

Big Sheep/Buhler Diversion Replacement

Completion Report

Bonneville Power Administration Project Number 1992-026-01

Contract #52673

Performance Period May 1, 2011 to November 15, 2011

By R. Coby Menton, Grande Ronde Model Watershed

April 2012



Photo 1: Looking upstream at completed project. Photo by R. Coby Menton on October 13, 2011.

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Abstract

Sometime in the past a large log, approximately 2 feet in diameter, was placed just downstream of the diversion intake in an effort to increase the water depth in the forebay area. Over time the forebay area has been filled in with sediment and the streambed in the forebay is now level with the top of the log. On the downstream side of the log there is a vertical drop in the streambed of approximately 5 feet and then the creek continues at a relatively constant grade. The drop on the downstream side of the log creates a fish passage barrier, particularly when the creek is experiencing low flows.



Photo 2: Photo taken by Chas Hutchins of Anderson Perry on December 5, 2011. The channel-spanning log upstream in the photo is approximately 5-feet above the channel downstream.

Occasionally, a hole is developed upstream of the log and water begins to flow underneath the log. When this occurs irrigators enter the stream and place material in the hole to repair the check structure. This causes disturbance in the streambed and turbidity in the creek.

The designed solution to eliminate this passage barrier in Big Sheep Creek was to build a roughened channel starting at the diversion structure and continuing downstream for approximately 350-feet. The upstream end this roughened channel wedge raises the channel invert approximately 8-feet and at the downstream end the wedge trails off to the natural channel bottom. To maintain grade 6 cross vanes were installed and to improve

habitat conditions two large woody material features were constructed. Channel simulation material (rock) was imported to fill in between the grade control structures. This rock was of the same size distribution as existed prior to the project. At the downstream end two resting pools were constructed.

At completion this project has addressed a multitude of in stream parameters of concern in Big Sheep Creek at the project site. Aquatic passage is the primary concern especially in the summer months when Big Sheep can experience warm stream temperatures. More than 30 miles of habitat exists above this diversion on Big Sheep alone and tributary streams offer many miles more. Habitat conditions upstream are variable but cool water is characteristic further upstream. While not common the current diversion does need to be fixed periodically. This activity disturbs the channel and causes sedimentation. The new structure will be more stable and maintenance activities will be eliminated or reduced.

Introduction

With the cooperation of the Buhler Family, technical assistance from ODFW, and engineering services of Anderson Perry (AP) the GRMW completed this diversion structure replacement project during the in stream work window in the summer and fall of 2011. Anderson Perry completed designs and the ODFW survey crew did topographic survey. Removal/fill permits were acquired by AP and the GRMW accomplished all other environmental compliance requirements. The GRMW is the project sponsor and was responsible for all contracting and AP supplied construction engineering. The resulting project is a diversion structure that requires minimal annual in stream maintenance, results in reduced erosion and sedimentation, and improves aquatic passage conditions.

The project area is located on Big Sheep Creek at river mile 6.4 approximately 3 miles above the confluence with Little Sheep Creek, is on private land owned by the Buehler Family Trust, and is near Imnaha, Oregon.

1. Legal – T1S R48E Section 8 SE ¼
2. Lat/Lon – 45.4841 116.8409

Relation to Imnaha Subbasin Plan:

Imnaha Subbasin Plan Supplement: 5.3.2.1 Natural Production Objectives and Strategies, page #7, bullet 13. **Increase passage efficiency of in-stream obstructions including culverts, bridges, diversion structures, and unscreened diversions.** Fish passage barriers should be corrected wherever they exist. However, if this is not feasible, a prioritization of the known barriers should be developed to account for life history stage impacted, miles of habitat reopened, and quality of reopened habitat. Problem 10 (p 35) lists the known passage problems; however, this is not a comprehensive list for all obstructions to migration in the Imnaha subbasin. It is recommended that the fish passage inventory, analysis and prioritization currently being conducted by the Nez Perce Tribe be utilized to further clarify/define the areas needing mitigation.

5.3.2.1 Natural Production Objectives and Strategies, page #7, bullet 14. Structural fixes installed to provide fish passage over irrigation dams, etc. require maintenance to operate within design criteria. All fish passage facilities should be maintained to provide optimal passage conditions.

As demonstrated by several similar diversion structures in Wallowa County large rock diversions require very little if any maintenance while maintaining aquatic passage. Examples include the Tully-Hill diversion on the Lostine River, the Chamberlain diversion in Bear Creek and the Lower Valley diversion on the Wallowa River. If maintenance becomes necessary the GRMW will assess with the MLRA, ODFW, and AP to determine appropriate maintenance actions.

Project Objectives

1. Provide year round passage for all life stages of aquatic organisms.
2. Reduce sedimentation from periodic structure maintenance activities.
3. Promote natural bedload transport through this stream channel.

Methods and Material

Proposed Actions

1. Coordination – Initial coordination is complete between the GRMW, the Buhler Family, and ODFW. GRMW is the project sponsor, the Buhler Family is willing to participate in the project, and ODFW has provided topographic survey and technical assistance.
2. Design & Engineering – GRMW contracted AP to complete initial design concept and final engineering complete with construction specification. The deliverable is final design with construction specification and is complete as of December 2010.
3. Environmental compliance –ESA Section 7 Consultation will be completed with USFWS through the Partners for Wildlife Programatic process that covers consultation for both USFWS and NMFS. GRMW will contract with AP to complete removal/fill permit applications. The first deliverable is biological clearance for the project as stated in the letter of concurrence from USFWS complete with terms and conditions of project construction. The second deliverable is removal/fill permits from both Oregon DSL and Army Corps' of Engineers complete with terms and conditions of project construction. Cultural resources consultation was initiated in November of 2010. This specific action will be complete by March 15th, 2011.
4. Contracting – GRMW will contract with BPA for funds to implement the project. GRMW will also advertise for and retain a construction contractor and materials provider assistance to build the project. All contracts will be in place by June 15th, 2011.
5. Construction – The project will be constructed during the in-stream work window for this reach of the Imnaha River during the summer of 2011. Anticipated work includes mobilization, delivery of rock & large wood material, installation of the roughened channel, site clean-up and final grading, and demobilization. The in

stream work window is between July 1st and October 15th with in stream extensions possible. The construction phase of this project is expected to last no longer than the in stream work window. The project will be complete by October 15, 2011.

Implemented Actions

This project was implemented as contracted with BPA, on time and to engineered specification. Henderson Logging, Inc. of Wallowa, Oregon was awarded the construction contract as lowest qualified bidder. Henderson Logging started materials delivery in early July, in stream work began on September 5, and the project was completed on October 12, 2011. All in channel work was completed during the in stream work window for Big Sheep Creek. No time extensions were necessary nor were change orders issued once the project began. Prior to start of construction Henderson Logging realized an error in their rock amount calculation. While this resulted in a \$9860 increase in project cost the total cost was still lower than the next qualified bidding contractor. This restoration project was implemented 100% according to plan. The following table indicates what was accomplished compared to what was proposed:

Deliverable Table

Action	Proposed	Contracted	Delivered	Difference
Pre-Implementation activities including survey, design, permitting, consultation and coordination	100 hours of GRMW staff time and contractual agreements.	As proposed	Landowner coordination, removal/fill permits, Section 7 consultation and cultural resource clearance.	None
Project management including GRMW staff time, inspection engineering and archaeology	65 hours of GRMW staff time and inspection engineer support. \$5,250	As proposed. \$5,250	As proposed	None
In house personnel including fiscal management and office assistant	30 hours of in-kind support	As proposed	As proposed	None
Contracted Services	\$57,441	\$67,301	As specified	\$9,860
Mobilization	\$2,723	\$2,723	As specified	\$0
Job photos	\$300	\$300	As specified	\$0
Clearing and grubbing	\$600	\$600	As specified	\$0
Remove and replace head gate	\$3,500	\$3,500	As specified	\$0
Grade control structures	\$25,818	\$25,818	As specified	\$0
Woody debris structures	5,000	\$5,000	As specified	\$0
Streambed simulation material	\$17,000	\$26,860	As specified	\$9,860
Seeding and planting	\$1,000	\$1,000	As specified	\$0
Erosion control	\$500	\$500	As specified	\$0
Water control	\$1,000	\$1,000	As specified	\$0

Discussion

Lessons Learned

In July of 2009 the Oregon Department of Fish and Wildlife approached the GRMW about a fish passage barrier on Big Sheep Creek. A site visit was scheduled and this project was developed at that time. In the fall of 2009 a site survey was completed and in March of 2010 Anderson Perry had completed a preliminary design report identifying restoration options. Following comment and identification of a preferred option a 50% plan set was delivered for comment and by April of 2011 construction plans were finalized. In February of 2011 the GRMW solicited for construction contractors and the project was awarded to Henderson Logging Inc. of Wallowa, Oregon. Construction began in July and was complete by October 12, 2011.

The 26 months it took to implement the Buhler project is typical of projects that involve passage and in stream work for rivers that have endangered species. Several review processes combined with environmental compliance requirements significantly lengthen the time in which these projects can be implemented. The following statements pertain to this project as from past projects implemented by the GRMW:

1. Due to overlapping jurisdictions and permitting requirements, it is essential to have a lead agency well versed in the laws, regulations and permitting processes required for river restoration, particularly in the presence of threatened and/or endangered species. Private landowners cannot be expected to pursue this process without guidance, support and leadership from an experienced and skilled lead agency. The GRMW with contract assistance from AP and technical support from ODFW served this purpose.
2. To the extent possible, flexibility for on-site design modifications should be built into the regulatory review and permitting process. This process remains rigid and risk-averse and may result in missed opportunities to improve end results.
3. Due to the active restoration and dynamic nature of rivers, funding agencies should be prepared to support maintenance and modification of these projects in response to lessons learned from continued monitoring and from short-term disturbances (i.e. spring flooding) that might occur before the newly implemented project has stabilized.

For in stream work Big Sheep Creek needed to be dewatered and fish salvage performed. On September 5, 2011 the contractor began diverting Big Sheep Creek into an excavated bypass channel. The bypass incorporated the irrigation ditch above the project and returned 50-feet below the bottom end of the project. The bypass was lined to reduce sediment input to the creek below the project area. On the morning of September 7 the contractor completed diversion into the bypass and the fish salvage was accomplished with two people operating fish shockers and 5 others netting, hauling and counting fish. A block net was installed at the lower end of the project site to preclude fish swimming into the work area.

- Data of Fish Salvage Operation: September 7, 2011.
- Supervisory Fish Biologist

1. Name: Bill Knox, Oregon Department of Fish and Wildlife.
 2. Address: ODFW Enterprise, OR. 97828
 3. Telephone Number: 541.426.3279.
- Number of fish captured: 174 juvenile steelhead and 31 juvenile Chinook.
 - Release site: The release site was the live flowing undisturbed Big Sheep Creek channel above the project.
 - Condition at release: Clear, continuous non-turbid water.
 - Number injured: Not recorded
 - Number killed by species: 4 steelhead and 0 Chinook.

Objectives Assessment

The as-built dimension, structure and dimension of the restoration efforts in the project area suggest that project objectives will be met. The passage barrier, the need for periodic diversion structure maintenance and the bed load transport disturbance to Big Sheep Creek has been eliminated. The elevation of the channel has been lifted with stream simulation material and 6 cross vanes will control grade in the restored channel. Large woody material and riparian planting will improve habitat conditions.



Photo 3: Photo taken on August 6, 2009. This pre-project photo shows the channel spanning log and diversion structure that is a fish passage barrier. The two ODFW biologists in the photo are removing rocks to try and provide passage to fish under the log.



Photo 4: Photo taken on September 12, 2011. The white sand bags and tarp above the log were used to divert Big Sheep Creek around the work area. While the work area was completely isolated from fish it was not possible to completely bypass flow. The porous substrate allowed water to flow subsurface into the project area.



Photo 5: Photo taken on September 20, 2011. Grade control and stream simulation material installation nearly complete. The channel spanning log has been left in place and buried.



Photo 6: Photo taken on October 13, 2011. The project is complete and water is back in the main channel. All fish passage criteria including jump height and velocity have been met. The original elevation of the diversion has been maintained and need for maintenance has been eliminated.



Photo 7: Photo taken on October 13, 2011. Large wood features are shown in this photo. Each feature is made with 3 logs keyed into the bank with the rootwad in the stream. Each log structure will improve habitat in the project reach.



Photo 8: View from top of project looking downstream at project completion. The new headgate is on the left side of the photo. Very little riparian vegetation was disturbed during construction and all disturbed areas have been replanted with native seed and willows.

Acknowledgment

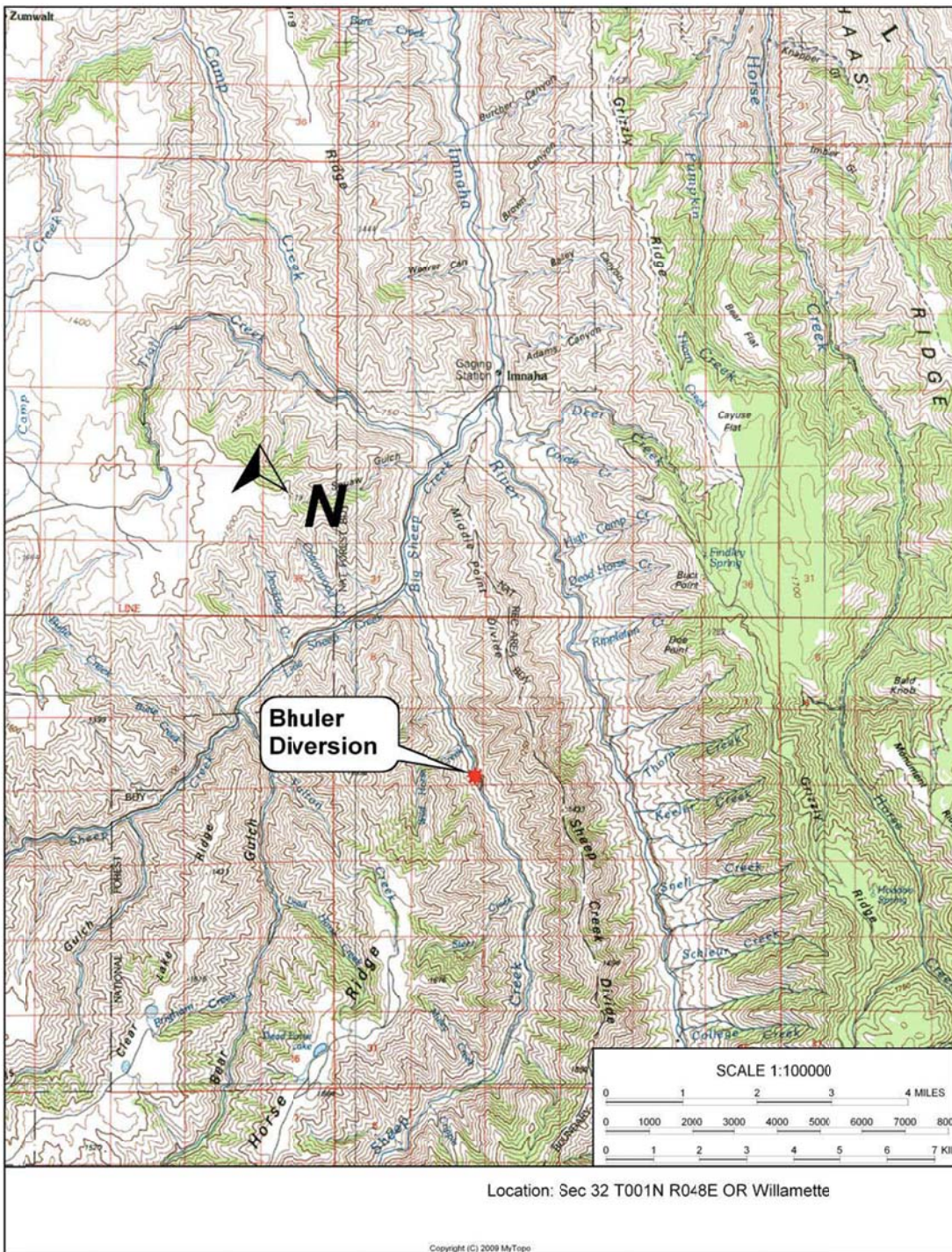
The Grande Ronde Model Watershed would like to thank all those organizations that made the Big Sheep Creek/Buhler Diversion Replacement project possible. Without the funding support of Bonneville Power Administration, the support of the Buhler Family Trust, technical and survey support from ODFW this project would not have been possible. Engineering provided by Anderson Perry, Inc. and archaeological services from Bruce R. Womack, RPA remain invaluable to our projects.

Final Budget

BPA Project Title: Grande Ronde Model Watershed
 Contract Title: 199202601 GRMW Big Sheep/Buehler
 Diversion
 Contract
 Number: 52673
 Performance Period: May 1,
 2011 - April 30, 2012
 Period Covered for this Invoice: October 5, 11 -
 November 15, 11
 Invoice Number: 5267305 Final - Prepared: December 12, 2011, By Mary Estes 541-
 663-0570

	Approved Budget	Total of Previous Invoices	Total for This Invoice	Total Invoices to Date	Total Remaining
Construction					
Engineering- AP	\$5,000.00	\$4,453.65	\$202.13	\$4,655.78	\$344.22
Archaeologist	\$250.00	\$0.00	\$0.00	\$0.00	\$250.00
Mobilization - Henderson					
Logging	\$2,723.00	\$2,723.00	\$0.00	\$2,723.00	\$0.00
Job Photos- Henderson					
Logging	\$300.00	\$300.00	\$0.00	\$300.00	\$0.00
Clearing and Grubbing- Henderson	\$600.00	\$600.00	\$0.00	\$600.00	\$0.00
Remove & Repl.					
Headgate & Pipe-HL	\$3,500.00	\$3,500.00	\$0.00	\$3,500.00	\$0.00
Grade Control					
Structures-Henderson	\$25,818.00	\$25,818.00	\$0.00	\$25,818.00	\$0.00
Woody Debris					
Structures-Henderson	\$5,000.00	\$5,000.00	\$0.00	\$5,000.00	\$0.00
Streambed Simulation					
Mat-Henderson	\$26,860.00	\$26,860.00	\$0.00	\$26,860.00	\$0.00
Seeding and Planting - Henderson Log	\$1,000.00	\$0.00	\$1,000.00	\$1,000.00	\$0.00
Erosion Control - Henderson	\$500.00	\$500.00	\$0.00	\$500.00	\$0.00
Water Control - Henderson	\$1,000.00	\$1,000.00	\$0.00	\$1,000.00	\$0.00
Total	\$72,551.00	\$70,754.65	\$1,202.13	\$71,956.78	\$594.22

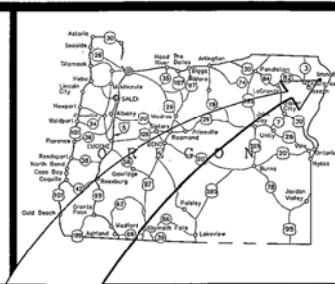
Map



Final/As-Built Design

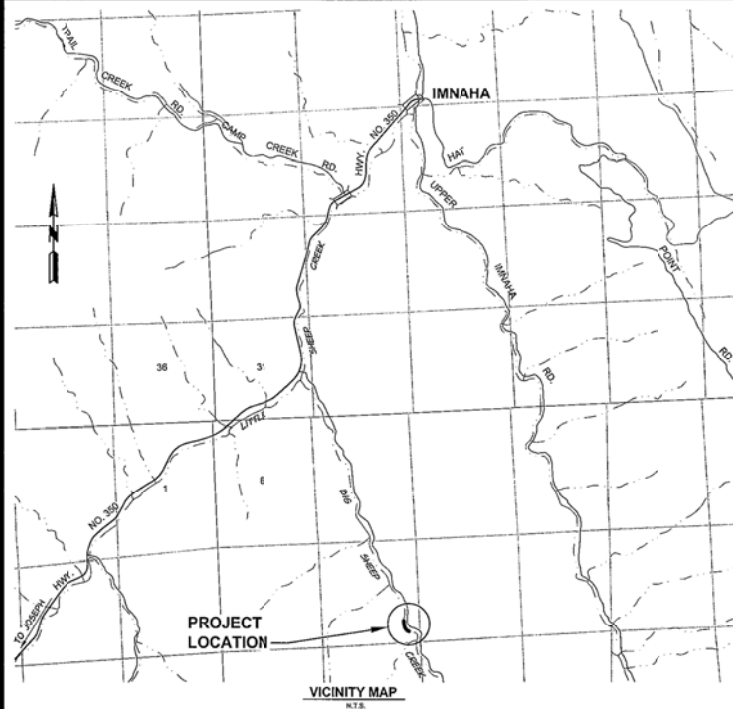
GRANDE RONDE MODEL WATERSHED

BIG SHEEP CREEK BUHLER DIVERSION - 2010 WALLOWA COUNTY, OREGON



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- 2 EXISTING SITE PLAN AND LEGEND
- 3 SITE PLAN AND PROFILE
- 4 RIVER CROSS SECTIONS
- 5 WOODY DEBRIS DETAILS
- 6 GRADE CONTROL STRUCTURE DETAILS



The Grande Ronde Model Watershed has reviewed these drawings and approved them for construction to fulfill the intended project objectives.

Date _____

GRANDE RONDE MODEL WATERSHED

EXECUTIVE DIRECTOR

JEFF OVESON

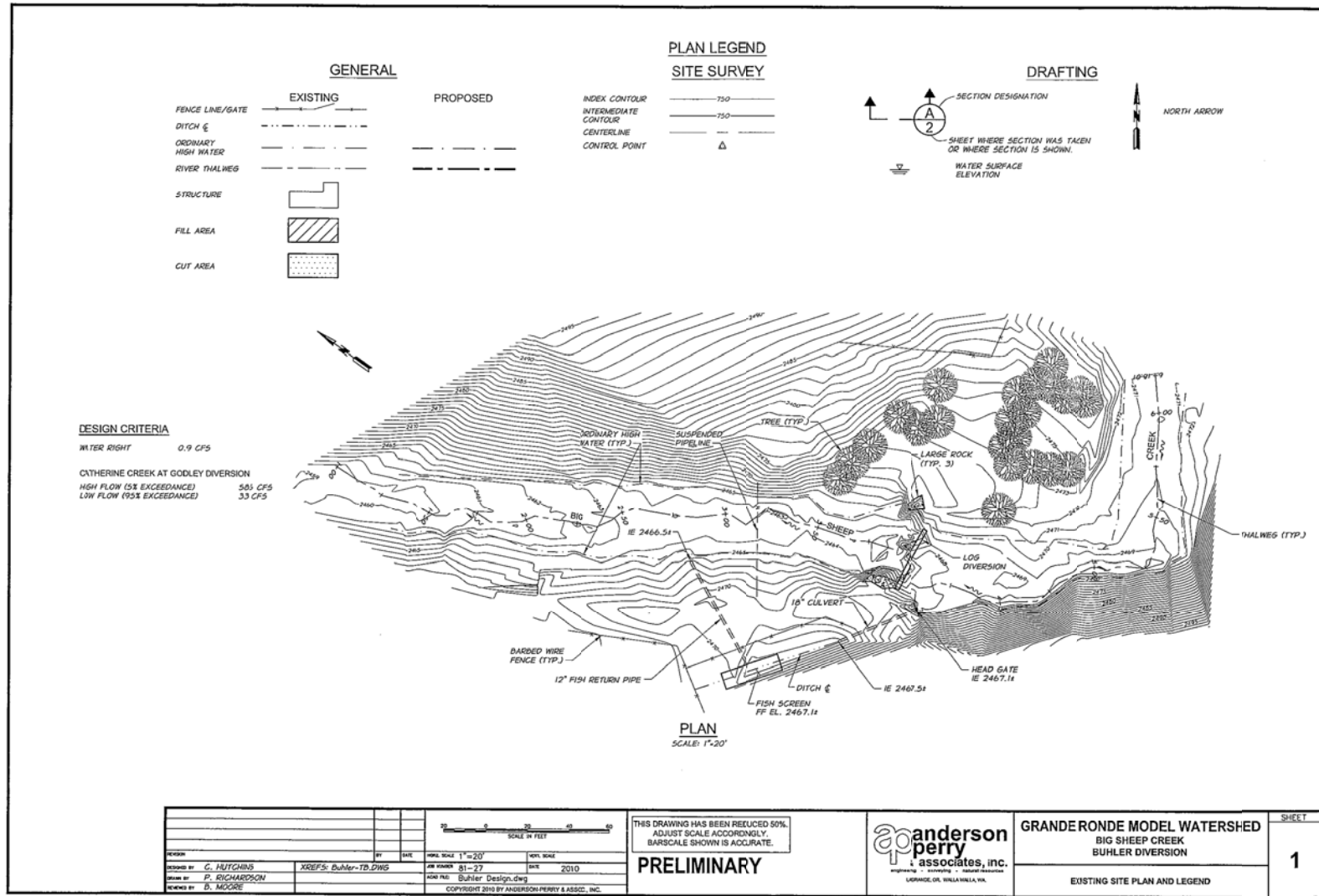
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& associates, inc.**
Engineering • Planning • Construction
1400 N. 10th St., Suite 100
LA GRANDE, OR 97631-1100

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1. STREAM SIMULATION MATERIAL SHALL BE PLACED BY FIRST INSTALLING THE LARGEST ROCK THAT WILL PROTRUDE ABOVE THE STREAM BED SURFACE. SMALLER MATERIAL SHALL THEN BE USED TO FILL THE VOIDS BETWEEN THE LARGE ROCK. THIS MATERIAL SHALL BE TAMPED IN PLACE FOLLOWED BY STIFFS OR PLACING THE SURFACE WITHIN WATER TO WASH THE FINER MATERIAL INTO REMAINING VOIDS.
2. 36" ROCKS SHALL BE PLACED APPROXIMATELY AT 10 FT. O.C. TWO THIRDS OF THE 36" ROCKS SHALL BE BURIED 50 PERCENT THRU THE ROCK PROTRUSION ABOVE THE STREAMBED.

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PRELIMINARY



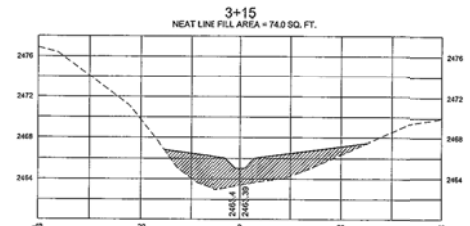
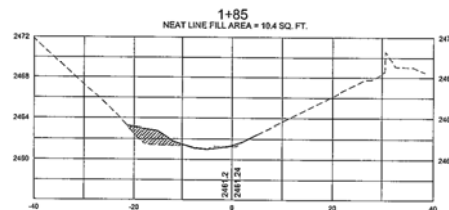
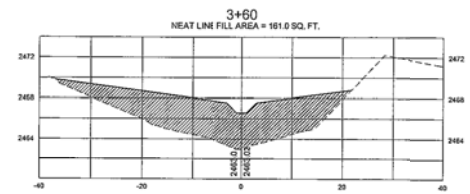
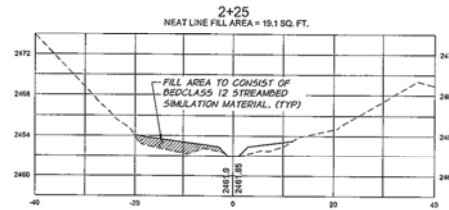
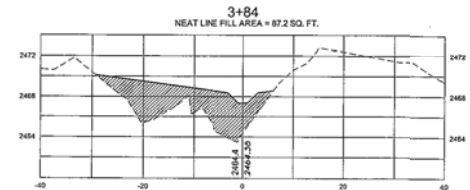
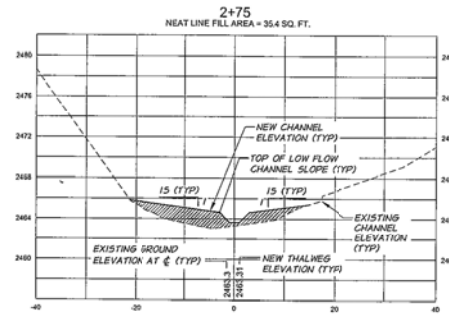
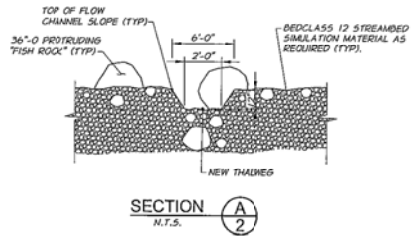
GRANDE RONDE MODEL WATERSHED
BIG SHEEP CREEK
BUHLER DIVERSION

SITE PLAN AND PROFILE

SHEET

2

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DESIGNED BY: C. HUTCHINS		CHECKED BY: J. BUEHLER		DATE: 10/5/2010	
DRAWN BY: P. RICHARDSON		DATE: 10/5/2010		PROJECT: GRAND RONDE MODEL WATERSHED	
REVIEWED BY: B. MOORE		DATE: 10/5/2010		SHEET: 3	

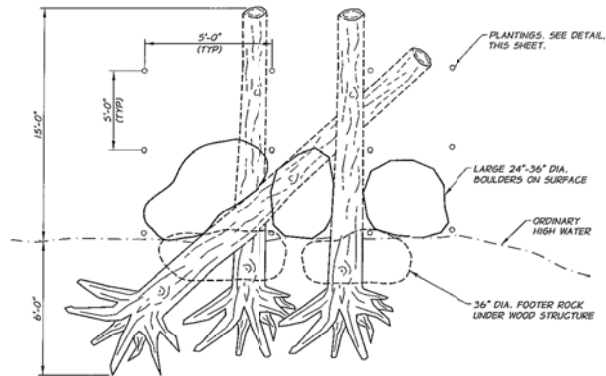
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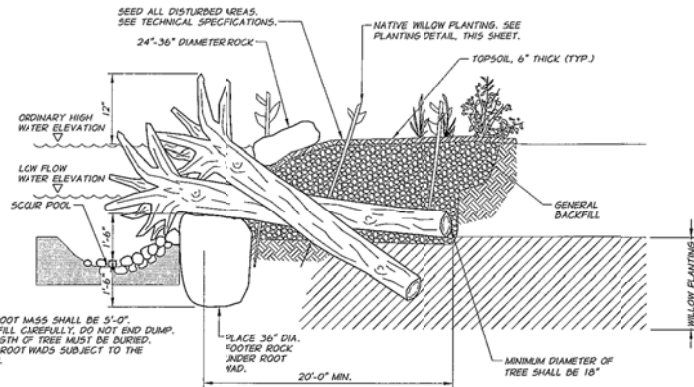
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ENGINEERS & ARCHITECTS
LAGUNA, CA 92653-1111

GRANDERONDE MODEL WATERSHED
BIG SHEEP CREEK
BUHLER DIVERSION
RIVER CROSS SECTIONS

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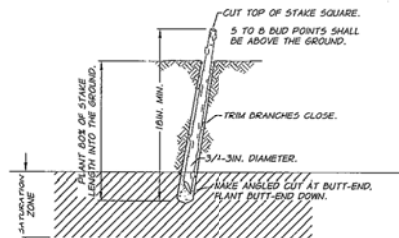


WOODY DEBRIS PLAN
N.T.S.



WOODY DEBRIS SECTION
N.T.S.

- NOTES:
1. MINIMUM DIAMETER OF ROOT MASS SHALL BE 5'-0".
 2. PLACE ROCK AND SOIL TELL CAREFULLY; DO NOT END DUMP.
 3. MORE THAN 50% OF LENGTH OF TREE MUST BE BURIED.
 4. FINAL INSTALLATION OF ROOT MADS SUBJECT TO THE APPROVAL OF ENGINEER.



- NOTES:
1. HARVEST AND PLANT STAKES DURING THE DORMANT SEASON.
 2. USE HEALTHY, STRAIGHT AND LIVE WOOD AT LEAST 1 YEAR OLD.
 3. MAKE CLEAN CUTS AND DO NOT DAMAGE STAKES OR SPLIT ENDS DURING INSTALLATION. USE A SLOTT BAR IN FIRM SOILS.
 4. SOAK CUTTINGS FOR 24 HOURS (MIN.) PRIOR TO INSTALLATION.
 5. TAMP THE SOIL AROUND THE STAKE.
 6. EXTEND STAKES IN TO WATER SATURATION ZONE.

TYPICAL PLANTING DETAIL
N.T.S.

DESIGNED BY	C. HITCHING	DATE	8-27	DATE	2010
DRAWN BY	P. RICHARDSON	DATE	8-27	DATE	2010
CHECKED BY	B. MOORE	DATE	8-27	DATE	2010
PROJECT	BIG SHEEP CREEK DIVERSION				
PROJECT NO.	81-27				
PROJECT NAME	WOOD DETAIL				
PROJECT LOCATION	BIG SHEEP CREEK DIVERSION				
PROJECT OWNER	ANDERSON PERRY & ASSOCIATES, INC.				

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LARGO, GA. WILMINGTON, NC

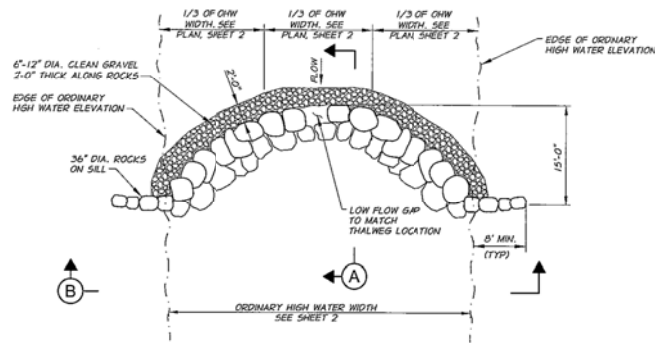
GRANDERONDE MODEL WATERSHED
BIG SHEEP CREEK
BUHLER DIVERSION

WOODY DEBRIS DETAILS

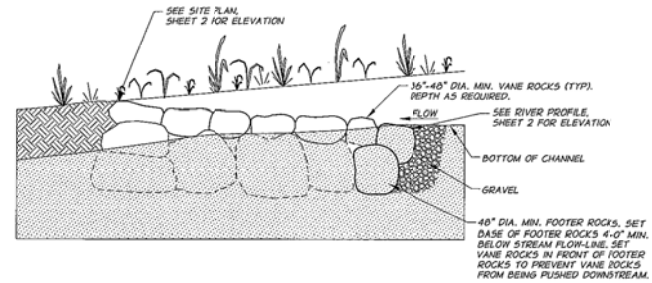
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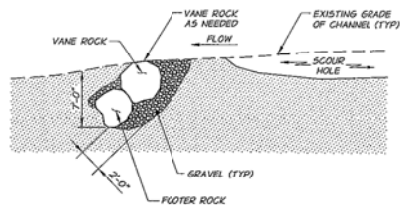
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PLAN
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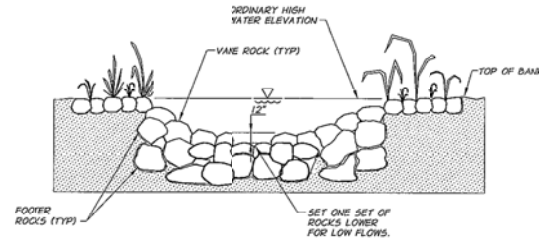


GRADE CONTROL SECTION A
(ROCKS SHOWN OUT OF SECTION FOR CLARITY)
N.T.S.



ROCK PLACEMENT DETAIL
N.T.S.

- NOTES:
1. VANE ROCKS SHALL BE PLACED UPSTREAM AND AGAINST FOOTER AND LOWER VANE ROCKS, NOT ON TOP OF THEM.
 2. GRAVEL SHALL BE COARSE GRADED AND INSTALLED SO THAT IT DOES NOT WASH THROUGH THE SPACES BETWEEN THE FOOTER AND VANE ROCKS.



GRADE CONTROL SECTION B
(ROCKS SHOWN OUT OF SECTION FOR CLARITY)
N.T.S.

- NOTES:
1. SEE ROCK PLACEMENT DETAIL THIS SHEET FOR HOW TO INSTALL ROCK.
 2. SILL ROCK SHOWN AS PLACED WHEN ORDINARY HIGH WATER AND BANKFULL ELEVATION ARE THE SAME. SILL ROCK WILL NEED TO BE PLACED ON SLOPE IF BANKFULL ELEVATION IS HIGHER THAN ORDINARY HIGH WATER ELEVATION.
 3. DETAILS SHOWN DEPICT A GRADE CONTROL STRUCTURE WITH THE THALWEG BEING IN THE MIDDLE OF THE STREAM. WHEN THE THALWEG IS OFF CENTER, THE LOW FLOW GAP AND LOW POINT OF THE STRUCTURE SHALL MATCH THE THALWEG LOCATION.

DESIGNED BY	C. HUTCHINS	DATE	10/12/2010
DRAWN BY	P. RICHARDSON	DATE	10/12/2010
CHECKED BY	B. MOORE	DATE	10/12/2010
PROJECT NO.	81-27	DATE	2010
FILED BY	Details.dwg	DATE	2010
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LA BARGE, OR • WILSONVILLE, OR

**GRANDERONDE MODEL WATERSHED
BIG SHEEP CREEK
BUHLER DIVERSION**

GRADE CONTROL STRUCTURE DETAILS

SHEET
5