



2020 319 Application Form

PART A—GENERAL INFORMATION

Project Name Nevada Creek Restoration Project Phase 4 Implementation

Sponsor Name Big Blackfoot Chapter of Trout Unlimited

Registered with the Secretary of State? Y

Registered with SAM? Y

Duns # 610096153

Does your organization have liability insurance? Y

Primary Contact Ryen Neudecker

Signatory Jim Stutzman

Title Restoration Coordinator

Title Board President

Address PO Box 1

Address PO Box 1

City Ovando State MT Zip Code 59854

City Ovando State MT Zip Code 59854

Phone Number 406-240-4824

Phone Number 406-799-4393

Email Address ryen@montanatu.org

Email Address stutz292@hotmail.com

Signature Ryen Neudecker Digitally signed by Ryen Neudecker
Date: 2019.11.01 11:47:27 -06'00'

Signature Jim Stutzman Digitally signed by Jim Stutzman
Date: 2019.11.01 11:47:41 -06'00'

Technical and Administrative Qualifications

The mission of BBCTU is to restore and preserve the cold-water fishery of the Blackfoot River and its tributaries. Our organization works closely with the Blackfoot Challenge whose mission is to coordinate efforts that will enhance, conserve and protect the natural resources and rural lifestyle of the Blackfoot River Valley for present and future generations. Through our collaborative efforts, in partnership with several local, state, federal agencies, other non-profits, and private landowners (Blackfoot Restoration Partners) we work towards a shared vision of resource conservation and management. Ryen Neudecker is the Restoration Coordinator for BBCTU and has 18 years' experience coordinating and implementing habitat restoration projects in the Blackfoot River Watershed and has managed over 100 different grants and partnership agreements with state, private and federal partners.

Past and Current Projects

Project Name	Grant or Contract Amount	Funding Entity (entity name/program, contact person, phone, email)	Completion Date
Nevada Creek Restoration Project Phase 3B	\$ 62,000.00	MTFWP Future Fisheries Ms. Michelle McGree 406.444.2432 MMcgree@mt.gov	November 2019
Nevada Creek Restoration Project Phase 3	\$ 49,000.00	National Fish & Wildlife Foundation--Bring Back the Natives	Ongoing
USFWS-Bull Trout-Cooperative Restoration Initiative	\$ 500,000.00	Funding to develop and implement habitat restoration projects to benefit bull trout populations. Grant was secured in 2016 and will be completed in November 2019.	September 2019

FUNDING REQUEST

319 Funds Requested (<i>including administrative fee</i>)	\$ 289,000.00	Administrative Fee (<i>not to exceed 10% of total 319 funding request</i>)	\$ 7,000.00
State Cash Match	\$ 50,000.00	Total Non-Federal Match	\$ 213,275.00
Local Cash Match	\$ 77,000.00		
In-Kind Match	\$ 86,275.00		
Federal Funds	\$ 10,000.00		
Other Funds (<i>not 319, not match, not federal</i>)	\$ 0.00		
Total Project Cost	\$ 512,275.00		

PART B—PROJECT INFORMATION

Part B must be filled out separately (*including providing separate attachments*) for each project included in your application. Use the following examples to help determine when to lump and when to split projects. If additional clarification is needed, contact Mark Ockey, at 406-444-5351 or mockey@mt.gov.

Splitting Examples (fill out multiple Part B's)

- 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 coral 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 (sub-project) Name Nevada Creek Restoration Project Phase 4

Total Project Cost Include costs already incurred, as well as anticipated costs, from all sources, for all aspects of the project.

\$ 512,275.00

Latitude 46.46'37"N Longitude -112.45'48"W

Latitude _____ Longitude _____

Latitude _____ Longitude _____

Map Y

12 Digit HUC #(s) 170102030406

Waterbody Name from 2018 List of Impaired Waters Nevada Creek

Probable Causes of Impairment to be Addressed Sediment, Nutrients, Temp, Altered streamside/phys substrate

Waterbody Name from 2018 List of Impaired Waters _____

Probable Causes of Impairment to be Addressed _____

Project Summary - Briefly describe the **nature and extent** of the problem, the **root causes** of the problem, and your **proposed solution**.

Nevada Creek is a large, third-order tributary to the middle Blackfoot River and supports populations of westslope cutthroat trout, rainbow trout, brown trout, bull trout and other fish species. The segment above the reservoir is listed by Montana Department of Environmental Quality as impaired for nutrients, siltation, suspended solids, alterations in streamside cover and substrate habitat alterations. The source of these impairments originates from grazing and haying impacts and from sections of Nevada Creek being historically straightened and cleared of riparian vegetation to accommodate adjacent agricultural fields. With the channel manipulations and loss of critical woody vegetation, Nevada Creek began to downcut and suffer from severe bank erosion as the stream tried to reconnect with a floodplain and regain the proper pattern, profile and dimensions. Over time the stream has become wider, cutting into the adjacent fields further and fine sediment began to deposit filling in pools and covering the gravels necessary to support aquatic life. Pre-project Bank Erosion Hazard Index (BEHI) studies have also determined that 545 tons/year of sediment is being generated through the project reach. This systemic erosion is not only a limiting factor for native trout living in the stream, it also means that every year the landowner are losing a significant amount of ground. Due to the chronic upstream bank erosion issues, Nevada Creek reservoir has lost an estimated 12% of its capacity (Dalby, 2006 report) and has been identified as not supporting the beneficial uses of aquatic life and primary contact recreation. High sediment and associated nutrient loads not only impact the lake itself, but also create downstream water quality impairments, and reduce holding capacity. The landowner upstream of the reservoir on Nevada Creek is interested in restoring the segment of Nevada Creek that runs through their property, especially after seeing the success of the projects on phases one, two and three downstream of the reservoir. The proposed project on this reach of Nevada Creek (phase four) involves restoring ~7,100 feet of channel and due to the poor recovery potential of this site, developing a project design following natural channel design philosophy and principles to re-establish physical and biological function is important. Our project goal is to restore a natural, self-maintaining, stable channel, establish a woody riparian community, and improve aquatic habitat and diversity while reducing the excessive land loss and the high sediment loads from streambank erosion. A similar restoration design was implemented on the lower reaches of Nevada Creek below the Nevada Creek Reservoir with observed increases in physical and biological functioning, total trout abundance and biomass. The project design includes constructing a low width/depth ratio, meandering stable channel with well-defined pools, glides and riffles while providing shade and bank stability with transplanted willows/alders/cottonwood and willow cuttings. Restoration concepts will focus on restoring eroding streambanks, re-establishing proper channel cross-section, plan form, and longitudinal profile dimensions, and identifying opportunities to increase floodplain connectivity either by raising the channel bed, re-activating meander oxbows, or lowering high banks to bankfull elevations. Streambank stability and habitat considerations will be addressed through installing native materials including woody debris, cuttings and transplants to direct the thalweg off the banks, reduce near bank shear stress and eliminate existing high bank dimensions. Grazing and range assessments have already been completed by a grazing specialist, who, in conjunction with the landowners, will include a detailed grazing management plan.

Continuation of previous or ongoing activity? If "Yes", please explain the relationship.

This project builds upon the downstream work In Nevada Creek that began in 2010 with the latest stretch being completed in November of 2019. The landowner associated with phase 4 has toured the previous phases multiple times and has been requesting assistance with restoring the stretch of Nevada Creek. In 2019, DEQ awarded BBCTU funding to develop the design for Nevada Creek phase 4, and we are now seeking implementation money to move forward with rehabilitating this stretch of Nevada Creek. Restoring Nevada Creek and addressing the multiple limiting factors throughout the drainage is an important priority for the Blackfoot Restoration team and is part of the Watershed Restoration Plan.

Watershed Restoration Plan (WRP) and authoring entity

Blackfoot River - Blackfoot Challenge

Letter of support from WRP authoring entity? If "No", please explain.

Y

How will this project implement recommendations in the WRP?

For more than 30 years, Big Blackfoot Chapter of Trout Unlimited (BBCTU) and Blackfoot Challenge have worked with local communities to restore and conserve the watershed in partnership with a multitude of state, federal and other NGO partners. This collaborative effort has resulted in the Blackfoot Watershed remaining a stronghold for two imperiled populations of native trout. This project builds upon those efforts by addressing fisheries habitat priorities and water quality concerns and fulfills the prioritization strategy of the Blackfoot Watershed Restoration plan by: addressing multiple TMDLs, improving high-priority fish habitat, involving multiple public and private partners, working in areas of imminent threat to water quality and aquatic habitat, and working with willing landowners. Our proposed restoration strategies are specifically recommended in the Blackfoot WRP (p.13-19). This project provides new opportunities to educate communities about water quality and encourage new projects and partnerships.

Nonpoint Source Goals

Our project goal with the Nevada Creek Phase 4 Restoration Project is to restore a natural, self-maintaining channel and riparian community, while improving aquatic habitat and diversity and reducing the excessive land loss and the high sediment loads from streambank erosion. The amount of bank erosion on Nevada Creek is a chronic issue not only affecting the project reach, but downstream habitat and water users. BEHI studies have estimated that over 545 tons of sediment is generated yearly in this reach and almost 30% of the banks suffer from very high to high levels of bank erosion. By restoring Nevada Creek to the proper profile, pattern and dimensions we expect to see dramatic decreases in sediment from bank erosion, and the grazing management plan will assist in the reduction of any nutrient contributions. Water temperature reduction goals will be aided by the improvement of channel cross-section dimensions and width to depth ratios along with recovery of a functional riparian area. The altered streamside/physical substrate conditions will also be addressed through design specifications.

Partners and Roles

Landowner(s)

Name

Rem & Diane Mannix

Letter of Support Attached?

 Y

 N

 N

Other Partners

Name

Role

Letter of Support Attached?

Montana Fish, Wildlife & Parks	MTFWP will assist with project design review, establish permit conditions and lead the monitoring effort of the fisheries response.
USFWS Partners for Fish & Wildlife Program	The USFWS will provide technical review for the Nevada Creek stream restoration design and grazing management plan along with financial support.
Blackfoot Challenge	The BC will develop the grazing management system and help conduct outreach and education with local communities and schools related to this and overall water quality in the Blackfoot.
Blackfoot Chapter of Trout Unlimited	BBCTU will manage the 319 contract, coordinate landowner meetings, project planning and design review, implementation and project monitoring, and volunteer /outreach events.

 Y

 Y

 Y

 N

 N

 N

Planning and Coordination

Planning and coordination includes permitting, design development, landowner agreements, volunteer labor recruitment, partnering and collaboration, alignment with watershed planning efforts, procurement and oversight of contractors, etc.

Planning Activities Already Completed	Documentation Attached?
Project Design has been developed	<input type="checkbox" value="Y"/>
Project Permits have been drafted and will be submitted in February 2020	<input type="checkbox" value="N"/>
Project construction bids have been drafted and will be awarded in March 2020	<input type="checkbox" value="N"/>
Landowner agreement is being developed	<input type="checkbox" value="N"/>
Partnership coordination meetings	<input type="checkbox" value="N"/>
Grazing Management Plan is being developed	<input type="checkbox" value="N"/>

Task Description

Big Blackfoot Chapter of Trout Unlimited has been coordinating partnership meetings to determine collaborative opportunities, outline project objectives, and review/develop project design and plans. BBCTU will also help facilitate implementation schedules, volunteer /outreach events and ensure project monitoring meets 319 contract requirements. BBCTU is the main contact between the landowner and contractors and will ensure the landowner agreement is drafted to outline the maintenance and monitoring responsibilities of the project. A copy of the agreement will be submitted to DEQ for review and comment prior to signature, followed with a final signed agreement. Partners will ensure that the landowner agreement addresses who shall be responsible for operating and maintaining all structures, vegetation, management measures, and water quality benefits associated with the projects. The partners will also monitor and ensure this operation and maintenance for the life of the projects. During the project lifetime, partners will identify and ensure procedures are in place for project coordinators and DEQ to access the project site. Project permits will be submitted in February of 2020 and construction bids will be sent in March of 2020 and documentation will be shared with DEQ project manager.

Deliverables

1. Copies of all required project permits.
 2. Copies of landowner, management and partnership agreements or subcontracts.
- (Note: project design and associated grazing management plan for this phase was previously provided to Montana DEQ for review and approval under a separate contract).

Funding

319 Funds	<input type="text" value="\$ 1,000.00"/>
Non-Federal Match	<input type="text" value="\$ 5,000.00"/>
Federal Funds	<input type="text" value="\$ 0.00"/>
Other Funds	<input type="text" value="\$ 0.00"/>
Total Cost	<input type="text" value="\$ 6,000.00"/>
Is Match Secured	<input type="checkbox" value="Y"/>

Timeline November 2019-November 2020

Match Source BBCTU

Project Implementation

Task Description

Under the Nevada Creek phase 4 project, we will continue to build on the success of the earlier work by focusing on reducing sources of sediment loading while setting the stage for recovery of riparian areas and aquatic habitat, ultimately improving conditions for a rebounding trout population. The project will utilize native material for channel shaping and minimize streambed treatments; incorporate vegetated wood and brush fascine matrices; increase sinuosity through finger bars, alcoves and backwater bays; identify opportunities to establish proper channel dimensions; and investigate opportunities to expand the floodplain by lowering high banks to create surfaces that will support emergent and scrub-shrub wetlands. A grazing management plan also will be established and implemented upon completion of the channel restoration work.

Deliverables

1. Restoration of 7,100 feet of channel along Nevada Creek.
 2. Revegetation components as outlined in restoration design.
 3. Grazing management plan infrastructure to protect channel and riparian work.
 4. A written project report that includes as-builts, photos and a summary of restoration activities. This will be covered under project effectiveness monitoring as well.

(Note: grazing plan infrastructure refers to any riparian fencing, livestock watering, etc).

(The only match that has not been secured is the Future Fisheries (State Match) which will be applied for in November of 2019).

Funding

319 Funds	\$ 274,000.00
Non-Federal Match	\$ 196,275.00
Federal Funds	\$ 10,000.00
Other Funds	\$ 0.00
Total Cost	\$ 480,275.00
Is Match Secured	N

Timeline Summer 2020-November 2020

Match Source BBCTU, Landowner, MT TU, Future Fisheries, USFWS

Appropriate Next Step

Often times, water quality and habitat goals can be achieved through passive restoration actions (ie: grazing management). Due to the lack of floodplain connection and entrenched nature of this reach of Nevada Creek (phase 4), actively restoring floodplain reconnection is a key component to removing this reach of Nevada Creek from the impaired waters list. To address floodplain disconnection, the channel bed will be raised slightly to reconnect former floodplain surfaces and features including side channels, alcoves and emergent and shallow open water wetlands. In some locations, existing terraces will be lowered to the bankfull elevation to increase floodprone areas. Additional work involves installing the streambank stability treatments described and creation of aquatic habitat features including riffles, runs, pools and glides to provide instream complexity for native and non-native fish species. These combined actions are projected to reduce sediment loading to Nevada Creek by more than 545 tons per year, increase floodplain connection and set the stage for recovery of the riparian zone and aquatic habitat conditions by restoring site hydrology and channel dimensions. The long-term goal is to have a self-sustaining stream system supporting a healthy riparian area and adjacent wetland systems. In addition, the demonstration and educational value of this project is important to begin expanding our restoration program to more properties and stream systems upstream of the Nevada Creek Reservoir, including Nevada Creek and the many tributaries entering the drainage. With the completion of phase 3 this past November, we have addressed the reaches downstream of the reservoir that have the highest bank erosion levels. We have chosen this reach as the next phase in our effort to restore the Nevada Creek drainage due to the incredible amount of bank erosion that affects not only areas upstream of the reservoir, but the reservoir itself. The dimensioning capacity of the reservoir will negatively impact downstream reaches of Nevada Creek and water delivery management for irrigation and potential water conservation opportunities. And as previously described, this phase of Nevada Creek is highly visible and well serve an another important demonstration project.

Sustainability

Implementing natural channel design methods and principles, in coordination with a grazing management plan will set the stage for the project goal which is to restore a self-sustaining stream channel and riparian system on this reach of Nevada Creek. The design will follow similar concepts and specifications implemented on the downstream 3.5 miles restored beginning in 2010. That work has required very little maintenance work and has seen sustained flows at 10 times bankfull discharge levels over multiple years.

Natural Processes

Restoration actions taken by the Blackfoot Restoration Partners support a stream’s central tendency to adjust towards the most probable natural state. Proposed actions are evaluated as to effects on dimension, pattern, and profile, based on the bankfull concept for restoration of stream function modeled after reference reaches. In the Blackfoot, all instream habitat restoration projects are screened through an assessment that links cause and consequence for determination of the appropriate corrective action and incorporate natural river geometry, channel behavior, riparian function, aesthetic value, and the comparative financial value of different alternatives. This philosophy and the underlying methods that complement it have been used on other similar restoration projects in the Blackfoot and have resulted in desired conditions and outcomes. As previously described, the project on reach 4 of Nevada Creek has a goal of restoring a natural, self-maintaining channel, with a robust woody riparian community, and will focus on using native materials to accomplish the design objectives. Natural channel design methods and principles form the foundation of restoration work in the Blackfoot watershed.

Project Effectiveness Evaluation

Task Description

Baseline monitoring of the stream conditions and limiting habitat factors has been conducted and this dataset informed the design parameters, the project objectives, and the particular methods we will use during the project to accomplish those objectives. The instream restoration work will be monitored during construction and post-project with as-built channel surveys (cross-sections and longitudinal profiles) to ensure the project was built to design specifications and standards. The success of the riparian planting effort and natural response will also be assessed post-project during the growing season and will include photo points and riparian vegetation surveys. "Best Management Practice" monitoring will include Bank Erosion Hazard Index (BEHI) surveys, established photo points, pre-and post-project to monitor habitat improvements. Big Blackfoot Chapter of Trout Unlimited will work in collaboration with the DEQ project manager to develop a plan and methods for evaluating, monitoring and reporting on the effectiveness of the proposed projects.

Deliverables

Deliverables	Funding
1. Monitoring plan provided to DEQ for review and approval.	319 Funds <input type="text" value="\$ 4,000.00"/>
2. Monitoring report summarizing data collection, analysis and assessment of results.	Non-Federal Match <input type="text" value="\$ 4,000.00"/>
3. Established photo points throughout project (before, after and during)	Federal Funds <input type="text" value="\$ 0.00"/>
4. Riparian vegetation installation monitoring, including mortality rate.	Other Funds <input type="text" value="\$ 0.00"/>
5. As-built channel measurements.	Total Cost <input type="text" value="\$ 8,000.00"/>
6. Sediment load reduction measurements and calculations using DEQ Bank Erosion Hazard Index monitoring procedures	Is Match Secured <input type="text" value="Y"/>

Timeline Spring 2020-Fall of 2020

Match Source BBCTU

The Bigger Picture

Other Natural Resources

This project will benefit westslope cutthroat trout and bull trout--a Montana species of special concern and a threatened species under the ESA. Species dependent on healthy riparian areas will also see positive benefits including migratory song birds, sandhill cranes, waterfowl, grizzly bears, and amphibians. Several wetland acres will be created through this project and with the increase in a functional riparian area and change in channel cross-sectional area to a lower width to depth ratio, water temperatures will decrease.

Climate Resiliency

Bank storage through floodplain connection, water temperature decreases, and the rejuvenation of a healthy, self-sustaining, native riparian ecosystem will all contribute to climate resiliency. By restoring the proper dimensions, including reference condition width to depth ratios, water temperatures will also decrease.

Public Visibility

This project builds upon the previous phases restored on Nevada Creek and hundreds of interested parties have toured those sites to learn more about the project goals. The location of the project is very visible from HWY 200, is located right above a USGS gaging station, and the landowner is a Powell county commissioner.

Point Source / Nonpoint Source Relationships

This phase of Nevada Creek flows into the Nevada Creek reservoir, an important irrigation conveyor for landowners downstream of the reservoir. Due to the existing condition of this reach of Nevada Creek, chronic bank erosion is an issue and the amount of sediment being generated totals over 545 tons yearly. All of this sediment is deposited into the Nevada Creek reservoir resulting in an estimated 12% loss of capacity over time (Dalby, 2006 report). There are no known point source discharges within the Nevada Creek watershed.

Source Water Protection

As previously described, by completing this project we'll be aiding in the protection of the Nevada Creek reservoir, an important water source for recreation and downstream water users.

Healthy Watersheds

The restoration program in the Blackfoot River watershed is a grass-roots led effort with 100% voluntary participation. The demonstration value of the work along Nevada Creek and other streams has highlighted the effectiveness of these projects and stimulated more interest in restoration. Simply put, landowners are realizing that they can still manage their agriculture operations while supporting a healthy riparian area and stream system. BEHI data confirmed that the landowners on phase 3 of Nevada Creek had lost over seven acres of land due to bank erosion in just six years. These projects are saving acres of important ground from being washed downstream and the collaborative nature of these projects demonstrate that agriculture, fisheries, high quality instream and riparian habitat can all coexist.

PART C—EDUCATION AND OUTREACH

Task Description

Big Blackfoot Chapter of Trout Unlimited will host at least three project tours to highlight project progress with conservation groups, agency partners and community members. BBCTU will also coordinate at least two service days for local students and volunteers to collect and install willow cuttings. In addition, the partners will host at least two field days for local schools, working with students to measure stream flows, turbidity, and temperature, while also teaching them to assess riparian and in-stream habitat health. The benefit of this project and information about the Blackfoot Restoration program aimed at improving water quality and fisheries habitat needs will also be promoted through the BBCTU and Blackfoot Challenge's web site, social media and print and electronic newsletters.

Deliverables

1. At least three project tours to share project progress and results.
2. At least two service days to collect and install willows
3. At least two school based field events to assess stream health and teach students on the value of instream and riparian habitat and water quality
4. Photos of tours, educational and service events
5. Report on types and impacts of outreach and education, including numbers of individuals reached.

Funding

319 Funds	\$ 3,000.00
Non-Federal Match	\$ 4,000.00
Federal Funds	\$ 0.00
Other Funds	\$ 0.00
Total Cost	\$ 7,000.00
Is Match Secured	Y

Timeline May 2020-November 2020

Match Source BBCTU, Blackfoot Challenge

PART D—PROJECT ADMINISTRATION

Task Description

Big Blackfoot Chapter of Trout Unlimited will provide contract accounting, record keeping and administration for this project ensuring that all activities remain on time and within budget. Administrative duties will include preparing and submitting billing statements, providing status reports and annual reports, and fulfilling the final report requirements. Project staff will remain in regular contact with the DEQ project manager.

Deliverables

1. Quarterly status and financial reports submitted to DEQ.
2. Annual progress reports submitted to DEQ.
3. Final project report including all required attachments submitted to DEQ.

Administrative fee is less than 3% of budget.

Funding

319 Funds	\$ 7,000.00
Non-Federal Match	\$ 4,000.00
Federal Funds	\$ 0.00
Other Funds	\$ 0.00
Total Cost	\$ 11,000.00
Is Match Secured	Y

Timeline Summer 2020-December 2020.

Match Source BBCTU

Letters of Support



"Better Rural Communities through Cooperative Conservation"

October 17, 2019

Eric Trum
Montana Department of Environmental Quality
1520 E. Sixth Ave.
Helena, MT 59620

RE: BBCTU 319 Proposal

Dear Eric:

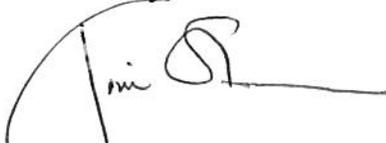
Over the last 30 years, the Big Blackfoot Chapter of Trout Unlimited has accomplished dozens of restoration projects, benefiting native fish habitat, stream health and water quality throughout the Blackfoot Watershed. All of this work helped lay the foundation for and continues to meet the goals of the Blackfoot Watershed Restoration Plan.

With the partnership and input of BBCTU, the Blackfoot Challenge completed the Blackfoot Watershed Restoration Plan in 2014. The plan has helped expand the BBCTU-Challenge partnership by providing opportunities for the two organizations to pursue shared projects and 319 program funding.

As proposed by BBCTU, the continued restoration of Nevada Creek will fulfill shared natural resource and community priorities as well as the long-term goals of the Blackfoot Watershed Restoration Plan. The next phase of the Nevada Creek restoration work furthers our commitment to a healthy watershed and long-term resilience, particularly as they relate to drought, fisheries habitat, and water quality.

The Challenge will continue to collaborate with BBCTU on the ongoing restoration of Nevada Creek and our partnership in the Blackfoot Watershed Restoration Plan. We wholeheartedly support the community-based process of neighboring up to ensure the resilience of working landscapes through strong partnerships. Thank you for your consideration of this funding proposal and for all of the support DEQ has provided toward conserving and enhancing the Blackfoot Watershed.

Sincerely,



Jim Stone
Chairman

(sent via email on April 12, 2019)Hello Ryan;

I got your email last night and am excited that we might get something started on the creek this year.

I remember sixty years ago when I was a teenager, the creek was beautiful with lots of willows along the banks, deep quiet pools and fishermen landing four pound trout on a regular basis. One pool straight down from the house was a favorite during haying. At the end of the day we kids would grab a bar of soap, and towel and head for the creek. In a half hour we would be cooled off, cleaned up, relaxed, and ready for supper.

As years went on the willows started dying and we were told that the cattle in the creek were the problem so we fenced the creek, moved the cattle, and put in waterers. The willows continued to die or the banks they were growing on undercut, sloughed off, and went down the creek during high waters. The swimming holes also are long gone.

Dave Rosgen has been spending a day with his class each year for 20+ years monitoring the creek. All of the posts they put in for reference points have long since washed away.

I think I told you that my claim as a golfer & fisherman is that I played golf in 1956 & fished in 1958, so I wasn't prepared when Ron Pierce shocked the creek and came up with almost nothing. Now I realize why I have almost no one asking permission to fish any more.

In conclusion, Ryan, I know I have problems. I don't like to see my hay meadows going down the creek, the Nevada Creek Water Users don't appreciate it filling their lake & the fish don't like me anymore.

Seeing what was done on Wade Stitt's property really opened my eyes that it might be possible to recapture what once was.

So, yes, you have permission to walk the creek, survey it, finalize designs, & whatever needs to be done to make the project happen.

I know that I have neither the time, knowledge, equipment, or money to do the job but I wish you God's speed and pray that you will succeed in putting it all together.

Much Appreciation & Thanks;
Rem



Patrick Uthe
3201 Spurgin Road
Missoula, MT 59804
406-542-5532
patrick.uthe@mt.gov

October 31, 2019

Water Protection Bureau
Department of Environmental Quality
Attn: Mark Ockey
P.O. Box 200901
Helena, MT 59620-0901

Dear DEQ Nonpoint Source Program Grant Committee:

This letter is written in support of the Nevada Creek Phase 4 Restoration Project application submitted by the Big Blackfoot Chapter of Trout Unlimited. Nevada Creek is a severely degraded tributary that suffers from sedimentation, low flows, nutrient inputs, elevated water temperatures, and lack of instream habitat complexity. As one of the largest tributaries to the Blackfoot River, it was historically an important spawning and rearing area for native westslope cutthroat trout and bull trout. Currently, salmonid assemblage in Nevada Creek is comprised of brown trout, cutthroat trout, and rainbow trout. Bull trout have been captured in the lower reaches during electrofishing surveys in recent years, but densities are very low. Habitat restoration efforts in the Nevada Creek drainage have increased in recent years, creating improved instream habitat and riparian conditions, which are eliciting very encouraging responses from the salmonid community.

The proposed project is directly upstream of Nevada Reservoir. Fisheries surveys in 2016 and 2017 revealed that westslope cutthroat trout were present in the project area at an average density of 50 trout/mile. Compared to cutthroat trout densities in restored sections of lower Nevada Creek, this represents an abundance that is significantly below the expected habitat capacity in an unimpaired condition. Following completion of a restoration project downstream of Nevada Reservoir, density of age-1 and older trout increased from 243 trout/mile to an average post-restoration density of 554 trout/mile. Cutthroat trout densities exhibited an even greater response, increasing from 29 trout/mile to an average post-restoration density of 128 trout/mile. Similar habitat actions and treatment techniques are proposed for the Phase 4 project, which are expected to provide similar benefits to the fish community.

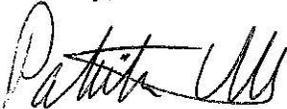
Current limiting factors in this section of stream include poor riparian and streambank conditions from livestock grazing, lack of instream habitat complexity, and low flows from irrigation

impacts. Furthermore, the bank erosion is contributing significant amounts of sediment and nutrients to the project reach and Nevada Reservoir. In 2019, a harmful algal bloom (HAB) was reported in Nevada Reservoir. Although the causes of HABs are complex and result from a combination of temperature, nutrients, sunlight, and flow, the presence of a HAB demonstrates that nutrient inputs from upstream sections of Nevada Creek are a significant problem.

In 2002, stocking of Nevada Reservoir was switched from rainbow trout to native westslope cutthroat trout to provide a new fishing opportunity, as well as align lake management with the objectives of the Blackfoot River conservation program. Subsequent surveys revealed limited recruitment of westslope cutthroat trout to the reservoir, suggesting significant restoration actions in upper Nevada Creek are necessary to establish a quality, self-sustaining cutthroat trout fishery in the reservoir. The proposed project is consistent with this recommendation and will also benefit the fish population in the Nevada Reservoir by decreasing sediment and nutrient inputs.

The Nevada Creek Phase 4 project will significantly improve the quality of aquatic resources in upper Nevada Creek while contributing to the broader native species conservation and restoration program in the Blackfoot River basin. It will also contribute to improved water quality in Nevada Reservoir and the lower sections of Nevada Creek. This project will be one of the first restoration projects in upper Nevada Creek. Funding this project will not only provide immediate local benefits, but it will facilitate future opportunities to implement additional large-scale projects that will help advance Nevada Creek towards its full habitat potential and greatly improve downstream water quality. Thank you very much for your consideration of this funding application. Please do not hesitate to contact me if you have any questions or would like additional fisheries information from the project area.

Sincerely,

A handwritten signature in black ink, appearing to read "Patrick Uthe". The signature is fluid and cursive, with a prominent initial "P" and a long horizontal stroke extending to the right.

Patrick Uthe
Fisheries Biologist



United States Department of the Interior
FISH AND WILDLIFE SERVICE
MONTANA PARTNERS FOR FISH & WILDLIFE PROGRAM
PO Box 66
Ovando, Montana 59854 406/793.7400

IN REPLY REFER TO:

October 18, 2019

Montana Department of Environmental Quality
319 Nonpoint Source Program
1520 E 6th Ave
Helena, MT 59620

Dear Committee Members:

This letter is in reference to the Nevada Creek Restoration Project located in the Blackfoot Watershed being proposed by the Big Blackfoot Chapter of Trout Unlimited. The U.S. Fish and Wildlife Service fully support this project because of the incredible biological values associated with it.

The Partners for Fish and Wildlife has a long history of working with the associated private landowners and other partners collaborating to restore the native trout fishery of this important tributary to the Blackfoot River. This project is exciting in that we will be able to continue our efforts of restoring native trout within the watershed by working with committed landowners.

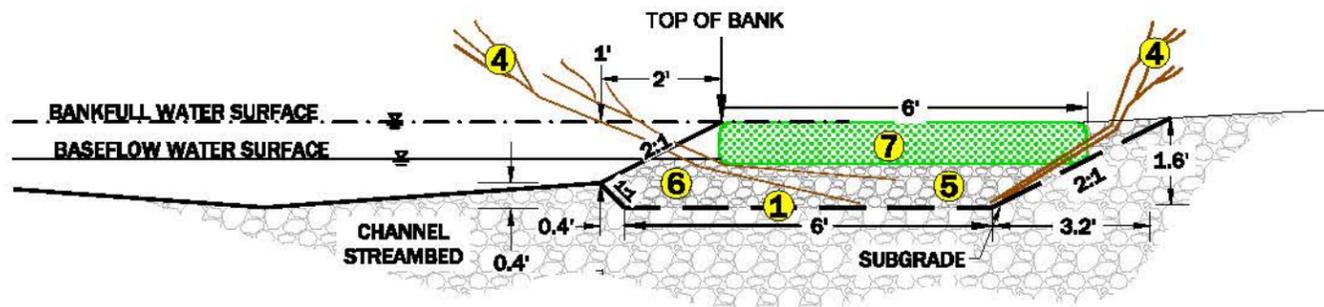
We commend the efforts of the many partners for their time and due diligence with this important project and urge the 319 Nonpoint Source Program Review Committee to support this grant application.

If you have any questions regarding this project feel free to contact me.

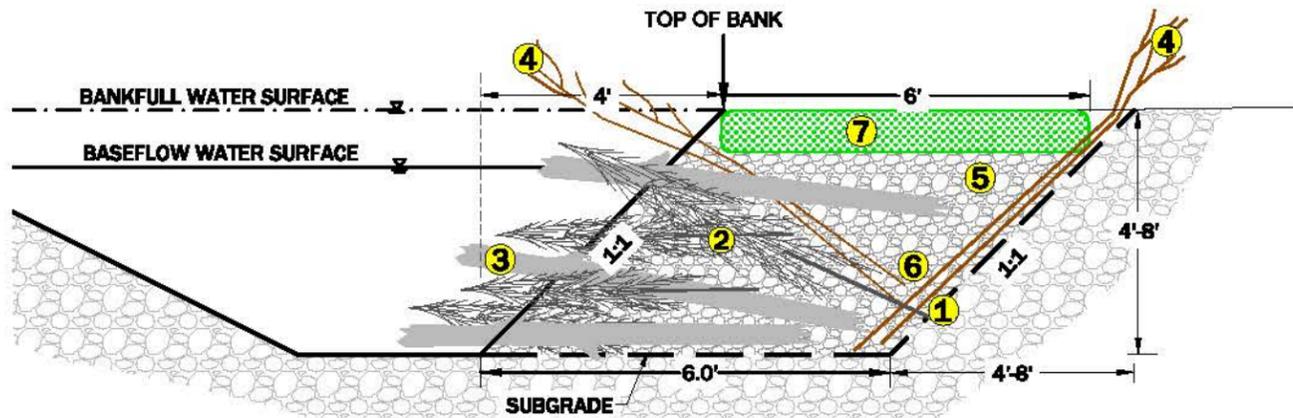
Sincerely,

Greg Neudecker
State Coordinator
Partners for Fish and Wildlife Service

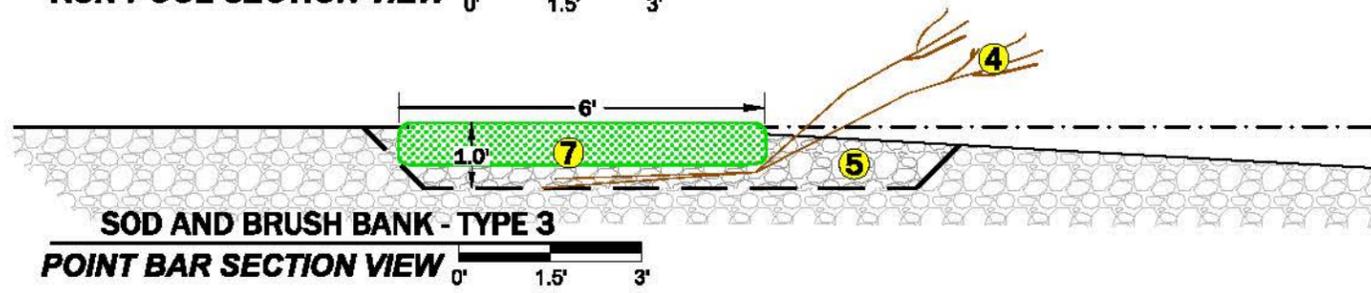
Maps, Designs, Other Attachments



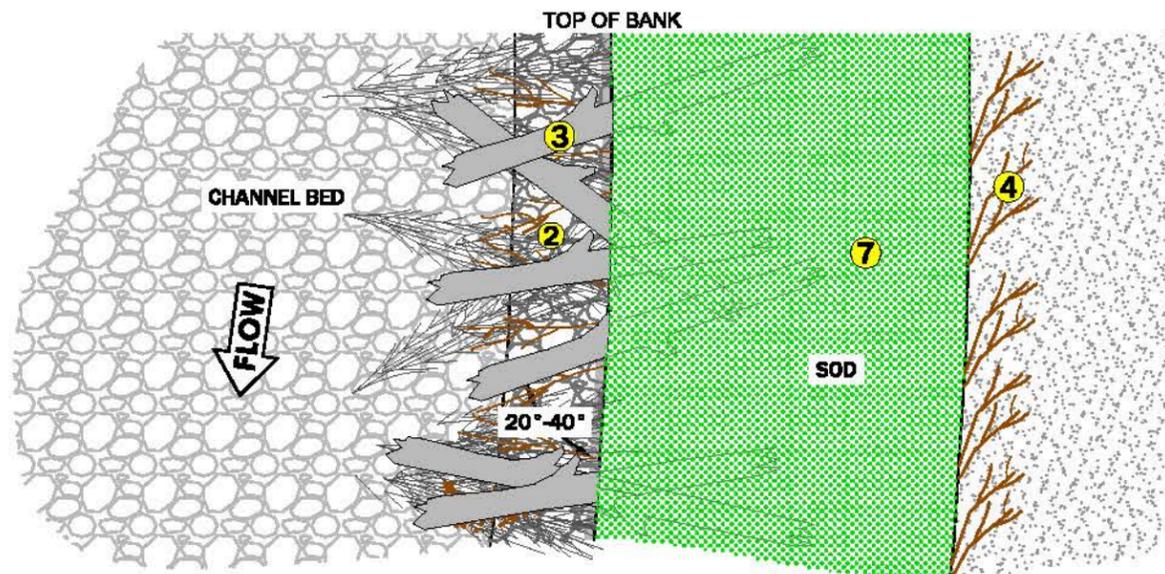
SOD AND BRUSH BANK - TYPE 1
RIFFLE SECTION VIEW
 0' 1.5' 3'



SOD AND BRUSH BANK - TYPE 2
RUN-POOL SECTION VIEW
 0' 1.5' 3'



SOD AND BRUSH BANK - TYPE 3
POINT BAR SECTION VIEW
 0' 1.5' 3'



SOD AND BRUSH BANK
PLAN VIEW
 0' 1.5' 3'

GENERAL NOTES

1. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED THE ENGINEER.
2. FIELD ENGINEER SHALL MARK THE GENERAL CONSTRUCTION LOCATION FOR EACH SOD AND BRUSH BANK STRUCTURE PRIOR TO CONSTRUCTION.

NOTES ON SOD AND BRUSH BANK INSTALLATION

- 1 EXCAVATE STREAMBANK TO SUBGRADE ELEVATIONS.
- 2 PLACE SMALL LOGS IN THE STREAMBANK AT SKEWED ANGLE TO THE STREAMBANK (AS APPLICABLE). LOGS SHALL BE PLACED BELOW THE TOP OF BANK ELEVATION. LOGS MAY OVERLAP.
- 3 PLACE BRUSH WITHIN THE MATRIX OF SMALL LOGS (AS APPLICABLE). BRUSH SHALL PLACED BELOW TOP OF BANK LINE. WILLOW CUTTINGS SHALL BE HARVESTED FOLLOWING DORMANCY AND NO EARLIER THAN OCTOBER 1 OR AS DIRECTED BY PROJECT ENGINEER. INSTALL CUTTINGS INTO THE LOG/BRUSH MATRIX WITH THE STEMS IN CONTACT WITH THE BASEFLOW WATER TABLE AND NO MORE THAN 50% OF THE STEM LENGTH EXPOSED ABOVE TOP OF BANK ELEVATION. TRIM LEADING BUDS FOLLOWING INSTALLATION AND ENSURE A MINIMUM 50% OF THE CUTTING LENGTH IS BURIED.
- 4 BACKFILL STREAMBANK WITH STREAMBANK FILL PER THE GRADATION SHOWN ON THE DRAWINGS.
- 5 WASH FINES AND WATER FROM ONSITE INTO THE STREAMBANK FILL TO SEAL THE VOIDS IN THE BACKFILL.
- 6 PLACE A 8-12 INCH SOD MAT BEGINNING AT BANKLINE AND EXTENDING BACK 6 FEET IN TO FLOODPLAIN TO MATCH FINISHED GROUND ELEVATIONS. REFER TO VEGETATION SALVAGE PLAN FOR SOD SOURCES.

STREAMBANK FILL GRADATION

SIZE (INCHES)	PERCENT PASSING	REPRESENTATIVE SIZE CLASS
6	95	D100
5	90-95	D95
4	85-90	D84
2.5	65 - 85	D65
2.0	50 - 65	D50
1.5	30 - 50	D35
0.6	10 - 30	D15
FINES	0	

MATERIAL SCHEDULE (PER LINEAR FOOT)

ITEM	TYPE 1 QUANTITY	TYPE 2 QUANTITY	TYPE 3 QUANTITY	DIA. (IN)	LENGTH (FT)
1 CY OF SUBGRADE EXCAVATION	0.34	1	0.1		
5 CY OF STREAMBANK FILL	0.1	0.3	0.05		
2 CATEGORY 3 WOOD	-	4	-	3-6	8-10
3 CATEGORY 4 WOOD	-	4	-	1-3	8-10
4 DORMANT WILLOW CUTTINGS	10	10	10	0.75-1.5	6-8
7 SEDGE SOD MAT	6 SF	6 SF	6 SF	8-12 (THICK)	

NO.	DATE	BY	DESCRIPTION	CHK
1	9-27-19	NW	CONCEPTUAL DESIGN	JM

PROJECT NUMBER
 RDG-18-002

SHEET NUMBER
6.0

NEVADA CREEK PHASE 4 RESTORATION PROJECT CONCEPTUAL DESIGN

PROJECT PARTNERS



BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED
P.O. BOX 1
OVANDO, MONTANA 59854



MONTANA FISH, WILDLIFE & PARKS
3201 SPURGIN ROAD
MISSOULA, MONTANA 59804

REM MANNIX AND FAMILY



US FISH AND WILDLIFE SERVICE
P.O. BOX 66
196 LOWER LAKE SIDE LANE
OVANDO, MONTANA 59854

PROJECT DESCRIPTION

BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED (BBCTU), IN COOPERATION WITH MONTANA FISH, WILDLIFE & PARKS (MFWP) AND THE U.S. FISH AND WILDLIFE SERVICE (USFWS), RETAINED RIVER DESIGN GROUP, INC. TO DEVELOP CHANNEL, AQUATIC HABITAT, AND FLOODPLAIN RESTORATION PLANS FOR A 6,800 REACH OF NEVADA CREEK, LOCATED APPROXIMATELY 55 MILES EAST OF MISSOULA, MONTANA. NEVADA CREEK IS A THIRD ORDER TRIBUTARY TO THE MIDDLE BLACKFOOT RIVER AND SUPPORTS POPULATIONS OF WESTSLOPE CUTTHROAT TROUT, RAINBOW TROUT, BROWN TROUT AND OTHER FISH SPECIES. NEVADA CREEK HAS BEEN IDENTIFIED AS AN IMPAIRED WATERBODY BY THE MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY. THE STREAM IS CONSIDERED NONSUPPORTING OF AQUATIC LIFE, COLD WATER FISHERY, AND CONTACT RECREATION DUE TO SEDIMENT AND HABITAT RELATED CAUSES (MDEQ 2008). PROBABLE CAUSES OF WATER QUALITY IMPAIRMENT INCLUDE TOTAL PHOSPHORUS, PHYSICAL SUBSTRATE, HABITAT ALTERATIONS, SEDIMENTATION/SILTATION, AND TOTAL NITROGEN. PROBABLE SOURCES OF IMPAIRMENT INCLUDE AGRICULTURE AND STREAMBANK MODIFICATION/DESTABILIZATION.

THREE PHASES OF RESTORATION WORK HAVE BEEN IMPLEMENTED DOWNSTREAM OF NEVADA CREEK RESERVOIR (2012, 2017 AND 2019). SIMILAR TO PAST PHASES, PHASE 4 WILL ADDRESS THE PRIMARY CAUSES OF WATER QUALITY IMPAIRMENT INCLUDING STREAMBANK MODIFICATIONS AND PHYSICAL HABITAT ALTERATIONS. STREAMBANK STABILITY WILL BE INCREASED WITH THE USE OF VEGETATED WOOD MATRICES AND SOD MATS. TO ADDRESS FLOODPLAIN DISCONNECTION, THE CHANNEL BED WILL BE SLIGHTLY RAISED TO RECONNECT FORMER FLOODPLAIN SURFACES AND FEATURES INCLUDING SIDE CHANNELS, ALCOVES, AND EMERGENT AND SHALLOW OPEN WATER WETLANDS. IN LOCATIONS, EXISTING TERRACES WILL BE LOWERED TO BANKFULL ELEVATION TO INCREASE FLOODPRONE AREA. AQUATIC HABITAT FEATURES INCLUDING RIFFLES, RUNS, POOLS AND GLIDES WILL BE FORMED TO PROVIDE INSTREAM COMPLEXITY FOR NATIVE AND NON-NATIVE FISH SPECIES. APPROXIMATELY 7,000 FEET OF CHANNEL AND 13,600 FEET OF STREAMBANK WILL BE RESTORED. THESE COMBINED ACTIONS ARE PROJECTED TO: 1) REDUCE SEDIMENT LOADING TO NEVADA CREEK BY MORE THAN 545 TONS PER YEAR; 2) INCREASE FLOODPLAIN CONNECTION; AND 3) SET THE STAGE FOR RECOVERY OF THE RIPARIAN ZONE AND AQUATIC HABITAT CONDITIONS BY RESTORING SITE HYDROLOGY AND CHANNEL DIMENSIONS.

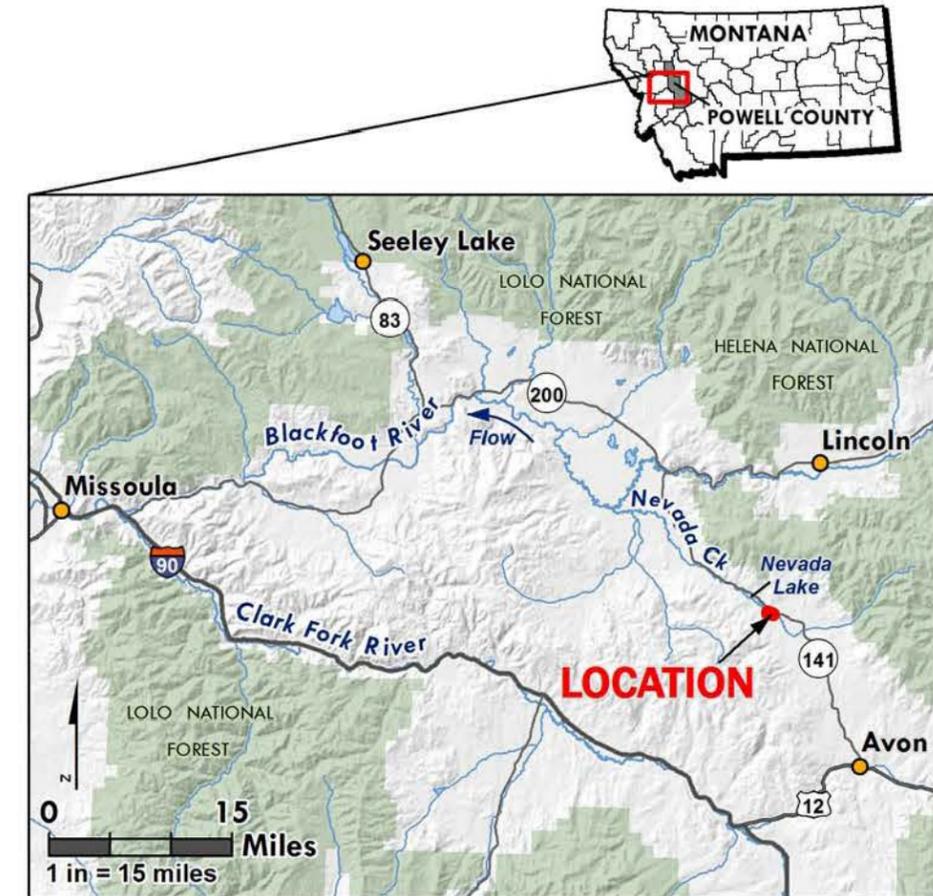
GENERAL NOTES

1. CONTOUR INTERVAL IS NOTED ON DRAWINGS.
2. SLOPES DESIGNATED AS 2:1, 1.5:1, ET CETERA, ARE THE RATIOS OF HORIZONTAL DISTANCE TO VERTICAL DISTANCE.
3. DIMENSIONS ARE NOTED IN FEET AND TENTHS OF A FOOT.
4. TOPOGRAPHY AND CROSS SECTION GROUND LINES ARE BASED ON SURVEY WORK PERFORMED FROM JULY TO AUGUST 2018. LIDAR DATA WAS COLLECTED BY TROUT UNLIMITED. ALL LIDAR DATA WAS COORDINATED BY RDG.
5. ALL EXISTING CONDITIONS ARE TO BE VERIFIED IN THE FIELD PRIOR TO CONSTRUCTION AND ANY ADJUSTMENTS TO THE DRAWINGS SHALL BE MADE AS DIRECTED BY THE ENGINEER.
6. EXISTING PRIVATE IMPROVEMENTS, WHICH LIE WITHIN THE CONSTRUCTION LIMITS, UNLESS OTHERWISE NOTED WILL BE REMOVED BY THE OWNER PRIOR TO CONSTRUCTION, OR ABANDONED IN PLACE.
7. PROTECT ALL TREES AND LAND AREAS NOT LOCATED WITHIN THE PROJECT CONSTRUCTION STAGING OR EARTHWORK LIMITS. EXERCISE CARE IN AREAS NOT SO MARKED TO AVOID UNNECESSARY DAMAGE TO NATURAL VEGETATION.
8. THE PROJECT SPONSOR IS RESPONSIBLE FOR COMPLYING WITH ALL PERMITS AND EASEMENTS INCLUDING ALL FEDERAL, STATE, COUNTY, AND LOCAL PERMIT CONDITIONS.
9. EXCAVATION, TRENCHING, SHORING, AND SHIELDING SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR PERFORMING THE WORK, THESE DRAWINGS ARE NOT INTENDED TO PROVIDE MEANS OR METHODS OF CONSTRUCTION.
10. EXCAVATION SHALL MEET THE REQUIREMENTS OF OSHA 29 CFR PART 1926, SUBPART P, EXCAVATIONS. ACTUAL SLOPES SHALL NOT EXCEED THE SLOPES AS INDICATED ON DRAWINGS.
11. ALL EXCAVATORS AND BULLDOZERS SHALL BE EQUIPPED WITH MACHINE GRADE GPS ((L1/L2/GLONASS)). CONSTRUCTION AREAS WILL BE STAKED OUT PRIOR TO CONSTRUCTION USING SURVEY GRADE GPS (L1/L2/GLONASS).
12. ENGINEER WILL PROVIDE SURVEY CONTROL AND GRADING SURFACES FOR EQUIPMENT WITH GPS MACHINE CONTROL CAPABILITY. CONTRACTOR SHALL PROVIDE SURVEY STAKING AND LAYOUT FOR CONSTRUCTION.
13. VERTICAL TOLERANCE FOR CONSTRUCTION COMPLIANCE WILL BE 0.3 FEET. HORIZONTAL TOLERANCE WILL BE 1.0 FEET.
14. CONTRACTOR SHALL CONFIRM QUANTITIES. REPORTED VOLUMES ARE NEATLINE AND DO NOT INCLUDE ADJUSTMENTS FOR COMPACTION OR OTHER FACTORS.

DRAWING INDEX

- 1.0 COVER PAGE
- 2.0 EXISTING CONDITIONS
- 2.1 EXISTING CONDITIONS: BANK EROSION HAZARD INDEX ASSESSMENT
- 3.0 SITE PLAN AND INDEX
- 4.0 PLAN VIEW AND DATA SHEET
- 4.1 GRADING PLAN AND PROFILE
- 4.2 PLAN VIEW AND DATA SHEET
- 4.3 GRADING PLAN AND PROFILE
- 4.4 PLAN VIEW AND DATA SHEET
- 4.5 GRADING PLAN AND PROFILE
- 5.0 CHANNEL CROSS SECTION DIMENSIONS
- 6.0 SOD AND BRUSH BANK DETAIL
- 6.1 CONSTRUCTED STREAMBED DETAIL
- 6.2 FLOODPLAIN ROUGHNESS DETAIL
- 7.0 BMP DETAILS

NEVADA CREEK PHASE 4 VICINITY MAP



LEGAL DESCRIPTION:
S10, T12N R10W, P.M., M
POWELL COUNTY, MONTANA

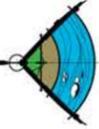
STANDARD OF PRACTICE

RIVER DESIGN GROUP, INC. WORKS EXCLUSIVELY IN THE RIVER ENVIRONMENT AND UTILIZES THE MOST CURRENT AND ACCEPTED PRACTICES AVAILABLE FOR PLANNING AND DESIGN OF RIVER, FLOODPLAIN, AND AQUATIC HABITAT RESTORATION PROJECTS. CURRENT STANDARDS FOR THE DESIGN OF RESTORATION PROJECTS VARY DEPENDING ON PROJECT GOALS. STABILITY CRITERIA INCLUDE DESIGNING STREAMBED AND STREAMBANK STRUCTURES FOR THE 10-YEAR RECURRENCE INTERVAL FLOOD. HEC-RAS, A ONE-DIMENSIONAL RIVER ANALYSIS MODEL WAS USED TO COMPLETE HYDRAULIC MODELING AND EVALUATE WATER SURFACE ELEVATIONS, CHANNEL AND OVBANK SHEAR STRESSES, AND VELOCITIES FOR A RANGE OF FLOWS, INCLUDING BANKFULL DISCHARGE, THE 10-YEAR DESIGN STABILITY FLOW, AND HIGHER RETURN INTERVAL DISCHARGES INCLUDING THE 100-YEAR FLOW.

REUSE OF DRAWINGS

THESE DRAWINGS, THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, ARE THE PROPERTY OF RIVER DESIGN GROUP, INC. (RDG) AND ARE NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF RDG. LIKEWISE, THESE DRAWINGS MAY NOT BE ALTERED OR MODIFIED WITHOUT AUTHORIZATION OF RDG. DRAWING DUPLICATION IS ALLOWED IF THE ORIGINAL CONTENT IS NOT MODIFIED.

RDG
RIVER DESIGN GROUP



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236 Wisconsin Avenue
Whitefish, MT 59927
tel: 406.862.8727
fax: 406.862.4965

COVER PAGE
NEVADA CREEK PHASE 4
NEAR HELMSVILLE, MONTANA

NO.	DATE	BY	DESCRIPTION	CHK
1	9-27-19	NW	CONCEPTUAL DESIGN	JM

PROJECT NUMBER
RDG-18-002

SHEET NUMBER

1.0



EXISTING CONDITIONS
NEVADA CREEK PHASE 4
NEAR HELMVILLE, MONTANA

EXISTING CONDITIONS

THE PHASE 4 RESTORATION PROJECT AREA IS IN THE UPPER NEVADA CREEK WATERSHED UPSTREAM OF NEVADA CREEK RESERVOIR, IN POWELL COUNTY, MONTANA. THE PROJECT AREA IS WITHIN A REACH OF NEVADA CREEK THAT IS CONSIDERED NON-SUPPORTING OF AQUATIC LIFE DUE TO SEDIMENT AND HABITAT RELATED IMPAIRMENT CAUSES. WATER USE CLASS IS B-1, WHICH INCLUDE WATERS CLASSIFIED SUITABLE FOR DRINKING, CULINARY, AND FOOD PROCESSING PURPOSES; BATHING, SWIMMING AND RECREATION; GROWTH AND PROPAGATION OF SALMONID FISHES AND ASSOCIATED AQUATIC LIFE; WATERFOWL AND FURBEARERS; AND AGRICULTURAL AND INDUSTRIAL WATER SUPPLY. PROBABLE CAUSES OF IMPAIRMENT INCLUDE STREAMSIDE ALTERATIONS, TOTAL NITROGEN, TOTAL PHOSPHORUS, PHYSICAL SUBSTRATE HABITAT ALTERATIONS, SEDIMENT, AND TEMPERATURE. PROBABLE SOURCES INCLUDING GRAZING IN RIPARIAN AREAS, AGRICULTURE, AND STREAMBANK MODIFICATIONS/DESTABILIZATION. APPROXIMATELY 54% OF STREAMBANKS IN THE PROJECT AREA (7,830 FEET) DISPLAY MODERATE TO VERY HIGH BANK ERODIBILITY HAZARD RATINGS, CONTRIBUTING OVER 545 TONS PER YEAR OF SEDIMENT TO NEVADA CREEK.

WITHIN THE PROJECT AREA, NEVADA CREEK IS CHARACTERIZED AS A MODERATELY TO HIGHLY ENTRENCHED, GRAVEL DOMINATED, F STREAM TYPE WITH ALTERNATING RIFFLE AND POOL SEQUENCES. REFERENCE CHANNEL WIDTHS FOR RIFFLE AND POOL CROSS-SECTIONS MEASURED IN THE PROJECT AREA RANGE FROM 24.5 FEET TO 37.5, RESPECTIVELY. AVERAGE SLOPE IS 0.29%, AND AQUATIC HABITAT IS GENERALLY CHARACTERIZED BY RIFFLE HABITAT UNITS LACKING COMPLEXITY. HIGH BANK HEIGHT RATIOS, POOR ROOTING STRUCTURE, AND LOSS OF WOODY VEGETATION RESULTS IN ERODIBLE BANK CONDITIONS AND MODERATE TO HIGH FLOODPLAIN DISCONNECTION. BED MATERIALS ARE PREDOMINANTLY GRAVEL AND COBBLE WITH A HIGH PERCENTAGE OF SANDS AND SILTS. BANK EROSION, LACK OF FLOODPLAIN CONNECTION, AND LOSS OF WETLAND AND RIPARIAN VEGETATION ARE PRIMARY LIMITING FACTORS IN THE PROJECT AREA.

SIMILAR TO STREAM REACHES DOWNSTREAM OF NEVADA CREEK RESERVOIR, UPPER NEVADA CREEK HISTORICALLY SUPPORTED A BEAVER/WILLOW COMPLEX THAT HAS BEEN CONVERTED TO HAY/GRAZING PASTURES THROUGH CONTROL AND ERADICATION OF BEAVER. TO DATE, RESTORATION PROJECTS ON LOWER NEVADA CREEK HAVE INCLUDED GRAZING MANAGEMENT, INSTALLATION OF FISH SCREENS AND FISH LADDERS, AND IMPLEMENTATION OF THREE PHASES OF RESTORATION ON THE WADE STITT PROPERTY (PHASES 1 AND 2) AND COOPER CREEK RANCH (PHASE 3).

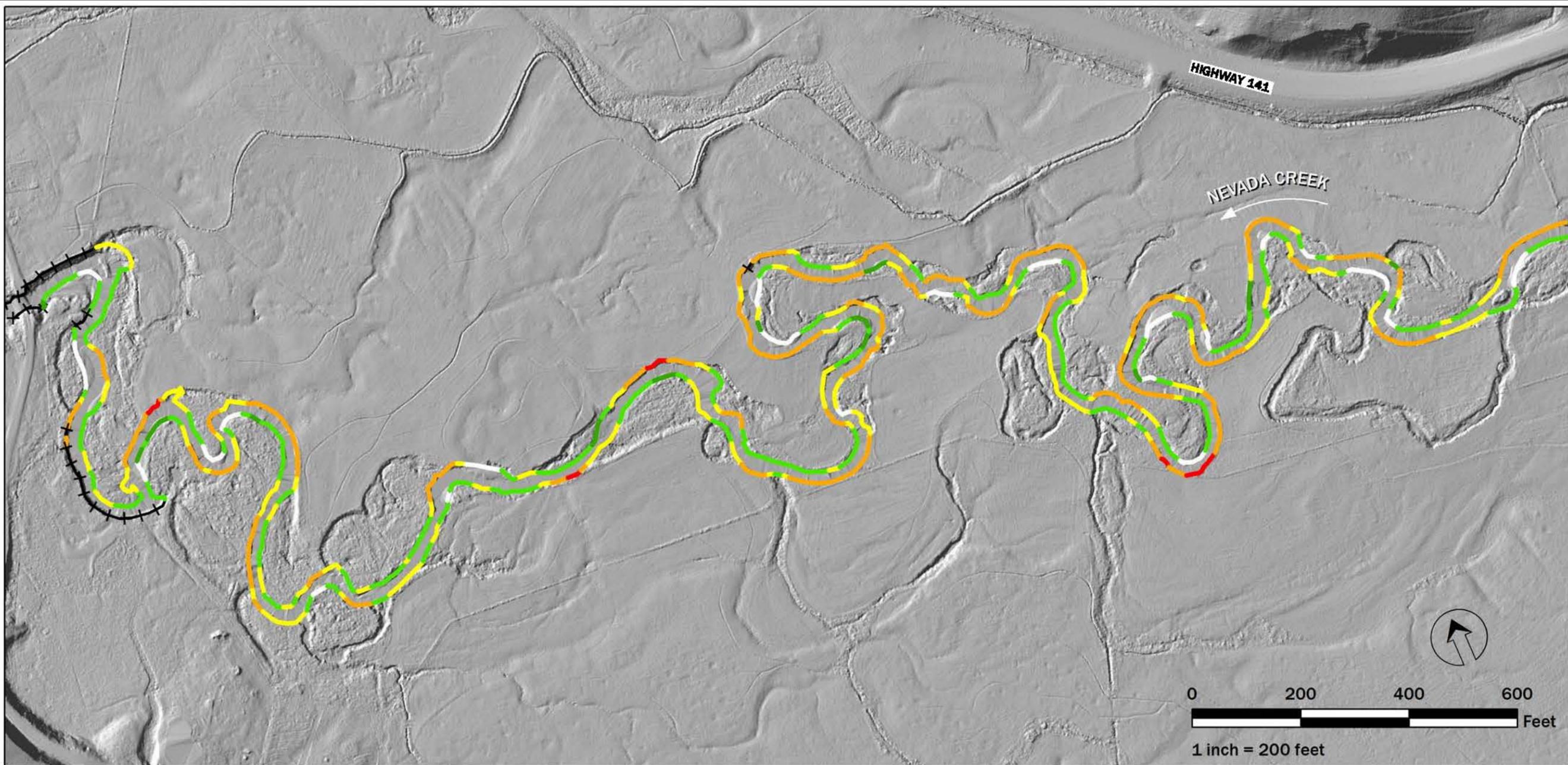
THE CONSTRAINTS AND LIMITING FACTORS IDENTIFIED DURING THE GEOMORPHIC INVESTIGATION INCLUDE:

- HIGH CHANNEL ENTRENCHMENT AND DISCONNECTED FLOODPLAIN SURFACES.
- HIGH CHANNEL WIDTH-TO-DEPTH RATIOS.
- MODERATE TO VERY HIGH BANK ERODIBILITY CONDITIONS RESULTING IN SEDIMENT LOADING TO THE SYSTEM.
- LACK OF WOODY RIPARIAN SHRUBS AND DEEP BINDING ROOT MASS.
- PAST BANK STABILIZATION PRACTICES, PRIMARILY RIPRAP IN THE LOWER REACH, LIMIT CHANNEL MARGIN COMPLEXITY.
- SIMPLIFIED AQUATIC HABITAT CONDITIONS, INCLUDING LOW POOL FREQUENCY AND LONG RIFFLE HABITAT UNITS WITH A HIGH PERCENTAGE OF FINE SEDIMENT.

NO.	DATE	BY	DESCRIPTION	CHK
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PROJECT NUMBER
RDG-18-002

SHEET NUMBER
2.0



**EXISTING CONDITIONS: BANK EROSION
HAZARD INDEX ASSESSMENT**

**NEVADA CREEK PHASE 4
NEAR HELMVILLE, MONTANA**

BANK EROSION HAZARD INDEX ASSESSMENT

CATEGORY

- VERY HIGH
- HIGH
- MODERATE
- LOW
- VERY LOW
- NON-CONTRIBUTING
- RIPRAP

BEHI CATEGORY	LENGTH (FT)	RATE (FT/YR)	HEIGHT (FT)	DENSITY (LBS/FT ³)	YIELD (TONS)
VERY HIGH	200	0.39	5.4	100	22
HIGH	4,185	0.31	4.8	100	311
MODERATE	3,445	0.23	3.4	100	142
LOW	4,298	0.17	1.9	100	69
VERY LOW	458	0.1	0.8	100	2
NON-CONTRIBUTING	1,182	0	0	100	0
RIP-RAP	624	0	5.1	100	0
TOTAL	14,391	1.20	21.4	700	545

NO.	DATE	BY	DESCRIPTION	CHK	JM
1	9-27-19	NW	CONCEPTUAL DESIGN		

PROJECT NUMBER
RDG-18-002

SHEET NUMBER
2.1



IMAGE: RDG ORTHO PHOTO 2019

SITE PLAN AND INDEX
NEVADA CREEK PHASE 4
NEAR HELMVILLE, MONTANA

RESTORATION ALTERNATIVES

RESTORATION ALTERNATIVES FOR THE NEVADA CREEK PHASE 4 RESTORATION PROJECT WERE DEVELOPED IN CONSULTATION WITH BIG BLACKFOOT CHAPTER OF TROUT UNLIMITED, MONTANA FISH, WILDLIFE & PARKS, U.S. FISH AND WILDLIFE SERVICE, MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY, AND THE MANNIX FAMILY (LANDOWNERS). THE SELECTED ALTERNATIVE INCLUDES A COMBINATION OF TWO PRIMARY RESTORATION APPROACHES: 1) EXPANDING THE FLOODPLAIN BY LOWERING HIGH TERRACES TO BANKFULL ELEVATION AND RECONSTRUCTING THE PROPER CHANNEL DIMENSIONS, PATTERN AND PROFILE TYPICAL OF A C4 STREAM TYPE; AND 2) RAISING THE CHANNEL BED ELEVATION AND PROFILE TO RECONNECT FORMER FLOODPLAIN SURFACES THAT ARE DISCONNECTED DUE TO CHANNEL DOWNCUTTING AND WIDENING. LOWERING TERRACES THAT CURRENTLY SUPPORT UPLAND VEGETATION WILL FACILITATE CONVERSION TO EMERGENT WETLAND VEGETATION AND SCRUB-SHRUB COMMUNITIES TO INCREASE STREAMBANK STABILITY, COVER, AND SHADE TO THE CHANNEL APPROXIMATELY 1,275 FEET OF CHANNEL WILL BE CONSTRUCTED OUTSIDE OF THE CURRENT PATTERN AND MEANDER BELT WIDTH TO ADDRESS FLOODPLAIN DISCONNECTION AND ACCELERATED DOWN VALLEY MEANDER BEND MIGRATION.

THE PREFERRED RESTORATION ALTERNATIVE BALANCES RESOURCE OBJECTIVES WITH LONG-TERM LAND MANAGEMENT NEEDS OF THE LANDOWNER BY MAINTAINING A MINIMUM FLOODPLAIN CORRIDOR THAT WILL BE EXCLUDED FROM GRAZING. GRAZING MANAGEMENT STRATEGIES INCLUDING EXCLOSURE FENCING, HARDENED WATER GAPS, AND OFF-CHANNEL WATER SOURCES, WILL BE IMPLEMENTED IN CLOSE CONSULTATION WITH THE LANDOWNER.

THE FOLLOWING OBJECTIVES WERE DEVELOPED BY BBCTU IN CONJUNCTION WITH USFWS AND MFWP:

- IMPROVE INSTREAM AQUATIC HABITAT CONDITIONS FOR SALMONIDS BY LOWERING CHANNEL WIDTH-TO-DEPTH RATIOS, INCREASING POOL FREQUENCY, OVERHEAD COVER, CHANNEL MARGIN COMPLEXITY, AND THE DISTRIBUTION OF RIFFLE, RUN, POOL AND GLIDE CHANNEL HABITAT UNITS.
- DECREASE SURFACE WATER TEMPERATURE BY REDUCING CHANNEL WIDTH-TO-DEPTH RATIOS, INCREASING VEGETATION COVER AND SHADE, AND ENHANCING HYPORHEIC FLOW EXCHANGE BETWEEN THE FLOODPLAIN, WETLANDS, AND CHANNEL.
- REDUCE SEDIMENT SUPPLY BY RESTORING STREAMBANKS WITH VEGETATION AND WOOD.
- IMPLEMENT FLOODPLAIN RESTORATION TREATMENTS THAT SET THE STAGE FOR NATURAL RECRUITMENT OF RIPARIAN VEGETATION.
- IMPLEMENT A GRAZING MANAGEMENT PLAN TO PROTECT SENSITIVE FLOODPLAIN AND RIPARIAN AREAS.
- UTILIZE NATURAL CHANNEL DESIGN TECHNIQUES AND AVOID THE USE OF HARDENED, NON-DEFORMABLE STRUCTURES SUCH AS ROCK AND LOG VANES, WEIRS, AND OTHER CHANNEL SPANNING STRUCTURES.

RESTORATION TREATMENTS

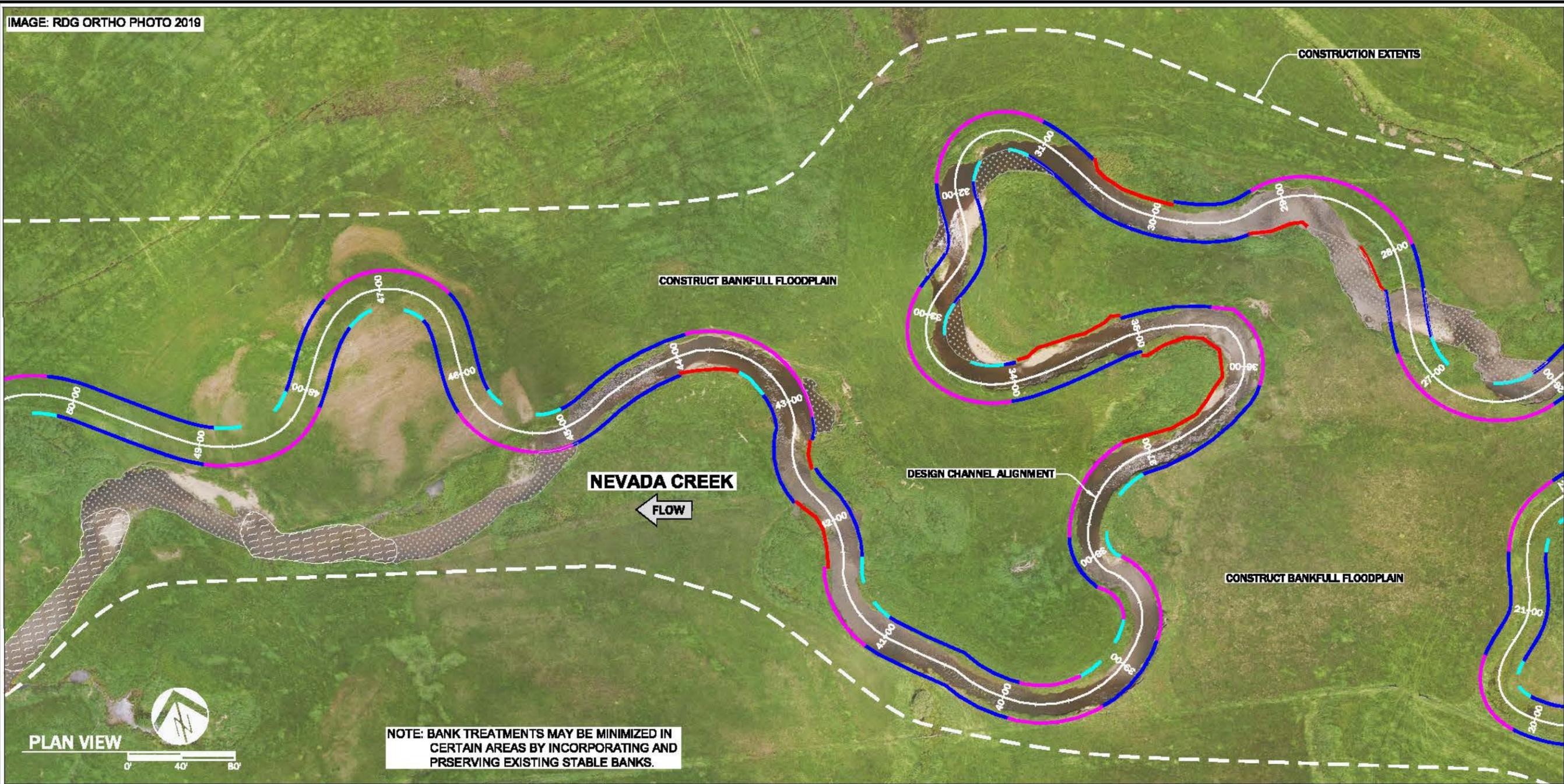
THE RESTORATION PLAN FOCUSES ON RESTORING ERODING STREAMBANKS, RE-ESTABLISHING PROPER CHANNEL CROSS-SECTION, PLAN FORM AND LONGITUDINAL PROFILE DIMENSIONS, AND IDENTIFYING OPPORTUNITIES TO INCREASE FLOODPLAIN CONNECTIVITY. SPECIFICALLY, THE FOLLOWING GUIDELINES WERE USED IN DEVELOPING THE DESIGN:

- MINIMIZE STREAMBED TREATMENTS AND UTILIZE ON-SITE NATIVE MATERIAL FOR CHANNEL SHAPING AND RECONSTRUCTION, TO THE GREATEST EXTENT PRACTICAL.
- INCORPORATE VEGETATED WOOD AND BRUSH FASCINE MATRIX STRUCTURES. LARGE WOOD WILL BE USED ONLY WHERE NECESSARY FOR BANK STABILIZATION AND POOL HABITAT DEVELOPMENT/ENHANCEMENT.
- SHAPE THE CHANNEL TO FORM THE APPROPRIATE CHANNEL DIMENSIONS WITHIN THE OVER-WIDENED STREAM CORRIDOR, INCLUDING RIFFLE, RUN, POOL AND GLIDE CHANNEL HABITAT FEATURES;
- INCREASE SINUOSITY WHILE MAINTAINING OPEN WATER HABITAT THROUGH THE USE OF VEGETATED FLOODPLAIN SURFACES, ALCOVES, AND BACKWATER BAYS.
- EXPAND THE FLOODPLAIN IN ENTRENCHED SECTIONS BY REDUCING BANK HEIGHTS AND CREATING A NARROW FLOODPLAIN CORRIDOR THAT WILL SUPPORT EMERGENT AND SCRUB-SHRUB WETLANDS. CONVERT THE "F" STREAM TYPE SECTIONS TO "C" STREAM TYPES WHERE FEASIBLE.

NO.	DATE	BY	DESCRIPTION	CHK
1	9-27-19	NW	CONCEPTUAL DESIGN	JM

PROJECT NUMBER
RDG-18-002

SHEET NUMBER
3.0



PLAN VIEW AND DATA SHEET
NEVADA CREEK PHASE 4
NEAR HELMVILLE, MONTANA

CHANNEL TOP OF BANK ELEVATIONS

STATION	ELEVATION (FT)	STATION	ELEVATION (FT)
27+00	4656.74	39+00	4653.75
28+00	4656.49	40+00	4653.50
29+00	4656.24	41+00	4653.25
30+00	4655.99	42+00	4653.00
31+00	4655.74	43+00	4652.75
32+00	4655.49	44+00	4652.50
33+00	4655.24	45+00	4652.25
34+00	4654.99	46+00	4652.00
35+00	4654.74	47+00	4651.58
36+00	4654.49	48+00	4651.17
37+00	4654.24	49+00	4650.75
38+00	4654.00		

LEGEND

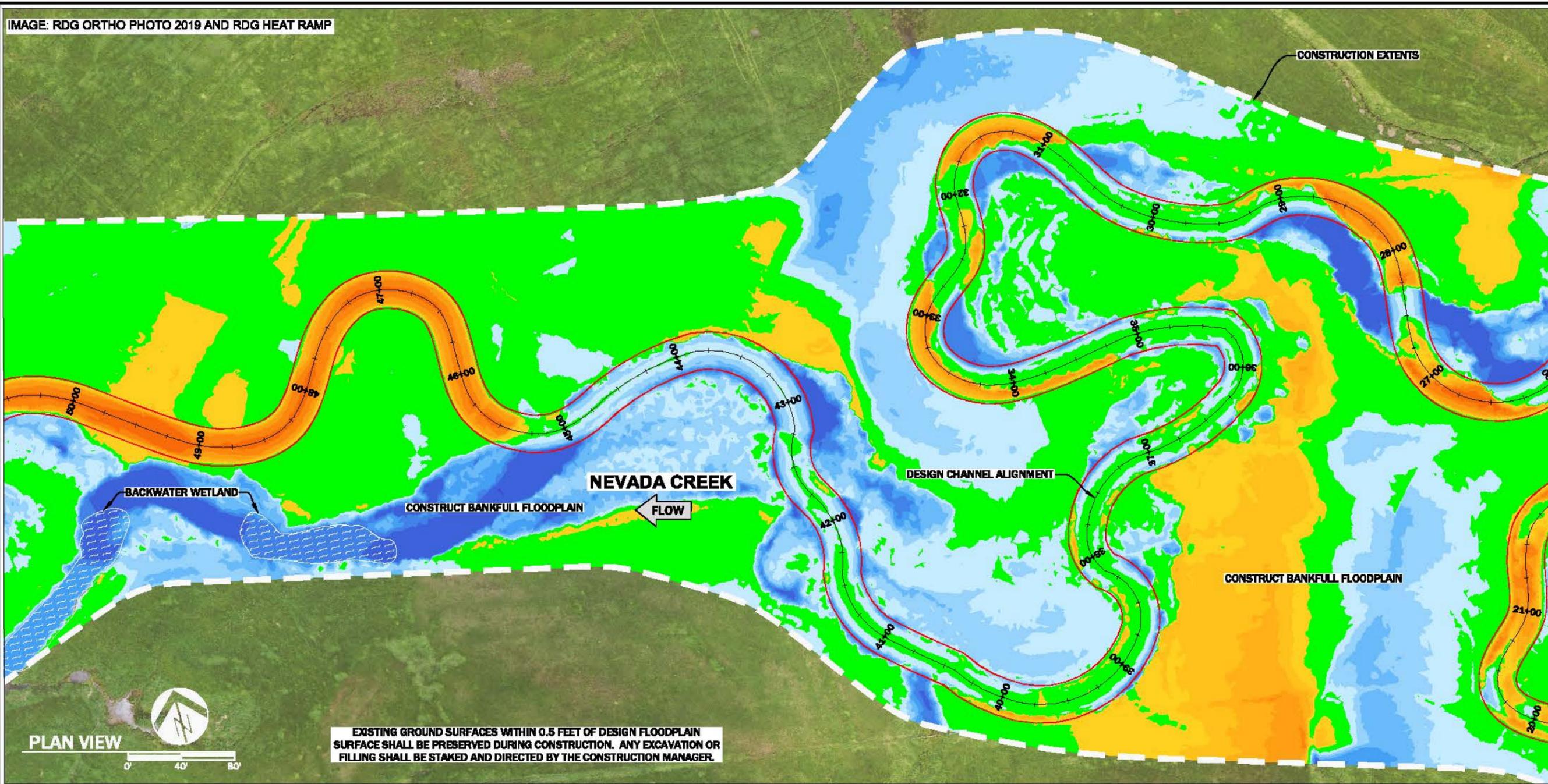
STRUCTURES	DETAIL SHEET #
SOD AND BRUSH BANK TYPE 1 (SBB 1)	6.0
SOD AND BRUSH BANK TYPE 2 (SBB 2)	6.0
SOD AND BRUSH BANK TYPE 3 (SBB 3)	6.0
PRESERVE EXISTING BANK	
FILL EXISTING CHANNEL	
BACKWATER/ALCOVE WETLAND	

NO.	DATE	BY	DESCRIPTION	CHK
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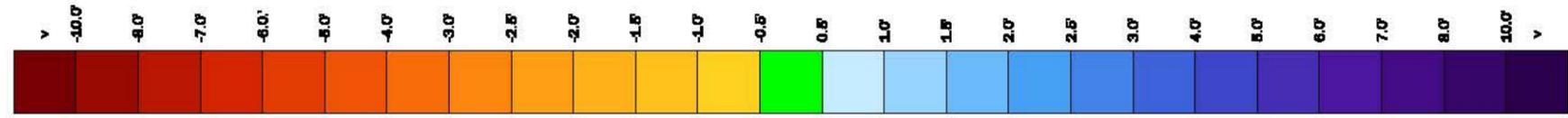
PROJECT NUMBER
RDG-18-002

SHEET NUMBER
4.2

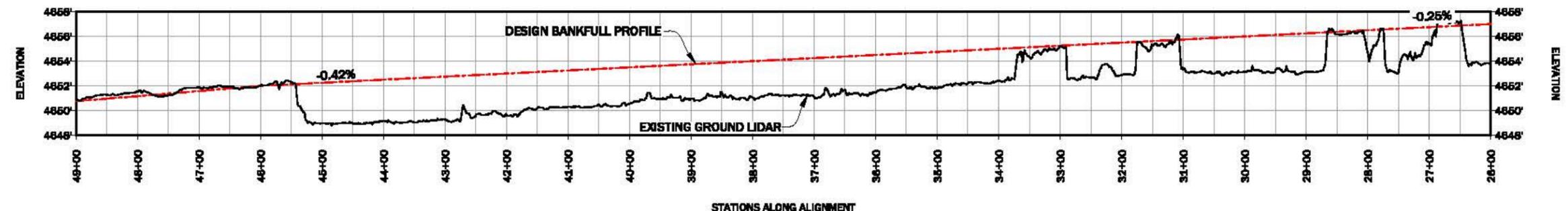
IMAGE: RDG ORTHO PHOTO 2019 AND RDG HEAT RAMP



EXISTING GROUND SURFACES WITHIN 0.5 FEET OF DESIGN FLOODPLAIN SURFACE SHALL BE PRESERVED DURING CONSTRUCTION. ANY EXCAVATION OR FILLING SHALL BE STAKED AND DIRECTED BY THE CONSTRUCTION MANAGER.



EXISTING GROUND LIDAR SURFACE COMPARED TO DESIGN BANKFULL SURFACE



RDG
RIVER DESIGN GROUP

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Whitefish, MT 59937
Tel: 406.863.8727
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GRADING PLAN AND PROFILE

NEVADA CREEK PHASE 4 NEAR HELMVILLE, MONTANA

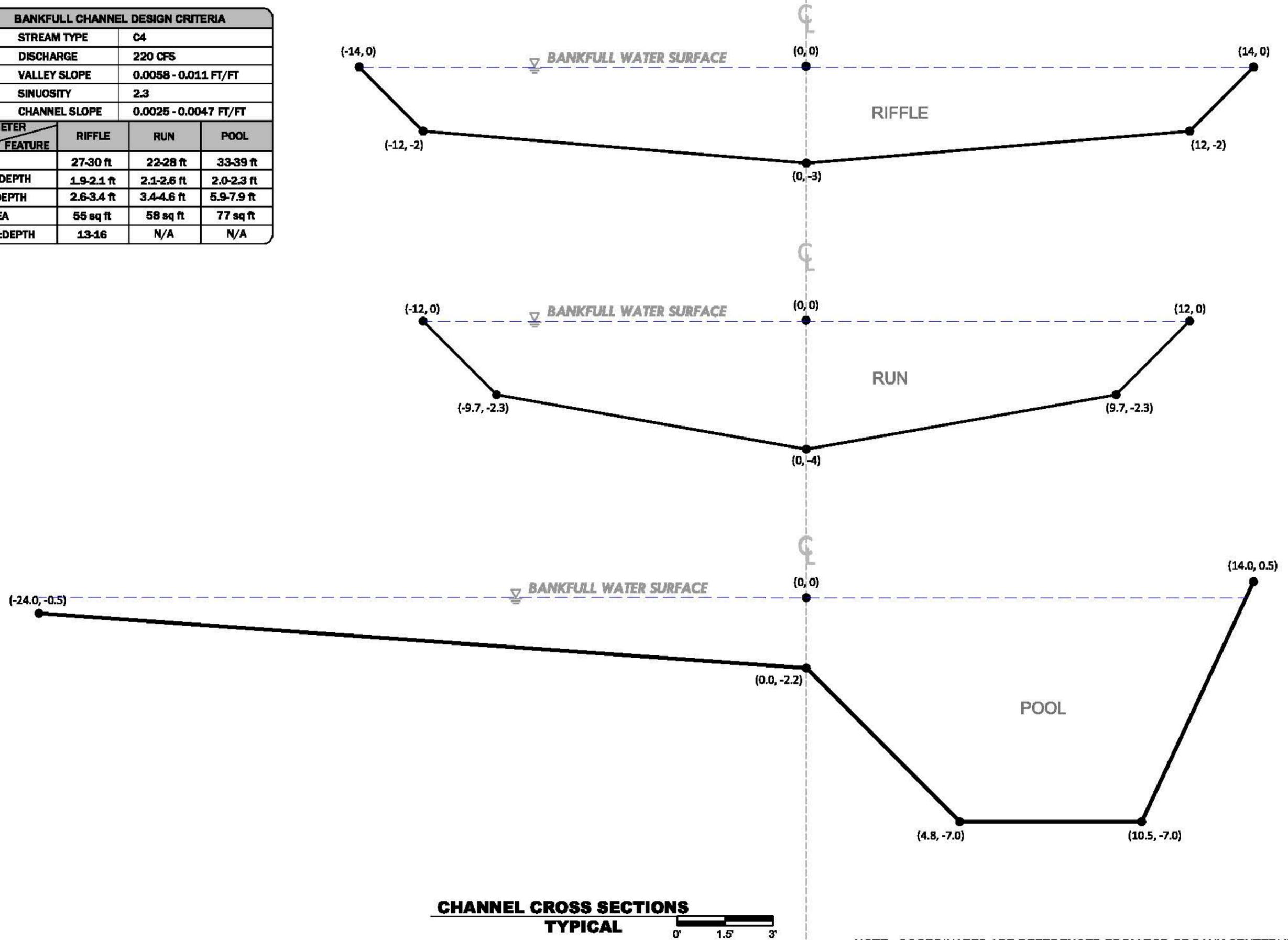
NO.	DATE	BY	DESCRIPTION	CHK
1	9-20-19	NW	Conceptual Design	JM

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RDG-18-002

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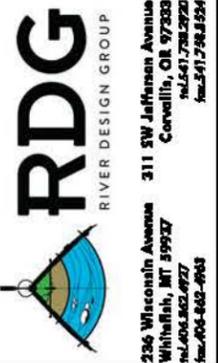
4.3

BANKFULL CHANNEL DESIGN CRITERIA			
STREAM TYPE	C4		
DISCHARGE	220 CFS		
VALLEY SLOPE	0.0058 - 0.011 FT/FT		
SINUOSITY	2.3		
CHANNEL SLOPE	0.0025 - 0.0047 FT/FT		
PARAMETER	RIFFLE	RUN	POOL
WIDTH	27-30 ft	22-28 ft	33-39 ft
MEAN DEPTH	1.9-2.1 ft	2.1-2.6 ft	2.0-2.3 ft
MAX. DEPTH	2.6-3.4 ft	3.4-4.6 ft	5.9-7.9 ft
XS AREA	55 sq ft	58 sq ft	77 sq ft
WIDTH:DEPTH	13-16	N/A	N/A



CHANNEL CROSS SECTIONS
TYPICAL

NOTE: COORDINATES ARE REFERENCED FROM TOP OF BANK CENTERLINE

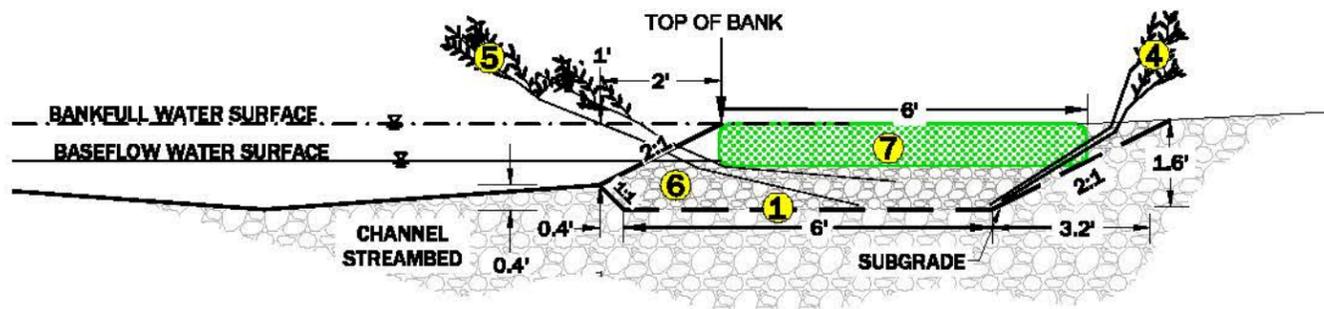


CHANNEL CROSS SECTION DIMENSIONS
NEVADA CREEK PHASE 4
NEAR HELMVILLE, MONTANA

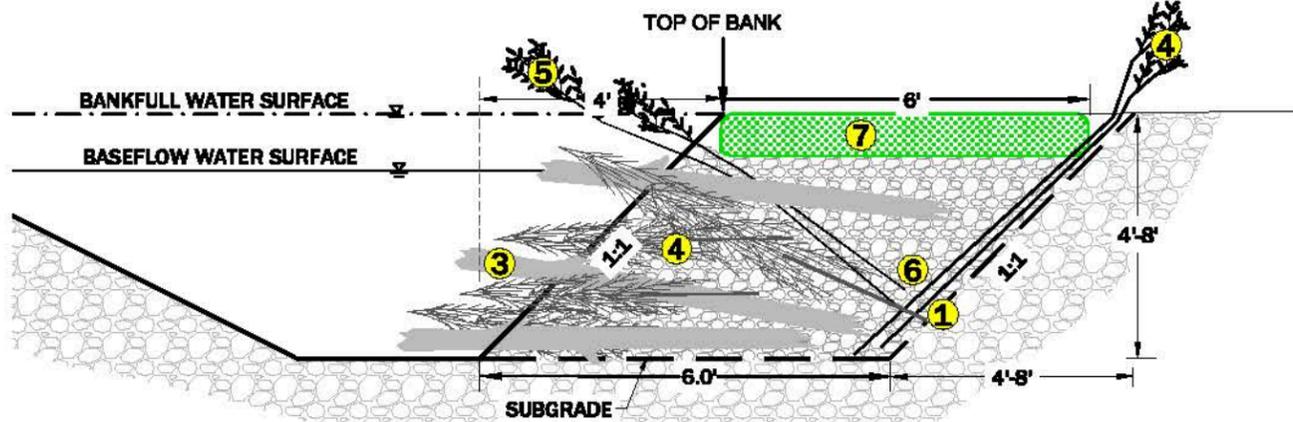
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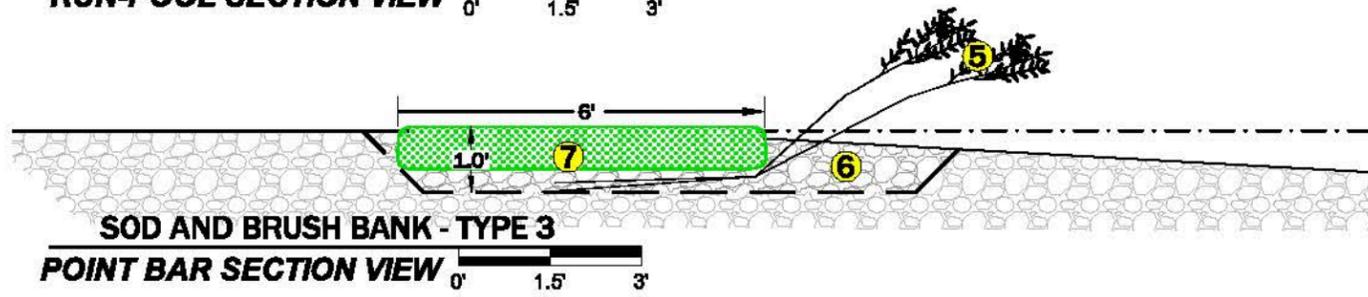
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5.0



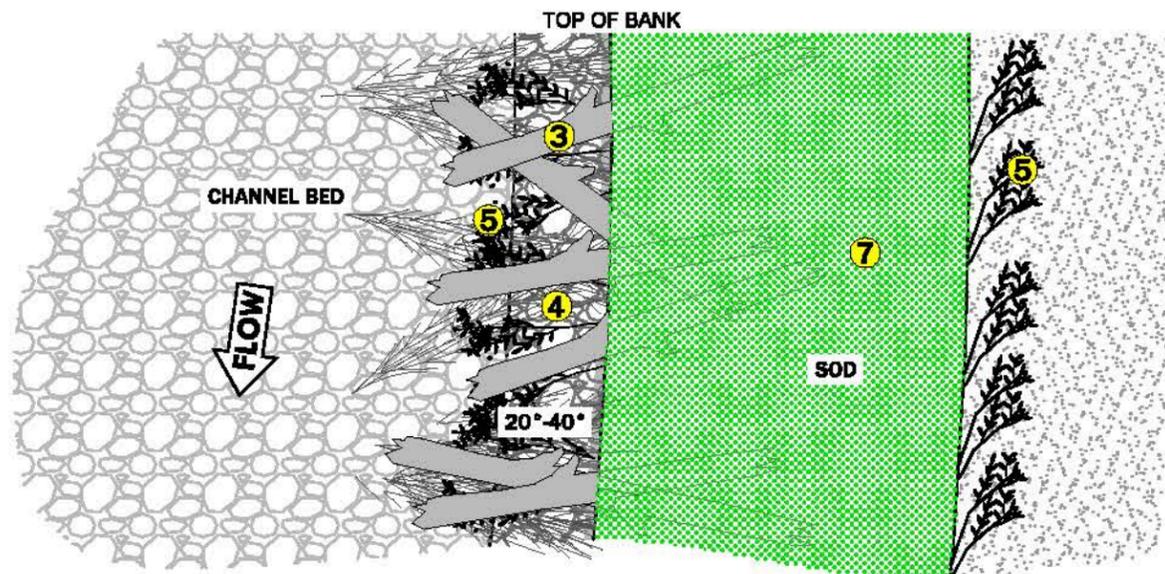
SOD AND BRUSH BANK - TYPE 1
RIFFLE SECTION VIEW
 0' 1.5' 3'



SOD AND BRUSH BANK - TYPE 2
RUN-POOL SECTION VIEW
 0' 1.5' 3'



SOD AND BRUSH BANK - TYPE 3
POINT BAR SECTION VIEW
 0' 1.5' 3'



SOD AND BRUSH BANK
PLAN VIEW
 0' 1.5' 3'

GENERAL NOTES

1. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED THE ENGINEER.
2. FIELD ENGINEER SHALL MARK THE GENERAL CONSTRUCTION LOCATION FOR EACH SOD AND BRUSH BANK STRUCTURE PRIOR TO CONSTRUCTION.

NOTES ON SOD AND BRUSH BANK INSTALLATION

- 1 EXCAVATE STREAMBANK TO SUBGRADE ELEVATIONS.
- 2 PLACE SMALL LOGS IN THE STREAMBANK AT SKEWED ANGLE TO THE STREAMBANK (AS APPLICABLE). LOGS SHALL BE PLACED BELOW THE TOP OF BANK ELEVATION. LOGS MAY OVERLAP.
- 3 PLACE BRUSH WITHIN THE MATRIX OF SMALL LOGS (AS APPLICABLE). BRUSH SHALL BE PLACED BELOW TOP OF BANK LINE.
- 4 PLACE CUTTINGS INTO THE LOG/BRUSH MATRIX WITH THE STEMS IN CONTACT WITH THE BASEFLOW WATER TABLE AND THE LEAVES AT OR ABOVE THE BANKFULL WATER SURFACE ELEVATION.
- 5 BACKFILL STREAMBANK WITH STREAMBANK FILL PER THE GRADATION SHOWN ON THE DRAWINGS.
- 6 WASH FINES AND WATER FROM ONSITE INTO THE STREAMBANK FILL TO SEAL THE VOIDS IN THE BACKFILL.
- 7 PLACE A 8-12 INCH SOD MAT BEGINNING AT BANKLINE AND EXTENDING BACK 6 FEET IN TO FLOODPLAIN TO MATCH FINISHED GROUND ELEVATIONS. REFER TO VEGETATION SALVAGE PLAN FOR SOD SOURCES.

STREAMBANK FILL GRADATION

SIZE (INCHES)	PERCENT PASSING	REPRESENTATIVE SIZE CLASS
6	95	D100
5	90-95	D95
4	85-90	D84
2.5	65 - 85	D65
2.0	50 - 65	D50
1.5	30 - 50	D35
0.6	10 - 30	D15
FINES	0	

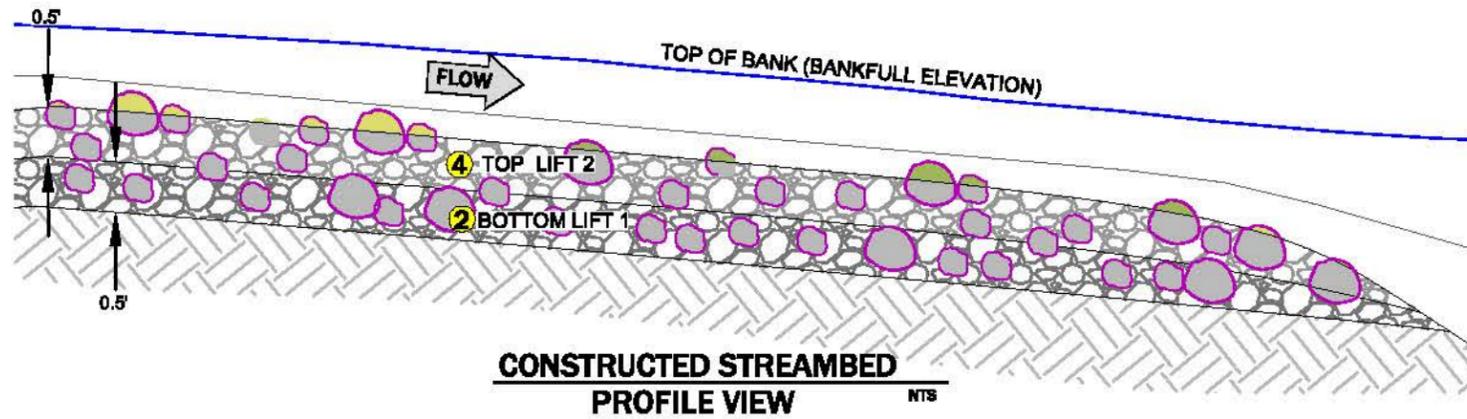
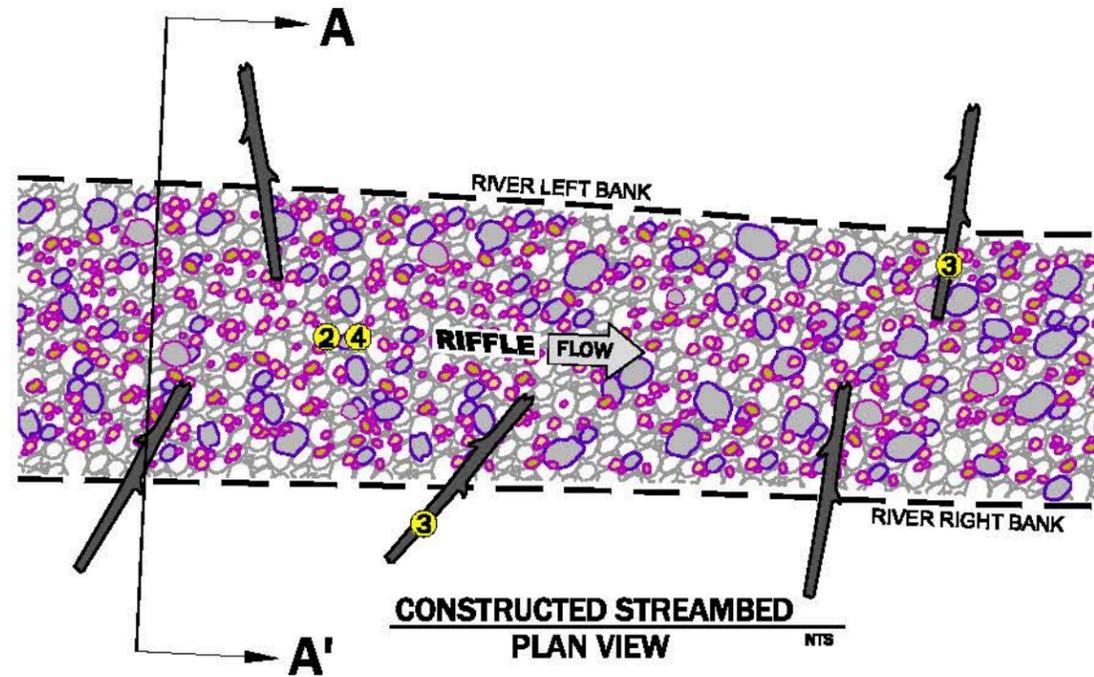
MATERIAL SCHEDULE (PER LINEAR FOOT)

ITEM	TYPE 1 QUANTITY	TYPE 2 QUANTITY	TYPE 3 QUANTITY	DIA. (IN)	LENGTH (FT)
1 CY OF SUBGRADE EXCAVATION	0.34	1	0.1		
6 CY OF STREAMBANK FILL	0.1	0.3	0.05		
3 CATEGORY 3 WOOD	-	4	-	3-6	8-10
4 CATEGORY 4 WOOD	-	4	-	1-3	8-10
7 SEDGE SOD MAT	6 SF	6 SF	6 SF	8-12 (THICK)	
5 WILLOW CUTTINGS	7	7	5	0.75-1.5	6-8

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SHEET NUMBER
6.0



GENERAL NOTES

1. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED THE ENGINEER.
2. CONTRACTOR SHALL MARK THE UPSTREAM AND DOWNSTREAM EXTENTS OF THE LOCATIONS OF THE CONSTRUCTED STREAMBED STRUCTURES.

NOTES ON CONSTRUCTED STREAMBED INSTALLATION

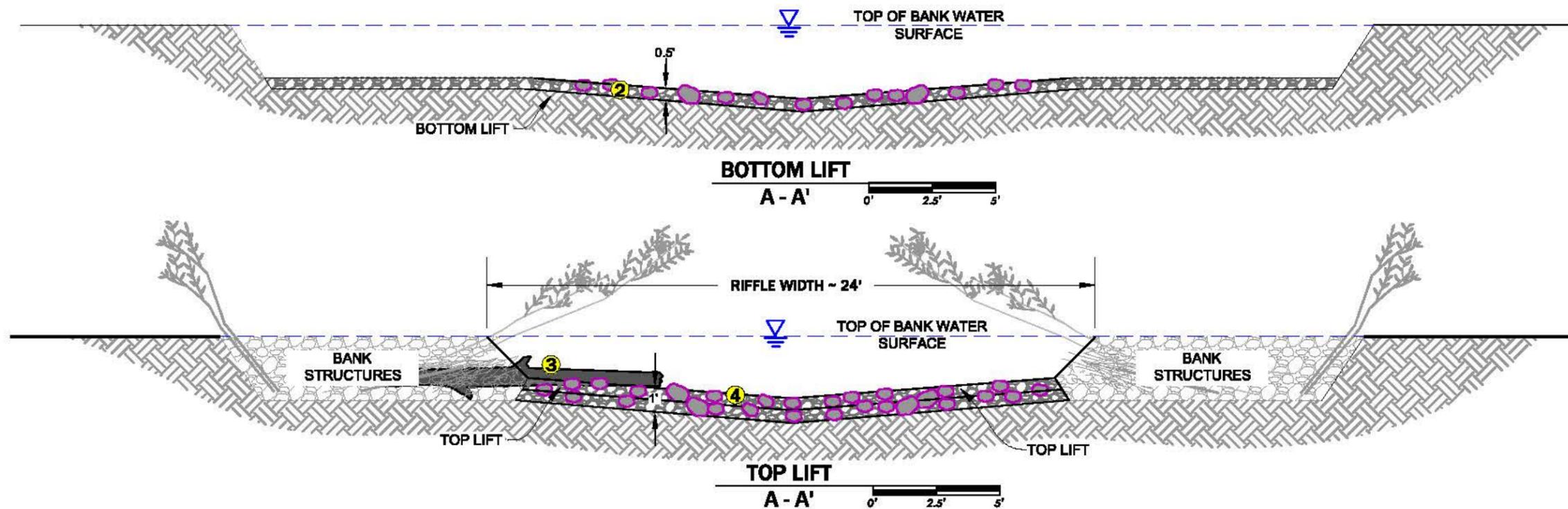
1. EXCAVATE STREAMBED TO SUBGRADE ELEVATIONS. THE ENGINEER WILL CONFIRM WHETHER SUBGRADE EXCAVATION AND RIFFLE CONSTRUCTION ARE NECESSARY BASED ON OBSERVED SUBSTRATE CONDITIONS.
2. PLACE THE BOTTOM LIFT OF RIFFLE MATERIAL. RIFFLE MATERIAL SHALL CONSIST OF THE DESIGNATED STREAMBED MATERIAL GRADATION.
3. COMPACT THE BOTTOM LIFT OF RIFFLE MATERIAL USING WEIGHT OF EQUIPMENT OR BUCKET COMPACTION. WASH WATER AND FINES INTO THE LIFT TO FILL VOIDS.
4. PLACE THE TOP LIFT OF RIFFLE MATERIAL LOOSELY ON TOP OF THE FIRST LIFT AND GRADE TO FINISHED ELEVATIONS. DO NOT COMPACT OR TRACK EQUIPMENT OVER THE TOP LIFT OF RIFFLE MATERIAL.
5. WASH WATER AND FINES INTO THE TOP LIFT TO FILL VOIDS.

STREAMBED FILL GRADATION

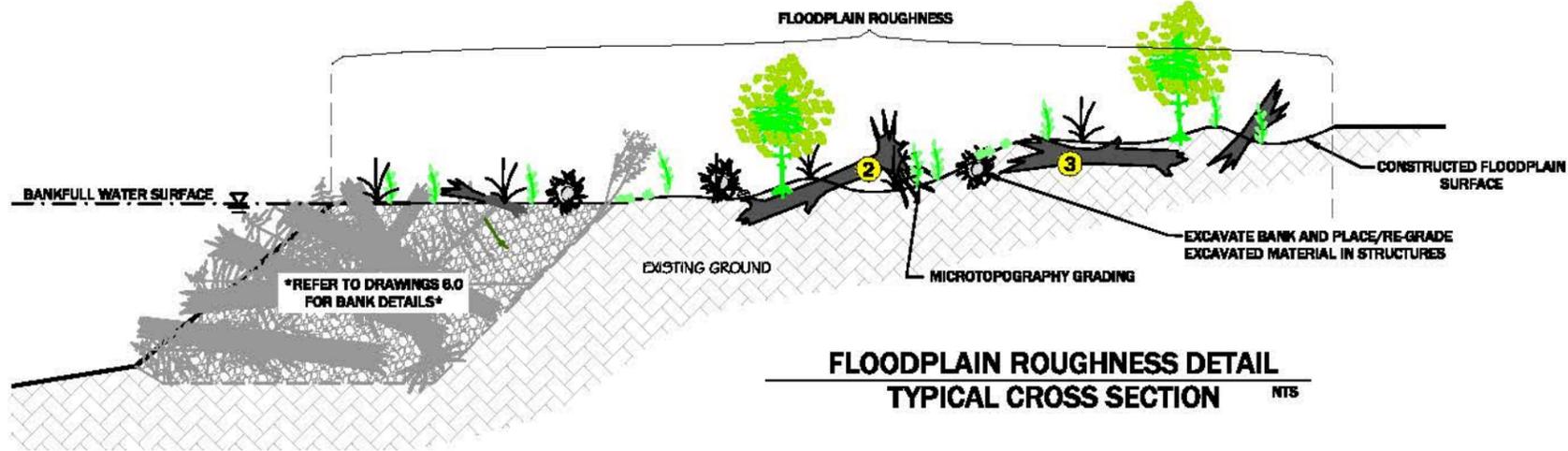
SIZE (INCHES)	PERCENT PASSING	REPRESENTATIVE SIZE CLASS
6	95	D100
5	90-95	D95
4	85-90	D84
2.5	65 - 85	D65
2.0	50 - 65	D50
1.5	30 - 50	D35
0.6	10 - 30	D15
FINES	0-10	

MATERIAL SCHEDULE (PER LINEAR FOOT)

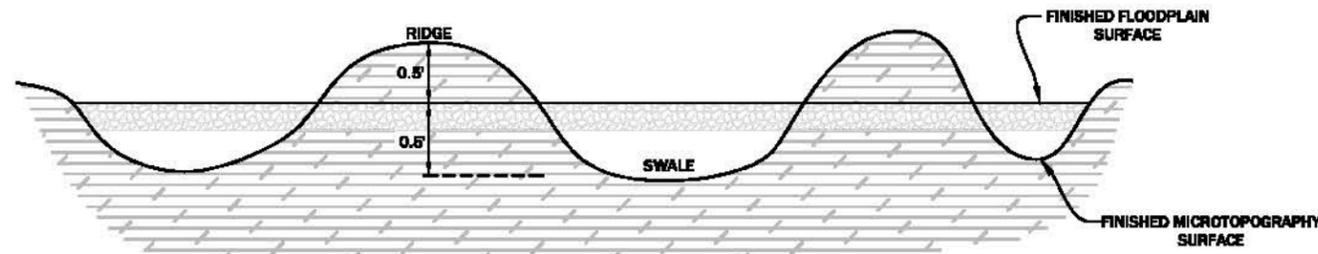
ITEM	DIAMETER	QUANTITY
2 4 STREAMBED MATERIAL	SEE GRADATION	1.0 CY
3 CATEGORY 3 WOOD	3"-6" DIA., 8'-10' L	0.1



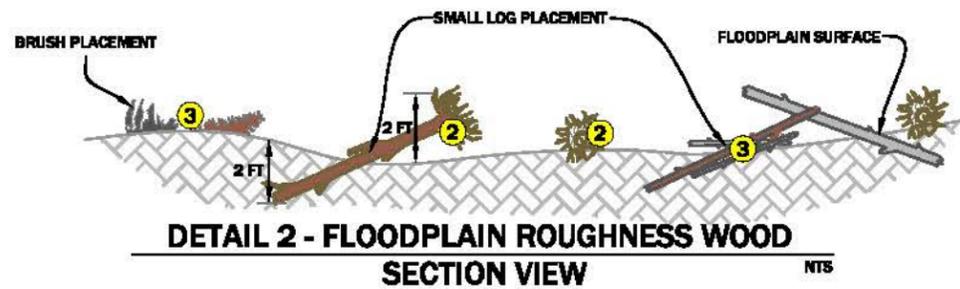
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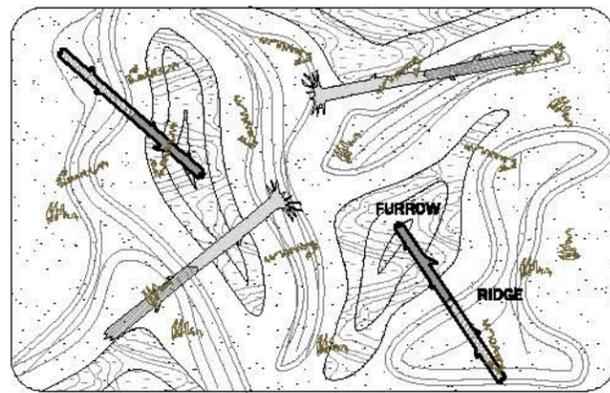
**FLOODPLAIN ROUGHNESS DETAIL
TYPICAL CROSS SECTION** NTS



**DETAIL 1 - MICROTOPOGRAPHY GRADING
SECTION VIEW** NTS



**DETAIL 2 - FLOODPLAIN ROUGHNESS WOOD
SECTION VIEW** NTS



**DETAIL 3 - MICROTOPOGRAPHY AND FLOODPLAIN WOOD PLACEMENT
PLAN VIEW** NTS

GENERAL NOTES

1. ANY CHANGES TO THE CONSTRUCTION SEQUENCE MUST BE APPROVED BY THE ENGINEER.

NOTES ON FLOODPLAIN ROUGHNESS INSTALLATION

1. CONTRACTOR SHALL DEVELOP MICROTOPOGRAPHY AND PLACE WOODY MATERIAL IN THE CONSTRUCTED FLOODPLAIN.
2. TRANSPORT COARSE WOOD AND BRUSH FROM DESIGNATED BORROW SOURCES OR STOCKPILE AREAS AND PLACE IT WITHIN THE MICROTOPOGRAPHY TREATMENT AREA AS SHOWN ON DRAWINGS.
3. PLACE WOOD CATEGORY 2 WOOD AT A RATE OF 50 PIECES PER ACRE, CATEGORY 3 WOOD AT A RATE OF 150 PIECES PER ACRE AND SPACED AT A TYPICAL DISTANCE OF 20 FEET FROM OTHER COARSE WOOD.
4. BURY COARSE WOOD WITHIN THE FLOODPLAIN SURFACE, WITH ONE HALF OF THE LENGTH BURIED TO A DEPTH OF 3-FT. AND ONE HALF EXPOSED AS SHOWN ON DRAWING.
5. CONSTRUCT LOW AND HIGH FEATURES (RIDGES AND FURROWS) AS SHOWN ON DRAWINGS. MAXIMUM HEIGHT OF RIDGES AND DEPTH OF FURROWS SHALL BE NO GREATER THAN 0.5-FT. RELATIVE TO FINISHED FLOODPLAIN SURFACE.

MATERIAL SCHEDULE (PER ACRE)

ITEM	QUANTITY
② CATEGORY 2 WOOD	50
③ CATEGORY 3 WOOD	150



EXAMPLE OF CONSTRUCTED FLOODPLAIN ROUGHNESS



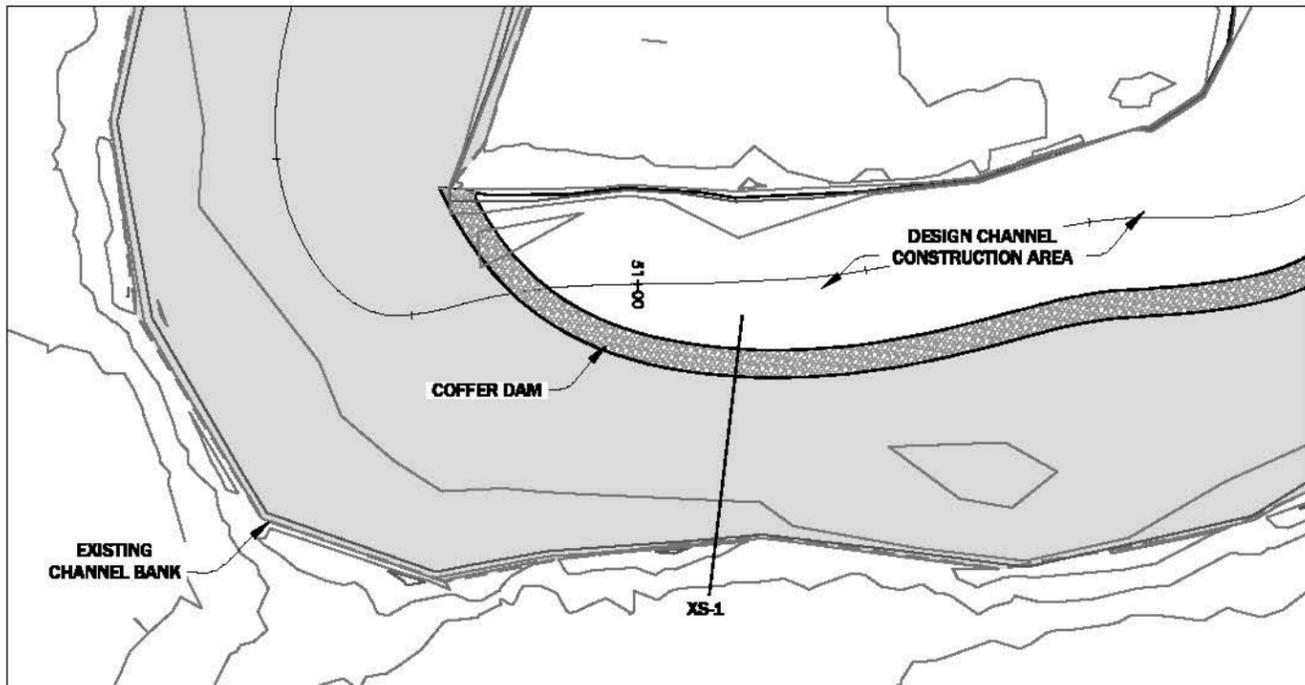
EXAMPLE OF CONSTRUCTED FLOODPLAIN ROUGHNESS

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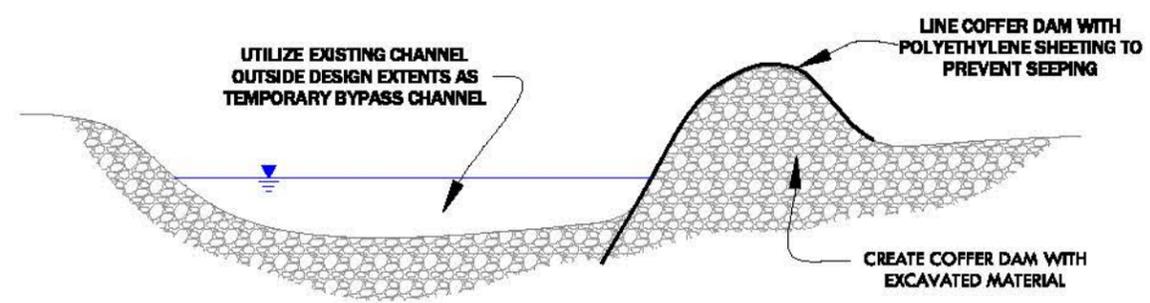
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6.2



TEMPORARY COFFER DAM DETAIL
PLAN VIEW 0' 10' 20'



TEMPORARY COFFER DAM DETAIL
XS-1 NTS NTS NTS

BULK BAG NOTES

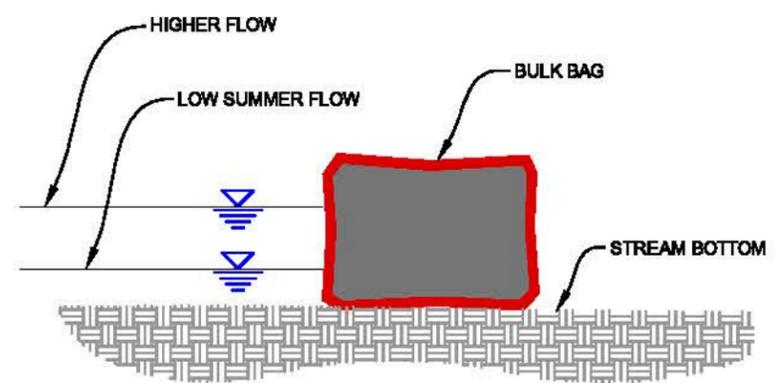
BULK BAGS ARE ALSO CALLED FLEXIBLE INTERMEDIATE BULK CONTAINERS (FIBC) THAT CAN BE CUSTOM MADE FROM VARIOUS FABRIC. THE FOLLOWING REQUIREMENTS ARE NECESSARY FOR THE RIVER ENVIRONMENT:

LARGE BULK BAGS SHALL BE CONSTRUCTED OF 8 oz WOVEN FABRIC, 1200 HOUR UV RESISTANT WITH SEWN LIFTING LOOPS. WHEN FILLED WITH NATIVE RIVER SAND AND GRAVEL, THE BAGS ARE APPROXIMATELY 6' WIDE x 6' LONG x 4' HIGH.

SMALL BULK BAGS SHALL BE CONSTRUCTED OF 8 oz WOVEN FABRIC, 1200 HOUR UV RESISTANT WITH SEWN LIFTING LOOPS. WHEN FILLED WITH NATIVE RIVER SAND AND GRAVEL, THE BAGS ARE APPROXIMATELY 3' WIDE x 3' LONG x 2.5' HIGH.

BULK BAGS SHALL BE CAREFULLY PLACED TO ENSURE NO TEARING OR CUTTING OF THE BAGS OCCURS.

BULK BAGS SHALL BE PLACED USING A HYDRAULIC CRANE OR TRACKHOE USING LIFTING BARS AND STEEL CABLES TO EQUALIZE LOAD ON LIFTING LOOPS.



TYPICAL BULK BAG PLACEMENT
0' 2.5' 5'

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NEVADA CREEK RESTORATION PHASE 4 - PROJECT SITE



Existing conditions along Nevada Creek Phase 4. An estimated 545 tons of sediment are being generated from streambank erosion annually through this stretch of Nevada Creek.



Note the high width to depth ratio through this section of Nevada Creek and lack of a functional riparian zone. 30% of stream banks suffer from very high to high levels of bank erosion.



Private landowner walking his stretch of property along Nevada Creek phase 4 and participating in fisheries monitoring downstream of reservoir.

