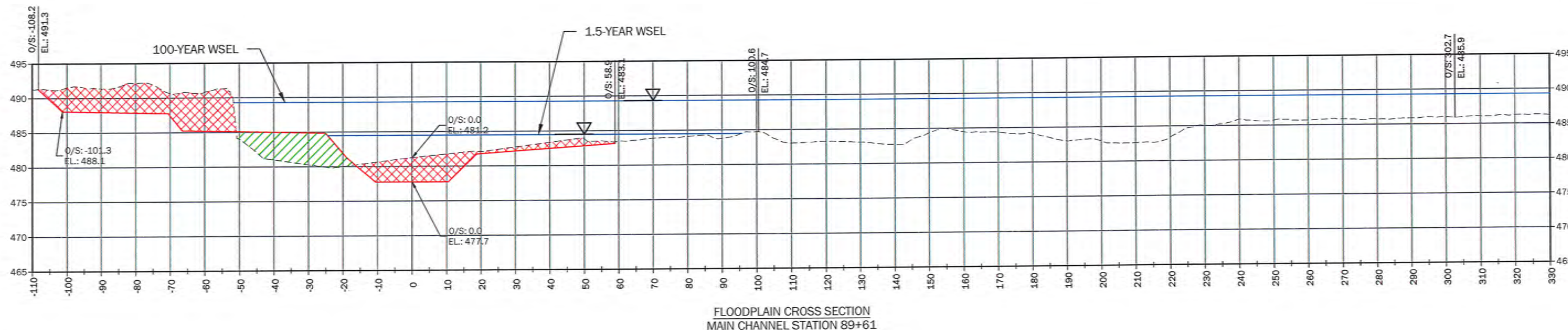


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Floodplain Sections
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
6.1

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Sections.dwg TAB:6.2 User: bmliller Plot time: Jul-11-16 @ 9:41am



NOTES:

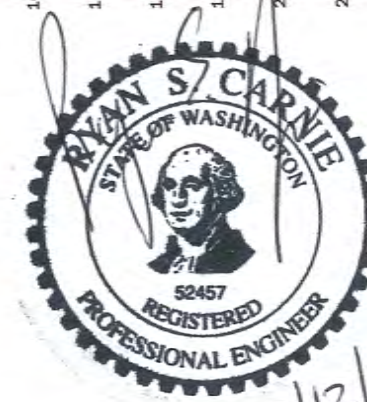
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LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS



VERTICAL EXAGGERATION = 2X
HORIZONTAL SCALE: 1" = 60'
VERTICAL SCALE: 1" = 30'



7/12/2016

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Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

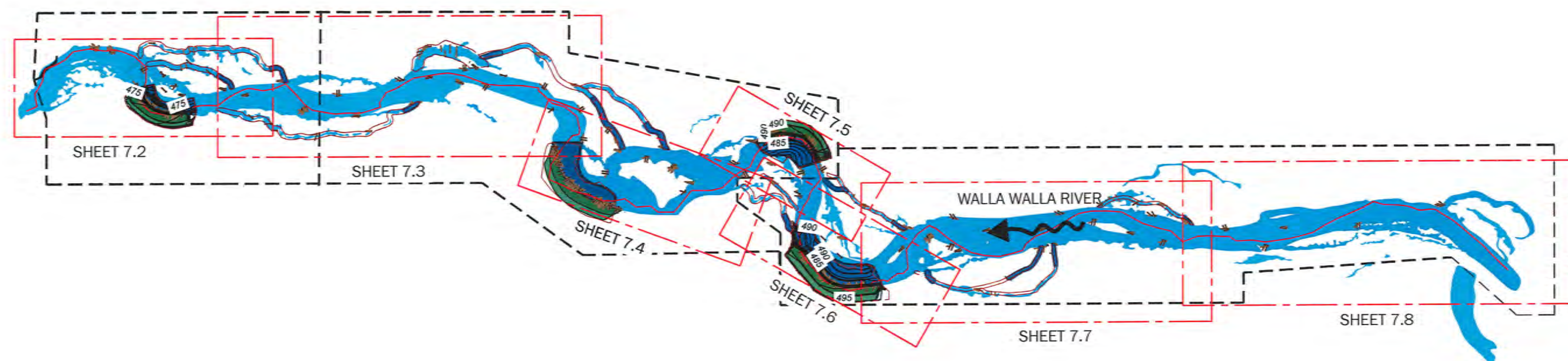


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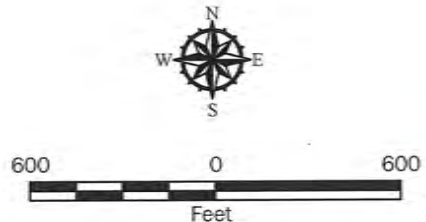
Floodplain Sections
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
6.2

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- LEGEND:
- EXISTING CHANNEL
 - PROPOSED CHANNEL
 - SIDE CHANNEL ENHANCEMENT
 - PHASE BOUNDARY
 - TERRACE
 - LARGE WOOD



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
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				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

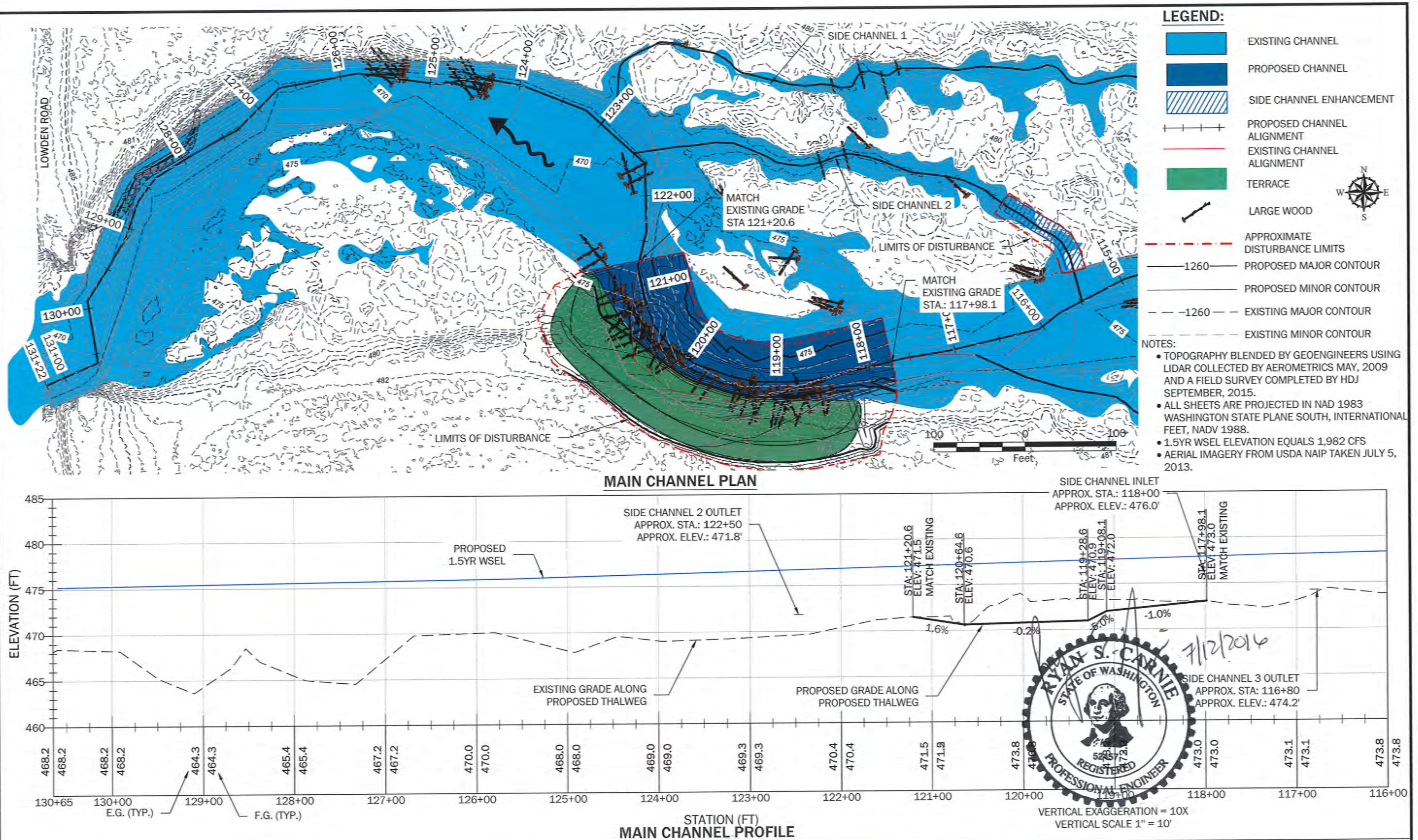


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Boise, Idaho 83705

**Proposed Main Channel Plan and
Profile Sheet Index**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
7.1

Dwg name: P:\111281005\03_CAD\80 Percent - Preliminary Design\03_Sheet Files\57.1-7.8 - Main Channel Plan and Profile.dwg TAB:7.2 User: bmliller Plot time: Jul-11-16 @ 9:46am



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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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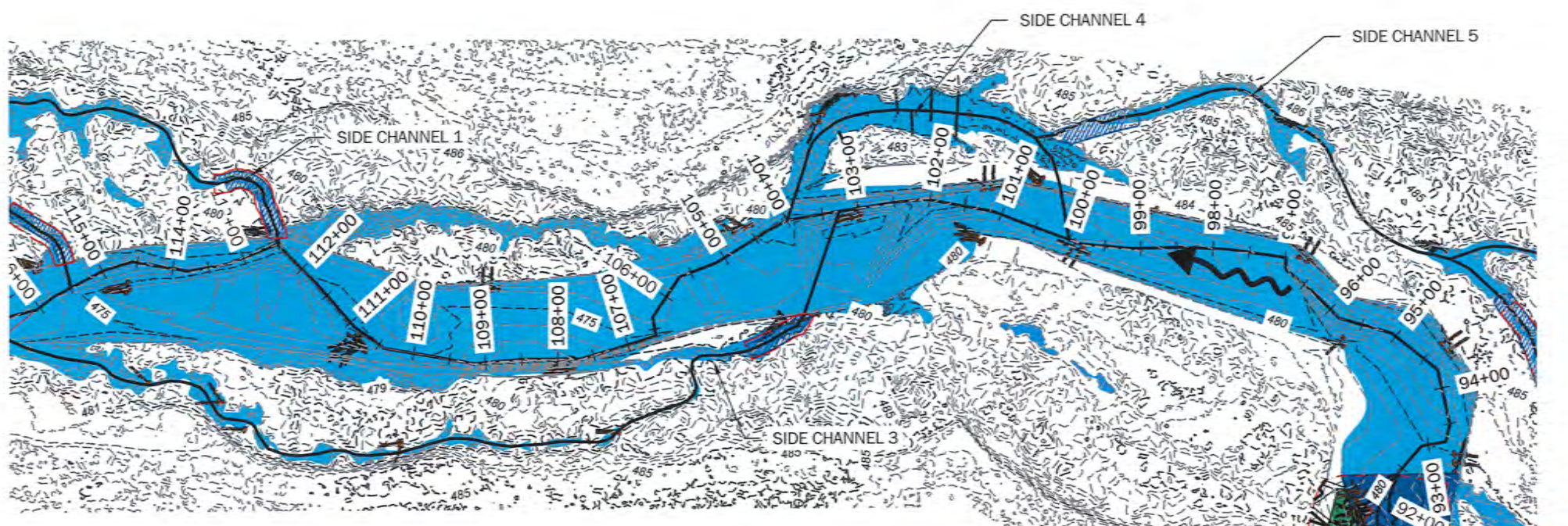
3501 West Elder Street, Suite 300
Boise, Idaho 83705

Main Channel Plan and Profile
Sta. 130+00 - 116+00

Walla Walla River Bridge-to-Bridge
Design Drawings

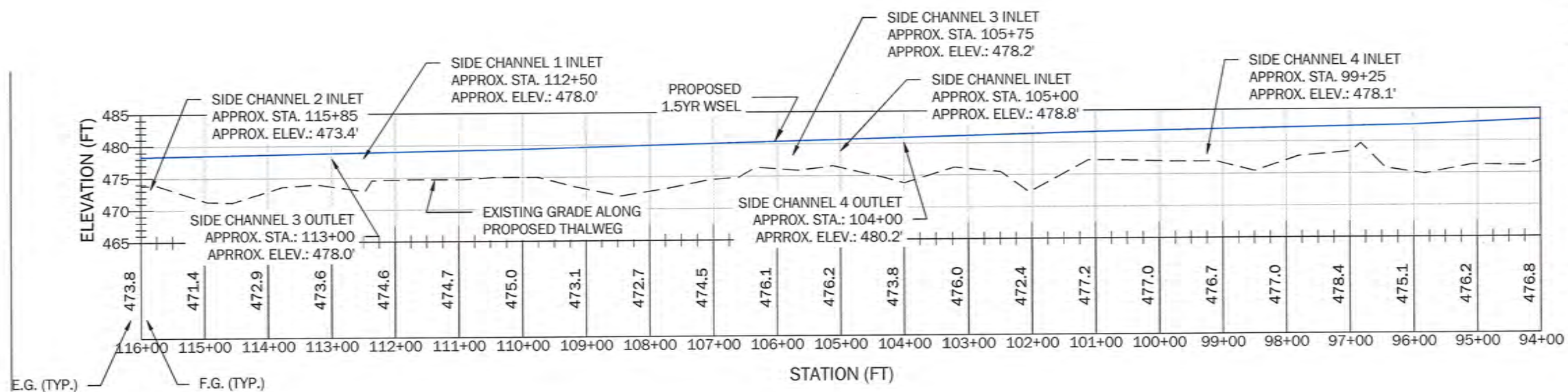
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LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- PROPOSED CHANNEL ALIGNMENT
- EXISTING CHANNEL ALIGNMENT
- TERRACE
- LARGE WOOD
- APPROXIMATE DISTURBANCE LIMITS
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR



NOTES:

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Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

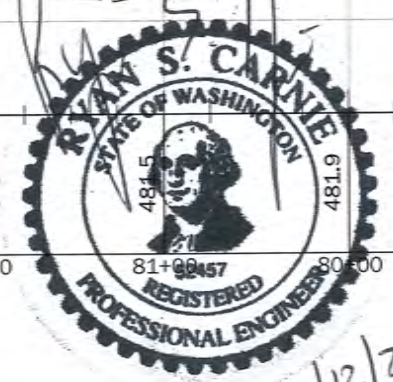
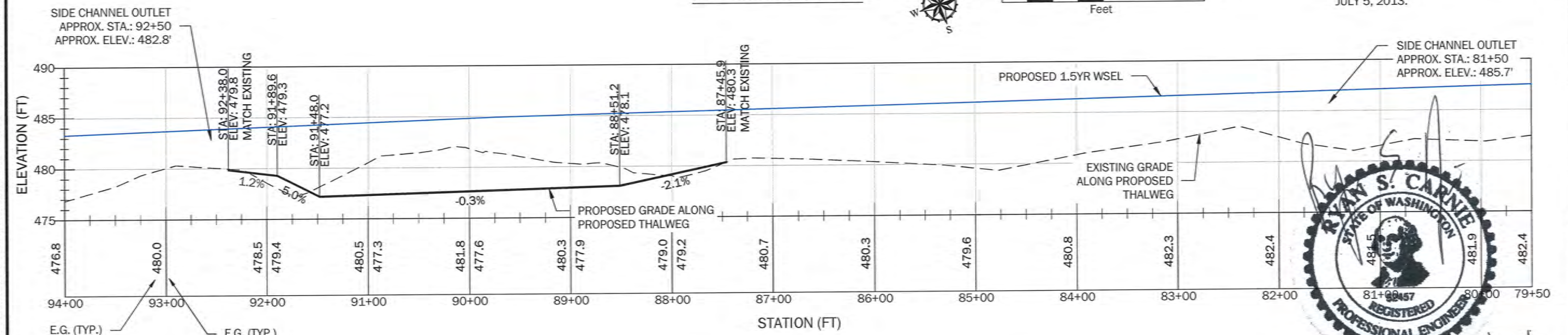
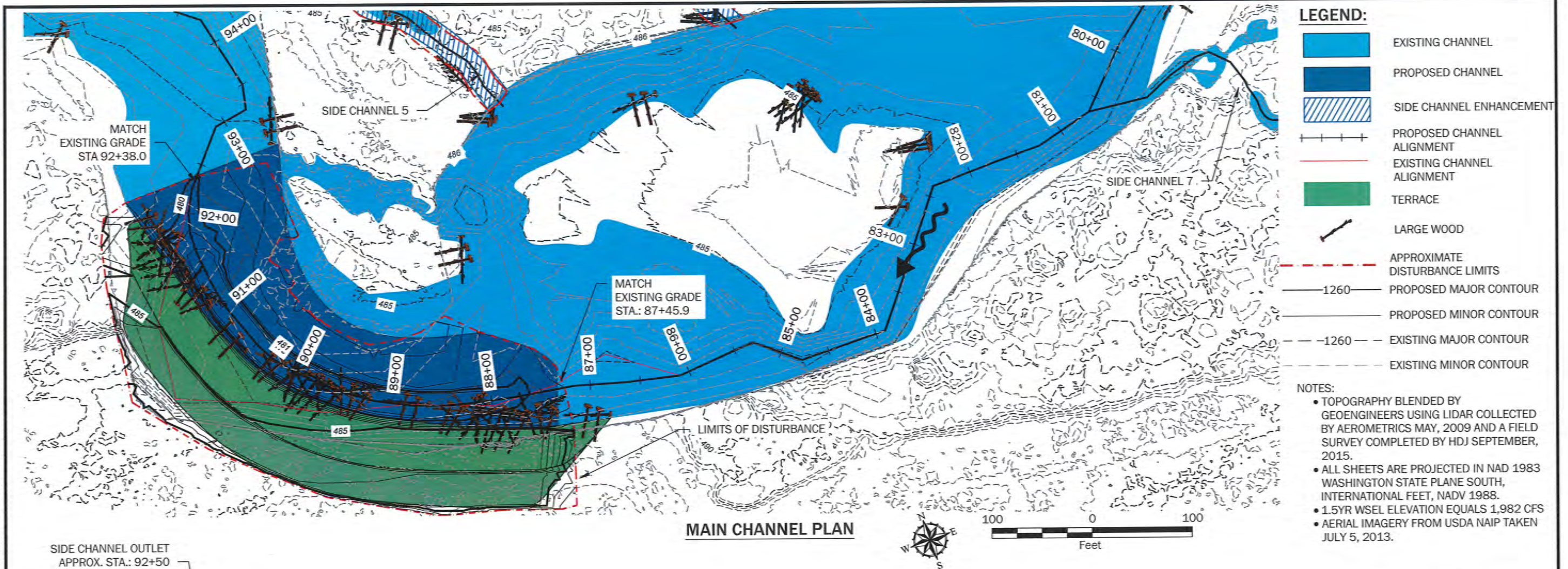


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Main Channel Plan and Profile
Sta. 116+00 - 94+00
Walla Walla River Bridge-to-Bridge
Design Drawings

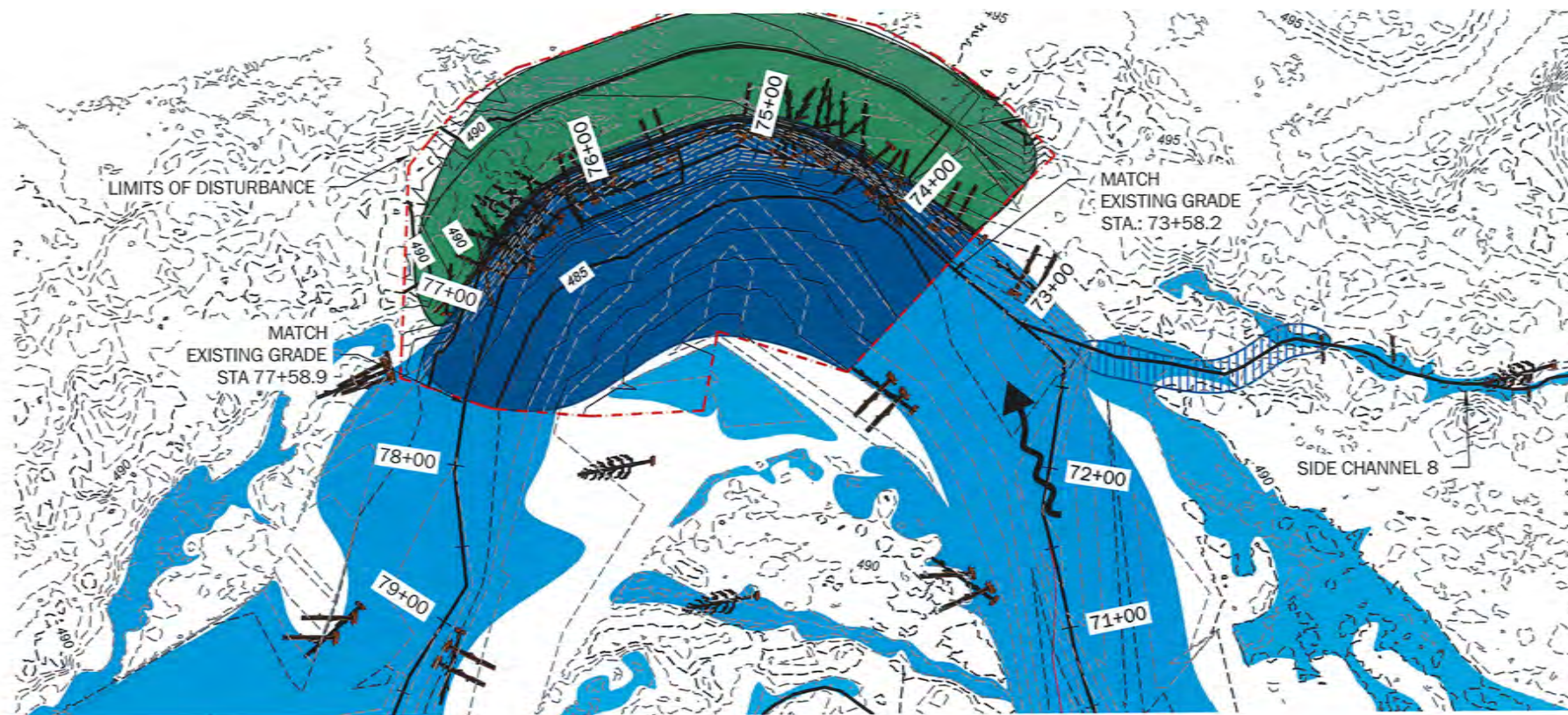
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Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC	Walla Walla River near Lowden, Washington Tri-State Steelheaders		GEOENGINEERS 3501 West Elder Street, Suite 300 Boise, Idaho 83705	Main Channel Plan and Profile Sta. 94+00 - 79+50 Walla Walla River Bridge-to-Bridge Design Drawings	Sheet 7.4
				Drawn: BHM					
				Checked: RSC, JRS					
				Date: 07/15/2016					
				Project No: 11281-005-03					

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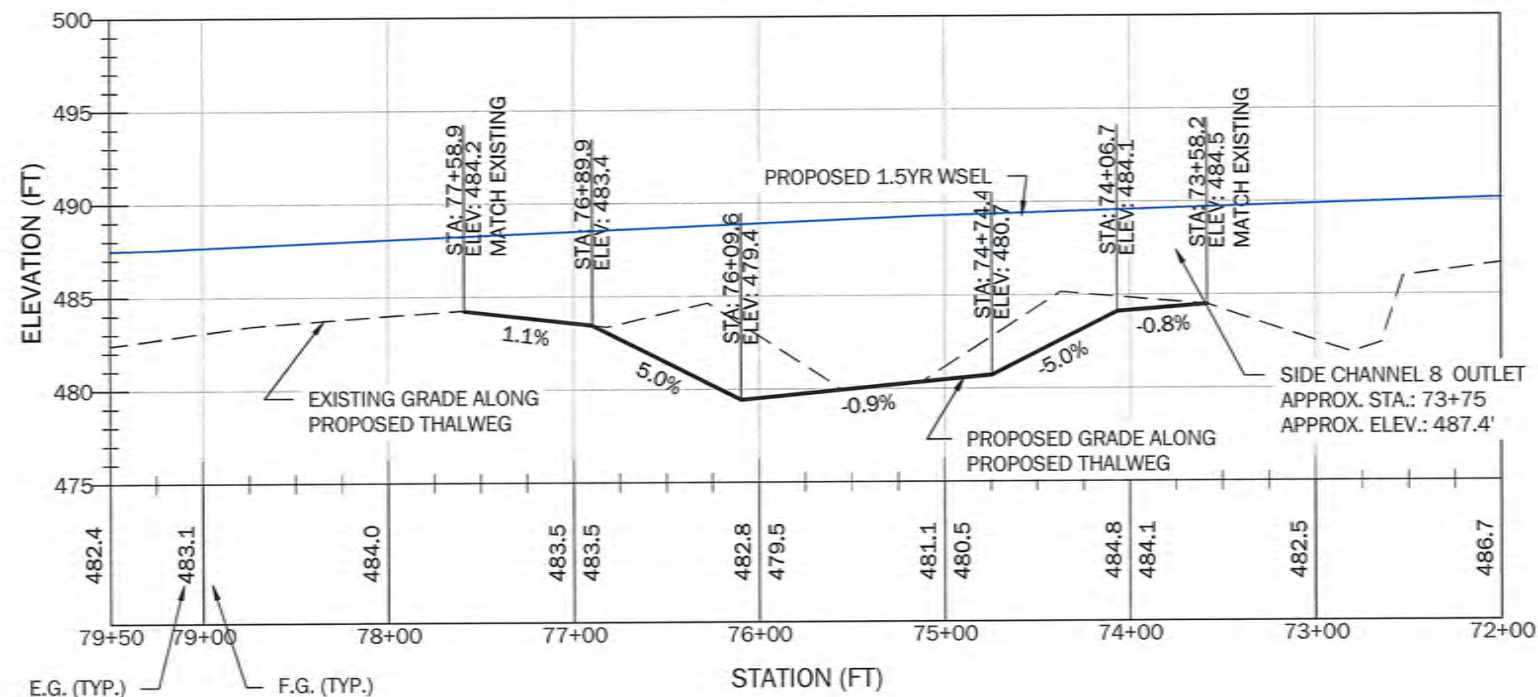
MAIN CHANNEL PLAN

LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- PROPOSED CHANNEL ALIGNMENT
- EXISTING CHANNEL ALIGNMENT
- TERRACE
- LARGE WOOD
- APPROXIMATE DISTURBANCE LIMITS
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR

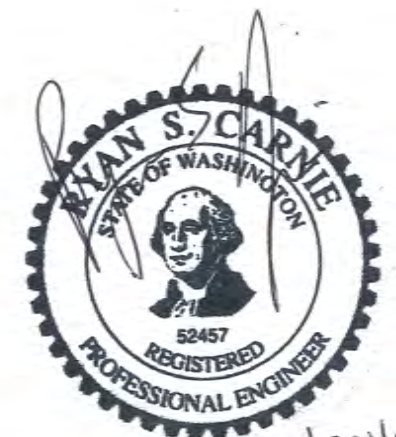
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MAIN CHANNEL PROFILE

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



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Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

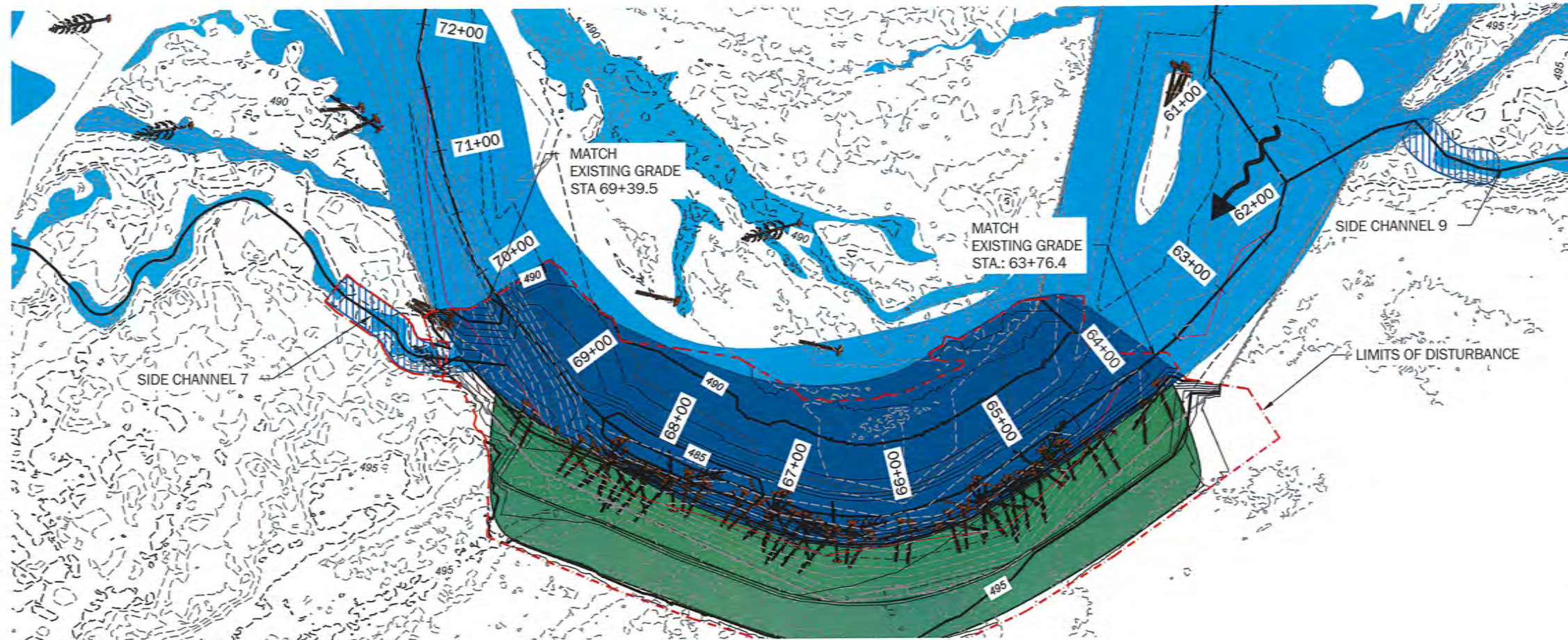


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Main Channel Plan and Profile
Sta. 79+50 - 72+00
Walla Walla River Bridge-to-Bridge
Design Drawings

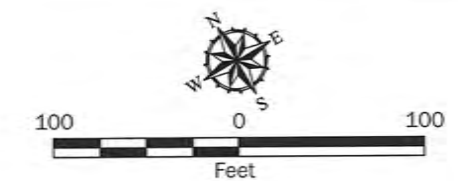
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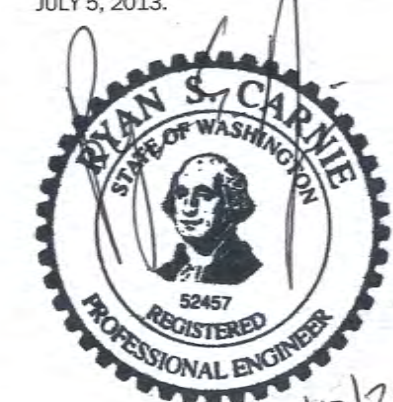


MAIN CHANNEL PLAN

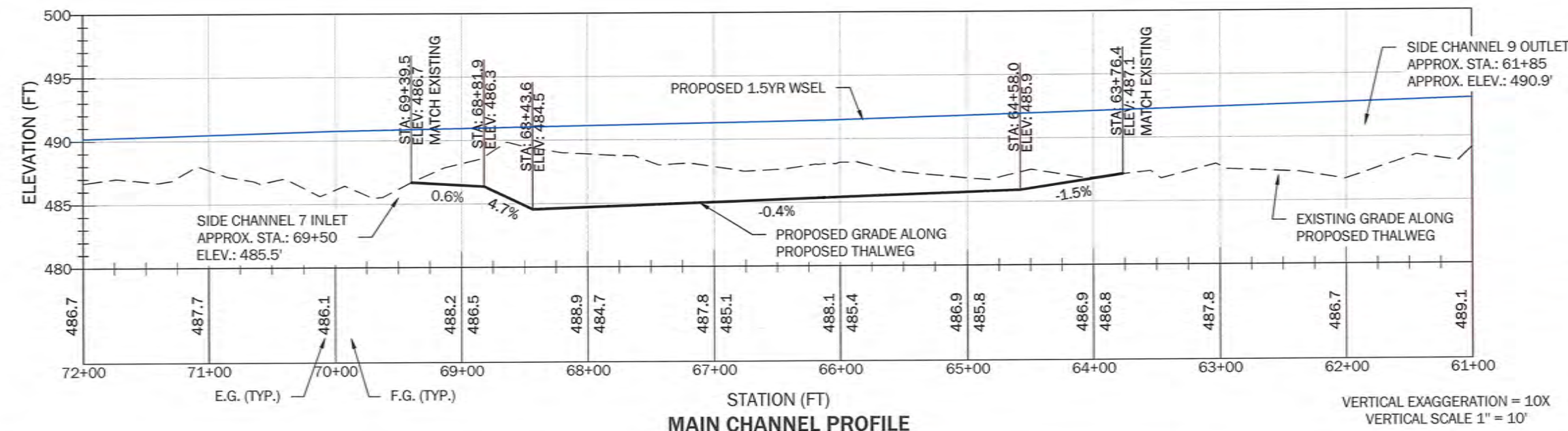
- LEGEND:**
- EXISTING CHANNEL
 - PROPOSED CHANNEL
 - SIDE CHANNEL ENHANCEMENT
 - PROPOSED CHANNEL ALIGNMENT
 - EXISTING CHANNEL ALIGNMENT
 - TERRACE
 - LARGE WOOD
 - APPROXIMATE DISTURBANCE LIMITS
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR



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MAIN CHANNEL PROFILE

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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

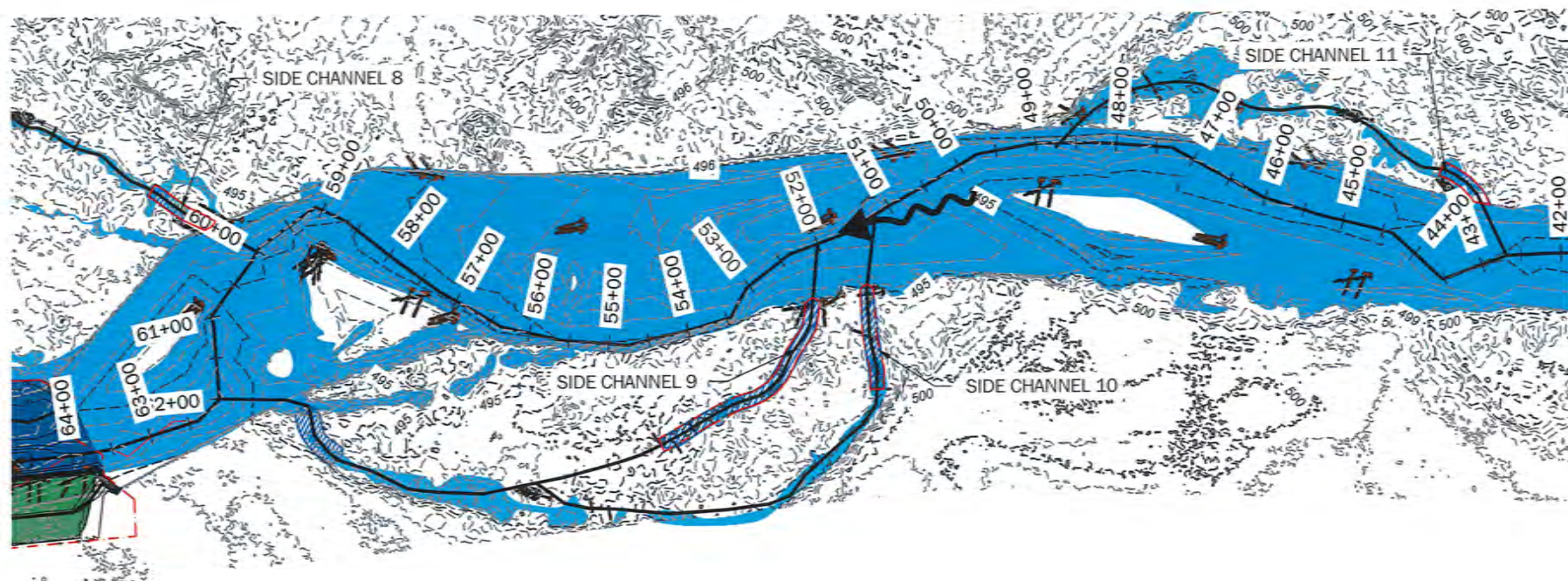


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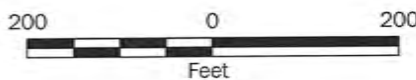
Main Channel Plan and Profile
Sta. 72+00 - 61+00
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
7.6

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MAIN CHANNEL PLAN

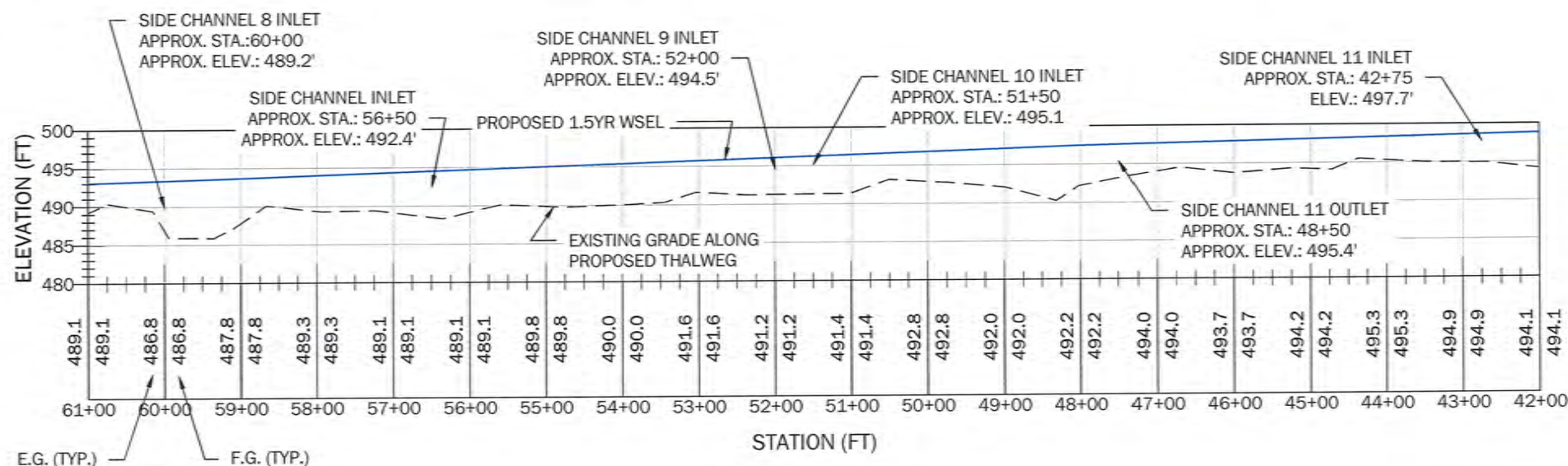


LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- PROPOSED CHANNEL ALIGNMENT
- EXISTING CHANNEL ALIGNMENT
- TERRACE
- LARGE WOOD
- APPROXIMATE DISTURBANCE LIMITS
- 1260 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 1260 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR

NOTES:

- TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.
- 1.5YR WSEL ELEVATION EQUALS 1,982 CFS
- AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.



MAIN CHANNEL PROFILE

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



7/12/2016

Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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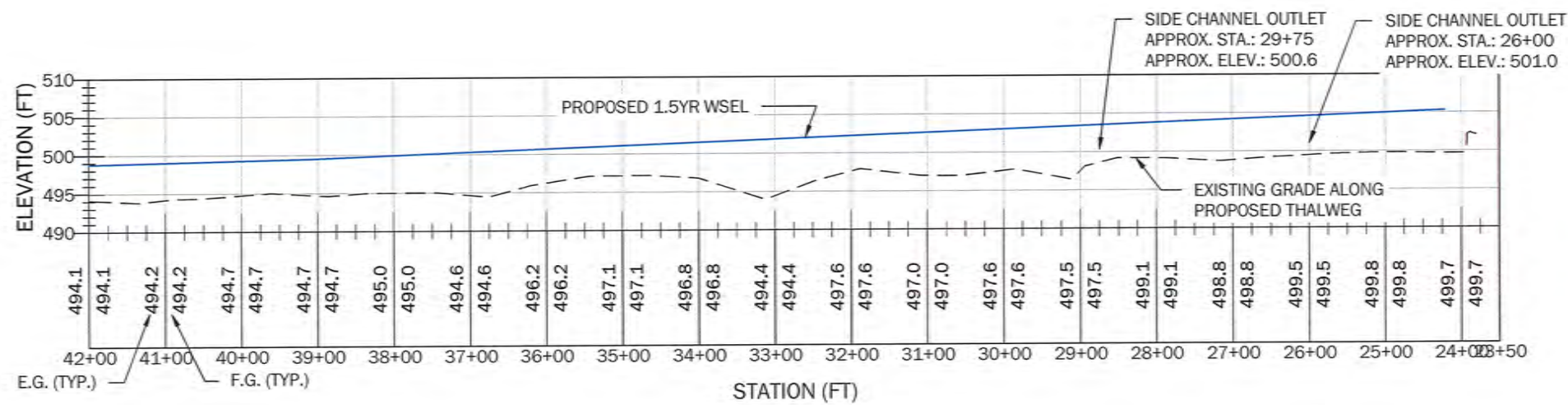
Main Channel Plan and Profile
Sta. 61+00 - 42+00
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
7.7

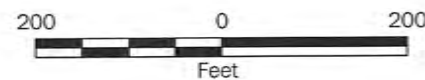
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MAIN CHANNEL PLAN



MAIN CHANNEL PROFILE



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

LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- PROPOSED CHANNEL ALIGNMENT
- EXISTING CHANNEL ALIGNMENT
- TERRACE
- LARGE WOOD
- APPROXIMATE DISTURBANCE LIMITS
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR

NOTES:

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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

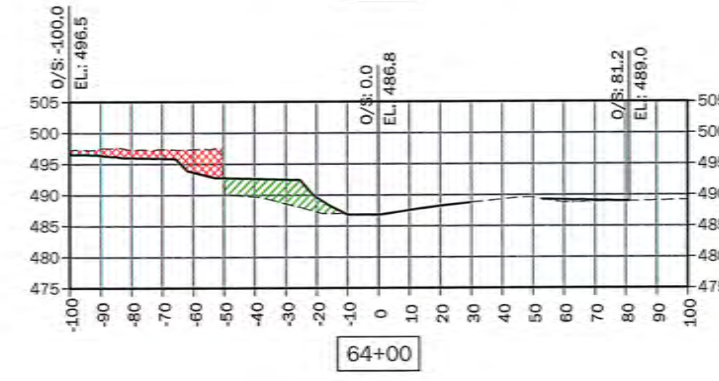
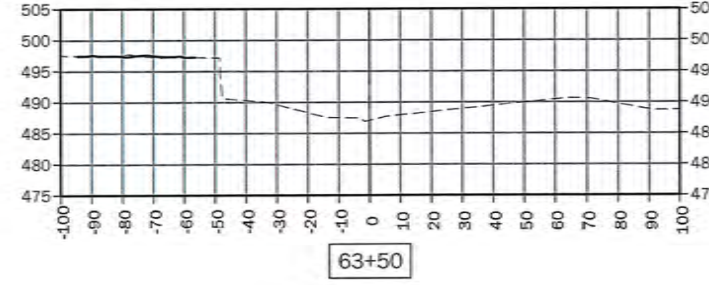
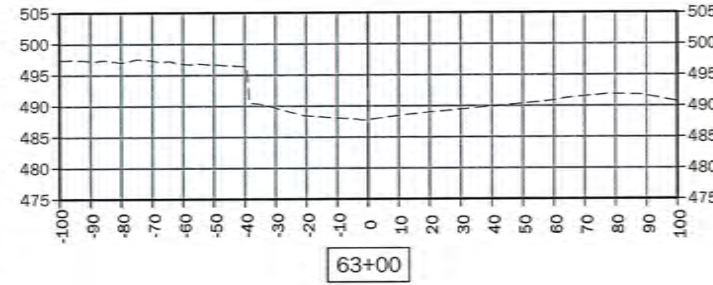
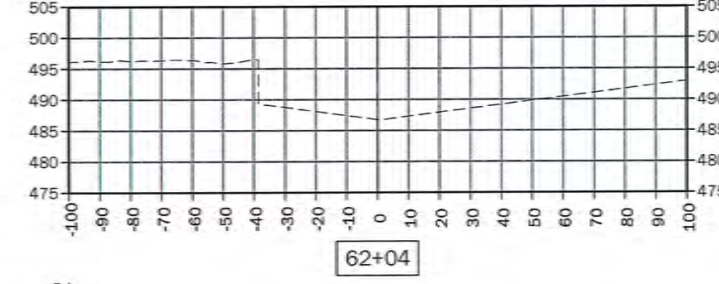
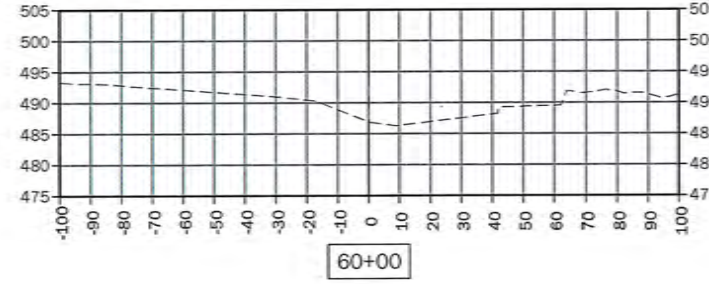
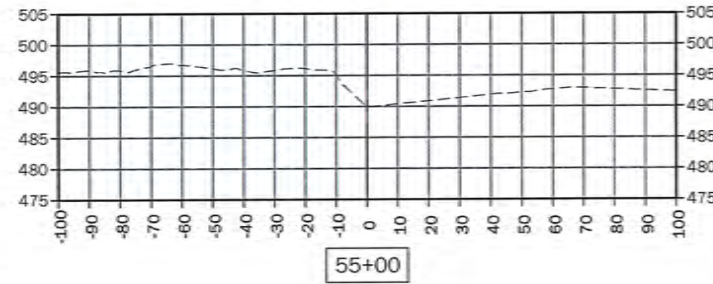
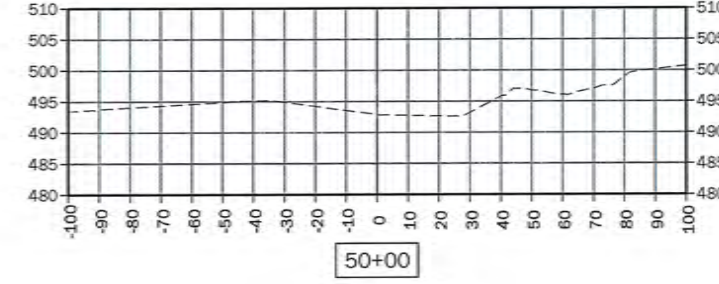
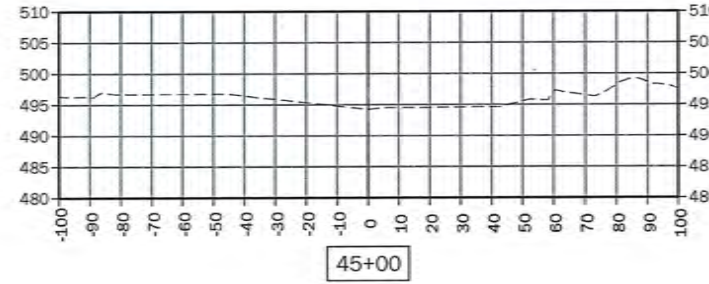
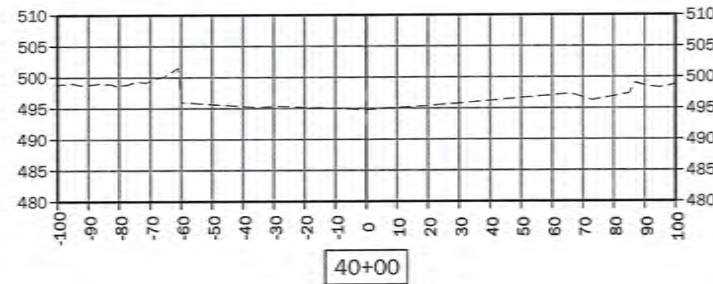
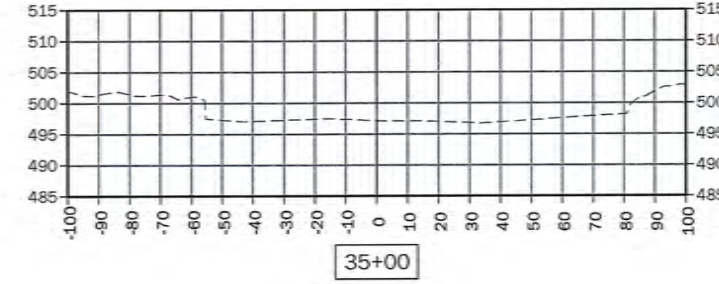
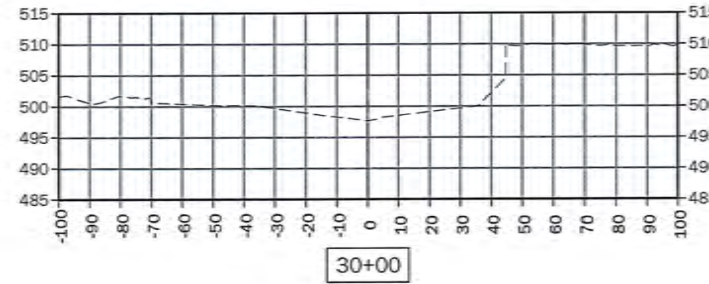
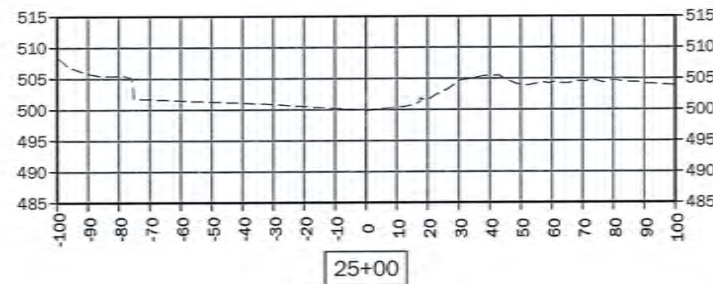


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Main Channel Plan and Profile
Sta. 42+00 - 23+50
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
7.8

Dwg name: P:\11\1281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\S8.1- 8.6 - Main Channel Sections.dwg TAB:8.1 User: bmliller Plot time: Jul-11-16 @ 9:50am

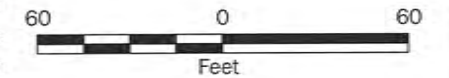


LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

NOTES:

- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE THALWEG ALIGNMENT.
- Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. THE ZERO STATION SHOWN ON THESE CROSS SECTIONS REPRESENTS THE PROPOSED THALWEG ALIGNMENT.
- TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.



VERTICAL EXAGGERATION = 2X
HORIZONTAL SCALE: 1" = 60'
VERTICAL SCALE: 1" = 30'



7/12/2016

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				Checked: RSC, JRS
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				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

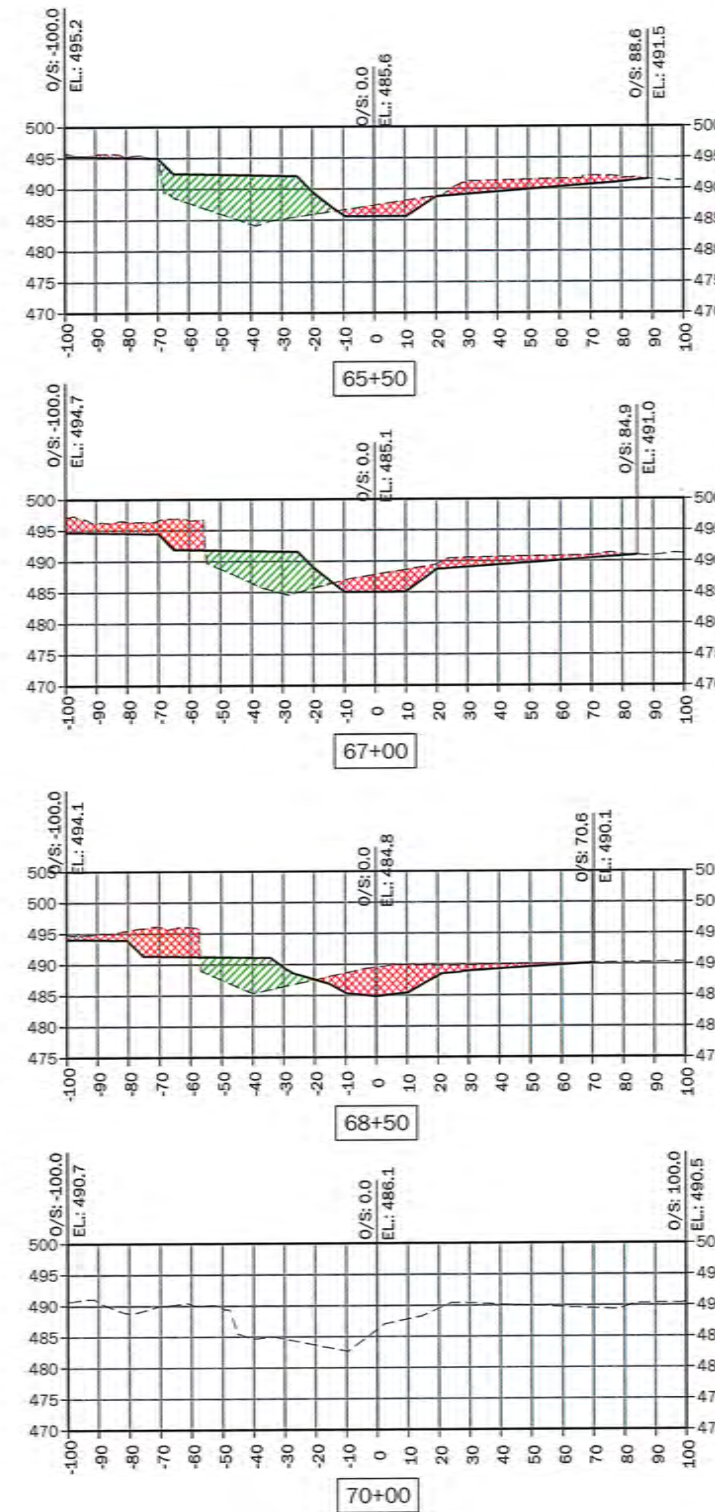
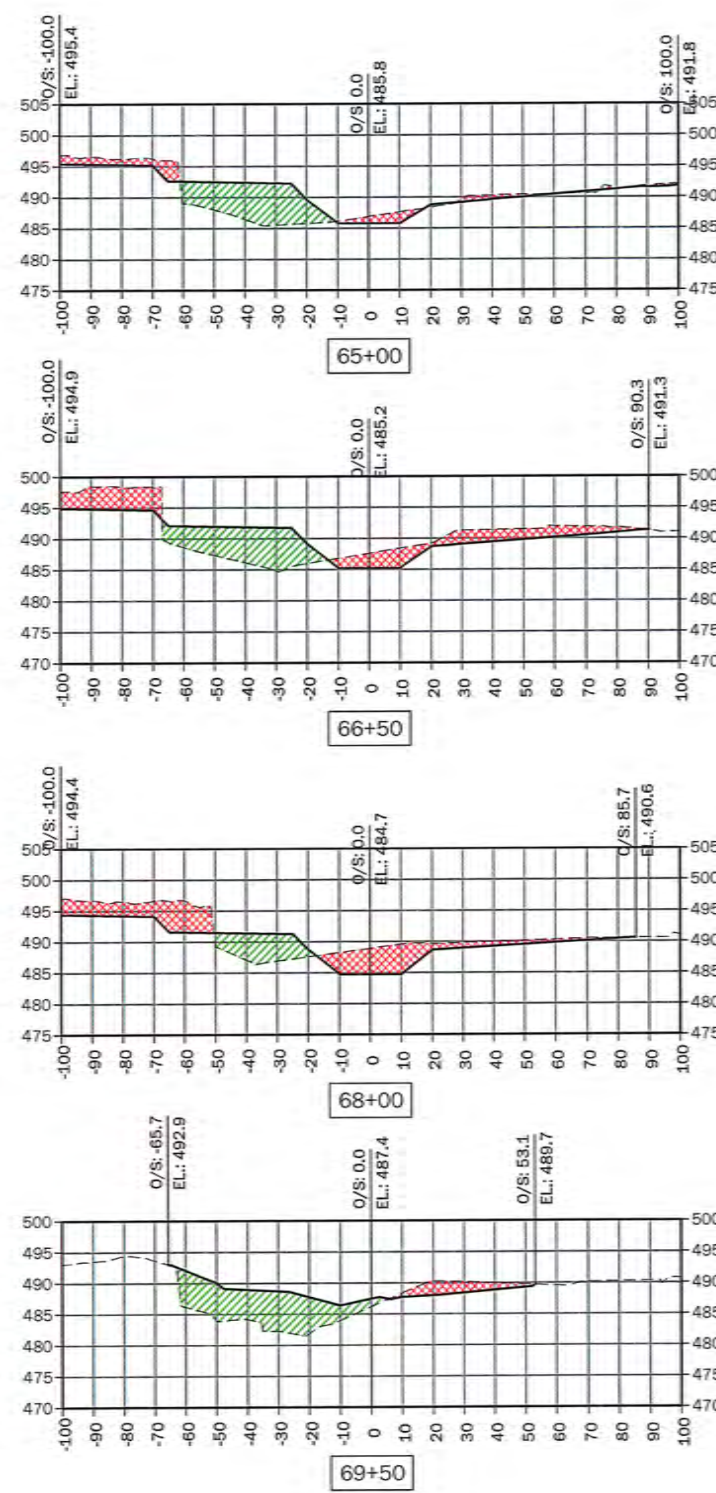
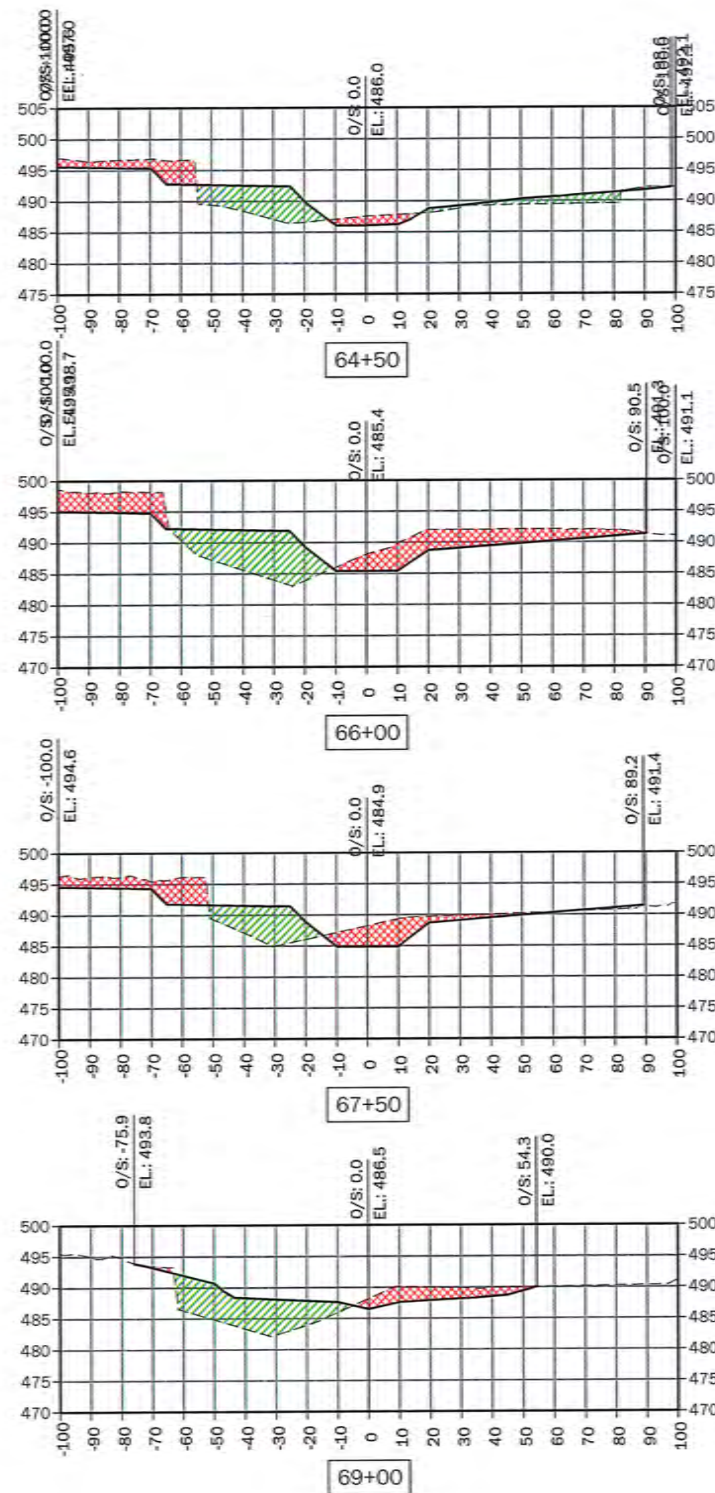


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Main Channel Sections
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
8.1

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LEGEND

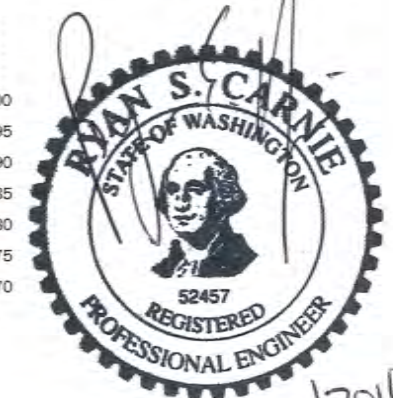
PROPOSED FILL AREAS

PROPOSED CUT AREAS

- NOTES:**
1. CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE THALWEG ALIGNMENT.
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 3. TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
 4. ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.

60 0 60
Feet

VERTICAL EXAGGERATION = 2X
HORIZONTAL SCALE: 1" = 60'
VERTICAL SCALE: 1" = 30'



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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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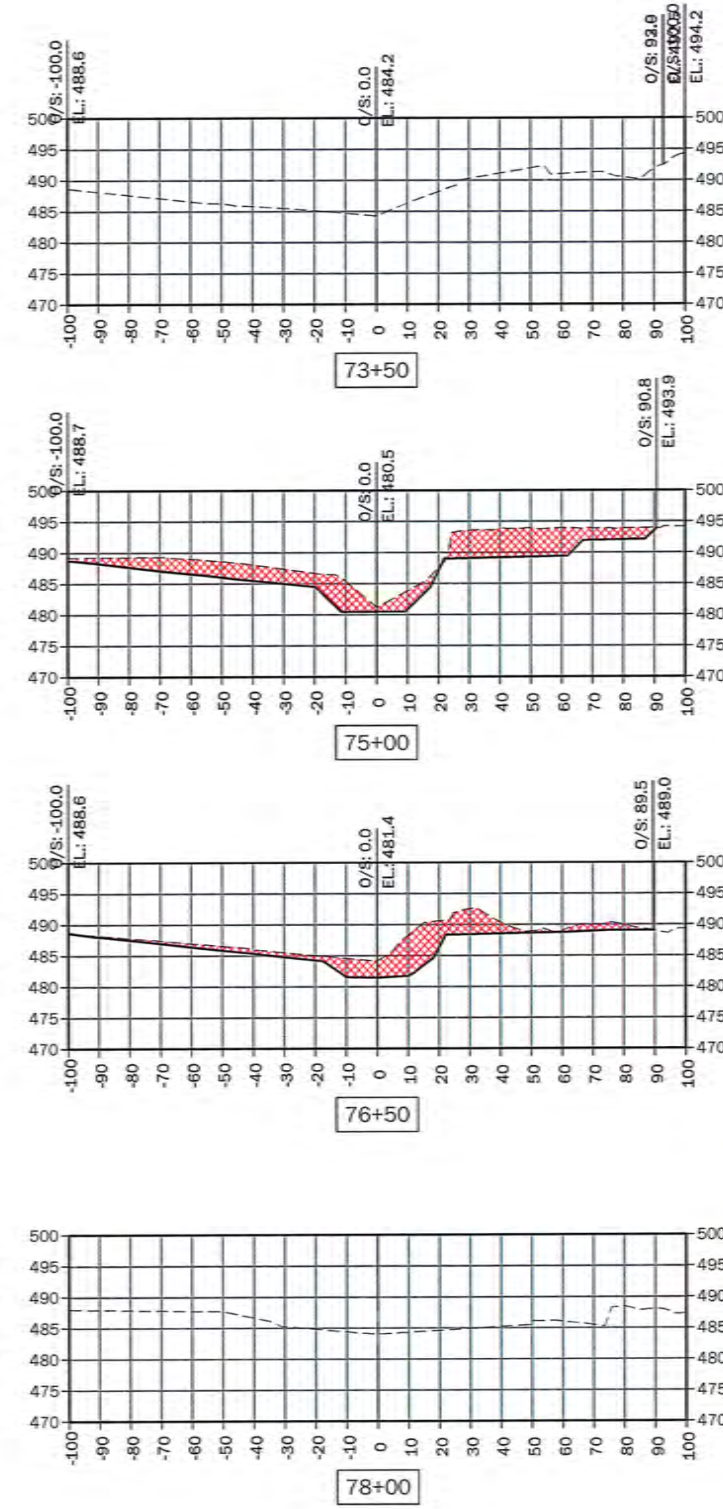
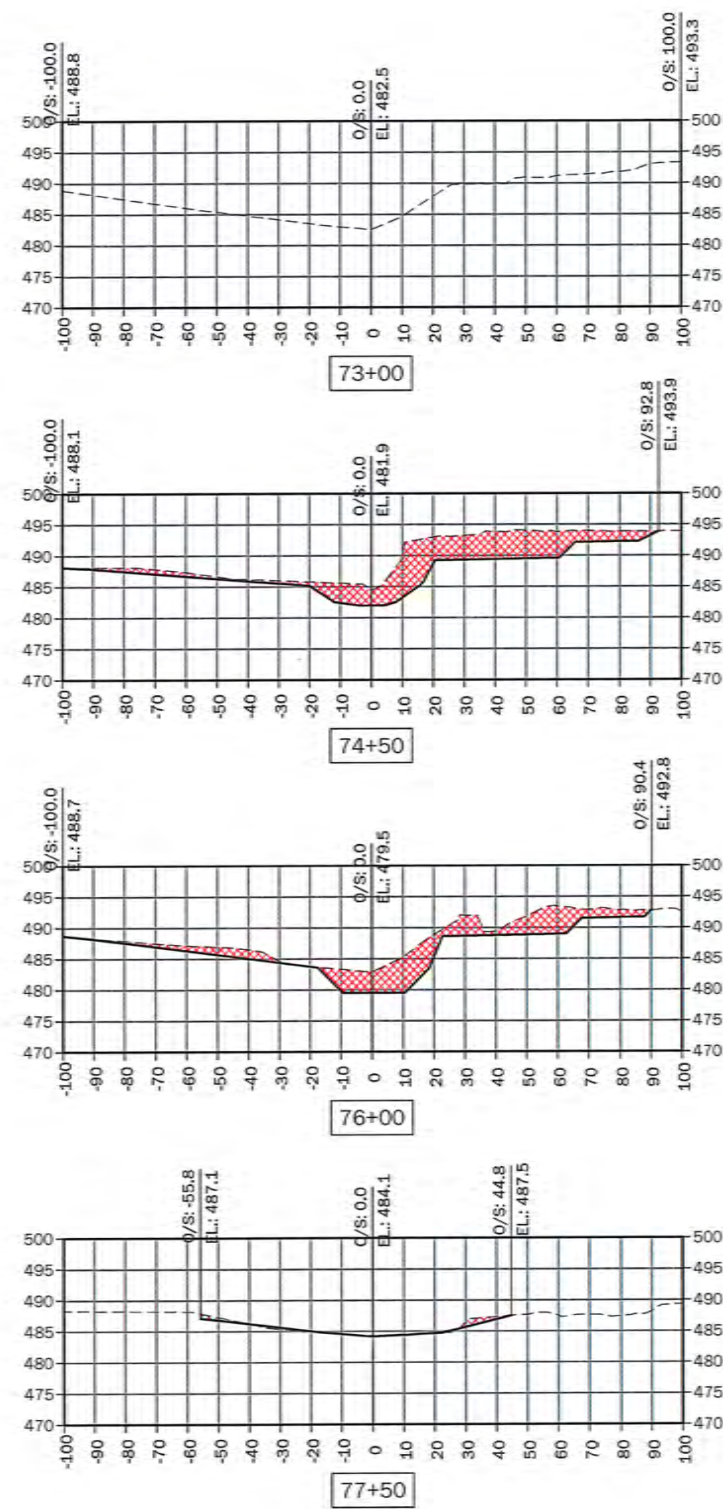
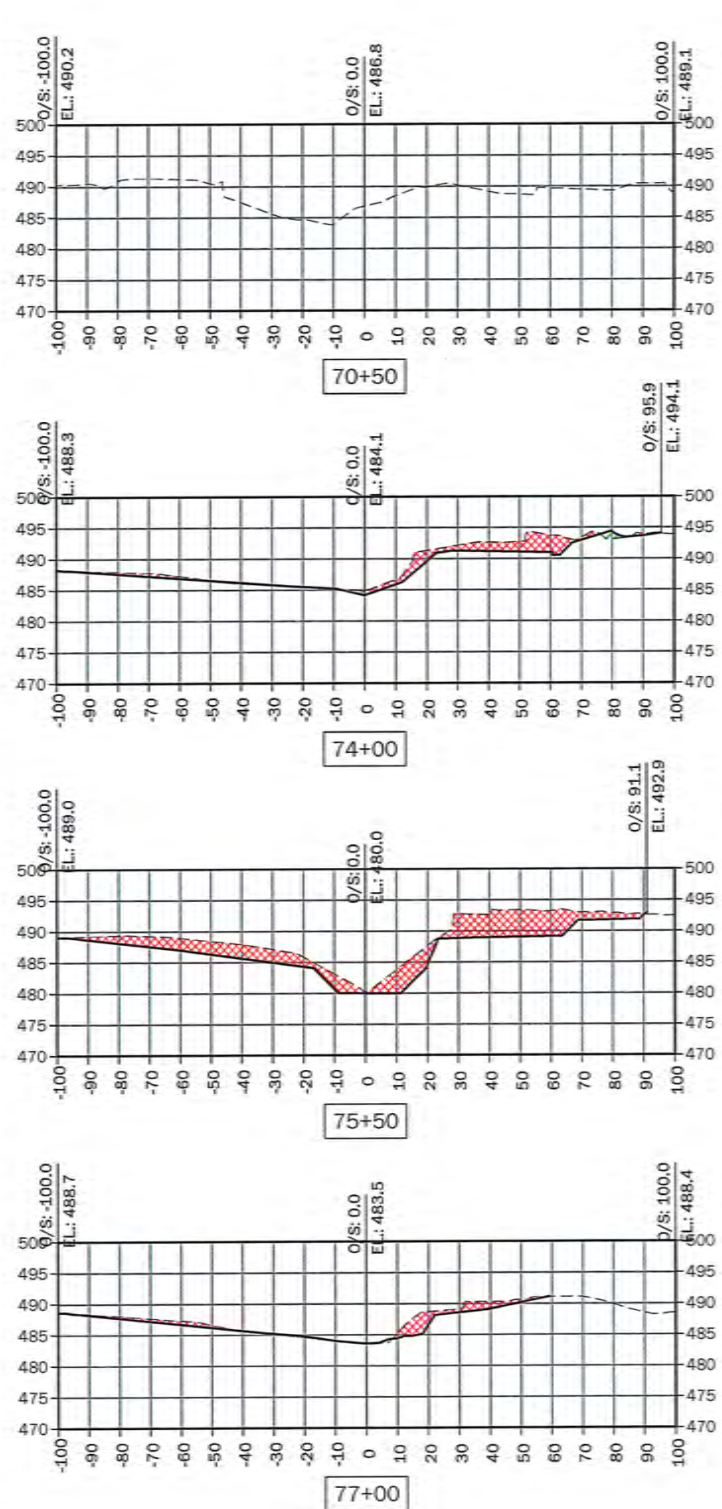
3501 West Elder Street, Suite 300
Boise, Idaho 83705

Main Channel Sections

Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
8.2

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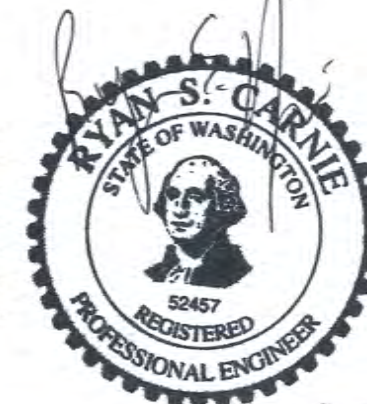


- LEGEND**
- PROPOSED FILL AREAS
 - PROPOSED CUT AREAS

- NOTES:**
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE THALWEG ALIGNMENT.
 - Y-AXIS IS ELEVATION (FEET), X-AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. THE ZERO STATION SHOWN ON THESE CROSS SECTIONS REPRESENTS THE EXISTING THALWEG ALIGNMENT.
 - TOPOGRAPHY BLENDED BY ANDERSON PERRY FROM ANDERSON PERRY'S 2009 LIDAR, AEROMETRIC'S 2010 LIDAR AND ANDERSON'S PERRY'S 2014 FIELD SURVEY.
 - ALL SHEETS ARE PROJECTED IN NAD 1983 OREGON STATE PLANE NORTH, INTERNATIONAL FEET, NADV 1988.

60 0 60
Feet

VERTICAL EXAGGERATION = 2X
HORIZONTAL SCALE: 1" = 60'
VERTICAL SCALE: 1" = 30'



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Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

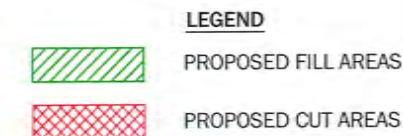
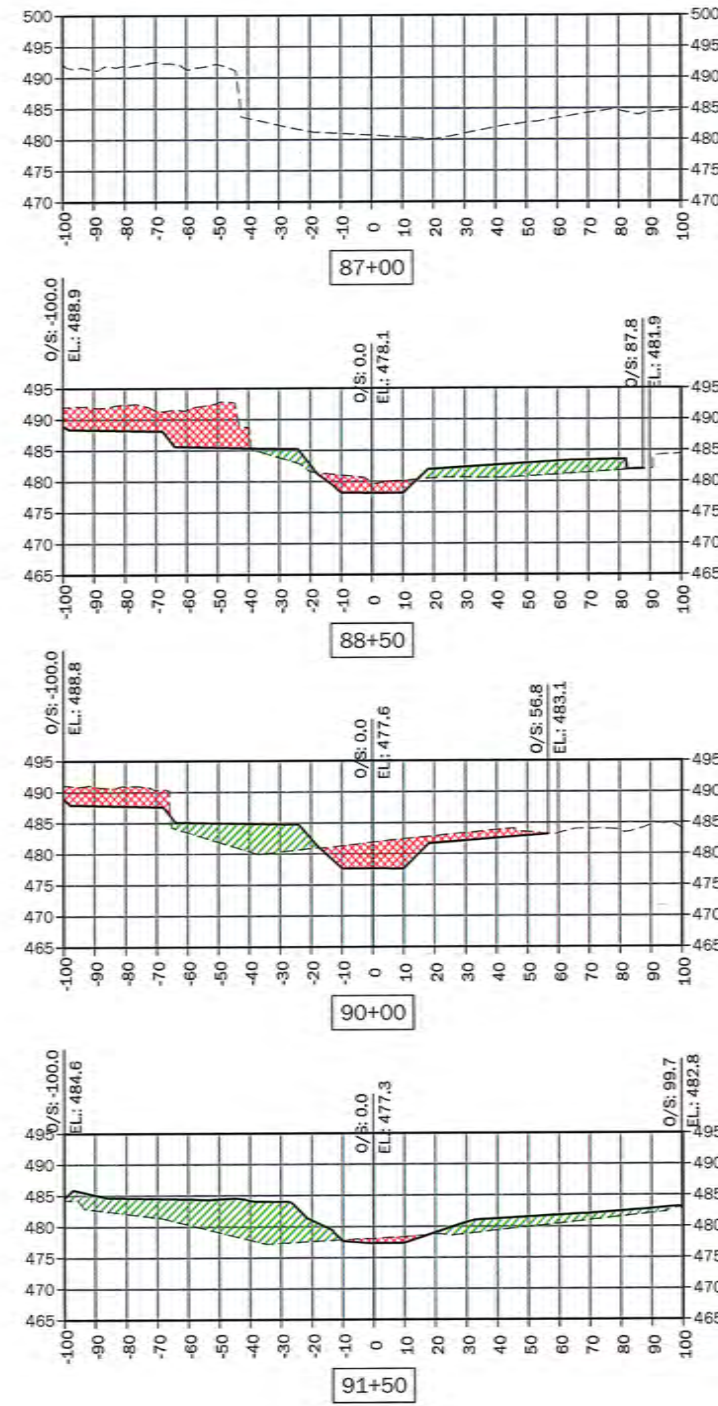
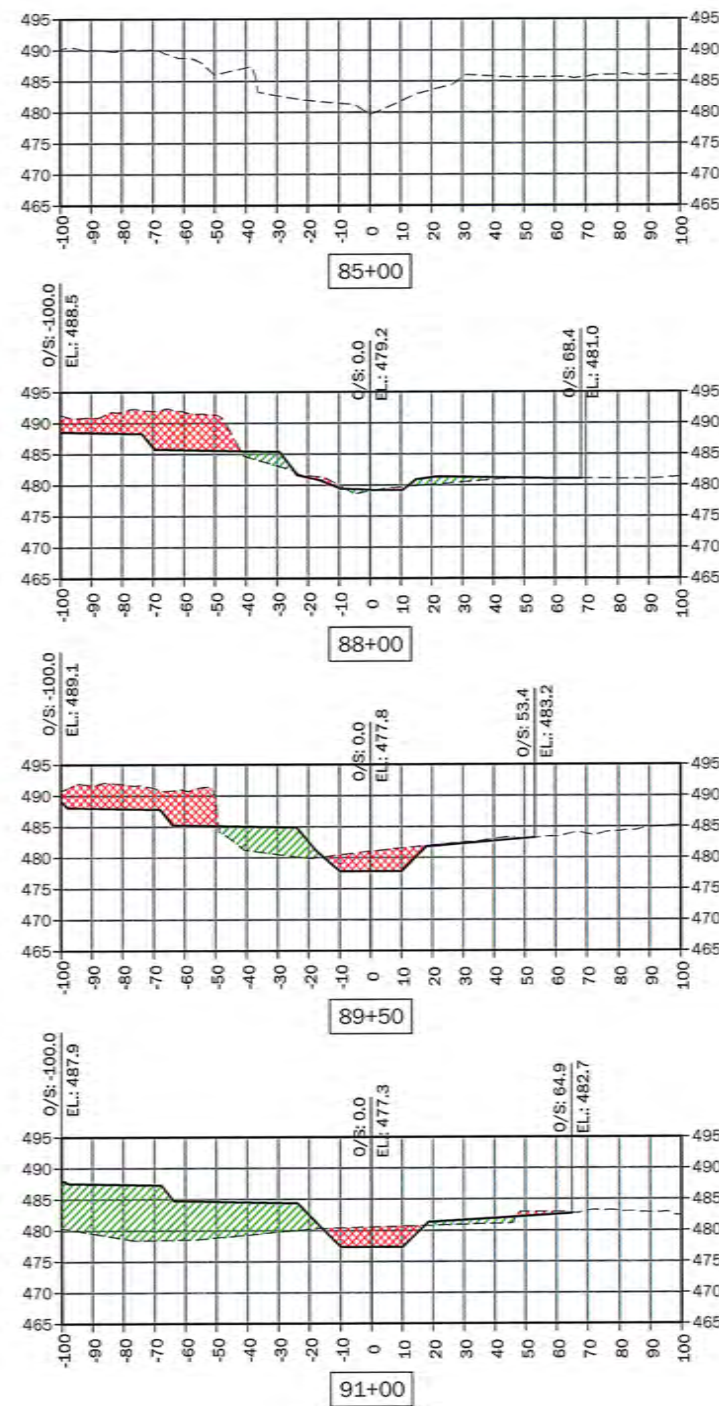
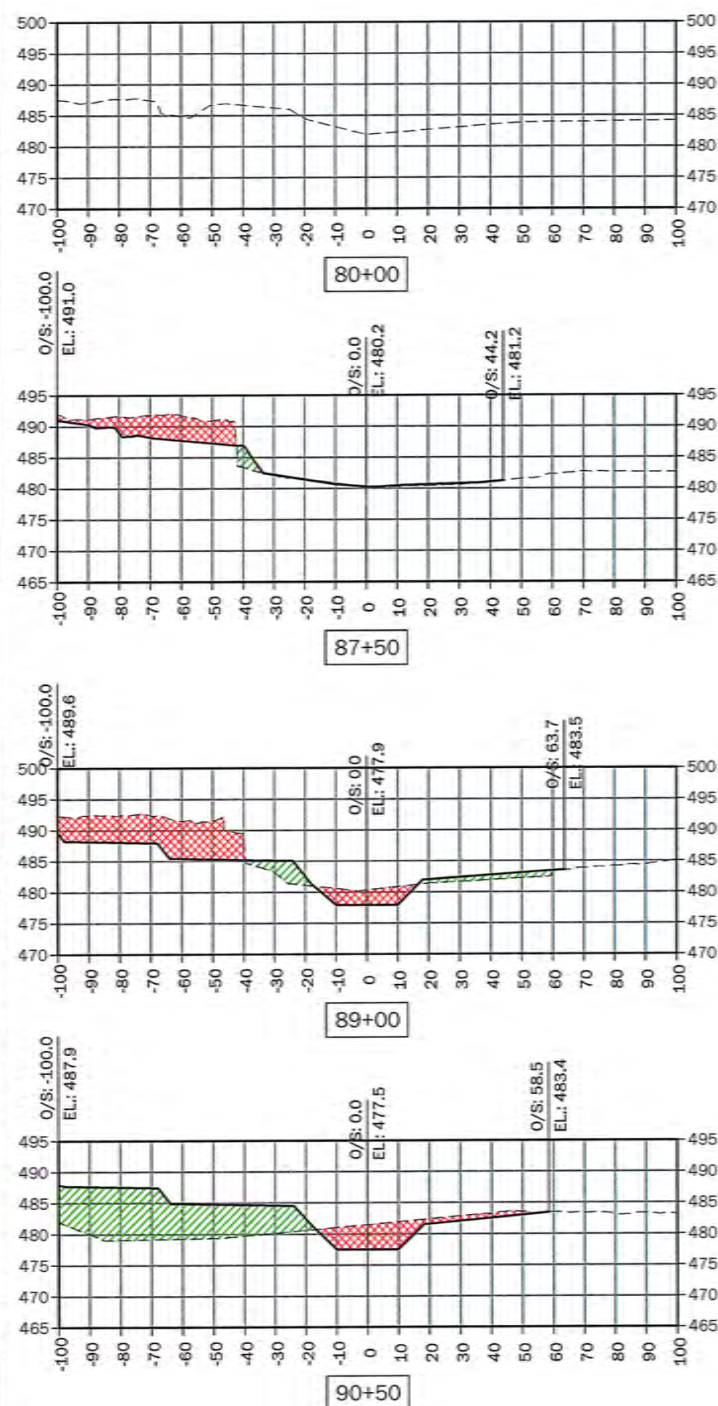


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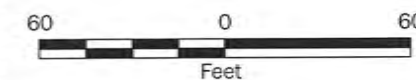
Main Channel Sections
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
8.3

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 - 3.
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VERTICAL EXAGGERATION = 2X
HORIZONTAL SCALE: 1" = 60'
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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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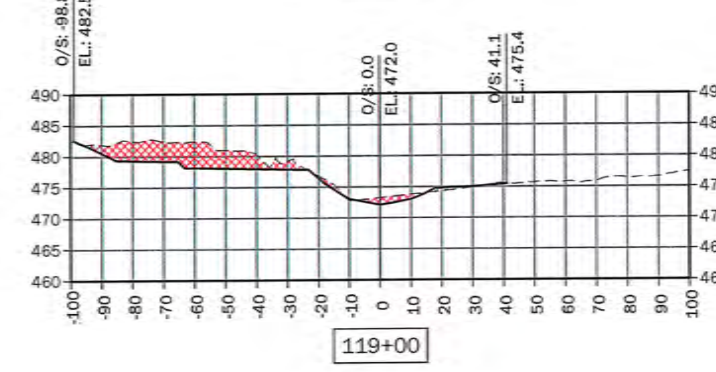
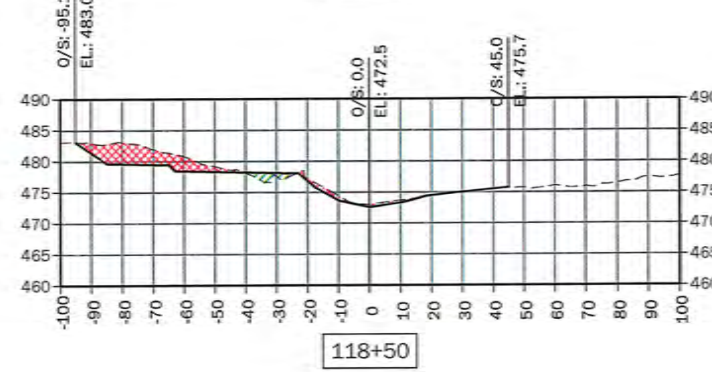
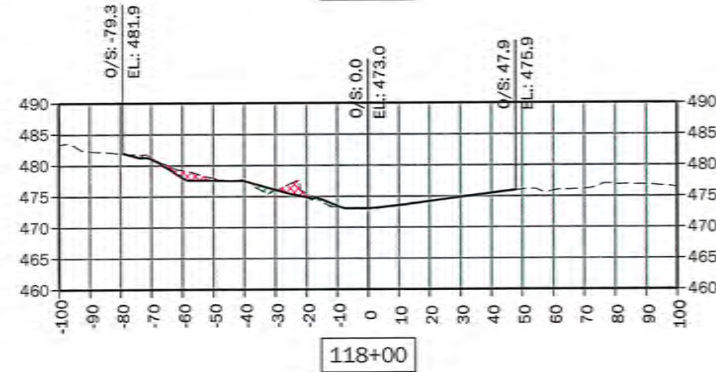
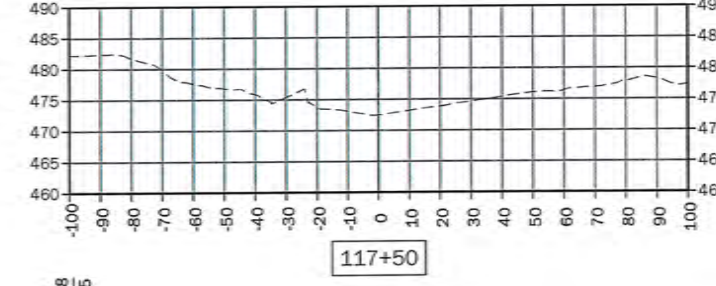
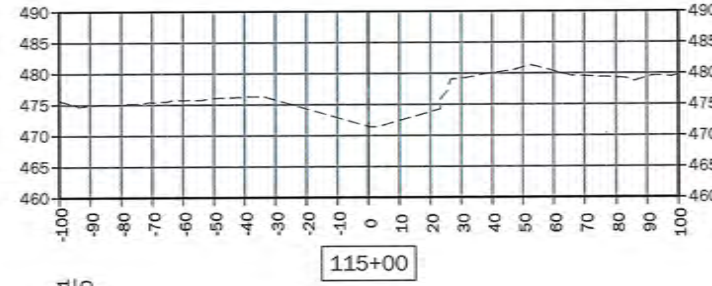
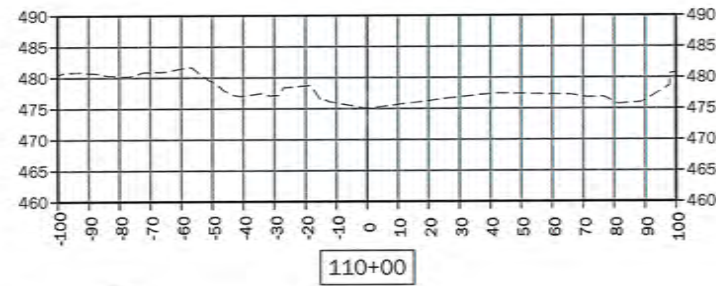
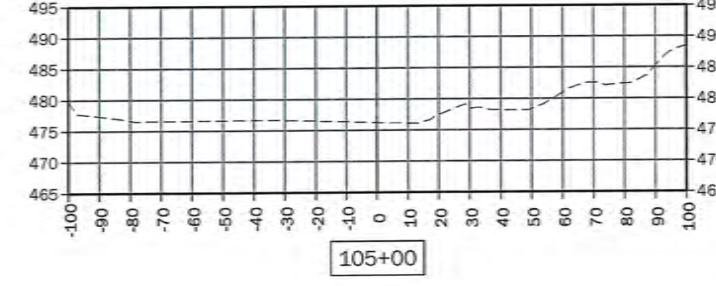
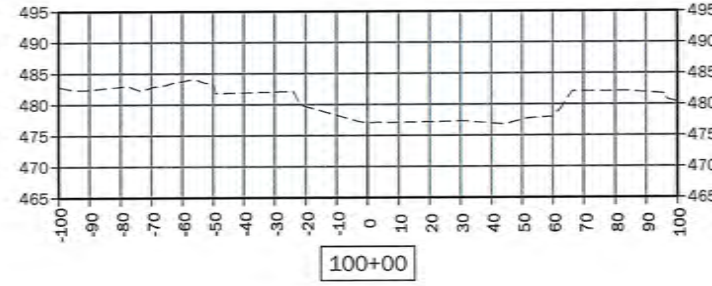
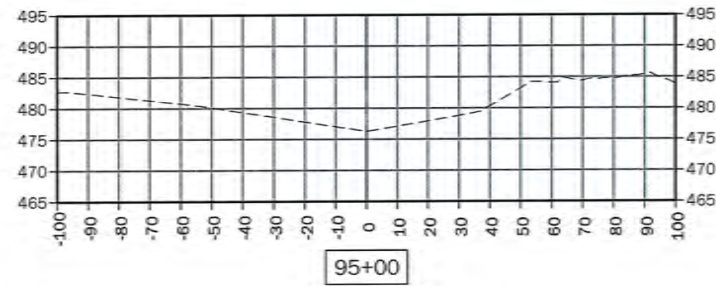
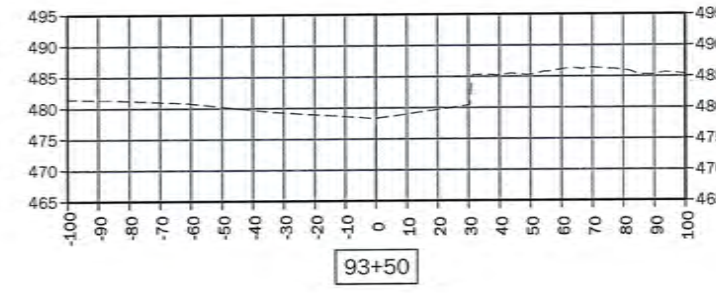
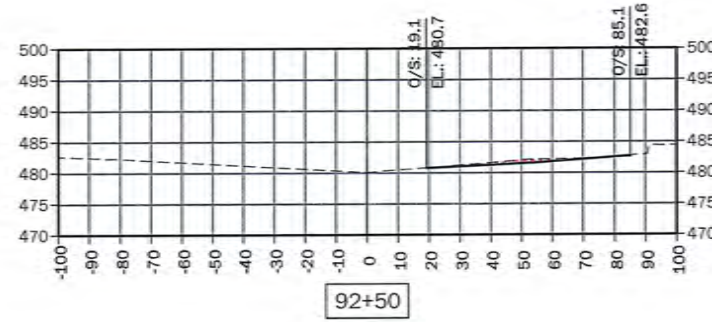
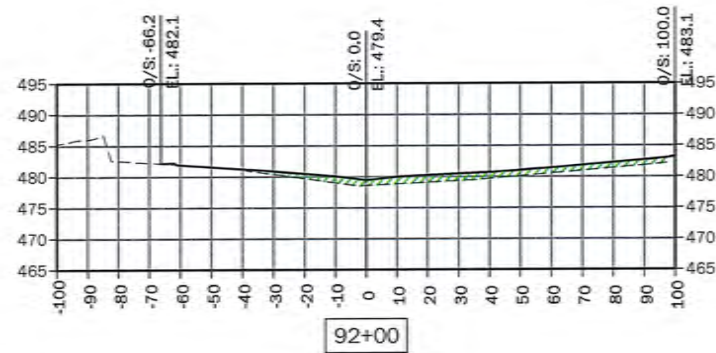
3501 West Elder Street, Suite 300
Boise, Idaho 83705

Main Channel Sections

Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
8.4

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\88.1- 8.6 - Main Channel Sections.dwg TAB:8.5 User: bmliller Plot time: Jul-11-16 @ 9:50am

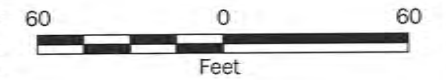


LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

NOTES:

- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE THALWEG ALIGNMENT.
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VERTICAL EXAGGERATION = 2X
HORIZONTAL SCALE: 1" = 60'
VERTICAL SCALE: 1" = 30'



7/12/2016

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				Checked: RSC, JRS
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Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

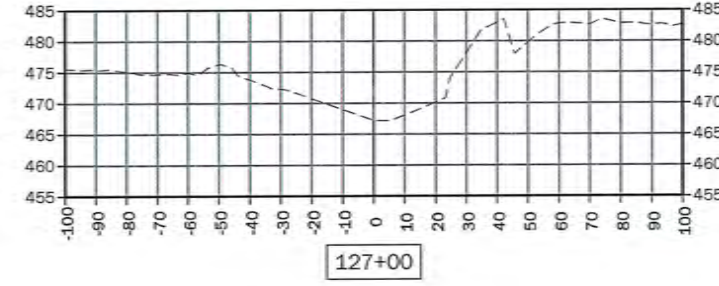
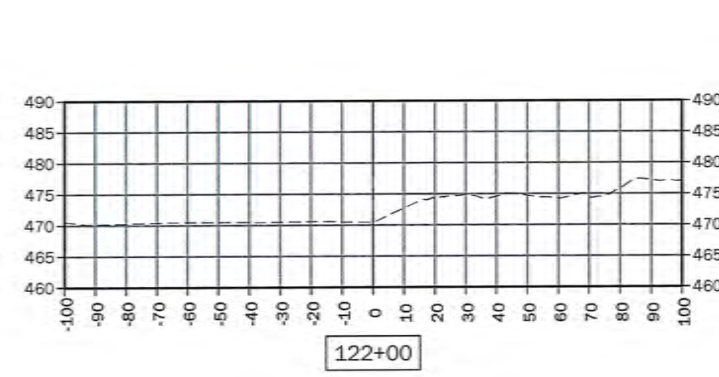
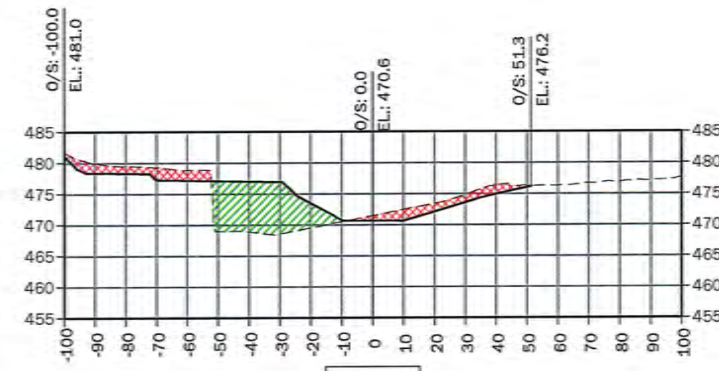
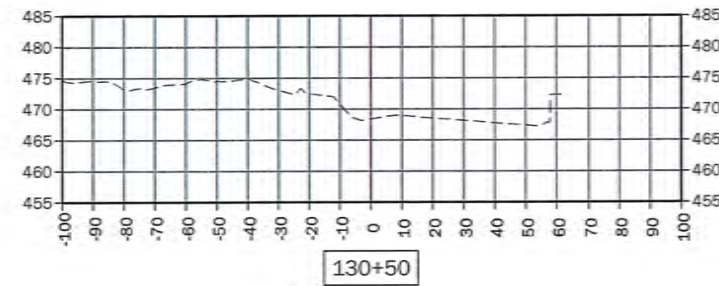
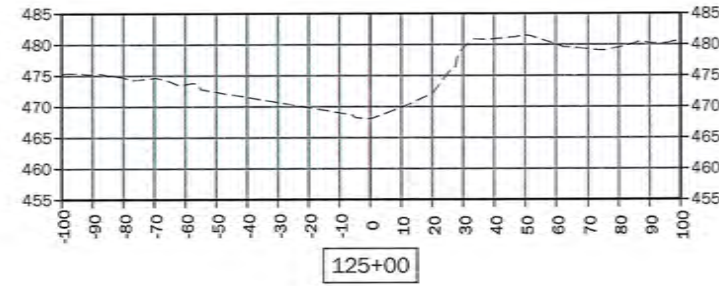
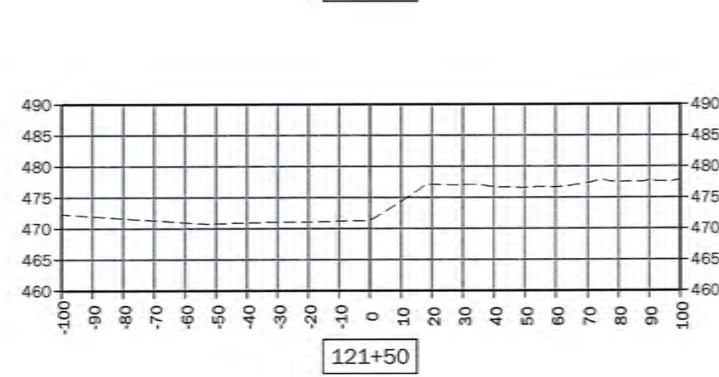
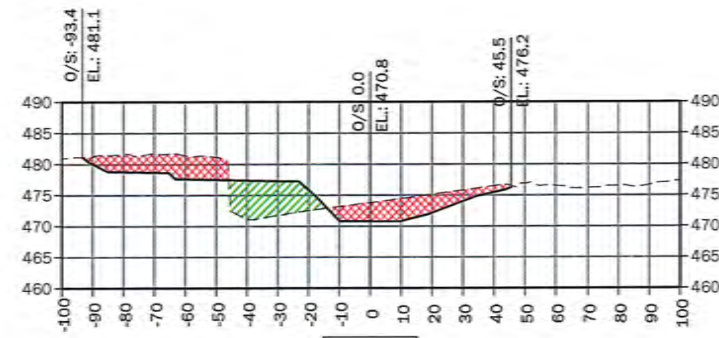
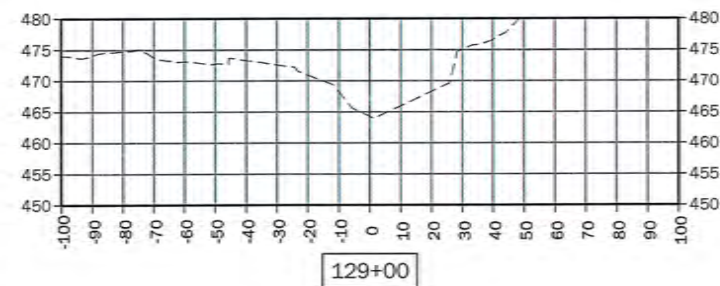
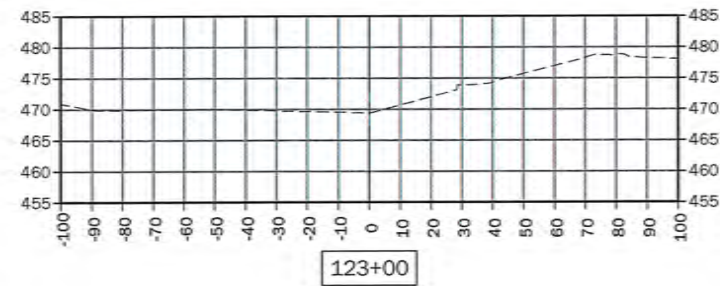
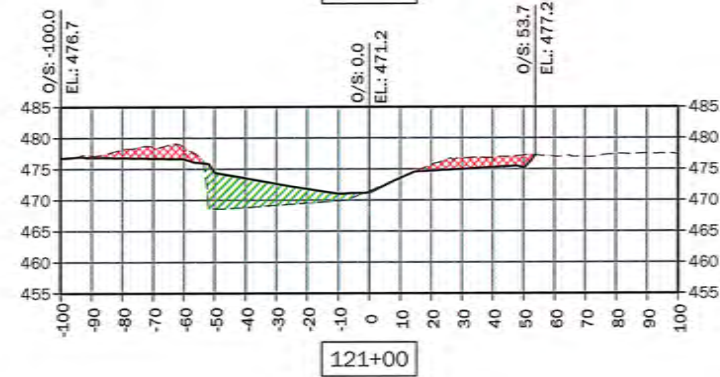
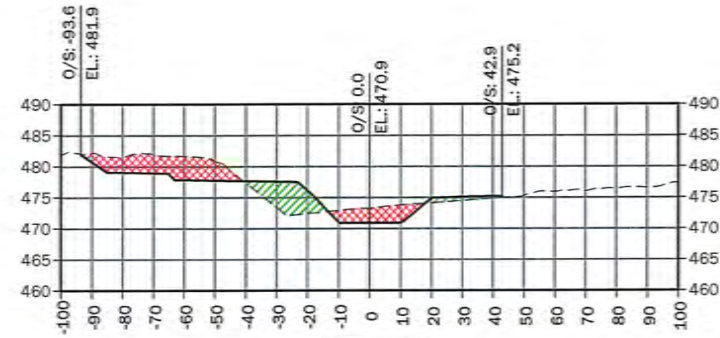


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Main Channel Sections
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
8.5

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\88.1-8.6 - Main Channel Sections.dwg TAB:8.6 User: bmiller Plot time: Jul-1-16 @ 9:50am



LEGEND

- PROPOSED FILL AREAS
- PROPOSED CUT AREAS

NOTES:

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60 0 60
Feet

VERTICAL EXAGGERATION = 2X
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VERTICAL SCALE: 1" = 30'



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				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

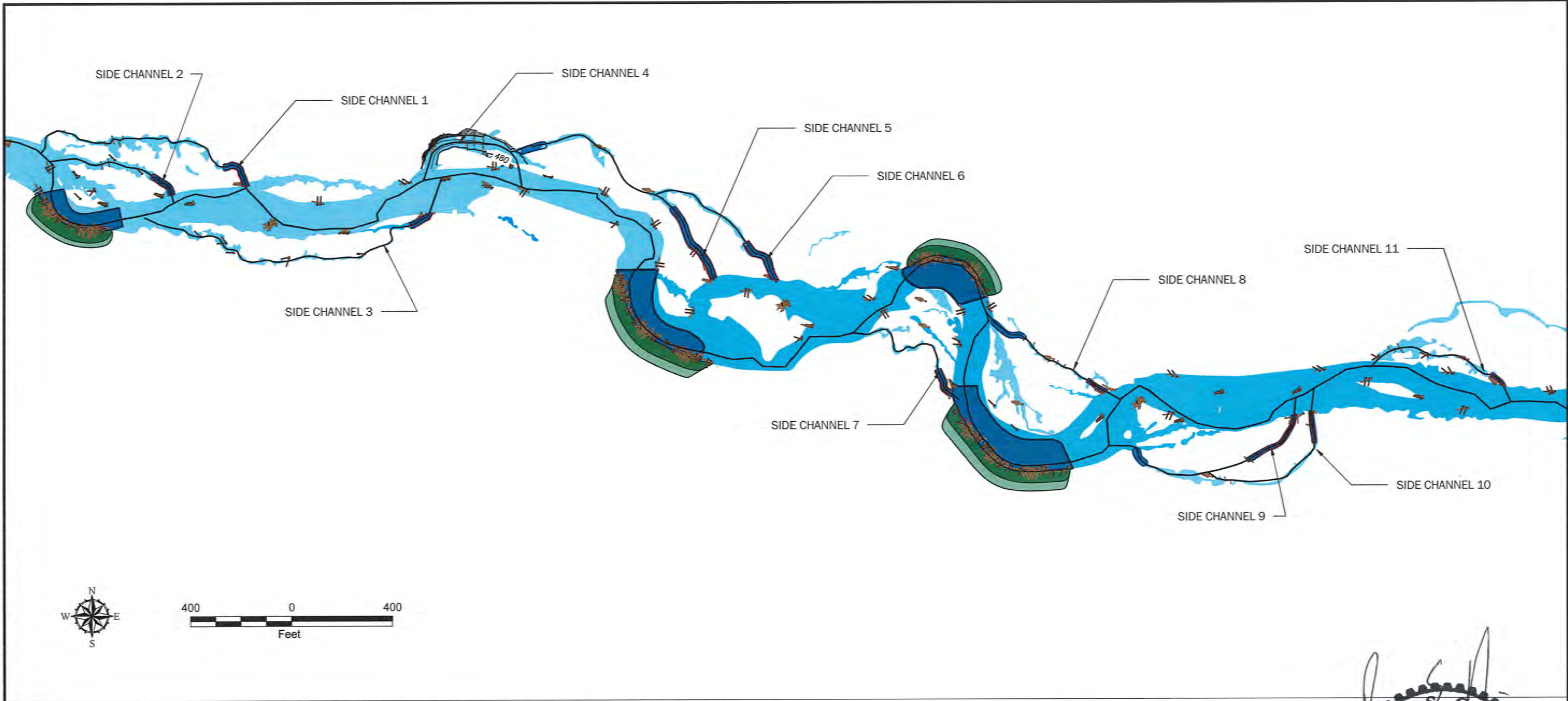


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Main Channel Sections
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
8.6

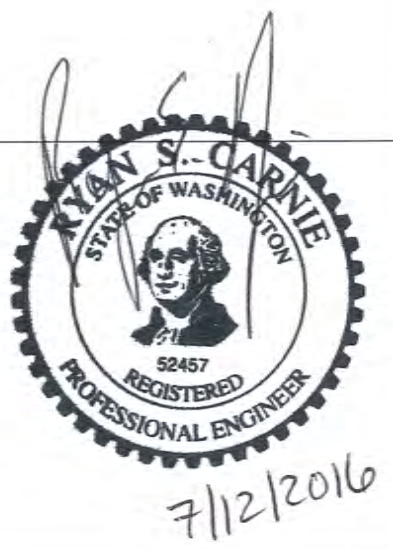
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LEGEND:

- | | | | |
|--|----------------------------|--|--------------------------------|
| | EXISTING CHANNEL | | LARGE WOOD |
| | PROPOSED CHANNEL | | APPROXIMATE DISTURBANCE LIMITS |
| | SIDE CHANNEL ENHANCEMENT | | PROPOSED MAJOR CONTOUR |
| | PROPOSED CHANNEL ALIGNMENT | | PROPOSED MINOR CONTOUR |
| | EXISTING CHANNEL ALIGNMENT | | EXISTING MAJOR CONTOUR |
| | TERRACE | | EXISTING MINOR CONTOUR |
| | | | PROPOSED GRADE |



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

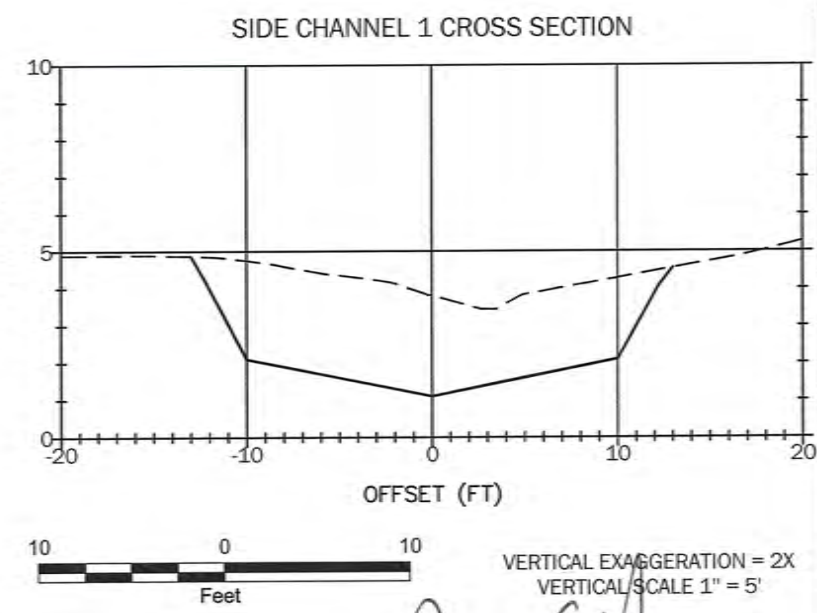
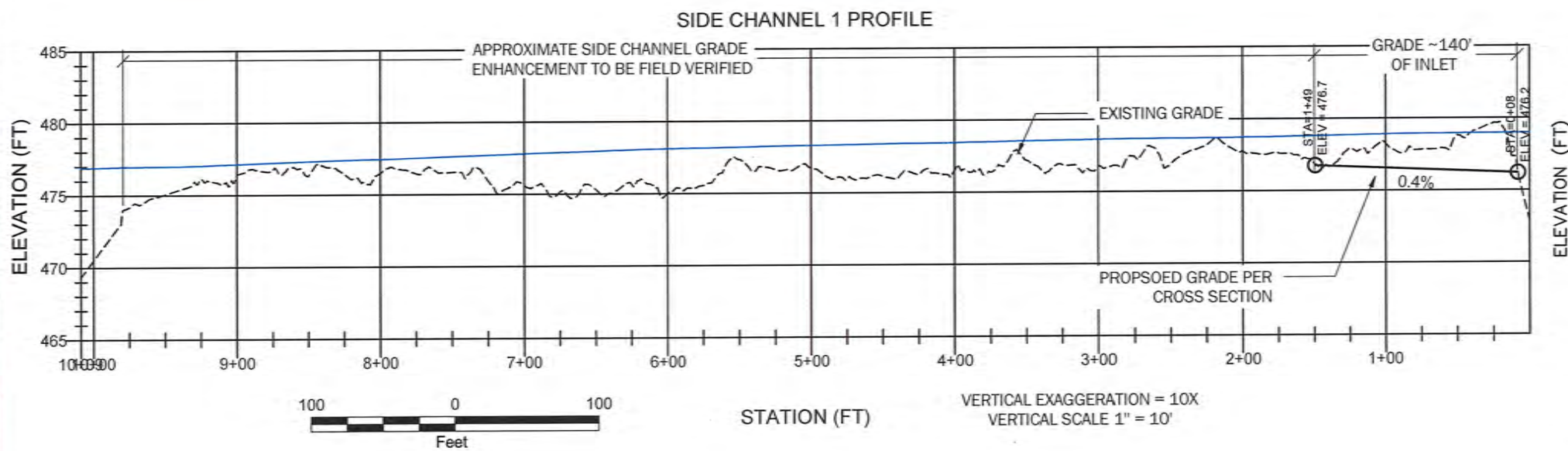
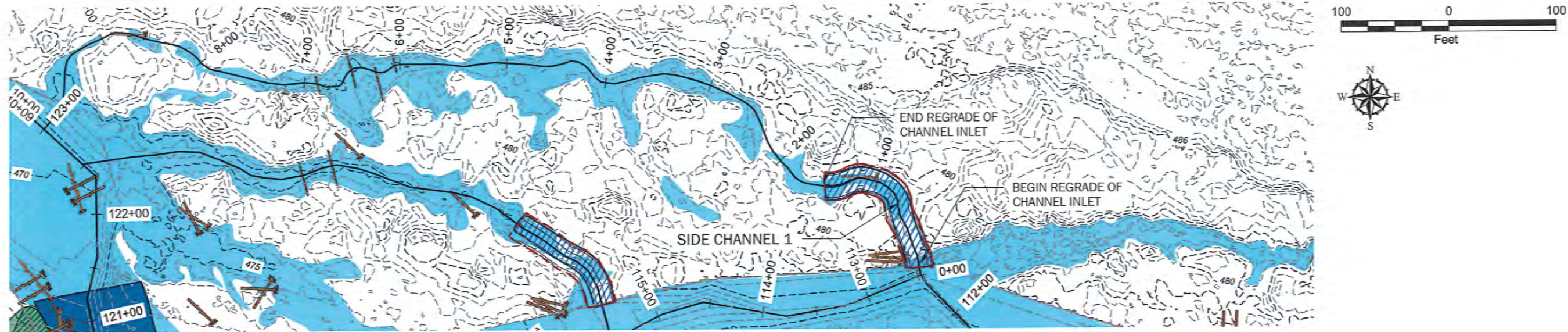


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**Proposed Side Channel Plan and
Profile Sheet Index**
Walla Walla River Bridge-to-Bridge
Design Drawings

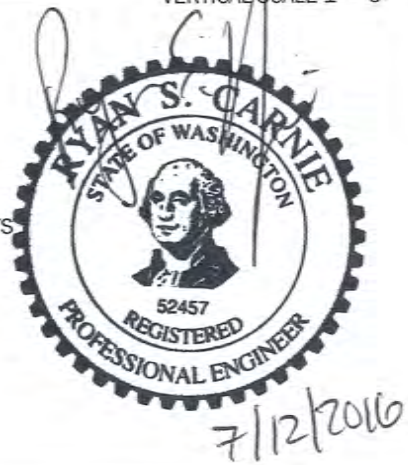
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- LEGEND:
- EXISTING CHANNEL
 - PROPOSED CHANNEL
 - SIDE CHANNEL ENHANCEMENT
 - PROPOSED CHANNEL ALIGNMENT
 - EXISTING CHANNEL ALIGNMENT
 - TERRACE
 - LARGE WOOD
 - APPROXIMATE DISTURBANCE LIMITS
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - PROPOSED GRADE



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

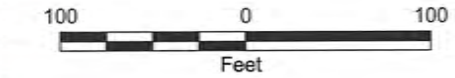
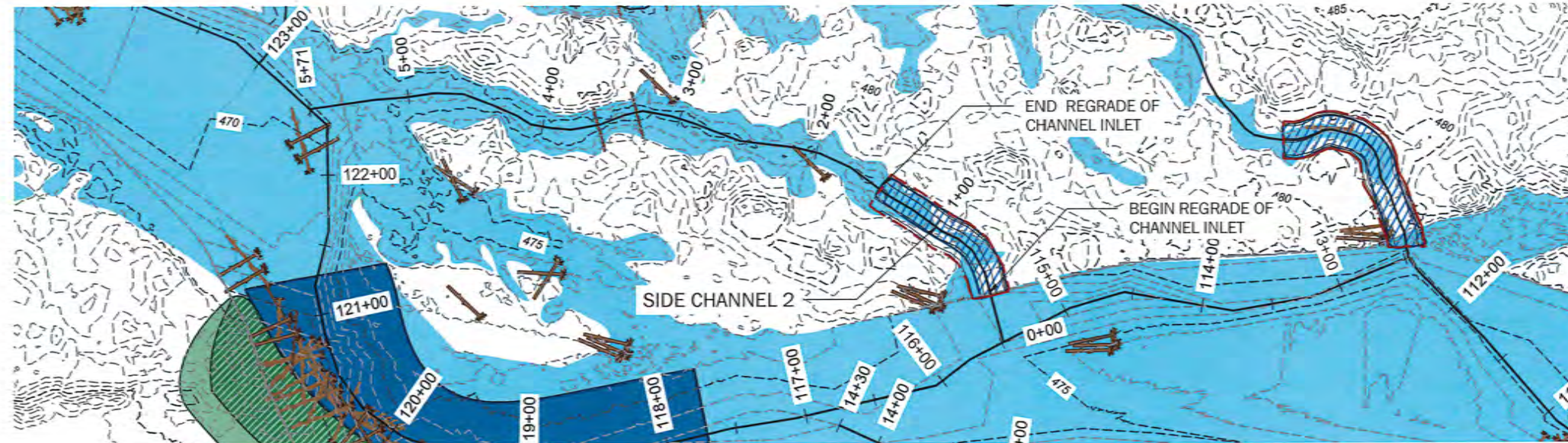
Tri-State Steelheaders



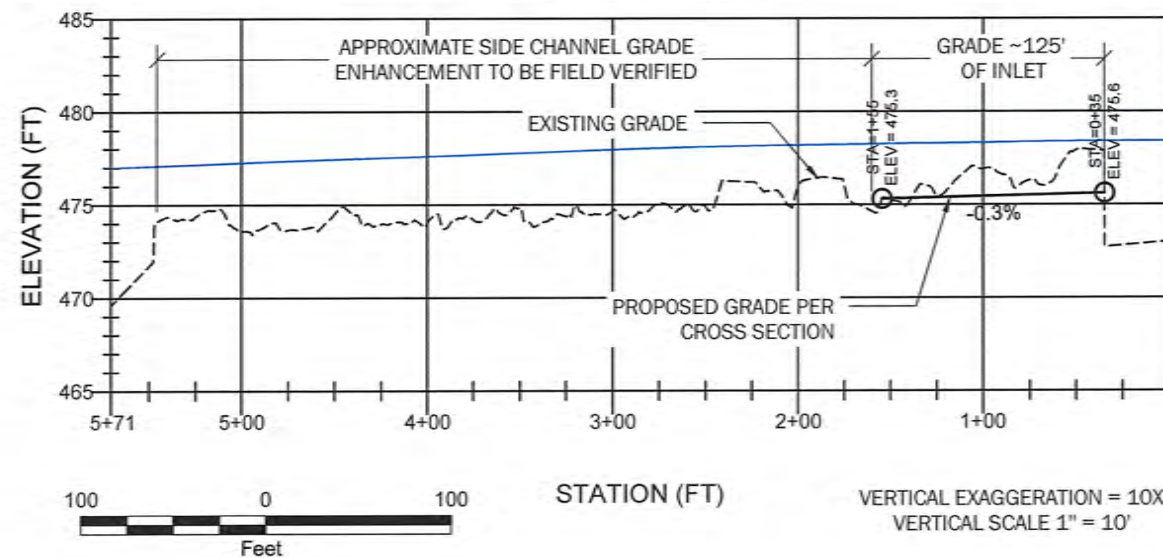
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Boise, Idaho 83705

**Proposed Side Channel 1
Plan and Profile**
Walla Walla River Bridge-to-Bridge
Design Drawings

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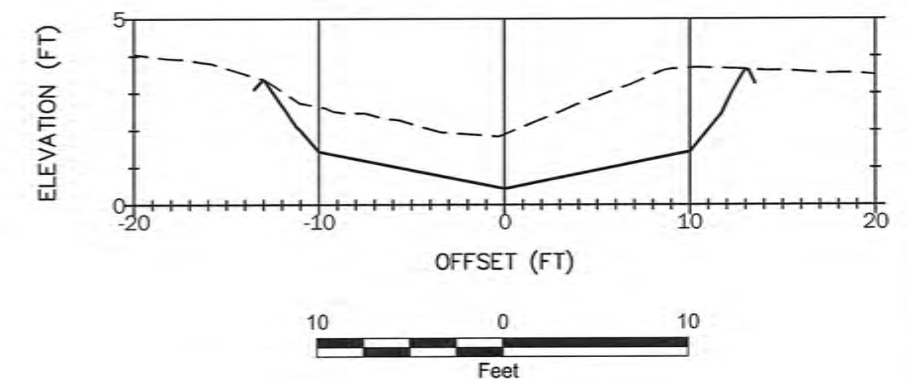


SIDE CHANNEL 2 PROFILE



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

SIDE CHANNEL 2 CROSS SECTION



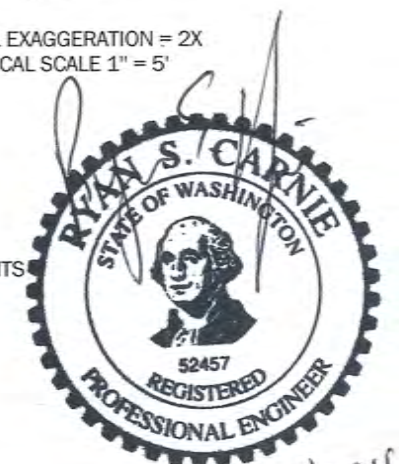
VERTICAL EXAGGERATION = 2X
VERTICAL SCALE 1" = 5'

LEGEND:

- | | | | |
|--|----------------------------|--|--------------------------------|
| | EXISTING CHANNEL | | LARGE WOOD |
| | PROPOSED CHANNEL | | APPROXIMATE DISTURBANCE LIMITS |
| | SIDE CHANNEL ENHANCEMENT | | PROPOSED MAJOR CONTOUR |
| | PROPOSED CHANNEL ALIGNMENT | | PROPOSED MINOR CONTOUR |
| | EXISTING CHANNEL ALIGNMENT | | EXISTING MAJOR CONTOUR |
| | TERRACE | | EXISTING MINOR CONTOUR |
| | | | PROPOSED GRADE |

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7/12/2016

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				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

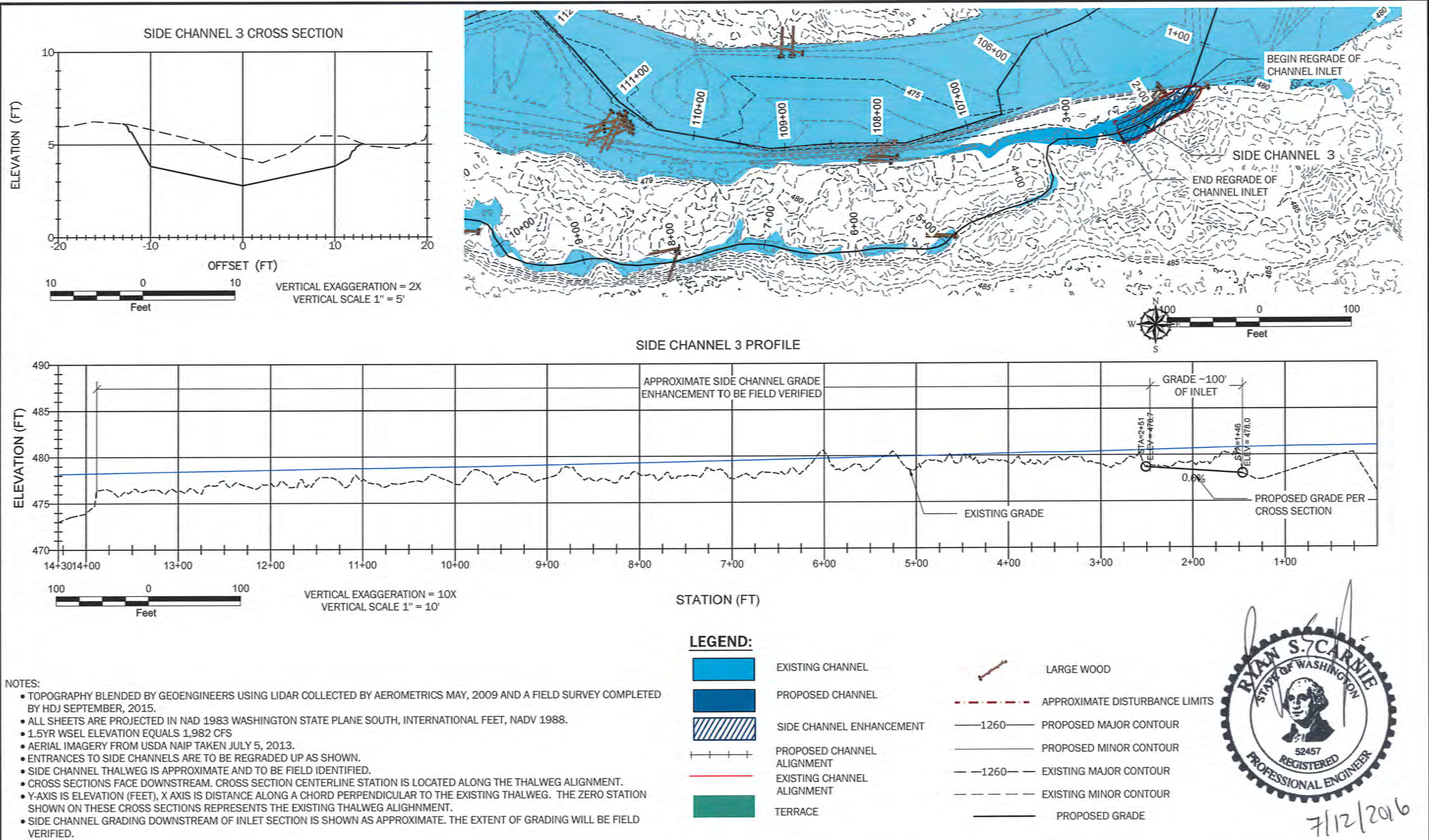


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**Proposed Side Channel 2
Plan and Profile**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
9.3

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Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
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				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



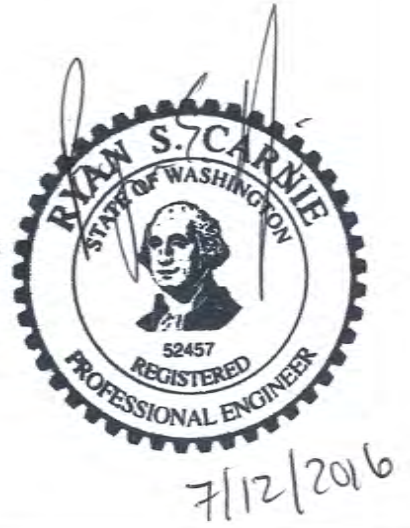
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Boise, Idaho 83705

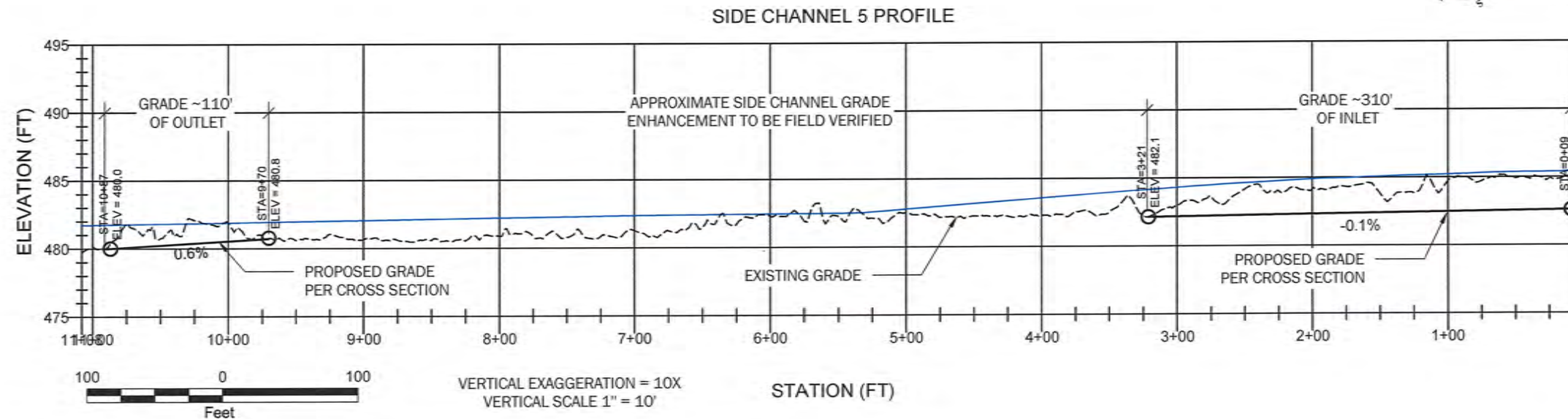
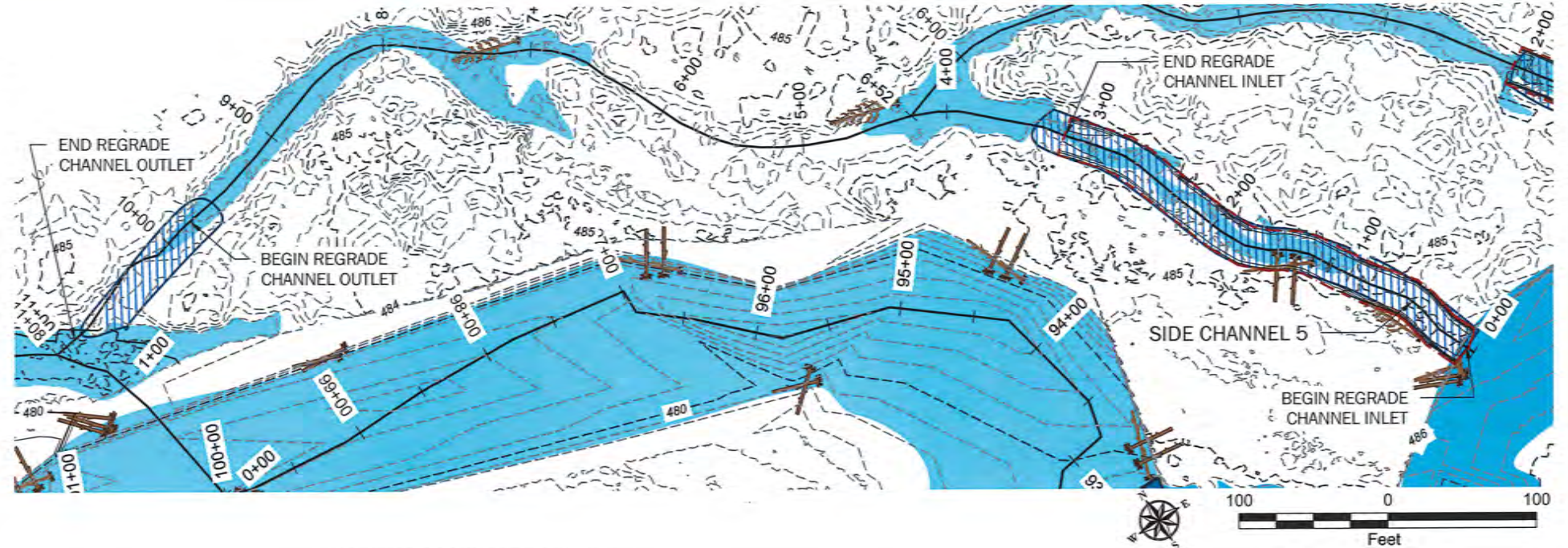
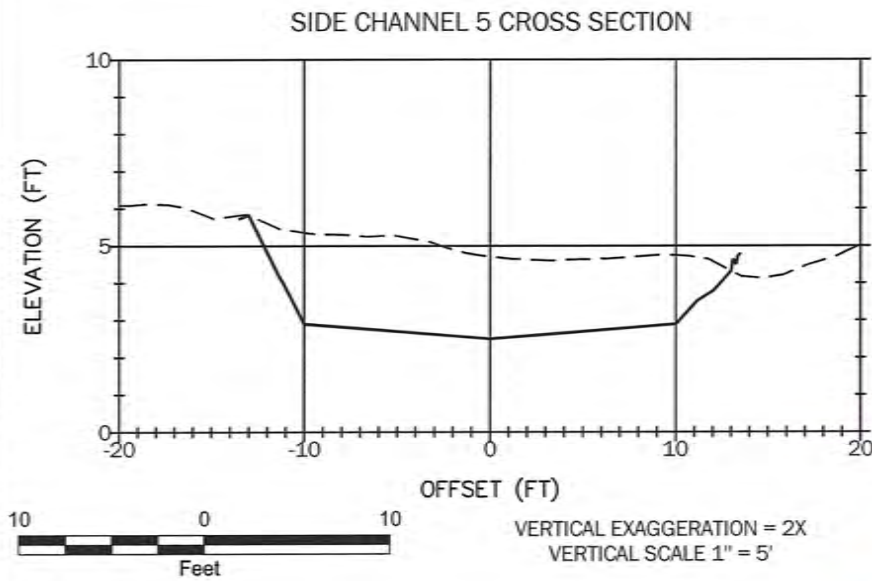
**Proposed Side Channel 3
Plan and Profile**

Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
9.4



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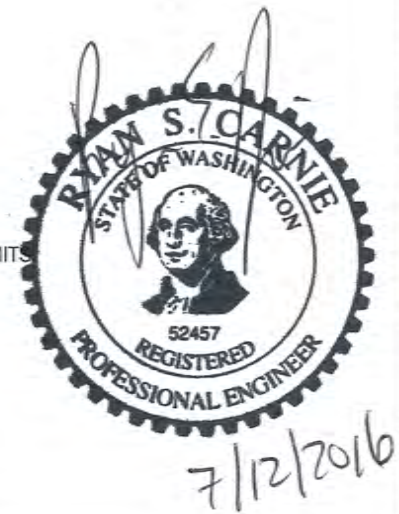


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LEGEND:

- | | | | |
|--|----------------------------|--|--------------------------------|
| | EXISTING CHANNEL | | LARGE WOOD |
| | PROPOSED CHANNEL | | APPROXIMATE DISTURBANCE LIMITS |
| | SIDE CHANNEL ENHANCEMENT | | PROPOSED MAJOR CONTOUR |
| | PROPOSED CHANNEL ALIGNMENT | | PROPOSED MINOR CONTOUR |
| | EXISTING CHANNEL ALIGNMENT | | EXISTING MAJOR CONTOUR |
| | TERRACE | | EXISTING MINOR CONTOUR |
| | | | PROPOSED GRADE |



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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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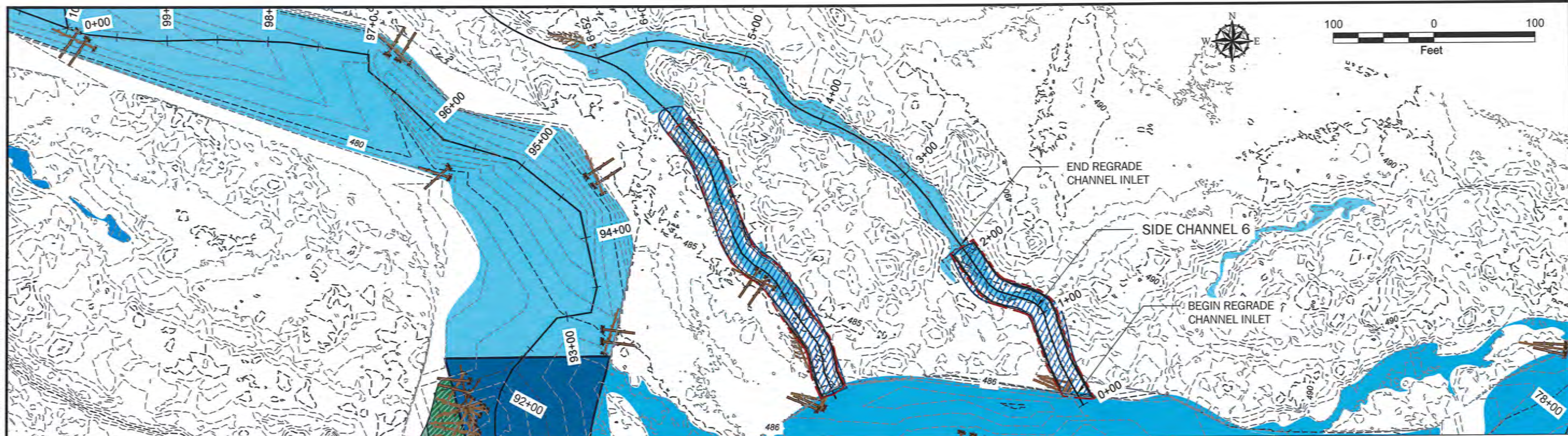
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**Proposed Side Channel 5
Plan and Profile**

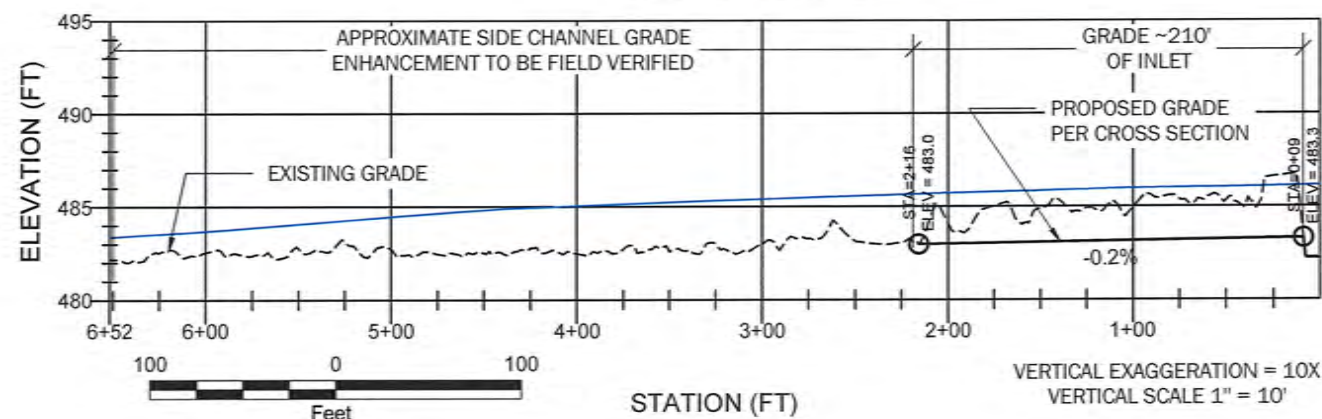
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
9.5

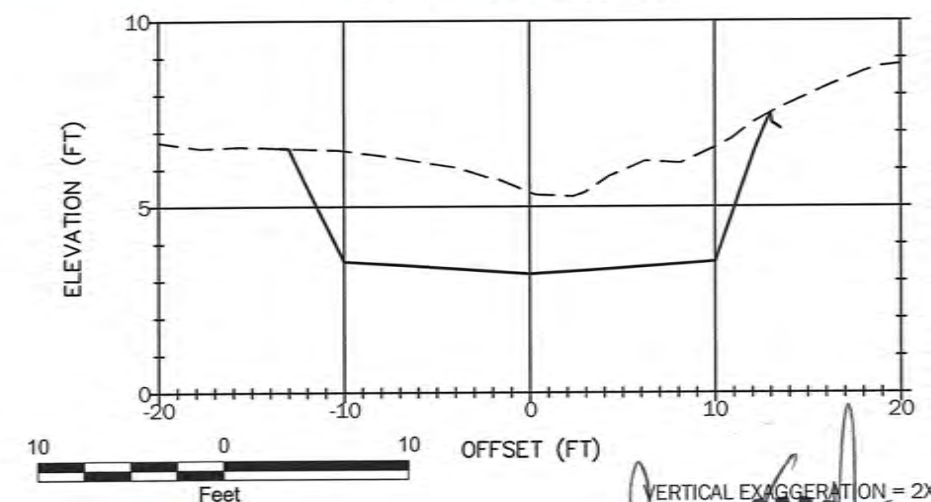
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SIDE CHANNEL 6 PROFILE



SIDE CHANNEL 6 CROSS SECTION

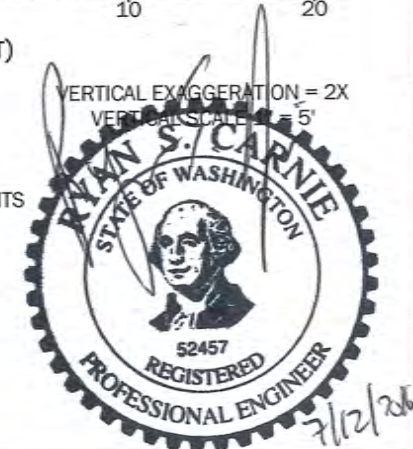


LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- PROPOSED CHANNEL ALIGNMENT
- EXISTING CHANNEL ALIGNMENT
- TERRACE
- LARGE WOOD
- APPROXIMATE DISTURBANCE LIMITS
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED GRADE

NOTES:

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Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

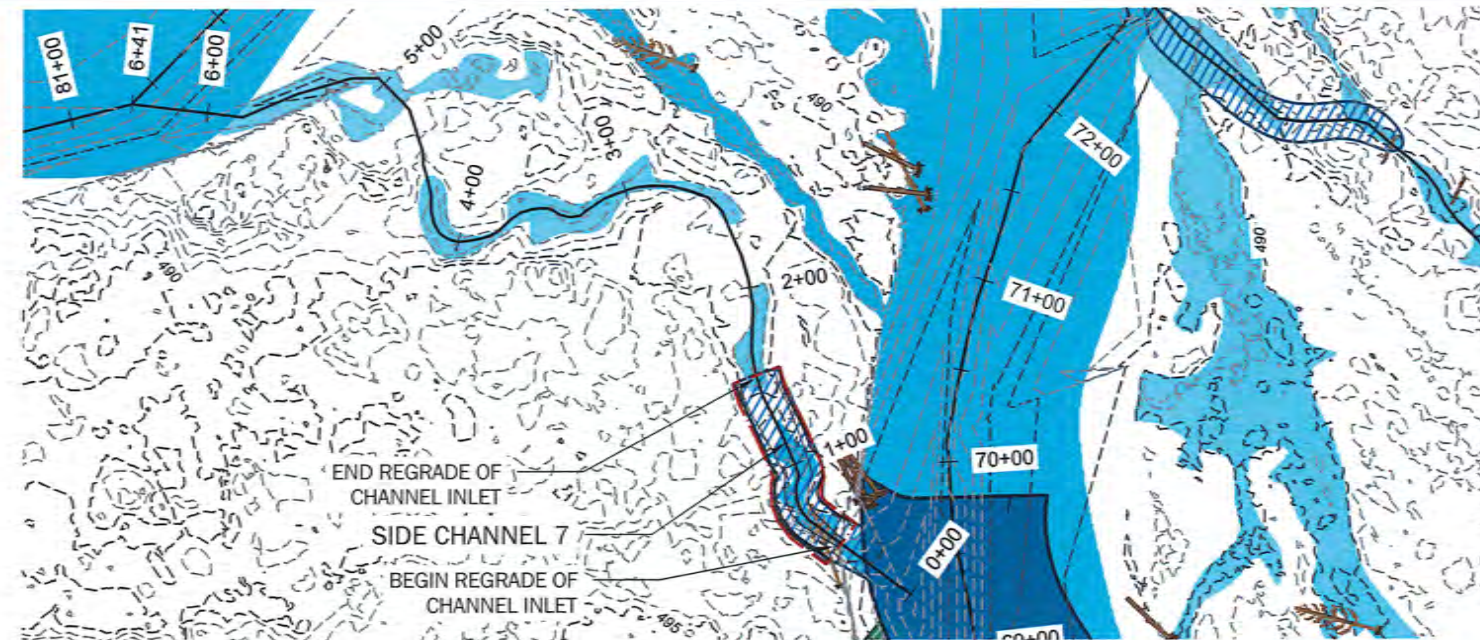


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**Proposed Side Channel 6
Plan and Profile**
Walla Walla River Bridge-to-Bridge
Design Drawings

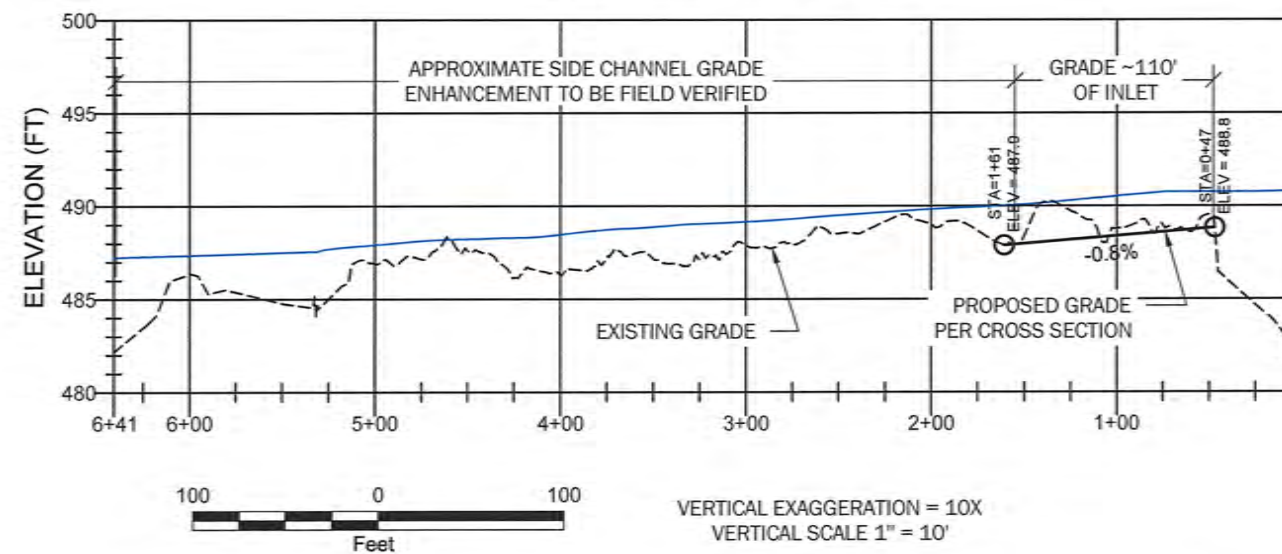
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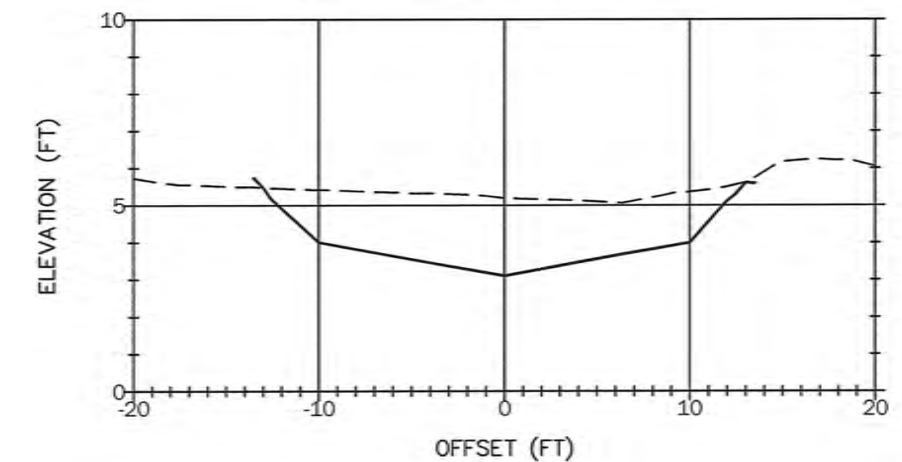


7/12/2016

SIDE CHANNEL 7 PROFILE



SIDE CHANNEL 7 CROSS SECTION



LEGEND:

- | | | | |
|--|----------------------------|--|--------------------------------|
| | EXISTING CHANNEL | | APPROXIMATE DISTURBANCE LIMITS |
| | PROPOSED CHANNEL | | PROPOSED MAJOR CONTOUR |
| | SIDE CHANNEL ENHANCEMENT | | PROPOSED MINOR CONTOUR |
| | PROPOSED CHANNEL ALIGNMENT | | EXISTING MAJOR CONTOUR |
| | EXISTING CHANNEL ALIGNMENT | | EXISTING MINOR CONTOUR |
| | TERRACE | | PROPOSED GRADE |
| | LARGE WOOD | | |

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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

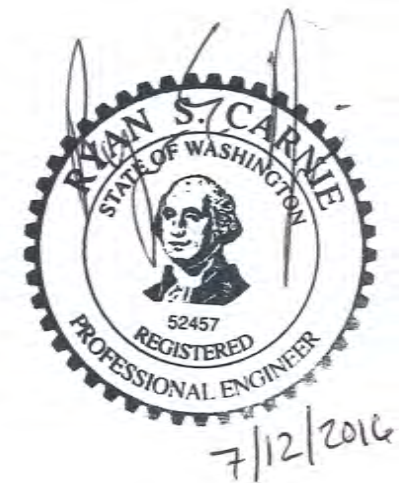
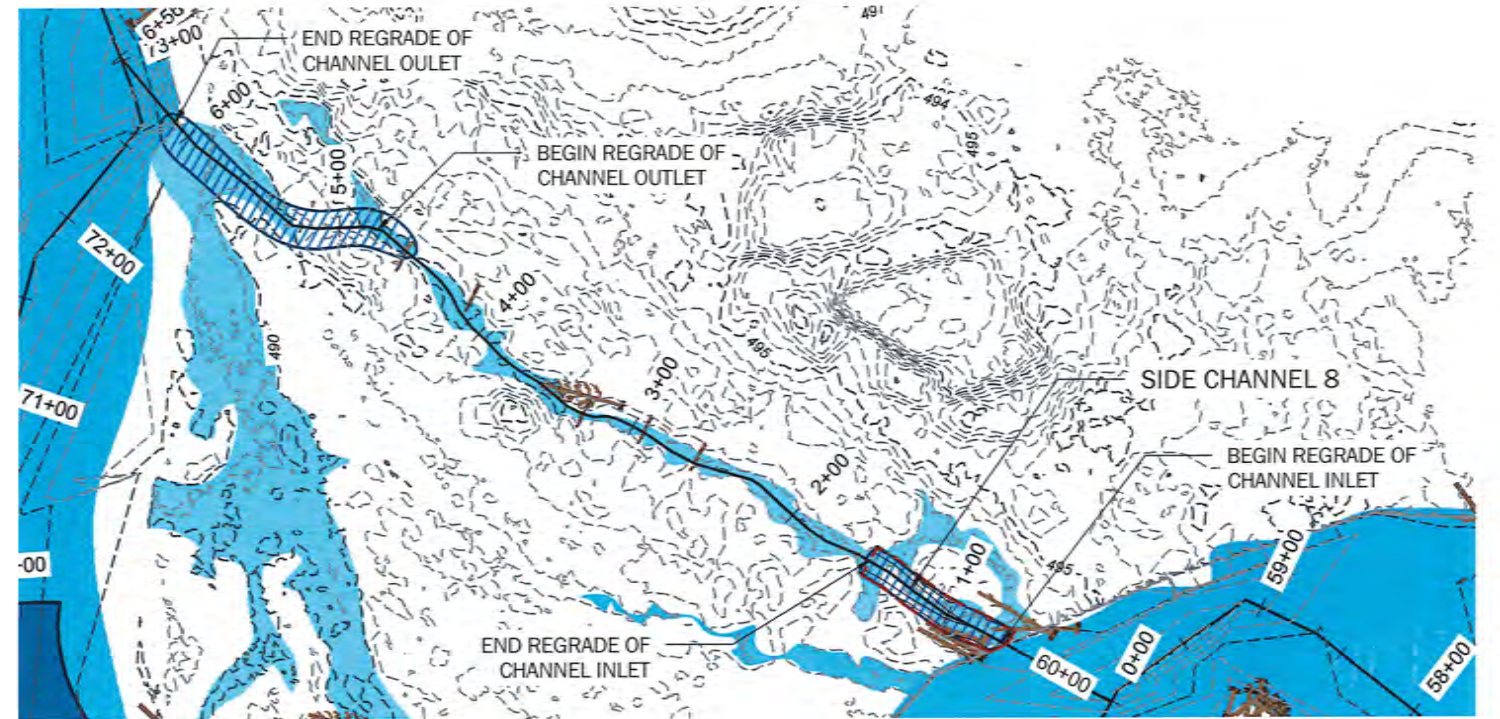
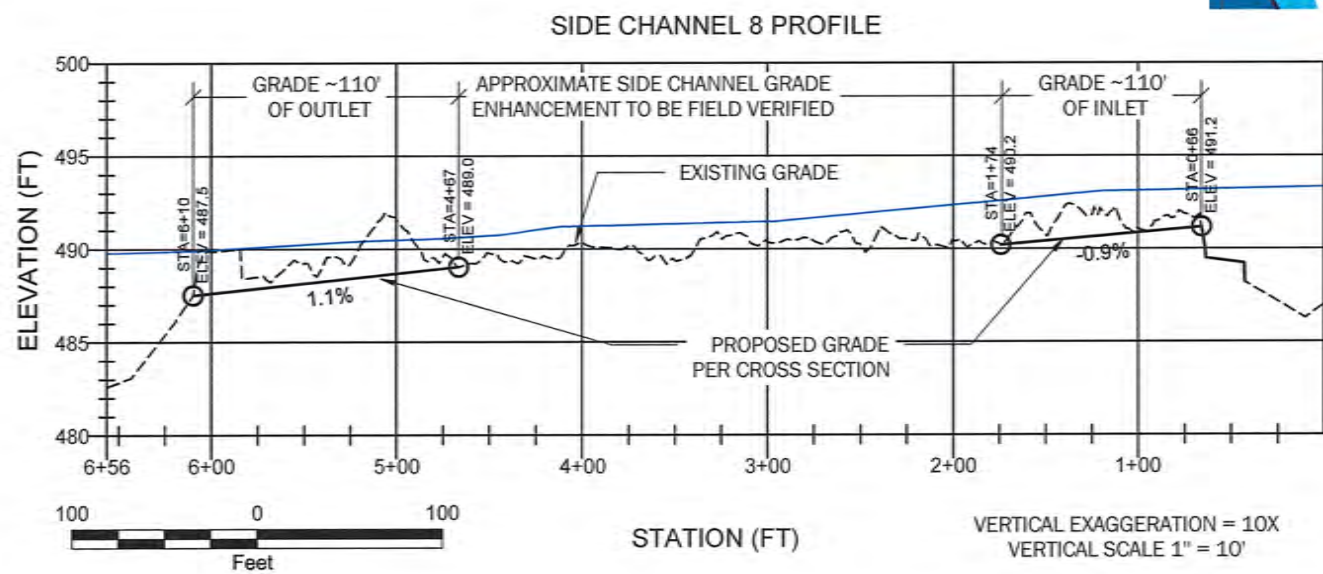
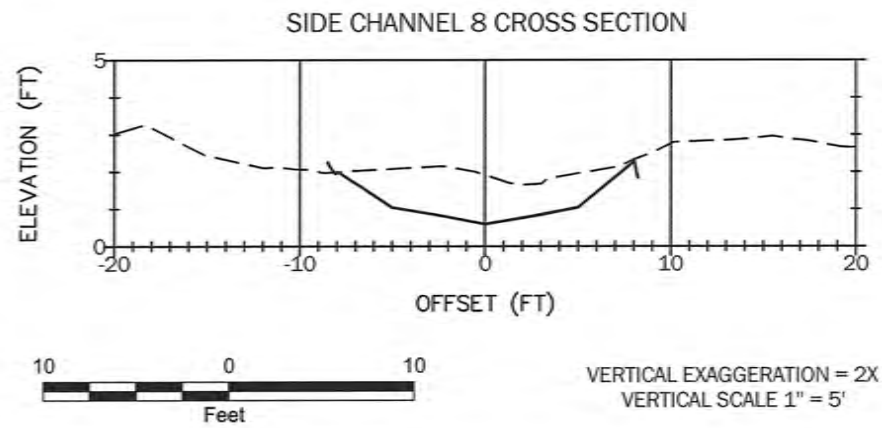


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**Proposed Side Channel 7
Plan and Profile**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
9.7

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\99.1-9.13 - Proposed Pilot Channel Plan and Profile.dwg TAB:9.8 User: bmliller Plot time: Jul-11-16 @ 9:53am



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LEGEND:

- | | | | |
|--|----------------------------|--|--------------------------------|
| | EXISTING CHANNEL | | LARGE WOOD |
| | PROPOSED CHANNEL | | APPROXIMATE DISTURBANCE LIMITS |
| | SIDE CHANNEL ENHANCEMENT | | PROPOSED MAJOR CONTOUR |
| | PROPOSED CHANNEL ALIGNMENT | | PROPOSED MINOR CONTOUR |
| | EXISTING CHANNEL ALIGNMENT | | EXISTING MAJOR CONTOUR |
| | TERRACE | | EXISTING MINOR CONTOUR |
| | | | PROPOSED GRADE |

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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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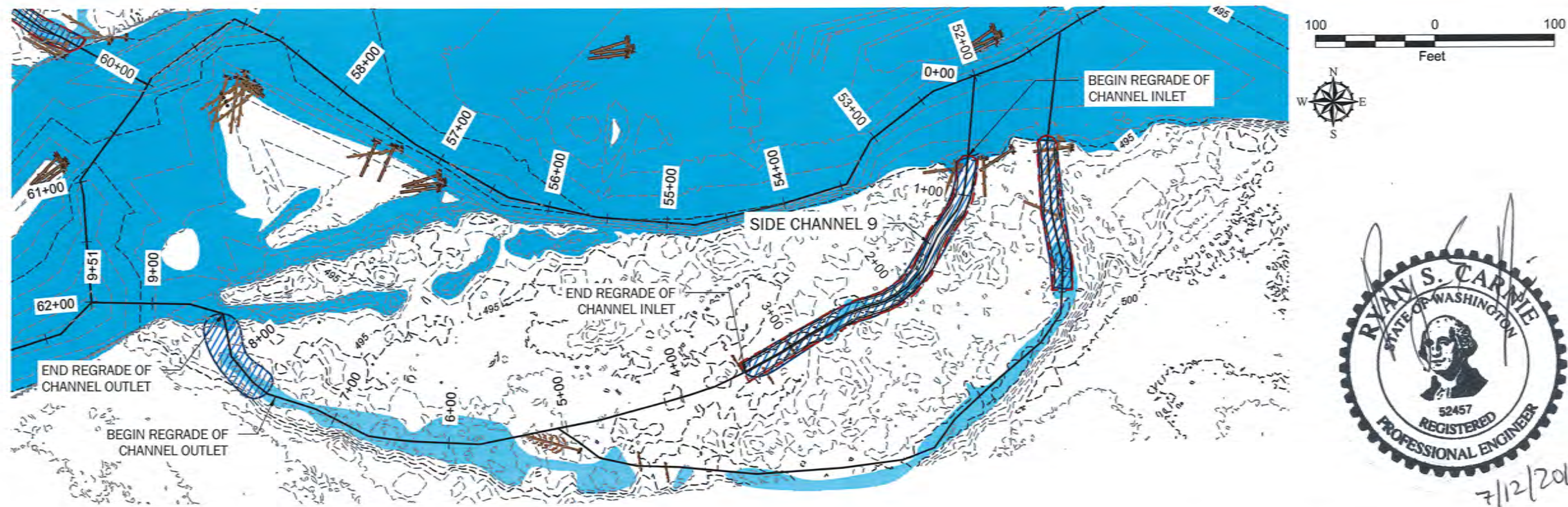
3501 West Elder Street, Suite 300
Boise, Idaho 83705

**Proposed Side Channel 8
Plan and Profile**

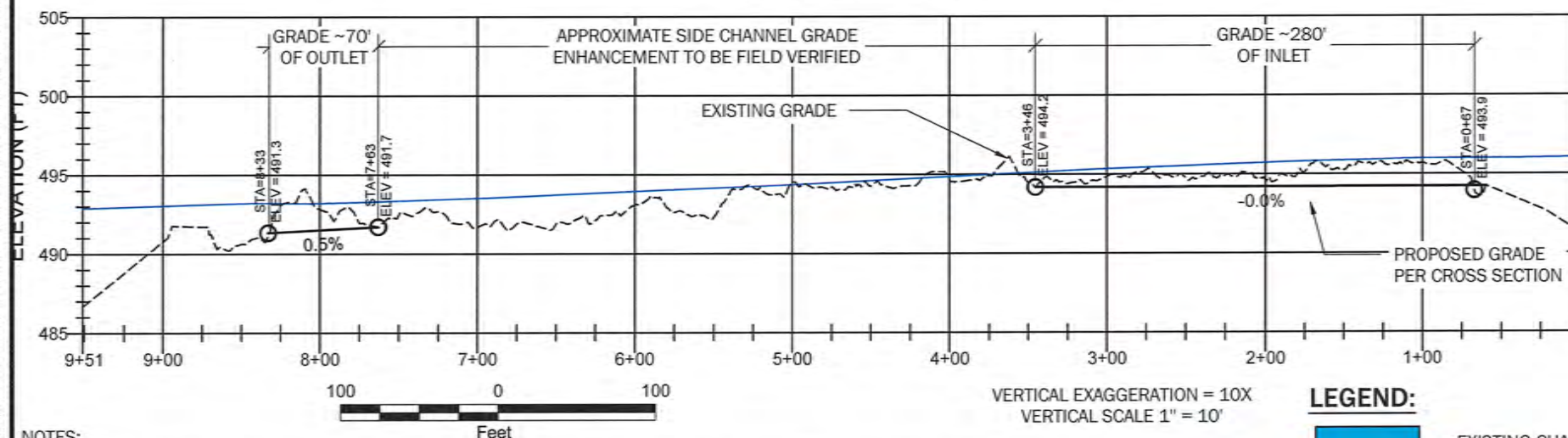
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
9.8

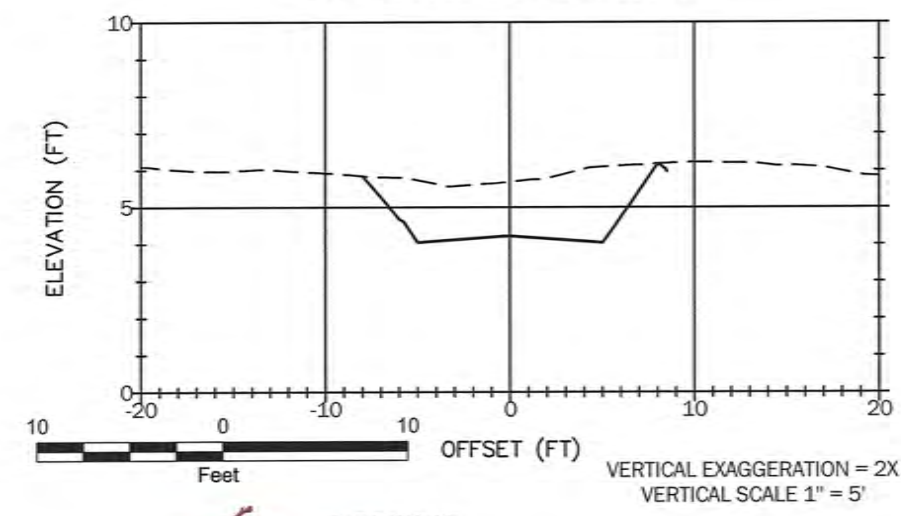
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SIDE CHANNEL 9 PROFILE



SIDE CHANNEL 9 CROSS SECTION



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- SIDE CHANNEL THALWEG IS APPROXIMATE AND TO BE FIELD IDENTIFIED.
- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE THALWEG ALIGNMENT.
- Y-AXIS IS ELEVATION (FEET), X AXIS IS DISTANCE ALONG A CHORD PERPENDICULAR TO THE EXISTING THALWEG. THE ZERO STATION SHOWN ON THESE CROSS SECTIONS REPRESENTS THE EXISTING THALWEG ALIGNMENT.
- SIDE CHANNEL GRADING DOWNSTREAM OF INLET SECTION IS SHOWN AS APPROXIMATE. THE EXTENT OF GRADING WILL BE FIELD VERIFIED.

LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- PROPOSED CHANNEL ALIGNMENT
- EXISTING CHANNEL ALIGNMENT
- TERRACE
- LARGE WOOD
- APPROXIMATE DISTURBANCE LIMITS
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED GRADE

Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

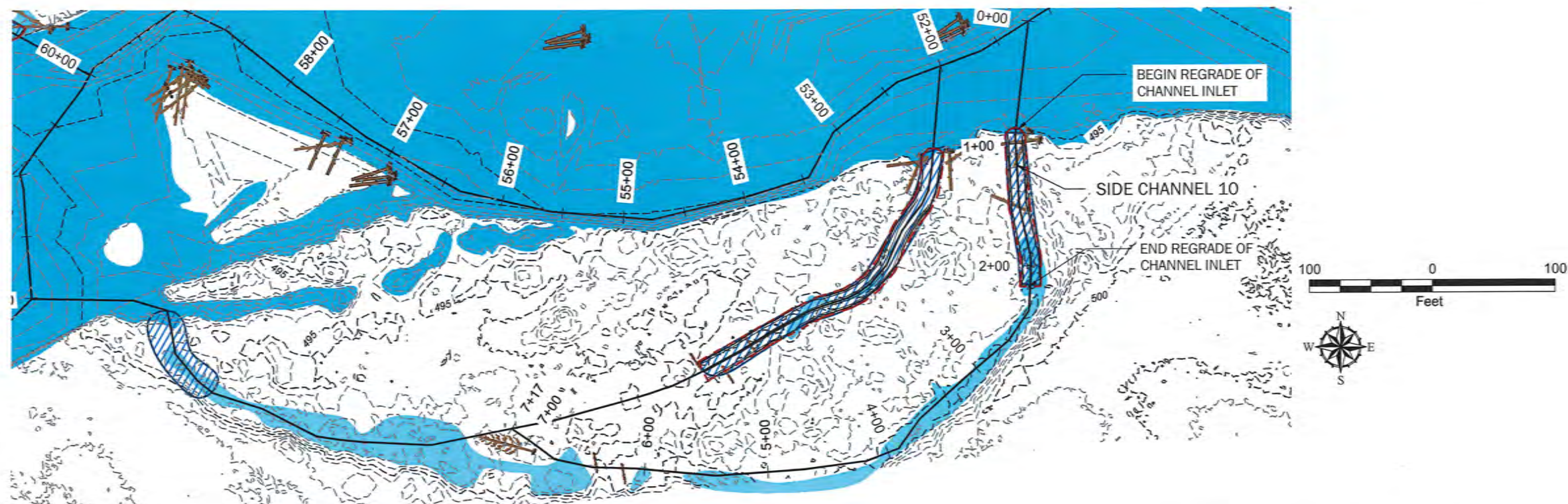


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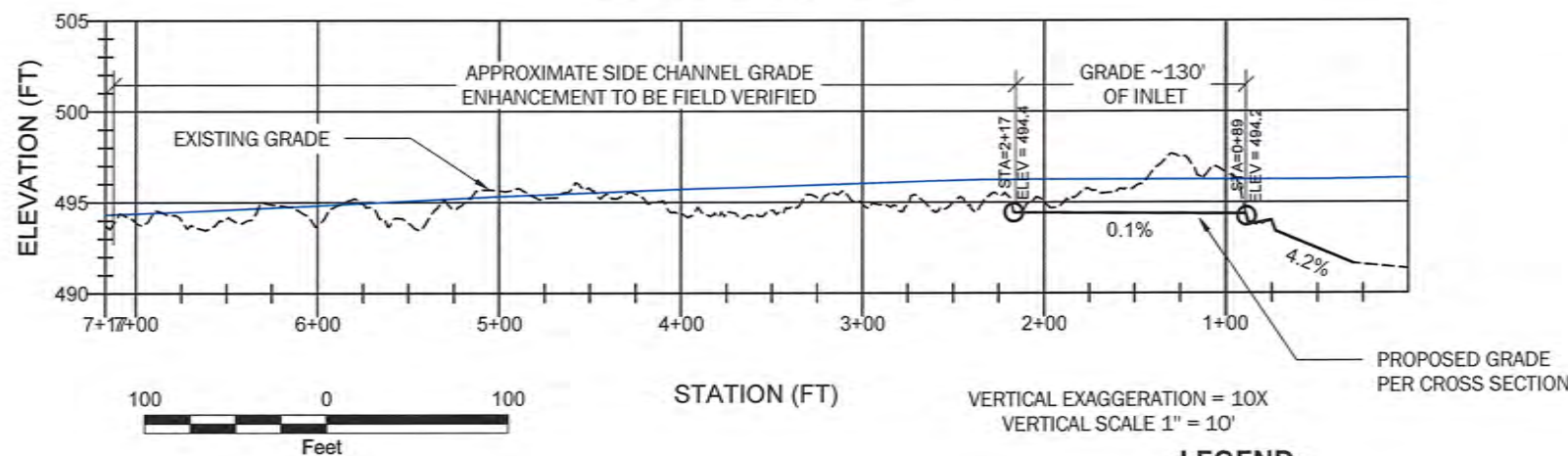
**Proposed Side Channel 9
Plan and Profile**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
9.9

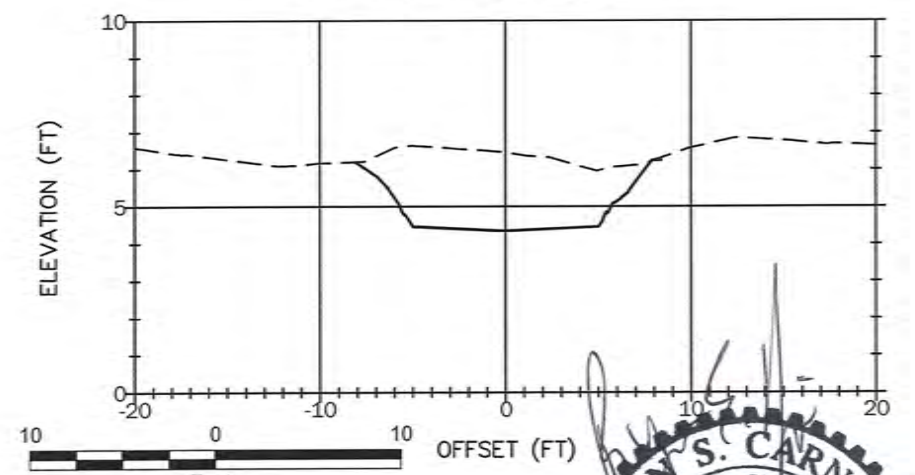
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SIDE CHANNEL 10 PROFILE



SIDE CHANNEL 10 CROSS SECTION

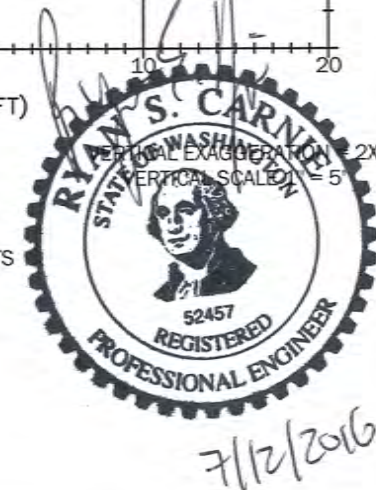


NOTES:

- TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.
- 1.5YR WSEL ELEVATION EQUALS 1,982 CFS
- AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.
- ENTRANCES TO SIDE CHANNELS ARE TO BE REGRADED UP AS SHOWN.
- SIDE CHANNEL THALWEG IS APPROXIMATE AND TO BE FIELD IDENTIFIED.
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- SIDE CHANNEL GRADING DOWNSTREAM OF INLET SECTION IS SHOWN AS APPROXIMATE. THE EXTENT OF GRADING WILL BE FIELD VERIFIED.

LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- PROPOSED CHANNEL ALIGNMENT
- EXISTING CHANNEL ALIGNMENT
- TERRACE
- LARGE WOOD
- APPROXIMATE DISTURBANCE LIMITS
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- PROPOSED GRADE



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

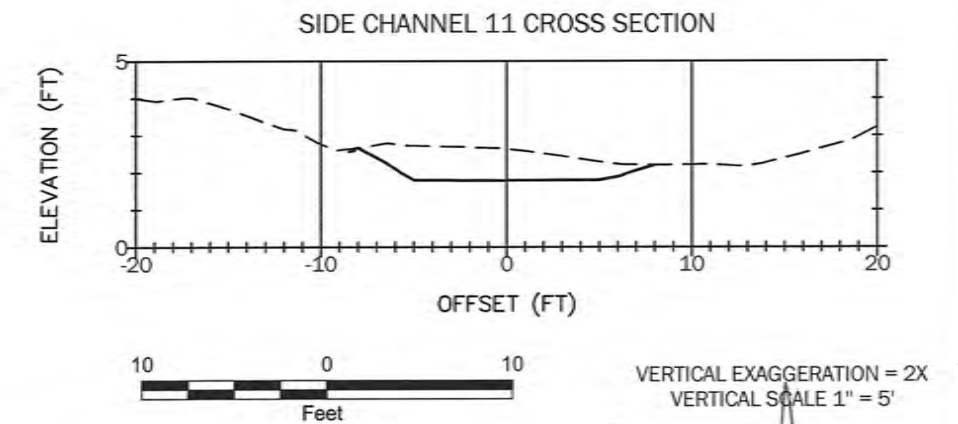
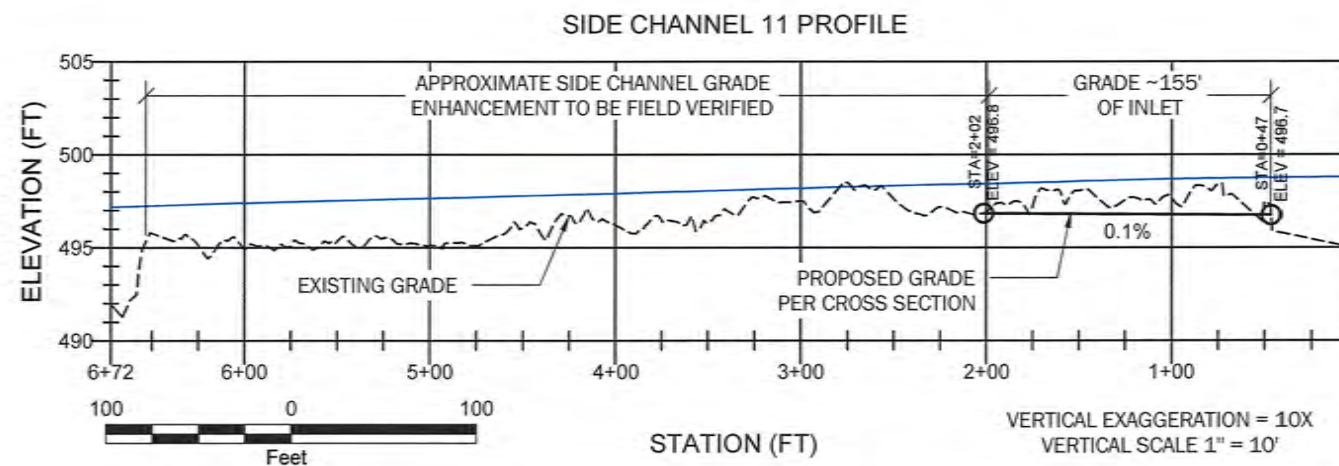
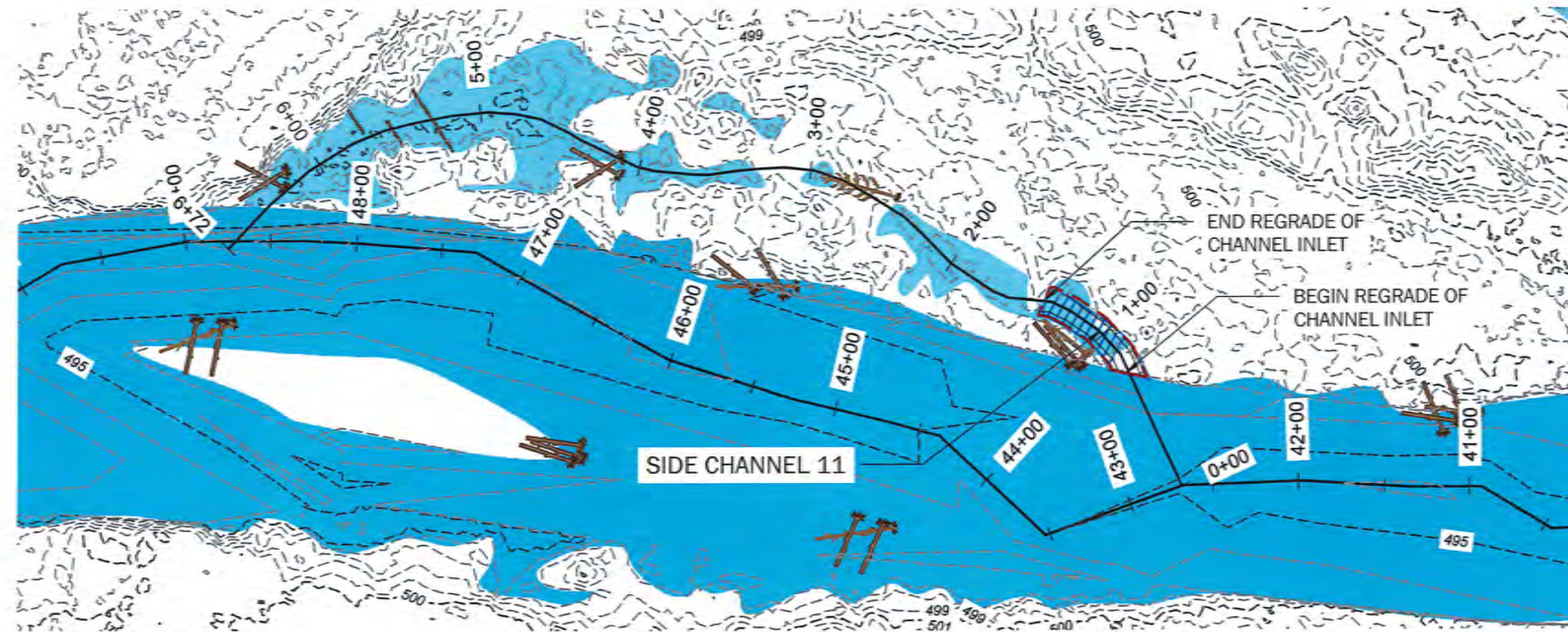


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**Proposed Side Channel 10
Plan and Profile**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
9.10

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\9.1-9.13 - Proposed Side Channel Plan and Profile.dwg TAB:9.11 User: bmliller Plot time: Jul-11-16 @ 9:54am

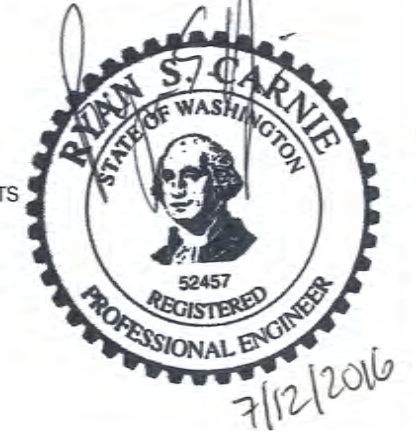


NOTES:

- TOPOGRAPHY BLENDED BY GEOENGINEERS USING LIDAR COLLECTED BY AEROMETRICS MAY, 2009 AND A FIELD SURVEY COMPLETED BY HDJ SEPTEMBER, 2015.
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- 1.5YR WSEL ELEVATION EQUALS 1,982 CFS
- AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.
- ENTRANCES TO SIDE CHANNELS ARE TO BE REGRADED UP AS SHOWN.
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- CROSS SECTIONS FACE DOWNSTREAM. CROSS SECTION CENTERLINE STATION IS LOCATED ALONG THE THALWEG ALIGNMENT.
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- SIDE CHANNEL GRADING DOWNSTREAM OF INLET SECTION IS SHOWN AS APPROXIMATE. THE EXTENT OF GRADING WILL BE FIELD VERIFIED.

LEGEND:

- | | | | |
|--|----------------------------|--|--------------------------------|
| | EXISTING CHANNEL | | LARGE WOOD |
| | PROPOSED CHANNEL | | APPROXIMATE DISTURBANCE LIMITS |
| | SIDE CHANNEL ENHANCEMENT | | PROPOSED MAJOR CONTOUR |
| | PROPOSED CHANNEL ALIGNMENT | | PROPOSED MINOR CONTOUR |
| | EXISTING CHANNEL ALIGNMENT | | EXISTING MAJOR CONTOUR |
| | TERRACE | | EXISTING MINOR CONTOUR |
| | | | PROPOSED GRADE |



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

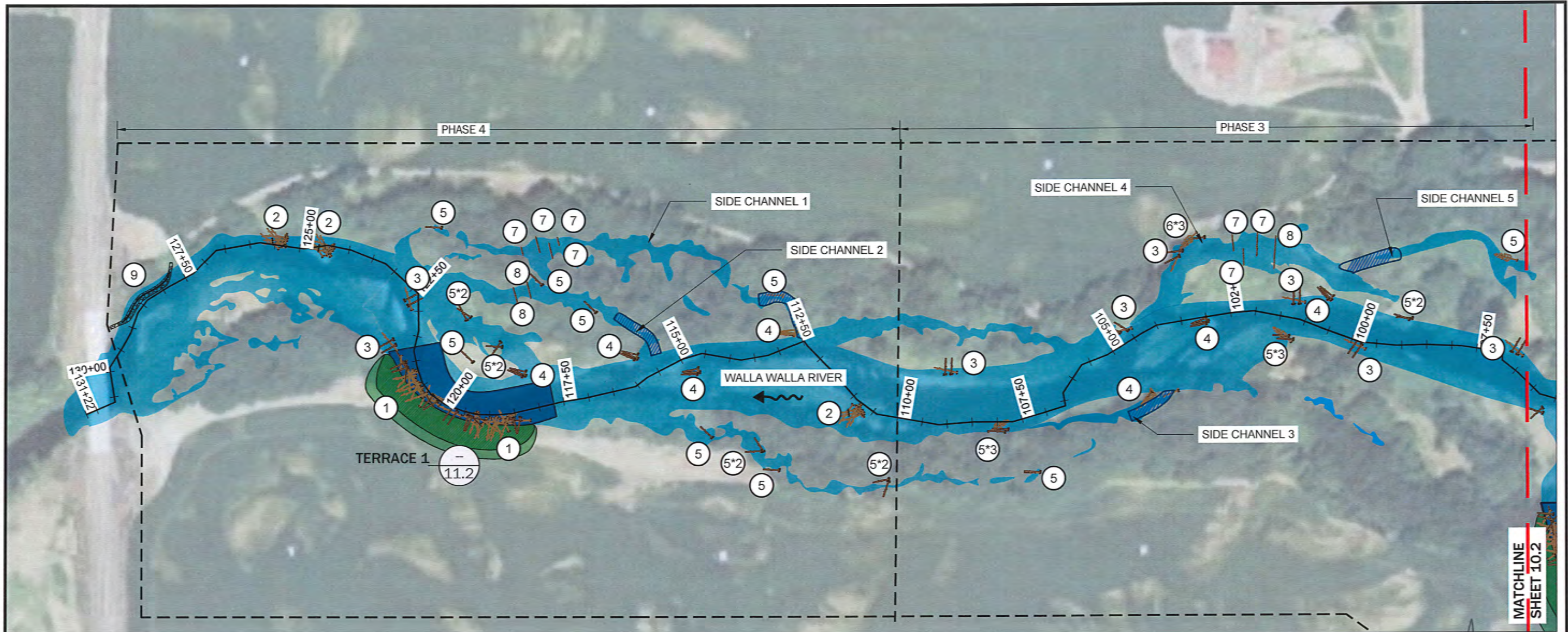


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**Proposed Side Channel 11
Plan and Profile**
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
9.11

Dwg name: P:\11281005\03 CAD\80 Percent - Preliminary Design\03_Sheet Files\10.1-10.3 - Proposed Habitat.dwg TAB:10.1 User: bmliller Plot time: Jul-11-16 @ 9:59am



NOTES:

- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NAD 1988.
- 1.5YR WSEL ELEVATION EQUALS 1,982 CFS
- AERIAL IMAGE FROM NAIP 2013 IMAGERY

HABITAT DETAIL	SHEET 10.1 MAIN CHANNEL QUANTITY	SHEET 10.1 SIDE CHANNEL QUANTITY				
		SC 1	SC 2	SC 3	SC 4	SC 5
1	2					
2	3					
3	7				1	
4	7					
5	13	2	2	7		1
6					2	
7		4			3	
8			2		1	
9	1					

LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- TERRACE
- MAIN CHANNEL ALIGNMENT
- SIDE CHANNEL ALIGNMENT
- PHASE BOUNDARY



HABITAT DETAILS:

- 1 MEANDER JAM (S11.6)
- 2 FLOW DEFLECTION JAM (S11.7)
- 3 LONGITUDINAL LOG (S11.8)
- 4 APEX JAM (S11.8)
- 5 BURIED SNAG (S11.9)
*NUMBER KEY MEMBERS, IF >1
- 6 ROOTWAD (S11.9)
*NUMBER OF KEY MEMBERS, IF >1
- 7 PARTIAL-SPANNING BEAVER DAM ANALOG (S11.10)
- 8 CHANNEL-SPANNING BEAVER DAM ANALOG (S11.10)
- 9 LONGITUDINAL STONE TOE (S11.1)



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

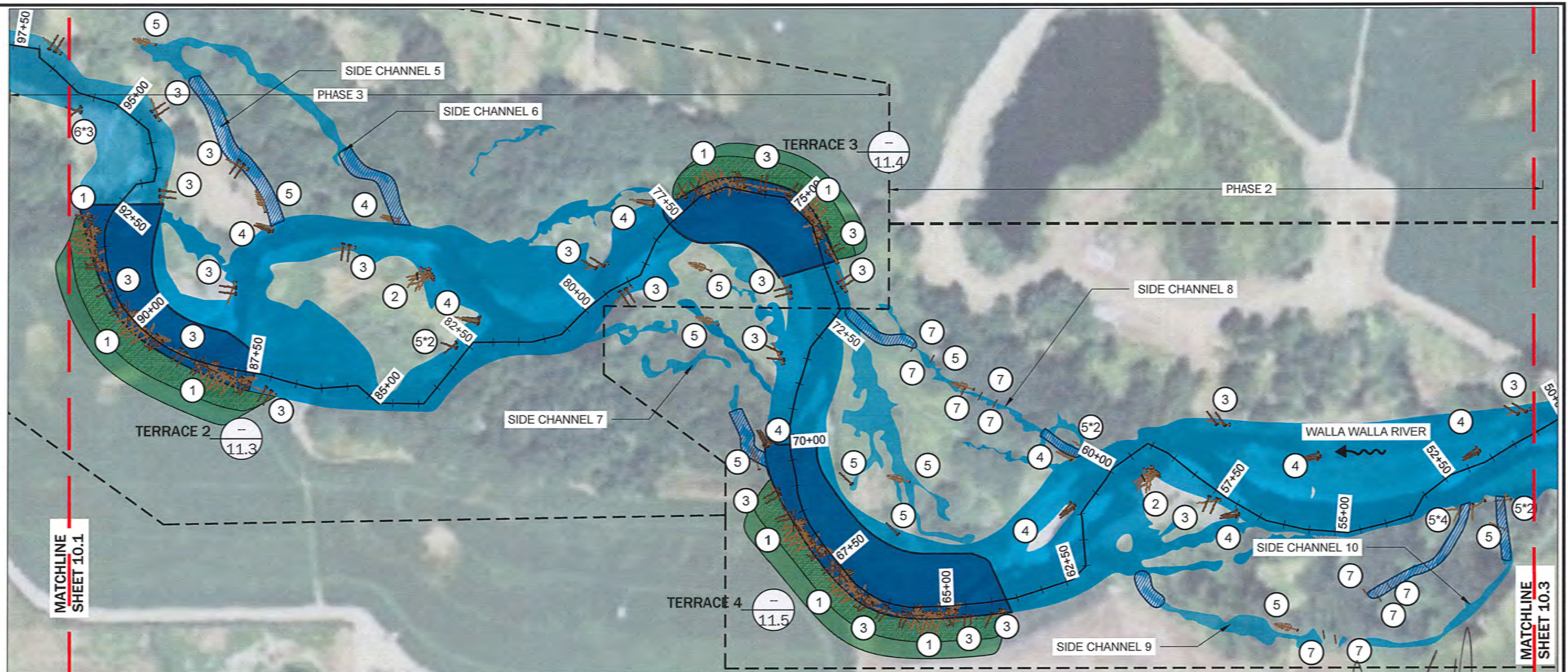


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Proposed Habitat Structures
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
10.1

Dwg name: P:\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\S10.1-10.3 - Proposed Habitat.dwg TAB:10.2 User: bmliller Plot time: Jul-12-16 @ 8:40am



- NOTES:
- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NAD 1988.
 - 1.5YR WSEL ELEVATION EQUALS 1,982 CFS

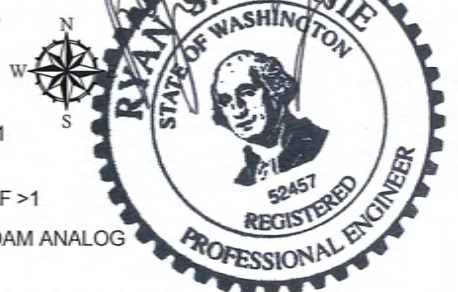
HABITAT DETAIL	SHEET 10.2 MAIN CHANNEL QUANTITIES	SHEET 10.2 SIDE CHANNEL QUANTITIES				
		SC 5	SC 7	SC 8	SC 9	SC 10
1	8					
2	2					
3	21	1				
4	10					
5	15	2	1	1	1	1
6	3					
7				5	3	2
8						
9						

LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- TERRACE
- MAIN CHANNEL ALIGNMENT
- SIDE CHANNEL ALIGNMENT
- PHASE BOUNDARY

HABITAT DETAILS:

- 1 MEANDER JAM (S11.6)
- 2 FLOW DEFLECTION JAM (S11.7)
- 3 LONGITUDINAL LOG (S11.8)
- 4 APEX JAM (S11.8)
- 5 BURIED SNAG (S11.9)
*NUMBER KEY MEMBERS, IF >1
- 6 ROOTWAD (S11.9)
*NUMBER OF KEY MEMBERS, IF >1
- 7 PARTIAL-SPANNING BEAVER DAM ANALOG (S11.10)
- 8 CHANNEL-SPANNING BEAVER DAM ANALOG (S11.10)
- 9 LONGITUDINAL STONE TOE (S11.1)



7/12/2016

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				Checked: RSC, JRS
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				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

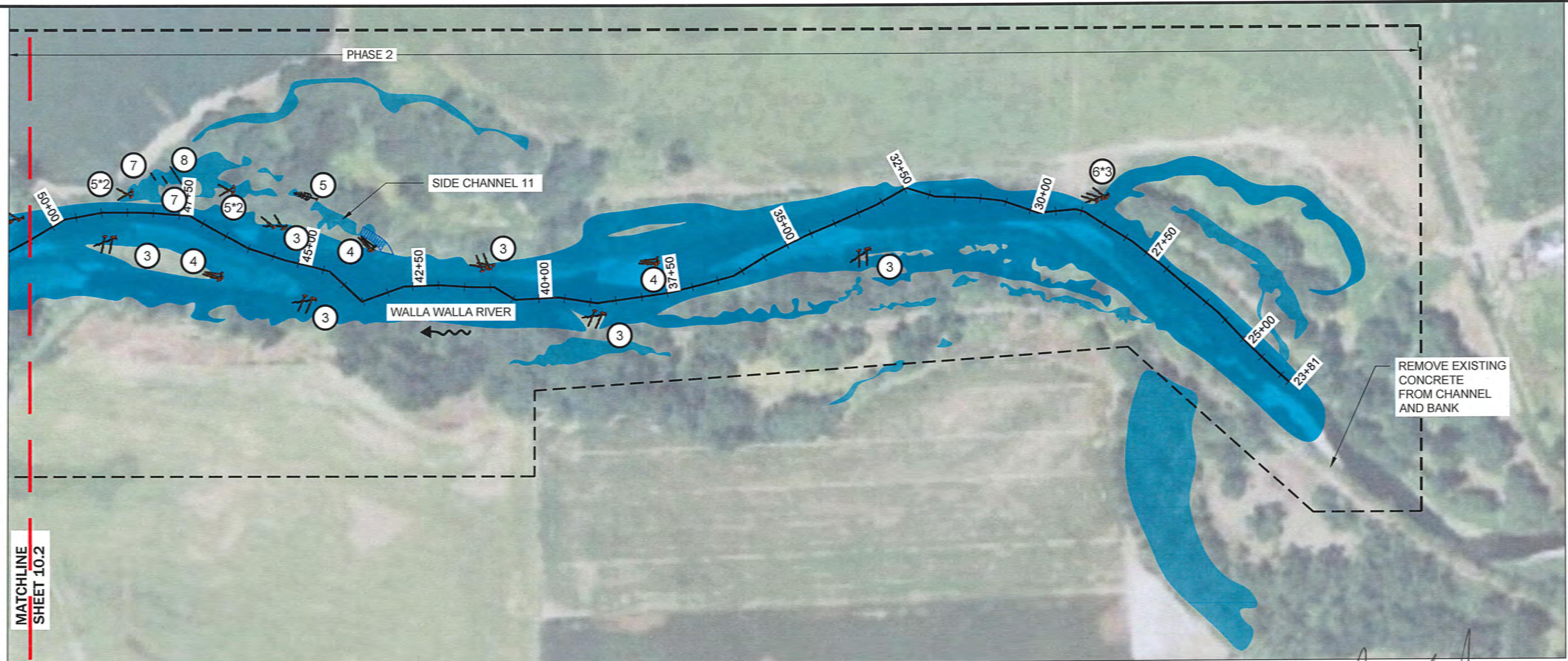


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Proposed Habitat Structures
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
10.2

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NOTES:
• ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NAD 1988.
• 1.5YR WSEL ELEVATION EQUALS 1,982 CFS

HABITAT DETAIL	SHEET 10.3 MAIN CHANNEL QUANTITY	SHEET 10.3 SIDE CHANNEL 11 QUANTITY
1		
2		
3	6	
4	3	
5		5
6	3	
7		2
8		1
9		

LEGEND:

- EXISTING CHANNEL
- PROPOSED CHANNEL
- SIDE CHANNEL ENHANCEMENT
- TERRACE
- MAIN CHANNEL ALIGNMENT
- SIDE CHANNEL ALIGNMENT
- PHASE BOUNDARY



HABITAT DETAILS:

- 1 MEANDER JAM (S11.6)
- 2 FLOW DEFLECTION JAM (S11.7)
- 3 LONGITUDINAL LOG (S11.8)
- 4 APEX JAM (S11.8)
- 5 BURIED SNAG (S11.9)
*NUMBER KEY MEMBERS, IF >1
- 6 ROOTWAD (S11.9)
*NUMBER OF KEY MEMBERS, IF >1
- 7 PARTIAL-SPANNING BEAVER DAM ANALOG (S11.10)
- 8 CHANNEL-SPANNING BEAVER DAM ANALOG (S11.10)
- 9 LONGITUDINAL STONE TOE (S11.1)



7/12/2016

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				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders



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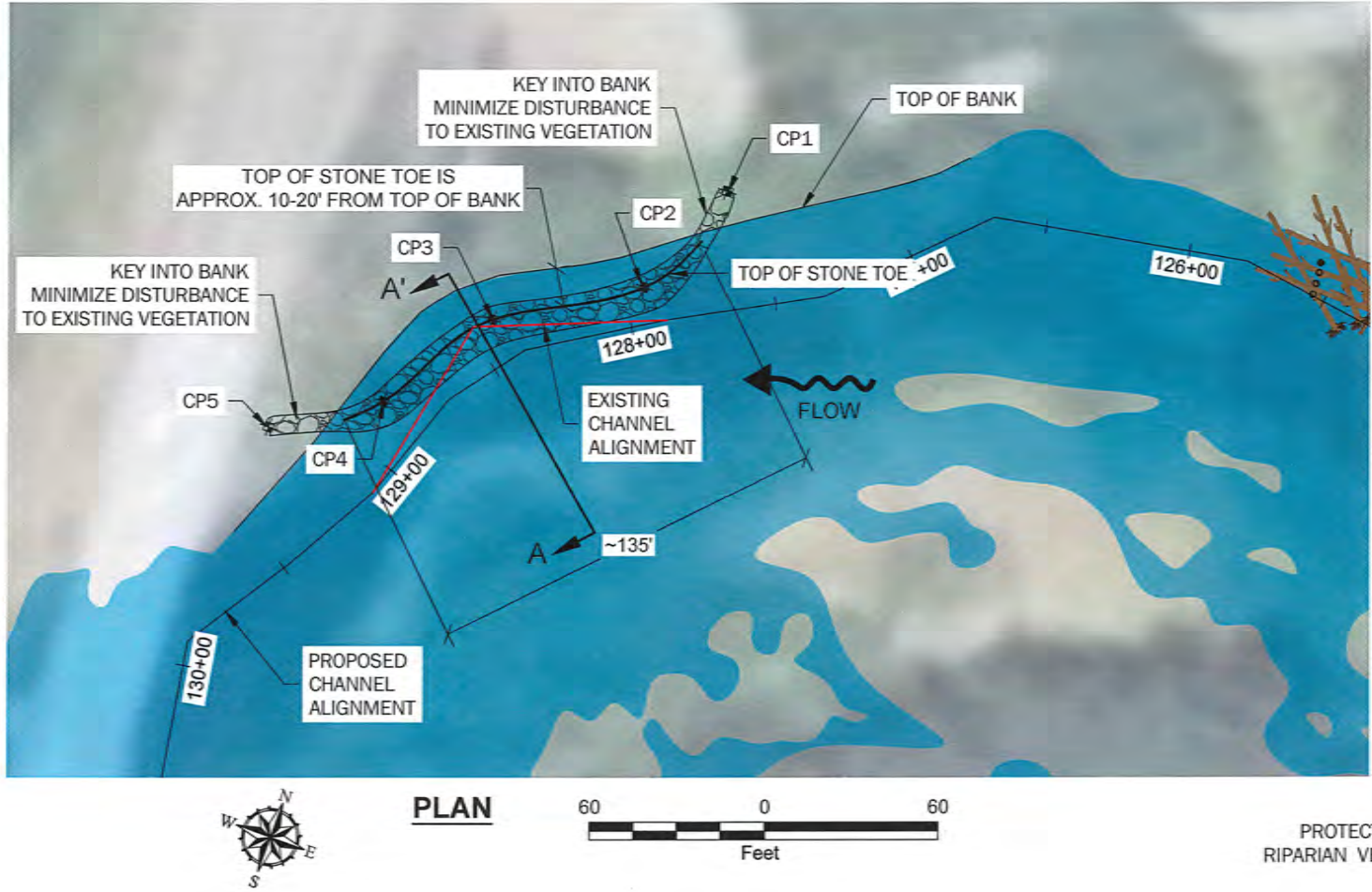
Proposed Habitat Structures
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
10.3

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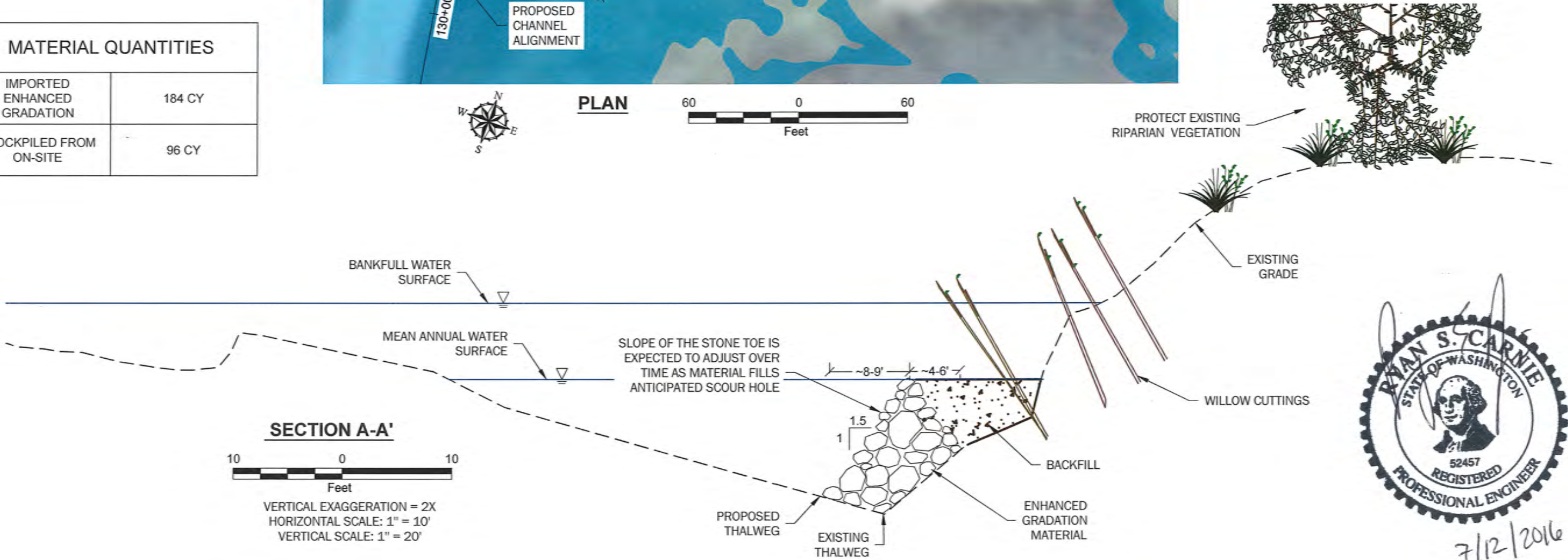
Control Points			
Control Point	Elevation	Northing	Easting
CP1	471.9	268283	2125083
CP2	471.9	268243	2125068
CP3	471.8	268243	2124997
CP4	471.8	268175	2124997
CP5	471.8	268153	2124963

MATERIAL QUANTITIES	
IMPORTED ENHANCED GRADATION	184 CY
STOCKPILED FROM ON-SITE	96 CY



LONGITUDINAL STONE TOE

- PURPOSE:**
- DECREASES BANK EROSION AND CHANNEL MIGRATION
 - MAINTAIN EXISTING RIPARIAN VEGETATION
 - PROMOTE SEDIMENT DEPOSITION AND RECRUIT RIPARIAN VEGETATION
- DESIGN SPECIFICATIONS:**
- SET HEIGHT OF THE STONE TOE APPROXIMATELY EQUAL TO MEAN ANNUAL WATER SURFACE ELEVATION AS SHOWN
 - MINIMIZE DISTURBANCE TO EXISTING VEGETATION WHEN CREATING TIE-IN LOCATIONS
 - KEY UPSTREAM AND DOWNSTREAM TIE-IN TRENCHES INTO BANK AT APPROXIMATELY 30° FROM THE PRIMARY FLOW DIRECTION.
 - ADD WILLOW CUTTINGS WITHIN STONE TOE AND BANK
 - VEGETATE BANK WITH WILLOW CUTTINGS AND RIPARIAN VEGETATION AFTER INSTALLATION, AS SHOWN IN PLANTING PLAN
 - WIDTH OF THE STONE TOE WILL VARY 12-15 FT
 - ENHANCED GRADATION MATERIAL WILL MATCH GRADATION OF WASHINGTON DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATION FOR 6" STREAMBED COBBLES (9-03.11(2))
 - BACKFILL MATERIAL SHALL BE FROM ONSITE EXCAVATION



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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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Details - Longitudinal Stone Toe

Walla Walla River Bridge-to-Bridge
Design Drawings

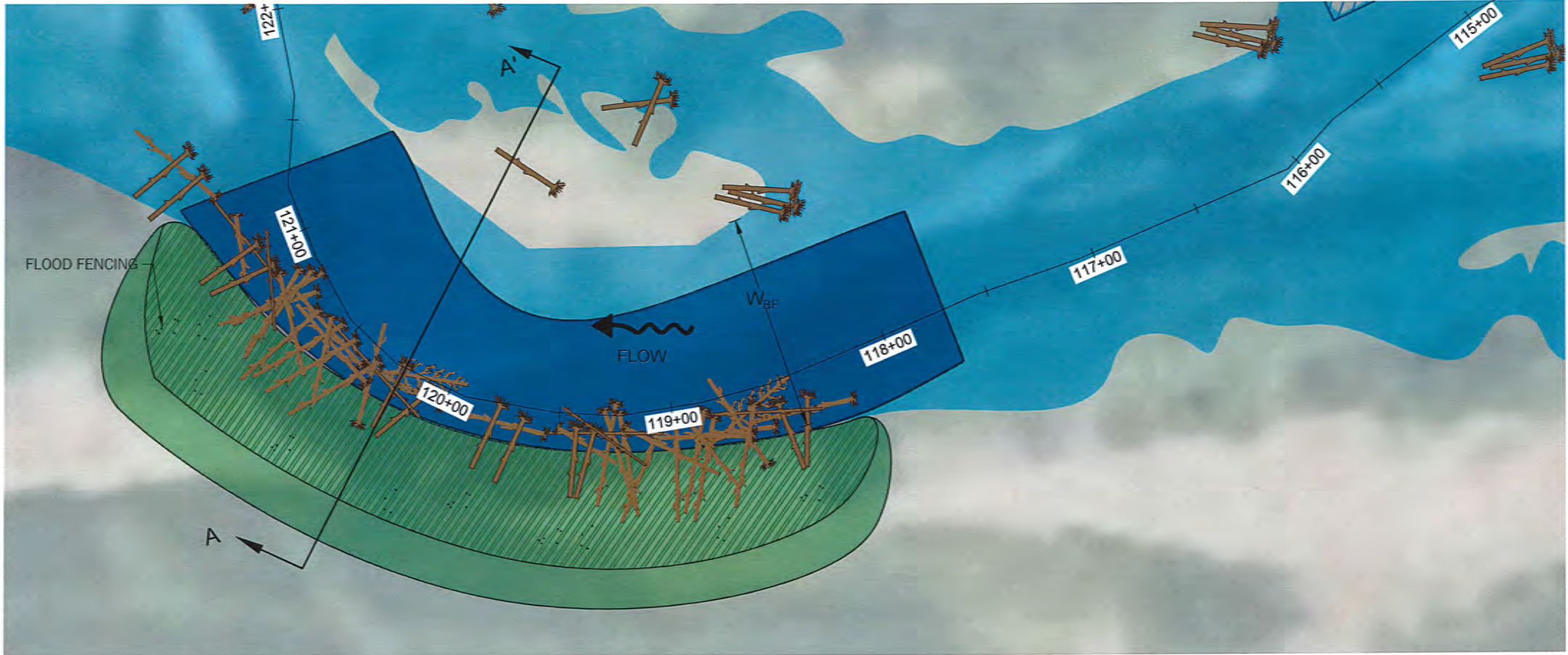
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11.1

TERRACE 1 - DETAILS

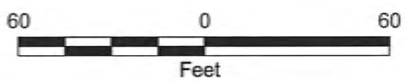
- NOTES:
- RACKING MEMBERS ARE NOT SHOWN.
 - DENSE VEGETATION SHALL BE PLANTED ON BANK TO ESTABLISH AN ADEQUATE ROOT ZONE.
 - INSTALLATION SHALL TAKE PLACE FROM DOWNSTREAM TO UPSTREAM.

- PURPOSE:
- INCREASES POOL DEPTH
 - INHIBITS LATERAL MIGRATION
 - REDUCES BANK EROSION
 - CREATES DEPTH AND VELOCITY DIVERSITY FOR HABITAT ENHANCEMENT
 - FLOOD FENCING INCREASES FLOODPLAIN ROUGHNESS AND RECRUITS FLOODPLAIN WOOD DURING HIGH FLOW EVENTS

- 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
 - INSTALL VEGETATION AMONG ARMORING AND ROOT WADS WHILE INSTALLING ROOT WADS
 - EXPOSED ROOT WAD DEPTH EQUALS POOL DEPTH
 - FLOOD FENCING POSTS SHOULD BE MIN. 4" DIAMETER, APPROX. 8' LENGTH
 - INSTALL FLOOD FENCING IN CLUSTERS. DRIVE POSTS APPROX. 4' BELOW GROUND SURFACE.
 - SEE HABITAT DETAIL SHEETS FOR WOOD DESIGN.

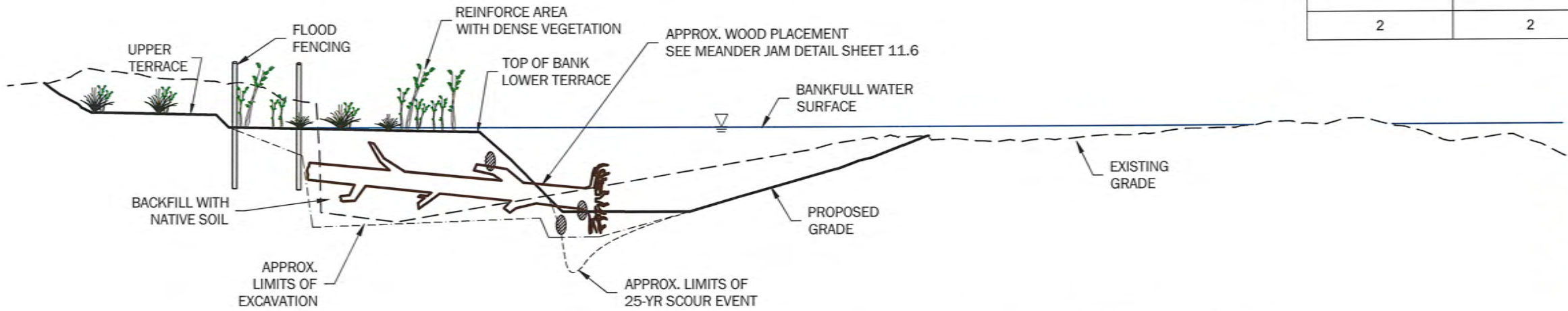


PLAN

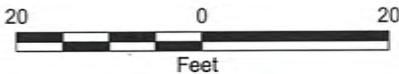


HABITAT DETAILS

MEANDER JAM (S11.6)	LONGITUDINAL LOG (S11.8)	FLOOD FENCING POSTS
2	2	50



SECTION A-A'



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



7/12/2016

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Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

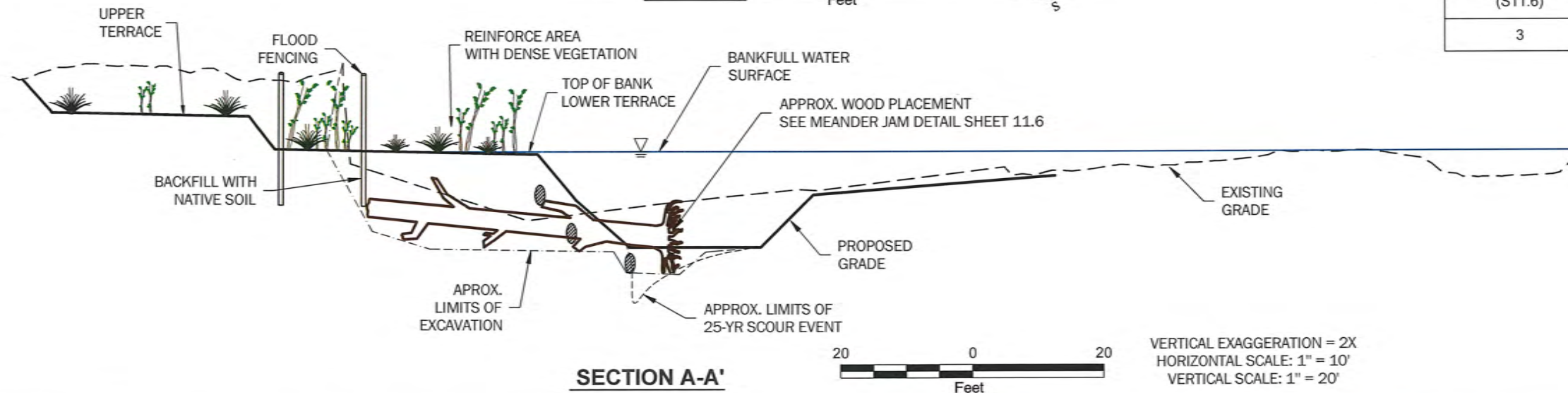
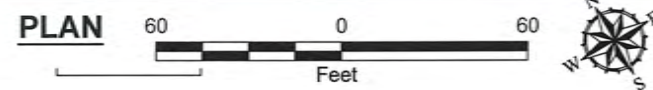
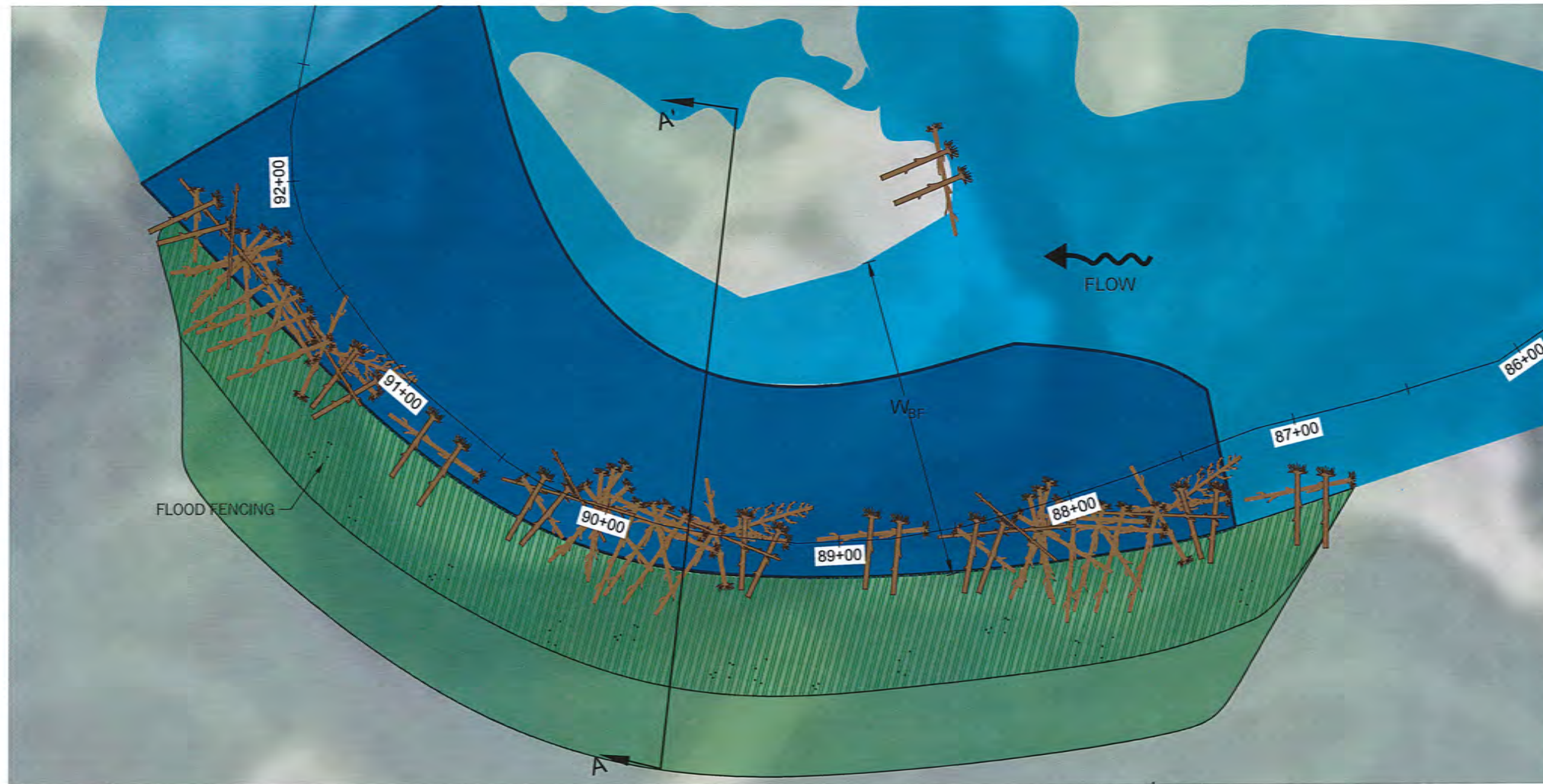


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Details - Terrace 1
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
11.2

Dwg name: P:\11281005\03 CAD\80 Percent - Preliminary Design\03_Sheet Files\11.1-11.8 - Details.dwg TAB:11.3 User: bmliller Plot time: Jul-11-16 @ 10:02am



TERRACE 2 - DETAILS

NOTES:

- RACKING MEMBERS ARE NOT SHOWN.
- DENSE VEGETATION SHALL BE PLANTED ON BANK TO ESTABLISH AN ADEQUATE ROOT ZONE.
- INSTALLATION SHALL TAKE PLACE FROM DOWNSTREAM TO UPSTREAM.

PURPOSE:

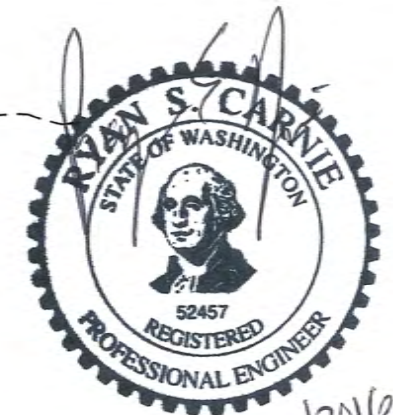
- INCREASES POOL DEPTH
- INHIBITS LATERAL MIGRATION
- REDUCES BANK EROSION
- CREATES DEPTH AND VELOCITY DIVERSITY FOR HABITAT ENHANCEMENT
- FLOOD FENCING INCREASES FLOODPLAIN ROUGHNESS AND RECRUITS FLOODPLAIN WOOD DURING HIGH FLOW EVENTS

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
- INSTALL VEGETATION AMONG ARMORING AND ROOT WADS WHILE INSTALLING ROOT WADS
- EXPOSED ROOT WAD DEPTH EQUALS POOL DEPTH
- FLOOD FENCING POSTS SHOULD BE MIN. 4" DIAMETER, APPROX. 8' LENGTH
- INSTALL FLOOD FENCING IN CLUSTERS. DRIVE POSTS APPROX. 4' BELOW GROUND SURFACE.
- SEE HABITAT DETAIL SHEETS FOR WOOD DESIGN.

HABITAT DETAILS

MEANDER JAM (S11.6)	LONGITUDINAL LOG (S11.8)	FLOOD FENCING POSTS
3	3	65



7/12/2016

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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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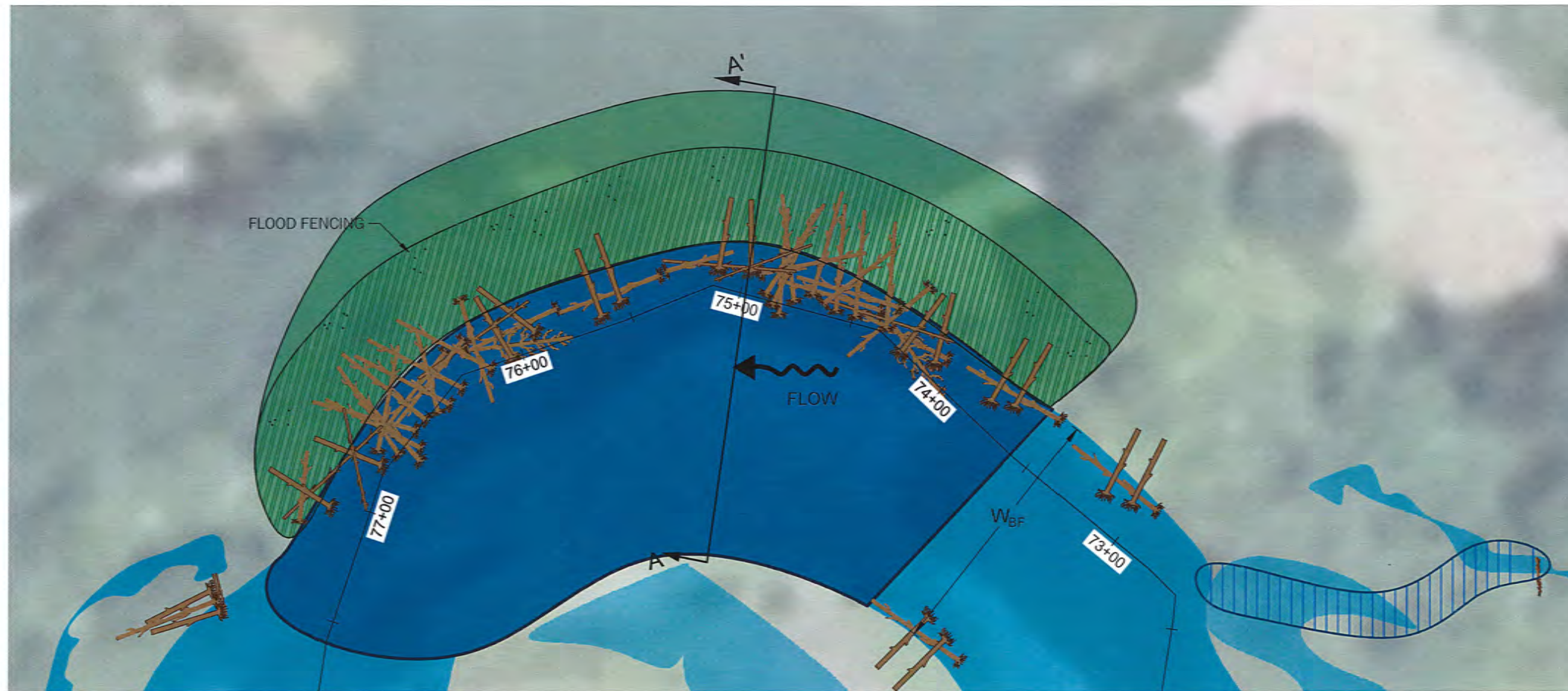
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Details - Terrace 2

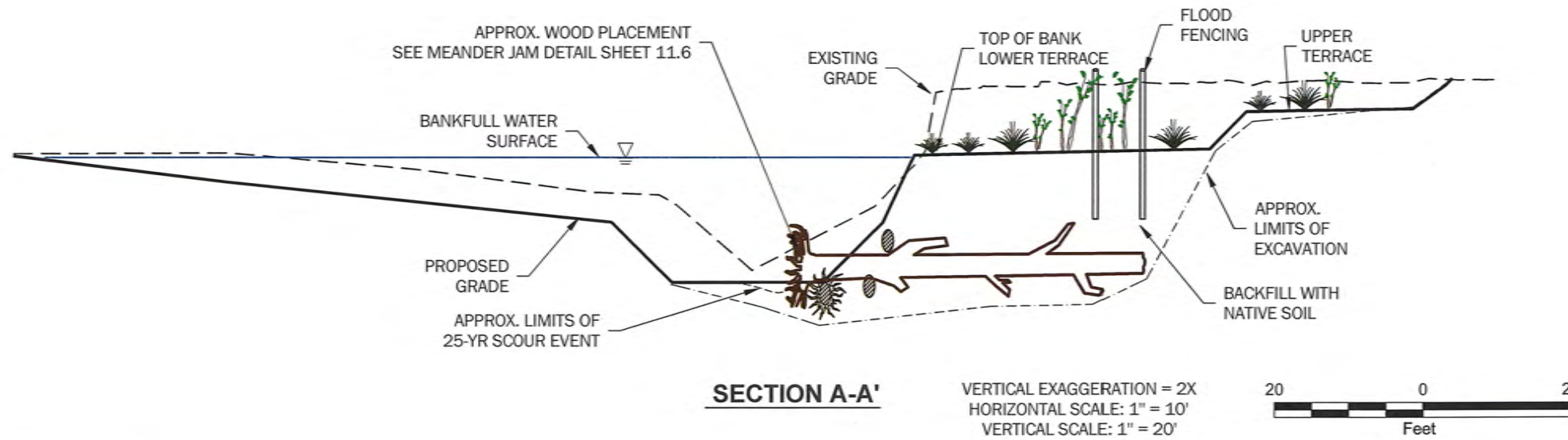
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
11.3

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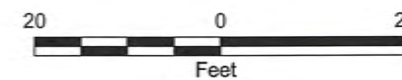


PLAN



SECTION A-A'

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



TERRACE 3 - DETAILS

NOTES:

- RACKING MEMBERS ARE NOT SHOWN.
- DENSE VEGETATION SHALL BE PLANTED ON BANK TO ESTABLISH AN ADEQUATE ROOT ZONE.
- INSTALLATION SHALL TAKE PLACE FROM DOWNSTREAM TO UPSTREAM.

PURPOSE:

- INCREASES POOL DEPTH
- INHIBITS LATERAL MIGRATION
- REDUCES BANK EROSION
- CREATES DEPTH AND VELOCITY DIVERSITY FOR HABITAT ENHANCEMENT
- FLOOD FENCING INCREASES FLOODPLAIN ROUGHNESS AND RECRUITS FLOODPLAIN WOOD DURING HIGH FLOW EVENTS

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
- INSTALL VEGETATION AMONG ARMORING AND ROOT WADS WHILE INSTALLING ROOT WADS
- EXPOSED ROOT WAD DEPTH EQUALS POOL DEPTH
- FLOOD FENCING POSTS SHOULD BE MIN. 4" DIAMETER, APPROX. 8' LENGTH
- INSTALL FLOOD FENCING IN CLUSTERS. DRIVE POSTS APPROX. 4' BELOW GROUND SURFACE.
- SEE HABITAT DETAIL SHEETS FOR WOOD DESIGN.

HABITAT DETAILS

MEANDER JAM (S11.6)	LONGITUDINAL LOG (S11.8)	FLOOD FENCING POSTS
2	3	50



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				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

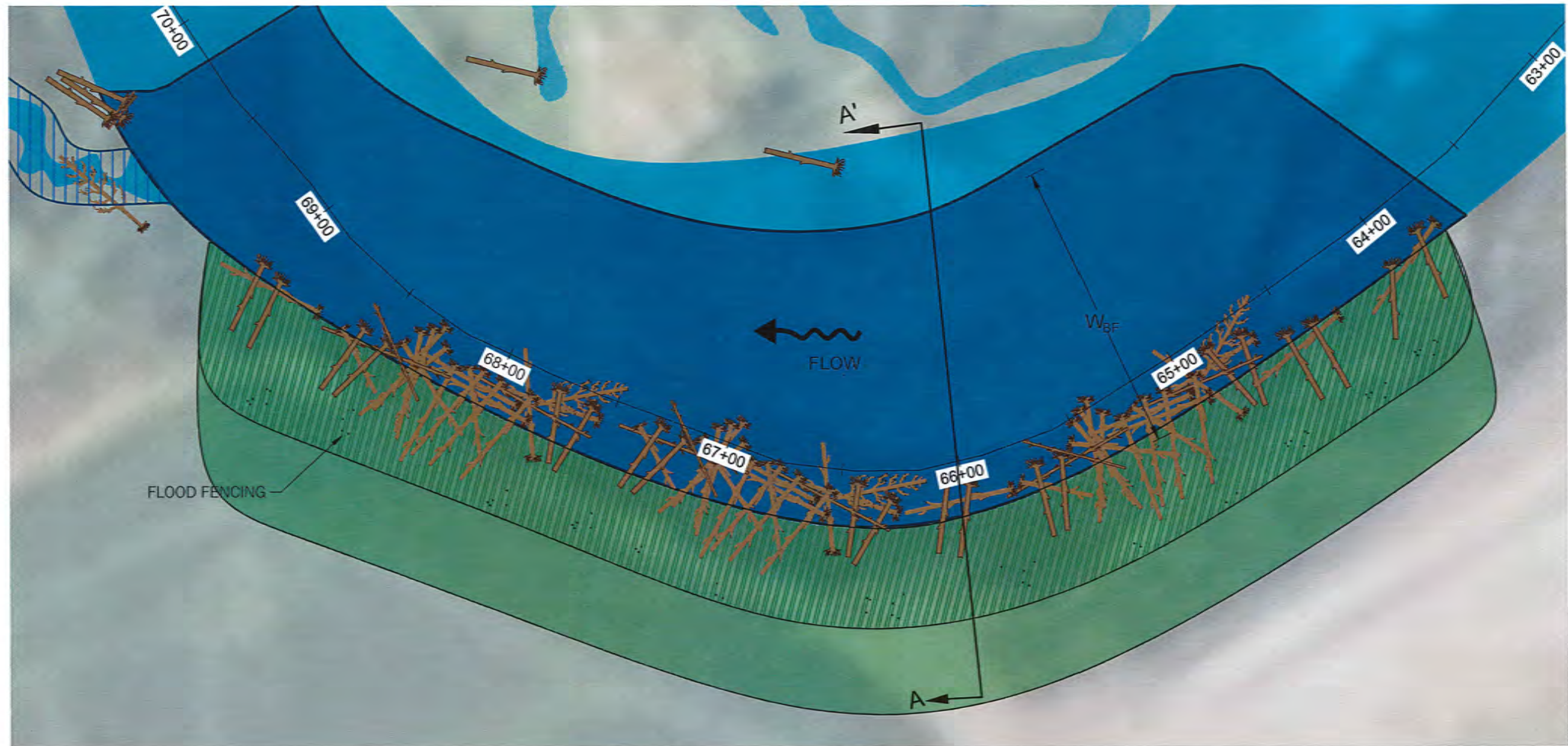


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Details - Terrace 3
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
11.4

Dwg name: P:\11281005\03 CAD\80 Percent - Preliminary Design\03_Sheet Files\11.1-11.8 - Details.dwg TAB:11.5 User: bmliller Plot time: Jul-11-16 @ 10:02am



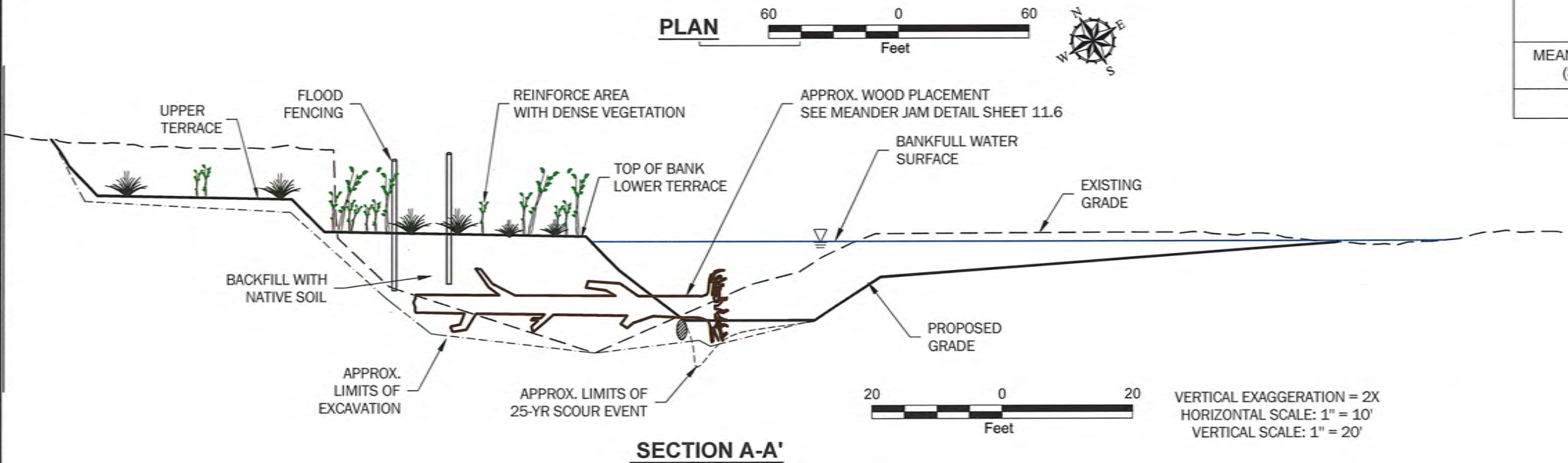
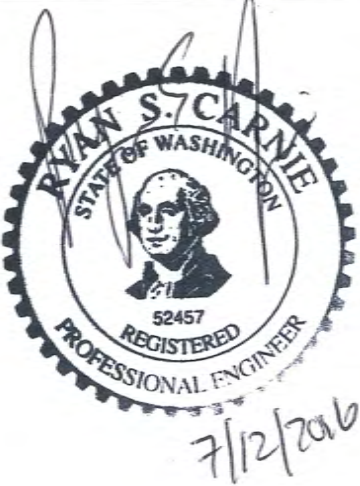
TERRACE 4 - DETAILS

- NOTES:**
- RACKING MEMBERS ARE NOT SHOWN.
 - DENSE VEGETATION SHALL BE PLANTED ON BANK TO ESTABLISH AN ADEQUATE ROOT ZONE.
 - INSTALLATION SHALL TAKE PLACE FROM DOWNSTREAM TO UPSTREAM.

- PURPOSE:**
- INCREASES POOL DEPTH
 - INHIBITS LATERAL MIGRATION
 - REDUCES BANK EROSION
 - CREATES DEPTH AND VELOCITY DIVERSITY FOR HABITAT ENHANCEMENT
 - FLOOD FENCING INCREASES FLOODPLAIN ROUGHNESS AND RECRUITS FLOODPLAIN WOOD DURING HIGH FLOW EVENTS

- 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
 - INSTALL VEGETATION AMONG ARMORING AND ROOT WADS WHILE INSTALLING ROOT WADS
 - EXPOSED ROOT WAD DEPTH EQUALS POOL DEPTH
 - FLOOD FENCING POSTS SHOULD BE MIN. 4" DIAMETER, APPROX. 8' LENGTH
 - INSTALL FLOOD FENCING IN CLUSTERS. DRIVE POSTS APPROX. 4' BELOW GROUND SURFACE.
 - SEE HABITAT DETAIL SHEETS FOR WOOD DESIGN.

HABITAT DETAILS		
MEANDER JAM (S11.6)	LONGITUDINAL LOG (S11.8)	FOOD FENCING POSTS
3	4	60



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				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

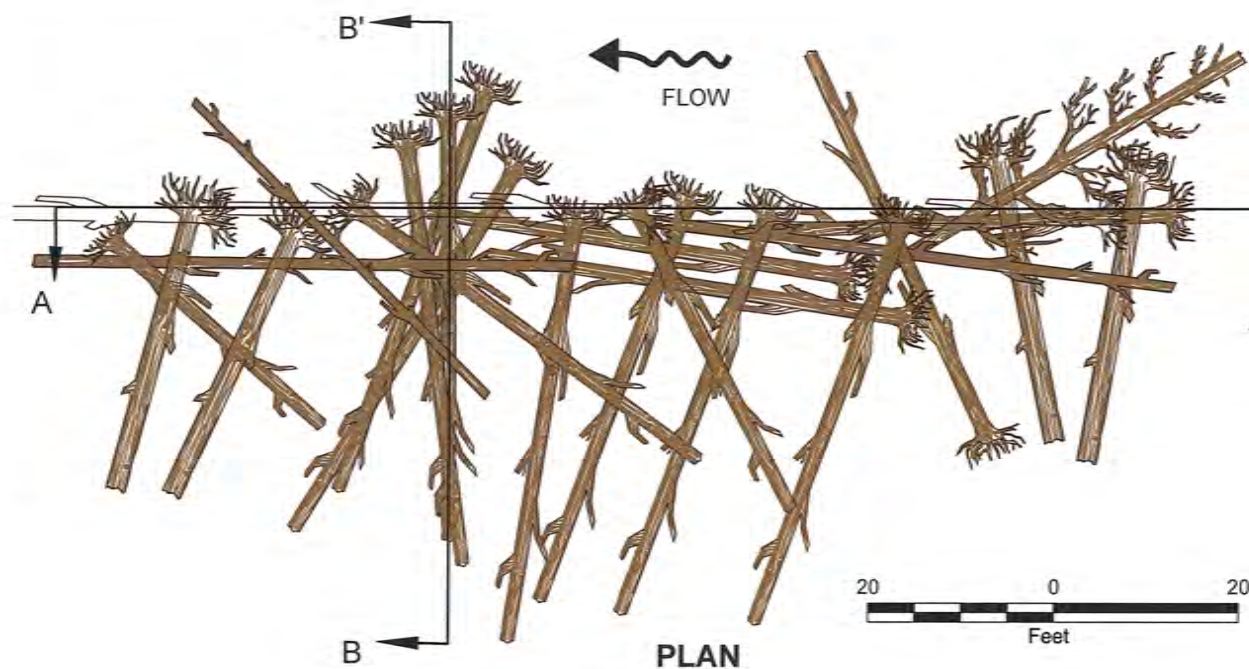
Tri-State Steelheaders



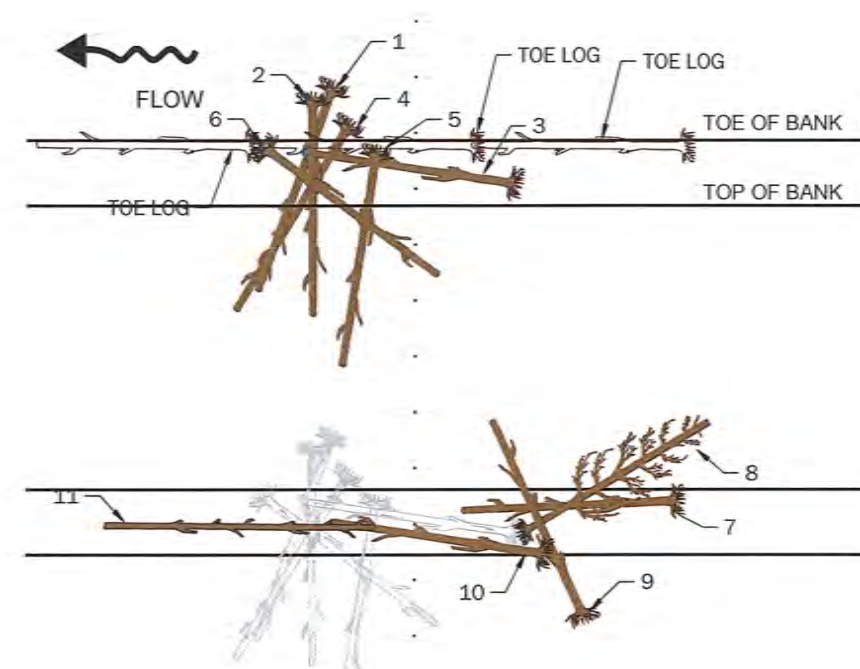
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Details - Terrace 4
Walla Walla River Bridge-to-Bridge
Design Drawings

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PLAN



MEANDER JAM 1

DESIGN SPECIFICATIONS:

- BUILD MEANDER JAM STRUCTURE ALONG THE OUTSIDE OF BENDS.
- PLACE WOOD ACCORDING TO ORDER DEPICTED AND LISTED BELOW
- PLACE 3 TOE LOGS PRIOR TO PLACING ANY OTHER MEMBER. PLACE TOE LOGS TOES AT A DEPTH EQUAL TO THREE FEET BELOW POOL ELEVATION. TOE LOGS ACT AS SCOUR COUNTERMEASURE. THEY ARE ANTICIPATED SETTLE INTO THE SCOUR HOLE AS IT DEVELOPS.
- TOP OF ROOT WAD SHOULD NOT EXTEND MORE THAN 1/2-FT ABOVE TOP OF BANK.
- INSTALL VEGETATION AMONG ROOTWADS WHILE INSTALLING

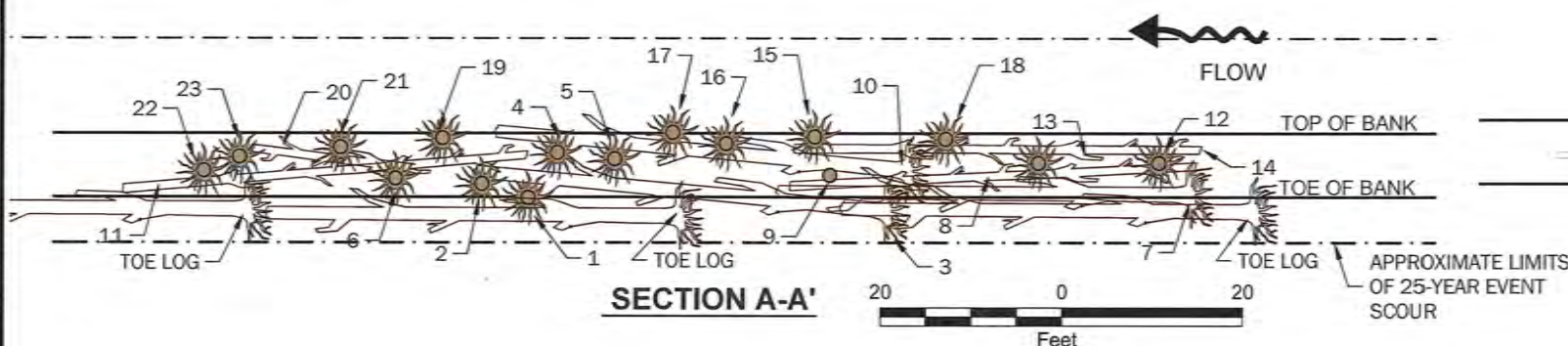
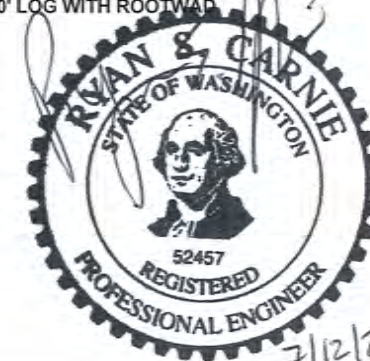
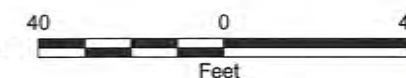
WOOD PLACEMENT ORDER:

PLACE TOE LOGS FIRST
TOE LOGS INCLUDE (3) 45' LOG WITH ROOTWAD
SET 3 FEET BELOW POOL DEPTH

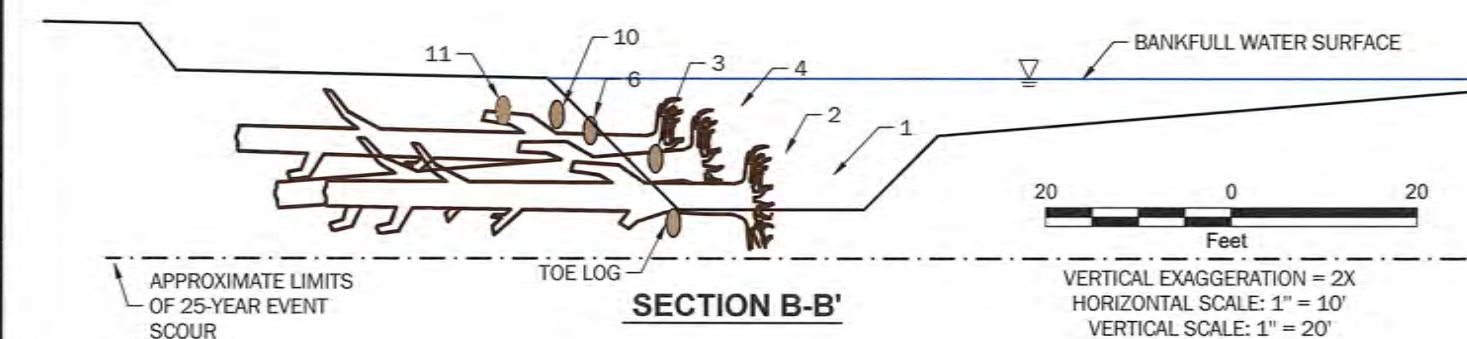
PLACE REMAINING LOGS ACCORDING TO
DIAGRAM IN THE FOLLOWING ORDER

- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD AND BRANCHES
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITHOUT ROOTWAD
- 30' LOG WITH ROOTWAD
- 30' LOG WITH ROOTWAD
- 45' LOG WITHOUT ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 45' LOG WITH ROOTWAD
- 30' LOG WITH ROOTWAD
- 30' LOG WITH ROOTWAD
- 30' LOG WITH ROOTWAD

SEQUENCING



SECTION A-A'



SECTION B-B'

WOOD QUANTITIES

45' LOG WITH ROOTWAD, MIN. 24" DBH	30' LOG WITH ROOTWAD, MIN. 18" DBH	45' LOG WITH ROOTWAD AND BRANCHES, MIN. 24" DBH	45' LOG WITHOUT ROOTWAD, MIN. 24" DBH	RACKING MATERIAL 6"-10" DIA. (EA)
17	5	1	3	30

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				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington
Tri-State Steelheaders

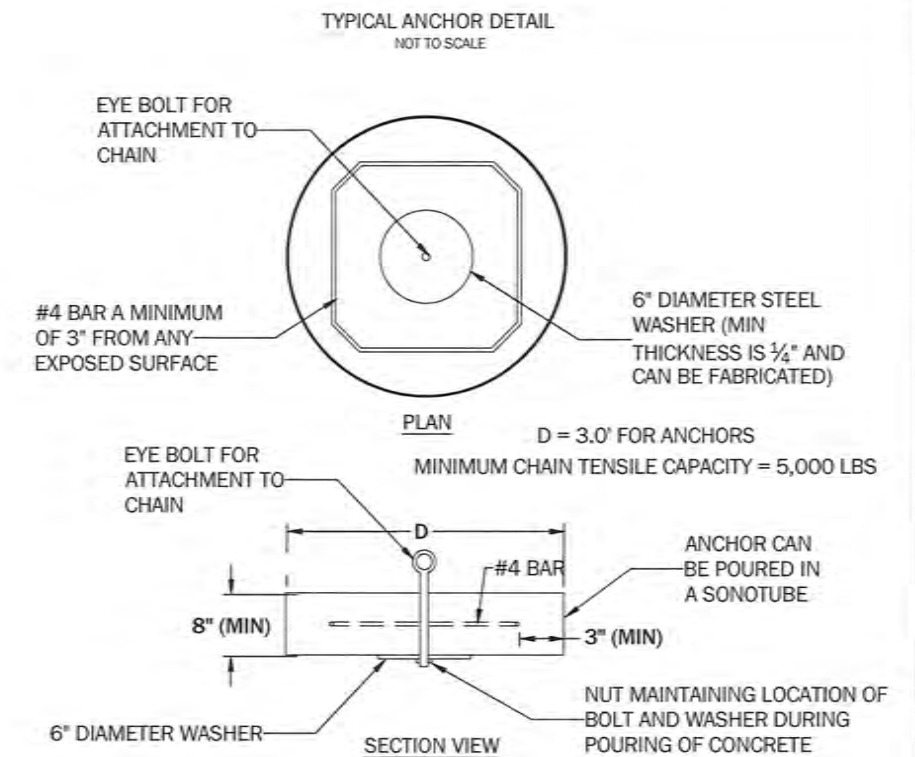
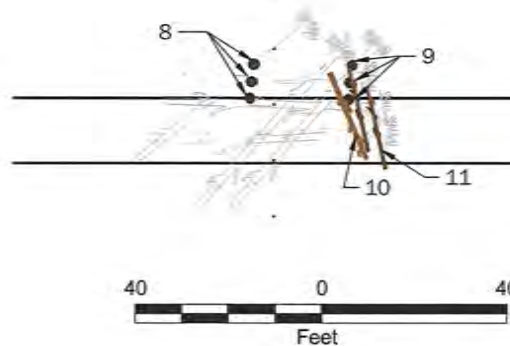
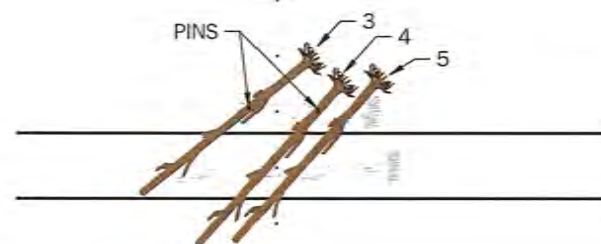
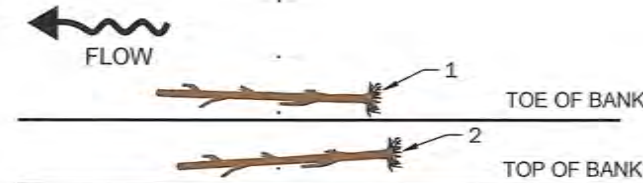
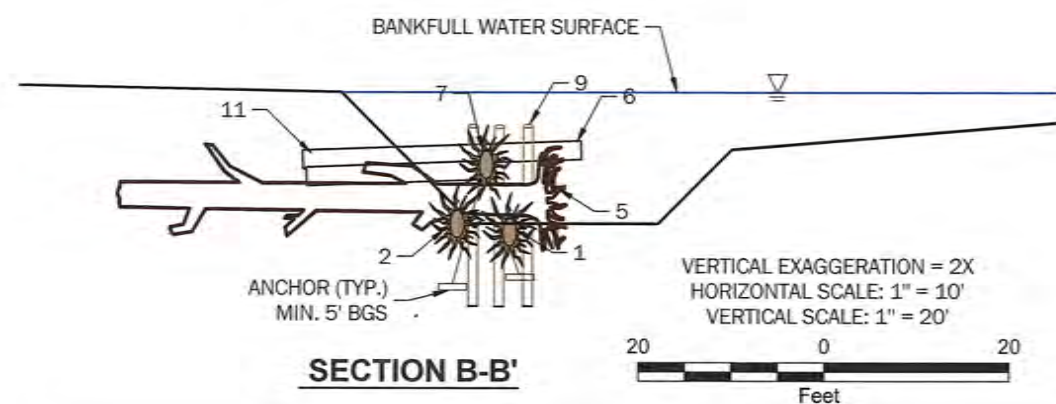
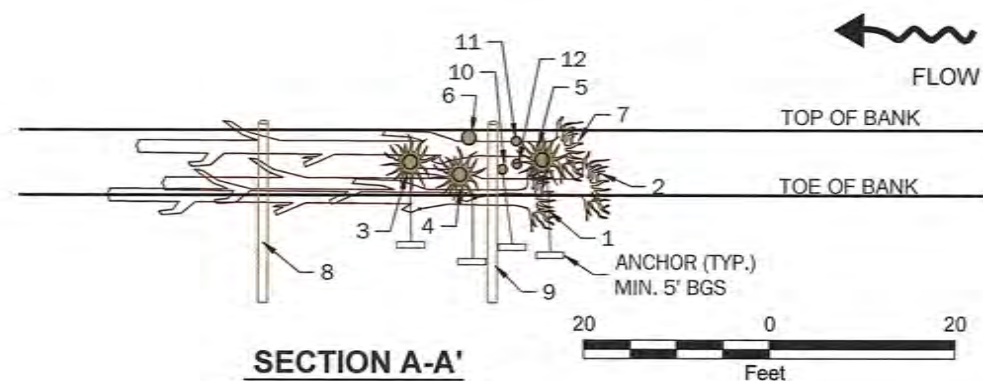
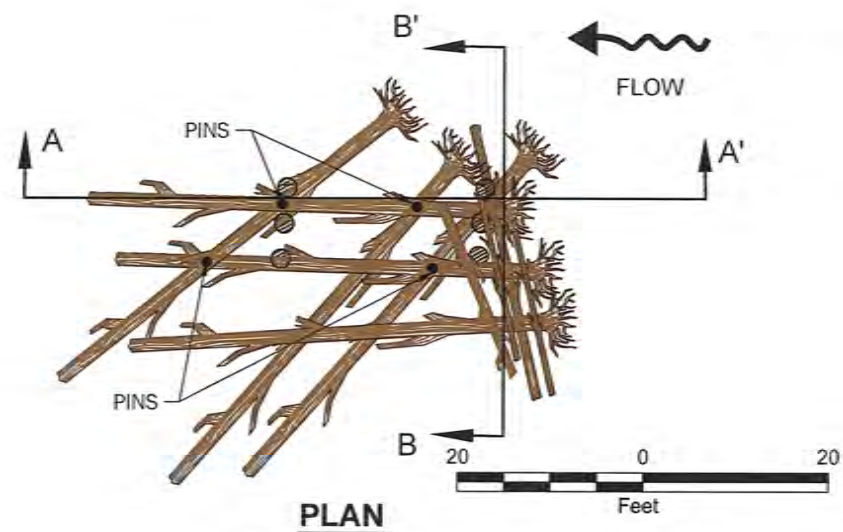


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Details - Meander Jam
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
11.6

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SEQUENCING

- 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

FLOW DEFLECTION JAM

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.
- INSTALL VEGETATION AMONG ARMORING AND ROOT WADS WHILE INSTALLING ROOT WADS
- EXPOSED ROOT WAD DEPTH EQUALS POOL DEPTH



WOOD QUANTITIES

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

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Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



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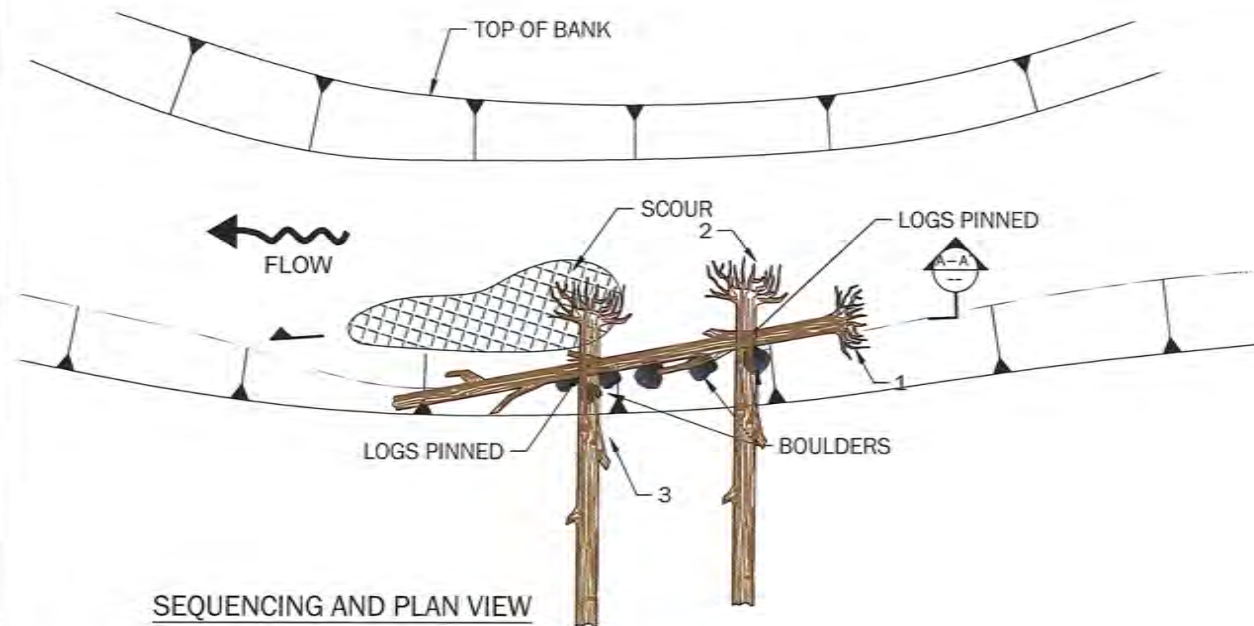
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Details - Flow Deflection Jam

Walla Walla River Bridge-to-Bridge
Design Drawings

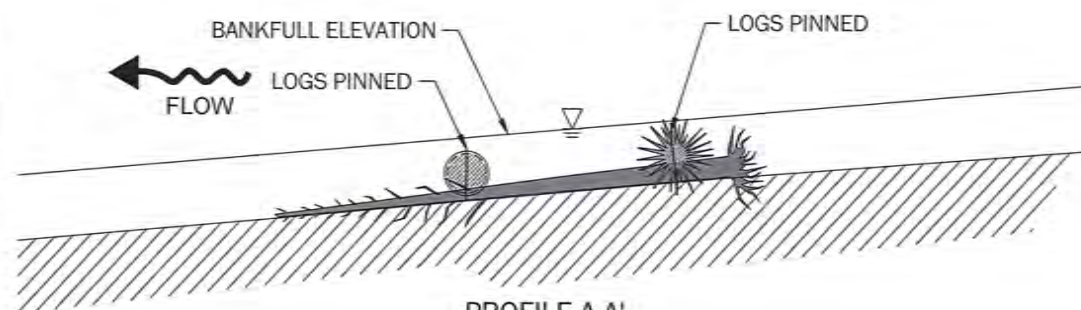
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SEQUENCING AND PLAN VIEW

NOT TO SCALE



PROFILE A-A'

NOTES:

PURPOSE:

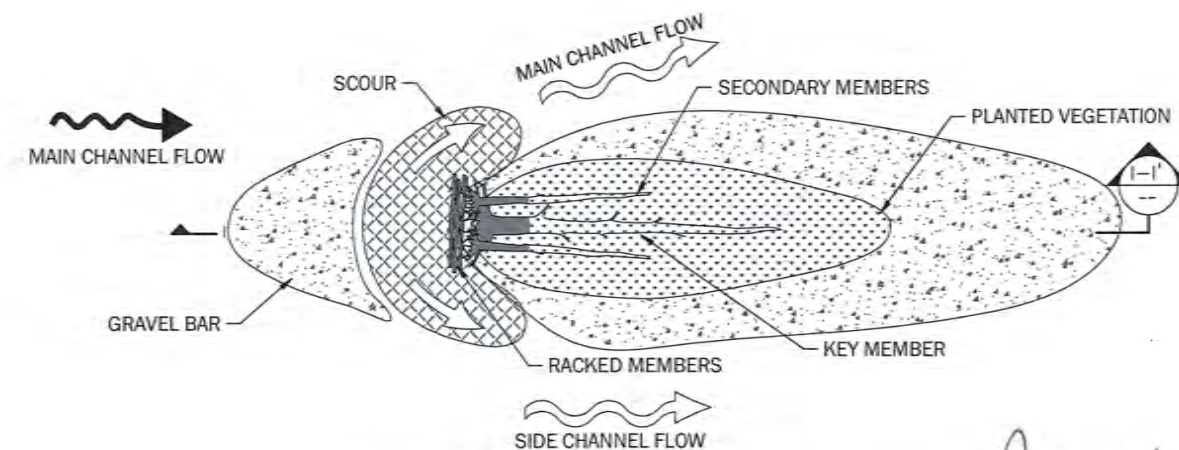
- CREATES SCOUR.
- HOLDS GRAVEL UPSTREAM.
- CREATES DIVERSE FISH HABITAT.
- PROVIDES COVER.

DESIGN SPECIFICS:

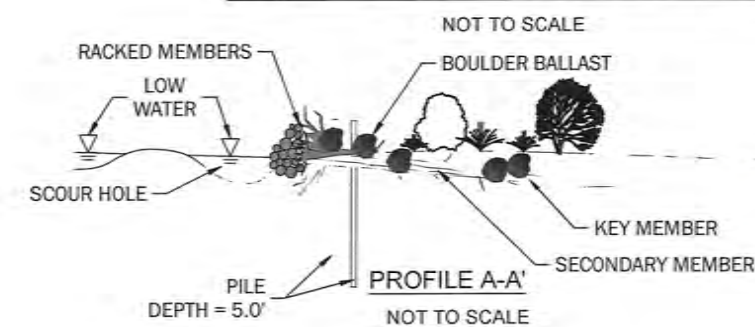
- PLACE AS INDICATED ON HABITAT PLANS.
- PLACE ROOT WAD ON OR IN STREAM BED.
- TREES WITH BRANCHES OR MULTIPLE TRUNKS PREFERRED.
- SECURE KEY MEMBERS BY PINNING TO PREVENT BOUNCING OF TREES DURING FLOODS.
- BALLAST SHALL BE INSTALLED ON KEY MEMBERS BURIED INTO BANK.
- SEE QUANTITY TABLE FOR MEMBER SIZES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

LONGITUDINAL LOG 3

WOOD QUANTITIES			
MAIN CHANNEL	45' LOG WITH ROOTWAD (EA), MIN. 24" DBH		24" DIA. BALLAST BOULDERS (EA)
	3		8
SIDE CHANNEL	30' LOG WITH ROOTWAD (EA), MIN. 18" DBH	30' LOG WITHOUT ROOTWAD (EA), MIN. 18" DBH	24" DIA. BALLAST BOULDERS (EA)
	2	1	8



EXAMPLE PLAN VIEW AT SIDE CHANNEL ENTRANCE



NOTES:

PURPOSE:

- CREATES OR ENLARGES MID-STREAM GRAVEL BARS, DIVERTS FLOW AND CREATES MULTIPLE CHANNELS AND/OR SIDE CHANNELS.
- PLACE JAM BELOW THE LOW WATER ELEVATION.
- UPSTREAM BAR GROWS AS A RESULT OF SLOWER "BACKWATERED" FLOW UPSTREAM.
- PRINCIPAL MECHANISM FOR FORMATION OF ANASTOMOSING CHANNEL SYSTEMS.
- ENHANCES FISH HABITAT BY CREATING MULTIPLE CHANNELS AND POOLS. SORTS GRAVEL.

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.

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 4



7/12/2016

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				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders

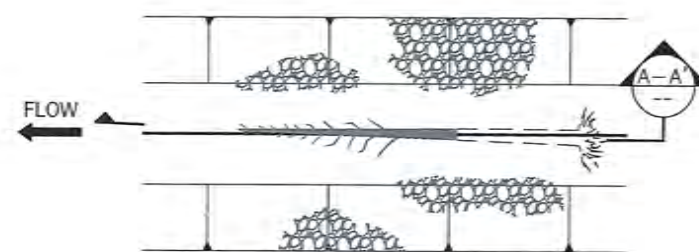


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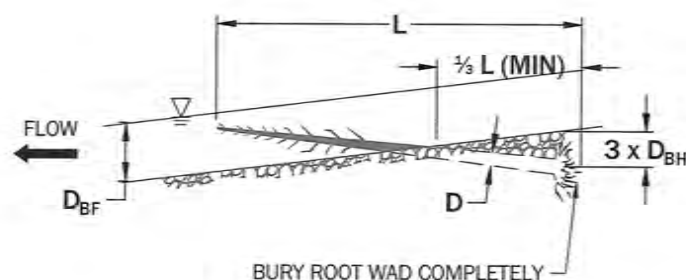
Details - Longitudinal Log and
Apex Jam
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
11.8

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\11.1-11.8 - Details.dwg TAB:11.9 User: bmliller Plot time: Jul-11-16 @ 10:04 am



PLAN



PROFILE A-A'

WOOD QUANTITIES	
SIDE CHANNEL / FLOODPLAIN	30' LOG WITH ROOTWAD (EA), MIN. 18" DBH
	1

NOTES:

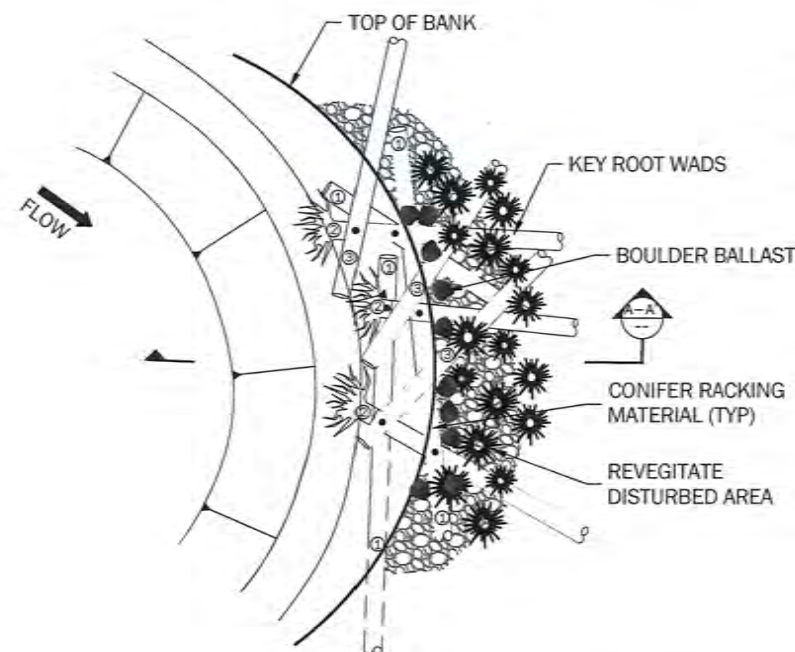
PURPOSE:

- SLOWS CREEK VELOCITY.
- CREATES DIVERSE FISH HABITAT.
- 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.

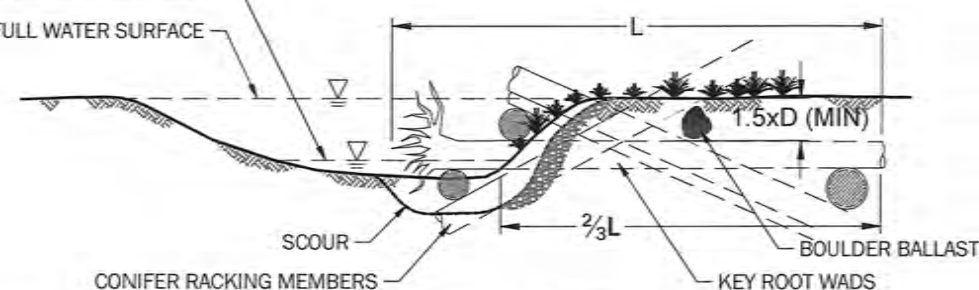
BURIED SNAG 5



PLAN

LOW POOL ELEVATION CONTROLLED BY DOWNSTREAM RIFFLE ELEVATION

BANKFULL WATER SURFACE



SECTION A-A'

MATERIAL QUANTITIES					
WOOD WITH ROOTWAD		WOOD WITHOUT ROOTWAD		RACKING	BALLAST
45' LOG (EA), MIN. 24" DBH	30' LOG (EA), MIN. 18" DBH	45' LOG (EA), MIN. 24" DBH	30' LOG (EA), MIN. 18" DBH	10' - 20' LENGTH 6"-10" DIA (EA)	18" MIN DIA. (EA)
1	2	2	3	15	9

NOTES:

PURPOSE:

- INCREASES POOL DEPTH.
- SLOWS LATERAL MIGRATION.
- PREVENTS BANK EROSION.

DESIGN SPECIFICS:

- TOP OF ROOTWAD SHOULD NOT EXTEND MORE THAN 1/2-FT ABOVE TOP OF BANK. (BANKFULL)
- MEMBERS SHALL EXTEND BELOW CALCULATED SCOUR DEPTH.
- PLACE ROOT WADS ALONG OUTSIDE OF BENDS.
- INSTALL RACKING MEMBERS AND VEGETATION AMONG ROOT WADS WHILE INSTALLING ROOT WADS.
- IRRIGATE VEGETATION AS REQUIRED.
- ALL KEY MEMBERS REQUIRE BALLAST. BALLAST SHALL MEET SIZE AND QUANTITY IDENTIFIED ON THE QUANTITIES TABLE.
- SEE QUANTITY TABLE FOR MEMBER SIZES.

ROOT WAD 6

CONSTRUCTING SEQUENCING:

1. INSTALL BOTTOM LAYER RACKING MATERIAL FIRST (LOGS ①)
2. INSTALL KEY MEMBERS ② OVER INITIAL RACKING MEMBERS
3. PIN KEY LOGS TO INITIAL RACKING MEMBERS
4. INSTALL RACKING MEMBERS ③ BETWEEN KEY LOGS
5. INSTALL DENSE LIVE STAKES AROUND BANK AND OVER BURIED LOGS.



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near Lowden, Washington

Tri-State Steelheaders



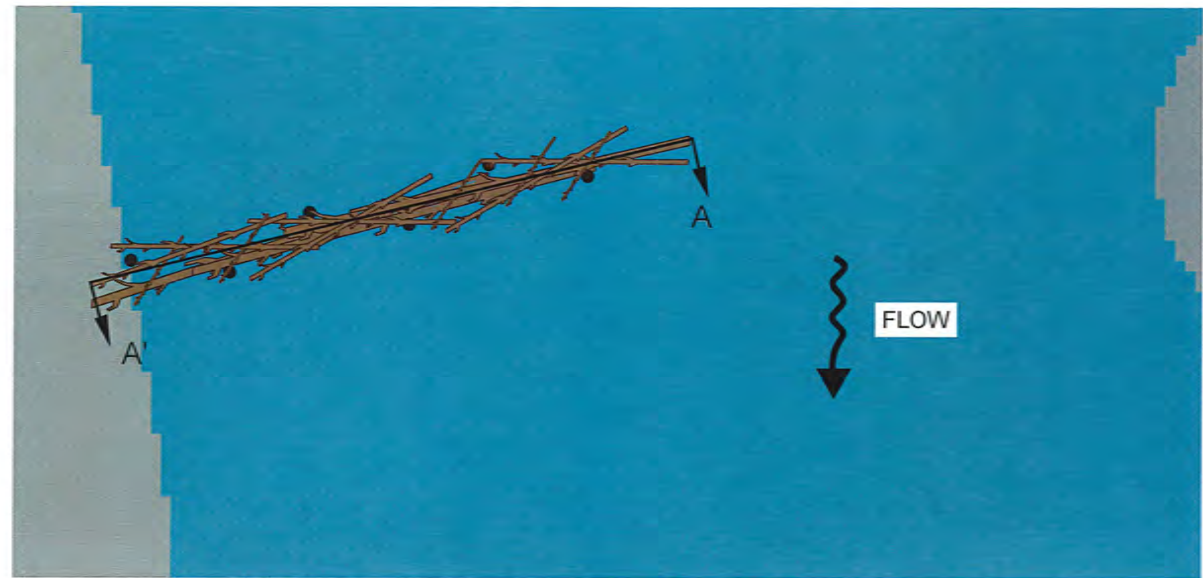
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Details - Buried Snag and Rootwad

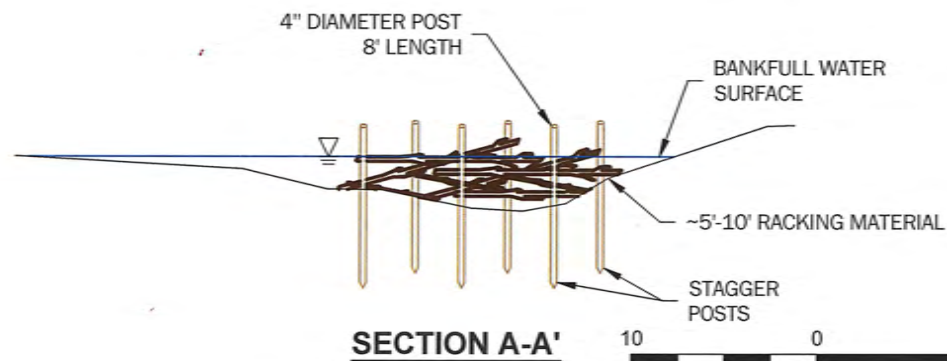
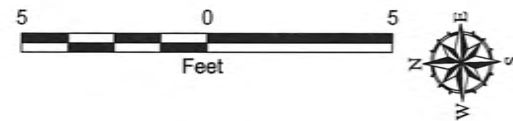
Walla Walla River Bridge-to-Bridge
Design Drawings

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11.9

PARTIAL-SPANNING BEAVER-DAM ANALOG



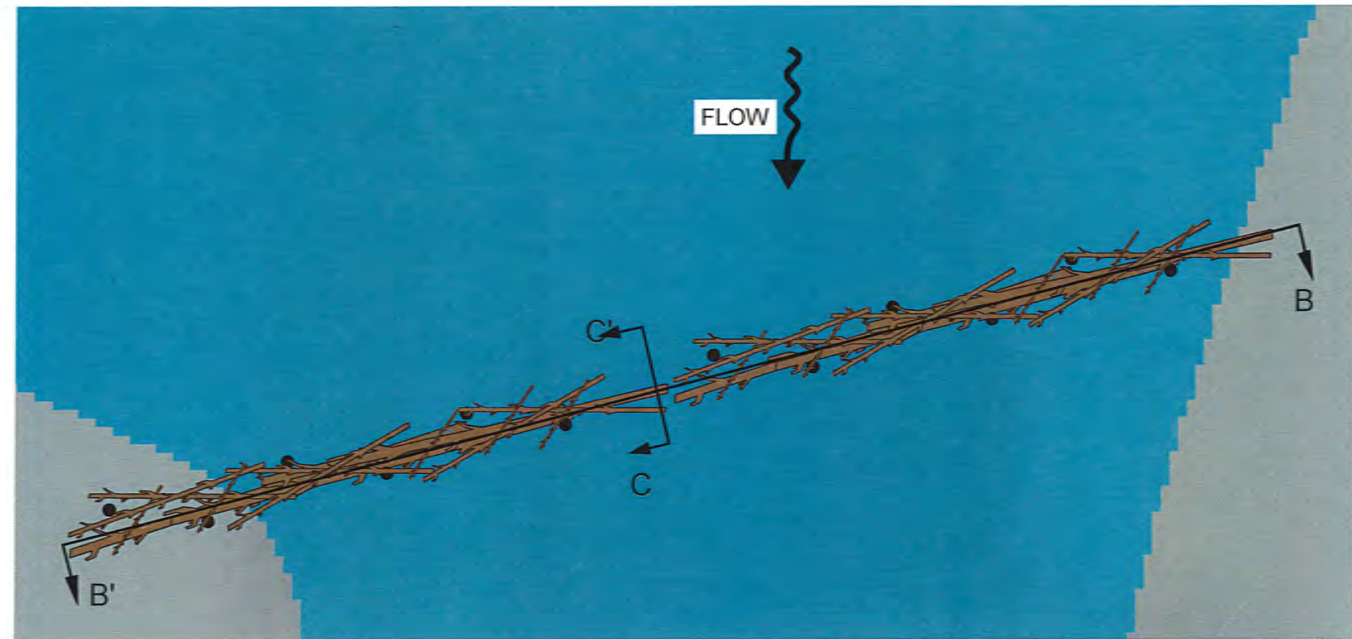
PLAN - SIDE CHANNEL 1



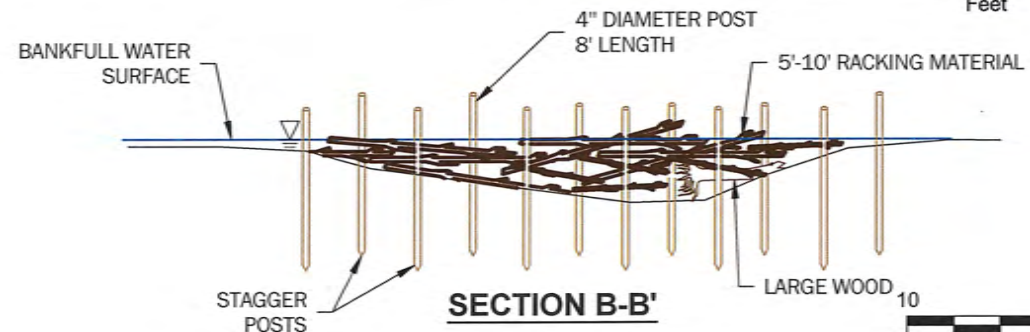
SECTION A-A'



CHANNEL-SPANNING BEAVER-DAM ANALOG



PLAN - SIDE CHANNEL 2



SECTION B-B'



BEAVER DAM ANALOG LOCATIONS

SIDE CHANNEL	NUMBER OF CHANNEL SPANNING STRUCTURE	NUMBER OF PARTIAL SPANNING STRUCTURES
1		4
2	2	
4	1	3
8		5
9		3
10		2
11	1	2

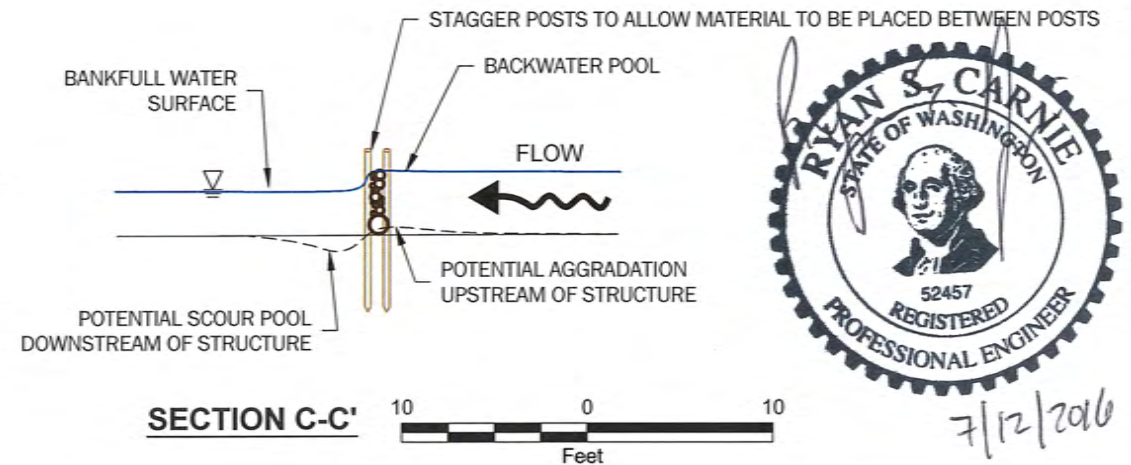
NOTES:

PURPOSE:

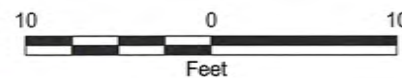
- MIMICS FUNCTIONALITY OF A BEAVER DAM
- USE IN SIDE CHANNELS TO CREATE BACKWATER CONDITIONS, INCREASED FLOODPLAIN INUNDATION AND HYPORHEIC EXCHANGE

DESIGN SPECIFICATIONS:

- USE 4" DIAMETER POSTS ~8' LONG AT 3' SPACING
- STAGGER POSTS SO THEY ARE NOT IN A STRAIGHT LINE
- DRIVE POSTS ~4" BELOW GROUND SURFACE
- WEAVE RACKING MATERIAL BETWEEN POSTS
- CAN INCLUDE LARGE WOOD, 12"-18" DBH, ~6'-8' LENGTH
- STRUCTURE SPANS 40-100% OF SIDE CHANNEL
- ADDITIONAL DEBRIS IS EXPECTED TO COLLECT OVER TIME



SECTION C-C'



7/12/2016

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Details - Beaver Dam Analog
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
11.10

HABITAT STRUCTURE QUANTITIES TABLE

Detail Number	Detail Name	TOTAL NUMBER OF DETAILS	WOOD WITH ROOTWAD			WOOD WITHOUT ROOT WAD			POLES	RACKING MATERIAL	BOULDER BALLAST	SLASH
			45' (DBH=18")	30' (DBH=12")	45' W/ Branches	45'	30'	20'	8'-10' Poles	EA	2.5' (MIN. DIA)	(CY)
1	Meander Jam	10	170	50	10	30	0	0	0	300	0	800
2	Flow Deflection Jam	5	30	0	0	0	5	15	30	100	40	120
3	Longitudinal Log Main Channel	34	102	0	0	0	0	0	0	306	272	408
3	Longitudinal Log Side Channel	2	0	4	0	0	2	0	0	12	16	0
4	Apex Jam	20	20	40	0	0	0	0	40	180	120	80
5	Buried Snag	51	0	51	0	0	0	0	0	153	0	0
6	Rootwad	8	8	16	0	16	24	0	0	120	72	96
7	Partial Spanning Beaver Dam Analog	19	0	19	0	0	0	0	114	475	0	0
8	Channel Spanning Beaver Dam Analog	4	0	12	0	0	0	0	48	200	0	0
9	Longitudinal Stone Toe	1	0	0	0	0	0	0	0	0	0	0
	Flood Fencing	225	0	0	0	0	0	0	225	0	0	0
TOTAL			330	192	10	46	31	15	457	1846	520	1504

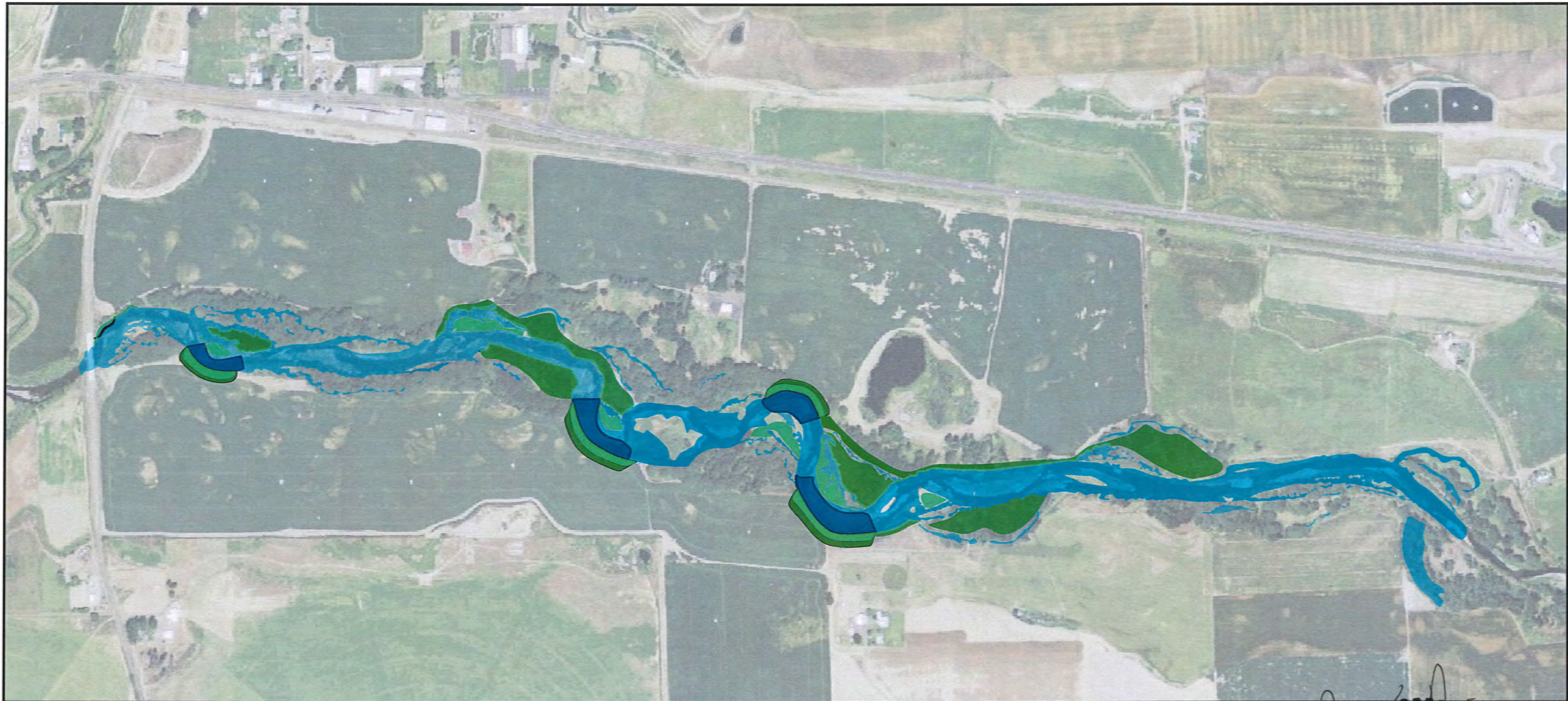


7/12/2016





Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\511.1-11.8 - Details.dwg TAB:11.11 User: bmliller Plot time: Jul-12-16 @ 1:51pm

Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC	Walla Walla River near Lowden, Washington Tri-State Steelheaders		GEOENGINEERS 3501 West Elder Street, Suite 300 Boise, Idaho 83705	Habitat Structure Quantities Walla Walla River Bridge-to-Bridge Design Drawings	Sheet 11.11
				Drawn: BHM					
				Checked: RSC, JRS					
				Date: 07/15/2016					
				Project No: 11281-005-03					

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\12.1-12.5 - Planting Plan.dwg TAB:12.1 User: bmliller Plot time: Jul-11-16 @ 10:07 am

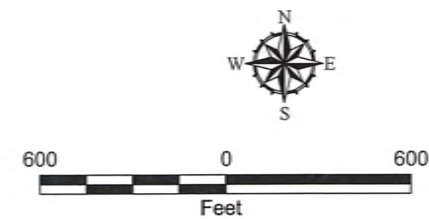


LEGEND:

-  EXISTING CHANNEL
-  PROPOSED CHANNEL
-  BANK ZONE A (WET)
APPROX. 5.1 ACRES
-  RIPARIAN ZONE B (MOIST-WET)
APPROX. 12.2 ACRES

NOTES:

- ALL SHEETS ARE PROJECTED IN NAD 1983 WASHINGTON STATE PLANE SOUTH, INTERNATIONAL FEET, NADV 1988.
- 1.5YR WSEL ELEVATION EQUALS 1,982 CFS
- AERIAL IMAGERY FROM USDA NAIP TAKEN JULY 5, 2013.



Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC
				Drawn: BHM
				Checked: RSC, JRS
				Date: 07/15/2016
				Project No: 11281-005-03

Walla Walla River
near Lowden, Washington

Tri-State Steelheaders



GEOENGINEERS
3501 West Elder Street, Suite 300
Boise, Idaho 83705

Planting Plan
Walla Walla River Bridge-to-Bridge
Design Drawings

Sheet
12.1

Dwg name: P:\11\11281005\03\CAD\80 Percent - Preliminary Design\03_Sheet Files\12.1-12.5 - Planting Plan.dwg TAB:12.2 User: bmillar Plot time: Jul-13-16 @ 11:23am

Bank Zone A (Wet)			Area (AC)		5.1
Species	Indicator Status	Size	Avg. Spacing (ft.)	Percent of Zone	Units*
Willow (Salix sp)	OBL/FACW	cutting	4	40%	4166
Water birch (Betula occidentalis)	FACW	cutting	4	20%	2083
Black cottonwood (Populus balsamifera)	FACW	cutting	15	10%	75
Redosier dogwood (Cornus sericea)	FACW	cutting	4	30%	3125
*Unit totals have been reduced by 25% to account for existing vegetation					
Riparian Zone B (Moist - Wet)			Area (AC)		12.2
Species	Indicator Status	Size	Avg. Spacing (ft.)	Percent of Zone	Units**
Willow (Salix sp)	OBL	cutting	6	40%	1477
Black cottonwood (Populus balsamifera)	FACW	cutting/bare root	25	35%	75
Oregon ash (Fraxinus latifolia)	FACW	bare root	20	25%	84
**Unit totals have been reduced by 75% to account for existing vegetation					
Seed mix for Zone A/B (Includes an additional 5.0 acres for access roads, staging areas, temporary stockpiles, etc.)				Area (AC)	11.9
Species	Indicator Status	Size	lbs/acre	Percent of Zone	Units***
Basin wildrye (Leymus cinereus)	FAC	Seed	10	100%	119
Sandberg's bluegrass (Poa secunda)	FACU	Seed	5	100%	59
Snake River wheatgrass (Elymus wawawaiensis)	FACU	Seed	10	100%	119
Beardless wildrye (Leymus triticoides)	FAC	Seed	10	100%	119
Meadow barley (Hordeum brachyantherum)	FACW	Seed	5	100%	59
***Total acres required for Zone A and Zone B have been reduced by 25% and 75%, respectively, to account for existing vegetation					

NOTES:

- THIS TABLE IDENTIFIED THE PLANT SPECIES AND QUANTITIES FOR THE PROJECT NOTED.
- SEEDS ARE MEASURED BY POUND. POTTED PLANTS AND CUTTING MEASURED BY INDIVIDUAL PIECE.
- REFER TO SHEET 12.1 FOR PLANTING ZONE DESIGNATIONS AND LOCATIONS
- TRANSPLANTED MATERIALS AND LIVE CUTTING INTEGRAL WITH WOOD HABITAT STRUCTURES SHALL BE INSTALLED CONCURRENTLY WITH STRUCTURE PLACEMENT
- NATIVE VEGETATION ESTABLISHED THROUGHOUT THE RIPARIAN AREAS SHALL BE MAINTAINED TO THE BEST EXTENT POSSIBLE



7/12/2016

Revision No:	Date:	Description:	Initials:	Designed: BHM, RSC	Walla Walla River near Lowden, Washington Tri-State Steelheaders		GEOENGINEERS 3501 West Elder Street, Suite 300 Boise, Idaho 83705	Planting Notes Walla Walla River Bridge-to-Bridge Design Drawings	Sheet 12.2
				Drawn: BHM					
				Checked: RSC, JRS					
				Date: 07/15/2016					
				Project No: 11281-005-03					