

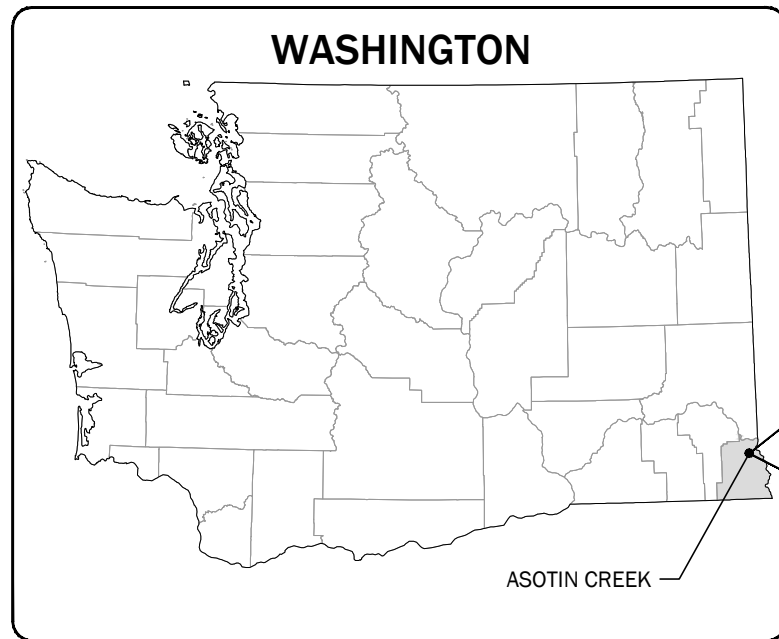
**APPENDIX A**  
**Design Drawings**

DRAFT

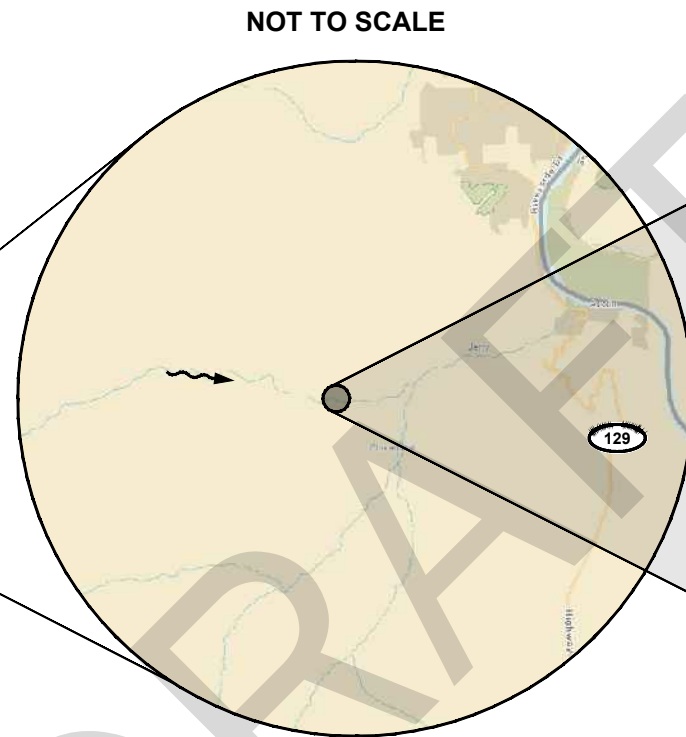
# ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION FINAL DESIGN

## ASOTIN COUNTY, WASHINGTON

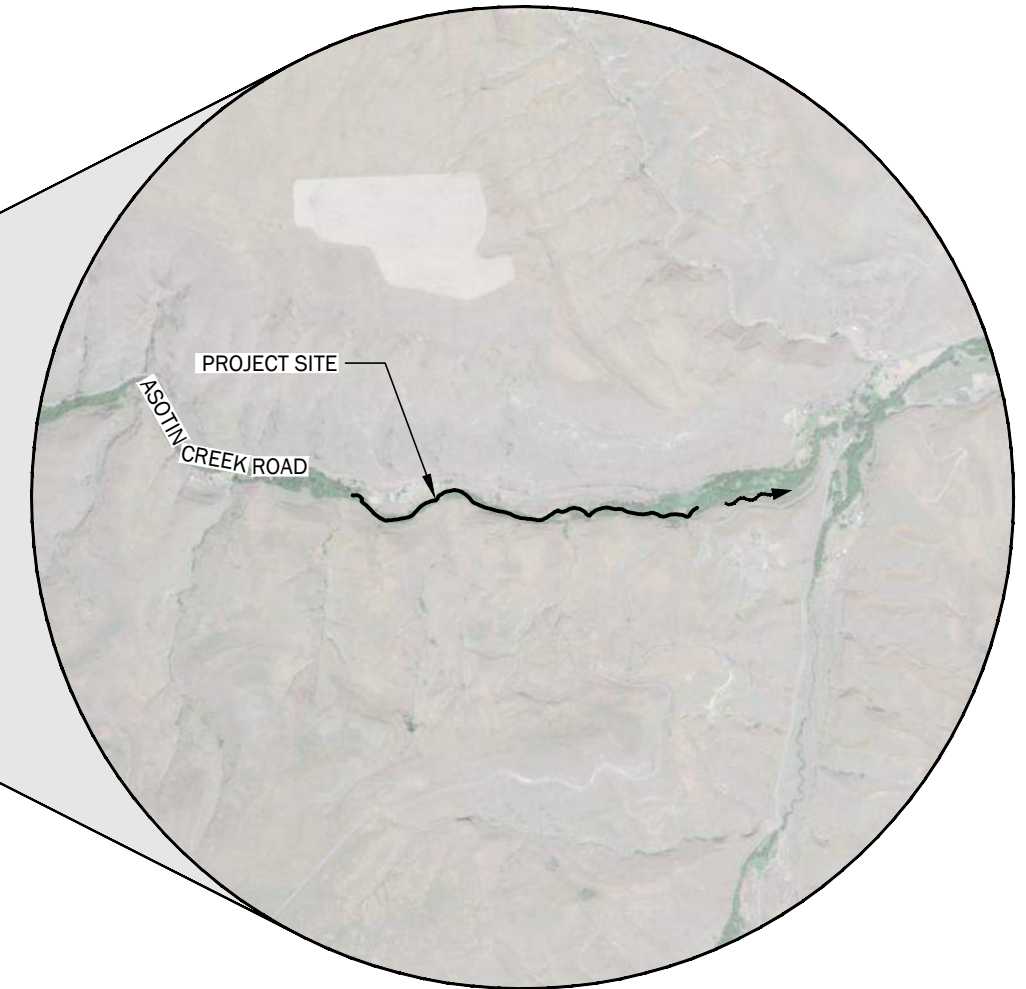
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PROJECT LOCATION



NOT TO SCALE



PROJECT SITE  
ASOTIN CREEK ROAD

SHEET INDEX		
Sheet Number	Drawing Number	Sheet Title
1	1.0	Cover Sheet
2	1.1	Notes and Quantities
3	2.0	Existing Conditions Overview
4	3.0	Proposed Conditions Overview
5	3.1	Proposed Conditions Plan
6	3.2	Proposed Conditions Plan
7	3.3	Proposed Conditions Plan
8	3.4	Proposed Conditions Plan
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15	4.2	Side Channel and Terrace Cross Section
16	5.0	Typical Habitat Details
17	5.1	Typical Habitat Details
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19	5.3	Typical Habitat Details
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22	5.6	Erosion and Sediment Control Details
23	5.7	Bridge Details
24	6.0	Revegetation Plan
25	7.0	HIP Conservation Measures
26	7.1	HIP Conservation Measures
27	7.2	HIP Conservation Measures

### CONTACT INFORMATION

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BECCA MILLER, PE  
5820 S KELLY AVENUE UNIT B  
PORTLAND, OREGON 97239  
PH: (208) 258-8320



Know what's below.  
Call before you dig.



The anticipated in-water construction window is  
July 15 to September 15

Plotted: 09/27/2024, 12:45 | bmliller | P:\2222228109\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228109000\_Sht\_1\_1.0 [Cover].dwg

NO.	DATE	BY	ISSUE / DESCRIPTION
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4	10/1/24	BHM	100% ISSUE FOR BID

DESIGNED BY:	KHR/BHM
DRAWN BY:	GER/KHR
APPROVED BY:	BHM/JRS
REVISION NO.:	---
DATE:	10/1/24

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ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**COVER SHEET**

DRAWING NUMBER:  
**1.0**  
SHEET: 1 OF 27

**GENERAL NOTES:**

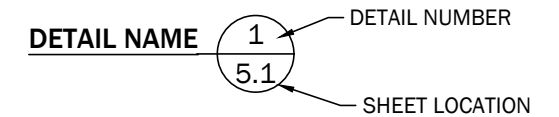
1. These designs and drawings have been prepared for the exclusive use of Asotin County Conservation District (ACCD) and their authorized agents. No other party may rely on the product of our services unless GeoEngineers Inc. (GeoEngineers) agrees in writing in advance of such use.
2. The drawings contained within should not be applied for any purpose or project except the Project Area 3.2 reach of Asotin Creek (Project Reach) as shown in the Project Area located on Sheet 1.0.
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. ACCD 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. ACCD 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 this stream system.
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.

**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 and HPA from the Washington Department of Fish and Wildlife. All work within or adjacent to any wetland area shall comply with the conditions of the applicable permits.
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.
12. The project coordinate system is Washington State Plane South, US Feet.

**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
LS	LUMP SUM
EA	EACH
LF	LINEAR FEET



**QUANTITIES**

Item No.	Specification Section	Item Description	Unit Measure	Phase 1	Phase 2
1	210	Mobilization and Demobilization	LS	1	1
2	210 & 480	Temporary Livestock Fence Removal and Reinstall	LS	1	1
3	280 & 290	Erosion Control and Water Pollution Control	LS	1	1
4	320	Clearing and Grubbing	LS	1	1
5	330	Channel Excavation Incl. Haul and Dispose Onsite	CY	1970	80
6	340	Select Borrow Inc. Haul	CY	50	0
8	470	8'x75' Bridge (Incl. Footings and Bridge Railings)	LS	1	0
9	480	Livestock Exclusion Fencing	LF	330	0
7	350	Class A Rock for Erosion and Scour Protection	CY	50	0
10	1080	Streambed Boulders	EA	414	126
11	1080	Install Flow Deflection Jam	EA	3	3
12	1090	Install Sweeper Logs	EA	7	8
13	1090	Install Bank Rootwads	EA	7	1
14	1090	Install Main Channel Single Rootwads	EA	26	7
15	1090	Install Side Channel Logs	EA	21	0
16	1100	Seeding and Mulching	AC	2	1

**LOG SCHEDULE**

LOG TYPE	STRUCTURES	DESCRIPTION	PHASE 1 - QUANTITY	PHASE 2 - QUANTITY
TYPE A	FLOW DEFLECTION JAMS	LARGE LOG WITH ROOTWAD. 16 TO 21-INCH DBH. 30-FEET LONG MIN.	12	12
TYPE B	BANK ROOTWADS	MEDIUM LOG WITH ROOTWAD. 12 TO 16-INCH DBH. 25 TO 30-FEET LONG	14	2
TYPE C	SINGLE LOGS	SMALL LOG WITH ROOTWAD. 8 TO 12-INCH DBH. 15 TO 20-FEET LONG	26	7
TYPE D	FLOW DEFLECTION JAMS, SWEEPER LOGS	LARGE TREE TOP, 10 TO 16" AVG DIA. LENGTH VARIES PER DETAIL (20 TO 30-FEET)	25	19
TYPE E	SIDE CHANNEL LOGS	SMALL TREE TOP, 6 TO 10" AVG DIA. 18 TO 25 FEET LONG	27	2
LARGE RACKING LOG	FLOW DEFLECTION JAMS	9 TO 14-INCH AVERAGE DIAMETER. 12 TO 16-FEET LONG	18	18
SMALL RACKING LOG	FLOW DEFLECTION JAMS	6 TO 8-INCH AVERAGE DIAMETER. 6 TO 15-FEET LONG	60	24
SLASH	FLOW DEFLECTION JAMS, BANK ROOTWADS	LESS THAN 6-INCH DIAMETER. VARIABLE LENGTH	26	14
ROPE CONNECTION	FLOW DEFLECTION JAMS	ROPE AND STAPLES	15	15
PILE	FLOW DEFLECTION JAMS	15-INCH AVERAGE DIAMETER. 15-FEET LONG	12	12



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2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

DESIGNED BY:	KHR/BHM
DRAWN BY:	GER/KHR
APPROVED BY:	BHM/JRS
REVISION NO.:	---
DATE:	10/1/24



ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**NOTES AND QUANTITIES**

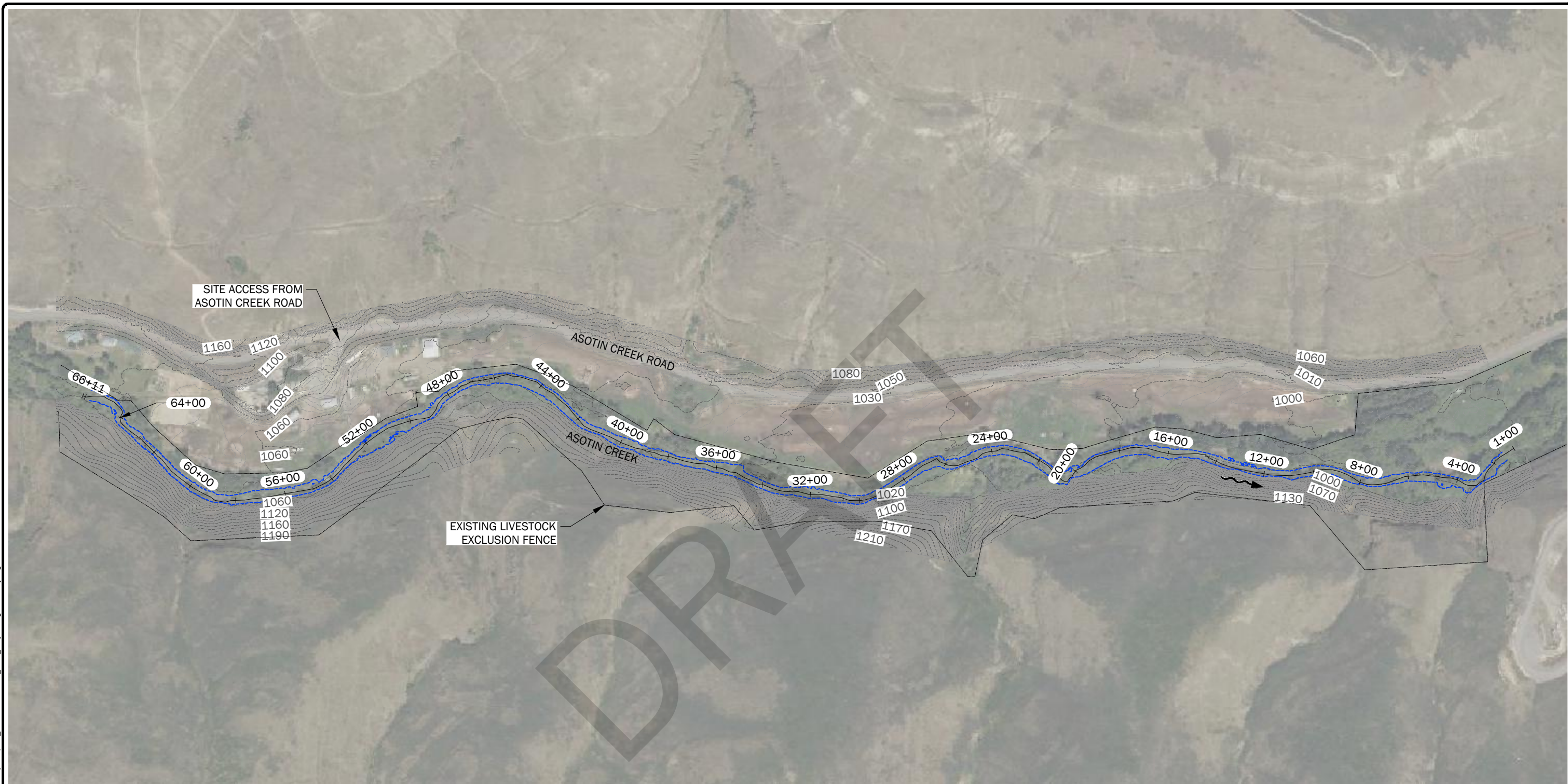
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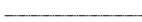
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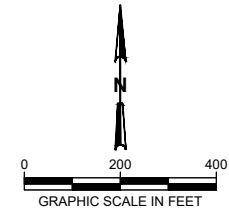


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**PLAN VIEW**

- LEGEND:**
-  EXISTING MAJOR CONTOUR
  -  EXISTING MINOR CONTOUR
  -  FLOW DIRECTION
  -  2-YEAR INUNDATION BOUNDARY (EXISTING OHW)
  -  EXISTING LIVESTOCK EXCLUSION FENCE



NO.	DATE	BY	ISSUE / DESCRIPTION
1	6/30/23	KHR	30%/60% FOR REVIEW
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 DATE: 10/1/24

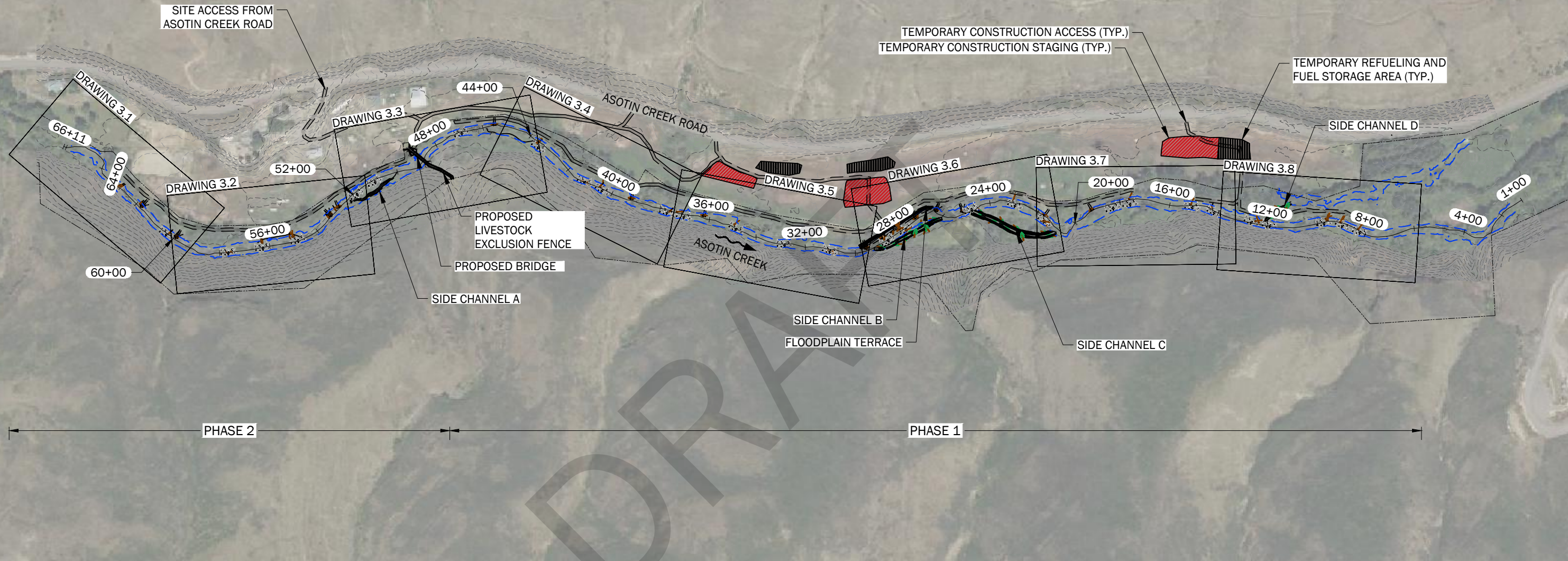


ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
 ASOTIN COUNTY, WASHINGTON  
**EXISTING CONDITIONS OVERVIEW**

DRAWING NUMBER:  
**2.0**  
 SHEET: 3 OF 27



Plotted: 09/27/2024, 12:46 | bmillier | P:\222228109\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228109000\_Sht 4\_3.0 [Proposed Overview].dwg



**PLAN VIEW**

**LEGEND**

	EXISTING MAJOR CONTOUR
	EXISTING MINOR CONTOUR
	FLOW DIRECTION
	TEMPORARY CONSTRUCTION ACCESS
	TEMPORARY CONSTRUCTION STAGING
	GRADING EXTENTS
	PROPOSED MAJOR CONTOUR
	PROPOSED MINOR CONTOUR
	2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)
	TEMPORARY REFUELING AND FUEL STORAGE LOCATION
	EXISTING LIVESTOCK EXCLUSION FENCE
	PROPOSED LIVESTOCK EXCLUSION FENCE

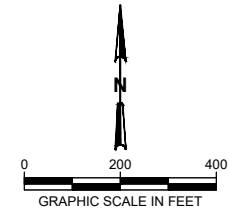
	HABITAT BOULDERS
	FLOW DEFLECTION JAM
	SWEEPER LOGS
	BANK ROOTWADS
	SINGLE ROOTWAD
	SIDE CHANNEL LOGS

**PROJECT ELEMENTS:**

1. INSTALL ROUGHNESS IN THE FORM OF WOODY MATERIAL AND BOULDERS INTO THE ASOTIN CREEK CHANNEL TO INCREASE HABITAT COMPLEXITY FOR NATIVE SALMONIDS.
2. IMPROVE SIDE CHANNEL CONNECTIVITY THROUGH SELECTIVE GRADING.
3. INSTALL A CATTLE CROSSING THAT WILL ALLOW THE LANDOWNER TO HERD CATTLE FROM THEIR WINTERING/CALVING AREA TO THE SUMMER PASTURE WITH OUT TRUCKING THEM.
4. RIPARIAN PLANTING THROUGHOUT THE LEFT BANK.

**PROJECT PHASING:**

1. PHASE 1 WORK INCLUDES INSTALLATION OF THE CATTLE CROSSING, TERRACE AND SIDE CHANNEL B, C, AND D GRADING AND ALL HABITAT ELEMENTS DOWNSTREAM OF THE NEW CROSSING.
2. PHASE 2 WORK INCLUDES SIDE CHANNEL A GRADING AND INSTALLATION OF ALL HABITAT ELEMENTS UPSTREAM OF THE NEW CATTLE CROSSING.



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3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

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DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: ---
DATE: 10/1/24

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**Asotin County**  
CONSERVATION DISTRICT

ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON  
**PROPOSED CONDITIONS OVERVIEW**

DRAWING NUMBER:  
**3.0**  
SHEET: 4 OF 27



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MATCHLINE (SEE DRAWING 3.2)

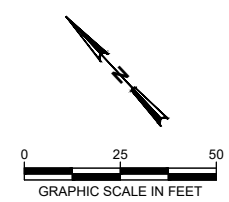


**PLAN VIEW**

- LEGEND:**
- EXISTING MAJOR CONTOUR
  - EXISTING MINOR CONTOUR
  - FLOW DIRECTION
  - TEMPORARY CONSTRUCTION ACCESS
  - 2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)
  - EXISTING LIVESTOCK EXCLUSION FENCE

- HABITAT BOULDERS
- D# FLOW DEFLECTION JAM
- S# SWEEPER LOGS
- B# BANK ROOTWADS
- R# SINGLE ROOTWAD
- SIDE CHANNEL LOGS

- Notes:**
1. SEE DRAWINGS 4.0 TO 4.2 FOR SIDE CHANNEL AND TERRACE GRADING.
  2. SEE DRAWINGS 5.0 TO 5.5 FOR TYPICAL HABITAT DETAILS.



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DATE: 10/1/24

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ASOTIN COUNTY, WASHINGTON

**PROPOSED CONDITIONS PLAN**

DRAWING NUMBER:  
**3.1**  
SHEET: 5 OF 27



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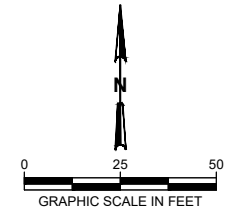


**PLAN VIEW**

**LEGEND:**

	EXISTING MAJOR CONTOUR		HABITAT BOULDERS
	EXISTING MINOR CONTOUR		FLOW DEFLECTION JAM
	FLOW DIRECTION		SWEEPER LOGS
	TEMPORARY CONSTRUCTION ACCESS		BANK ROOTWADS
	2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)		SINGLE ROOTWAD
	EXISTING LIVESTOCK EXCLUSION FENCE		SIDE CHANNEL LOGS

- Notes:
- SEE DRAWINGS 4.0 TO 4.2 FOR SIDE CHANNEL AND TERRACE GRADING.
  - SEE DRAWINGS 5.0 TO 5.5 FOR TYPICAL HABITAT DETAILS.



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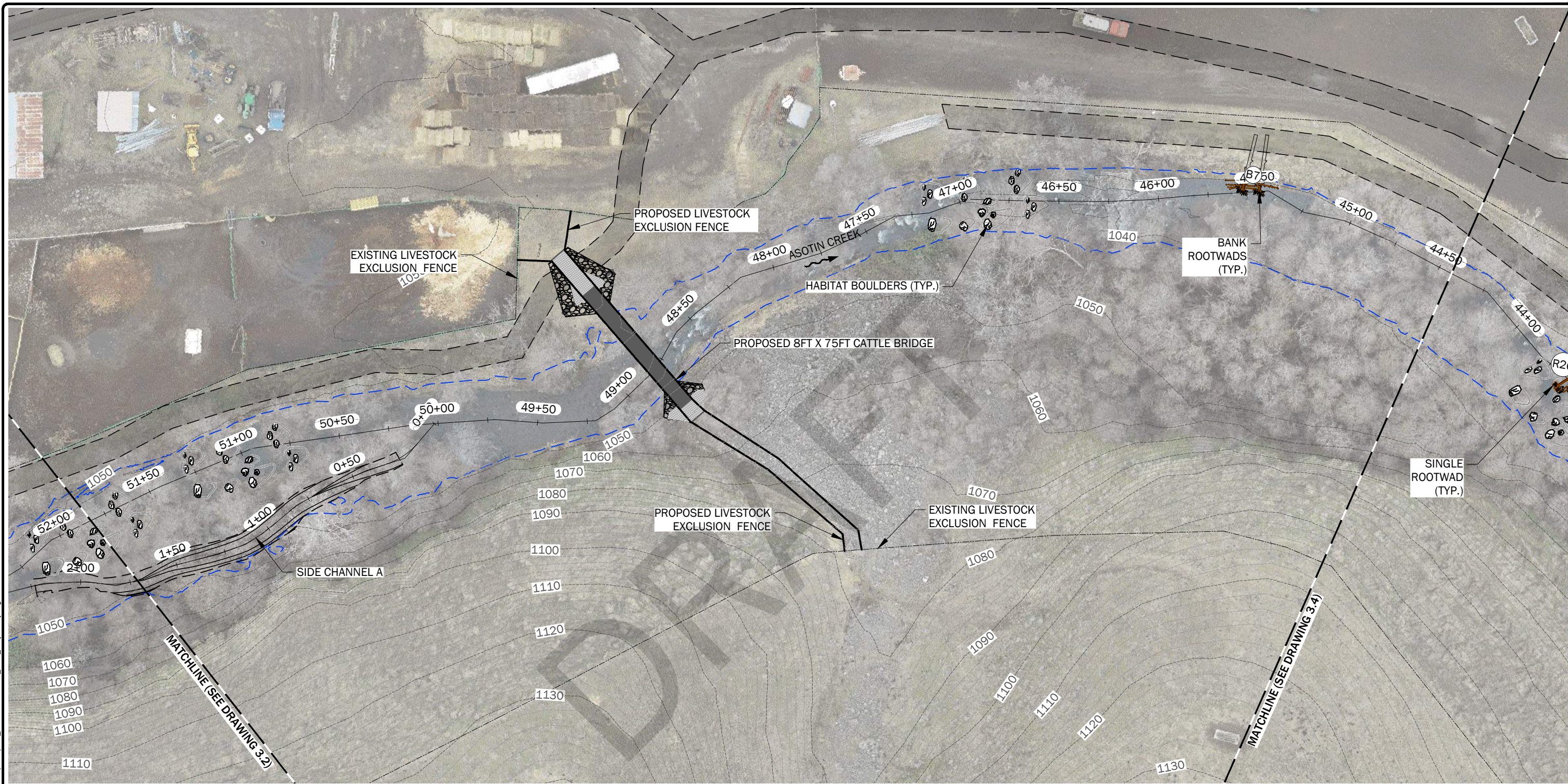
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ASOTIN COUNTY, WASHINGTON  
**PROPOSED CONDITIONS PLAN**

DRAWING NUMBER:  
**3.2**  
SHEET: 6 OF 27



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**PLAN VIEW**

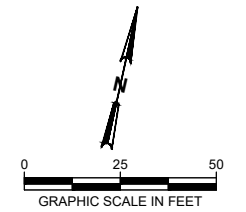
**LEGEND:**

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- FLOW DIRECTION
- TEMPORARY CONSTRUCTION ACCESS
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)
- EXISTING LIVESTOCK EXCLUSION FENCE
- PROPOSED LIVESTOCK EXCLUSION FENCE

- HABITAT BOULDERS
- D# FLOW DEFLECTION JAM
- S# SWEEPER LOGS
- B# BANK ROOTWADS
- R# SINGLE ROOTWAD
- SIDE CHANNEL LOGS

**Notes:**

1. SEE DRAWINGS 4.0 TO 4.2 FOR SIDE CHANNEL AND TERRACE GRADING.
2. SEE DRAWINGS 5.0 TO 5.5 FOR TYPICAL HABITAT DETAILS.
3. SEE DRAWING 5.7 FOR BRIDGE DETAILS.
4. BPA FUNDING DOES NOT INCLUDE BRIDGE CONSTRUCTION.



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ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON  
**PROPOSED CONDITIONS PLAN**

DRAWING NUMBER:  
**3.3**  
SHEET: 7 OF 27



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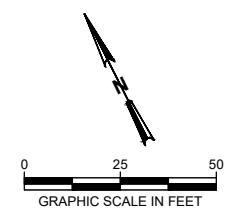


**PLAN VIEW**

- LEGEND:**
- EXISTING MAJOR CONTOUR
  - EXISTING MINOR CONTOUR
  - FLOW DIRECTION
  - TEMPORARY CONSTRUCTION ACCESS
  - 2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)
  - EXISTING LIVESTOCK EXCLUSION FENCE

- HABITAT BOULDERS
- D# FLOW DEFLECTION JAM
- S# SWEEPER LOGS
- B# BANK ROOTWADS
- R# SINGLE ROOTWAD
- SIDE CHANNEL LOGS

- Notes:**
- SEE DRAWINGS 4.0 TO 4.2 FOR SIDE CHANNEL AND TERRACE GRADING.
  - SEE DRAWINGS 5.0 TO 5.5 FOR TYPICAL HABITAT DETAILS.



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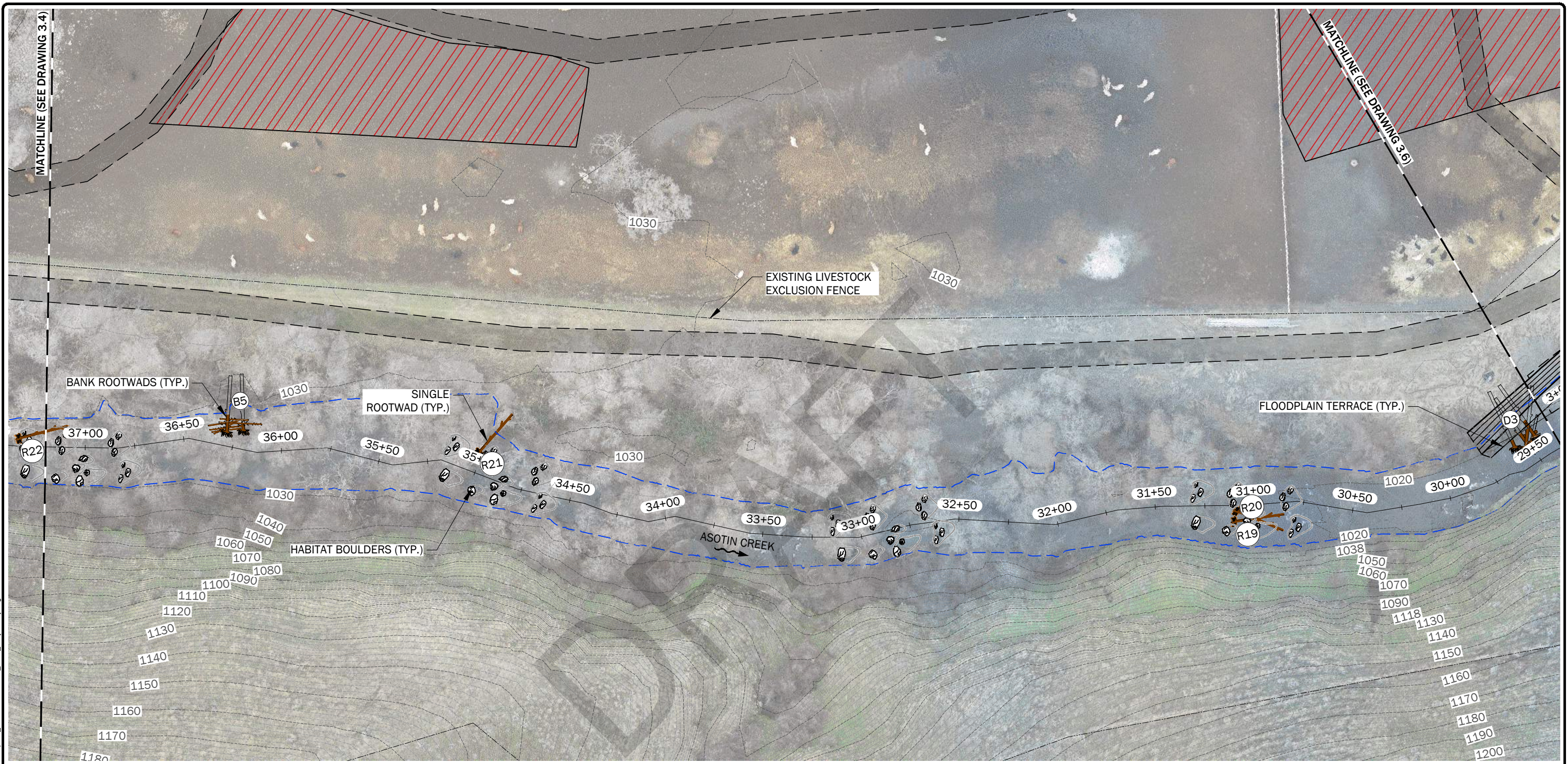
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ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON  
**PROPOSED CONDITIONS PLAN**

DRAWING NUMBER:  
**3.4**  
SHEET: 8 OF 27



Plotted: 09/27/2024, 12:48 | bmliller | P:\2222228109\CAD\00\Fish\_Habitat\_Restoration (100%)\%03\_100%\2228100900\_Sht 9\_3.5 [Plan 5].dwg

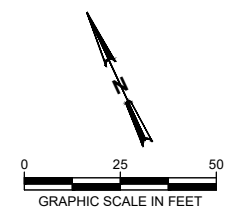


**PLAN VIEW**

**LEGEND:**

- |  |   |  |                     |
|--|---|--|---------------------|
|  | EXISTING MAJOR CONTOUR                    |  | HABITAT BOULDERS    |
|  | EXISTING MINOR CONTOUR                    |  | FLOW DEFLECTION JAM |
|  | FLOW DIRECTION                            |  | SWEEPER LOGS        |
|  | TEMPORARY CONSTRUCTION ACCESS             |  | BANK ROOTWADS       |
|  | TEMPORARY CONSTRUCTION STAGING            |  | SINGLE ROOTWAD      |
|  | PROPOSED MAJOR CONTOUR                    |  | SIDE CHANNEL LOGS   |
|  | PROPOSED MINOR CONTOUR                    |  |                     |
|  | 2-YEAR INUNDATION BOUNDARY (PROPOSED OHW) |  |                     |
|  | EXISTING LIVESTOCK EXCLUSION FENCE        |  |                     |

- Notes:
- SEE DRAWINGS 4.0 TO 4.2 FOR SIDE CHANNEL AND TERRACE GRADING.
  - SEE DRAWINGS 5.0 TO 5.5 FOR TYPICAL HABITAT DETAILS.



NO.	DATE	BY	ISSUE / DESCRIPTION
1	6/30/23	KHR	30%/60% FOR REVIEW
2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

DESIGNED BY:	KHR/BHM
DRAWN BY:	GER/KHR
APPROVED BY:	BHM/JRS
REVISION NO.:	---
DATE:	10/1/24

**GEOENGINEERS**  
WWW.GEOENGINEERS.COM

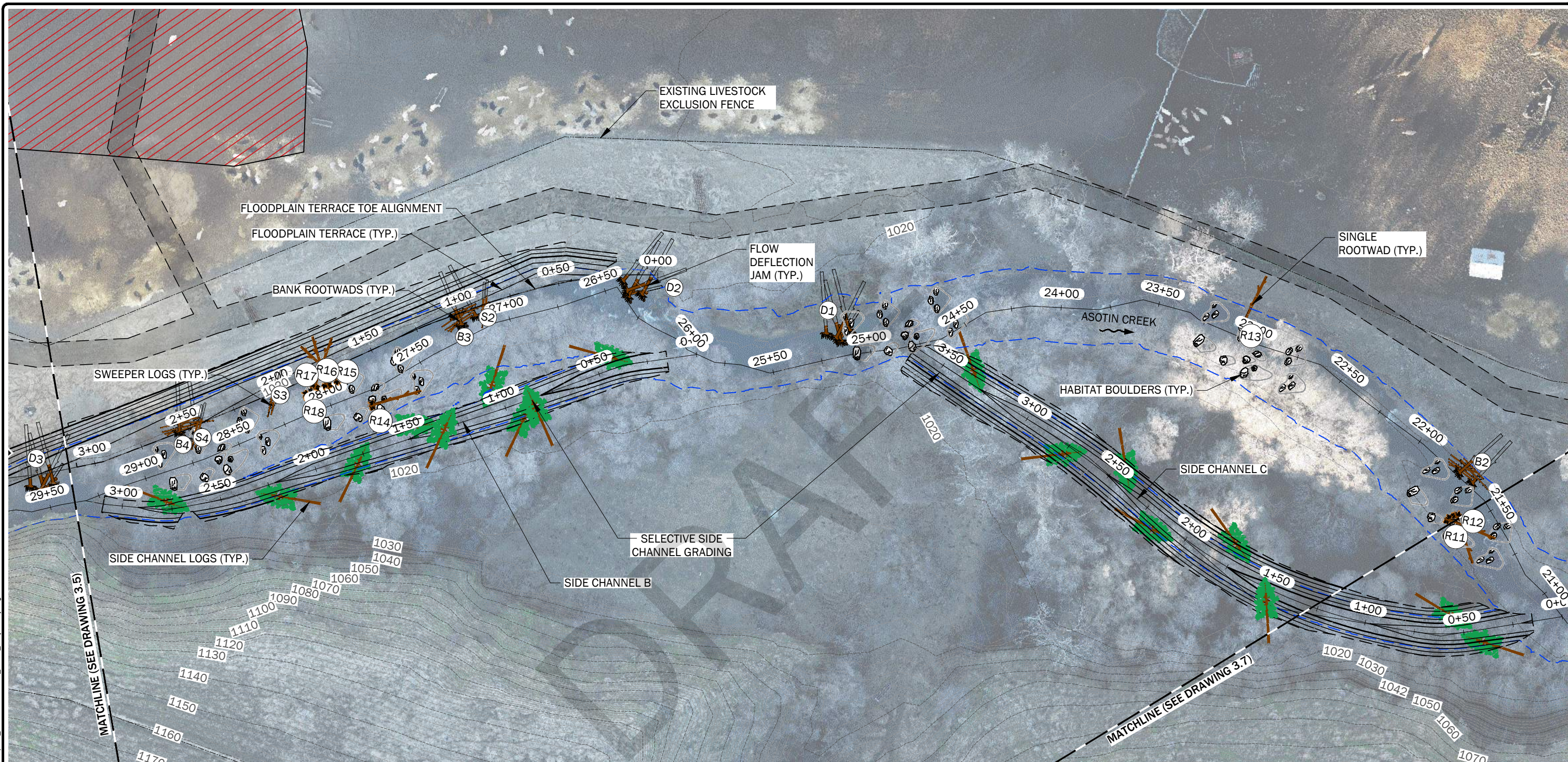
PREPARED FOR:  
**Asotin County**  
CONSERVATION DISTRICT

ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON  
**PROPOSED CONDITIONS PLAN**

DRAWING NUMBER:  
**3.5**  
SHEET: 9 OF 27



Plotted: 09/27/2024, 12:49 | bmillier | P:\22222228\109\CAD\00\Fish\_Habitat\_Restoration (100%)\103\_100%\2228\00900\_Sht 10\_3.6 (Plan 6).dwg

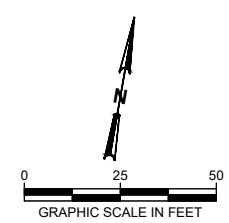


**PLAN VIEW**

**LEGEND:**

	EXISTING MAJOR CONTOUR		HABITAT BOULDERS
	EXISTING MINOR CONTOUR		D# FLOW DEFLECTION JAM
	FLOW DIRECTION		S# SWEEPER LOGS
	TEMPORARY CONSTRUCTION ACCESS		B# BANK ROOTWADS
	TEMPORARY CONSTRUCTION STAGING		R# SINGLE ROOTWAD
	PROPOSED MAJOR CONTOUR		SIDE CHANNEL LOGS
	PROPOSED MINOR CONTOUR		
	2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)		
	EXISTING LIVESTOCK EXCLUSION FENCE		

- Notes:
- SEE DRAWINGS 4.0 TO 4.2 FOR SIDE CHANNEL AND TERRACE GRADING.
  - SEE DRAWINGS 5.0 TO 5.5 FOR TYPICAL HABITAT DETAILS.



NO.	DATE	BY	ISSUE / DESCRIPTION
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2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

DESIGNED BY:	KHR/BHM
DRAWN BY:	GER/KHR
APPROVED BY:	BHM/JRS
REVISION NO.:	---
DATE:	10/1/24

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Asotin County  
CONSERVATION DISTRICT

ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**PROPOSED CONDITIONS PLAN**

DRAWING NUMBER:  
**3.6**

SHEET: 10 OF 27





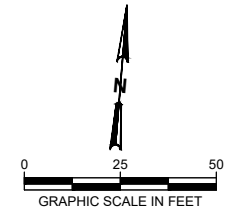
**PLAN VIEW**

Plotted: 09/27/2024, 12:49 | bmliller | P:\2222228109\CAD\00\Fish\_Habitat\_Restoration\_100%\103\_100%\_3.7\_Plan\_7.dwg

**LEGEND:**

- |  |   |  |                     |
|--|---|--|---------------------|
|  | EXISTING MAJOR CONTOUR                    |  | HABITAT BOULDERS    |
|  | EXISTING MINOR CONTOUR                    |  | FLOW DEFLECTION JAM |
|  | FLOW DIRECTION                            |  | SWEPPER LOGS        |
|  | TEMPORARY CONSTRUCTION ACCESS             |  | BANK ROOTWADS       |
|  | PROPOSED MAJOR CONTOUR                    |  | SINGLE ROOTWAD      |
|  | PROPOSED MINOR CONTOUR                    |  | SIDE CHANNEL LOGS   |
|  | 2-YEAR INUNDATION BOUNDARY (PROPOSED OHW) |  |                     |
|  | EXISTING LIVESTOCK EXCLUSION FENCE        |  |                     |

- Notes:
- SEE DRAWINGS 4.0 TO 4.2 FOR SIDE CHANNEL AND TERRACE GRADING.
  - SEE DRAWINGS 5.0 TO 5.5 FOR TYPICAL HABITAT DETAILS.



NO.	DATE	BY	ISSUE / DESCRIPTION
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3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

DESIGNED BY:	KHR/BHM
DRAWN BY:	GER/KHR
APPROVED BY:	BHM/JRS
REVISION NO.:	---
DATE:	10/1/24

PREPARED FOR:

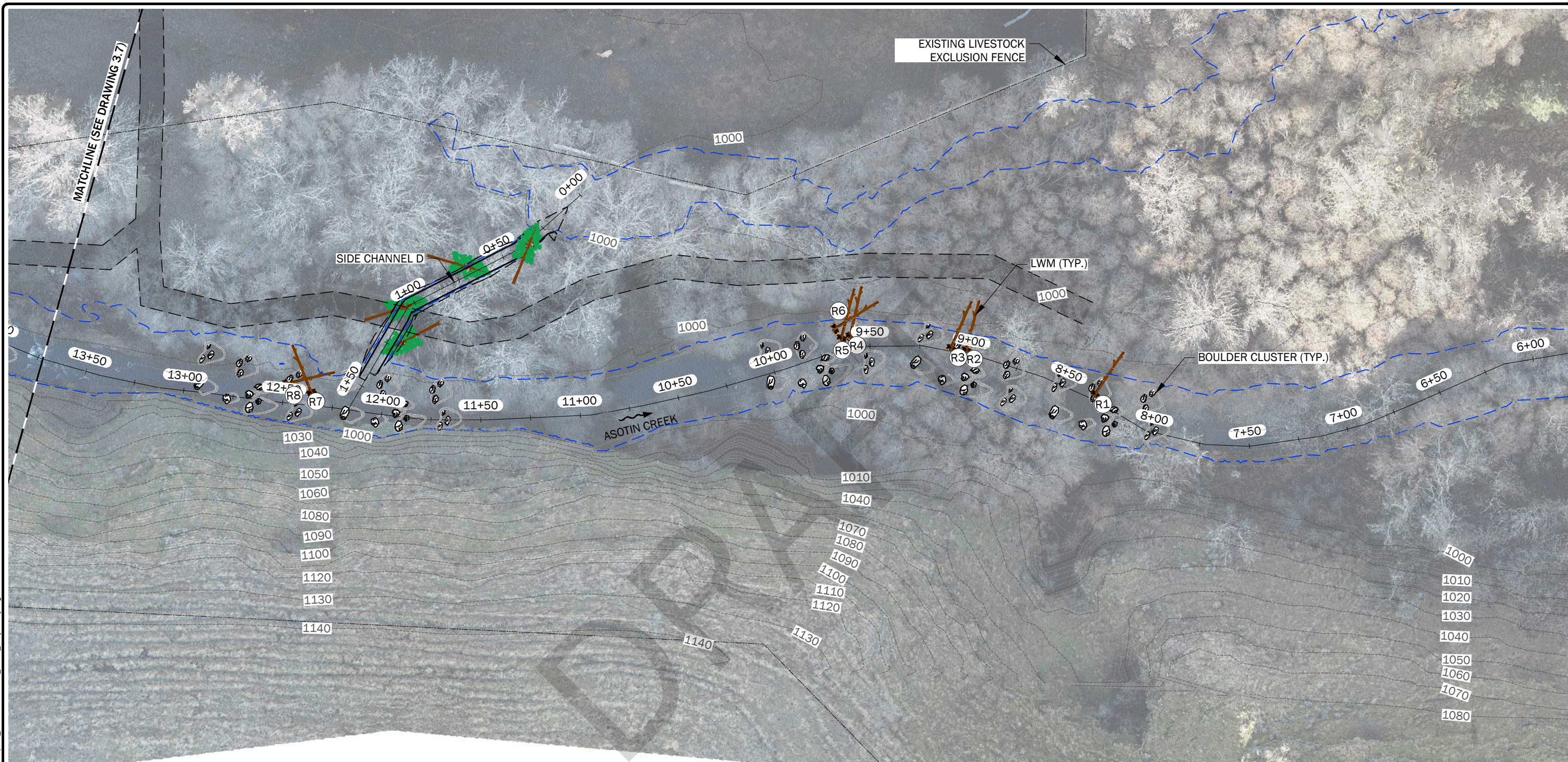
ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**PROPOSED CONDITIONS PLAN**

DRAWING NUMBER:  
**3.7**  
SHEET: 11 OF 27



Plotted: 09/27/2024, 12:50 l bmillier P:\22222228\109\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228\00900\_Sht 12\_3.8 [Plan 8].dwg



**PLAN VIEW**

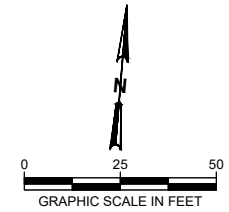
**LEGEND:**

- EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- FLOW DIRECTION
- TEMPORARY CONSTRUCTION ACCESS
- PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)
- EXISTING LIVESTOCK EXCLUSION FENCE

- HABITAT BOULDERS
- D# FLOW DEFLECTION JAM
- S# SWEEPER LOGS
- B# BANK ROOTWADS
- R# SINGLE ROOTWAD
- SIDE CHANNEL LOGS

**Notes:**

1. SEE DRAWINGS 4.0 TO 4.2 FOR SIDE CHANNEL AND TERRACE GRADING.
2. SEE DRAWINGS 5.0 TO 5.5 FOR TYPICAL HABITAT DETAILS.



NO.	DATE	BY	ISSUE / DESCRIPTION
1	6/30/23	KHR	30%/60% FOR REVIEW
2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

DESIGNED BY: KHR/BHM
DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: ---
DATE: 10/1/24

PREPARED FOR:

ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

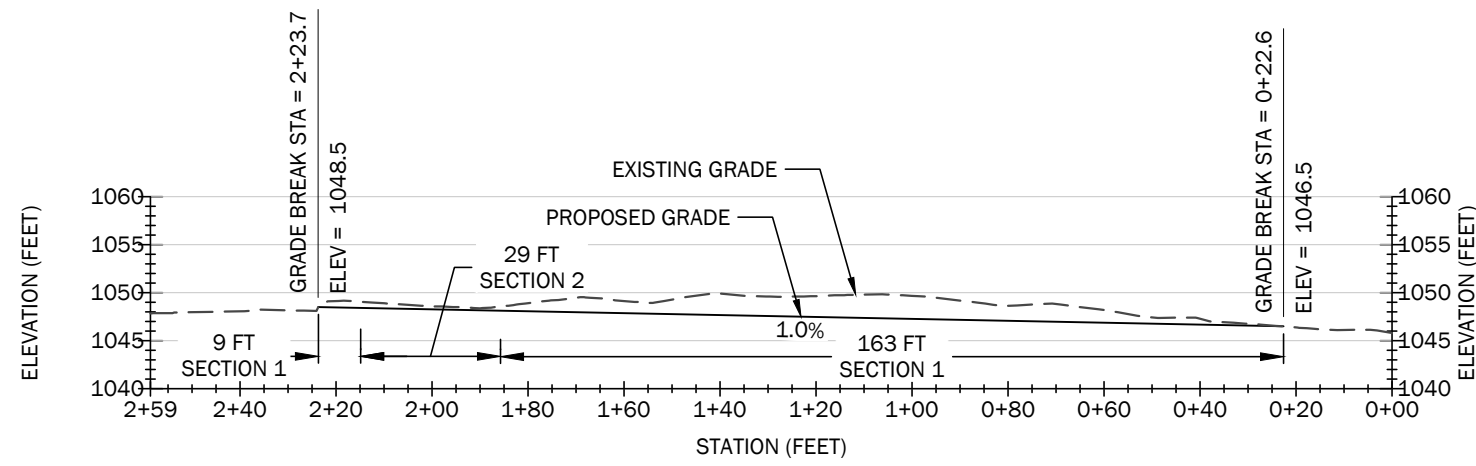
**PROPOSED CONDITIONS PLAN**

DRAWING NUMBER:  
**3.8**  
SHEET: 12 OF 27

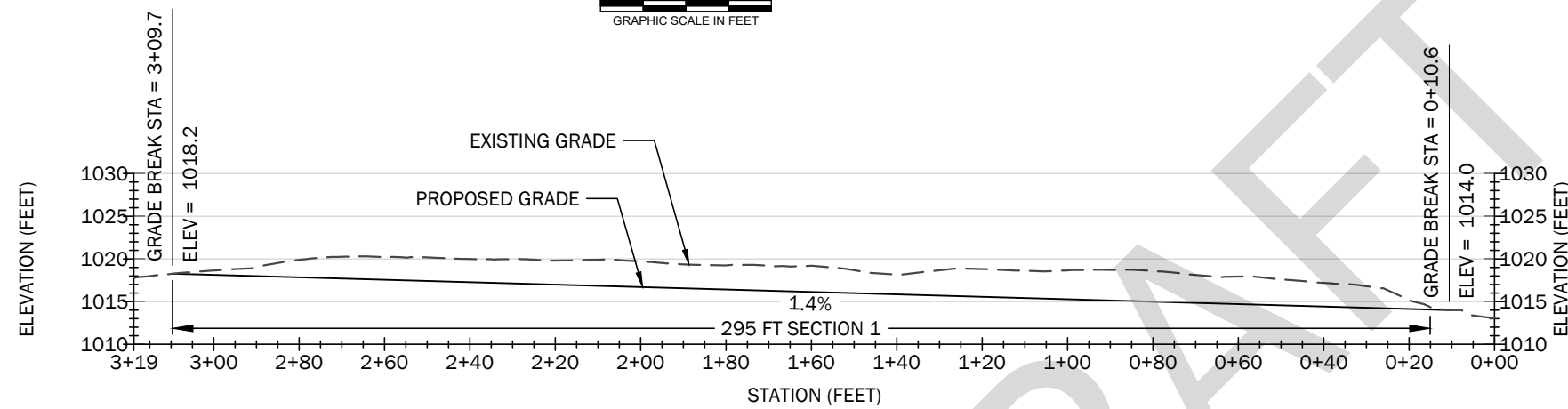
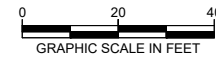


Plotted: 09/27/2024, 12:50 | bmilller P:\222222281009\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228100900\_Sht 13\_4.dwg [Profile].dgn

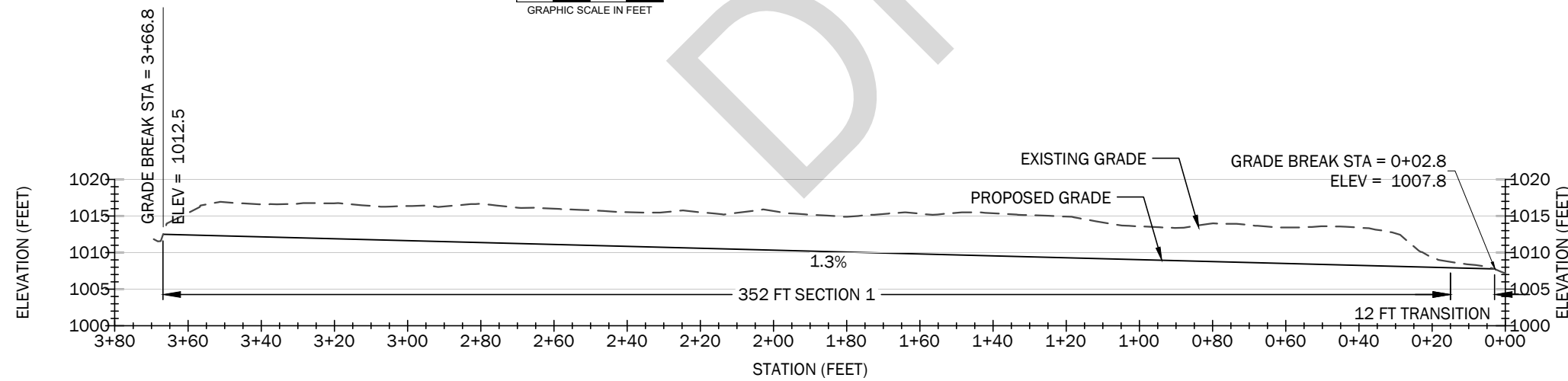
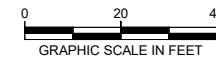
**NOTES:**  
 1. SEE DRAWING NUMBER 4.2 FOR TYPICAL SECTIONS



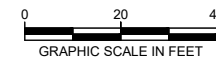
**SIDE CHANNEL A PROFILE**  
 2X VERT. EXAGGERATION



**SIDE CHANNEL B PROFILE**  
 2X VERT. EXAGGERATION



**SIDE CHANNEL C PROFILE**  
 2X VERT. EXAGGERATION



NO.	DATE	BY	ISSUE / DESCRIPTION
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3	6/24/24	KHR	100% FOR REVIEW
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DESIGNED BY: KHR/BHM  
 DRAWN BY: GER/KHR  
 APPROVED BY: BHM/JRS  
 REVISION NO.: ---  
 DATE: 10/1/24

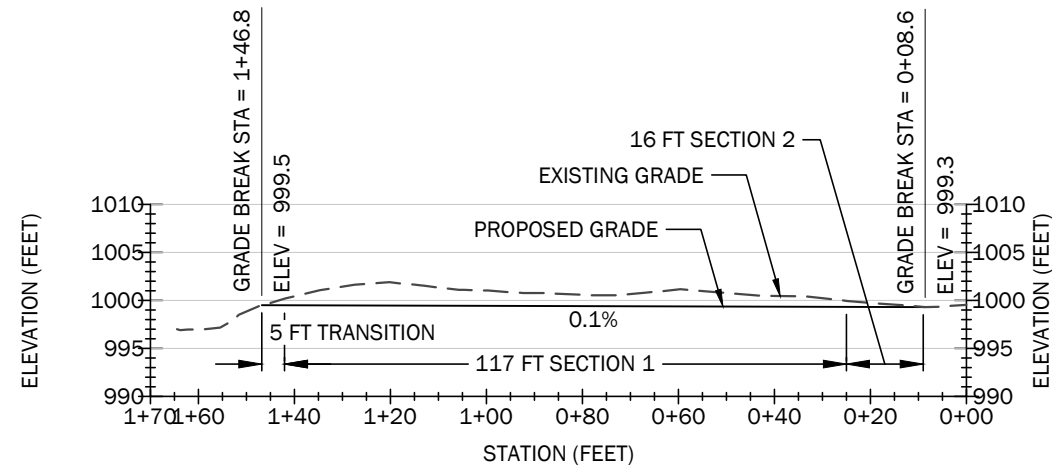


ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
 ASOTIN COUNTY, WASHINGTON  
**SIDE CHANNEL GRADING PROFILES**

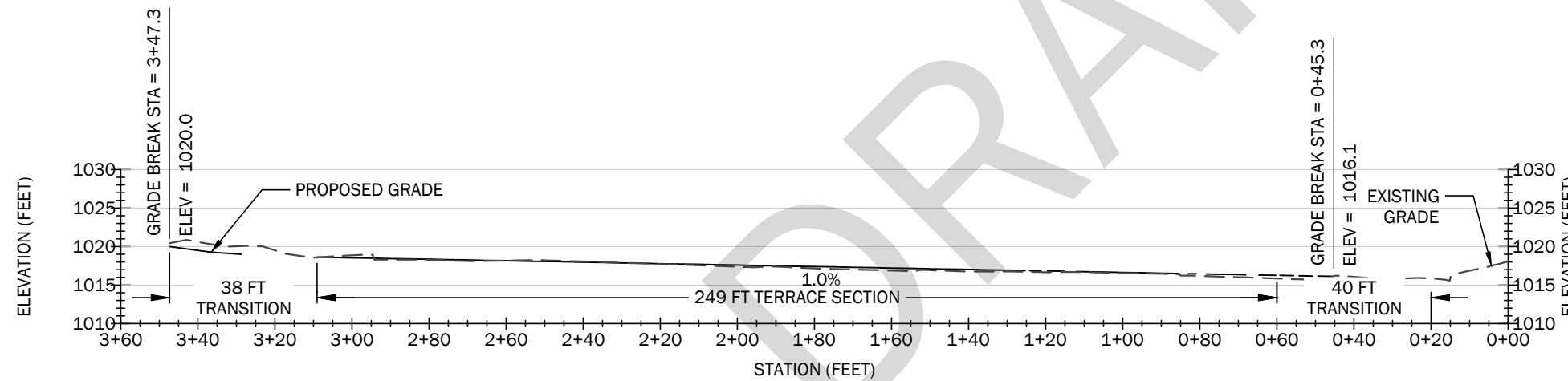
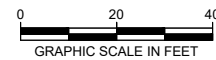
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**4.0**  
 SHEET: 13 OF 27



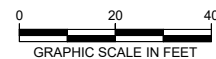
NOTES:  
 1. SEE DRAWING NUMBER 4.2 FOR TYPICAL SECTIONS



**SIDE CHANNEL D PROFILE**  
 2X VERT. EXAGGERATION



**TERRACE PROFILE**  
 2X VERT. EXAGGERATION



Plotted: 09/27/2024, 12:51 | bmillar P:\22222228\109\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228\00900\_Sht 14\_4\_1\_Profile.dwg

NO.	DATE	BY	ISSUE / DESCRIPTION
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2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

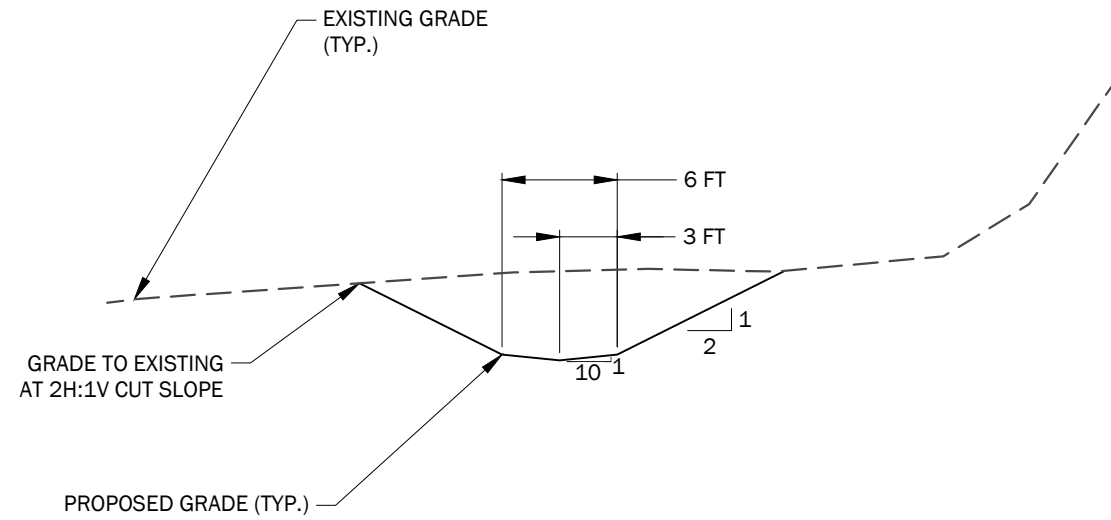
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 DRAWN BY: GER/KHR  
 APPROVED BY: BHM/JRS  
 REVISION NO.: ---  
 DATE: 10/1/24



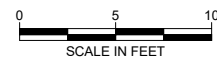
ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
 ASOTIN COUNTY, WASHINGTON  
**SIDE CHANNEL GRADING PROFILES**

DRAWING NUMBER:  
**4.1**  
 SHEET: 14 OF 27

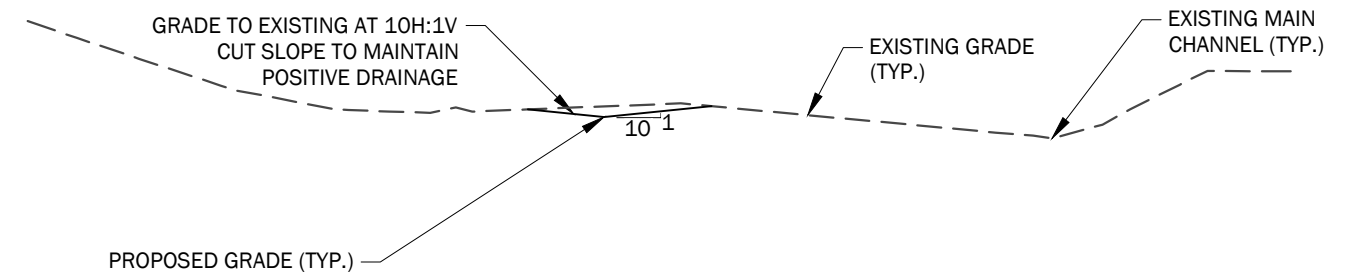




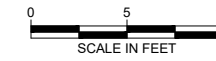
**TYPICAL CHANNEL 1**  
SCALE: 1:5 4.2



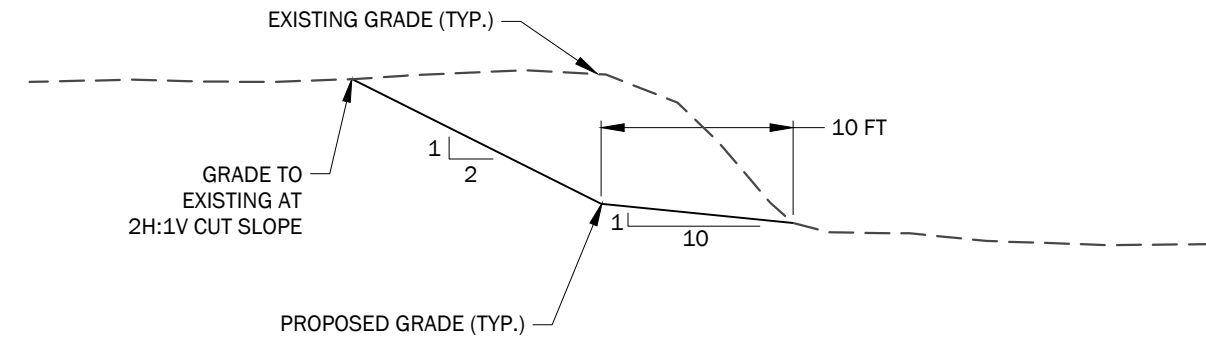
- SIDE CHANNEL A  
0+25.0 TO 1+86.0  
2+14.9 TO 2+23.0
- SIDE CHANNEL B  
0+15.0 TO 3+09.6
- SIDE CHANNEL C  
0+15.0 TO 3+60.8
- SIDE CHANNEL D  
0+25.0 TO 1+42.1



**MINIMAL GRADING WITHIN EXISTING LOW FEATURES 2**  
SCALE: 1:5 4.2



- SIDE CHANNEL A  
1+86.0 TO 2+14.9
- SIDE CHANNEL D  
0+9.0 TO 0+25.0



**TYPICAL MAIN CHANNEL TERRACE 3**  
SCALE: 1:5 4.2



0+60.0 TO 3+09.1

**NOTES:**

1. CROSS SECTIONS FACE DOWNSTREAM.
2. SECTION 2 DEPICTS LOW CHANNEL WITHIN EXISTING LOW TOPOGRAPHIC FEATURES TO PROVIDE POSITIVE DRAINAGE THROUGHOUT SIDE CHANNELS. MINIMIZE DISTURBANCE OUTSIDE OF THE LOW FLOW CHANNEL.
3. MATERIAL EXCAVATED DURING LOW FLOW GRADING SHALL BE SIDE CAST AND SPREAD TO APPEAR NATURAL, WHILE MINIMIZING DISTURBANCE.
4. BOULDERS REMOVED FROM SIDE CHANNEL D INLET TO BE STOCKPILED AND REUSED AS HABITAT BOULDERS.
5. SIDE CHANNEL SECTION INCLUDES EXCAVATION TO EXPOSE NATIVE SOILS AND DOES NOT INCLUDE IMPORT OF STREAMBED MATERIALS OR WASHING IN FINES.



Plotted: 09/27/2024, 12:51 | bmillier P:\22222228109\CAD\00\Fish Habitat Restoration (100%)\%03\_100%\2228109\000\_Sht 15\_4.2 [Cross Section].dwg

NO.	DATE	BY	ISSUE / DESCRIPTION
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2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

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DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: ---
DATE: 10/1/24



ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**SIDE CHANNEL AND TERRACE CROSS SECTION**

DRAWING NUMBER:  
**4.2**  
SHEET: 15 OF 27



**PHASE 1 LWM AND BOULDERS**

**HABITAT BOULDERS**

STA 7+90 TO STA 9+30	STA 28+30 TO STA 28+95
STA 9+40 TO STA 10+05	STA 30+75 TO STA 31+35
STA 11+60 TO STA 12+95	STA 31+50 TO STA 33+15
STA 13+85 TO STA 14+50	STA 34+55 TO STA 35+15
STA 14+80 TO STA 15+45	STA 36+70 TO STA 38+00
STA 17+30 TO STA 18+65	STA 40+10 TO STA 40+70
STA 21+25 TO STA 21+90	STA 40+85 TO STA 41+50
STA 22+65 TO STA 23+30	STA 43+15 TO STA 43+85
STA 24+50 TO STA 25+15	STA 46+55 TO STA 47+20
STA 27+45 TO STA 28+10	

**SIDE CHANNEL LOGS**

SIDE CHANNEL B: 9 LOGS  
 SIDE CHANNEL C: 8 LOGS  
 SIDE CHANNEL D: 4 LOGS

BANK ROOTWADS - LWM CONTROL POINTS		
STRUCTURE NUMBER_CONTROL POINT	NORTHING	EASTING
BANK_ROOTWAD_1_A	378833.0	2492837.5
BANK_ROOTWAD_1_B	378838.0	2492844.1
BANK_ROOTWAD_2_A	378816.0	2492650.2
BANK_ROOTWAD_2_B	378811.9	2492657.6
BANK_ROOTWAD_3_A	378801.9	2492143.7
BANK_ROOTWAD_3_B	378807.5	2492149.9
BANK_ROOTWAD_4_A	378724.1	2492014.1
BANK_ROOTWAD_4_B	378727.3	2492021.7
BANK_ROOTWAD_5_A	378812.2	2491308.3
BANK_ROOTWAD_5_B	378811.4	2491316.6
BANK_ROOTWAD_6_A	378879.7	2491022.6
BANK_ROOTWAD_6_B	378879.1	2491030.8
BANK_ROOTWAD_7_A	379170.2	2490482.0
BANK_ROOTWAD_7_B	379171.1	2490490.2

FLOW DEFLECTION JAM - LWM CONTROL POINTS		
STRUCTURE NUMBER_CONTROL POINT	NORTHING	EASTING
FLOW_DEFLECTION_1_A	378833.8	2492330.6
FLOW_DEFLECTION_1_B	378830.1	2492332.3
FLOW_DEFLECTION_1_C	378834.8	2492336.7
FLOW_DEFLECTION_2_A	378837.0	2492227.3
FLOW_DEFLECTION_2_B	378833.2	2492225.9
FLOW_DEFLECTION_2_C	378833.5	2492232.4
FLOW_DEFLECTION_3_A	378688.8	2491950.7
FLOW_DEFLECTION_3_B	378685.1	2491952.4
FLOW_DEFLECTION_3_C	378689.8	2491956.8

SINGLE ROOTWADS - LWM CONTROL POINTS		
STRUCTURE NUMBER_CONTROL POINT	NORTHING	EASTING
ROOTWAD_1_A	378760.0	2493890.2
ROOTWAD_2_A	378786.7	2493826.4
ROOTWAD_3_A	378788.2	2493819.2
ROOTWAD_4_A	378797.5	2493768.9
ROOTWAD_5_A	378797.0	2493764.6
ROOTWAD_6_A	378801.1	2493762.2
ROOTWAD_7_A	378787.0	2493496.4
ROOTWAD_8_A	378790.9	2493485.4
ROOTWAD_9_A	378859.0	2493231.1
ROOTWAD_10_A	378879.7	2492986.8
ROOTWAD_11_A	378791.2	2492649.4
ROOTWAD_12_A	378793.1	2492652.8
ROOTWAD_13_A	378872.6	2492530.7
ROOTWAD_14_A	378754.7	2492107.9
ROOTWAD_15_A	378763.8	2492086.8
ROOTWAD_16_A	378760.9	2492082.2
ROOTWAD_17_A	378759.7	2492077.0
ROOTWAD_18_A	378753.7	2492074.5
ROOTWAD_19_A	378673.5	2491800.3
ROOTWAD_20_A	378677.8	2491802.3
ROOTWAD_21_A	378778.9	2491432.3
ROOTWAD_22_A	378828.0	2491205.7
ROOTWAD_23_A	378927.4	2490914.1
ROOTWAD_24_A	378946.0	2490830.9
ROOTWAD_25_A	378950.3	2490832.8
ROOTWAD_26_A	379101.0	2490655.2

SWEEPER LOGS - LWM CONTROL POINTS		
STRUCTURE NUMBER_CONTROL POINT	NORTHING	EASTING
SWEEPER_1_A	378852.9	2493314.1
SWEEPER_2_A	378813.7	2492153.6
SWEEPER_3_A	378757.3	2492057.7
SWEEPER_4_A	378729.3	2492022.8
SWEEPER_5_A	378839.8	2491187.8
SWEEPER_6_A	378937.2	2490911.2
SWEEPER_7_A	379109.7	2490671.5

**PHASE 2 LWM AND BOULDERS**

**HABITAT BOULDERS**

STA 50+65 TO STA 51+30
STA 51+50 TO STA 52+15
STA 54+55 TO STA 55+20
STA 56+00 TO STA 56+60
STA 57+35 TO STA 58+00
STA 60+00 TO STA 60+65
STA 62+80 TO STA 63+45

BANK ROOTWADS - LWM CONTROL POINTS		
STRUCTURE NUMBER_CONTROL POINT	NORTHING	EASTING
BANK_ROOTWAD_1_A	378844.8	2489867.5
BANK_ROOTWAD_1_B	378847.0	2489875.5

FLOW DEFLECTION JAM - LWM CONTROL POINTS		
STRUCTURE NUMBER_CONTROL POINT	NORTHING	EASTING
FLOW_DEFLECTION_1_A	378817.2	2489838.7
FLOW_DEFLECTION_1_B	378814.7	2489842.0
FLOW_DEFLECTION_1_C	378820.9	2489843.7
FLOW_DEFLECTION_2_A	378731.5	2489235.4
FLOW_DEFLECTION_2_B	378727.9	2489233.4
FLOW_DEFLECTION_2_C	378727.1	2489239.8
FLOW_DEFLECTION_3_A	378853.9	2489099.9
FLOW_DEFLECTION_3_B	378850.9	2489097.2
FLOW_DEFLECTION_3_C	378848.7	2489103.3

SINGLE ROOTWADS - LWM CONTROL POINTS		
STRUCTURE NUMBER_CONTROL POINT	NORTHING	EASTING
ROOTWAD_1_A	378730.0	2489690.9
ROOTWAD_2_A	378732.3	2489695.6
ROOTWAD_3_A	378706.6	2489572.7
ROOTWAD_4_A	378663.4	2489431.6
ROOTWAD_5_A	378668.3	2489431.5
ROOTWAD_6_A	378937.2	2488985.9
ROOTWAD_7_A	378940.9	2488989.1

SWEEPER LOGS - LWM CONTROL POINTS		
STRUCTURE NUMBER_CONTROL POINT	NORTHING	EASTING
SWEEPER_1_A	378843.6	2489855.6
SWEEPER_2_A	378814.2	2489826.0
SWEEPER_3_A	378733.2	2489679.8
SWEEPER_4_A	378713.4	2489568.2
SWEEPER_5_A	378752.5	2489214.7
SWEEPER_6_A	378864.6	2489095.0
SWEEPER_7_A	378933.6	2489028.3
SWEEPER_8_A	378937.7	2489024.0



Plotted: 09/27/2024, 12:51 | bmliller P:\22222228\009\CAD\00\Fish Habitat Restoration (100%)\%03\_100%\2228\009000\_Sht 16\_5.0 [Details].dwg

NO.	DATE	BY	ISSUE / DESCRIPTION
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2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

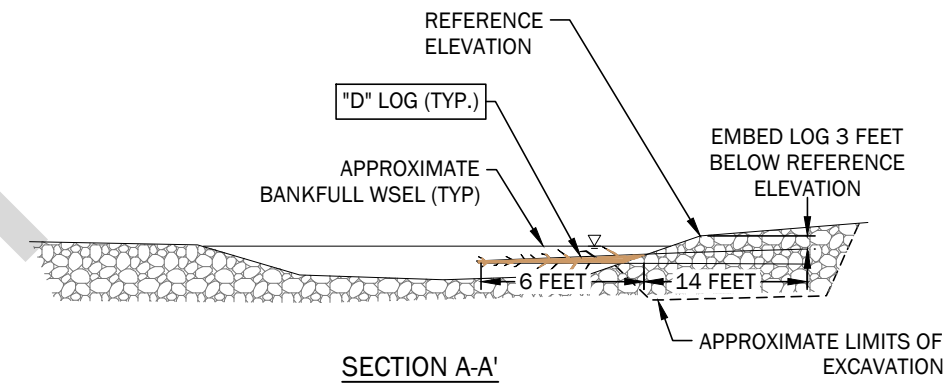
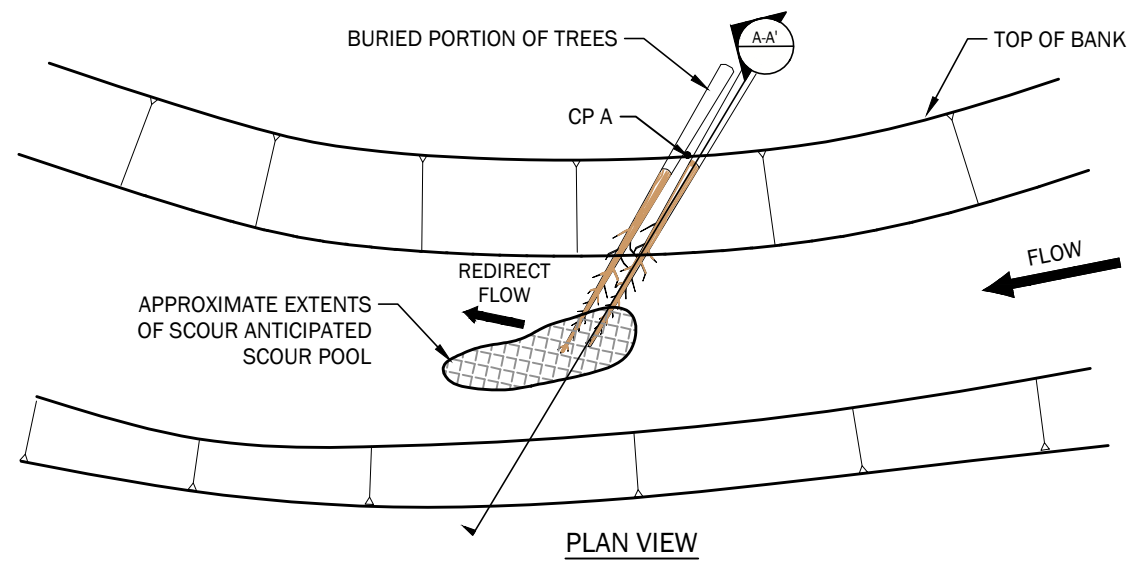
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DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: ---
DATE: 10/1/24



ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
 ASOTIN COUNTY, WASHINGTON  
**TYPICAL HABITAT DETAILS**

DRAWING NUMBER:  
**5.0**  
 SHEET: 16 OF 27





STRUCTURE QUANTITIES
LOG TYPE D - LARGE TREE TOP
25' TO 30' LONG LOG, 10" TO 16" AVG. DIA.
2

**PURPOSE:**

- REDIRECTS FLOW.
- CREATES SCOUR.
- ENCOURAGES GRAVEL DEPOSITION.

**DESIGN SPECIFICS:**

- SWEEPERS MAY BE PLACED INDEPENDENTLY OR INCORPORATED INTO OTHER LARGE WOOD STRUCTURES.
- TREES WITH BRANCHES OR MULTIPLE TRUNKS PREFERRED.
- THE DESIGN ENGINEER SHALL MAINTAIN THE ABILITY TO MAKE ADJUSTMENT TO THE PROPOSED STRUCTURE IF SITE CONDITIONS WARRANT.
- SEE TABLE FOR MATERIAL SIZES AND QUANTITIES.

**CONSTRUCTION SEQUENCING:**

1. INSTALL WORK ISOLATION STRUCTURES AND DEWATER THE WORK AREA.
2. ESTABLISH REFERENCE ELEVATION PRIOR TO CONSTRUCTION AND CONFIRM WITH HYDRAULIC ENGINEER. REFERENCE GRADE HUB SHOULD BE ESTABLISHED OUTSIDE OF DISTURBANCE LIMITS AND USED TO CHECK STRUCTURE EMBEDDED DEPTHS. REFERENCE GRADE IS THE TOP OF THE BANK WHERE SWEEPER LOGS WILL BE INSTALLED.
3. PLACE TWO TYPE D LOGS A MINIMUM OF 3 FEET BELOW REFERENCE ELEVATIONS AND BURY 14 FEET OF THE TRUNK IN THE BANK. BRANCHES SMALLER THAN 3 INCHES ARE NOT COUNTED TOWARDS TRUNK LENGTH.
4. ORIENT SWEEPER LOGS SO THE BRANCHES EXTEND DOWN INTO THE CHANNEL, ABOVE THE THALWEG. BACKFILL THE STRUCTURE AND REBUILD THE BANK WITH NATIVE COBBLES AND GRAVEL. PLACE BACKFILL IN 1.0 FOOT LIFTS AND COMPACT WITH EXCAVATOR BUCKET OR SIMILAR METHOD BETWEEN LIFTS.
5. REMOVE DEWATERING AND FLOW ISOLATION STRUCTURE.

**SWEEPER LOG DETAIL**   
SCALE: NTS



Plotted: 09/27/2024, 12:51 | bmliller P:\222222281009\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228100900\_Sht 17\_5\_1\_Details.dwg

NO.	DATE	BY	ISSUE / DESCRIPTION
1	6/30/23	KHR	30%/60% FOR REVIEW
2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

DESIGNED BY: KHR/BHM
DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: ---
DATE: 10/1/24



ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**TYPICAL HABITAT DETAILS**

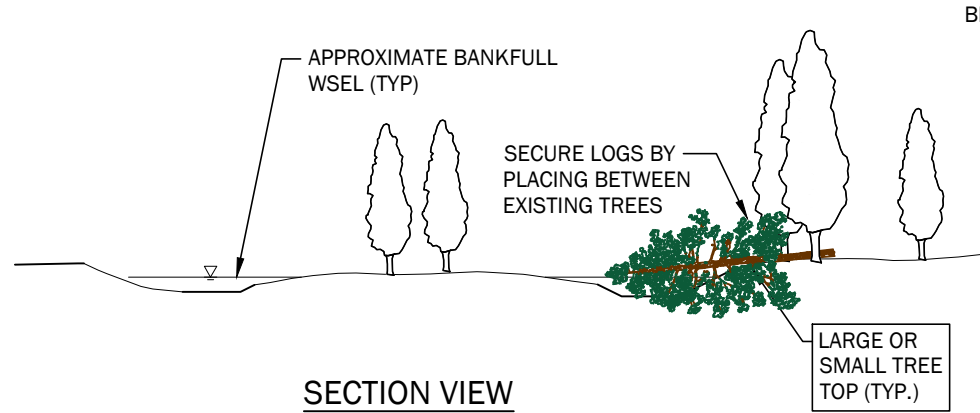
DRAWING NUMBER:

**5.1**

SHEET: 17 OF 27



Plotted: 09/27/2024, 12:51 | bmliller P:\22222228\109\CAD\00\Fish Habitat Restoration (100%)\%03\_100%\2228\00900\_Sht 18\_5.2 (Details).dwg



**SECTION VIEW**

STRUCTURE QUANTITIES (1 LOG PER STRUCTURE)	
LOG TYPE D - LARGE TREE TOP	LOG TYPE E - MED/SMALL TREE TOP
18' TO 25' LONG LOG, 10" TO 16" AVG. DIA.	18' TO 25' LONG LOG, 6" TO 10" AVG. DIA.
1	1

**PURPOSE:**

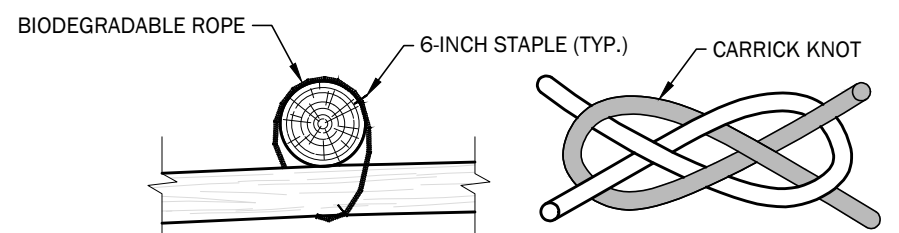
- CREATES CHANNEL AND FLOODPLAIN ROUGHNESS.
- CREATES DIVERSE FISH HABITAT.

**DESIGN SPECIFICS:**

- SEE TABLE FOR MATERIAL SIZES AND QUANTITIES. LOG MAY BE EITHER LARGE OR SMALL TREE TOPS.
- TREE TOPS CONTAIN BRANCHES IN ADDITION TO ROOTWADS. HANDLE WITH CARE TO MINIMIZE BREAKING OF BRANCHES.
- PLACEMENT SHALL LOOSELY FOLLOW PLANS. EXACT PLACEMENT WILL BE FIELD FIT AND SHALL BE APPROVED BY THE CONTRACTING OFFICER.
- WEAVE LOGS BETWEEN TREES AS DIRECTED IN THE FIELD BY THE DESIGN ENGINEER.
- EXCAVATE ONLY AS NECESSARY TO SECURE TREE TOPS.
- MINIMIZE DISTURBANCE.
- THE DESIGN ENGINEER SHALL MAINTAIN THE ABILITY TO MAKE ADJUSTMENTS TO THE PROPOSED STRUCTURE IF SITE CONDITIONS WARRANT.

**SIDE CHANNEL SINGLE LOGS**

SCALE: NTS

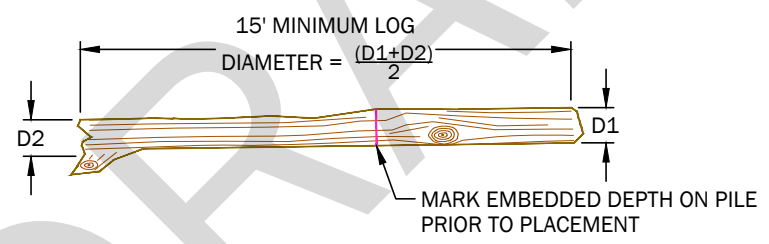


**NOTES:**

- ALL ROPE SHALL BE BIODEGRADABLE MANILA ROPE WITH A MINIMUM BREAKING STRENGTH GREATER THAN OR EQUAL TO 12,000 POUNDS.
- ROPE SHALL BE WRAPPED TWICE AROUND BOTH THE CONNECTING LOGS WITH A CARRICK KNOT. ALL EXCESS SLACK SHALL BE REMOVED FROM THE ROPE PRIOR TO TYING AND BINDING. NOTCH LOG TO PREVENT ROPE FROM SLIDING.
- SECURE BOTH FREE-ENDS OF ROPE WITH A 1/2-INCH X 6-INCH (MIN.) CABLE STAPLE, A MINIMUM OF 12 INCHES FROM THE END. STAPLES SHALL BE DRIVEN INTO THE LOGS TO PREVENT ROPE FROM SLIPPING. ALL CONNECTING HARDWARE SHALL BE NON-GALVANIZED.
- ROPE LENGTH VARIES PER CONNECTION.

**ROPE CONNECTION**

SCALE: NTS

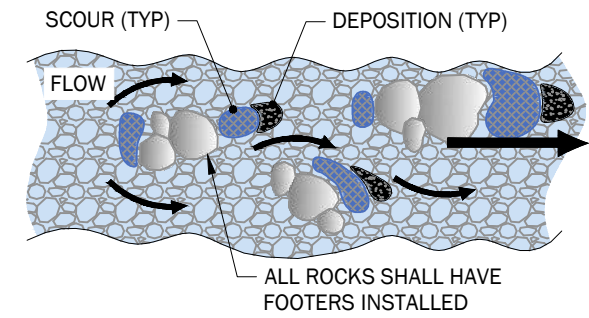


**PILE NOTES:**

- LOG DIAMETER IS THE AVERAGE OF THE DIAMETER MEASURED ON EITHER END OF THE LOG.
- LOG DIAMETER ON EITHER SIDE OF THE PILE MAY VARY BETWEEN 12 TO 18 INCHES.
- AVERAGE DIAMETER SHALL BE 15 INCHES.
- PILE LENGTH IS 15 FEET MINIMUM.
- PILE SHALL NOT EXTEND MORE THAN 2 FEET ABOVE THE TALLEST KEY MEMBER. BREAK OR CUT THE TOP OF THE PILE TO DESIRED HEIGHT FOLLOWING STRUCTURE INSTALLATION.
- PILES SHALL BE DRIVEN USING A VIBRATORY HEAD DRIVER. AN IMPACT HAMMER SHALL NOT BE USED.
- MARK MINIMUM EMBEDDED DEPTHS ON THE PILE PRIOR TO PLACEMENT.

**PILES**

SCALE: NTS



**PURPOSE:**

- CREATES IN-STREAM HABITAT DIVERSITY AND COMPLEXITY BY CREATING LOCAL AREAS OF SCOUR, DEPOSITION AND "POCKET WATER" (EDDYS) IN CHANNEL.
- GENERALLY INCREASES HYDRAULIC FRICTION AND CREATES VARIABLE VELOCITIES ACROSS CHANNEL.
- ENHANCES HABITAT FOR MACROINVERTEBRATES AND ALL LIFE STAGES OF FISH SPECIES.
- PROVIDES HABITAT ENHANCEMENT WITH RELATIVELY MINIMAL CHANNEL BED DISTURBANCE.

**DESIGN SPECIFICS:**

- STREAMBED BOULDERS SHALL BE 24 INCH TO 48 INCH IN DIAMETER.
- PLACE BOULDERS ON CHANNEL BED. RELATIVELY LARGER ROCKS SHOULD BE USED IF PLACED DIRECTLY ON BED TO PREVENT ROLLING.
- THE CROSS-SECTIONAL AREA OF BOULDER PLACEMENTS MAY NOT EXCEED 25% OF THE CROSS-SECTIONAL AREA OF THE LOW-FLOW CHANNEL.
- BOULDERS WILL BE INSTALLED IN A LOW POSITION IN RELATION TO CHANNEL DIMENSIONS SO THAT THEY ARE COMPLETELY OVERTOPPED DURING CHANNEL-FORMING FLOW EVENTS (APPROXIMATELY A 2-YEAR FLOW EVENT).
- BOULDER PLACEMENTS MAY NOT BE INSTALLED WITH THE PURPOSE OF SHIFTING THE STREAM FLOW TO A SINGLE FLOW PATTERN IN THE MIDDLE OR TO THE SIDE OF THE STREAM.
- BOULDERS WILL BE MACHINE-PLACED (NO END DUMPING ALLOWED) AND WILL RELY ON THE SIZE OF BOULDER, RATHER THAN ANCHORING, FOR STABILITY.

**HABITAT BOULDER PLACEMENT**

SCALE: NTS



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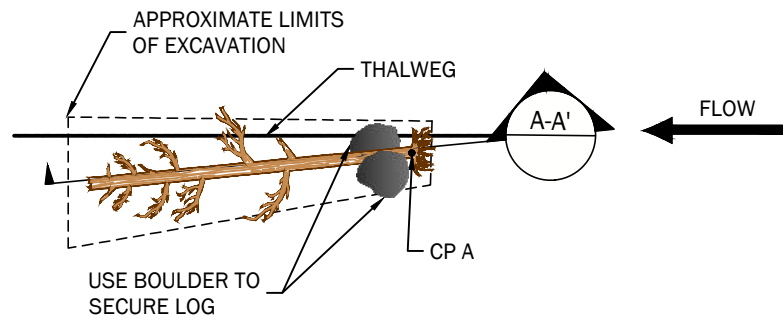
ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**TYPICAL HABITAT DETAILS**

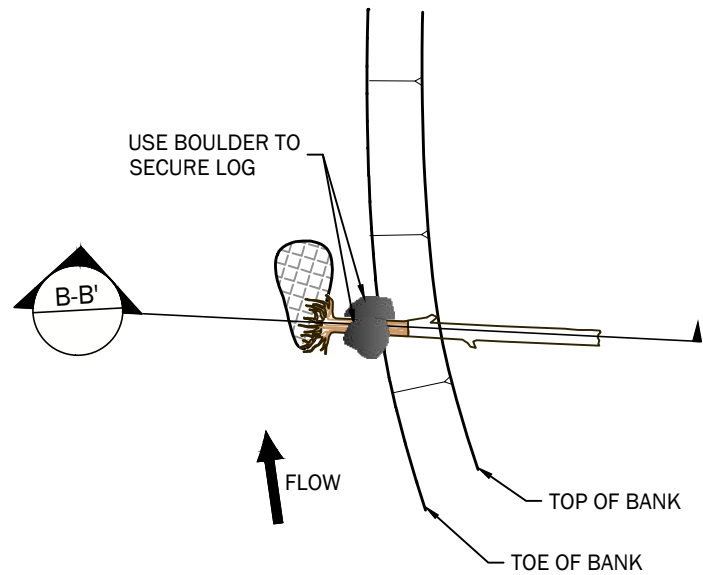
DRAWING NUMBER:  
**5.2**  
SHEET: 18 OF 27



Plotted: 09/27/2024, 12:51 | bmliller P:\22222228\109\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228\00900\_Sht 19\_5.3 [Details].dwg

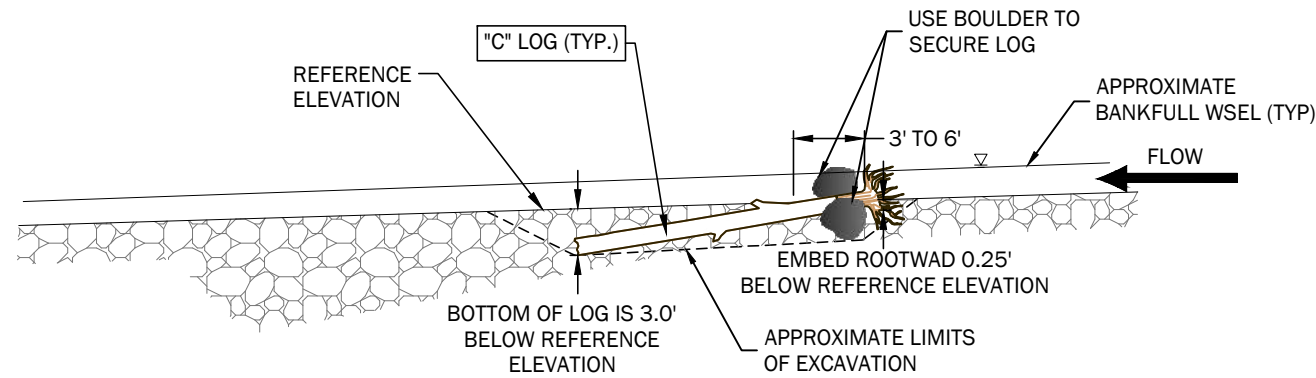


**PLAN VIEW - SINGLE LOG IN CHANNEL**

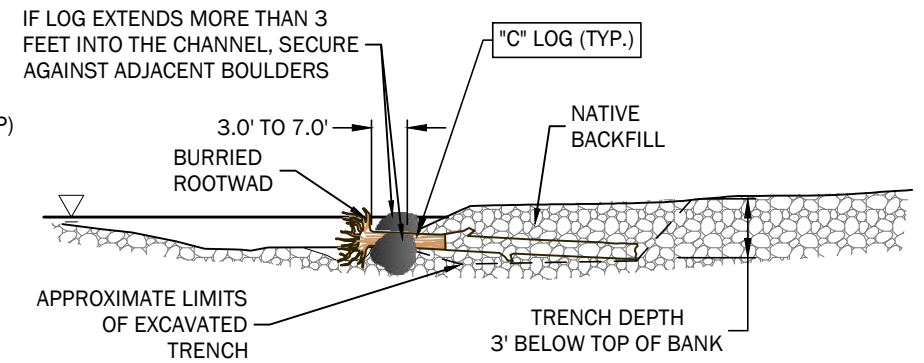


**PLAN VIEW - SINGLE LOG IN BANK**

**SINGLE ROOTWARD DETAIL**  
SCALE: NTS



**SECTION A-A' - SINGLE LOG IN CHANNEL**



**SECTION B-B' - SINGLE LOG IN BANK**

**CONSTRUCTION SEQUENCING:**

1. INSTALL WORK ISOLATION STRUCTURES AND DEWATER THE WORK AREA.
2. ESTABLISH REFERENCE ELEVATION PRIOR TO CONSTRUCTION AND CONFIRM WITH HYDRAULIC ENGINEER. REFERENCE GRADE HUB SHOULD BE ESTABLISHED OUTSIDE OF DISTURBANCE LIMITS AND USED TO CHECK STRUCTURE EMBEDDED DEPTHS. REFERENCE GRADE IS THE CHANNEL THALWEG.
3. EXCAVATE A TRENCH TO PLACE ONE TYPE C LOG. BOTTOM OF TRENCH SHALL BE 3.0 FEET BELOW REFERENCE ELEVATION AT THE DOWNSTREAM WORK LIMITS.
4. PLACE TYPE C LOG IN TRENCH AS SHOWN IN SECTION VIEW.
5. BACKFILL THE STRUCTURE AND REBUILD THE BED WITH NATIVE COBBLES AND GRAVEL. PLACE BACKFILL IN 1.0 FOOT LIFTS AND COMPACT WITH EXCAVATOR BUCKET OR SIMILAR METHOD BETWEEN LIFTS.
6. USE BOULDERS TO SECURE THE LOG.
7. REMOVE DEWATERING AND FLOW ISOLATION STRUCTURE.

**CONSTRUCTION SEQUENCING:**

1. INSTALL WORK ISOLATION STRUCTURES AND DEWATER THE WORK AREA.
2. ESTABLISH REFERENCE ELEVATION PRIOR TO CONSTRUCTION AND CONFIRM WITH HYDRAULIC ENGINEER. REFERENCE GRADE HUB SHOULD BE ESTABLISHED OUTSIDE OF DISTURBANCE LIMITS AND USED TO CHECK STRUCTURE EMBEDDED DEPTHS. REFERENCE GRADE IS THE TOP OF THE BANK.
3. EXCAVATE A TRENCH TO PLACE ONE TYPE C LOG. BOTTOM OF TRENCH SHALL BE 3.0 FEET BELOW REFERENCE ELEVATION AT THE DOWNSTREAM WORK LIMITS.
4. PLACE TYPE C LOG IN TRENCH AS SHOWN IN SECTION VIEW.
5. BACKFILL THE STRUCTURE AND REBUILD THE BANK WITH NATIVE COBBLES AND GRAVEL. PLACE BACKFILL IN 1.0 FOOT LIFTS AND COMPACT WITH EXCAVATOR BUCKET OR SIMILAR METHOD BETWEEN LIFTS.
6. IF LOG EXTENDS MORE THAN 3 FEET INTO THE CHANNEL, SECURE AGAINST ADJACENT BOULDERS.
7. REMOVE DEWATERING AND FLOW ISOLATION STRUCTURE.

**PURPOSE:**

- SLOWS CHANNEL VELOCITY IN RIFFLES.
- CREATES DIVERSE FISH HABITAT.

**DESIGN SPECIFICS:**

- THE DESIGN ENGINEER SHALL MAINTAIN THE ABILITY TO MAKE ADJUSTMENTS TO THE PROPOSED STRUCTURE IF SITE CONDITIONS WARRANT.
- SEE TABLE FOR MATERIAL SIZES AND QUANTITIES.

**STRUCTURE QUANTITIES**

STRUCTURE QUANTITIES	
LOG TYPE C - SMALL ROOTWAD	BOULDER (BOULDER BALLAST REQUIRED IF LOG EXTENDS MORE THAN 3 FT INTO THE CHANNEL)
13' TO 18' LONG LOG WITH ROOTWAD, 8" TO 12" DBH	30" TO 42" AVG. DIA.
1	2



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ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

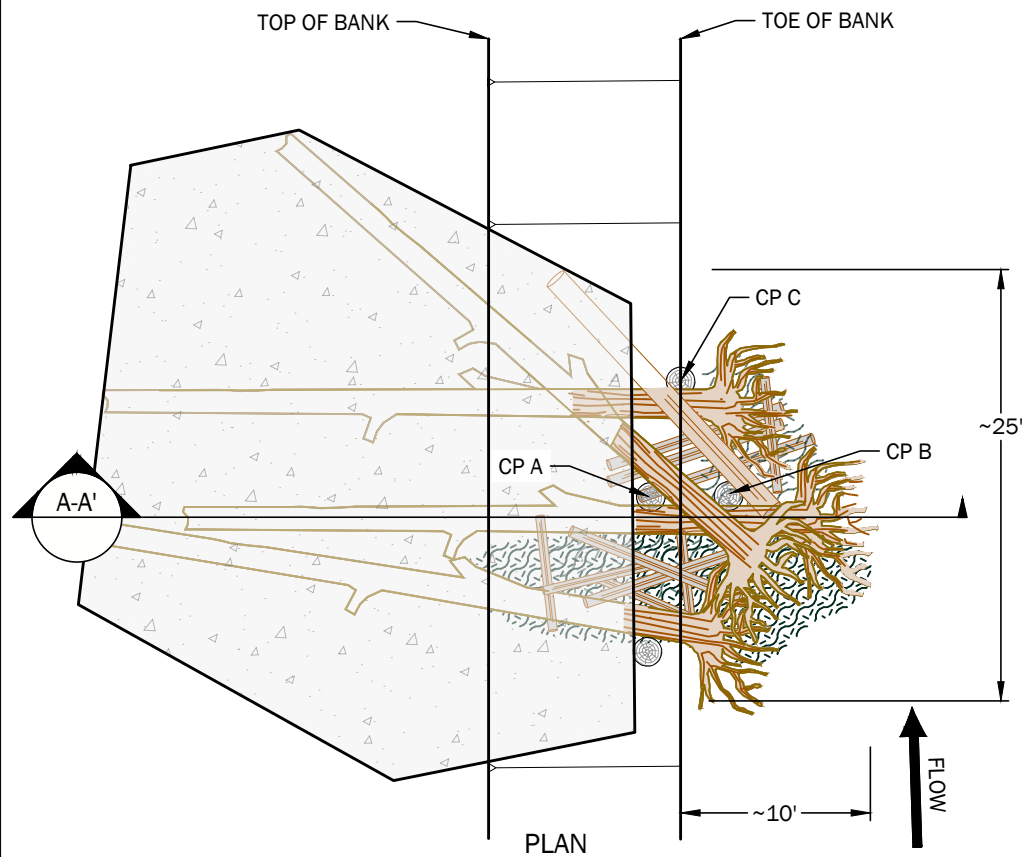
**TYPICAL HABITAT DETAILS**

DRAWING NUMBER:

**5.3**

SHEET: 19 OF 27





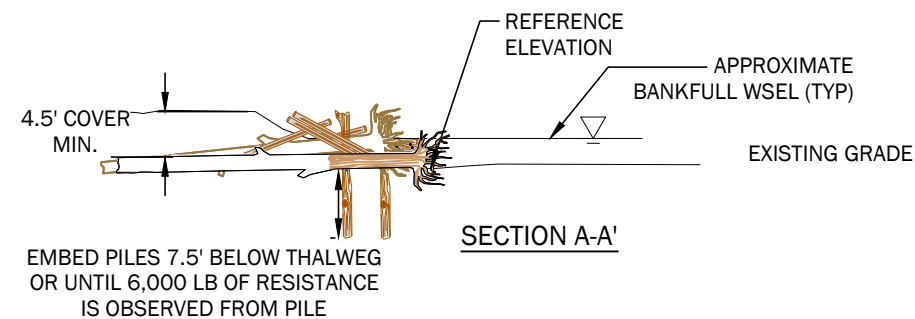
PLAN

**PURPOSE:**

- PROVIDES INCREASED HYDRAULIC ROUGHNESS THROUGHOUT THE REACH.
- REDIRECTS FLOWS TO OPPOSITE BANK.
- OVER TIME ACCUMULATES ADDITIONAL LARGE WOOD MATERIAL.

**DESIGN SPECIFICS:**

- THE DESIGN ENGINEER SHALL MAINTAIN THE ABILITY TO MAKE ADJUSTMENTS TO THE PROPOSED STRUCTURE IF SITE CONDITIONS WARRANT.
- SEE TABLE FOR MATERIAL SIZES AND QUANTITIES.



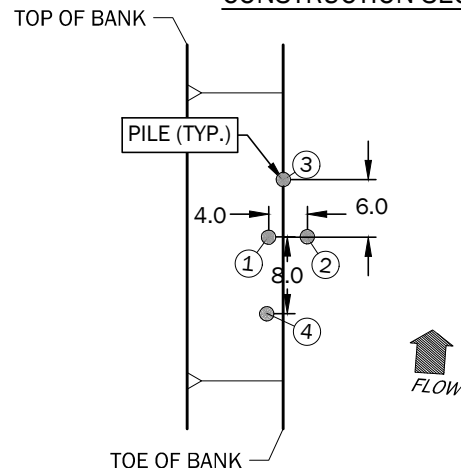
SECTION A-A'

STRUCTURE QUANTITIES						
LOG TYPE A - LARGE ROOTWAD	LOG TYPE D - LARGE TREE TOP	PILE	LARGE RACKING LOGS	SMALL RACKING LOGS	SLASH MATERIAL (CY)	ROPE CONNECTIONS (EACH)
30' MIN. LONG LOG WITH ROOTWAD, 16" TO 21" DBH	25' TO 35' LONG LOG, 10" TO 16" AVG. DIA.	15' MIN. LONG, 15" AVG. DIA.	12' TO 16' LONG LOG, 9" TO 14" AVG. DIA.	6' TO 15' LONG LOG, 6" TO 8" AVG. DIA.	4	5
4	1	4	6	6	4	5

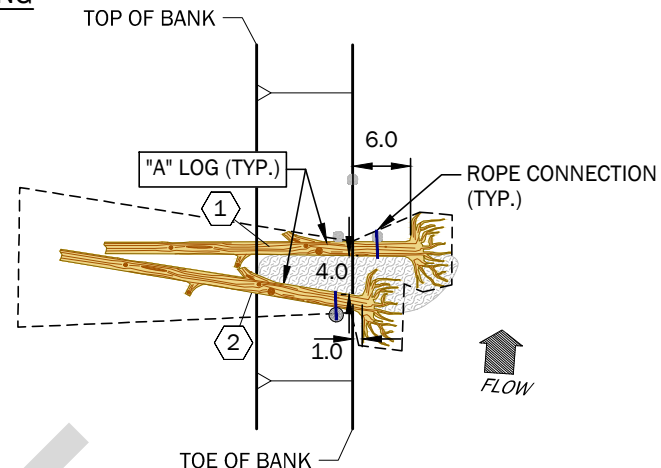
**FLOW DEFLECTION JAM**

SCALE: NTS

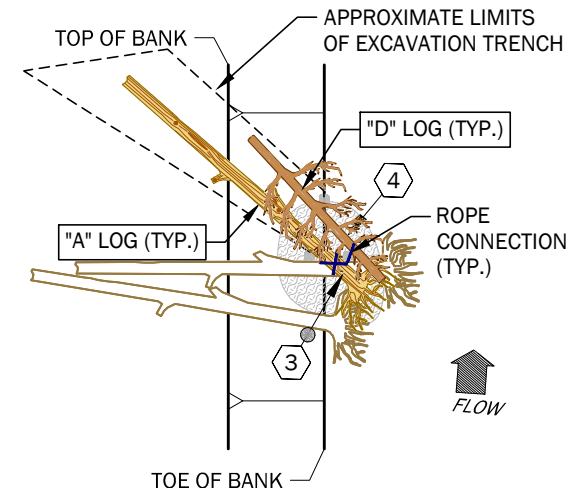
**CONSTRUCTION SEQUENCING**



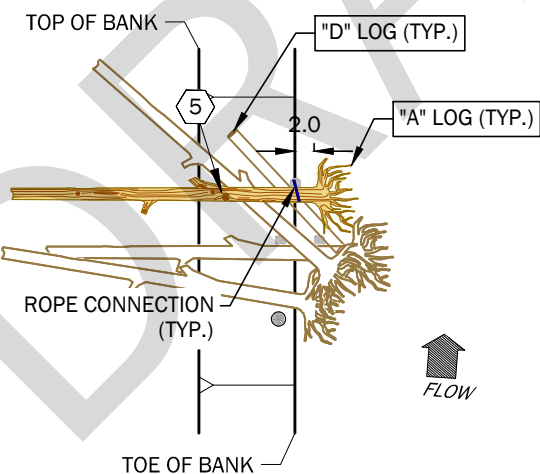
1. DEWATER THE WORK AREA.
2. ESTABLISH REFERENCE ELEVATION PRIOR TO CONSTRUCTION AND CONFIRM WITH HYDRAULIC ENGINEER. REFERENCE GRADE HUB SHOULD BE ESTABLISHED OUTSIDE OF DISTURBANCE LIMITS AND USED TO CHECK STRUCTURE EMBEDDED DEPTHS. REFERENCE GRADE IS THE THALWEG ELEVATION ADJACENT TO THE STRUCTURE.
3. EMBED PILES 12 FEET BELOW REFERENCE ELEVATION PER PILE DETAIL ON DRAWING 6.5.



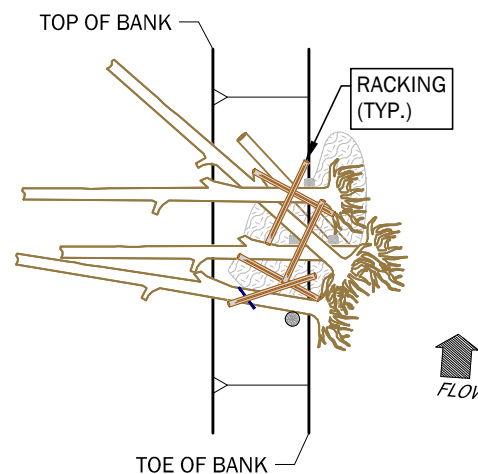
4. EXCAVATE A TRENCH FOR LOGS 1 AND 2. TRENCH DEPTH SHALL BE DEEP ENOUGH TO ALLOW 4.5 FEET OF COVER OVER LOGS.
5. PLACE LOG 1 (TYPE A) PERPENDICULAR (0°) TO THE TOE OF THE BANK. THE LOG BOLE EXTENDS 6 FEET PAST THE TOE OF THE BANK (MEASUREMENT DOES NOT INCLUDE ROOTWAD). ROOTWAD SHALL BE PARTIALLY EMBEDDED INTO THE CHANNEL.
6. PLACE LOG 2 (TYPE A) WITH ROOTWAD ORIENTED AT SLIGHT ANGLE UPSTREAM (5 TO 10°). THE LOG BOLE EXTENDS 1 FEET PAST THE TOE OF THE BANK (MEASUREMENT DOES NOT INCLUDE ROOTWAD).
7. SECURE LOG 1 TO PILE 2 PER ROPE CONNECTION DETAIL ON DRAWING 6.5.
8. PLACE SLASH BETWEEN LOGS 1 AND 2.



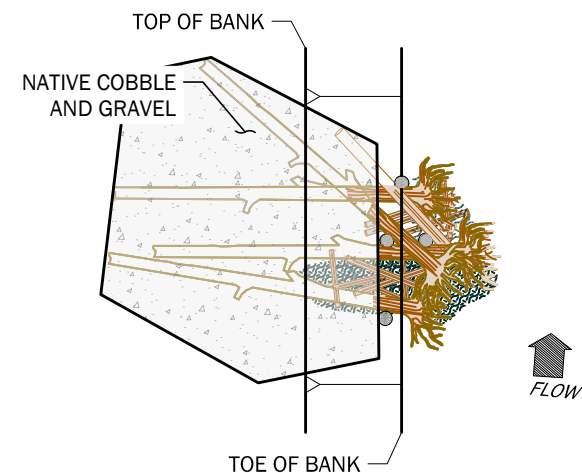
9. EXCAVATE A TRENCH FOR LOGS 3 (TYPE A) AND 4 (TYPE D). TRENCH SHALL BE DEEP ENOUGH TO ALLOW 4.5 FEET OF COVER OVER LOGS.
10. PLACE LOG 3 ON TOP OF LOG 1 AND BETWEEN PILES 1 AND 2. CUT END OF LOG 3 SHALL BE 4.5 FEET BELOW THALWEG ELEVATION. USE ROPE TO CONNECT LOG 3 TO LOG 1.
11. PLACE LOG 4 ON TOP OF LOG 1 AND BETWEEN PILES 2 AND 3. EMBEDDED END OF LOG 4 SHALL BE 3 FEET BELOW THALWEG ELEVATION. USE ROPE TO CONNECT LOG 4 TO PILE 2.
12. PLACE SMALL RACKING MEMBERS AND SLASH BETWEEN LOGS 1, 2, 3, AND 4.



13. PLACE LOG 5 (TYPE A) DOWNSTREAM OF PILE 3 AND PERPENDICULAR TO THE TOE OF THE BANK. THE LOG BOLE EXTENDS 2.0 FEET PAST THE TOE OF THE BANK (MEASUREMENT DOES NOT INCLUDE ROOTWAD). EXCAVATE AS NEEDED TO EMBED THE CUT END OF LOG 5 INTO THE BANK. THE BOTTOM OF THE LOG AT BOTH THE CUT AND THE ROOTWAD SIDE SHALL BE 0.5 FEET ABOVE THE THALWEG WITH THE ROOTWAD PARTIALLY EMBEDDED INTO THE CHANNEL BED.
14. SECURE LOG 5 TO PILE 1 PER ROPE CONNECTION DETAIL.



15. WEAVE THE REMAINING RACKING MATERIAL AND SLASH BETWEEN THE ROOTWADS AND PILES.
16. BACKFILL THE STRUCTURE AND REBUILD THE BANK WITH NATIVE COBBLES AND GRAVEL. PLACE BACKFILL IN 1.0 FOOT LIFTS AND COMPACT WITH EXCAVATOR BUCKET OR SIMILAR METHODS BETWEEN LIFTS.



Plotted: 09/27/2024, 12:51 | b.miller | P:\22222810\ASOTIN\ASOTIN\Fish Habitat Restoration (100%)\03\_100%\2228106000\_Sht 20\_5.dwg [Details].dwg

NO.	DATE	BY	ISSUE / DESCRIPTION
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APPROVED BY: BHM/JRS
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ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**TYPICAL HABITAT DETAILS**

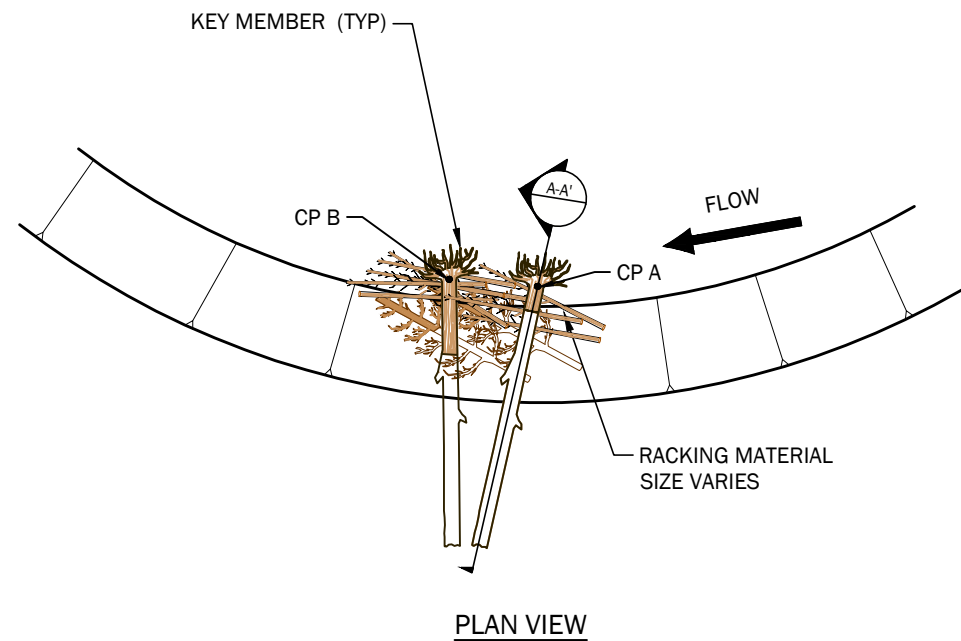
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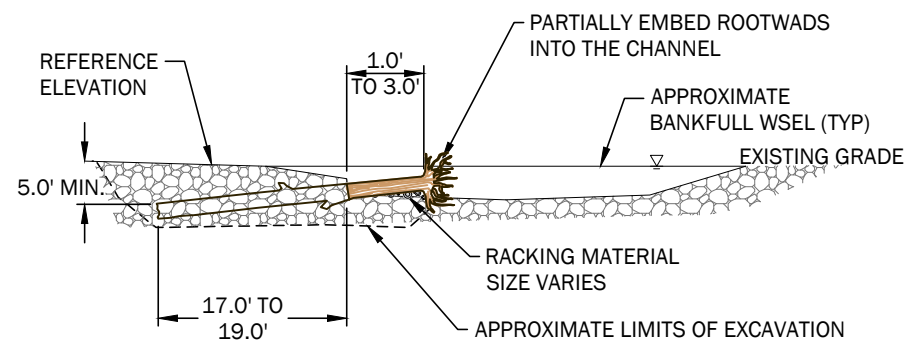
SHEET: 20 OF 27



Plotted: 09/27/2024, 12:51 | bmliller | P:\222222281009\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228100900\_Sht 21\_5.5 [Details].dwg



PLAN VIEW



SECTION A-A'

STRUCTURE QUANTITIES			
LOG TYPE B - MEDIUM LOG WITH ROOTWAD	LOG TYPE E - MEDIUM/SMALL TREE TOP	SMALL RACKING LOGS	SLASH MATERIAL (CY)
20' TO 25' LONG LOG WITH ROOTWAD, 12" TO 16" DBH	18' TO 25' LONG LOG, 6" TO 10" AVG. DIA.	6' TO 15' LONG LOG, 6" TO 8" AVG. DIA.	
2	2	6	2

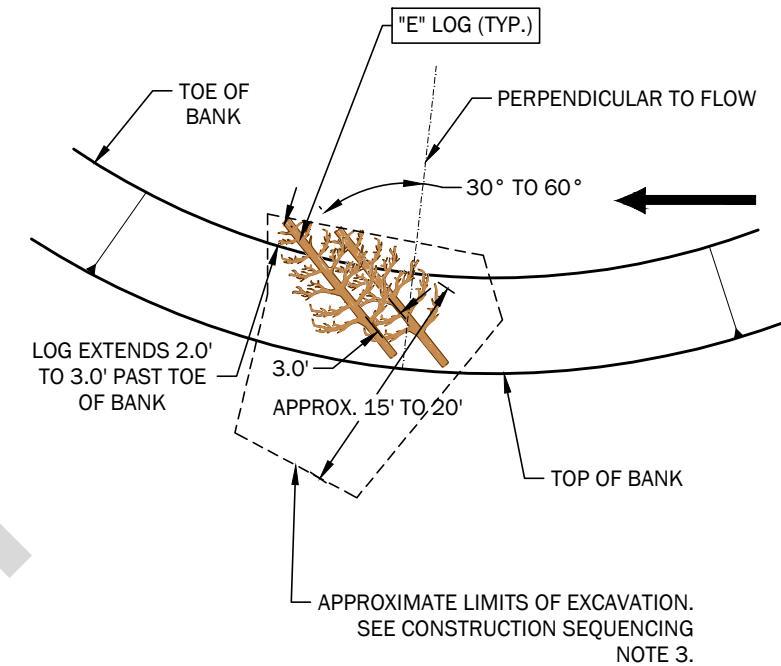
**BANK ROOTWADS**  
SCALE: NTS

**CONSTRUCTION SEQUENCING:**

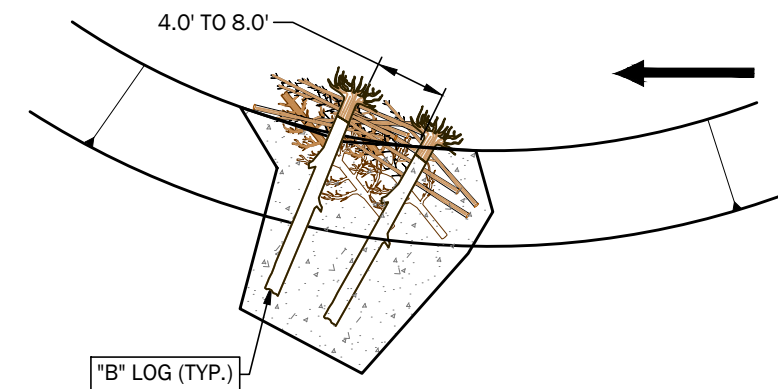
1. INSTALL WORK ISOLATION STRUCTURES AND DEWATER THE WORK AREA.
2. ESTABLISH REFERENCE ELEVATION PRIOR TO CONSTRUCTION AND CONFIRM WITH HYDRAULIC ENGINEER. REFERENCE GRADE HUB SHOULD BE ESTABLISHED OUTSIDE OF DISTURBANCE LIMITS AND USED TO CHECK STRUCTURE EMBEDDED DEPTHS. REFERENCE GRADE IS THE TOP OF THE BANK.
3. EXCAVATE A TRENCH TO PLACE TWO TYPE B LOGS AND TWO TYPE D LOGS. TRENCH SHALL BE DEEP ENOUGH TO ALLOW 5 FEET OF COVER ABOVE THE EMBEDDED ENDS OF THE TYPE B LOGS, MEASURED FROM REFERENCE ELEVATION. MINIMIZE DISTURBANCE TO BANK OUTSIDE OF TRENCH.
4. PLACE TWO TYPE E LOGS AT THE TOE OF THE BANK AT THE ELEVATION OF THE CHANNEL THALWEG OR AS DIRECTED BY THE HYDRAULIC ENGINEER. DISTANCE FROM REFERENCE ELEVATION MAY VARY BETWEEN STRUCTURE. ANGLE THE TYPE D LOGS DOWNSTREAM APPROXIMATELY 30° TO 60° AS SHOWN.

5. PLACE THE CUT END OF THE TYPE B LOGS IN THE TRENCH AND ROOTWADS INTO THE CHANNEL ON TOP OF THE TYPE D LOGS. ANGLE ROOTWADS INTO THE FLOW. ANGLE OF ORIENTATION MAY VARY BETWEEN PERPENDICULAR (0°) TO FLOW AND 30°. BASE OF THE ROOTWAD SHALL EXTEND BETWEEN 1 TO 3 FEET PAST THE TOE OF THE BANK. EMBEDDED END OF THE TYPE B LOG SHALL BE 5 FEET BELOW THE REFERENCE ELEVATION.
6. WEAVE SMALL RACKING LOGS AND SLASH BETWEEN LOGS.
7. BACKFILL THE STRUCTURE AND REBUILD THE BANK WITH NATIVE COBBLES AND GRAVEL. PLACE BACKFILL IN 1.0 FOOT LIFTS AND COMPACT WITH EXCAVATOR BUCKET OR SIMILAR METHOD BETWEEN LIFTS.
8. REMOVE DEWATERING AND FLOW ISOLATION STRUCTURE.

**STEPS 1 - 4**



**STEPS 5 - 9**



**PURPOSE:**

- PROVIDES INCREASED HYDRAULIC ROUGHNESS.
- REDIRECTS FLOW.
- CREATES DIVERSE FISH HABITAT.
- OVER TIME ACCUMULATES ADDITIONAL LARGE WOOD MATERIAL.

**DESIGN SPECIFICS:**

- THE DESIGN ENGINEER SHALL MAINTAIN THE ABILITY TO MAKE ADJUSTMENTS TO THE PROPOSED STRUCTURE IF SITE CONDITIONS WARRANT.
- SEE TABLE FOR MATERIAL SIZES AND QUANTITIES.



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ASOTIN COUNTY, WASHINGTON

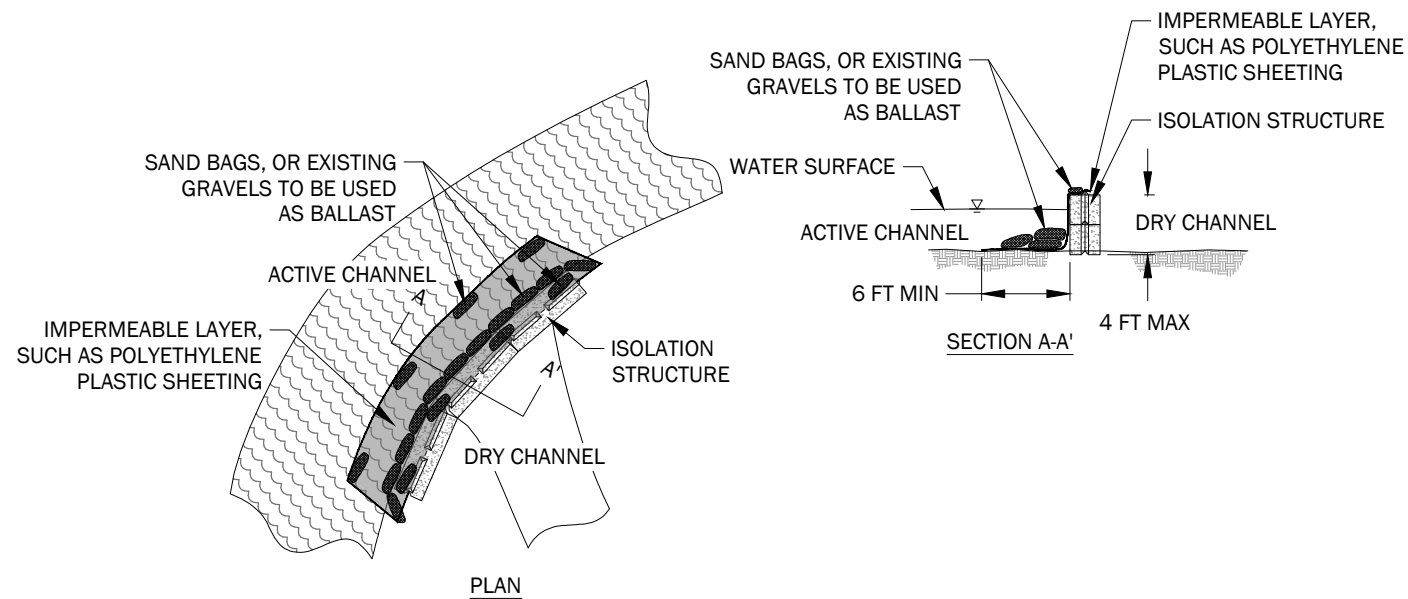
**TYPICAL HABITAT DETAILS**

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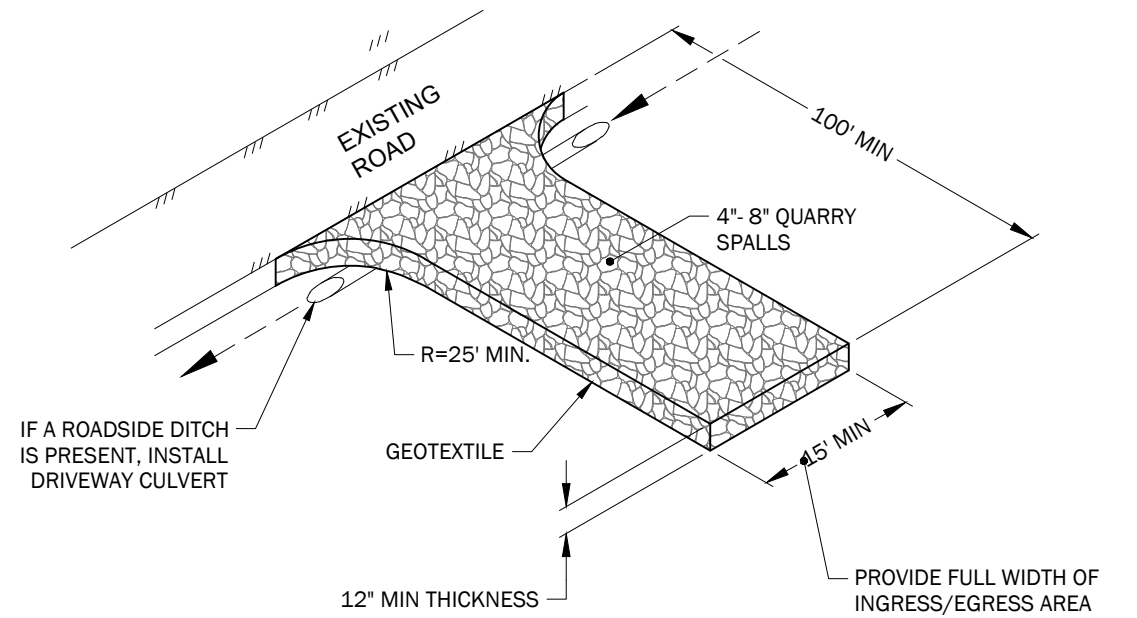
**5.5**

SHEET: 21 OF 27





**SIDE CHANNEL WORK ZONE ISOLATION STRUCTURE** 2  
SCALE: NOT TO SCALE



**STABILIZED CONSTRUCTION ENTRANCE DETAIL** -  
SCALE: NOT TO SCALE

**EROSION SEDIMENT CONTROL NOTES:**

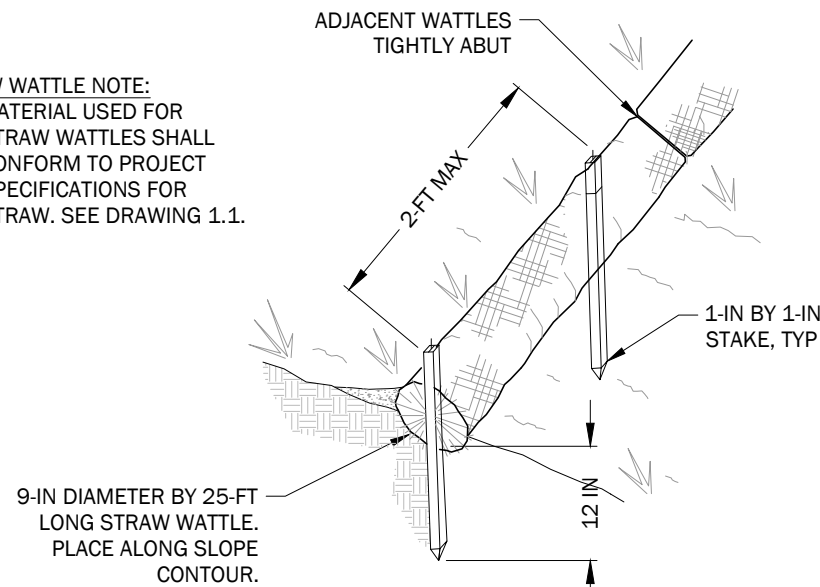
1. THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THE EROSION AND SEDIMENT CONTROL (ESC) STRUCTURES IS THE RESPONSIBILITY OF THE LEAD ESC CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETE AND APPROVED.
2. ESC FACILITIES SHOWN ON THIS SHEET ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE ESC FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS TO ENSURE THAT WATER MEETS WASHINGTON STATE WATER QUALITY STANDARDS.
3. THE ESC FACILITIES SHALL BE INSPECTED BY THE CONTRACTOR DAILY AND MAINTAINED AS NECESSARY TO ENSURE THEIR PROPER PERFORMANCE THROUGHOUT THE DURATION OF CONSTRUCTION. ANY DAMAGE SHALL BE REPAIRED IMMEDIATELY.

**STABILIZED CONSTRUCTION ENTRANCE NOTES:**

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHT-OF-WAYS. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEAN OUT OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHT-OF-WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
4. WHERE RUNOFF CONTAINING SEDIMENT LADEN WATER IS LEAVING THE SITE VIA THE CONSTRUCTION ENTRANCE, OTHER MEASURES SHALL BE IMPLEMENTED TO DIVERT RUNOFF THROUGH AN APPROVED FILTERING SYSTEM.

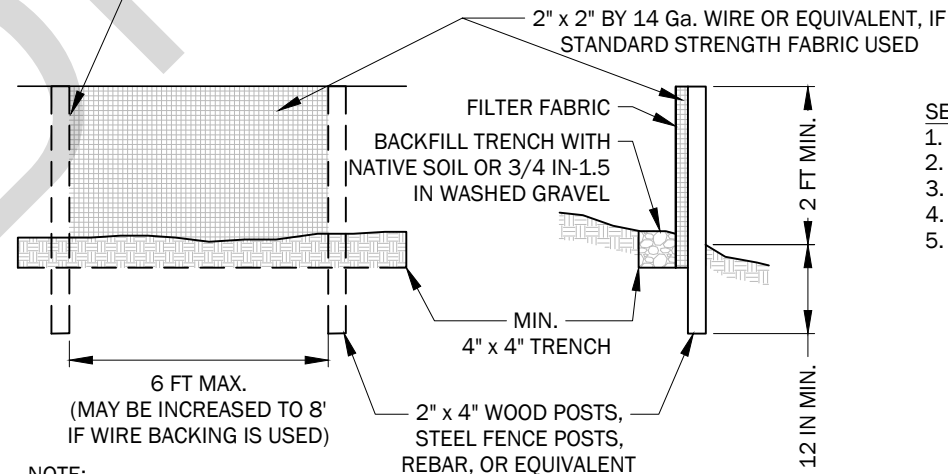
**STRAW WATTLE NOTE:**

1. MATERIAL USED FOR STRAW WATTLES SHALL CONFORM TO PROJECT SPECIFICATIONS FOR STRAW. SEE DRAWING 1.1.



**STRAW WATTLE** -  
SCALE: NOT TO SCALE

JOINTS IN FILTER FABRIC SHALL BE SPLICED AT POSTS. USE STAPLES, WIRE RINGS, OR EQUIVALENT TO ATTACH FABRIC TO POSTS.



**NOTE:**

1. FILTER FABRIC FENCES SHALL BE INSTALLED ALONG CONTOUR WHENEVER POSSIBLE.

**SEDIMENT FENCE DETAIL** -  
SCALE: NOT TO SCALE

**SEDIMENT FENCE NOTES:**

1. SEDIMENT FENCE TO HAVE STITCHED LOOPS AROUND 2" x 2" POSTS.
2. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
3. 3" MIN x 2" x 2" FIR, PINE OR STEEL FENCE POSTS.
4. POSTS TO BE INSTALLED ON UPHILL SIDE OF SLOPE.
5. COMPACT BOTH SIDES OF FILTER FABRIC TRENCH.



Plotted: 09/27/2024, 12:52 | b.miller | P:\22222228\109\CAD\00\Fish Habitat Restoration (100%)\103\_100%\2228\00900\_Sht 22\_5.6 (Control Details).dwg

NO.	DATE	BY	ISSUE / DESCRIPTION
1	6/30/23	KHR	30%/60% FOR REVIEW
2	3/12/24	KHR	80% FOR REVIEW
3	6/24/24	KHR	100% FOR REVIEW
4	10/1/24	BHM	100% ISSUE FOR BID

DESIGNED BY: KHR/BHM
DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: ---
DATE: 10/1/24



ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

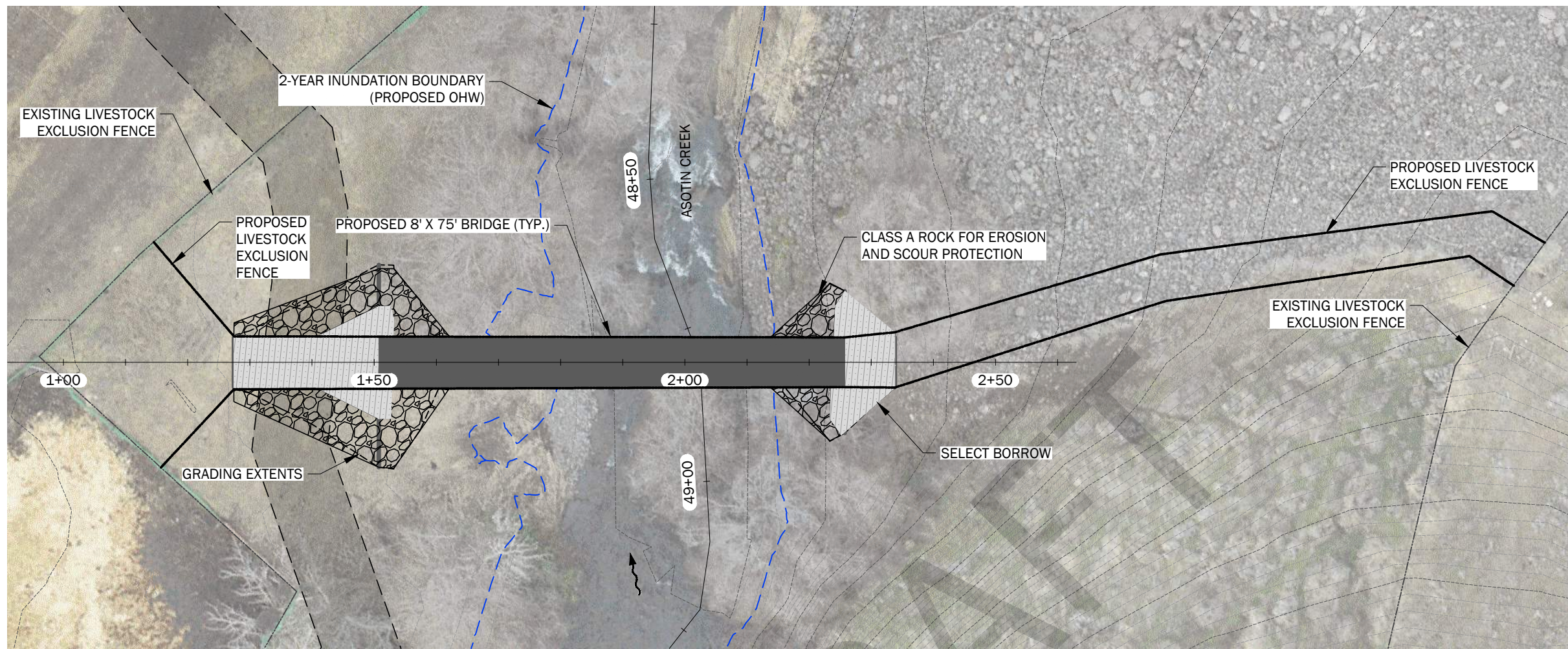
**EROSION AND SEDIMENT CONTROL DETAILS**

DRAWING NUMBER:

**5.6**

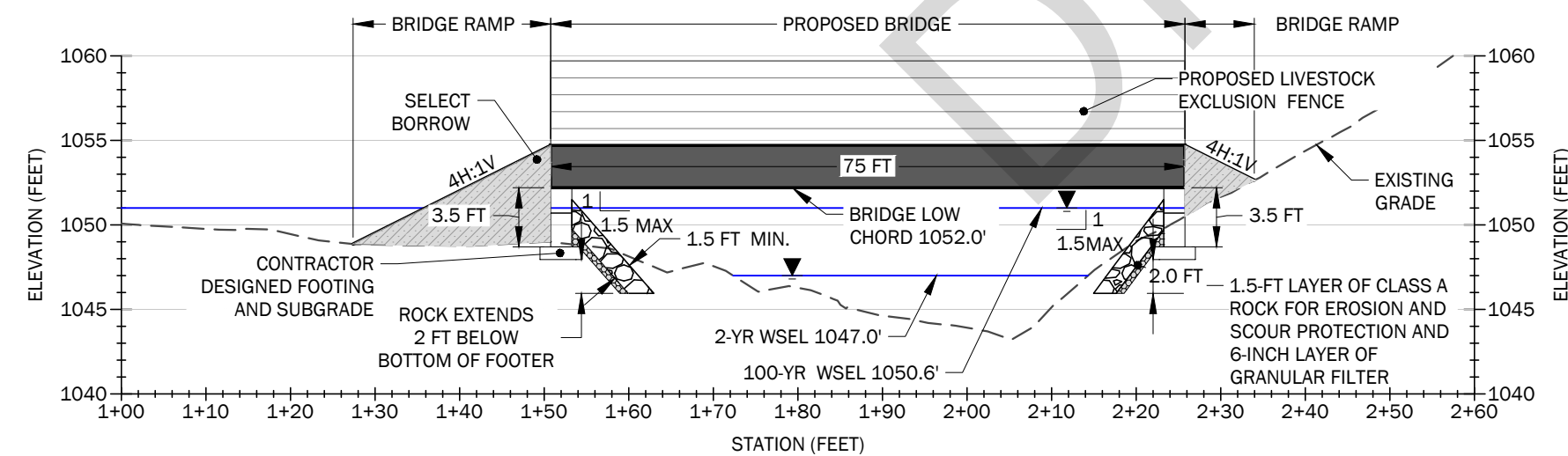
SHEET: 22 OF 27



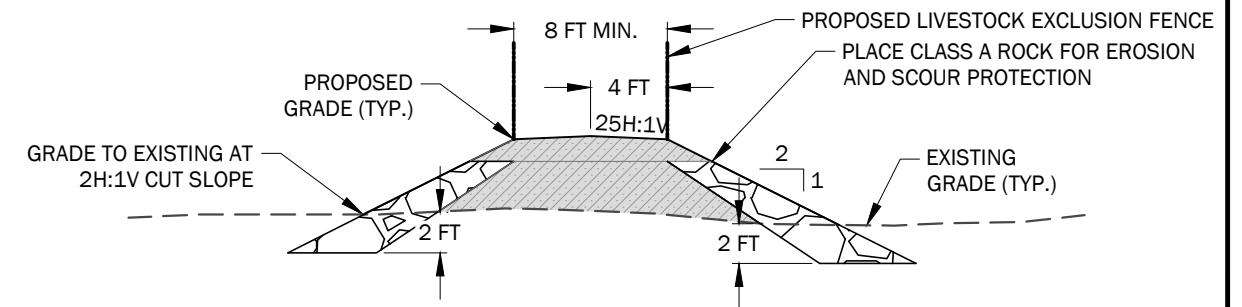


- LEGEND:**
- EXISTING MAJOR CONTOUR
  - EXISTING MINOR CONTOUR
  - FLOW DIRECTION
  - PROPOSED MINOR CONTOUR
  - 2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)
  - EXISTING LIVESTOCK EXCLUSION FENCE
  - PROPOSED LIVESTOCK EXCLUSION FENCE

**PLAN VIEW**  
 0 10 20  
 GRAPHIC SCALE IN FEET



**BRIDGE PROFILE**  
 SCALE: 1" = 10'  
 VERTICAL EXAGGERATION: 2X



**BRIDGE RAMP SECTION**  
 SCALE: 1" = 5'  
 NO VERTICAL EXAGGERATION

- NOTES:**
1. PREMANUFACTURED BRIDGE DECK AND SUPPORTS DESIGNED BY OTHERS. BRIDGE RAILINGS TO INCLUDE 5' LIVESTOCK EXCLUSION FENCE.
  2. ARMOR BRIDGE RAMPS AND FOOTINGS WITH CLASS A ROCK FOR EROSION AND SCOUR PROTECTION PER WSDOT STANDARD SPECIFICATION (9-13.4). KEY ROCK IN 2 FEET BELOW BOTTOM OF FOOTER AND 2 FEET BELOW EXISTING GRADE ALONG RAMP SECTION.
  3. BPA FUNDING DOES NOT INCLUDE BRIDGE CONSTRUCTION AND BRIDGE IS NOT REVIEWED/COVERED UNDER HIP.
  4. BPA FUNDING DOES NOT INCLUDE LIVESTOCK EXCLUSION FENCING.



Plotted: 09/27/2024, 12:52 | bmillier | P:\22222281009\CAD\00\Fish\_Habitat\_Restoration (100%)\03\_100%\2228100900\_Sht 23\_5.7 [Bridge\_Details].dwg

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DESIGNED BY:	KHR/BHM
DRAWN BY:	GER/KHR
APPROVED BY:	BHM/JRS
REVISION NO.:	---
DATE:	10/1/24

**GEOENGINEERS**  
 WWW.GEOENGINEERS.COM

PREPARED FOR:  
 Asotin County  
 CONSERVATION DISTRICT

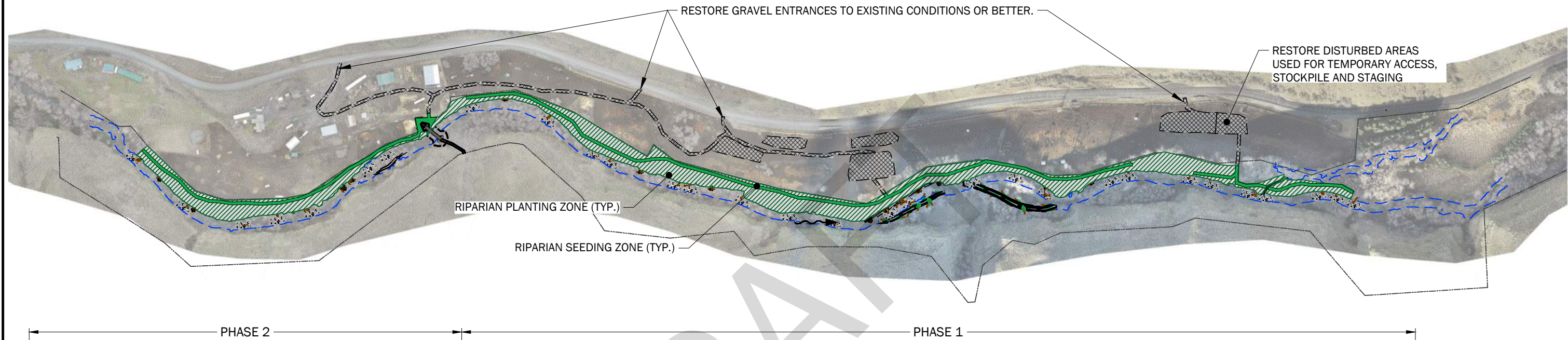
ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
 ASOTIN COUNTY, WASHINGTON

**BRIDGE DETAILS**

DRAWING NUMBER:  
**5.7**  
 SHEET: 23 OF 27



Plotted: 09/27/2024, 12:53 | bmillier | P:\22222228\109\CAD\00\Fish Habitat Restoration (100%)\03\_100%\2228\00000\_Sht 24\_6.0 [Revegetation Plan].dwg



SEED MIX		
SPECIES <sup>1</sup>	SEEDING RATE BY SPECIES (LBS/ACRE)	PERCENT OF MIX
'Secar' Snake River Wheatgrass ( <i>Elymus wawawaiensis</i> )	6	40%
Sherman Big Bluegrass ( <i>Poa secunda</i> )	2	13%
Thickspike Wheatgrass ( <i>Elymus lanceolatus</i> )	6	40%
Slender Wheatgrass ( <i>Elymus trachycaulus</i> )	1	7%

NOTE: 1. CONTRACTOR MAY SUBSTITUTE WITH ANOTHER NATIVE SPECIES UPON APPROVAL BY ACCD

**SITE RESTORATION NOTES:**

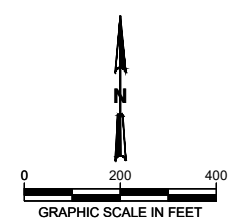
- CLEAN SITE OF ALL MATERIALS, SOILS, AND DEBRIS.
- SITE RESTORATION SHALL INCLUDE FINISH GRADING AND TRACK WALKING OF AREAS DISTURBED BY CONSTRUCTION TO LEAVE A SMOOTH AND UNIFORM APPEARANCE AND TO PROVIDE FOR DRAINAGE.
- GRADE BANKS TO APPEAR NATURAL.
- RESTORE ALL ACCESS ROUTES TO PRE-EXISTING CONDITIONS.
- BROADCAST SEED ALL DISTURBED AREAS WITH NATIVE GRASS AND SEED MIX. SEEDING MAY BE ACCOMPANIED BY MULCHING (WEED FREE STRAW) TO REDUCE EROSION, PROVIDE GROUND COVER, AND REDUCE THE LIKELIHOOD OF INVASIVE SPECIES ENCROACHMENT. IF SEEDING OCCURS THE YEAR AFTER CONSTRUCTION, IT WILL BE IMPORTANT TO DO IT AS EARLY AS PRACTICAL, AFTER HIGH-FLOW EVENTS, AND MIGHT REQUIRE RE-SCARIFYING THE SEED BED AGAIN, AS APPROPRIATE. SPOT WEED TREATMENT MAY BE REQUIRED AS A POST-CONSTRUCTION FOLLOW UP TO REDUCE THE LIKELIHOOD OF INVASIVE SPECIES ENCROACHMENT.

**REVEGETATION NOTES:**

- SEEDING AND MULCHING TO BE COMPLETED BY THE CONTRACTOR. SEED MIX MUST BE APPROVED BY ACCD PRIOR TO USE. APPLY AT 15LB/ACRE.
- PLANTING TO BE COMPLETED BY ACCD FOLLOWING CONSTRUCTION AND WILL INCLUDE PLANTING 1,700 NATIVE TREES AND SHRUBS OVER APPROXIMATELY 3.5 ACRES.
- RIPARIAN PLANTING TO TARGET AREAS WHERE THERE ARE GAPS IN THE ESTABLISHED RIPARIAN CANOPY, AREAS DISTURBED DURING CONSTRUCTION AND THE NEWLY CONSTRUCTED FLOODPLAIN TERRACE.
- WILLOWS WILL BE PLANTED IN THE WINTER FOLLOWING EACH CONSTRUCTION PHASE AND TREES AND SHRUBS WILL BE PLANTED IN THE SPRING FOLLOWING EACH CONSTRUCTION PHASE.

**LEGEND:**

	EXISTING MAJOR CONTOUR		HABITAT BOULDERS
	EXISTING MINOR CONTOUR		FLOW DEFLECTION JAM
	FLOW DIRECTION		SWEEPER LOGS
	GRADING EXTENTS		BANK ROOTWADS
	PROPOSED MAJOR CONTOUR		SINGLE ROOTWAD
	PROPOSED MINOR CONTOUR		SIDE CHANNEL LOGS
	2-YEAR INUNDATION BOUNDARY (PROPOSED OHW)		RIPARIAN PLANTING ZONE
			SEEDING
			RESTORE DISTURBED AREAS



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DESIGNED BY: KHR/BHM  
 DRAWN BY: GER/KHR  
 APPROVED BY: BHM/JRS  
 REVISION NO.: ---  
 DATE: 10/1/24



ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
 ASOTIN COUNTY, WASHINGTON  
**REVEGETATION PLAN**

DRAWING NUMBER:  
**6.0**  
 SHEET: 24 OF 27



HIP GENERAL CONSERVATION MEASURES APPLICABLE TO ALL ACTIONS

THE ACTIVITIES COVERED UNDER THE HIP ARE INTENDED TO PROTECT AND RESTORE FISH AND WILDLIFE HABITAT WITH LONG-TERM BENEFITS TO ESA-LISTED SPECIES. THE FOLLOWING GENERAL CONSERVATION MEASURES (DEVELOPED IN COORDINATION WITH USFWS AND NMFS) WILL BE APPLIED TO ALL ACTIONS OF THIS PROJECT.

PROJECT DESIGN AND SITE PREPARATION.

1. STATE AND FEDERAL PERMITS.

- A. ALL APPLICABLE REGULATORY PERMITS AND OFFICIAL PROJECT AUTHORIZATIONS WILL BE OBTAINED BEFORE PROJECT IMPLEMENTATION.
- B. THESE PERMITS AND AUTHORIZATIONS INCLUDE, BUT ARE NOT LIMITED TO, NATIONAL ENVIRONMENTAL POLICY ACT, NATIONAL HISTORIC PRESERVATION ACT, THE APPROPRIATE STATE AGENCY REMOVAL AND FILL PERMIT, USACE CLEAN WATER ACT (CWA) 404 PERMITS, CWA SECTION 401 WATER QUALITY CERTIFICATIONS, AND FEMA NO-RISE ANALYSES.

2. TIMING OF IN-WATER WORK.

- A. APPROPRIATE STATE (OREGON DEPARTMENT OF FISH AND WILDLIFE (ODFW), WASHINGTON DEPARTMENT OF FISH AND WILDLIFE (WDFW), IDAHO DEPARTMENT OF FISH AND GAME (IDFG), AND MONTANA FISH WILDLIFE AND PARKS (MFWP)) GUIDELINES FOR TIMING OF IN-WATER WORK WINDOWS (IWW) WILL BE FOLLOWED.
- B. CHANGES TO ESTABLISHED WORK WINDOWS WILL BE APPROVED BY REGIONAL STATE BIOLOGISTS AND BPA'S EC LEAD.
- C. BULL TROUT. FOR AREAS WITH DESIGNATED IN-WATER WORK WINDOWS FOR BULL TROUT OR AREAS KNOWN TO HAVE BULL TROUT, PROJECT PROPONENTS WILL CONTACT THE APPROPRIATE USFWS FIELD OFFICE TO INSURE THAT ALL REASONABLE IMPLEMENTATION MEASURES ARE CONSIDERED AND AN APPROPRIATE IN-WATER WORK WINDOW IS BEING USED TO MINIMIZE PROJECT EFFECTS.
- D. LAMPREY. WORKING IN STREAM OR RIVER CHANNELS THAT CONTAIN PACIFIC LAMPREY WILL BE AVOIDED FROM MARCH 1 TO JULY 1 FOR REACHES <5,000 FEET IN ELEVATION AND FROM MARCH 1 TO AUGUST 1 FOR REACHES >5,000 FEET. IF EITHER TIMEFRAME IS INCOMPATIBLE WITH OTHER OBJECTIVES, THE AREA WILL BE SURVEYED FOR NESTS AND LAMPREY PRESENCE, AND AVOIDED IF POSSIBLE. IF LAMPREYS ARE KNOWN TO EXIST, THE PROJECT SPONSOR WILL UTILIZE DEWATERING AND SALVAGE PROCEDURES (SEE FISH SALVAGE AND ELECTROFISHING SECTIONS) TO MINIMIZE ADVERSE EFFECTS.
- E. THE IN-WATER WORK WINDOW WILL BE PROVIDED IN THE CONSTRUCTION PLANS.

3. CONTAMINANTS.

- A. EXCAVATION OF MORE THAN 20 CUBIC YARDS WILL REQUIRE A SITE VISIT AND DOCUMENTED ASSESSMENT FOR POTENTIAL CONTAMINANT SOURCES. THE SITE ASSESSMENT WILL BE STORED WITH PROJECT FILES OR AS AN APPENDIX TO THE BASIS OF DESIGN REPORT.
- B. THE SITE ASSESSMENT WILL SUMMARIZE:
  - 1. THE SITE VISIT, CONDITION OF THE PROPERTY, AND IDENTIFICATION OF ANY AREAS USED FOR VARIOUS INDUSTRIAL PROCESSES;
  - 2. AVAILABLE RECORDS, SUCH AS FORMER SITE USE, BUILDING PLANS, AND RECORDS OF ANY PRIOR CONTAMINATION EVENTS;
  - 3. INTERVIEWS WITH KNOWLEDGEABLE PEOPLE, SUCH AS SITE OWNERS, OPERATORS, OCCUPANTS, NEIGHBORS, OR LOCAL GOVERNMENT OFFICIALS; AND
  - 4. THE TYPE, QUANTITY, AND EXTENT OF ANY POTENTIAL CONTAMINATION SOURCES.

4. SITE LAYOUT AND FLAGGING.

- A. CONSTRUCTION AREAS TO BE CLEARLY FLAGGED PRIOR TO CONSTRUCTION.
- B. AREAS TO BE FLAGGED WILL INCLUDE:
  - 1. SENSITIVE RESOURCE AREAS, SUCH AS AREAS BELOW ORDINARY HIGH WATER, SPAWNING AREAS, SPRINGS, AND WETLANDS;
  - 2. EQUIPMENT ENTRY AND EXIT POINTS;
  - 3. ROAD AND STREAM CROSSING ALIGNMENTS;
  - 4. STAGING, STORAGE, AND STOCKPILE AREAS; AND
  - 5. NO-SPRAY AREAS AND BUFFERS.

5. TEMPORARY ACCESS ROADS AND PATHS.

- A. EXISTING ACCESS ROADS AND PATHS WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER AND LENGTH OF TEMPORARY ACCESS ROADS AND PATHS THROUGH RIPARIAN AREAS AND FLOODPLAINS WILL BE MINIMIZED.
- B. VEHICLE USE AND HUMAN ACTIVITIES, INCLUDING WALKING, IN AREAS OCCUPIED BY TERRESTRIAL ESA-LISTED SPECIES WILL BE MINIMIZED.
- C. TEMPORARY ACCESS ROADS AND PATHS WILL NOT BE BUILT ON SLOPES WHERE GRADE, SOIL, OR OTHER FEATURES SUGGEST A LIKELIHOOD OF EXCESSIVE EROSION OR FAILURE. IF SLOPES ARE STEEPER THAN 30%, THEN THE ROAD WILL BE DESIGNED BY A CIVIL ENGINEER WITH EXPERIENCE IN STEEP ROAD DESIGN.
- D. THE REMOVAL OF RIPARIAN VEGETATION DURING CONSTRUCTION OF TEMPORARY ACCESS ROADS WILL BE MINIMIZED. WHEN TEMPORARY VEGETATION REMOVAL IS REQUIRED, VEGETATION WILL BE CUT AT GROUND LEVEL (NOT GRUBBED).
- E. AT PROJECT COMPLETION, ALL TEMPORARY ACCESS ROADS AND PATHS WILL BE OBLITERATED, AND THE SOIL WILL BE STABILIZED AND REVEGETATED. ROAD AND PATH OBLITERATION REFERS TO THE MOST COMPREHENSIVE DEGREE OF DECOMMISSIONING AND INVOLVES DECOMPACTING THE SURFACE AND DITCH, PULLING THE FILL MATERIAL ONTO THE RUNNING SURFACE, AND RESHAPING TO MATCH THE ORIGINAL CONTOUR.
- F. HELICOPTER FLIGHT PATTERNS WILL BE ESTABLISHED IN ADVANCE AND LOCATED TO AVOID TERRESTRIAL ESA-LISTED SPECIES AND THEIR OCCUPIED HABITAT DURING SENSITIVE LIFE STAGES.

6. TEMPORARY STREAM CROSSINGS.

- A. EXISTING STREAM CROSSINGS OR BEDROCK WILL BE PREFERENTIALLY USED WHENEVER REASONABLE, AND THE NUMBER OF TEMPORARY STREAM CROSSINGS WILL BE MINIMIZED.
- B. TEMPORARY BRIDGES AND CULVERTS WILL BE INSTALLED TO ALLOW FOR EQUIPMENT AND VEHICLE CROSSING OVER PERENNIAL STREAMS DURING CONSTRUCTION. TREATED WOOD SHALL NOT BE USED ON TEMPORARY BRIDGE CROSSINGS OR IN LOCATIONS IN CONTACT WITH OR DIRECTLY OVER WATER.
- C. FOR PROJECTS THAT REQUIRE EQUIPMENT AND VEHICLES TO CROSS IN THE WET:
  - 1. THE LOCATION AND NUMBER OF ALL WET CROSSINGS SHALL BE APPROVED BY THE BPA EC LEAD AND DOCUMENTED IN THE CONSTRUCTION PLANS;
  - 2. VEHICLES AND MACHINERY SHALL CROSS STREAMS AT RIGHT ANGLES TO THE MAIN CHANNEL WHENEVER POSSIBLE;
  - 3. NO STREAM CROSSINGS WILL OCCUR 300 FEET UPSTREAM OR 100 FEET DOWNSTREAM OF AN EXISTING REDD OR SPAWNING FISH; AND
  - 4. AFTER PROJECT COMPLETION, TEMPORARY STREAM CROSSINGS WILL BE OBLITERATED AND BANKS RESTORED.

7. STAGING, STORAGE, AND STOCKPILE AREAS.

- A. STAGING AREAS (USED FOR CONSTRUCTION EQUIPMENT STORAGE, VEHICLE STORAGE, FUELING, SERVICING, AND HAZARDOUS MATERIAL STORAGE) WILL BE 150 FEET OR MORE FROM ANY NATURAL WATER BODY OR WETLAND. STAGING AREAS CLOSER THAN 150 FEET WILL BE APPROVED BY THE EC LEAD.
- B. NATURAL MATERIALS USED FOR IMPLEMENTATION OF AQUATIC RESTORATION, SUCH AS LARGE WOOD, GRAVEL, AND BOULDERS, MAY BE STAGED WITHIN 150 FEET IF CLEARLY INDICATED IN THE PLANS THAT AREA IS FOR NATURAL MATERIALS ONLY.
- C. ANY LARGE WOOD, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION WILL BE STOCKPILED FOR USE DURING SITE RESTORATION AT A SPECIFICALLY IDENTIFIED AND FLAGGED AREA.
- D. ANY MATERIAL NOT USED IN RESTORATION, AND NOT NATIVE TO THE FLOODPLAIN, WILL BE DISPOSED OF OUTSIDE THE 100-YEAR FLOODPLAIN.

8. EQUIPMENT.

- A. MECHANIZED EQUIPMENT AND VEHICLES WILL BE SELECTED, OPERATED, AND MAINTAINED IN A MANNER THAT MINIMIZES ADVERSE EFFECTS ON THE ENVIRONMENT (E.G., MINIMALLY-SIZED, LOW PRESSURE TIRES; MINIMAL HARD-TURN PATHS FOR TRACKED VEHICLES; TEMPORARY MATS OR PLATES WITHIN WET AREAS OR ON SENSITIVE SOILS).
- B. EQUIPMENT WILL BE STORED, FUELED, AND MAINTAINED IN AN CLEARLY IDENTIFIED STAGING AREA THAT MEETS STAGING AREA CONSERVATION MEASURES.

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

9. EROSION CONTROL.

- A. TEMPORARY EROSION CONTROL MEASURES INCLUDE:
  - 1. TEMPORARY EROSION CONTROLS WILL BE IN PLACE BEFORE ANY SIGNIFICANT ALTERATION OF THE ACTION SITE AND APPROPRIATELY INSTALLED DOWNSLOPE OF PROJECT ACTIVITY WITHIN THE RIPARIAN BUFFER AREA UNTIL SITE REHABILITATION IS COMPLETE;
  - 2. IF THERE IS A POTENTIAL FOR ERODED SEDIMENT TO ENTER THE STREAM, SEDIMENT BARRIERS WILL BE INSTALLED AND MAINTAINED FOR THE DURATION OF PROJECT IMPLEMENTATION;
  - 3. TEMPORARY EROSION CONTROL MEASURES MAY INCLUDE SEDGE MATS, FIBER WATTLES, SILT FENCES, JUTE MATTING, WOOD FIBER MULCH AND SOIL BINDER, OR GEOTEXTILES AND GEOSYNTHETIC FABRIC;
  - 4. SOIL STABILIZATION UTILIZING WOOD FIBER MULCH AND TACKIFIER (HYDRO-APPLIED) MAY BE USED TO REDUCE EROSION OF BARE SOIL IF THE MATERIALS ARE NOXIOUS WEED FREE AND NONTOXIC TO AQUATIC AND TERRESTRIAL ANIMALS, SOIL MICROORGANISMS, AND VEGETATION;
  - 5. SEDIMENT WILL BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL; AND
  - 6. ONCE THE SITE IS STABILIZED AFTER CONSTRUCTION, TEMPORARY EROSION CONTROL MEASURES WILL BE REMOVED.
- B. EMERGENCY EROSION CONTROLS. THE FOLLOWING MATERIALS FOR EMERGENCY EROSION CONTROL WILL BE AVAILABLE AT THE WORK SITE:
  - 1. A SUPPLY OF SEDIMENT CONTROL MATERIALS; AND
  - 2. AN OIL-ABSORBING FLOATING BOOM WHENEVER SURFACE WATER IS PRESENT.

10. DUST ABATEMENT.

- A. THE PROJECT SPONSOR WILL DETERMINE THE APPROPRIATE DUST CONTROL MEASURES BY CONSIDERING SOIL TYPE, EQUIPMENT USAGE, PREVAILING WIND DIRECTION, AND THE EFFECTS CAUSED BY OTHER EROSION AND SEDIMENT CONTROL MEASURES.
- B. WORK WILL BE SEQUENCED AND SCHEDULED TO REDUCE EXPOSED BARE SOIL SUBJECT TO WIND EROSION.
- C. DUST-ABATEMENT ADDITIVES AND STABILIZATION CHEMICALS (TYPICALLY MAGNESIUM CHLORIDE, CALCIUM CHLORIDE SALTS, OR LIGNINSULFONATE) WILL NOT BE APPLIED WITHIN 25 FEET OF WATER OR A STREAM CHANNEL AND WILL BE APPLIED SO AS TO MINIMIZE THE LIKELIHOOD THAT THEY WILL ENTER STREAMS. APPLICATIONS OF LIGNINSULFONATE WILL BE LIMITED TO A MAXIMUM RATE OF 0.5 GALLONS PER SQUARE YARD OF ROAD SURFACE, ASSUMING MIXED 50:50 WITH WATER.
- D. APPLICATION OF DUST ABATEMENT CHEMICALS WILL BE AVOIDED DURING OR JUST BEFORE WET WEATHER, AND AT STREAM CROSSINGS OR OTHER AREAS THAT COULD RESULT IN UNFILTERED DELIVERY OF THE DUST ABATEMENT MATERIALS TO A WATERBODY (TYPICALLY THESE WOULD BE AREAS WITHIN 25 FEET OF A WATERBODY OR STREAM CHANNEL; DISTANCES MAY BE GREATER WHERE VEGETATION IS SPARSE OR SLOPES ARE STEEP).
- E. SPILL CONTAINMENT EQUIPMENT WILL BE AVAILABLE DURING APPLICATION OF DUST ABATEMENT CHEMICALS.
- F. PETROLEUM-BASED PRODUCTS WILL NOT BE USED FOR DUST ABATEMENT.



Plotted: 09/27/2024, 12:53 | bmliller P:\22222281089\CAD\00\Fish Habitat Restoration (100%)\03\_100%\22281089000\_Sht 25\_7.dwg [HIP Conservation Measures].dwg

NO.	DATE	BY	ISSUE / DESCRIPTION
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DESIGNED BY: KHR/BHM
DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: --
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ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**HIP CONSERVATION MEASURES**

DRAWING NUMBER:  
**7.0**  
SHEET: 25 OF 27



**PROJECT DESIGN AND SITE PREPARATION (CONTINUED).**

**11. SPILL PREVENTION, CONTROL, AND COUNTER MEASURES.**

- A. A DESCRIPTION OF HAZARDOUS MATERIALS THAT WILL BE USED, INCLUDING INVENTORY, STORAGE, AND HANDLING PROCEDURES WILL BE AVAILABLE ON-SITE.
- B. WRITTEN PROCEDURES FOR NOTIFYING ENVIRONMENTAL RESPONSE AGENCIES WILL BE POSTED AT THE WORK SITE.
- C. SPILL CONTAINMENT KITS (INCLUDING INSTRUCTIONS FOR CLEANUP AND DISPOSAL) ADEQUATE FOR THE TYPES AND QUANTITY OF HAZARDOUS MATERIALS USED AT THE SITE WILL BE AVAILABLE AT THE WORK SITE.
- D. WORKERS WILL BE TRAINED IN SPILL CONTAINMENT PROCEDURES AND WILL BE INFORMED OF THE LOCATION OF SPILL CONTAINMENT KITS.
- E. ANY WASTE LIQUIDS GENERATED AT THE STAGING AREAS WILL BE TEMPORARILY STORED UNDER AN IMPERVIOUS COVER, SUCH AS A TARPULIN, UNTIL THEY CAN BE PROPERLY TRANSPORTED TO AND DISPOSED OF AT A FACILITY THAT IS APPROVED FOR RECEIPT OF HAZARDOUS MATERIALS.
- F. PUMPS USED ADJACENT TO WATER SHALL USE SPILL CONTAINMENT SYSTEMS.

**12. INVASIVE SPECIES CONTROL.**

- A. PRIOR TO ENTERING THE SITE, ALL VEHICLES AND EQUIPMENT WILL BE POWER WASHED, ALLOWED TO FULLY DRY, AND INSPECTED TO MAKE SURE NO PLANTS, SOIL, OR OTHER ORGANIC MATERIAL ADHERES TO THE SURFACE.
- B. WATERCRAFT, WADERS, BOOTS, AND ANY OTHER GEAR TO BE USED IN OR NEAR WATER WILL BE INSPECTED FOR AQUATIC INVASIVE SPECIES.
- C. WADING BOOTS WITH FELT SOLES ARE NOT TO BE USED DUE TO THEIR PROPENSITY FOR AIDING IN THE TRANSFER OF INVASIVE SPECIES UNLESS DECONTAMINATION PROCEDURES HAVE BEEN APPROVED BY THE EC LEAD.

**WORK AREA ISOLATION AND FISH SALVAGE.**

**1. WORK AREA ISOLATION.**

- A. ANY WORK AREA WITHIN THE WETTED CHANNEL WILL BE ISOLATED FROM THE ACTIVE STREAM WHENEVER ESA-LISTED FISH ARE REASONABLY CERTAIN TO BE PRESENT, OR IF THE WORK AREA IS LESS THAN 300-FEET UPSTREAM FROM KNOWN SPAWNING HABITATS.
- B. WORK AREA ISOLATION AND FISH SALVAGE ACTIVITIES WILL COMPLY WITH THE IN-WATER WORK WINDOW.
- C. DESIGN PLANS WILL INCLUDE ALL ISOLATION ELEMENTS AND AREAS (COFFER DAMS, PUMPS, DISCHARGE AREAS, FISH SCREENS, FISH RELEASE AREAS, ETC.).
- D. WORK AREA ISOLATION AND FISH CAPTURE ACTIVITIES WILL OCCUR DURING PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES POSSIBLE, NORMALLY EARLY IN THE MORNING VERSUS LATE IN THE DAY, AND DURING CONDITIONS APPROPRIATE TO MINIMIZE STRESS AND DEATH OF SPECIES PRESENT.

**2. FISH SALVAGE.**

- A. MONITORING AND RECORDING WILL TAKE PLACE FOR DURATION OF SALVAGE. THE SALVAGE REPORT WILL BE COMMUNICATED TO AGENCIES VIA THE PROJECT COMPLETION FORM (PCF).
- B. SALVAGE ACTIVITIES SHOULD TAKE PLACE DURING CONDITIONS TO MINIMIZE STRESS TO FISH SPECIES, TYPICALLY PERIODS OF THE COOLEST AIR AND WATER TEMPERATURES WHICH OCCUR IN THE MORNING VERSUS LATE IN THE DAY.
- C. SALVAGE OPERATIONS WILL FOLLOW THE ORDERING, METHODS, AND CONSERVATION MEASURES SPECIFIED BELOW:
  - 1. SLOWLY REDUCE WATER FROM THE WORK AREA TO ALLOW SOME FISH TO LEAVE VOLITIONALLY.
  - 2. BLOCK NETS WILL BE INSTALLED AT UPSTREAM AND DOWNSTREAM LOCATIONS AND MAINTAINED IN A SECURED POSITION TO EXCLUDE FISH FROM ENTERING THE PROJECT AREA.
  - 3. BLOCK NETS WILL BE SECURED TO THE STREAM CHANNEL BED AND BANKS UNTIL FISH CAPTURE AND TRANSPORT ACTIVITIES ARE COMPLETE. BLOCK NETS MAY BE LEFT IN PLACE FOR THE DURATION OF THE PROJECT TO EXCLUDE FISH AS LONG AS PASSAGE REQUIREMENTS ARE MET.
  - 4. NETS WILL BE MONITORED HOURLY DURING IN-STREAM DISTURBANCE.

- 5. IF BLOCK NETS REMAIN IN PLACE MORE THAN ONE DAY, THE NETS WILL BE MONITORED AT LEAST DAILY TO ENSURE THEY ARE SECURED AND FREE OF ORGANIC ACCUMULATION. IF BULL TROUT ARE PRESENT, NETS ARE TO BE CHECKED EVERY 4 HOURS FOR FISH IMPINGEMENT.
- 6. CAPTURE FISH THROUGH SEINING AND RELOCATE TO STREAMS.
- 7. WHILE DEWATERING, ANY REMAINING FISH WILL BE COLLECTED BY HAND OR DIP NETS.
- 8. SEINES WITH A MESH SIZE TO ENSURE CAPTURE OF THE RESIDING ESA-LISTED FISH WILL BE USED.
- 9. MINNOW TRAPS WILL BE LEFT IN PLACE OVERNIGHT AND USED IN CONJUNCTION WITH SEINING.
- 10. ELECTROFISH TO CAPTURE AND RELOCATED FISH NOT CAUGHT DURING SEINING PER ELECTROFISH CONSERVATION MEASURES.
- 11. CONTINUE TO SLOWLY DEWATER STREAM REACH.
- 12. COLLECT ANY REMAINING FISH IN COLD-WATER BUCKETS AND RELOCATED TO THE STREAM.
- 13. LIMIT THE TIME FISH ARE IN A TRANSPORT BUCKET.
- 14. MINIMIZE PREDATION BY TRANSPORTING COMPARABLE SIZES IN BUCKETS.
- 15. BUCKET WATER TO BE CHANGED EVERY 15 MINUTES OR AERATED.
- 16. BUCKETS WILL BE KEPT IN SHADED AREAS OR COVERED.
- 17. DEAD FISH WILL NOT BE STORED IN TRANSPORT BUCKETS, BUT WILL BE LEFT ON THE STREAM BANK TO AVOID MORTALITY COUNTING ERRORS.

**D. SALVAGE GUIDELINES FOR BULL TROUT, LAMPREY, MUSSELS, AND NATIVE FISH.**

- 1. CONDUCT SITE SURVEY TO ESTIMATE SALVAGE NUMBERS.
- 2. PRE-SELECT SITE(S) FOR RELEASE AND/OR MUSSEL BED RELOCATION.
- 3. SALVAGE OF BULL TROUT WILL NOT TAKE PLACE WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.
- 4. IF DRAWDOWN LESS THAN 48 HOURS, SALVAGE OF LAMPREY AND MUSSELS MAY NOT BE NECESSARY IF TEMPERATURES SUPPORT SURVIVAL IN SEDIMENTS.
- 5. SALVAGE MUSSELS BY HAND, LOCATING BY SNORKELING OR WADING.
- 6. SALVAGE LAMPREY BY ELECTROFISHING (SEE ELECTROFISHING FOR LARVAL LAMPREY SETTINGS AND LARVAL LAMPREY DRY SHOCKING SETTINGS).
- 7. SALVAGE BONY FISH AFTER LAMPREY WITH NETS OR ELECTROFISHING (SEE ELECTROFISHING FOR APPROPRIATE SETTINGS).
- 8. REGULARLY INSPECT DEWATERED SITE SINCE LAMPREY LIKELY TO EMERGE AFTER DEWATERING AND MUSSELS MAY BECOME VISIBLE.
- 9. MUSSELS MAY BE TRANSFERRED IN COOLERS.
- 10. MUSSELS WILL BE PLACED INDIVIDUALLY TO ENSURE ABILITY TO BURROW INTO NEW HABITAT.

**3. ELECTROFISHING.**

- A. INITIAL SITE SURVEY AND INITIAL SETTINGS.
  - 1. IDENTIFY SPAWNING ADULTS AND ACTIVE REDDS TO AVOID.
  - 2. RECORD WATER TEMPERATURE. ELECTROFISHING WILL NOT OCCUR WHEN WATER TEMPERATURES ARE ABOVE 18 DEGREES CELSIUS.
  - 3. IF POSSIBLE, A BLOCK NET WILL BE PLACED DOWNSTREAM AND CHECKED REGULARLY TO CAPTURE STUNNED FISH THAT DRIFT DOWNSTREAM.
  - 4. INITIAL SETTINGS WILL BE 100 VOLTS, PULSE WIDTH OF 500 MICRO SECONDS, AND PULSE RATE OF 30 HERTZ.
  - 5. RECORDS FOR CONDUCTIVITY, WATER TEMPERATURE, AIR TEMPERATURE, ELECTROFISHING SETTINGS, ELECTROFISHER MODEL, ELECTROFISHER CALIBRATION, FISH CONDITIONS, FISH MORTALITIES, AND TOTAL CAPTURE RATES WILL BE INCLUDED IN THE SALVAGE LOG BOOK.

**B. ELECTROFISHING TECHNIQUE.**

- 1. SAMPLING SHOULD BEGIN USING STRAIGHT DC. POWER WILL REMAIN ON UNTIL THE FISH IS NETTED WHEN USING STRAIGHT DC. GRADUALLY INCREASE VOLTAGE WHILE REMAINING BELOW MAXIMUM LEVELS.
- 2. MAXIMUM VOLTAGE WILL BE 1100 VOLTS WHEN CONDUCTIVITY IS <100 MILLISECONDS, 800 VOLTS WHEN CONDUCTIVITY IS BETWEEN 100 AND 300 MILLISECONDS, AND 400 VOLTS WHEN CONDUCTIVITY IS >300 MILLISECONDS.
- 3. IF FISH CAPTURE IS NOT SUCCESSFUL USING STRAIGHT DC, THE ELECTROFISHER WILL BE SET TO INITIAL VOLTAGE FOR PDC. VOLTAGE, PULSE WIDTH, AND PULSE FREQUENCY WILL BE GRADUALLY INCREASED WITHIN MAXIMUM VALUES UNTIL CAPTURE IS SUCCESSFUL.
- 4. MAXIMUM PULSE WIDTH IS 5 MILLISECONDS. MAXIMUM PULSE RATE IS 70 HERTZ
- 5. ELECTROFISHING WILL NOT OCCUR IN ONE AREA FOR AN EXTENDED PERIOD.
- 6. THE ANODE WILL NOT INTENTIONALLY COME INTO CONTACT WITH FISH. THE ZONE FOR POTENTIAL INJURY OF 0.5 M FROM THE ANODE WILL BE AVOIDED.
- 7. SETTINGS WILL BE LOWERED IN SHALLOWER WATER SINCE VOLTAGE GRADIENTS LIKELY TO INCREASE.
- 8. ELECTROFISHING WILL NOT OCCUR IN TURBID WATER WHERE VISIBILITY IS POOR (I.E. UNABLE TO SEE THE BED OF THE STREAM).
- 9. OPERATIONS WILL IMMEDIATELY STOP IF MORTALITY OR OBVIOUS FISH INJURY IS OBSERVED. ELECTROFISHING SETTINGS WILL BE REEVALUATED.

**C. SAMPLE PROCESSING.**

- 1. FISH SHALL BE SORTED BY SIZE TO AVOID PREDATION DURING CONTAINMENT.
- 2. SAMPLERS WILL REGULARLY CHECK CONDITIONS OF FISH HOLDING CONTAINERS, AIR PUMPS, WATER TRANSFERS, ETC.
- 3. FISH WILL BE OBSERVED FOR GENERAL CONDITIONS AND INJURIES
- 4. EACH FISH WILL BE COMPLETELY REVIVED BEFORE RELEASE. ESA-LISTED SPECIES WILL BE PRIORITIZED FOR SUCCESSFUL RELEASE.

**D. BULL TROUT ELECTROFISHING.**

- 1. ELECTROFISHING FOR BULL TROUT WILL ONLY OCCUR FROM MAY 1 TO JULY 31. NO ELECTROFISHING WILL OCCUR IN ANY BULL TROUT OCCUPIED HABITAT AFTER AUGUST 15. IN FMO HABITATS ELECTROFISHING MAY OCCUR ANY TIME.
- 2. ELECTROFISHING OF BULL TROUT WILL NOT OCCUR WHEN WATER TEMPERATURES EXCEED 15 DEGREES CELSIUS.

**E. LARVAL LAMPREY ELECTROFISHING.**

- 1. PERMISSION FROM EC LEAD WILL BE OBTAINED IF LARVAL LAMPREY ELECTROFISHER IS NOT ONE OF FOLLOWING PRE-APPROVED MODELS: ABP-2 "WISCONSIN", SMITH-ROOT LR-24, OR SMITH-ROOT APEX BACKPACK.
- 2. LARVAL LAMPREY SAMPLING WILL INCORPORATE 2-STAGE METHOD: "TICKLE" AND "STUN".
- 3. FIRST STAGE: USE 125 VOLT DC WITH A 25 PERCENT DUTY CYCLE APPLIED AT A SLOW RATE OF 3 PULSES PER SECOND. IF TEMPERATURES ARE BELOW 10 DEGREES CELSIUS, VOLTAGE MAY BE INCREASED GRADUALLY (NOT TO EXCEED 200 VOLTS). BURSTED PULSES (THREE SLOW AND ONE SKIPPED) RECOMMENDED TO INCREASE EMERGENCE.
- 4. SECOND STAGE (OPTIONAL FOR EXPERIENCED NETTERS): IMMEDIATELY AFTER LAMPREY EMERGE, USE A FAST PULSE SETTING OF 30 PULSES PER SECOND.
- 5. USE DIP NETS FOR VISIBLE LAMPREY. SIENES AND FINE MESH NET SWEEPS MAY BE USED IN POOR VISIBILITY.
- 6. SAMPLING WILL OCCUR SLOWLY (>60 SECONDS PER METER) STARTING AT UPSTREAM AND WORKING DOWNSTREAM.
- 7. MULTIPLE SWEEPS TO OCCUR WITH 15 MINUTES BETWEEN SWEEPS.
- 8. POST-DRAWDOWN "DRY-SHOCKING" WILL BE APPLIED IF LARVAL LAMPREY CONTINUE TO EMERGE. ANODES TO BE PLACED ONE METER APART TO SAMPLE ONE SQUARE METER AT A TIME FOR AT LEAST 60 SECONDS. FOR TEMPERATURES LESS THAN 10 DEGREES CELSIUS, MAXIMUM VOLTAGE MAY BE GRADUALLY INCREASED TO 400 VOLTS (DRY-SHOCKING ONLY).



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NO.	DATE	BY	ISSUE / DESCRIPTION
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DESIGNED BY: KHR/BHM
DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: --
DATE: 10/1/24

PREPARED FOR:

ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**HIP CONSERVATION MEASURES**

DRAWING NUMBER:  
**7.1**  
SHEET: 26 OF 27



**WORK AREA ISOLATION AND FISH SALVAGE (CONTINUED).**

**4. DEWATERING.**

- A. DEWATERING WILL OCCUR AT A RATE SLOW ENOUGH TO ALLOW SPECIES TO NATURALLY MIGRATE OUT OF THE WORK AREA.
- B. WHERE A GRAVITY FEED DIVERSION IS NOT POSSIBLE, A PUMP MAY BE USED. PUMPS WILL BE INSTALLED TO AVOID REPETITIVE DEWATERING AND REWATERING.
- C. WHEN FISH ARE PRESENT, PUMPS WILL BE SCREENED IN ACCORDANCE WITH NMFS FISH SCREEN CRITERIA. NMFS ENGINEERING REVIEW AND APPROVAL WILL BE OBTAINED FOR PUMPS EXCEEDING 3 CUBIC FEET PER SECOND.
- D. DISSIPATION OF FLOW ENERGY AT THE BYPASS OUTFLOW WILL BE PROVIDED TO PREVENT DAMAGE TO THE STREAM CHANNEL AND RIPARIAN VEGETATION.
- E. SEEPAGE WATER WILL BE PUMPED TO A TEMPORARY STORAGE AND TREATMENT SITE OF INTO UPLAND AREAS TO ALLOW WATER TO PERCOLATE THROUGH SOIL AND VEGETATION PRIOR TO REENTERING THE STREAM CHANNEL.

**CONSTRUCTION AND POST CONSTRUCTION CONSERVATION MEASURES.**

**1. FISH PASSAGE.**

- A. FISH PASSAGE WILL BE PROVIDED FOR ADULT AND JUVENILE FISH LIKELY TO BE PRESENT DURING CONSTRUCTION UNLESS PASSAGE DID NOT EXIST BEFORE CONSTRUCTION, THE STREAM IS NATURALLY IMPASSABLE, OR PASSAGE WILL NEGATIVELY IMPACT ESA-LISTED SPECIES OR THEIR HABITAT.
- B. FISH PASSAGE ALTERNATIVES WILL BE APPROVED BY THE BPA EC LEAD UNDER ADVISEMENT BY THE NMFS HABITAT BIOLOGIST.

**2. CONSTRUCTION AND DISCHARGE WATER.**

- A. SURFACE WATER MAY BE DIVERTED TO MEET CONSTRUCTION NEEDS ONLY IF DEVELOPED SOURCES ARE UNAVAILABLE OR INADEQUATE.
- B. DIVERSIONS WILL NOT EXCEED 10% OF THE AVAILABLE FLOW.
- C. CONSTRUCTION DISCHARGE WATER WILL BE COLLECTED AND TREATED TO REMOVE DEBRIS, NUTRIENTS, SEDIMENT, PETROLEUM HYDROCARBONS, METALS, AND OTHER POLLUTANTS.

**3. TIME AND EXTENT OF DISTURBANCE.**

- A. EARTHWORK REQUIRING IN-STREAM MECHANIZED EQUIPMENT (INCLUDING DRILLING, EXCAVATION, DREDGING, FILLING, AND COMPACTING) WILL BE COMPLETED AS QUICKLY AS POSSIBLE.
- B. MECHANIZED EQUIPMENT WILL WORK FROM TOP OF BANK UNLESS WORK FROM ANOTHER LOCATION WILL RESULT IN LESS HABITAT DISTURBANCE (TURBIDITY, VEGETATION DISTURBANCE, ETC.).

**4. CESSATION OF WORK.**

- A. PROJECT OPERATIONS WILL CEASE WHEN HIGH FLOW CONDITIONS MAY RESULT IN INUNDATION OF THE PROJECT AREA (FLOOD EFFORTS TO DECREASE DAMAGES TO NATURAL RESOURCES PERMITTED).
- B. WATER QUALITY LEVELS EXCEEDED. SEE CWA SECTION 401 WATER QUALITY CERTIFICATION AND TURBIDITY MEASURES.

**5. SITE RESTORATION.**

- A. DISTURBED AREAS, STREAM BANKS, SOILS, AND VEGETATION WILL BE CLEANED UP AND RESTORED TO IMPROVED OR PRE-PROJECT CONDITIONS.
- B. PROJECT-RELATED WASTE WILL BE REMOVED.
- C. TEMPORARY ACCESS ROADS AND STAGING WILL BE DECOMPACTED AND RESTORED. SOILS WILL BE LOOSENED IF NEEDED FOR REVEGETATION OR WATER INFILTRATION.
- D. THE PROJECT SPONSOR WILL RETAIN THE RIGHT OF REASONABLE ACCESS TO THE SITE TO MONITOR AND MAINTAIN THE SITE OVER THE LIFE OF THE PROJECT.

**6. REVEGETATION.**

- A. PLANTING AND SEEDING WILL OCCUR PRIOR TO OR AT THE BEGINNING OF THE FIRST GROWING SEASON AFTER CONSTRUCTION.

- B. A MIX OF NATIVE SPECIES (INVASIVE SPECIES NOT ALLOWED) APPROPRIATE TO THE SITE WILL BE USED TO REESTABLISH VEGETATION, PROVIDE SHADE, AND REDUCE EROSION. REESTABLISHED VEGETATION SHOULD BE AT LEAST 70% OF PRE-PROJECT CONDITIONS WITHIN THREE YEARS.
- C. VEGETATION SUCH AS WILLOWS, SEDGES, OR RUSH MATS WILL BE SALVAGED FROM DISTURBED OR ABANDONED AREAS TO BE REPLANTED.
- D. SHORT-TERM STABILIZATION MEASURE MAY INCLUDE THE USE OF NON-NATIVE STERILE SEED MIX (WHEN NATIVE NOT AVAILABLE), WEED-FREE CERTIFIED STRAW, OR OTHER SIMILAR TECHNIQUES.
- E. SURFACE FERTILIZER WILL NOT BE APPLIED WITHIN 50 FEET OF ANY STREAM, WATE BODY, OR WETLAND.
- F. FENCING WILL BE INSTALLED AS NECESSARY TO PREVENT ACCESS TO REVEGETATED SITES BY LIVESTOCK OR UNAUTHORIZED PERSONS.
- G. INVASIVE PLANTS WILL BE REMOVED OR CONTROLLED UNTIL NATIVE PLANT SPECIES ARE WELL ESTABLISHED (TYPICALLY THREE YEARS POST-CONSTRUCTION).

**7. SITE ACCESS AND IMPLEMENTATION MONITORING.**

- A. THE PROJECT SPONSOR WILL PROVIDE CONSTRUCTION MONITORING DURING IMPLEMENTATION TO ENSURE ALL CONSERVATION MEASURES ARE ADEQUATELY FOLLOWED, EFFECTS TO LISTED SPECIES ARE NOT GREATER THAN PREDICTED, AND INCIDENTAL TAKE LIMITATIONS ARE NOT EXCEEDED.
- B. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL SUBMIT THE PROJECT COMPLETION FORM (PCF) WITHIN 30 DAYS OF PROJECT COMPLETION.

**8. CWA SECTION 401 WATER QUALITY CERTIFICATION.**

- A. THE PROJECT SPONSOR OR DESIGNATED REPRESENTATIVE WILL COMPLETE AND RECORD WATER QUALITY OBSERVATIONS (SEE TURBIDITY MONITORING) TO ENSURE IN-WATER WORK IS NOT DEGRADING WATER QUALITY.
- B. DURING CONSTRUCTION, WATER QUALITY PROVISIONS PROVIDED BY THE OREGON DEPARTMENT OF ENVIRONMENTAL QUALITY, WASHINGTON DEPARTMENT OF ECOLOGY, IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY WILL BE FOLLOWED.

**STAGED REWATERING PLAN.**

- A. WHEN REINTRODUCING WATER TO DEWATERED AREAS AND NEWLY CONSTRUCTED CHANNELS, A STAGED REWATERING PLAN WILL BE APPLIED.
- B. THE FOLLOWING WILL BE APPLIED TO ALL REWATERING EFFORTS. COMPLEX REWATERING EFFORTS MAY REQUIRE ADDITIONAL NOTES OR A DEDICATED SHEET IN THE CONSTRUCTION DETAILS.
  - 1. TURBIDITY MONITORING PROTOCOL WILL BE APPLIED TO REWATERING EFFORTS.
  - 2. PRE-WASH THE AREA BEFORE REWATERING. TURBID WASH WATER WILL BE DETAINED AND PUMPED TO THE FLOODPLAIN OR SEDIMENT CAPTURE AREAS RATHER THAN DISCHARGING TO FISH-BEARING STREAMS.
  - 3. INSTALL SEINE NETS AT UPSTREAM END TO PREVENT FISH FROM MOVING DOWNSTREAM UNTIL 2/3 OF TOTAL FLOW IS RESTORED TO THE CHANNEL.
  - 4. STARTING IN EARLY MORNING INTRODUCE 1/3 OF NEW CHANNEL FLOW OVER PERIOD OF 1-2 HOURS.
  - 5. INTRODUCE SECOND THIRD OF FLOW OVER NEXT 1 TO 2 HOURS AND BEGIN FISH SALVAGE OF BYPASS CHANNEL IF FISH ARE PRESENT.
  - 6. REMOVE UPSTREAM SEINE NETS ONCE 2/3 FLOW IN REWATERED CHANNEL AND DOWNSTREAM TURBIDITY IS WITHIN ACCEPTABLE RANGE (LESS THAN 40 NTU OR LESS THAN 10% BACKGROUND).
  - 7. INTRODUCE FINAL THIRD OF FLOW ONCE FISH SALVAGE EFFORTS ARE COMPLETE AND DOWNSTREAM TURBIDITY VERIFIED TO BE WITHIN ACCEPTABLE RANGE.
  - 8. INSTALL PLUG TO BLOCK FLOW INTO OLD CHANNEL OR BYPASS. REMOVE ANY REMAINING SEINE NETS.
  - 9. IN LAMPREY SYSTEMS, LAMPREY SALVAGE AND DRY SHOCKING MAY BE NECESSARY.

**TURBIDITY MONITORING.**

- A. RECORD THE READING, LOCATION, AND TIME FOR THE BACKGROUND READING APPROXIMATELY 100 FEET UPSTREAM OF THE PROJECT AREA USING A RECENTLY CALIBRATED TURBIDIMETER OR VIA VISUAL OBSERVATION (SEE THE HIP HANDBOOK TURBIDITY MONITORING SECTION FOR A VISUAL OBSERVATION KEY).
- B. RECORD THE TURBIDITY READING, LOCATION, AND TIME AT THE MEASUREMENT COMPLIANCE LOCATION POINT.
  - 1. 50 FEET DOWNSTREAM FOR STREAMS LESS THAN 30 FEET WIDE.
  - 2. 100 FEET DOWNSTREAM FOR STREAMS BETWEEN 30 AND 100 FEET WIDE.
  - 3. 200 FEET DOWNSTREAM FOR STREAMS GREATER THAN 100 FEET WIDE.
  - 4. 300 FEET FROM THE DISCHARGE POINT OR NONPOINT SOURCE FOR LOCATIONS SUBJECT TO TIDAL OR COASTAL SCOUR.
- C. TURBIDITY SHALL BE MEASURED (BACKGROUND LOCATION AND COMPLIANCE POINTS) EVERY 4 HOURS WHILE WORK IS BEING IMPLEMENTED.
- D. IF THERE IS A VISIBLE DIFFERENCE BETWEEN A COMPLIANCE POINT AND THE BACKGROUND, THE EXCEEDANCE WILL BE NOTED IN THE PROJECT COMPLETION FORM (PCF). ADJUSTMENTS OR CORRECTIVE MEASURES WILL BE TAKEN IN ORDER TO REDUCE TURBIDITY.
- E. IF EXCEEDANCES OCCUR FOR MORE THAN TWO CONSECUTIVE MONITORING INTERVALS (AFTER 8 HOURS), THE ACTIVITY WILL STOP UNTIL THE TURBIDITY LEVEL RETURNS TO BACKGROUND. THE BPA EC LEAD WILL BE NOTIFIED OF ALL EXCEEDANCES AND CORRECTIVE ACTIONS AT PROJECT COMPLETION.
- F. IF TURBIDITY CONTROLS (COFFER DAMS, WADDLES, FENCING, ETC.) ARE DETERMINED INEFFECTIVE, CREWS WILL BE MOBILIZED TO MODIFY AS NECESSARY. OCCURRENCES WILL BE DOCUMENTED IN THE PROJECT COMPLETION FORM (PCF).
- G. FINAL TURBIDITY READINGS, EXCEEDANCES, AND CONTROL FAILURES WILL BE SUBMITTED TO THE BPA EC LEAD USING THE PROJECT COMPLETION FORM (PCF).

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DESIGNED BY: KHR/BHM
DRAWN BY: GER/KHR
APPROVED BY: BHM/JRS
REVISION NO.: ---
DATE: 10/1/24



ASOTIN CREEK PROJECT AREA 3.2 FISH HABITAT RESTORATION  
ASOTIN COUNTY, WASHINGTON

**HIP CONSERVATION MEASURES**

DRAWING NUMBER:

**7.2**

SHEET: 27 OF 27

