2021 319 Application Form

General Information

Project Name: Upper Ruby River Restoration

Sponsor Name: Ruby Valley Conservation District

Registered with the Secretary of State? Y

Registered with SAM? Y

Duns # 62-361-0149

Does your organization have liability insurance? Y

Primary Contact: Dominique Shore	Signatory: Gary Giem
Title: Stewardship Director	Title: Board Chairman - Ruby Valley Conservation District
Address: 402 S. Main Street	Address: 402 S. Main Street
City: Sheridan State: MT Zip Code: 59749	City: Sheridan State: MT Zip Code: 59749
Phone Number: (406) 842-5741 x 105	Phone Number: (406) 596-0920
Email Address: dominique@rvcd.org	Email Address: giem@3rivers.net
Signature: Dominique Shore Digitally signed by Dominique Shore Date: 2020.11.13 08:19:06 -07'00'	Signature: GARY GIEM Digitally signed by GARY GIEM Date: 2020.11.13 10:01:10 -07'00'

Technical and Administrative Qualifications

RVCD staff has over 10 years experience managing grants associated with the DEQ 319 grant program. Administrative staff are well experienced at bookkeeping, reporting, and invoicing for grants of this type. RVCD recently closed a 319 contract supporting restoration work on the Ruby River. The RVCD staff responsible for grant coordination has experience in planning and implementing ecological restoration, working with contractors and subcontractors and is proficient in technical writing and grant management.

Past Projects

Project Name	Grant or Contract Amount	Funding Entity *(entity name/program, contact person, phone, email)*	Completion Date
Upper Ruby Wildlife Habitat Improvement Project	$ 564,000.00	Kim Antonick, Wildlife Habitat Improvement Program Coordinator, Montana Fish, Wildlife & Parks kim.antonick@mt.gov, (406) 444-7291	December, 2023
Ramshorn Creek Floodplain Restoration and Demonstration	$ 120,000.00	MT DEQ, Mark Ockey, Watershed Protection Section mockey@mt.gov, (406) 444-5351	August, 2019
Miller Ranch Ruby River Channel Restoration	$ 104,500.00	MT DEQ, Robert Ray, Watershed Protection Section rray@mt.gov, (406) 444-5319	December, 2016

Budget Summary*

		Other Funding	Federal Match	Non-Federal Match	319 Funding Request	Total Cost
	Education and Outreach	$ 0	$ 0	$ 480	$ 1,600	$ 2,080
	Project Administration	$ 0	$ 0	$ 0	$ 16,600	$ 16,600
	Total	$ 0	$ 0	$ 480	$ 18,200	$ 18,680
	Project 1 Name	Upper Ruby River Restoration				
Project 1	Project Planning	$ 6,200	$ 0	$ 0	$ 8,700	$ 14,900
Project 1	Landowner Agreements, O & M	$ 0	$ 0	$ 0	$ 360	$ 360
Project 1	Project Implementation	$ 0	$ 0	$ 175,000	$ 240,000	$ 415,000
Project 1	Other Activities	$ 0	$ 0	$ 0	$ 0	$ 0
Project 1	Project Effectiveness Monitoring	$ 0	$ 0	$ 7,000	$ 1,440	$ 8,440
Project 1	***Total***	$ 6,200	$ 0	$ 182,000	$ 250,500	$ 438,700
	Project 2 Name					
Project 2	Project Planning					$ 0
Project 2	Landowner Agreements, O & M					$ 0
Project 2	Project Implementation					$ 0
Project 2	Other Activities					$ 0
Project 2	Project Effectiveness Monitoring					$ 0
Project 2	***Total***	$ 0	$ 0	$ 0	$ 0	$ 0
	Project 3 Name					
Project 3	Project Planning					$ 0
Project 3	Landowner Agreements, O & M					$ 0
Project 3	Project Implementation					$ 0
Project 3	Other Activities					$ 0
Project 3	Project Effectiveness Monitoring					$ 0
Project 3	***Total***	$ 0	$ 0	$ 0	$ 0	$ 0
	Total	$ 6,200	$ 268,700	$ 182,480	$ 268,700	$ 457,380

Fields outlined in black* ***on this page* *will auto-populate from other sections of the application form. Fields outlined in red* ***on this page*** *will not auto-populate. You must manually transfer the information for fields outlined in red.*

Education and Outreach

DEQ recognizes that developing good projects often requires a considerable amount of time and effort up front to build relationships and trust with individual landowners and stakeholder groups. To promote the development of future projects, DEQ is encouraging project sponsors to use up to $5,000 in 319 funding for education and outreach to develop and capitalize on these critical relationships. DEQ encourages applicants to incorporate on-the-ground projects into education and outreach efforts through on-site demonstrations and project tours. 319 funding may not be used to pay for food and beverages, or for honorariums and gifts. Education and outreach activities funded by 319 or used as match for 319 funding must adhere to all of the eligibility requirements outlined in the annual Call for Applications document.

Education and Outreach Deliverables *(Identify the education and outreach activities you will engage in and methods you will use to document their completion.)*

1. Pictures of tour and number of local landowners
2. Web article on Ruby Valley Conservation District Website

State Cash Match	Local Cash Match	In-Kind Match
		$ 480

319 Funding Request	Total Non-Federal Match	Federal Match	Other Funding*	Total Planning Cost
$ 1,600	$ 480			$ 2,080

Match Source		Secured
Match Source	10 Tour Participants at $12/hr for 4 hours	Secured ☐
Match Source		Secured ☐
Match Source		Secured ☐
Match Source		Secured ☐

**Use this space to record any funding that will be used to support creation of the task deliverables, but will not be reported as match. The purpose of this information is to give application reviewers a clearer understanding of the total amount of funding required to complete a task.*

Project Administration

Project administration includes book keeping, invoicing, interim/annual/final report preparation, office supplies, rent, communications, etc. Up to 10% of the total requested 319 funds for your entire application can be used to pay for project administration. However, like all other tasks, payment is by reimbursement for actual expenses incurred.

Project Administration Deliverables *(Include interim/mid-year, annual, and final reports, as well as invoicing and office necessities.)*

1. Quarterly reports
2. Annual Reports
3. Final Report
4. Billing Statements

State Cash Match	Local Cash Match	In-Kind Match

319 Funding Request	Total Non-Federal Match	Federal Match	Other Funding*	Total Planning Cost
$ 16,600	$ 0			$ 16,600

Match Source ____________________ Secured ☐

Match Source ____________________ Secured ☐

Match Source ____________________ Secured ☐

Match Source ____________________ Secured ☐

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Project Form

A separate Project Form ***(including providing separate attachments)*** must be submitted for each project included in your application. Use the following examples to help determine when to lump and when to split projects. For additional assistance, contact Mark Ockey at mockey@mt.gov.

Splitting Examples (fill out multiple Project Forms)

- Stream restoration work occurring on two separate streams, on parcels owned by two separate individuals
- Two projects with significantly different sets of project partners
- Two projects that address substantially different pollution sources (e.g., one project that moves a corral off of a stream, and another to remove mine tailings, with both projects being on the same 800-acre recreational property)

Lumping Examples

- Contiguous stream restoration work spanning multiple land parcels
- 3 projects that address similar sources of pollution on a single land parcel (e.g., moving a corral off a stream, implementing a grazing management plan, and relocating a manure storage facility out of the floodplain, all on the same ranch)
- A mini-grant program designed to address numerous failing septic systems scattered throughout a watershed

Project Name Ruby River Channel Realignment

Project Location

Latitude 45.17831 Longitude -112.14794

Latitude 45.19243 Longitude -112.14263

Latitude ______ Longitude ______

12-digit HUC(s) # 10020003

☑ **Project site map** attached, showing the location of all proposed on-the-ground restoration

Project Planning and Purpose

Select the Watershed Restoration Plan that your project will help implement.

Ruby - Ruby Watershed Group

Y Letter of support from author entity attached? *(if no, explain why below.)*

Waterbody name from the 2018 List of Impaired Waters Ruby River, Confluence of East, West, and Middle Forks to Reservoi

Probable causes of impairment to be addressed Sedimentation-siltation, alteration in stream-side vegetative cover

Waterbody name from the 2018 List of Impaired Waters ______

Probable causes of impairment to be addressed ______

or*

Name of healthy waterbody to be protected ______

Description of identified threat to non-impairment status

Name of healthy waterbody to be protected ______

Description of identified threat to non-impairment status

**While the majority of the available 319 project funding is dedicated to addressing known impairments, EPA is allowing states to use a limited amount of funding to protect non-impaired waters (healthy waters) from becoming impaired.*

Community Participation and Support

Landowner	Contributions to Project	Letter of Support Attached?
Ruby Valley Hydroelectric Authority	Financial Support	☑
		☐
		☐
		☐

Partner	Role	Letter of Support Attached?
The Nature Conservancy	Financial Support	☑
Montana FWP	Design feedback & review	☑
Trout Unlimited	Financial Support	☑
		☐

Other Community/Stakeholder Support

This project is supported by the Ruby River Water Users who hope to see Ruby Reservoir storage maintained. Letter of Support is attached.

Project Description

Describe the nature and extent of the nonpoint source problem you are trying to address, the root causes of the problem, and your proposed solution.

The RVCD plans to restore 2.3 miles of the Upper Ruby River just upstream of Ruby Reservoir to address sedimentation and loss of riparian vegetation. Today, this section of river is marked by high, fine-grained banklines that are quickly receding, washing fine sediment into the river, degrading in-stream habitat and reducing the storage capacity of Ruby Reservoir. The Upper Ruby Valley was once a patchwork of wetlands and floodplain channels promoting healthy aquatic and riparian habitat. Beaver were the keystone species that helped to maintain healthy floodplain habitat. Aggressive trapping of beaver in the mid-1800's lead to downcutting as the river transformed from a multi-threaded system into a single channel. By 1950, the floodplain had been converted into irrigated lands. In efforts to maintain crop-producing land, meanders were intentionally cut off by straightening the river and further which encouraged destabilization of the stream bank and causing the development of migrating headcuts. Destabilized banks left the river vulnerable to flooding, and when a ~500-year flood hit in 1984, three more meanders were cutoff. Since the late 1800's, ~6,500 ft of the Ruby River have been lost in the project area due to intentional and natural meander cutoffs. The loss of stream length caused localized downcutting and floodplain abandonment dropping the water table out of reach of bank-stabilizing riparian roots resulting in the loss of 9,199 ft of woody bank vegetation from 1961 to 2015. Degradation of riparian vegetation and downcutting has caused high, unvegetated banks to quickly erode resulting in high fine sediment loads reducing in-stream habitat and water quality.

The first phase of this project will address nonpoint source pollution by improving ~ 5,000 ft of bank with willow and brush matrix treatments and lengthening the Ruby River. To slow lateral erosion and transport of fine sediment into Ruby Reservoir, ~5,000 ft of streambank will be restored using three types of woody debris matrix treatments depending on the current rate of bank erosion. Where banklines are too high to use this method alone or the channel is over-widened, an inset floodplain will be created as well. Woody debris matrix structures increase roughness along the channel slowing erosion and encouraging sediment deposition and the establishment of desirable woody, riparian vegetation. The second phase of the project will add channel length and wetland habitat. Channel length will be added by plugging the current main channel and moving the river back into cut-off meanders. Bed aggradation structures will be placed throughout the project area to elevate the water surface elevation and encourage bedload aggradation. Aggradation structures will be placed on top of existing riffles preventing further down cutting and encourage floodplain connectivity. Adding back stream length, creating and activating overflow and seasonal channels, and restoring banklines with woody debris matrix treatments will help to reduce fine sediment loading as well as create a more functional, sustainable, and ecologically beneficial riparian area. We are requesting funding to complete the first phase of this project.

Is this project a continuation of a previous project? If so, please explain the connection.

Restoration actions have not been taken before on this property, but this project will be the third project on the Ruby River aimed at reducing sediment loading by increasing stream length and using willow matrices to treat banks.

Tasks and Budget

DEQ uses a standard template to develop scopes of work for 319 contracts. The tasks below match up with DEQ standard scope of work template. Some tasks might not be applicable to your project. Please leave the non-applicable tasks blank. If your project doesn't fit the task outline, use the task labeled "Other" to describe your project.

Task 1 - Project Planning Deliverables *(Include such things as completing project designs, conducting site evaluations, obtaining permits, organizing volunteers, conducting scoping meetings, etc. Identify specific deliverables that will be submitted.)*

1. Finalized 'permit-ready' designs
2. Contracting wetland delineation
3. Obtaining permits
4. Contracting excavation work

State Cash Match	Local Cash Match	In-Kind Match

319 Funding Request	Total Non-Federal Match	Federal Match	Other Funding*	Total Planning Cost
$ 8,700	$ 0		$ 6,200	$ 14,900

Match Source		Secured	
Match Source	Landowner	Secured	☑
Match Source		Secured	☐
Match Source		Secured	☐
Match Source		Secured	☐

**Use this space to record any funding that will be used to support creation of the task deliverables, but will not be reported as match. The purpose of this information is to give application reviewers a clearer understanding of the total amount of funding required to complete a task.*

Landowner Agreements, Operation and Maintenance

This task only applies to projects involving on-the-ground activities. DEQ periodically evaluates the effectiveness of each on-the-ground project. To accomplish this, DEQ requires a process be in place to allow periodic access to the project site. The landowner agreement should also specify the roles of each project partner in the design, implementation and continued operation of on-the-ground pollution prevention practices. DEQ does not require the use of a specific landowner agreement template. In some situations, existing agreements between the project sponsor and the landowner may be sufficient.

Task 2 - Landowner Agreements, Operation and Maintenance Deliverables *(Include such things as landowner/sponsor communication, and draft and final agreements.*

1. Landowner Agreement

State Cash Match	Local Cash Match	In-Kind Match

319 Funding Request	Total Non-Federal Match	Federal Match	Other Funding*	Total Planning Cost
$ 360	$ 0			$ 360

Match Source ____________________ Secured ☐

Match Source ____________________ Secured ☐

Match Source ____________________ Secured ☐

Match Source ____________________ Secured ☐

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Project Implementation

Task 3 - Project Implementation Deliverables *(Include such things as construction oversight, implementation of on-the-ground restoration practices, preparation and submittal of as-built drawings, etc.)*

1. Agreements with subcontractors
2. Construction documentation
3. As-built drawings or equivalent
4. Before and after photos of restoration work
5. 1,917 ft of bank treated using woody debris matrix with inset floodplain
6. 415 ft of bank treated using woody debris bank matrix with preserved native bank toe
7. 1,388 ft of bank treated using woody debris bank matrix with brush toe fascine
8. 3,787 ft of bank treated using woody debris bank matrix with cobble toe

State Cash Match	Local Cash Match	In-Kind Match
	$ 175,000	

319 Funding Request	Total Non-Federal Match	Federal Match	Other Funding*	Total Planning Cost
$ 240,000	$ 175,000			$ 415,000

Match Source		Secured
Match Source	Landowner	✓
Match Source	Trout Unlimited	✓
Match Source	The Nature Conservancy	✓
Match Source		☐

**Use this space to record any funding that will be used to support creation of the task deliverables, but will not be reported as match. The purpose of this information is to give application reviewers a clearer understanding of the total amount of funding required to complete a task.*

Other Activities

Use this task if the activities you are proposing are outside the scope of the typical design/implement/monitor process. Provide sufficient details to enable application reviewers to successfully compare the nonpoint source pollution reduction benefits of your project to those of other projects in the applicant pool.

Task 4 - Project Deliverables *(Include activities you will complete and the products you will submit to demonstrate completion.)*

State Cash Match

Local Cash Match

In-Kind Match

319 Funding Request

Total Non-Federal Match

$ 0

Federal Match

Other Funding*

Total Planning Cost

$ 0

Match Source ______________________ Secured ☐

Match Source ______________________ Secured ☐

Match Source ______________________ Secured ☐

Match Source ______________________ Secured ☐

**Use this space to record any funding that will be used to support creation of the task deliverables, but will not be reported as match. The purpose of this information is to give application reviewers a clearer understanding of the total amount of funding required to complete a task.*

Project Effectiveness Monitoring

The short duration (1-3 years) and limited spatial extent (often just a few hundred yards) of most 319-funded projects frequently precludes the use of traditional water chemistry monitoring as a means of evaluating project effectiveness. Instead, DEQ encourages project sponsors to use simpler, more qualitative tools. Typically, this will include pre- and post-construction photo point monitoring, vegetation mortality measurements, and perhaps modeling to estimate pollution load reductions. Please contact one of the DEQ Nonpoint Source Program staff for guidance relative to your specific project.

Task 5 - Project Effectiveness Monitoring Deliverables *(Identify the specific tools and products you will use to evaluate and demonstrate the effectiveness of your project in reducing nonpoint source pollution.)*

1. Establish 4 pre- and post-construction photo monitoring locations
2. Establish 4 vegetation transects
3. Establish lateral streambank erosion rate estimates using bank erosion hazard index (BEHI) calculations pre- and post-treatment at 4 representative reaches
4. Create monitoring and effectiveness plan with input from DEQ project manager

State Cash Match	Local Cash Match	In-Kind Match
	$ 7,000	

319 Funding Request	Total Non-Federal Match	Federal Match	Other Funding*	Total Planning Cost
$ 1,440	$ 7,000			$ 8,440

Match Source	The Nature Conservancy	Secured	☑
Match Source	The Ruby Valley Conservation District	Secured	☑
Match Source		Secured	☐
Match Source		Secured	☐

**Use this space to record any funding that will be used to support creation of the task deliverables, but will not be reported as match. The purpose of this information is to give application reviewers a clearer understanding of the total amount of funding required to complete a task.*

Water Quality Benefits and Sustainability

Explain why the project is an appropriate next step for making progress towards removing a pollutant/waterbody combination from Montana's 2018 Impaired Waters List or preventing a healthy waterbody from becoming impaired?

This project will reduce fine sediment loading in the Upper Ruby River and Ruby Reservoir. Reducing localized sediment inputs will improve aquatic habitat within the study reach. Limiting the sediment inputs to Ruby Reservoir will maintain storage capacity as well as reduce sediment inputs to the Lower Ruby River which is also impaired for sediment. While restoration of this 2.3 mile stretch of the Upper Ruby River is a small project compared to the ~42 miles of the Upper Ruby River, it is a positive step forward in promoting stream stewardship. The private land adjacent to the Upper Ruby River is held by only four landowners, the largest of which is already engaged in more passive stream restoration measures like rotational grazing and riparian conifer removal. This project will be used to build momentum for future on-the-ground projects in the area. This project itself was inspired by a site visit to a past 319-funded project on the Lower Ruby River completed in 2016 implementing similar restoration techniques.

Will your project address a major local source of nonpoint source pollution? Explain.

The Upper Ruby River receives high volumes of fine sediment as the stream downcuts and migrates laterally at anthropogenically accelerated rates into high, unvegetated banks composed primarily of fine-grained sediment. This project will restore the river system to a more natural sediment regime by improving, raw, unvegetated banks using brush matrix bank treatments resulting in increased channel roughness to slow bank erosion. These bank treatments will encourage recruitment of desirable woody vegetation providing a long-term solution to fine sediment loading. Additionally, the stream will be lengthened by restoring the channel to abandoned meanders which will reduce the river's erosive power and by placing bed aggradation structures to reconnect the channel with its floodplain.

Describe the long-term, sustainable benefits your project will have on water quality.

This project was designed to encourage, long-lasting sustainable changes to the river system that will reduce nonpoint source pollution. Without intervention, the current banklines within the project area will continue to erode for decades supplying high volumes of fine sediment to the Upper Ruby River and Ruby Reservoir. Brush matrix treatments will be used to slow bank erosion and create more sustainable in-stream and riparian habitat. Bank treatments will immediately stabilize eroding banklines and increase bank roughness . Over time, the bank treatments will promote recruitment of a desirable array of woody riparian vegetation that will promote bank stabilization long-term. Bank treatments are also designed to be deformable long-term to allow channel migration processes to occur once banks are stabilized with riparian vegetation. The proposed restoration site is currently lightly grazed, and grazing management post-restoration will prioritize woody vegetation recruitment over grazing potential. Additionally, this project will increase stream length and create seasonal and overflow channels which will decrease the erosive power of the river. Channel plugs constructed with deformable material that will ensure new channels remain activated long-term.

Explain how your project will promote self-maintaining natural, ecological, and social processes that protect water quality.

The Ruby River is currently excavating a new floodplain at a lower elevation. Natural channel evolution toward a functional floodplain will be a slow process without restoration and high volumes of fine sediment from bare banks will be flushed into the river system and Ruby Reservoir. The project will reduce sediment loading into the Ruby River by improving stream banks with brush matrix bank treatments which will mimic a streamside naturally vegetated by an ideal array of woody riparian vegetation which slow the erosive power of the river and naturally store sediment. Existing streamside vegetation communities are expected to rebound because of stream lengthening and reconnection with the floodplain. Grazing post-construction will be limited, as the landowner is strongly invested in improving the river system and protecting new vegetation growth from cattle browsing.

Nonpoint Source Goals and Success Metrics

Nonpoint source pollution goal	Action that will be taken to reach the goal	Metric used to measure success
Decrease siltation	Siltation will be addressed using two methods. Bank treatments will be done along ~5,000 ft of stream bank. Stream length will be added slowing flow and reducing erosive power. This will prevent further erosion of fine sediment from unvegetated banks and promote floodplain connection which will reduce stream energy and filter fine sediment.	Lateral erosion estimates pre- and post-restoration using BEHI calculations
Improve stream-side vegetation array	Willow matrix bank treatments will encourage the recruitment of new woody vegetation that will slow sediment erosion as well as provide shade and cover lowering stream temperatures and improving in-stream habitat.	Photos will be taken pre-construction and for five years following construction to qualitatively observe vegetation changes. Four vegetation transects will be established and monitored before and for five years following restoration work to quantitatively monitor vegetation change.

Project Education and Outreach

Describe the educational benefits of your project. Will the project inspire additional nonpoint source pollution prevention work within the watershed?

Following this project, the RVCD will organize educational site visits and field trips for local landowners, agencies, and non-profits. This project was inspired by a field trip following a similar 319-funded project completed on Miller Ranch downstream of Ruby Reservoir. There are only private landowners bordering the Ruby River for over twenty miles (USFS for many miles upstream of there) upstream of Ruby Reservoir. It is the goal of site visits to inspire more upstream and downstream landowners to perform similar projects on the Ruby Reservoir which has chronic problems with sedimentation from bare banks and incompatible grazing management, as well as improve future restoration projects through shared learning.

Bigger Picture Benefits

Describe your project's benefits to each of the items below. If there are no associated benefits, type "NA" for "not applicable".

Benefit to additional natural resources (e.g. native fisheries, threatened and endangered species, wetlands, etc).

The Ruby River upstream of Ruby Reservoir sustains populations of native Arctic grayling and westslope cutthroat trout. Arctic grayling populations are rebounding after reintroduction in the late 1990's, but are not common within this reach of the river, likely because of currently poor habitat conditions. Work done through this project will improve fisheries habitat by improving channel complexity, cover, spawning habitat and cooling water temperatures. Willow matrix bank treatments will increase woody riparian vegetation improving habitat for many species of ungulates, small mammals, and birds.The completion of this project will enhance ~7 ac of wetlands improving wildlife habitat.

Addressing climate resiliency and hazard mitigation.

The Ruby Reservoir has lost ~3000 ac-ft of storage since being constructed due to the influx of fine sediment from upstream. This project will promote natural sediment storage on floodplains and bars before sediment enters the reservoir slowing the loss of storage volume in Ruby Reservoir. As water supply becomes less predictable, maintaining the storage capacity of Ruby Reservoir will become more important for irrigation water supply. Additionally, this project will restore naturally functioning floodplains which will have to large benefits on climate resiliency and hazard mitigation. Floodplain connectivity leads to natural water storage sustaining stream flows through drought years. Additionally, functioning floodplains and wetlands buffer the erosive power of large flood events.

Provides direct public recreational access or aesthetic benefit.

The Upper Ruby Watershed is a popular recreation destination for hunters and anglers. There are public fishing access sites at bridges crossing the Ruby River on the downstream end of the proposed project site. Improving in-stream habitat between these two access points will improve angling opportunities for the public as well as improving the fisheries in general in the Upper Ruby River and Ruby Reservoir. Wildlife habitat for large game and migratory waterfowl will be improved by enhancing wetlands and restoring riparian vegetation.

Reduces pollutant loading above a permitted point source in a manner that could contribute to future economic benefit for a downstream Montana community.

Directly helps protect a drinking water source.

Drinking water in the Ruby Valley comes from shallow, unconfined aquifers. This project will encourage floodplain connectivity which promotes the recharge of unconfined aquifers protecting the drinking water supply. Wetlands created by the project will help to naturally filter water and improve the quality of groundwater supplies.

Benefit to socially disadvantaged populations.

Funding for this project will support Applied Geomorphology and the Ruby Valley Conservation District which are majority female-employee organizations.

Additional Attachments

Attach additional items that could help reviewers better understand your project. Items could include site photos, design drawings, site evaluations, permits, etc. Please be conscious of reviewers' time, as they may not have time to read lengthy studies and reports. List all additional attachments below.

- [x] Geomorphic Assessment
- [x] 70% Design Plan
- [x] Ruby River Water Users LOS
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]

Letters of Support

Montana Department of Environmental Quality

Attn: Mark Ockey

Watershed Protection Bureau

PO Box 200901

Helena, MT 59620

Letter of Support for the Ruby Valley Conservation District's 2020 319 Nonpoint Sources Project Funding Proposal: Upper Ruby Channel Realignment

Dear Mr. Ockey,

I am writing to express the Ruby Valley Water Users Association's support for the Ruby Valley Conservation District's Upper Ruby River Realignment Project. This project will have positive impacts for downstream water users by helping to maintain the long-term storage capacity of Ruby Reservoir.

The downstream water users rely on Ruby Reservoir to supply irrigation water through the growing season, supporting the economy of the Ruby Valley. Sedimentation of Ruby Reservoir and pressing threat to the community, as many in the Ruby Valley depend on water from Ruby Reservoir for our livelihoods. High sediment loads in the Upper Ruby have been causing loss of storage in Ruby Reservoir and degrading downstream water quality. It is our hope that lengthening and slowing bank erosion along the section of river upstream of Ruby Reservoir will slow sediment entering the Ruby River helping to maintain the storage capacity of Ruby Reservoir over the long-term.

We believe the outcomes of this project will prove invaluable to downstream water users who rely on the water stored in Ruby Reservoir for our livelihoods. For these reasons, the Ruby Valley Water Users Association supports the Ruby Valley Conservation District's proposal. Thank you for your consideration of the Ruby Valley Conservation District's restoration project along the Upper Ruby River and the benefits to the Ruby Valley Water Users Association this project will provide.

Sincerely,

Daniel E. Dooubos

President, Ruby River Water Users

11/07/2020

FWP.MT.GOV

THE **OUTSIDE** IS IN US ALL.

Region 3 Fisheries 730 N. Montana, Dillon, MT 59725 406-683-9310

Novemeber 3, 2020

RE: Ruby Valley Conservation District Upper Ruby River 319 application

Dear Mark and 319 selection panel,

Montana Fish, Wildlife & Parks (FWP) strongly supports the Ruby Valley Conservation District 319 application to reduce sediment input and restore riparian health and floodplain connectivity to the upper Ruby River.

The section of the upper Ruby River targeted for restoration has a degraded and disconnected riparian community and over-widened and simplified channel that combine to result in high sediment input, degraded aquatic habitat, and reduced trout abundances. Although many historic stressors have been removed, natural recovery is anticipated to take decades due to present channel dimensions and rapidly eroding streambanks composed primarily of fines and vegetated by introduced pasture grasses. Strong landowner commitment to restoration and complimentary stewardship in conjunction with prolonged natural recovery make this reach ideal for targeted intervention. This project has a high likelihood of success; the proposed techniques have been implemented elsewhere in the Ruby River to successfully establish and stabilize streambanks with woody riparian species, reconnect relict channels, reduce erosion, and promote floodplain reconnection and sediment storage. Preliminary fisheries monitoring there suggests improved trout spawning and rearing following the project and similar responses are anticipated in the upper Ruby River. As part of a stakeholder group convened to assess and implement long-term solutions, FWP is strongly supportive of the Ruby Valley Conservation District proposal to restore this reach of the Ruby River and expects the proposed approach will maximize aquatic habitat benefits and fish abundaces by reducing sediment input and improving riparian health.

FWP is committed to ensuring a successful outcome to this project and believes the aforementioned proposal is an essential part of achieving one. Please don't hesitate to contact me if you have further questions. Thank you for the opportunity to comment on the upper Ruby River 319 project and your continuing dedication to restoring and conserving Montana resources.

Sincerely,

Matthew Jaeger
Hydropower Mitigation, Native Species,
& Beaverhead-Ruby Program Manager

Ruby Valley
Conservation
District

P. O. BOX 295
402 SO. MAIN ST.
SHERIDAN, MT 59749
(406) 842-5741 PHONE
(406) 842-5914 FAX

*** PROTECT THE LAND AND PRESERVE OUR HERITAGE ***

October 22, 2020

Montana Department of Environmental Quality
Attn: Mark Ockey
PO Box 200901
Helena, MT 59620-0901

Dear Mr. Ockey:

This letter is in support of the proposal by the Ruby Valley Conservation District (RVCD) and the Ruby Watershed Council for their DEQ 319 Grant application for assistance to restore 2.3 miles of the Upper Ruby River just upstream of Ruby Reservoir in Madison County to address sedimentation, the loss of wetlands, floodplain channels and promoting healthy aquatic and riparian habitat.

The RVCD is committed to uniting agriculture, recreation, conservation and education to "protect the land and preserve our heritage". The proposed project is in line with the RVCD goals to work with local landowners to reduce historic impacts of stream alterations and to improve fish and wildlife habitat. Please consider providing full funding for this very worthwhile project.

Sincerely,

Gary Giem

Gary Giem, Chariman
Ruby Valley Conservation District

DC
Deep Creek

Mark Ockey
Montana Department of Environmental Quality
1520 E. Sixth Avenue
Helena, MT 59620-0901

Re: Ruby River 319 Proposal

Dear Mr. Ockey,
I would like to express our strong support for the Ruby Valley Conservation District's 319 proposal for reducing sediment loads in the Ruby River. This project will occur on our ranch just upstream of the Ruby reservoir, we are committed to restoring stream function and improving water quality in this reach of the river. Over the past year, we have implemented and paid for the completion of geomorphic and hydrologic assessments including restoration design for the river. If the RVCD's proposal is funded, we are planning to privately contribute $170,000 toward the implementation of the project in 2021 and 2022. We will also work with the conservation district to complete a landowner agreement that protects the investment in river restoration through careful grazing management, monitoring, and maintenance. Thank you for considering the Ruby River proposal.

Sincerely,

Alan Oborny

Alan Oborny

Manager
Ruby Valley Hydroelectric Authority

The Nature Conservancy
Protecting nature. Preserving life.™

The Nature Conservancy of Montana
32 South Ewing Street
Helena, MT 59601

Tel (406) 443-0303
Fax (406) 443-8311

nature.org

November 12, 2020

Mark Ockey
Montana Department of Environmental Quality
1520 E. Sixth Avenue
Helena, MT 59620-0901

Re: Ruby River 319 Proposal

Dear Mr. Ockey,
The Nature Conservancy strongly supports the Ruby Valley Conservation District's 319 proposal to restore two miles of the Ruby River upstream of Ruby Reservoir. The project is along an ecologically important reach of the river where several landowners and agencies are working together to protect and restore over ten miles of the upper Ruby River and associated floodplains and wetlands. If the project is funded, the Conservancy will contribute a total of $7,000 over 2021 and 2022: $3,000 for project implementation and $4,000 to measure project outcomes relating to water quality, water quantity, and stream function. Thank you for considering this exciting and well-designed river restoration project!

Sincerely,

Nathan Korb
Freshwater Director

November 13, 2020

Montana Trout Unlimited
PO Box 7186
Missoula, MT. 59807

Montana Department of Environmental Quality
Nonpoint Source Pollution Program
PO Box 200901
Attn: Eric Trum
Helena, MT. 59620-0901

RE: Support for Ruby Valley Conservation District 319 Grant Application

Montana Trout Unlimited writes in support of the Ruby Valley Conservation District's application to the Montana Department of Environmental Quality's 319 Nonpoint Source Pollution Grant Program. Chartered in 1964, Montana TU represents nearly 4,500 individual Trout Unlimited members and friends and is the umbrella organization for 13 separate TU chapters around the state, 3 of which call the waters of the Ruby River home. Montana TU, headquartered in Missoula, Montana, has a small dedicated staff of 6 conservation professionals and is organized and chartered under the non-profit umbrella of Trout Unlimited national. Montana TU's mission is to conserve, protect, and restore coldwater fisheries and their watersheds in Montana. This project aligns with our mission.

Montana Trout Unlimited is familiar with the proposal, understands the general expectations, and supports the project proposed to stabilize highly erosive banks and restore riparian habitat. Decades of poor land management have had severe impacts on the Upper Ruby Valley ecosystem. Completion of the proposed project will have several positive impacts; improve the fishery by creating complex habitat and storing groundwater for late-season return, reduce sediment infilling in the reservoir which is having a negative impact on irrigation water storage, reducing the availability of water downstream of the Ruby Reservoir during critical low-water periods, and returning natural processes and ecosystem functions to the river and floodplain.

Montana Trout Unlimited intends to provide $2,000 cash of financial support for project implementation.

Thank you for the opportunity to comment on this project,

Chris Edgington

Jefferson Watershed Project Manager
Montana Trout Unlimited
chris@montanatu.org
406.451.3035

Supplemental Attachments

Ruby River at RVHA
Geomorphic Evolution
Stream and Riparian Restoration Alternatives

February 28, 2018

Prepared by:

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Executive Summary

Prior to the General Land Office Survey of 1871, the Ruby River probably supported a mosaic of wetlands and floodplain channels that were supported by beaver activity. As beaver were aggressively trapped out of this region in the mid-1800s, the whole ecological framework that supported flow spreading and wide zones of riparian vegetation was undermined. Regionally, streams downcut as dams decayed and failed, and overbank flooding became less common. As flow became concentrated in the single channel, the river eroded downward into the fine wetland sediment, perching the adjacent floodplain. The Ruby River at RVHA appears to have experienced this change, as evidenced by perching of old channels, the exposure of predominantly fine sediment in the banklines, and the local exposure of small historic channels that used to spread flow energy and hydrate the floodplain.

The establishment of a single thread meandering river appears to have been largely complete by the time of the 1871 General Land Office Survey. This configuration was much more conducive to ranching, and by 1950, the floodplain surrounding river had been developed as irrigated hay ground. Floodplain development also included some river manipulation, as by the early 1960s several meanders had been intentionally cutoff, shortening the river. The 1984 flood cut off more meanders. The shortening steepened the river and caused some additional localized downcutting. Currently, the river has responded to the shortening and steepening by forming several headcuts in the bed indicating ongoing instability. With the perching of the floodplain, the riparian corridor has become stressed and degraded. Woody reinforcement of banklines has demonstrably dropped since the 1960s, and bank migration rates are high as the river develops new meanders and regains its length. Bank erosion is extensive along high banks that are consistently fine grained, so fine sediment production is high. In-stream fish habitat is well below potential.

Even with these impacts, however, the reach has excellent restoration opportunity, due to the preservation of several channel remnants that are low enough to still support healthy riparian vegetation and are feasible to restore. Restoration efforts in this reach will serve to improve the riparian corridor, increase stream shade, reduce stream temperatures, and reduce sediment loading into Ruby Reservoir. As the Upper Ruby River was listed by Montana Department of Environmental Quality as impaired due to excessive sediment loads, restoration work would be in concert with overall goals stated in the Ruby Watershed Restoration Plan (Montana DEQ, 2015).

1 Introduction

This report summarizes the development of restoration alternatives for a section of the Ruby River near Alder, Montana, referred to as RVHA (Figure 1). A second parcel called Triple Grizzly is also being evaluated, and the results of that effort will be provided in a second report. The main objectives of this assessment are to evaluate the geomorphic history of the river, and to provide practical restoration alternatives that will help address historic impacts, improve ecological function, and provide for long-term system resiliency.

The field assessment was performed on both sites during fall of 2017 by the authors of this report. Our project team includes Karin Boyd of Applied Geomorphology Inc, who was retained to perform a site investigation and her subcontracted long-term colleague Scott Gillilan of Gillilan Associates. Ranch manager Patrick Trischman walked both sites with us and we extend our gratitude for his insights and observations.

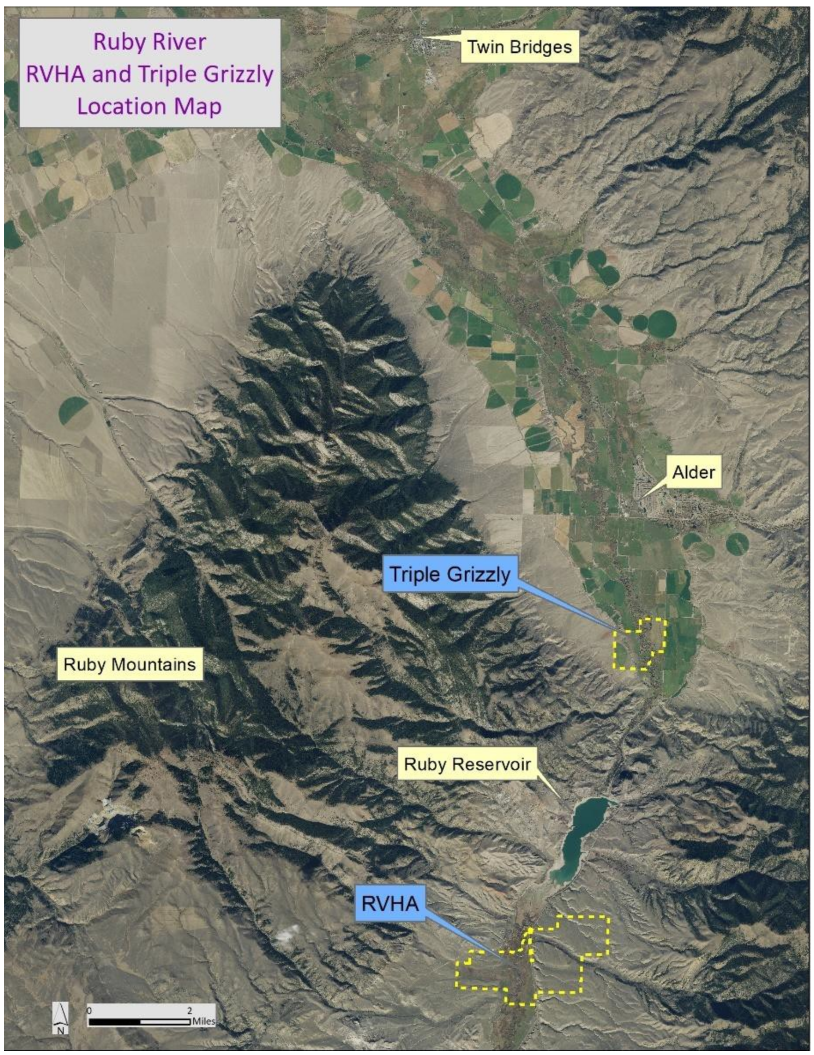

Figure 1. General project location, RVHA and Triple Grizzly parcels.

The property at RVHA includes about 2.3 miles of the Ruby River, most of which lies between the Maloney Ranch Road and Cottonwood Creek Road (Figure 2).

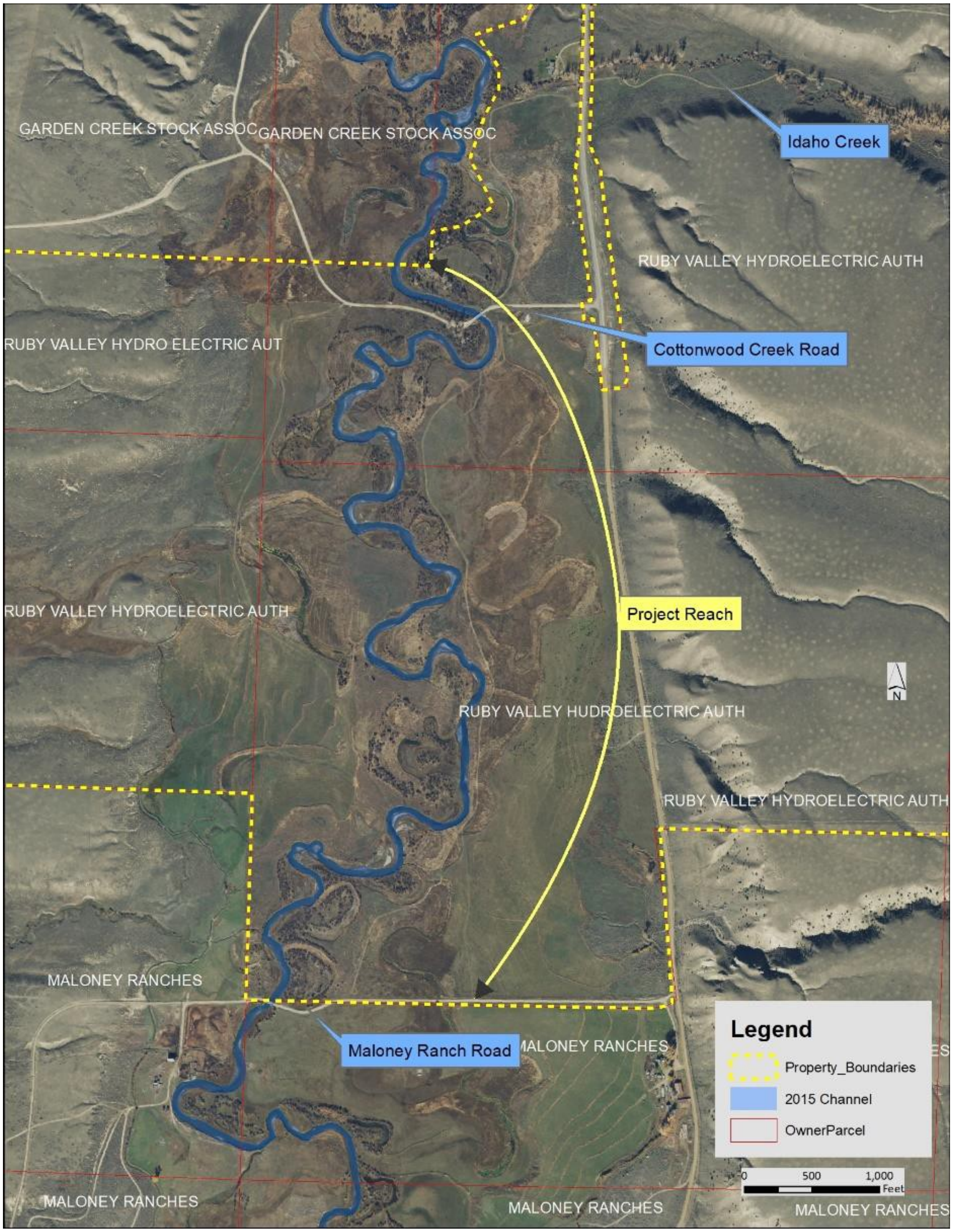

Figure 2. 2015 air photo showing project reach through RVHA parcel.

2 General Description of the Ruby River Valley

Understanding the historic evolution of the lower Ruby River over the last two centuries is critical in interpreting its current condition regarding floodplain access, channel stability, habitat value, and restoration potential. Major historic changes include extirpation of beaver, land development, riparian clearing, and irrigation. The flood of 1984, which was about a 200-year event, modified both the length and width of the river. Our goal is to tie together this history to better understand the historic evolution, current condition, and future trajectory of the Ruby River, to support the development of cost-effective restoration opportunities that will work with the system rather than fight it as it progressively heals.

The earliest available descriptions of the area are from Lewis and Clark's journals. As was common on their journey, the Corps of Discovery renamed the river from its original Shoshone name. The names of the Ruby in recent history are as follows:

- ***Pre-1805:*** The Shoshone knew the modern Ruby River as the ***Passamai,*** which means "Water of the Cottonwood Groves".

- **1805-~1870:** Lewis and Clark named the river the ***Philanthropy River***, in honor of one of Thomas Jefferson's Virtues. As they came up the Jefferson River to modern-day Twin Bridges, Lewis wrote the following in his journal on August 6th, 1805:

  "we therefore determined that the middle fork was that which ought of right to bear the name we had given to the lower portion or *River Jefferson* and called the bold rapid an clear stream Wisdom and the more mild an placid one which flows in from the S. E.*Philanthrophy*, in commemoration of two of those cardinal virtues, which have so eminently marked that deservedly selibrated character through life."

  The Jefferson River has since been renamed the Beaverhead, and the Wisdom River is now the Big Hole River.

- **~1870:** Early miners called the Ruby River ***Stinking Water***. According to one account, that name was adopted because of smells generated nearby sulphur springs. Another account is from artist A.E. Mathews, who noted in 1867 that miners found a herd of buffalo carcasses rotting along the stream banks (Montana Historic Society). An old Ruby River channel called Stinking Water Slough on the Hamilton Ranch has undergone major restoration in recent years.

- **1871:** General Land Office Surveyors called the river "The Passimeri or Stinking Water River"

- **1877:** The ***Ruby River*** was named in 1877 when miners in search of gold panned garnets out of the creek and mistakenly thought they were rubies.

2.1 Major Historic Impacts

While exploring the evolution of this section of the Ruby River, it has become clear that there have been some dramatic changes in the river system since the mid-1800s. These changes, along with the current condition of the river, paint a picture of a dynamic river corridor that has excellent potential for ecological uplift with strategic restoration. Alternatively, it is important to note that the river is currently healing from those impacts, such that a No Action alternative should be discussed. But the natural recovery trajectory is very slow; probably on the timescale of several decades. Furthermore, the natural healing process involves the production of high volumes of fine sediment that end up in the Ruby Reservoir as the river regains length and establishes a new inset floodplain at a lower elevation that was present historically.

2.1.1 Beaver Trapping

When Lewis and Clark arrived at the confluences of the Ruby, Beaverhead, and Big Hole Rivers in early August of 1805, they hiked more than 20 miles up and down the rivers trying to decide the best route forward (http://www.jeffersonriver.org). Lewis opted to explore up the Beaverhead and left a note for Clark on a "*pole at the forks of the river*" instructing Clark to follow him up the Beaverhead. But when Clark got to the confluence, a beaver had already cut down the pole where Lewis had left the note. Clark ended up going up the Big Hole and had a terrible time; he injured his ankle and they overturned a canoe, losing supplies and almost losing a man. They went back down the Big Hole and the expedition re-gathered at the confluence of the Big Hole and Beaverhead. A few days later, when Lewis and Clark were camped a few miles upstream of present day Twin Bridges, Clark noted that "*all those Streams Contain emence number of Beaver orter Musk-rats.*"

On the return trip, Clark came back down the Beaverhead. On Thursday, July 10, 1806, he wrote "*the Musquetors were troublesom all day and untill one hour after Sunset when it became cool and they disappeared. in passing down in the course of this day we saw great numbers of beaver lying on the Shores in the Sun. wild young Gees and ducks are common in the river. we killed two young gees this evening. I saw several large rattle snakes in passing the rattle Snake Mountain they were fierce.*"

The next day they camped at the mouth of the Philanthropy (Ruby) River, where they recovered a bayonet and extra canoe that they had left the year before.

American fur traders followed the Lewis and Clark expedition into the Upper Missouri River watershed. The trapping was most active in the 1820s and 1830s, with the American Fur Company having received 58% of its beaver pelts (13,685 pelts) between 1835 and 1838 from the Upper Missouri Outfit (Kauffman, 2005). The beaver trade was largely played out in the area by the late-1830s due to a devastated resource base and a drop in pelt prices. As early as 1831, a pelt trader named William Gordon described beaver as "extirpated" on the Northern Great Plains (Kauffman, 2005). The trapping era was remarkably efficient and extensive, but by the 1920's colonies started to reappear in the Upper Missouri (Figure 3).

Figure 3. Beaver range in Montana in 1936 (Kauffman, 2005).

Beaver are considered a keystone species that greatly affect ecosystem structure and dynamics. The removal of beaver from our riverscapes has resulted in dramatic changes to thousands of miles of streams in Montana, with persistent downcutting and resulting loss of connectivity between streams and their floodplains. Beaver dam complexes promote fine sediment deposition, flow spreading, wetland development and vigorous growth of riparian vegetation. These conditions translated into a mosaic of diverse aquatic and wildlife habitats. As the beaver were trapped out, the dams failed and streams cut through those wetland areas, leaving deeper, higher energy channels flowing through fine materials. The very fine bank sediments through RVHA support the notion that this system was historically a broad wetland complex, which was very likely sustained by beaver. It is also not uncommon to see old channels in the banklines that are smaller than the river today, indicating historic multi-thread channel networks typical of beaver dominated valley bottoms (Figure 4).

Figure 4. Typical fine-grained eroding bank with a perched side channel on the RVHA. This suggests that the Ruby River was historically connected to valley floor but is now downcut and disconnected.

While on the RVHA parcel, we saw one beaver and overall very little beaver sign. Unfortunately, the beaver could hardly move, and as it tried to escape us by diving, it couldn't go underwater due to what appeared to be bloating. These symptoms are typical of Tularemia, which is a disease caused by the bacteria *Francisella tularensis.* Tularemia, which is also called rabbit fever, occurs naturally world-wide. The manager of Red Rock Lakes Wildlife Refuge in the Centennial Valley has recently had positive test results for the disease in beaver. A graduate student at Montana State who is tracking tagged beaver in the region suggested that increasingly widespread reports indicate a potential outbreak in other upper Missouri systems such as the Madison and Gallatin Rivers (Torrey Ritter, pers, comm, 2018). So far, we don't really know how to anticipate population rebound as this disease runs its course.

Figure 5. Ailing Beaver spotted on RVHA reach, October 2017.

Figure 6. Beaver unsuccessfully trying to dive, RVHA.

2.1.2 Riparian Degradation

Another major trend in the region is the reduction of woody riparian cover on the Ruby and Beaverhead Rivers during the early 20th Century. Figure 7 shows air photos from 1963 and 2015 at the mouth of Idaho Creek, where there has been a loss of woody riparian density through time. On the RVHA parcel, most of the floodplain had been converted to hayfields by 1955, however there has been some additional loss of woody riparian vegetation since then. These more recent losses in woody cover are probably not due to active clearing, but due to some historic stream downcutting (post-beaver) that has perched the floodplain above the river and water table and created high eroding banks. Figure 8 shows the current riparian vigor in the upper portion of RVHA which is well below potential. A series of air photos showing the progression of stream and floodplain conditions from 1953 to 2015 are compiled in Appendix 1.

Figure 7. Ruby River just below Idaho Creek in 1963 (left) and 2015 (right) showing loss of woody riparian density. The RVHA has excellent potential to recover and expand its riparian and wetland communities.

Figure 8. View upstream of RVHA showing current density of woody riparian vegetation; note increased densities upstream of bridge (Kestrel Aerial Services).

2.1.3 Ruby Reservoir

In 1936, the State Water Conservation Board authorized the construction of a dam on the Ruby River to impound water over 1,000 acres of the Upper Ruby River valley, which was projected to support irrigation on 30,000 acres of land. The reservoir was completed in 1939 at a cost of $600,000 (Montana Historical Society, 2009). The 111 ft high structure is owned by the State of Montana. The impact of reservoir elevations on the river stability upstream is unclear, however it appears that the reservoir can backwater at least to the mouth of Idaho Creek. Changing water surface elevations in the reservoir probably drive cycles of sedimentation and erosion over the lowermost mile or so of river.

2.2 Flood History of the Ruby River

Another extremely important aspect of overall context at RVHA is flood history. Fortunately, the USGS has stream gages both below Ruby Reservoir near Alder and above the reservoir at Cottonwood Creek Road. Figure 9 shows the annual high flows measured above and below the reservoir since 1964. The flood of record on the Ruby was in May of 1984, when a massive rain on snow event caused extensive flooding on both the Ruby and Beaverhead Rivers. This event has been associated with major flooding across large portions of the Missouri River basin due to intermittent heavy spring rainstorms that drove rapid snowmelt (NOAA, 2010). While the flood below the reservoir was of itself extreme at a ~200 year event, the discharge measured upstream was 800 cfs higher, which the USGS identified as exceeding a 500 year flood event. This flood plays a major role in the evolution of the Upper Ruby River.

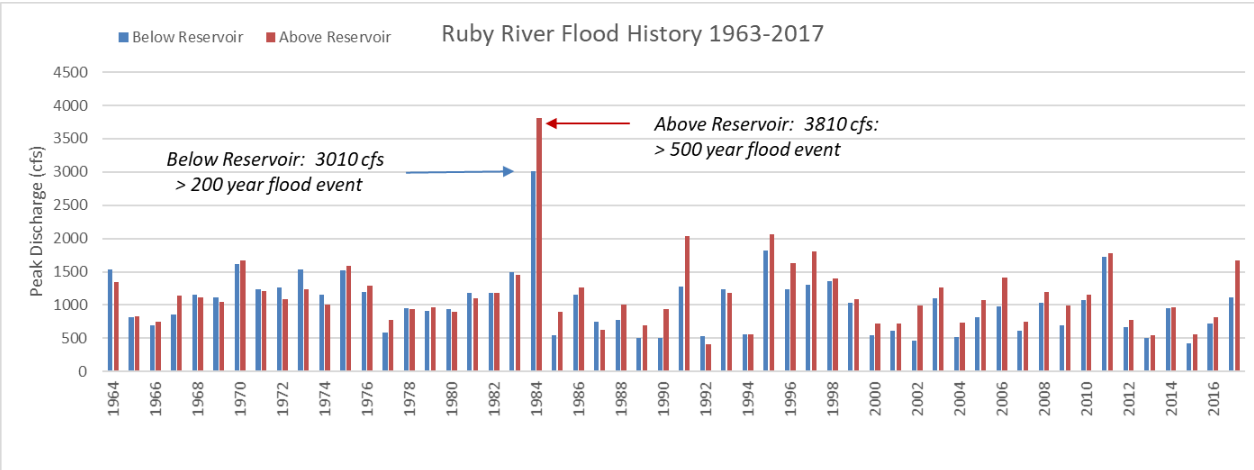

Figure 9. Annual Peak Flows on the Ruby River since 1942.

There is very little documentation of this Upper Ruby River flood event, even though it was relatively recent. The only reference we could find is from an EIS that the Beaverhead National Forest wrote for the Upper Ruby Watershed in 1992 as part of a Cattle and Horse Allotment Management Plan (USFS, 1982). They describe the impacts of the flood as follows:

> *"The flood has caused the channel to be in the configuration it exhibits today….Floods of this magnitude exacerbate the unstable geologic situation, produced vast amounts of sediment, and perpetuate channel instability. However, even a flood of the magnitude of 1984 shows little evidence of downcutting on the main stem of the Ruby River. Rather, the flood perpetuated the lateral migration of the channel, made some local adjustment in grade by cutting off meanders, and formed extensive point and mid-channel bars of bedload".*

This summary is consistent with our findings of channel change, in that most of the downcutting (or "incision") appears to have occurred well before this flood. The observation that the 1984 grade adjustments (adjustments to channel slope) were localized and caused by meander cutoffs has important implications for restoration opportunity.

Ruby Reservoir is managed for irrigation. The difference in flood peaks above and below the reservoir show that, as the reservoir is filling in the springtime to support irrigation, it can reduce annual peaks by several hundred cfs below the dam. This will be important in considering restoration options downstream of the reservoir at Triple Grizzly, as the flow regime there is more controlled and less energetic than at RVHA (Figure 10).

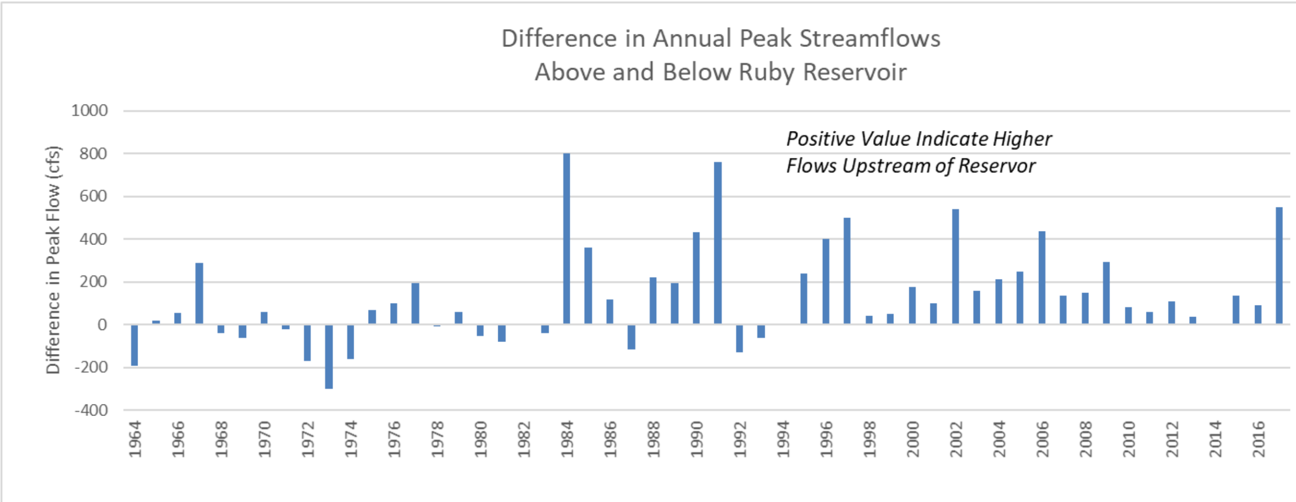

Figure 10. Difference in annual peak flows above and below Ruby Reservoir; positive numbers indicate higher flows entering reservoir than leaving.

2.3 The 1994 "Sediment Event"

In the fall of 1994, Ruby Reservoir was nearly drained, and sediment stored in the reservoir pool was mobilized. This delivered a huge sediment pulse downstream (Oswald, 2006) which caused a major fish kill. The event resulted in the implementation of a minimal storage pool of 2,600 acre-ft. The next year, a 5-year flood probably flushed much of the sediment further downstream, however this pulse would have strongly impacted conditions at Triple Grizzly. The Ruby River below Alder has elevated fine sediment loads to this day, particularly near Twin Bridges.

3 Geomorphic Evolution of the Ruby River through RVHA

Within the RVHA parcel, the Ruby River flows for 2.3 miles through a half-mile wide agricultural valley that supports irrigated hay production and non-irrigated grazing bottomlands (Figure 2). Our interpretation of the geomorphic evolution of the river through RVHA can be summarized as follows:

1. In pre-settlement conditions, the valley was a broad wet riverine bottom with multiple channel threads, dense woody riparian vegetation, and beaver dam complexes.
2. Following beaver trapping, the channel rapidly converted to a single thread river, eroding down into fine sediment by the time the General Land Office Survey (GLO) was completed in 1871.
3. The single thread meandering planform persisted through time. Riparian vegetation remained fairly dense along the banklines through at least the 1960s, although much of the floodplain had been converted to hayfields by then.
4. As part of floodplain development, at least three meanders were intentionally cut off just downstream of the Maloney Ranch Bridge at the upper end of RVHA.
5. During the 1984 flood, more meanders cut off, and the channel widened.
6. The meander cutoffs shortened and locally steepened the river. The consequences of this steepening are still manifested on the river as a series of headcuts in the streambed.
7. Since the 1984 event, the channel has been regaining its lost length through bank erosion. However, the erosion has been into areas where the riparian cover has decayed due to both land uses and early downcutting, so erosion rates are high and the sediment entering the river is notably fine grained and damaging to instream habitat.

This evidence that supports this sequence of events is described in more detail below, as the restoration strategies directly stem from an understanding of that history.

3.1 Pre-Settlement Conditions

The premise that RVHA originally hosted a wet mosaic of channel threads stems is based on both site conditions as well as our constant exposure to this change on the rivers of the Upper Missouri. As described in Section 2.1.1, small fine-grained channels are exposed in the modern eroding streambanks suggesting historic networks of channels smaller than the river is today. The bank sediment is persistently fine, indicating a low energy environment at its time of deposition (Figure 11). The only place large gravel deposits are exposed in the banks are where the river intersects meanders that cut off more recently, exposing a more recently developed streambed (Figure 12). Fortunately, the amount of downcutting has been relatively minor as the river encountered erosion-resistant clays in the bed, and as coarse material was transported in that helps support streambed elevations. Based on the current condition of the riparian vegetation, however, it appears that the downcutting has been sufficient to perch much of the historic floodplain above the water table, stressing willows to the point where most have not regenerated, leaving long unvegetated banklines vulnerable to additional erosion. The extent and quality of wetland habitat on the ranch has probably similarly degraded due to a drop in the groundwater table.

Figure 11. View downstream of high, fine-grained eroding streambank typical of RVHA.

Figure 12. View across river of gravel bankline where a meander cut off during the 1984 flood.

3.2 The General Land Office Survey (1871)

In May of 1863, six prospectors camped on Alder Gulch and turned up gold on their first pan. Virginia City was platted within a month and became the new territorial capital of Montana in 1865. By 1864, ten thousand people lived in Alder Gulch. The town of Alder served as the main railroad terminus for the miners, importing supplies and shipping gold ore out. By that time the beaver pelt marked had crashed and the economic driver in the area was mining, and agriculture rapidly expanded to support those mining communities.

By 1871, when the U.S. government surveyors came through, the beaver trapping era had been over for several decades. The 1871 General Land Office (GLO) Survey map shows at least two residences in the area, one just below Idaho Creek and the other down by the current reservoir location, suggesting that ranching was becoming established in the Upper Ruby River Valley (Peterson and Williams, Figure 13). The map also shows a dominant single thread channel through RVHA. It is interesting as the river segment flowing through what is now Ruby Reservoir was unusually straight, suggesting that the area was probably a low gradient geologically controlled wetland at the reservoir.

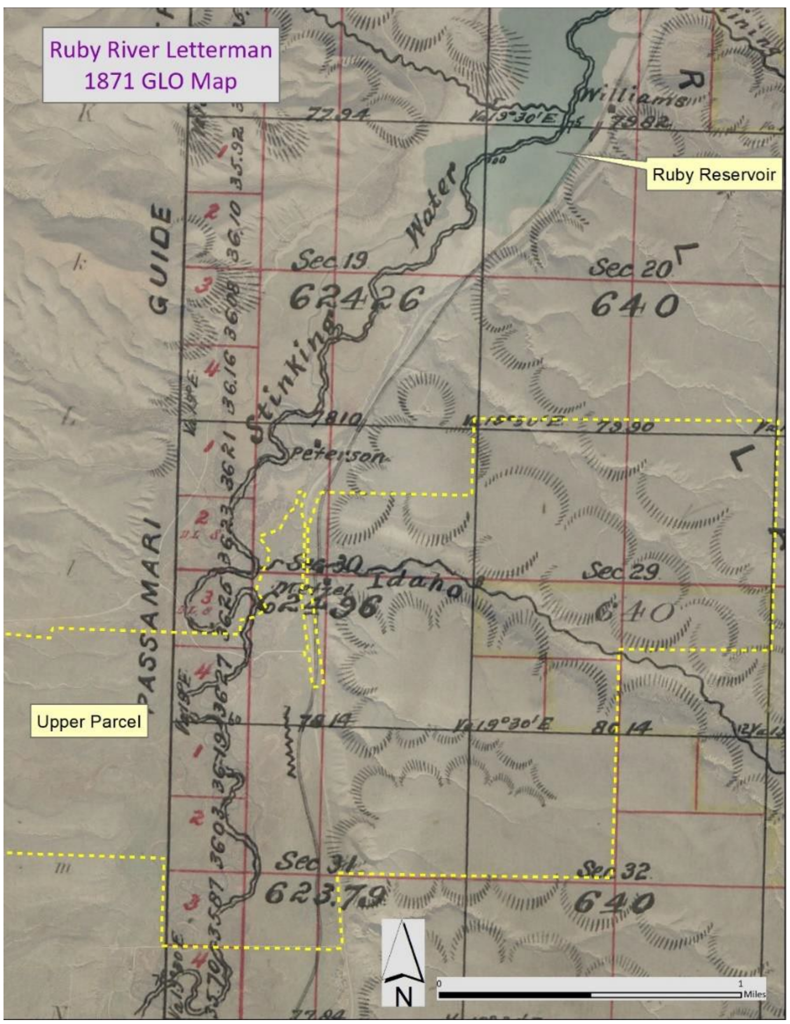

Figure 13. 1871 General Land Office Survey Map of RVHA.

3.3 Floodplain Development

Floodplain development was probably ongoing as early as the Alder Gulch mining days, but by the 1960s it was extensive. Figure 14 shows the extent of cultivation on the floodplain in 1961, with distinct changes in floodplain conditions at the southwest RVHA property line indicating active management. The figure also shows that the three meanders immediately downstream of the bridge were cut off by 1961. The meander on the left side of the river (as viewed downstream), was active in 1953. By 1961 it was cut off, and berms appear to block the cutoff from the river. Two other meanders on the opposite side of the river had been cut off by 1953, and their entrances and exits are blocked by berms as well (Figure 15). These two meanders provide an excellent restoration opportunity as described in Chapter 4.

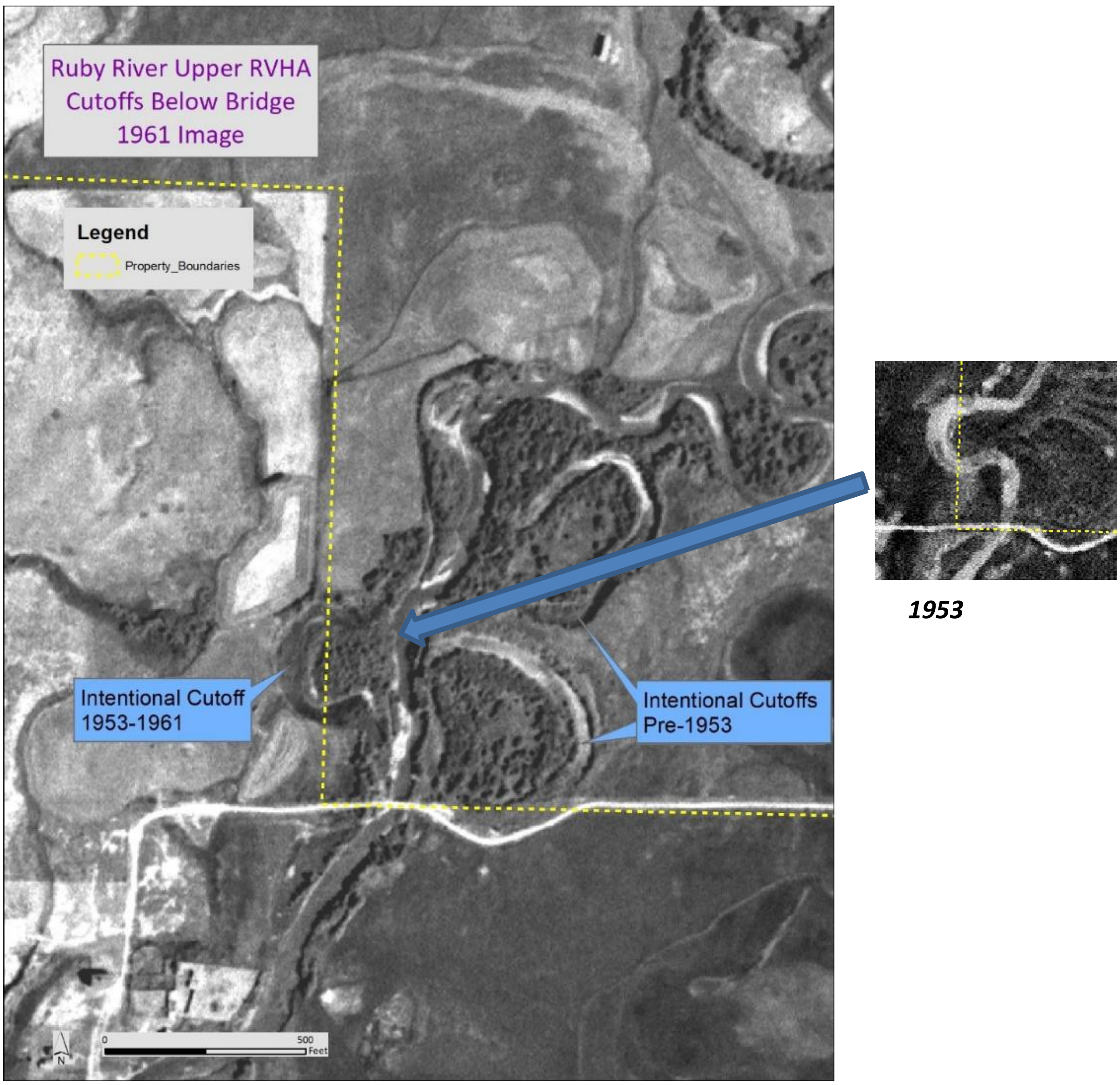

Figure 14. 1961 air photos showing floodplain development along property lines and earliest cutoffs in RVHA.

Figure 15. View downstream of berm blocking the entrance to the first meander below the bridge; P. Trischman is on the berm and S. Gillilan is down in the old channel to the right.

Intentionally cutting off river meanders or straightening streams was a common practice when landowners wanted to improve access to river bottoms or improve drainage from wetlands (Figure 16). Typically, new channels were dug through the meander core and the material was used to block the abandoned meander. Large scale channelization was supported by the US Government; between 1960 and 1971, the Soil Conservation Service (now the NRCS) approved the channelization of 16,483 miles of waterways in the US. Aldo Leopold called the post-WWII SCS an "Army of Stream Straighteners".

The flurry of channelization projects was quickly followed by the discovery of the unintended consequences of that work. In the southeastern US for example, the steepening caused by channelization created headcuts (essentially waterfalls in the stream bed) to form that rapidly migrated upstream. This work was not unheard of in Montana; we recently worked on a restoration plan for a rancher near Cascade whose grandfather had channelized much of their creek, driving major instability and riparian degradation upstream (Figure 18).

August, 1935 AMERICAN FORESTS 385

How DYNAMITE streamlines streams

Practically every farm in the heavy crop-producing areas of the United States needs some ditching, and there is hardly a stream in the entire boundary of the Union that does not need to be corrected to give better service in discharging the large amounts of waste water from heavy rains, and to protect low lands.

FIG. 54. DIAGRAM OF STREAM TROUBLES THAT MAY BE CORRECTED BY BLASTING.

CROOKED STREAMS are a menace to life and crops in the areas bordering on their banks. The twisting and turning of the channel retards the flow and reduces the capacity of the stream to handle large volumes of water. Floods result. Crops are ruined. Lives are lost. Banks are undermined, causing cave-ins that steal valuable acreage.

Figure 16. American Forests image from 1935 describing the virtues of channel straightening.

Figure 17. Stream downcutting caused by channelization downstream; the headcuts migrated upstream until intercepted by a road culvert.

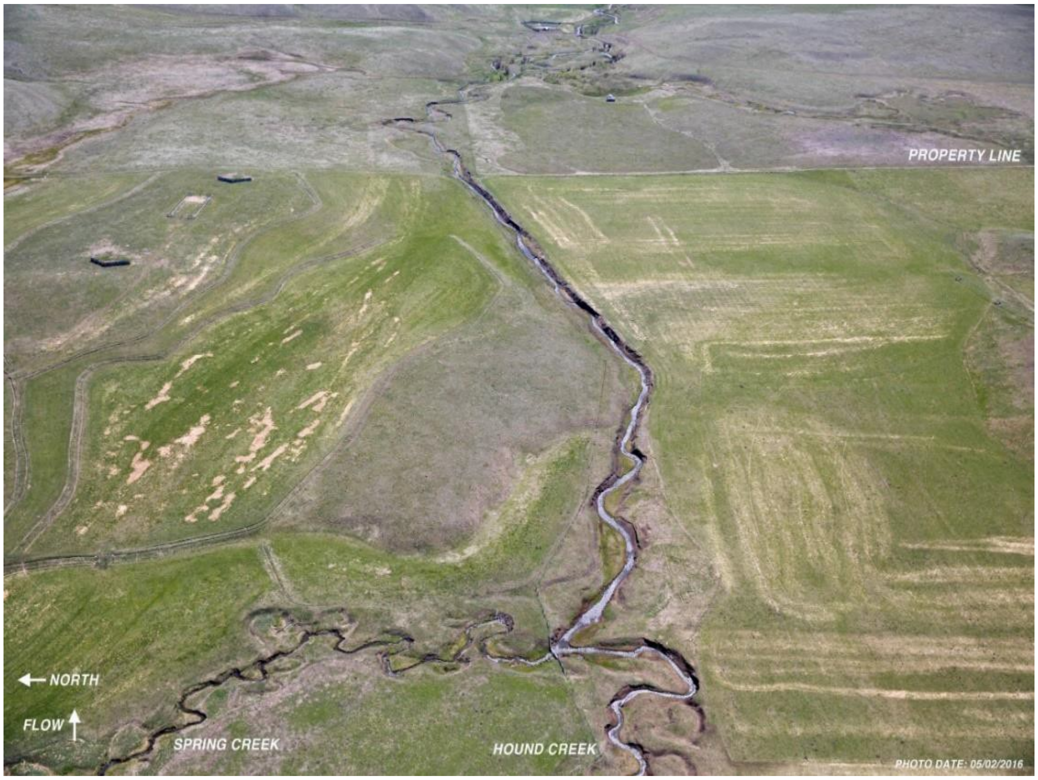

Figure 18. View downstream of channelized creek near Cascade MT (kestrel aerial services).

A tremendous amount of restoration work has been carried out on streams that were historically shortened. In many cases, such as on Hound Creek shown in Figure 18, the downcutting is so severe that restoring the stream to some semblance of its historic condition isn't financially feasible. On the RVHA parcel, however, the shortening has not been too severe, so the instability is manageable and cost-effective restoration appears highly feasible.

3.4 The 1984 Flood

The air photos that we use to bracket the 1984 flood are from 1977 and 1995. During those 18 years there may have been slow, non-flood related changes in river course that were not flood-driven. For example, one highly compressed bendway in the lower portion of RVHA cut off well before the flood ("natural cutoff" on Figure 19). However, based on recorded observations of the flood (USFS, 1992), and the shape of the bends that cut off, we believe that three meanders cut off during the flood (Figure 19). This is supported by USGS topo maps from 1983, which show the meanders as still intact the year before the flood.

Floods are great drivers of meander cutoffs as water overtops the bendway core creating a shorter, steeper flow path. If the flood lasts long enough, the steep channel will headcut back through the cutoff path and capture the main channel, leaving the old channel thread as an oxbow. Figure 20 shows an example of that process during a 2008 flood on the East Gallatin River in Bozeman.

Another clear impact of the 1984 flood was channel widening and formation of extensive open bars in the channel (Figure 21). Just like channel straightening, channel widening is a common impact of major floods, especially when bankline resilience is low due to degraded riparian vegetation.

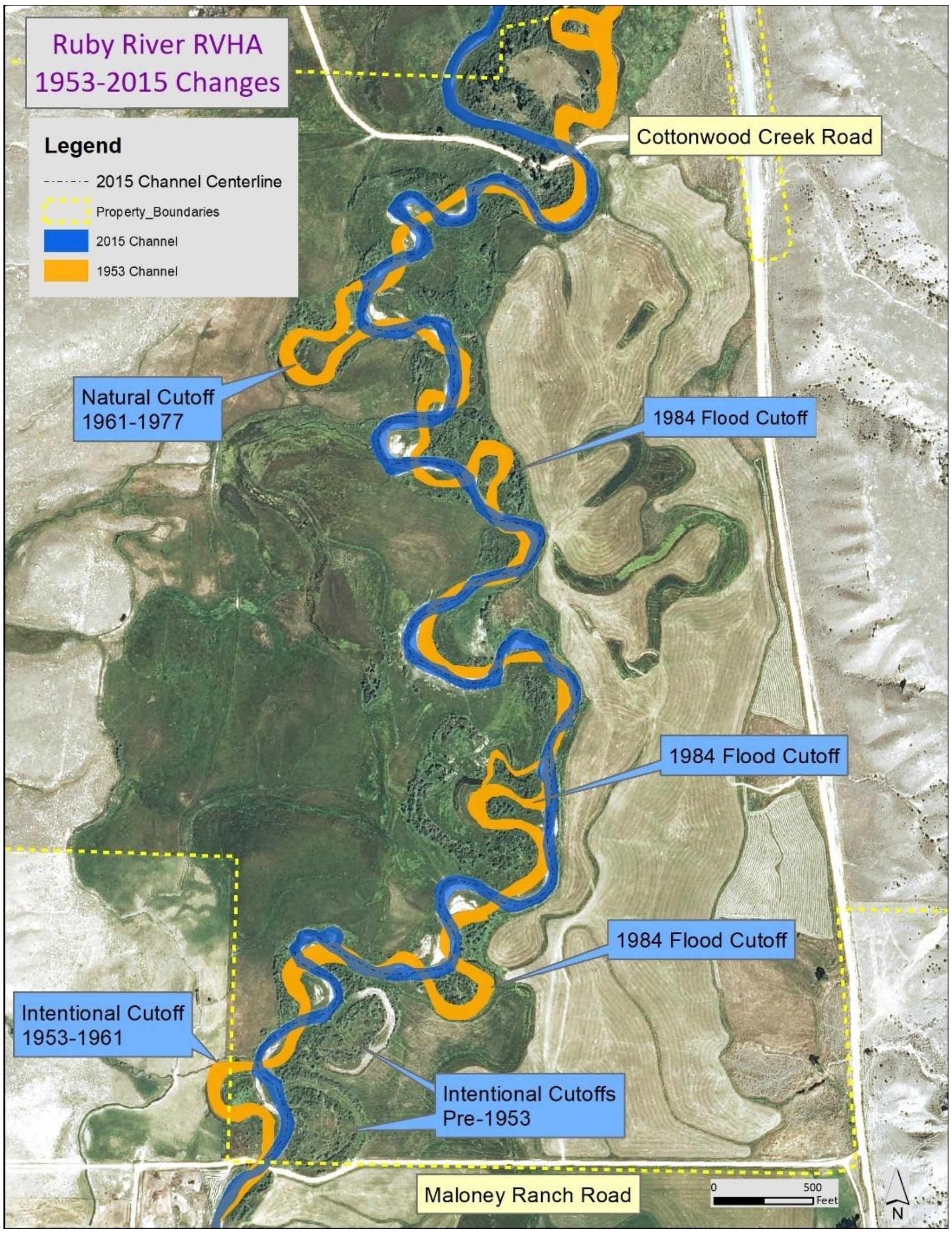

Figure 19. Changes in channel location between 1953 and 2015 highlighting timing and location of major cutoffs.

Figure 20. Example meander cutoff during a May 2008 flood on the East Gallatin River in Bozeman (DNRC).

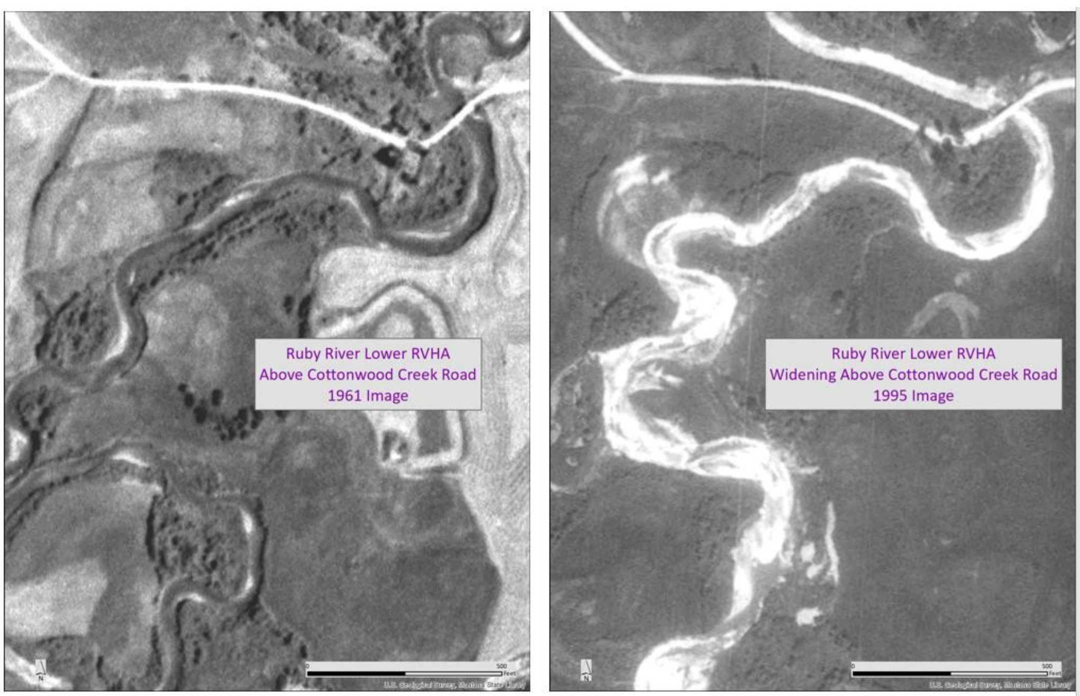

Figure 21. Channel widening between 1961 (left) and 1995 (right) attributed to 1984 flood.

3.5 Summary and Discussion

The project reach through RVHA has experienced substantial loss of meandering channel length since the pre-1950s due to a combination of constructed cutoffs, natural cutoffs, and flood impacts. A total of eight cutoffs were mapped, and all of them occurred before 1995 (Figure 22). In total, over a mile of channel length has been abandoned between the Upper Bridge and Cottonwood Creek Road (Figure 23).

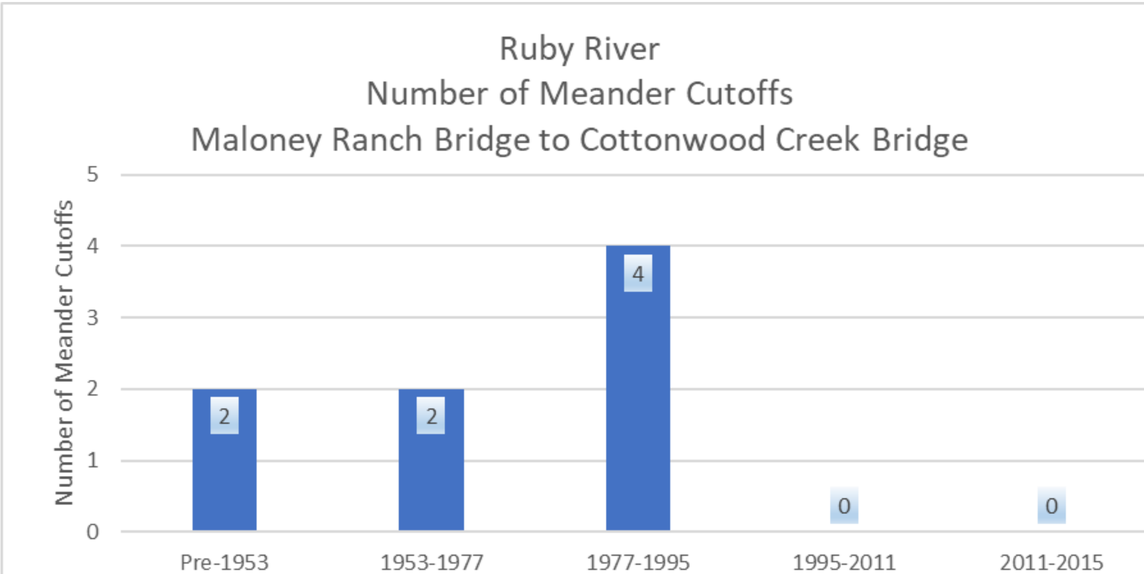

Figure 22. Number of meander cutoffs through time, RVHA.

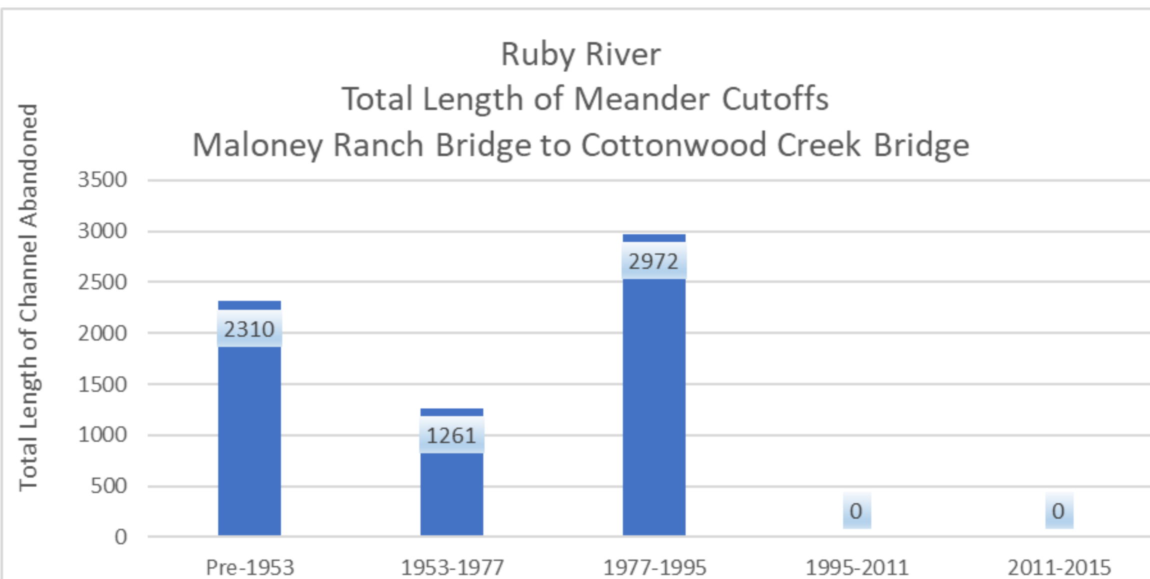

Figure 23. Total length of channel abandoned by meander cutoffs through time.

The river's response to these cutoffs is evident in the field through localized downcutting. When a bendway cuts off, the channel steepening typically causes some localized downcutting just upstream of the cutoff. This grade imbalance typically flattens out with time as it is absorbed by adjustments in the streambed. In some cases, however, the imbalanced is preserved by erosion-resistant materials in the bed that can maintain steep drops. For example, just upstream of the upper bridge at RVHA there is a rock ramp in the river holding a steep drop in the streambed on the southern neighbor's property (Maloney Ranches, Figure 24). This ramp was probably built to intercept downcutting that was migrating upstream, and now it records the grade imbalance caused by the cutoffs.

Further downstream in the core of RVHA, old wetland clays are exposed in the channel bed; these deposits are cohesive and fairly resistant to erosion. As a result, grade breaks can get "hung up" on clays causing steep drops in the bed profile. Figure 25 shows a good example of this phenomenon, which is a headcut that is migrating slowly upstream, leaving a deep channel with high banks below. As this headcut continues to migrate, it will continue to perch the adjacent floodplain.

Figure 24. View upstream through bridge on south RVHA boundary showing an over-steepened area reinforced by rock riprap.

The historic downcutting of the Ruby River through RVHA is recorded by high streambanks and headcuts in the channel bed. There is also a section of old riprap on the right bank, that is now about 30 feet from the river and perched a few feet above the river, located just upstream of a meander cutoff (Figure 26).

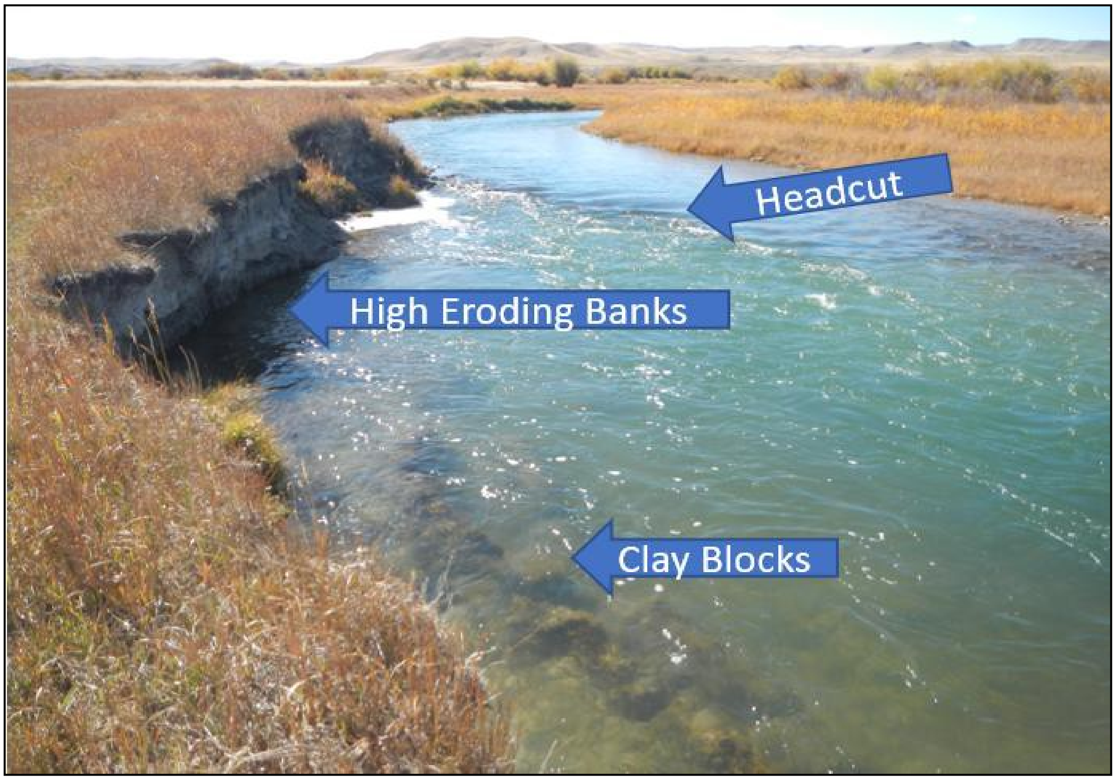

Figure 25. View upstream of central portion of RVHA showing headcut hung up on a clay bed.

Figure 26. View downstream at RVHA showing old perched riprap.

Although thousands of feet of channel length have been abandoned through RVHA due to cutoffs, the total length of the river has been increasing in recent decades (Figure 27). This is also typical of a "straightened" river, as the oversteepened straight channel will erode banklines to regain length and restore overall stability. The problem with this response to straightening is the extent of bank erosion that is required to recover length. Measured migration rates through RVHA are shown in Figure 28; the most severe bank erosion occurred during the window of the 1984 flood (1997-1995). Overall, however, migration rates have been relatively high through RVHA, typically on the order of two to four feet per year.

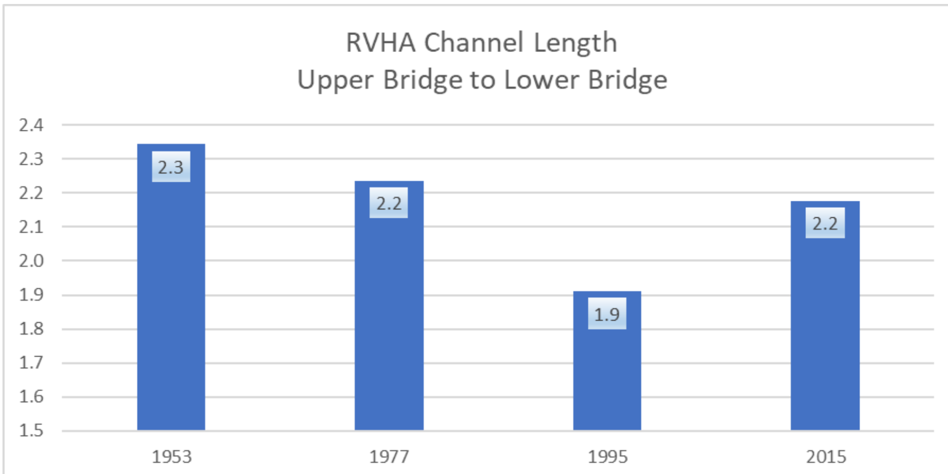

Figure 27. Channel length through time, RVHA.

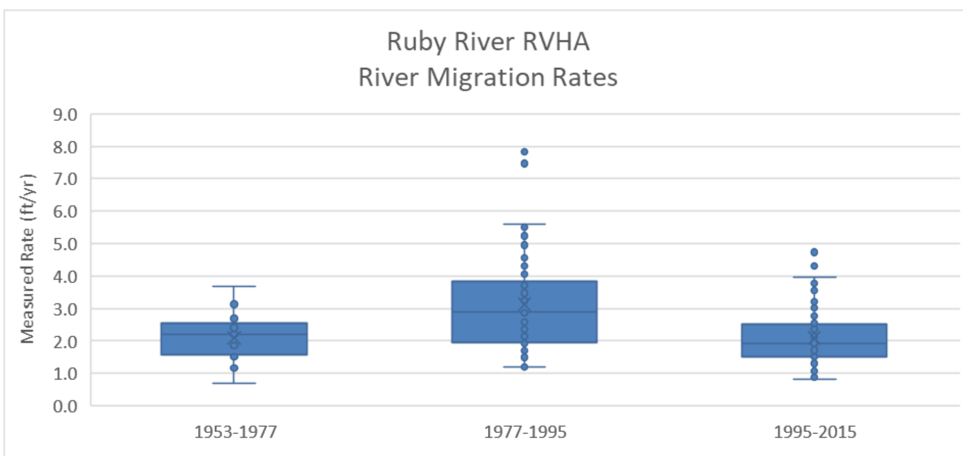

Figure 28. Measured channel migration (bank erosion) rates through time, RVHA.

Figure 29 shows the nature of channel movement through time based on mapping from 1953, 1961, 1977, 1995, and 2015 air photos.

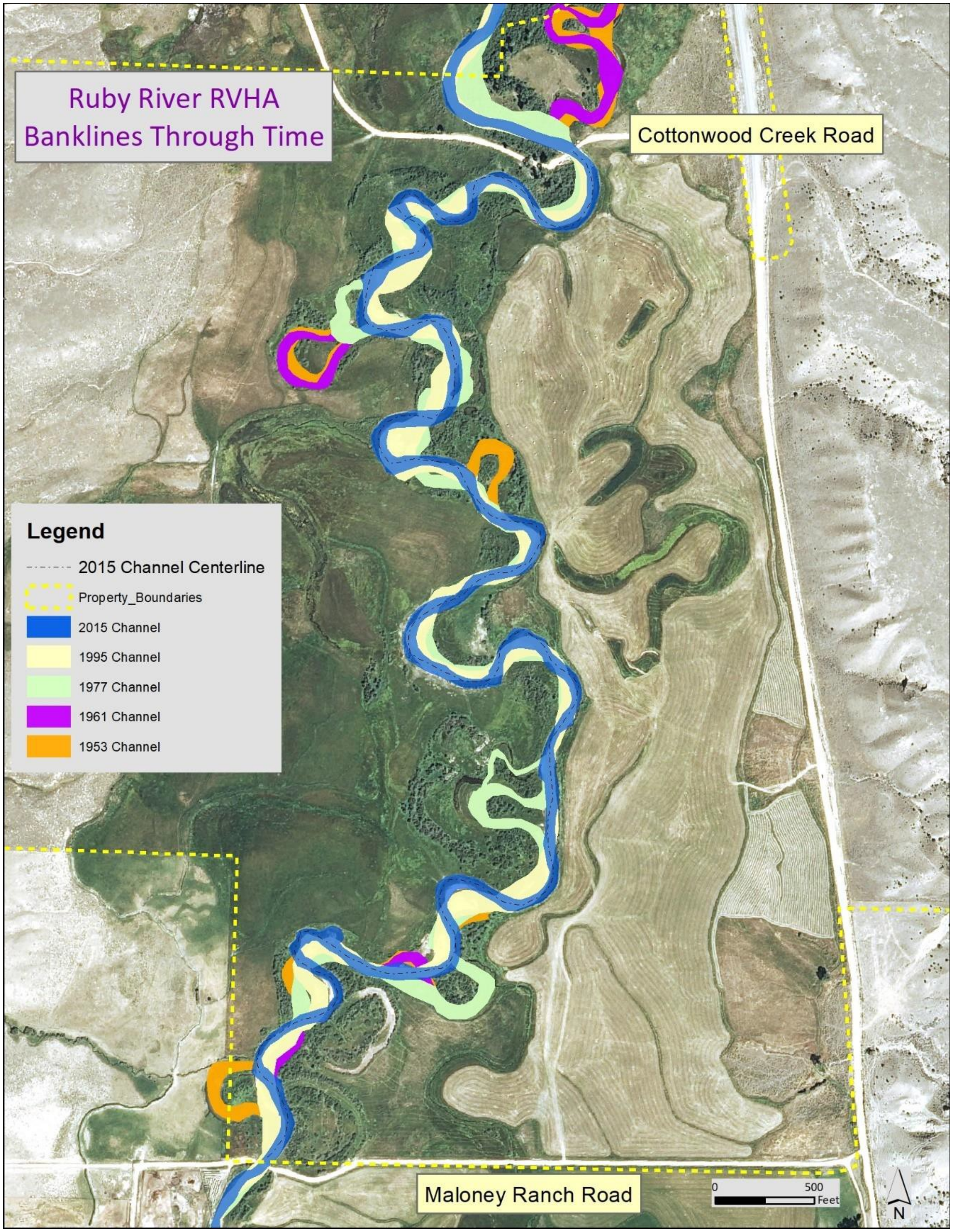

Figure 29. Mapped channel banklines plotted on a 2011 air photo.

Bank erosion is a natural stream process, and is an important aspect of stream function, as it helps create open bars for riparian vegetation growth, recruits spawning gravels, etc. Accelerated erosion into high, fine grained banks is more of a problem however, both with respect to the loss of productive bottomlands as well as the impact of fine sediment on in-stream habitat, and in this case, Ruby Reservoir. This process is made even worse when the banklines have no deep rooting vegetation to slow rates of bank movement. Figure 30 and Figure 31 show that the extent of non-woody bankline through RVHA has essentially tripled since 1961, making this reach especially prone to high rates of bank erosion and fine sediment production in response to historic shortening. An example non-woody eroding bankline is shown in Figure 32.

We saw two erosion control projects through RVHA, one is a few rock barbs in the upper part of the parcel, and the second is s series of rock/wood erosion control structures on the left bank. Although these structures are controlling bank erosion, they are impeding the natural need for the river to regain its equilibrium length.

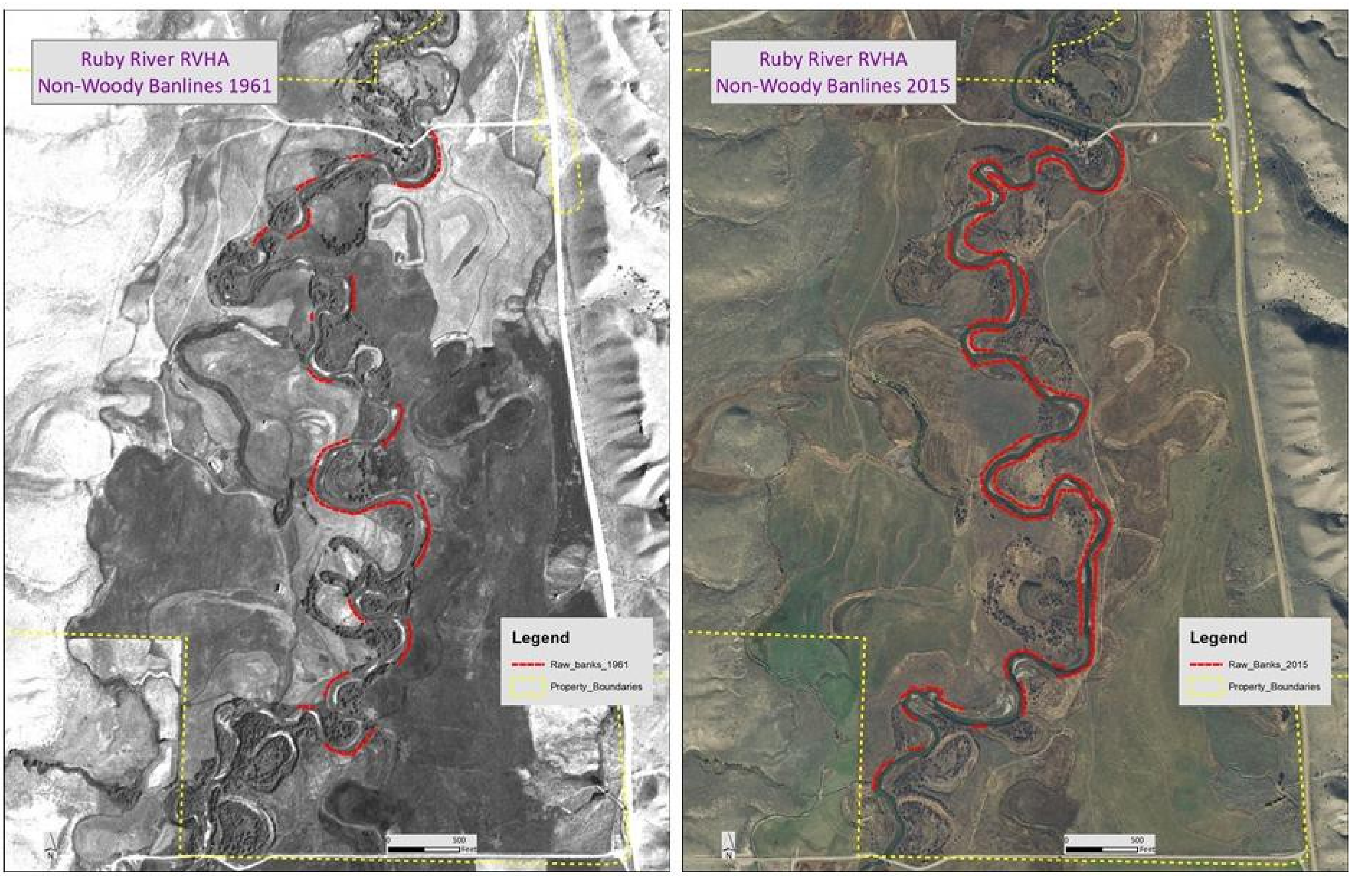

Figure 30. Extent of non-woody bankline through RVHA in 1961 (left) and 2015) right; red lines depict banks with low erosion resistance and low habitat value.

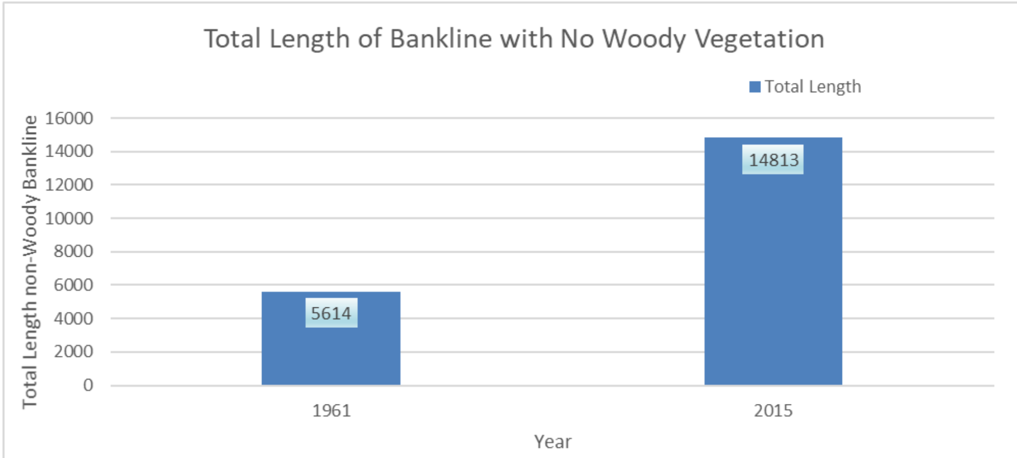

Figure 31. Total length of bankline with grassy vegetation, 1961 and 2015.

Figure 32. View downstream of typical grassed eroding bankline, RVHA.

Figure 33. View across river of rock/wood erosion control structures.

4 References

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RUBY RIVER RVHA RESTORATION PROJECT - 70% DESIGN

Madison County, Montana

September 2020

PREPARED FOR:

Ruby Valley Hydroelectric Authority

PREPARED BY:

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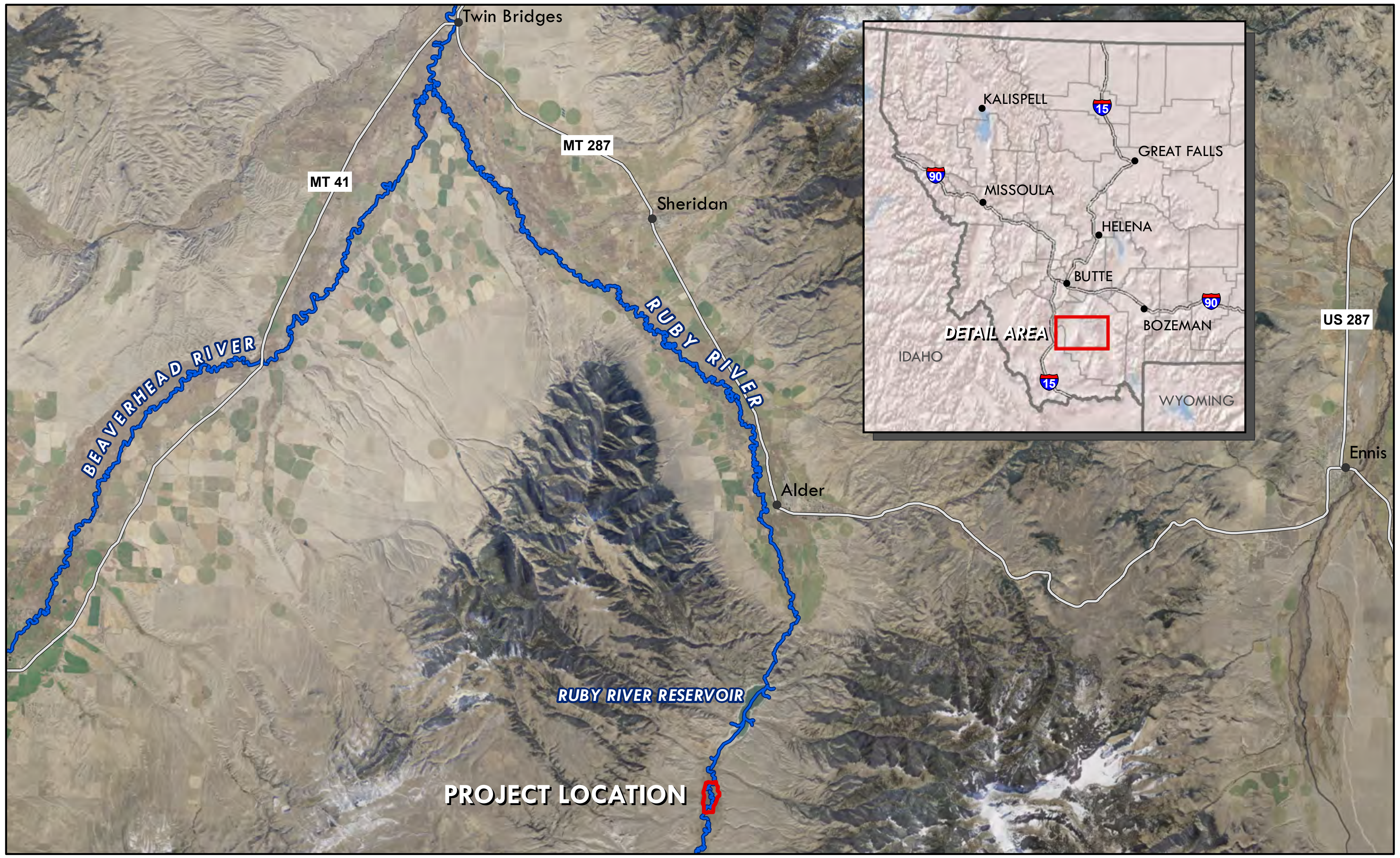

PROJECT DESCRIPTION

The Ruby River watershed is located in southwest Montana. The Ruby River is a tributary to the Beaverhead River and enters the Beaverhead at Twin Bridges, Montana. It originates on the Beaverhead National Forest between the Snowcrest and Gravelly Mountain Ranges. The Ruby River flows in a northerly direction for approximately 76 miles. The Ruby River RVHA Restoration Project includes a 2.2 mile long reach of the Ruby River upstream of the Ruby River Reservoir. The RVHA section of the Ruby River is located in Township 7 South, Range 4 West, Sections 30 and 31.

Prior to the General Land Office Survey of 1871, the Ruby River probably supported a mosaic of wetlands and floodplains that were supported by beaver activity. Beaver were trapped out of this region by the mid-1800s, followed by intense livestock grazing and conversion of floodplains to pasture and agricultural land. These actions resulted in concentration of flows into a single channel, vertical erosion of the river bed, and accelerated erosion of streambanks resulting in an over-widened channel, a perched floodplain and degraded aquatic habitat.

In 2017, Applied Geomorphology Inc. and Gillian Associates were asked to evaluate the geomorphic history of the Ruby River, and to provide practical restoration alternatives to help address historic impacts, improve ecological function, and provide for long-term site resiliency of the river and floodplain within the RVHA property. This plan set represents a 30% level design for a restoration plan to meet those objectives.

SHEET INDEX

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DATUM: North American Datum 1983

PROJECTION: Montana State Plane

UNIT: US Foot

DATA SOURCES:
USDA NAIP Imagery, 2017
ESRI Terrain Basemap
NHD Streams
MSL Roads, Towns, Borders

COVER SHEET

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

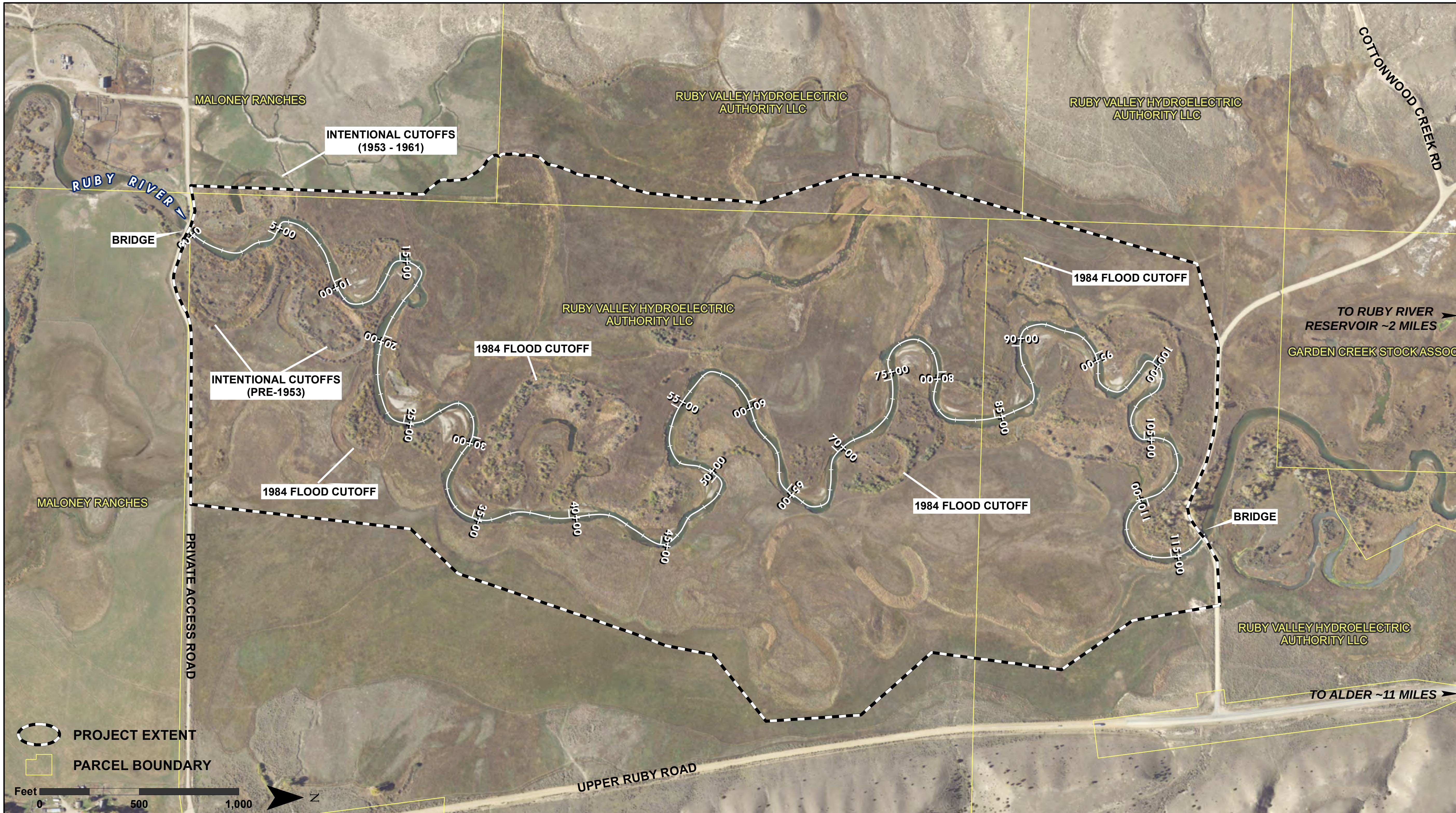
DRAWN BY: J. Wallace

DESIGNED BY: Geum, AGI, Gillilan

DATE: September 2020

SHEET

1.0



The Ruby River has been subject to significant human induced changes over the last 200 years. Beaver trapping, livestock grazing, conversion of floodplains and riparian areas to agriculture, irrigation, and infrastructure have all significantly changed the natural dynamics and overall ecological function of the river and floodplain. As part of floodplain development, at least three meanders were intentionally cut off. Past changes have resulted in a channel with high bank erosion that is too large to allow average flows to leave the channel. The loss of floodplain connectivity has resulted in a stressed and degraded riparian corridor with limited establishment of new woody riparian vegetation, little woody riparian vegetation along streambanks, and a predominance of introduced agricultural grasses in the floodplain. These changes have resulted in low resiliency of the system to high flow events. During the 1984 flood, more meanders cut off, and the channel widened. The meander cutoffs shortened and locally steepened the river. Since the 1984 flood event, the channel has been regaining its lost length through bank erosion. However, bank erosion primarily occurs in areas where cover of woody riparian vegetation is low due to both land uses and channel incision, resulting in high erosion rates. Both degraded channel and riparian conditions have resulted in aquatic habitat dominated by riffles and shallow runs with very few high-quality pools. High erosion rates also increase the amount of fine sediment entering the river, further reducing the quality of instream habitat.

Even with these impacts, the RVHA property has excellent restoration potential, due to the preservation of several channel remnants that are low enough to still support healthy riparian vegetation and are feasible to reconnect. Restoration efforts at the site will serve to improve the riparian corridor, increase stream shade, reduce stream temperatures, and reduce sediment loading into Ruby Reservoir. As the Upper Ruby River was listed by Montana Department of Environmental Quality as impaired due to excessive sediment loads, restoration work would be in concert with overall goals stated in the Ruby Watershed Restoration Plan (Montana DEQ, 2015).

The main factors limiting ecological function within the Ruby River RVHA reach that restoration actions need to address include:
- Over-widened channel that limits floodplain connectivity and aquatic habitat diversity
- Perched floodplain surfaces that limit floodplain connectivity and support degraded riparian habitats
- Conversion of floodplain surfaces to introduced pasture grasses
- Simplified aquatic habitat

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DATUM: North American Datum 1983

PROJECTION: Montana State Plane

UNIT: US Foot

DATA SOURCES:
USDA NAIP Imagery, 2017
Madison County Cadastral, 2019

EXISTING CONDITION

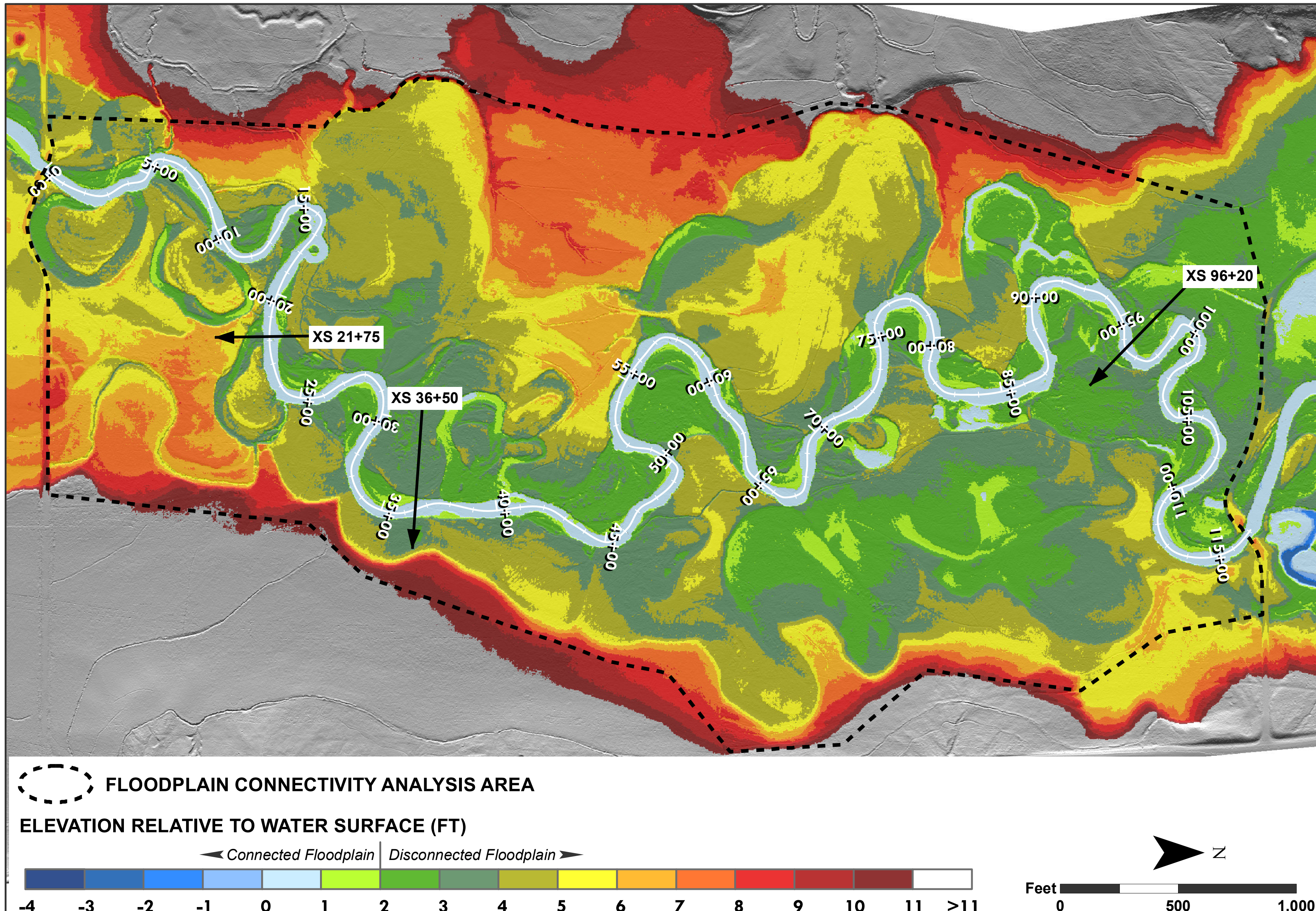
RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

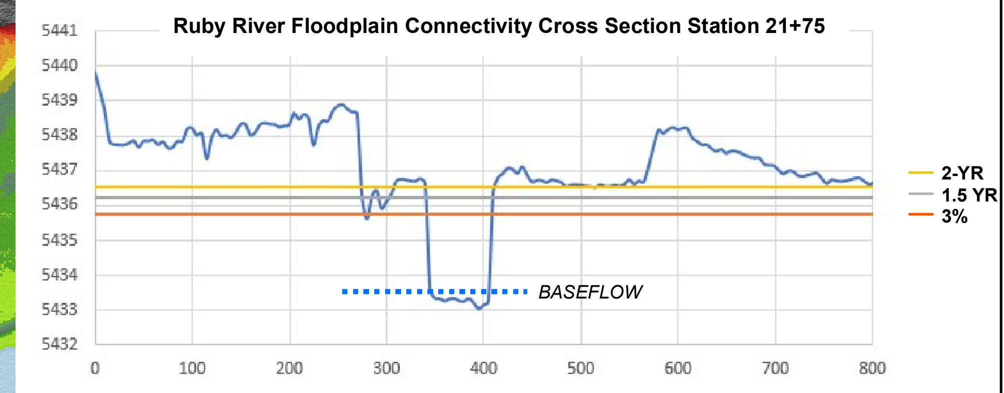
DRAWN BY: J. Wallace

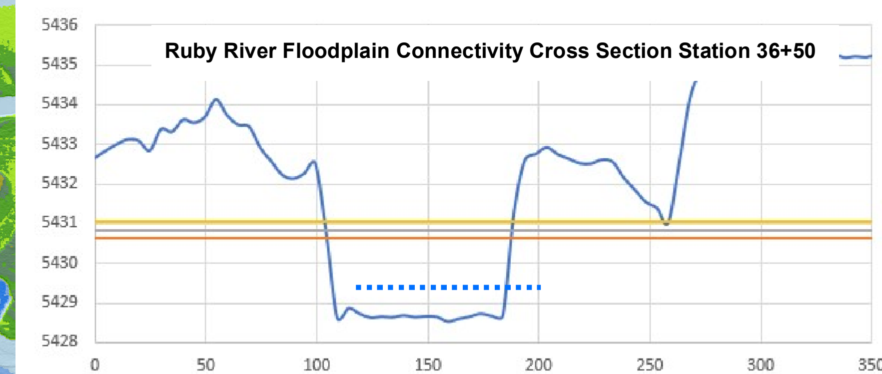
DESIGNED BY: Geum, AGI, Gillilan

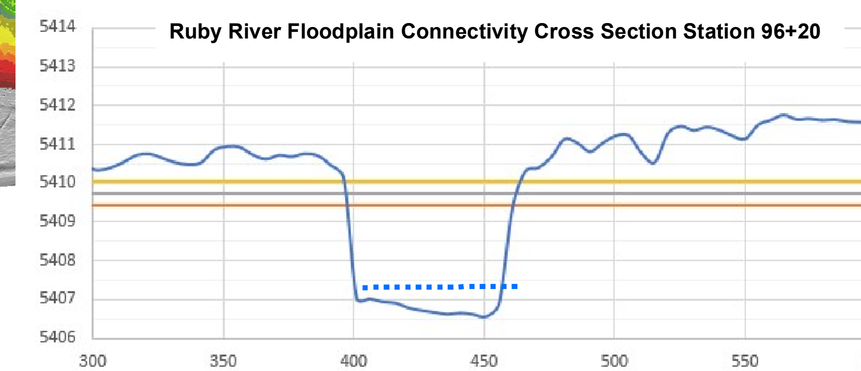
DATE: September 2020

SHEET
2.0









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DATUM: North American Datum 1983
PROJECTION: Montana State Plane
UNIT: US Foot
DATA SOURCES:
AGI Relative Elevation Model, 2019

EXISTING CONDITION: FLOODPLAIN CONNECTIVITY

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: J. Wallace
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
2.1

FLOODPLAIN CONNECTIVITY SUMMARY

This map was created from LiDAR elevation data collected in September, 2018. This map shows the elevations of the floodplain relative to the water surface at the time the LiDAR data was collected, estimated to be approximately 130 cfs at the USGS *06019500 Ruby River above reservoir near Alder MT* gage located at the Cottonwood Creek Bridge. This flow corresponds with an approximate base flow or low flow condition in the river with an average water depth of 1 foot. This map shows the extent that the perched floodplain is disconnected from the current river channel and hydrology (See Table 2.1A). Floodplain surfaces within 2 feet of the baseflow water surface elevation are considered connected surfaces. Floodplain surfaces greater than 2 feet above the baseflow water surface elevation are considered disconnected surfaces that are not frequently accessed by out of bank flows.

To evaluate the extent to which the floodplain is perched and support design of treatments to reactivate the floodplain, a hydrologic analysis of the channel and floodplain were completed. This analysis was done using data from the USGS 06020600 Ruby River gage located at Cottonwood Creek bridge. Table 2.1B summarizes flows associated with flood intervals ranging from the 3% duration flow to 100 Year Peak Flood. Cross sections were taken from the LiDAR data to evaluate the capacity of the existing channel to contain the discharges typically seen in the Ruby River at this location. Example cross sections provided on this sheet that shows that more than a 2 Year Peak Flood is needed for flows to leave the current channel and access the floodplain. The channel forming or effective discharge of Rocky Mountain alluvial rivers is typically within the 3% duration to 1.5 year peak flood range.

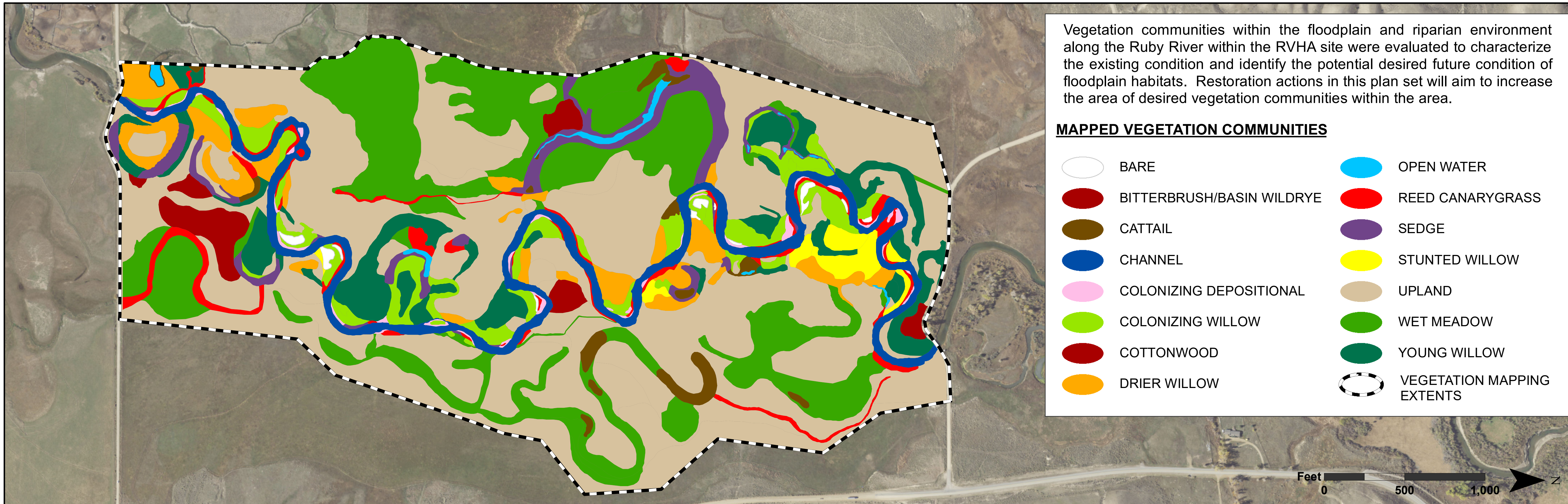
Table 2.1A

Elevation Relative to Water Surface	Total Area (acres)	% of Area
0 - 1'	16.30	6.59%
1 - 2'	8.91	3.60%
2 - 3'	43.64	17.65%
3' +	178.35	72.15%

Table 2.1B

Flood Interval	Discharge*
3% Duration	679 cfs
1.5 Year Peak Flood	830 cfs
2 Year Peak Flood	971 cfs
5 Year Peak Flood	1340 cfs
10 Year Peak Flood	1620 cfs
25 Year Peak Flood	1990 cfs
50 Year Peak Flood	2290 cfs
100 Year Peak Flood	2600 cfs

*Based on USGS 06020600 gage data with 73-year period of record



Vegetation Community	Acres	% of Area	Description	Desired Vegetation Community
Bare	0.86	0.35%	Higher, drier areas of alluvial deposition (small gravels, sand and silt) that have been colonized by little to no vegetation due to their high elevation above the water table. Plant species present include dry species such as common yarrow, rubber rabbitbrush or weedy species such as spotted knapweed.	No if high elevation
Bitterbrush/Basin wildrye	5.04	2.03%	Upland inclusions that occur along the margin of the floodplain on the east side of the river. These areas are dominated by native grasses, forbs and sub-shrubs and may represent the upland condition prior to grazing and agriculture. Dominant species include bitterbrush, snowberry, rabbitbrush, switchgrass, basin wildrye, Idaho fescue and white sagebrush.	Yes
Cattail	3.34	1.35%	Wetland areas that typically represent a transition between open water and sedge communities. Occur primarily in abandoned channel meanders (oxbow wetlands). These areas are very good at slowing overland flows, trapping and retaining fine sediment, and providing habitat for amphibians and waterfowl. Dominant species include common cattail, dagger-leaf rush, Nebraska sedge and hardstem bulrush.	Yes
Channel	13.49	5.44%		
Colonizing Depositional	1.24	0.50%	Areas along the channel that have recent alluvial deposition and are being colonized by early seral wetland and riparian vegetation such as spikerush, willow and cottonwood seedlings, rushes, or weedier species such as clover. These areas are key for establishment of new communities of desirable woody riparian vegetation.	Yes, represent primary succession for cottonwood and willow communities
Colonizing Willow	11.71	4.72%	Areas dominated by willow seedlings 2-3 years in age. Areas are typically lower elevation and willows are activate expanding. These areas often occur at the downstream end of meander cutoffs where significant fine sediment likely accumulated during the cut-off process. Areas are often co-dominated by reed canarygrass.	Yes, represent primary succession for cottonwood and willow communities
Cottonwood	0.48	0.20%	Only one stand present near Cottonwood Road that may be the result of flood deposition in 1964. Dominant species include: narrowleaf cottonwood, black cottonwood, common juniper, silverberry, snowberry, Wood's rose, water birch, bebb willow, Booth's willow and sandbar willow.	Yes
Decadent Willow	11.42	4.61%	Willow stands showing significant sign of decadence due to willow age or drying floodplain conditions. Willows in these areas are typically very old, with umbrella structure indicating a legacy of grazing. Very little willow expansion or new colonization is occurring in these areas. Willows are scattered in some of these areas. Dominant willow species include sandbar willow and bebb willow. The understory is typically dominated by drier species such as currant, Wood's use, smooth brome and snowberry. Weedy species such as Canada thistle are also often present.	Yes, vigor and diversity should increase with floodplain reconnection
Open Water	1.25	0.51%	Open water and backwater areas that occur within depressions in the floodplain that intercept groundwater. Typically unvegetated or vegetated with aquatic macrophytes. Occur primarily in the lowest elevation areas of abandoned channels (oxbow wetlands).	Yes, as a component of diverse floodplain wetlands
Reed Canarygrass	6.10	2.46%	Areas dominated by reed canarygrass, an introduced pasture grass that is highly invasive in wetlands and along river corridors. Reed canarygrass forms a monotype with few other species present. Young willows occur in some of these areas, but the understory is dominated by reed canarygrass. Sedges and rushes can occur in low depressions. Commonly occurs on fine sediment deposition along streambanks, ditches, intermixed in oxbow wetland with sedges, stunted willows, on md-channel islands.	No
Sedge	8.38	3.38%	Wetland areas dominated by sedges and rushes. Typically occur as a narrow strip immediately along the channel, around backwater depressions and in oxbow wetlands. These areas are very good at slowing overland flows, trapping and retaining fine sediment, and providing habitat for amphibians and waterfowl. Dominant species include beaked sedge, dagger-leaf rush and Nebraska sedge.	Yes
Stunted Willow	3.20	1.29%	These are young willow stands with high willow cover but intense browse creating a stunted appearance. Willows in these stands are often mixed with drier shrubs. Dominant species include Booth's willow and sandbar willow. Understory vegetation is dominated by smooth brome in drier areas and common timothy in wetter areas. These areas are concentrated on the east side of the river upstream of Cottonwood Road and typically occur in lower elevation areas of the floodplain. Willows may naturally expand in these areas if grazing pressure lessens.	Yes
Upland	113.34	45.73%	Dry areas dominated by introduced pasture grasses with very low cover of wetter species such as sedges, rushes and Rocky Mountain iris. The dominant species in upland areas is smooth brome. Uplands extend right up to the banks of the Ruby River in many areas and provide little stabilization for streambanks or cover to support aquatic habitat diversity.	Yes, with less cover of introduced grasses and further from the active channel
Wet Meadow	51.85	20.92%	Grass dominated areas wetter than uplands due to sub-irrigation from agriculture or groundwater seepage from adjacent slopes. Areas are typically dominated by introduced pasture grasses such as timothy, meadow foxtail and redtop, but also include varying amounts of wet native species such as arctic rush, Nebraska sedge, and common horsetail.	Yes, with less cover of introduced grasses
Young Willow	16.11	6.50%	Areas dominated by young willow communities. Young willow stands typically occur on low elevation inside meander bends and along oxbow wetlands. Several species of willows are present including sandbar willow, Booth's willow and bebb willow. The understory ranges from a mix of introduced pasture grasses such as field meadow foxtail to wetter, native species such as sedges.	Yes

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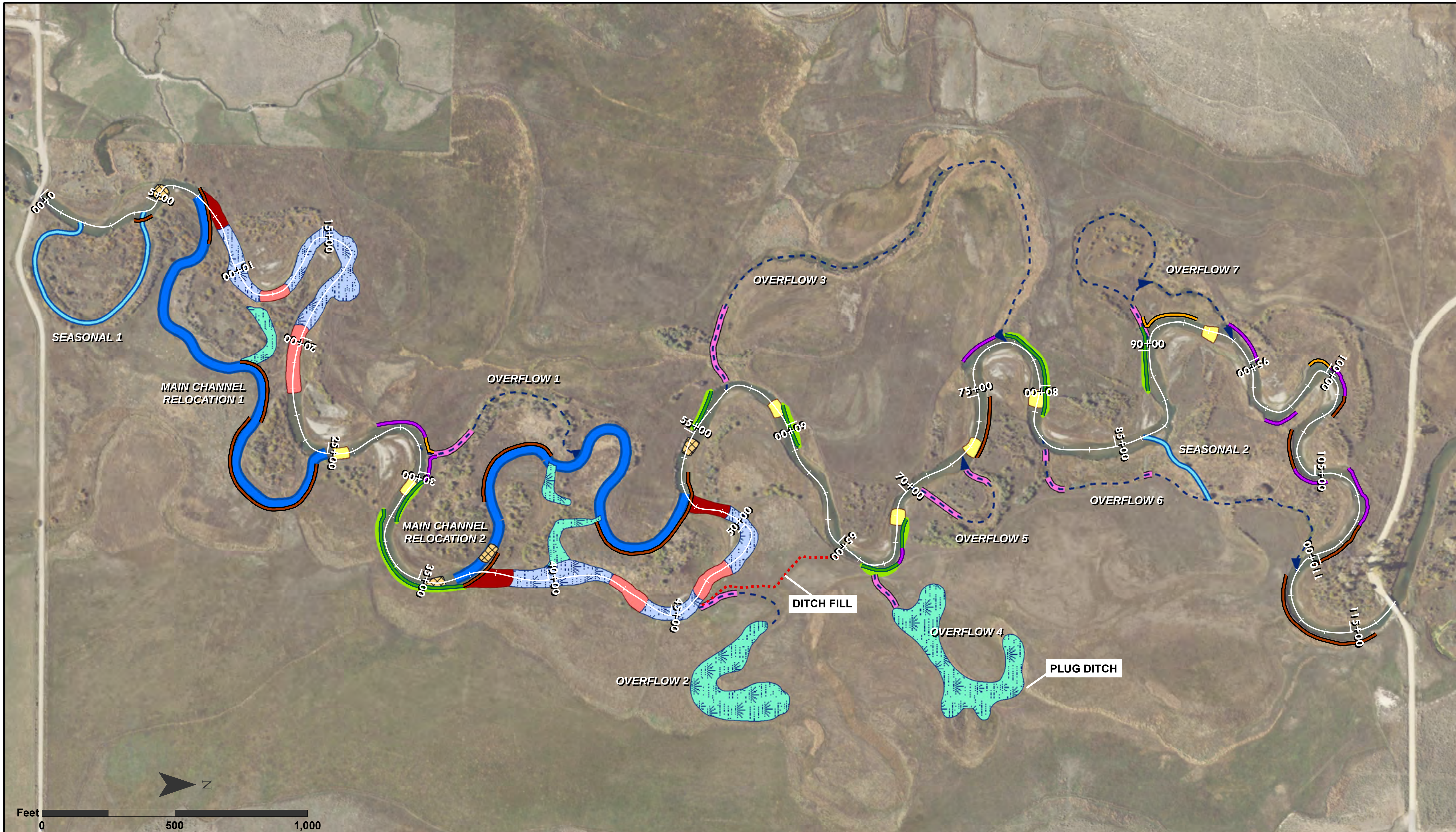
DATUM: North American Datum 1983
PROJECTION: Montana State Plane
UNIT: US Foot
DATA SOURCES:
USDA NAIP Imagery, 2017

EXISTING CONDITION: FLOODPLAIN VEGETATION COMMUNITIES

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: Jesse Wallace
DESIGNED BY: Amy Sacry
DATE: September 2020

SHEET
2.2



DESIGN RESTORATION TREATMENTS

- MAIN CHANNEL RELOCATION
- SEASONAL CHANNEL
- OVERFLOW CHANNEL
- OVERFLOW CHANNEL EXCAVATION
- BRUSH MATRIX W/ INSET FLOODPLAIN BANK TREATMENT
- BRUSH MATRIX BANK TREATMENT - TYPE 1
- BRUSH MATRIX BANK TREATMENT - TYPE 2
- BRUSH MATRIX BANK TREATMENT - TYPE 3
- DITCH FILL
- BED AGGRADATION STRUCTURE
- RIFFLE GRADE CONTROL STRUCTURE
- MAIN CHANNEL PLUG
- MAIN CHANNEL PLUG - LOW PROFILE
- INSET FLOODPLAIN
- ABANDONED CHANNEL WETLAND SHAPING
- WETLAND ENHANCEMENT

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DATUM: North American Datum 1983
PROJECTION: Montana State Plane
UNIT: US Foot
DATA SOURCES: USDA NAIP Imagery, 2017

RESTORATION TREATMENT OVERVIEW

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: J. Wallace
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
3.0

RESTORATION GOAL AND TREATMENTS

The goal for the Ruby River RVHA project is to optimize ecological functions within the river and the floodplain. To achieve this goal, the restoration actions included in this plan set include reactivating old channel meanders, locally raising the bed of the river to raise the groundwater table in the adjacent riparian and floodplain environments, constructing channels to activate floodplain surfaces, treating streambanks to restore woody shrub cover, and increasing floodplain diversity. Restoration treatment locations are shown on Sheet 3.0, and each type of restoration treatment is described below:

CHANNEL REACTIVATION

Channel reactivation aims to reconnect the Ruby River with the perched floodplain and improve instream fish habitat. Several types of channel reactivations are proposed, including: reactivations of the entire main channel, reactivations that just provide overflow into existing channels and depressions in the floodplain, and construction of new floodplain channels. Channel reactivation will be done by locally checking up the elevation of the channel bed in most places. Reactivations that include the entire main channel will be done by plugging the main channel and raising the channel bed upstream of channel plugs. Some channel reactivations require excavation of a new channel and others only require excavation to tie into the existing floodplain channel or area to be reactivated. Details on the types of channel reactivations are provided on Sheet 3.1. All channel reactivations will incorporate aquatic habitat enhancement features such as: shaping of pools and riffles, streambank treatments aimed at increasing cover and woody riparian vegetation, preservation of existing high-quality habitat and/or vegetation, channel spanning woody debris structures to route high flows into adjacent floodplains, and incorporation of roughness elements where needed for stability.

BED AGGRADATION STRUCTURE

To reactivate channels and increase floodplain connectivity, structures will be built on the channel bed to raise the water surface elevation allowing some of the channel flow to route into old channel meanders or floodplain features. Bed Aggradation Structures are built on existing riffles using layers of cobble and rock.

CHANNEL PLUG

In areas where most main channel flows will be routed into a new channel, a full channel plug will be constructed across the main channel. These plugs are constructed using layers of cobble, gravel, and riprap. The upstream face of channel plugs will consist of woody debris matrix streambank treatment that will form the bank of the new channel.

WOODY DEBRIS MATRIX STREAMBANK

This treatment is used to build new streambanks or restore existing, actively eroding streambanks. The intent of these structures is to create conditions directly along the channel that increase roughness to slow erosion, provide cover and shade, and allow desirable woody, riparian vegetation to establish. Woody debris matrix streambanks are constructed using layers of salvaged willow clumps or other woody debris, and alluvium. Dormant willow cuttings may be incorporated as needed. Three types of Woody Debris Matrix Streambank Treatments will be used: Type 1 is used in areas with little active toe erosion and preserves the existing streambank toe material; Type 2 is used where there are deep pools and adds roughness, such as juniper branches or small trees to the toe for aquatic habitat enhancement; and Type 3 is used where the toe is actively eroding and adds large cobble toe protection.

INSET FLOODPLAIN

Inset floodplains are a treatment used to narrow over-widened sections of channel while improving bankline habitat. These structures consist of a low bench built in front of an existing bank line to reduce channel capacity in over-widened streams. They are built using gravel and cobble and a Woody Debris Matrix Streambank Treatment is constructed along the face of each inset floodplain to form the new bankline.

WETLAND CREATION and ENHANCEMENT

Wetlands and topographically diverse floodplain surfaces will be created as part of restoration actions. Wetlands will be created and enhanced in abandoned channel segments and in and along seasonal and overflow channel activation areas. Wetland creation and enhancement includes creating surfaces with varying depths and gradual slopes to create a wide range of habitats capable of supporting a wide range of plant communities. Wetland enhancement may also include varying substrates, placing woody debris, and transplanting salvaged wetland sod and riparian shrubs. In some areas, wetland enhancement will be done by increasing how much water is routed to an area. Increasing the hydrology of an area will increase wetland area and allow introduced grass species to convert to native wetland species.

SUMMARY OF RESTORATION TREATMENT QUANTITIES

Restoration Treatment	Unit	Quantity
Main channel relocation	Linear ft	3,830
Seasonal channel construction	Linear ft	1,515
Overflow channel (constructed)	Linear ft	1,360
Overflow channel (activated - no construction)	Linear ft	7,580
Bed aggradation structure	Each	7
Riffle control structure	Each	4
Main channel plug	Square ft	23,635
Main channel plug - Low profile	Square ft	36,141
Abandoned channel wetland shaping	Square ft	112,895
Wetland enhancement	Square ft	179,735
Brush Matrix with Inset Floodplain	Linear ft	1,917
Brush Matrix Type 1	Linear ft	415
Brush Matrix Type 2	Linear ft	1,388
Brush Matrix Type 3	Linear ft	3,787

FLOODPLAIN TREATMENT

Floodplain treatment includes increasing topographic diversity and roughness of floodplain surfaces to reduce erosion and increase retention of fluvially transported sediment and plant propagules. Floodplain treatment includes constructing small depressions and hummocks on the floodplain surface and scattering and burying woody debris across the surface. Floodplain treatment locations are not shown on Sheet 3.0. Floodplain treatments will be used on inset floodplains and in wetland enhancement areas.

VEGETATION PRESERVATION, SALVAGE & TRANSPLANT

Preservation of desirable floodplain vegetation will be maximized to the extent possible. Desirable vegetation located within areas to be disturbed during streambank construction or channel activations will be salvaged and transplanted along new channel activations, within streambanks, on floodplain surfaces, or within created wetlands.

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RESTORATION TREATMENT SUMMARY

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: J. Wallace
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

CHANNEL ACTIVATION SUMMARY

Identifying an appropriate channel forming/effective discharge is key to achieving the restoration goal. This flow is used to determine channel design dimensions and how much flow can be routed down seasonal activation and overflow channels. USGS stream gage data for a 73-year period, along with existing channel dimensions, were evaluated to select the discharge to target for channel activations and to develop a template for main channel relocations. The table below represents the flood return flow intervals and corresponding discharges commonly used in stream restoration channel design. 700 cfs was selected as the effective discharge for the Ruby River Restoration Project design. It is both the flow that is met or exceeded 3% of the annual record and has been correlated to effective discharge in snowmelt driven gravel bed rivers. It is expected to occur at an approximate 1.2-year return interval. This return frequency is also desirable as it suggests all channels will be wetter on an almost annual basis.

Flood Return Flow Interval	Estimated Discharge (cfs)
Q2	969 - 989 cfs
Q1.5	800 - 835 cfs
Q1.2 (3% duration or 11 days)	690 cfs
Baseflow	130 cfs

CHANNEL ACTIVATION DESCRIPTIONS

MAIN CHANNEL

These activations will carry the bulk of flows up to about 500 cfs, at which point flows will split into both the new and old channels. These channels will require some excavation and shaping to create habitat and effectively route the main flow through them. Flows above ~500 cfs will route down both the new Primary Channel and the abandoned current main channel. The existing main channel will be plugged with a full channel plug with a top height equivalent to the stage height of the effective flow discharge. The abandoned main channel will be shaped into a series of wetland ponds and diverse floodplain features. Main channel reactivations will incorporate aquatic habitat enhancement features such as: shaping of pools and riffles, streambank treatments aimed at increasing cover and woody riparian vegetation, preservation of existing high-quality habitat and/or vegetation, and incorporation of roughness elements where needed for stability.

SEASONAL FLOW CHANNEL

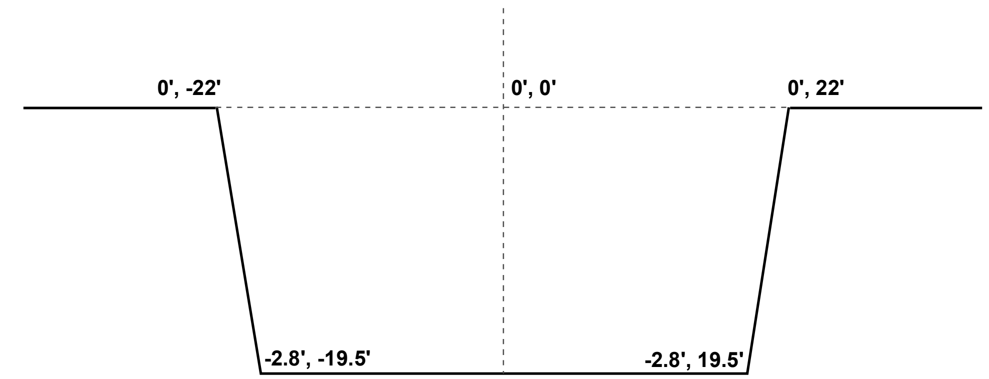
This activation requires excavation of a channel to route flows through the feature. The amount of flow and number of days activated varies by location and depends on the existing elevation of the feature to be activated relative to the bed elevation of the main channel. One seasonal flow activation constructs a channel through an abandoned meander (Seasonal Flow #1). The dimensions of each seasonal flow channel depends on activation stage and activation discharge (see Sheet 4.0). Seasonal flow channel activations will incorporate aquatic habitat enhancement features such as: shaping of pools and riffles, streambank treatments aimed at increasing cover and woody riparian vegetation, preservation of existing high-quality habitat and/or vegetation, channel spanning woody debris structures to route high flows into adjacent floodplains, and incorporation of roughness elements where needed for stability.

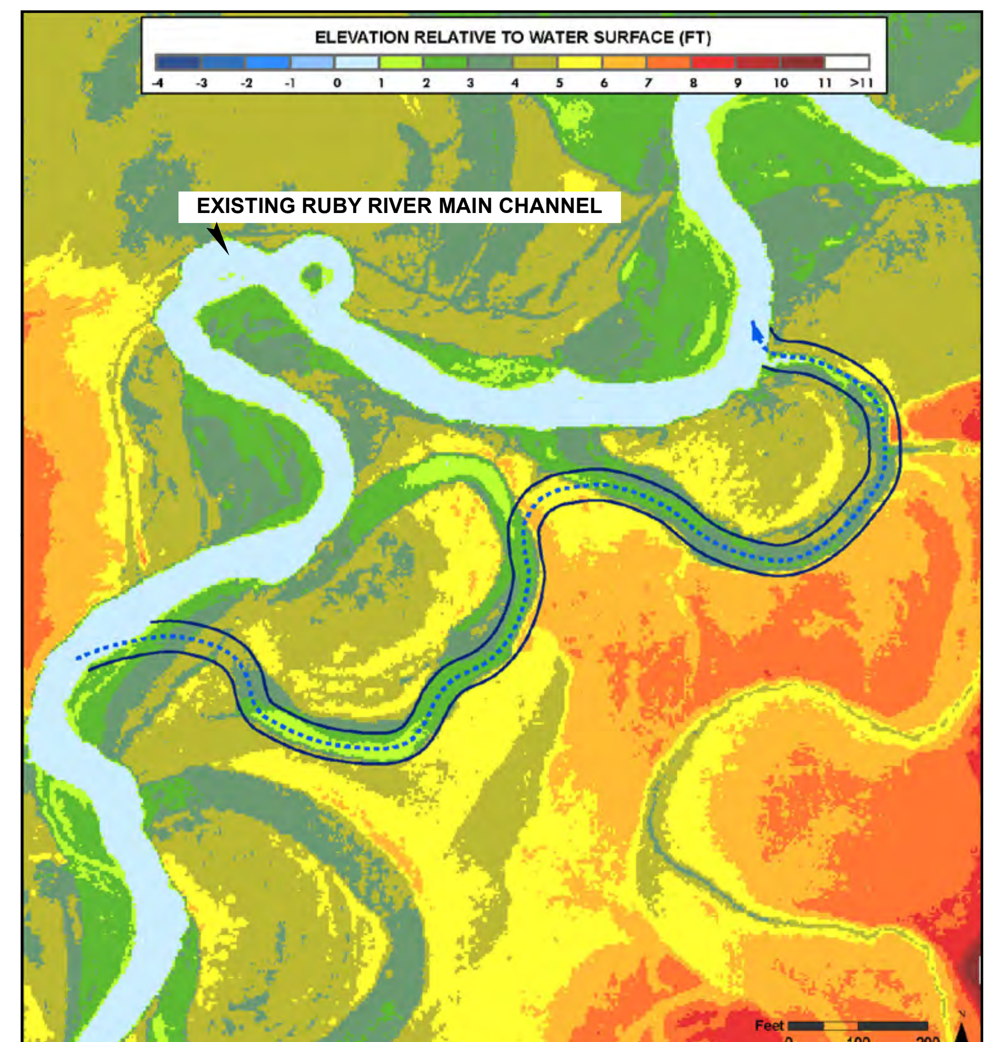
OVERFLOW CHANNEL

This type of channel activation will be done by lowering the inlet, outlet or high elevation sections within an existing perched floodplain feature to activate the feature. The amount of flow and number of days activated varies by location and depends on the existing elevation of the feature to be activated relative to the bed elevation of the main channel. These areas will be activated through construction of pilot channels or swales. Once flows enter the activated feature beyond the pilot channel they will disperse throughout the feature following existing flow paths. The dimensions of each pilot channel varies depending on the activation stage and activation discharge (see Sheet 4.0). Overflow channel activations will incorporate aquatic habitat enhancement features such as: shaping of pools and riffles, streambank treatments aimed at increasing cover and woody riparian vegetation, preservation of existing high-quality habitat and/or vegetation, channel spanning woody debris structures to route high flows into adjacent floodplains, and incorporation of roughness elements where needed for stability.

MAIN CHANNEL DESIGN TEMPLATE

BOTTOM WIDTH: 39 feet
TOP WIDTH: 44 feet
MEAN DEPTH: 2.8 feet
WIDTH/DEPTH: 15.7
SLOPE: 0.003 ft/ft
DISCHARGE: 500 cfs
SEDIMENT MOBILITY @ 500 cfs: 1.6 inches





The design realignment path of Main Channel Relocation #1

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DATUM:
PROJECTION:
UNIT: INTL FT
DATA SOURCES:

CHANNEL ACTIVATION TEMPLATES

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

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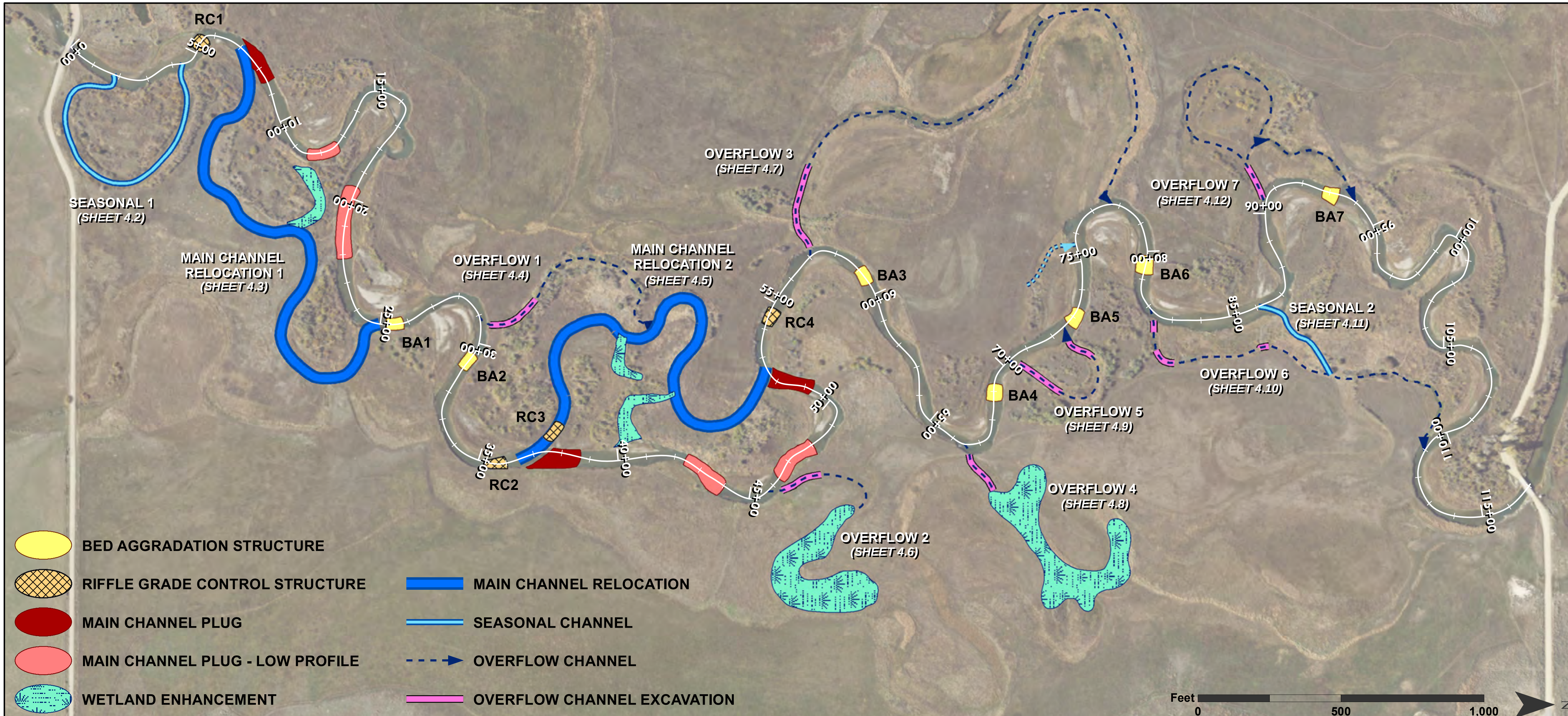
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
3.2



Channel Activation	Main Channel Start Station	Main Channel End Station	Total Constructed Channel Length (ft)	Total Activated Channel Length (ft)	Activation Stage (ft)	Activation Q (cfs)	Days / Year Activated	Channel Template Dimensions
Seasonal 1	1+78	4+37	1075	*N/A*	2.3	480	26	Channel 10' wide, 1.5' deep
Main Channel 1	6+99	24+59	1810	*N/A*	0	0	365	Main Channel *(See Sheet 3.2)*
Overflow 1	29+02	*N/A*	200	645	1.9	400	29	Pilot Channel 10' wide, 1.0' deep
Main Channel 2	37+00	52+64	1950	*N/A*	0	0	365	Main Channel *(See Sheet 3.2)*
Overflow 2	45+73	*N/A*	625	390	*N/A*	*N/A*	*N/A*	Pilot Channel 10' wide, 1.5' deep
Overflow 3	56+98	77+75	340	1985	2.5	670	11	Pilot Channel 10' wide, 1.5' deep
Overflow 4	66+46	*N/A*	160	645	2	340	37	Pilot Channel 10' wide, 1.5' deep
Overflow 5	70+22	72+54	295	240	0.8	80	354	Pilot Channel 10' wide, 0.5' deep
Overflow 6	82+10	111+08	285	1050	1.8	390	35	Pilot Channel, 10' wide 1' deep
Seasonal 2	86+08	*N/A*	170	105	2	470	26	Channel 10' wide, 1.5' deep
Overflow 7	90+23	93+95	105	1290	2	330	37	Pilot Channel 10' wide, 1' deep

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DATUM: North American Datum 1983
PROJECTION: Montana State Plane
UNIT: US Foot
DATA SOURCES:
USDA NAIP Imagery, 2017

CHANNEL ACTIVATION PLANVIEW

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: J. Wallace
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DATE: September 2020

SHEET
4.0

Structure	Station	Target Elevation	Max Structure Height (ft)	Mean Structure Height (ft)
Riffle Control 1 (RC1)	5+70	5433.3	1.1	0.6
Bed Aggradation 1 (BA1)	25+25	5428	1.3	0.5
Bed Aggradation 2 (BA2)	30+75	5426.6	1.2	0.4
Bed Aggradation 3 (BA3)	59+50	5419	1.9	1.2
Riffle Control 2 (RC2)	36+00	5425.8	2.3	2.0
Riffle Control 3 (RC3)*	38+50*	5425.5	1.5	1

Structure	Station	Target Elevation	Max Structure Height (ft)	Mean Structure Height (ft)
Riffle Control 4 (RC4)	54+90	5419.9	1.8	0.6
Bed Aggradation 4 (BA4)	69+25	5416.2	2.2	1.4
Bed Aggradation 5 (BA5)	72+50	5414.6	1.2	0.7
Bed Aggradation 6 (BA6)	80+50	5413.5	2.3	1.6
Bed Aggradation 7 (BA7)	93+00	5411	2.8	2.1

**Structure RC3 is located on the MC2 realignment channel and is not shown in the chart above*

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PROFILE and STRUCTURE HEIGHTS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

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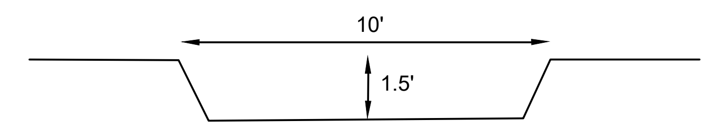
DATE: September 2020

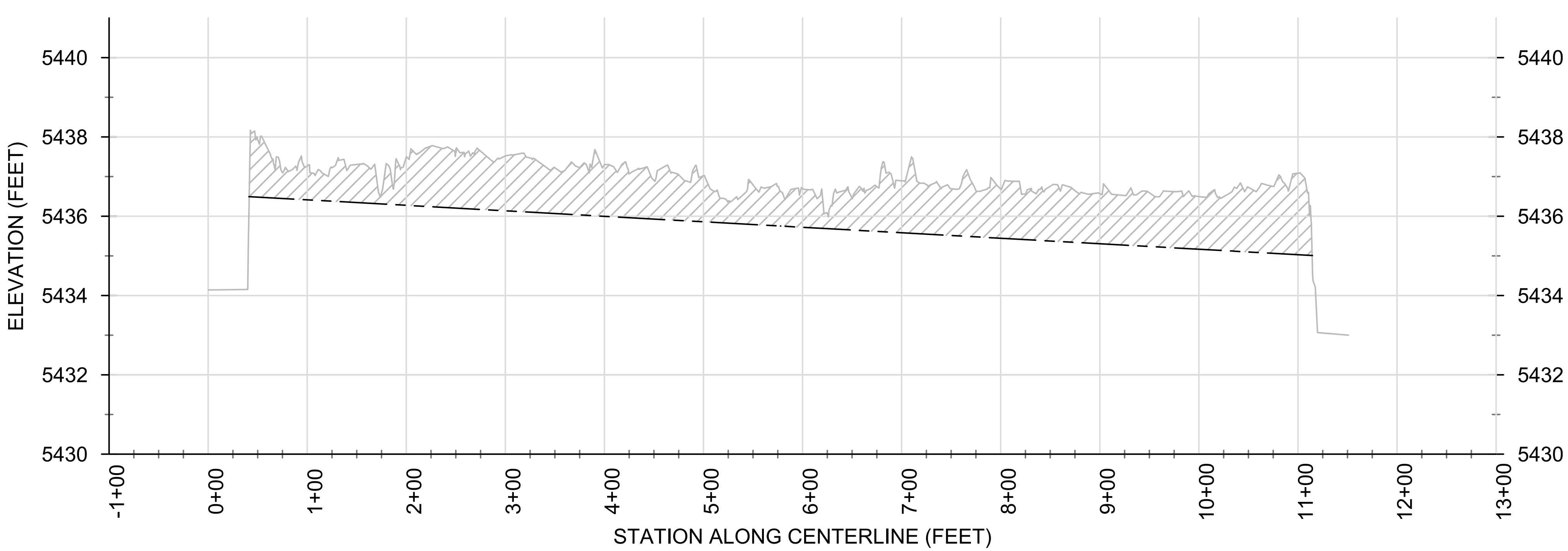
SHEET
4.1

ACTIVATION CHANNEL DETAILS	
MAIN CHANNEL START STATION	1+78
MAIN CHANNEL END STATION	4+37
ACTIVATED CHANNEL LENGTH (FT)	N/A
CONSTRUCTED CHANNEL LENGTH (FT)	1075
TARGET INLET ELEVATION (FT)	5436.5
TARGET OUTLET ELEVATION (FT)	5435.0
ACTIVATION STAGE ABOVE BED (FT)	2.3
ACTIVATION Q (CFS)	480
DAYS PER YEAR ACTIVATED	26
SLOPE	0.14%

SEASONAL 1
TYPICAL CROSS SECTION



SEASONAL 1 - PROFILE VIEW



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL	
CUT (CY)	600
FILL (CY)	0

LEGEND

EXISTING GROUND
DESIGN THALWEG
CHANNEL STRUCTURE
EXCAVATION

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UNITS: US Foot
DATA SOURCES: Digital Globe Imagery

ACTIVATION CHANNEL SEASONAL 1 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

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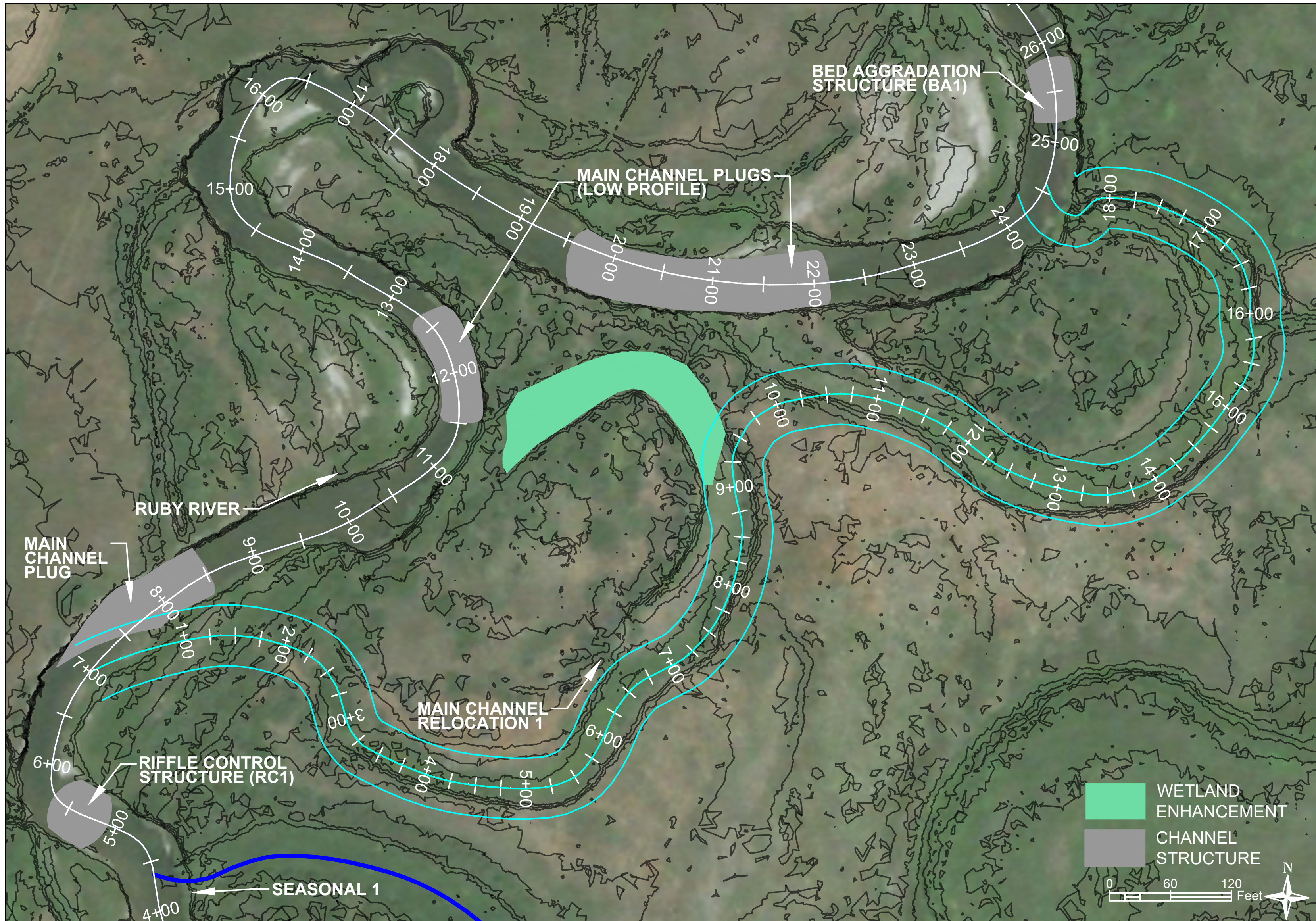
DESIGNED BY: Geum, AGI, Gilllan
DATE: September 2020

SHEET
4.2



ACTIVATION CHANNEL DETAILS	
MAIN CHANNEL START STATION	6+99
MAIN CHANNEL END STATION	24+59
ACTIVATED CHANNEL LENGTH (FT)	N/A
CONSTRUCTED CHANNEL LENGTH* (FT)	1810
TARGET INLET ELEVATION (FT)	5433.0
TARGET OUTLET ELEVATION (FT)	5428.5
ACTIVATION STAGE ABOVE BED (FT)	0.0
ACTIVATION Q (CFS)	0
DAYS PER YEAR ACTIVATED	365
SLOPE	(ON PROFILE)
MAIN CHANNEL PLUG ELEVATION	5435.9
RIFFLE CONTROL STRUCTURE RC1 ELEVATION	5433.3
BED AGGRADATION STRUCTURE BA1 ELEVATION	5428.0

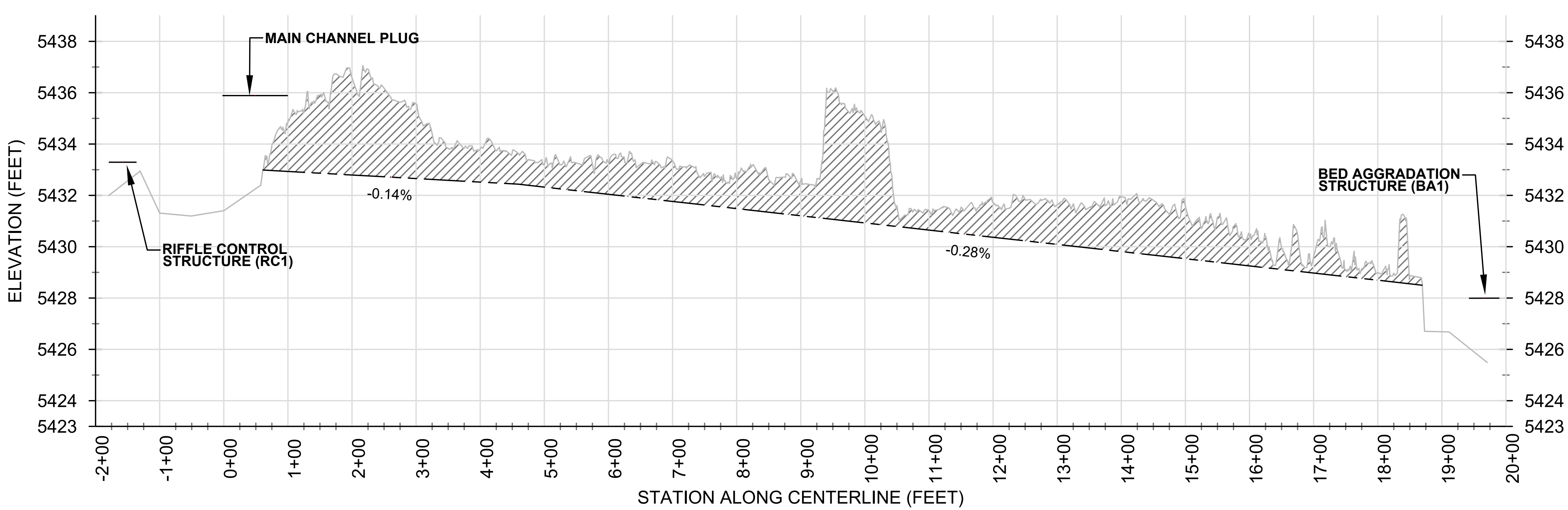
*TYPICAL CROSS SECTION DISPLAYED ON SHEET 3.2

LEGEND

- EXISTING GROUND
- DESIGN THALWEG
- CHANNEL STRUCTURE
- EXCAVATION

ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL	
CUT (CY)	5380
FILL (CY)	0

MAIN CHANNEL RELOCATION 1 - PROFILE VIEW



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ACTIVATION CHANNEL MAIN CHANNEL RELOCATION 1 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

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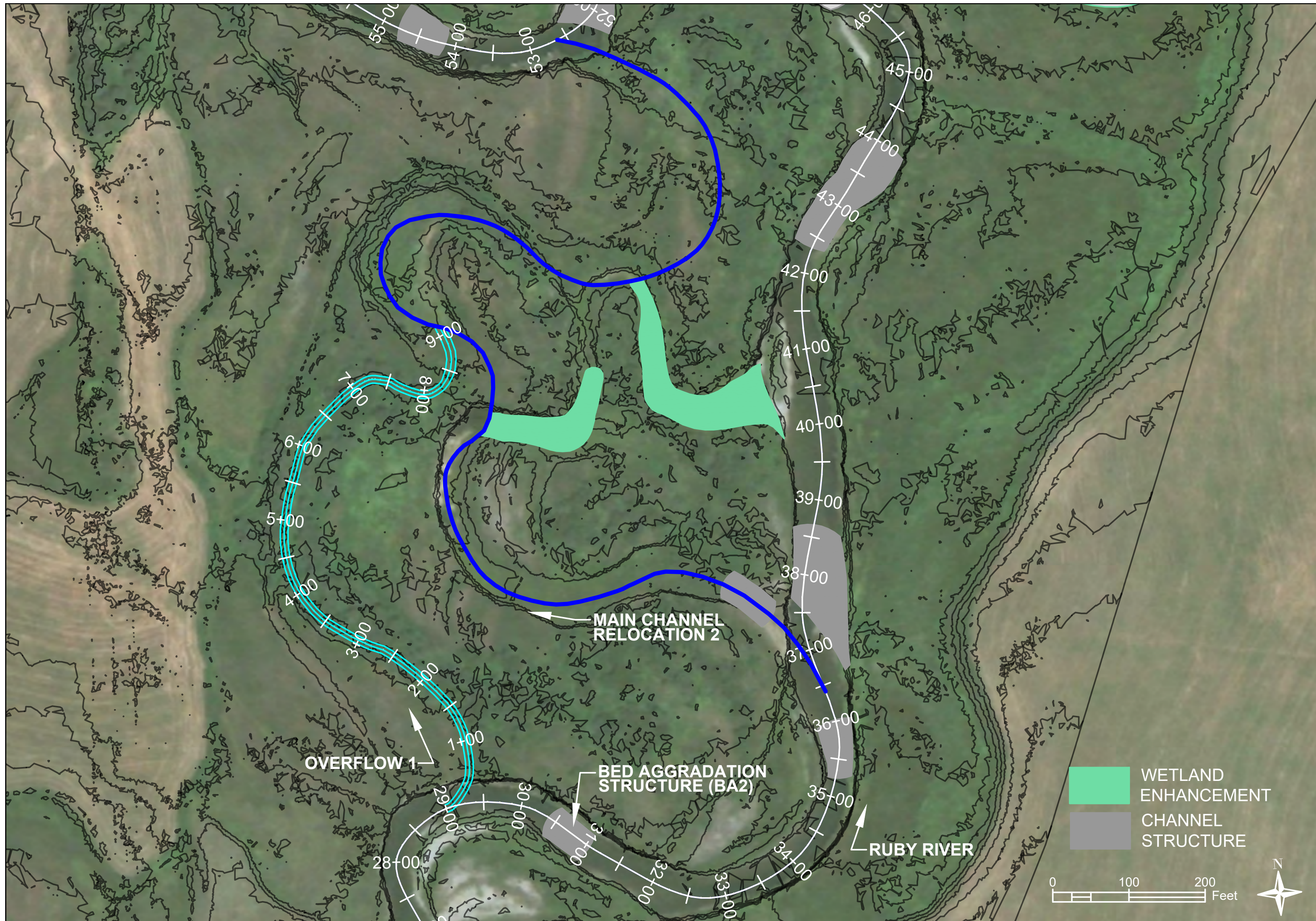
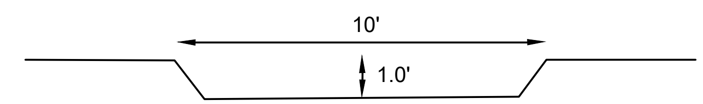
4.3

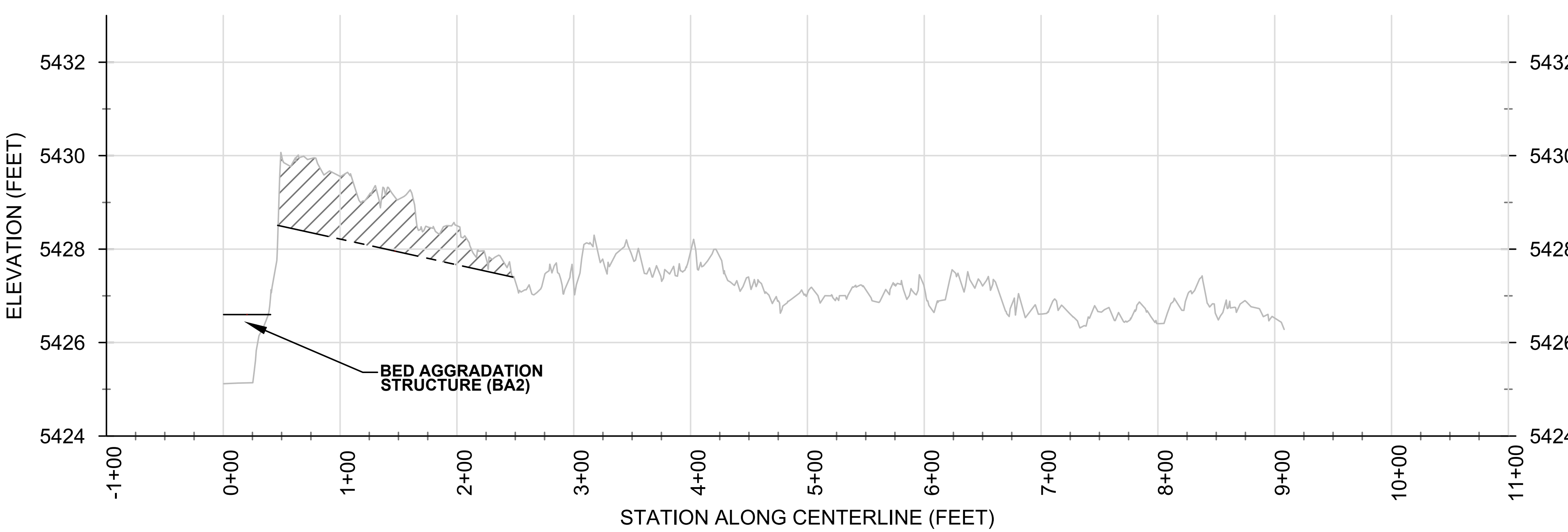


ACTIVATION CHANNEL DETAILS	
MAIN CHANNEL START STATION	29+02
MAIN CHANNEL END STATION	N/A
ACTIVATED CHANNEL LENGTH (FT)	645
CONSTRUCTED CHANNEL LENGTH (FT)	200
TARGET INLET ELEVATION (FT)	5428.5
TARGET OUTLET ELEVATION (FT)	N/A
ACTIVATION STAGE ABOVE BED (FT)	1.9
ACTIVATION Q (CFS)	400
DAYS PER YEAR ACTIVATED	29
SLOPE	0.30%
BED AGGRADATION STRUCTURE BA2 ELEVATION	5426.6

OVERFLOW 1
TYPICAL CROSS SECTION



OVERFLOW 1 - PROFILE VIEW



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL	
CUT (CY)	75
FILL (CY)	0

LEGEND

EXISTING GROUND
DESIGN THALWEG
CHANNEL STRUCTURE
EXCAVATION

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ACTIVATION CHANNEL OVERFLOW 1 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

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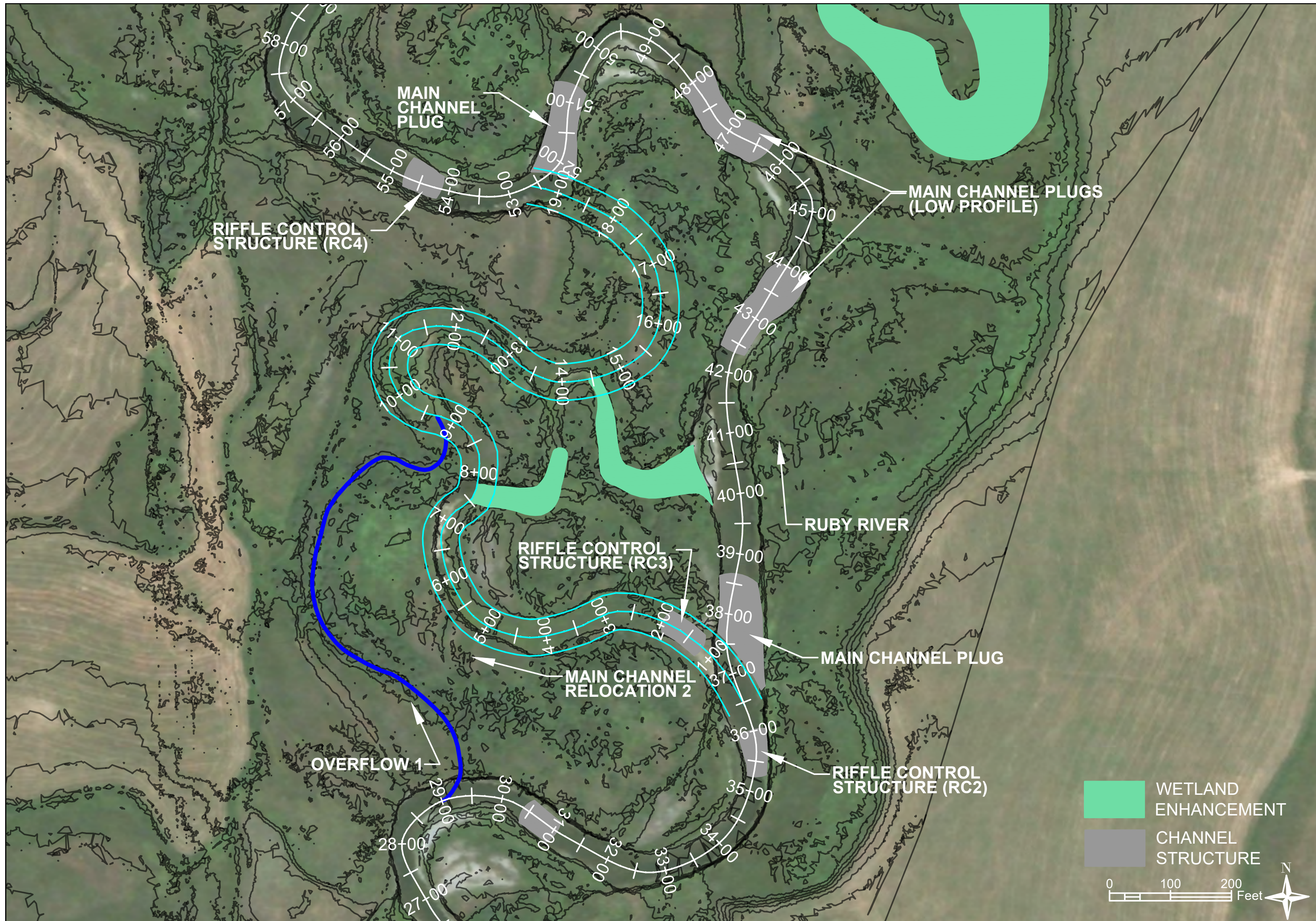
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
4.4



ACTIVATION CHANNEL DETAILS	
MAIN CHANNEL START STATION	37+00
MAIN CHANNEL END STATION	52+64
ACTIVATED CHANNEL LENGTH (FT)	N/A
CONSTRUCTED CHANNEL LENGTH* (FT)	1745
UPPER STRUCTURE HEIGHT (FT)	2.5
LOWER STRUCTURE HEIGHT (FT)	N/A
TARGET INLET ELEVATION (FT)	5425.5
TARGET OUTLET ELEVATION (FT)	5421.0
ACTIVATION STAGE ABOVE BED (FT)	0.0
ACTIVATION Q (CFS)	0
DAYS PER YEAR ACTIVATED	365
SLOPE	(ON PROFILE)
UPSTREAM MAIN CHANNEL PLUG ELEVATION	5428.0
DOWNSTREAM MAIN CHANNEL PLUG ELEVATION	5422.4
RIFFLE CONTROL STRUCTURE RC2 ELEVATION	5425.8
RIFFLE CONTROL STRUCTURE RC3 ELEVATION	5425.5
RIFFLE CONTROL STRUCTURE RC4 ELEVATION	5419.9

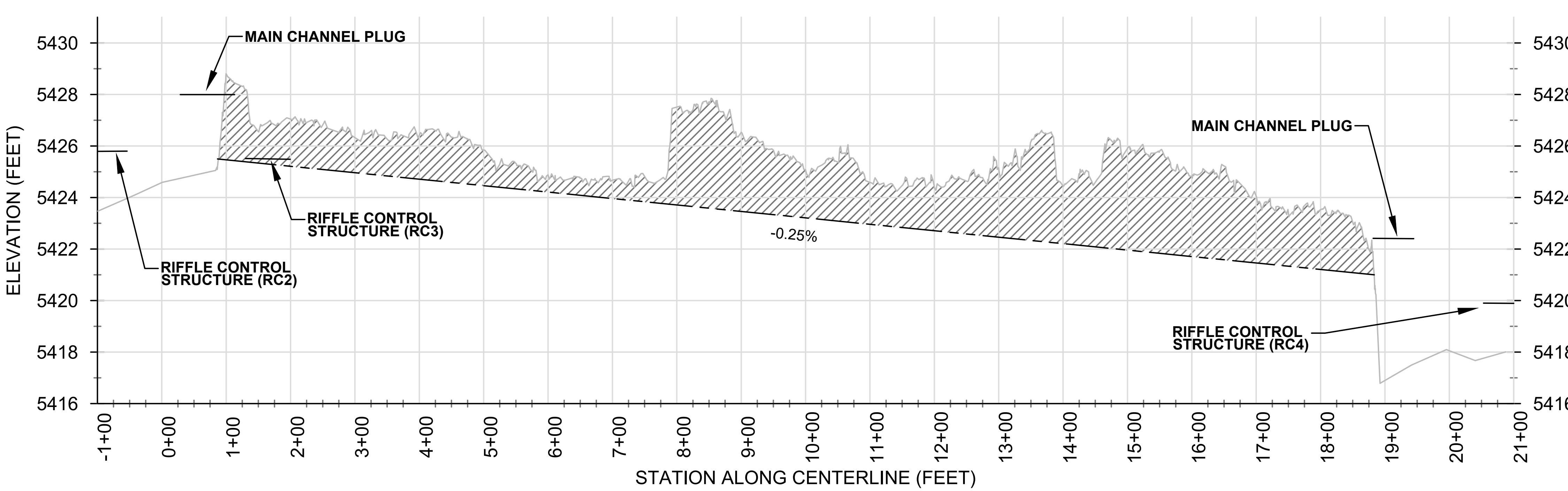
*TYPICAL CROSS SECTION DISPLAYED ON SHEET 3.2

LEGEND

- EXISTING GROUND
- DESIGN THALWEG
- CHANNEL STRUCTURE
- EXCAVATION

ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL	
CUT (CY)	7170
FILL (CY)	0

MAIN CHANNEL RELOCATION 2 - PROFILE VIEW



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ACTIVATION CHANNEL MAIN CHANNEL RELOCATION 2 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

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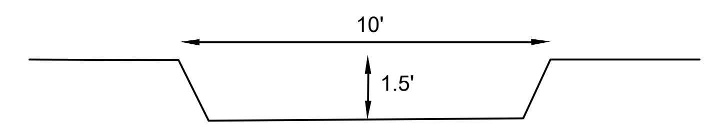
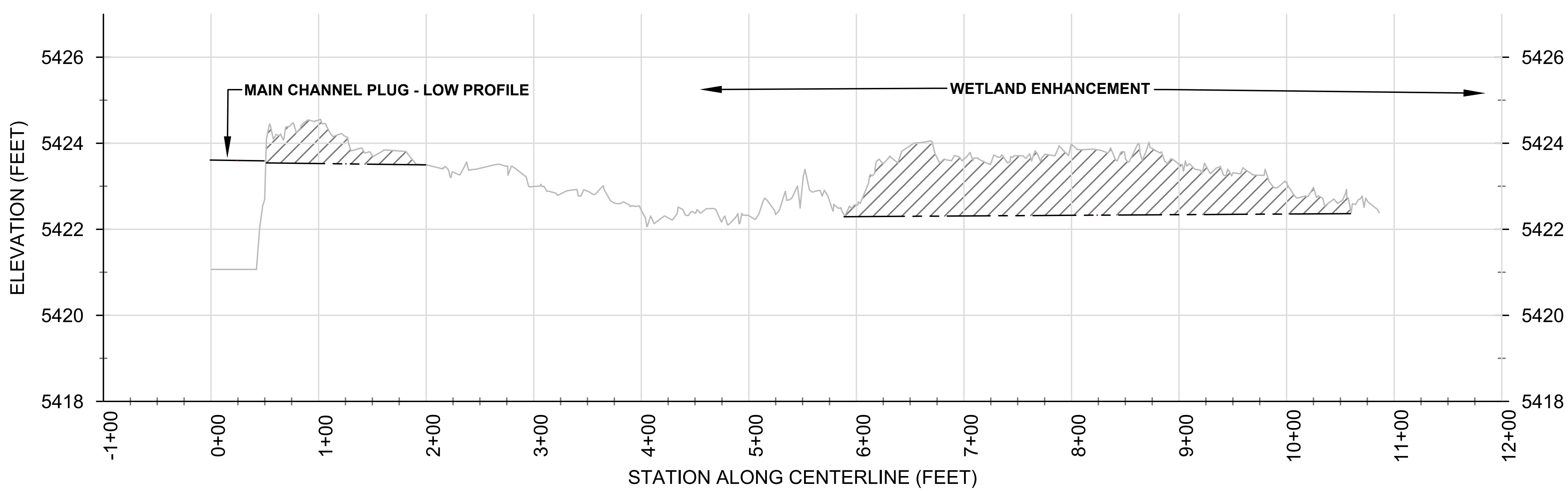
4.5

ACTIVATION CHANNEL DETAILS	
MAIN CHANNEL START STATION	45+73
MAIN CHANNEL END STATION	N/A
ACTIVATED CHANNEL LENGTH (FT)	390
CONSTRUCTED CHANNEL WITH WETLAND ENHANCEMENT LENGTH (FT)	625
TARGET INLET ELEVATION (FT)	5423.5
TARGET OUTLET ELEVATION (FT)	N/A
ACTIVATION STAGE ABOVE BED (FT)	N/A
ACTIVATION Q (CFS)	N/A
DAYS PER YEAR ACTIVATED	N/A
SLOPE	0.11%
MAIN CHANNEL PLUG LOW PROFILE ELEVATION	5423.6

OVERFLOW 2
TYPICAL CROSS SECTION



OVERFLOW 2 - PROFILE VIEW



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL	
CUT (CY)	340
FILL (CY)	0

LEGEND

- EXISTING GROUND
- DESIGN THALWEG
- CHANNEL STRUCTURE
- EXCAVATION

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ACTIVATION CHANNEL OVERFLOW 2 DETAILS

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MADISON COUNTY, MONTANA

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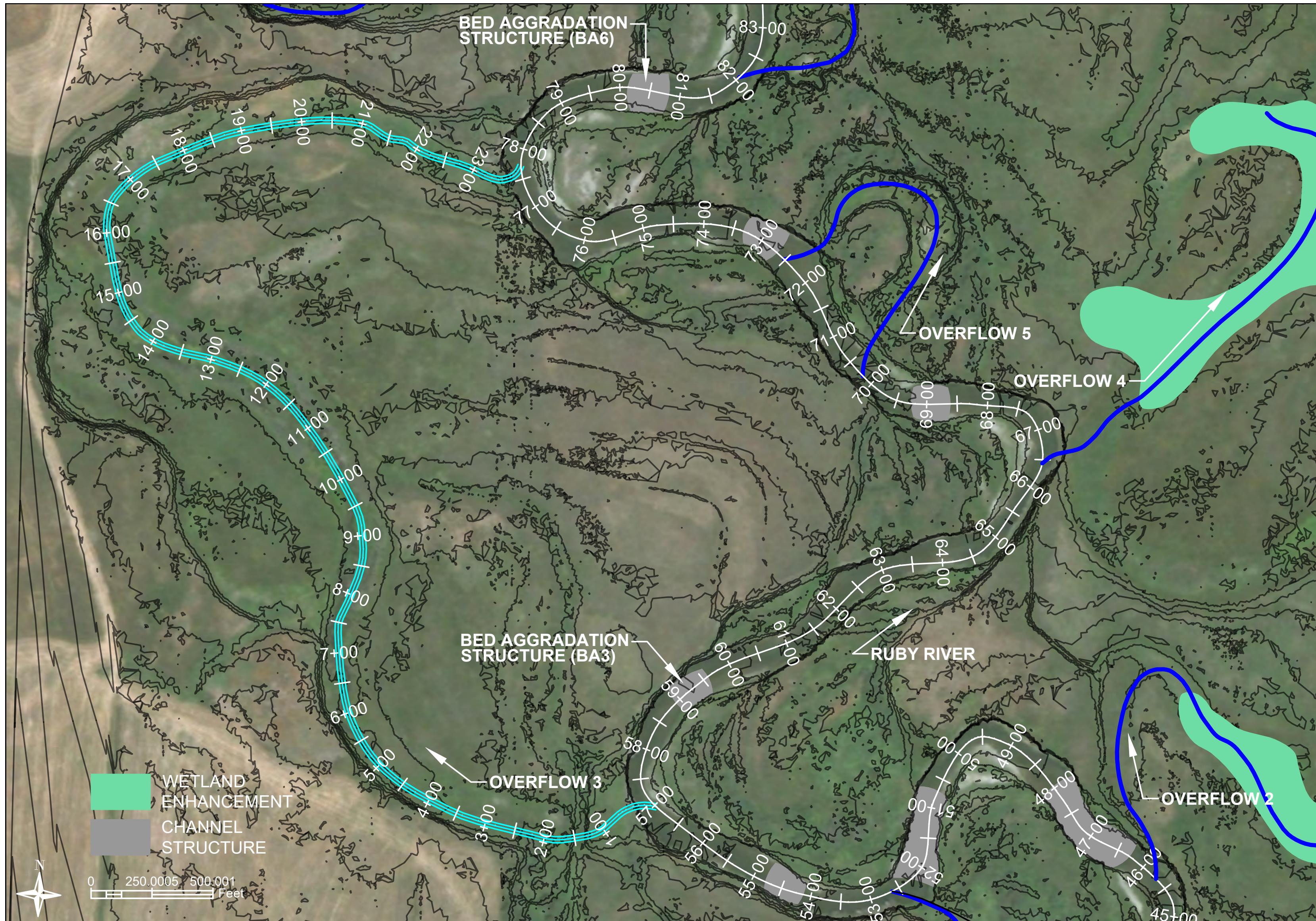
DATE: September 2020

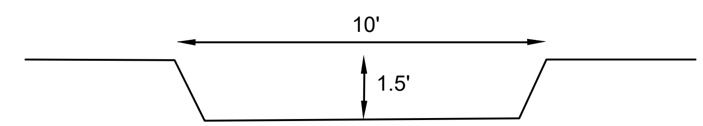
SHEET
4.6



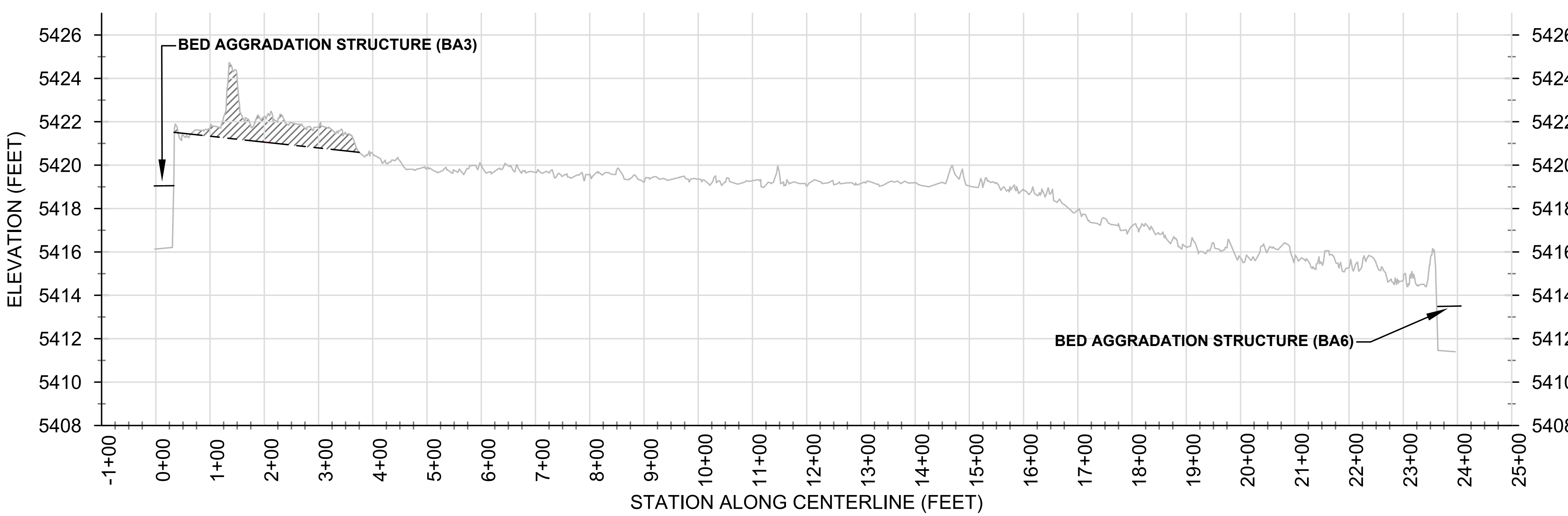
ACTIVATION CHANNEL DETAILS

MAIN CHANNEL START STATION	56+98
MAIN CHANNEL END STATION	77+75
ACTIVATED CHANNEL LENGTH (FT)	1985
CONSTRUCTED CHANNEL LENGTH (FT)	340
TARGET INLET ELEVATION (FT)	5421.5
TARGET OUTLET ELEVATION (FT)	N/A
ACTIVATION STAGE ABOVE BED (FT)	2.5
ACTIVATION Q (CFS)	670
DAYS PER YEAR ACTIVATED	11
SLOPE	0.31%
BED AGGRADATION STRUCTURE BA3 ELEVATION	5419.0
BED AGGRADATION STRUCTURE BA6 ELEVATION	5413.5

OVERFLOW 3
TYPICAL CROSS SECTION



OVERFLOW 3 - PROFILE VIEW



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL

CUT (CY)	125
FILL (CY)	0

LEGEND

- EXISTING GROUND
- DESIGN THALWEG
- CHANNEL STRUCTURE
- EXCAVATION

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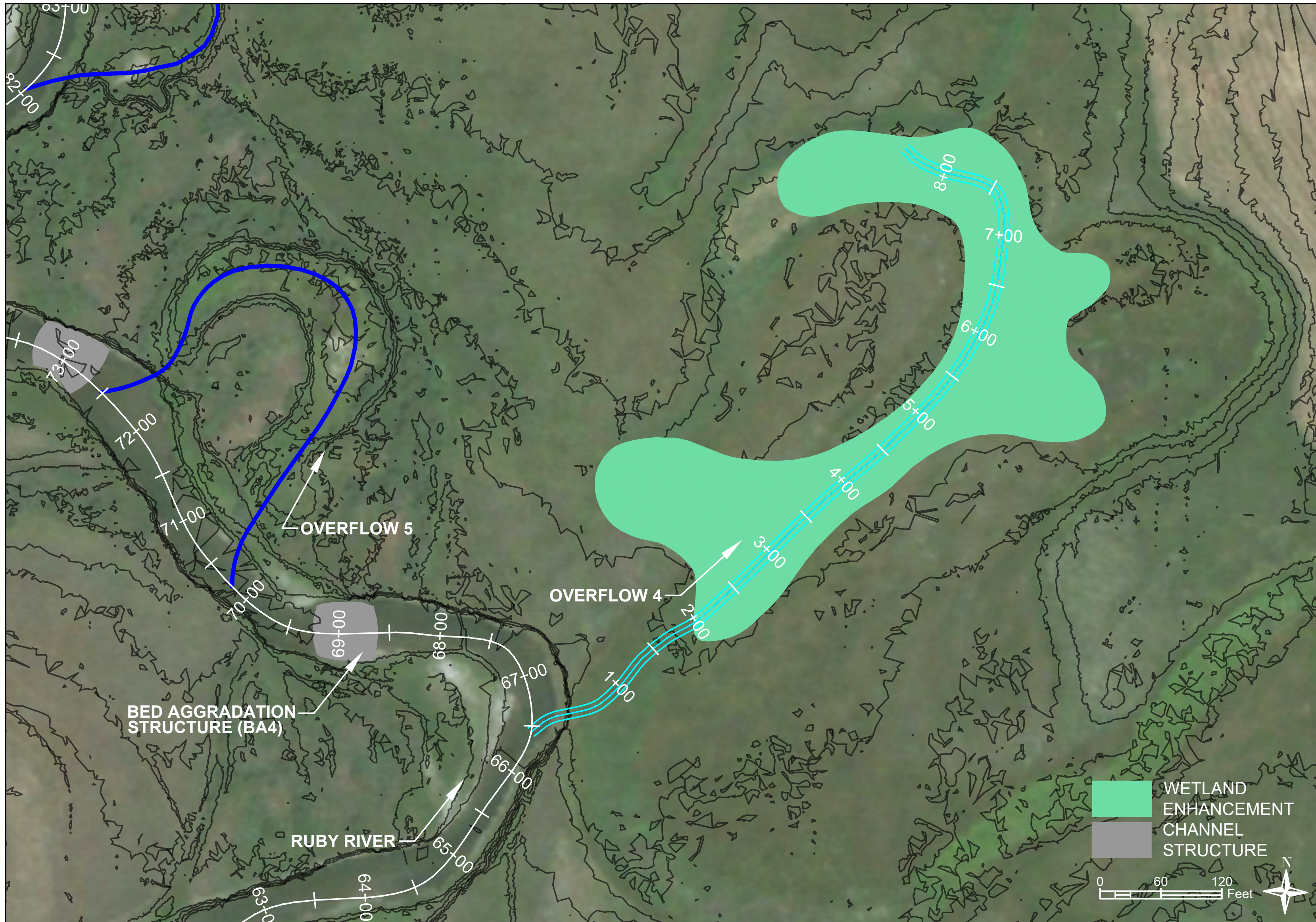
ACTIVATION CHANNEL OVERFLOW 3 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: A.Gulley
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

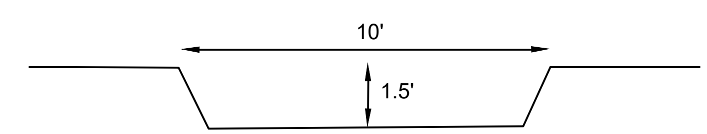
SHEET
4.7



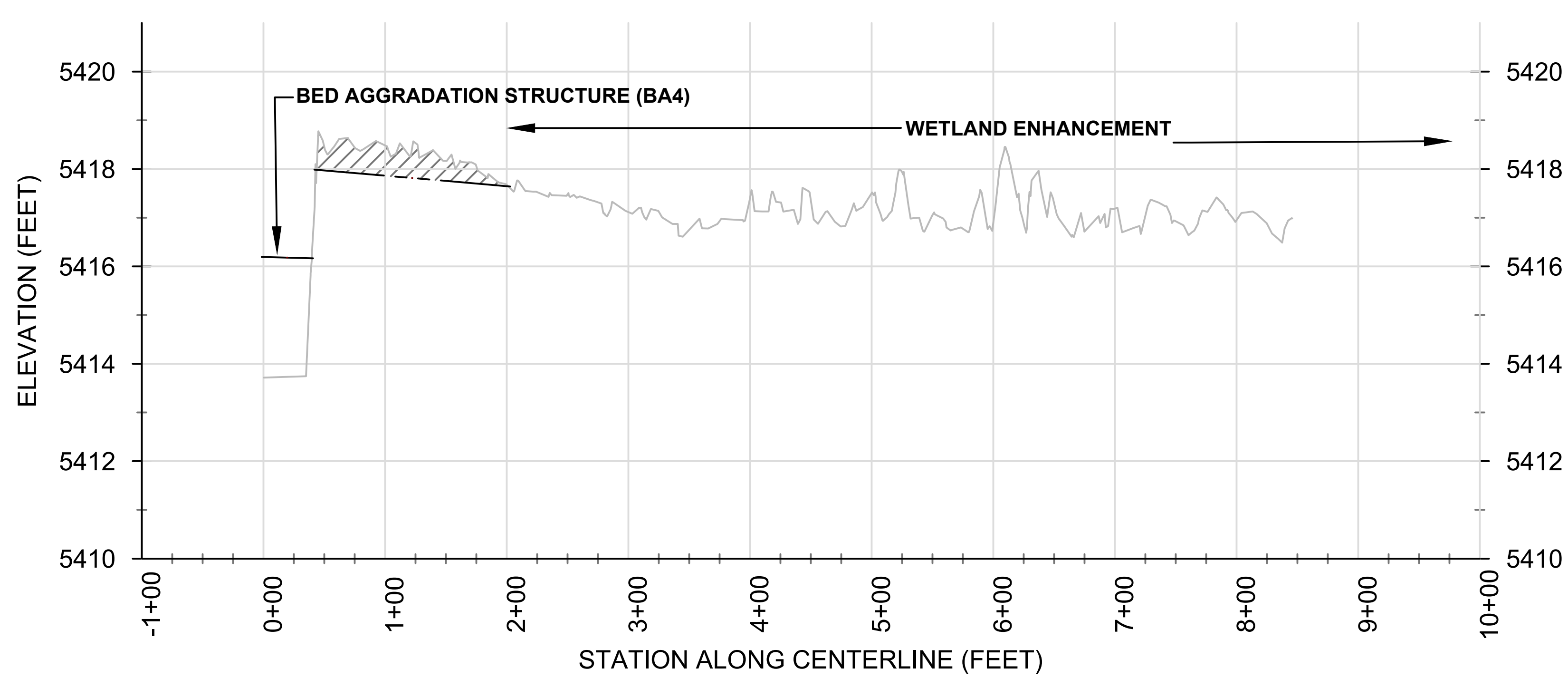
ACTIVATION CHANNEL DETAILS

MAIN CHANNEL START STATION	66+46
MAIN CHANNEL END STATION	N/A
ACTIVATED CHANNEL LENGTH (FT)	645
CONSTRUCTED CHANNEL LENGTH (FT)	160
TARGET INLET ELEVATION (FT)	5418.0
TARGET OUTLET ELEVATION (FT)	N/A
ACTIVATION STAGE ABOVE BED (FT)	2.0
ACTIVATION Q (CFS)	340
DAYS PER YEAR ACTIVATED	37
SLOPE	0.15%
BED AGGRADATION STRUCTURE BA4 ELEVATION	5416.2

OVERFLOW 4
TYPICAL CROSS SECTION



OVERFLOW 4 - PROFILE VIEW



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL

CUT (CY)	30
FILL (CY)	0

LEGEND

- EXISTING GROUND
- DESIGN THALWEG
- CHANNEL STRUCTURE
- EXCAVATION

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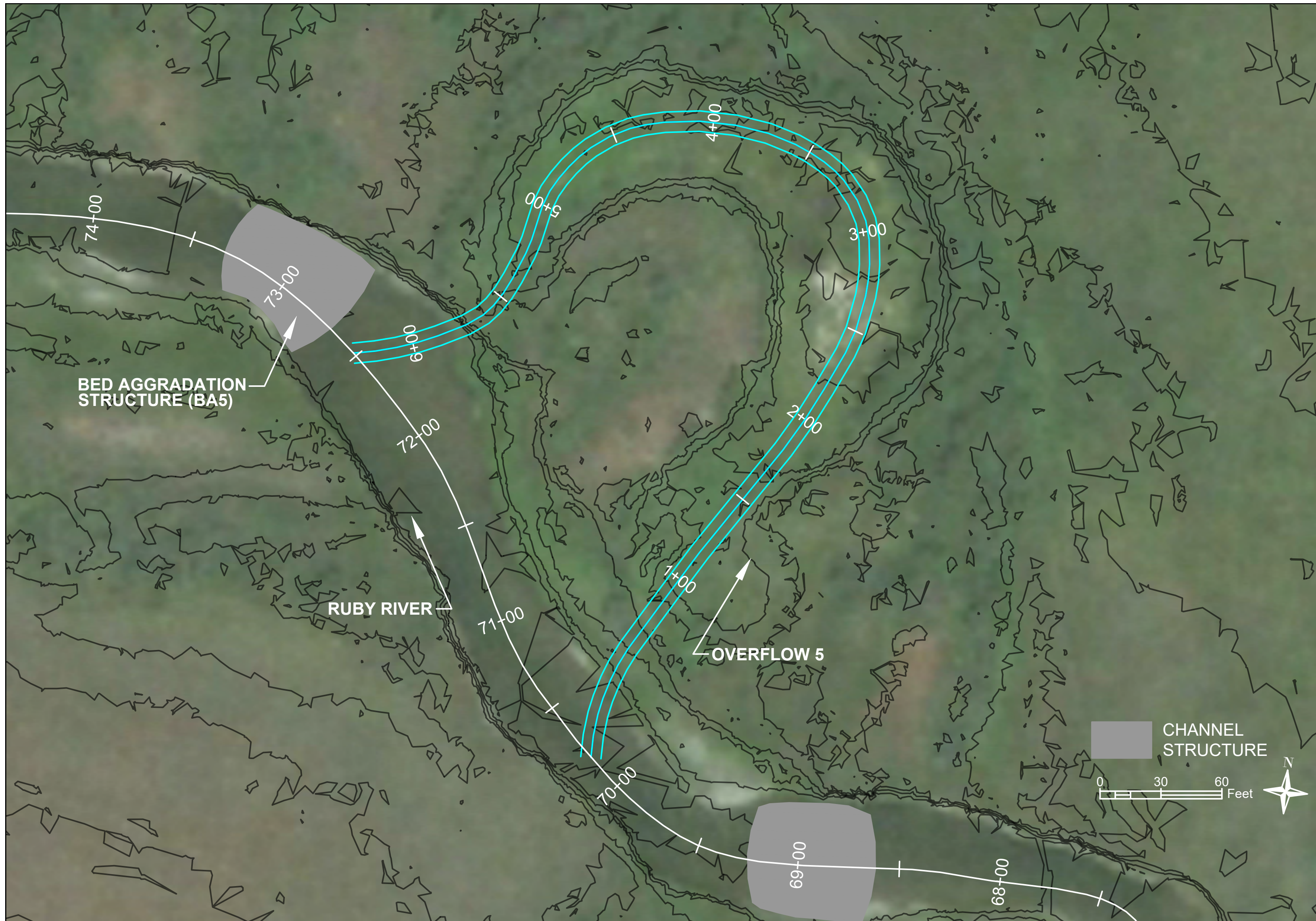
DATA SOURCES: Digital Globe Imagery

ACTIVATION CHANNEL OVERFLOW 4 DETAILS

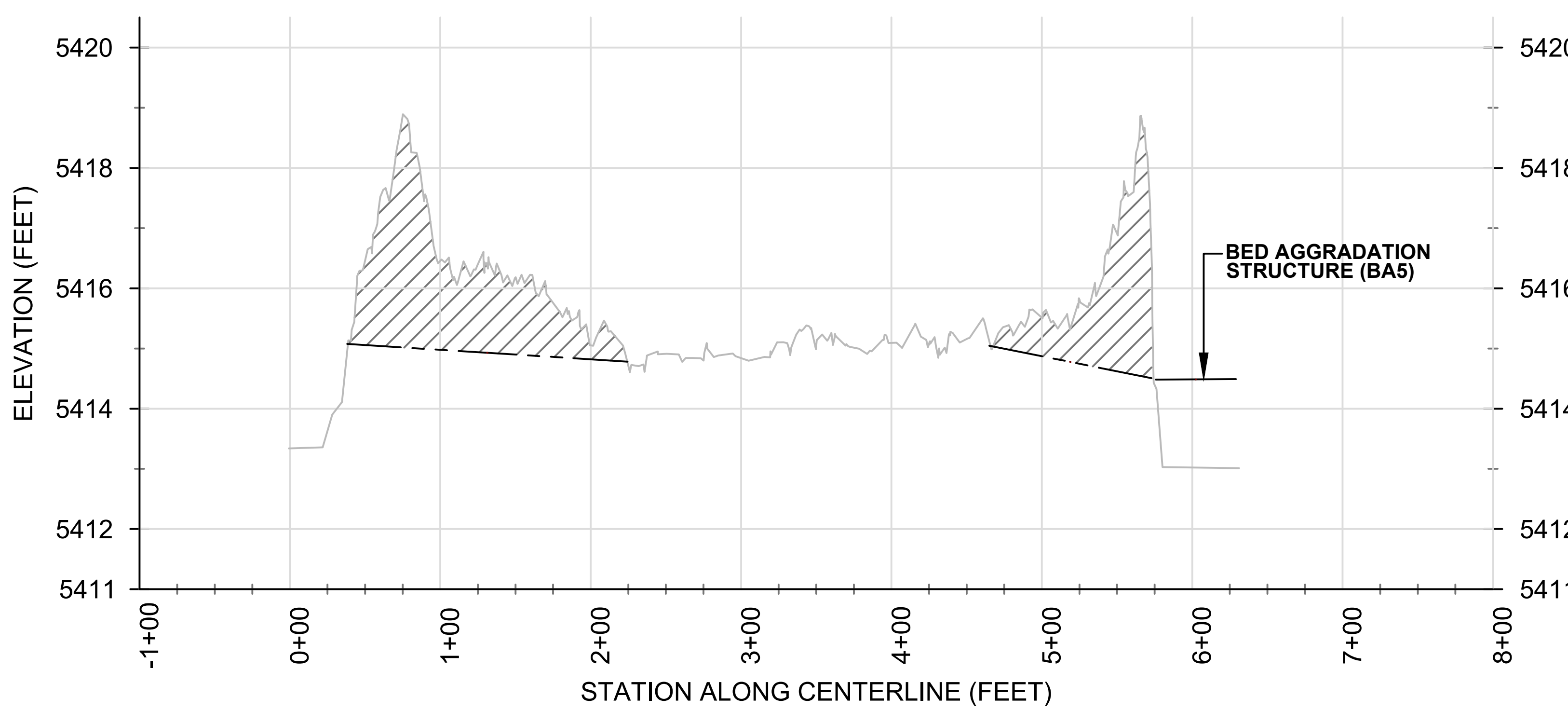
RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: A.Gulley
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
4.8

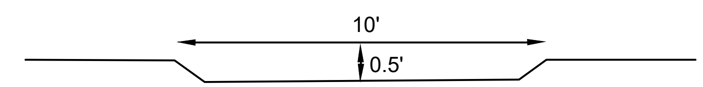


OVERFLOW 5 - PROFILE VIEW



ACTIVATION CHANNEL DETAILS	
MAIN CHANNEL START STATION	70+22
MAIN CHANNEL END STATION	72+54
ACTIVATED CHANNEL LENGTH (FT)	240
CONSTRUCTED CHANNEL LENGTH (FT)	295
TARGET INLET ELEVATION (FT)	5415.0
TARGET OUTLET ELEVATION (FT)	5414.5
ACTIVATION STAGE ABOVE BED (FT)	0.8
ACTIVATION Q (CFS)	80
DAYS PER YEAR ACTIVATED	354
SLOPE	0.08%
BED AGGRADATION STRUCTURE BA5 ELEVATION	5414.6

OVERFLOW 5
TYPICAL CROSS SECTION



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL	
CUT (CY)	165
FILL (CY)	0

LEGEND

- EXISTING GROUND
- DESIGN THALWEG
- CHANNEL STRUCTURE
- EXCAVATION

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307 STATE ST.
HAMILTON, MT 59840
406.363.2353
geumconsulting.com

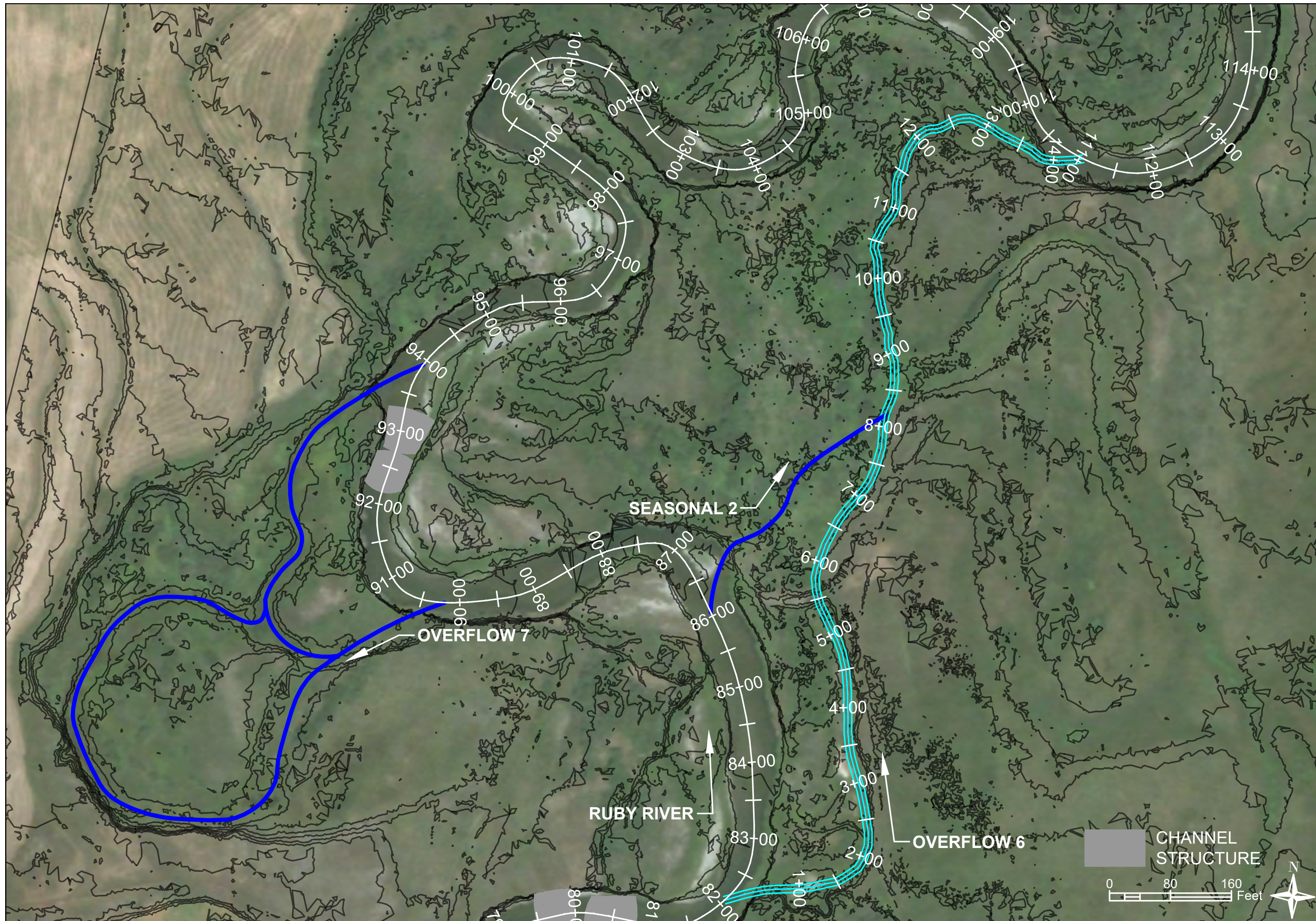
DATUM: North American Datum 1983
PROJECTION: Montana State Plane
UNITS: US Foot
DATA SOURCES: Digital Globe Imagery

ACTIVATION CHANNEL OVERFLOW 5 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

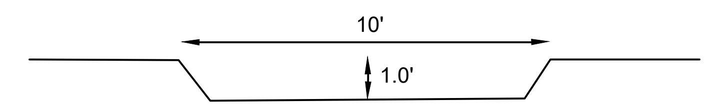
DRAWN BY: A.Gulley
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
4.9

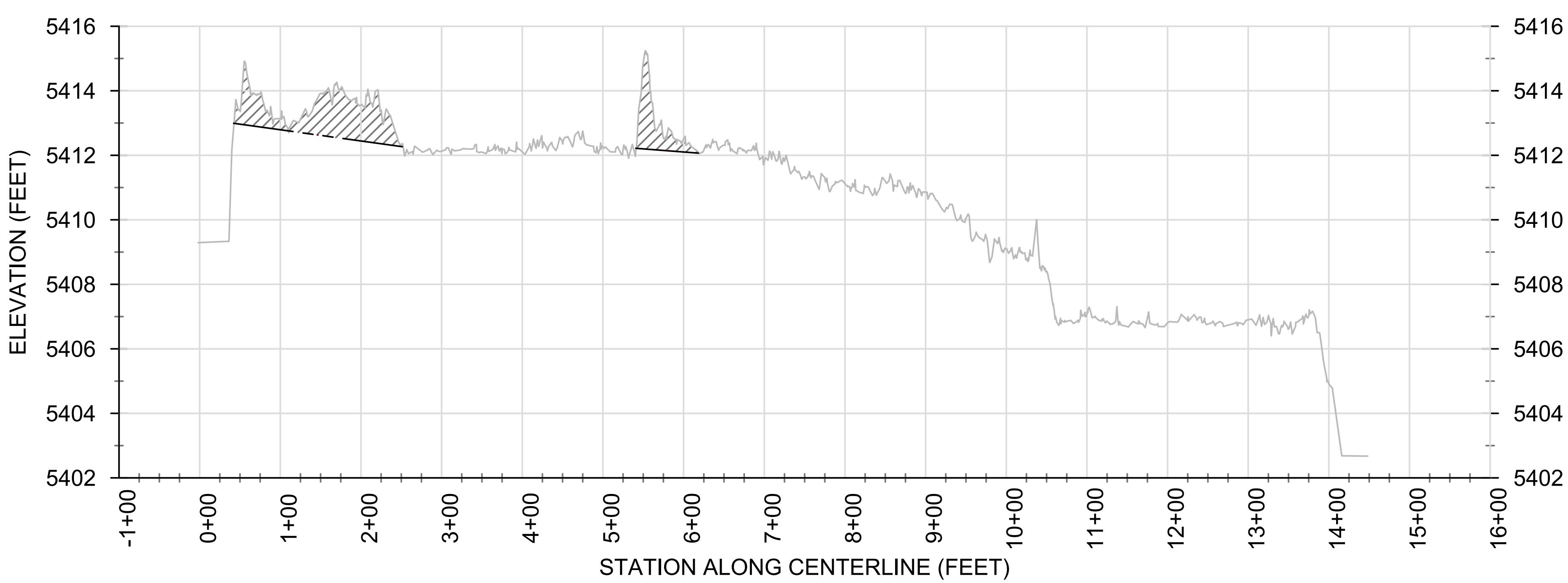


ACTIVATION CHANNEL DETAILS	
MAIN CHANNEL START STATION	82+10
MAIN CHANNEL END STATION	111+08
ACTIVATED CHANNEL LENGTH (FT)	1050
CONSTRUCTED CHANNEL LENGTH (FT)	285
TARGET INLET ELEVATION (FT)	5413.0
TARGET OUTLET ELEVATION (FT)	N/A
ACTIVATION STAGE ABOVE BED (FT)	1.8
ACTIVATION Q (CFS)	390
DAYS PER YEAR ACTIVATED	35
SLOPE	0.42%

OVERFLOW 6
TYPICAL CROSS SECTION



OVERFLOW 6 - PROFILE VIEW



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL	
CUT (CY)	85
FILL (CY)	0

LEGEND

- EXISTING GROUND
- DESIGN THALWEG
- CHANNEL STRUCTURE
- EXCAVATION

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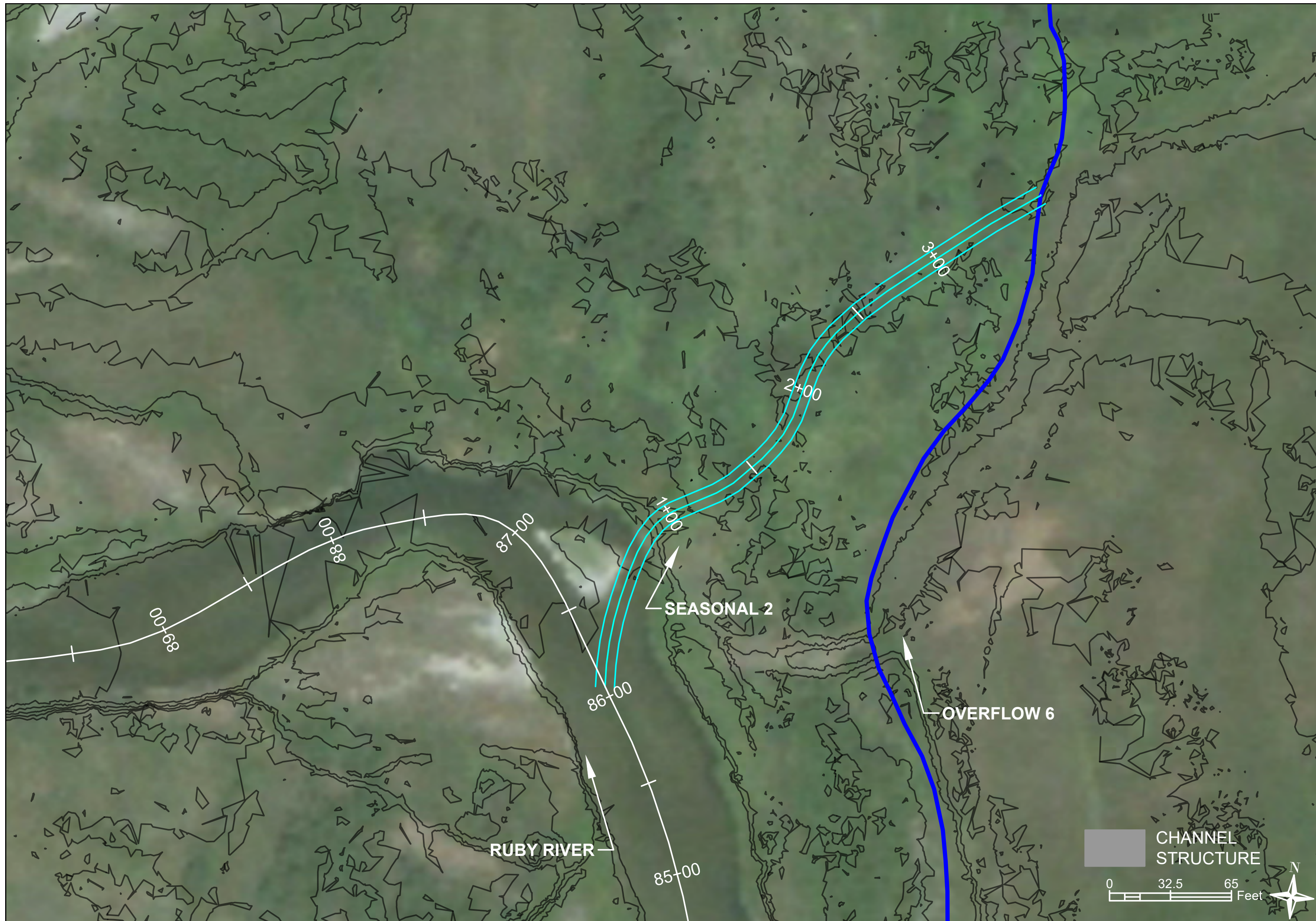
ACTIVATION CHANNEL OVERFLOW 6 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: A.Gulley
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

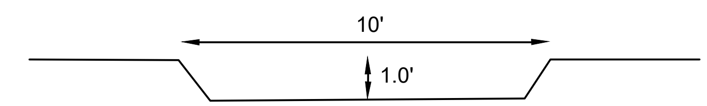
SHEET
4.10



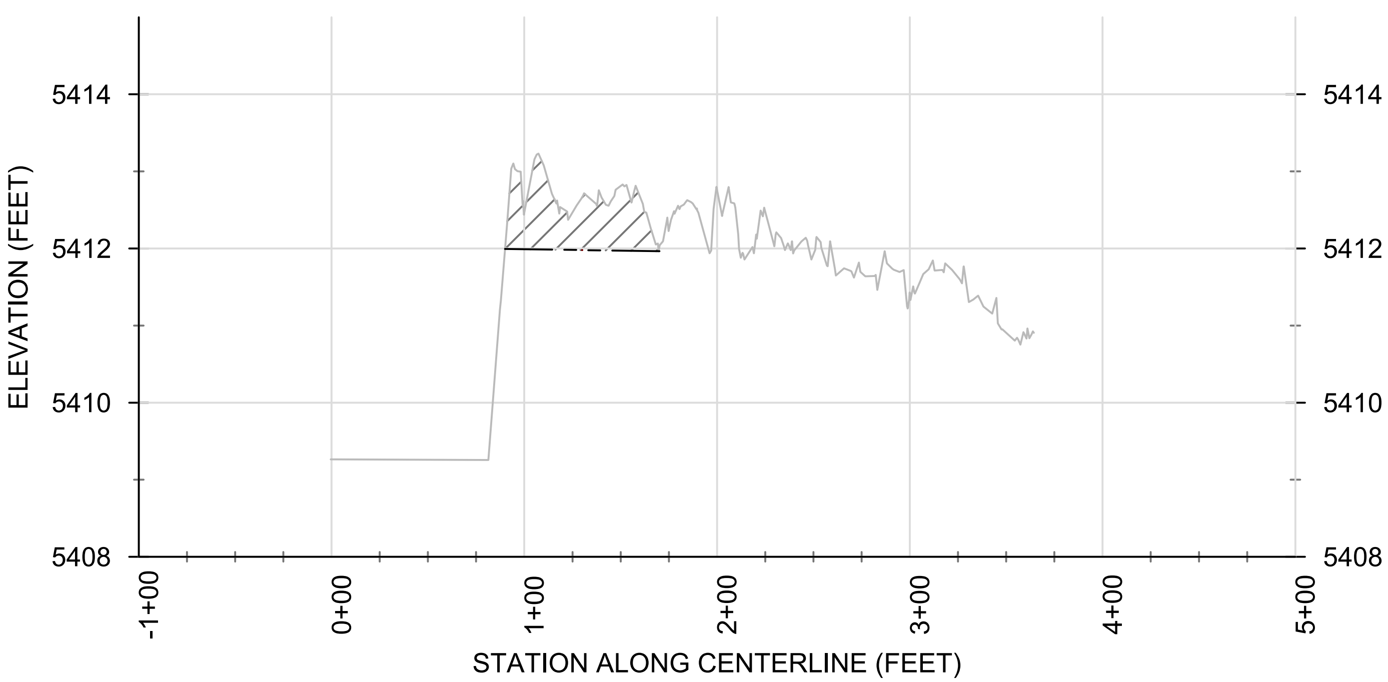
ACTIVATION CHANNEL DETAILS

MAIN CHANNEL START STATION	86+08
MAIN CHANNEL END STATION	N/A
ACTIVATED CHANNEL LENGTH (FT)	105
CONSTRUCTED CHANNEL LENGTH (FT)	75
TARGET INLET ELEVATION (FT)	5412.0
TARGET OUTLET ELEVATION (FT)	N/A
ACTIVATION STAGE ABOVE BED (FT)	2.0
ACTIVATION Q (CFS)	470
DAYS PER YEAR ACTIVATED	26
SLOPE	0.40%

SEASONAL 2
TYPICAL CROSS SECTION



SEASONAL 2 - PROFILE VIEW



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL

CUT (CY)	30
FILL (CY)	0

LEGEND

- EXISTING GROUND
- DESIGN THALWEG
- CHANNEL STRUCTURE
- EXCAVATION

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DATUM: North American Datum 1983
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ACTIVATION CHANNEL SEASONAL 3 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: A.Gulley
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

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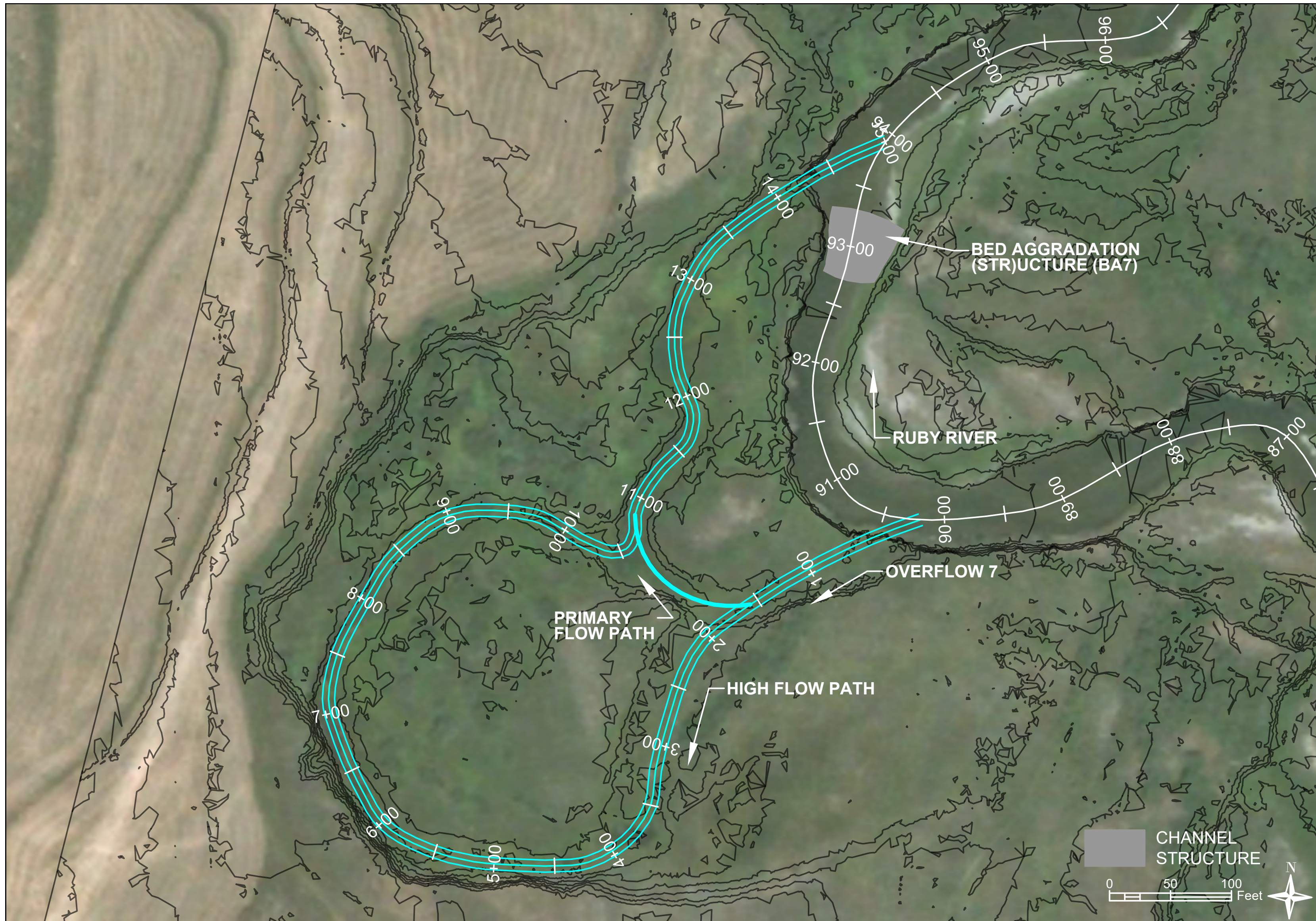
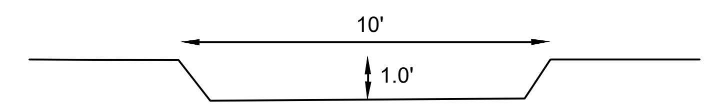
4.11

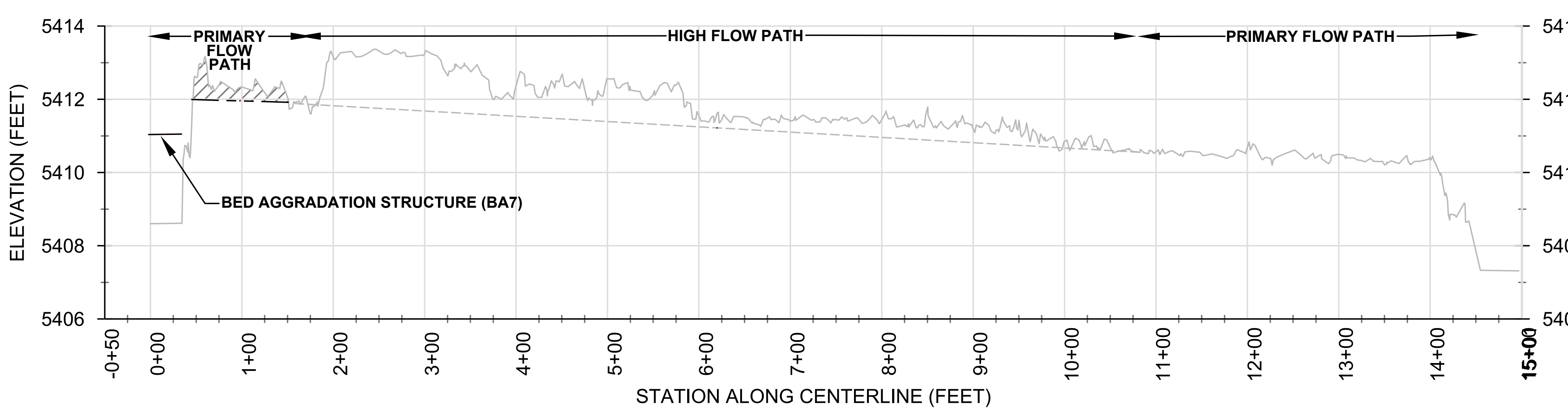


ACTIVATION CHANNEL DETAILS	
MAIN CHANNEL START STATION	90+23
MAIN CHANNEL END STATION	93+95
ACTIVATED CHANNEL LENGTH (FT)	1290
CONSTRUCTED CHANNEL LENGTH (FT)	105
TARGET INLET ELEVATION (FT)	5412.0
TARGET OUTLET ELEVATION (FT)	N/A
ACTIVATION STAGE ABOVE BED (FT)	2.0
ACTIVATION Q (CFS)	330
DAYS PER YEAR ACTIVATED	37
SLOPE	0.13%
BED AGGRADATION STRUCTURE BA7 ELEVATION	5411.0

OVERFLOW 7
TYPICAL CROSS SECTION



OVERFLOW 7 - PROFILE VIEW



ESTIMATED EARTHWORK VOLUMES FOR CONSTRUCTED CHANNEL	
CUT (CY)	20
FILL (CY)	0

LEGEND

EXISTING GROUND
DESIGN THALWEG
CHANNEL STRUCTURE
EXCAVATION

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HAMILTON, MT 59840
406.363.2353
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DATUM: North American Datum 1983
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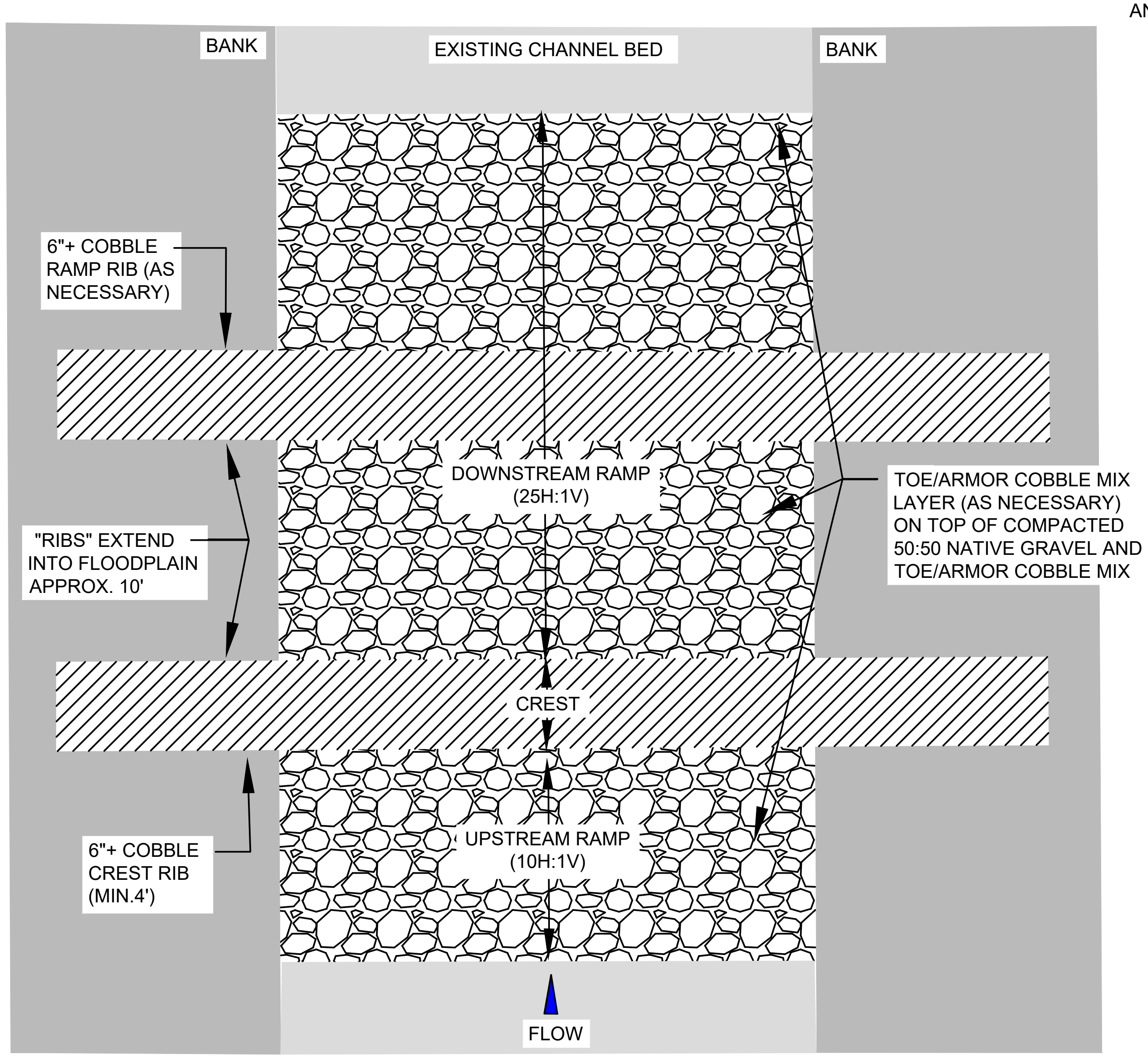
ACTIVATION CHANNEL OVERFLOW 7 DETAILS

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

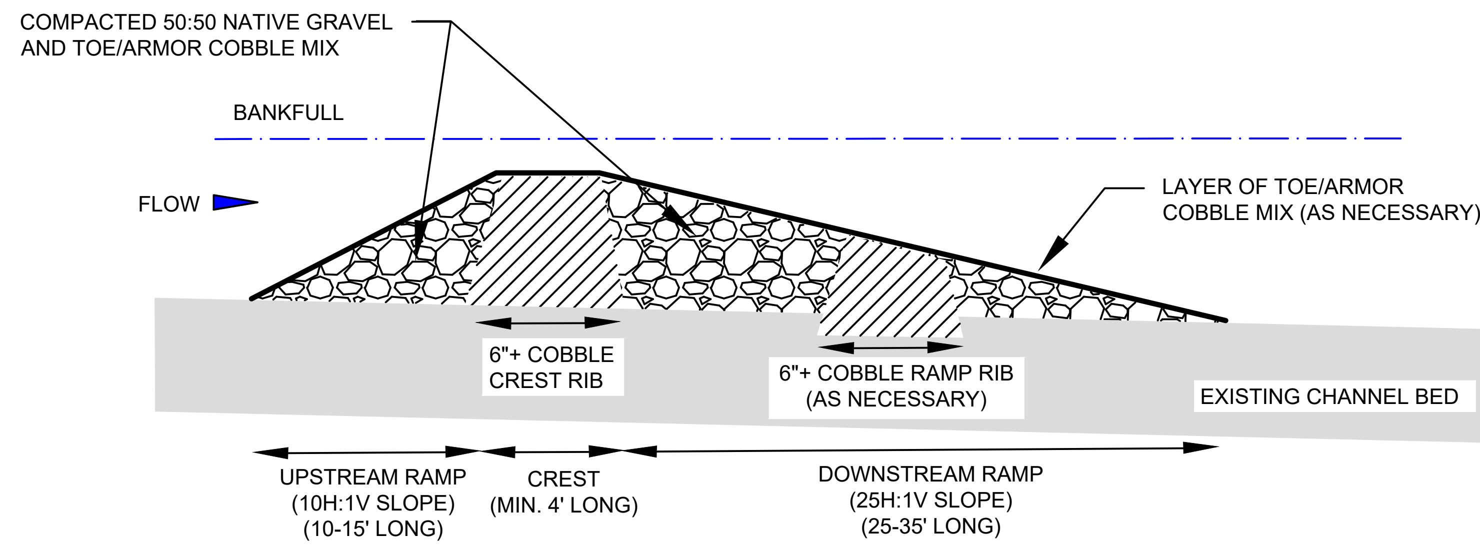
DRAWN BY: A.Gulley
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
4.12

BED AGGRADATION STRUCTURE
PLAN VIEW



BED AGGRADATION STRUCTURE
PROFILE VIEW

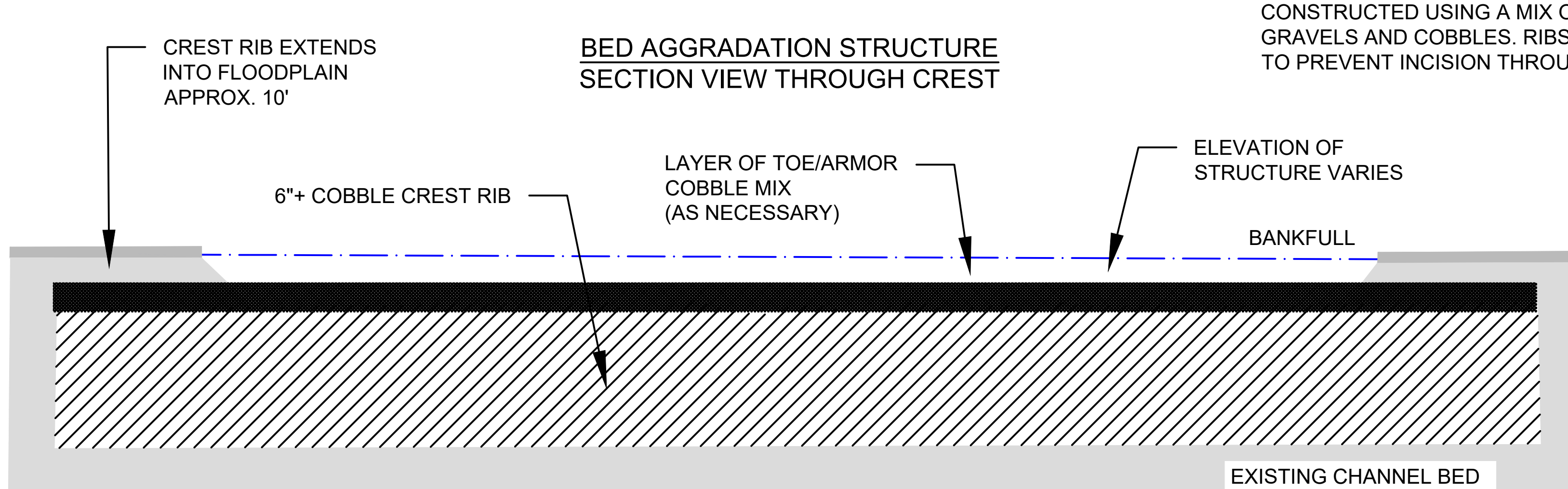


6"+ COBBLE ROCK GRADATION		
SIZE (INCHES)	PERCENT PASSING	SIZE CLASS
TBD	TBD	TBD

TOE/ARMOR COBBLE MIX GRADATION		
SIZE (INCHES)	PERCENT PASSING	SIZE CLASS
TBD	TBD	TBD

MATERIAL SCHEDULE PER STRUCTURE			
ITEM	DIMENSION	UNIT	QUANTITY
6"+ COBBLE	AREA (SF)	CY	TBD
TOE/ARMOR COBBLE MIX	AREA (SF)	CY	TBD
NATIVE GRAVEL	AREA (SF)	CY	TBD

BED AGGRADATION STRUCTURE
SECTION VIEW THROUGH CREST



WORK DESCRIPTION
THIS WORK INCLUDES CONSTRUCTION OF BED AGGRADATION STRUCTURES AT THE LOCATIONS SHOWN ON SHEET 3.0. THE INTENT OF THIS STRUCTURE IS TO LOCALLY RAISE THE BED ELEVATION TO CREATE A BACKWATER THAT WILL ACTIVATE SEASONAL AND OVERFLOW CHANNELS DURING VARIOUS FLOW DISCHARGES TO PASSIVELY INCREASE FLOODPLAIN RECONNECTION. THE BACKWATER DEPTH AND EXTENT VARIES FOR EACH STRUCTURE. THE BED UPSTREAM OF EACH STRUCTURE IS EXPECTED TO AGGRADE OVER TIME. STRUCTURES ARE CONSTRUCTED USING A MIX OF COMPACTED NATIVE AND IMPORTED GRAVELS AND COBBLES. RIBS OF 6" OR LARGER COBBLE ARE INSTALLED TO PREVENT INCISION THROUGH THE STRUCTURE.

BED AGGRADATION STRUCTURE CONSTRUCTION NOTES
1. UPSTREAM RAMP SLOPE WILL VARY DEPENDING ON DESIRED BED MORPHOLOGY.
2. AS-BUILT THE STRUCTURE WILL APPEAR AS A NATURAL RIFFLE.
3. TYPICAL STRUCTURE HEIGHT IS 1' TO 1.5'.
4. TYPICAL STRUCTURE LENGTH IS 40' TO 60'.
5. CONSTRUCT STRUCTURE ON EXISTING CHANNEL BED.
6. CONSTRUCT STRUCTURE IN SHALLOW LAYERS (0.5') AND COMPACT EACH LAYER.

EXAMPLE OF BED AGGRADATION STRUCTURE

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307 STATE ST.
HAMILTON, MT 59840
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DATUM:
PROJECTION:
UNITS: US Feet
DATA SOURCES:

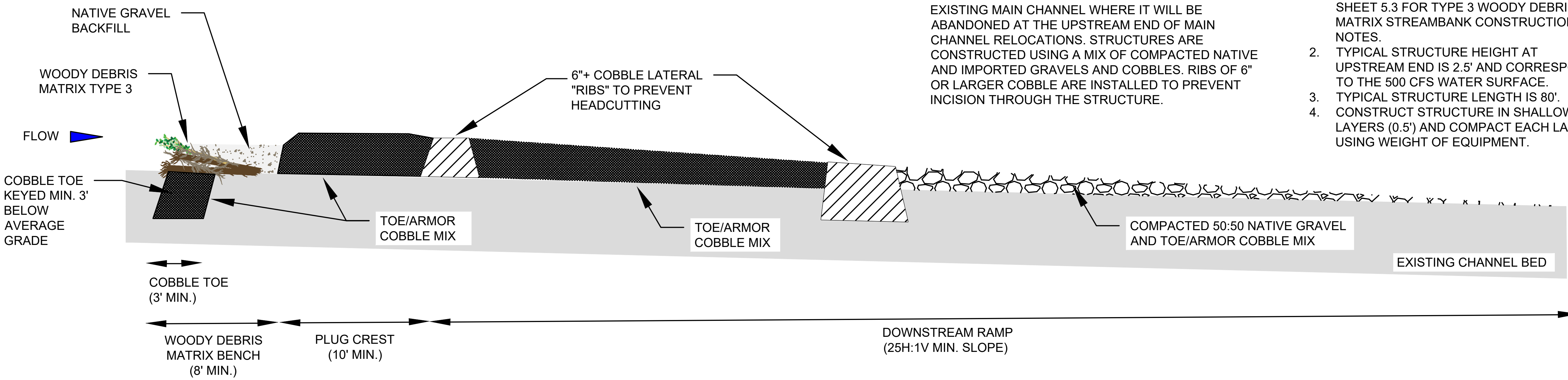
BED AGGRADATION STRUCTURE DETAIL

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: Alyssa Gulley
DESIGNED BY:
DATE: September 2020

SHEET
5.0

CHANNEL PLUG
PROFILE VIEW



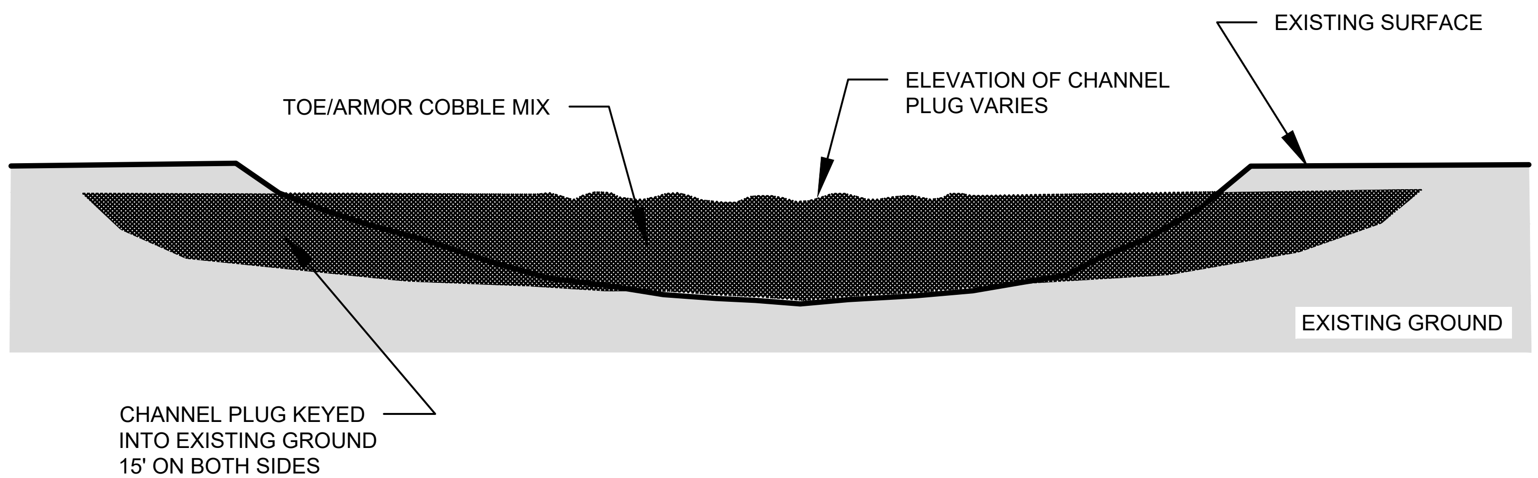
WORK DESCRIPTION

THIS WORK INCLUDES CONSTRUCTION OF CHANNEL PLUGS AT THE LOCATIONS SHOWN ON SHEET 3.0. THE INTENT OF THIS STRUCTURE IS TO PLUG THE EXISTING MAIN CHANNEL WHERE IT WILL BE ABANDONED AT THE UPSTREAM END OF MAIN CHANNEL RELOCATIONS. STRUCTURES ARE CONSTRUCTED USING A MIX OF COMPACTED NATIVE AND IMPORTED GRAVELS AND COBBLES. RIBS OF 6" OR LARGER COBBLE ARE INSTALLED TO PREVENT INCISION THROUGH THE STRUCTURE.

CHANNEL PLUG CONSTRUCTION NOTES

1. WOODY DEBRIS MATRIX HEIGHT IS CONSTRUCTED TO EFFECTIVE CHANNEL DESIGN DISCHARGE (SEE SHEET 3.2). SEE SHEET 5.3 FOR TYPE 3 WOODY DEBRIS MATRIX STREAMBANK CONSTRUCTION NOTES.
2. TYPICAL STRUCTURE HEIGHT AT UPSTREAM END IS 2.5' AND CORRESPONDS TO THE 500 CFS WATER SURFACE.
3. TYPICAL STRUCTURE LENGTH IS 80'.
4. CONSTRUCT STRUCTURE IN SHALLOW LAYERS (0.5') AND COMPACT EACH LAYER USING WEIGHT OF EQUIPMENT.

CHANNEL PLUG
SECTION VIEW THROUGH CREST



MATERIAL SCHEDULE PER STRUCTURE			
ITEM	DIMENSION	UNIT	QUANTITY
NATIVE GRAVEL	AREA (SF)	CY	TBD
6"+ COBBLE	AREA (SF)	CY	TBD
TOE/ARMOR COBBLE MIX	AREA (SF)	CY	TBD

*SEE SHEET 5.3 FOR WOODY DEBRIS MATRIX MATERIAL SCHEDULE

6"+ COBBLE ROCK GRADATION		
SIZE (INCHES)	PERCENT PASSING	SIZE CLASS
TBD	TBD	TBD

TOE/ARMOR COBBLE MIX GRADATION		
SIZE (INCHES)	PERCENT PASSING	SIZE CLASS
TBD	TBD	TBD

EXAMPLE OF CHANNEL PLUG (PHOTO LOOKING UP PLUG FROM DOWNSTREAM RAMP DURING HIGH FLOWS)

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DATUM:
PROJECTION:
UNITS: US Feet
DATA SOURCES:

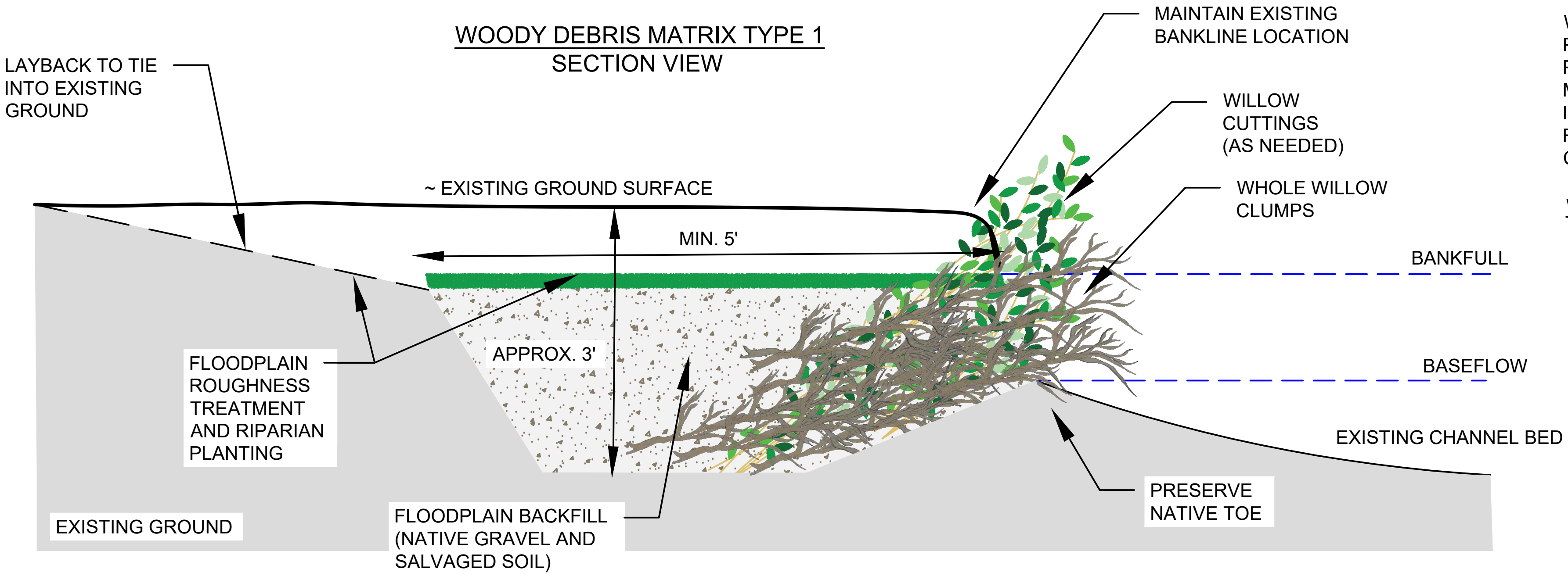
MAIN CHANNEL PLUG DETAIL

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: Alyssa Gulley
DESIGNED BY:
DATE: September 2020

SHEET
5.1

WOODY DEBRIS MATRIX TYPE 1
SECTION VIEW



WORK DESCRIPTION

THIS WORK INCLUDES INSTALLATION OF TYPE 1 WOODY DEBRIS MATRIX STRUCTURES AND WOODY DEBRIS MATRIX WITH INSET FLOODPLAIN STRUCTURES. THESE STRUCTURES PRESERVE THE NATIVE STREAMBANK TOE. THE INTENT OF THESE STRUCTURES IS TO PROVIDE TEMPORARY BANK STABILIZATION AND CREATE A COMPLEX, VEGETATED BANK MARGIN THAT CREATES AQUATIC HABITAT AND SUPPORTS VEGETATION ESTABLISHMENT. IN SELECT LOCATIONS WOODY DEBRIS MATRIX STRUCTURES WILL INCLUDE AN INSET FLOODPLAIN DESIGNED TO NARROW THE CHANNEL DIMENSIONS AND PROVIDE FLOODPLAIN CONNECTIVITY.

WOODY DEBRIS MATRIX STREAMBANK CONSTRUCTION NOTES

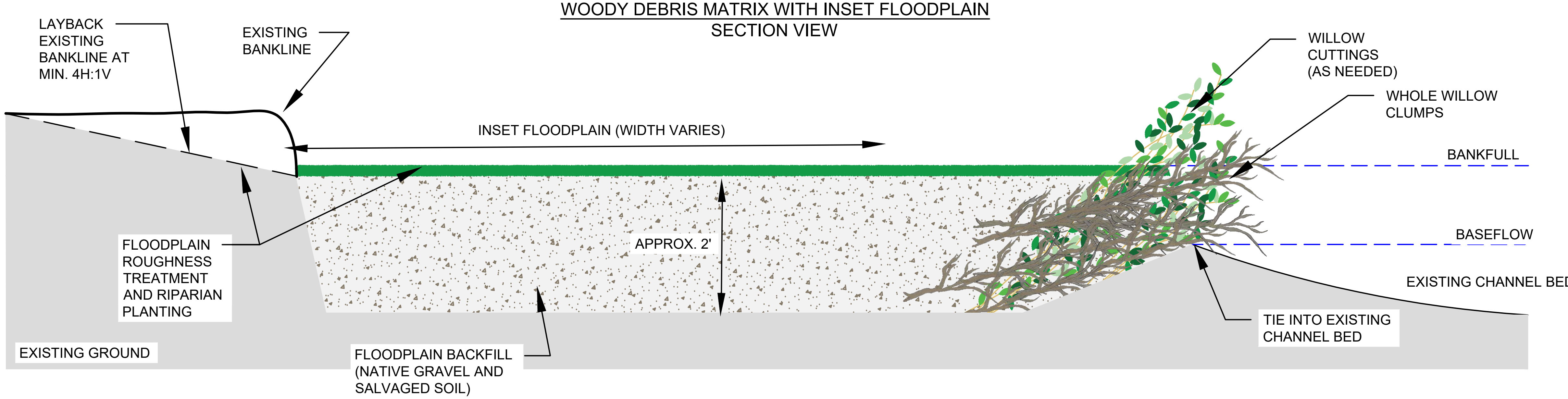
1. EXCAVATE STREAMBANK TO SUBGRADE ELEVATIONS.
2. INSTALL WHOLE WILLOW CLUMPS IN THE STREAMBANK AT A DOWNWARD ANGLE TO THE STREAMBANK. CLUMPS CAN OVERLAP AND CAN BE ORIENTED FACING UPSTREAM OR DOWNSTREAM, BUT SHOULD BE PLACED BELOW THE BANKFULL ELEVATION.
3. IF OUTSIDE OF DORMANCY PLACE WILLOW CUTTINGS INTO THE MATRIX AS SHOWN IN THE DRAWING WITH THE STEMS IN CONTACT WITH THE BASEFLOW WATER TABLE AND TOPS AT OR ABOVE THE BANKFULL ELEVATION.
4. BACKFILL STREAMBANK WITH FLOODPLAIN BACKFILL TO DESIGN ELEVATIONS. WASH FINES INTO THE FLOODPLAIN BACKFILL TO SEAL VOIDS. IN LOCATIONS WITH AN INSET FLOODPLAIN, FLOODPLAIN BACKFILL WILL EXTEND BEYOND THE WOODY DEBRIS MATRIX. THE WIDTH OF INSET FLOODPLAINS VARIES AND WILL BE DEFINED FOR EACH FEATURE.
5. WHERE THE EXISTING BANKLINE ABUTS THE FLOODPLAIN BACKFILL, LAY BACK THE GROUND BY EXCAVATING MATERIAL TO FORM A SLOPE AT A MINIMUM OF 4H:1V TO BLEND THE WOODY DEBRIS MATRIX STREAMBANK AND INSET FLOODPLAIN WITH THE ADJACENT EXISTING GROUND.
6. THE FLOODPLAIN BENCH SHOULD BE ROUGHENED AND RIPARIAN PLANTS INSTALLED.

MATERIAL SCHEDULE PER LINEAR FOOT

ITEM	DIMENSION	UNIT	QUANTITY
WHOLE WILLOW CLUMPS	10' MIN. HEIGHT W/ ROOTBALL	EA	0.2 (1 PER 8FT)
DORMANT WILLOW CUTTINGS	MIN. 1/2" D, 6-8' L	EA	3
RIPARIAN PLANTS OR TRANSPLANTS	1 GAL.	EA	2
FLOODPLAIN BACKFILL (TYPE 1 WOODY DEBRIS MATRIX)	NATIVE	CY/LF	1.1
FLOODPLAIN BACKFILL (WOODY DEBRIX MATRIX WITH INSET FLOODPLAIN)	NATIVE	CY/LF	VARIES


EXAMPLES OF WOODY DEBRIS MATRIX STREAMBANK TREATMENTS

WOODY DEBRIS MATRIX WITH INSET FLOODPLAIN
SECTION VIEW



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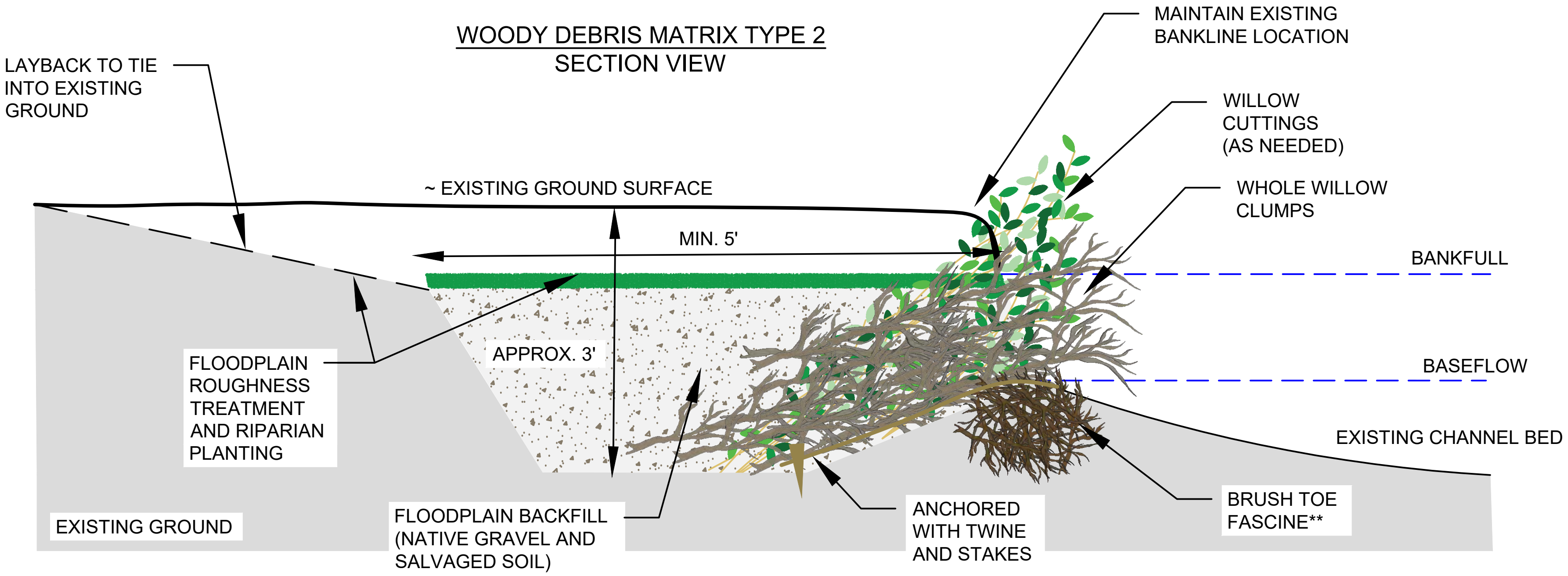
DATUM:
PROJECTION:
UNITS: US Feet
DATA SOURCES:

WOODY DEBRIS MATRIX TYPE 1 AND WOODY DEBRIS MATRIX WITH INSET FLOODPLAIN DETAIL

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: Alyssa Gulley
DESIGNED BY:
DATE: September 2020

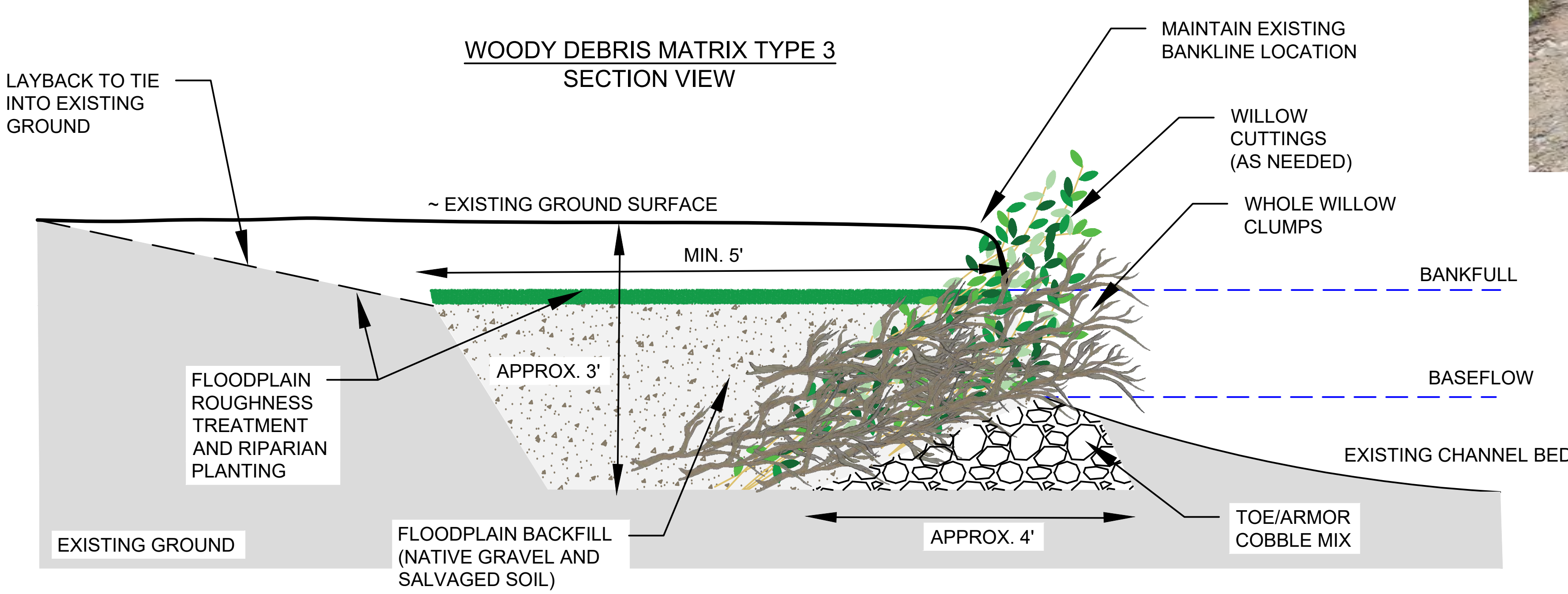
SHEET
5.2



** BRUSH TOE FASCINE CONSTRUCTED WITH BUNDLES OF JUNIPER BRANCHES (OR OTHER) PLACED PARALLEL TO STREAMFLOW AND ANCHORED BENEATH WHOLE WILLOW CLUMPS USING BIODEGRADABLE TWINE AND 2FT WOODEN STAKES

MATERIAL SCHEDULE PER LINEAR FOOT

ITEM	DIMENSION	UNIT	QUANTITY
WHOLE WILLOW CLUMPS	10' MIN. HEIGHT W/ ROOTBALL	EA	0.2 (1 PER 8FT)
DORMANT WILLOW CUTTINGS	MIN. 1/2" D, 6-8' L	EA	3
TOE/ARMOR COBBLE MIX (TYPE 3)	TBD	CY/LF	0.3
RIPARIAN PLANTS OR TRANSPLANTS	1 GAL.	EA	2
FLOODPLAIN BACKFILL	NATIVE	CY/LF	1.1
BRUSH TOE FASCINES	1-2' WIDE, 8-10' L	EA	0.2



WORK DESCRIPTION

THIS WORK INCLUDES INSTALLATION OF TYPE 2 AND TYPE 3 WOODY DEBRIS MATRIX STRUCTURES AT THE LOCATIONS SHOWN ON SHEET 3.0. THE INTENT OF THESE STRUCTURES IS TO PROVIDE TEMPORARY BANK STABILIZATION AND CREATE A COMPLEX, VEGETATED BANK MARGIN THAT CREATES AQUATIC HABITAT AND SUPPORTS VEGETATION ESTABLISHMENT. TYPE 2 WILL BE USED ALONG POOLS TO INCREASE HABITAT AND TYPE 3 WILL BE USED IN HIGH VELOCITY AREAS WHERE TOE STABILITY IS NEEDED.

WOODY DEBRIS MATRIX STREAMBANK CONSTRUCTION NOTES

1. EXCAVATE STREAMBANK TO SUBGRADE ELEVATIONS.
2. FOR TYPE 2 INSTALL BRUSH TOE FASCINE AND ANCHOR TO BACK OF EXCAVATION. FOR TYPE 3 CONSTRUCT STREAMBANK TOE WHERE NEEDED AND ACCORDING TO SPECIFIED DIMENSIONS.
3. INSTALL WHOLE WILLOW CLUMPS IN THE STREAMBANK AT A DOWNWARD ANGLE TO THE STREAMBANK. CLUMPS CAN OVERLAP AND CAN BE ORIENTED FACING UPSTREAM OR DOWNSTREAM, BUT SHOULD BE PLACED BELOW THE BANKFULL ELEVATION.
4. IF OUTSIDE OF DORMANCY PLACE WILLOW CUTTINGS INTO THE MATRIX AS SHOWN IN THE DRAWING WITH THE STEMS IN CONTACT WITH THE BASEFLOW WATER TABLE AND TOPS AT OR ABOVE THE BANKFULL ELEVATION.
5. BACKFILL STREAMBANK WITH FLOODPLAIN BACKFILL TO DESIGN ELEVATIONS. WASH FINES INTO THE FLOODPLAIN BACKFILL TO SEAL VOIDS. IN LOCATIONS WITH AN INSET FLOODPLAIN, FLOODPLAIN BACKFILL WILL EXTEND BEYOND THE WOODY DEBRIS MATRIX. THE WIDTH OF INSET FLOODPLAINS VARIES AND WILL BE DEFINED FOR EACH FEATURE.
6. WHERE THE EXISTING BANKLINE ABUTS THE FLOODPLAIN BACKFILL, LAY BACK THE GROUND BY EXCAVATING MATERIAL TO FORM A SLOPE AT A MINIMUM OF 4H:1V TO BLEND THE WOODY DEBRIS MATRIX STREAMBANK AND INSET FLOODPLAIN WITH THE ADJACENT EXISTING GROUND.
7. THE FLOODPLAIN BENCH SHOULD BE ROUGHENED AND RIPARIAN PLANTS INSTALLED.

EXAMPLES OF WOODY DEBRIS MATRIX STREAMBANK TREATMENTS

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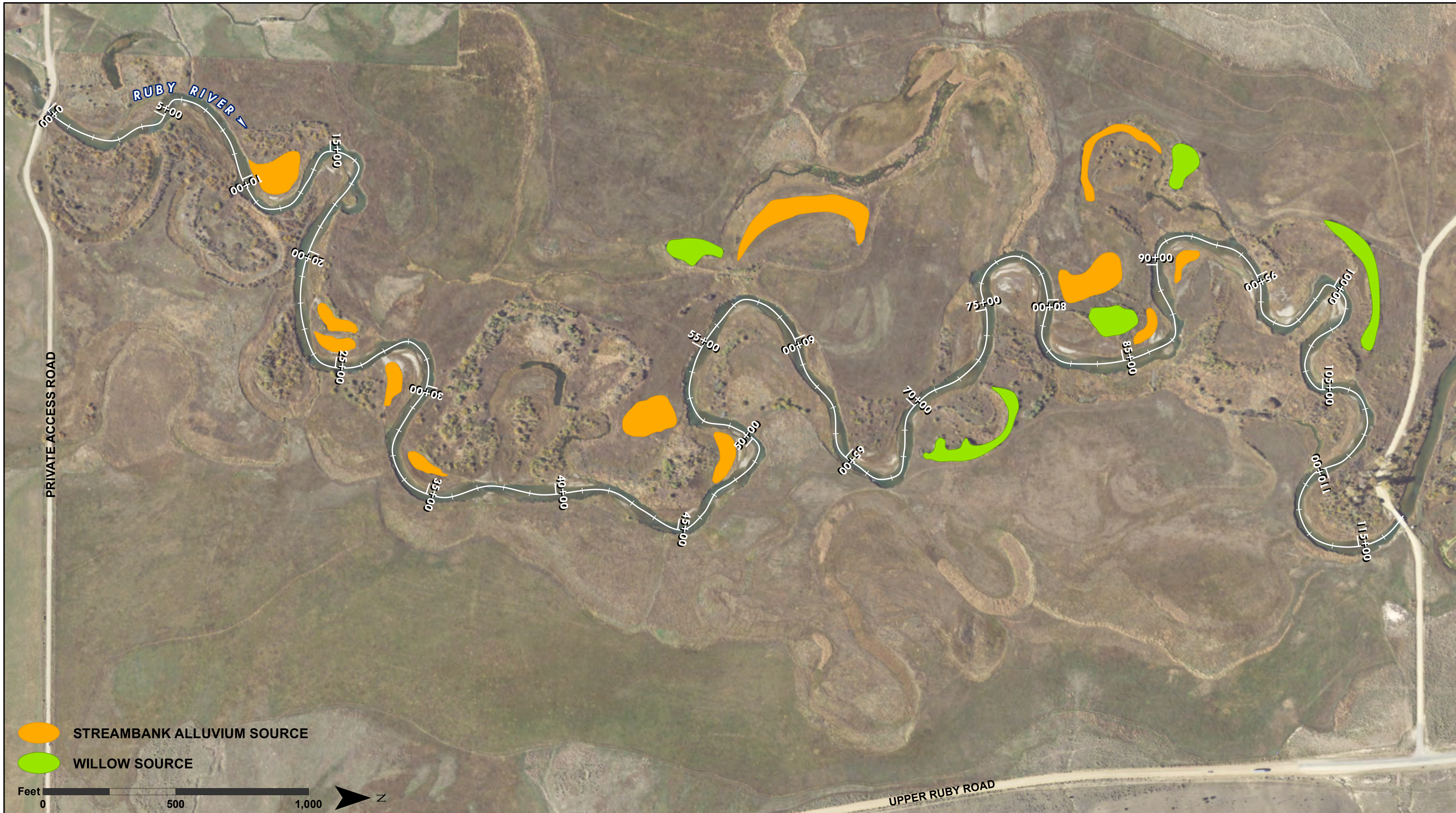
DATUM:
PROJECTION:
UNITS: US Feet
DATA SOURCES:

WOODY DEBRIS MATRIX TYPE 2 AND TYPE 3 DETAIL

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: Alyssa Gulley
DESIGNED BY:
DATE: September 2020

SHEET
5.3



BORROW SOURCES

Alluvial Borrow:
Rock and alluvial materials needed to construct streambanks and bed aggradation structures will be both imported and acquired on site. This sheet shows potential on site borrow areas for alluvial gravels based on test pit excavations. All borrow areas will be stripped of sod and soil. Sod will be salvaged to the extent possible. Alluvial gravels will be mined from area, topsoil replaced, and salvaged sod placed on surface to reclaim gravel borrow sites. Abandoned channel segments will also be used to acquire cobble and gravel needed for structure and streambank construction.

Willow Sources:
Streambanks will be constructed using a mix of willows and junipers. Willows will be salvaged from on site to the extent feasible and without impacting the function of existing riparian vegetation. Additional willows and junipers will be imported from off site. This sheet shows the location of potential on site willow sources. On site salvage will consist of digging up older, more decadent willows from existing stands on site. No more than 20% of willows in a stand will be harvested. All other willows and woody material needed for streambank construction will be acquired from off site and transported to the site.

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DATUM: North American Datum 1983
PROJECTION: Montana State Plane
UNIT: US Foot
DATA SOURCES:
USDA NAIP Imagery, 2017
Madison County Cadastral, 2019

BORROW and MATERIALS SOURCES

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: J. Wallace
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
6.0

Structure Summary	Number of structures	Units	Estimated Total Quantity
Brush Matrix with Inset Floodplain	8	linear feet	1,917
Brush Matrix Type 1	3	linear feet	415
Brush Matrix Type 2	9	linear feet	1,388
Brush Matrix Type 3	12	linear feet	3,787
Bed Aggradation Structure	7	square feet	21,061
Riffle Control Structure	4	square feet	11,333
Main Channel Plug	3	square feet	23,635
Main Channel Plug - Low Profile	4	square feet	36,141

Materials List	Dimensions	Unit	Estimated Total Quantity
Toe/Armor Cobble Mix	*TBD*	cubic yard	1,900
6" Cobble	*TBD*	cubic yard	*TBD*
Native Gravel/Alluvium	cubic yard	cubic yard	4,272
Whole Willow Clumps	10' min. height w/ rootball	each	1,500
Dormant Willow Cuttings	1/2" min. diameter x 6-8' length	each	22,500
Riparian Plants or Transplants	D40 - 1 Gallon container	each	1,500
Juniper/Conifers	30-40' tree with branches	each	30

Summary of Total Estimated Excavation and Fill Volumes	Unit	Estimated Total Quantity
Estimated Excavation	cubic yards	21,257
Estimated Fill	cubic yards	12,772
Net	cubic yards	+8,485

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307 STATE ST
HAMILTON, MT 59840
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MATERIAL SUMMARY

RUBY RIVER RVHA RESTORATION PROJECT
MADISON COUNTY, MONTANA

DRAWN BY: J. Wallace
DESIGNED BY: Geum, AGI, Gillilan
DATE: September 2020

SHEET
6.1

ATTACHMENT F – DECLARATION FORM

Declaration Form
Dark Money Spending Disclosure Requirements

Contracting Entity shall comply with the State of Montana Executive Order No. 15-2018 requiring the disclosure of dark money spending.

Definitions. As used in this declaration form, the following definitions apply:

Electioneering Communication: A paid communication that is publicly distributed by radio, television, cable, satellite, internet website, mobile device, newspaper, periodical, billboard, mail, or any other distribution of printed or electronic materials, that is made within 60 days of the initiation of voting in an election in Montana, that can be received by more than 100 recipients in the district in Montana voting on the candidate or ballot issue, and that:

a. refers to one or more clearly identified candidates in that election in Montana;

b. depicts the name, image, likeness, or voice of one or more clearly identified candidates in that election in Montana; or

c. refers to a political party, ballot issue, or other question submitted to the voters in that election in Montana.

The term does not mean:

a. a bona fide news story, commentary, blog, or editorial distributed through the facilities of any broadcasting station, newspaper, magazine, internet website, or other periodical publication of general circulation unless the facilities are owned or controlled by a candidate or political committee;

b. a communication by any membership organization or corporation to its members, stockholders, or employees;

c. a commercial communication that depicts a candidate's name, image, likeness, or voice only in the candidate's capacity as owner, operator, or employee of a business that existed prior to the candidacy; or

d. a communication that constitutes a candidate debate or forum or that solely promotes a candidate debate or forum and is made by or on behalf of the person sponsoring the debate or forum.

In this definition, the phrase "made within 60 days of the initiation of voting in an election" means:

a. in the case of mail ballot elections, the initiation of voting occurs when official ballot packets are mailed to qualified electors pursuant to 13-19-206, MCA; or

b. in other elections the initiation of voting occurs when absentee ballot packets are mailed to or otherwise delivered to qualified electors pursuant to 13-13-214, MCA.

Contracting Entity: A bidder, offeror, or contractor.

Covered Expenditure means:

a. A contribution, expenditure, or transfer made by the Contracting Entity, any of its parent entities, or any affiliates or subsidiaries within the entity's control, that:

 i. is to or on behalf of a candidate for office, a political party, or a party committee in Montana; or

 ii. is to another entity, regardless of the entity's tax status, that pays for an Electioneering Communication, or that makes contributions, transfers, or expenditures to another entity, regardless of its tax status, that pays for Electioneering Communication; and

b. The term excludes an expenditure made by the Contracting Entity, any of its parent entities, or any affiliates or subsidiaries within the entity's control made in the ordinary course of business conducted by the entity making the expenditure; investments; or expenditures or contributions where the entity making the expenditure or contribution and the recipient agree that it will not be used to contribute to candidates, parties, or Electioneering Communication.

Solicitation Requirements. The Contracting Entity shall disclose Covered Expenditures that the Contracting Entity has made within two years prior to submission of its bid or offer.

The disclosure of Covered Expenditures is only required by the bidder/offeror whenever the aggregate amount of Covered Expenditures made within a 24-month period by the bidder/offeror, any parent entities, or any affiliates or subsidiaries within the bidder/offeror's control exceeds $2,500.

If the bidder/offeror meets the disclosure requirements, the bidder/offeror shall submit this signed declaration form indicating "Yes" AND the required disclosure form with its bid/proposal.

If the bidder/offeror does NOT meet the disclosure requirements, the bidder/offeror shall submit this signed declaration form with its bid/proposal indicating "No".

Annual Contract Requirements. The Contracting Entity agrees that if awarded a contract and the contract term exceeds, or has the potential to exceed 24 months, it must annually review and complete a new declaration form and disclosure form, if necessary.

☐ Yes- I have read, understand, and meet the disclosure requirements for the 24 months immediately preceding the submission of this form. I will complete the necessary disclosure form and submit it with this form.

Company Name (Clearly Printed):

____

Authorized Signature:

____

Date: ____________________

☒ No- I have read, understand, and do NOT meet the disclosure requirements. I certify that the Contracting Entity has not made Covered Expenditures in excess of $2,500 in the 24 months immediately preceding the submission of this form.

Company Name (Clearly Printed):

Ruby VALLEY CONSERVATION DISTRICT

Authorized Signature:

[signature], Chairman

Date: 11/11/2020