

## GRMWP Project Proposal

**Project Name: Imnaha River/Marr Habitat Improvement.**

**Applicant:**

Grande Ronde Model Watershed  
1114 J Ave.  
La Grande, Or. 97850  
Email: [coby@grmw.org](mailto:coby@grmw.org)  
Phone: 541.663.0570  
Fax: 541.962.1585

**Participating Landowner(s) and Agencies:**

Participant	Contact	Role	Address	Phone	Email
GRMW	Coby Menton	Project Manager	1114 J Ave. La Grande, OR 97850	541.663.0570	coby@grmw.org
Gary Marr	Todd Marr	Land owner	PO Box 221 Enterprise, OR 97828	541.398.1553	thmarr@eoni.com
Anderson Perry	Chas Hutchins	Design & Engineering	PO Box 1107 La Grande, OR 97850	541.963.8309	bmoore@andersonperry.com
ODFW	Bill Knox	Technical support	Fish Hatchery Lane Enterprise, OR 97828	541.426.3279	Bill.Knox@state.or.us

**Project Contact(s):**

Contact	Role	Address	Phone	Email
Coby Menton	Technical	1114 J Ave. La Grande, Or. 97850	541.663.0570	coby@grmw.org
Mary Estes	Administrative	1114 J Ave. La Grande, Or. 97850	541.663.0570	mary@grmw.org

**Project Location:**

- Legal Description: Township 2 North, Range 38 East, Sections 16 (sw/sw) and 17 (se/se).
- Latitude: 45.6454.  
Longitude: 116.8363.

**Project Objectives:**

1. Reduce erosion on the Marr property and sediment contribution to the Imnaha River to improve habitat conditions for aquatic species.
2. Stop Imnaha River channel widening on the Marr property to maintain or improve existing channel width to depth ratio.

3. Improve riparian vegetation condition on the Marr property adjacent to the Imnaha River by planting riparian vegetation and installing livestock exclusion fence in the project area.
4. Increase available fish habitat in the Imnaha River by constructing habitat features that will improve habitat complexity and diversity.

## **Project Description**

### **Introduction**

The purpose of this project is to improve fish habitat, reduce erosion and improve water quality in the Lower Imnaha River. The GRMW is proposing to stop 340 feet of severe bank erosion on the Imnaha River on property owned by the Marr Family Trust. Several methods will be utilized including the installation of an engineered log jam, one woody habitat feature, 3 woody debris structures, approximately 300 feet of bank stabilizing toe logs with rock ballast, native vegetation planting and livestock exclusion fence. Project results will be improved backwater and off of main river channel habitat, habitat complexity, water quality and riparian vegetation conditions. Construction is scheduled for the late summer and fall of 2011. Partners include GRMW (sponsor), Anderson Perry & Associates (design and engineering), Marr Family Trust (landowner), and ODFW (technical assistance).

### **Existing condition**

The primary land use at the project site is livestock management including winter feeding operation and grazing. Riparian vegetation consists of annual grasses and herbaceous species with shrub and overstory vegetation absent. The absence of bank stabilizing shrub and overstory vegetation has lead to an unstable streambank and subsequent erosion. Over the past 10 years 100 lateral feet of the riverbank has eroded threatening to wash out the access road to neighboring property downstream. With the cooperation of the Marr Family Trust, this project provides the opportunity to improve fish habitat, riparian and water quality condition while protecting property and road infrastructure.

Federally listed fish species in the Imnaha River in the project area include Snake River fall run and Snake River spring/summer run Chinook salmon, Snake River steelhead and Columbia River bull trout. This reach of the Imnaha River is designated critical habitat for Chinook, steelhead and bull trout. The Imnaha is a designated National Wild and Scenic River. It is not anticipated that the project will adversely affect the river's wild and scenic character, water quality, or other outstanding characteristics. This project will not affect the hydrologic regime of the river nor is change in profile and flood levels expected.

The Imnaha Subbasin Plan supports the activities proposed in this project. The Imnaha Subbasin Plan Supplement does not rank restoration strategies and actions in order of importance rather a listing of activities by topic is given.

1. Page #1, C) Top 3 Strategies Limiting Fish Populations. Perform instream or other enhancements.
2. Pages 6 & 7, 5.3.2.1 Natural Production Objectives and Strategies:
  - **Education and outreach for improving riparian and floodplain protection.** Education of local individuals and groups to improve their

knowledge of proper riparian and floodplain function will result in an increased sense of ownership in the individual stream reaches, as well as longer term, more sustained results.

- **Place large woody debris and large boulders.** Where opportunities exist, work on public, federal, state, tribal and private lands will be conducted to improve instream habitat. Placing large woody debris and large boulders directly increases habitat complexity and can improve habitat quantity by increasing the number of pools.
- **Fence and plant riparian zones/Develop offsite watering facilities.** Where opportunities exist, work on public, federal, state, tribal and private lands will be conducted to improve riparian habitat. Fencing and/or offsite water development is utilized to manage use of the riparian zone by livestock and planting of native vegetation is done to speed the recovery process once grazing or other land uses have been modified. Riparian habitat improvements can directly impact stream temperatures and sediment inputs (through stabilizing stream banks and filtering runoff).
- **Modify detrimental land use activities.** Change land use activities leading to degradation of habitat, thereby allowing stream attributes impacted by these activities to recover without intervention. A common example of this kind of work is riparian buffers where streamside areas are protected from uses such as livestock grazing, timber harvest or agricultural crops (mainstem Imnaha and Big Sheep Creek).

This project compliments other restoration efforts in the Imnaha Subbasin. Livestock management, riparian planting, erosion control, habitat complexity improvement and weed control are all efforts ongoing in the area that this project will compliment.

### **Specific Actions**

**Coordination:** The GRMW will coordinate all aspects of this project including the following items:

- Landowner and agency involvement.
- Funding acquisition and contracting.
- Engineering contractor direction and coordination of project objectives.

**Environmental Compliance:** All environmental compliance documentation will be completed by July 2011. Deliverables include:

- Complete ESA Section 7 Consultation with US Fish & Wildlife Service and National Marine Fisheries Service.
- Removal/fill permits from Army Corps' of Engineers and Oregon Department of State Lands.
- Cultural resources clearance with Oregon State Historic Preservation Office.

**Contracting:** The GRMW will be responsible for all funding and construction contracting. Construction will start in the late summer of 2011 and in water work activities will be done during the 2011 work window. The in water work window is from July 1<sup>st</sup> to October 15<sup>th</sup>. Construction will be complete in the fall of 2011. Contracting actions include:

- Contract with BPA to fund project construction.
- Advertise for, bid and award to construct project.

Monitoring: A project completion report and three monitoring reports will be required for this project. The completion report will be written according to GRMW/BPA standard reporting guidelines and the monitoring reports will assess project objectives for five years following project completion.

Construction: To implement the necessary improvements at the project location, work isolation barriers will be installed (if necessary) and fish salvage will occur. Following construction, restoration activities, including seeding, planting and fencing will minimize construction impacts and promote improved riparian conditions. All work will occur within the ODFW preferred in-water work period. Project components include:

- Install work area isolation barriers around the work area and perform fish salvage.
- Reshape riverbanks, install toe-of-slope stabilization, install coir matting and brush layers, and replant riverbanks.
- Install woody debris structures.
- Install wood habitat structure.
- Install engineered logjam.
- Remove work area isolation barriers.
- Reseed disturbed upland areas.
- Fence project area and preclude from cattle use for a minimum of 10 years.

Work Area Isolation and Fish Salvage:

Some of the proposed work will take place below the ordinary high water elevation (OWHE); however, it is expected that the work area will not contain active flows during the construction period. If water is present in the work area during the construction period, measures will be implemented to prevent working in active flows. A water control barrier will be installed at the upstream end of the project area in order to guide water into the main channel of the river and away from the work area, and a net will be installed at the downstream end of the project area to prevent fish from entering the work area. The water control barrier will be constructed out of sandbags, ecology blocks, plastic sheeting or other appropriate materials. A total of approximately 40 cubic yards (CY) of temporary fill will be required for the water control barrier.

Once the work area is isolated, any remaining fish in isolated pools will be removed by seining and electrofishing, if necessary. Electrofishing will be completed according to both the NMFS and ODFW electrofishing guidelines by an ODFW or other qualified biologist. All fish handled will be recorded. Captured fish will be placed in aerated buckets, examined, identified, and released downstream of the project area in similar habitat from which they were obtained or pools located downstream of the project area. Any fish injuries observed will result in a modification of the electrofishing settings. If electrofishing is utilized, fish capture will be conducted when stream temperatures are at or below 15 C (59 F), to the extent practical. Electrofishing will be conducted early in the day to minimize stress

to Salmonids. Care will be taken to avoid putting predators into the same bucket as prey species. The amount of time fish spend in the buckets will be minimized to reduce impacts. Any listed fish will be noted and, if mortality occurs to a listed fish species, it will be collected according to NMFS requirements.

#### Bank Stabilization:

One section of bank (340 linear feet) will be stabilized. The bank will be reshaped to a 2:1 slope. Footer logs (24-inch diameter) will be installed at the toe of slope and stabilized with 36-inch diameter ballast rock. Brush layers with wrapped coir matting will be installed above the ballast rock in order to stabilize the slope and revegetate the bank. Above the OHWE, coir matting will be used to wrap the reshaped bank with a minimum of 6 inches of topsoil placed on top of the bank to anchor the coir matting. Seed will be placed under the coir matting, and live stakes will be planted on 5-foot centers.

Construction will require permanent removal of approximately 480 CY of bank material below the OHWE to reshape the bank and temporarily removal of approximately 220 CY of material below the OHWE to install the coir matting and brush layers. Installing the toe protection (footer logs and ballast rock) will require permanent removal of 130 CY of streambank material and placement of 130 CY of permanent fill (wood and rock) below the OHWE.

#### Woody Debris Structures Installation:

Three woody debris structures will be used to help protect the stabilized streambank and enhance aquatic habitat. Each structure will be constructed of three 30-foot long, 18-inch diameter logs with attached root wads. A minimum of 50 percent of the length of the logs will be buried in the bank with the ends of the logs resting on 36-inch diameter footer rock, anchored to it as needed, and stabilized with 36-inch diameter ballast rock placed above the logs. The logs will be pinned together with 1-inch diameter rebar. It is anticipated that installation of each woody debris structure will require approximately 20 CY of permanent fill below the OHWE and 127 CY of removal below the OHWE. Of the streambank material removed, 20 CY will be permanent removal to accommodate the logs and ballast rocks, and the remaining volume (106 CY) will be temporary removal as it will be stockpiled on site and used as needed to backfill around the logs. Excess material not used as backfill will be disposed of at an upland location.

The total impact for installation of all three woody debris structures will be 60 CY of permanent fill below the OHWE, 60 CY of permanent removal below the OHWE, and 320 CY of temporary removal below the OHWE.

#### Wood Habitat Structure Installation:

One wood habitat structure will be installed in order to provide in-water structure and enhance fish habitat. This structure will consist of seven 30-foot long, 18-inch diameter logs with attached root wads, arranged in four layers. The structure will rest on 48-inch diameter footer rocks and will be anchored with 36-inch to 48-inch ballast rocks. The logs will be pinned together with 1-inch diameter rebar. A minimum of 50 percent of the length of the logs will be buried in the bank. It is anticipated that installation of the wood habitat structure will require approximately

70 CY of permanent fill below the OHWE and 320 CY of removal below the OHWE. Of the material removed, 70 CY will be permanent removal to accommodate the logs and ballast rocks, and the remaining volume (250 CY) will be temporary removal as it will be stockpiled on site and used as needed to backfill around the logs. Excess material not used as backfill will be disposed of at an upland location.

Engineered Log Jam Installation:

One wood habitat structure will be installed in order to provide in-water structure and enhance fish habitat. This structure will consist of thirty-four 30-foot long, 18-inch diameter logs with attached root wads, arranged in 7 layers. The structure will be anchored with 36 to 48-inch ballast rocks and the logs will be pinned together with 1-inch diameter rebar. It is anticipated that installation of the engineered logjam will require approximately 180 CY (110 CY below the OHWE) and 770 CY of removal (400 CY below the OHWE). Of the material removed, 180 CY (110 CY below the OHWE) will be permanent removal to accommodate the logs and ballast rocks, and the remaining volume (590 CY above the OHWE, 290 below the OHWE) will be temporary removal, as it will be stockpiled on site and used as needed to backfill around the logs. Excess material not used as backfill will be disposed of at an upland location.

Riparian Fencing and Livestock Exclusion:

The entire project footprint will be fenced and excluded from livestock use for a minimum of 10 years. Fence construction will be wildlife friendly as per ODFW fence specification. Fence location is being negotiated at this time and a minimum 80-foot buffer will be fenced.

As part of the UF Fish and Wildlife Service Partners for Conservation Program an agreement for non-use will be executed. This agreement will specify for a period of 10 years that no livestock utilization is to occur in the fenced project area. This agreement is attached to the property and any subsequent landowner or manager is obliged to honor this 10-year period.

Construction Access and Site Restoration:

Site access and staging will take place on the west bank of the Imnaha River. Construction activities will be done entirely from upland areas without entering the channel if possible. However, it may be necessary for equipment to enter the channel in order to construct the engineered logjam. Upon completion of the in-stream work, the water control barrier and block net will be removed and disturbed areas will be reseeded with native riparian species.

Benefits

Reduced erosion: Bank stabilizing activities are expected to eliminate eroding banks in the project area. This will reduce sedimentation and improve water quality in the Imnaha River. Bank stabilizing will eliminate the widening of the Imnaha River channel. This will preserve or improve existing width to depth ratios.

Improved aquatic habitat conditions: Habitat conditions will be improved through the installation of the woody debris structure, woody habitat structure and the

engineered logjam. These structures will provide habitat complexity, hiding cover and resting habitat during periods of high flow condition in the project reach.

**Restored Riparian Community:** An aggressive native species planting plan combined with fencing and livestock exclusion will act to restore the riparian area in the project reach. Results will not be immediate but the 10-year period of non-use will promote a recovery of the riparian community.

### **Project Maintenance**

The Marr Family Trust will be responsible for fence maintenance, weed control, and trespass cattle at all times and as needed. Weed control will efforts will be coordinated and in accordance with existing Wallowa County weed control activities in the Imnaha Subbasin. The GRMW, through monitoring and evaluation of the project, will access and coordinate structural fixes if and as needed.

### **Permits**

Permit Name	Applicable	Complete	Description & Time of Completion
ESA Section 7 – USFWS	Yes	No	The Oregon Partners for Fish and Wildlife Programmatic (Partners). Will be complete in July of 2011.
ESA Section 7 – NMFS	Yes	No	Covered by the Partners program. Will be complete in July of 2011.
COE/DSL Permit	Yes	No	Removal Fill permits to be complete in July of 2011.
Cultural Resources Sec. 106	Yes	No	Cultural resources clearance to be complete in July of 2011.

### **Monitoring Plan**

A final completion report following GRMW/BPA guidelines will be submitted within 60 days of project completion. Following the completion report 3 monitoring reports will be submitted at years 1, 3 and 5 following project completion.

Monitoring will access project objectives for five years following project implementation. Reduced erosion and sedimentation and improved aquatic habitat and riparian condition will be assessed in the following ways:

- Bank stabilizing and erosion reducing tactics employed in this project will be photo monitored annually. A photo point will be established at each structure to document stability and effectiveness. In addition to photos steel bank pins will be established to measure erosion.
- Aquatic habitat improvement tactics will be documented through photo points. All structures will be documented annually to see if they are still in place, if they are providing the intended habitat benefits and how they may be maturing over time.
- Riparian vegetation improvement will be documented with photos, survival counts and species diversity assessment.
- The project area will be inspected annually for evidence of trespass cattle and weed control.

**Work Dates**

Construction work will be between August 1<sup>st</sup> and October 15<sup>th</sup>, 2011 corresponding with the ODFW in-water work window. Fencing and planting can occur out of this time frame, as this is not in-water work. Planting will likely occur in November corresponding with plant dormancy and prior to the ground freezing. Fencing can be done at any time from project start to finish. This project will be complete by November 30, 2011. We are requesting a BPA contract term of July 1, 2011 to January 31, 2012.





## **Project Budget**

Description	Unit	Quantity	Material Unit Price	Labor Unit Price	Landowner Contribution	GRMW Admin Contract Contribution	BPA/Biop Contribution	Total Price
Mobilization	Lump Sum	All Req'd		5,600			5,600	5,600
Clearing & Grubbing	Hourly Rate	10		3,000			3,000	3,000
Bank Stabilization	Linear Foot	250	11,000	14,000			25,000	25,000
Woody Debris Structure	Each	3	5,400	7,800			13,200	13,200
Wood Habitat Structure	Each	1	3,600	5,100			8,700	8,700
Engineered Log Jam	Each	1	22,000	18,000			40,000	40,000
Water Break	Each	2	400	2,400			2,800	2,800
Seeding of Disturbed Areas	Lump Sum	All Req'd	500	1,000			1,500	1,500
Planting	Lump Sum	All Req'd	200	3,000			3,200	3,200
Water Control	Lump Sum	All Req'd	2,000	8,000			10,000	10,000
Fencing	Linear Foot	3000	3000	3000	6,000			6,000
Engineering Inspection	Lump Sum	All Req'd		4,000		4,000		4,000
Agency Administration	Lump Sum	All Req'd		4,000		4,000		4,000
			48,100	78,900	6,000	8,000	113,000	127,000

### **Attachments**

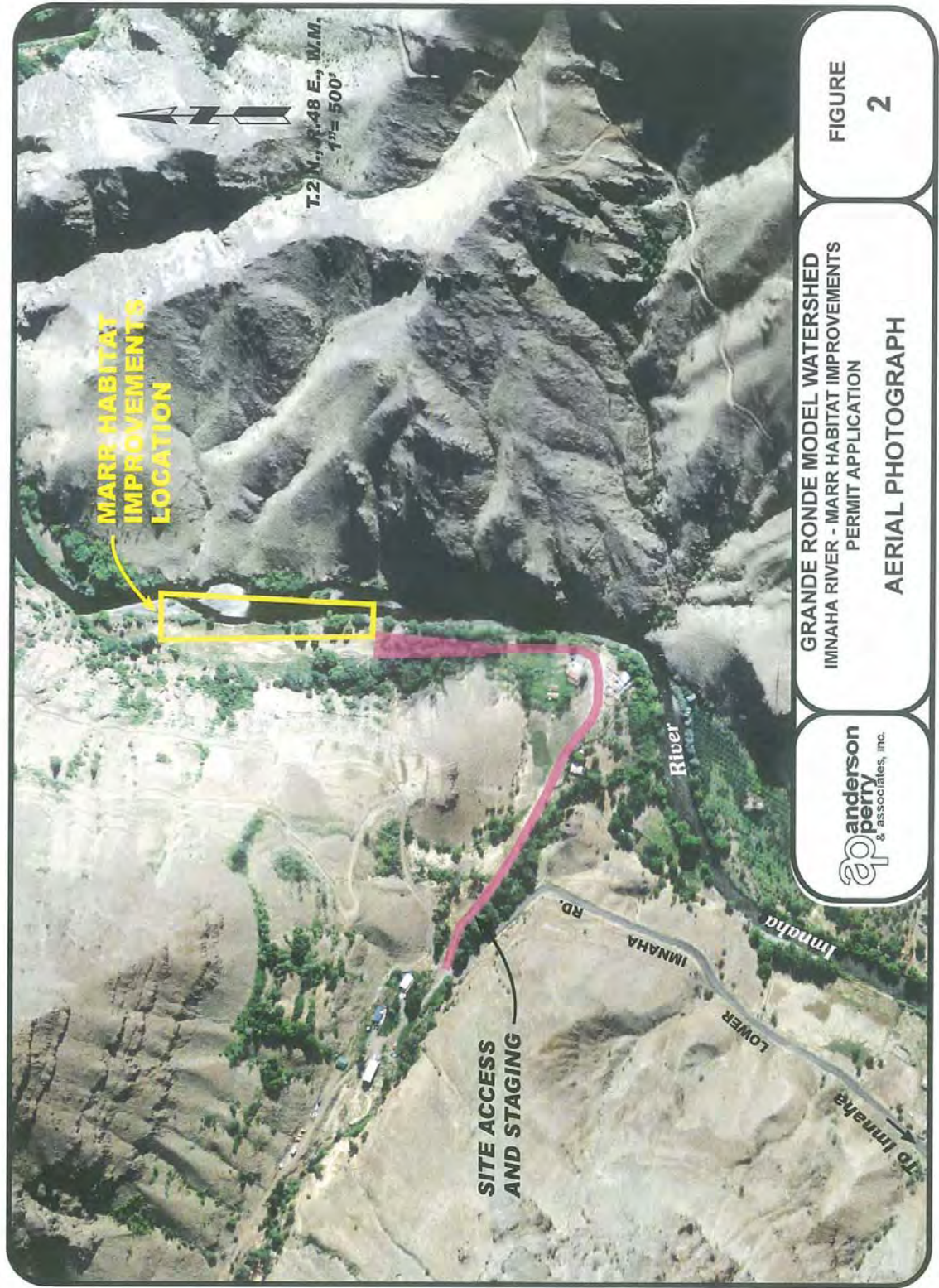
1. Maps
2. Designs
3. Photos

# Maps

Job# 81-34-222 Feb. 22, 2011 lbauer



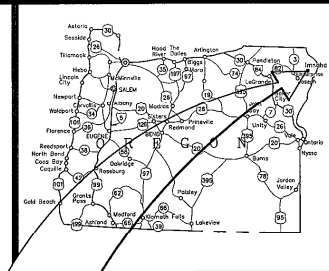




## Designs

# GRANDE RONDE MODEL WATERSHED

## IMNAHA RIVER MARR HABITAT IMPROVEMENTS - 2011 WALLOWA COUNTY, OREGON

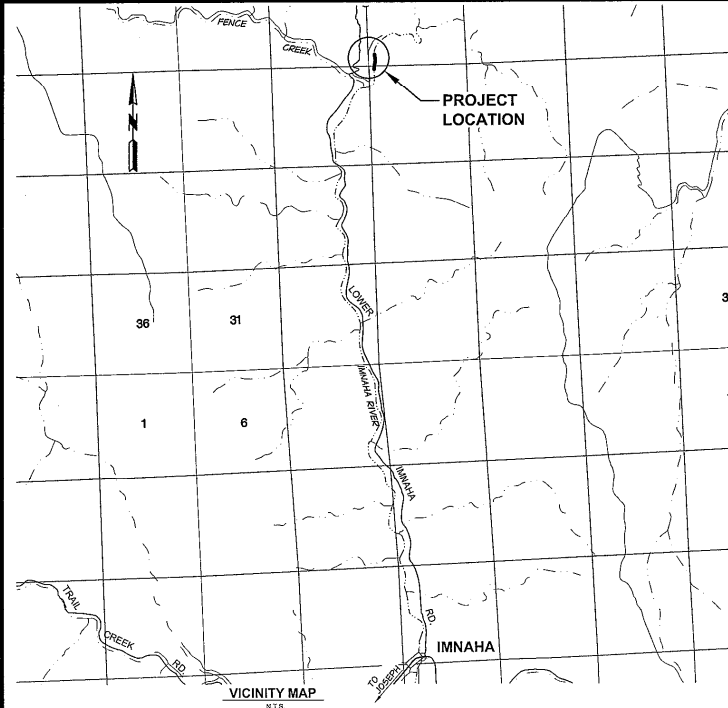


### INDEX

- 1 COVER
- 1 EXISTING SITE PLAN AND LEGEND
- 2 SITE PLAN IMPROVEMENTS
- 3 WOOD DEBRIS AND PLANTING DETAILS
- 4 WOOD HABITAT STRUCTURE DETAILS
- 5 ENGINEERED LOG JAM 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

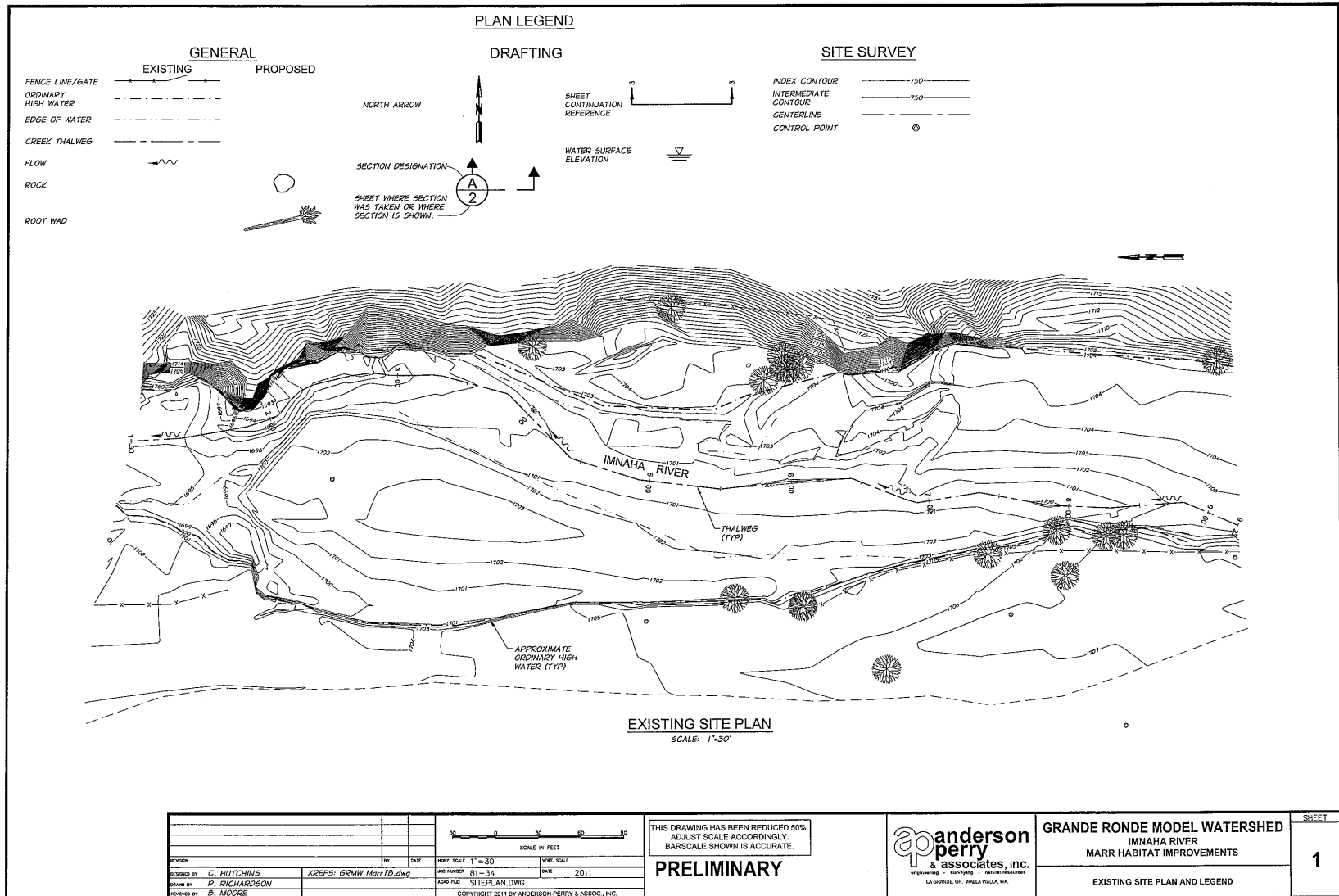
**EXECUTIVE DIRECTOR**  
JEFF OVESON

**BOARD OF DIRECTORS**  
MIKE HAYWARD - Chair  
STEVE McCURE - Vice Chair  
ALLEN CHILDS  
NORM CIMON  
BRUCE EDDY  
DARYL HAWES  
JOE McCORMACK  
PAT WORTMAN  
LARRY CRIBBS  
ANNA CAVINATO  
TED TAYLOR  
DAVE YOST

**PRELIMINARY**

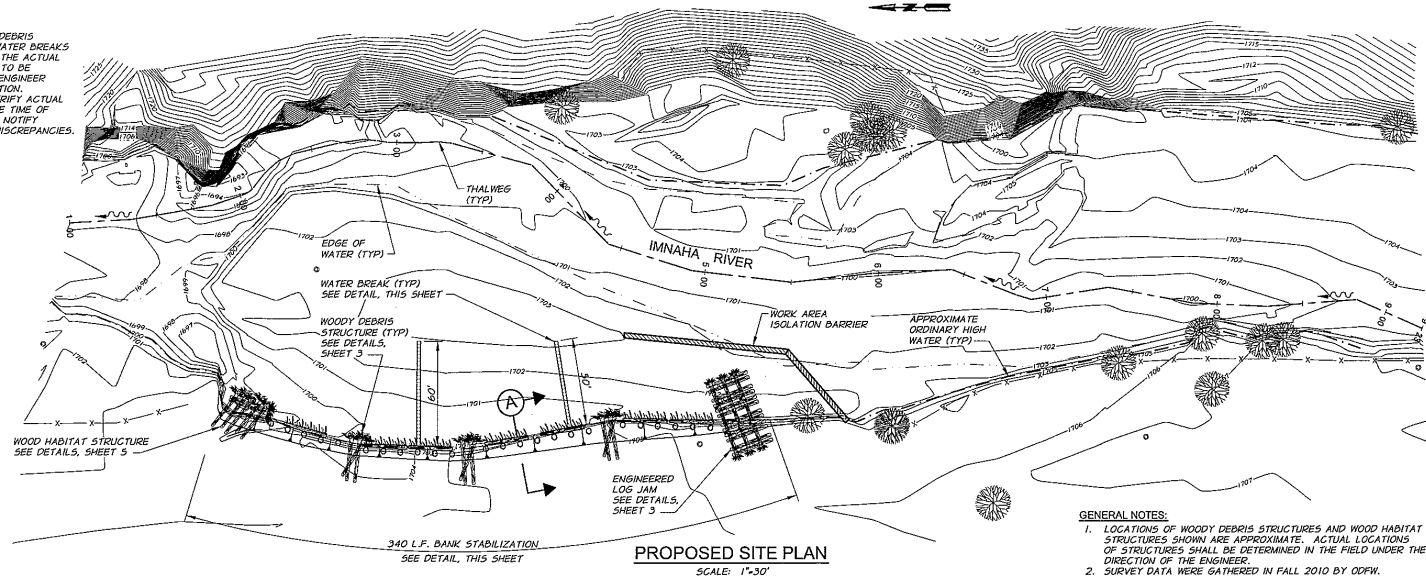
**ap anderson  
perry  
& associates, inc.**  
engineering • planning • construction  
14000 E. 10th Ave., Wallowa, OR 97147

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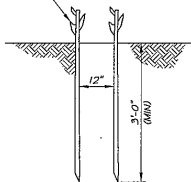
- NOTES:**
1. LOCATIONS WOODY DEBRIS STRUCTURES AND WATER BREAKS ARE APPROXIMATE. THE ACTUAL LOCATION OF EACH TO BE APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.
  2. CONTRACTOR TO VERIFY ACTUAL TOPOGRAPHY AT THE TIME OF CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.



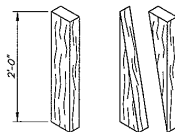
**GENERAL NOTES:**

1. LOCATIONS OF WOODY DEBRIS STRUCTURES AND WOOD HABITAT STRUCTURES SHOWN ARE APPROXIMATE. ACTUAL LOCATIONS OF STRUCTURES SHALL BE DETERMINED IN THE FIELD UNDER THE DIRECTION OF THE ENGINEER.
2. SURVEY DATA WERE GATHERED IN FALL 2010 BY DDW. CONTRACTOR TO VERIFY ACTUAL TOPOGRAPHY AT THE TIME OF CONSTRUCTION AND NOTIFY ENGINEER OF ANY DISCREPANCIES.

WILLOW PLANTINGS. SEE DETAIL, SHEET 3. PLANTS SHALL BE SPACED AT 12" O.C. THROUGHOUT LENGTH OF WATER BREAK.

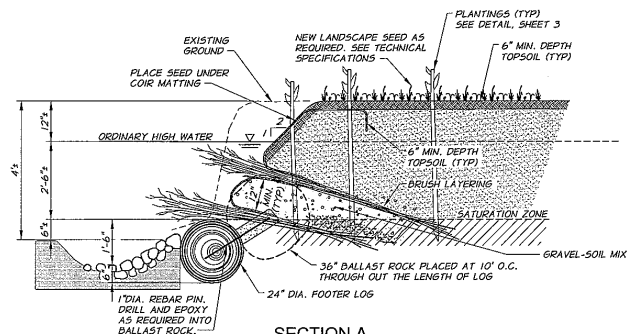


**WATER BREAK DETAIL**  
N.T.S.



NOTE: SAW A 2"x4" DIAGONALLY TO PRODUCE 2 STAKES.

**TYPICAL STAKE DETAIL**  
N.T.S.



**SECTION A  
BANK STABILIZATION**  
N.T.S.

DESIGNED BY	C. HUTCHINS	DATE	APRIL SCALE 1"=30'	DATE	2011
BY	P. RICHARDSON	DATE	APRIL SCALE 1"=30'	DATE	2011
REVIEWED BY	B. MOORE	DATE	APRIL SCALE 1"=30'	DATE	2011
PROJECT	GRANDE RONDE MODEL WATERSHED				
PROJECT	IMNAHA RIVER				
PROJECT	MARR HABITAT IMPROVEMENTS				
PROJECT	SITE PLAN IMPROVEMENTS				

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ADJUST SCALE ACCORDINGLY.  
BARS SCALE SHOWN IS ACCURATE.

**PRELIMINARY**

**anderson  
perry  
& associates, inc.**  
14 GRANITE, OK, 74106-1111, OKLA

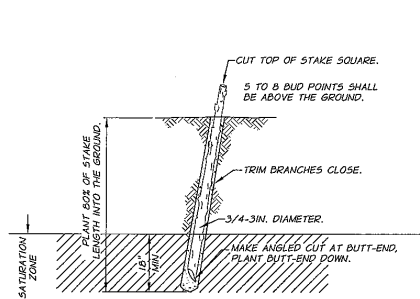
**GRANDE RONDE MODEL WATERSHED**  
IMNAHA RIVER  
MARR HABITAT IMPROVEMENTS

**SITE PLAN IMPROVEMENTS**

SHEET  
**2**



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**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 PILOT BAR IN FIRM SOILS.
4. CUTTINGS HARVESTED FRESH AT THE TIME OF INSTALLATION SHALL BE SOAKED FOR A MINIMUM OF 24 HOURS PRIOR TO INSTALLATION. CUTTINGS HARVESTED AND STORED SHALL BE SOAKED FOR A MINIMUM OF 10 DAYS PRIOR TO PLANTING.
5. TAMP THE SOIL AROUND THE STAKE.
6. EXTEND STAKES IN TO WATER SATURATION ZONE.
7. SEE APPROVED SPECIES, THIS SHEET.

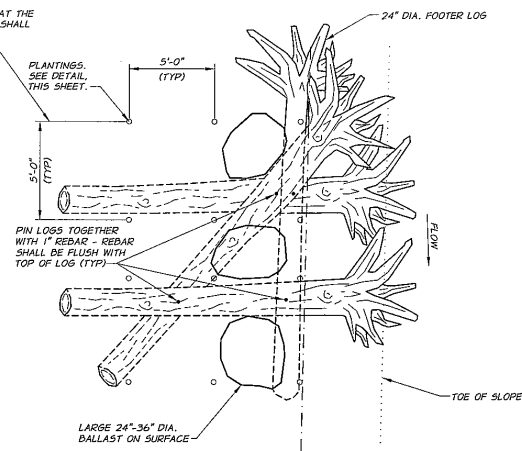
**TYPICAL PLANTING DETAIL**

N.T.S.

**APPROVED BRUSH SPECIES**

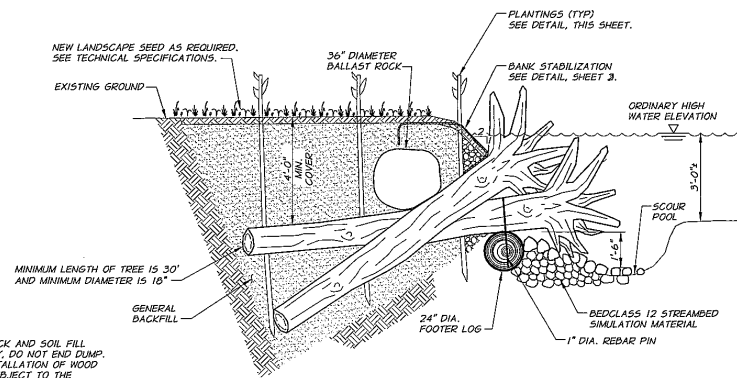
- BELOW ORDINARY HIGH WATER:
- SALIX EXIGUA (COYOTE WILLOW)
  - SALIX LASIOLEPSIS (ARROYO WILLOW)
  - CORNUS SERICEA (REDOSIER DOGWOOD)

FIRST ROW OF PLANTINGS SHALL BE PLACED AT THE ORDINARY HIGH WATER ELEVATION. ENGINEER SHALL APPROVE LOCATION PRIOR TO PLANTING.



**WOODY DEBRIS PLAN**

N.T.S.



**WOODY DEBRIS SECTION**

N.T.S.

**NOTES:**

1. PLACE ROCK AND SOIL FILL CAREFULLY, DO NOT END DUMP.
2. FINAL INSTALLATION OF WOOD DEBRIS SUBJECT TO THE APPROVAL OF ENGINEER.

DESIGNED BY	C. HUTCHINS	BY	DATE	NO. SCALE	NO. SCALE
DRAWN BY	P. RICHARDSON	DATE	2011	NO. SCALE	NO. SCALE
CHECKED BY	D. MOORE	DATE		NO. SCALE	NO. SCALE
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XREFS: VaneDet1.dwg					
COPYRIGHT 2011 BY ANDERSON-PERRY & ASSOC., INC.					

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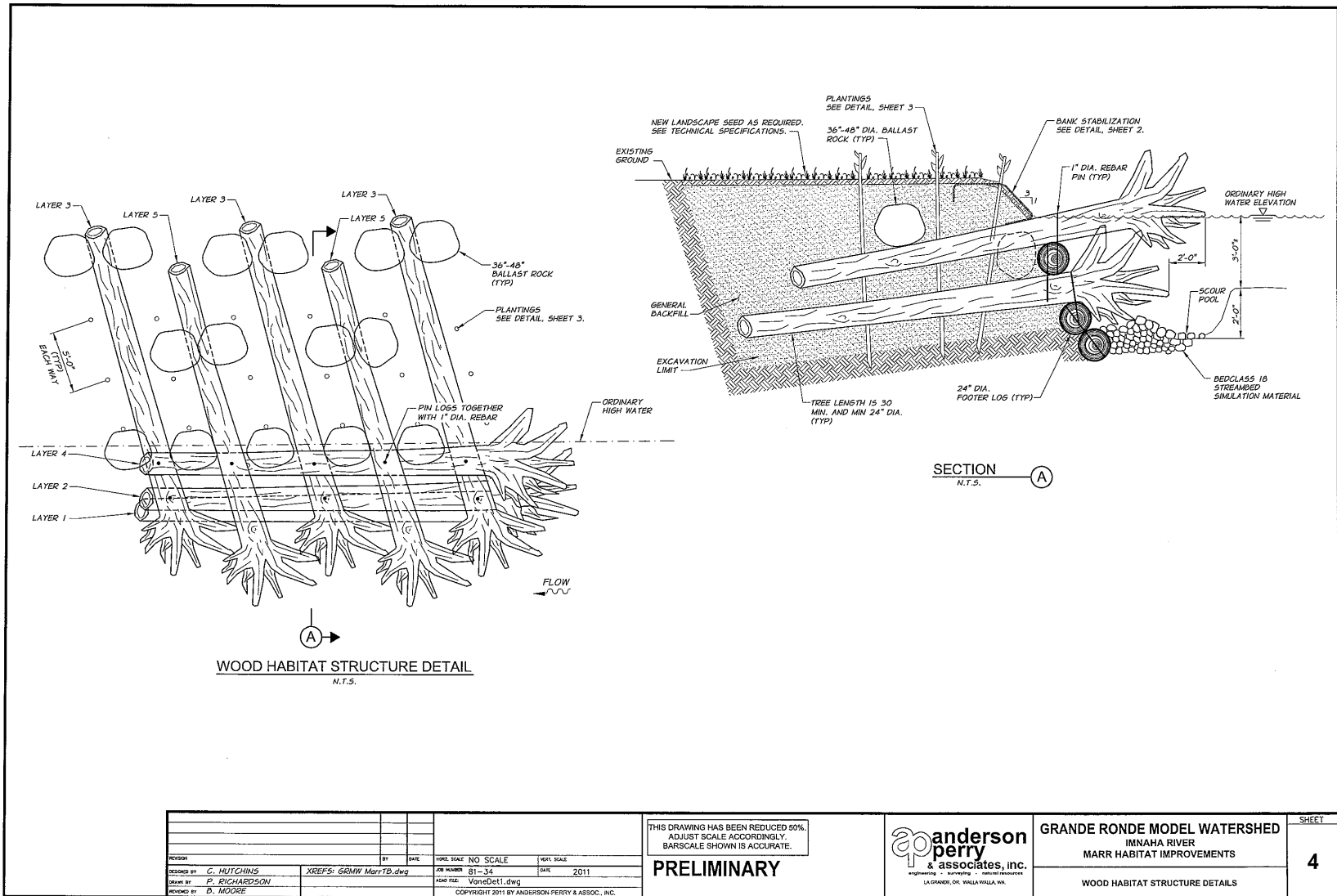
**PRELIMINARY**

**anderson  
perry**  
& associates, inc.  
engineering • architecture • interior design  
LA GRANDE, OR WALLA WALLA, WA

**GRANDE RONDE MODEL WATERSHED**  
IMNAHA RIVER  
MARR HABITAT IMPROVEMENTS  
WOOD DEBRIS AND PLANTING DETAILS

SHEET  
**3**

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DESIGNED BY	G. HUTCHINS	DATE	NO SCALE	DATE	NO SCALE
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CHECKED BY	D. MOORE	DATE	VanDet1.dwg	DATE	
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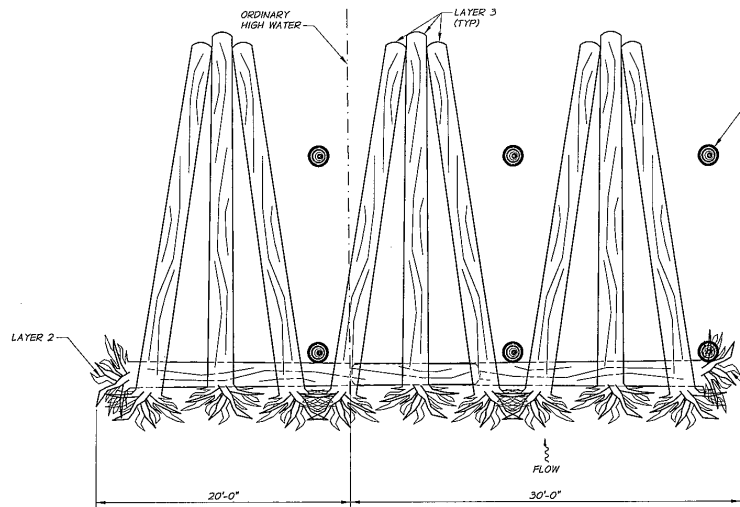
**PRELIMINARY**

**anderson perry & associates, inc.**  
engineering • architecture • landscape architecture  
LA GRANGE, OK. WILLOU, WY.

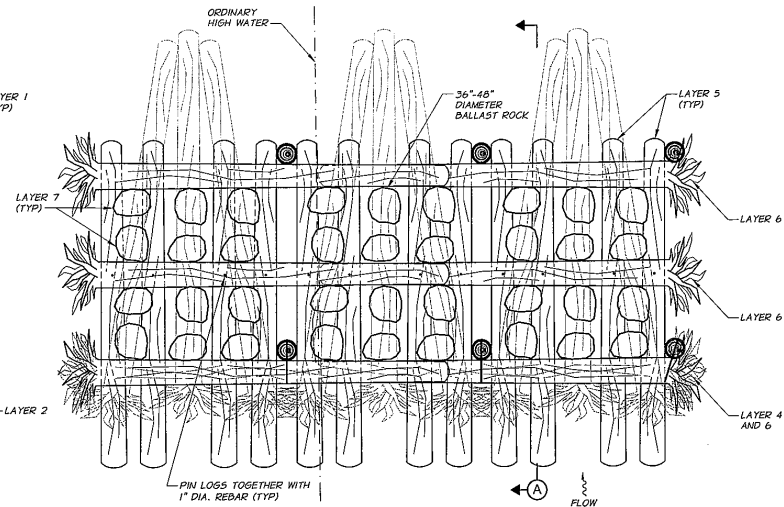
**GRANDE RONDE MODEL WATERSHED**  
IMNAHA RIVER  
MARR HABITAT IMPROVEMENTS  
WOOD HABITAT STRUCTURE DETAILS

SHEET  
**4**

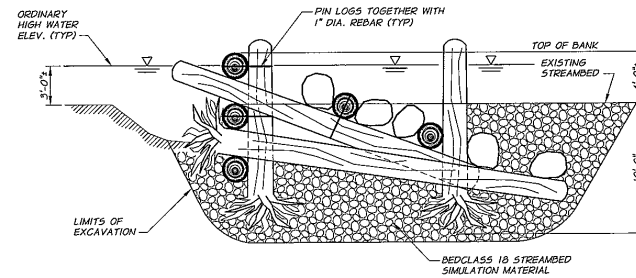
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**ENGINEERED LOG JAM PLAN**  
FIRST LEVEL  
N.T.S.



**ENGINEERED LOG JAM PLAN**  
SECOND LEVEL  
N.T.S.



**SECTION A**  
N.T.S.

DESIGN	BY	DATE	APP. SCALE	NO. SCALE	DATE
DESIGNED BY: G. HUTCHINS			AS SHOWN	81-34	2011
DRAWN BY: P. RICHARDSON			AS SHOWN	81-34	2011
CHECKED BY: D. MOORE			AS SHOWN	81-34	2011
XREFS: GRMW MarrTB.dwg					
4200 P.D. Vordet1.dwg					
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THIS DRAWING HAS BEEN REDUCED 50%.  
ADJUST SCALE ACCORDINGLY.  
BARSCALE SHOWN IS ACCURATE.

**PRELIMINARY**

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& associates, inc.  
engineering • planning • construction  
LA GRANGE, OH • WILMINGTON, VA

**GRANDE RONDE MODEL WATERSHED**  
IMNAHA RIVER  
MARR HABITAT IMPROVEMENTS

ENGINEERED LOG JAM DETAILS

SHEET  
**5**

## Photos



**Photo 1: Standing on upstream end of project. Gravel bar in center of photo was meadow prior to bank erosion. During high flow the side channel carries enough water to erode the riverbank on left side of photo. Imnaha River main channel on right side of photo.**



**Photo 2: Upstream end of project and location of proposed engineered logjam.**





**Photo 3: Downstream end of project and location of proposed wood habitat structure.**



**Photo 4: Looking upstream at eroding riverbank. Habitat will be improved by installing woody debris structures, toe logs, planting riparian vegetation and bank shaping.**

