FUTURE FISHERIES IMPROVEMENT PROGRAM GRANT APPLICATION

All sections must be addressed, or the application will be considered invalid

I. APPLICANT INFORMATION

A. Applicant Name: Liberty County Conservation District – Lanny Jones, Chair

Mailing Address: PO Box 669

City: Chester State: MT Zip: 59522

Telephone: _____ E-mail: _____

B. Contact Person (if different than applicant): Diane Roberts

Address: PO Box 669

City: Chester State: MT Zip: 59522

Telephone: 1-406-759-5128 x102 E-mail: libertycountycd@gmail.com

C. Landowner and/or Lessee Name (if different than applicant): David Pugsley

Mailing Address: PO Box 460

City: Chester State: MT Zip: 59522

Telephone: 1-406-456-3363 E-mail: davidtpugsley4@gmail.com

II. PROJECT INFORMATION

A. Project Name: Pugsley Bridge Fishery and Riparian Enhancement

River, stream, or lake: Marias River

Location: Township: 29N Range: 5E Section: 11

Latitude: 48.29125 Longitude: -111.04440 *Within project (decimal degrees)*

County: Liberty County

B. Purpose of Project: *(high level, focus on why the project is important)*

Spring flow pulses downstream of Tiber Dam are necessary to provide attraction flows and connectivity to spawning habitat for pallid sturgeon, a native fish and federally endangered species. To be able to execute this increase in streamflow in the Marias River, an area of accelerated erosion must be addressed. This project is focused on reducing erosion on the river left bank of the Marias River downstream of Pugsley Bridge to prevent lateral stream bank migration and facilitate flushing flows while also protecting the bridge and road system. Additionally, fish habitat structures will be incorporated into the design to maximize habitat for all species present.

C. Brief Project Description (attach additional information to end of application). Please include the anticipated construction schedule:

To meet the goals of habitat conditions that can provide flushing flows and enhance fish habitat, this project will stabilize and enhance the river left (north) bank immediately downstream of Pugsley Bridge. The project area is located on the Marias River downstream of Tiber Reservoir (Appendix 1) on an outside bend of the river that has been subject to erosion and accelerated down-valley meander bend migration. Earlier work in the area was completed circa 2014 and consisted of riprapping approximately 330 linear feet of streambank downstream of Pugsley Bridge. Since 2014, river bend erosion and migration has accelerated downstream into the current project area. The landowner, Liberty County Conservation District, and Montana Fish, Wildlife & Parks have worked with SWCA (formerly River Design Group, or RDG) to develop a preliminary restoration design to stabilize and enhance the eroding bank using strategies and techniques that will improve aquatic habitat conditions for trout and native species including pallid sturgeon, as well as protecting Pugsley Road. SWCA presented 3 alternatives to a group of stakeholders and Alternative 2 (presented in this application) was selected to pursue a final design and construction.

This alternative was chosen because it effectively treats the eroding terrace by providing bank enhancement and stabilization measures through the entire outside bank line, while also allowing natural recovery at the tail end of the meander bend. This is an approach that is both effective and lower cost. A vegetated wood matrix will span the entire project and two large wood structures will be installed at the apex of the meander and in the lower 25-feet of treated bankline. The proposed low terrace bench would encroach into the river by approximately 15-feet from the existing vertical bank line, smoothing out the current tortuous meander. The upper terrace scarp would be daylighted at a 2(h):1(v) slope. Preliminary design plans with more details are shown at the end of this application.

If funding is available, construction will start and finish in summer/fall of 2025. All other funding sources are secured.

D. What was the cause of habitat degradation and how will the project correct the cause?

A previous bank stabilization project completed circa 2014 utilized rip rap and root wads and the downstream extent of the project was in the middle of a tortuous outside bend. The termination of the project at this point has accelerated the water velocity resulting in significant erosion and a high bank for the remainder of the bend. This erosion threatens a county road. This project will smooth out the tortuous bend, slope the high bank, and provide a more natural woody matrix armoring of the stream bank that continues through the remainder of the outside bend. The proposed treatments will move the system toward achieving natural stream and riparian function while also providing valuable fish habitat. Addressing the erosion with a method that focuses on natural stream function is expected to achieve a long-term, sustainable solution that will allow for flushing flows.

E. Length of stream or size of lake that will be treated (project extent): 352 feet

Length/size of impact, if larger than project extent (e.g., stream miles opened): 352 feet

F. Project Budget Summary:

Grant Request (Dollars):	**$ 59,025**
Matching Dollars:	**$ 118,843**
Matching In-Kind Services:*	$

**salaries of government employees are not considered matching contributions*

Other Contributions (not used as match)	$
Total Project Cost:	**$ 177,868**

G. Attach itemized (line item) budget – *see budget template*

H. Attach project location map(s) that include:

- [X] Extent of the project, including context (relation to major landmark or town)
- [X] Indication of public and private property
- [ ] Riparian buffer locations and widths (if applicable) and grazing locations

I. Attach project plans:

- [X] Detailed sketches or plan views with the location and proposed restoration
- [X] Pre-project photographs (GPS location strongly recommended)
- [ ] If water leasing or water salvage is involved, attach a supplemental questionnaire (https://myfwp.mt.gov/getRepositoryFile?objectID=36110)

J. Attach support letters or statements of (e.g., landowner consent, community or public support). For FWP statement, attach provided template. List any other project partners:

David Pugsley (landowner) – letter of support
Luke Holmquist (FWP biologist) – biologist statement

III. MAINTENANCE AND MONITORING (attach additional information to end of application):

A. A 20-year maintenance commitment is required*. Please confirm that you will ensure this protection and describe your approach. Attach any relevant maintenance plans. **If it is a water leasing project, describe the length of the agreement.*

Yes	No
[X]	[ ]

This project is intended to improve the Marias River and return it to natural function, which should not require maintenance. There are no project components that will require active maintenance. The consultant (SWCA) is very experienced in successful bank construction techniques and revegetation. However, should a problem with the project arise, project partners will come together to find a solution and maintain the integrity of the project.

B. Will grazing be part of or adjacent to the project? If so, describe or attach land management plans, including short term and long term grazing regimes. If the landowner is not the applicant, please describe their involvement in the project. *If you want assistance with grazing plan development, note your need.*

No. A fence on the bank keeps livestock out of the project area. The landowner is supportive of the project (see attached letter of support) and will maintain the fence to keep the riparian area protected.

C. Will the project be monitored to determine if goals were met? If so, what are the short-term and long-term plans to assess benefits and lessons learned? Were pre-project data collected? Will monitoring information be shared with FWP?

The LCCD, FWP staff, and the landowner have been monitoring the erosive streambank over time but have not taken Bank Erosion Hazard Index (BEHI) measurements. The FWP biologist has been tracking fish abundance and movement in the Marias River, as this is a priority area for pallid sturgeon recovery. Post-project monitoring will include long term photo points of the project area as well as data collection for abundance of target fish species. The pre- and post-treatment data will be held by FWP but shared with partners and interested parties.

IV. PROJECT BENEFITS (attach additional information to end of application):

A. What species of fish will benefit from this project?

The focus of this project is to enhance habitat for pallid sturgeon (native, endangered), but will also benefit native species shovelnose sturgeon, blue sucker, bigmouth buffalo, smallmouth buffalo, channel catfish, sauger, sturgeon chub, and mountain whitefish. The project will also benefit nonnative brown trout and rainbow trout.

B. How will the project protect or enhance wild fish habitat?

This project will provide refuge habitat for young brown trout, rainbow trout, and mountain whitefish in terms of the woody matrix, large wood structures, and associated slack water habitat near the bank. This project is 4 miles downstream of Tiber dam and therefore inputs of large woody debris are lacking.

This project will also allow spring pulses to be released from Tiber Dam without bank erosion near Pugsley Road being a negative consequence of the release. These spring pulses serve as important spawning migration cues for many native species including pallid sturgeon, shovelnose sturgeon, blue suckers, bigmouth buffalo, and smallmouth buffalo. Utilizing elevated spring releases that mimic the natural hydrograph at Tiber Dam is currently believed to be the best chance of promoting successful spawning and recruitment for this isolated population of pallid sturgeon. In addition, spawning pulses flush fine sediments from spawning gravels, improving spawning success by brown trout, rainbow trout, and mountain whitefish in the tailwater fishery.

C. What is the expected improvement to fish populations, both short term and long term? How might the project translate to angler success?

The project activities will improve angler opportunities and success for warmwater species and tailwater species, described below.

<u>Warm Water species angler benefits - summary</u>

- Increased recruitment for forage species
- Trophic benefit to gamefish (e.g., walleye, sauger, channel catfish)
- More reliable runs of shovelnose sturgeon for anglers

<u>Warm Water species - detail</u>

Many species of native warm water fish use the Marias River during the spring to spawn. These species are attracted from the Missouri River into the Marias River to spawn when adequate flows are provided. For example, shovelnose sturgeon from the mainstem Missouri River enter the Marias to spawn when May and June flows mimic natural snowmelt patterns. Years without a spring rise see very few shovelnose sturgeon enter the Marias River. Strong year-classes of shovelnose sturgeon can be tied to years with elevated discharge in the Marias River for prolonged periods of time. Radio telemetry data also shows increased use of the Marias River by pallid sturgeon, blue suckers, bigmouth buffalo, and smallmouth buffalo. All of these species are long-lived and have experience limited natural recruitment since the construction of large dams on the Missouri and Marias Rivers. The long-term benefit of this project is that more frequent high

flows during the spring provide a better opportunity for successful recruitment on a more regular basis than is currently observed. The additional habitat available to forage species during this spawning window can also have a short-term trophic benefit to Missouri River gamefish such as walleye, sauger, and channel catfish. A growing number of dedicated anglers have learned to time the shovelnose sturgeon migration to catch sturgeon near the confluence with the Missouri River. These anglers will greatly benefit from the ability to perform spring releases on a more regular basis, thus creating more reliable runs of shovelnose sturgeon. Stabilizing stream banks near important infrastructure provides a major benefit by reducing the ways that those spring rises conflict with the needs of other stakeholders along the Marias River corridor.

Tailwater species angler benefits - summary

- Refuge habitat and clean spawning gravels to support higher densities of trout
- Reductions in fine sediment to support spawning, recruitment, and densities of trout

Detail - Tailwater Species

The brown trout and rainbow trout fishery below Tiber Dam is a trophy trout fishery with very low densities of fish. Refuge habitat and availability of clean spawning gravel are reasons why densities may be low. First, this project creates large woody debris habitat that is not present in this reach and will provide refuge habitat for young trout. Cleaner gravel may contribute to higher age-0 survival and ultimately higher densities of trout. Second, by stabilizing this rapidly eroding bank, the input of fine sediments into the river will be reduced in the reach downstream of this project. Third, by helping to reduce landowner conflicts (erosion threatening infrastructure) related to spring rise releases from the dam, this project helps provide those flows which have a secondary benefit to the trout fishery by flushing fine sediments that have infiltrated the gravel in the previous summer, fall, and winter. Cleaner gravel may contribute to higher hatch success and higher densities of trout.

D. Will the project increase public fishing opportunity for wild fish and, if so, how? Is public fishing allowed onsite? Is it allowed by permission? If not, describe how the public would benefit.

This project is located directly across the river from one of the most popular BLM public stream access sites on the Marias River. As such, the habitat improvements provided by this project should increase fishing opportunity for wild fish by providing better in-stream habitat that is publicly accessible and in close proximity to an access point.

E. Aside from angling, what local or large-scale public benefits will be realized from this project?

This project protects a road that connects to a bridge over the Marias River. The road/bridge is used for many agricultural activities in the area and provides access to a large Block Management Area for many hunters. In addition, the landowner residence is across the river, and without the road/bridge, their trips into the nearby town become much more time and effort consuming.

F. Will the project interfere with water or property rights of adjacent landowners? (explain):

No

G. Will the project result in the development of commercial recreational use on the site (including paid access)? Explain:

No

H. Is this project associated with the reclamation of past mining activity?

No

Each approved project applicant must enter into a written agreement with Montana Fish, Wildlife & Parks specifying terms and duration of the project. The applicant must obtain all applicable permits prior to project construction. A competitive bid process must be followed when using State funds.

V. AUTHORIZING STATEMENT

I (we) hereby declare that the information and all statements to this application are true, complete, and accurate to the best of my (our) knowledge and that the project or activity complies with rules of the Future Fisheries Improvement Program.

Applicant Signature: Date:

Larry Lowe 4-17-25

Submittal: **Applications must be signed and received on or before November 15 and May 15 to be considered for the subsequent funding period**. Late or incomplete applications will be rejected.

Mail to:	FWP Future Fisheries Fish Habitat Bureau PO Box 200701 Helena, MT 59620-0701	Email:	Future Fisheries Coordinator FWPFFIP@mt.gov (electronic submissions must be signed) For files over 10MB, use https://transfer.mt.gov and send to mmcgree@mt.gov

BUDGET TEMPLATE SHEET FOR FUTURE FISHERIES PROGRAM APPLICATIONS

Both tables MUST be completed appropriately or the application will be invalid. Please see the example budget sheet for clarification.

PROJECT COSTS					GRANT REQUEST AND FUNDING			
Work Items (Itemize by Category)	**Number of Units**	**Unit Description***	**Cost/Unit**	**Total Cost**	**FUTURE FISHERIES REQUEST**	**Matching Contributions (Cash or In-Kind)*** **	**Other Contributions (Funds not used as match)**	**Total Funding**
**Units = feet, hours, cubic yards, etc. Do not use lump sum unless necessary.*								
Personnel								
Survey				$ -				$ -
Design	1	ea	$48,843.00	$ 48,843.00		48,843.00		$ 48,843.00
Engineering				$ -				$ -
Permitting				$ -				$ -
Oversight	1	ea	$21,000.00	$ 21,000.00	10,000.00	11,000.00		$ 21,000.00
Maintenance**				$ -				$ -
			Sub-Total	$ 69,843.00	$ 10,000.00	$ 59,843.00	$ -	$ 69,843.00
Travel								
Mileage				$ -				$ -
Per diem				$ -				$ -
			Sub-Total	$ -		$ -	$ -	$ -
Construction Materials								
furninsh wood	1	ea	$15,000.00	$ 15,000.00	5,000.00	10,000.00		$ 15,000.00
8-inch minus alluvium rock	510	CY	$35.00	$ 17,850.00	12,000.00	5,850.00		$ 17,850.00
ballast rock	20	CY	$60.00	$ 1,200.00		1,200.00		$ 1,200.00
willow stakes	3250	ea	$1.50	$ 4,875.00	3,000.00	1,875.00		$ 4,875.00
				$ -				$ -
				$ -				$ -
				$ -				$ -
				$ -				$ -
			Sub-Total	$ 38,925.00	$ 20,000.00	$ 18,925.00	$ -	$ 38,925.00
Equipment, Labor, and Mobilization								
mobilization	1	ea	$11,000.00	$ 11,000.00	11,000.00			$ 11,000.00
demobilization	1	ea	$11,000.00	$ 11,000.00		11,000.00		$ 11,000.00
access and staging	1	ea	$2,000.00	$ 2,000.00	2,000.00			$ 2,000.00
excavate, haul, place backfill	600	CY	$12.00	$ 7,200.00	5,125.00	2,075.00		$ 7,200.00
install large wood structures	2	ea	$5,000.00	$ 10,000.00	5,000.00	5,000.00		$ 10,000.00
install vegetated wood matrix	287	LF	$50.00	$ 14,350.00	5,000.00	9,350.00		$ 14,350.00

(Revised 5/9/2025)

install willow trench	300	LF	$3.00	$ 900.00	900.00			$ 900.00
install floodplain treatment	0.26	acre	$2,500.00	$ 650.00		650.00		$ 650.00
Contingency	7%	project cost	$177,868.00	$ 12,000.00		12,000.00		$ 12,000.00
				$ -				$ -
				$ -				$ -
			Sub-Total	$ 69,100.00	$ 29,025.00	$ 40,075.00	$ -	$ 69,100.00
			OVERALL TOTALS	$ 177,868.00	$ 59,025.00	$ 118,843.00	$ -	$ 177,868.00

OTHER REQUIREMENTS:

**For projects that include a maintenance request, it cannot exceed 10% of the total project cost.

***Match can include in-kind materials or labor. Justification for in-kind labor (e.g. hourly rates used) can be noted below. Do not use government salaries as match.

Additional budget detail:
Design line item includes survey, design and permitting.

APPLICATION MATCHING CONTRIBUTIONS

Total should equal match listed above; do not include requested funds

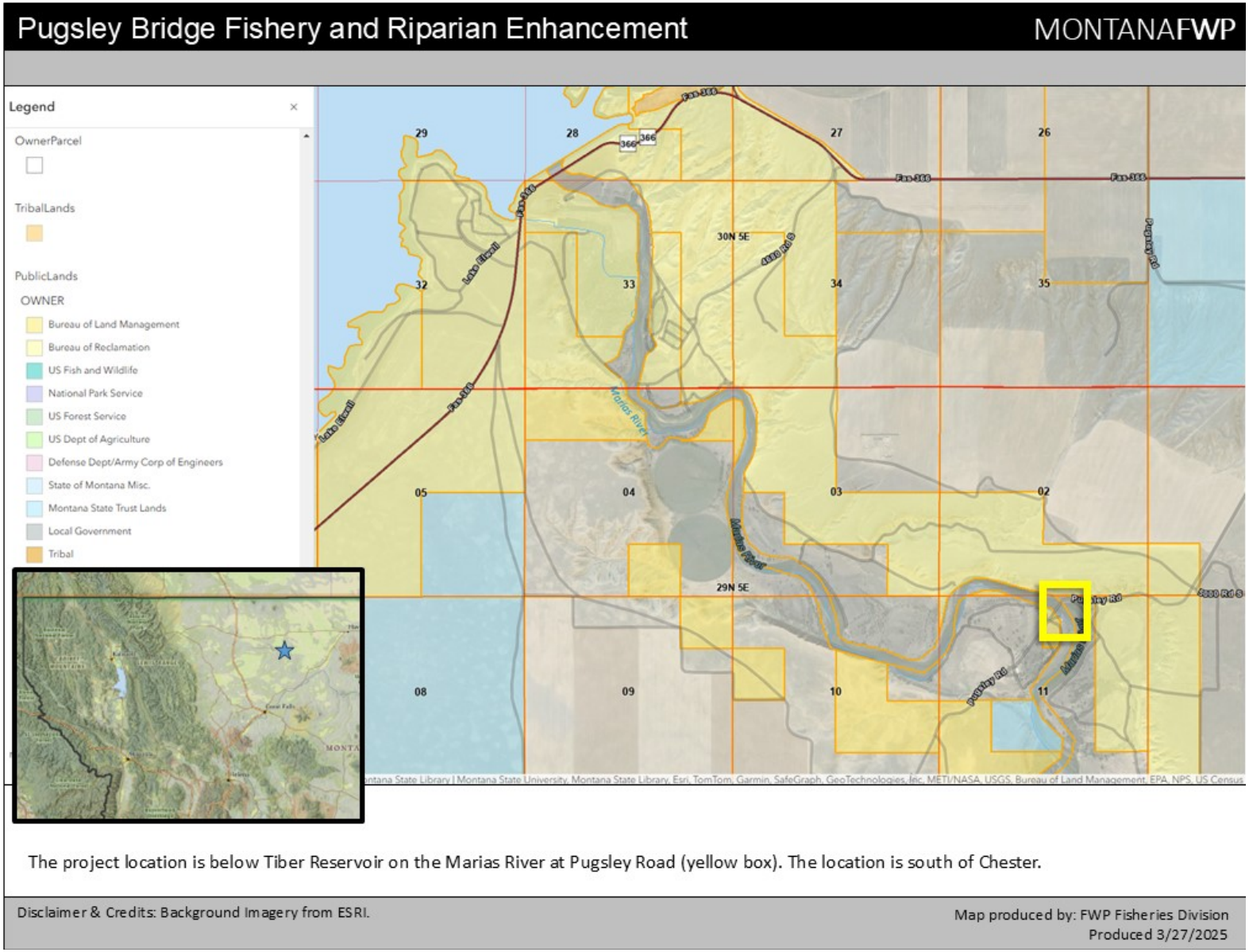
CONTRIBUTOR	IN-KIND	CASH	TOTAL	Secured? (Y/N)
FWP	$ -	$ 48,843.00	$ 48,843.00	Y
Tiber Fish Fund	$ -	$ 50,000.00	$ 50,000.00	Y
Northwestern Energy	$ -	$ 20,000.00	$ 20,000.00	Y
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
TOTALS	$ -	$ 118,843.00	$ 118,843.00	

OTHER CONTRIBUTIONS

Total should equal other contributions listed above; these are funds not specically matched to the Future Fisheries application

CONTRIBUTOR	IN-KIND	CASH	TOTAL	Secured? (Y/N)
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
	$ -	$ -	$ -	
TOTALS	$ -	$ -	$ -	

Appendix 1: Site Map



The project location is below Tiber Reservoir on the Marias River at Pugsley Road (yellow box). The location is south of Chester.

Disclaimer & Credits: Background Imagery from ESRI.

Map produced by: FWP Fisheries Division
Produced 3/27/2025

Appendix 2: Site Photos

Appendix 3: Landowner Support

David Pugsley
Pugsley Ranch Inc.
PO BOX 460
Chester, MT 59522
(406) 456-33693
davidtpugsley4@gmail.com

October 31, 2024

Future Fisheries Improvement Program
FWP Fisheries Division
P.O. Box 200701
Helena, MT 59620

Dear FFIP;

I am writing to declare my support for the Pugsley Bridge Fishery and Riparian Enhancement project on my ranch.

The stream bank has continued to erode since the implementation of an earlier bank stabilization project, completed in 2014. The continued erosion is now threatening the road on the north bank approaching an important bridge. This project will be greatly beneficial for stabilizing the bank and protecting the road, preserving access to our ranch, maintaining public access to a BLM access point on the south side of the river, while also providing important fish habitat.

Thank you for considering this project for funding from the Future Fisheries Improvement Program.

Sincerely,

David Pugsley

David Pugsley
Landowner – Pugsley Ranch Inc.

MONTANA FISH, WILDLIFE & PARKS

Future Fisheries Improvement Program

Appendix: FWP Statement

Project Title: Pugsley Bridge Fishery and Riparian Enhancement

Please describe the potential impact of the project, including the priorities of the Fisheries Division and the importance to Montana's anglers.

Spring flow pulses downstream of Tiber Dam are necessary to provide attraction flows and habitat for pallid sturgeon, a native fish and federally endangered species. To be able to execute this increase in streamflow in the Marias River when upstream water storage is available, an area of accelerated erosion must be addressed. This project is focused on reducing erosion on the river left bank of the Marias River downstream of Pugsley Bridge to prevent lateral stream bank migration and facilitate flushing flows while also protecting the bridge and road system. Additionally, fish habitat structures will be incorporated into the design to maximize habitat for all species present. In addition to benefits to pallid sturgeon, elevated spring flows downstream of Tiber Dam are anticipated to have positive impacts on the tailwater trout fishery immediately downstream as well as warmwater game and non-game species that utilize the lower reaches for spawning in the spring.

The brown trout and rainbow trout fishery below Tiber Dam is a trophy trout fishery with very low densities of fish. Refuge habitat and availability of clean gravel are reasons why densities may be low. First, this project creates large woody debris habitat that is not present in this reach and will provide refuge habitat for young trout. Cleaner gravel may contribute to higher age-0 survival and ultimately higher densities of trout. Second, by stabilizing this rapidly eroding bank, the input of fine sediments into the river will be reduced in the reach immediately downstream of this project. Third, by helping to reduce landowner conflicts (erosion threatening infrastructure) related to spring rise releases from the dam, this project helps provide those flows at a more frequent interval which has a secondary benefit to the trout fishery by flushing fine sediments that have infiltrated the gravel in the previous summer, fall, and winter. Fourth, cleaner gravel will also provide better habitat for aquatic macroinvertebrates that are important forage for tailwater trout.

Further downstream, there are many species of native warm water fish use the Marias River during the spring to spawn. These species are attracted from the Missouri River into the Marias River to spawn when natural flows are provided. Many of these species are long-lived and have experience limited natural recruitment since the construction of large dams on the Missouri and Marias Rivers. The long-term benefit of this project is that more frequent high flows during the spring provide a better opportunity for successful recruitment on a more regular basis than is currently observed. The additional habitat available to forage species during this timeframe can also have a short-term trophic benefit to Missouri River gamefish such as walleye, sauger, smallmouth bass, and channel catfish.

Details related to the importance of these fisheries and habitat enhancement are outlined in Sections 2.25 (Judith River Drainage) and 2.26 (Marias River Drainage) of the Statewide Fisheries Management Plan 2023-2026.

Name of FWP Biologist Luke Holmquist Date: 4/9/2025

Please attach to the FFIP application and materials and submit according to listed deadlines.

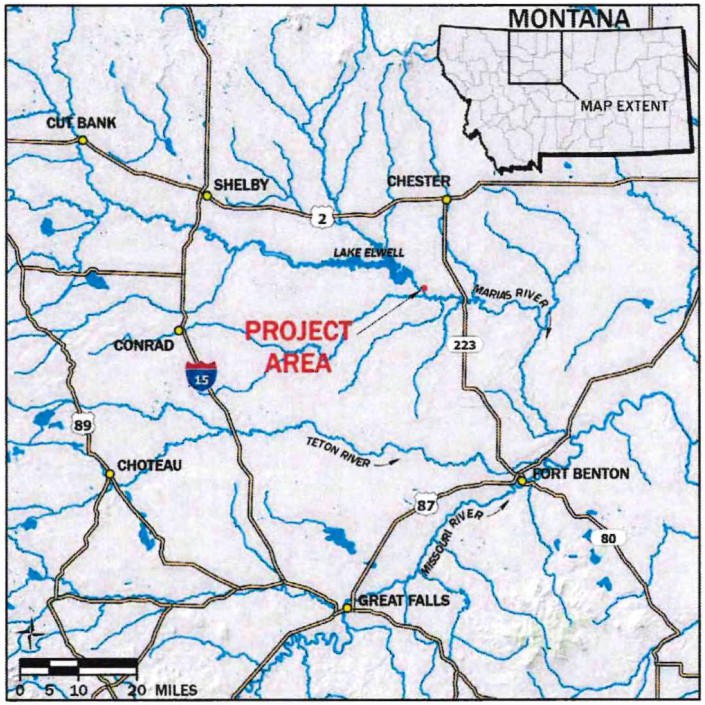
Pugsley Bridge Bank Stabilization Cost Opinion

4/04/2025 NW				ALTERNATIVE 2 ENGINEER'S ESTIMATE	
WORK ITEM	DESCRIPTION	ESTIMATED QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
1	MOBILIZATION, DEMOBILIZATION	1	LS	$22,000	$22,000
2	DEVELOP ACCESS ROADS, AND STAGING AREAS	1	LS	$2,000	$2,000
4	FURNISH WOOD	1	LS	$15,000	$15,000
5	FURNISH 8-INCH MINUS ALLUVIUM	510	CY	$35	$17,850
6	FURNISH BALLAST ROCK	20	CY	$60	$1,200
7	FURNISH WILLOWS	3,250	EA	$1.5	$4,875
8	EXCAVATE, HAUL, AND PLACE BACKFILL	600	CY	$12	$7,200
9	INSTALL LARGE WOOD STRUCTURES	2	EA	$5,000	$10,000
10	INSTALL VEGETATED WOOD MATRIX	287	LF	$50	$14,350
11	INSTALL WILLOW TRENCH	300	LF	$3	$900
12	INSTALL FLOODPLAIN TREATMENT	0.26	LS	$2,500	$650
13	CONSTRUCTION MANAGEMENT, AS-BUILT DRAWINGS & CERTIFICATION	1.0	LS	$21,000	$21,000
				Total Costs:	$117,025
				10.254% Contingency:	$12,000
				TOTAL ALTERNATIVE 2 COST OPINION: ($)	**$129,025**

AC = Acres EA = Each SY = Square Yards Kgal = 1,000 Gallons
CY = Cubic Yards LF = Linear Feet LS = Lump Sum LBS = Pounds

PUGSLEY BRIDGE STABILIZATION PROJECT
FINAL DESIGN PLAN SET

PUGSLEY BRIDGE VICINITY MAP



LEGAL DESCRIPTION: NE 1/4 S11, T29 N, R05 E,
LIBERTY COUNTY, MONTANA

DRAWING INDEX

PROJECT PARTNERS

MONTANA FISH, WILDLIFE & PARKS
DESIGN AND CONSTRUCTION BUREAU
1522 NINTH AVENUE
HELENA, MONTANA 59620-0701

LIBERTY COUNTY CONSERVATION DISTRICT
18 MAIN STREET
PO BOX 669
CHESTER, MONTANA 59522

DAVID PUGSLEY
LANDOWNER

PROJECT DESCRIPTION

RIVER DESIGN GROUP, INC. WAS RETAINED BY THE STATE OF MONTANA, DEPARTMENT OF FISH, WILDLIFE & PARKS, IN PARTNERSHIP WITH DAVID PUGSLEY (LANDOWNER) AND LIBERTY COUNTY CONSERVATION DISTRICT, TO EVALUATE STREAMBANK RESTORATION AND STABILIZATION ALTERNATIVES FOR A 600-FOOT REACH OF THE MARIAS RIVER LOCATED APPROXIMATELY 3 MILES DOWNSTREAM OF TIBER DAM. TIBER DAM IS LOCATED ON THE MARIAS RIVER IN SOUTHERN LIBERTY COUNTY. COMPLETED IN 1956, THE EARTH-FILL DAM FORMS LAKE ELWELL (TIBER RESERVOIR) AND HAS A LENGTH OF 4,300 FEET AND HEIGHT OF 211 FEET. THE DAM'S PRIMARY SPILLWAY IS CONTROLLED BY THREE GATES AND HAS A MAXIMUM DISCHARGE OF 68,467 CUBIC FEET PER SECOND.

THE PROJECT AREA IS CHARACTERIZED BY A STEEPLY ERODING BANK LOCATED ON RIVER LEFT DOWNSTREAM OF PUGSLEY BRIDGE. LOCAL AGENCIES AND LANDOWNERS HAVE EXPRESSED CONCERN WITH CONTINUED LATERAL EROSION OF THE RIVER AND POTENTIAL RISK TO PUGSLEY ROAD, AN IMPORTANT TRANSPORTATION ROUTE FOR THE COMMUNITY OF CHESTER.

THIS FINAL DESIGN PLAN SET PRESENTS THE SELECTED DESIGN FOR STABILIZING ~600-FEET OF STREAMBANK TO PROTECT PUGSLEY ROAD FROM FURTHER RIVER BEND MIGRATION. SECONDARY GOALS OF THIS PROJECT ARE TO ENHANCE REARING HABITAT FOR JUVENILE FISH (YEAR-1) AND TO INCREASE AQUATIC HABITAT COMPLEXITY FOR FOCAL FISH SPECIES INCLUDING BROWN TROUT (SALMO TRUTTA) AND RAINBOW TROUT (ONCORHYNCHUS MYKISS).

STANDARD OF PRACTICE

RIVER DESIGN GROUP, INC. WORKS EXCLUSIVELY IN THE RIVER ENVIRONMENT AND UTILIZES THE MOST CURRENT AND ACCEPTED PRACTICES AVAILABLE FOR PLANNING AND DESIGN OF RIVER, FLOODPLAIN, AND AQUATIC HABITAT RESTORATION PROJECTS. CURRENT STANDARDS FOR THE DESIGN OF RESTORATION PROJECTS VARY DEPENDING ON PROJECT GOALS. STABILITY CRITERIA INCLUDE DESIGNING STREAMBED AND STREAMBANK STRUCTURES FOR THE 25-YR RECURRENCE INTERVAL DISCHARGE FLOOD. THE USGS GAGE AT MARIAS RIVER NEAR CHESTER, MT (#06101500) HAS RECORDED ANNUAL PEAK FLOWS FOR THE POST-DAM PERIOD FROM 1956 TO PRESENT. A BULLETIN 17C FLOOD FREQUENCY ANALYSIS WAS COMPLETED TO DETERMINE FLOOD FLOW FREQUENCIES FOR THE POST-DAM RIVER ENVIRONMENT. THESE VALUES WILL BE UTILIZED TO EVALUATE STABILITY AND HYDRAULIC PERFORMANCE OF THE SELECTED PRELIMINARY DESIGN ALTERNATIVE."

...

REUSE OF DRAWINGS

NOW PART OF SWCA
RDG
236 Wisconsin Avenue
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

COVER SHEET AND NOTES

PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	1/30/25	LS	Final Design	NW

PROJECT NUMBER
RDG-24-009

DRAWING NUMBER
1.0

Drawing 1 of 13

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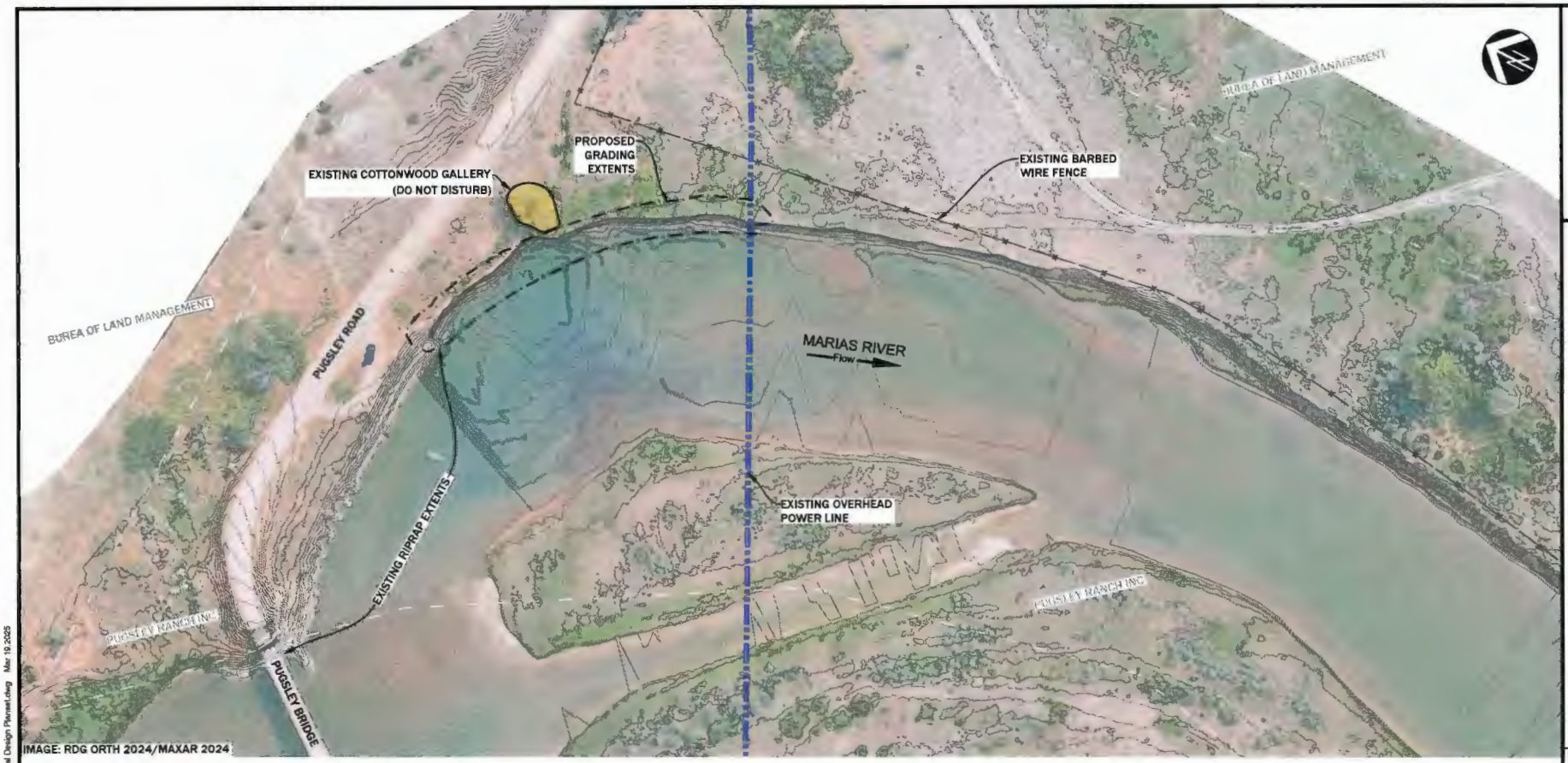

1 **EXISTING CONDITIONS**
PLAN VIEW
1" = 100'

EXISTING CONDITIONS

THE PROJECT AREA IS LOCATED ON AN OUTSIDE MEANDER BEND OF THE MARIAS RIVER APPROXIMATELY 3 MILES DOWNSTREAM OF TIBER DAM. THE CONTRIBUTING DRAINAGE AREA FOR THE MARIAS RIVER UPSTREAM OF THE BRIDGE IS 4,406 SQUARE MILES. APPROXIMATELY 99.8% OF THE CONTRIBUTING DRAINAGE AREA IS DAM REGULATED. MEAN ANNUAL PRECIPITATION FOR THE CONTRIBUTING WATERSHED AREA IS 17.4-INCHES. WITHIN THE PROJECT REACH, THE RIVER IS CHARACTERIZED AS A COARSE GRAVEL TO SMALL COBBLE DOMINATED, MEANDERING, RIFFLE-POOL STREAM TYPE FORMED IN A TERRACED ALLUVIAL VALLEY. LAND USE PRACTICES BRACKETING THE RIVER CORRIDOR HAVE DISPLACED WHAT WAS HISTORICALLY A BLACK COTTONWOOD FORESTED COVER TYPE WITH A DENSE UNDERSTORY OF WOODY VEGETATION INCLUDING WILLOW, RED OSIER DOGWOOD, GRASSES AND RUSHES TO POST AGRICULTURAL ASSEMBLAGES AND A SPARSE RIPARIAN FOREST. LAND CLEARING HAS REDUCED THE RECRUITMENT OF LARGE WOOD TO THE SYSTEM AND REDUCED BANK STRENGTH RESULTING IN BANK EROSION AND ACCELERATED RIVER BEND MIGRATION DOWNSTREAM OF PUGSLEY BRIDGE ON RIVER LEFT.

PAST BANK STABILIZATION MEASURES EMPLOYED DOWNSTREAM OF PUGSLEY BRIDGE CONSISTED OF ROCK RIP-RAP, ROCK BARBS, AND SINGLE-PLACED ROOTWAD REVETMENTS. THESE TECHNIQUES FUNCTIONING TO STABILIZE APPROXIMATELY 250-FEET OF BANK, BUT IN THE PROCESS TRANSLATED STREAM ENERGY AND HIGH VELOCITY FLOW PATHS TO A VERTICAL, ERODING TERRACE LOCATED AT THE APEX OF A TORTUOUS MEANDER BEND ADJACENT TO PUGSLEY ROAD. SINCE 2005, THE TERRACE HAS RETREATED APPROXIMATELY 15-FEET THROUGH TOE EROSION AND GRAVITATIONAL BLOCK FAILURE OF OVERLYING SEDIMENTS.

RIVER CHARACTERISTICS	
DRAINAGE AREA	4,406 SQUARE MILES
AVERAGE REACH SLOPE	0.3%
ACTIVE CHANNEL WIDTH	190 FEET
STREAM TYPE	C4 (TERRACED ALLUVIAL VALLEY)
1.5 YEAR FLOW (BANKFULL)	1,516 CFS
2 YEAR FLOW	2,058 CFS
5 YEAR FLOW	3,600 CFS
10 YEAR FLOW	4,733 CFS
25 YEAR FLOW	6,249 CFS
50 YEAR FLOW	7,422 CFS
100 YEAR FLOW	8,622 CFS
IN WATER WORK PERIOD	JULY 1- SEPTEMBER 15

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EXISTING CONDITIONS
PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	3/07/25	LS	FINAL DESIGN	NW

PROJECT NUMBER
RDG-24-009

DRAWING NUMBER
2.0

Drawing 2 of 13

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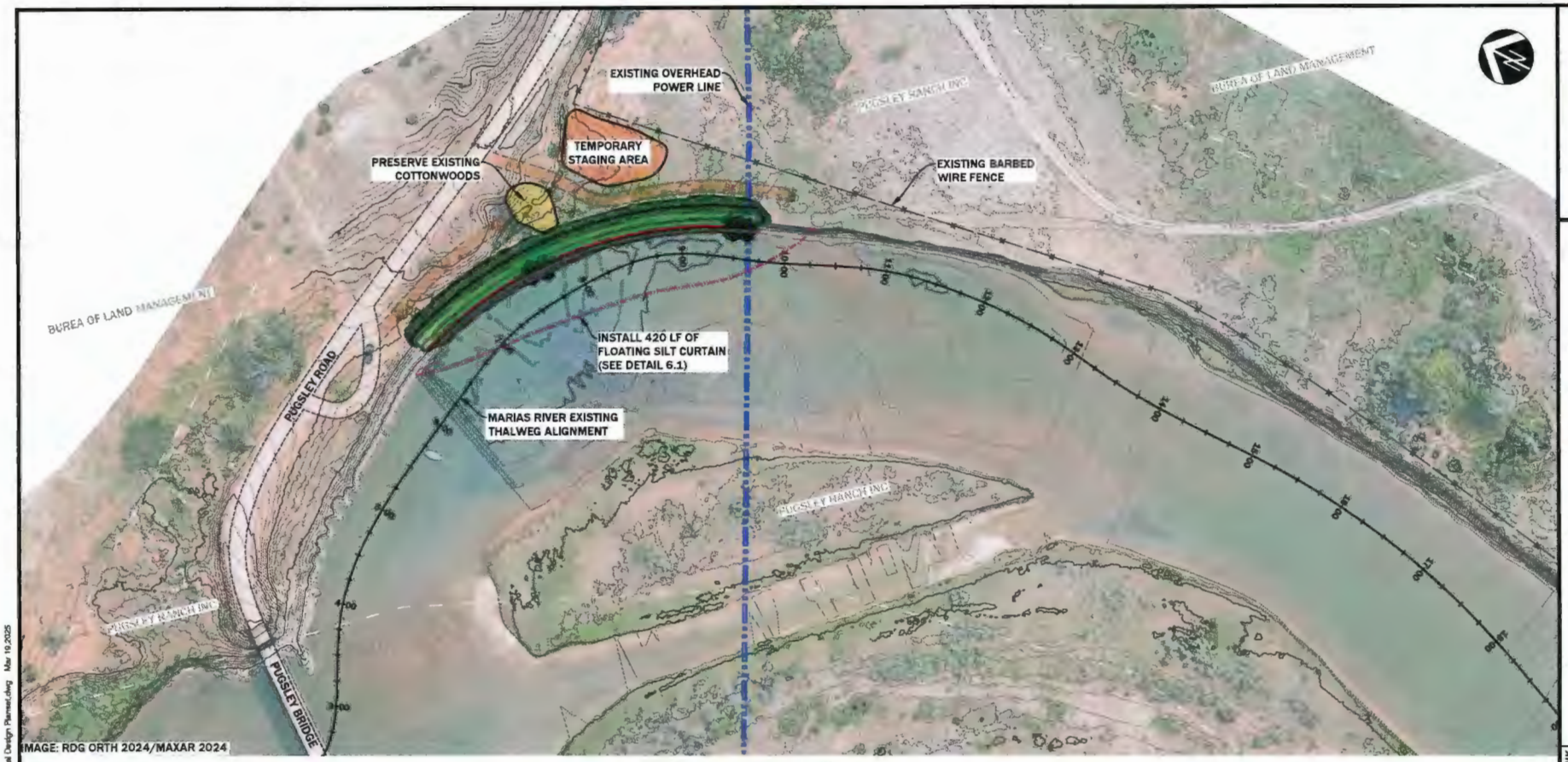

1 **RESTORATION PLAN**
PLAN VIEW
1" = 60'

RESTORATION OBJECTIVES

THE PROJECT ADDRESSES LIMITING FACTORS AND CONSTRAINTS IDENTIFIED BY PROJECT PARTNERS. THE PRIMARY GOAL OF THIS PROJECT IS TO MITIGATE CHRONIC EROSION OF A HIGH TERRACE AND THE NORTHERLY ADVANCEMENT OF THE MARIAS RIVER RESULTING FROM ACCELERATED CHANNEL BEND MIGRATION. PUGSLEY ROAD IS AN IMPORTANT TRANSPORTATION CORRIDOR FOR PRIVATE LANDOWNERS AND THE COMMUNITY OF CHESTER AND IS CURRENTLY BEING THREATENED BY THE RAPID MIGRATION OF THE RIVER. THE PROJECT WILL CREATE AN INSET FLOODPLAIN SURFACE ADJACENT TO THE ERODING TERRACE TO REDUCE CURRENT RATES OF BANK EROSION WHILE PROVIDING SITE CONDITIONS TO SUPPORT WOODY RIPARIAN VEGETATION. PROPOSED BANK RESTORATION STRUCTURES ARE INTENDED TO PROMOTE VERTICAL POOL SCOUR, REDUCE NEAR-BANK STRESS, AND CREATE COMPLEX HABITAT CONDITIONS FOR FOCAL FISH SPECIES INCLUDING BROWN TROUT AND RAINBOW TROUT.

SPECIFIC OBJECTIVES INCLUDE:

- PRODUCE CLEAN WATER CONSISTENT WITH SUPPORTING AQUATIC LIFE AND BENEFICIAL USES IN THE MARIAS RIVER WATERSHED BY AMELIORATING A CHRONIC SOURCE OF FINE SEDIMENT TO THE RIVER CORRIDOR;
- CONSTRUCT AN INSET FLOODPLAIN SURFACE CONNECTED TO THE Q1.5 WATER SURFACE ELEVATION AND CREATE FLOODPLAIN SITE CONDITIONS THAT WILL SUPPORT THE ESTABLISHMENT OF WOODY RIPARIAN VEGETATION.
- INCORPORATE BANK RESTORATION TREATMENTS INCLUDING WOOD, ALLUVIUM, AND VEGETATION TO DISSIPATE STREAM ENERGY ALONG THE BANK LINE AND PROVIDE COMPLEX HABITAT CONDITIONS INCLUDING COVER, SHADE, AND HOLDING WATER FOR JUVENILE AND ADULT TROUT.

DRAWING LEGEND	
SYMBOL	
	EXISTING ACCESS ROAD
	TEMPORARY ACCESS ROAD
	GRADING EXTENTS
	LARGE WOOD STRUCTURE
	VEGETATED WOOD MATRIX - TYPE 2
	FLOODPLAIN TREATMENT
	STAGING AREA

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RESTORATION PLAN

PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	3/07/25	LS	FINAL DESIGN	NW

PROJECT NUMBER RDG-24-009

DRAWING NUMBER 3.0

Drawing 3 of 13

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GENERAL SPECIFICATIONS

1. THE PROJECT SHALL BE CONSTRUCTED ACCORDING TO THE PLAN SET. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ANY CHANGES PRIOR TO IMPLEMENTATION. THE CONSTRUCTION MANAGER FOR THIS PROJECT SHALL BE A DESIGNATED RIVER DESIGN GROUP REPRESENTATIVE.

2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO IDENTIFY ALL UNDERGROUND UTILITIES PRIOR TO CONSTRUCTION. CALL U-DIG PRIOR TO CONSTRUCTION.

3. COSTS INCURRED DUE TO PROJECT DELAYS RESULTING FROM FAILURE OF THE CONTRACTOR TO MEET THE REQUIREMENTS OF THE GENERAL SPECIFICATIONS, CONTRACTOR QUALIFICATIONS, CONSTRUCTION SPECIFICATIONS, MATERIALS SPECIFICATIONS AND REVEGETATION SPECIFICATIONS SHALL BE THE EXPENSE OF THE CONTRACTOR.

CONTRACTOR QUALIFICATIONS

1. THE CONTRACTOR SHALL HAVE AT LEAST TWO (2) YEARS OF RIVER RESTORATION CONSTRUCTION EXPERIENCE AND SHALL HAVE COMPLETED AT LEAST FIVE (5) RIVER RESTORATION PROJECTS. OR, THE CONTRACTOR SHALL HAVE AT LEAST ONE (1) YEAR OF RIVER RESTORATION EXPERIENCE, SHALL HAVE COMPLETED AT LEAST THREE (3) RIVER RESTORATION PROJECTS, AND SHALL HAVE COMPLETED AN APPROVED RIVER RESTORATION TRAINING CLASS. APPROVED TRAINING CLASSES INCLUDE THOSE SPONSORED BY WILDLAND HYDROLOGY, INC., OR A SIMILARLY QUALIFIED PRACTITIONER OF NATURAL CHANNEL DESIGN STREAM RESTORATION PRINCIPLES.

2. IF THE CONTRACTOR CHOOSES TO DESIGNATE AN EMPLOYEE WITHOUT QUALIFIED STREAM RESTORATION EXPERIENCE, THE CONTRACTOR SHALL BE ON-SITE AT ALL TIMES WHEN THE EMPLOYEE IS PERFORMING RIVER RESTORATION WORK. FAILURE TO ABIDE BY THIS CONDITION WITHOUT PREVIOUS AGREEMENT WITH THE CONSTRUCTION MANAGER WOULD BE GROUNDS FOR TERMINATION.

3. THE CONTRACTOR SHALL MAINTAIN AT LEAST $2,000,000 IN LIABILITY INSURANCE AND HAVE PROOF OF LIABILITY INSURANCE ON-SITE DURING THE ENTIRETY OF PROJECT CONSTRUCTION.

4. THE CONTRACTOR SHALL HAVE PROOF OF WORKER'S COMPENSATION INSURANCE ON-SITE DURING THE ENTIRETY OF PROJECT CONSTRUCTION.

5. COPIES OF ALL PROJECT PERMITS SHALL BE POSTED ON-SITE IN A VISIBLE LOCATION. THE CONTRACTOR SHALL COMPLY WITH THE PROVISIONS OF THE PERMITS. THE CONTRACTOR SHALL NOTIFY THE CONSTRUCTION MANAGER OF ANY KNOWN CHANGES OR ACTIVITIES THAT COULD VIOLATE PERMIT REQUIREMENTS PRIOR TO IMPLEMENTATION. THE CONSTRUCTION MANAGER SHALL BE RESPONSIBLE FOR ALL CORRESPONDENCE WITH PERMIT AGENCIES.

MATERIALS SPECIFICATIONS

1. THE CONTRACTOR SHALL FURNISH ALL MATERIALS NECESSARY TO CONSTRUCT THE PROJECT. THE CONTRACTOR SHALL DELIVER ALL MATERIALS TO THE DESIGNATED STOCKPILE LOCATIONS LABELED ON THE PLAN SET OR TO A LOCATION SPECIFIED BY THE CONSTRUCTION MANAGER. IF A MATERIAL SOURCE HAS BEEN PRE-DETERMINED, THE CONSTRUCTION MANAGER SHALL PROVIDE DIRECTIONS TO THE CONTRACTOR.

2. MATERIAL QUANTITIES, DIMENSIONS AND SIZES SHALL CONFORM TO THE NOTES AND SPECIFICATIONS PROVIDED ON THE PLAN SET OR ON THE MATERIALS LIST.

3. THE CONSTRUCTION MANAGER SHALL INSPECT AND APPROVE ALL MATERIALS PRIOR TO CONSTRUCTION. IF MATERIALS DO NOT MEET THE MINIMUM REQUIREMENTS SPECIFIED IN THE PLAN SET OR MATERIAL LIST, THE CONSTRUCTION MANAGER SHALL REJECT THE MATERIALS.

EQUIPMENT SPECIFICATIONS

1. THE CONTRACTOR SHALL FURNISH ALL EQUIPMENT NECESSARY TO CONSTRUCT THE PROJECT. THE CONTRACTOR SHALL MOBILIZE ALL EQUIPMENT TO THE PROJECT AREA AS DIRECTED BY THE CONSTRUCTION MANAGER.

2. ALL EQUIPMENT SHALL BE WASHED PRIOR TO MOBILIZATION TO THE SITE TO MINIMIZE THE INTRODUCTION OF FOREIGN MATERIALS AND FLUIDS TO THE PROJECT SITE. ALL EQUIPMENT SHALL BE FREE OF OIL, HYDRAULIC FLUID, AND DIESEL FUEL LEAKS. TO PREVENT INVASION OF NOXIOUS WEEDS OR THE SPREAD OF WHIRLING DISEASE SPORES, ALL EQUIPMENT SHALL BE POWER WASHED OR CLEANED TO REMOVE MUD AND SOIL PRIOR TO MOBILIZATION INTO THE PROJECT AREA. IT WILL BE THE CONTRACTOR'S RESPONSIBILITY TO INSURE THAT ADEQUATE MEASURES HAVE BEEN TAKEN.

3. EQUIPMENT SHALL BE IN A WELL-MAINTAINED CONDITION TO MINIMIZE THE LIKELIHOOD OF A FLUID LEAK. IF A FLUID LEAK DOES OCCUR, THE CONSTRUCTION MANAGER SHALL BE NOTIFIED IMMEDIATELY, AND ALL WORK CEASED UNTIL THE LEAK HAS BEEN RECTIFIED. AT ALL TIMES DURING THE CONSTRUCTION PHASE, FLUID SPILL CONTAINMENT EQUIPMENT SHALL BE PRESENT ON-SITE AND READY FOR DEPLOYMENT SHOULD AN ACCIDENTAL SPILL OCCUR.

4. THE CONTRACTOR SHALL MAINTAIN A COMPLETE TOOL SET WITH COMMONLY REPLACED PARTS (E.G. O-RINGS) TO MINIMIZE DOWNTIME IN THE EVENT OF EQUIPMENT MALFUNCTION. THE CONTRACTOR SHALL HAVE AN EMERGENCY SPILL KIT ON SITE DURING THE PROJECT.

REVEGETATION SPECIFICATIONS

1. ALL DISTURBED AREAS SHALL BE BROADCAST SEEDED WITH THE SPECIFIED MIXES SHOWN ON THE DRAWINGS. BROADCAST SEEDING WILL BE ACCOMPLISHED USING A HAND SEEDER.

2. THE CONTRACTOR SHALL FURNISH ALL PLANTS, SEED, GROWING MEDIA AND EQUIPMENT NECESSARY TO REVEGETATE THE PROJECT. THE CONTRACTOR SHALL DELIVER ALL MATERIALS TO THE DESIGNATED STOCKPILE LOCATIONS LABELED ON THE PLAN SET OR TO A LOCATION SPECIFIED BY THE CONSTRUCTION MANAGER. IF A PLANT SOURCE HAS BEEN PRE-DETERMINED, THE CONSTRUCTION MANAGER SHALL PROVIDE DIRECTIONS TO THE CONTRACTOR.

3. PLANTING PRESCRIPTIONS, QUANTITIES, DENSITIES, AND SIZES SHALL CONFORM TO THE NOTES AND SPECIFICATIONS PROVIDED ON THE PLAN SET, THE MATERIALS LIST, AND THE REVEGETATION PLAN.

5. NATIVE GRASS SEED MIX SHALL BE SPREAD ON DISTURBED AREAS AS DIRECTED BY THE CONSTRUCTION MANAGER. SEEDING PRESCRIPTIONS SHALL CONFORM WITH SPECIFICATIONS IN THE REVEGETATION PLAN, PLANT LIST AND MATERIALS LIST.

6. WILLOWS CUTTINGS (STAKES) SHALL BE COLLECTED FROM DONOR STANDS IDENTIFIED BY CONSTRUCTION MANAGER, HARVESTING NO MORE THAN ONE-THIRD OF A SINGLE WILLOW SHRUB, AND NO MORE THAN 40% OF THE CANOPY COVER OF AN AREA. AVOID HARVEST OF THE CURRENT YEAR'S GROWTH; IDEAL AGE IS TWO TO SEVEN YEARS. HARVEST SHALL BE SPACED TO MINIMIZE IMPACTS ON THE EXISTING WILLOW COMMUNITY. WILLOW STAKES SHALL BE HARVESTED DURING THE DORMANT SEASON, AND SHALL BE STORED WITH THE BOTTOM END IN WATER OR MOIST BURLAP UNTIL INSTALLATION. STAKES SHALL BE STORED NO MORE THAN ONE WEEK PRIOR TO INSTALLATION. TOPS OF WILLOW STAKES (APICAL BUDS) AND ALL SMALL BRANCHES SHALL BE CUT. BOTTOMS OF STAKES SHALL BE CUT AT AN ANGLE TO ENSURE PROPER ORIENTATION DURING INSTALLATION.

CONSTRUCTION SPECIFICATIONS

1. CONSTRUCTION SHALL OCCUR IN ACCORDANCE WITH THE PLAN SET, CONSTRUCTION SPECIFICATIONS, EQUIPMENT SPECIFICATIONS, MATERIAL SPECIFICATIONS, REVEGETATION SPECIFICATIONS AND GENERAL SPECIFICATIONS.

2. PRIOR TO CONSTRUCTION, CONTRACTOR SHALL PERFORM GPS SITE CALIBRATION AND ESTABLISH GPS CONTROL.

3. CONSTRUCTION ACCESS IS DESIGNATED IN THE DESIGN PLAN SET. CONSTRUCTION EQUIPMENT SHALL NOT CROSS PRIVATE LAND UNLESS PERMISSION IS OBTAINED FROM THE LANDOWNER. THE CONTRACTOR SHALL LEAVE ALL GATES, WHETHER OPEN OR CLOSED, AS FOUND.

4. STREAM CROSSINGS SHALL NOT BE NECESSARY TO CONSTRUCT THIS PROJECT.

5. STRAW BALES AND SILT FENCING SHALL BE AVAILABLE AND INSTALLED BY THE CONTRACTOR IF DEEMED NECESSARY BY THE CONSTRUCTION MANAGER. CONSTRUCTION FENCING (LIMITS OF DISTURBANCE) SHALL BE INSTALLED BY THE CONTRACTOR IF DEEMED NECESSARY BY THE CONSTRUCTION MANAGER.

6. INITIALLY, THE CONTRACTOR SHALL EXCAVATE THE SUBGRADE TO APPROXIMATE DESIGN DIMENSIONS USING THE EXCAVATOR. EXCAVATION SHALL COMPLY WITH GRADING SURFACES AND THE PLAN SET. EXCAVATION SHALL ESTABLISH STREAMBANK ELEVATIONS WITHIN THREE TENTHS OF A FOOT OF FINAL ELEVATIONS. THE CONSTRUCTION MANAGER SHALL INSPECT EXCAVATION FOR COMPLIANCE WITH THE PLAN SET. ALL EXCAVATED MATERIALS SHALL BE STOCKPILED ON-SITE, ABOVE THE BANKFULL CHANNEL. DISTURBANCE TO RIPARIAN VEGETATION, CHANNEL BANKS AND SOD SHALL BE MINIMIZED. EXCAVATED SOD AND RIPARIAN SHRUB TRANSPLANTS SHALL BE CAREFULLY STOCKPILED AND REUSED FOR PLANTING FLOODPLAINS OR STREAM BANKS.

7. AFTER EXCAVATING THE CHANNEL, THE CONTRACTOR SHALL CONSTRUCT THE BANK STRUCTURES AND CREATE FLOODPLAIN ROUGHNESS. THE FLOODPLAIN, STREAMBANKS, AND FLOODPLAIN ROUGHNESS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE PLAN SET AND AS DIRECTED BY THE CONSTRUCTION MANAGER.

8. THE CONTRACTOR SHALL REMOVE EXCESS MATERIALS, TEMPORARY CULVERTS AND EQUIPMENT FROM THE SITE. THE CONTRACTOR SHALL REGRADE DISTURBED AREAS AND CONSTRUCTION ACCESS ROADS TO THEIR ORIGINAL GRADES. THE CONTRACTOR SHALL TREAT COMPACTED SOIL AREAS INCLUDING ACCESS ROADS AND MATERIAL STOCKPILE AREAS. THE CONTRACTOR SHALL REMOVE SOIL FROM THE PROJECT SITE IF THE SOIL IS TAINTED WITH PETROLEUM-BASED FLUIDS.

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SPECIFICATIONS

PUGSLEY BRIDGE STABILIZATION PROJECT

CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	1/30/25	LS	Final Design	NW

PROJECT NUMBER
RDG-24-009

DRAWING NUMBER
3.1

IMAGE: RDG ORTH 2024/MAXAR 2024

1 ACCESS, STAGING, AND SURVEY CONTROL
PLAN VIEW
1" = 200'

ACCESS AND STAGING

1. FROM CHESTER, HEAD SOUTH ON STATE HIGHWAY 223 FOR 10.5 MILES. THEN, TURN RIGHT ONTO MOFFETT ROAD. FOLLOW MOFFETT ROAD FOR 2.8 MILES THEN TURN RIGHT ON TO SEC. 366. FOLLOW SEC. 366 FOR 2 MILES THEN TURN LEFT ONTO PUGSLEY ROAD. STAY ON PUGSLEY ROAD FOR 2.9 MILES TO ARRIVE AT THE PROJECT SITE.
2. UTILIZE VARIOUS UNIMPROVED TEMPORARY ACCESS ROADS TO ACCESS THE PROJECT SITE.

CONTROL POINTS

POINT NUMBER	NORTHING	EASTING	POINT ELEVATION	RAW DESCRIPTION
1	1476584.4230'	1592269.2740'	2815.707'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"
2	1476712.7660'	1592171.2730'	2817.099'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"
3	1477166.0850'	1592601.6280'	2824.534'	5/8" REBAR WITH A 2" ALUMINUM CAP MARKED "RDG"

PROJECT DATUM

THE PROJECT COORDINATES ARE BASED ON THE FOLLOWING:

HORIZONTAL PROJECTION:	MONTANA STATE PLANE FIPS 2500
UNITS:	INTERNATIONAL FEET
HORIZONTAL DATUM:	NAD83 2011
VERTICAL DATUM:	NAVD88 (GEOID 18)

TOPOGRAPHY AND CROSS SECTION GROUND LINES ARE BASED ON SURVEY WORK PERFORMED BY RDG IN JULY 2024 COMBINED WITH LIDAR DATA CREATED IN 2021.

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ACCESS, STAGING, AND SURVEY CONTROL
PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
X	3/07/25	LS	FINAL DESIGN	NW

PROJECT NUMBER
RDG-24-009

DRAWING NUMBER
3.2

TOTAL ROCK QUANTITIES

ITEM	QUANTITY (EA)	DIAMETER (IN)	
BALLAST ROCK	20	24-30	ANGULAR RIPRAP

ITEM	QUANTITY (CY)	GRADATION		
		SIZE (IN)	PERCENT PASSING	REPRESENTANTIVE CLASS
STREAMBANK FILL	510	8	95	D100
		5	90-95	D95
		4	85-90	D84
		3	65-85	D65
		2	50-65	D50
		1	30-50	D35
		0.5	20-30	D15
		0.08	20	

TOTAL EARTHWORK QUANTITIES

ITEM	QUANTITY (CY)
CUT	608
BACKFILL	580
NET FILL	28

NOTE:
VOLUMES ARE NEATLINE, CONTRACTOR TO APPLY EXPANSION FACTORS TO DETERMINE A MORE ACCURATE BACKFILL VOLUME.

TOTAL WOOD QUANTITIES

ITEM	QUANTITY (EA)	DIAMETER (IN)	LENGTH (FT)	ROOTWAD
CATEGORY 1 WOOD	24	12 - 18	20-25	YES
CATEGORY 2 WOOD	2,489	10 - 12	20-25	OPTIONAL
CATEGORY 3 WDOD	3,029	< 4	15-25	OPTIONAL
WILLOW CUTTINGS	3,250	0.25-1.0	8	NO

NOTE:
WOOD LENGTHS SHOWN WILL PRODUCE THE PROPER AMOUNT MATERIAL FOR STRUCTURES WHEN SPLIT INTO APPROPRIATE SIZES DURING CONSTRUCTION. IT IS CONTRACTOR'S RESPONSIBILITY TO CUT WOOD INTO APPROPRIATE SIZE LENGTHS TO FIT STRUCTURE DIMENSIONS.

LARGE WOOD STRUCTURE QUANTITIES

ITEM	QUANTITY (EA)
LARGE WOOD STRUCTURES	2
CATEGORY 1 WOOD	24
CATEGORY 2 WOOD	30
CATEGORY 3 WOOD	50
WILLOW CUTTINGS	800
BALLAST ROCK	20 CY
STREAMBANK FILL	20 CY

VEGETATED WOOD MATRIX QUANTITIES

ITEM	QUANTITY
VEGETATED WOOD MATRIX TYPE 2	245 LF
CATEGORY 2 WOOD	2,450 EA
CATEGORY 3 WOOD	2,940 EA
WILLOW CUTTINGS	2,450 EA
STREAMBANK FILL	490 CY

FLOODPLAIN TREATMENT

ITEM	QUANTITY
ACRES OF FLOODPLAIN	0.26 AC
CATEGORY 2 WOOD	9 EA
CATEGORY 3 WOOD	39 EA

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MATERIALS AND QUANTITIES

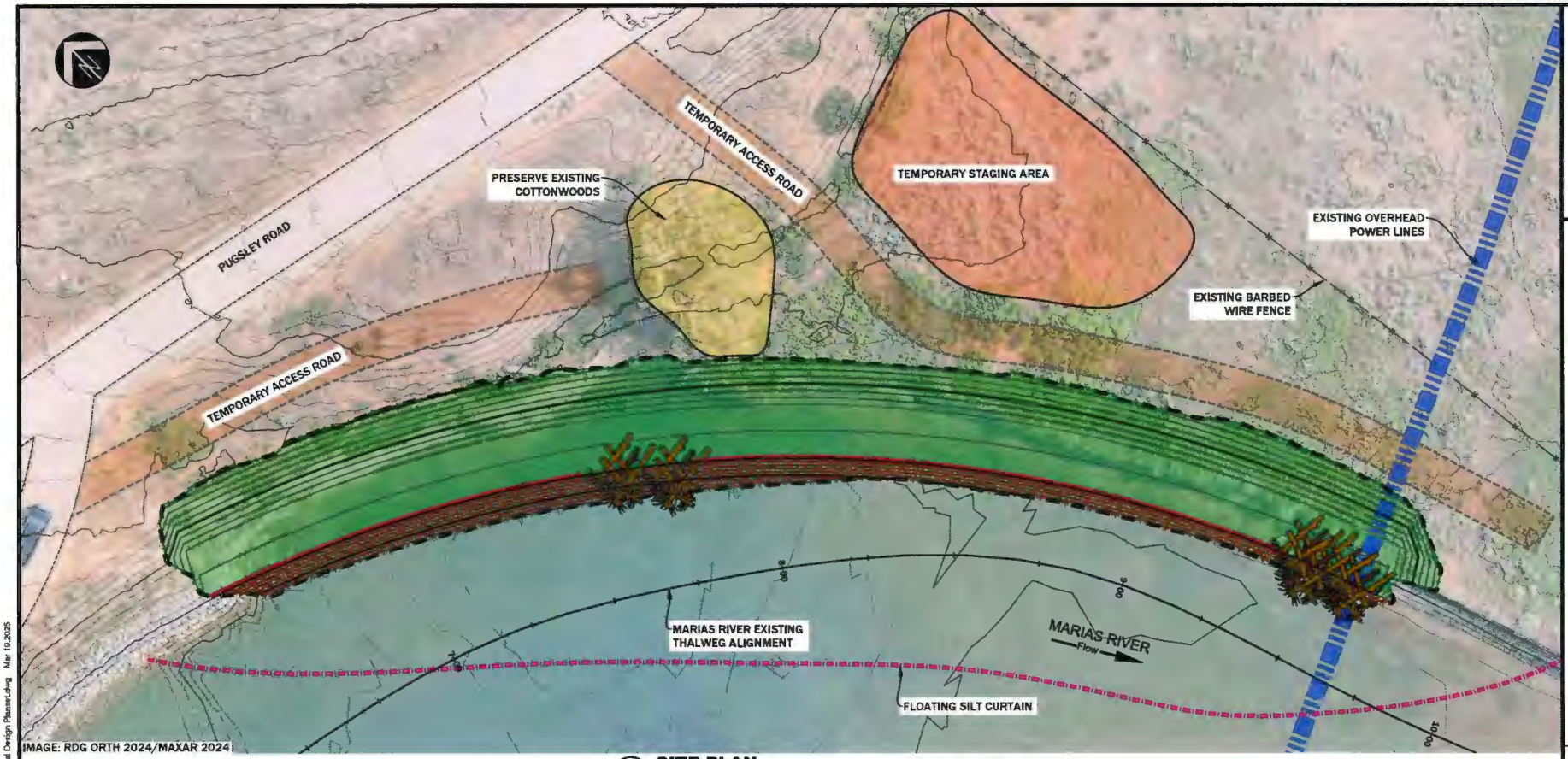
PUGSLEY BRIDGE STABILIZATION PROJECT

CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	3/07/25	LS	FINAL DESIGN	NW

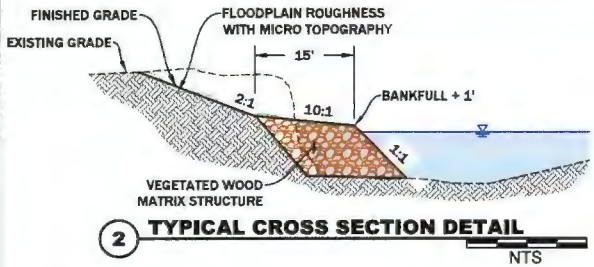
PROJECT NUMBER
RDG-24-009

DRAWING NUMBER
3.3



1 SITE PLAN
PLAN VIEW

1" = 30'



2 TYPICAL CROSS SECTION DETAIL
NTS

CHANNEL TOP OF BANK ELEVATIONS	
STATION START	ELEVATIONS (FT)
6+50	2810.29
6+75	2810.27
7+00	2810.26
7+25	2810.24
7+50	2810.20
7+75	2810.22
8+00	2810.21
8+25	2810.19
8+50	2810.18
8+75	2810.17
9+00	2810.15
9+25	2810.14
9+50	2810.13

STRUCTURE SCHEDULE			
STATION START	STATION END	BANK	STRUCTURE
6+60	7+50	L	VWM
7+50	7+80	L	LWS
7+80	9+35	L	VWM
9+35	9+60	L	LWS

DRAWING LEGEND	
SYMBOL	
	EXISTING ACCESS ROAD
	TEMPORARY ACCESS ROAD
	GRADING EXTENTS
	LARGE WOOD STRUCTURE
	VEGETATED WOOD MATRIX - TYPE 2
	FLOODPLAIN ROUGHNESS
	STAGING

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SITE PLAN
PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	3/07/25	LS	FINAL DESIGN	NW

PROJECT NUMBER
RDG-24-009

DRAWING NUMBER
4.0

Drawing 7 of 13

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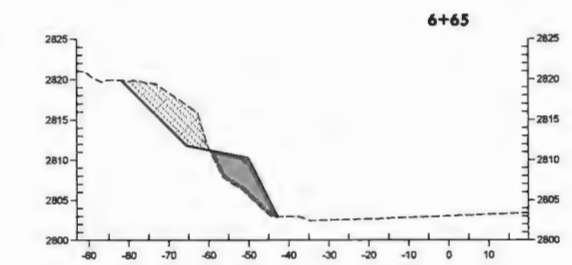

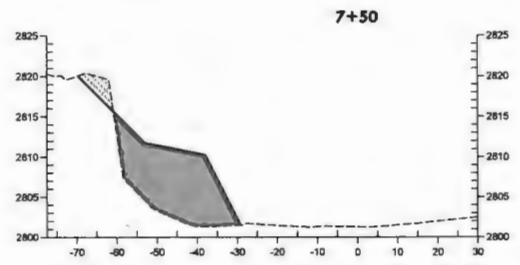

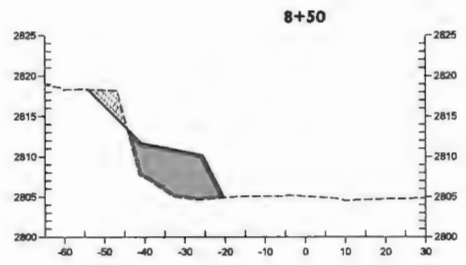

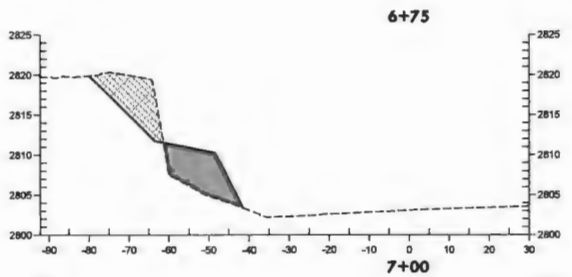

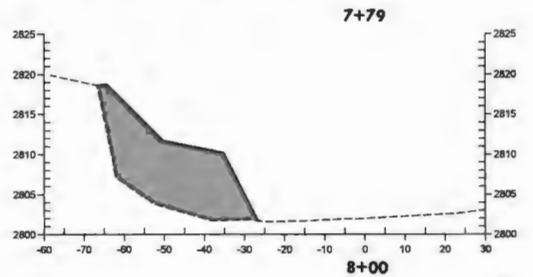

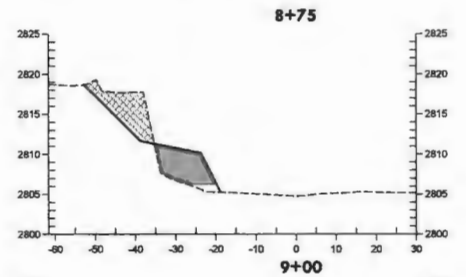

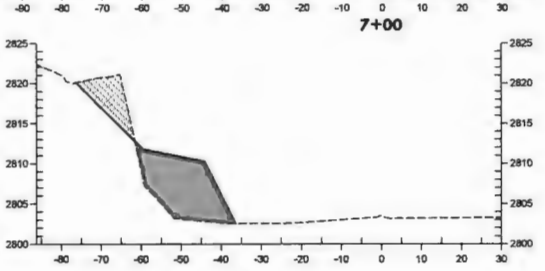

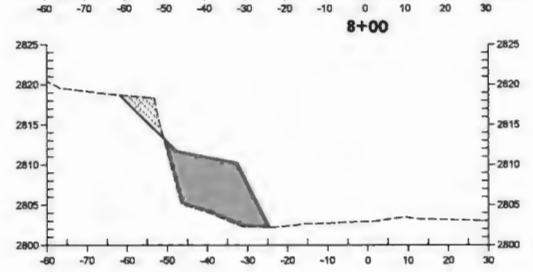

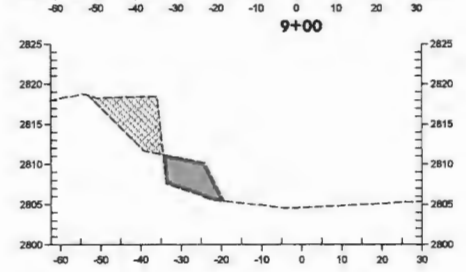

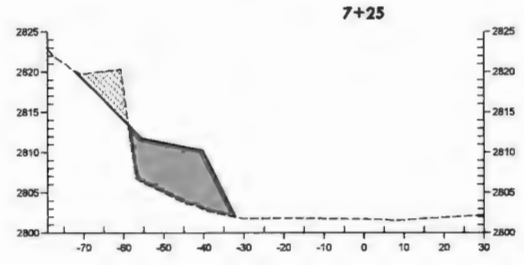

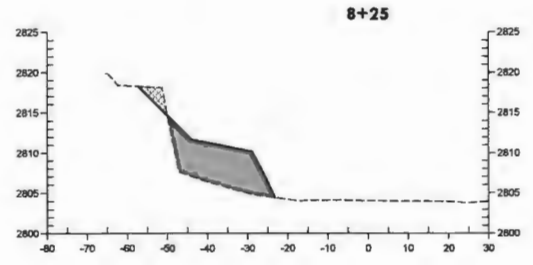

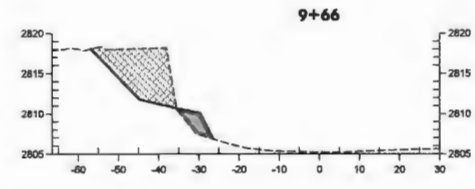

LEGEND
- EXISTING GRADE (EG)
- FINISHED GRADE (FG)
- CUT
- FILL

1 CROSS SECTIONS

HOR: 1" = 30'
VER: 1: = 15'

NOW PART OF RDG SWCA
236 Wisconsin Avenue, Whitefish, MT 59937, 406.862.4927
311 SW Jefferson Avenue, Corvallis, OR 97333, 541.738.2920

CROSS SECTIONS

PUGSLEY BRIDGE STABILIZATION PROJECT

CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
X	1/30/25	LS	Final Design	NW

PROJECT NUMBER
RDG-24-009

DRAWING NUMBER
4.1

Drawing 8 of 13

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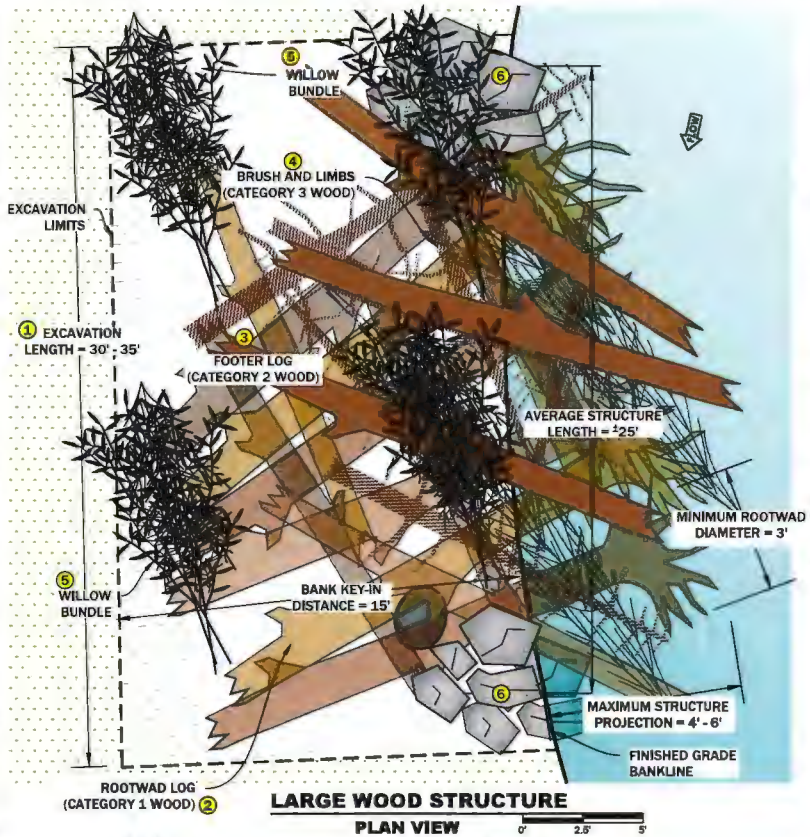
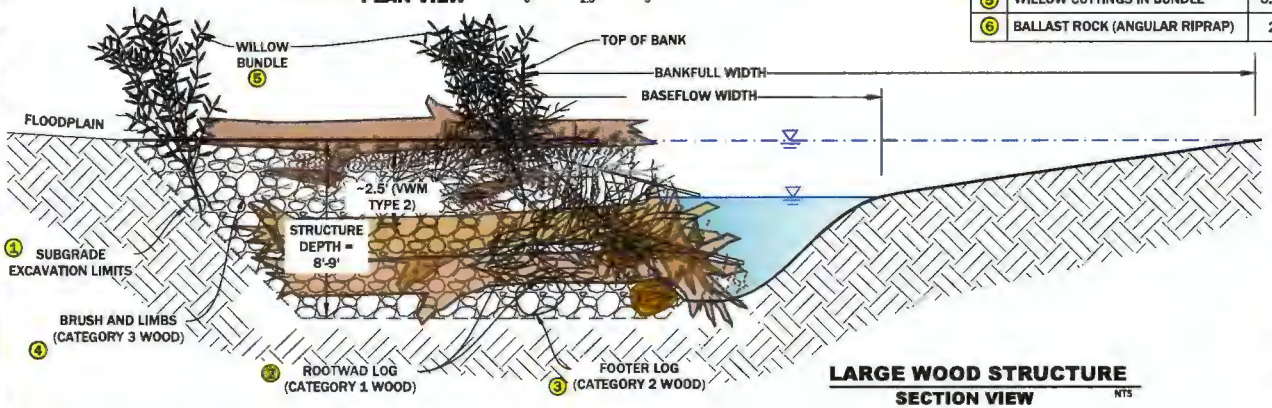


LARGE WOOD STRUCTURE
PLAN VIEW



LARGE WOOD STRUCTURE
SECTION VIEW NTS

GENERAL NOTES

1. CONSTRUCTION OF THE LARGE WOOD STRUCTURE WILL OCCUR BEFORE THE INSTALLATION OF VEGETATED WOOD MATRIX BANK TREATMENTS. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED THE ENGINEER.
2. FIELD ENGINEER SHALL MARK THE GENERAL CONSTRUCTION LOCATION FOR EACH LARGE WOOD STRUCTURE PRIOR TO CONSTRUCTION.

NOTES ON LARGE WOOD STRUCTURE INSTALLATION

1. EXCAVATE TO THE EXCAVATION LIMITS. EXCAVATED MATERIAL SHALL BE STOCKPILED ON THE FLOODPLAIN OUTSIDE OF THE IMMEDIATE WORK AREA.
2. INSTALL FOUR FOOTER LOGS (CATEGORY 2 WOOD) AT THE BASE OF THE EXCAVATED TRENCH AT THE ORIENTATIONS NOTED IN PLAN VIEW. FOOTER LOGS SHALL PROJECT NO GREATER THAN 1 FT. BEYOND THE FINISH GRADE BANK LINE. EXPOSED ENDS OF FOOTER LOGS SHALL BE BROKEN/ROUGHENED SO AS TO APPEAR NATURAL. SAWED ENDS OF FOOTER LOGS SHALL NOT BE EXPOSED.
3. INSTALL 6 ROOTWAD LOGS (CATEGORY 1 WOOD) INTERSECTING BOTH FOOTER LOGS AT THE ORIENTATION NOTED IN PLAN VIEW. THE UPSTREAM ROOTWAD SHALL NOT PROJECT INTO THE CHANNEL AND SHALL BE FLUSH WITH THE FINISHED BANK LINE. THE DOWNSTREAM ROOTWAD SHALL PROJECT NO GREATER THAN 3 FT. BEYOND THE FINISHED BANK LINE
4. BACKFILL TRENCH WITH STOCKPILED MATERIAL UP TO THE TOP OF THE FOOTER LOGS (CATEGORY 2 WOOD). BACKFILL SHALL BE BUCKET COMPACTED.
5. INSTALL A SECOND TIER OF 4 FOOTER LOGS (CATEGORY 2 WOOD) FOOTER LOGS SHALL PROJECT NO GREATER THAN 1 FT. BEYOND THE FINISH GRADE BANK LINE. EXPOSED ENDS OF FOOTER LOGS SHALL BE BROKEN/ROUGHENED SO AS TO APPEAR NATURAL. SAWED ENDS OF FOOTER LOGS SHALL NOT BE EXPOSED.
6. INSTALL SMALL WOOD AND BRUSH (CATEGORY 3 WOOD) AT APPROXIMATE 45° ANGLE TO ROOTWAD STEMS. BRUSH AND LIMBS SHALL PROJECT NO GREATER THAN 3 FT. BEYOND THE FINISHED BANK LINE.
7. INSTALL 6 ROOTWAD LOGS (CATEGORY 1 WOOD) INTERSECTING THE LOWER TIER OF ROOTWADS AT THE ORIENTATION NOTED IN PLAN VIEW. THE ROOTWADS SHALL PROJECT NO GREATER THAN 2 FT. BEYOND THE FINISHED BANK LINE.
8. INSTALL SMALL WOOD AND BRUSH (CATEGORY 3 WOOD) AND WILLOW CUTTINGS INTERWOVEN INTO WOOD MATRIX UP TO FINISHED GRADE. BRUSH, LIMBS, AND WILLOW CUTTINGS SHALL PROJECT NO GREATER THAN 4 FT. BEYOND THE FINISHED BANK LINE.
9. BACKFILL WOOD MATRIX WITH STREAMBED FILL UP TO FINISHED GRADE WITH STOCKPILED NATIVE MATERIAL. NO AREAS BEHIND THE FINISHED BANKLINE ARE TO BE LEFT BELOW FINISHED GRADE.
10. INSTALL DEFLECTOR LOGS (CATEGORY 2 WOOD)) AT APPROXIMATE 45° ANGLE TO ROOTWAD STEMS. DEFLECTOR LOGS SHALL BE HALF EMBEDDED IN THE FLOODPLAIN AND PROJECT NO GREATER THAN 4 FT. BEYOND THE FINISHED BANK LINE. EXPOSED ENDS OF FOOTER LOGS SHALL BE BROKEN/ROUGHENED SO AS TO APPEAR NATURAL. SAWED ENDS OF FOOTER LOGS SHALL NOT BE EXPOSED.

LARGE WOOD STRUCTURE MATERIAL SCHEDULE (PER STRUCTURE)

	ITEM	DIA. (IN)	LENGTH (FT)	RDOTWAD (Y/N)	QTY.
1	SUBGRADE EXCAVATION				50 CY
2	CATEGORY 1 WOOD	12 - 18	20-25	YES - 36 IN DIA. MIN	12 EA
3	CATEGORY 2 WOOD	10 - 12	20-25	OPTIONAL	15 EA
4	CATEGORY 3 WOOD	< 4	15-25	OPTIONAL	25 EA
5	WILLOW CUTTINGS IN BUNDLE	0.25 - 1.0	8		400 EA
6	BALLAST ROCK (ANGULAR RIPRAP)	24 - 30			10 CY

EXAMPLE OF A LARGE WOOD STRUCTURE

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LARGE WOOD STRUCTURE DETAIL

PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	1/30/25	LS	Final Design	NW

PROJECT NUMBER RDG-24-009

DRAWING NUMBER 5.0

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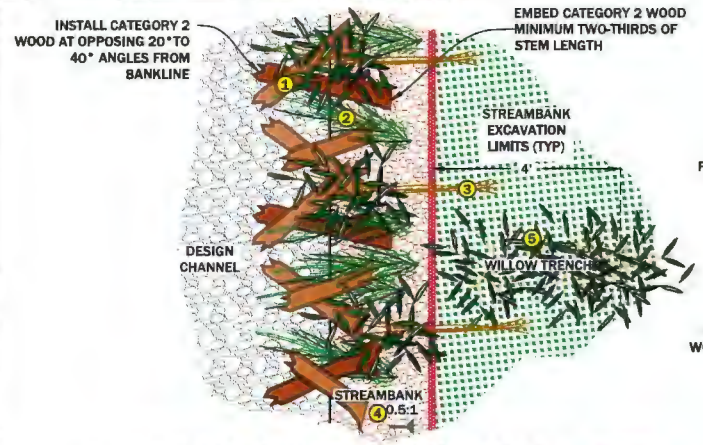
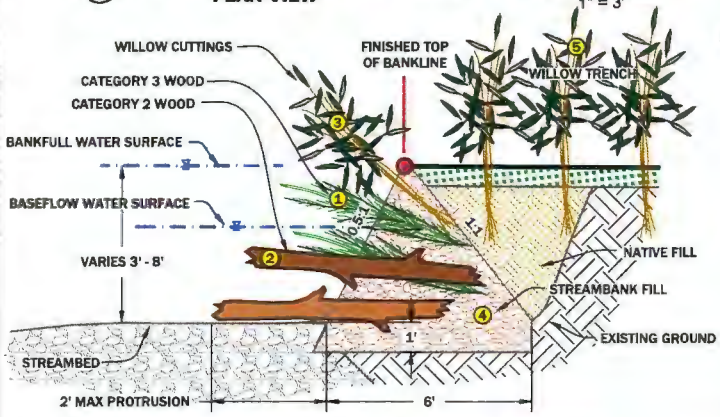
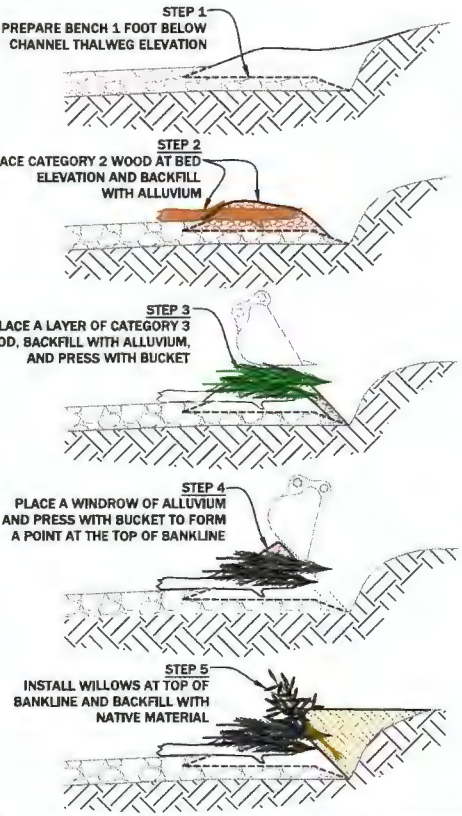


1 VEGETATED WOOD MATRIX - TYPE 2
PLAN VIEW
1" = 3'



2 VEGETATED WOOD MATRIX - TYPE 2
SECTION VIEW
1" = 3'



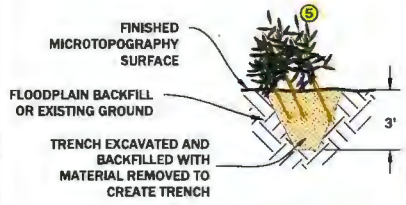
3 RECOMMENDED VEGETATED WOOD MATRIX INSTALLATION SEQUENCE
SECTION VIEW
1" = 5'

GENERAL NOTES

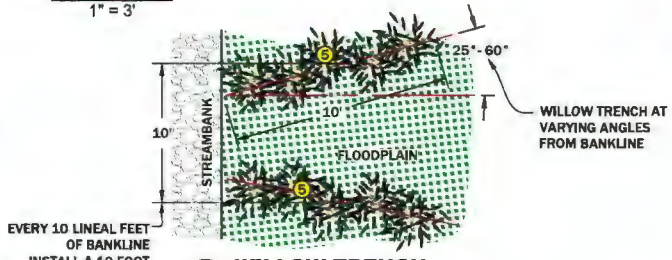
1. CONSTRUCTION OF THE VEGETATED WOOD MATRIX WILL OCCUR AFTER THE LARGE WOOD STRUCTURES ARE INSTALLED.
2. IF VEGETATED WOOD MATRIX STRUCTURES ARE INSTALLED PRIOR TO OCTOBER 1, LEAVE BACK TRENCH UNFILLED AND COMPLETE STRUCTURE WHEN DORMANT WILLOWS ARE AVAILABLE.
3. IT IS CONTRACTOR'S RESPONSIBILITY TO CUT WOOD INTO APPROPRIATE SIZE LENGTHS TO FIT STRUCTURE DIMENSIONS.
4. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY CONSTRUCTION MANAGER.
5. CONTRACTOR SHALL MARK AND CONSTRUCTION ENGINEER SHALL APPROVE THE GENERAL LOCATION FOR EACH VEGETATED WOOD MATRIX STRUCTURE PRIOR TO CONSTRUCTION.

NOTES ON VEGETATED WOOD MATRIX INSTALLATION

1. EXCAVATE TO THE EXCAVATION LIMITS AS SHOWN. EXCAVATED MATERIAL SHALL BE STOCKPILED ON THE FLOODPLAIN OUTSIDE OF THE IMMEDIATE WORK AREA.
2. PREPARE THE BENCH OF THE STRUCTURE BY PLACING STREAMBED ALLUVIUM MINIMUM 1 FOOT BELOW CHANNEL THALWEG ELEVATION.
3. CATEGORY 2 AND CATEGORY 3 WOOD, AND STREAMBED ALLUVIUM SHALL BE PLACED IN ALTERNATING LIFTS AND BUCKET COMPACTED UP TO THE TOP OF BANK ELEVATION AS SHOWN IN THE INSTALLATION SEQUENCE. PLACE 6 FT TO 8 FT. DORMANT WILLOW CUTTINGS AT A DENSITY OF 5 PER LINEAR FT ALONG THE TOP OF BANK LINE ELEVATION. WILLOW CUTTINGS SHALL SLOPE AT AN APPROXIMATE 1:1 SLOPE AS SHOWN IN SECTION VIEW. STEMS MAY OVERLAP. THE CUT ENDS SHALL BE PLACED AT THE BASE OF THE SLOPES WITH THE UN-CUT ENDS EXTENDING BEYOND THE EDGE OF THE TRENCH SO NO GREATER THAN ONE-THIRD OF THE TOTAL CUTTING LENGTH IS EXPOSED BEYOND THE TOP OF BANKLINE. WILLOW CUTTINGS SHOULD INTERCEPT THE DESIGN TOP OF BANKLINE AS SHOWN IN STEP 5 OF THE INSTALLATION SEQUENCE.
4. THE UPSTREAM AND DOWNSTREAM ENDS OF THE STRUCTURE SHALL TRANSITION SMOOTHLY INTO ADJACENT STREAMBANK STRUCTURES TO MINIMIZE EROSION, FLANKING, AND BANK FAILURE.
5. AFTER INSTALLATION OF THE VEGETATED WOOD MATRIX, BACKFILL THE STRUCTURE WITH STOCKPILED MATERIAL TO FINISHED GRADE, AND BUCKET COMPACT. INSTALL WILLOW TRENCHES AT A RATE OF 5 PER LINEAR FOOT (OR 50 PER TRENCH) AS SHOWN. NO AREAS BEHIND THE FINISHED BANKLINE ARE TO BE LEFT BELOW FINISHED GRADE.



4 WILLOW TRENCH
SECTION VIEW NTS



5 WILLOW TRENCH
PLAN VIEW NTS

STREAMBANK FILL GRADATION	
SIZE (IN)	PERCENT PASSING
8	100
4	90-100
3	50-80
1	30-50
0.05	10-30
FINES	10

NOTE: MIX SALVAGED MATERIAL AND IMPORTED MATERIAL TO ACHIEVE SPECIFIED GRADATION

TYPE 2 - VEGETATED WOOD MATRIX MATERIAL SCHEDULE (PER LINEAR FOOT)			
	ITEM	DIA. (IN)	QTY.
1	CATEGORY 2 WOOD	10 - 12	10
2	CATEGORY 3 WOOD	<4	12
3	BANK WILLOW CUTTINGS	0.25 - 1.0	5
4	STREAMBANK ALLUVIUM	8" MINUS	2 CY

WILLOW TRENCH MATERIAL SCHEDULE (PER LINEAL FOOT)			
	ITEM	DIA.	QUANTITY (EA)
5	WILLOW CUTTINGS	0.25" - 1"	5

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VEGETATED WOOD MATRIX TYPE 2 DETAIL

PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	3/07/25	LS	FINAL DESIGN	NW

PROJECT NUMBER RDG-24-009

DRAWING NUMBER 5.1

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DESIGN INTENT

PURPOSE: THE PURPOSE OF THIS TREATMENT IS TO CREATE CHARACTERISTICS DN NEWLY CONSTRUCTED FLOODPLAIN SURFACES THAT ARE SIMILAR TO THE CONDITIONS ON NATURAL, VEGETATED FLOODPLAIN SURFACES.

PLACEMENT CRITERIA: TREATMENTS ARE APPLIED TO FLOODPLAIN SURFACES THAT LACK ROUGHNESS ELEMENTS AND VEGETATION.

SUPPLEMENTAL INFORMATION: FLOODPLAIN ROUGHNESS TREATMENTS REDUCE THE RISK OF SURFACE EROSION AND INCREASE THE RETENTION OF SEDIMENT AND NUTRIENTS FOR THE DEVELOPMENT OF RIPARIAN VEGETATION. FLOODPLAIN ROUGHNESS IS APPLIED USING TWO METHODS: (1) MICROTOPOGRAPHY GRADING AND (2) WOODY DEBRIS PLACEMENT. MICROTOPOGRAPHY GRADING WILL CREATE AN UNEVEN SURFACE OF FURROWS AND RIDGES ON THE FLOODPLAIN. WOODY DEBRIS WILL PROVIDE STABILITY AND CONTRIBUTE ORGANIC MATTER TO FLOODPLAIN SOILS. PROPER ANCHORING OF WOODY DEBRIS IS REQUIRED TO PREVENT MOVEMENT DURING OVERBANK FLOWS.

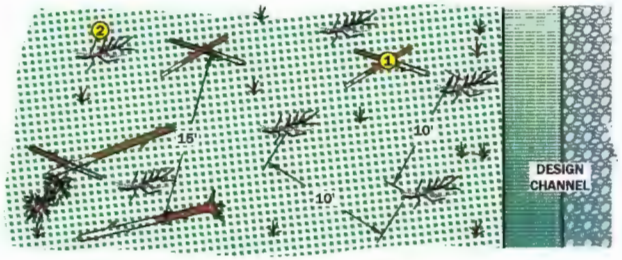
NOTES ON FLOODPLAIN ROUGHNESS INSTALLATION

1. CONTRACTOR SHALL DEVELOP MICROTOPOGRAPHY AND PLACE WOODY MATERIAL IN THE CONSTRUCTED FLOODPLAIN.
2. TRANSPORT CATEGORY 2, AND CATEGORY 3 WOOD FROM FROM DESIGNATED STOCKPILE AREAS. PLACE CATEGORY 2 WOOD AT A RATE DF 35 PIECES PER ACRE AND SPACED AT AN AVERAGE DISTANCE OF 20 FEET FROM OTHER CATEGORY 2 WOOD. PLACE CATEGORY 3 WOOD SO IT COVERS 25 PERCENT OF THE FLOODPLAIN SURFACE (APPROXIMATELY 250 PIECES PER ACRE).
3. BURY CATEGORY 2 WOOD WITHIN THE FLOODPLAIN SURFACE, WITH ONE HALF OF THE LENGTH BURIED TO A DEPTH OF 2-FT., AND ONE HALF EXPOSED A MAXIMUM DF 2-FT ABOVE FINISHED GRADE AS SHOWN ON DRAWING. PLACE CATEGORY 3 WOOD ON THE SURFACE. CATEGORY 3 WOOD DOES NOT NEED TO BE BURIED.
4. CONSTRUCT LOW AND HIGH FEATURES (RIDGES AND FURROWS) AS SHOWN ON THE DRAWINGS. MAXIMUM HEIGHT OF RIDGES AND DEPTH OF FURROWS SHALL BE NO GREATER THAN 0.5-FT. RELATIVE TO FINISHED FLOODPLAIN SURFACE.

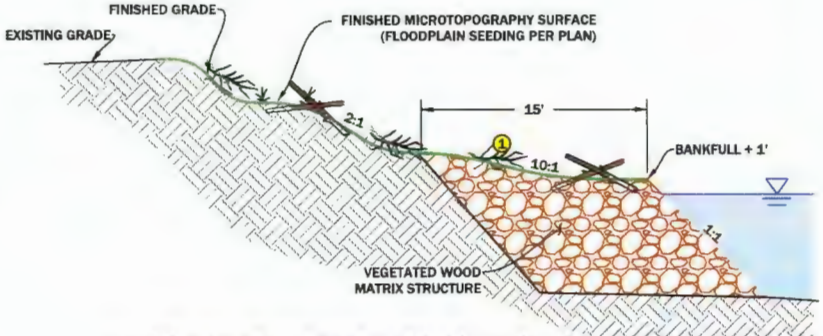
NOTES ON WILLOW TRENCH INSTALLATION

1. WILLOW TRENCHES WILL BE CONSTRUCTED WITHIN THE FLOODPLAIN AT THE DIRECTION OF THE CONSTRUCTION MANAGER.
2. CONSTRUCTION OF WILLOW TRENCHES WILL OCCUR AFTER OCTOBER 1ST AND BEFORE THE END OF THE CONSTRUCTION SEASON.
3. CONTRACTOR SHALL MARK AND ENGINEER SHALL APPROVE THE GENERAL CONSTRUCTIDN LOCATIDN FOR EACH VEGETATED WILLOW TRENCH PRIOR TO CONSTRUCTION.
4. A TRENCH WILL BE CONSTRUCTED APPROXIMATELY 3' DEEP AND EXTEND THE LENGTH OF THE STAKED TREATMENT LOCATION. LIVE WILLOW CUTTINGS WILL BE PLACED IN THE TRENCH SUCH THAT THEY ARE INTERMIXED AND ORIENTED AT A NEAR VERTICAL ANGLE.
5. THE TRENCH WILL THEN BE BACKFILLED WITH THE SAME MATERIAL REMOVED TO CREATE THE TRENCH AND SHOULD MATCH THE ELEVATION OF THE SURROUNDING FLOODPLAIN GRADE.

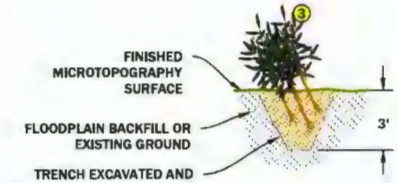
EXAMPLE OF CONSTRUCTED FLOODPLAIN ROUGHNESS



1 MICROTOPOGRAPHY AND FLOODPLAIN WOOD PLACEMENT
PLAN VIEW NTS



2 MICROTOPOGRAPHY AND FLOODPLAIN WOOD PLACEMENT
SECTION VIEW NTS



3 FLOODPLAIN WILLOW TRENCH
SECTION VIEW NTS

FLOODPLAIN TREATMENT MATERIAL SCHEDULE (PER ACRE)					
	ITEM	DIA. (IN)	LENGTH	QUANTITY (EA)	UNIT
1	CATEGORY 2 WOOD	10-12	10'-12'	35	EA
2	CATEGORY 3 WOOD	<4	10'-12'	25	% COVER*

*APPROXIMATELY 250 PIECES/ACRE

WILLOW TRENCH MATERIAL SCHEDULE (PER LINEAL FOOT)			
	ITEM	DIA.	QUANTITY (EA)
3	WILLOW CUTTINGS	0.25" - 1"	5

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FLOODPLAIN ROUGHNESS DETAIL

PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER RDG-24-009

DRAWING NUMBER 5.2

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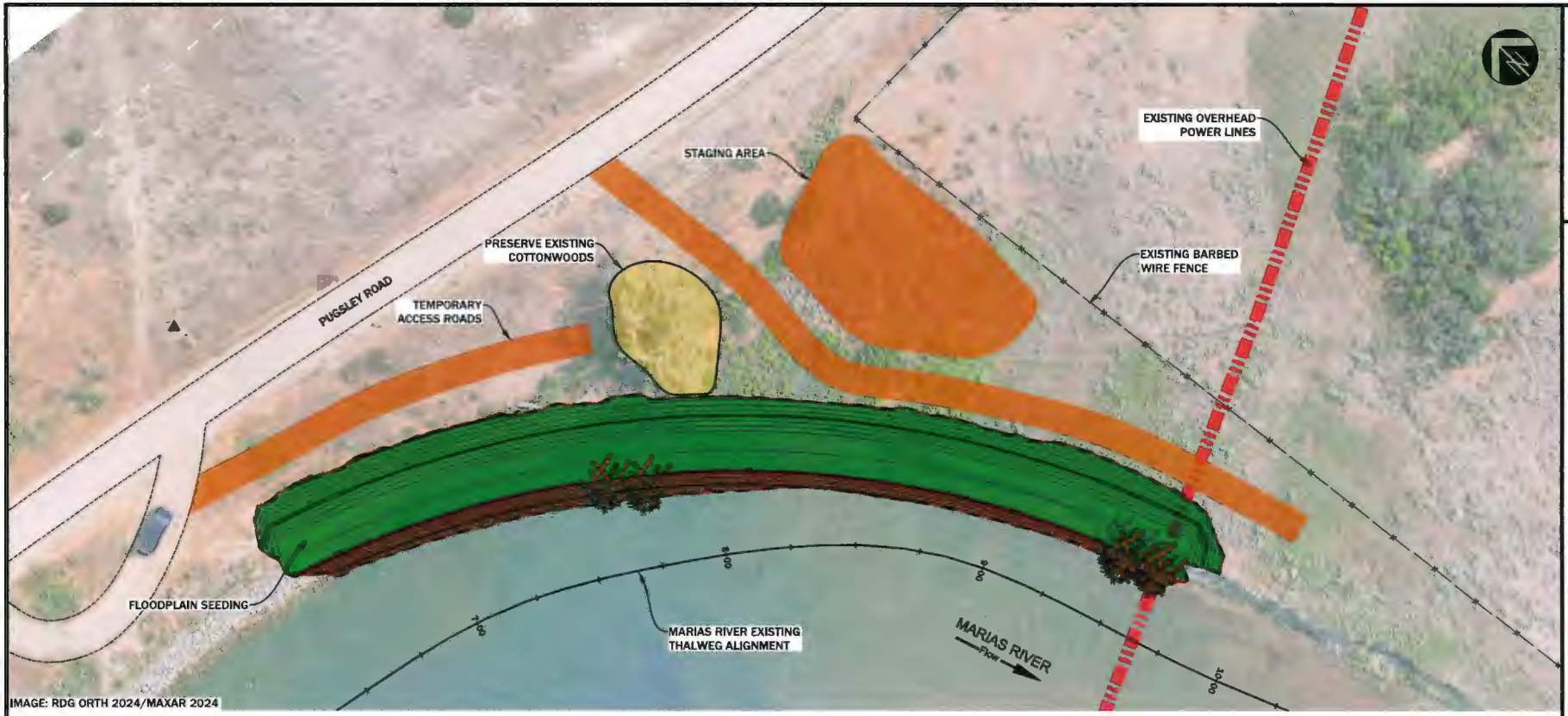

1 **SEEDING PLAN**
PLAN VIEW

1" = 30'

LOCATION	SPECIES		PLS LBS/ACRE	TOTAL PLS LBS
FLOODPLAIN 0.26 ACRES	SLENDER WHEATGRASS	*ELYMUS TRACHYCAULUS*	12.80	3.33
	BLUEJOINT REEDGRASS	*CALAMAGROSTIS CANADENSIS*	5.00	1.30
	TUFTED HAIRGRASS	*DESCHAMPSIA CAESPITOSA*	0.20	0.05
	MEADOW BARLEY	*HORDEUM BRACHYANTHERUM*	7.20	1.87
			TOTAL	6.55

LOCATION	SPECIES		PLS LBS/ACRE	TOTAL PLS LBS
STAGING AREAS, TEMPORARY ACCESS ROUTE 0.25 ACRES	STREAMBANK WHEATGRASS	*ELYMUS LANCEOLATUS*	8.00	2.00
	WESTERN WHEATGRASS	*PASCOPYRUM SMITHII*	14.22	3.56
	IDAHO FESCUE	*FESTUCA IDAHOENSIS*	3.56	0.89
			TOTAL	6.44

LEGEND

- FLOODPLAIN SEEDING AREA (~0.26)
- UPLAND SEEDING AREA (~0.25)

NOTE: CONTRACTOR SHALL RESEED ALL CONSTRUCTED AND DISTURBED AREAS SUCH AS FLOODPLAIN AND ACCESS AND STAGING AREAS

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SEEDING PLAN

PUGSLEY BRIDGE STABILIZATION PROJECT
CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
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RDG-24-009

DRAWING NUMBER
6.0

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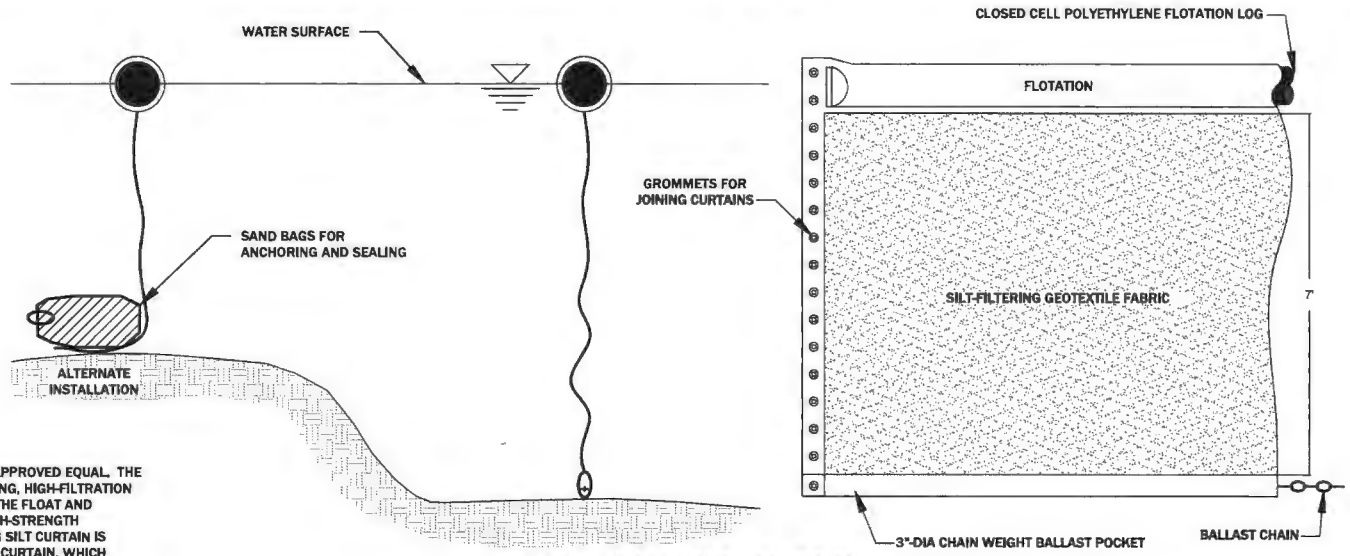
BMP'S SHALL BE INSTALLED AT THE DIRECTION OF THE CONSTRUCTION MANAGER



NOTE:

FLOATING SILT CURTAIN SHALL BE A "LAYFIELD FSC 13" OR APPROVED EQUAL. THE BODY OF THE FLOATING SILT CURTAIN IS MADE FROM A STRONG, HIGH-FILTRATION FABRIC THAT RETAINS FINE SILTS AND SEDIMENTS ON-SITE. THE FLOAT AND BOTTOM SLEEVE ARE CONSTRUCTED FROM A UV-STABLE, HIGH-STRENGTH POLYETHYLENE (I.E. RIPSTOP-TYPE MATERIAL). THE FLOATING SILT CURTAIN IS INCREASED IN LENGTH BY JOINING ADDITIONAL SECTIONS OF CURTAIN, WHICH TYPICALLY COMES IN 50' LENGTHS.

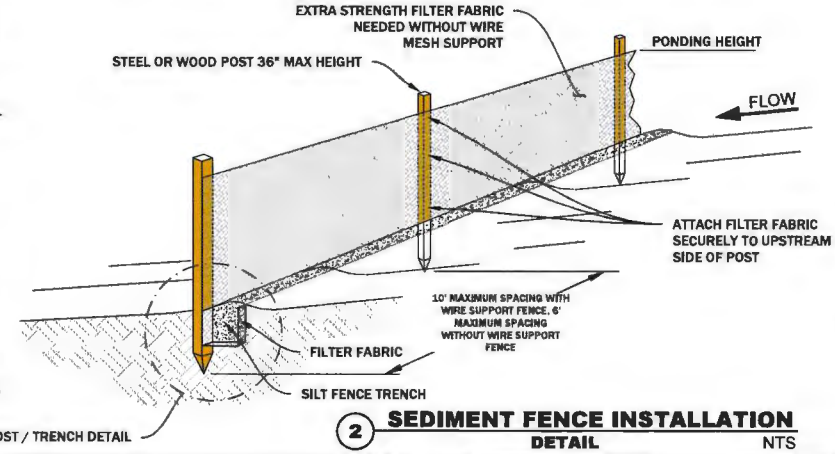
1 FLOATING SILT CURTAIN DETAIL NTS

GENERAL NOTES:

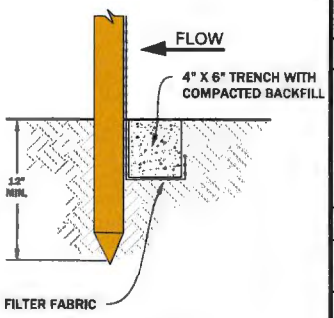
1. THE HEIGHT OF A SEDIMENT FENCE SHALL NOT EXCEED 36 INCHES. STORAGE HEIGHT AND PONDING HEIGHT SHALL NEVER EXCEED 18 INCHES.
2. THE FENCE LINE SHALL FOLLOW THE CONTOUR AS CLOSELY AS POSSIBLE.
3. IF POSSIBLE, THE FILTER FABRIC SHALL BE CUT FROM A CONTINUOUS ROLL TO AVOID THE USE OF JOINTS. WHEN JOINTS ARE NECESSARY, FILTER CLOTH SHALL BE SPLICED ONLY AT A SUPPORT POST, WITH A MINIMUM 6 INCH OVERLAP AND BOTH ENDS SECURELY FASTENED TO THE POST.
4. POSTS SHALL BE SPACED A MAXIMUM OF 10 FEET APART AND DRIVEN SECURELY INTO THE GROUND (MINIMUM DF 12 INCHES. WHEN EXTRA-STRENGTH FABRIC IS USED WITHOUT THE WIRE SUPPORT FENCE, POST SPACING SHALL NOT EXCEED 6 FEET.
5. TURN THE ENDS OF THE FENCE UPHILL.
6. A TRENCH SHALL BE EXCAVATED APPROXIMATELY 4 INCHES WIDE AND 6 INCHES DEEP ALONG THE LINE OF POSTS AND UPSLOPE FROM THE BARRIER.
7. WHEN STANDARD-STRENGTH FILTER FABRIC IS USED, A WIRE MESH SUPPORT FENCE SHALL BE FASTENED SECURELY TO THE UPSLOPE SIDE OF THE POSTS USING HEAVY DUTY WIRE STAPLES AT LEAST 1INCH LONG, TIE WIRES OR HOG RINGS.
8. THE WIRE SHALL EXTEND INTO THE TRENCH A MINIMUM OF 2 INCHES AND SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
9. THE STANDARD-STRENGTH FILTER FABRIC SHALL BE STAPLED OR WIRED TO THE FENCE, AND 6 INCHES OF THE FABRIC SHALL EXTEND INTO THE TRENCH.
10. THE FABRIC SHALL NOT EXTEND MORE THAN 36 INCHES ABOVE THE ORIGINAL GROUND SURFACE.
11. FLTER FABRIC SHALL NOT BE STAPLED TO EXISTING TREES.
12. WHEN EXTRA-STRENGTH FILTER FABRIC AND CLOSER POST SPACING ARE USED, THE WIRE MESH SUPPORT FENCE MAY BE ELIMINATED. IN SUCH A CASE, THE FILTER FABRIC IS STAPLED OR WIRED DIRECTLY TO THE POSTS.
13. THE TRENCH SHALL BE BACKFILLED AND THE SOIL COMPACTED OVER THE TOE OF THE FILTER FABRIC.
14. SEDIMENT FENCES PLACED AT THE TOE OF A SLOPE SHALL BE SET AT LEAST 6 FEET FROM THE TOE IN ORDER TO INCREASE PONDING VOLUME.
15. SEDIMENT FENCES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFUL PURPOSE, BUT NOT BEFORE THE UPSLOPE AREA HAS BEEN PERMANENTLY STABILIZED AND ANY SEDIMENT STORED BEHIND THE SEDIMENT FENCE HAS BEEN REMOVED.

GENERAL NOTES - CONT:

16. SEDIMENT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.
17. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY. 9" MAXIMUM RECOMMENDED STORAGE HEIGHT.
18. REMOVEO SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.



2 SEDIMENT FENCE INSTALLATION DETAIL NTS



POST / TRENCH DETAIL NTS

REFER TO PLAN FOR PLACEMENT OF BMP'S

RDG NOW PART OF SWCA
236 Wisconsin Avenue Whitefish, MT 59937 406.862.4927
311 SW Jefferson Avenue Corvallis, OR 97333 541.738.2323

BMP DETAIL

PUGSLEY BRIDGE STABILIZATION PROJECT

CHESTER, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
x	3/07/25	LS	FINAL DESIGN	NW

PROJECT NUMBER RDG-24-009

DRAWING NUMBER 6.1

Drawing 13 of 13

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