

**COLORADO**Colorado Water
Conservation Board

Department of Natural Resources

Colorado Water Conservation Board

Water Plan**Water Project Summary**

Name of Applicant	Roaring Fork Conservancy	
Name of Water Project	Project-01906 Crystal River at Riverfront Park Restoration	
Grant Request Amount		\$798,574.00
Primary Category		\$798,574.00
<i>Watershed Restoration & Recreation</i>		
Total Applicant Match		\$927,091.00
<i>Applicant Cash Match</i>		\$927,091.00
<i>Applicant In-Kind Match</i>		
Total Other Sources of Funding		\$527,091.00
<i>Colorado Parks and Wildlife</i>		\$20,000.00
<i>WaterSMART</i>		\$252,091.00
<i>Aspen Valley Land Trust R3 Fund</i>		\$10,000.00
<i>GOCO Resilient Communities</i>		\$55,000.00
<i>CPW Fishing is Fun</i>		\$30,000.00
<i>Colorado River Water Conservation District</i>		\$100,000.00
<i>Pitkin County Healthy Rivers</i>		\$10,000.00
<i>CPW Fishing is Fun 2021</i>		\$50,000.00
Total Project Cost		\$2,252,756.00

Applicant & Grantee Information

Name of Grantee: Roaring Fork Conservancy
Mailing Address: 22800 Two Rivers Road Basalt CO 81621
FEIN: 841,376,379

Organization Contact: Heather Lewin
Position/Title: Email: heather@roaringfork.org
Phone: (970) 710-9023

Organization Contact - Alternate: Rick Lofaro
Position/Title: Executive Director Email: rick@roaringfork.org
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Grant Management Contact: Heather Lewin
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Grant Management Contact - Alternate: Rick Lofaro
Position/Title: Executive Director Email: rick@roaringfork.org
Phone: 9709271290

Description of Grantee/Applicant

No description provided

Type of Eligible Entity

- ☐ Public (Government)
- ☐ Public (District)
- ☐ Public (Municipality)
- ☐ Ditch Company
- ☐ Private Incorporated
- ☐ Private Individual, Partnership, or Sole Proprietor
- ☒ Non-governmental Organization
- ☐ Covered Entity
- ☐ Other

Category of Water Project

- ☐ Agricultural Projects
Developing communications materials that specifically work with and educate the agricultural community on headwater restoration, identifying the state of the science of this type of work to assist agricultural users among others.
- ☐ Conservation & Land Use Planning
Activities and projects that implement long-term strategies for conservation, land use, and drought planning.
- ☐ Engagement & Innovation Activities
Activities and projects that support water education, outreach, and innovation efforts. Please fill out the Supplemental Application on the website.
- ☒ Watershed Restoration & Recreation
Projects that promote watershed health, environmental health, and recreation.
- ☐ Water Storage & Supply
Projects that facilitate the development of additional storage, artificial aquifer recharge, and dredging existing reservoirs to restore the reservoirs' full decreed capacity and Multi-beneficial projects and those projects identified in basin implementation plans to address the water supply and demand gap.

Location of Water Project

Latitude	39.384600
Longitude	-107.206590
Lat Long Flag	Ditch diversion structure location: Coordinates based on ditch's diversion structure
Water Source	Crystal River
Basins	Colorado
Counties	Garfield
Districts	38-Roaring Fork River Basin

Water Project Overview

Major Water Use Type	Environmental
Subcategory	Education
Scheduled Start Date - Design	
Scheduled Start Date - Construction	7/15/2022
Description	

Colorado's riparian habitats are under constant pressure-whether from over allocation of rivers, anthropogenic demands, or climate change. A stakeholder led planning process, resulting in the Crystal River Management Plan, a comprehensive Stream Management Plan, identified and prioritized the implementation of the Crystal River at Riverfront Park Restoration and Efficiency Project. The 18 acre project reach is severely to unsustainably degraded. A collaborative team of experts worked with the Town of Carbondale to develop restoration plans to address the habitat, hydrologic, agricultural and cultural pressures within this reach and associated upland areas. The project will have measurable aquatic and vegetative benefits to the local reach and serve as a model for other projects in the Crystal Valley, Roaring Fork Watershed, and state of Colorado-demonstrating how a completed SMP can be implemented and translate to significant benefits to the environment. The project is designed to target multiple objectives through a collaborative and holistic approach. Habitat and wildlife values are key to the goals of the project, which will restore wetland and riparian areas, preserve healthy habitat, enhance hydrologic connectivity and fisheries, prevent unnecessary dewatering, and provide wildlife-associated recreation for future generations. This grant will fund on-the-ground project implementation.

Measurable Results

	New Storage Created (acre-feet)
	New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive
	Existing Storage Preserved or Enhanced (acre-feet)
	New Storage Created (acre-feet)
3,500	Length of Stream Restored or Protected (linear feet)
	Efficiency Savings (dollars/year)
	Efficiency Savings (acre-feet/year)
18	Area of Restored or Preserved Habitat (acres)
	Quantity of Water Shared through Alternative Transfer Mechanisms or water sharing agreement (acre-feet)
	Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning
500	Number of Coloradans Impacted by Engagement Activity

Water Project Justification

The proposed Crystal River Restoration and Weaver Ditch Efficiency project supports several key goals and objectives of both the Colorado Water Plan (CWP) and the Colorado Basin Implementation Plan (CBIP). One of the primary goals of both plans is the development of Stream Management Plans (7-3, CWP; 15, CBIP) that can facilitate environmental and recreational projects and needs. This project stems directly from the findings and recommendations of the 2016 Crystal River Management Plan (CRMP).

The CRMP states that "The reaches of the Crystal River between Thompson Creek and the confluence with the Roaring Fork exhibit the most degraded overall functional condition" (5.4, CRMP). This project will work to reverse some of that degradation and create a more sustainable and resilient channel, diversion, banks, and riparian area and serve as a pilot project for comparable areas on the Crystal and other streams. In most years, the State's In-Stream Flow right on the lower Crystal is not met. Improvements to the river channel and diversion structure will create a low flow channel with fish passage, may benefit flows, and work towards the overall goals of the ISF program to preserve the natural environment (Section 6.6, CWP)

The CBIP conducted significant public outreach and input to develop the primary themes and goals for the Basin. The number one Basin Wide theme is to "Protect and Restore Healthy Streams, Rivers, Lakes and Riparian Area" with the goal to "protect and rehabilitate healthy rivers, streams, lakes and riparian areas" (p43, CBIP). The highest priority identified through Plan Input Surveys were related to environmental health (p39, CBIP). This

project, in similar fashion, conducted significant public and stakeholder outreach to meet the goals of protecting and rehabilitating river and riparian areas.

The CBIP goals are echoed in the Colorado Water Plan as well. This project will “support a strong environment that includes healthy watersheds, rivers and streams, and wildlife” (Executive Order D 2013-005). The Crystal River Restoration is a Tier I priority project within the Colorado Basin. (CBIP 2021 Update) This project represents a significant action identified in the CRMP and the CBIP and supports actions called for by the CWP. (p 6-178, Stream Management Plans, Multipurpose projects) The 2021 BIP update highlights “tourism, agriculture and energy” as “critical and integral components of the Basin Economy.” (17, CBIP 2021(draft)) The impacts of this project will benefit tourism through increased angling opportunities, fish habitat and passage, as well as serve as an example of agricultural efficiency through diversion structure rebuild and headgate automation.

The improvement of both the efficiency and operation of the Weaver Ditch diversion and headgate improves the diversion itself as well as habitat conditions for this reach of the Crystal River. This action aligns with the CWP’s call for projects that “address more than one type of need” (p 9-44, CWP). With input from multiple stakeholders, the final design provides sustainability for the diversion, the river and the adjacent riparian area in Riverfront Park and serves as a model for the two other ditches operated by the Town, as well as privately managed diversions.

The CBIP update discusses concerns of climate change impacts. (p11) This project, through re-establishment of the thalweg, strategic diversion structure reconstruction, and riparian creation, enhancement, and protection will serve as an example of enhanced resiliency in a stream system.

Another significant goal of the CBIP is to strengthen the knowledge and understanding of water issues and needs among the general population of the basin. Carbondale (population 6,785) and the Town’s Riverfront Park are in the heart of the Roaring Fork Valley (population 32,197) and within easy reach by hundreds of school age children as well as classes from Colorado Mountain College. Currently, there is a disconnect between the downtown and the river. The Weaver ditch runs through town, through parks and one can often even spot fish swimming in the ditch waters. However, the Crystal River runs on the edge of town and is less visible. The education plan associated with the project will help lessen this disconnect. The project location will help facilitate the stated objective of “Enhancing K-12 water education opportunities, both inside and beyond the classroom” and “Enhancing water education opportunities in higher education.” (41) There will also be passive educational opportunities through interpretive signage in both Riverfront Park and Sopris Park, which the Weaver ditch runs through.

The goals and objectives for the Project also align with the CWP’s Technical update, which identifies projected gaps in “Environment and Recreation.” Notably, the concern that “drier conditions in late summer could increase risk to cold water ...fish due to higher water temperatures and reduced habitat” (41,90 A&T Update) is addressed in the instream component of this project through the creation of a low flow channel, as well as enhanced riparian shading. In addition, the diversion structure rebuild will help the Town of Carbondale secure their allocated water right with less environmental disturbance and maintenance. The Technical update also states that “recreational use and environmental conservation are major drivers in the basin and are important for economic health and quality of life.” (77) This project benefits both recreation and the environment. Of note, the Crystal River near Redstone (upstream of the project site) was selected a “Flow Tool Node” for the Colorado Basin.

In summary, the Crystal River Restoration Project at Riverfront Park meets multiple goals for Environment and Recreation across all planning documents, as well as piloting diversion and headgate improvements and efficiencies that will benefit water rights holders including municipalities and agriculture.

Related Studies

Crystal River Management Plan 2016
Carbondale Water and Wastewater Master plan 2016
Carbondale Parks and Recreation Master Plan 2015
Regional Water Efficiency Plan Roaring Fork Watershed, Colorado 2015
Municipal Water Efficiency Plan, Town of Carbondale Colorado 2015
Opportunities for Water Conservation Roaring Fork Conservancy
Town of Carbondale Source Water Protection Plan 2015
Wildland Hydrology Crystal River Restoration Scoping 2014
Roaring Fork Watershed Plan 2012/2019 update
Crystal River and Coal Basin Aquatic Life Use Assessment 2012
State of the Roaring Fork Watershed 2008

Taxpayer Bill of Rights

N/A

Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that: (1) Summarizes the project and how the project was completed. (2) Describes any obstacles encountered, and how these obstacles were overcome. (3) Confirms that all matching commitments have been fulfilled. (4) Includes photographs, summaries of meetings and engineering reports/designs. The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions. Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following: (a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in the Budget & Schedule Exhibit B. Per Water Plan Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment. (b) Accountability: Per Water Plan Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Water Plan Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment. (c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary. (d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.

Last Updated: May 2021

ENGAGEMENT & INNOVATION GRANT FUND SUPPLEMENTAL APPLICATION

Introduction & Purpose

Colorado's Water Plan calls for an outreach, education, public engagement, and innovation grant fund in Chapter 9.5.

The overall goal of the Engagement & Innovation Grant Fund is to enhance Colorado's water communication, outreach, education, and public engagement efforts; advance Colorado's water supply planning process; and support a statewide water innovation ecosystem.

The grant fund aims to engage the public to promote well-informed community discourse regarding balanced water solutions statewide. The grant fund aims to support water innovation in Colorado. The grant fund prioritizes measuring and evaluating the success of programs, projects, and initiatives. The grant fund prioritizes efforts designed using research, data, and best practices. The grant fund prioritizes a commitment to collaboration and community engagement. The grant fund will support local and statewide efforts.

The grant fund is divided into two tracks: engagement and innovation. The Engagement Track supports education, outreach, communication, and public participation efforts related to water. The Innovation Track supports efforts that advance the water innovation ecosystem in Colorado.

Application Questions

*The grant fund request is referred to as "project" in this application.

Overview (answer for both tracks)
<p>In a few sentences, what is the overall goal of this project? How does it achieve the stated purpose of this grant fund (above)?</p> <p>The goal of the project is to implement riparian and river restoration priorities identified by stakeholders (Town of Carbondale, American Rivers, Aspen Valley Land Trust, Colorado Parks and Wildlife, River Valley Ranch, Roaring Fork Conservancy) through the Crystal River Management Plan (CRMP). The river, riparian and headgate improvements were planned using data collected during the SMP process, as well as site specific assessments and hydraulic analysis, and community feedback collected through various means of stakeholder engagement. The project represents a significant degree of ongoing collaboration among stakeholders on the Crystal River and advances the success of the implementation of the Crystal River Stream Management Plan (Lotic 2016). This project is intended to serve the community both as a model for future Crystal River restoration and diversion system improvement projects, and as an educational resource for community members and others interested in multi-benefit water projects. The project focuses on restorative elements and natural assets which promote educational opportunities without comprising the wildland nature of the park. The project will be visible and accessible to the over 100 homes in River Valley Ranch, as well as within walking distance from downtown Carbondale and five of its local schools.</p>
<p>Who is/are the target audience(s)? How will you reach them? How will you involve the community?</p>



Last Updated: May 2021

The target audiences are residents and visitors to the Town of Carbondale, youth attending local schools, and water rights holders looking to upgrade infrastructure and habitat. RFC already has a significant presence in the Carbondale school system. Using programs pertinent to the location mixed with new programming that will be developed, RFC Education staff anticipates reaching over 500 students a year. Currently, river access from the schools is challenging or not possible. This site will create accessible outdoor teaching space that is immediately usable. In addition, RFC hosts a series of Watershed Explorations for community members each year that highlight the importance of projects that create healthy riparian areas and include best management practices. This project location and goals is ideal for a community program, which could be implemented as soon as next summer. This project has been regularly highlighted in RFC's newsletter, local papers, and websites. We anticipate this communication to continue through the construction and completion of the project.

Describe how the project is collaborative or engages a diverse group of stakeholders. Who are the partners in the project? Do you have other funding partners or sources?

As briefly mentioned above, the project represents a significant collaboration between the diverse Crystal River stakeholders, with direct involvement from the Town of Carbondale, Carbondale residents, River Valley Ranch Golf Club and residents, Aspen Valley Land Trust, Trout Unlimited, Roaring Fork Audubon Society, American Rivers, and Colorado Parks and Wildlife. While this project does not involve an agricultural property, there has been interest from the ranching community in replicating the project for agricultural diversions upstream if this project proves successful. This project is a significant step forward in the implementation of the Crystal River Management Plan and ongoing efforts to turn planning documents into on the ground improvements. The Town participated as stakeholders in the Planning process and has partnered with Pitkin County Healthy Rivers (even though the town itself is in Garfield County) to implement improvements in diversion and automation and raw water delivery pursuant to the Plan. Aspen Valley Land Trust is invested in conserving open space and passive recreation in River Valley Ranch, in partnership with Roaring Fork Conservancy whose mission includes connecting school children and the public with local rivers and river health. Other funding sources include: GOCO Resilient Communities, WaterSMART, Pitkin County Healthy Rivers, CPW Fishing is Fun, CPW Wetlands Grant, Aspen Valley Land Trust's R3 Fund, and the Town of Carbondale.

Describe how you plan to measure and evaluate the success and impact of the project?

Project success and impact will be measured by regular monitoring and comparisons to baseline conditions, as well as fish surveys and water quality testing. We will track engagement through RFC's education program by gathering statistics on individuals participating in programs and feedback from teachers and community members. Recreational fishing will be monitored informally. Furthermore, the interest generated, and implementation of future projects will help gauge impact.

What research, evidence, and data support your project?



Last Updated: May 2021

The Crystal River Management Plan found riparian vegetation, debris supply, physical structure, biotic structure all to be “severely impaired” in this reach. In addition to data collected in the CRMP process, the consultant group performed intensive riparian and instream evaluations to create the final design. (See Attached) Our community and youth engagement will continue to build upon the outreach used to create both the CRMP and the current project design- soliciting community feedback as well as sharing and exploring the science of river and riparian health.

Describe potential short- and long-term challenges with this project.

Our biggest challenge currently is fund raising and a restricted construction window. With support of the community and town through the stakeholder process, 404 permitting complete, design plans complete, and budget determined, timely funds are the final piece necessary to begin construction this fall. CPW has constricted the construction window from mid-July through mid-September. We are currently working with contractors to see if we can complete the work in the given time frame or if it will be phased over two years.

Long term challenges include learning from both riparian and instream restoration successes and opportunities for improvement.

Please fill out the applicable questions for either the Engagement Track or Innovation Track, unless your project contains elements in both tracks. If a question does not relate to your project, just leave it blank. Please answer each question that relates to your project. Please reference the relevant documents and use chapters and page numbers (Colorado’s Water Plan, Basin Implementation Plan, PEPO Education Action Plan, etc.).

Engagement Track

Describe how the project achieves the education, outreach, and public engagement measurable objective set forth in Colorado’s Water Plan to “significantly improve the level of public awareness and engagement regarding water issues statewide by 2020, as determined by water awareness surveys.”

This project will create an outdoor classroom for both active and planned educational activities, as well as passive education through the trail and signage. The goal is to significantly improve people’s understanding of water needs for environmental (aquatic and riparian), recreational (fishing, boating, and the CPW’s Carbondale Fish Hatchery, located at the upper end of the project) and irrigation for both agricultural and municipal uses (Weaver Ditch headgate). Roaring Fork Conservancy already works with local schools and the public in this area. Adding Riverfront Park to the mix of venues will provide a new and exciting opportunity for community education. Some of the existing educational programs that would benefit from safe river access and healthy riparian field site are: Identifying Macroinvertebrates, Aquatic Macroinvertebrates and the Pollution Tolerance Index, Riparian Ecology Surveys, and The Art and Science of Birds. RFC education staff anticipates using the site for 500 local students each year. The Park is, in many ways, a unique location combining the river, extensive riparian and irrigation in an easily accessible public setting. It would be an example of a success story in which multiple users worked together to improve an imperiled section of the Crystal River.

Describe how the project achieves the other measurable objectives and critical goals and actions laid out in Colorado’s Water Plan around the supply and demand gap; conservation; land use; agriculture; storage; watershed health, environment, and recreation; funding; and additional.



Last Updated: May 2021

The CWP notes that “The environment and recreation are too critical to Colorado’s brand not to have robust objectives; a strong Colorado environment is critical to the economy and way of life.” (p 10-7, CWP). Agriculture and recreation are the two major economic drivers in the Crystal River valley. As noted in the Crystal River Management Plan, this reach of the lower Crystal “the most degraded overall functional condition” (Section 5.4, CRMP). This project is hopefully the first of several involving the river channel with ditch diversion and headgate efficiency improvement aimed at restoring that overall functioning condition and a “strong environment” for the Crystal River. This project will allow educational programs to take advantage of a physical example of Stream Management Planning in action- highlighting the shared benefit (environment, recreation, and conservation/efficiency) that is possible through collaboration and creative problem solving around river issues.

Describe how the project achieves the education, outreach, and public engagement goals set forth in the applicable Basin Implementation Plan(s).

One of the primary goals of the Colorado BIP for public outreach is to enhance “K-12 water education opportunities, both inside and beyond the classroom”, and for higher education. (p 41, CBIP). Riverfront Park is within easy access, even walking distance, from most Carbondale schools (over 1,000 students) with existing facilities, walkways, and parking, making this area and the project an ideal location to enhance education opportunities called for in the BIP. RFC education staff is already actively working in Carbondale schools, and anticipates regularly using this space due to its ease of access and educational opportunities. RFC has already brought students from Colorado College and University of Santa Barbara’s Bren School of Environmental Science and Management on tours of this area. The programs taught at this site would incorporate many of the Statewide Water Education Action Plan (SWEPA) guiding principles set forth in the Colorado Water Plan (CPW). The Riverfront Park would create accessible, engaging, and equitable education and outreach programs engaging marginalized communities that often do not have safe access to watershed experiences. We anticipate demand to increase as the project comes to fruition, creating a venue to share the multiple facets of the project that align with Stream Management Planning and the CBIP.

Describe how the project achieves the basin roundtable’s PEPO Education Action Plans.

The Colorado Basin Education Action Plan echo’s the Colorado BIP in its goals for enhanced K-12 and higher education opportunities. Currently the Roundtable has developed a website and social media platforms that could highlight this project and the opportunities it can provide. It also enhances “coordination with watershed groups and other community organizations to inform a broader set of the public about CBRT activities” (CBRT Education Action Plan 2015-17) that will lead to greater public engagement in the Roundtable process.



Last Updated: May 2021

Colorado Water Conservation Board

Water Plan Grant – Statement of Work- Exhibit A

Statement Of Work

Date:	November 22, 2021
Name of Grantee:	Roaring Fork Conservancy
Name of Water Project:	Crystal River at Riverfront Park Restoration and Efficiency Project
Funding Source:	Multiple (Colorado Water Plan Grant, GOCO Resilient Communities, WaterSMART, Pitkin County Healthy Rivers, CPW Fishing is Fun, Aspen Valley Land Trust's R3 Fund, and the Town of Carbondale.)
Water Project Overview:	
<p>Colorado's riparian habitats are under constant pressure-whether from over allocation of rivers, anthropogenic demands, or climate change. A stakeholder led planning process, resulting in the Crystal River Management Plan (CRMP) (2016) a comprehensive Stream Management Plan (SMP), identified and prioritized the implementation of the Crystal River Restoration and Weaver Ditch Efficacy Project. The project reach is severely to unsustainably degraded. A collaborative team of experts has worked hand-in-hand with the Town of Carbondale to develop restoration plans to address the habitat, hydrologic, agricultural and cultural pressures within this reach and associated upland areas. The Crystal River Restoration and Weaver Ditch Efficiency project will have measurable aquatic and vegetative benefits to the local reach and serve as a model for other projects in the Crystal Valley, Roaring Fork Watershed, and state of Colorado-demonstrating how a completed SMP can be implemented and translate to significant benefits to the environment. The project is designed to target multiple objectives through a collaborative and holistic approach. Habitat and wildlife values are key to the goals of the project, which will restore wetland and riparian areas, preserve healthy habitat, enhance hydrologic connectivity and fisheries, prevent unnecessary dewatering, and provide wildlife-associated recreation for future generations.</p> <p>Roaring Fork Conservancy, with the Town of Carbondale is proposing to restore and enhance a one-half mile, 18-acre reach of the Crystal River as it flows through the town of Carbondale and improve the efficiency of the town owned Weaver Ditch headgate and diversion.</p>	
Project Objectives:	



Last Updated: May 2021

- 1) Restore the ecological integrity of the riparian zone through streambank stabilization, reconnection of the floodplain, and replace invasive weed communities and plant monocultures with healthy and diverse riparian plant regimes, while preserving healthy bird and wildlife habitat.
- 2) Develop a long term, self-sustaining solution to improve river channel stability, fish habitat and spawning areas by promoting conditions that support and enhance instream biotic structure and diversity.
- 3) Create a self-sustaining diversion and head gate structure for the Weaver Ditch to function as part of the river system while improving the water delivery for the Town of Carbondale and consistent with future ditch improvements and efficiencies.
- 4) Enhance passive user experiences of Riverfront Park through interpretive signs, trails, gathering spaces, and educational programs.

Tasks

Task 1 – In-Channel Improvements

Description of Task:

1. The timing In-channel improvements construction will be coordinated with Colorado Fish and Wildlife to mitigate impacts to fish habitat and spawning. Work is to include:
 - a. The Weaver Ditch Headgate Structure and “Island” Rebuild –The project reach includes the Weaver Ditch diversion structure, which will be modified with a permanent boulder grade control structure and engineered riffle to reduce in-channel maintenance needs and improve channel stability issues associated with semi-annual push up dam construction.
 - b. Maintenance Access Ramp Installation – a maintenance access ramp will provide a dedicated and durable access point to service and maintain the Weaver Ditch diversion from the east side of the river adjacent to the headgate.
 - c. In-Channel Improvements – Instream work is focused on the lower 1600 feet of the river channel through the project reach, from the Weaver Diversion, downstream to the Crystal Bridge Drive bridge. The thalweg in this stretch will be re-established to provide low flow connectivity for fish. The channel ins this location is currently over-widened and becomes very shallow during low flow periods, blocking fish passage. An additional, smaller riffle crest will be constructed partway down the reach to provide additional pool habitat. Material excavated from the thalweg will be used to build a gravel bar and low lying vegetated area on the inside of the bend. Habitat boulders, small rock vanes and other roughness elements will be placed along the outside of the bend to promote faster moving water to maintain the thalweg and to provide bank stabilization. The engineered riffle, improved thalweg, additional riffle, and habitat elements will also work together to provide connectivity at a wide range of flow and improve hydraulic diversity, provide resident fish with holding and feed areas through the project reach. Re-establishing a thalweg and reducing an annual occurrence of channel bed and bank destabilization will return the river to a more natural state with a deeper low flow channel and adjacent gravel bar. More healthy sections of the Crystal River upstream and downstream of the project reach were used as a reference.
 - d. West Bank Improvements – Approximately 900 feet of stream bank will be restored, primarily through regrading and planting. Specific sections will be rebuilt with boulder steps to create access points for anglers and other river users, limiting the



Last Updated: May 2021

formation social trails that damage riparian vegetation. The access points will connect with an interpretive/education focused trail system, see the Upland Improvements described in Task 2 for more information.

Method/Procedure:

This task will be performed primarily by the selected construction contractor. Preparation and management of the project site during construction will utilize construction techniques and Best Management Practices that are consistent with industry standards and in compliance with federal, state, and local regulations. Regular inspections of the project during construction will be conducted by the project team and their consultants.

Equipment to be utilized will include excavators, dump trucks, front-end loaders and miscellaneous smaller earth moving equipment. The contractor will manage the flow of the river during construction with the use of coffer dams and other control measures, isolating one half of the river and then the other. The project has been designed to balance cut and fill of alluvium, minimizing haul off of river alluvium. Boulder will be imported for the diversion grade control and the habitat boulders. Access to the project will be from the east bank adjacent to the Weaver headgate.

Haul off of fine material will be needed for the west bank improvements, where most banks will be laid back to 3:1 to 5:1 and revegetated.

The contractor will be required to utilize machine-controlled equipment in the river and on the banks, meaning that GPS location will be compared to a digital elevations model of finished grade real time to ensure the completed project matches the intended design.

Deliverable:

The completed construction of the in-channel improvements as described in the project's construction plans and specifications.

The completed work will be documented with photographs and as-built survey, both of which will be provided to CWCB as part of the final report.

Tasks

Task 2 – Upland Improvements



Last Updated: May 2021

Description of Task:
<p>1. Upland improvements include riparian restoration, habitat enhancement and preservation, and creation/formalization of cultural and recreational amenities.</p> <ul style="list-style-type: none">a. Paving and Trail Network - The project will make improvements for accessibility to Riverfront Park, allowing visitors of every ability to access the Crystal River. The improvement will make Riverfront Park the only accessible Crystal River frontage within the Town of Carbondale. The accessible ramp off Crystal Bridge Drive will lead to a rustic gathering area with direct access to the Crystal River. This area is intended to also serve as an outdoor classroom for the five nearby schools, helping to create the community's future river stewards. Additional hard and soft-scape trails will be formalized within the park providing passive recreational opportunism such as wildlife viewing while preserving important habitat and sensitive areas by deterring off trail use.b. Site Features and Furnishing- Two locations will become outdoor classroom and public gathering spaces (see attached "Preferred Alternative" map), one at the north end of the park near Crystal Bridge Drive and one at the south end of the park. The north end location near Crystal Bridge Drive will be along the bank with multiple points for visitors to access the river. This access will be a universally accessible gathering space, serving as an educational opportunity and for recreational opportunities such as angling. This gathering space will also serve as an area to inform the public about regulations or special information about the park. The second public gathering space will be near the existing cottonwood grove at the south end of the park. This space will be focused on the wetland and upland areas of the park. Interpretive elements will be updated throughout the park expanding and updating the current interpretive materials to make them more accessible and interactive. Site furnishings providing areas for picnicking, nature play, shade, respite and exploration will be included in the formalizing public gathering areas.c. Restoration Planting and Seeding - Riparian improvements will focus on removing invasive species while retaining vegetation in functional habitat areas. The project team has worked with the Roaring Fork Audubon Society to develop a riparian restoration plan that provided nesting and habitat for the various bird species that visit or reside in Riverfront Park including waterfowl.
Method/Procedure:
<p>This task will be performed primarily by the selected construction contractor. As with the in-channel project elements, preparation, and management of the project site during construction will utilize construction techniques and Best Management Practices that are consistent with industry standards and in compliance with federal, state, and local regulations. Regular inspections of the project during construction will be conducted by the project team and their consultants.</p> <p>Equipment to be utilized will include excavators, carts, trucks, and miscellaneous smaller earth moving equipment. Heavier equipment will be used on the north end of the project for the outdoor classroom and boulder terracing. Smaller, less impactful equipment will be used for the revegetation and trails improvements towards the south end of the project. Much of the invasive species removal and revegetation will be done with hand tools. During river isolation discussed in Task 1, construction access from the river will be utilized when needed to supply material and</p>



Last Updated: May 2021

equipment to a specific location on the bank. Construction access will also be available from Crystal Bridge Drive on the north end of the project.

Temporary irrigation will be utilized during the vegetation establishment period.

Deliverable:

The completed construction of the Upland Improvements as described in the project's construction plans and specifications. (See Attached)

The completed Upland Improvements work will be documented with photographs and as-built survey, both of which will be provided to CWCB as part of the final report.

Tasks

Task 3 – Outreach, Oversight, and Administration

Description of Task:

Throughout the construction phase, public outreach and coordination will continue. Dedicated efforts will be made to provide the public and stakeholder with information about the work occurring at River Front Park and in the Crystal River and why the restoration and park improvements are vital to ecosystem and community.

RFC as well as consultants will ensure that work is completed and stays on schedule. In addition, coordination between project partners as well as reporting and communicating to funders.

Method/Procedure:

This task will be performed by Roaring Fork Conservancy, the project team, and consultants.

The team will keep the public and stakeholders updated on construction progress through websites, periodic articles in the local paper (Sopris Sun), and other methods. In addition, the team will have a public meeting at River Valley Ranch prior to the start of construction to update the public on schedule and set expectations for activities during construction.

This task also includes final reporting and project documentation.

Deliverable:

Final reporting will include documentation of stakeholder meetings and outreach as well as any published articles.



Last Updated: May 2021

Budget and Schedule

This Statement of Work shall be accompanied by a combined Budget and Schedule that reflects the Tasks identified in the Statement of Work and shall be submitted to CWCB in excel format.

Reporting Requirements

Progress Reports: The applicant shall provide the CWCB a progress report every 6 months, beginning from the date of issuance of a purchase order, or the execution of a contract. The progress report shall describe the status of the tasks identified in the statement of work, including a description of any major issues that have occurred and any corrective action taken to address these issues.

Final Report: At completion of the project, the applicant shall provide the CWCB a Final Report on the applicant's letterhead that:

- Summarizes the project and how the project was completed.
- Describes any obstacles encountered, and how these obstacles were overcome.
- Confirms that all matching commitments have been fulfilled.
- Includes photographs, summaries of meetings and engineering reports/designs.

The CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

Payment

Payment will be made based on actual expenditures and must include invoices for all work completed. The request for payment must include a description of the work accomplished by task, an estimate of the percent completion for individual tasks and the entire Project in relation to the percentage of budget spent, identification of any major issues, and proposed or implemented corrective actions.

Costs incurred prior to the effective date of this contract are not reimbursable. The last 10% of the entire grant will be paid out when the final deliverable has been received. All products, data and information developed as a result of this contract must be provided to as part of the project documentation.

Performance Measures

Performance measures for this contract shall include the following:

(a) Performance standards and evaluation: Grantee will produce detailed deliverables for each task as specified. Grantee shall maintain receipts for all project expenses and documentation of the minimum in-kind contributions (if applicable) per the budget in Exhibit B. Per Water Plan Grant Guidelines, the CWCB will pay out the last 10% of the budget when the Final Report is completed to the satisfaction of CWCB staff. Once the Final Report has been accepted, and final payment has been issued, the purchase order or grant will be closed without any further payment.

(b) Accountability: Per Water Plan Grant Guidelines full documentation of project progress must be submitted with each invoice for reimbursement. Grantee must confirm that all grant conditions have been complied with on each invoice. In addition, per Water Plan Grant Guidelines, Progress Reports must be submitted at least once every 6 months. A Final Report must be submitted and approved before final project payment.



COLORADO

Colorado Water
Conservation Board

Department of Natural Resources

Last Updated: May 2021

(c) Monitoring Requirements: Grantee is responsible for ongoing monitoring of project progress per Exhibit A. Progress shall be detailed in each invoice and in each Progress Report, as detailed above. Additional inspections or field consultations will be arranged as may be necessary.

(d) Noncompliance Resolution: Payment will be withheld if grantee is not current on all grant conditions. Flagrant disregard for grant conditions will result in a stop work order and cancellation of the Grant Agreement.



Colorado Water Conservation Board

Water Plan Grant - Detailed Budget Estimate

Fair and Reasonable Estimate

Prepared Date:
Name of Applicant:
Name of Water Project:

30-Nov-21
Roaring Fork Conservancy
Crystal River at Riverfront Park Restoration and Efficiency Project

EXAMPLE C: Construction

Task 1 - In-channel Improvements

Sub-task	Unit	Quantity	Unit Cost	Total Cost		CWCB Funds	Matching Funds
Site Preparation							
Erosion Control and General BMPs - Furnish, Install, and Manage (year 1)	1	LS	\$ 10,000.00	\$ 10,000.00		\$ 10,000.00	\$ -
Erosion Control and General BMPs - Furnish, Install, and Manage (year 2)	1	LS	\$ 10,000.00	\$ 10,000.00		\$ 10,000.00	\$ -
Construction Access and Repair - year 1	1	LS	\$ 20,000.00	\$ 20,000.00		\$ 20,000.00	\$ -
Additional Construction Access Point - North Side	1	LS	\$ 15,000.00	\$ 15,000.00		\$ -	\$ 15,000.00
Construction Access and Repair - year 2	1	LS	\$ 15,000.00	\$ 15,000.00		\$ -	\$ 15,000.00
Care of Water - Furnish, Install, and Manage - year 1	1	LS	\$100,000.00	\$ 100,000.00		\$ 90,000.00	\$ 10,000.00
Care of Water - Furnish, Install, and Manage - year 2	1	LS	\$ 80,000.00	\$ 80,000.00		\$ 40,000.00	\$ 40,000.00
Temporary Site Restoration after year 1	1	LS	\$ 10,000.00	\$ 10,000.00		\$ 10,000.00	\$ -
Final Site Restoration	1	LS	\$ 15,000.00	\$ 15,000.00		\$ 10,000.00	\$ 5,000.00
Weaver Ditch Diversion "Island" Rebuild							
Haul and Disposal of Alluvial Material Offsite	CY	0	\$ 50.00	\$ -		\$ -	\$ -
Clear and Grub	SY	138	\$ 1.00	\$ 138.00		\$ -	\$ 138.00
General Excavation and Stockpiling	CY	56	\$ 17.00	\$ 945.00		\$ -	\$ 945.00
Removal, Haul and Disposal of Existing Concrete Barriers	LS	1	\$ 1,000.00	\$ 1,000.00		\$ -	\$ 1,000.00
Alluvial Backfill	CY	108	\$ 12.00	\$ 1,299.00		\$ -	\$ 1,299.00
Type C Bank Boulder - Furnish	TON	138	\$ 75.00	\$ 10,341.00		\$ -	\$ 10,341.00
Type C Bank Boulder - Install	TON	138	\$ 100.00	\$ 13,787.00		\$ -	\$ 13,787.00
8 oz Non-Woven Filter Fabric	SY	167	\$ 10.00	\$ 1,672.00		\$ -	\$ 1,672.00
Erosion Control Blanket	SY	74	\$ 15.00	\$ 1,110.00		\$ -	\$ 1,110.00
Furnish and Install Topsoil	CY	13	\$ 100.00	\$ 1,271.00		\$ -	\$ 1,271.00
Filter Boulders - Furnish	TON	3	\$ 75.00	\$ 211.00		\$ -	\$ 211.00
Filter Boulders - Install	TON	3	\$ 100.00	\$ 282.00		\$ -	\$ 282.00
Maintenance Access Ramp							
Clear and Grub	SY	129	\$ 1.00	\$ 130.00		\$ -	\$ 130.00
General Excavation and Stockpiling	CY	83	\$ 17.00	\$ 1,415.00		\$ -	\$ 1,415.00
Haul and Disposal of Alluvial Material Offsite	CY	81	\$ 50.00	\$ 4,035.00		\$ -	\$ 4,035.00
Remove Fence	LF	26	\$ 2.00	\$ 52.00		\$ -	\$ 52.00
Furnish and Install 6" Aggregate Base Course	CY	31	\$ 30.00	\$ 917.00		\$ -	\$ 917.00
Alluvial Backfill	CY	35	\$ 12.00	\$ 420.00		\$ -	\$ 420.00
Type C Bank Boulder - Furnish	TON	7	\$ 75.00	\$ 550.00		\$ -	\$ 550.00
Type C Bank Boulder - Install	TON	7	\$ 100.00	\$ 734.00		\$ -	\$ 734.00
8 oz Non-Woven Filter Fabric	SY	55	\$ 10.00	\$ 550.00		\$ -	\$ 550.00
Erosion Control Blanket	SY	47	\$ 15.00	\$ 711.00		\$ -	\$ 711.00
Furnish and Install Topsoil	CY	6	\$ 100.00	\$ 612.00		\$ -	\$ 612.00
Furnish and Install Access Gate	LS	1	\$ 300.00	\$ 300.00		\$ -	\$ 300.00
Furnish and Install Livestock Fence	LF	60	\$ 40.00	\$ 2,400.00		\$ -	\$ 2,400.00
In-channel Improvements							
General Excavation and Stockpiling	CY	3,396	\$ 17.00	\$ 57,733.00		\$ 41,727.00	\$ 16,006.00
Haul and Disposal of Alluvial Material Offsite	CY	1552	\$ 50.00	\$ 77,600.00		\$ 60,868.00	\$ 16,732.00
Regrade Riffle	CY	1,748	\$ 18.00	\$ 31,466.00		\$ -	\$ 31,466.00
Grade Control Boulder - Furnish	TON	476	\$ 75.00	\$ 35,665.00		\$ 11,000.00	\$ 24,665.00
Grade Control Boulder - Install	TON	793	\$ 100.00	\$ 79,255.00		\$ 49,000.00	\$ 30,255.00
Habitat Boulder Clusters - Furnish	TON	93	\$ 75.00	\$ 6,961.00		\$ -	\$ 6,961.00
Habitat Boulder Clusters - Install	TON	93	\$ 100.00	\$ 9,282.00		\$ -	\$ 9,282.00
Cutoff Wall	LS	1	\$ 80,000.00	\$ 80,000.00		\$ -	\$ 80,000.00
Alluvial Backfill	CY	96	\$ 12.00	\$ 1,152.00		\$ 1,152.00	\$ -
West Bank Improvements							
Bank 1							
Clear and Grub	SY	355	\$ 1.00	\$ 355.00		\$ 355.00	\$ -
General Excavation and Stockpiling	CY	177	\$ 17.00	\$ 3,014.00		\$ 3,014.00	\$ -
Haul and Disposal of Alluvial Material Offsite	CY	93	\$ 50.00	\$ 4,643.00		\$ 4,643.00	\$ -
Alluvial Backfill	CY	84	\$ 12.00	\$ 1,014.00		\$ 1,014.00	\$ -
Type C Bank Boulder - Furnish	TON	43	\$ 75.00	\$ 3,232.00		\$ 3,232.00	\$ -
Type C Bank Boulder - Install	TON	43	\$ 100.00	\$ 4,310.00		\$ 4,310.00	\$ -
Type D Bank Boulder - Furnish	TON	102	\$ 75.00	\$ 7,632.00		\$ 7,632.00	\$ -
Type D Bank Boulder - Install	TON	102	\$ 100.00	\$ 10,175.00		\$ 10,175.00	\$ -
Rock Barb - Furnish	TON	21	\$ 75.00	\$ 1,547.00		\$ -	\$ 1,547.00
Rock Barb - Install	TON	21	\$ 100.00	\$ 2,063.00		\$ -	\$ 2,063.00
Habitat Boulder Clusters - Furnish	TON	17	\$ 75.00	\$ 1,266.00		\$ -	\$ 1,266.00
Habitat Boulder Clusters - Install	TON	17	\$ 100.00	\$ 1,688.00		\$ -	\$ 1,688.00
8 oz Non-Woven Filter Fabric	SY	170	\$ 10.00	\$ 1,698.00		\$ 1,698.00	\$ -
Erosion Control Blanket	SY	252	\$ 15.00	\$ 3,782.00		\$ 3,782.00	\$ -
Furnish and Install Topsoil	CY	21	\$ 100.00	\$ 2,101.00		\$ 2,101.00	\$ -
Live Willow Fascine	EA	6	\$ 50.00	\$ 300.00		\$ 300.00	\$ -

Cobble/Topsoil Mix	CY	0.8	\$ 75.00	\$ 57.00		\$ 57.00	\$ -
Bank 2							
Clear and Grub	SY	114	\$ 1.00	\$ 115.00		\$ 115.00	\$ -
General Excavation and Stockpiling	CY	82	\$ 17.00	\$ 1,389.00		\$ -	\$ 1,389.00
Haul and Disposal of Alluvial Material Offsite	CY	52	\$ 50.00	\$ 2,583.00		\$ 2,583.00	\$ -
Alluvial Backfill	CY	30	\$ 12.00	\$ 361.00		\$ -	\$ 361.00
Type C Bank Boulder - Furnish	TON	37	\$ 75.00	\$ 2,797.00		\$ -	\$ 2,797.00
Type C Bank Boulder - Install	TON	37	\$ 100.00	\$ 3,729.00		\$ -	\$ 3,729.00
Habitat Boulder Clusters - Furnish	TON	8	\$ 75.00	\$ 633.00		\$ -	\$ 633.00
Habitat Boulder Clusters - Install	TON	8	\$ 100.00	\$ 844.00		\$ -	\$ 844.00
8 oz Non-Woven Filter Fabric	SY	47	\$ 10.00	\$ 471.00		\$ 471.00	\$ -
Erosion Control Blanket	SY	106	\$ 15.00	\$ 1,584.00		\$ -	\$ 1,584.00
Furnish and Install Topsoil	CY	8	\$ 100.00	\$ 776.00		\$ -	\$ 776.00
Live Willow Fascine	EA	7	\$ 50.00	\$ 350.00		\$ -	\$ 350.00
Cobble/Topsoil Mix	CY	7	\$ 75.00	\$ 507.00		\$ -	\$ 507.00
Bank 3							
Clear and Grub	SY	762	\$ 1.00	\$ 763.00		\$ 763.00	\$ -
General Excavation and Stockpiling	CY	622	\$ 17.00	\$ 10,574.00		\$ -	\$ 10,574.00
Haul and Disposal of Alluvial Material Offsite	CY	484	\$ 50.00	\$ 24,207.00		\$ 24,207.00	\$ -
Alluvial Backfill	CY	138	\$ 12.00	\$ 1,655.00		\$ -	\$ 1,655.00
Type C Bank Boulder - Furnish	TON	165	\$ 75.00	\$ 12,413.00		\$ -	\$ 12,413.00
Type C Bank Boulder - Install	TON	165	\$ 100.00	\$ 16,550.00		\$ -	\$ 16,550.00
Rock Barb - Furnish	TON	26	\$ 75.00	\$ 1,969.00		\$ -	\$ 1,969.00
Rock Barb - Install	TON	26	\$ 100.00	\$ 2,626.00		\$ -	\$ 2,626.00
Habitat Boulder Clusters - Furnish	TON	17	\$ 75.00	\$ 1,266.00		\$ -	\$ 1,266.00
Habitat Boulder Clusters - Install	TON	17	\$ 100.00	\$ 1,688.00		\$ -	\$ 1,688.00
Erosion Control Blanket	SY	871	\$ 15.00	\$ 13,063.00		\$ 13,063.00	\$ -
Furnish and Install Topsoil	CY	58	\$ 100.00	\$ 5,820.00		\$ -	\$ 5,820.00
Live Willow Fascine	EA	21	\$ 50.00	\$ 1,050.00		\$ -	\$ 1,050.00
Cobble/Topsoil Mix	CY	57	\$ 75.00	\$ 4,262.00		\$ -	\$ 4,262.00
Bank 4							
Clear and Grub	SY	92	\$ 1.00	\$ 93.00		\$ 93.00	\$ -
General Excavation and Stockpiling	CY	101	\$ 17.00	\$ 1,718.00		\$ -	\$ 1,718.00
Haul and Disposal of Alluvial Material Offsite	CY	0	\$ 50.00	\$ -		\$ -	\$ -
Alluvial Backfill	CY	104	\$ 12.00	\$ 1,244.00		\$ -	\$ 1,244.00
Type C Bank Boulder - Furnish	TON	72	\$ 75.00	\$ 5,363.00		\$ -	\$ 5,363.00
Type C Bank Boulder - Install	TON	72	\$ 100.00	\$ 7,150.00		\$ -	\$ 7,150.00
Rock Barb - Furnish	TON	7	\$ 75.00	\$ 534.00		\$ -	\$ 534.00
Rock Barb - Install	TON	7	\$ 100.00	\$ 712.00		\$ -	\$ 712.00
Habitat Boulder Clusters - Furnish	TON	4	\$ 75.00	\$ 317.00		\$ -	\$ 317.00
Habitat Boulder Clusters - Install	TON	4	\$ 100.00	\$ 422.00		\$ -	\$ 422.00
8 oz Non-Woven Filter Fabric	SY	87	\$ 10.00	\$ 867.00		\$ -	\$ 867.00
Erosion Control Blanket	SY	68	\$ 15.00	\$ 1,026.00		\$ 1,026.00	\$ -
Furnish and Install Topsoil	CY	4	\$ 100.00	\$ 444.00		\$ -	\$ 444.00
Live Willow Fascine	EA	7	\$ 50.00	\$ 350.00		\$ -	\$ 350.00
Cobble/Topsoil Mix	CY	5	\$ 75.00	\$ 392.00		\$ -	\$ 392.00
Bank 5							
Clear and Grub	SY	539	\$ 1.00	\$ 540.00		\$ 540.00	\$ -
General Excavation and Stockpiling	CY	0	\$ 17.00	\$ -		\$ -	\$ -
Haul and Disposal of Alluvial Material Offsite	CY	0	\$ 50.00	\$ -		\$ -	\$ -
Alluvial Backfill	CY	134	\$ 12.00	\$ 1,608.00		\$ -	\$ 1,608.00
Type C Bank Boulder - Furnish	TON	47	\$ 75.00	\$ 3,537.00		\$ -	\$ 3,537.00
Type C Bank Boulder - Install	TON	47	\$ 100.00	\$ 4,716.00		\$ -	\$ 4,716.00
Habitat Boulder Clusters - Furnish	TON	13	\$ 75.00	\$ 950.00		\$ -	\$ 950.00
Habitat Boulder Clusters - Install	TON	13	\$ 100.00	\$ 1,266.00		\$ -	\$ 1,266.00
8 oz Non-Woven Filter Fabric	SY	64	\$ 10.00	\$ 643.00		\$ -	\$ 643.00
Erosion Control Blanket	SY	581	\$ 15.00	\$ 8,722.00		\$ 8,722.00	\$ -
Furnish and Install Topsoil	CY	43	\$ 100.00	\$ 4,267.00		\$ -	\$ 4,267.00
Live Willow Fascine	EA	18	\$ 50.00	\$ 900.00		\$ -	\$ 900.00
Cobble/Topsoil Mix	CY	35	\$ 75.00	\$ 2,599.00		\$ -	\$ 2,599.00
Bank 6							
Clear and Grub	SY	452	\$ 1.00	\$ 453.00		\$ 453.00	\$ -
General Excavation and Stockpiling	CY	135	\$ 17.00	\$ 2,293.00		\$ -	\$ 2,293.00
Haul and Disposal of Alluvial Material Offsite	CY	54	\$ 50.00	\$ 2,687.00		\$ -	\$ 2,687.00
Alluvial Backfill	CY	81	\$ 12.00	\$ 974.00		\$ -	\$ 974.00
Type C Bank Boulder - Furnish	TON	100	\$ 75.00	\$ 7,511.00		\$ -	\$ 7,511.00
Type C Bank Boulder - Install	TON	100	\$ 100.00	\$ 10,014.00		\$ -	\$ 10,014.00
Habitat Boulder Clusters - Furnish	TON	17	\$ 75.00	\$ 1,266.00		\$ -	\$ 1,266.00
Habitat Boulder Clusters - Install	TON	17	\$ 100.00	\$ 1,688.00		\$ -	\$ 1,688.00
8 oz Non-Woven Filter Fabric	SY	127	\$ 10.00	\$ 1,275.00		\$ -	\$ 1,275.00
Erosion Control Blanket	SY	363	\$ 15.00	\$ 5,442.00		\$ 5,442.00	\$ -
Furnish and Install Topsoil	CY	15	\$ 100.00	\$ 1,534.00		\$ -	\$ 1,534.00
Live Willow Fascine	EA	26	\$ 50.00	\$ 1,300.00		\$ -	\$ 1,300.00
Cobble/Topsoil Mix	CY	35	\$ 75.00	\$ 2,610.00		\$ -	\$ 2,610.00
Construction Contingency	LS	1	\$ 67,606.86	\$ 67,606.86		\$ 25,000.00	\$ 42,606.86
Construction Contingency - Phased Construction	LS	1	\$ 33,803.43	\$ 33,803.43		\$ 10,000.00	\$ 23,803.43

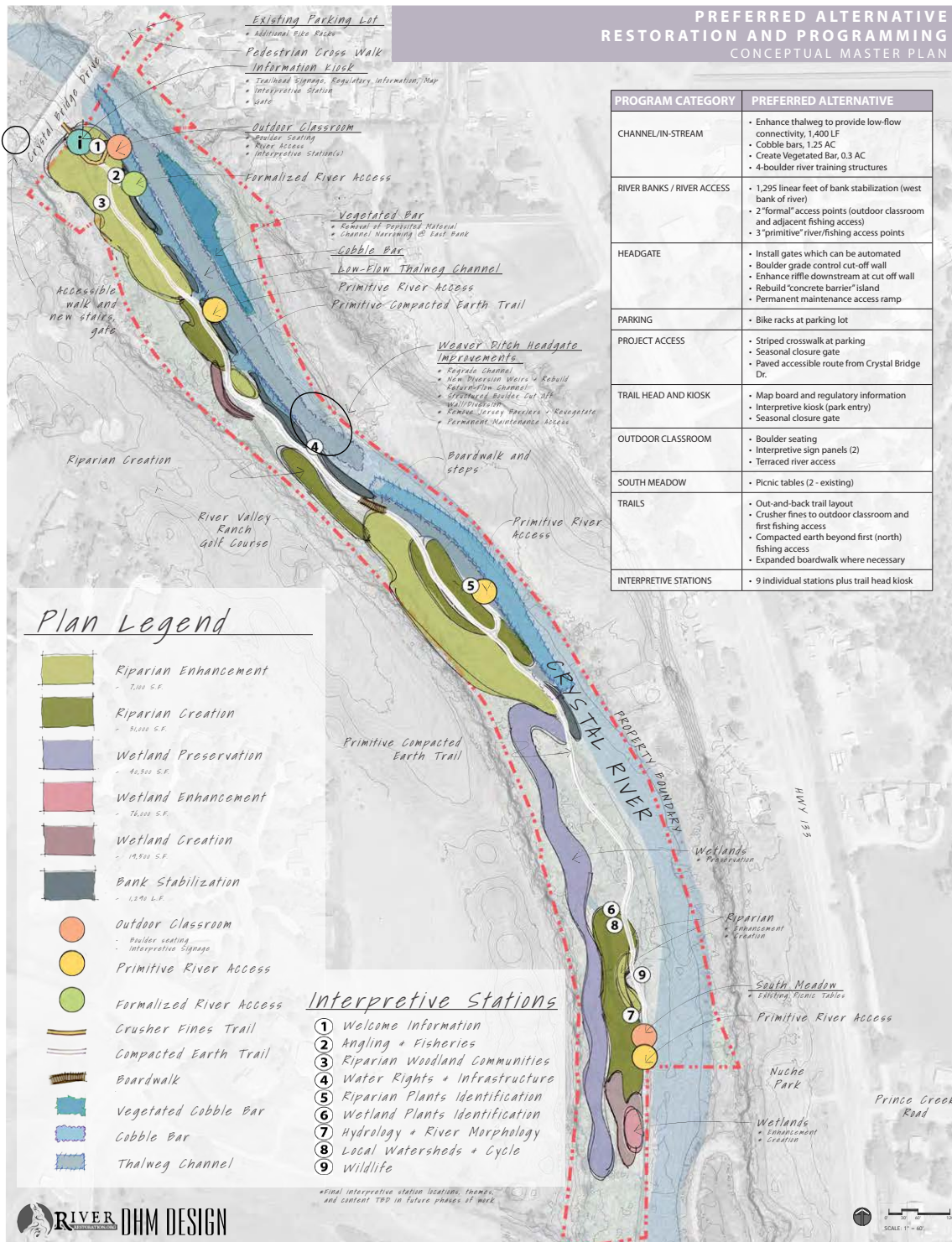
Task 2 - Upland Improvements							
Sub-task	Unit	Quantity	Unit Cost	Total Cost		CWCB Funds	Matching Funds
Site Improvements Paving							

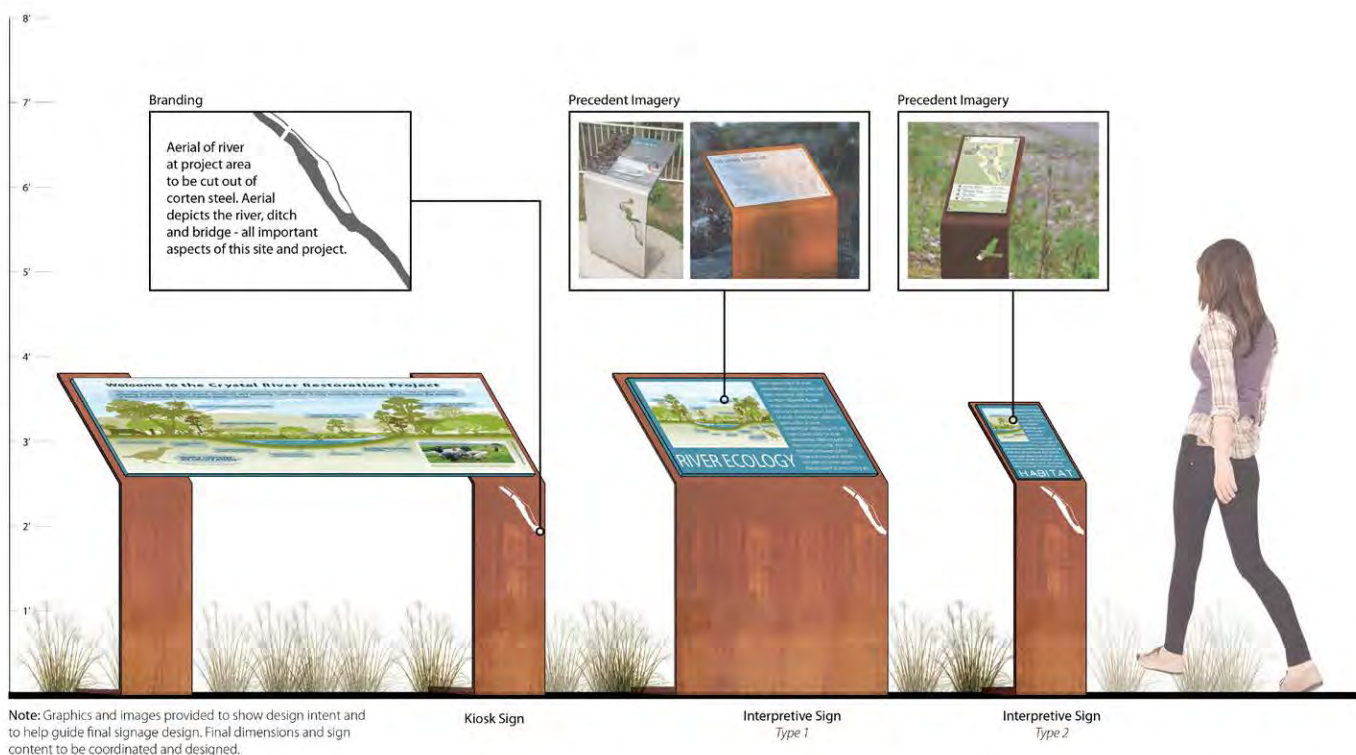
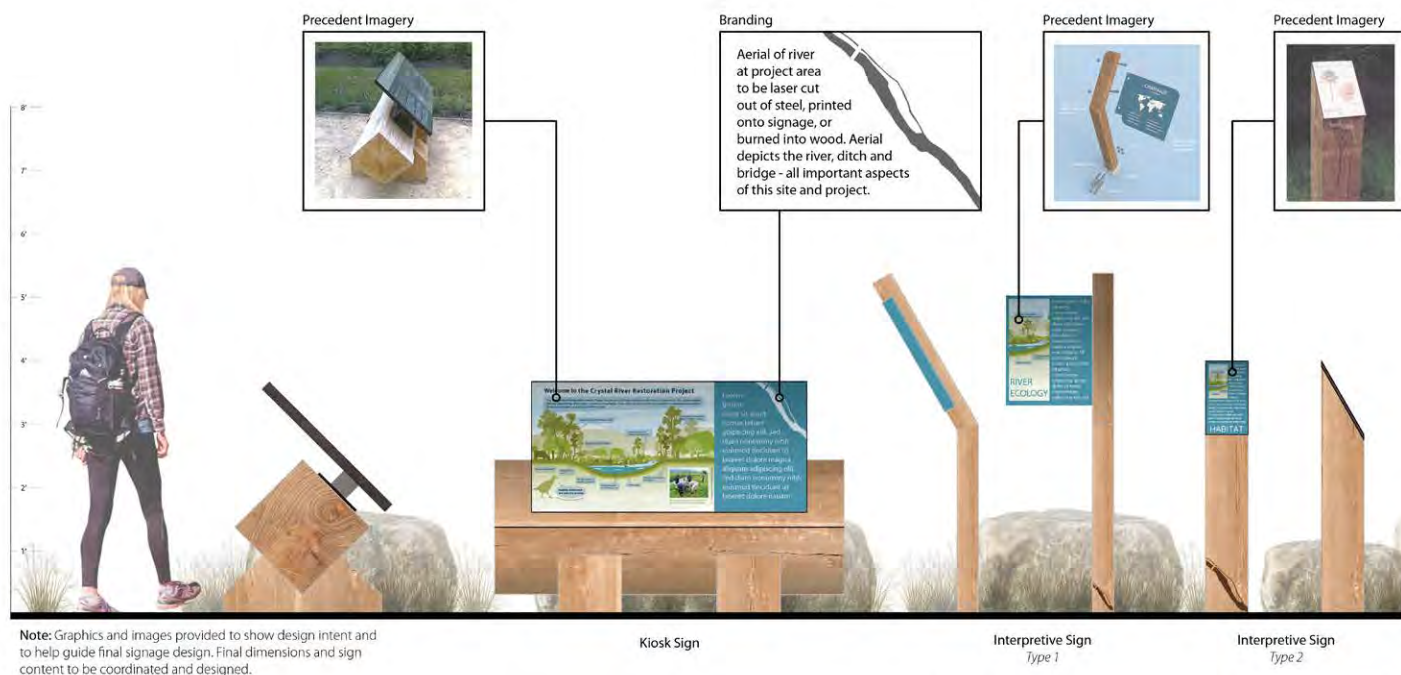
Road Base Trail	SF	2,596	\$ 4.00	\$ 10,384.00		\$ 10,384.00	\$ -
Concrete Path	SF	1,460	\$ 12.00	\$ 17,520.00		\$ 17,520.00	\$ -
Compacted Earth Trail	LF	2,260	\$ 1.00	\$ 2,260.00		\$ 2,260.00	\$ -
River Cobble	CY	6	\$ 4.00	\$ 24.00		\$ 24.00	\$ -
Site Walls & Other Features							
Timber Walls	LF	337	\$ 50.00	\$ 16,850.00		\$ -	\$ 16,850.00
Concrete Stairs	LF	18	\$ 36.00	\$ 648.00		\$ -	\$ 648.00
6x6 dowel fence 42" w/ galvanized wire mesh	LF	82	\$ 45.00	\$ 3,690.00		\$ -	\$ 3,690.00
6x6 dowel fence 36"	LF	48	\$ 30.00	\$ 1,440.00		\$ -	\$ 1,440.00
Steel Handrail	LS	1	\$ 3,000.00	\$ 3,000.00		\$ -	\$ 3,000.00
Beamstone Walls	LF	26	\$ 190.00	\$ 4,940.00		\$ -	\$ 4,940.00
Beamstone Steps	LF	342	\$ 150.00	\$ 51,300.00		\$ -	\$ 51,300.00
Boulder Seats	EA	4	\$ 500.00	\$ 2,000.00		\$ -	\$ 2,000.00
Boardwalk	LF	90	\$ 125.00	\$ 11,250.00		\$ -	\$ 11,250.00
Boardwalk additional pier and handrail (contingency)	EA	1	\$ 1,800.00	\$ 1,800.00		\$ -	\$ 1,800.00
Timber Stairs	EA	7	\$ 1,000.00	\$ 7,000.00		\$ -	\$ 7,000.00
Boulder Fishing Access Type A	EA	3	\$ 1,000.00	\$ 3,000.00		\$ -	\$ 3,000.00
Boulder Fishing Access Type B	EA	1	\$ 2,500.00	\$ 2,500.00		\$ -	\$ 2,500.00
Landscape							
Import Topsoil	CY	237	\$ 70.00	\$ 16,590.00		\$ -	\$ 16,590.00
Supply Mulch (10 sf per planting)	SF	11,940	\$ 0.33	\$ 3,940.20		\$ -	\$ 3,940.20
Acer Glabrum / Rocky Mountain Maple (5 Gal)	EA	2	\$ 80.00	\$ 160.00		\$ 160.00	\$ -
Alnus Tenuifolia / Thinleaf Alder (5 Gal)	EA	47	\$ 80.00	\$ 3,760.00		\$ -	\$ 3,760.00
Artemisia Tridentata / Big Sagebrush (5 Gal)	EA	2	\$ 80.00	\$ 160.00		\$ 160.00	\$ -
Betula Occidentalis / Water Birch (5 Gal)	EA	46	\$ 80.00	\$ 3,680.00		\$ -	\$ 3,680.00
Chrysothamnus Nauseosus / Rubber Rabbitbrush (5 Gal)	EA	2	\$ 80.00	\$ 160.00		\$ 160.00	\$ -
Cornus Sericea / Red Twig Dogwood (5 Gal)	EA	48	\$ 80.00	\$ 3,840.00		\$ -	\$ 3,840.00
Populus Angustifolia / Narrowleaf Poplar (5 Gal)	EA	46	\$ 80.00	\$ 3,680.00		\$ -	\$ 3,680.00
Prunus Virginiana Melanocarpa / Western Chokeberry (5 Gal)	EA	2	\$ 80.00	\$ 160.00		\$ 160.00	\$ -
Salix Bebbiana / Bebb'S Willow (5 Gal)	EA	52	\$ 80.00	\$ 4,160.00		\$ -	\$ 4,160.00
Salix Drummondiana / Drummond'S Willow (5 Gal)	EA	57	\$ 80.00	\$ 4,560.00		\$ -	\$ 4,560.00
Salix Lasiandra / Whiplash Willow (5 Gal)	EA	58	\$ 80.00	\$ 4,640.00		\$ -	\$ 4,640.00
Salix Monticola / Rocky Mountain Willow (5 Gal)	EA	62	\$ 80.00	\$ 4,960.00		\$ -	\$ 4,960.00
Shepherdia Argentea / Silver Buffaloberry (5 Gal)	EA	52	\$ 80.00	\$ 4,160.00		\$ -	\$ 4,160.00
Acer Glabrum / Rocky Mountain Maple (1 Gal)	EA	4	\$ 80.00	\$ 320.00		\$ -	\$ 320.00
Alnus Tenuifolia / Thinleaf Alder (1 Gal)	EA	71	\$ 80.00	\$ 5,680.00		\$ -	\$ 5,680.00
Artemisia Tridentata / Big Sagebrush (1 Gal)	EA	4	\$ 80.00	\$ 320.00		\$ -	\$ 320.00
Betula Occidentalis / Water Birch (1 Gal)	EA	68	\$ 80.00	\$ 5,440.00		\$ -	\$ 5,440.00
Chrysothamnus Nauseosus / Rubber Rabbitbrush (1 Gal)	EA	4	\$ 80.00	\$ 320.00		\$ -	\$ 320.00
Cornus Sericea / Red Twig Dogwood (1 Gal)	EA	73	\$ 80.00	\$ 5,840.00		\$ -	\$ 5,840.00
Populus Angustifolia / Narrowleaf Poplar (1 Gal)	EA	69	\$ 80.00	\$ 5,520.00		\$ -	\$ 5,520.00
Prunus Virginiana Melanocarpa / Western Chokeberry (1 Gal)	EA	4	\$ 80.00	\$ 320.00		\$ -	\$ 320.00
Salix Bebbiana / Bebb'S Willow (1 Gal)	EA	79	\$ 80.00	\$ 6,320.00		\$ -	\$ 6,320.00
Salix Drummondiana / Drummond'S Willow (1 Gal)	EA	86	\$ 80.00	\$ 6,880.00		\$ -	\$ 6,880.00
Salix Lasiandra / Whiplash Willow (1 Gal)	EA	87	\$ 80.00	\$ 6,960.00		\$ -	\$ 6,960.00
Salix Monticola / Rocky Mountain Willow (1 Gal)	EA	92	\$ 80.00	\$ 7,360.00		\$ -	\$ 7,360.00
Shepherdia Argentea / Silver Buffaloberry (1 Gal)	EA	77	\$ 80.00	\$ 6,160.00		\$ 963.37	\$ 5,196.63
10 CI Wetlands Plug Grass	EA	641	\$ 2.00	\$ 1,282.00		\$ -	\$ 1,282.00
Willow and Cottonwood Cuttings	EA	1200	\$ 2.00	\$ 2,400.00		\$ -	\$ 2,400.00
Seeding & Revegetation	SF	77600	\$ 0.35	\$ 27,160.00		\$ 27,160.00	\$ -
Wildlife Fencing	LF	3222	\$ 14.50	\$ 46,719.00		\$ 46,719.00	\$ -
Tree Protection Fencing	LF	750	\$ 12.50	\$ 9,375.00		\$ 9,375.00	\$ -
Irrigation System (materials and installation)	LS	1	\$ 16,000.00	\$ 16,000.00		\$ 16,000.00	\$ -
Siting deadfall logs	LS	1	\$ 500.00	\$ 500.00		\$ 500.00	\$ -
Site Furnishings							
Closure Gates	EA	2	\$ 300.00	\$ 600.00		\$ -	\$ 600.00
Closure Gate Posts & Bases	EA	2	\$ 800.00	\$ 1,600.00		\$ -	\$ 1,600.00
Gate Installation	LS	1	\$ 1,500.00	\$ 1,500.00		\$ -	\$ 1,500.00
Entry Monument (contingency)	EA	1	\$ 8,000.00	\$ 8,000.00		\$ -	\$ 8,000.00
Kiosk Signs	EA	2	\$ 5,000.00	\$ 10,000.00		\$ -	\$ 10,000.00
Interpretive Signs	LS	1	\$ 20,000.00	\$ 20,000.00		\$ -	\$ 20,000.00

Task 3 - Outreach, Oversight, and Administration

Sub-task	Unit	Quantity	Unit Cost	Total Cost	CWCB Funds	Matching Funds
Traffic Control - Year 1	LS	1	\$ 5,000.00	\$ 5,000.00	\$ 5,000.00	\$ -
Traffic Control - Year 2	LS	1	\$ 5,000.00	\$ 5,000.00	\$ 2,500.00	\$ 2,500.00
Construction Bonding/Ins (5%)	LS	1	\$ 67,606.86	\$ 67,606.86	\$ 45,856.85	\$ 21,750.01
Mob and Demob (5%) - Year 1	LS	1	\$ 67,606.86	\$ 67,606.86	\$ 40,856.85	\$ 26,750.01
Mob and Demob (5%) - Year 2	LS	1	\$ 67,606.86	\$ 67,606.86	\$ 40,000.00	\$ 27,606.86
Construction Stakeout - Year 1	LS	1	\$ 6,000.00	\$ 6,000.00	\$ 6,000.00	\$ -
Construction Stakeout - Year 2	LS	1	\$ 6,000.00	\$ 6,000.00	\$ 6,000.00	\$ -
Construction Review Observations - Year 1	LS	1	\$ 17,500.00	\$ 17,500.00	\$ 17,500.00	\$ -
Construction Review Observations - Year 2	LS	1	\$ 12,500.00	\$ 12,500.00	\$ 12,500.00	\$ -
Interpretive Design Programming/Details	LS	1	\$ 15,020.00	\$ 15,020.00	\$ -	\$ 15,020.00
Irrigation Consultant (Irrigation Design)	LS	1	\$ 2,250.00	\$ 2,250.00	\$ 2,250.00	\$ -
TOTAL				\$ 1,725,638.07	\$ 798,547.07	\$ 927,091.00

Appendix A: Master Plan Preferred Alternative





Appendix B: Recommendations from the Riparian Restoration Plan & Ecological Integrity Assessment

1.0 Restoration Opportunities

There are ample opportunities for riparian habitat preservation, enhancement and restoration across the Project Area. The project team has developed a restoration concept which addresses the existing conditions with four types of interventions by ecologic community type:

- Preserve
- Enhance
- Create
- Future Restoration Opportunities

These opportunities are conceptual in nature and based on initial field visits and data collection. The project team anticipates further collaboration with stakeholder groups to develop the presented opportunities into two (2) comprehensive concept alternatives.

1.1 Restoration Concept

The Project Area restoration concept focuses on three main ecologic communities, riparian, wetland and in channel. For the purpose of this report and based on stakeholder goals, upland communities are reserved for future restoration opportunities. The surveyed riparian and wetland communities are recommended for preservation, enhancement or creation.

- Preservation - The protection of intact and functioning wetland or riparian through ecologic and landscape planning and site development.
- Enhancement - The restoration of partially functioning healthy wetlands and riparian areas. This can include noxious weed elimination, planting, seeding, and other restoration techniques.
- Creation - Identifying and re-establishing areas that are heavily degraded but have the opportunity due to location and surrounding vegetation for full restoration activities resulting in

the creation of a new wetland or riparian area.

The in-channel restoration opportunities are discussed in Section 4.1.3.

Maps of these opportunities can be found at the end of this section. All priorities and decisions about restoration actions should be guided by stakeholder goals and values.

1.1.1 Riparian Restoration Opportunities

As discussed in the existing conditions section, the health and quality of the riparian environment within the Project Area is good. **The project team recommends 10.1 acres for preservation, 0.45 acres for enhancement, and 1.1 acres for creation.**

4.1.1.1 Riparian Preservation

Riparian preservation would include developing a regular monitoring and maintenance plan to preserve the high quality riparian habitat. Monitoring noxious and native vegetation will preserve and sustain current riparian conditions. By limiting access to sensitive areas and minimizing disturbance by directing human traffic through way-finding and the creation of designated, formalized paths impacts can be reduced. The project team recommends preserving approximately 10.4 acres of high quality riparian habitat.

4.1.1.2 Riparian Enhancement

Riparian enhancement will improve existing conditions to increase habitat value. This is done through the development and implementation of a weed management plan to control noxious vegetation, identifying arboricultural maintenance needs/plans and increasing plant diversity through planting and seeding. The resulting enhancement will provide increased habitat value for wildlife and improve overall ecological conditions. The project team recommends that Project Area Stakeholders consider interventions to enhance approximately .45 acres of Riparian habitat.



Image 4-1 This image demonstrates highly degraded ecologic conditions near the river on the left side of the photograph. This is an area recommended for riparian creation. Near the center of the photo, healthy forbes indicate an intact wetland which could be enhanced.



Image 4-2 A high quality wetland can be seen on the right side of the image. This area would be recommended for wetland preservation. On the left side of the image, closer to the Crystal River there is an area recommended for wetland creation

4.1.1.3 Riparian Creation

Riparian creation is the most intensive of the three types of restoration. This involves grading the topography to create elevations with the appropriate available water to support native riparian vegetation plantings. Areas identified within the report are immediately adjacent to the river bank and are located in close proximity to the river water table. Areas identified for bank stabilization as part of river improvements are ideal locations for this recommended intervention as bank stabilization and riparian creation are both interventions with overlapping goals. The project team recommends 1.1 acres of Riparian Creation.

1.1.2 Wetland Restoration Opportunities

As discussed in the existing conditions section, the health and quality of the wetland environment within the Project Area is good to excellent. The project team recommends 1.6 acres for preservation, .076 acres for enhancement, and .17 acres for creation.

4.1.2.1 Wetland Preservation

Wetland preservation includes regular monitoring and maintenance of plant species, the percent cover of the plants, and the hydrological conditions on site. Monitoring can assist with understanding overall wetland health, identify trends, and allow for short term and long term preservation planning. The construction of boardwalks in these areas would dramatically reduce human impacts and provide excellent learning and wildlife viewing opportunities. The project team recommends 1.6 acres for wetland preservation.

4.1.2.2 Wetland Enhancement

Wetland Enhancement including noxious and invasive species control, selective planting and maintenance can enhance what is already considered a high quality wetland within the Project Area. The project team recommends that at the Project Area Stakeholders consider .076 acres within the Project Area for wetland enhancement.



Image 4-3 This location of the assessment area has mature trees and shrubs suitable for riparian preservation. The herbaceous ground cover is mostly noxious weeds making it a candidate for riparian creation

4.1.2.3 Wetland Creation

Appropriate hydrological conditions to support wetland plant species can be created by grading the topography of appropriate sites within the Project Area. The location of the proposed wetland creation sites (See maps “Restoration Opportunities - Study Area A” and “Restoration Opportunities - Study Area B” at the end of this section) allows for ease of colonization of adjacent wetland plant species. Minimal grading would be required to achieve successful wetland creation in this area. The project team recommends that at the Project Area Stakeholders consider approximately 7,225 square feet for wetland creation.

1.1.3 Bank and Channel Restoration Opportunities

Several locations along the west bank of the river have been identified as opportunities for restoration. This restoration work can take several forms depending on the location and other project goals such as river access, angling locations and educational



Image 4-4 An example of healthy PER wetlands and riparian shrublands. Both areas are recommended for preservation



Image 4-5 The shrubs in this image are in good health and these woody vegetated zones are recommended for preservation. The wide swaths of brome in the foreground of the photograph are an opportunity for riparian enhancement.

opportunities. In higher traffic and access areas, the bank restoration will be comprised of boulders. Lower traffic area restoration activities will utilize vegetation and large wood, with boulders only used for toe reinforcement. Examples of this type of restoration are shown in Images 4-6 and 4-7. Proposed locations are shown on the maps at the end of this section.

The Weaver Ditch diversion structure will be the primary focus of the in-channel improvements. Proposed modifications will create a stable boulder structure in the river that allows for proper function at a wide range of flows with reduced maintenance requirements. The headgate structure itself will also be modified to allow for reduced maintenance needs and the ability to add an automated system in the future.

The team will also look at the section of the channel downstream of the diversion which is experiencing higher sediment accumulation. Options here include the creation of a thalweg and potentially a localized, slight narrowing of the channel to increase sediment transport capacity. Sections of river upstream of the Weaver Diversion will likely be unmodified with the exception of bank work. This area of the river is highlighted on the Existing Conditions maps in section 3.

1.2 Ecological Performance Standards (Success Criteria)

Ecological performance standards and success criteria for riparian enhancement and creation opportunities should be established and agreed upon by all stakeholders, designers, and agencies to provide a clear road map for success. Vegetative success criteria can include the identification of thresholds for percent cover, vegetative composition, and native vs. non native species. New plantings and seeded areas should be monitored on a regular basis to ensure success. Areas where hydrological conditions are necessary for growth should be monitored regularly. For creation and enhancement areas, adjustments to site conditions may be necessary to allow for optimal success.

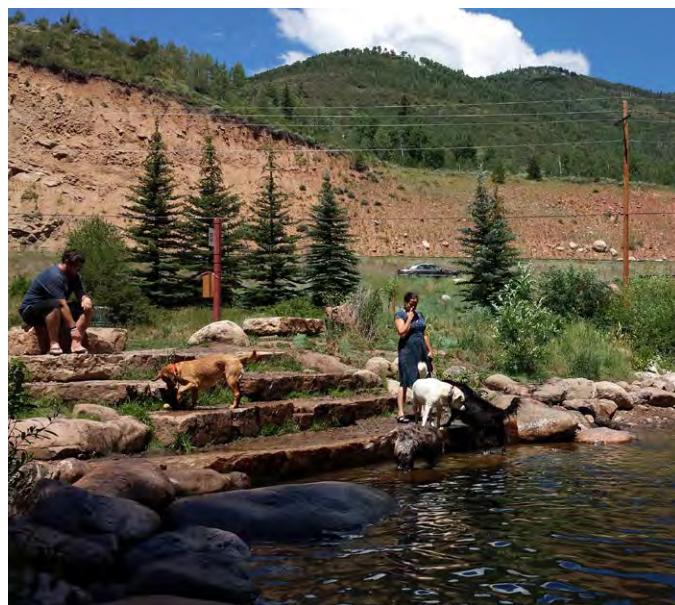


Image 4-6 An example of a bank repaired with boulders and steps

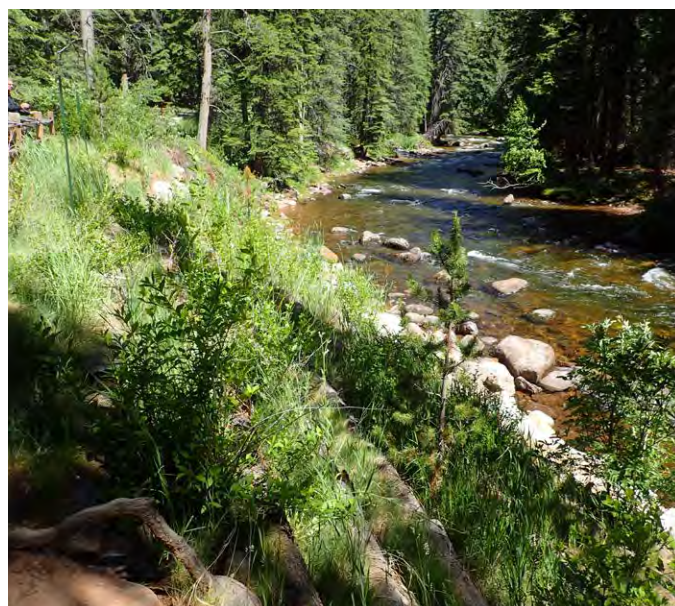
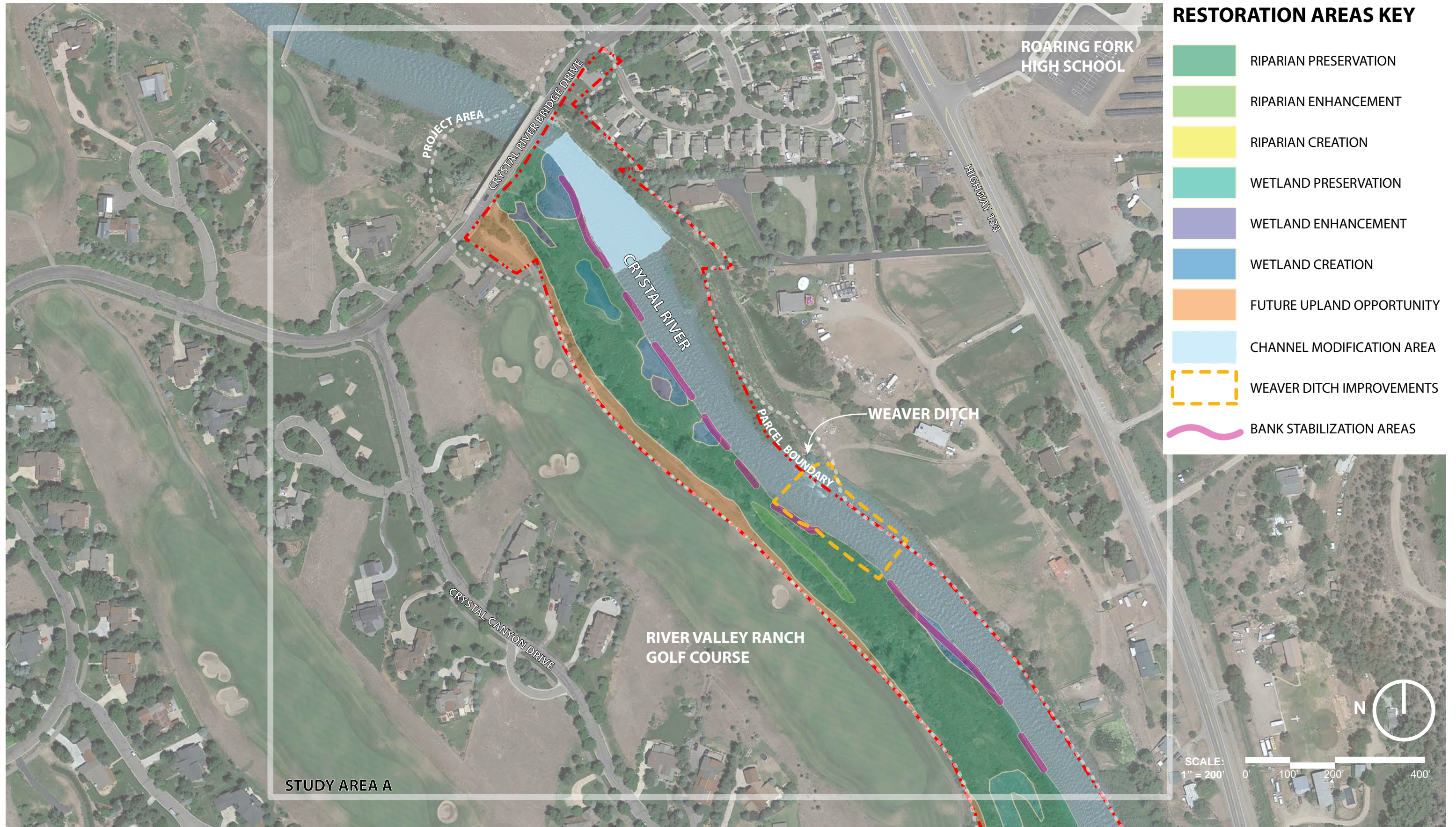


Image 4-7 An example of a bank repaired with vegetation





EXISTING CONDITIONS KEY

- FORESTED RIPARIAN
- PALUSTRINE EMERGENT WETLAND
- RIPARIAN SCRUBLAND/
SCRUB SHRUB WETLAND
- HISTORICAL AGRICULTURAL USE
- UPLAND



1.0 Recreation, Education and Interpretation Opportunities

1.1 Existing Conditions

The current on-site opportunities for people to engage with the ecology and nature of the Project Area are limited while human use of the Project Area is evident. Existing amenities such as the trail, river access, interpretive and regulatory information and gathering places have become degraded and weathered overtime. These spaces are generally in disrepair and are no longer as effective as they once were.

The main trail along the site is heavily overgrown and can be difficult to locate and navigate. Areas of the trail have eroded into the river and navigation through the overgrowth is difficult in sections. This trail overgrowth and degradation has resulted in informal “social trails” winding through the site and degraded river banks from informal access points contributing to erosion and bank destabilization.

The Project Area contains a number of interpretive signs, however these signs have become worn over time and are dated. Many signs are no longer visible due to vegetation overgrowth and do not describe the ecologies of the locations where they stand. Instructional and regulatory signs are not concentrated or clearly placed near the main access point near the bridge.

The current inventory of sign topics include:

- Bald eagle closure area notice
- No dogs or glass containers regulation
- Riverfront Park entrance sign
- 8 Interpretive Signs
 - “River Valley Ranch Wetlands”
 - “Riparian Woodland”
 - “Fisheries”
 - “Wetland Plants - What herb is this?”
 - “Aquatic Plants”



Image 5-1 View of the proposed southern gathering area with views of Mount Sopris



Image 5-2 Example of an outdoor classroom with seating and naturalized elements



Image 5-3 Navigating the overgrown trail



Image 5-4 Example of current interpretive signage



Image 5-5 Picnic benches on South end of Project Area



Image 5-6 Informal river access with visible erosion

- "Wetland Plants"
- "Willows"
- "Birds of the Wetlands"

There are no formal gathering places with the exception of two picnic tables near the south end of the site (see Image 5-5). The area is both hard to locate and in disrepair due to age and lack of maintenance. Several informal gathering spaces exist and are evident in areas where the vegetation has been disturbed.

Additional challenges existing on site are the small parking area, lack of alternative transportation options such as a bike rack, lack of designated pedestrian crossing area and a visual disconnect resulting in difficulty locating the site. The access point beneath the bridge is difficult to find, is steep and the stairs are in disrepair. The site is currently not universally accessible.

Opportunities for new recreational, educational and interpretive amenities have been identified. There are many unique features of the site that have the potential to serve as the basis for recreational, interpretive and educational programming elements for diverse audiences. There are a wealth of opportunities to program the site building on interactive, recreational, and interpretive experiences, while simultaneously improving, restoring and protecting the health and ecology of the Crystal River and its riparian corridor.

This tandem approach of creating recreational amenities that also provide ecological benefits is the recommended method to bring cultural and ecological value to the site simultaneously. The following sections identify opportunities for; public gathering spaces, educational and interpretive sites, trail and way-finding improvements, access and recreation. No significant local, state or federal permitting challenges are anticipated for the recreation, education and interpretive opportunities.

These opportunities are conceptual in nature and



Image 5-7 An apple tree in the Project Area hints at the past land uses and history of the area



Image 5-8 Example of an interactive interpretive site element, this map is both tactile and informative

based on initial field visits and data collection. The project team anticipates further collaboration with stakeholders groups to develop the presented opportunities into two (2) comprehensive concept alternatives.

1.2 Public Gathering Spaces

Through site visits and a discussion with stakeholders, two locations have been identified for outdoor classroom and public gathering spaces (see maps at the end of this section). One at the north end of the park near Crystal Bridge Drive and one at the south end of the park. As with all other project elements, final locations for public gathering space will be developed through a collaborative process with the project team, stakeholder group and general public.

- North end near Crystal Bridge Drive: The area along the river bank is degraded, reducing impacts to healthy riparian areas elsewhere. Optimally, gathering space would be placed along the bank with multiple access points down to the river to provide visitors with an opportunity to access the river and bank. This access could serve as an educational opportunity and/or for recreational opportunities such as angling. This gathering space could also serve as an area to inform the public about regulations or special information about the park. This is the most ideal site for a universally accessible gathering space.
- South End: The second public gathering space would be near the existing cottonwood grove at the south end of the park. This space could be more focused on the wetland and upland areas or the park. Amenities may include: a boardwalk and overlook of the enhanced wetland created by the reconnected side channel and an interactive exhibit describing ecological benefits of riparian features such as downed nurse logs and understory vegetation. This location also has the potential to serve as an outdoor classroom with seating, shade and interactive interpretive elements.

Constraints of these two sites include the limited

amount of parking available near the bridge and access to the area for people of different abilities and mobility types. Stakeholders should consider what the target audience is for these gathering places and what additional amenities will need to be on site to facilitate those user types.

1.3 Educational and Interpretive Opportunities

Many interpretive elements have already been introduced to the site. The proximity to schools, residential neighborhoods, and existing trail networks such as the Crystal Valley Trail create an ideal opportunity for educational and interpretive elements that could reach a large and diverse segment of the community. The project team recommends expanding and updating the current interpretive materials and making them more accessible and interactive. These interventions could include bilingual signage, the inclusion of tactile elements, view platforms and three dimensional exhibits.

Every site has a unique story to tell and this parcel is no exception. Identifying additional interpretive opportunities and communicating a larger, more engaging story is a goal moving forward. Interpretive elements to consider are as follows:

- Updating and expanding current interpretive topics
- Hydrology and river morphology
- Expanded information about variety of birds and their habitats
- Human history including indigenous populations, European settlers, ranchers and farmers
- Water infrastructure in our communities as it pertains to the Weaver Diversion
- Understanding place through landmarks such as Red Hill and Mount Sopris
- The water cycle and our local watersheds
- Insects and macro invertebrates in wetlands and riparian areas
- Angling
- Water rights and irrigation

The proposed new amenities would link together



Image 5-9 Navigating the trail can be tricky, the surface material changes through out the site



Image 5-10 Example of a boardwalk through an ecologically sensitive area



Image 5-11 Bird houses have been installed in the Project Area. Enhancing wildlife habitat would encourage passive recreation such as birding



Image 5-12 Example of a durable surface used for river access, helping to prevent erosion, fisheries health and bank destabilization

places on the site that help create a unique narrative. The project team recommends ongoing collaboration to create the educational and interpretive programming. In conjunction with the interpretive elements, an outdoor classroom area is a key recommendation of this report.

1.4 Recreational Opportunities

Currently the Project Area supports many passive recreation activities such as angling, walking, hiking, bird watching, picnicking, and nature play. All of these activities could be enhanced by improving, updating and programming the Project Area. A dual benefit of the proposed enhancements is that they would help to protect the restored ecology by directing people into areas specifically designed for recreation and intentionally directing people away from ecologically sensitive areas.

Angling opportunities would be greatly improved by the recommended river bank restorations and in-stream restorations proposed in Section 4.0. Fishing and fishing access could also be greatly improved and made more standardized by formalizing river access points to places along the bank which are safe, stable and offer opportunities to interact with the river.

Walking and hiking through the site could be improved in a host of ways. Trail improvements and access are discussed in the following section. Hiking and walking offer low impact exercise to many people. The gentle grade of the Project Area makes this site ideal for people of many ability levels and provides access to a wide range of people.

The existing bird watching opportunities on the site have the potential to be expanded. Wetland and riparian areas host some of the greatest bird life of any ecosystem type. The ecological restorations recommend in section 4.0 would improve the habitat of bird populations and provide birding enthusiasts with an incredible in-town amenity. Focusing on this recreation type also gives the project team an opportunity to collaborate and work with other specialty groups such as the local Audubon Society chapter. Furthermore, focusing on bird watching as a

major element of recreation on the site will encourage users to protect the ecosystem and respect the Project Area.

Finally picnicking, nature play and exploration are recreation objectives that can be easily met by formalizing public gathering areas. A focus on these types of recreation gives families, school groups and people of all ages a passive and enjoyable way to experience the natural environment. These elements can easily and imaginatively be incorporated through seating, shade and interactive interpretive elements.

1.5 Trail Improvements and Access

The project team advocates for an improved trail system that provides access and connectivity for park visitors. An ideal trail system would lead visitors to the different planned amenities, as well as allow them to experience the riparian corridor. The recommendation is for the trail to follow existing trail corridors, where possible, to minimize impact to healthy vegetation areas. The incorporation of a small loop trail could be a valuable asset allowing visitors to engage with unique places within the Project Area. Importantly, the existing trail needs to be cleared of obtrusive vegetation, undergo over-due maintenance, be reinforced in areas where it is eroding and have way finding practices such as clear lines of sight and signage.

There are three types of trails which would be most appropriate for the site. The primary trail type would be composed of a wide, firm surface and would connect to the universally accessible public gathering spaces and interpretive, educational areas. This trail would be accessible for less mobile individuals. The second type of trail would be more primitive and narrow. This trail could pass through several existing and healthy riparian areas. Finally, low boardwalks could be used in a few areas such as floodplains, connection areas and the re-established secondary channel.

As with all other project elements, alternatives for the trail system configuration will be developed through a collaborative process with the project team, stakeholder group and general public.



RECREATION AREAS KEY

- EXISTING PARKING AREA
- PROPOSED IMPROVED PEDESTRAIN CROSSING AND BIKE RACK
- PROPOSED IMPROVED ACCESS AND RAMP
- PROPOSED PUBLIC GATHERING AREA
- ECOLOGIC PRESERVATION ZONE
- PROPOSED WEAVER DITCH REHABILITATION
- PROJECT AREA ACCESS ROUTE
- PROPOSED TRAIL FOLLOWING EXISTING ALIGNMENT
- PROPOSED FORMALIZED RIVER ACCESS POINT

INTERPRETIVE OPPORTUNITIES

- ① WELCOME INFORMATION, MONUMENT SIGN, AND SITE REGULATIONS
- ② ANGING AND FISHERIES
- ③ RIPARIAN WOODLAND COMMUNITIES
- ④ WATER INFRASTRUCTURE AND WATER RIGHTS
- ⑤ RIPARIAN PLANTS, IDENTIFICATION
- ⑥ HUMAN HISTORY
- ⑦ SCRUB AND SHRUB HABITATS





RECREATION AREAS KEY

- PROPOSED PUBLIC GATHERING AREA
- ECOLOGIC PRESERVATION ZONE
- PROPOSED BOARDWALK LOOP
- PROPOSED TRAIL FOLLOWING EXISTING ALIGNMENT
- PROPOSED BOARD WALK TRAIL
- PROPOSED FORMALIZED RIVER ACCESS POINT

INTERPRETIVE OPPORTUNITIES

- ⑧ BIRDS
- ⑨ ORIENTEERING
- ⑩ HYDROLOGY AND RIVER MORPHOLOGY
- ⑪ WATER CYCLE AND LOCAL WATERSHEDS
- ⑫ INSECTS AND INVERTEBRATES
- ⑬ WILDLIFE
- ⑭ WETLAND PLANT IDENTIFICATION



CRYSTAL RIVER RESTORATION

RIPARIAN RESTORATION PLAN & ECOLOGICAL INTEGRITY ASSESSMENT
GARFIELD COUNTY, COLORADO





Prepared for: The Town of Carbondale
Prepared by: DHM Design Corp. and River Restoration
311 Main Street, Suite 102, Carbondale, Colorado 81623

November 2018

Table of Contents

- 1.0 Introduction..... 1**
- 2.0 Methods 2**
 - 2.1 Site Survey 2
 - 2.2 Channel Stability Assessment..... 2
 - 2.3 Ecological Integrity Assessment for Colorado Wetlands..... 2
 - 2.3.1 Existing Conditions Analysis..... 2
 - 2.3.2 Post-Restoration Assessment..... 3
 - 2.4 Recreational, Educational and Interpretive Field Analysis..... 3
- 3.0 Existing Conditions 4**
 - 3.1 Landform, Elevation and Size..... 4
 - 3.2 Land Use 4
 - 3.3 Channel Characteristics..... 4
 - 3.4 Vegetation 5
 - 3.5 Soils 6
 - 3.6 Hydrology..... 8
 - 3.7 Growing Season..... 9
 - 3.8 Ecologic Communities Definitions..... 9
 - 3.8.1 Riparian Scrubland / Scrub Shrub Wetland..... 9
 - 3.8.2 Palustrine Emergent Wetland 9
 - 3.8.3 Forested Riparian..... 10
 - 3.8.4 Upland 10
 - 3.9 Wildlife and Threatened and Endangered Species..... 10
- EXISTING CONDITIONS - STUDY AREA A..... 13**
- EXISTING CONDITIONS - STUDY AREA B 15**
- EXISTING WILDLIFE CONDITIONS..... 17**
- 4.0 Restoration Opportunities 19**
 - 4.1 Restoration Concept..... 19
 - 4.1.1 Riparian Restoration Opportunities 19
 - 4.1.2 Wetland Restoration Opportunities..... 21
 - 4.1.3 Bank and Channel Restoration Opportunities..... 22
 - 4.2 Ecological Performance Standards (Success Criteria) 23

RESTORATION OPPORTUNITIES - STUDY AREA A25

RESTORATION OPPORTUNITIES - STUDY AREA B.....27

5.0 Recreation, Education and Interpretation Opportunities29

5.1 Existing Conditions29

5.2 Public Gathering Spaces32

5.3 Educational and Interpretive Opportunities32

5.4 Recreational Opportunities34

5.5 Trail Improvements and Access.....34

RECREATION OPPORTUNITIES - STUDY AREA A35

|RECREATION OPPORTUNITIES - STUDY AREA B37

Appendix A: Species Lists39

Appendix B: 2015 Colorado Wetland Ecological Integrity Assessment (EIA)49

1.0 Introduction

The Town of Carbondale in partnership with Roaring Fork Conservancy, Aspen Valley Land Trust, American Rivers, Colorado Parks & Wildlife, Public Counsel of the Rockies, and Trout Unlimited are developing a riparian restoration plan for in-stream and riparian improvements to the Carbondale Riverfront Park along the Crystal River. The parcel is owned by the Town of Carbondale and is approximately 14-acres, situated south of Crystal Bridge Drive. This parcel (Project Area) encompasses the 0.5 miles of the Crystal River and includes the west side of the riparian corridor to the boundary of River Valley Ranch and portions of the east bank including the Weaver Ditch (See Figure 1).

The riparian restoration plan proposes in-stream and riparian improvements. This report provides an evaluation of the existing riparian ecological conditions within and around the Project Area and identifies ecological system intervention recommendations and opportunities for amenity improvements within the project area (see figure 1). All of the proposed restoration/enhancement and recreation/educational opportunities are located on the West side of the river. Due to private property ownership and access, it is recommended that the riparian habitat on the East side of the river be preserved as is.

The following report details site survey and data collection, existing environmental and wildlife constraints and makes recommendations for stakeholder consideration. This report also provides recommendations on restoration, recreation, education and interpretation opportunities throughout the Project Area.



Figure 1-1 Overview map of Project Area



Image 1-1 A family plays in the Crystal River, near the Crystal River Bridge.

2.0 Methods

As part of this report a site survey, channel stability assessment, Ecological Integrity Assessment and a professional site analysis were conducted. Existing conditions are defined and recommendations are founded on the findings and data from these studies.

2.1 Site Survey

Hydrographic survey data were collected on April 27 and 30, May 4 and 7 and July 20, 2018. The project team collected the data using a Total Station and a survey grade RTK GPS unit. Information collected included water surface elevations, bank topography, channel bathymetry, and existing infrastructure. Local control points were used to tie the data into the North American Datum 1983 (NAD-83) State Plane Coordinate System, Colorado Central Zone, North American Vertical Datum 1988 (NAVD-88) vertical datum. This current data collection effort was supplemented with channel bathymetry collected via boat and sounders as part of the Crystal River Management Plan project in in 2014 and 2015. All data were compiled and combined with LiDAR data obtained from State of Colorado Geological Survey to create a continuous digital terrain model (DTM) was generated of the project reach, including the channel, floodplain and upland areas.

2.2 Channel Stability Assessment

The project team also evaluated bank and channel stability of the Crystal River through the project reach. This was accomplished through a detailed look at the channel and the banks. This process began with a desktop study of current and past aerial images and concluded with field study of channel and bank conditions. Potential issues such as channel deposition and scour areas and bank erosion or bank failure were documented and surveyed.

2.3 Ecological Integrity Assessment for Colorado Wetlands

To evaluate the ecologic condition of the Project Area an Ecological Integrity Assessment (EIA) for Colorado Wetlands Field Manual, Version 2.1 as developed Colorado Natural Heritage Program, Colorado State University, 2016 was used. This is an assessment method, that measures overall wetland condition with an emphasis on biological integrity. The method combines quantitative vegetation metrics with qualitative metrics that evaluate landscape context, hydrology, soils, water quality, and size into a multi-metric index. Final EIA scores rank a riparian systems condition on a four-tiered scale (excellent/good/ fair/ poor), as compared to unaltered wetlands of the same type. This methodology was chosen because it has the ability to provide baseline data to establish existing conditions and evaluate restoration efforts over time. The EIA method provides land managers with a tool to measure the ecological integrity of riparian habitats and wetlands, and could be used to target sites for restoration or further protection.

2.3.1 Existing Conditions Analysis

A Level 2.5 EIA Assessment was conducted for the site on July 26 and July 27, 2018 by Jeremy Allinson of DHM Design, Corp. In accordance with the Field Manual, Version 2.1 (Lemly et al., 2016). Major ecological factors scored included landscape context, buffer, vegetation condition, hydrological condition, and size, and the ratings are based on deviation from “natural” reference benchmarks. The Project Area was divided into to Assessment Areas (AA-1 and AA-2) and an Ecological Integrity Assessment (EIA) was conducted for each. The scores for each assessment area were added together and the average was used for the overall Project Area.

The results of the EIA for Crystal River Project Area show the site has an Overall Ecological Integrity Score of 2.31, which represents a C+ letter grade, or a fair riparian condition. The major factors leading to the

score include the lack of hydrological input; i.e., low flows reduce groundwater influence and wetland hydrology; the moderately high cover of non-native plants and invasive noxious weeds, and the adjacent land use activities. In addition, the size was determined to be a negative factor as the natural extent of good quality riparian habitat has been relegated to a narrow band along the Crystal River. See Appendix B for the EIA data form and EIA scorecards.

2.3.2 Post-Restoration Assessment

A proposed condition EIA was prepared assuming completion of the recommended restoration activities. Over time, the EIA rating of the Crystal River Restoration Project riparian habitat will likely increase to a 3.12 score, which represents an B letter grade, good condition. The major factors leading to the increase in ecological health include an increase of all vegetation metrics including restoration of the native plant species community, structural diversity, and elimination of noxious invasive weeds. In addition, size and connectivity scores would be increased once the riparian habitat is restored.

2.4 Recreational, Educational and Interpretive Field Analysis

Professional landscape architects and designers conducted a field visit, site inventory and analysis to establish the recreational, educational and interpretive opportunities on the site. Recommendations are based on projects of similar type and scale, a familiarity with the surrounding community and amenities and stakeholder goals and priorities that were communicated during meetings with the project team.

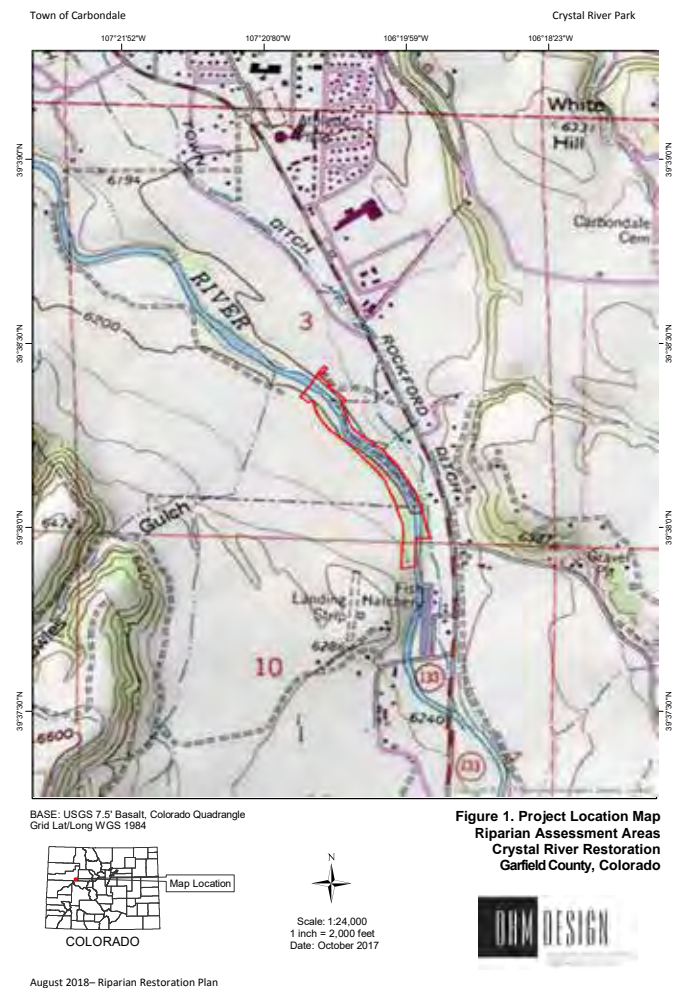


Figure 1-2 Project location map, riparian assessment areas

3.0 Existing Conditions

The existing conditions of the Project Area are diverse. The ecologic health and communities vary by location on site. In general the site ranges from hosting very intact riparian communities to areas of high degradation with opportunities for restoration.

3.1 Landform, Elevation and Size

The Project Area is located on a relatively flat terrace along an unconfined section of the Crystal River at an elevation of 6,288 feet. The Project Area encompasses the east and west side of the Crystal River and is located in parts of Sections 9, 16, and 19 of Township 88 West and Range 8 South in Garfield County, Colorado, see figure 3.1. The assessment areas also encompass both sides of the Crystal River and takes into consideration the hydrological influence of the river. See maps "Existing Conditions - Study Area A" and "Existing Conditions - Study Area B" at the end of this section.

3.2 Land Use

Historically, the Project Area was a working ranch with an agricultural land use component. This is evident

by the presence of European pasture grasses and apple trees. Today, as part of the Crystal River Park, the riparian corridor provides habitat for wildlife and is used for recreational activities which likely include fishing in the Crystal River, hiking/walking and wildlife observation. Adjacent land uses include River Valley Ranch Golf Course to the west and private residential land ownership to the east.

3.3 Channel Characteristics

The Crystal River from the Roaring Fork River confluence through the Town of Carbondale was analyzed through aerial imagery from 1993 - 2015 to resolve geomorphic characteristics and trends over time. The selected channel reach has exhibited minimal migration over the duration of the aerial photography record, primarily due to entrenchment within quaternary terraces. Overall the river through Carbondale maintains a moderately steep slope, SO , of approximately 0.008 ft/ft and an overall sinuosity of 1.2. Quantitative observations of the meander characteristics correspond well with empirical observations of unconfined alluvial channels made by Leopold et al. (1960). The river has been observed as relatively stable in planform over time and the values of the radius of curvature to top-width ratio and

sinuosity index indicate a high potential for erosion (Biedenharn et al., 1989; Nanson and Hickin, 1986; Brice 1984). Overall, the channel is classified as a stable, sinuous system confined within a paleo channel with strong potential for erosion and bed load transport.

The project area itself has similar characteristics to the overall river reach and is typified by a general bend of the river from a north flowing direction to a



Image 3-1 Alluvium dam, boulder grade control, concrete headgate structure, and the beginning of the Weaver Ditch.

northwest direction. The Crystal River has a sinuosity of 1.06 and a bed slope of $S=0.006$ ft/ft through the project area. A review of the past 25 years of aerial photos depicts a laterally stable channel that has not exhibited sign of meander. As would be expected from the gradual bend to the northwest, the right (east) bank is fairly steep and high with no floodplain bench. Much of this bank has been reinforced with riprap. The left (west) bank is lower with period connections to the narrow floodplain bench. Areas where vegetation has established have stable banks and areas where vegetation has been removed exhibit erosion. The banks are characterized by 3 to 4 feet of fine material overlaid on a coarse gravels and cobbles. In areas where bank erosion is occurring, the fine material is sloughing into the river, leaving vertical faces of fine material on top of the underlain cobble/gravel.

At low flows the project reach exhibits a riffle-pool geomorphology. There are currently 5 distinct riffles in the project reach. The pools between these riffles are fairly shallow. At higher flows the pools wash out and the project reach exhibits a riffle run geomorphology.

The most prominent in-channel feature is the

Weaver Diversion headgate, located approximately 1,000 feet upstream of the Crystal Bridge Drive bridge. The diversion consists of a boulder and cobble grade control structure placed in the river to maintain water surface elevations and a concrete headgate structure with sluice gate and return channel on the east bank. During low flow periods, such as in the summer of 2018, the alluvium dam will be raised and extended upstream by Town of Carbondale staff. Image 3-1 shows the alluvium dam,

boulder grade control, concrete headgate structure, and the beginning of the Weaver Ditch.

There is significant cobble deposits in the channel below the diversion point. This material is likely old alluvium push up dams washed down during past runoff events. This deposition area is also likely enhanced by the high flow constriction of the Crystal Bridge Drive bridge, which creates a backwater section upstream of the bridge at high flows. The deposit has created a wide, long riffle with no thalweg formation. During low flow periods this results in a channel wide, very shallow flow depth through this section of the project. Photo 3-2 shows the alluvium deposition area upstream the Crystal Bridge Drive bridge.

3.4 Vegetation

The vegetation within the Project Area is consistent with that typically found within riverine riparian systems and is characterized by cottonwood trees, shrublands and herbaceous zones with sedges and forbs. The vegetative composition and diversity is generally healthy throughout the property. The vegetative diversity and resilience is intimately tied to the hydrological regime within the riparian system. When the river overflows it's banks, it feeds water into the surrounding plants and soils, creates natural levees,



Image 3-2 Alluvium deposition area



Image 3-3 Example of the riparian shrublands within the project area

and deposits sediment which have a direct impact on plant species and composition. The combination of a historical frequent disturbance regime and being situated adjacent to development and agriculture has increased the presence of non-native and noxious vegetation on the property.

A detailed vascular plant species list is included in Appendix A, Table 1, and vegetative species associated with the mapped ecological system types on pages 9 and 10.

3.5 Soils

The restoration areas are characterized by three soil mapping units including the Atencio-Aseltine Complex (unit 13), Dahlquist-Southace Complex (unit 28) and Fluvaquents (unit 42), as described and illustrated in the Soil Survey of Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield and Pitkin Counties (Soil Conservation Service, 1992). Each unit is briefly described below.

The Atencio-Azeline Complex, which occurs on alluvial fans and terraces, formed in alluvium derived predominantly from sandstone and shale. Typically, the surface layer is a sandy loam about 6 inches thick. The next layer is a sandy loam about 4 inches thick. The subsoil is about 10 inches of a sandy loam over about 4 inches of a gravelly sandy loam. The upper 6 inches of the substratum is a gravelly sandy loam. The lower part to a depth of 60 inches is a very gravelly sandy loam. Permeability is moderate to a depth of 30 inches and rapid below that depth. The available water capacity is low, runoff is slow and the hazard of erosion is slight. This soil is deep and well drained.

The Dahlquist-Southace Complex, which formed in alluvium and colluvium derived from mixed mineralogy, occurs on terraces, alluvial fans and side slopes. Typically, the surface layer is brown cobbly sandy loam and is about 6 inches thick. The upper 7 inches of the subsoil is very cobbly sandy clay loam. The lower 10 inches is very cobbly sandy loam. The



Image 3-4 Palustrine emergent wetland in the foreground with riparian forest in the background



Image 3-5 Upland area of the site bordering the River Valley Ranch Golf Course



Image 3-6 Regulatory sign informing visitors of seasonal wildlife closures and present fishery pressure



Image 3-7 The wide shallow course of the river through the project area seasonally limits fish habitat and angling potential

substratum to a depth of 60 inches is calcareous extremely cobbly sandy loam. The permeability is moderately rapid and the available water capacity is low. Runoff is rapid and the hazard of water erosion is moderate to severe on steeper slopes. This soil is deep and well drained.

Fluvaquents are poorly drained and somewhat poorly drained soils that occur along floodplains of rivers. Typically, the surface layer of the Fluvaquents is grayish brown loamy sand about 5 inches thick. The underlying material extends to a depth of 80 inches or more.

3.6 Hydrology

The entire project area is located immediately adjacent to the Crystal River below the 100-year floodplain (see Figure 1-1). The alluvial aquifer of the river likely extends to the toe of the slope on both sides of the river. Hydro geological influences from the toe on the west side of the river increase groundwater availability and influence on the Palustrine Emergent Wetland areas located on the southwest side of the river. On the east side, the Weaver Ditch and the small agricultural ditch located further to the south, saturate subsoils in some areas of the terrace. The elevation of the Weaver Ditch is higher than the riparian vegetation and seepage occurs to the terrace as evidenced by the large stands of sandbar willows, alders, and other riparian vegetation.

Large flood event flow rates from the current Effective Flood Insurance Study will be used for the floodplain analysis. Listed flow rates for various flood events from the 10-year to the 500-year event are summarized in Table 3.6.1 below. Major flood flows on the Crystal River within the study area result from the rapid melting of mountain snow pack in the basin during the period from late May through early July. Snowmelt floods are characterized by moderate peak flows, large volumes and long durations and are marked by diurnal fluctuation in flow (FEMA, 1986).

Table 3.6.1 – Effective Flood Insurance Study Flows	
Recurrence interval	Flowrate (cfs)
10-year	5,310 cfs
50-year	6,510 cfs
100-year	7,410 cfs
500-year	11,210 cfs

Annual peak runoff flows at the project reach were determined from the USGS gauge at Avalanche Creek (#09081600). The gauge has 63 years of daily average flow records available. The peak flow range from a high of 4,840 cubic feet per second (cfs) in 2010 to a low of 953 cfs in 2012. 2018 was the third lowest peak on record with a flow of 1,200 cfs. The average for the last 5 years is 2,216 cfs. The percentiles of these peak flow rates is summarized in table 3.6.2. These flow rates will differ from the flowrate at the project site due to inputs and diversions downstream of Avalanche Creek.

Table 3.6.2 – Peak Runoff Percentiles at Avalanche Creek Gauge	
Percentile	Flowrate (cfs)
10	1,414
25	1,770
50	2,220
75	2,690
90	3,152

There is also a stream gauge at the fish hatchery, immediately upstream of the project site, which is operated by the Colorado Division of Water Resources. The gauge has been operated seasonally on and off since 2006. A continuous 12-month record began in 2017. Table 3.6.3 compares the peak flow at Avalanche Creek versus the peak flow at the fish hatchery for 2017 and 2018. There is approximately a 15-percent increase between the two gauge for the two years with data currently available.

Table 3.6.3 – Peak Flow Comparison between the Avalanche Creek and Fish Hatchery stream gauges		
Year	Avalanche Ranch Flowrate (cfs)	Fish Hatchery Flowrate (cfs)
2017	2,300 cfs	2,700 cfs
2018	1,200 cfs	1,450 cfs

As discussed in the Crystal River Management Plan, determining historical low flows at the project site is difficult due to the network tributary inputs and surface water diversion located between the Avalanche Gauge and the site. As part of the hydraulic modeling process the project team will look at a wide range of low flow events from 5 cfs through 500 cfs.

The recent addition of the real-time and full-time fish hatchery gauge removes much of this uncertainty moving forward. The low flow for 2017 was approximately 30 cfs. For the low water year of 2018, flow dipped as low as 5 cfs in mid-September.

3.7 Growing Season

The growing season is defined as that part of the year when soil temperatures at 50 cm (20 inches) below the soil surface are higher than biologic zero (5 degrees C, 41 degrees F). As this quantitative determination requires in-ground instrumentation which is not usually available, growing season can be estimated by approximating the number of frost free days. The growing season can be approximated as the period of time between the average date of the last killing frost in the spring to the average date of the first killing frost in the fall. This represents a temperature threshold of 28 degrees F or lower at a frequency of 5 years in 10.

The closest WETS weather station with information on the growing season is the Eagle County AP located near Eagle Colorado at an elevation of 6,497 feet. The

mean high temperature of 85.5°F occurs in July and the mean low of 4.7°F occurs in January. The growing season length as defined by 39°F air temperature, is 94 days with a 50% chance of occurring between June 5 and September 12 (USDANRCS, 2017).

3.8 Ecologic Communities Definitions

The Project Area characterized as ecological system type of Rocky Mountain Lower Mountain-Foothill Riparian Woodland and Shrubland. The major vegetative zones that occur within the Project assessment areas include Riparian Shrubland and Scrub Shrub Wetland, Riparian Palustrine Emergent, Forested Riparian and Upland.

3.8.1 Riparian Scrubland / Scrub Shrub Wetland

The Riparian Scrubland / Scrub Shrub Wetland zone within the project area is dominated by woody vegetation less than 6 m (20 feet) tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. The most dominant vegetative class of within the Project Area at 10.3 acres, this system occurs on both sides of the river and includes the following dominant vegetation types: Silver buffaloberry (*Shepherdia argentea*), Alder (*Alnus incana* subsp. *tenifolia*), Twinberry/bush honeysuckle (*Distegia involucreta* (*Lonicera*)), Redosier dogwood (*Cornus sericea* (*C. alba*)), Red haw (*Crataegus erythropoda*), Sandbar willow (*Salix exigua*), Mountain willow (*Salix monticola*), Green rabbitbrush (*Chrysothamnus viscidiflorus*).

3.8.2 Palustrine Emergent Wetland

This emergent wetland class is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens (USFWS, 2018). With vegetation present for most of the growing season, these wetlands are dominated by perennial plants. This wetland type occurs primarily in two areas within the Project Area:

along the toe of the slope at the north side of the Project Area and again towards the south side, where the wetland is large and is of very high quality, with significant vegetative composition, diversity and structure. The total acreage for this type of wetland is 2.7 acres. Dominant vegetative species for this type of system within the project area include: Woolly sedge (*Carex pellita*), Nebraska sedge (*Carex nebrascensis*), Beaked sedge (*Carex rostrata*), Nodding rush (*Isolepis cernua*), Baltic rush (*Juncus articus subs. Ater(=J.balticu)*), Colorado rush (*Juncus confusus*) and Alpine bluegrass (*Poa alpina*).

3.8.3 Forested Riparian

This vegetative zone includes mature trees over 6 meters (20 feet) tall and is found along the periphery of the west side of the Project Area. The dominant tree species within the project area includes the Narrow-leaf Cottonwood (*Populus angustifolia*), other tree species occurring within the project area include: Rocky Mountain Juniper (*Juniperus scopulorum*), Blue Spruce (*Picea pungens*), Siberian elm (*Ulmus pumila*), Russian Olive (*Elaeagnus angustifolia*), and cultivated Apple trees (*Malus domestica*).

3.8.4 Upland

On the hillside of the site, a small strip of upland occurs on the periphery of the forested riparian zone and is limited to 1.2 acres. The upland zone extends to the golf course and consists primarily of European pasture grasses including various species of brome, timothy and ryegrass. Cheatgrass (*Bromus tectorum*) is present in abundance in various locations.

3.9 Wildlife and Threatened and Endangered Species

The Project Area provides habitat for a variety of wildlife species. A complete list of threatened and endangered species and known and likely species to occur, is included in Appendix A, Table 2, Project Area Wildlife Species List. The Project Area provides good quality habitat for various avian species, from

waterfowl to raptors and a variety of other bird species in between. The many dead trees and snags throughout provide excellent hunting perches for a variety of raptor species and cavity nesting opportunities. An active osprey (*Pandion haliaetus*) nest is located approximately 900 feet to the south of the Project Area (see figure 3, Wildlife Map). Colorado Parks and Wildlife (CPW) recommend no surface occupancy (beyond that which historically occurred in the area) within 1/4 mile (1,320 feet) of active nests from April 1 through August 31. Some osprey populations have habituated and are tolerant to human activity in the immediate vicinity of their nests, coordination with CPW on seasonal closures is recommended. The Crystal River Park is currently closed from December 15 to March 15, to allow for bald eagle (*Haliaeetus leucocephalus*) winter foraging activities. Bird nesting boxes exist on the parcel. Additional nesting boxes for variety of species could increase nesting opportunities and provide additional birding opportunities for visitors. The Project Ecologist on site also noted a high incidence of great blue heron (*Ardea herodias*) within the Project Area.

Mammal habitat is limited due to the size and surrounding land use. Mapped habitat within the project area includes overall range and winter range for larger ungulates such as Mule deer (*Odocoileus hemionus*), Elk (*Cervus canadensis*), and Black bear (*Ursus americanus*). The project area is located within a black bear human conflict area. Additional potential mammal species likely to occur within the project area are listed in Appendix A, Table 2.

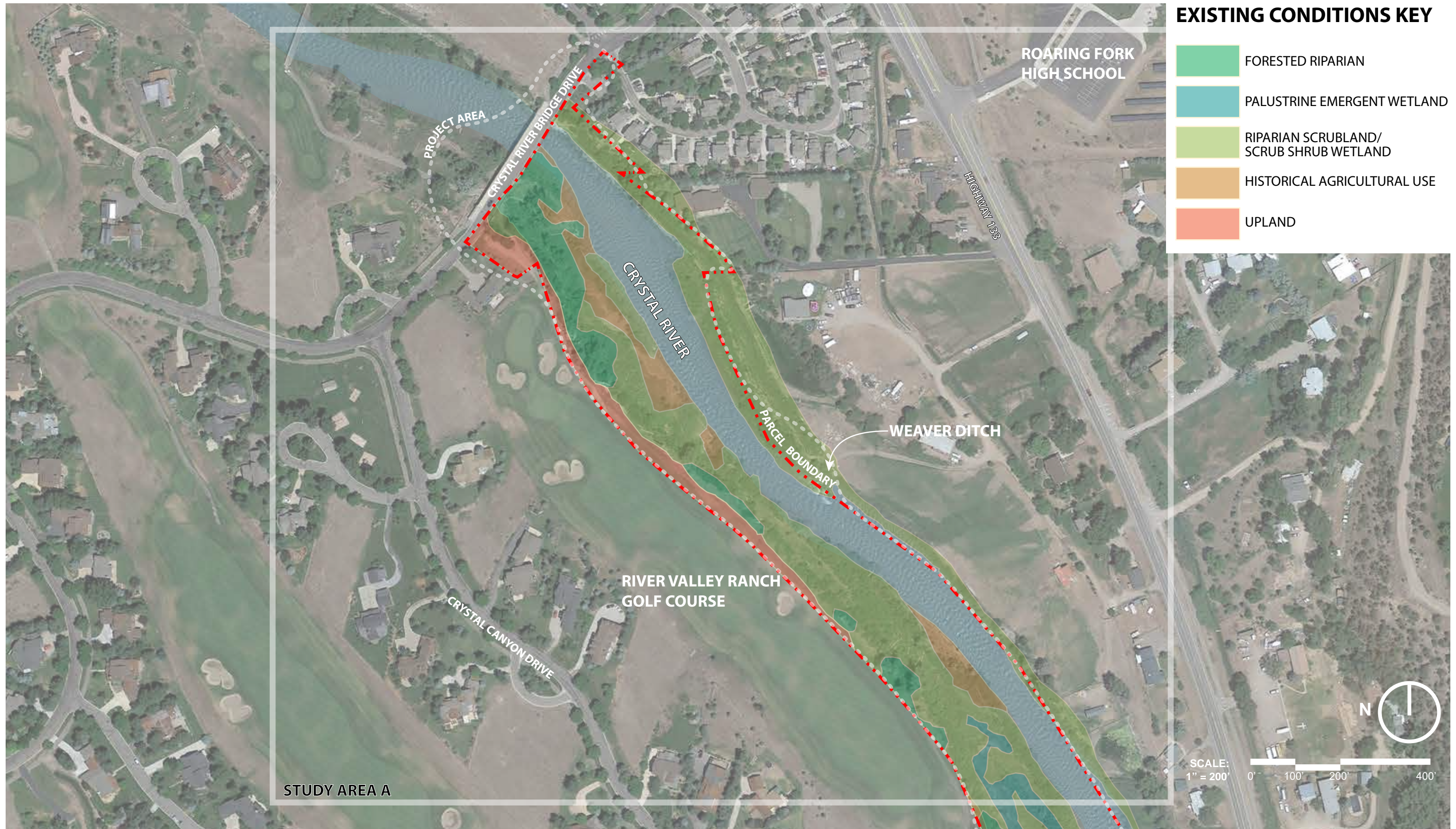
Fish species likely to occur within the Project Area include Rainbow trout (*Oncorhynchus mykiss*), Brown trout (*Salmo trutta*), Brook trout (*Salvelinus fontinalis*), Colorado Cutthroat trout (*Oncorhynchus clarki pleuriticus*), and Mountain whitefish (*Prosopium williamsoni*). Fish habitat is limited throughout the reach, and due to extremely low water conditions during certain times of the year which constrains fishing opportunities. There is a Colorado Parks and Wildlife (CPW) operated fish hatchery located immediately upstream of the project on the east bank.

Per the CPW website, the hatchery raises rainbow trout and Snake River cutthroat trout (*Oncorhynchus clarkii bouvieri*) brood fish. The eggs generated by these brood fish are shipped to other hatcheries for hatching, raising and stocking.

No Threatened or Endangered Species (T&E) were observed within the Project Area. State and federal T&E species likely to occur in the project area include: U.S. Fish and Wildlife (USFWS) threatened and endangered tiger salamander (*Ambystoma tigrinum stebbinsi*), state listed species of concern northern leopard frog (*Lithobates pipiens*) and the peregrine falcon (*Falco peregrinus*), which is also a state listed species of concern. Colorado Parks and Wildlife Species Activity Mapping (SAM) data and USFWS Information for Planning and Consultation (IPAC) data was utilized for desktop review and to create the Existing Wildlife Conditions Map on page 13. Some T&E species listed under the USFWS IPAC report are unlikely to occur within the project area, consultation with a local biologist is recommended prior to any proposed project development.



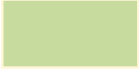




Image 3-8 Interpretive sign at the project site describing seasonal closures to protect Bald Eagle Habitat and information on bird watching.

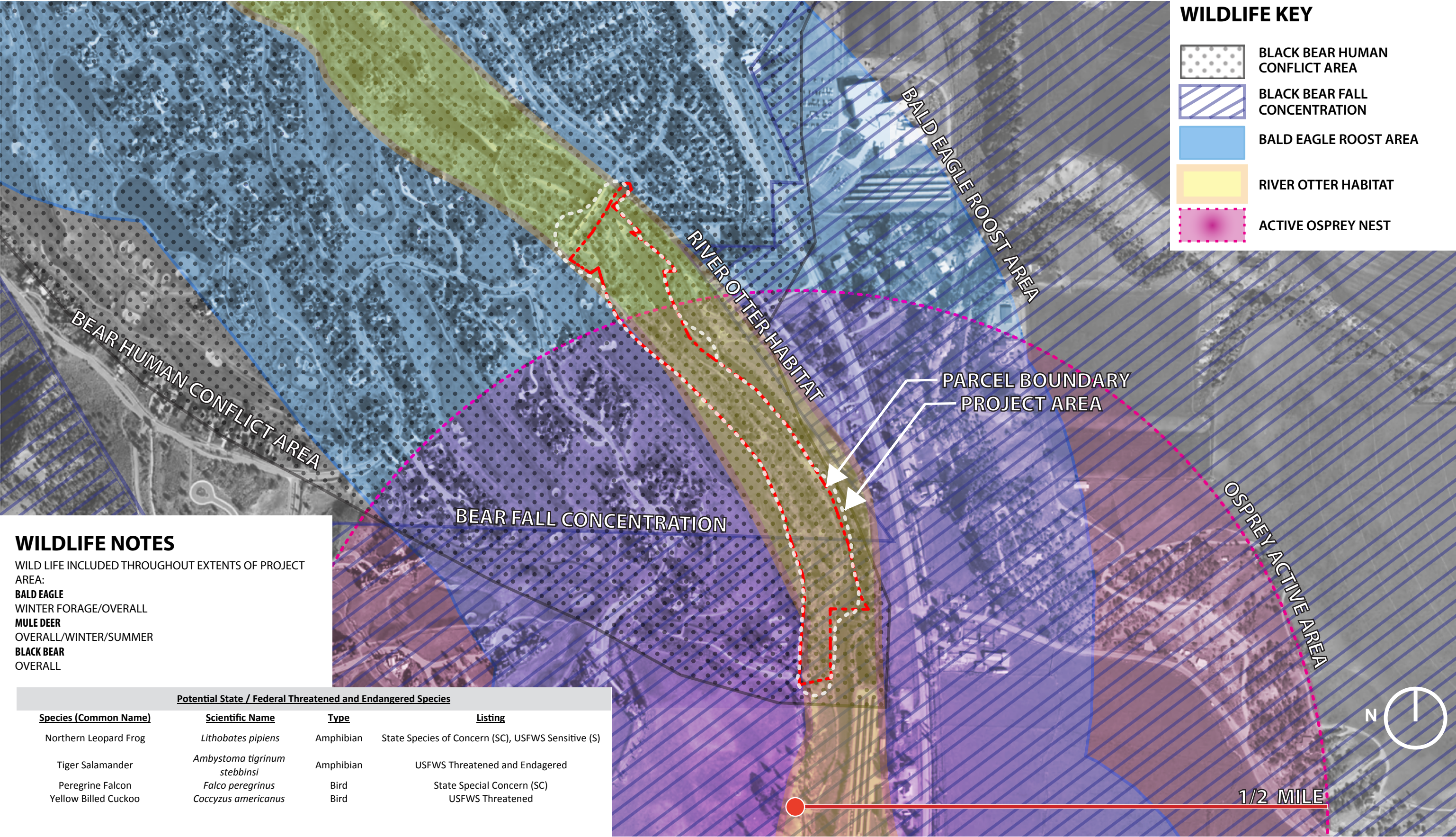




EXISTING CONDITIONS KEY

-  FORESTED RIPARIAN
-  PALUSTRINE EMERGENT WETLAND
-  RIPARIAN SCRUBLAND/
SCRUB SHRUB WETLAND
-  HISTORICAL AGRICULTURAL USE
-  UPLAND





WILDLIFE NOTES

WILD LIFE INCLUDED THROUGHOUT EXTENTS OF PROJECT AREA:
BALD EAGLE
WINTER FORAGE/OVERALL
MULE DEER
OVERALL/WINTER/SUMMER
BLACK BEAR
OVERALL

Potential State / Federal Threatened and Endangered Species			
Species (Common Name)	Scientific Name	Type	Listing
Northern Leopard Frog	Lithobates pipiens	Amphibian	State Species of Concern (SC), USFWS Sensitive (S)
Tiger Salamander	Ambystoma tigrinum stebbinsi	Amphibian	USFWS Threatened and Endangered
Peregrine Falcon	Falco peregrinus	Bird	State Special Concern (SC)
Yellow Billed Cuckoo	Coccyzus americanus	Bird	USFWS Threatened

4.0 Restoration Opportunities

There are ample opportunities for riparian habitat preservation, enhancement and restoration across the Project Area. The project team has developed a restoration concept which addresses the existing conditions with four types of interventions by ecologic community type:

- Preserve
- Enhance
- Create
- Future Restoration Opportunities

These opportunities are conceptual in nature and based on initial field visits and data collection. The project team anticipates further collaboration with stakeholder groups to develop the presented opportunities into two (2) comprehensive concept alternatives.

4.1 Restoration Concept

The Project Area restoration concept focuses on three main ecologic communities, riparian, wetland and in channel. For the purpose of this report and based on stakeholder goals, upland communities are reserved for future restoration opportunities. The surveyed riparian and wetland communities are recommended for preservation, enhancement or creation.

- Preservation - The protection of intact and functioning wetland or riparian through ecologic and landscape planning and site development.
- Enhancement - The restoration of partially functioning healthy wetlands and riparian areas. This can include noxious weed elimination, planting, seeding, and other restoration techniques.
- Creation - Identifying and re-establishing areas that are heavily degraded but have the opportunity due to location and surrounding vegetation for full restoration activities resulting in

the creation of a new wetland or riparian area.

The in-channel restoration opportunities are discussed in Section 4.1.3.

Maps of these opportunities can be found at the end of this section. All priorities and decisions about restoration actions should be guided by stakeholder goals and values.

4.1.1 Riparian Restoration Opportunities

As discussed in the existing conditions section, the health and quality of the riparian environment within the Project Area is good. **The project team recommends 10.1 acres for preservation, 0.45 acres for enhancement, and 1.1 acres for creation.**

4.1.1.1 Riparian Preservation

Riparian preservation would include developing a regular monitoring and maintenance plan to preserve the high quality riparian habitat. Monitoring noxious and native vegetation will preserve and sustain current riparian conditions. By limiting access to sensitive areas and minimizing disturbance by directing human traffic through way-finding and the creation of designated, formalized paths impacts can be reduced. The project team recommends preserving approximately 10.4 acres of high quality riparian habitat.

4.1.1.2 Riparian Enhancement

Riparian enhancement will improve existing conditions to increase habitat value. This is done through the development and implementation of a weed management plan to control noxious vegetation, identifying arboricultural maintenance needs/plans and increasing plant diversity through planting and seeding. The resulting enhancement will provide increased habitat value for wildlife and improve overall ecological conditions. The project team recommends that Project Area Stakeholders consider interventions to enhance approximately .45 acres of Riparian habitat.



Image 4-1 This image demonstrates highly degraded ecologic conditions near the river on the left side of the photograph. This is an area recommended for riparian creation. Near the center of the photo, healthy forbes indicate an intact wetland which could be enhanced.



Image 4-2 A high quality wetland can be seen on the right side of the image. This area would be recommended for wetland preservation. On the left side of the image, closer to the Crystal River there is an area recommended for wetland creation

4.1.1.3 Riparian Creation

Riparian creation is the most intensive of the three types of restoration. This involves grading the topography to create elevations with the appropriate available water to support native riparian vegetation plantings. Areas identified within the report are immediately adjacent to the river bank and are located in close proximity to the river water table. Areas identified for bank stabilization as part of river improvements are ideal locations for this recommended intervention as bank stabilization and riparian creation are both interventions with overlapping goals. The project team recommends 1.1 acres of Riparian Creation.

4.1.2 Wetland Restoration Opportunities

As discussed in the existing conditions section, the health and quality of the wetland environment within the Project Area is good to excellent. The project team recommends 1.6 acres for preservation, .076 acres for enhancement, and .17 acres for creation.

4.1.2.1 Wetland Preservation

Wetland preservation includes regular monitoring and maintenance of plant species, the percent cover of the plants, and the hydrological conditions on site. Monitoring can assist with understanding overall wetland health, identify trends, and allow for short term and long term preservation planning. The construction of boardwalks in these areas would dramatically reduce human impacts and provide excellent learning and wildlife viewing opportunities. The project team recommends 1.6 acres for wetland preservation.

4.1.2.2 Wetland Enhancement

Wetland Enhancement including noxious and invasive species control, selective planting and maintenance can enhance what is already considered a high quality wetland within the Project Area. The project team recommends that at the Project Area Stakeholders consider .076 acres within the Project Area for wetland enhancement.



Image 4-3 This location of the assessment area has mature trees and shrubs suitable for riparian preservation. The herbaceous ground cover is mostly noxious weeds making it a candidate for riparian creation

4.1.2.3 Wetland Creation

Appropriate hydrological conditions to support wetland plant species can be created by grading the topography of appropriate sites within the Project Area. The location of the proposed wetland creation sites (See maps “Restoration Opportunities - Study Area A” and “Restoration Opportunities - Study Area B” at the end of this section) allows for ease of colonization of adjacent wetland plant species. Minimal grading would be required to achieve successful wetland creation in this area. The project team recommends that at the Project Area Stakeholders consider approximately 7,225 square feet for wetland creation.

4.1.3 Bank and Channel Restoration Opportunities

Several locations along the west bank of the river have been identified as opportunities for restoration. This restoration work can take several forms depending on the location and other project goals such as river access, angling locations and educational



Image 4-4 An example of healthy PER wetlands and riparian shrublands. Both areas are recommended for preservation



Image 4-5 The shrubs in this image are in good health and these woody vegetated zones are recommended for preservation. The wide swaths of brome in the foreground of the photograph are an opportunity for riparian enhancement.

opportunities. In higher traffic and access areas, the bank restoration will be comprised of boulders. Lower traffic area restoration activities will utilize vegetation and large wood, with boulders only used for toe reinforcement. Examples of this type of restoration are shown in Images 4-6 and 4-7. Proposed locations are shown on the maps at the end of this section.

The Weaver Ditch diversion structure will be the primary focus of the in-channel improvements. Proposed modifications will create a stable boulder structure in the river that allows for proper function at a wide range of flows with reduced maintenance requirements. The headgate structure itself will also be modified to allow for reduced maintenance needs and the ability to add an automated system in the future.

The team will also look at the section of the channel downstream of the diversion which is experiencing higher sediment accumulation. Options here include the creation of a thalweg and potentially a localized, slight narrowing of the channel to increase sediment transport capacity. Sections of river upstream of the Weaver Diversion will likely be unmodified with the exception of bank work. This area of the river is highlighted on the Existing Conditions maps in section 3.

4.2 Ecological Performance Standards (Success Criteria)

Ecological performance standards and success criteria for riparian enhancement and creation opportunities should be established and agreed upon by all stakeholders, designers, and agencies to provide a clear road map for success. Vegetative success criteria can include the identification of thresholds for percent cover, vegetative composition, and native vs. non native species. New plantings and seeded areas should be monitored on a regular basis to ensure success. Areas where hydrological conditions are necessary for growth should be monitored regularly. For creation and enhancement areas, adjustments to site conditions may be necessary to allow for optimal success.

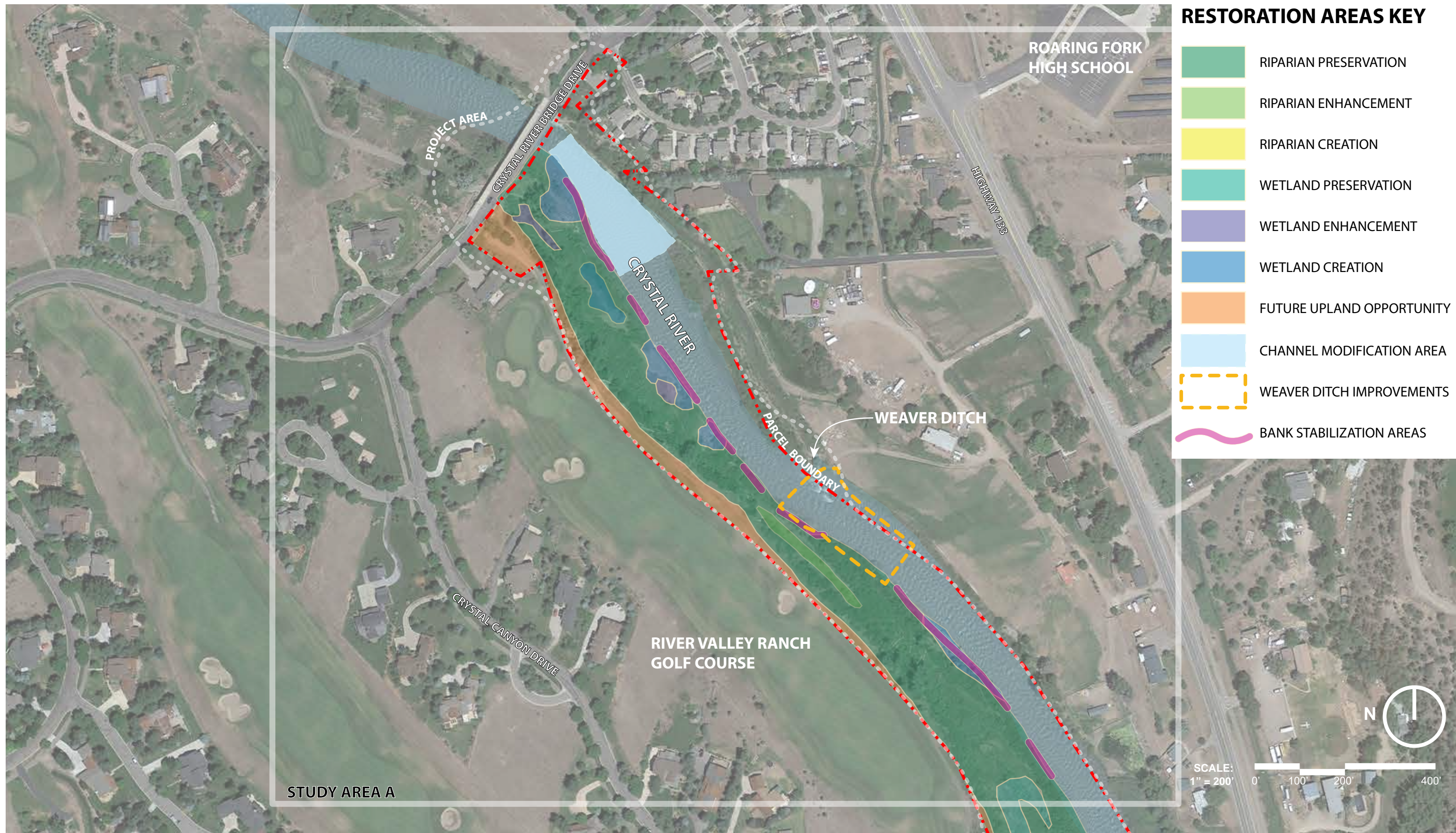


Image 4-6 An example of a bank repaired with boulders and steps



Image 4-7 An example of a bank repaired with vegetation

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5.0 Recreation, Education and Interpretation Opportunities

5.1 Existing Conditions

The current on-site opportunities for people to engage with the ecology and nature of the Project Area are limited while human use of the Project Area is evident. Existing amenities such as the trail, river access, interpretive and regulatory information and gathering places have become degraded and weathered overtime. These spaces are generally in disrepair and are no longer as effective as they once were.

The main trail along the site is heavily overgrown and can be difficult to locate and navigate. Areas of the trail have eroded into the river and navigation through the overgrowth is difficult in sections. This trail overgrowth and degradation has resulted in informal “social trails” winding through the site and degraded river banks from informal access points contributing to erosion and bank destabilization.

The Project Area contains a number of interpretive signs, however these signs have become worn over time and are dated. Many signs are no longer visible due to vegetation overgrowth and do not describe the ecologies of the locations where they stand. Instructional and regulatory signs are not concentrated or clearly placed near the main access point near the bridge.

The current inventory of sign topics include:

- Bald eagle closure area notice
- No dogs or glass containers regulation
- Riverfront Park entrance sign
- 8 Interpretive Signs
 - “River Valley Ranch Wetlands”
 - “Riparian Woodland”
 - “Fisheries”
 - “Wetland Plants - What herb is this?”
 - “Aquatic Plants”



Image 5-1 View of the proposed southern gathering area with views of Mount Sopris



Image 5-2 Example of an outdoor classroom with seating and naturalized elements



Image 5-3 Navigating the overgrown trail



Image 5-4 Example of current interpretive signage



Image 5-5 Picnic benches on South end of Project Area



Image 5-6 Informal river access with visible erosion

- "Wetland Plants"
- "Willows"
- "Birds of the Wetlands"

There are no formal gathering places with the exception of two picnic tables near the south end of the site (see Image 5-5). The area is both hard to locate and in disrepair due to age and lack of maintenance. Several informal gathering spaces exist and are evident in areas where the vegetation has been disturbed.

Additional challenges existing on site are the small parking area, lack of alternative transportation options such as a bike rack, lack of designated pedestrian crossing area and a visual disconnect resulting in difficulty locating the site. The access point beneath the bridge is difficult to find, is steep and the stairs are in disrepair. The site is currently not universally accessible.

Opportunities for new recreational, educational and interpretive amenities have been identified. There are many unique features of the site that have the potential to serve as the basis for recreational, interpretive and educational programming elements for diverse audiences. There are a wealth of opportunities to program the site building on interactive, recreational, and interpretive experiences, while simultaneously improving, restoring and protecting the health and ecology of the Crystal River and its riparian corridor.

This tandem approach of creating recreational amenities that also provide ecological benefits is the recommended method to bring cultural and ecological value to the site simultaneously. The following sections identify opportunities for; public gathering spaces, educational and interpretive sites, trail and way-finding improvements, access and recreation. No significant local, state or federal permitting challenges are anticipated for the recreation, education and interpretive opportunities.

These opportunities are conceptual in nature and



Image 5-7 An apple tree in the Project Area hints at the past land uses and history of the area



Image 5-8 Example of an interactive interpretive site element, this map is both tactile and informative

based on initial field visits and data collection. The project team anticipates further collaboration with stakeholders groups to develop the presented opportunities into two (2) comprehensive concept alternatives.

5.2 Public Gathering Spaces

Through site visits and a discussion with stakeholders, two locations have been identified for outdoor classroom and public gathering spaces (see maps at the end of this section). One at the north end of the park near Crystal Bridge Drive and one at the south end of the park. As with all other project elements, final locations for public gathering space will be developed through a collaborative process with the project team, stakeholder group and general public.

- North end near Crystal Bridge Drive: The area along the river bank is degraded, reducing impacts to healthy riparian areas elsewhere. Optimally, gathering space would be placed along the bank with multiple access points down to the river to provide visitors with an opportunity to access the river and bank. This access could serve as an educational opportunity and/or for recreational opportunities such as angling. This gathering space could also serve as an area to inform the public about regulations or special information about the park. This is the most ideal site for a universally accessible gathering space.
- South End: The second public gathering space would be near the existing cottonwood grove at the south end of the park. This space could be more focused on the wetland and upland areas or the park. Amenities may include: a boardwalk and overlook of the enhanced wetland created by the reconnected side channel and an interactive exhibit describing ecological benefits of riparian features such as downed nurse logs and understory vegetation. This location also has the potential to serve as an outdoor classroom with seating, shade and interactive interpretive elements.

Constraints of these two sites include the limited

amount of parking available near the bridge and access to the area for people of different abilities and mobility types. Stakeholders should consider what the target audience is for these gathering places and what additional amenities will need to be on site to facilitate those user types.

5.3 Educational and Interpretive Opportunities

Many interpretive elements have already been introduced to the site. The proximity to schools, residential neighborhoods, and existing trail networks such as the Crystal Valley Trail create an ideal opportunity for educational and interpretive elements that could reach a large and diverse segment of the community. The project team recommends expanding and updating the current interpretive materials and making them more accessible and interactive. These interventions could include bilingual signage, the inclusion of tactile elements, view platforms and three dimensional exhibits.

Every site has a unique story to tell and this parcel is no exception. Identifying additional interpretive opportunities and communicating a larger, more engaging story is a goal moving forward. Interpretive elements to consider are as follows:

- Updating and expanding current interpretive topics
- Hydrology and river morphology
- Expanded information about variety of birds and their habitats
- Human history including indigenous populations, European settlers, ranchers and farmers
- Water infrastructure in our communities as it pertains to the Weaver Diversion
- Understanding place through landmarks such as Red Hill and Mount Sopris
- The water cycle and our local watersheds
- Insects and macro invertebrates in wetlands and riparian areas
- Angling
- Water rights and irrigation

The proposed new amenities would link together



Image 5-9 Navigating the trail can be tricky, the surface material changes through out the site



Image 5-10 Example of a boardwalk through an ecologically sensitive area



Image 5-11 Bird houses have been installed in the Project Area. Enhancing wildlife habitat would encourage passive recreation such as birding



Image 5-12 Example of a durable surface used for river access, helping to prevent erosion, fisheries health and bank destabilization

places on the site that help create a unique narrative. The project team recommends ongoing collaboration to create the educational and interpretive programming. In conjunction with the interpretive elements, an outdoor classroom area is a key recommendation of this report.

5.4 Recreational Opportunities

Currently the Project Area supports many passive recreation activities such as angling, walking, hiking, bird watching, picnicking, and nature play. All of these activities could be enhanced by improving, updating and programming the Project Area. A dual benefit of the proposed enhancements is that they would help to protect the restored ecology by directing people into areas specifically designed for recreation and intentionally directing people away from ecologically sensitive areas.

Angling opportunities would be greatly improved by the recommended river bank restorations and in-stream restorations proposed in Section 4.0. Fishing and fishing access could also be greatly improved and made more standardized by formalizing river access points to places along the bank which are safe, stable and offer opportunities to interact with the river.

Walking and hiking through the site could be improved in a host of ways. Trail improvements and access are discussed in the following section. Hiking and walking offer low impact exercise to many people. The gentle grade of the Project Area makes this site ideal for people of many ability levels and provides access to a wide range of people.

The existing bird watching opportunities on the site have the potential to be expanded. Wetland and riparian areas host some of the greatest bird life of any ecosystem type. The ecological restorations recommend in section 4.0 would improve the habitat of bird populations and provide birding enthusiasts with an incredible in-town amenity. Focusing on this recreation type also gives the project team an opportunity to collaborate and work with other specialty groups such as the local Audubon Society chapter. Furthermore, focusing on bird watching as a

major element of recreation on the site will encourage users to protect the ecosystem and respect the Project Area.

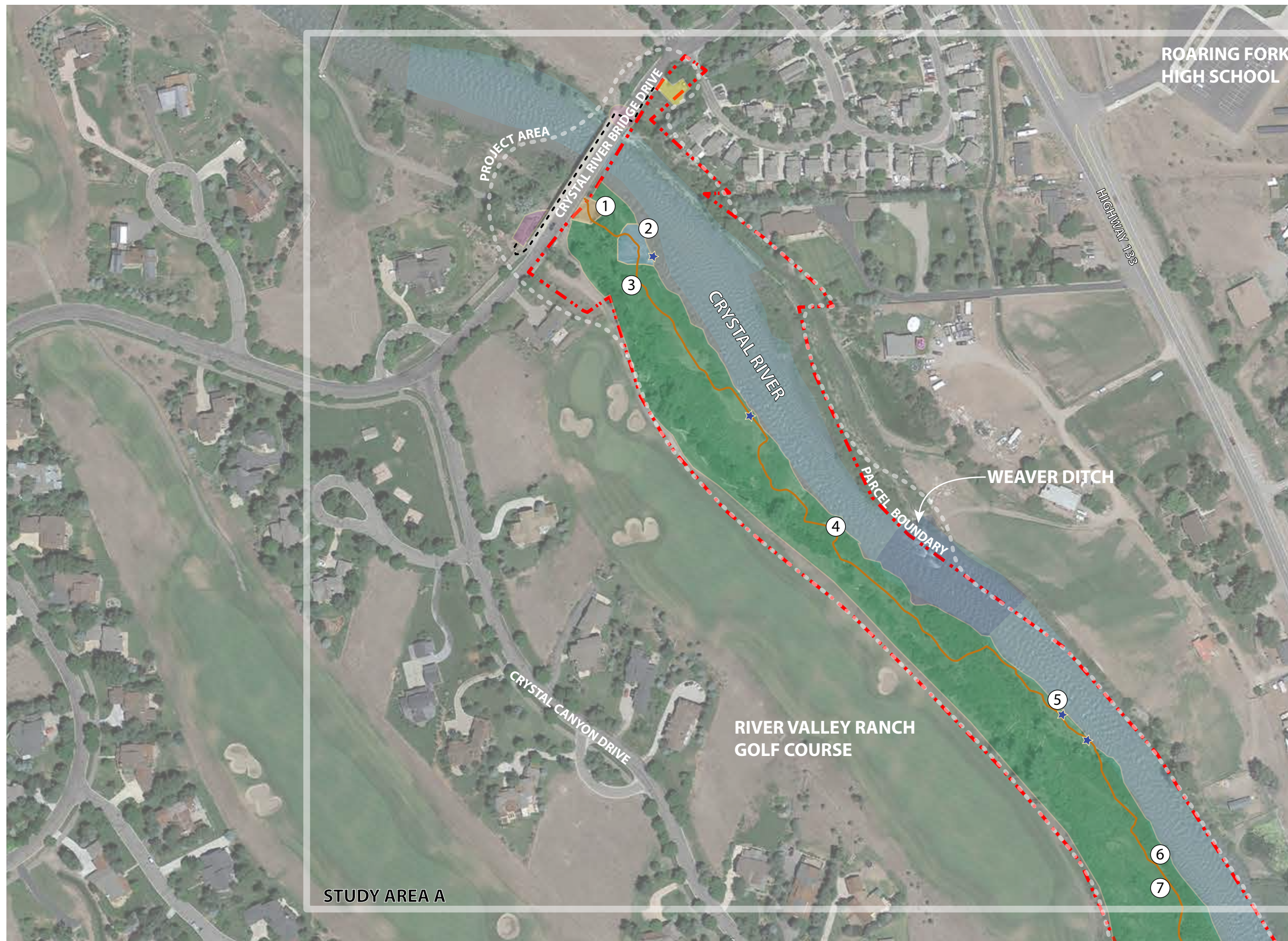
Finally picnicking, nature play and exploration are recreation objectives that can be easily met by formalizing public gathering areas. A focus on these types of recreation gives families, school groups and people of all ages a passive and enjoyable way to experience the natural environment. These elements can easily and imaginatively be incorporated through seating, shade and interactive interpretive elements.

5.5 Trail Improvements and Access

The project team advocates for an improved trail system that provides access and connectivity for park visitors. An ideal trail system would lead visitors to the different planned amenities, as well as allow them to experience the riparian corridor. The recommendation is for the trail to follow existing trail corridors, where possible, to minimize impact to healthy vegetation areas. The incorporation of a small loop trail could be a valuable asset allowing visitors to engage with unique places within the Project Area. Importantly, the existing trail needs to be cleared of obtrusive vegetation, undergo over-due maintenance, be reinforced in areas where it is eroding and have way finding practices such as clear lines of sight and signage.

There are three types of trails which would be most appropriate for the site. The primary trail type would be composed of a wide, firm surface and would connect to the universally accessible public gathering spaces and interpretive, educational areas. This trail would be accessible for less mobile individuals. The second type of trail would be more primitive and narrow. This trail could pass through several existing and healthy riparian areas. Finally, low boardwalks could be used in a few areas such as floodplains, connection areas and the re-established secondary channel.

As with all other project elements, alternatives for the trail system configuration will be developed through a collaborative process with the project team, stakeholder group and general public.



RECREATION AREAS KEY

- EXISTING PARKING AREA
- PROPOSED IMPROVED PEDESTRAIN CROSSING AND BIKE RACK
- PROPOSED IMPROVED ACCESS AND RAMP
- PROPOSED PUBLIC GATHERING AREA
- ECOLOGIC PRESERVATION ZONE
- PROPOSED WEAVER DITCH REHABILITATION
- PROJECT AREA ACCESS ROUTE
- PROPOSED TRAIL FOLLOWING EXISTING ALIGNMENT
- PROPOSED FORMALIZED RIVER ACCESS POINT

INTERPRETIVE OPPORTUNITIES

- ① WELCOME INFORMATION, MONUMENT SIGN, AND SITE REGULATIONS
- ② ANGING AND FISHERIES
- ③ RIPARIAN WOODLAND COMMUNITIES
- ④ WATER INFRASTRUCTURE AND WATER RIGHTS
- ⑤ RIPARIAN PLANTS, IDENTIFICATION
- ⑥ HUMAN HISTORY
- ⑦ SCRUB AND SHRUB HABITATS

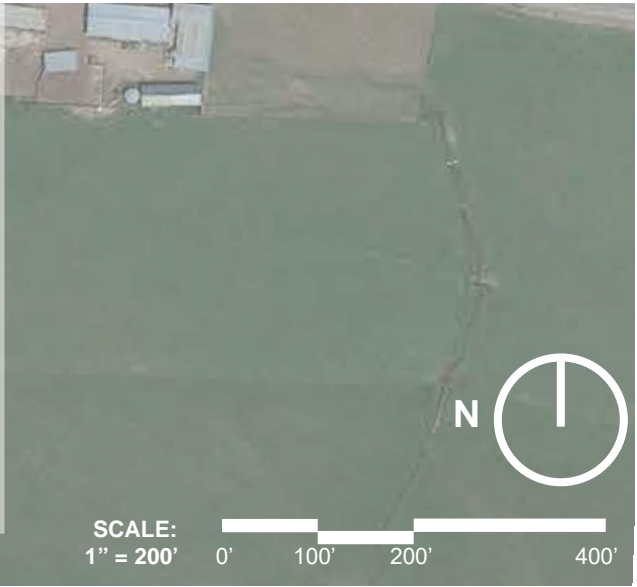


RECREATION AREAS KEY

- PROPOSED PUBLIC GATHERING AREA
- ECOLOGIC PRESERVATION ZONE
- PROPOSED BOARDWALK LOOP
- PROPOSED TRAIL FOLLOWING EXISTING ALIGNMENT
- PROPOSED BOARD WALK TRAIL
- PROPOSED FORMALIZED RIVER ACCESS POINT

INTERPRETIVE OPPORTUNITIES

- 8 BIRDS
- 9 ORIENTEERING
- 10 HYDROLOGY AND RIVER MORPHOLOGY
- 11 WATER CYCLE AND LOCAL WATERSHEDS
- 12 INSECTS AND INVERTEBRATES
- 13 WILDLIFE
- 14 WETLAND PLANT IDENTIFICATION



Appendix A: Species Lists

TABLE 1
Vascular Plant Species List
Crystal River Restoration

<u>Scientific Name</u>	<u>Common Name</u>	<u>Family</u>	<u>Origin*</u>
Trees			
<i>Juniperus scopulorum</i>	Rocky Mountain Juniper	Cupressaceae	N
<i>Malus domestica</i>	Apple tree (cultivated)	Rosaceae	I
<i>Picea pungens</i>	Blue spruce	Pinaceae	N
<i>Populus angustifolia</i>	Narrowleaf cottonwood	Salicaceae	N
<i>Ulmus pumila</i>	Siberian elm	Ulmaceae	I
<i>Elaeagnus angustifolia</i>	Russian Olive	Salicaceae	I
Shrubs/Subshrubs			
<i>Alnus incana</i> subsp. <i>Tenuifolia</i>	Alder	Betulaceae	N
<i>Shepherdia argentea</i>	Silver buffaloberry	Sherpherdia	N
<i>Amelanchier alnifolia</i>	Serviceberry	Rosaceae	N
<i>Chrysothamnus nauseosus</i>	Rubber rabbitbrush	Asteraceae	N
<i>Chrysothamnus viscidiflorus</i>	Green rabbitbrush	Asteraceae	N
<i>Cornus sericea</i> (C. <i>alba</i>)	Redosier dogwood	Cornaceae	N
<i>Crataegus erythropoda</i>	Red haw	Rosaceae	N
<i>Distegia involucrata</i> (Lonicera)	Twinberry, Bush honeysuckle	Caprifoliaceae	N
<i>Prunus virginiana</i> var. <i>melanocarpa</i>	Native chokecherry	Rosaceae	N
<i>Quercus gambelii</i>	Gambel oak	Fagaceae	N
<i>Ribes inerme</i>	Whitestem gooseberry	Grossulariaceae	N
<i>Prunus americana</i>	American plum	Rosaceae	N
<i>Rosa woodsii</i>	Wood rose	Rosaceae	N
<i>Salix exigua</i>	Sandbar willow	Salicaceae	N
<i>Salix frageilis</i>	Crack willow	Salicaceae	I
<i>Salix amygaloides</i>	Peach willow	Salicaceae	N
<i>Salix monticola</i>	Mountain willow	Salicaceae	N
<i>Betula occidentalis</i>	Water Birch	Betulaceae	N
Perennial Graminoids			

Bromus inermis	Smooth brome	Poaceae	I
Dactylis glomerata	Orchardgrass	Poaceae	I
Elytrigia repens	Quackgrass	Poaceae	I+
Festuca pretensis	Meadow fescue	Poaceae	I
Carex nebrascensis	Nebraska sedge	Carex	N
Carex rostrata	Beaked sedge	Carex	N
Carex pellita	Wooly sedge	Carex	N
Isolepis cernua	Nodding rush	Cyperaceae	N
Juncus articus subs. Ater(=J. balticu)	Baltic rush	Juncaceae	N
Juncus confusus	Colorado rush	Juncaceae	N
Pascopyrum smithii (Agropyron)	Western wheatgrass	Poaceae	N
Phalaris arundinacea	Reed Canarygrass	Poaceae	I/[N]
Poa pratensis	Kentucky bluegrass	Poaceae	I
Poa alpina	Alpine bluegrass	Poaceae	N

Perennial Forbs

Apocynum cannabinum	Indian dogbane	Apocynaceae	N
Asclepias speciosa	Showy milkweed	Asclepiadaceae	N
Asparagus officinalis	Asparagus	Liliaceae	I
Barbarea orthoceras	Wintercress	Brassicaceae	N
Cicuta maculata	Spotted water hemlock	Apiaceae	N
Cirsium arvense (Breea)	Canada Thistle	Asteraceae	I+
Clematis ligusticifolia	Western white clematis	Ranunculaceae	N
Convolvulus arvensis	Field bindweed	Convolvulaceae	I+
Epilobium angustifolium (Chaemerion)	Fireweed	Onagraceae	N
Heracleum sphondylium subsp. Montanum	Cow parsnip	Apiaceae	N
Leucanthemum vulgare (Chrysanthemum leucanthemum)	Ox-eye daisy	Asteraceae	I+
Medicago lupulina	Black medic	Fabaceae	I
Medicago sativa	Alfalfa	Fabaceae	I
Penstemon strictus	Rocky Mountain penstemon	Scrophulariaceae	N
Solidago velutina	Threenerve goldenrod	Asteraceae	N
Taraxacum officinale	Dandelion	Asteraceae	I

<i>Trifolium pratense</i>	Red clover	Fabaceae	I
<i>Urtica gracilis</i> subsp. <i>gracilis</i>	Stinging nettle	Urticaceae	N
<i>Veronicastrum serpyllifolia</i>	Thyme leaf speedwell	Scrophulariaceae	N
<i>Maianthemum racemosum</i>	False soloman's-seal	Maianthemum	N
<i>Vicia americana</i>	American vetch	Fabaceae	N

Ferns and Fern Allies

<i>Equisetum arvense</i>	Field horsetail	Equisetaceae	N
<i>Hippochaete hyemalis</i>	Scouring rush	Equisetaceae	N

Annual/Biennial Forbs

<i>Arctium minus</i>	Common burdock	Asteraceae	I+
<i>Carduus acanthoides</i>	Plumeless thistle	Asteraceae	I+
<i>Chenopodium album</i>	Lambs quarters	Chenopodiaceae	I
<i>Cynoglossum officinale</i>	Houndstongue	Boraginaceae	I+
<i>Lactuca serriola</i>	Prickly lettuce	Asteraceae	I
<i>Lepidium campestre</i>	Field cress	Brassicaceae	I
<i>Melilotus albus</i>	White sweet clover	Fabaceae	I
<i>Melilotus officinalis</i>	Yellow sweet clover	Fabaceae	I
<i>Sisymbrium altissimum</i>	Tumble mustard	Brassicaceae	I
<i>Tragopogon dubius</i>	Salsify	Asteraceae	I
<i>Verbascum thapsus</i>	Common mullein	Scrophulariaceae	I+
<i>Bromus tectorum</i>	Cheatgrass, Downy brome	Poaceae	I+

*Origin

N=Native, I=Introduced, I+
Colorado State listed Noxious
Weed

Table 2 – Potential State / Federal Threatened and Endangered Species

<u>Species (Common Name)</u>	<u>Scientific Name</u>	<u>Type</u>	<u>Listing</u>
Peregrine Falcon	<i>Falco peregrinus</i>	Bird	State Special Concern (SC)
Northern Leopard Frog	<i>Lithobates pipiens</i>	Amphibian	State Species of Concern (SC), USFWS Sensitive (S)
Tiger Salamander	<i>Ambystoma tigrinum stebbinsi</i>	Amphibian	USFWS Sensitive (S)
<u>Known or Suspected Animal List</u>			
American dipper	<i>Cinclus mexicanus</i>	Bird	N/A
American kestrel	<i>Falco sparverius</i>	Bird	N/A
American robin	<i>Turdus migratorius</i>	Bird	N/A
Bald eagle	<i>Haliaeetus leucocephalus</i>	Bird	N/A
Black-billed magpie	<i>Pica hudsonia</i>	Bird	N/A
Black-capped chickadee	<i>Poecile atricapillus</i>	Bird	N/A
Blue wing teal	<i>Anas discors</i>	Bird	N/A
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>	Bird	N/A
Canada goose	<i>Branta canadensis</i>	Bird	N/A
Chipping sparrow	<i>Spizella passerina</i>	Bird	N/A
Cinnamon teal	<i>Anas cyanoptera</i>	Bird	N/A
Common raven	<i>Common raven</i>	Bird	N/A
Cooper's hawk	<i>Accipiter cooperii</i>	Bird	N/A
Cordilleran flycatcher	<i>Empidonax occidentalis</i>	Bird	N/A
Common snipe	<i>Gallinago gallinago</i>	Bird	N/A
Dark-eyed junco	<i>Junco hyemalis</i>	Bird	N/A
Downey woodpecker	<i>Picoides pubescens</i>	Bird	N/A
Dusky flycatcher	<i>Empidonax oberholseri</i>	Bird	N/A
Fox sparrow	<i>Passerella iliaca</i>	Bird	N/A
Great blue heron	<i>Ardea herodias</i>	Bird	N/A
Great horned owl	<i>Bubo virginianus</i>	Bird	N/A
Green-tailed towhee	<i>Pipilo chlorurus</i>	Bird	N/A
Green-winged teal	<i>Anas carolinensis</i>	Bird	N/A
Hairy woodpecker	<i>Leuconotopicus villosus</i>	Bird	N/A
House finch	<i>Haemorhous mexicanus</i>	Bird	N/A
House wren	<i>Troglodytes aedon</i>	Bird	N/A
Lewis' woodpecker	<i>Melanerpes lewis</i>	Bird	N/A

Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bird	N/A
MacGillivray's warbler	<i>Geothlypis tolmiei</i>	Bird	N/A
Mallard	<i>Anas platyrhynchos</i>	Bird	N/A
Mountain dove	<i>Spilopelia chinensis</i>	Bird	N/A
Mountain bluebird	<i>Sialia currucoides</i>	Bird	N/A
Mountain chickadee	<i>Poecile gambeli</i>	Bird	N/A
Peregrine falcon	<i>Falco peregrinus</i>	Bird	N/A
Plumbeous vireo	<i>Vireo plumbeus</i>	Bird	N/A
Northern flicker	<i>Colaptes auratus</i>	Bird	N/A
Red-tailed hawk	<i>Buteo jamaicensis</i>	Bird	N/A
Red-winged blackbird	<i>Agelaius phoeniceus</i>	Bird	N/A
Ruby-crowned kinglet	<i>Regulus calendula</i>	Bird	N/A
Song sparrow	<i>Melospiza melodia</i>	Bird	N/A
Spotted sandpiper	<i>Actitis macularius</i>	Bird	N/A
Stellar's jay	<i>Cyanocitta stelleri</i>	Bird	N/A
Townsend's solitaire	<i>Myadestes townsendi</i>	Bird	N/A
Tree swallow	<i>Tachycineta bicolor</i>	Bird	N/A
Vesper sparrow	<i>Pooecetes gramineus</i>	Bird	N/A
Western tanager	<i>Piranga ludoviciana</i>	Bird	N/A

Table 2 – Potential State and Federal Threatened and Endangered Species (cont.)

<u>Species (Common Name)</u>	<u>Scientific Name</u>	<u>Type</u>	<u>Listing</u>
White-breasted nuthatch	<i>Sitta carolinensis</i>	Bird	N/A
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	Bird	N/A
Yellow warbler	<i>Setophaga petechia</i>	Bird	N/A
Yellow-rumped warbler	<i>Setophaga coronata</i>	Bird	N/A
American beaver	<i>Castor canadensis</i>	Mammal	N/A
Big brown bat	<i>Eptesicus fuscus</i>	Mammal	N/A
Black bear	<i>Ursus americanus</i>	Mammal	N/A
Bobcat	<i>Lynx rufus</i>	Mammal	N/A
Bushy-tailed woodrat	<i>Neotoma cinerea</i>	Mammal	N/A
Common muskrat	<i>Ondatra zibethicus</i>	Mammal	N/A
Squirrel	<i>Sciuridae</i>	Mammal	N/A
Common porcupine	<i>Erethizon dorsatum</i>	Mammal	N/A
Coyote	<i>Canis latrans</i>	Mammal	N/A

Deer mouse	<i>Peromyscus</i>	Mammal	N/A
Elk	<i>Cervus canadensis</i>	Mammal	N/A
Ermine or short-tailed weasel	<i>Mustela erminea</i>	Mammal	N/A
Golden-mantled ground squirrel	<i>Callospermophilus lateralis</i>	Mammal	N/A
Hoary bat	<i>Lasiurus cinereus</i>	Mammal	N/A
Least chipmunk	<i>Tamias minimus</i>	Mammal	N/A
Little brown myotis	<i>Myotis lucifugus</i>	Mammal	N/A
Long-legged myotis	<i>Myotis volans</i>	Mammal	N/A
Long-tailed weasel	<i>Mustela frenata</i>	Mammal	N/A
Meadow vole	<i>Microtus pennsylvanicus</i>	Mammal	N/A
Montane vole	<i>Microtus montanus</i>	Mammal	N/A
Mountain lion	<i>Puma concolor</i>	Mammal	N/A
Mule deer	<i>Odocoileus hemionus</i>	Mammal	N/A
Northern pocket gopher	<i>Thomomys talpoides</i>	Mammal	N/A
Raccoon	<i>Procyon lotor</i>	Mammal	N/A
Silver-haired bat	<i>Lasionycteris noctivagans</i>	Mammal	N/A
Striped skunk	<i>Mephitis mephitis</i>	Mammal	N/A
Rainbow trout	<i>Oncorhynchus mykiss</i>	Fishes	N/A
Brown trout	<i>Salmo trutta</i>	Fishes	N/A
Brooke trout	<i>Salvelinus fontinalis</i>	Fishes	N/A
Colorado Cutthroat Trout	<i>Oncorhynchus clarki pleuriticus</i>	Fishes	N/A
Mountain Whitefish	<i>Prosopium williamsoni</i>	Fishes	N/A

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American robin	<i>Turdus migratorius</i>	Bird	N/A

CRYSTAL RIVER RESTORATION | RIVERFRONT PARK

GARFIELD COUNTY, COLORADO

November 2018

Bald eagle	<i>Haliaeetus leucocephalus</i>	Bird	N/A
Black-billed magpie	<i>Pica hudsonia</i>	Bird	N/A
Black-capped chickadee	<i>Poecile atricapillus</i>	Bird	N/A
Blue wing teal	<i>Anas discors</i>	Bird	N/A
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Hairy woodpecker	<i>Leuconotopicus villosus</i>	Bird	N/A
House finch	<i>Haemorhous mexicanus</i>	Bird	N/A
House wren	<i>Troglodytes aedon</i>	Bird	N/A
Lewis' woodpecker	<i>Melanerpes lewis</i>	Bird	N/A
Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bird	N/A
MacGillivray's warbler	<i>Geothlypis tolmiei</i>	Bird	N/A
Mallard	<i>Anas platyrhynchos</i>	Bird	N/A
Mountain dove	<i>Spilopelia chinensis</i>	Bird	N/A
Mountain bluebird	<i>Sialia currucoides</i>	Bird	N/A
Mountain chickadee	<i>Poecile gambeli</i>	Bird	N/A
Orange-Crowned warbler	<i>Vermivora celata</i>	Bird	N/A
Osprey	<i>Pandion haliaetus</i>	Bird	N/A
Peregrine falcon	<i>Falco peregrinus</i>	Bird	N/A
Plumbeous vireo	<i>Vireo plumbeus</i>	Bird	N/A
Northern flicker	<i>Colaptes auratus</i>	Bird	N/A
Red-tailed hawk	<i>Buteo jamaicensis</i>	Bird	N/A
Red-winged blackbird	<i>Agelaius phoeniceus</i>	Bird	N/A

Ruby-crowned kinglet	<i>Regulus calendula</i>	Bird	N/A
Song sparrow	<i>Melospiza melodia</i>	Bird	N/A
Spotted sandpiper	<i>Actitis macularius</i>	Bird	N/A
Stellars jay	<i>Cyanocitta stelleri</i>	Bird	N/A
Townsend's solitaire	<i>Myadestes townsendi</i>	Bird	N/A
Tree swallow	<i>Tachycineta bicolor</i>	Bird	N/A
Vesper sparrow	<i>Pooecetes gramineus</i>	Bird	N/A
Western tanager	<i>Piranga ludoviciana</i>	Bird	N/A
Table 2 – Potential State and Federal Threatened and Endangered Species (cont.)			
Species (Common Name)	Scientific Name	Type	Listing
White-breasted nuthatch	<i>Sitta carolinensis</i>	Bird	N/A
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	Bird	N/A
Wild turkey	<i>Meleagris gallopavo silvestris</i>	Bird	N/A
Yellow warbler	<i>Setophaga petechia</i>	Bird	N/A
Yellow-rumped warbler	<i>Setophaga coronata</i>	Bird	N/A
American beaver	<i>Castor canadensis</i>	Mammal	N/A
Big brown bat	<i>Eptesicus fuscus</i>	Mammal	N/A
Black bear	<i>Ursus americanus</i>	Mammal	N/A
Bobcat	<i>Lynx rufus</i>	Mammal	N/A
Bushy-tailed woodrat	<i>Neotoma cinerea</i>	Mammal	N/A
Common muskrat	<i>Ondatra zibethicus</i>	Mammal	N/A
Squirrel	<i>Sciuridae</i>	Mammal	N/A
Common porcupine	<i>Erethizon dorsatum</i>	Mammal	N/A
Coyote	<i>Canis latrans</i>	Mammal	N/A
Deer mouse	<i>Peromyscus</i>	Mammal	N/A
Elk	<i>Cervus canadensis</i>	Mammal	N/A
Ermine or short-tailed weasel	<i>Mustela erminea</i>	Mammal	N/A
Golden-mantled ground squirrel	<i>Callospermophilus lateralis</i>	Mammal	N/A
Hoary bat	<i>Lasiurus cinereus</i>	Mammal	N/A
Least chipmunk	<i>Tamias minimus</i>	Mammal	N/A
Little brown myotis	<i>Myotis lucifugus</i>	Mammal	N/A
Long-legged myotis	<i>Myotis volans</i>	Mammal	N/A
Long-tailed weasel	<i>Mustela frenata</i>	Mammal	N/A
Meadow vole	<i>Microtus pennsylvanicus</i>	Mammal	N/A
Montane vole	<i>Microtus montanus</i>	Mammal	N/A

CRYSTAL RIVER RESTORATION | RIVERFRONT PARK

GARFIELD COUNTY, COLORADO

November 2018

Mountain lion	Puma concolor	Mammal	N/A
Mule deer	Odocoileus hemionus	Mammal	N/A
Northern pocket gopher	Thomomys talpoides	Mammal	N/A
Raccoon	Procyon lotor	Mammal	N/A
Silver-haired bat	Lasionycteris noctivagans	Mammal	N/A
Striped skunk	Mephitis mephitis	Mammal	N/A
Rainbow trout	Oncorhynchus mykiss	Fishes	N/A
Brown trout	Salmo trutta	Fishes	N/A
Brooke trout	Salvelinus fontinalis	Fishes	N/A
Colorado Cutthroat Trout	Oncorhynchus clarki pleuriticus	Fishes	N/A
Mountain Whitefish	Prosopium williamsoni	Fishes	N/A
Source: Hanks, Bill. An Inventory and Assessment of Wildlife Habitat, Crystal River Valley, May 2007.			

Appendix B: 2015 Colorado Wetland Ecological Integrity Assessment (EIA)

2015 COLORADO WETLAND ECOLOGICAL INTEGRITY ASSESSMENT (EIA) – SITE INFORMATION

LOCATION AND GENERAL INFORMATION			
Site ID: <u>CR - 1</u>	Site Name: <u>Crystal River Restoration</u>	LEVEL 2.5 ASSESSMENT	
Date: <u>July 26, 2018</u>	Surveyors: <u>Jeremy Allinson</u>		
General Location: <u>Near the Town of Carbondale (1.15 miles south)</u> County: <u>Garfield County</u>			
General Ownership: <u>Town of Carbondale</u> Specific Ownership: <u>Town of Carbondale</u>			
Directions to Point: From the Town of Carbondale proceed south on Highway 133, go east southeast on Crystal Bridge Drive, cross bridge and site is located upstream on both sides of river.			
Access Comments (note permit requirements or difficulties accessing the site): Contact the Town of Carbondale prior to visit for access constraints.			
GPS COORDINATES OF TARGET POINT AND ASSESSMENT AREA			
Dimensions of AA: <input type="checkbox"/> 40-m radius circle <input checked="" type="checkbox"/> Freeform polygon, limited to 0.5 ha <input type="checkbox"/> Wetland boundary, other (note in comments)		Elevation (m): <u>1893 m or 6,200 ft</u> Slope (deg): <u>1 deg (2%)</u> Aspect (deg): <u>320 deg</u>	
AA-Center WP #: _____ UTM E: <u>309726</u> UTM N: <u>4362009</u> Error (+/-): <u>13.2 ft.</u> (Circle AAs Only)			
AA-1 WP #: _____ UTM E: <u>392308</u> UTM N: <u>4361916</u> Error (+/-): <u>11.8 ft</u>			
AA-2 WP #: _____ UTM E: <u>392309</u> UTM N: <u>4361711</u> Error (+/-): <u>11.5 ft.</u>			
AA-3 WP #: _____ UTM E: <u>310102</u> UTM N: <u>4361499</u> Error (+/-): <u>11.5 ft</u>			
AA-4 WP #: _____ UTM E: _____ UTM N: _____ Error (+/-): <u>12.2 ft</u>			
AA-Track Track Name: <u>Assessment Area 1 and AA 2</u> Area: <u>13.96 acres</u>			
AA Placement and Dimensions Comments: AA 1-4 represent degraded riparian habitat of the area. AA includes the entire Assessment Area on the west side of the river.			
PHOTOS OF ASSESSMENT AREA (Taken at four points on edge of AA looking in. Record WPs of each photo in table above.)			
AA-1 Photo #: <u>162</u> Aspect: <u>180 deg</u> AA-2 Photo #: <u>163</u> Aspect: <u>180 deg</u> AA-3 Photo #: _____ Aspect: _____ AA-4 Photo #: _____ Aspect: _____		Photo Range: <u>3884 - 4309</u> Comments: <u>None</u>	

ENVIRONMENTAL DESCRIPTION AND CLASSIFICATION OF ASSESSMENT AREAWetland / riparian / upland inclusions: (should = 100%)5 % AA with true wetland and/or water95 % AA with non-wetland riparian arean/a % AA with upland inclusionsWetland origin: (if known)☐ Natural feature with minimal alteration☒ Natural feature, but altered or augmented by modification☐ Non-natural feature created by passive or active management☐ UnknownEcological System: (see manual for key and pick the *best match*)

Fidelity: High Med Low

Cowardin Classification Fidelity: High Med Low(see manual and pick *one each* of System, Class, Water Regime, and optional Modifier for dominant type)

Palustrine Forested / Scrub Shrub / Emergent

HGM Class: (pick *only one*) Fidelity: High Med Low☒ Riverine* ☐ Lacustrine Fringe☐ Depressional ☐ Slope☐ Flats ☐ Novel (Irrigation-Fed) Riverine / Slope**Specific classification and metrics apply to the Riverine HGM Class***RIVERINE SPECIFIC CLASSIFICATION OF THE ASSESSMENT AREA**Confined vs. Unconfined Valley Setting☐ Confined Valley Setting (valley width < 2x bankfull width)☒ Unconfined Valley Setting (valley width ≥ 2x bankfull width)Stream Flow Duration☒ Perennial☐ Intermittent☐ EphemeralProximity to Channel☐ AA includes the channel and both banks☒ AA is adjacent to or near the channel (< 50 m) and evaluation includes one or both banks☐ AA is > 50 m from the channel and banks were not evaluatedStream Depth at Time of Survey (if evaluated)☒ Wadeable☐ Non-wadeable**MAJOR ZONES WITHIN THE ASSESSMENT AREA** (See manual for rules and definitions. Mark each zone on the site sketch.)Zone 1 Description Scrub Shrub Riparian Dom spp: UPDATE % of AA: _____Zone 2 Description Forested Riparian Dom spp: UPDATE % of AA: _____Zone 3 Description Palustrine Emergent Dom spp: UPDATE % of AA: _____

Zone 4 Description _____ Dom spp: _____ % of AA: _____

Zone 5 Description _____ Dom spp: _____ % of AA: _____

ENVIRONMENTAL AND CLASSIFICATION COMMENTS

Classification Issues (important for sites with medium or low fidelity to one or more classification systems):

The vegetation has been modified in some areas from it's pre-disturbance condition.

AA REPRESENTATIVENESSIs AA the entire wetland/riparian area? ☒ Yes ☐ No*If no*, is AA representative of larger wetland/riparian area? ☐ Yes ☐ No ☐ NA (if AA is the entire wetland)

Comments:

ASSESSMENT AREA DRAWING

Add north arrow and approx. scale bar. Document **habitat features** and **biotic and abiotic zones** (particularly open water), inflows and outflows, and indicate direction of drainage. Include location of **AA points**, **soil pits**, and **water chemistry** samples. If appropriate, add a **cross-sectional diagram** and indicate slope of side.



ASSESSMENT AREA DESCRIPTION AND COMMENTS

Overall site description and details on site hydrology, soil, and vegetation.

LEVEL 2.5 VEGETATION, SOILS & BASIC WATER CHEMISTRY

[illegible]

VEGETATION PLOT SPECIES TABLE

Cover Classes 1: trace 2: <1% 3: 1-<2% 4: 2-<5% 5: 5-<10% 6: 10-<25% 7: 25-<50% 8: 50-<75% 9: 75-<95% 10: >95%

[illegible]

GROUND COVER BY HABITAT TYPE*Estimate cover of each ground cover by habitat type. Estimate cover based on 1% or 5% increments (not cover classes).*

Cover (unless otherwise noted) →	C	Comments
Actual cover of water (any depth, vegetated or not, standing or flowing) (A+B+C below)		minimal surface water present
Actual cover of open water zone and no vegetation (or only algae) (A)		
Actual cover of water zone with emergent vegetation (B)	<1%	
Actual cover of water zone with submergent / floating vegetation (C)		
Actual predominant <u>depth</u> of water (cm)		
Actual max <u>depth</u> of water (cm)		
Potential cover of water at ordinary high water		
Potential predominant <u>depth</u> at ordinary high water (cm)		
Stability of water level (<i>Pick one</i> : A: permanent and stable / B: permanent but fluctuates / C: intermittent or ephemeral)	B	
Cover of exposed bare ground (any substrate, can have algae cover)	<5%	
Cover of litter (all cover, <u>including under water or vegetation</u>)	15%	
<u>Depth</u> of litter (cm) – average of four non-trampled locations where litter occurs	2-5cm	
<u>Count</u> of standing dead trees (>25 cm diameter at breast height)	13	
Cover of standing dead shrubs or small trees (<25 cm diameter at breast height)	0**	
Cover of downed coarse woody debris (fallen trees, rotting logs, >25 cm diameter)	9	
Cover of downed fine woody debris (<25 cm diameter)	0**	
Cover bryophytes (all cover, <u>including under water, vegetation or litter cover</u>)	<3%	
Cover lichens (all cover, <u>including under water, vegetation or litter cover</u>)	0%	
Cover algae (all cover, <u>including under water, vegetation or litter cover</u>)	0%	

VERTICAL STRATA BY HABITAT TYPE*Estimate cover of each vertical strata by habitat type. Estimate height using classes. Estimate cover base on 1% or 5% increments (not classes).*

Height Classes 0: <0.2 m 1: 0.2–0.5 m 2: 0.5–1m 3: 1–2 m 4: 2–5 m 5: 5–10 m 6: 10–15 m 7: 15–20 m 8: 20–35 m 9: 35–50 m 10: >50 m

Vertical Vegetation Strata (live or very recently dead)	Height / Cover →	H	C	Comments
(T1) Dominant canopy trees (>5 m and >~ 30% cover)	Populus angustifolia	7	15%	
(T2) Sub-canopy trees (> 5m but < dominant canopy height) or trees with sparse cover	Elaeagnus angustifolia	5	8%	
(S1) Tall shrubs, tree saplings or seedling (>2 m)	Alnus incana subsp. Tenuifolia, Salix exigua	5	40%	
(S2) Short shrubs (<2 m)	Ribes inerme	3	30%	
(HT) Herbaceous total	Variety of species	1	42%	
(H1) Graminoids (grass and grass-like plants)	Variety of species	1	38%	
(H2) Forbs (all non-graminoids)	Variety of species	1	2%	
(AQ) Submergent or floating aquatics		--	0	

SOIL PROFILE DESCRIPTION – SOIL PIT 1							<input type="checkbox"/> Representative Pit?		WP # _____	Photo #s _____	(mark on site sketch)		
Depth to saturated soil (+/-cm): _____									Depth to free water (+/-cm): _____		<input type="checkbox"/> Pit dry and groundwater not observed		Settling Time: _____
Horizon (optional)	Depth (cm)	Matrix Color (moist)	Dominant Redox Features Color (moist) %		Secondary Redox Features Color (moist) %		Texture	Remarks (<i>note % visible salts in each layer</i>)					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
Hydric Soil Indicators: See field manual for descriptions and check all that apply to pit.												Major Soil Type:	
<input type="checkbox"/> Histosol (A1)			<input type="checkbox"/> Gleyed Matrix (S4/F2)									<input type="checkbox"/> Histosol	
<input type="checkbox"/> Histic Epipedon (A2/A3)			<input type="checkbox"/> Depleted Matrix (A11/A12/F3)									<input type="checkbox"/> Histic Epipedon	
<input type="checkbox"/> Mucky Mineral (S1/F1)			<input type="checkbox"/> Redox Features (S5/F6/F8/S6/F7)									<input type="checkbox"/> Clayey/Loamy	
<input type="checkbox"/> Hydrogen Sulfide Odor (A4)			<input type="checkbox"/> No Hydric Indicators									<input type="checkbox"/> Sandy	
SOIL PROFILE DESCRIPTION – SOIL PIT 2							<input type="checkbox"/> Representative Pit?		WP # _____	Photo #s _____	(mark on site sketch)		
Depth to saturated soil (+/-cm): _____									Depth to free water (+/-cm): _____		<input type="checkbox"/> Pit dry and groundwater not observed		Settling Time: _____
Horizon (optional)	Depth (cm)	Matrix Color (moist)	Dominant Redox Features Color (moist) %		Secondary Redox Features Color (moist) %		Texture	Remarks (<i>note % visible salts in each layer</i>)					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
_____	_____	_____	_____	_____	_____	_____	_____	_____					
Hydric Soil Indicators: See field manual for descriptions and check all that apply to pit.										Comments:		Major Soil Type:	
<input type="checkbox"/> Histosol (A1)			<input type="checkbox"/> Gleyed Matrix (S4/F2)							<input type="checkbox"/> Histosol			
<input type="checkbox"/> Histic Epipedon (A2/A3)			<input type="checkbox"/> Depleted Matrix (A11/A12/F3)							<input type="checkbox"/> Histic Epipedon			
<input type="checkbox"/> Mucky Mineral (S1/F1)			<input type="checkbox"/> Redox Features (S5/F6/F8/S6/F7)							<input type="checkbox"/> Clayey/Loamy			
<input type="checkbox"/> Hydrogen Sulfide Odor (A4)			<input type="checkbox"/> No Hydric Indicators							<input type="checkbox"/> Sandy			

[illegible]

2015 COLORADO WETLAND ECOLOGICAL INTEGRITY ASSESSMENT (EIA) – METRICS

LANDSCAPE METRICS			
L1. CONTIGUOUS NATURAL LAND COVER		L2. LAND USE INDEX	
Select the statement that best describes the contiguous natural land cover within the 500 m envelope surrounding the AA. See list of natural land covers in the field manual.		Select the statement that best describes the intensity of surrounding land use. Use the Land Use Index Worksheet (last page) to calculate the Land Use Index score.	
Intact: AA embedded in 90–100% contiguous natural land cover.	A	Land Use Index = 9.5–10.0	A
Variegated: AA embedded in 60–90% contiguous natural land cover.	B	Land Use Index = 8.0–9.4	B
Fragmented: AA embedded in 20–60% contiguous natural land cover.	C	Land Use Index = 4.0–7.9	C
Relictual: AA embedded within <20% contiguous natural land cover.	D	Land Use Index = <4.0	D
Landscape comments:			
BUFFER METRICS			
B1. PERIMETER WITH NATURAL BUFFER		B2. WIDTH OF NATURAL BUFFER	
Select the statement that best describes the perimeter of the AA with natural buffer . Buffer land covers must be ≥ 5 m wide and extend along ≥ 10 m of the AA perimeter. See list of buffer land covers in the field manual.		Select the statement that best describes the width of the natural buffer . Estimate the width of buffer land covers along eight lines radiating out from the AA at the cardinal and ordinal directions (N, NE, E, SE, S, SW, W, NW) and average their width. Estimate up to 100 m.	
Natural buffer surrounds 100% of the AA perimeter.	A	Average buffer width is 100 m	A
Natural buffer surrounds 75–99% of the AA perimeter.	B	Average buffer width is 75–99 m	B
Natural buffer surrounds 25–74% of the AA perimeter.	C	Average buffer width is 25–74 m	C
Natural buffer surrounds <25% of the AA perimeter.	D	Average buffer width is <25 m	D
B3. CONDITION OF NATURAL BUFFER			
Select the statement that best describes the natural buffer condition . Select one statement per column. Only consider <u>the actual natural buffer</u> measured in metrics above. <i>Remember to look for non-native hay grasses when evaluating native / non-native vegetation in the buffer.</i>			
Abundant (≥95%) relative cover native vegetation and little or no (<5%) cover of non-native plants.	A	Intact soils, no water quality concerns, little or no trash, AND little or no evidence of human visitation.	A
Substantial (75–95%) relative cover of native vegetation and low (5–25%) cover of non-native plants.	B	Intact or minor soil disruption, minor water quality concerns, moderate or lesser amounts of trash, AND/OR minor intensity of human visitation or recreation.	B
Low (25–75%) relative cover of native vegetation and moderate to substantial (25–75%) cover of non-native plants.	C	Moderate or extensive soil disruption, moderate to strong water quality concerns, moderate or greater amounts of trash, AND/OR moderate intensity of human use.	C
Very low (<25%) relative cover of native vegetation and dominant (>75% cover) of non-native plants OR no buffer exists.	D	Barren ground and highly compacted or otherwise disrupted soils, significant water quality concerns, substantial amounts of trash, extensive human use, OR no buffer exists.	D
Buffer comments:			

VEGETATION COMPOSITION METRICS

V1. NATIVE PLANT SPECIES COVER (RELATIVE)

V2. INVASIVE NONNATIVE PLANT SPECIES COVER (ABSOLUTE)

Select the statement that best describes the relative cover of **native plant species** within the AA.

Select the statement that best describes the absolute cover of **invasive nonnative plant species** within the AA. Use list provided in the manual.

AA contains >99% relative cover of native plant species.

A

Invasive nonnative species are absent from all strata.

A

AA contains 95–99% relative cover of native plant species.

B

Invasive species present, but sporadic (<4% absolute cover).

B

AA contains 85–95% relative cover of native plant species.

C

Noxious weeds somewhat abundant (4–10% cover).

C

AA contains 60–85% relative cover of native plant species.

C-

Noxious weeds abundant (10–30% cover).

C-

AA contains <60% relative cover of native plant species.

D

Noxious weed very abundant (>30% cover).

D

V3. NATIVE PLANT SPECIES COMPOSITION

Select the statement that best describes the **native plant species composition** (species abundance and diversity) within the AA. Look for native species diagnostic of the system vs. native increasers that may thrive in human disturbance.

Native plant species composition with expected natural conditions:

- i) Typical range of native diagnostic species present, AND
- ii) Native species sensitive to anthropogenic degradation are present, AND
- iii) Native species indicative of anthropogenic disturbance (i.e., increasers, weedy or ruderal species) absent to minor.

A

Native plant species composition with minor disturbed conditions:

- i) Some native diagnostic species absent or substantially reduced in abundance, OR
- ii) Native species indicative of anthropogenic disturbance are present with low cover.

B

Native plant species composition with moderately disturbed conditions:

- i) Many native diagnostic species absent or substantially reduced in abundance, OR
- ii) Native species indicative of anthropogenic disturbance are present with moderate cover.

C

Native plant species composition with severely disturbed conditions:

- i) Most or all native diagnostic species absent, a few remain in low cover, OR
- ii) Native species indicative of anthropogenic disturbance are present with high cover.

D

Vegetation composition comments:

VEGETATION STRUCTURE METRICS

V4. VEGETATION STRUCTURE (VERTICAL AND HORIZONTAL)

Select the statement below that best describes the **overall vertical and horizontal structure** within the AA. Vertical structure relates to the number of vertical vegetation strata. Horizontal structure relates to the number and complexity of biotic and abiotic patches within the wetland/riparian area. See reference card for potential structural patches. Assess each site based on the expected conditions within its Ecological System type. For woody systems, rate regeneration and woody debris individually on next page, then consider those ratings in the overall assessment of structure.

Herbaceous systems: Marsh, Meadow, Playa

Woody systems: Riparian and Floodplain

General: Vegetation structure is at or near minimally disturbed natural conditions. Little to no structural indicators of degradation evident.

Structural patches/zones are appropriate in number and type for the system (can be few in playas, fens, meadows). There is diversity in vertical strata within the herbaceous vegetation (some tall and some short layers and/or low cover of shrubs or trees, where appropriate). Litter and other organic inputs are typical of the system (i.e., playas should have low litter while meadows and marshes should have moderate amounts of litter).

AA is characterized by a complex array of nested or interspersed patches. Canopy (if present) contains a mosaic of different ages or sizes, including large old trees and obvious regeneration. Number of live stems is well within expected range. Shrub and herbaceous layers are complex, providing a diversity of vertical strata. Woody species are of sufficient size and density to provide future woody debris to stream or floodplain. Litter layer is neither lacking nor extensive.

A

<i>General: Vegetation structure shows minor alterations from natural conditions.</i>				B
Marshes: cattail and bulrush density may prevent animal movement in some areas of the wetland, but not throughout. Meadows: grazing and mowing have minor effects. Playas: natural areas of bare ground are still prevalent, though non-native or weedy species may be encroaching.		AA is characterized by a moderate array of nested or interspersed zones with no single dominant zone, though some structural patches (especially open zones) may be missing. Canopy still heterogeneous in age or size, but may be missing some age classes. Vertical strata may be somewhat less complex than natural conditions. Woody debris or litter may be somewhat lacking.		
<i>General: Vegetation structure is moderately altered from natural conditions.</i>				C
Marshes: cattail and bulrush density may prevent animal movement in half or more of the wetland. Meadows: grazing and mowing have moderate effects. Playas: natural areas of bare ground are present, but non-native or weedy species have filled in many area.		AA is characterized by a simple array of nested or interspersed zones. One zone may dominate others. Vertical strata may be moderately less complex than natural conditions. Site may be denser than natural conditions (due to non-native woody species) or may be more open and decadent. Woody debris or litter may be moderately lacking.		
<i>General: Vegetation structure is greatly altered from natural conditions.</i>				D
Marshes: cattail and bulrush density prevent animal movement throughout the wetland. Meadows: grazing and mowing greatly affect the structure of the vegetation and prevalence of litter. Playas: natural areas of bare ground are absent due to an abundance of non-native or weedy species.		AA is characterized by one dominant zone and several expected structural patches or vertical strata are missing. Site is either extremely dense with non-native woody species or open with predominantly decadent or dead trees. Woody debris and/or litter may be absent entirely or may be excessive due to decadent trees.		
V5. REGENERATION OF NATIVE WOODY SPECIES		V6. COARSE AND FINE WOODY DEBRIS		
Select the statement that best describes the regeneration of native woody species within the AA.		Select the statement that best describes coarse and fine woody debris within the AA.		
Woody species are naturally uncommon or absent.	NA	There are no obvious inputs of woody debris or woody species are naturally uncommon.	NA	
All age classes of <i>native</i> woody species present. Native tree saplings /seedlings and shrubs common to the type present in expected amounts and diversity. Regeneration is obvious.	A	AA characterized by moderate amount of coarse and fine woody debris, relative to expected conditions. There is wide size-class diversity of standing snags and downed logs in various stages of decay. For riverine wetlands, debris is sufficient to trap sediment, but does not inhibit stream flow. For non-riverine wetlands, woody debris provides structural complexity, but does not overwhelm the site.	A/B	
Age classes of <i>native</i> woody species restricted to mature individuals and young sprouts. Middle age groups appear to be absent or there is some other indication that regeneration is moderately impacted.	B			
<i>Native</i> woody species comprised of mainly mature individuals OR mainly evenly aged young sprouts that choke out other vegetation. Regeneration is obviously impacted. Site may contain Russian Olive and/or Salt Cedar.	C	AA characterized by small amounts of woody debris OR debris is somewhat excessive. For riverine wetlands, lack of debris may affect stream temperatures and reduce available habitat.	C	
<i>Native</i> woody species predominantly consist of decadent or dying individuals OR are absent from an area that should be wooded. Site may be dominated by Russian Olive / Salt Cedar.	D	AA lacks woody debris, even though inputs are available.	D	
Vegetation structure comments (including regeneration and woody debris):				

HYDROLOGY METRICS**H1. WATER SOURCE**

Check off all *major* water sources in the table to the right. Select the statement below that best describes the **water sources** feeding the AA during the growing season.

<input checked="" type="checkbox"/>	Overbank flooding	<input type="checkbox"/>	Irrigation via direct application
<input checked="" type="checkbox"/>	Alluvial aquifer	<input type="checkbox"/>	Irrigation via seepage
<input type="checkbox"/>	Groundwater discharge	<input type="checkbox"/>	Irrigation via tail water run-off
<input type="checkbox"/>	Natural surface flow	<input type="checkbox"/>	Urban run-off / culverts
<input type="checkbox"/>	Precipitation	<input type="checkbox"/>	Pipes (directly feeding wetland)
<input type="checkbox"/>	Snowmelt	<input type="checkbox"/>	Other:

Water sources are natural. Site hydrology is fed by precipitation, groundwater, natural runoff, or natural flow from an adjacent freshwater body. The system may naturally lack water at times, even for several years. There is no indication of direct artificial water sources, either point sources or non-point sources. Land use in the local watershed is primarily open space or low density, passive use with little irrigation.

A

Water sources are mostly natural, but also include occasional or small amounts of inflow from anthropogenic sources. Indications of anthropogenic sources include developed land or irrigated agriculture that comprises < 20% of the immediate drainage area, some road runoff, small storm drains or other minor point source discharges. No large point sources control the overall hydrology.

B

Water sources are moderately impacted by anthropogenic sources, but are still a mix of natural and non-natural sources. Indications of moderate contribution from anthropogenic sources include developed land or irrigated agriculture that comprises 20–60% of the immediate drainage area or moderate point source discharges into the wetland, such as many small storm drains or a few large ones or many sources of irrigation runoff. The key factors to consider are whether the wetland is located in a landscape position that supported wetlands before irrigation / development *AND* whether the wetland is still connected to its natural water source (e.g., modified ponds on a floodplain that are still connected to alluvial aquifers or natural stream channels that now receive substantial irrigation return flows).

C

Water sources are primarily from anthropogenic sources (e.g., urban runoff, direct irrigation, pumped water, artificially impounded water, or another artificial hydrology). Indications of substantial artificial hydrology include developed or irrigated agricultural land that comprises > 60% of the immediate drainage basin of the AA, or the presence of major drainage point source discharges that obviously control the hydrology of the AA. The key factors to consider are whether the wetland is located in a landscape position that likely never supported a wetland prior to human development *OR* did support a wetland, but is now disconnected from its natural water source. The reason the wetland exists is because of direct irrigation, irrigation seepage, irrigation return flows, urban storm water runoff, or direct pumping.

D

Water source comments:

H2. HYDROPERIOD

Select the statement below that best describes the **hydroperiod** within the AA (extent and duration of inundation and/or saturation). Search the AA and 500 m envelope for hydrologic stressors (see list on following pages). Use best professional judgment to determine the overall condition of the hydroperiod. For some wetlands, this may mean that water is being channelized or diverted away from the wetland. For others, water may be concentrated or increased. *Please add comments on next page.*

Hydroperiod is characterized by natural patterns of inundation/saturation and drawdown and/or flood frequency, duration, level and timing. There are no major hydrologic stressors that impact the natural hydroperiod. Riparian channels are characterized by equilibrium conditions with no evidence of severe aggradation or degradation indicative of altered hydrology.

A

Hydroperiod inundation and drying patterns deviate slightly from natural conditions due to presence of stressors such as: flood control/water storage dams upstream; berms or roads at/near grade; minor pugging by livestock; small ditches or diversions removing water; or minor flow additions from irrigation return flow or storm water runoff. Outlets may be slightly constricted, but not to significantly slow outflow. Riparian channels may have some sign of aggradation or degradation, but approach equilibrium conditions. Playas are not significantly impacted pitted or dissected. *If wetland is artificially controlled*, the management regime closely mimics a natural analogue (it is very unusual for a purely artificial wetland to be rated in this category).

B

Hydroperiod inundation and drying patterns deviate moderately from natural conditions due to presence of stressors such as: flood control/water storage dams upstream or downstream that moderately effect hydroperiod; two lane roads; culverts adequate for base stream flow but not flood flow; moderate pugging by livestock that could channelize or divert water; shallow pits within playas; ditches or diversions 1–3 ft. deep; or moderate flow additions. Outlets may be moderately constricted, but flow is still possible. Riparian channels may show distinct signs of aggradation or degradation. *If wetland is artificially controlled*, the management regime approaches a natural analogue. Site may be passively managed, meaning that the hydroperiod is still connected to and influenced by natural high flows timed with seasonal water levels.

C

Hydroperiod inundation and drawdown patterns deviate substantially from natural conditions from high intensity alterations such as: significant flood control / water storage dam upstream or downstream; a 4-lane highway; large dikes impounding water; diversions > 3ft. deep that withdraw a significant portion of flow, deep pits in playas; large amounts of fill; significant artificial groundwater pumping; or heavy flow additions. Outlets may be significantly constricted, blocking most flow. Riparian channels may be concrete or artificially hardened. *If wetland is artificially controlled*, the site is actively managed and not connected to any natural season fluctuations.

D

Hydroperiod comments:

H3. HYDROLOGIC CONNECTIVITY

Select the statement below that best describes the degree to which **hydrology within the AA is connected to the larger landscape** throughout the year, but particularly at times of high water. Consider the effect of impoundments, entrenchment, or other obstructions to connectivity that occur within the surrounding landscape, if those impoundments clearly impact the AA.

<i>Marsh / Meadow variant</i>	<i>Playa variant</i>	<i>Riverine / Riparian variant</i>	
No unnatural obstructions to lateral or vertical movement of surface or ground water. Rising water in the site has unrestricted access to adjacent upland, without levees, excessively high banks, artificial barriers, or other obstructions to the lateral movement of flood flows.	Surrounding land cover / vegetation does not interrupt surface flow. No artificial channels feed water to playa.	Completely connected to floodplain (backwater sloughs and channels). No geomorphic modifications made to contemporary floodplain. Channel is not entrenched.	A
Minor restrictions to the lateral or vertical movement of surface and ground water by unnatural features such as levees, road grades or excessively high banks. Up to 25% of the site may be restricted by barriers to drainage. Restrictions may be intermittent along the margins of the AA, or they may occur only along one bank or shore. Flood flows may exceed the impoundments, but drainage back into the wetland may be incomplete due to the impoundments.	Surrounding land cover / vegetation may interrupt a minor amount of surface flow. Artificial channels may feed minor amounts of excess water to playa.	Minimally disconnected from floodplain. Up to 25% of stream banks may be affected by dikes, rip rap, and/or elevated culverts. Channel may be somewhat entrenched, but overbank flow occurs during most floods.	B
Moderate restrictions to the lateral or vertical movement of surface and ground water by unnatural features such as levees, road grades or excessively high banks. Between 25–75% of the site may be restricted by barriers to drainage. Flood flows may exceed the impoundments, but drainage back into the wetland may be incomplete due to the impoundments.	Surrounding land cover / vegetation may interrupt a moderate amount of surface flow. Artificial channels may feed moderate amounts of excess water to playa.	Moderately disconnected from floodplain due to multiple geomorphic modifications. Between 25-75% of stream banks may be affected by dikes, rip rap, concrete, and/or elevated culverts. Channel may be moderately entrenched and disconnected from the floodplain except in large floods.	C
Essentially no hydrologic connection to adjacent landscape. Most or all stages may be contained within artificial banks, levees, or comparable features. Greater than 75% of the site is restricted by barriers to drainage.	Surrounding land cover / vegetation may dramatically restrict surface flow. Artificial channels may feed significant amounts of excess water to playa.	Channel is severely entrenched and entirely disconnected from the floodplain. More than 75% of stream banks may be affected by dikes, rip rap, concrete and/or elevated culverts. Overbank flow never occurs or only in severe floods.	D

Hydrologic connectivity comments:

PHYSIOCHEMICAL METRICS

S1. SUBSTRATE / SOIL DISTURBANCE

Select the statement below that best describes disturbance to the substrate or soil within the AA. For playas, the most significant substrate disturbance is sedimentation or unnaturally filling, which prevents the system's ability to pond after heavy rains. For other wetland types, disturbances may lead to bare or exposed soil and may increase ponding or channelization where it is not normally. For any wetland type, consider the disturbance relative to what is expected for the system.

No soil disturbance within AA. Little bare soil OR bare soil areas are limited to naturally caused disturbances such as flood deposition or game trails OR soil is naturally bare (e.g., playas). No pugging, soil compaction, or sedimentation.	A
Minimal soil disturbance within AA. Some amount of bare soil, pugging, compaction, or sedimentation present due to human causes, but the extent and impact are minimal. The depth of disturbance is limited to only a few inches and does not show evidence of altering hydrology. Any disturbance is likely to recover within a few years after the disturbance is removed.	B
Moderate soil disturbance within AA. Bare soil areas due to human causes are common and will be slow to recover. There may be pugging due to livestock resulting in several inches of soil disturbance. ORVs or other machinery may have left some shallow ruts. Sedimentation may be filling the wetland. Damage is obvious, but not excessive. The site could recover to potential with the removal of degrading human influences and moderate recovery times.	C
Substantial soil disturbance within AA. Bare soil areas substantially degrade the site and have led to altered hydrology or other long-lasting impacts. Deep ruts from ORVs or machinery may be present, or livestock pugging and/or trails are widespread. Sedimentation may have severely impacted the hydrology. The site will not recover without active restoration and/or long recovery times.	D

Substrate / soil comments and photo #'s:

S2. SURFACE WATER TURBIDITY / POLLUTANTS

S3. ALGAL GROWTH

Select the statement that best describes the turbidity or evidence or pollutants in surface water within the AA.		Select the statement that best describes algal growth within surface water in the AA. Exclude <i>Chara</i> (multicellular algae) in cover estimate.	
No open water in AA	NA	No open water in AA or evidence of open water.	NA
No visual evidence of turbidity or other pollutants.	A	Water is clear with minimal algal growth.	A
Some turbidity in water (such as turbidity caused by high flows or naturally occurring in playas) OR presence of other pollutants, but limited to small and localized areas within the wetland. Water may be slightly cloudy.	B	Algal growth is limited to small and localized areas of the wetland. Water may have a greenish tint or cloudiness.	B
Water is cloudy or has unnatural oil sheen, but the bottom is still visible. <i>Note: If the sheen breaks apart when you run your finger through it, it is a natural bacterial process and not water pollution.</i>	C	Algal growth occurs in moderate to large patches throughout the AA. Water may have a moderate greenish tint or sheen.	C
Water is milky and/or muddy or has unnatural oil sheen. The bottom is difficult to see. <i>Note: If the sheen breaks apart when you run your finger through it, it is a natural bacterial process and not water pollution.</i>	D	Algal mats are extensive, blocking light to the bottom. Water may have a strong greenish tint and the bottom is difficult to see.	D

Water quality comments and photo #'s:

Turbidity and algal growth may be natural depending on recent weather patterns and flow timing (i.e., higher flows are often more turbid). Please rank the system as you see it, regardless of whether the conditions are natural. Include good notes and take photos.

SIZE METRICS**Z1. COMPARATIVE SIZE**

Select the statement below that best describes the **absolute size** of the wetland, as compared with others of its type.

<i>Meadows and Marshes</i>	<i>Playas and Fens</i>	<i>Riparian Areas</i>	
>10 hectares (>25 acres)	>2 hectares (>5 acres)	>5 km (>3 miles)	A
2–10 hectares (25 acres)	0.5–2 hectares (5 acres)	1–5 km (3 miles)	B
0.5–2 hectares (5 acres)	0.1–0.5 hectares (1 acre)	0.1–1 km (0.6 mile)	C
<0.5 hectare (<1 acre)	<0.1 hectare (<0.25 acre)	<0.1 km (<0.06 mile)	D

Comparative size comments:

Z2. CHANGE IN SIZE

Select the statement below that best describes the **change in size** of the wetland.

Occurrence is at, or only minimally reduced (<15%) from its original, natural extent, and has not been artificially reduced in size.	A
Occurrence is only somewhat reduced (15-10%) from its original natural extent.	B
Occurrence is modestly reduced (10-30%) from its original, natural extent.	C
Occurrence is substantially reduced (>30%) from its original, natural extent.	D

Change in size comments:

Land Use Index Worksheet

<i>Land Use Categories</i> ¹	<i>Coefficient</i>	<i>500 m Envelope</i>	
		<i>% Area</i>	<i>Score</i>
Paved roads, parking lots, domestic, commercial, and industrial buildings	0	15	0
Gravel pit operation, open pit mining, strip mining, abandoned mines	0		
Unpaved roads (e.g., driveway, tractor trail, 4-wheel drive roads)	1	.03	.03
Resource extraction (oil and gas)	1		
Tilled agricultural crop production (corn, wheat, soy, etc.)	2	10	20
Intensively managed golf courses, sports fields, lawns	2	65	130
Vegetation conversion (chaining, cabling, rotochopping, clearcut)	3		
Heavy grazing by livestock	3		
Logging or tree removal with 50-75% of large trees removed	4		
Intense recreation (ATV use / camping / popular fishing spot, etc.)	4		
Permanent crop agriculture (hay pasture, vineyard, orchard)	4	10	40
Dam sites and disturbed shorelines around water storage reservoirs. Include open water of reservoir if there is intensive recreation, such as boating.	5		
Old fields and other disturbed fallow lands dominated by non-native species	5		
Moderate grazing on rangeland	6		
Moderate recreation (high-use trail)	7	.004	.028
Selective logging or tree removal with <50% of large trees	8		
Light grazing on rangeland	9		
Light recreation (low-use trail)	9	.001	.009
Natural area / land managed for native vegetation	10	0.65	6.5
*Percentages estimated based of aerial imagery		Total Land Use Score	196.57

Buffer Width Worksheet

1: <u>78</u>	5: <u>103</u>
2: <u>135</u>	6: <u>89</u>
3: <u>102</u>	7: <u>92</u>
4: <u>96</u>	8: <u>96</u>
Average width: <u>98.88 m</u>	

2015 COLORADO ECOLOGICAL INTEGRITY ASSESSMENT (EIA) –STRESSOR CHECKLIST

Stressors: *direct threats*; “the proximate (human) activities or processes that have caused, are causing, or may cause the destruction, degradation, and/or impairment of biodiversity and natural processes” or altered disturbance regime (e.g. flooding, fire, or browse).

Some Important Points about Stressors Checklists:

- The Stressors Checklist must be completed for the 500 m envelop surrounding the AA (Landscape) and for the 0.5 ha AA (Veg, Hydro, Soils). Rely on imagery in combination with what you can field check.
- Assess stressors in the 500 m envelope for their effects on land surrounding the AA (*NOT how they may impact the AA*)
- Stressors for Vegetation, Soils, and Hydrology are assessed across the full 0.5 ha assessment area (AA)
- Severity has been pre-assigned for many stressors. If the severity differs from the pre-assigned rating, cross it out and note the true severity. If there is more than one pre-assigned value, circle the appropriate value.
- To comment, note the stressor number before writing comments.

SCOPE of Threat (% of AA or Buffer affected by direct threat)	
1 = Small	Affects a small portion (1-10%) of the AA or landscape
2 = Restricted	Affects some (11-30%) of the AA or landscape
3 = Large	Affects much (31-70%) of the AA or landscape
4 = Pervasive	Affects all or most (71-100%) of the AA or landscape
SEVERITY of Threat within the defined Scope (degree of degradation to AA or Buffer)	
1 = Slight	Likely to only slightly degrade/reduce
2 = Moderate	Likely to moderately degrade/reduce
3 = Serious	Likely to seriously degrade/reduce
4 = Extreme	Likely to extremely degrade/destroy or eliminate

UPDATE

UPDATE

		500 m Envelope Landscape			ASSESSMENT AREA (0.5 ha)									Comments
		Scope	Severity	IMPACT	Vegetation			Soil / Substrate			Hydrology			
	STRESSORS CHECKLIST	Scope	Severity	IMPACT	Scope	Severity	IMPACT	Scope	Severity	IMPACT	Scope	Severity	IMPACT	
D E V E L O P	1. Residential, recreational buildings, associated pavement	3	3	2										
	2. Industrial, commercial, military buildings, associated pavement	<div><div></div><div></div><div></div></div>												
	3. Oil and gas wells and surrounding footprint	<div><div></div><div></div><div></div></div>												
	4. Roads (gravel=2, paved=3, highway=4), railroad=3	2	2, 3, 4	2										
	5. Sports field, golf course, urban parkland, expansive lawns	3	2	3										
	6. Row-crop agriculture, orchard, nursery	1	3	1										
	7. Hay field, fallow field	2	2, 3	2										
	8. Utility / power line corridor	1	1, 2, 3		<div><div></div><div></div><div></div></div>									
	9. Other [specify]:	<div><div></div><div></div><div></div></div>												
R E C	10. Low impact recreation (hunting, fishing, camping, hiking, bird-watching, canoe/kayak)	1	1	1	1	1	1							
	11. High impact recreation (ATV, mountain biking, motor boats)	<div><div></div><div></div><div></div></div>			<div><div></div><div></div><div></div></div>									
	12. Other [specify]:	<div><div></div><div></div><div></div></div>			<div><div></div><div></div><div></div></div>									
V E G	13. Tree resource extraction (clear cut=3 or 4, selective cut= 2 or 3)	<div><div></div><div></div><div></div></div>	2, 3, 4		<div><div></div><div></div><div></div></div>	2, 3, 4								
	14. Vegetation management (cutting, mowing)		2		<div><div></div><div></div><div></div></div>	2								
	15. Livestock grazing, excessive herbivory by native species (ungulates, prairie dogs) (low=1, mod=2, high=3)		1, 2, 3		<div><div></div><div></div><div></div></div>	1, 2, 3								
	16. Insect pest damage (low=1, mod=2, high=3)		1, 2, 3		<div><div></div><div></div><div></div></div>	1, 2, 3								
	17. Invasive plant species (see noxious weed list)		3		3	3	7							
	18. Direct application of agricultural chemicals, herbicide spraying	<div><div></div><div></div><div></div></div>	2, 3		<div><div></div><div></div><div></div></div>	2, 3								
	19. Other [specify]:	<div><div></div><div></div><div></div></div>			<div><div></div><div></div><div></div></div>									
N A T	20a. Evidence of recent fire (low=1, mod=2, high=3)	<div><div></div><div></div><div></div></div>	1, 2, 3		<div><div></div><div></div><div></div></div>	1, 2, 3								
	20b. Recent beaver dam blowout	<div><div></div><div></div><div></div></div>	1, 2		<div><div></div><div></div><div></div></div>	1, 2								
	21. Other [specify]:	<div><div></div><div></div><div></div></div>			<div><div></div><div></div><div></div></div>									

		500 m Envelope Landscape			ASSESSMENT AREA (0.5 ha)									Comments	
		Scope	Severity	IMPACT	Vegetation			Soil / Substrate			Hydrology				
S O I L S	22. Excessive sediment or organic debris (inputs from recently logged sites, sedimentation in playas)														
	23. Excessive erosion or loss of organic matter (gullyng, decay of organic soils)														
	24. Trash or refuse dumping														
	25. Filling or dumping of sediment (spoils from excavation)														
	26. Substrate removal (excavation)														
	27. Indirect soil disturbance (compaction or trampling by livestock, human use, vehicles)	1	1	1											
	28. Direct soil disturbance (grading, compaction, plowing, discing, deeply dug fire lines)	1	1	1											
	29. Physical resource extraction (rock, sand, gravel, minerals, etc.)														
	30. Obvious excess salinity (dead or stressed plants, salt crusts)														
31. Other [specify]:															
H Y D R O L O G Y	32. PS discharge (waste water treatment, factory discharge, septic)														
	33. NPS discharge (urban / storm water runoff)														
	34. NPS discharge (agricultural runoff, excess irrigation, feedlots, excess manure)										1	1	1		
	35. NPS discharge (mine runoff, discharge from oil and gas)														
	36. Large dams / reservoirs														
	37. Impoundments, berms, dikes, levees that hold water in or out														
	38. Canals, diversions, ditches, pumps that move water in or out														
	39. Excavation for water retention (gravel ponds, pitted playas)														
	40. Groundwater extraction (few small wells=2, extensive extraction cause a lowered water table=4)														
	41. Flow obstructions (culverts, paved stream crossings)														
	42. Engineered channel (riprap, armored channel bank, bed)														
	43. Control of flow and energy (weir/drop structure, dredging)														
44. Other [specify]:															
Stressors Very Minimal or Not Evident (check box, if true)		<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>			<input type="checkbox"/>				
STRESSOR RATING BY CATEGORY (Envelope, Veg, Soils, Hydro)		Score: 16	Rating: VH		Score: 8	Rating: M		Score: n/a	Rating:		Score: 1.2	Rating: L	HIS Score: 9.6	HIS Rating: High	
OVERALL HUMAN STRESSOR INDEX (HSI) – use category weights		0.3			0.3			0.1			0.3				

Threat Impact Calculator		Scope			
		Pervasive = 4	Large = 3	Restricted = 2	Small = 1
Severity	Extreme = 4	VERY HIGH = 10	High = 7	Medium = 4	Low = 1
	Serious = 3	High = 7	High = 7	Medium = 4	Low = 1
	Moderate = 2	Medium = 4	Medium = 4	Low = 1	Low = 1
	Slight = 1	Low = 1	Low = 1	Low = 1	Low = 1

Category / HSI Roll-up Formulas	
Score	Rating
10+	Very High
7 – 9.9	High
4 – 6.9	Medium
1 – 3.9	Low
0 – 0.9	Absent

COLORADO ECOLOGICAL INTEGRITY ASSESSMENT (EIA) SCORECARD

Made by: Colorado Natural Heritage Program, Version: August 31, 2015



Site ID: Crystal River Restoration
 Site Name: Assessment Area 1
 Project: Baseline EIA Data for Riparian Health Assessment

Date: 7/27/2018

Ecol System: Rocky Mt. Lower Montane-Foothill Riparian Woodland
 HGM: Riverine
 Cowardin: Palustrine Forested Intermittently Flooded

	Wt	Field Rating	Field Points	Calc Points	Calc Rating
Overall Ecological Integrity Score and Rank				2.26	C+
Overall Ecological Integrity + Size Score and Rank				2.51	B-
Rank Factor: LANDSCAPE CONTEXT	0.30			1.48	D
LANDSCAPE METRICS	0.33			2.00	C+
L1. Contiguous Natural Land Cover	1	c	2		
L2. Land Use Index	1	c	2		
BUFFER METRICS	0.67			1.22	D
B1. Perimeter with Natural Buffer	n/a	d	1		
B2. Width of Natural Buffer	n/a	d	1		
B3.1. Condition of Natural Buffer - Veg	n/a	d	1		
B3.2. Condition of Natural Buffer - Soils	n/a	c	2		
Rank Factor: CONDITION	0.70			2.59	B-
VEGETATION METRICS	0.55			2.50	B-
V1. Native Plant Species Cover	1	c	2		
V2. Invasive Nonnative Plant Species Cover	1	c	2		
V3. Native Plant Species Composition	1	c	2		
V4. Vegetation Structure	1	b	3		
V5. Regen. of Native Woody Species (opt.)	1	b	3		
V65. Coarse and Fine Woody Debris (opt.)	1	b	3		
HYDROLOGY METRICS	0.35			2.33	C+
H1. Water Source	1	d	1		
H2. Hydroperiod	1	b	3		
H3. Hydrologic Connectivity	1	b	3		
PHYSIOCHEMISTRY METRICS	0.10			4.00	A+
S1. Soil Condition	1	a	4		
S2. Surface Water Turbidity / Pollutants (opt.)	0.5	a	4		
S3. Algal Growth (opt.)	0.5	a	4		
Rank Factor: SIZE	n/a			3.00	B+
SIZE METRICS	1			3.00	B+
Z1. Comparative Size (opt.)	1	a	4		
Z2. Change in Size (opt.)	1	c	2		

Input field metric ratings into empty boxes to calculate Rank Factor and Final EIA Scores. Fill in all metrics that are not marked as optional. Optional metrics depend on method used and wetland type.

COLORADO ECOLOGICAL INTEGRITY ASSESSMENT (EIA) SCORECARD

Made by: Colorado Natural Heritage Program, Version: August 31, 2015



Site ID: Crystal River Restoration
 Site Name: Assessment Area 2
 Project: Baseline EIA Data for Riparian Health Assessment

Date: 7/27/2018

Ecol System: Rocky Mt. Lower Montane-Foothill Riparian Woodland
 HGM: Riverine
 Cowardin: Palustrine Forested Intermittently Flooded

	Wt	Field Rating	Field Points	Calc Points	Calc Rating
Overall Ecological Integrity Score and Rank				2.36	C+
Overall Ecological Integrity + Size Score and Rank				2.61	B-
Rank Factor: LANDSCAPE CONTEXT	0.30			1.65	C-
LANDSCAPE METRICS	0.33			2.50	B-
L1. Contiguous Natural Land Cover	1	b	3		
L2. Land Use Index	1	c	2		
BUFFER METRICS	0.67			1.22	D
B1. Perimeter with Natural Buffer	n/a	d	1		
B2. Width of Natural Buffer	n/a	d	1		
B3.1. Condition of Natural Buffer - Veg	n/a	d	1		
B3.2. Condition of Natural Buffer - Soils	n/a	c	2		
Rank Factor: CONDITION	0.70			2.66	B-
VEGETATION METRICS	0.55			2.50	B-
V1. Native Plant Species Cover	1	c	2		
V2. Invasive Nonnative Plant Species Cover	1	c	2		
V3. Native Plant Species Composition	1	c	2		
V4. Vegetation Structure	1	b	3		
V5. Regen. of Native Woody Species (opt.)	1	b	3		
V65. Coarse and Fine Woody Debris (opt.)	1	b	3		
HYDROLOGY METRICS	0.35			2.67	B-
H1. Water Source	1	d	1		
H2. Hydroperiod	1	b	3		
H3. Hydrologic Connectivity	1	a	4		
PHYSIOCHEMISTRY METRICS	0.10			3.50	A-
S1. Soil Condition	1	b	3		
S2. Surface Water Turbidity / Pollutants (opt.)	0.5	a	4		
S3. Algal Growth (opt.)	0.5	a	4		
Rank Factor: SIZE	n/a			3.00	B+
SIZE METRICS	1			3.00	B+
Z1. Comparative Size (opt.)	1	a	4		
Z2. Change in Size (opt.)	1	c	2		

Input field metric ratings into empty boxes to calculate Rank Factor and Final EIA Scores. Fill in all metrics that are not marked as optional. Optional metrics depend on method used and wetland type.

Aquatic Resource Delineation Report

Crystal River Restoration and Weaver Ditch Efficiency Project

Garfield County, Colorado

October 16, 2019



Prepared by:

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Table of Contents

ACRONYMS AND ABBREVIATIONS	iii
EXECUTIVE SUMMARY	1
INTRODUCTION	2
Project Proponent and Agent.....	2
Survey	2
Objective	2
LOCATION	3
Directions to the Survey Area	3
METHODS	3-4
Data Review.....	3
Field Survey	4
EXISTING CONDITIONS.....	4-5
Geographic Setting	4
Hydrology	4
Soils	4-5
Plant Communities	5
Current Land Use and Major Disturbances	5
AQUATIC RESOURCES	5-8
Summary of Results.....	5
Aquatic Resources Present Inside Survey Area Table	6
Riverine	6
Wetlands	6-7
National Wetlands Inventory	7-8
Wetland Parameters	7-8
SENSITIVE PLANTS, FISH, WILDLIFE, AND CULTURAL/HISTORICAL PROPERTIES	8
REFERENCES	9
APPENDIX A. AQUATIC RESOURCE DEILINEATION MAP	11
APPENDIX B. SUPPORTING MAPS	12-18
APPENDIX C. NRCS SOIL MAP UNIT DESCRIPTIONS	20
APPENDIX D. SITE PHOTOS	30-34
APPENDIX E. PRINCIPLE PLANT SPECIES IN THE SURVEY AREA	36
APPENDIX F. WETLAND DETERMINATION DATA SHEETS	37

ACRONYMS AND ABBREVIATIONS

WMVC	Western Mountains, Valleys, and Coast
FAC	Facultative Plant Indicator Status
FACU	Facultative Up Plant Indicator Status
FACW	Facultative Wet Plant Indicator Status
HUC	Hydrologic Unit Code
MU	Soil Map Unit
NAIP	National Agriculture Imagery Project
NL	Not Listed
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OBL	Obligate Plant Indicator Status
OHWM	Ordinary High Water Mark
ROW	Right-of-Way
TNW	Traditional Navigable Water
UPL	Upland
USACE	United States Army Corps of Engineers
USBR	United States Bureau of Reclamation
USFWS	United States Fish and Wildlife Service United
USGS	States Geological Survey
WOUS	Water of the U.S.

EXECUTIVE SUMMARY

This delineation was conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast (Version 2.0)* (USACE 2010). The purpose of the delineation is to facilitate 404 permitting for a bank stabilization project along the Crystal River near Carbondale, CO.

Delineated aquatic resources inside the survey area include approximately 0.27 - acres of palustrine persistent emergent wetland 0.59 - acres of palustrine scrub-shrub wetland. The study area is located on public land owned by the Town of Carbondale.

INTRODUCTION

Project Proponent and Agent

Project Proponent:

Town of Carbondale
Mark O'Meara Utilities Director
Utility Department
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970-920-5355

Agent/Consultant:

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Survey Area Description

The 3.23 - acre survey area extends from the Crystal Bridge Drive Bridge south an approximately 1,800 feet along the western side of Crystal River and on the eastern side of the river approximately 115 feet. The survey area is located entirely in Garfield County and is isolated to one parcel which is public land owned by the Town of Carbondale.

Objective

This report presents the results of a delineation of aquatic resources found inside the survey area. This report facilitates efforts to:

1. Avoid or minimize impacts to aquatic resources.
2. Document aquatic resource boundaries for review by regulatory authorities.
3. Provide early indications of known sensitive species and historic/cultural properties.
4. Provide background information.

The aquatic resources delineated and described in this report may be subject to regulation by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Federal Clean Water Act. Delineation results are subject to change pending USACE review and determination.

LOCATION

County, State: Garfield County, Colorado

Legal Description of Survey Area and General Information

Section: 3 Township: 8 Range: 88

Garfield County Parcel Number: 246303410005

Latitude and Longitude of Survey Area Centroid (NAD 83 UTM Zone 13N): 39.384603, -107.206588

U.S Geological Survey (USGS) 7.5 Minute Quadrangle: Mount Sopris, CO (2013)

Directions to the Survey Area

The survey location is shown in *Appendix B. Supporting Maps, Figure 1*. To access the survey area, take highway 133 South from Carbondale, CO approximately 0.5 miles, Turn right onto Crystal Bridge Dr, after 0.2 miles, park at small parking lot on east side of the road just before the bridge. Cross the bridge on foot and access the river via the stairs on the west side of the road. No permission is required to access the property.

METHODS

Data Review

Jeremy Allinson of DHM Design, Corp. reviewed the following data sources prior to conduction the field survey.

- USGS 7.5-minute Mount Sopris, Colorado quadrangle (2013),
- Natural Resources Conservation Service (NRCS) National Agriculture Imagery Program (NAIP) aerial photographs of the survey area where taken in 2016 and available from the NRCS Geospatial Data Gateway and ESRI World Map;
- Google Earth Imagery dating back to 1993 (sourced from the USGS and NAIP);
- U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPAC).
- National Wetlands Inventory (NOW) Wetland Mapper (USFWS) 2019.
- NRCS Web Soils Mapper.

Field Survey

Survey Dates

The delineation was conducted on 09 October 2019 and 10 October 2019 by Jeremy Allinson and Jonathan Rose of DHM Design.

Ordinary High Water Mark Delineation

The ordinary high water mark (OHWM) of the Crystal River and Weaver Ditch was delineated in the field using indicators described in *Regulatory Guidance Letter 05-05 Ordinary High Water Mark Identification*. The OHWM on the both sides of the river was well defined. See *Appendix A. Aquatic Resource Delineation Map* for location of OHWM.

Wetland Delineation

Wetlands were delineated based upon vegetation, soils, and hydrology using the approach outlined in the *Corps of Engineers Wetlands Delineation Manual* (USACE 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region*. Data was collected at paired sample points to determine wetland boundaries. Data sheets were completed for representative sample points, although additional sampling was conducted as needed to refine the delineator's understanding of the wetland boundaries. A determination of hydric soils was made based upon guidance provided in *Field Indicators of Hydric Soils in the United States, Guide for Identifying and Delineating Hydric Soils* (NRCS 2017a). Vegetation cover (absolute canopy cover) by species was estimated in representative plots around each sample point. After evaluating the vegetation, soils, and hydrology, the boundaries of the wetlands were extrapolated by following contours, wetland vegetation boundaries, and/or clear hydrologic boundaries.

EXISTING CONDITIONS

Geographic Setting

The survey area is located along the Crystal River approximately 0.5 miles south of the City of Carbondale. This part of the valley supports a major agricultural industry and associated low-density residential development and is heavily influenced by a network of irrigation canals and ditches. Elevation is approximately 6,219 feet.

Hydrology

The survey area is located within the Hydrologic Unit Code (HUC 12) Edgerton Creek-Crystal River (140100040709) which is part of the larger HUC 10 Crystal River Watershed (14010004) that encompasses roughly 231,812 acres in Western Colorado (NRCS 2017). The entire survey area is located in the Edgerton Creek-Crystal River subwatershed.

Soils

Three NRCS soil map unit (MU) have been mapped inside the survey area (NRCS 2017c), as shown in *Appendix B, Figure 3*:

- 13 Atencio – Azeltine complex, 3 to 6 percent slopes
- 42 Fluvaquents, 0 to 10 percent slopes
- 120- Water

13- This MU is a riverwash complex mostly consisting of a sandy loam composition. This MU is listed as partially hydric on the *National List of Hydric Soils* (NRCS 2017b). This soil type is consistent throughout the survey area with the exception of the west side of the river adjacent to the agricultural field. Soil disturbance from historic agricultural use is evident in this area.

Plant Communities

Plant communities inside the survey area include forested riparian, scrub shrub and emergent wetlands and upland. The majority of the survey area is located within the riparian scrub shrub and pre-emergent wetland type. The wetland types are described in more detail below under *Results*.

Current Land Use and Major Disturbances

The current land use within the survey area is open space. The existing park experiences low levels of recreational use. Major land disturbances surround the survey area include River Valley Ranch Golf Course to the south and west and agriculture to the north and east.

Aquatic Resources

Summary of Results

Delineated aquatic resources inside the survey are included approximately 1,776 feet of the Crystal River, 0.27 acres of palustrine persistent emergent wetland, and 0.59 acres of palustrine scrub-shrub wetland. All aquatic features are summarized in Table 1 below and are described in more detail in the text. Locations of each resource are mapped and shown in *Appendix A* and photo documentation for each is included in *Appendix D. Photo Documentation*. The areal extent of the delineated waters provided in Table 1 indicates the extent of wetlands and waters inside the survey area. An assessment of jurisdiction is provided for the delineated wetlands. The final determination on jurisdiction will be made by the U.S. Army Corps of Engineers.

A list of principle plant species found in the survey area with their scientific and common names and wetland indicator status is provided in *Appendix E. Principle Plant Species in Survey Area* Plant names follow the Mountains, Valleys and Coast 2016 Regional Wetland Plant List. Wetland Determination Data Forms for the Arid West Region were completed for representative sample points and are provided in *Appendix F. Wetland Determination Data Sheets* Additional photo documentation is included in *Appendix D*.

Table 1. Aquatic Resources Present inside survey Area

Aquatic Resource	Cowardin Type	Latitude	Longitude	Length (ft)	Area (ac)	Jurisdictional
Wetlands						
Wetland 1 - PSSB1 - 1	Palustrine Scrub-Shrub (PSSB)	39.3848200	-107.206518	171	0.03	Yes
Wetland 2 - PSSB1 - 2	Palustrine Scrub-Shrub (PSSB)	39.3850543	-107.206779	55	0.01	Yes
Wetland 3 - PSSB1 - 3	Palustrine Scrub-Shrub (PSSB)	39.3850545	-107.206931	50	0.04	Yes
Wetland 4 - PEM1B - 1	Palustrine Emergent (PEM1B)	39.3839410	-107.206104	396	0.27	Yes
Wetland 5 - PSSB1 - 4	Palustrine Scrub-Shrub (PSSB)	39.3842910	-107.206253	645	0.46	Yes
Wetland 6 - PSSB1 - 5	Palustrine Scrub-Shrub (PSSB)	39.3857360	-107.20836	91	0.05	Yes
Wetlands Subtotal				1408	0.86	
Open Water				Linear Feet(L.ft)		
Crystal River	Riverine Unconsolidated Bottom (R3RBH)	39.3849560	-107.207343	1,776	5.61	Yes
Weaver Ditch	Riverine Unconsolidated Bottom (R4SBCx)	39.3851970	-107.206934	34	0.02	Yes
Riverine Subtotal				1,810	2.47	
Total Aquatic Features				3,218	6.49	Yes

Crystal River

The Crystal River is a Water of the U.S (WoUS) and a tributary to the Roaring Fork River, which is a tributary to the Colorado River, a traditional navigable water (TNW). At the time of the initial survey, the flow in the Crystal River was 410 cubic feet per second (cfs) at the Colorado Division of Wildlife Fish Hatchery gaging station.

Wetlands

Wetland 1 – PSSB1 - 1

This 0.03-acre palustrine scrub shrub wetland exists on the east side of the Crystal River. It is characterized by Coyote willow (*Salix exigua*) (FACW), reed canary grass (*Phalaris arundinacea*) (FACW), scouring rush (*Equisetum hyemale*) (FACW) and Canada thistle (*Cirsium arvense*) (FAC). The wetland is charged by groundwater and surface water from the Crystal River. Primary hydric soil indicators include a S5 LRR, Sandy Redox Matrix, contained redox features and soils were moist to the touch. Hydrological indicators included a high-water table and saturation (*Appendix D - Photos 1-3*).

Jurisdiction

Wetland 1 is charged from and fully dependent on the Crystal River, Wetland 1 is considered jurisdictional.

Wetland 2 – PSSB1 - 2

This 0.01-acre palustrine scrub shrub wetland exists on the east side of the Crystal River. It is characterized by Coyote willow (*Salix exigua*) (FACW), reed canary grass (*Phalaris arundinacea*) (FACW), scouring rush (*Equisetum hyemale*) (FACW) and Canada thistle (*Cirsium arvense*) (FAC). The wetland is charged by groundwater and surface water from the Crystal River. Primary hydric soil indicators include a S5 LRR, Sandy Redox Matrix, contained redox features and soils were moist to the touch. Hydrological indicators included a high-water table and saturation (*Appendix D - Photos 7-8*).

Jurisdiction

Wetland 2 is charged from and fully dependent on the Crystal River, Wetland 2 is considered jurisdictional.

Wetland 3 – PSSB1 - 3

This 0.04-acre palustrine scrub shrub wetland exists on the east side of the Crystal River. It is characterized by Coyote willow (*Salix exigua*) (FACW), reed canary grass (*Phalaris arundinacea*) (FACW), scouring rush (*Equisetum hyemale*) (FACW) and Canada thistle (*Cirsium arvense*) (FAC). The wetland is charged by groundwater and surface water from the Crystal River. Primary hydric soil indicators include a S5 LRR, Sandy Redox Matrix, contained redox features and soils were moist to the touch. Hydrological indicators included a high-water table and saturation (*Appendix D - Photo 9*).

Jurisdiction

Wetland 3 is charged from and fully dependent on the Uncompahgre River, Wetland 3 is considered jurisdictional.

Wetland 4 – PEM1B - 1

This 0.27-acre palustrine emergent persistent wetland exists on the west side of the Crystal River. It is characterized by Coyote willow (*Salix exigua*) (FACW), reed canary grass (*Phalaris arundinacea*) (FACW), Beaked sedge (*Carex rostrata*) (OBL), Nebraska sedge (*Carex nebrascensis*) (OBL), Redtop (*Agrostis gigantea*) (FAC) Colorado rush (*Juncus confusus*) (FAC), scouring rush (*Equisetum hyemale*) (FACW), Broadleaf cattail (*Typha latifolia*) (OBL), and Soft-stem bullrush (*Schoenoplectus tabernaemontani*) (OBL). The wetland is charged by groundwater and surface water from the Crystal River. Primary hydric soil indicators include a S5 LRR, Sandy Redox Matrix, contained redox features and soils were moist to the touch. Hydrological indicators included a high-water table, surface water and saturation (*Appendix D - Photos 10-12*).

Jurisdiction

Wetland 4 is charged from and fully dependent on the Crystal River, Wetland 4 is considered jurisdictional.

Wetland 5 – PSSB1 - 4

This 0.46 acre palustrine scrub shrub wetland exists on the west side of the Crystal River (Appendix A – Figure 1). It is characterized by Speckled alder (*Alnus incana*) (FACW), Red-osier dogwood (*Cornus alba*) (FACW), Whitestem gooseberry (*Ribes inerme*) (FAC), Narrow-leaf cottonwood (*Populus angustifolia*) (FACW), Bush honeysuckle (*Lonicera involucrate*) (FAC), Coyote willow (FACW) and Reed canary grass (*Phalaris arundinacea*). The wetland is charged by groundwater and surface water from the Crystal River. Primary hydric soil indicators include a S5 LRR, Sandy Redox Matrix, contained redox features and soils were moist to the touch. Hydrological indicators included saturated soils. (Appendix D - Photo 16-18).

Jurisdiction

Wetland 5 is charged from and fully dependent on the Crystal River, Wetland 5 is considered jurisdictional.

Wetland 6 – PSSB1 - 5

This 0.05-acre palustrine scrub shrub wetland exists on the west side of the Crystal River (Appendix A – Figure 1). It is characterized by coyote willow (*Salix exigua*) (FACW), Bittersweet nightshade (*Solanum dulcamara*) (FAC), Canada thistle (*Cirsium arvense*) (FAC), Redtop (*Agrostis gigantea*) (FAC), Wild mint (*Mentha arvensis*) (FACW), and wooly sedge (*Carex pellita*) (OBL). The wetland is charged by groundwater and surface water from the Crystal River. Primary hydric soil indicators include a S5 LRR, Sandy Redox Matrix, contained redox features and soils were moist to the touch. Hydrological indicators included a saturated soil (Appendix D - Photo 28-30).

Jurisdiction

Wetland 5 is charged from and fully dependent on the Crystal River, Wetland 5 is considered jurisdictional.

National Wetlands Inventory

The aquatic resources mapped by the NWI inside the survey area included a small area of freshwater forested scrub shrub wetland (PSSA) in the middle of the reach, on the eastern side of the Crystal River, freshwater palustrine persistent emergent seasonally flooded (PEM1C), riverine (R3USC) (Appendix B - Figure 4).

Wetland Parameters

Vegetation

Coyote willow (FACW) and Speckled alder (FACW) are the dominant shrubs throughout the assessment area and occur in both wetland and non-wetlands riparian areas. In wetland 1, there is a distinct line of Coyote willow that acts as a wetland boundary. Redtop (FAC), reed canary grass (FACW), and Beaked sedge (OBL) are the dominant graminoids within the assessment area. Western wheatgrass (NL – UPL) and Smooth brome (UPL), and Silver buffaloberry (FACU) are all indicators of non-wetland riparian areas.

Soils

The sandy loam, silty clay soils were somewhat problematic within the assessment area. Hydric soils are indicated by the presence of a depleted matrix but some soils did not show redox concentrations as many areas include underdeveloped soils, which is a common occurrence within a seasonally flooded ecosystem. Soil hydrology and presence of groundwater were the primary indicator for hydric soils within delineated wetlands.

Hydrology

Site hydrology is not problematic, all delineated wetlands are charged by the Crystal River.

SENSITIVE PLANTS, FISH, WILDLIFE, AND CULTURAL/HISTORIC PROPERTIES

There are no listed U.S. Fish and Wildlife Service critical habitats within the survey area. The following species could have potential to occur within the survey area:

- Canada Lynx (*Lynx canadensis*)
- Yellow-billed Cuckoo (*Coccyzus americanus*)
- Ute Ladies'-tresses (*Spiranthes diluvialis*)

Additional USFWS fish species including the Bonytail chub, Colorado pikeminnow, Greenback cutthroat trout, Humpback chub and Razorback sucker are listed as being potentially affected due to the Crystal River's proximity to the Colorado River.

A Cultural/Historical survey is outside the scope for this project.

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<https://datagateway.nrcs.usda.gov/>>.

Natural Resources Conservation Service (NRCS). 2017a. Field Indicators of Hydric Soils in the United States, Guide for Identifying and Delineating Hydric Soils, Version 8.1. L.M.
Vasilas, G.W. Hurt, and C.V. Noble (eds.). USDA, NRCS, in cooperation with the National Technical Committee for Hydric Soils.

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<https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/use/hydric/>>.

Natural Resources Conservation Service (NRCS). 2019c Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties Online at: <http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx>

United States Army Corps of Engineers (USACE). 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, MS.

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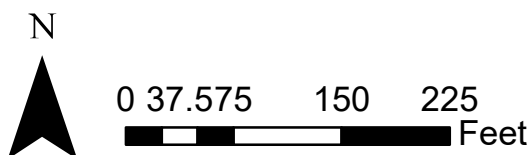
Appendix A. Aquatic Resource Delineation Map



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Basemap Source:
Esri World Imagery High Resolution
Delineator: Jeremy Allinson
& Jonathan Rose
Map Created: 10/16/2019

1:1,600



Legend

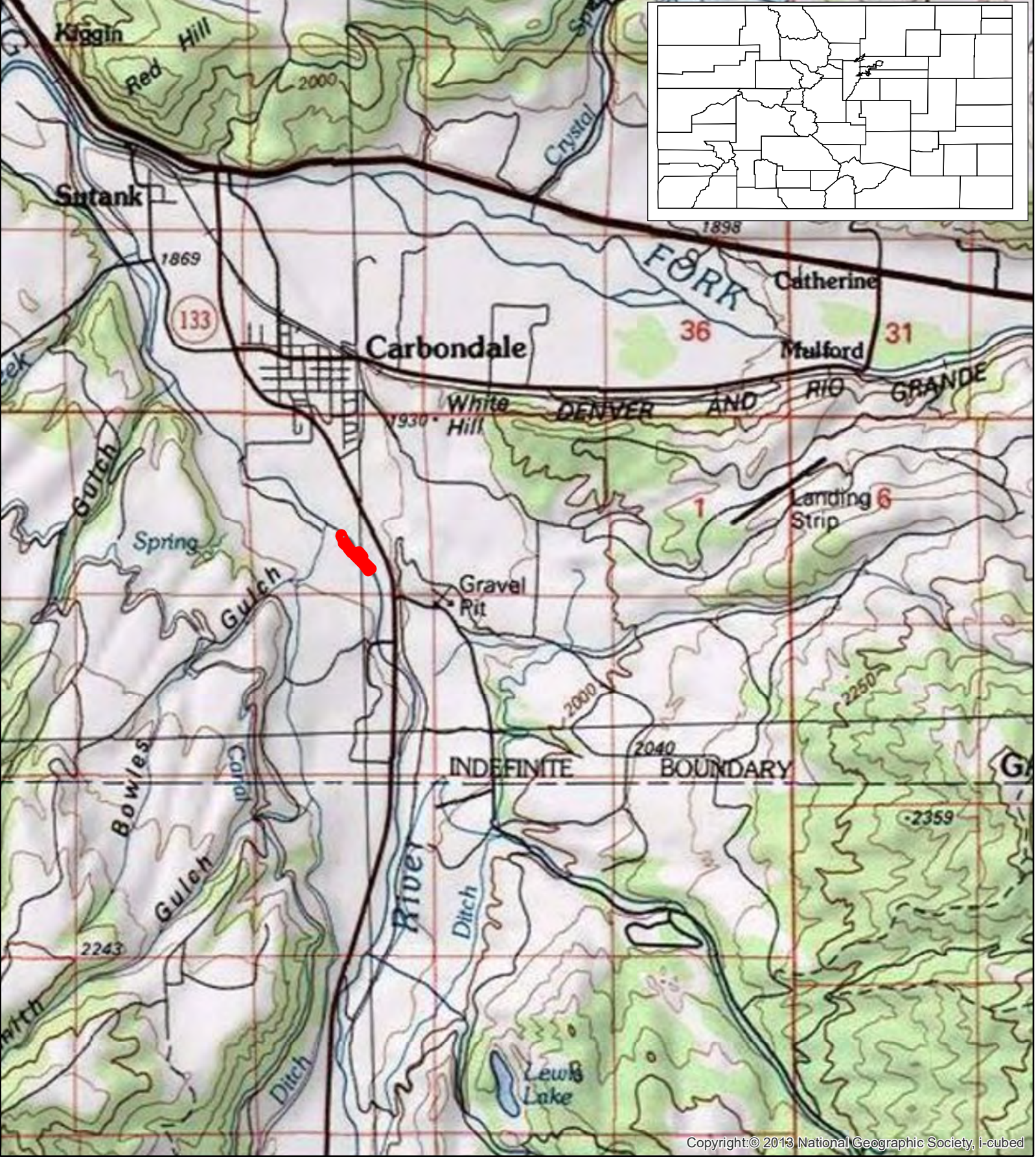
- | | | | |
|--|--|--|----------------------|
| | Wetland Survey Boundaries (3.23 ac) | | Wetland Sample Point |
| | Palustrine Emergent Wetland (PEM1B)-0.27 ac | | Upland Sample Point |
| | Palustrine Scrub Shrub Wetland (PSSB)-0.59 ac | | Bank Disturbance |
| | Perennial River (R3RBH) -1,176 (L.ft) - 5.61ac | | OWHL |
| | Intermittent Stream (R4SBCx) -34 (L.ft) - 0.02ac | | |

Crystal River Restoration and
Weaver Ditch Efficiency Project

Figure 1
Delineated Aquatic Resources Overview

DHM Design, Corp.
311 Main Street, Suite 102
Carbondale, CO 81623
(970) 963-6520, www.dhmdesign.com

Appendix B. Supporting Maps



Copyright © 2013 National Geographic Society, i-cubed

Basemap Source:
2013 National Geographic Topographic Map
Author: Jonathan Rose
Map Created: 10/16/2017

Legend

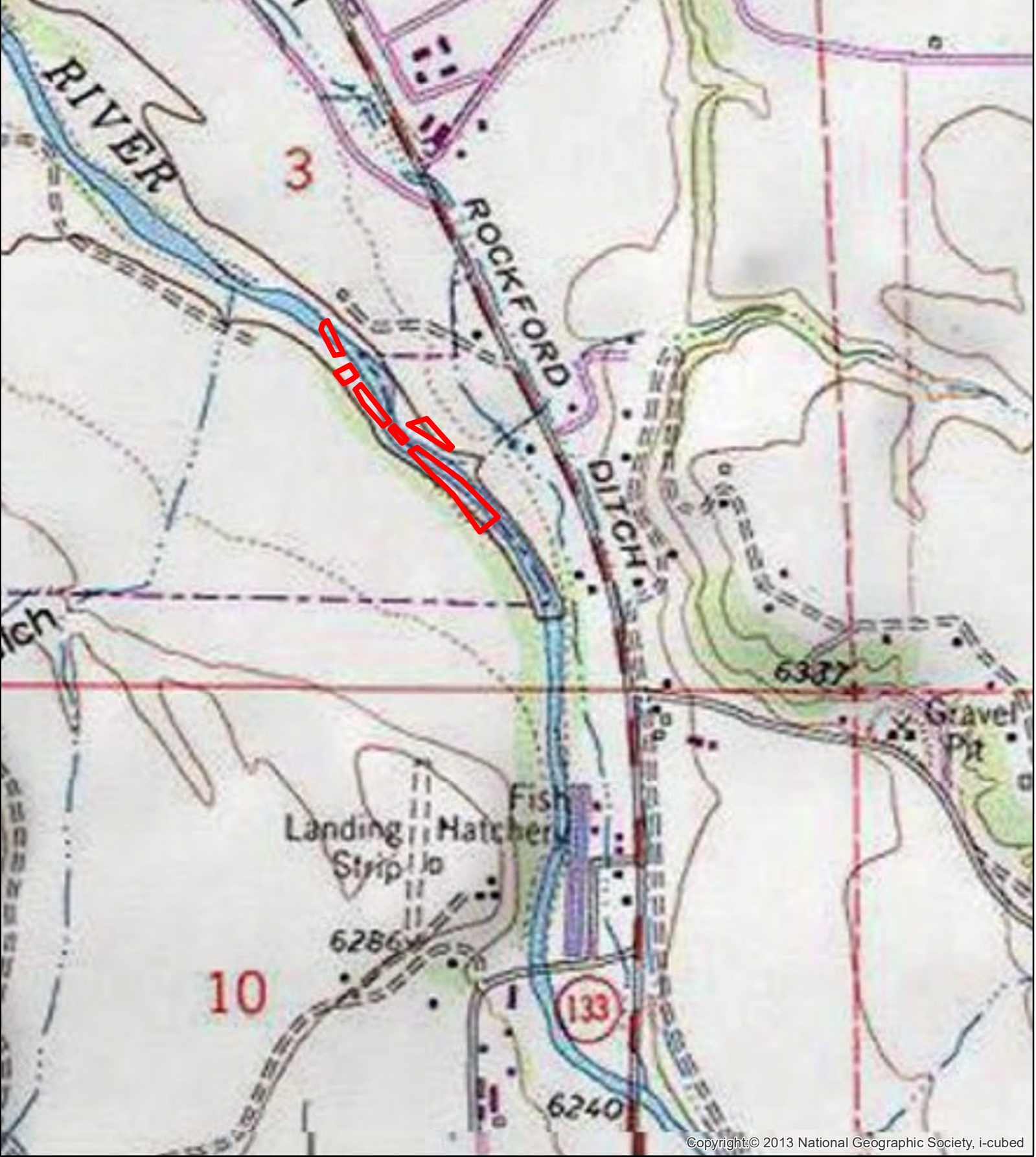
 Project Location

Crystal River Restoration and
Weaver Ditch Efficiency Project

Figure 1
Project Location Map



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Basemap Source:
2013 National Geographic Topographic Map
Author: Jonathan Rose
Map Created: 10/16/2017

Legend

 Survey Area (3.23 ac)

Crystal River Restoration and
Weaver Ditch Efficiency Project

Figure 2
Topographic Map



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Soil Map—Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties
(Crystal River Restoration and Weaver Ditch Efficiency Project)



Soil Map—Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties
(Crystal River Restoration and Weaver Ditch Efficiency Project)

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties

Survey Area Data: Version 10, Sep 13, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 14, 2010—Nov 1, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

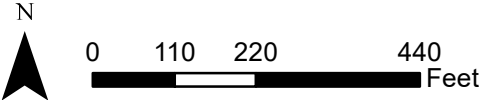
Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
13	Atencio-Azeltine complex, 3 to 6 percent slopes	52.5	73.8%
28	Dahlquist-Southace complex, 25 to 50 percent slopes	3.2	4.5%
38	Evanston loam, 1 to 6 percent slopes	2.0	2.9%
40	Evanston loam, 25 to 45 percent slopes	0.1	0.1%
42	Fluvaquents, 0 to 10 percent slopes	5.6	7.8%
120	Water	7.8	10.9%
Totals for Area of Interest		71.2	100.0%



Basemap Source:
ESRI World Imagery High Resolution
Author: Jonathan Rose
Map Created: 10/16/2017

1:3,100



Legend

- | | |
|---|---|
|  PEM1C |  R3USC |
|  PSS1C |  Survey Area (3.23 ac) |

Crystal River Restoration and
Weaver Ditch Efficiency Project

Figure 4
NWI Wetland Map

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Appendix C. NRCS Soil Map Unit Descriptions



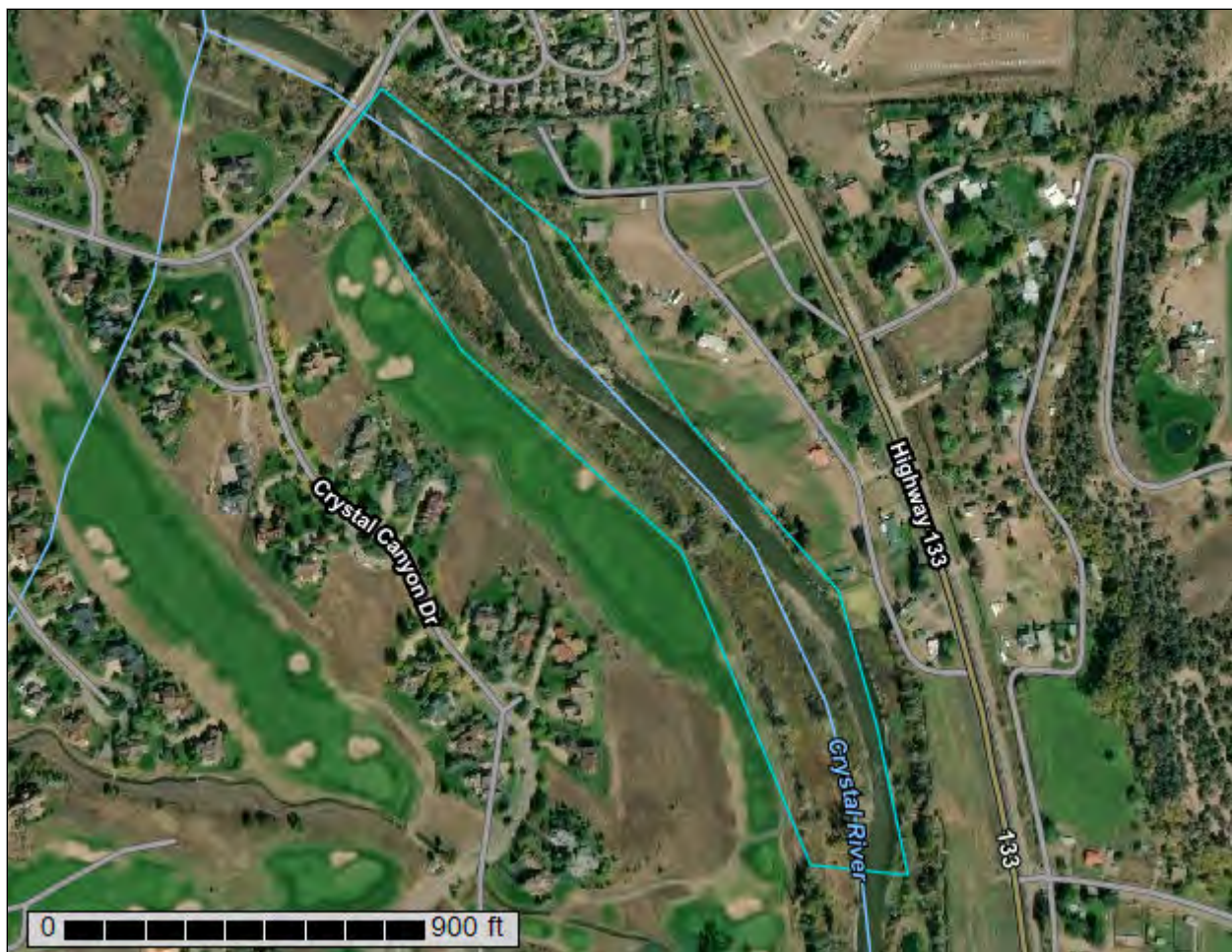
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties



October 16, 2019

Contents

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map.....	9
Legend.....	10
Map Unit Legend.....	12
Map Unit Descriptions.....	12
Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties.....	14
13—Atencio-Azeltine complex, 3 to 6 percent slopes.....	14
28—Dahlquist-Southace complex, 25 to 50 percent slopes.....	15
42—Fluvaquents, 0 to 10 percent slopes.....	17
120—Water.....	19
References	20

Aspen-Gypsum Area, Colorado, Parts of Eagle, Garfield, and Pitkin Counties

13—Atencio-Azeltine complex, 3 to 6 percent slopes

Map Unit Setting

National map unit symbol: jq4y
Elevation: 5,900 to 6,500 feet
Mean annual precipitation: 15 to 18 inches
Mean annual air temperature: 44 to 46 degrees F
Frost-free period: 105 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Atencio and similar soils: 60 percent
Azeltine and similar soils: 30 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Atencio

Setting

Landform: Terraces, alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 10 inches: sandy loam
H2 - 10 to 20 inches: sandy clay loam
H3 - 20 to 30 inches: gravelly sandy loam
H4 - 30 to 60 inches: very gravelly sand

Properties and qualities

Slope: 3 to 6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): 4s
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: B
Ecological site: Rolling Loam (R048AY298CO)
Other vegetative classification: Rolling Loam (null_60)

Custom Soil Resource Report

Hydric soil rating: No

Description of Azeltine

Setting

Landform: Alluvial fans, terraces

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from sandstone and/or alluvium derived from shale

Typical profile

H1 - 0 to 9 inches: gravelly sandy loam

H2 - 9 to 16 inches: gravelly loam

H3 - 16 to 60 inches: extremely gravelly sand

Properties and qualities

Slope: 3 to 6 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 10 percent

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): 4s

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: B

Ecological site: Rolling Loam (R048AY298CO)

Other vegetative classification: Rolling Loam (null_60)

Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent

Hydric soil rating: No

28—Dahlquist-Southace complex, 25 to 50 percent slopes

Map Unit Setting

National map unit symbol: jq5g

Custom Soil Resource Report

Elevation: 6,200 to 7,400 feet
Mean annual precipitation: 12 to 16 inches
Mean annual air temperature: 42 to 46 degrees F
Frost-free period: 105 to 115 days
Farmland classification: Not prime farmland

Map Unit Composition

Dahlquist and similar soils: 40 percent
Southace and similar soils: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dahlquist

Setting

Landform: Alluvial fans, terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Typical profile

H1 - 0 to 6 inches: cobbly sandy loam
H2 - 6 to 13 inches: very cobbly sandy clay loam
H3 - 13 to 23 inches: very cobbly sandy loam
H4 - 23 to 60 inches: extremely cobbly sandy loam

Properties and qualities

Slope: 25 to 50 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Available water storage in profile: Low (about 3.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Loamy Slopes (R048AY303CO)
Other vegetative classification: LOAMY SLOPES (null_31)
Hydric soil rating: No

Description of Southace

Setting

Landform: Alluvial fans, terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Mixed alluvium

Custom Soil Resource Report

Typical profile

H1 - 0 to 10 inches: very stony sandy loam
H2 - 10 to 22 inches: extremely stony sandy loam
H3 - 22 to 60 inches: extremely stony loamy coarse sand

Properties and qualities

Slope: 25 to 50 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Stony Foothills (R048AY287CO)
Other vegetative classification: Stony Foothills (null_81)
Hydric soil rating: No

Minor Components

Other soils

Percent of map unit: 10 percent
Hydric soil rating: No

Gypsiorthids

Percent of map unit: 10 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 5 percent
Hydric soil rating: No

42—Fluvaquents, 0 to 10 percent slopes

Map Unit Setting

National map unit symbol: jq5z
Elevation: 3,500 to 7,200 feet
Mean annual precipitation: 14 to 18 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 80 to 150 days

Custom Soil Resource Report

Farmland classification: Not prime farmland

Map Unit Composition

Fluvaquents and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fluvaquents

Setting

Landform: Flood plains, valley floors

Down-slope shape: Concave

Across-slope shape: Linear

Parent material: Mixed alluvium

Typical profile

H1 - 0 to 10 inches: variable

H2 - 10 to 24 inches: stratified gravelly sand to clay

H3 - 24 to 60 inches: very gravelly sand, gravelly sand

H3 - 24 to 60 inches:

Properties and qualities

Slope: 0 to 10 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: About 6 to 24 inches

Frequency of flooding: Occasional

Frequency of ponding: None

Calcium carbonate, maximum in profile: 10 percent

Salinity, maximum in profile: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)

Available water storage in profile: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): 6w

Land capability classification (nonirrigated): 6w

Hydrologic Soil Group: B/D

Ecological site: River Bottom (R048AY236CO)

Other vegetative classification: riverbottom (null_19)

Hydric soil rating: No

Minor Components

Redrob

Percent of map unit: 10 percent

Hydric soil rating: No

120—Water

Map Unit Composition

Water: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Minor Components

Aquolls

Percent of map unit: 5 percent

Landform: Marshes

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: Yes

Appendix D. Site Photos



Photo 1. View looking east at wetland sample point 1a (PSSB1-1 east side of Crystal River).



Photo 2. View looking southeast at wetland area 1 (PSSB1-1). Distinct boundary between scrub shrub wetland and upland agricultural field.



Photo 3. View looking northeast at wetland area 1 (PSSB1-1). Narrow strip of scrub shrub wetland between east bank of Crystal River and agricultural field.



Photo 4. View looking north at upland sample point 1b (east side of Crystal River).



Photo 5. View looking north at upland area 1. High amounts of disturbance and soil compaction in the area.



Photo 6. View looking west at upland area 1. High amounts of disturbance and soil compaction in the area attributed to access and maintenance of head gate structure.



Photo 7. View looking southeast at wetland area 2 (PSSB1-2). This area is fragmented by spoil piles from irrigation ditch as well as disturbances for



Photo 8. View looking east at wetland area 2 (PSSB1-2). This area is fragmented by spoil piles from irrigation ditch as well as disturbances for



Photo 9. View looking northwest at wetland area 3 (PSSB1-3). This area is fragmented by spoil piles from irrigation ditch as well as disturbances for irrigation ditch access and up-keep.



Photo 10. View looking east at wetland sample point 2a (PEMB1-1 west side of Crystal River).



Photo 11. View looking southeast at the boundary between wetland 4(PEMB1-1) and wetland 5 (PSSB1-4).



Photo 12. View looking northwest at the boundary between wetland 4(PEMB1-1) and wetland 5 (PSSB1-4).



Photo 13. View looking south at upland sample point 2b (west side of Crystal River).



Photo 14. View looking east at upland area 2, between wetland 5 and west bank of Crystal River.



Photo 15. View looking north at the boundary between wetland 5 (PSSB1-4) and upland area 2.



Photo 16. View looking south at wetland sample point 3a (PSSB1-4 west side of Crystal River).



Photo 17. View looking south at wetland area 5 (PSSB1-4).



Photo 18. View looking southeast at boundary between wetland 5 (PSSB1-4) and upland area 3.



Photo 19. View looking north at upland sample point 3b (west side of Crystal River).



Photo 20. View looking west at upland area 3.



Photo 21. View looking northwest at boundary between upland area 3 and wetland 5 (PSSB1-4).



Photo 22. View looking east at upland sample point 4a (west side of Crystal River).



Photo 23. View looking east at upland area 4, upland area persists up to the west bank of the Crystal River.



Photo 24. View looking north at upland area 4 persisting up to the western bank of the Crystal River.



Photo 25. View looking southeast at upland sample point 5a (west side of Crystal River).



Photo 26. View looking northwest at upland area 5.



Photo 27. View looking northwest at upland area 5, upland area persists up to western bank of Crystal River.



Photo 28. View looking north at wetland sample point 6b (PSSB1-5 west side of Crystal River).



Photo 29. View looking west at wetland area 6 (PSSB1-5).



photo 30. View looking southeast at at boundary between wetland 6 (PSSB1-5) and upland area 6.



Photo 31. View looking south at upland sample point 6a (west side of Crystal River).



Photo 32. View looking south at upland area 6.



Photo 33. View looking north at Upland area 6, upland persists up to western bank of Crystal River.



Photo 32. View looking south at upland sample point 7a (west side of Crystal River).



Photo 33. View looking south at upland area 7, upland persists up to western bank of Crystal River.



Photo 34. View looking orht at upland area 7, upland persists up to western bank of Crystal River.

Appendix E. Principle Plant Species in Survey Area

Scientific Name	Common Name	Family	AW Indicator Stats
Trees			
<i>Populus angustifolia</i>	Narrow-leaf cottonwood	Salicaceae	FACW
Shrubs			
<i>Salix exigua</i>	Coyote willow	Salicaceae	FACW
<i>Alnus incana</i>	Thinleaf alder	Salicaceae	OBL
<i>Quercus gambelii</i>	Gambel oak	Fagacea	FACU
<i>Cornus alba</i>	Redosier dogwood	Cornacea	FACW
<i>Crataegus erythropoda</i>	Red haw	Rosaceae	FACU
<i>Prunus virginiana</i>	Native chokecherry	Rosaceae	FACU
<i>Lonicera involucrata</i>	Twinberry, Bush Honeysuckle	Caprifoliaceae	FAC
<i>Ribes inerme</i>	Whitestem gooseberry	Grossulariaceae	FAC
<i>Shepherdia argentia</i>	Silver buffaloberry	Shepherdia	FACU
<i>Rosa woodsii</i>	Woods rose	Rosaceae	FACU
Graminoids and Graminoid-like Species			
<i>Carex pelita</i>	Wooly sedge	Cyperaceae	OBL
<i>Carex nebrascensis</i>	Nebraska sedge	Cyperaceae	OBL
<i>Carex rostrata</i>	Beaked sedge	Cyperaceae	OBL
<i>Juncus confusus</i>	Colorado rush	Juncaceae	FAC
<i>Phalaris arundinacea</i>	Reed canary grass	Poaceae	FACW
<i>Bromus inermis</i>	Smooth brome	Poaceae	UPL
<i>Dactylis glomerata</i>	Orchardgrass	Poaceae	FACU
<i>Pascopyrum smithii</i>	Western wheatgrass	Poaceae	FACU
<i>Agrostis gigantea</i>	Redtop	Poaceae	FACW
<i>Schoenoplectus tabernaemontani</i>	Softstem bullrush	Cyperaceae	OBL
Forbs/Herbs			
<i>Cirsium arvense</i>	Canada thistle	Asteraceae	FAC
<i>Clematis ligusticifolia</i>	Western white clematis	Ranunculaceae	FAC
<i>Leucanthemum vulgare</i>	Ox-eye daisy	Asteraceae	FACU
<i>Medicago sativa</i>	Alfalfa	Fabaceae	UPL
<i>Hippochaete hyemalis</i>	Scouring rush	Equisetaceae	OBL
<i>Arctium minus</i>	Common burdock	Asteraceae	UPL
<i>Carduus acanthoides</i>	Plumeless thistle	Asteraceae	FACU
<i>Artemisia campestris</i>	Common sagewort	Asteraceae	FACU
<i>Mentha arvense</i>	Wild mint	Lamiaceae	FACW

Appendix F. Wetland Determination Data Sheets

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-08-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 1A
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.384847 Long: -107.206567 Datum: WGS 1984
 Soil Map Unit Name: (42) Fluvaquents NWI classification: PSS1

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Remarks:					

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 1 (A) Total Number of Dominant Species Across All Strata: <input type="text"/> 1 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 100 (A/B)
1.					
2.					
3.					
4.					
					Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
= Total Cover					
Sapling/Shrub Stratum	(Plot size: <input type="text"/> 1m ²)				
1. <i>Salix exigua</i>		70	Yes	FACW	
2. <i>Crataegus erythropoda</i>		5		FACU	
3. <i>Rosa woodsii</i>		5		FACU	
4. <i>Lonicera involucrata</i>		5		FAC	
5.					
= Total Cover					
Herb Stratum	(Plot size: <input type="text"/> 1m ²)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <i>Grass spp.</i>		40		FAC	
2. <i>Cirsium arvense</i>		10		FAC	
3. <i>Equisetum hyemale</i>		5		FACW	
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
= Total Cover					
Woody Vine Stratum	(Plot size: <input type="text"/> 1m ²)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. <i>Clematis ligusticifolia</i>		20		FAC	
2.					
= Total Cover					
% Bare Ground in Herb Stratum <input type="text"/> 20					

Remarks:

SOIL

Sampling Point: 1A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
7	10YR 3/2	70	5YR 3/4	15	D	M	Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)				Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input checked="" type="checkbox"/> x	Sandy Redox (S5)	<input type="checkbox"/>	2 cm Muck (A10)	
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/>	Stripped Matrix (S6)	<input type="checkbox"/>	Red Parent Material (TF2)	
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/>	Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/>	Very Shallow Dark Surface (TF12)	
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/>	Loamy Gleyed Matrix (F2)	<input type="checkbox"/>	Other (Explain in Remarks)	
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/>	Depleted Matrix (F3)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/>	Redox Dark Surface (F6)			
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/>	Depleted Dark Surface (F7)			
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/>	Redox Depressions (F8)			

Restrictive Layer (if present): Type: <u>Rock/gravel</u> Depth (inches): <u>8 inches</u>	Hydric Soil Present? Yes <input checked="" type="checkbox"/> X No <input type="checkbox"/>
Remarks:	

HYDROLOGY

Wetland Hydrology Indicators:			
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)	
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)	
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)	
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)	
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)	
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)	
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)	
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)	
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> (LRR A)	<input type="checkbox"/> Frost-Heave Hummocks (D7)	
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/> Other (Explain in Remarks)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)			
Field Observations:			
Surface Water Present?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches):	<input type="text"/>
Water Table Present?	Yes <input type="checkbox"/> No <input type="checkbox"/>	Depth (inches):	<input type="text"/>
Saturation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches):	<u>4 inches</u>
(includes capillary fringe)			
Wetland Hydrology Present?		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:			
Remarks:			

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 1B
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.384952 Long: -107.206686 Datum: WGS 1984
 Soil Map Unit Name: (42) Fluvaquents NWI classification: Upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes x No (If no, explain in Remarks.)
 Are Vegetation x, Soil x, or Hydrology significantly disturbed? Are "Normal Circumstances" present? Yes No
 Are Vegetation , Soil , or Hydrology naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <u> </u> No <u>x</u>	Is the Sampled Area within a Wetland? Yes <u> </u> No <u>X</u>
Hydric Soil Present?	Yes <u> </u> No <u>x</u>	
Wetland Hydrology Present?	Yes <u> </u> No <u>x</u>	

Remarks: Disturbed area for access to head gate structure.

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <u> </u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <u> </u> (A) Total Number of Dominant Species Across All Strata: <u> </u> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <u> </u> (A/B)
1. <u> </u>					
2. <u> </u>					
3. <u> </u>					
4. <u> </u>					
		= Total Cover			
Sapling/Shrub Stratum	(Plot size: <u>3m²</u>)				Prevalence Index worksheet: Total % Cover of: <u> </u> Multiply by: OBL species <u> </u> x 1 = <u> </u> FACW species <u> </u> x 2 = <u> </u> FAC species <u> </u> x 3 = <u> </u> FACU species <u> </u> x 4 = <u> </u> UPL species <u> </u> x 5 = <u> </u> Column Totals: <u> </u> (A) <u> </u> (B) Prevalence Index = B/A = <u> </u>
1. <u>Salix exigua</u>		15		FACW	
2. <u> </u>					
3. <u> </u>					
4. <u> </u>					
		45 = Total Cover			
Herb Stratum	(Plot size: <u>3m²</u>)				Hydrophytic Vegetation Indicators: 1 - Rapid Test for Hydrophytic Vegetation 2 - Dominance Test is >50% 3 - Prevalence Index is ≤3.0 ¹ 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) 5 - Wetland Non-Vascular Plants ¹ Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Bromus inermis</u>		30	yes	UPL	
2. <u>Medicago sativa</u>		30	yes	UPL	
3. <u>Artemisia campestris</u>		15		FACU	
4. <u>Pascopyrum smithii</u>		15		FACU	
5. <u>Convolvulus arvensis</u>		5		-	
6. <u> </u>					
7. <u> </u>					
8. <u> </u>					
9. <u> </u>					
		95 = Total Cover			
Woody Vine Stratum	(Plot size: <u> </u>)				Hydrophytic Vegetation Present? Yes <u> </u> No <u>X</u>
1. <u> </u>					
2. <u> </u>					
		= Total Cover			
% Bare Ground in Herb Stratum <u>10</u>					

Remarks:

SOIL

Sampling Point: 1B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
<1	NA		NA					

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic
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Restrictive Layer (if present): Type: <u>Rock/Gravel</u> Depth (inches): <u><1 inch</u>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks: Soils at sample point were highly compacted and disturbed. Close to ag. Field use and disturbance in area from access to head gate structure.

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)				Secondary Indicators (2 or more required)			
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)					

Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ (includes capillary fringe)	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 2A
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.383850 Long: -107.205958 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: PEM1
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>			

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <u>3m²</u>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> (A) Total Number of Dominant Species Across All Strata: <input type="text"/> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> (A/B)
1. <u>Populus angustifolia</u>		5		FACW	
2. _____					
3. _____					
4. _____					
		5	= Total Cover		Prevalence Index worksheet: Total % Cover of: <input type="text"/> Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
Sapling/Shrub Stratum (Plot size: <u>3m²</u>)					
1. <u>Salix exigua</u>		5		FACW	
2. _____					
3. _____					
		5	= Total Cover		
Herb Stratum (Plot size: <u>3m²</u>)					Hydrophytic Vegetation Indicators: <input checked="" type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Phalaris arundinacea</u>		50	yes	FACW	
2. <u>Carex rostrata</u>		30	yes	OBL	
3. <u>Carex nebrascensis</u>		15		OBL	
4. <u>Agrostis gigantea</u>		15	yes	FAC	
5. <u>Juncus confusus</u>		5		FAC	
6. <u>Equisetum hyemale</u>		5		FACW	
7. <u>Schoenoplectus tabernaemontani</u>		5		OBL	
8. _____					
9. _____					
10. _____					
11. _____					
		125	= Total Cover		
Woody Vine Stratum (Plot size: <input type="text"/>)					
1. _____					
2. _____					
			= Total Cover		
% Bare Ground in Herb Stratum <u>0</u>					

Remarks:

SOIL

Sampling Point: 2A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-17	10YR 3/1	75	5YR 4/6	10	D	M	Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)				Indicators for Problematic Hydric Soils³:	
<input type="checkbox"/> Histosol (A1)	<input checked="" type="checkbox"/>	Sandy Redox (S5)	<input type="checkbox"/> 2 cm Muck (A10)		
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/>	Stripped Matrix (S6)	<input type="checkbox"/> Red Parent Material (TF2)		
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/>	Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/> Very Shallow Dark Surface (TF12)		
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/>	Loamy Gleyed Matrix (F2)	<input type="checkbox"/> Other (Explain in Remarks)		
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/>	Depleted Matrix (F3)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic		
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/>	Redox Dark Surface (F6)			
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/>	Depleted Dark Surface (F7)			
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/>	Redox Depressions (F8)			

Restrictive Layer (if present):
 Type: _____
 Depth (inches): _____

Hydric Soil Present? Yes ☒ No ☐

Remarks: _____

HYDROLOGY

Wetland Hydrology Indicators:				
Primary Indicators (minimum of one required; check all that apply)			Secondary Indicators (2 or more required)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/>	Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/>	Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)
<input checked="" type="checkbox"/> High Water Table (A2)	<input type="checkbox"/>	Salt Crust (B11)	<input type="checkbox"/>	Drainage Patterns (B10)
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/>	Aquatic Invertebrates (B13)	<input type="checkbox"/>	Dry-Season Water Table (C2)
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/>	Hydrogen Sulfide Odor (C1)	<input type="checkbox"/>	Saturation Visible on Aerial Imagery (C9)
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/>	Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/>	Geomorphic Position (D2)
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/>	Presence of Reduced Iron (C4)	<input type="checkbox"/>	Shallow Aquitard (D3)
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/>	Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/>	FAC-Neutral Test (D5)
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/>	Stunted or Stressed Plants (D1)	<input type="checkbox"/>	Raised Ant Mounds (D6) (LRR A)
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/>	(LRR A)	<input type="checkbox"/>	Frost-Heave Hummocks (D7)
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)	<input type="checkbox"/>	Other (Explain in Remarks)		
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)				
Field Observations:				
Surface Water Present?	Yes <input type="checkbox"/>	No <input type="checkbox"/>	Depth (inches):	<input type="text"/>
Water Table Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Depth (inches):	10
Saturation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Depth (inches):	1
(includes capillary fringe)	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Depth (inches):	1
			Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:				
Remarks:				

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 2B
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.383853 Long: -107.205815 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: Upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 1 (A) Total Number of Dominant Species Across All Strata: <input type="text"/> 3 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 33% (A/B)
1.					
2.					
3.					
4.					
		5	= Total Cover		Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
Sapling/Shrub Stratum	(Plot size: <input type="text"/>)				
1. <u>Salix exigua</u>		15	yes	FACW	
2. <u>Cornus alba</u>		5			
3.					
4.					
5.					
		5	= Total Cover		
Herb Stratum	(Plot size: <input type="text"/>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Bromus inermis</u>		25	yes	UPL	
2. <u>Pascopyrum smithii</u>		25	yes	FACU	
3. <u>Verbascum thapsus</u>		15		FACU	
4. <u>Leucanthemum vulgare</u>		15		FACU	
5. <u>Tragopogon dubius</u>		5		-	
6. <u>Dactylis glomerata</u>		5		FACU	
7.					
8.					
9.					
10.					
11.					
		125	= Total Cover		
Woody Vine Stratum	(Plot size: <input type="text"/>)				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1.					
2.					
			= Total Cover		
% Bare Ground in Herb Stratum		20			

Remarks:

SOIL

Sampling Point: 2B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	10YR 4/2	75	NA				Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic
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Restrictive Layer (if present): Type: <u>Rock/gravel</u> Depth (inches): <u>7 inches</u>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)				Secondary Indicators (2 or more required)			
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)					

Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 3A
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.384401 Long: -107.206674 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: PSS1
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 2 (A) Total Number of Dominant Species Across All Strata: <input type="text"/> 2 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 100 (A/B)
1.					
2.					
3.					
4.					
		= Total Cover			Prevalence Index worksheet: Total % Cover of: <input type="text"/> Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
Sapling/Shrub Stratum	(Plot size: <input type="text"/> 3m ²)				
1.	<u>Alnus incana</u>	70	Yes	FACW	
2.	<u>Prunus virginiana</u>	10		FACU	
3.	<u>Cornus alba</u>	5		FACW	
4.	<u>Ribes inerme</u>	5		FAC	
5.	<u>Salix exigua</u>	5		FACW	
		95 = Total Cover			
Herb Stratum	(Plot size: <input type="text"/> 3m ²)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1.	<u>Phalaris arundinacea</u>	80	yes	FACW	
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
		80 = Total Cover			
Woody Vine Stratum	(Plot size: <input type="text"/>)				
1.					
2.					
		= Total Cover			
% Bare Ground in Herb Stratum <input type="text"/> 0					

Remarks:

SOIL

Sampling Point: 3A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-4	10YR 3/1	80					Sandy loam	
4-10	10YR 3/2	80					Sandy loam	
10-16	10YR 3/2	70	10YR 3/6	10	D	M	Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)			Indicators for Problematic Hydric Soils ³ :	
<input type="checkbox"/> Histosol (A1)	<input checked="" type="checkbox"/> x	Sandy Redox (S5)	<input type="checkbox"/>	2 cm Muck (A10)
<input type="checkbox"/> Histic Epipedon (A2)	<input type="checkbox"/>	Stripped Matrix (S6)	<input type="checkbox"/>	Red Parent Material (TF2)
<input type="checkbox"/> Black Histic (A3)	<input type="checkbox"/>	Loamy Mucky Mineral (F1) (except MLRA 1)	<input type="checkbox"/>	Very Shallow Dark Surface (TF12)
<input type="checkbox"/> Hydrogen Sulfide (A4)	<input type="checkbox"/>	Loamy Gleyed Matrix (F2)	<input type="checkbox"/>	Other (Explain in Remarks)
<input type="checkbox"/> Depleted Below Dark Surface (A11)	<input type="checkbox"/>	Depleted Matrix (F3)	³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic	
<input type="checkbox"/> Thick Dark Surface (A12)	<input type="checkbox"/>	Redox Dark Surface (F6)		
<input type="checkbox"/> Sandy Mucky Mineral (S1)	<input type="checkbox"/>	Depleted Dark Surface (F7)		
<input type="checkbox"/> Sandy Gleyed Matrix (S4)	<input type="checkbox"/>	Redox Depressions (F8)		

Restrictive Layer (if present): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input checked="" type="checkbox"/> X No <input type="checkbox"/>
Remarks: _____	

HYDROLOGY

Wetland Indicators:			
Primary Indicators (minimum of one required; check all that apply)		Secondary Indicators (2 or more required)	
<input type="checkbox"/> Surface Water (A1)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B)	
<input type="checkbox"/> High Water Table (A2)	<input type="checkbox"/> Salt Crust (B11)	<input type="checkbox"/> Drainage Patterns (B10)	
<input checked="" type="checkbox"/> Saturation (A3)	<input type="checkbox"/> Aquatic Invertebrates (B13)	<input type="checkbox"/> Dry-Season Water Table (C2)	
<input type="checkbox"/> Water Marks (B1)	<input type="checkbox"/> Hydrogen Sulfide Odor (C1)	<input type="checkbox"/> Saturation Visible on Aerial Imagery (C9)	
<input type="checkbox"/> Sediment Deposits (B2)	<input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3)	<input type="checkbox"/> Geomorphic Position (D2)	
<input type="checkbox"/> Drift Deposits (B3)	<input type="checkbox"/> Presence of Reduced Iron (C4)	<input type="checkbox"/> Shallow Aquitard (D3)	
<input type="checkbox"/> Algal Mat or Crust (B4)	<input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6)	<input type="checkbox"/> FAC-Neutral Test (D5)	
<input type="checkbox"/> Iron Deposits (B5)	<input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A)	<input type="checkbox"/> Raised Ant Mounds (D6) (LRR A)	
<input type="checkbox"/> Surface Soil Cracks (B6)	<input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Frost-Heave Hummocks (D7)	
<input type="checkbox"/> Inundation Visible on Aerial Imagery (B7)			
<input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)			
Field Observations:			
Surface Water Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches):	<input type="text"/>
Water Table Present?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Depth (inches):	<input type="text"/>
Saturation Present?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	Depth (inches):	<u>1</u>
(includes capillary fringe)			
		Wetland Hydrology Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	
Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:			
Remarks:			

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 3B
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.384320 Long: -107.206697 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: Upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 0 (A) Total Number of Dominant Species Across All Strata: <input type="text"/> 2 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 0 (A/B)
1.					
2.					
3.					
4.					
		= Total Cover			Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
Sapling/Shrub Stratum (Plot size: <input type="text"/> 3m ²)					
1.	<u>Salix exigua</u>	15		FACW	
2.	<u>Prunus virginiana</u>	15		FACU	
3.	<u>Quercus gambelii</u>	10		-	
4.					
5.					
		40 = Total Cover			
Herb Stratum (Plot size: <input type="text"/> 3m ²)					Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1.	<u>Bromus inermis</u>	40	yes	UPL	
2.	<u>Pascopyrum smithii</u>	40	yes	FACU	
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
		80 = Total Cover			
Woody Vine Stratum (Plot size: <input type="text"/>)					Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1.					
2.					
		= Total Cover			
% Bare Ground in Herb Stratum <input type="text"/> 10					

Remarks:

SOIL

Sampling Point: 3B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-7	10YR 4/2	75	NA				Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4) </div> <div style="width: 48%;"> <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) </div> </div>	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present): Type: <u>Rock/gravel</u> Depth (inches): <u>7 inches</u>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)				Secondary Indicators (2 or more required)			
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)					

Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 4A
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.384962 Long: -107.207342 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: Upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> (A) Total Number of Dominant Species Across All Strata: <input type="text"/> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> (A/B)
1.					
2.					
3.					
4.					
		= Total Cover			
Sapling/Shrub Stratum	(Plot size: <u>3m²</u>)				Prevalence Index worksheet: Total % Cover of: <input type="text"/> Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
1.	<u>Salix exigua</u>	20		FACW	
2.					
3.					
4.					
5.					
		20 = Total Cover			
Herb Stratum	(Plot size: <u>3m²</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1.	<u>Bromus inermis</u>	60	yes	UPL	
2.	<u>Cynoglossum officinale</u>	15		FACU	
3.	<u>Arctium minus</u>	10		UPL	
4.					
5.					
6.					
7.					
8.					
9.					
10.					
		85 = Total Cover			
Woody Vine Stratum	(Plot size: <input type="text"/>)				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1.					
2.					
		= Total Cover			
% Bare Ground in Herb Stratum		<u>10</u>			

Remarks:

SOIL

Sampling Point: 4A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-12	7.5YR 4/2	90	NA				Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic
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Restrictive Layer (if present): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks: _____

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)				Secondary Indicators (2 or more required)			
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)					

Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: _____

Remarks: _____

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 5A
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.385392 Long: -107.207838 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: Upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> (A) Total Number of Dominant Species Across All Strata: <input type="text"/> (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> (A/B)
1.					
2.					
3.					
4.					
		= Total Cover			
Sapling/Shrub Stratum	(Plot size: <u>3m²</u>)				Prevalence Index worksheet: Total % Cover of: <input type="text"/> Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
1.	<u>Shepherdia argentea</u>	30	yes	FACU	
2.	<u>Rosa woodsii</u>	20		FACU	
3.					
4.					
		50 = Total Cover			
Herb Stratum	(Plot size: <u>3m²</u>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1.	<u>Lepidium campestre</u>	40	yes	UPL	
2.	<u>Carduus acanthoides</u>	30		FACU	
3.	<u>Artemisia campestris</u>	20		UPL	
4.					
5.					
6.					
7.					
8.					
9.					
		90 = Total Cover			
Woody Vine Stratum	(Plot size: <input type="text"/>)				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1.					
2.					
		= Total Cover			
% Bare Ground in Herb Stratum		<u>10</u>			

Remarks:

SOIL

Sampling Point: 5A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-6	10YR 3/2	60	NA				Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Sandy Gleyed Matrix (S4) </div> <div style="width: 48%;"> <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Redox Depressions (F8) </div> </div>	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks)
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³Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic

Restrictive Layer (if present): Type: _____ Depth (inches): _____	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks: _____

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)				Secondary Indicators (2 or more required)			
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)					

Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available: _____

Remarks: _____

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 6A
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.385392 Long: -107.207838 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: Upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐ , Soil ☐ , or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 1 (A) Total Number of Dominant Species Across All Strata: <input type="text"/> 3 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 33 (A/B)
1.					
2.					
3.					
4.					
		= Total Cover			
Sapling/Shrub Stratum	(Plot size: <input type="text"/>)				Prevalence Index worksheet: Total % Cover of: Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
1.	<u>Shepherdia argentea</u>	40	yes	FACU	
2.	<u>Crataegus erythroga</u>	15		FACU	
3.					
4.					
5.					
		55 = Total Cover			
Herb Stratum	(Plot size: <input type="text"/>)				
1.	<u>Bromus inermis</u>	30	yes	UPL	
2.	<u>Agrostis gigantea</u>	30	yes	FAC	
3.	<u>Cynoglossum officinale</u>	20		FACU	
4.	<u>Dactylis glomerata</u>	10		FACU	
5.	<u>Verbascum thapsus</u>	5		FACU	
6.	<u>Glycyrrhiza lepidota</u>	5		FAC	
7.					
8.					
9.					
10.					
11.					
		100 = Total Cover			
Woody Vine Stratum	(Plot size: <input type="text"/>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1.					
2.					
		= Total Cover			
% Bare Ground in Herb Stratum <u>0</u>					Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>

Remarks:

SOIL

Sampling Point: 6A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-13	10YR 3/2	60	NA				Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic
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Restrictive Layer (if present): Type: <u>Rock</u> Depth (inches): <u>13</u>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)				Secondary Indicators (2 or more required)			
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)					

Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-10-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 6B
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.385729 Long: -107.208363 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: PSS1
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Hydric Soil Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Wetland Hydrology Present?	Yes <input checked="" type="checkbox"/>	No <input type="checkbox"/>	
Remarks:			

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 3 (A) Total Number of Dominant Species Across All Strata: <input type="text"/> 3 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 100 (A/B)
1.					
2.					
3.					
4.					
		= Total Cover			
Sapling/Shrub Stratum	(Plot size: <input type="text"/>)				Prevalence Index worksheet: Total % Cover of: <input type="text"/> Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
1. <u>Salix exigua</u>		50	Yes	FACW	
2.					
3.					
4.					
		50 = Total Cover			
Herb Stratum	(Plot size: <input type="text"/>)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1. <u>Cirsium arvense</u>		40	yes	FACW	
2. <u>Agrostis gigantea</u>		40	yes	FAC	
3. <u>Carex pellita</u>		10		OBL	
4. <u>Mentha arvensis</u>		10		FACW	
5. <u>Cynoglossum officinale</u>		10		FACU	
6.					
7.					
8.					
9.					
10.					
		110 = Total Cover			
Woody Vine Stratum	(Plot size: <input type="text"/>)				Hydrophytic Vegetation Present? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
1. <u>Solanum dulcamara</u>		20		FAC	
2.					
		20 = Total Cover			
% Bare Ground in Herb Stratum <u>0</u>					

Remarks:

Sampling Point: 6B

HYDROLOGY

Western Mountains, Valleys, and Coast – Version 2.0

WETLAND DETERMINATION DATA FORM – Western Mountains, Valleys, and Coast Region

Project/Site: Crystal River Restoration City/County: Carbondale/Garfield Sampling Date: 10-09-2019
 Applicant/Owner: City of Carbondale State: CO Sampling Point: 7A
 Investigator(s): Jeremy Allinson, Jon Rose Section, Township, Range: S3 T8 R88
 Landform (hillslope, terrace, etc.): Terrace Local relief (concave, convex, none): Concave Slope (%): 0-1%
 Subregion (LRR): E. Rocky Mountain Lat: 39.386281 Long: -107.208556 Datum: WGS 1984
 Soil Map Unit Name: (13) Atencio-Azeltine complex NWI classification: Upland
 Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐
 Are Vegetation ☐, Soil ☐, or Hydrology ☐ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	Is the Sampled Area within a Wetland? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
Hydric Soil Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	
Wetland Hydrology Present?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum	(Plot size: <input type="text"/>)	Absolute % Cover	Dominant Species?	Indicator Status	Dominance Test worksheet: Number of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 0 (A) Total Number of Dominant Species Across All Strata: <input type="text"/> 1 (B) Percent of Dominant Species That Are OBL, FACW, or FAC: <input type="text"/> 0 (A/B)
1.					
2.					
3.					
4.					
		= Total Cover			Prevalence Index worksheet: Total % Cover of: <input type="text"/> Multiply by: OBL species <input type="text"/> x 1 = <input type="text"/> FACW species <input type="text"/> x 2 = <input type="text"/> FAC species <input type="text"/> x 3 = <input type="text"/> FACU species <input type="text"/> x 4 = <input type="text"/> UPL species <input type="text"/> x 5 = <input type="text"/> Column Totals: <input type="text"/> (A) <input type="text"/> (B) Prevalence Index = B/A = <input type="text"/>
Sapling/Shrub Stratum	(Plot size: <input type="text"/>)				
1.					
2.					
3.					
4.					
5.					
		= Total Cover			
Herb Stratum	(Plot size: <input type="text"/> 3m ²)				Hydrophytic Vegetation Indicators: <input type="checkbox"/> 1 - Rapid Test for Hydrophytic Vegetation <input type="checkbox"/> 2 - Dominance Test is >50% <input type="checkbox"/> 3 - Prevalence Index is ≤3.0 ¹ <input type="checkbox"/> 4 - Morphological Adaptations ¹ (Provide supporting data in Remarks or on a separate sheet) <input type="checkbox"/> 5 - Wetland Non-Vascular Plants ¹ <input type="checkbox"/> Problematic Hydrophytic Vegetation ¹ (Explain) ¹ Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.
1.	<u>Bromus inermis</u>	100	yes	UPL	
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
		= Total Cover			
Woody Vine Stratum	(Plot size: <input type="text"/>)				Hydrophytic Vegetation Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
1.					
2.					
		= Total Cover			
% Bare Ground in Herb Stratum <input type="text"/>					

Remarks:

SOIL

Sampling Point: 7A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)								
Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type ¹	Loc ²		
0-14	7.5YR 4/3	70	NA				Sandy loam	

¹Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. ²Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.) <input type="checkbox"/> Histosol (A1) <input type="checkbox"/> Sandy Redox (S5) <input type="checkbox"/> Histic Epipedon (A2) <input type="checkbox"/> Stripped Matrix (S6) <input type="checkbox"/> Black Histic (A3) <input type="checkbox"/> Loamy Mucky Mineral (F1) (except MLRA 1) <input type="checkbox"/> Hydrogen Sulfide (A4) <input type="checkbox"/> Loamy Gleyed Matrix (F2) <input type="checkbox"/> Depleted Below Dark Surface (A11) <input type="checkbox"/> Depleted Matrix (F3) <input type="checkbox"/> Thick Dark Surface (A12) <input type="checkbox"/> Redox Dark Surface (F6) <input type="checkbox"/> Sandy Mucky Mineral (S1) <input type="checkbox"/> Depleted Dark Surface (F7) <input type="checkbox"/> Sandy Gleyed Matrix (S4) <input type="checkbox"/> Redox Depressions (F8)	Indicators for Problematic Hydric Soils³: <input type="checkbox"/> 2 cm Muck (A10) <input type="checkbox"/> Red Parent Material (TF2) <input type="checkbox"/> Very Shallow Dark Surface (TF12) <input type="checkbox"/> Other (Explain in Remarks) ³ Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic
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Restrictive Layer (if present): Type: <u>Rock</u> Depth (inches): <u>13</u>	Hydric Soil Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Remarks:

HYDROLOGY

Wetland Hydrology Indicators: Primary Indicators (minimum of one required; check all that apply)				Secondary Indicators (2 or more required)			
<input type="checkbox"/> Surface Water (A1) <input type="checkbox"/> High Water Table (A2) <input type="checkbox"/> Saturation (A3) <input type="checkbox"/> Water Marks (B1) <input type="checkbox"/> Sediment Deposits (B2) <input type="checkbox"/> Drift Deposits (B3) <input type="checkbox"/> Algal Mat or Crust (B4) <input type="checkbox"/> Iron Deposits (B5) <input type="checkbox"/> Surface Soil Cracks (B6) <input type="checkbox"/> Inundation Visible on Aerial Imagery (B7) <input type="checkbox"/> Sparsely Vegetated Concave Surface (B8)	<input type="checkbox"/> Water-Stained Leaves (B9) (except MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Salt Crust (B11) <input type="checkbox"/> Aquatic Invertebrates (B13) <input type="checkbox"/> Hydrogen Sulfide Odor (C1) <input type="checkbox"/> Oxidized Rhizospheres along Living Roots (C3) <input type="checkbox"/> Presence of Reduced Iron (C4) <input type="checkbox"/> Recent Iron Reduction in Tilled Soils (C6) <input type="checkbox"/> Stunted or Stressed Plants (D1) (LRR A) <input type="checkbox"/> Other (Explain in Remarks)	<input type="checkbox"/> Water-Stained Leaves (B9) (MLRA 1, 2, 4A, and 4B) <input type="checkbox"/> Drainage Patterns (B10) <input type="checkbox"/> Dry-Season Water Table (C2) <input type="checkbox"/> Saturation Visible on Aerial Imagery (C9) <input type="checkbox"/> Geomorphic Position (D2) <input type="checkbox"/> Shallow Aquitard (D3) <input type="checkbox"/> FAC-Neutral Test (D5) <input type="checkbox"/> Raised Ant Mounds (D6) (LRR A) <input type="checkbox"/> Frost-Heave Hummocks (D7)					

Field Observations: Surface Water Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Water Table Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____ Saturation Present? (includes capillary fringe) Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Depth (inches): _____	Wetland Hydrology Present? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
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Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

CRYSTAL RIVER RESTORATION AND WEAVER DITCH EFFICIENCY PROJECT
CRYSTAL RIVER - CARBONDALE, CO
90% DESIGN SET - MARCH 2021

SHEET INDEX

SHEET NO.	SHEET TITLE
G01	COVER SHEET
G02	SITE PLAN AND HORIZONTAL CONTROL PLAN
CW00	PROJECT ACCESS AND CARE OF WATER OVERVIEW - PLAN
CW01	RIFFLE AND DIVERSION STRUCTURE CARE OF WATER - PLAN (WEST ISOLATION)
CW02	RIFFLE AND DIVERSION STRUCTURE CARE OF WATER - PLAN (EAST ISOLATION)
CW03	TYPICAL BANK RESTORATION AREA CARE OF WATER - PLAN (WEST ISOLATION)
CW04	CONSTRUCTION ACCESS DETAILS
CW05	EROSION CONTROL DETAILS
CW06	CARE OF WATER DETAILS
CW07	COFFERDAM DETAILS
R01	DOWNSTREAM CHANNEL - PLAN AND PROFILE
R02	RIFFLE AND GRADE CONTROL STRUCTURE - PLAN AND PROFILE
R03	UPSTREAM CHANNEL - PLAN AND PROFILE
R04	CHANNEL SECTIONS 1 OF 2
R05	CHANNEL SECTIONS 2 OF 2
BK00	BANK RESTORATION - OVERVIEW
BK01-BK01b	BANK RESTORATION AREA 1 - PLAN AND SECTIONS
BK02-BK02b	BANK RESTORATION AREA 2 - PLAN AND SECTIONS
BK03-BK03b	BANK RESTORATION AREA 3 - PLAN AND SECTIONS
BK04-BK04b	BANK RESTORATION AREA 4 - PLAN AND SECTIONS
BK05-BK05b	BANK RESTORATION AREA 5 - PLAN AND SECTIONS
BK06-BK06b	BANK RESTORATION AREA 6 - PLAN AND SECTIONS
L00	UPLAND IMPROVEMENTS - OVERVIEW
L01	ACCESSIBLE RAMP
L02-L12	UPLAND IMPROVEMENTS
L13	WILDLIFE PROTECTION FENCING PLAN
L14	IRRIGATION DIAGRAM
D01	ACCESS IMPROVEMENT DETAILS
D02	TRAIL IMPROVEMENT DETAILS
D03-D04	UPLAND IMPROVEMENT AND RIVER ACCESS DETAILS
D05	CONTAINERIZED PLANTING DETAILS
D06-D07	RESTORATION DETAILS
D08	FENCING DETAILS
D09a	GENERAL RESTORATION NOTES AND MATERIALS SCHEDULE
D09b	PLANTING AND SEEDING NOTES
D09c	OVERALL PLANTING SCHEDULE AND SEED MIXES
D10	BANK RESTORATION DETAILS
D11	EROSION CONTROL BLANKET DETAILS
D12	IN-CHANNEL BOULDER DETAILS
D13	BOULDER GRADE CONTROL DETAILS
D14	ENGINEERED RIFFLE DETAILS
D15	MAINTENANCE ACCESS RAMP DETAILS
D16	DIVERSION "ISLAND" DETAILS

CONTACTS

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Utility Director
Town of Carbondale
0171 Hwy 131
Carbondale, CO 81623
970.963.3140

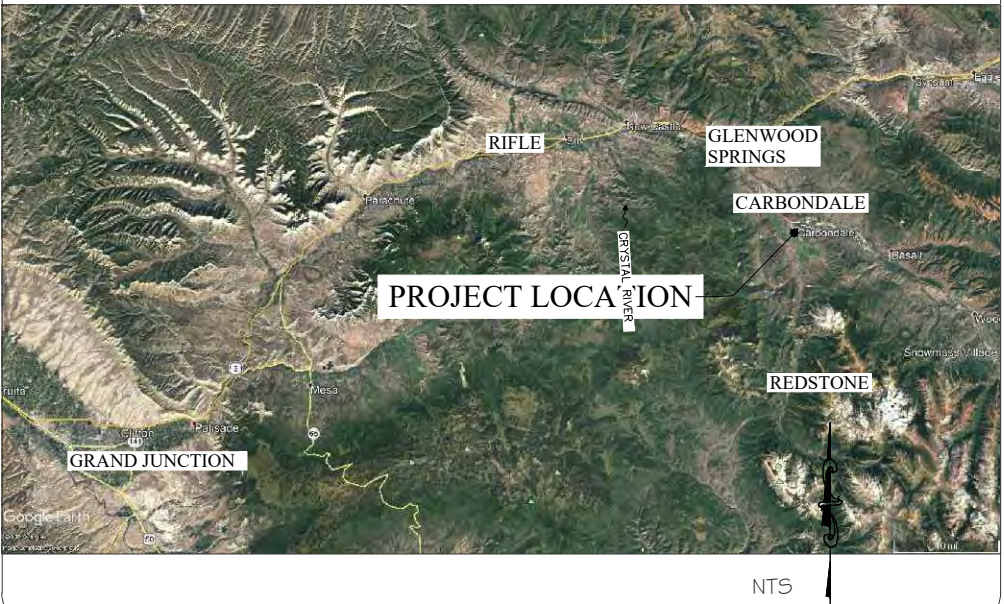
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Jason Jaynes, PLA
Principal Landscape Architect
DHM Design
311 Main Street, Suite 102
Carbondale, CO 81623
970.963.6520

ABBREVIATIONS:

BMP BEST MANAGEMENT PRACTICE
OHWM ORDINARY HIGH WATER MARK
PIP PROTECT-IN-PLACE

LOCATION MAP



VICINITY MAP



PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
COVER SHEET

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS
 Town of Carbondale 511 Colorado Ave Carbondale, CO 81623

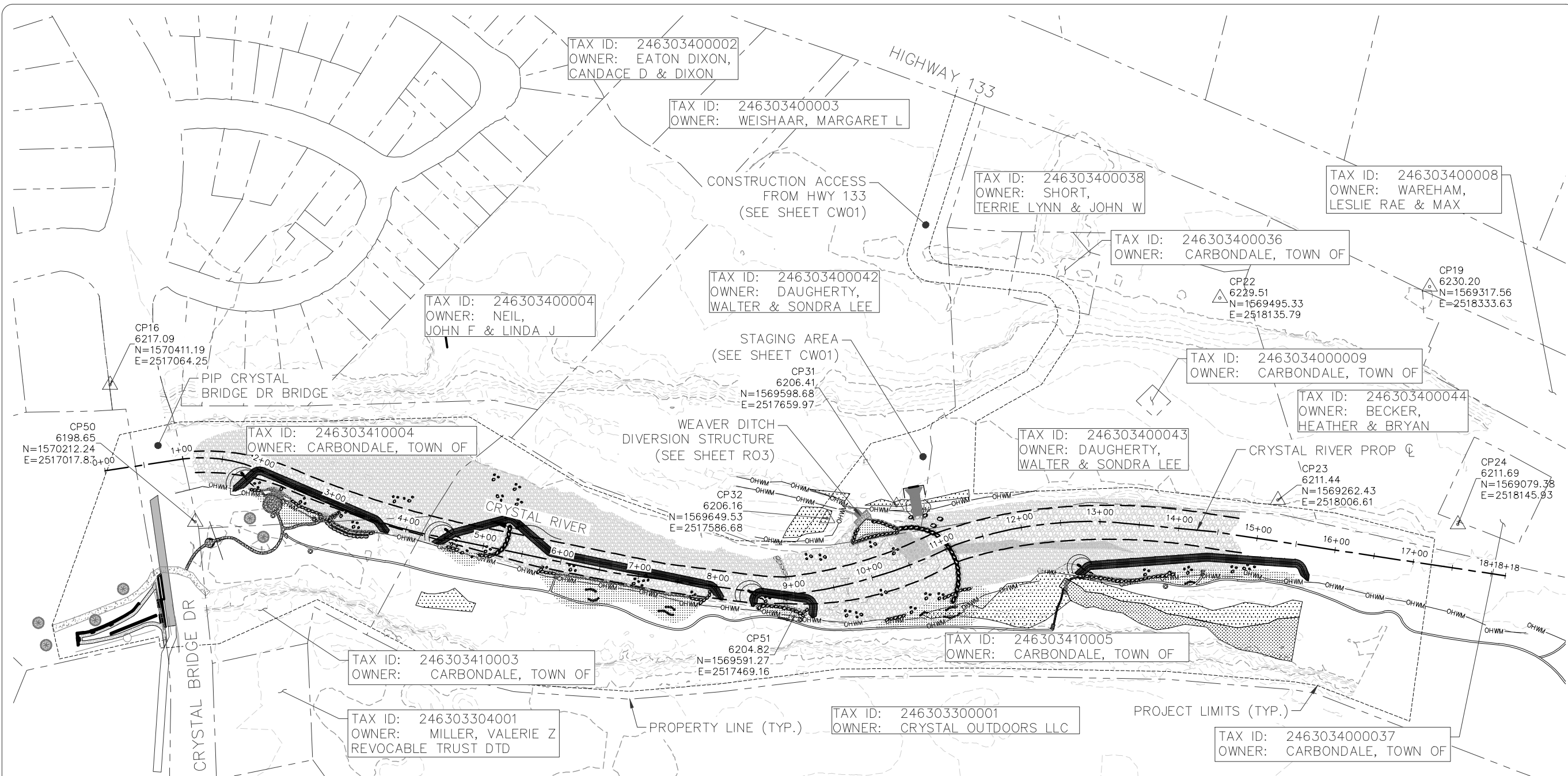
DESIGN FIRMS NAME AND ADDRESSES
 RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org
 311 Main St, Suite 102 Carbondale, CO 81623 970.963.6520 www.dhmdesign.com

PROJECT NAME AND ADDRESS
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623

Project 38047	Sheet
Date March 2021	GO 1
Scale NTS	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION





HORIZONTAL DATUM:

NORTH AMERICAN DATUM 1983 (NAD83) – COLORADO STATE PLANE, CENTRAL ZONE, US SURVEY FOOT

VERTICAL DATUM:

NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88)

LEGEND

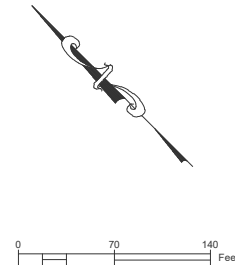
- PALUSTRINE EMERGENT WETLAND (PEM1B)
- PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- PROPERTY LINE
- ORDINARY HIGH WATER MARK
- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROJECT LIMITS
- STAGING AREA

NOTES:

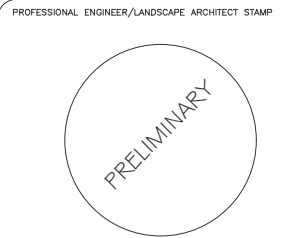
- PROPERTY LINES SHOWN ARE FROM GARFIELD COUNTY GIS DATABASE AND ARE APPROXIMATE AND SHOWN FOR REFERENCE ONLY.

CONTROL POINT TABLE

POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
16	1570411.1930	2517064.2470	6217.09	CP 16
19	1569317.5630	2518333.6290	6230.20	CP 19
22	1569495.3280	2518135.7870	6229.51	CP 22
23	1569262.4300	2518006.6110	6211.44	CP 23
24	1569079.3770	2518145.9260	6211.69	CP 24
31	1569598.6830	2517659.9660	6206.41	CP 31 REBAR
32	1569649.5320	2517586.6750	6206.16	CP 32 REBAR
50	1570212.2360	2517017.8260	6198.65	CP 50 AL CAP
51	1569591.2670	2517469.1580	6204.82	CP 51 AL CAP
52	1568310.4820	2518213.1860	6216.42	CP 52 AL CAP



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
SITE ACCESS PLAN AND
HORIZONTAL CONTROL PLAN

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

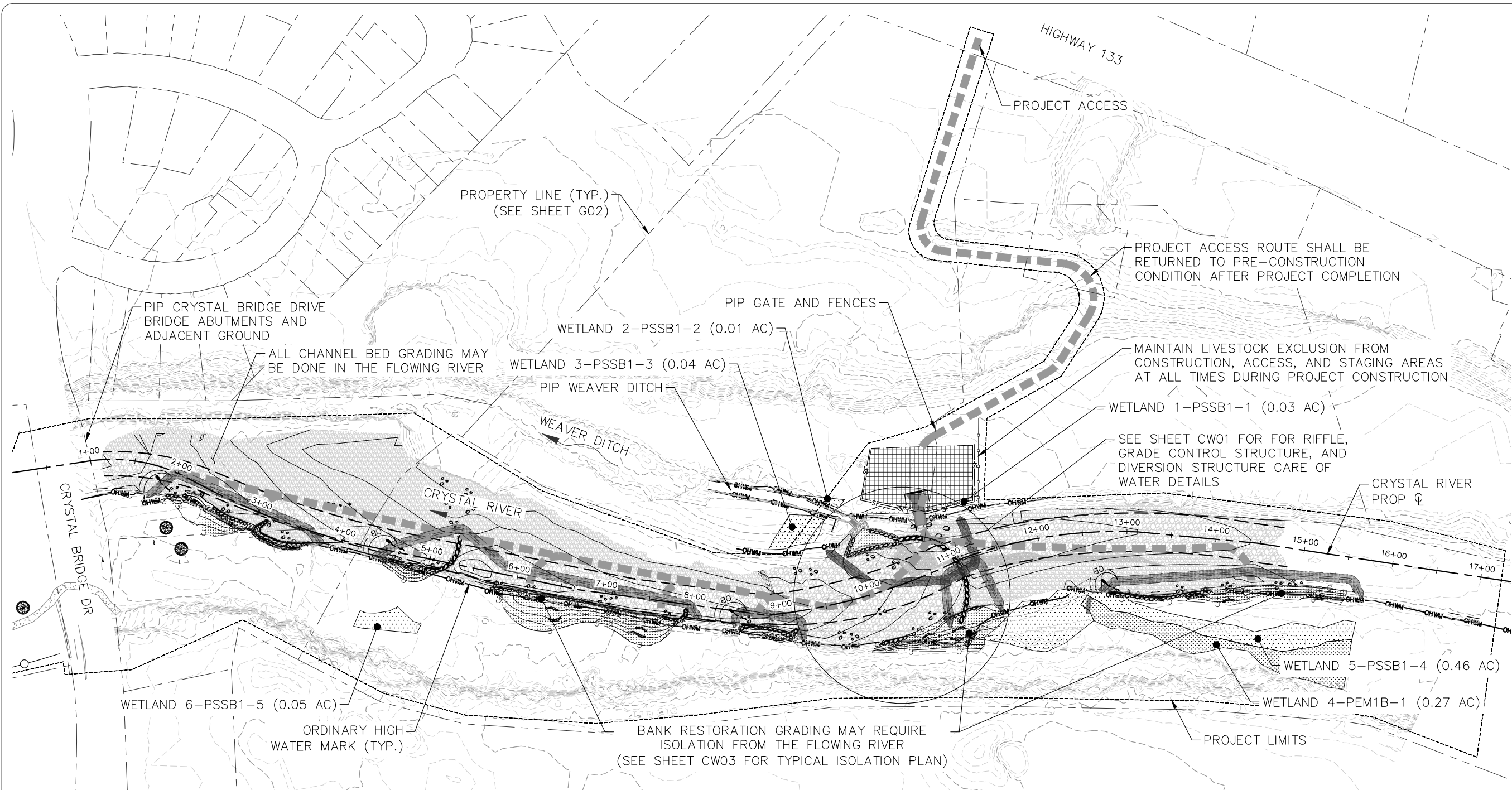
 Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES


RiverRestoration.org, LLC
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www.RiverRestoration.org


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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet G02
Date March 2021	
Scale 1"=70' (FULL SIZE)	

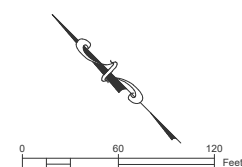


CARE OF WATER NOTES (APPLICABLE TO ALL CW SHEETS):

- 1) CARE OF WATER (CW) PLAN SHOWN IS FOR PERMITTING AND COST ESTIMATION ONLY. THE FINAL CW PLAN, INCLUDING DEVELOPMENT OF STAGING AREAS AND ACCESS ROUTES, IS WHOLLY THE RESPONSIBILITY OF THE CONTRACTOR. SEE SPECIFICATIONS FOR DETAILS.
- 2) CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH ALL LOCAL, STATE, AND FEDERAL REGULATIONS AND BEST MANAGEMENT PRACTICES (BMPs).
- 3) IF CHANNEL CONSTRUCTION REQUIRES ISOLATION FROM THE CRYSTAL RIVER, A COFFER SYSTEM MAY BE REQUIRED AND CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTATION OF ISOLATION PLAN. SEE SHEET CW04 AND SPECIFICATIONS FOR OPTIONAL COFFERDAM DETAILS.
- 4) ALL TREES AND ESTABLISHED VEGETATION WITHIN THE DISTURBANCE AREA NOT SPECIFIED AS PROTECT-IN-PLACE (PIP) SHALL NOT BE REMOVED OR DAMAGED UNLESS NECESSARY FOR ACCESS OR WITHIN GRADING AREAS.
- 5) UTILITY LOCATIONS SHOWN IN PLANS ARE APPROXIMATE. CONTRACTOR IS RESPONSIBLE FOR ALL UTILITY LOCATES INCLUDING UTILITIES NOT SHOWN IN PLANS.
- 6) SEE SPECIFICATIONS FOR BMPs, CARE OF WATER, AND MATERIALS INFORMATION.

LEGEND


- | | | | |
|--|--|--|---------------------------|
| | PALUSTRINE EMERGENT WETLAND (PEM1B) | | STAGING AREA |
| | PALUSTRINE SCRUB SHRUB WETLAND (PSSB1) | | COFFERDAM-EAST |
| | PROPERTY LINE | | COFFERDAM-WEST |
| | ORDINARY HIGH WATER MARK | | ACCESS ROUTE |
| | PROPOSED CONTOUR | | SILT FENCE |
| | EXISTING CONTOUR | | LIVESTOCK EXCLUSION FENCE |
| | PROJECT LIMITS | | OIL BOOM |
| | | | TURBIDITY CURTAIN |



PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
PROJECT ACCESS AND CARE OF WATER
OVERVIEW - PLAN

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS
 Town of Carbondale 511 Colorado Ave Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES
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DHM DESIGN

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PROJECT NAME AND ADDRESS
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623

Project 38047	Sheet CWO0
Date March 2021	
Scale 1"=60' (FULL SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

PALUSTRINE EMERGENT WETLAND (PEM1B)
 PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
 ----- PROPERTY LINE
 —OHWM— ORDINARY HIGH WATER MARK
 ——— PROPOSED CONTOUR
 - - - - - EXISTING CONTOUR
 - - - - - PROJECT LIMITS
 [Grid] STAGING AREA
 [Hatched] COFFERDAM—EAST
 [Hatched] COFFERDAM—WEST
 [Thick Line] ACCESS ROUTE
 —SF— SILT FENCE
 —□— LIVESTOCK EXCLUSION FENCE
 —OB— OIL BOOM
 —TC— TURBIDITY CURTAIN

DIVERSION STRUCTURE MODIFICATIONS,
PERMANENT ACCESS RAMP
CONSTRUCTION, AND ISLAND
MODIFICATIONS MUST BE DONE IN
ISOLATION FROM THE FLOWING RIVER

CRYSTAL RIVER

HABITAT BOULDERS MAY BE
INSTALLED IN THE FLOWING RIVER
SEE SHEET D12 FOR DETAILS

CRYSTAL RIVER
PROP C

TURBIDITY CURTAIN (TYP)
SEE SHEET CW06 FOR DETAILS

OIL BOOM (TYP) -
SEE SHEET CW06 FOR DETAILS

ORDINARY HIGH-
WATER MARK (TYP.)

PUMP AND FILTER (TYP)
SEE SHEET CW06 FOR DETAILS

WEST ISOLATION

1. SEE SHEET CW00 FOR PROJECT ACCESS.



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND WEAVER DITCH EFFICIENCY PROJECT RIFFLE AND DIVERSION STRUCTURE CARE OF WATER PLAN (WEST ISOLATION)

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



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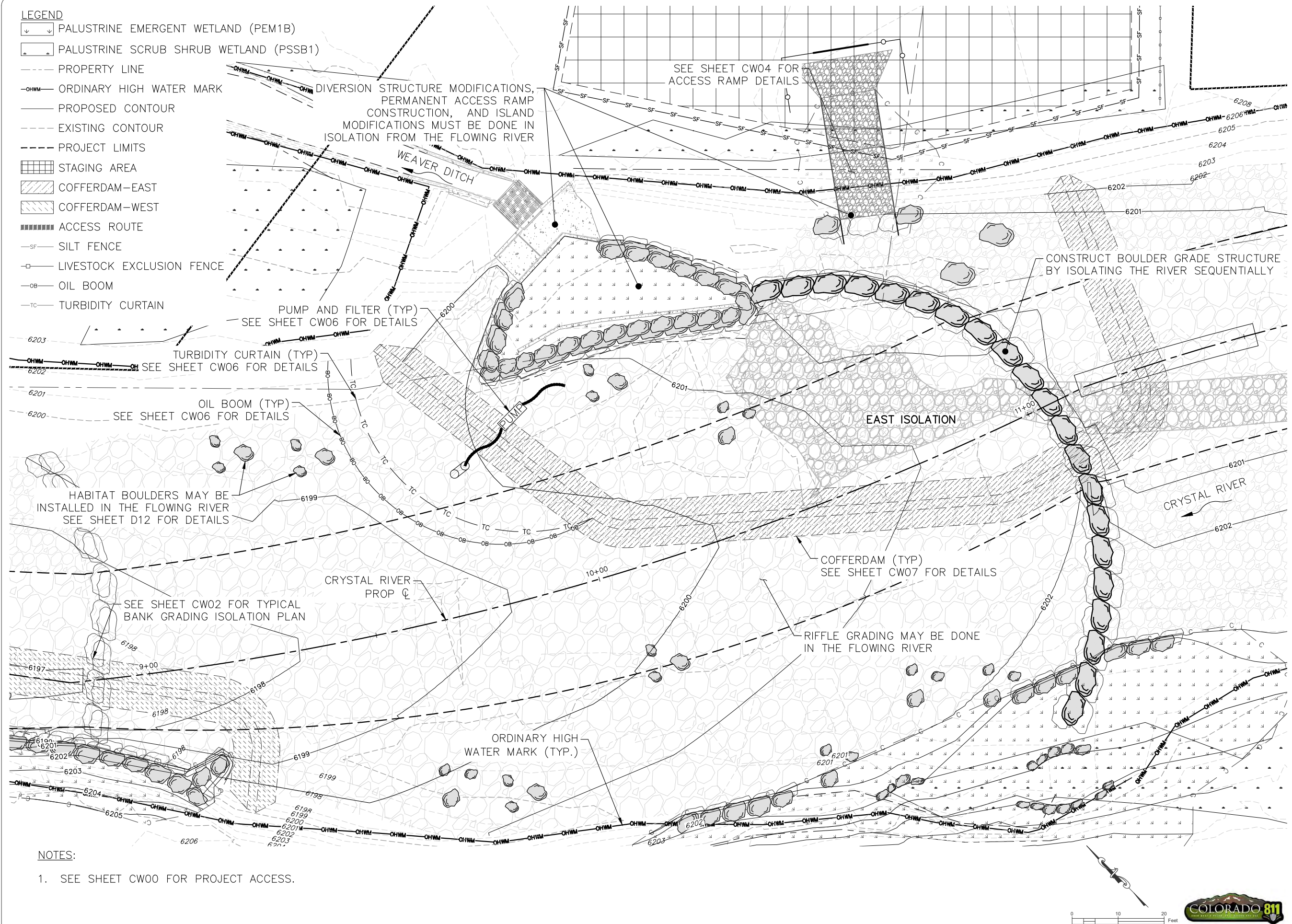
PROJECT NAME AND ADDRESS

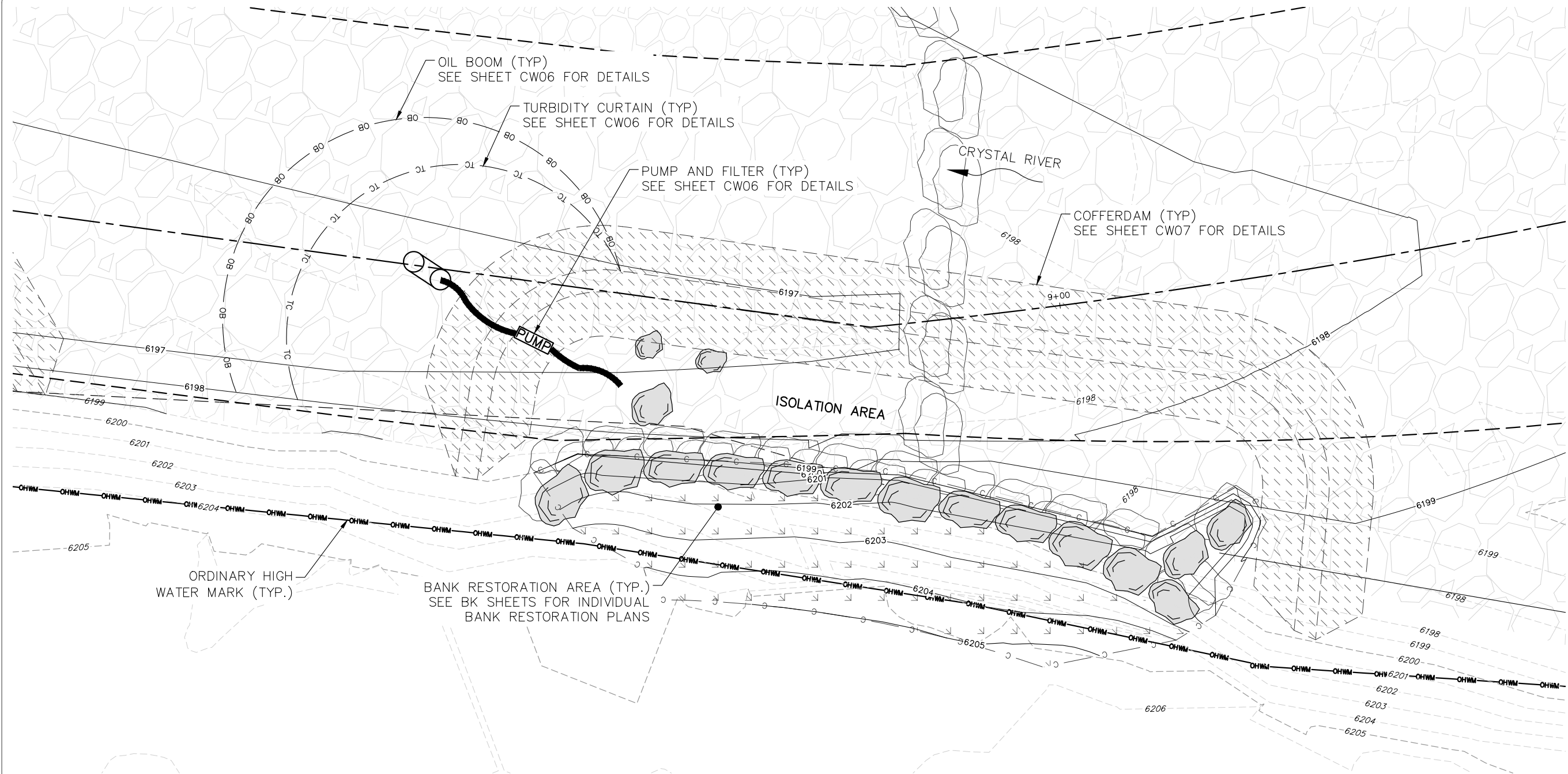
Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

Project 38047	Sheet
Date March 2021	CWO I
Scale 1" = 10' (FULL SIZE)	

LEGEND

- ↓ PALUSTRINE EMERGENT WETLAND (PEM1B)
- ▤ PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- PROPERTY LINE
- OHWM- ORDINARY HIGH WATER MARK
- PROPOSED CONTOUR
- - - EXISTING CONTOUR
- - - PROJECT LIMITS
- ▤ STAGING AREA
- ▤ COFFERDAM—EAST
- ▤ COFFERDAM—WEST
- ||||| ACCESS ROUTE
- SF- SILT FENCE
- LIVESTOCK EXCLUSION FENCE
- OB- OIL BOOM
- TC- TURBIDITY CURTAIN





- LEGEND**
- | | | | |
|--|--|--|---------------------------|
| | PALUSTRINE EMERGENT WETLAND (PEM1B) | | STAGING AREA |
| | PALUSTRINE SCRUB SHRUB WETLAND (PSSB1) | | COFFERDAM-EAST |
| | PROPERTY LINE | | COFFERDAM-WEST |
| | ORDINARY HIGH WATER MARK | | ACCESS ROUTE |
| | PROPOSED CONTOUR | | SILT FENCE |
| | EXISTING CONTOUR | | LIVESTOCK EXCLUSION FENCE |
| | PROJECT LIMITS | | OIL BOOM |
| | | | TURBIDITY CURTAIN |

- NOTES:**
- SEE SHEET CW00 FOR PROJECT ACCESS.
 - THIS CARE OF WATER BANK GRADING ISOLATION PLAN IS APPLICABLE TO ALL BANK RESTORATION AREAS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FINAL ISOLATION PLANS AND PLACEMENT OF COFFER SYSTEMS, TURBIDITY CURTAINS, OIL BOOMS, PUMPS AND FILTERS, AND OTHER BMPs FOR EACH BANK RESTORATION AREA.



PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
TYPICAL BANK RESTORATION AREA
CARE OF WATER PLAN (WEST ISOLATION)

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



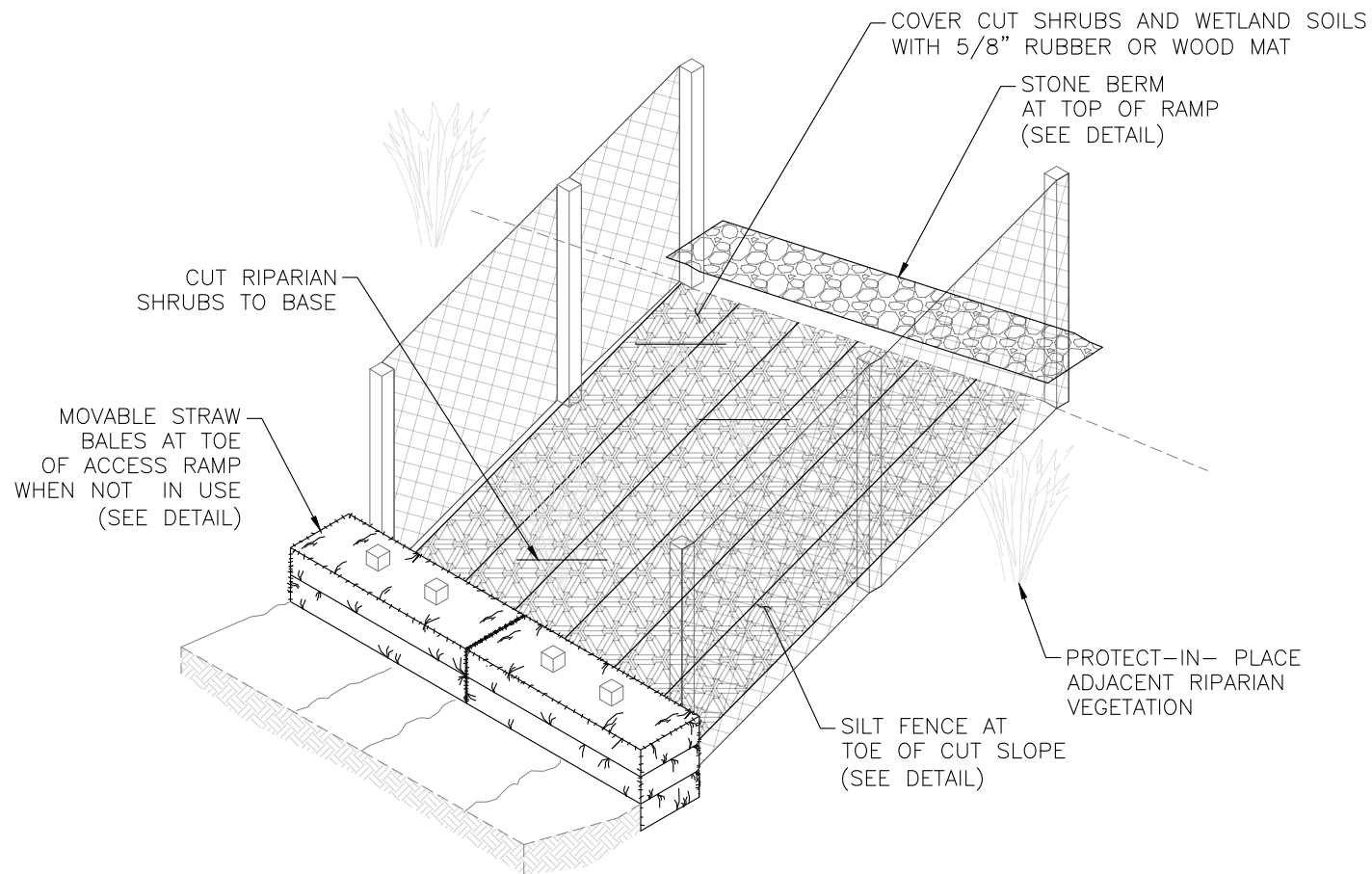
RiverRestoration.org, LLC
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org



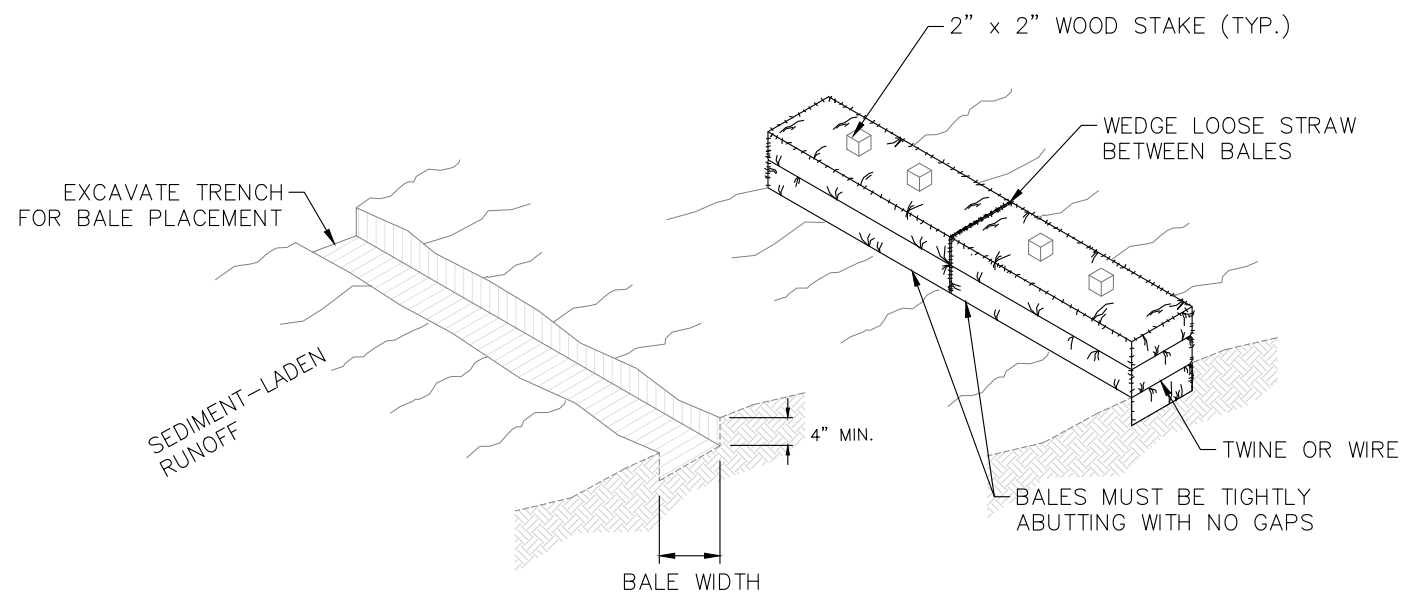
311 Main St, Suite 102
Carbondale, CO 81623
970.963.6520
www.dhmdesign.com

PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project 38047	Sheet CW03	
Date March 2021		
Scale 1"=5' (FULL SIZE)		

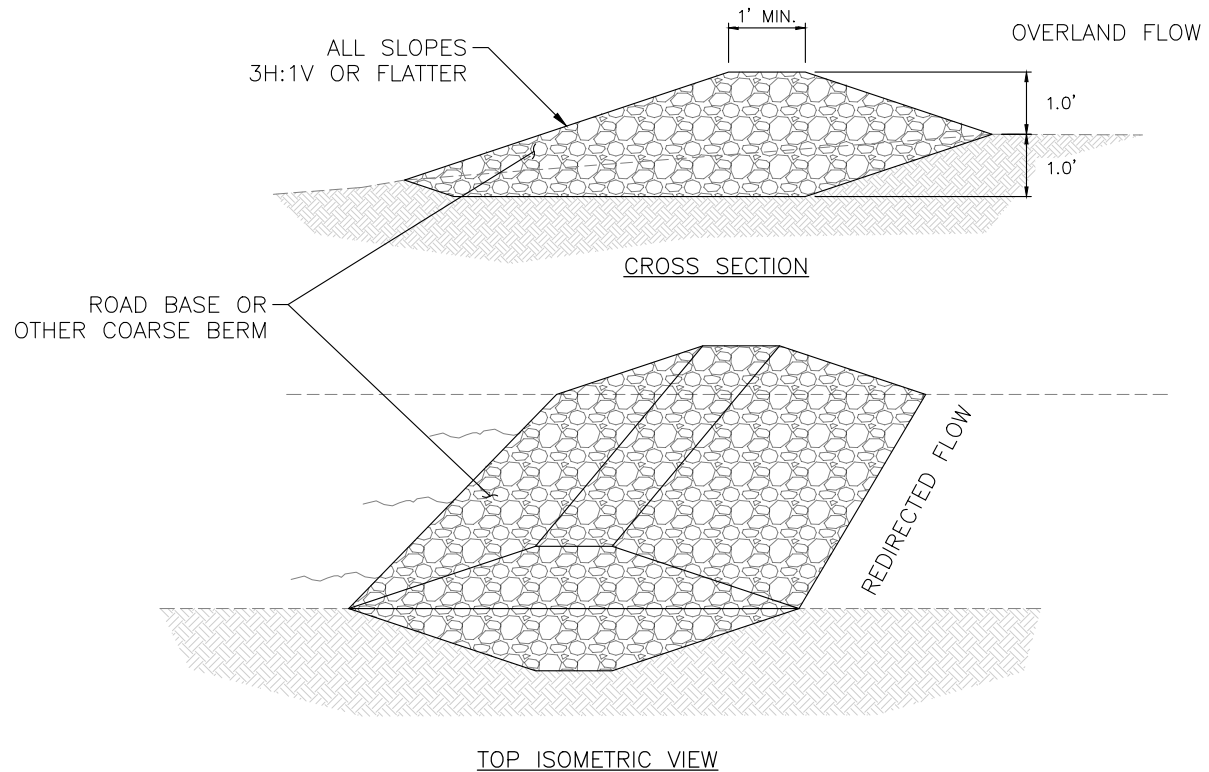
PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



1 TEMPORARY EQUIPMENT ACCESS (TYP)
CW03 NTS



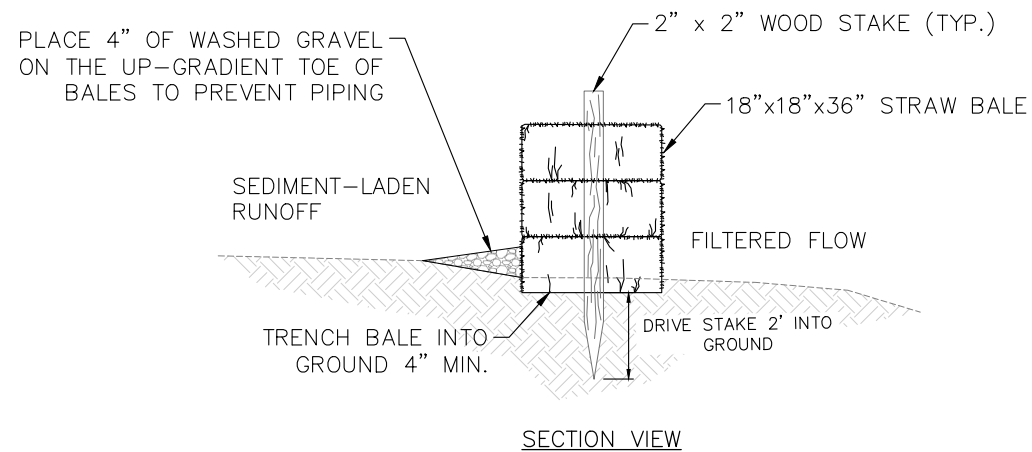
2 STRAW BALE INSTALLATION (TYP)
CW03 NTS



3 STONE BERM (TYP)
CW03 NTS

STRAW BALE INSTALLATION NOTES:

1. EXCAVATE TRENCH 4" MIN.
2. PLACE AND STAKE STRAW BALES.
3. STRAW BALES SHALL BE CERTIFIED "WEED-FREE" AND NOT HAY.



PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
CONSTRUCTION ACCESS DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



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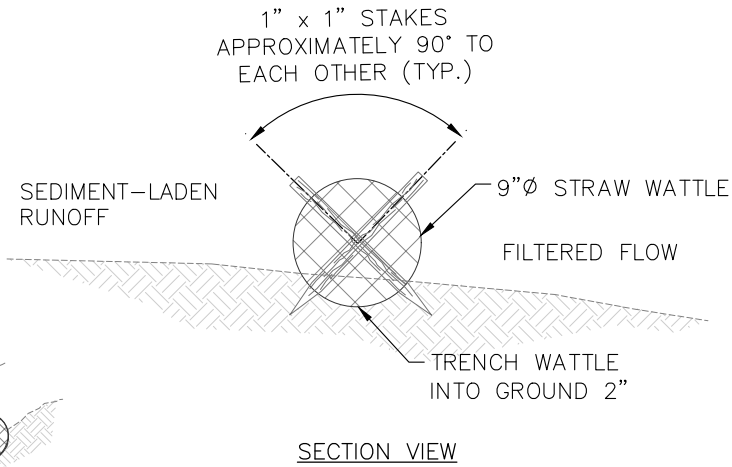
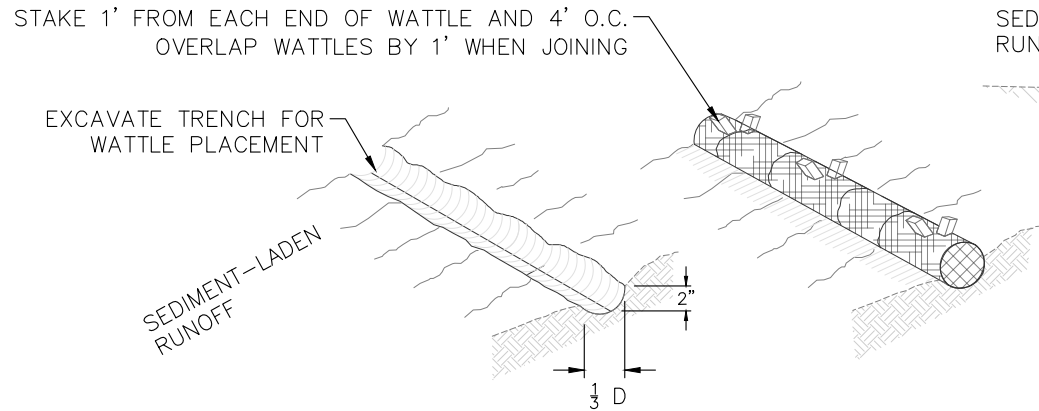
PROJECT NAME AND ADDRESS
Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

Project 38047	Sheet CWO4
Date March 2021	Scale NOT TO SCALE

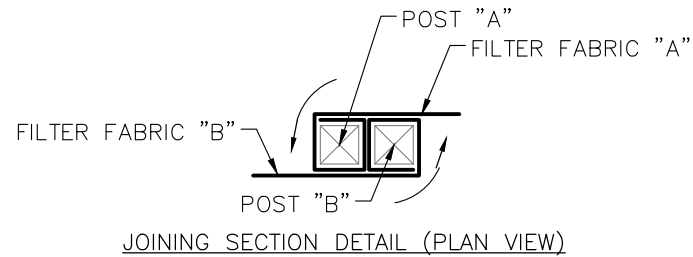
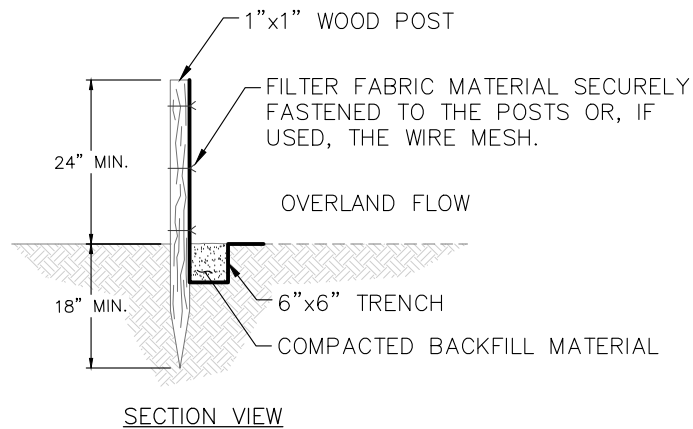
PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



- STRAW WATTLE INSTALLATION NOTES:
1. EXCAVATE TRENCH 2".
 2. PLACE AND STAKE WATTLE.
 3. PLACE SPOILS UP-SLOPE FROM WATTLE, KNIFE-IN AND COMPACT.

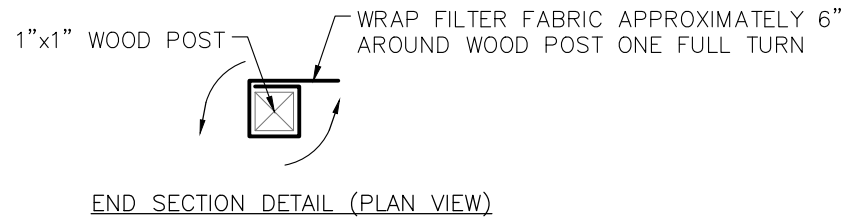
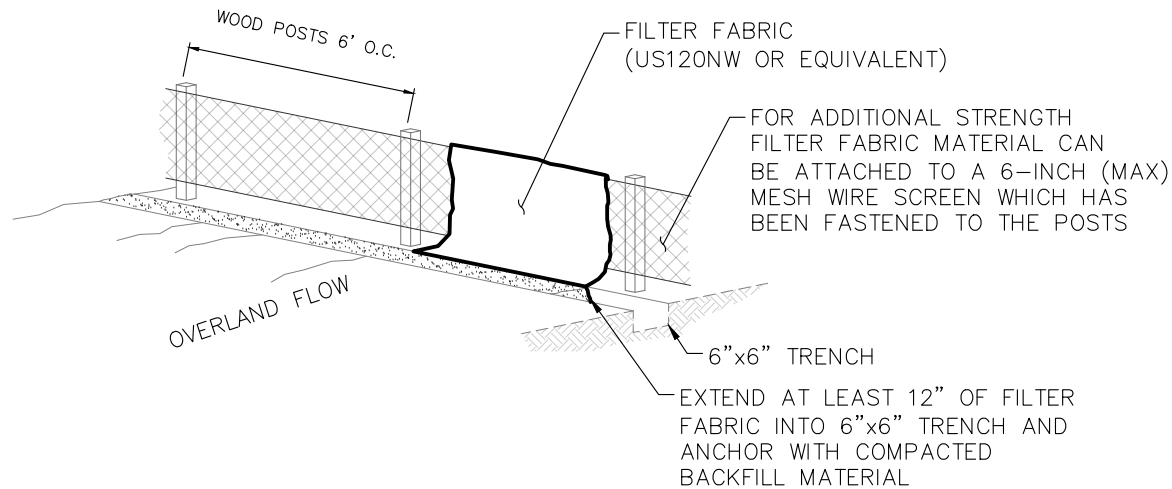


1
CW04
STRAW WATTLE INSTALLATION (TYP)
NTS



JOINING SECTION DETAIL (PLAN VIEW)

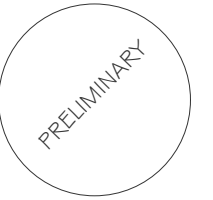
- SILT FENCE JOINING NOTES:
1. WRAP APPROXIMATELY 6" OF FILTER FABRIC OF EACH END AROUND A WOODEN POST ONE FULL TURN, THEN SECURED ALONG THE POST WITH HEAVY DUTY WIRE STAPLES AT LEAST 1" LONG.
 2. POST SHALL BE TIGHTLY ABUTTED WITH NO GAPS TO PREVENT POTENTIAL FLOW-THROUGH OF SEDIMENT AT JOINT.



END SECTION DETAIL (PLAN VIEW)

2
CW04
SILT FENCE (TYP)
NTS

PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
EROSION CONTROL DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



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DHM DESIGN

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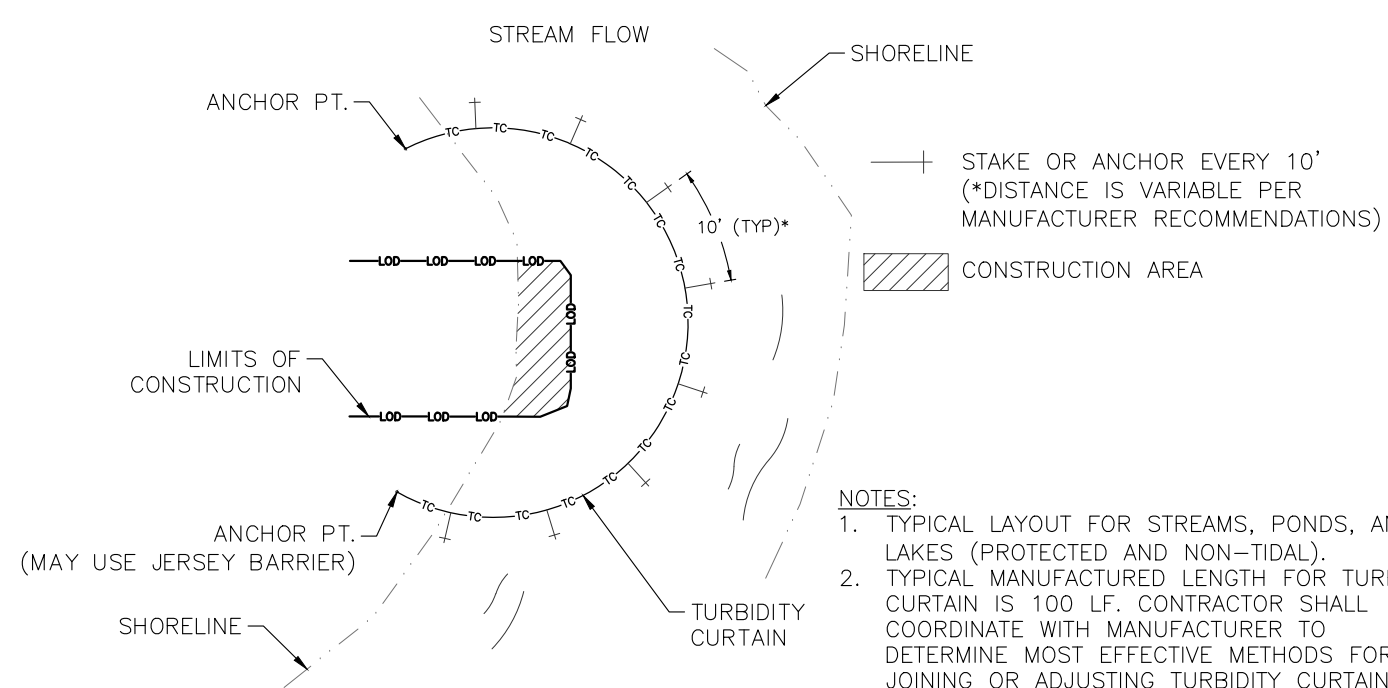
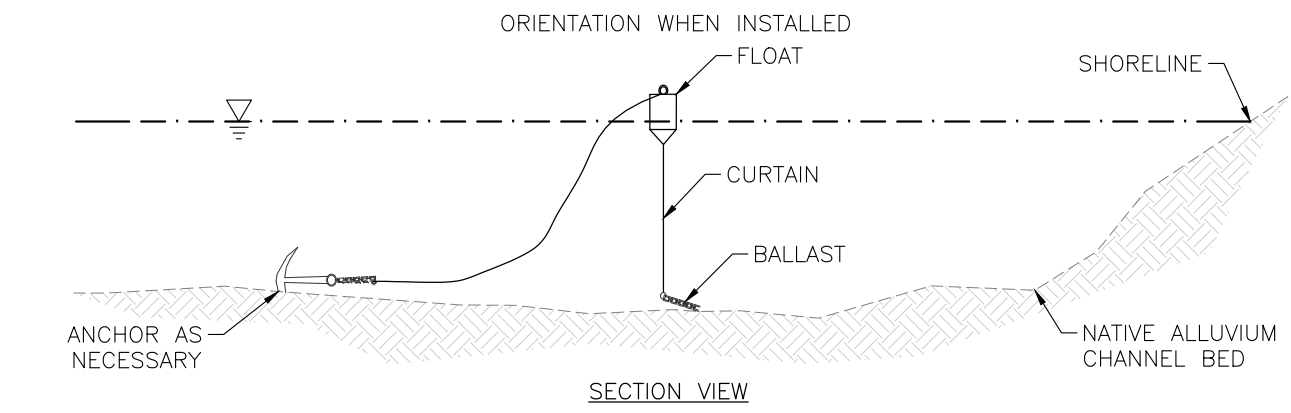
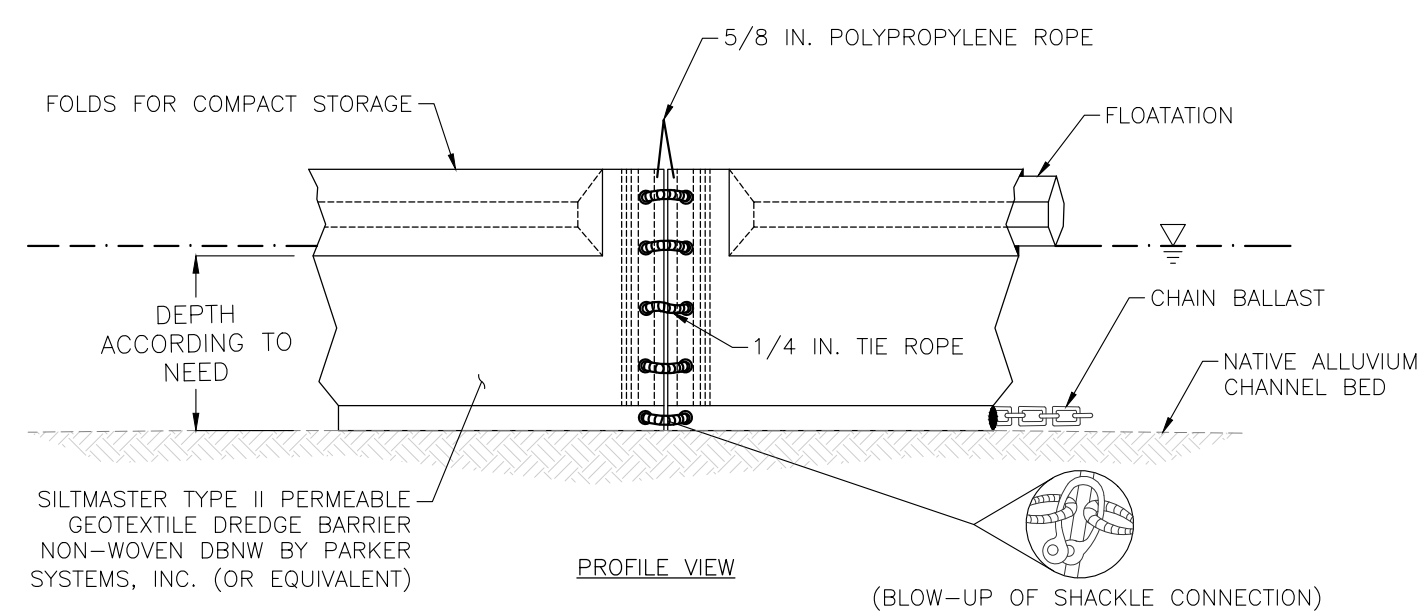
PROJECT NAME AND ADDRESS

Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

Project 38047	Sheet CW05
Date March 2021	
Scale NOT TO SCALE	

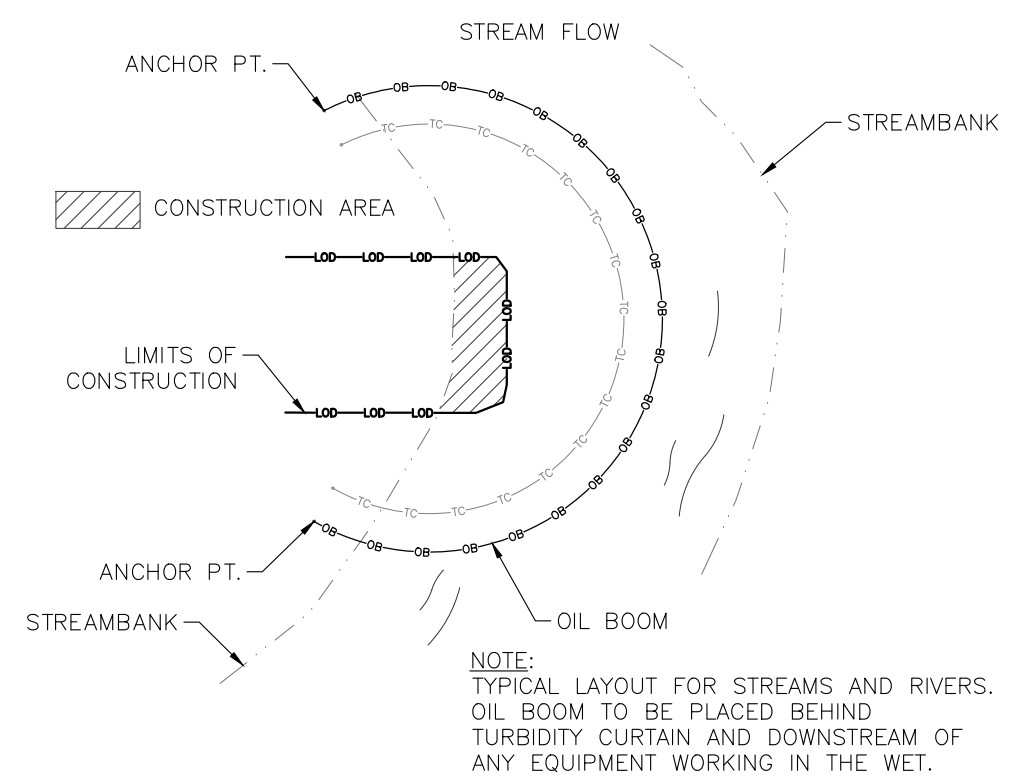


PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

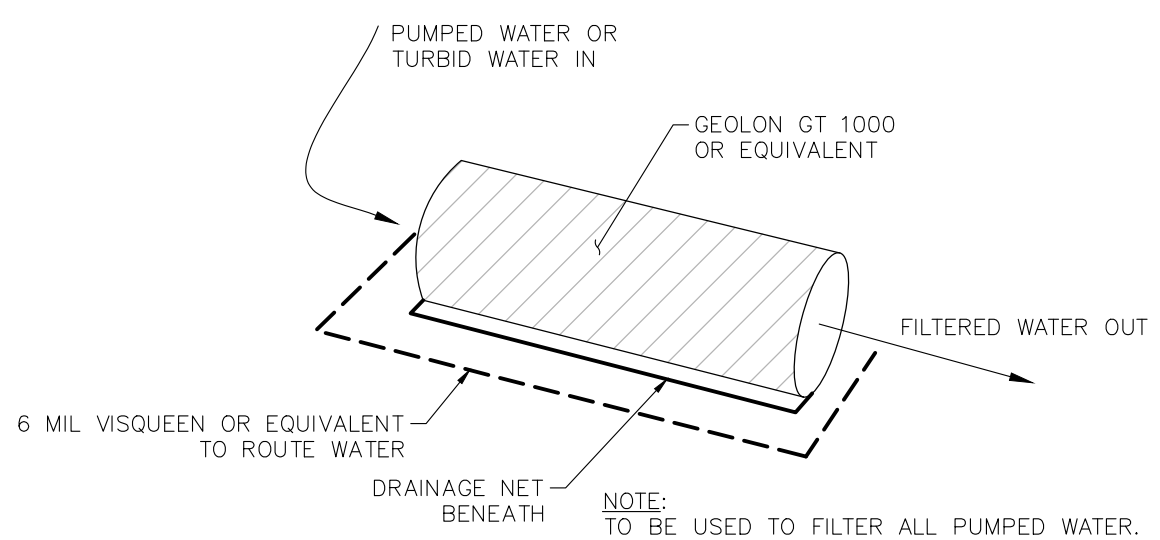


1 TURBIDITY CURTAIN (TYP)
CW05 PLAN VIEW - NTS

- NOTES:
1. TYPICAL LAYOUT FOR STREAMS, PONDS, AND LAKES (PROTECTED AND NON-TIDAL).
 2. TYPICAL MANUFACTURED LENGTH FOR TURBIDITY CURTAIN IS 100 LF. CONTRACTOR SHALL COORDINATE WITH MANUFACTURER TO DETERMINE MOST EFFECTIVE METHODS FOR JOINING OR ADJUSTING TURBIDITY CURTAINS WITHIN ACTIVE WORK AREAS.



2 OIL BOOM (TYP)
CW05 PLAN VIEW - NTS



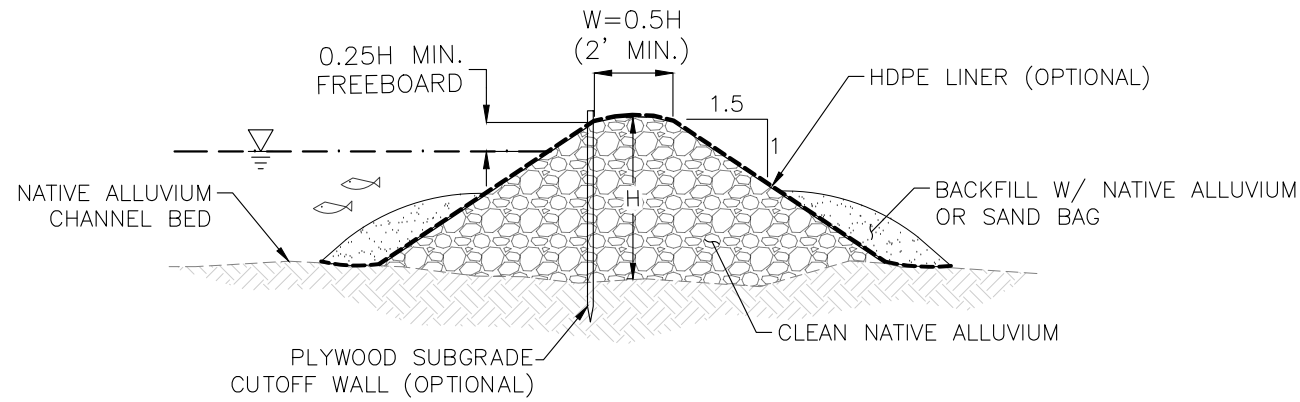
3 GEO-TUBE FILTER (TYP)
CW05 NTS



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
CARE OF WATER DETAILS

No.	REVISION/UPDATE	Date
CLIENT NAME AND ADDRESS		
 Town of Carbondale 511 Colorado Ave Carbondale, CO 81623		
DESIGN FIRMS NAME AND ADDRESSES		
 RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org		
DHM DESIGN 311 Main St, Suite 102 Carbondale, CO 81623 970.963.6520 www.dhmdesign.com		
PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project 38047	Sheet	
Date March 2021	CW06	
Scale NOT TO SCALE		

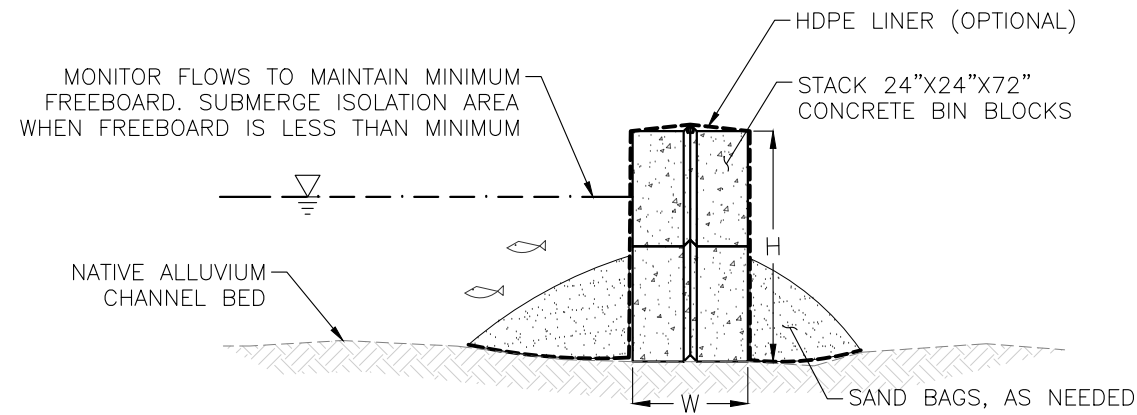
PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



NOTE:
HMAX=8.0'
WMIN=0.5H
MIN FREEBOARD=0.25H
MAX DEPTH=6'

*SUBMERGE WORK WHEN MIN FREEBOARD IS EXCEEDED

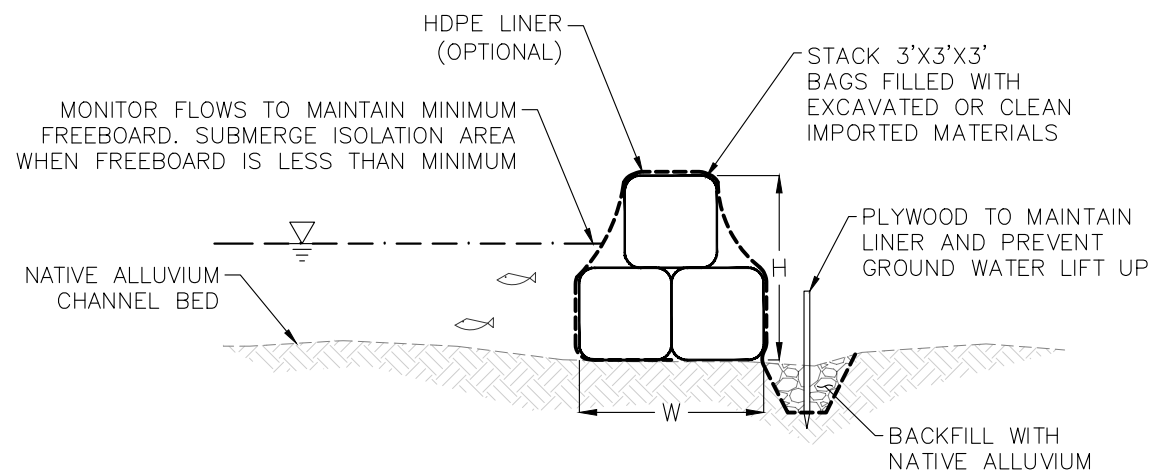
1 ALLUVIUM COFFERDAM (TYP)
CW06 SECTION VIEW - NTS



NOTE:
HMAX=8.0'
WMIN=1.5H-1.5
MIN FREEBOARD=0.25H
MAX DEPTH=0.75H

*SUBMERGE WORK WHEN MIN FREEBOARD IS EXCEEDED

2 CONCRETE BLOCK COFFERDAM (TYP)
CW06 SECTION VIEW - NTS



NOTE:
 $W=H^2-2.5H$
WMIN = 1.5H-1.5
H MAX = 8.0'
MIN FREEBOARD = 0.25H
MAX DEPTH = 0.75H

*SUBMERGE WORK WHEN MIN FREEBOARD IS EXCEEDED

3 AGGREGATE BAGS COFFERDAM (TYP)
CW06 SECTION VIEW - NTS

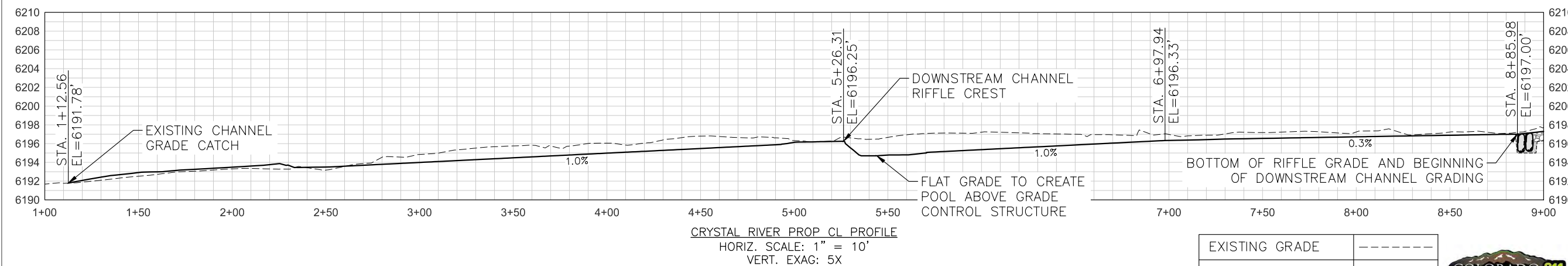
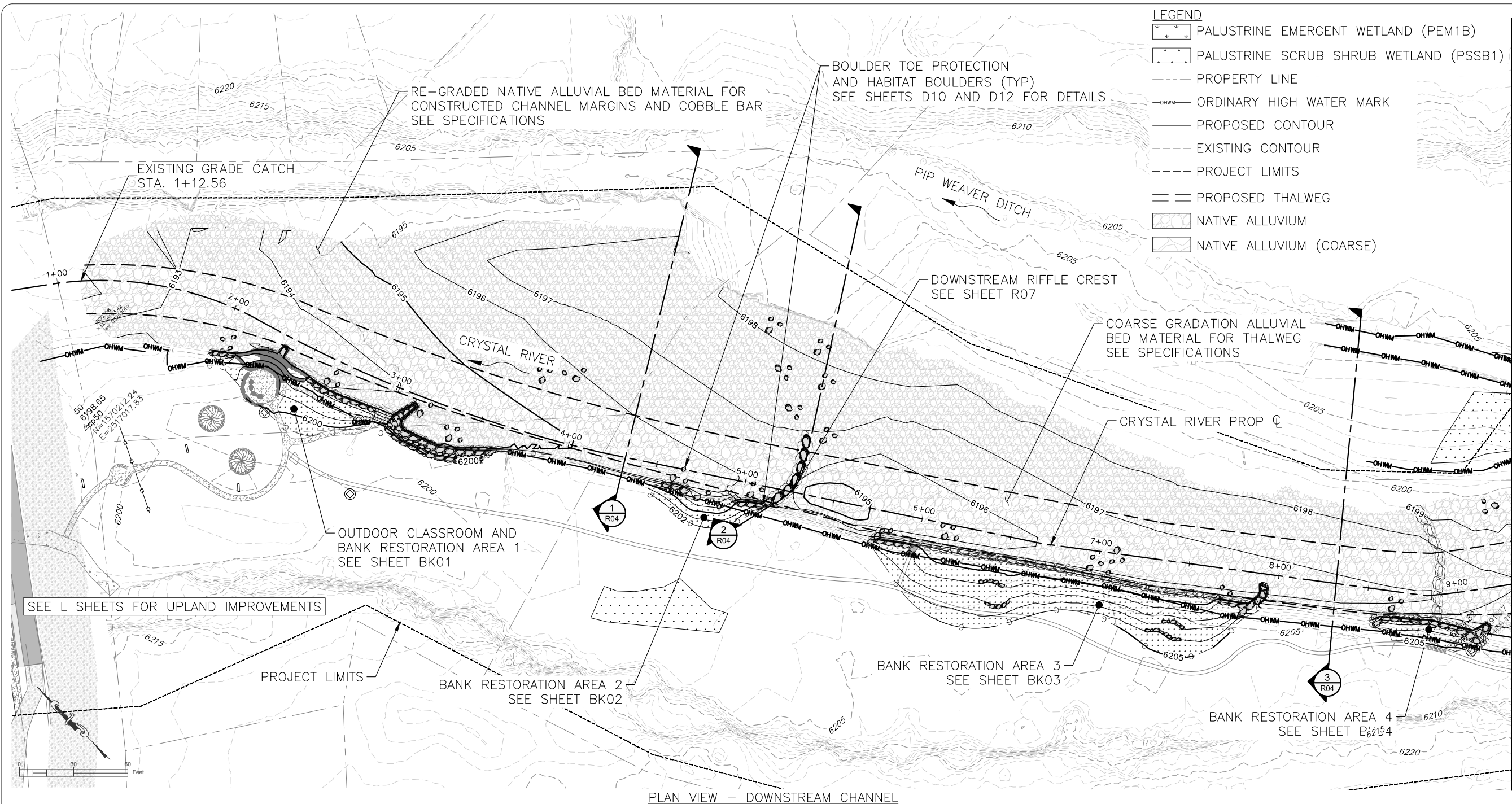
PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
COFFERDAM DETAILS

No.	REVISION/UPDATE	Date
CLIENT NAME AND ADDRESS		
 Town of Carbondale 511 Colorado Ave Carbondale, CO 81623		
DESIGN FIRMS NAME AND ADDRESSES		
 RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org		
 311 Main St, Suite 102 Carbondale, CO 81623 970.963.6520 www.dhmdesign.com		
PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project 38047	Sheet CW07	
Date March 2021		
Scale NOT TO SCALE		



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



SEE SHEET R02

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND WEAVER DITCH EFFICIENCY PROJECT
DOWNSTREAM CHANNEL
PLAN AND PROFILE

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

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RiverRestoration.org, LLC
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970.963.6520
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PROJECT NAME AND ADDRESS

Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

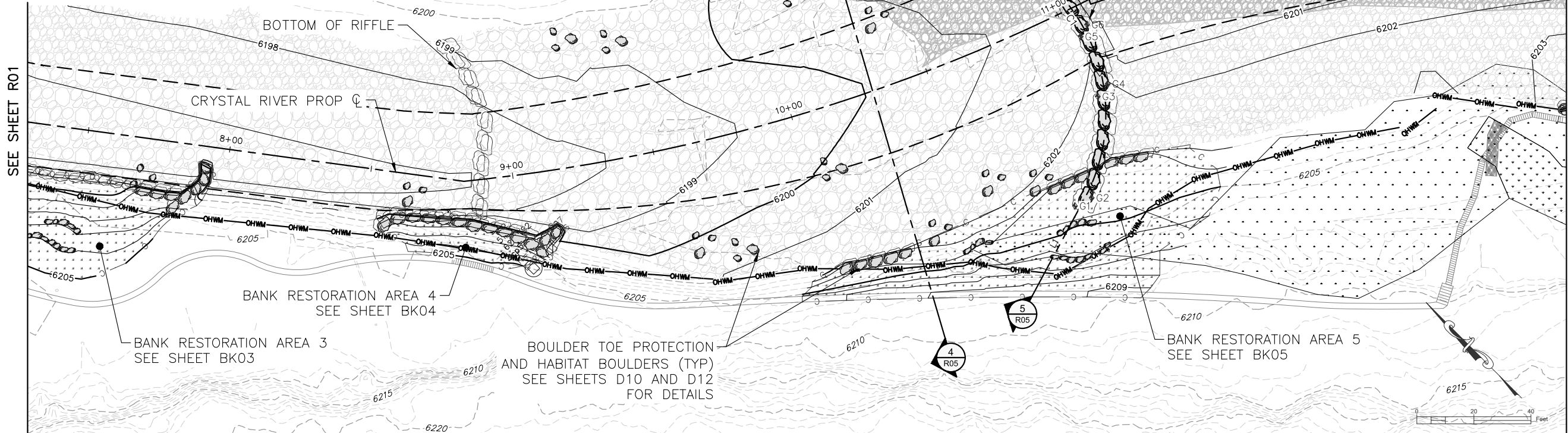
Project	Sheet
38047	RO1

Date
March 2021

Scale
1"=30' (FULL-SIZE)

RIFFLE GRADE CONTROL POINTS				
POINT #	NORTHING	EASTING	ELEVATION	DESCRIPTION
1	1569463.8647	2517621.8509	6202.45	G1
2	1569461.7369	2517628.0187	6202.41	G2
3	1569485.3642	2517654.6177	6202.11	G3
4	1569485.9860	2517660.2212	6202.07	G4
5	1569504.4530	2517665.2005	6201.80	G5
6	1569505.7960	2517669.7794	6201.75	G6
7	1569541.1162	2517666.4383	6202.36	G7
8	1569545.3187	2517669.3130	6202.36	G8
9	1569573.2951	2517639.6291	6202.50	G9
10	1569576.8878	2517641.3875	6202.97	G10

RIFFLE GRADE CONTROL ALIGNMENT			
NUMBER	LENGTH	RADIUS	LIN/CHORD DIRECTION
L1	43.946		N73° 16' 11.14"E
C1	128.298	62.621	N11° 44' 41.46"E
L2	27.849		N57° 29' 10.28"W



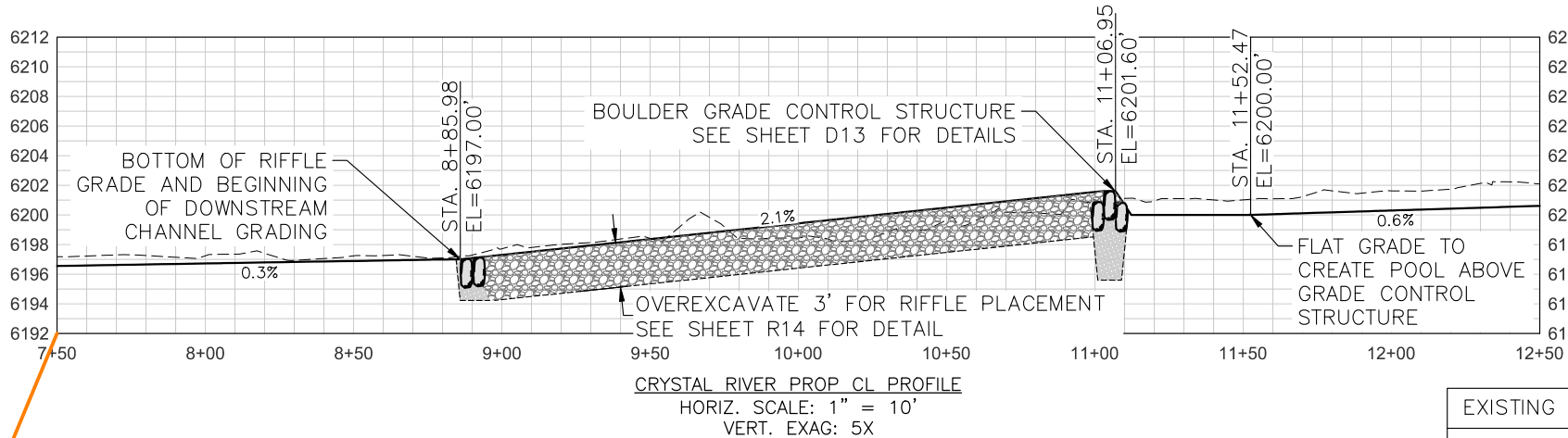
SEE SHEET R01

SEE SHEET R03

LEGEND

- PALUSTRINE EMERGENT WETLAND (PEM1B)
- PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- PROPERTY LINE
- ORDINARY HIGH WATER MARK
- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROJECT LIMITS
- PROPOSED THALWEG
- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

PLAN VIEW - RIFFLE AND GRADE CONTROL STRUCTURE



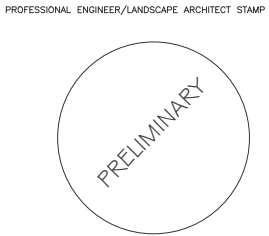
NOTES:

- EXISTING COBBLE BED MATERIAL SHALL BE SORTED INTO 2 GRADATION CLASSES AND REDISTRIBUTED TO CONSTRUCT RIFFLE. COARSER GRADATION SHALL BE INSTALLED IN THE CHANNEL THALWEG TO A DEPTH OF 1 FOOT. SEE SPECIFICATIONS FOR DETAILS ON MATERIAL CLASSES AND SHEETS R13-R14 FOR RIFFLE AND GRADE CONTROL CONSTRUCTION DETAILS.

EXISTING GRADE	
PROPOSED GRADE	



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
RIFFLE AND GRADE CONTROL STRUCTURE
PLAN AND PROFILE

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

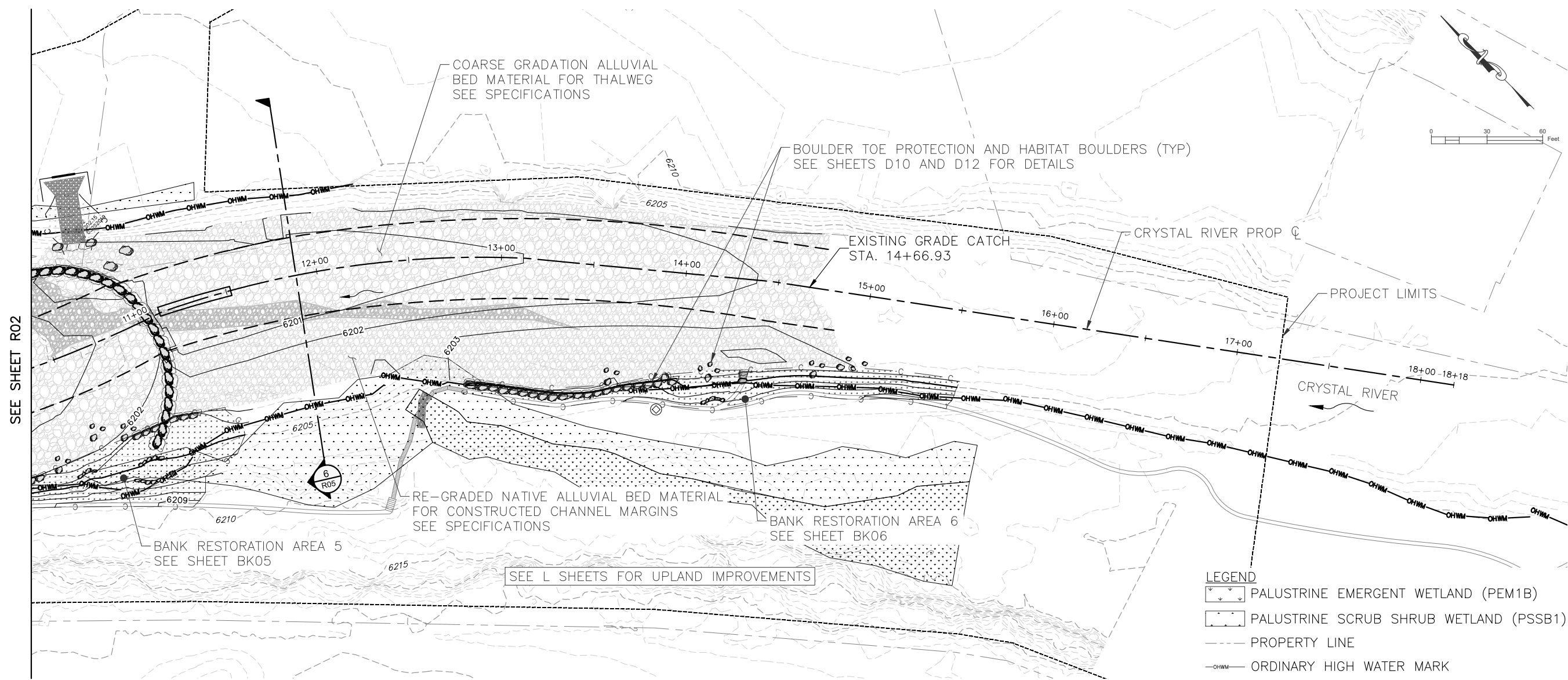


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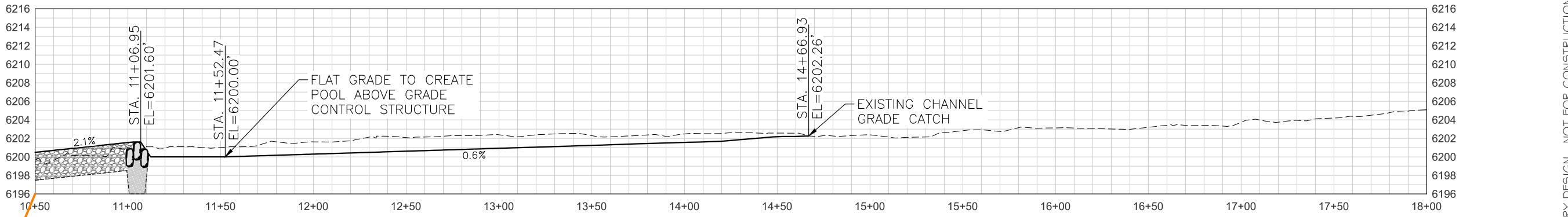


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www.dhmdesign.com

PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet R02
Date March 2021	
Scale VARIES	



PLAN VIEW — UPSTREAM CHANNEL



CRYSTAL RIVER PROP CL PROFILE
HORIZ. SCALE: 1" = 10'
VERT. EXAG: 5X

- LEGEND
- PALUSTRINE EMERGENT WETLAND (PEM1B)
 - PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
 - PROPERTY LINE
 - ORDINARY HIGH WATER MARK
 - PROPOSED CONTOUR
 - EXISTING CONTOUR
 - PROJECT LIMITS
 - PROPOSED THALWEG
 - NATIVE ALLUVIUM
 - NATIVE ALLUVIUM (COARSE)

EXISTING GRADE	---
PROPOSED GRADE	—



PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPSTREAM CHANNEL
PLAN AND PROFILE

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

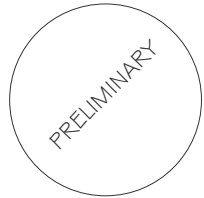
 Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

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P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet R03
Date March 2021	Scale 1"=30' (FULL-SIZE)



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
CHANNEL SECTIONS 1 OF 2

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



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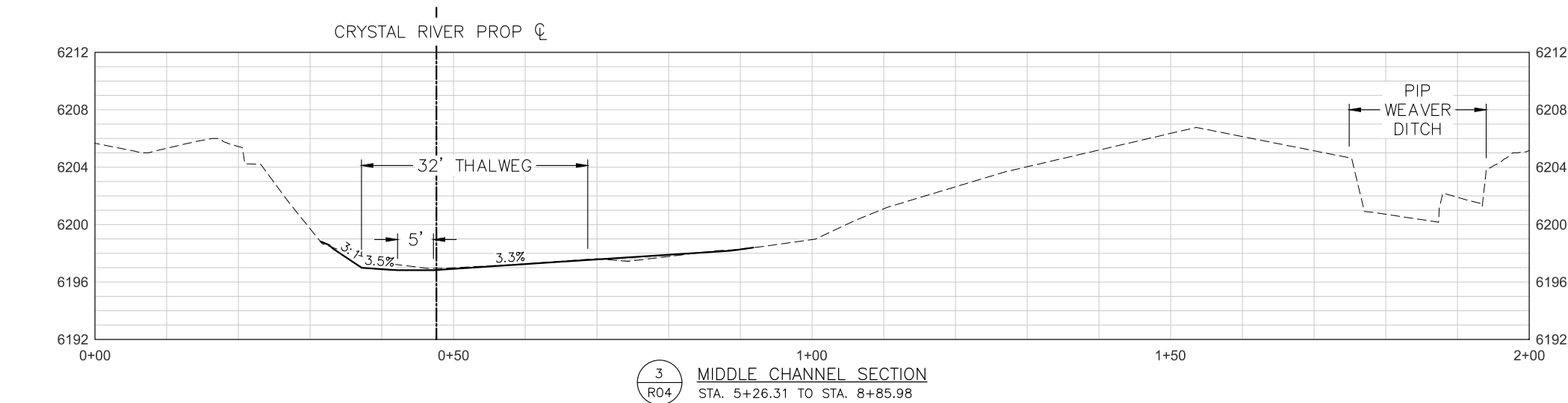
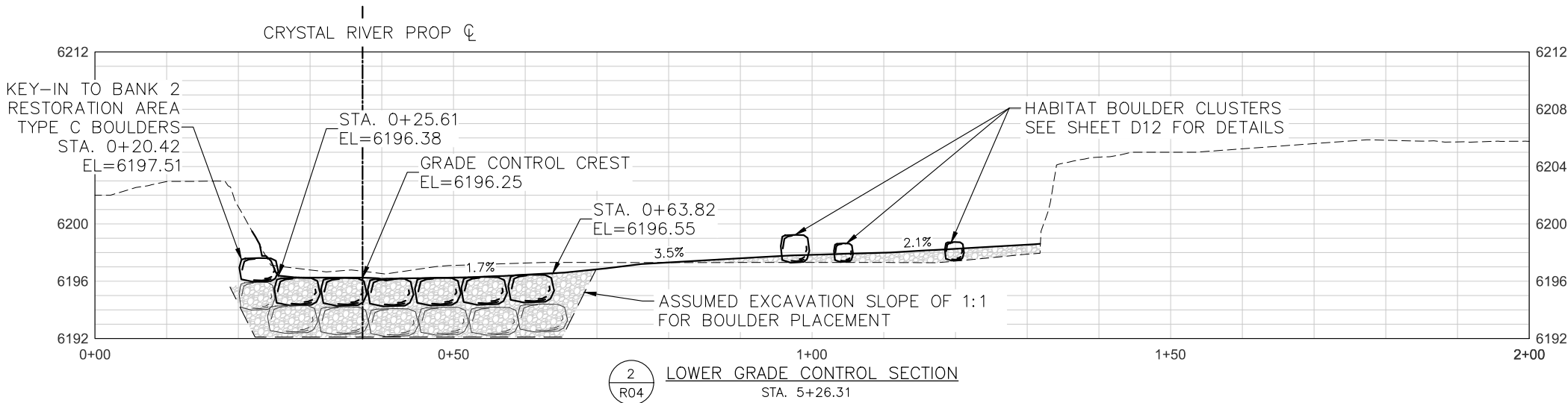
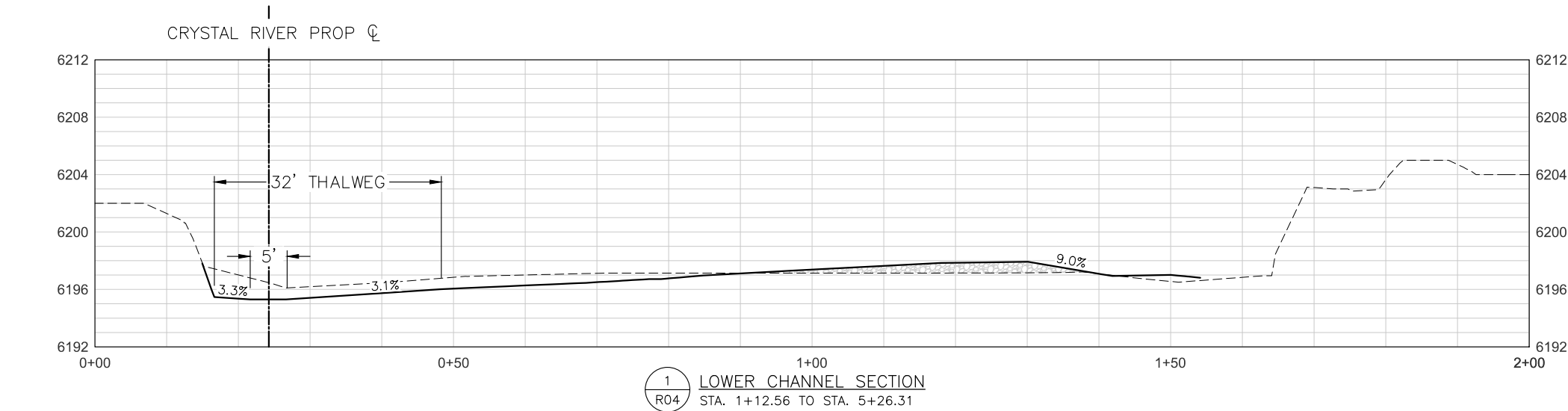
PROJECT NAME AND ADDRESS

Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

Project 38047	Sheet
Date March 2021	RO4
Scale 1"= 10' (FULL-SIZE)	

GRADATION LEGEND (SEE SPECIFICATIONS)

-  NATIVE ALLUVIUM
-  NATIVE ALLUVIUM (COARSE)



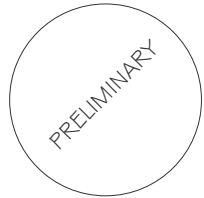
EXISTING GRADE	---
PROPOSED GRADE	—

0 10 20 Feet

2x VERTICAL EXAGGERATION



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
CHANNEL SECTIONS 2 OF 2

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



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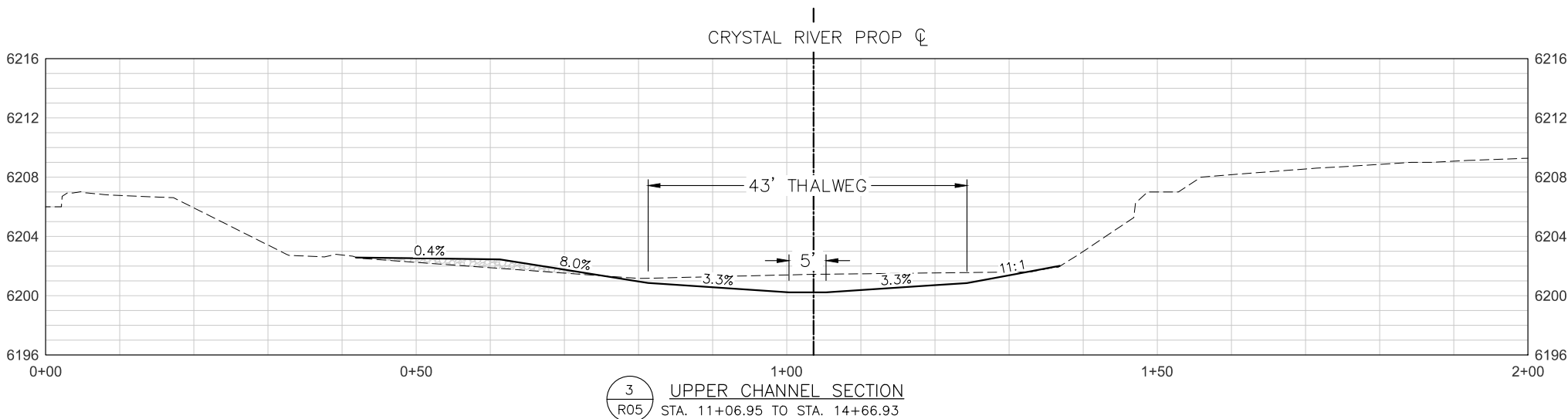
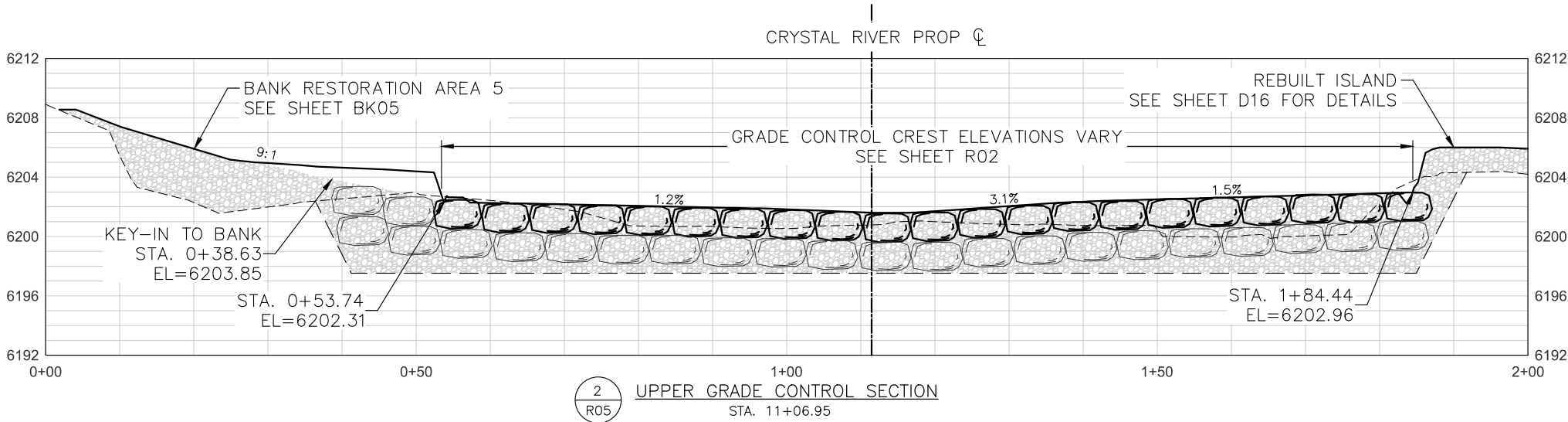
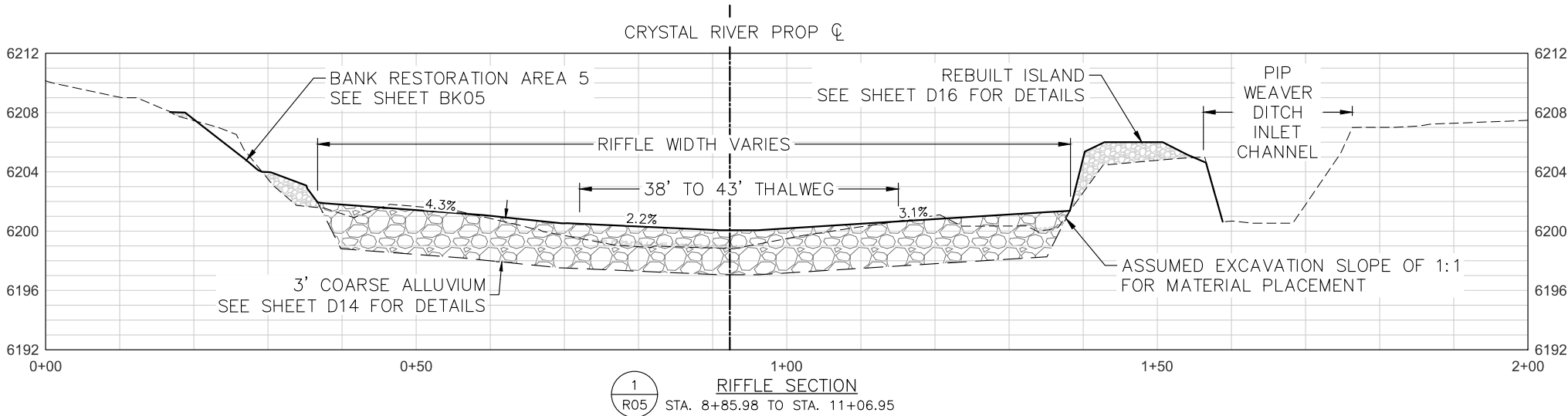
PROJECT NAME AND ADDRESS

Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

Project 38047	Sheet R05
Date March 2021	
Scale 1"= 10' (FULL-SIZE)	

GRADATION LEGEND (SEE SPECIFICATIONS)

- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)



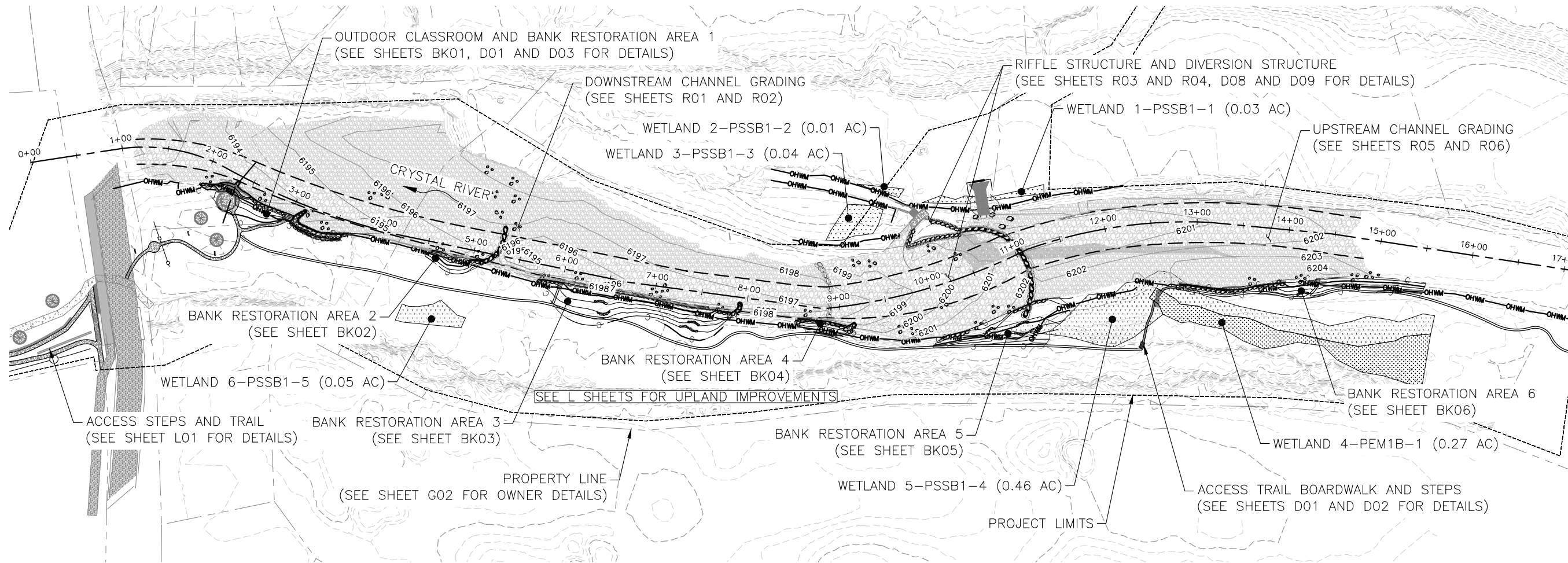
EXISTING GRADE	---
PROPOSED GRADE	—

0 10 20 Feet

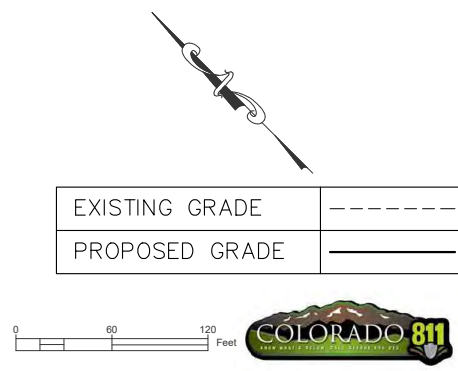
2x VERTICAL EXAGGERATION



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



- LEGEND
- PALUSTRINE EMERGENT WETLAND (PEM1B)
 - PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
 - PROPERTY LINE
 - ORDINARY HIGH WATER MARK
 - PROPOSED CONTOUR
 - EXISTING CONTOUR
 - PROJECT LIMITS
 - PROPOSED THALWEG
 - NATIVE ALLUVIUM
 - NATIVE ALLUVIUM (COARSE)



EXISTING GRADE	----
PROPOSED GRADE	_____

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION - OVERVIEW

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



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Carbondale, CO 81623

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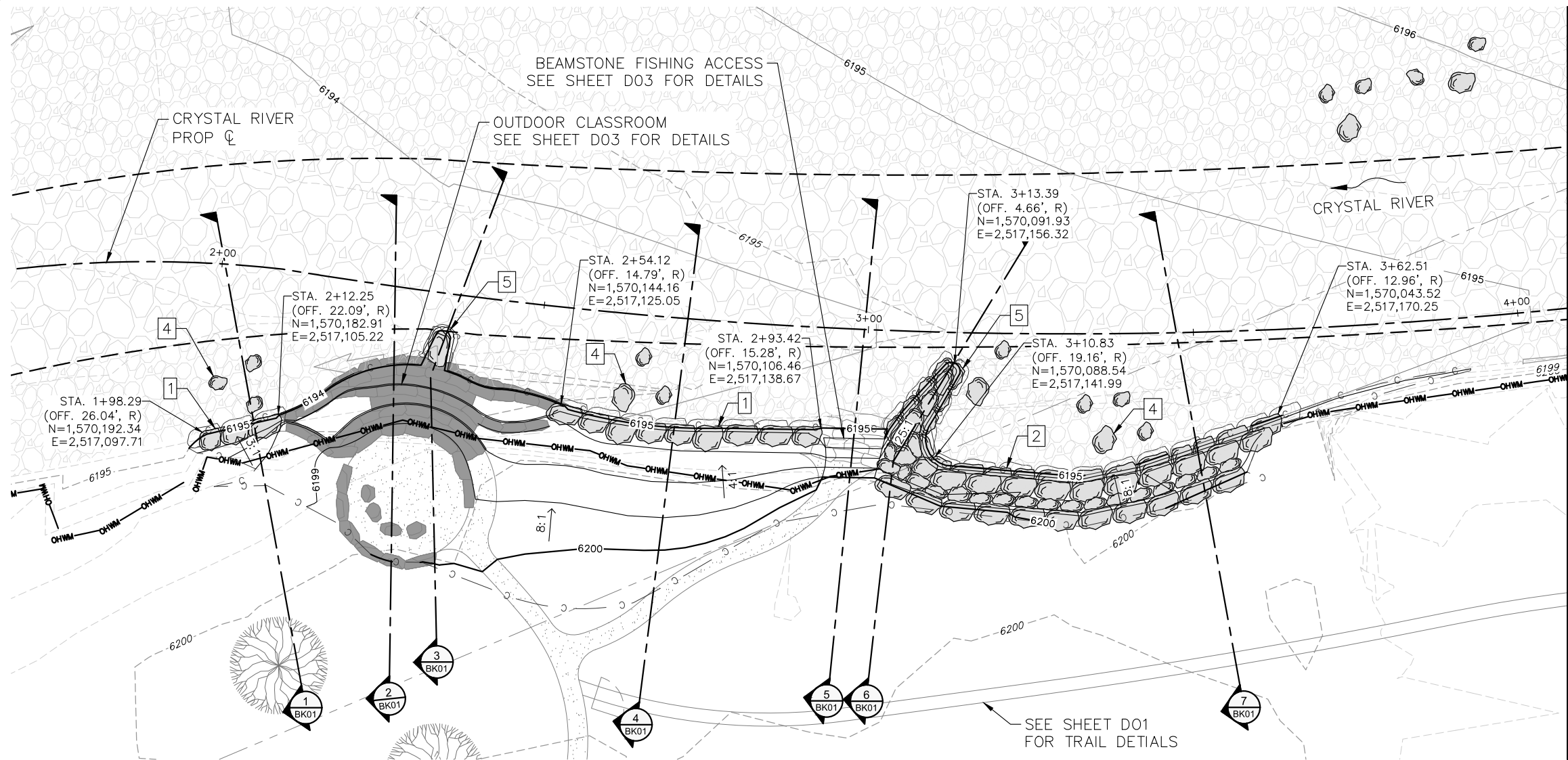
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PROJECT NAME AND ADDRESS

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Carbondale, CO 81623

Project 38047	Sheet BK00
Date March 2021	
Scale 1"=60' (FULL-SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



PLAN VIEW — BANK RESTORATION AREA 1

LEGEND

- PALUSTRINE EMERGENT WETLAND (PEM1B)
- PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- PROPERTY LINE
- ORDINARY HIGH WATER MARK
- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROJECT LIMITS
- PROPOSED THALWEG
- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

BANK RESTORATION KEY NOTES

- TYPE C BANK RESTORATION (SEE SHEET D10a)
- TYPE D BANK RESTORATION (SEE SHEET D10b)
- HABITAT BOULDER CLUSTER (SEE SHEET D12)
- ROCK BARB (SEE SHEET D12)

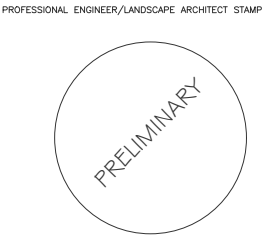
SEE SHEET BK02



EXISTING GRADE	-----
PROPOSED GRADE	—————



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION AREA 1
PLAN VIEW

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



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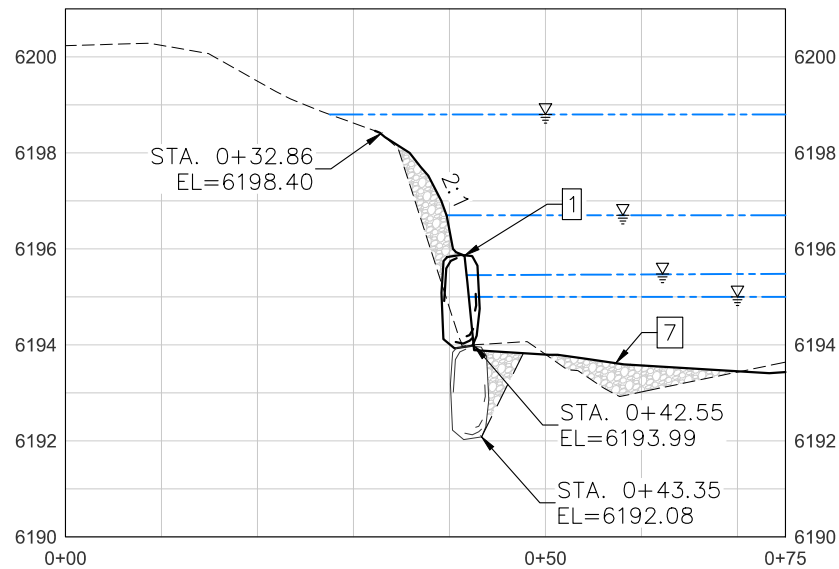
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Carbondale, CO 81623
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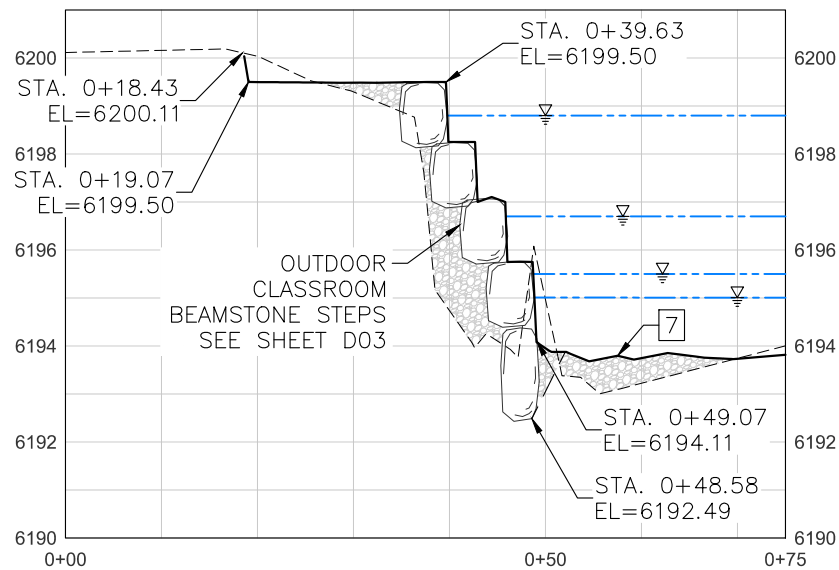
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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet BKO1
Date March 2021	
Scale 1" = 10' (FULL-SIZE)	

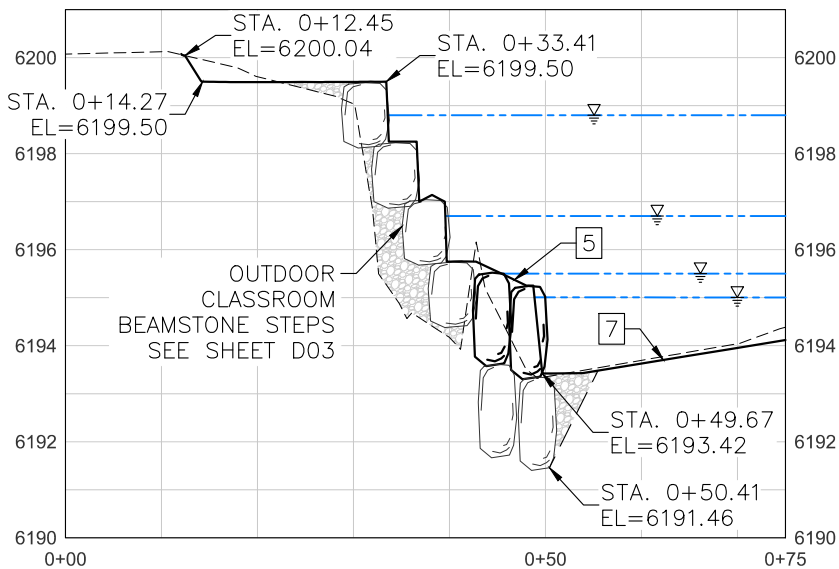
BK01 1 SECTION



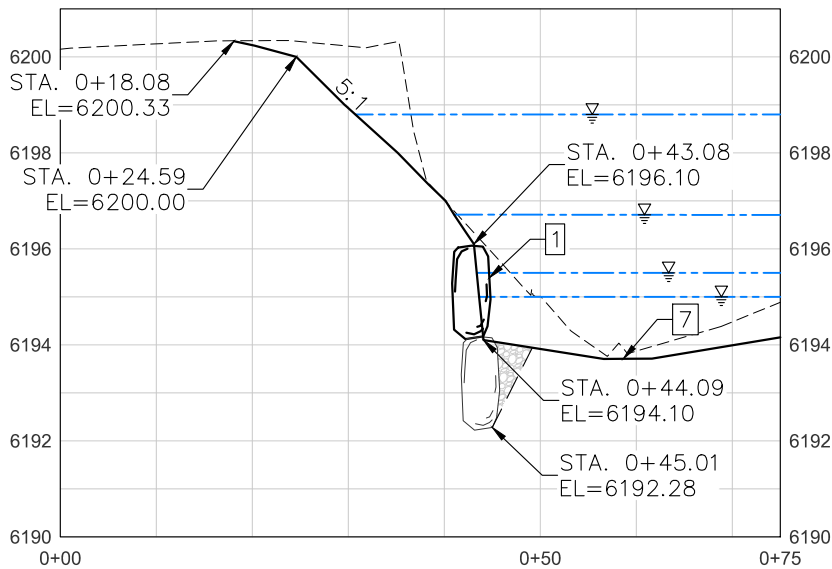
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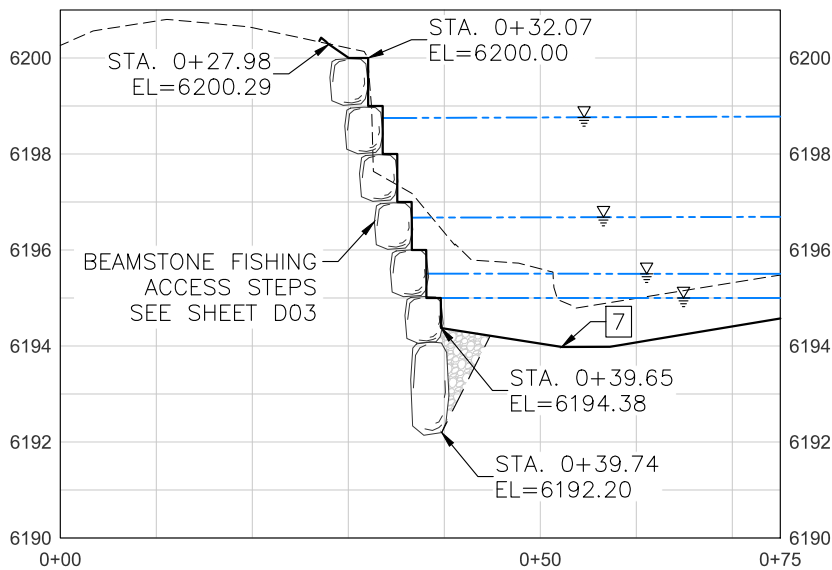
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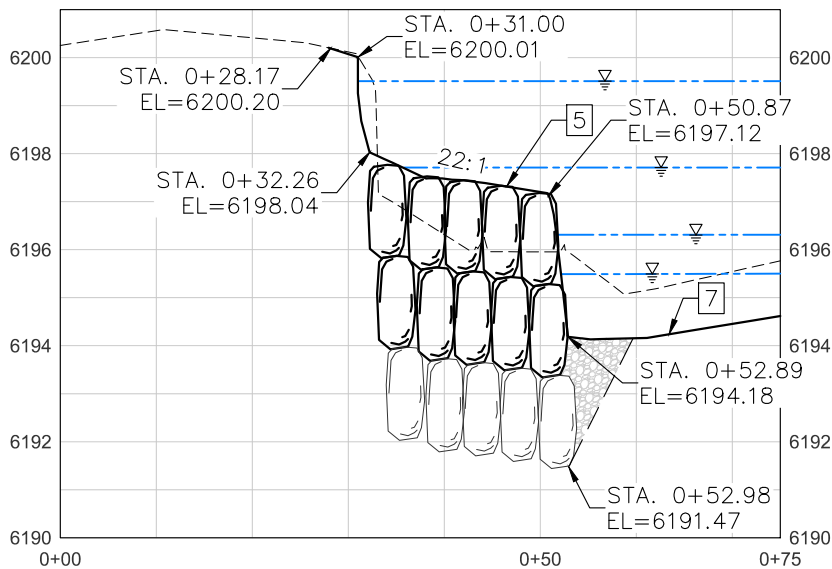
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BK01 5 SECTION



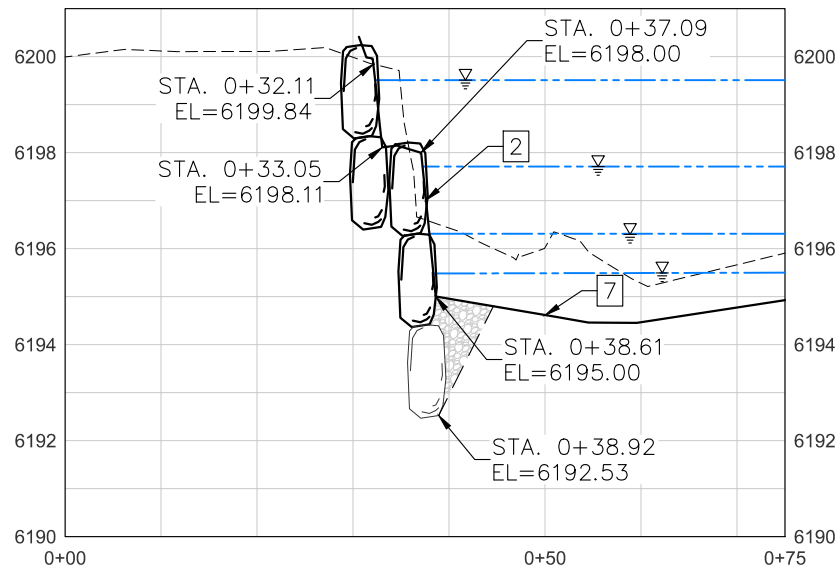
BK01 6 SECTION



BANK RESTORATION KEY NOTES

- 1 TYPE C BANK RESTORATION (SEE SHEET D10a)
- 2 TYPE D BANK RESTORATION (SEE SHEET D10b)
- 4 HABITAT BOULDER CLUSTER (SEE SHEET D12)
- 5 ROCK BARB (SEE SHEET D12)
- 7 PROPOSED CHANNEL BED (SEE SHEETS R04-R05)

BK01 7 SECTION



GRADATION LEGEND (SEE SPECIFICATIONS)

- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

- 5310 CFS (10-YR)
- 2600 CFS (OHWM)
- 966 CFS (MAY)
- 91 CFS (MARCH)

EXISTING GRADE	----
PROPOSED GRADE	----

5x VERTICAL EXAGGERATION



PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND WEAVER DITCH EFFICIENCY PROJECT BANK RESTORATION AREA 1 CROSS SECTIONS

No.	REVISION/UPDATE	Date

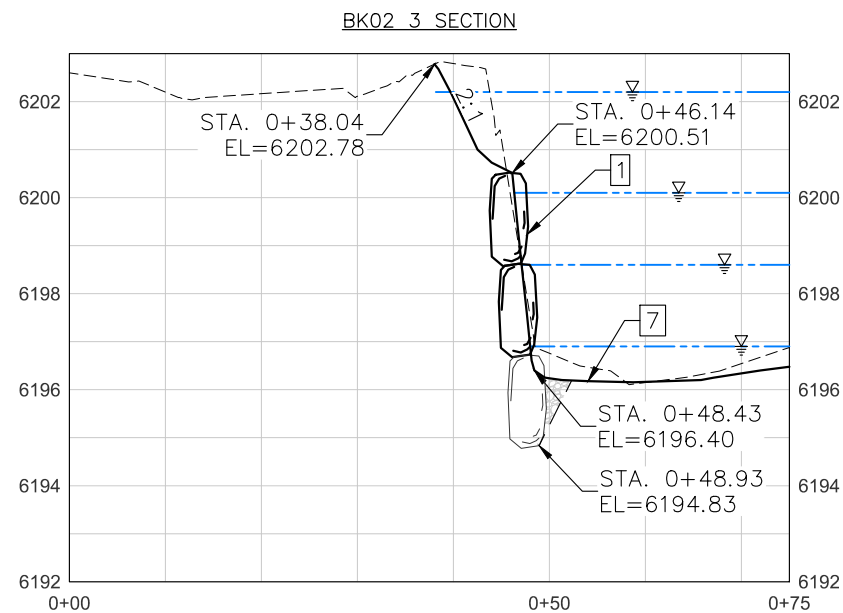
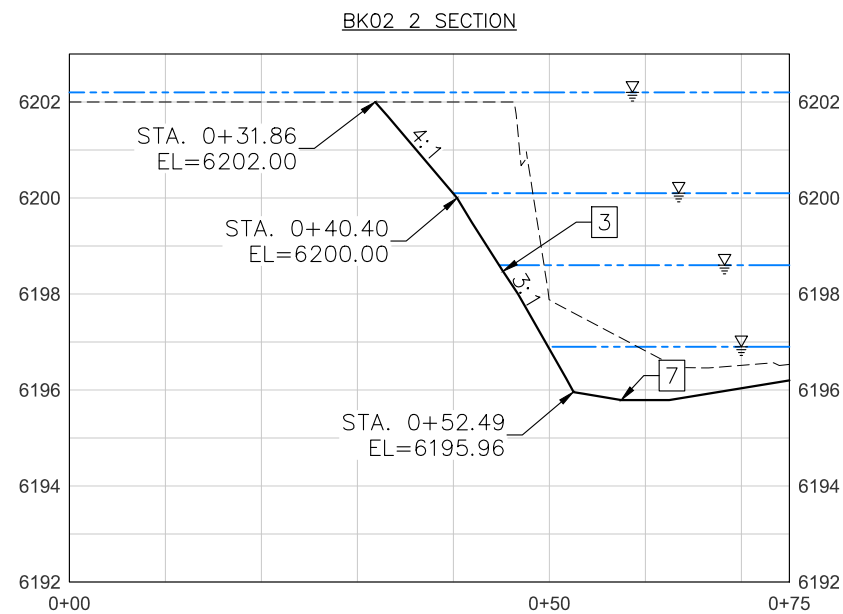
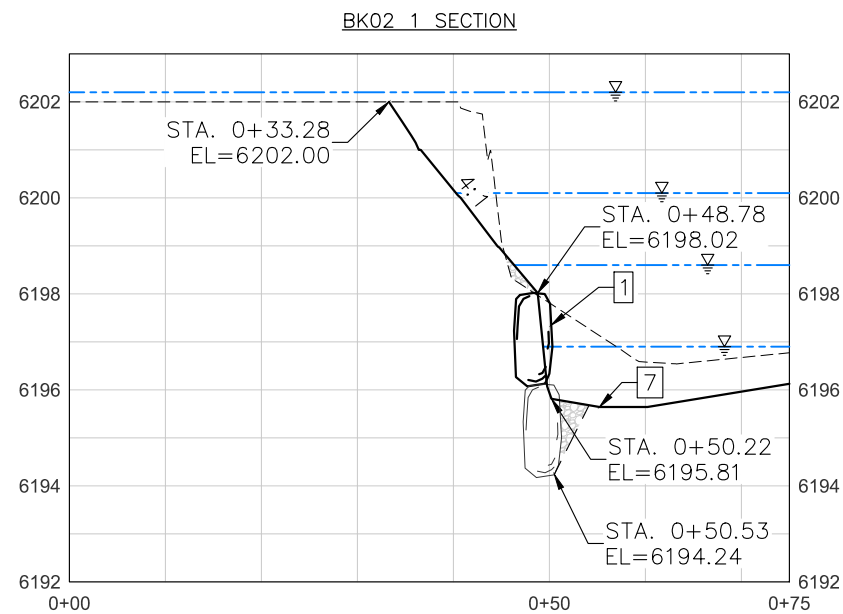
CLIENT NAME AND ADDRESS	Town of Carbondale 511 Colorado Ave Carbondale, CO 81623
-------------------------	--

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---------------------------------	--

PROJECT NAME AND ADDRESS	Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623
--------------------------	--

Project 38047	Sheet BK01b
Date March 2021	
Scale 1"= 10' (FULL-SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



- BANK RESTORATION KEY NOTES
- 1 TYPE C BANK RESTORATION (SEE SHEET D10a)
 - 3 TYPE E BANK RESTORATION (SEE SHEET D10c)
 - 4 HABITAT BOULDER CLUSTER (SEE SHEET D12)
 - 7 PROPOSED CHANNEL BED (SEE SHEETS R04–R05)

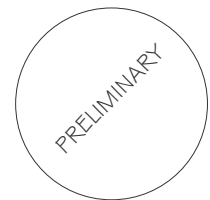
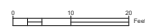
GRADATION LEGEND (SEE SPECIFICATIONS)

- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

- 5310 CFS (10-YR)
- 2600 CFS (OHWM)
- 966 CFS (MAY)
- 91 CFS (MARCH)

EXISTING GRADE	----
PROPOSED GRADE	———

5x VERTICAL EXAGGERATION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION AREA 2
CROSS SECTIONS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



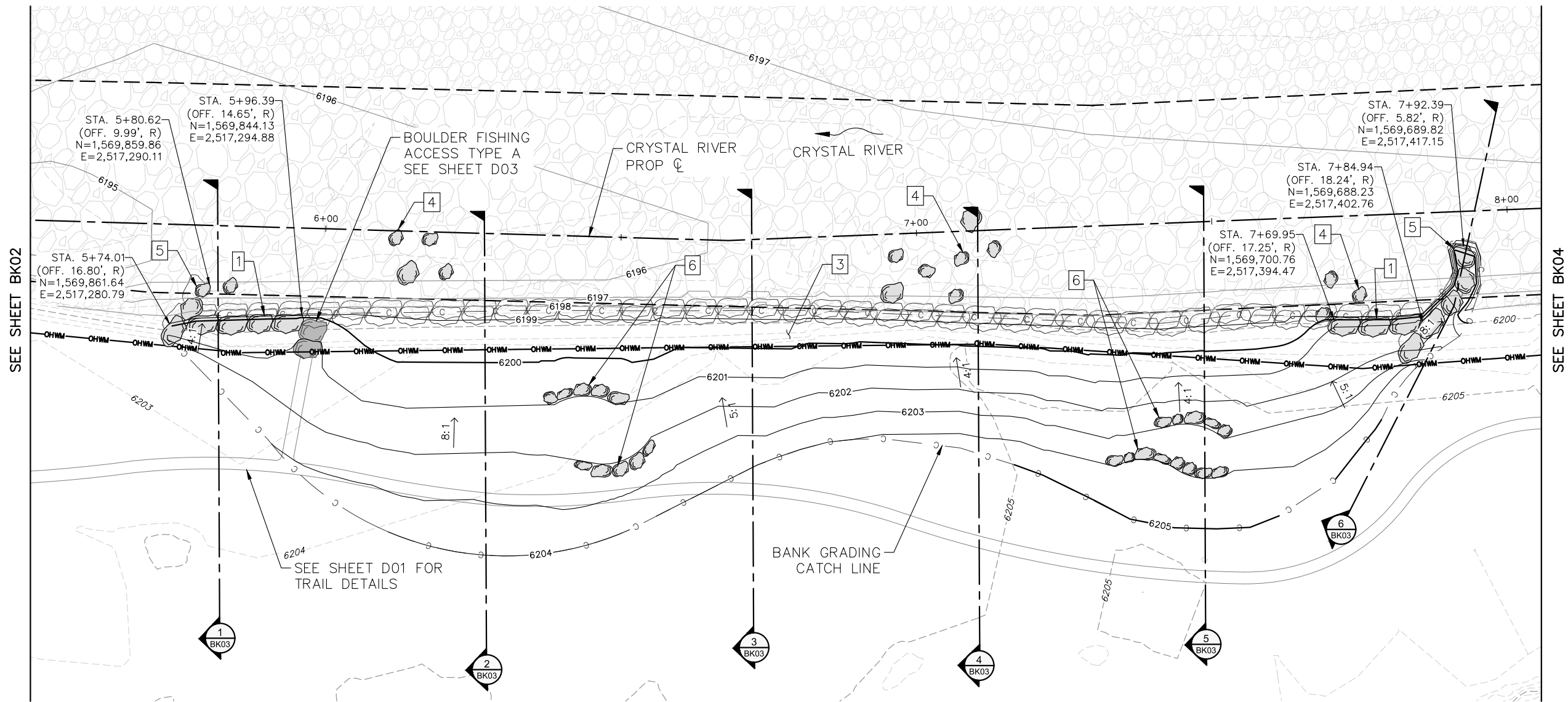
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www.RiverRestoration.org

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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet BK02b
Date March 2021	
Scale 1"= 10' (FULL-SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



PLAN VIEW – BANK RESTORATION AREA 3

LEGEND

- PALUSTRINE EMERGENT WETLAND (PEM1B)
- PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- PROPERTY LINE
- ORDINARY HIGH WATER MARK
- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROJECT LIMITS
- PROPOSED THALWEG
- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

BANK RESTORATION KEY NOTES

- TYPE C BANK RESTORATION (SEE SHEET D10a)
- TYPE E BANK RESTORATION (SEE SHEET D10c)
- HABITAT BOULDER CLUSTER (SEE SHEET D12)
- ROCK BARB (SEE SHEET D12)
- CONTAINER PLANTINGS IN BOULDER RETAINING WALL (SEE SHEET D06)

EXISTING GRADE

PROPOSED GRADE

0 10 20 Feet

COLORADO 811

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION AREA 3
PLAN VIEW

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

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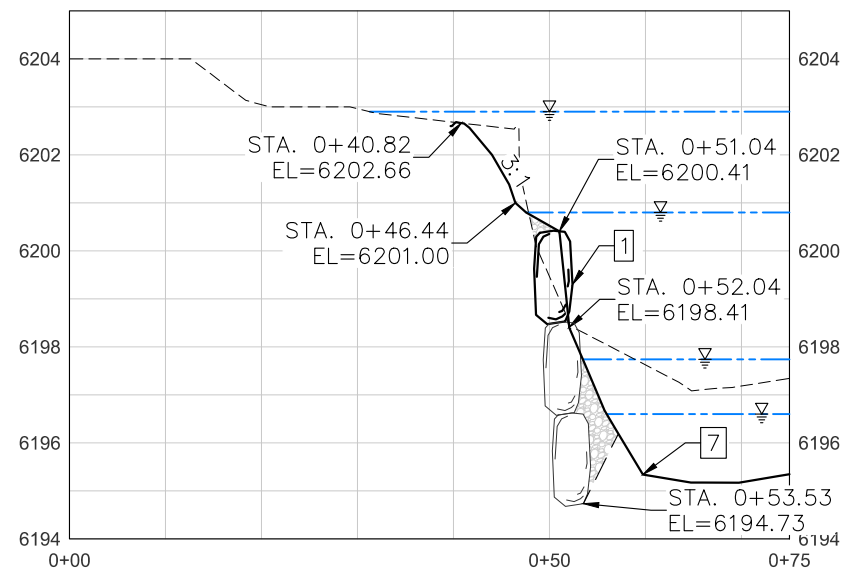
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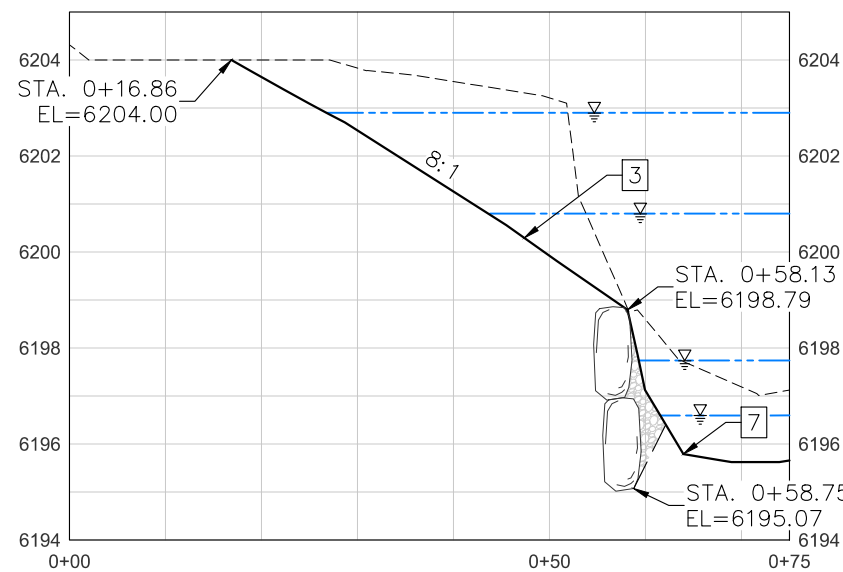
PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet BK03
Date March 2021	
Scale 1" = 10' (FULL-SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

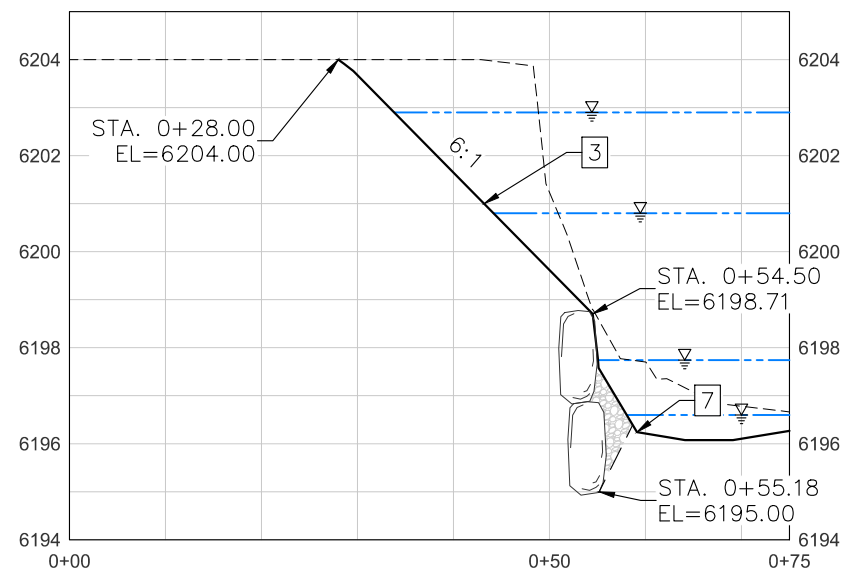
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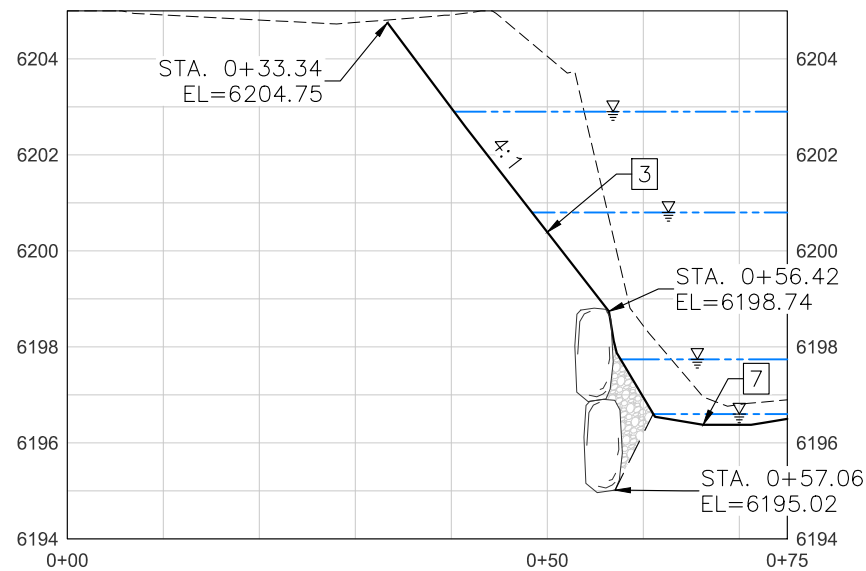
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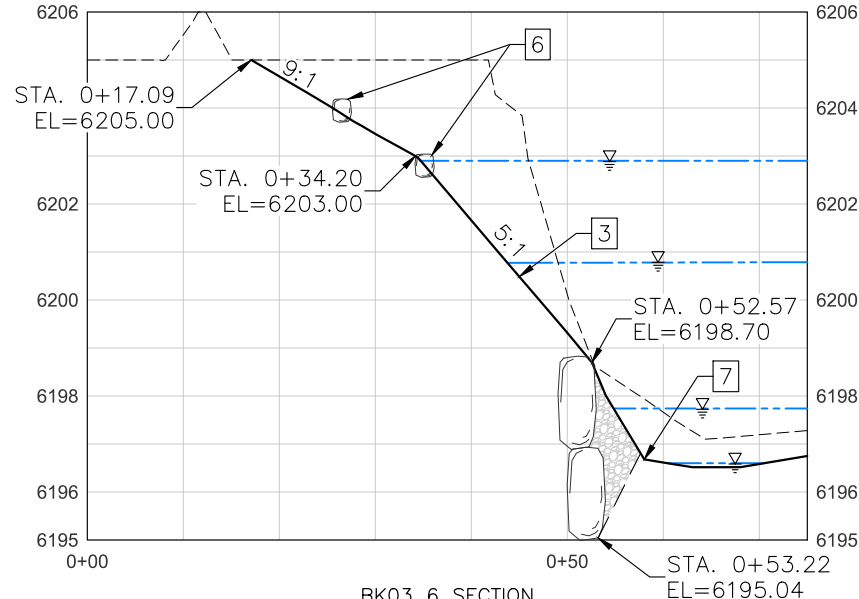
BK03 3 SECTION



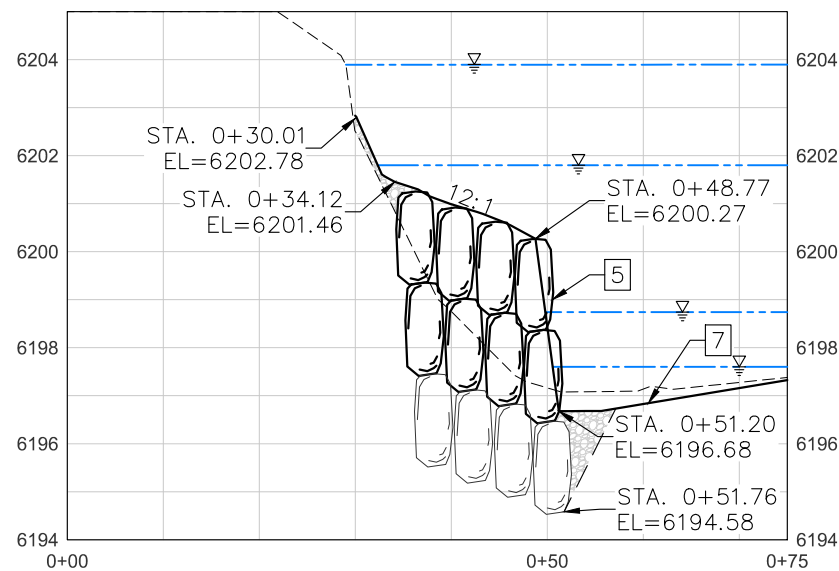
BK03 4 SECTION



BK03 5 SECTION



BK03 6 SECTION



BANK RESTORATION KEY NOTES

- 1 TYPE C BANK RESTORATION (SEE SHEET D10a)
- 3 TYPE E BANK RESTORATION (SEE SHEET D10c)
- 4 HABITAT BOULDER CLUSTER (SEE SHEET D12)
- 5 ROCK BARB (SEE SHEET D12)
- 6 CONTAINER PLANTINGS IN BOULDER RETAINING WALL (SEE SHEET D06)
- 7 PROPOSED CHANNEL BED (SEE SHEETS R04-R05)

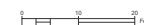
GRADATION LEGEND (SEE SPECIFICATIONS)

- NATIVE ALLUVIUM
 NATIVE ALLUVIUM (COARSE)

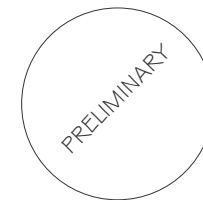
- 5310 CFS (10-YR)
 --- 2600 CFS (OHWM)
 --- 966 CFS (MAY)
 --- 91 CFS (MARCH)

EXISTING GRADE	----
PROPOSED GRADE	—

5x VERTICAL EXAGGERATION



PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP



CRYSTAL RIVER RESTORATION AND WEAVER DITCH EFFICIENCY PROJECT BANK RESTORATION AREA 3 CROSS SECTIONS

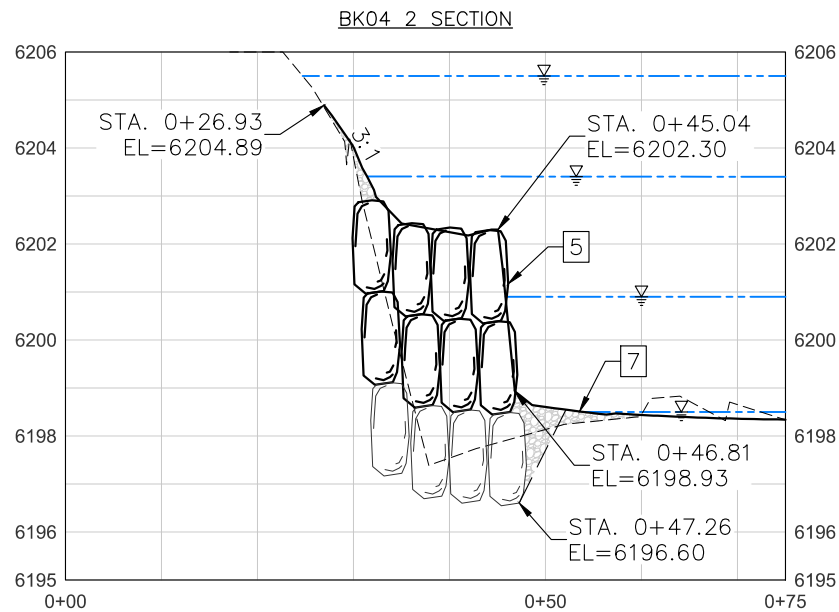
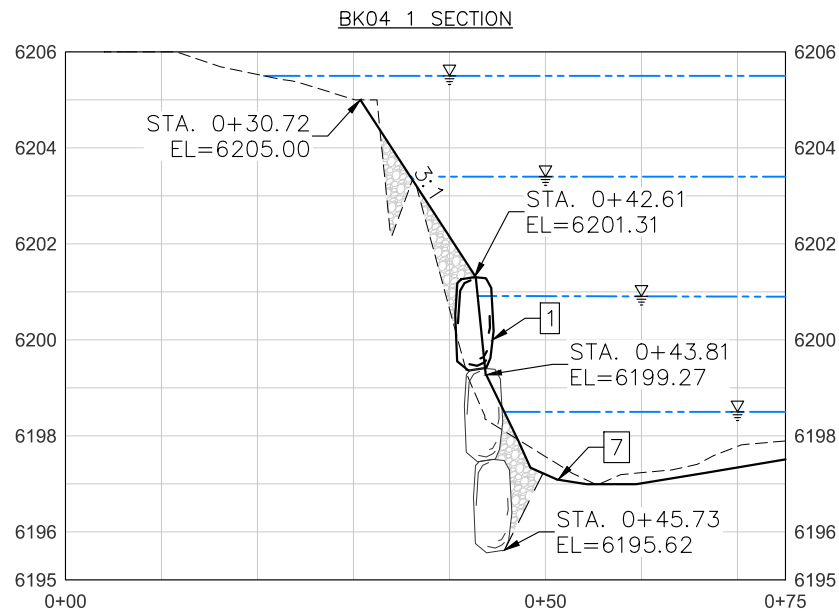
No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS
Town of Carbondale 511 Colorado Ave Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES
RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org DHM DESIGN 311 Main St, Suite 102 Carbondale, CO 81623 970.963.6520 www.dhmdesign.com

PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet
Date March 2021	BK03b
Scale 1" = 10' (FULL-SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



- BANK RESTORATION KEY NOTES
- 1 TYPE C BANK RESTORATION (SEE SHEET D10a)
 - 4 HABITAT BOULDER CLUSTER (SEE SHEET D12)
 - 5 ROCK BARB (SEE SHEET D12)
 - 7 PROPOSED CHANNEL BED (SEE SHEETS R04–R05)

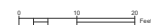
GRADATION LEGEND (SEE SPECIFICATIONS)

- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

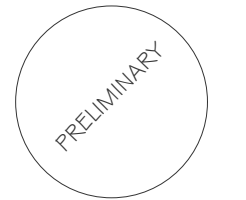
- 5310 CFS (10-YR)
- 2600 CFS (OHWM)
- 966 CFS (MAY)
- 91 CFS (MARCH)

EXISTING GRADE	-----
PROPOSED GRADE	-----

5x VERTICAL EXAGGERATION




PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION AREA 4
CROSS SECTIONS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



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DESIGN FIRMS NAME AND ADDRESSES



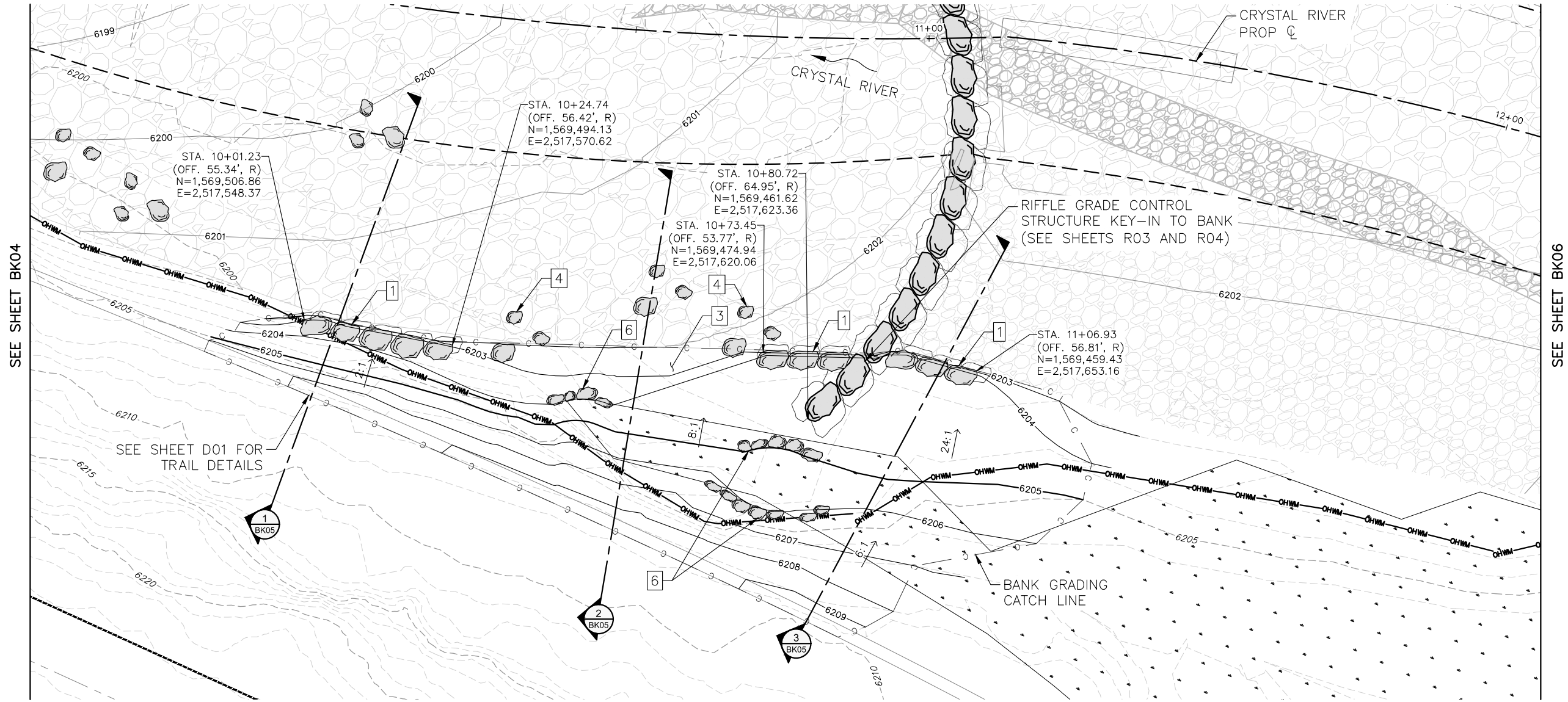
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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet
Date March 2021	BK04b
Scale 1"= 10' (FULL-SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

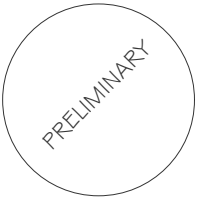


PLAN VIEW - BANK RESTORATION AREA 5

- LEGEND
- PALUSTRINE EMERGENT WETLAND (PEM1B)
 - PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
 - PROPERTY LINE
 - ORDINARY HIGH WATER MARK
 - PROPOSED CONTOUR
 - EXISTING CONTOUR
 - PROJECT LIMITS
 - PROPOSED THALWEG
 - NATIVE ALLUVIUM
 - NATIVE ALLUVIUM (COARSE)

- BANK RESTORATION KEY NOTES
- 1 TYPE C BANK RESTORATION (SEE SHEET D10a)
 - 3 TYPE E BANK RESTORATION (SEE SHEET D10c)
 - 4 HABITAT BOULDER CLUSTER (SEE SHEET D12)
 - 6 CONTAINER PLANTINGS IN BOULDER RETAINING WALL (SEE SHEET D06)

EXISTING GRADE	-----
PROPOSED GRADE	_____



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION AREA 5
PLAN VIEW

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

 Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

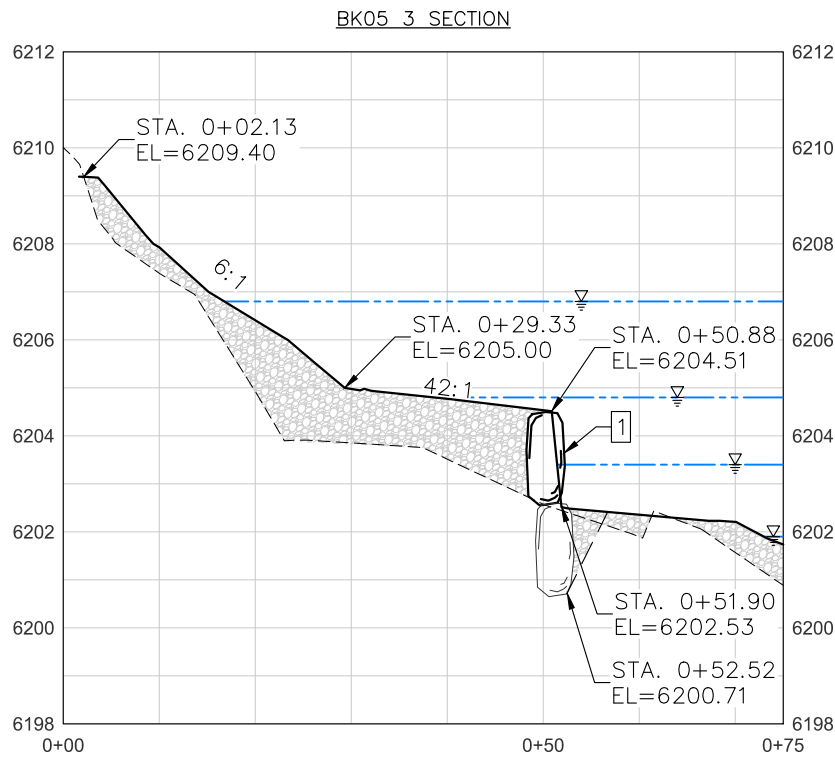
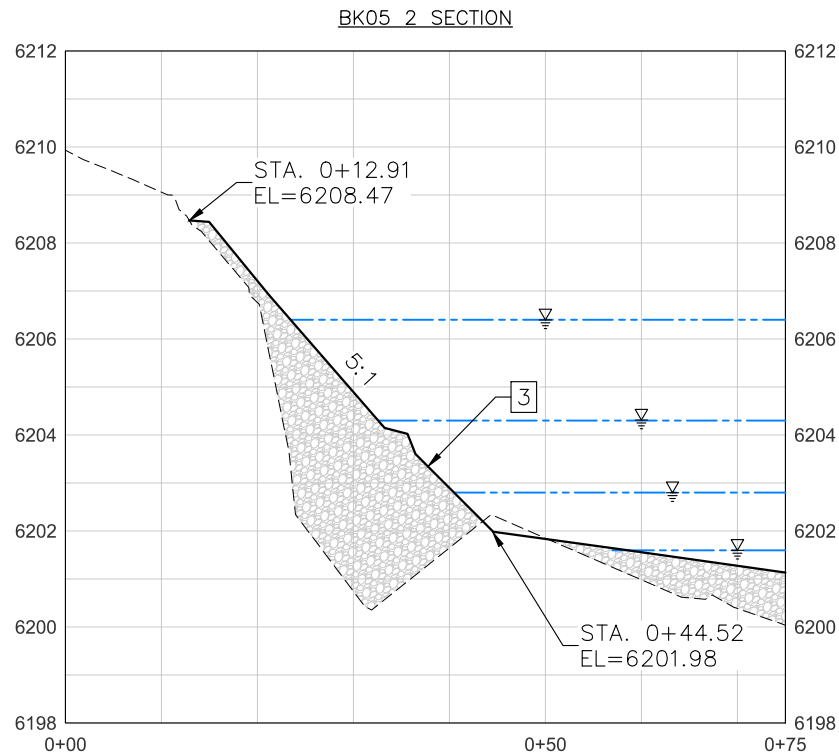
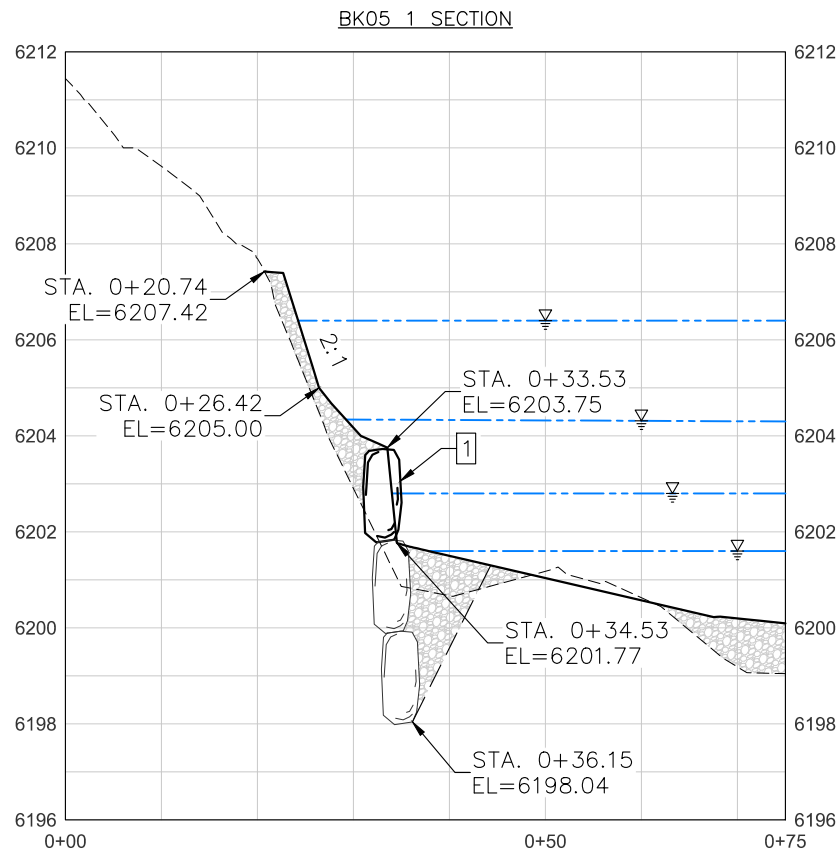
DESIGN FIRMS NAME AND ADDRESSES

 River
RiverRestoration.org, LLC
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org

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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet BK05
Date March 2021	
Scale 1"= 10' (FULL-SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



- BANK RESTORATION KEY NOTES**
- 1 TYPE C BANK RESTORATION (SEE SHEET D10a)
 - 3 TYPE E BANK RESTORATION (SEE SHEET D10c)
 - 4 HABITAT BOULDER CLUSTER (SEE SHEET D12)
 - 6 CONTAINER PLANTINGS IN BOULDER RETAINING WALL (SEE SHEET D06)
 - 7 PROPOSED CHANNEL BED (SEE SHEETS R04-R05)

GRADATION LEGEND (SEE SPECIFICATIONS)

- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

- 5310 CFS (10-YR)
- 2600 CFS (OHWM)
- 966 CFS (MAY)
- 91 CFS (MARCH)

EXISTING GRADE	-----
PROPOSED GRADE	-----

5x VERTICAL EXAGGERATION



PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION AREA 5
CROSS SECTIONS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

 Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

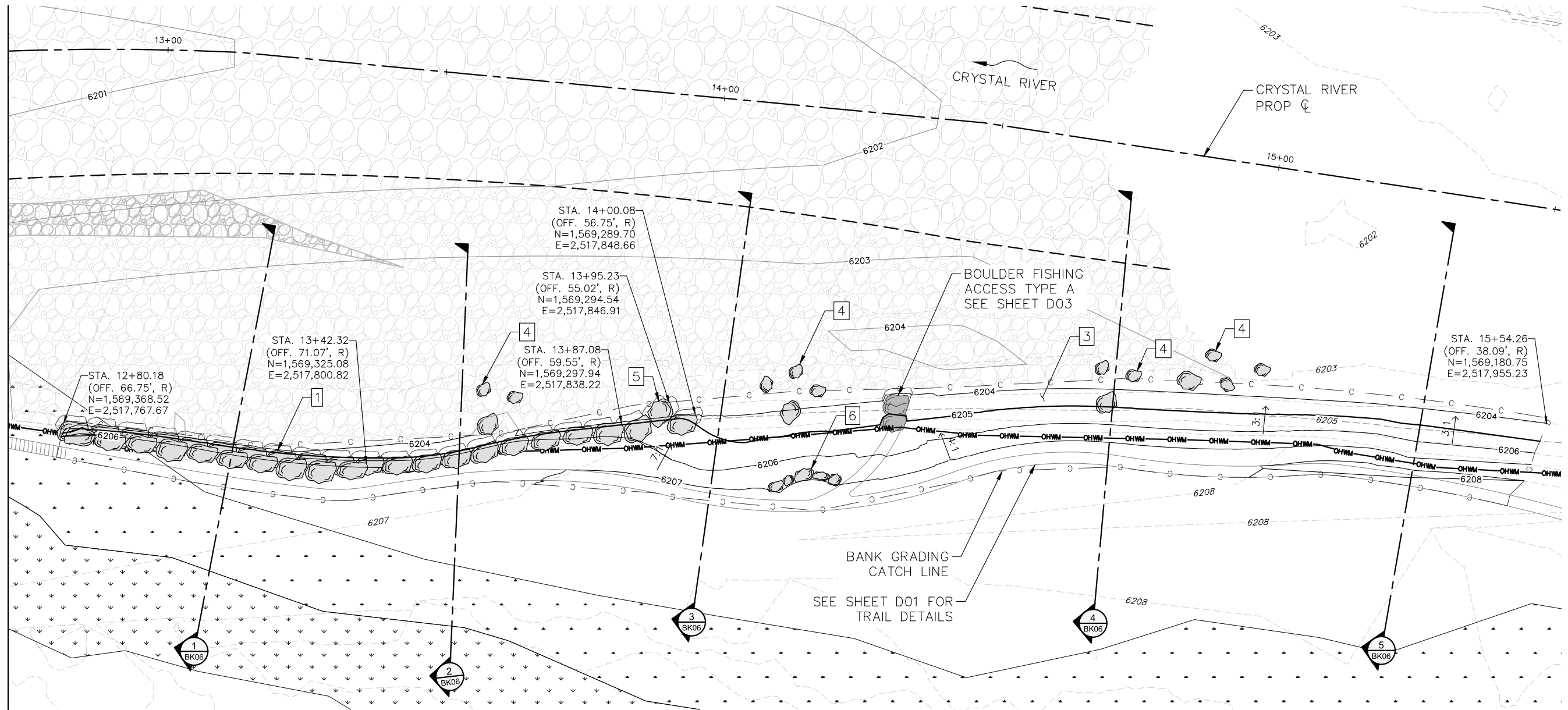
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Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet BK05b
Date March 2021	
Scale 1"= 10' (FULL-SIZE)	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

SEE SHEET BK05



PLAN VIEW — BANK RESTORATION AREA 6

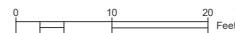
LEGEND

- PALUSTRINE EMERGENT WETLAND (PEM1B)
- PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- PROPERTY LINE
- ORDINARY HIGH WATER MARK
- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROJECT LIMITS
- PROPOSED THALWEG
- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

BANK RESTORATION KEY NOTES

- 1 TYPE C BANK RESTORATION (SEE SHEET D10a)
- 3 TYPE E BANK RESTORATION (SEE SHEET D10c)
- 4 HABITAT BOULDER CLUSTER (SEE SHEET D12)
- 5 ROCK BARB (SEE SHEET D12)
- 6 CONTAINER PLANTINGS IN BOULDER RETAINING WALL (SEE SHEET D06)

EXISTING GRADE	----
PROPOSED GRADE	_____



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION AREA 6
PLAN VIEW

No.	REVISION/UPDATE	Date

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DESIGN FIRMS NAME AND ADDRESSES



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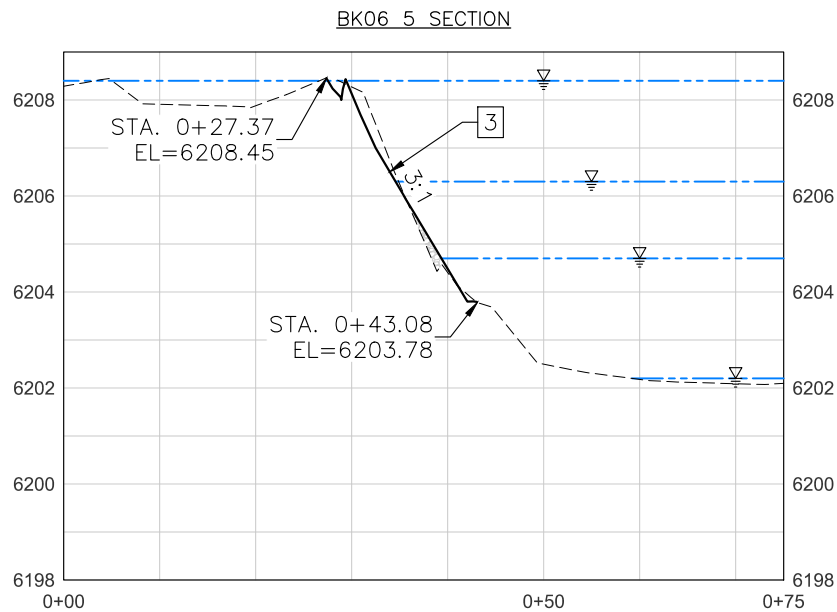
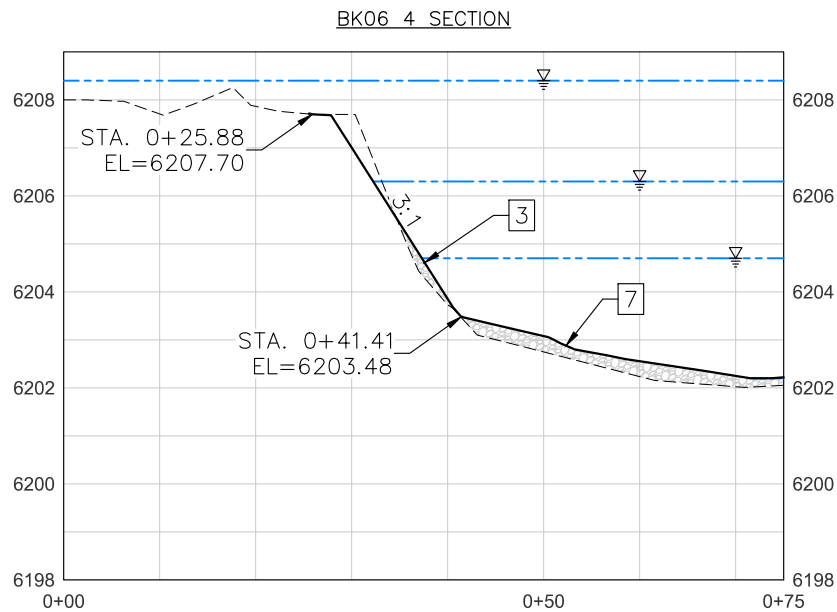
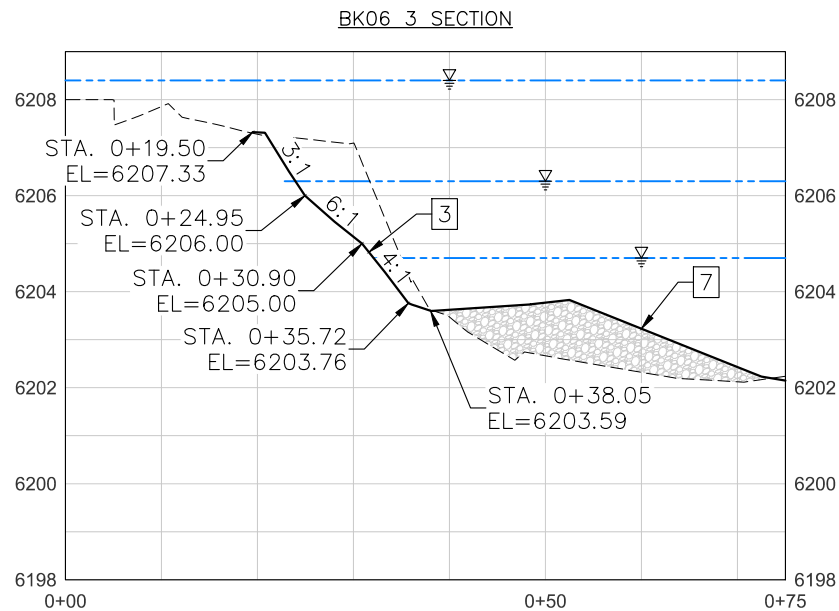
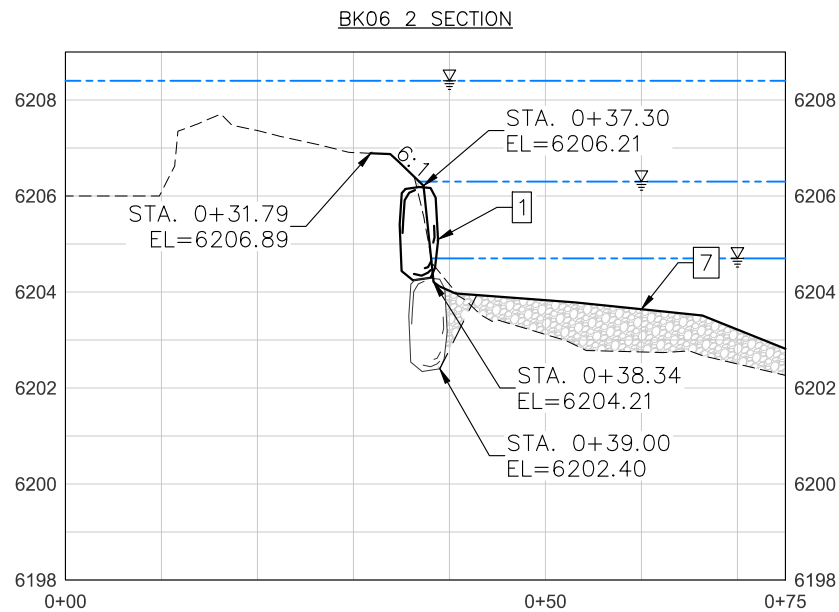
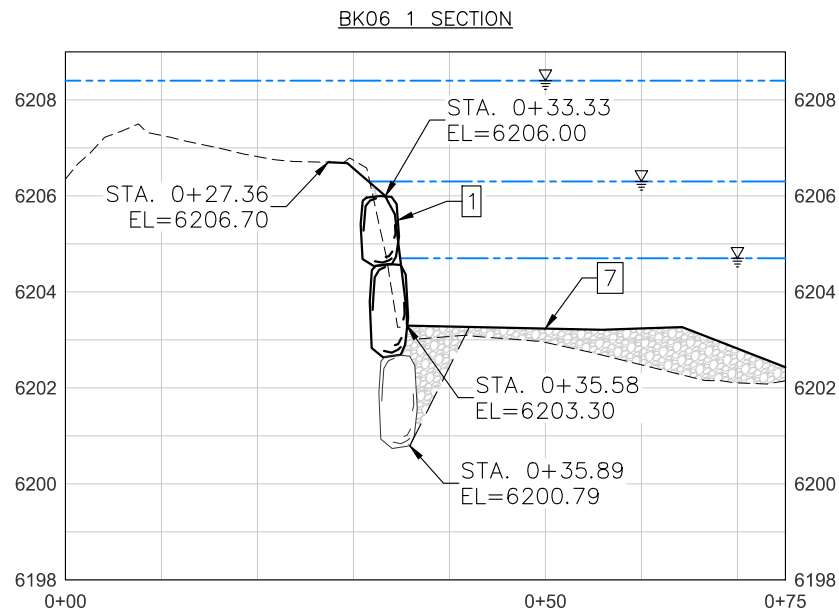
Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

Project
38047

Date
March 2021

Scale
1"= 10' (FULL-SIZE)

Sheet
BK06



- BANK RESTORATION KEY NOTES**
- 1 TYPE C BANK RESTORATION (SEE SHEET D10a)
 - 3 TYPE E BANK RESTORATION (SEE SHEET D10c)
 - 4 HABITAT BOULDER CLUSTER (SEE SHEET D12)
 - 5 ROCK BARB (SEE SHEET D12)
 - 6 CONTAINER PLANTINGS IN BOULDER RETAINING WALL (SEE SHEET D06)
 - 7 PROPOSED CHANNEL BED (SEE SHEETS R04-R05)

GRADATION LEGEND (SEE SPECIFICATIONS)

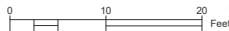
- NATIVE ALLUVIUM
- NATIVE ALLUVIUM (COARSE)

- 5310 CFS (10-YR)
- 2600 CFS (OHWM)
- 966 CFS (MAY)
- 91 CFS (MARCH)*

*NOT SHOWN ON BK06 SECTIONS 1-4

EXISTING GRADE	-----
PROPOSED GRADE	—————

5x VERTICAL EXAGGERATION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION AREA 6
CROSS SECTIONS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



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511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

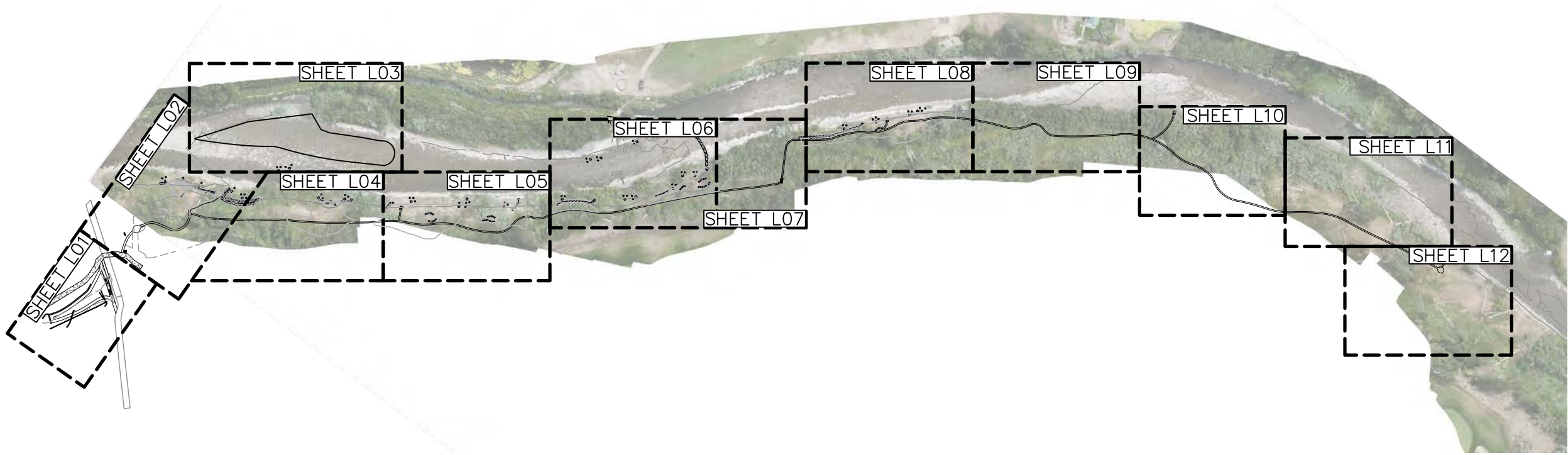


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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet BK06b
Date March 2021	
Scale 1"= 10' (FULL-SIZE)	



CONSTRUCTION NOTES:

1. PROVIDE ALLOWANCE FOR 8 INTERPRETIVE SIGNS AND 2 KIOSK SIGNS TO BE DESIGNED IN SUBSEQUENT PROJECT PHASES.
2. REFER TO ENGINEERING PLANS FOR GRADING, DRAINAGE AND HORIZONTAL LAYOUT
3. SEE ENGINEERING PLANS FOR SITE ACCESS, CONSTRUCTION STAGING AND STOCKPILING AREAS.
4. CIVIL ENGINEER TO VERIFY UTILITY LOCATION AND REQUIREMENTS AND IDENTIFY ANY POTENTIAL CONFLICTS WITH PROPOSED SITE DESIGN.
5. SEE INDIVIDUAL SITE AND LANDSCAPE PLAN ENLARGEMENT SHEETS FOR SPECIFIC SITE AMENITY, FURNISHING, AND LAYOUT.
6. ALL LAYOUT OF SITE WALLS, PAVING AND LANDSCAPE FEATURES TO BE PERFORMED IN FIELD BY SURVEYOR AND APPROVED BY LANDSCAPE ARCHITECT.
7. ANY DISCREPANCIES, ERRORS OR OMISSIONS ON THE CONSTRUCTION DRAWINGS SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE.
8. CONTRACTOR TO REPAIR ANY ASPHALT, CONCRETE AND OTHER SITE IMPROVEMENTS DAMAGED DURING CONSTRUCTION AT NO ADDITIONAL COST TO OWNER.
9. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ANY PERMITS OR LICENSES REQUIRED FOR THE PERFORMANCE OF THE WORK AS APPLICABLE TO THIS PROJECT.
10. PROVIDE RECESSED AND CAULKED EXPANSION JOINTS, PER WRITTEN SPECIFICATIONS, WHERE CONCRETE FLATWORK MEETS VERTICAL STRUCTURES SUCH AS POSTS, WALLS, RAMPS, CURBS, AND STEPS,.
11. ALL CONTROL JOINTS TO BE SAWCUT ON ALL TRAILS UNLESS NOTIFICATION FROM LANDSCAPE ARCHITECT IS GIVEN, NO EXCEPTIONS.
12. ADDITIONAL LAYOUT INFORMATION WILL BE PROVIDED TO THE CONTRACTOR PRIOR TO CONSTRUCTION AS NEEDED.
13. DUE TO SCALE OF DRAWINGS, NOT ALL CONDITIONS/ITEMS CARRY A DETAIL CALLOUT ON THE PLAN. THIS DOES NOT EXCLUDE THIS CONDITION/ITEM FROM THE PROJECT.

LEGEND

- MAJOR CONTOUR - PROPOSED

MINOR CONTOUR - PROPOSED

MINOR CONTOUR - EXISTING

MINOR CONTOUR - EXISTING

PATH CENTERLINE

PALUSTRINE EMERGENT WETLAND (PEM1B)

PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)

POST AND DOWEL FENCE

FENCE - EXISTING

CONCRETE - PROPOSED

CONCRETE - EXISTING

GRAVEL MULCH

TIMBER WALL
- LOW WATER MARK - MARCH 91 CFS

LOW WATER MARK - MAY 966 CFS

ORDINARY HIGH WATER MARK 2600 CFS

10-YEAR FLOODPLAIN 5310 CFS

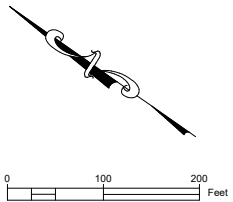
RIPARIAN CREATION TOPSOIL

CLOSURE GATE

INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.

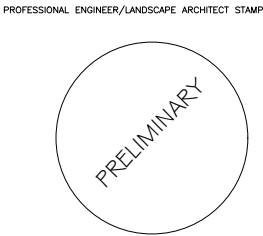
BOULDER BANK RETENTION; RE: ENGINEER DWGS, THIS SET

EXISTING TREES



Flow Rate (cfs)	March 91	May 966	OHWM 2600	10-yr 5310
Water Surface Elevation (ft)				
Bank 1 between dike and jetty	6195.5	6195.5	6196.7	6198.8
Bank 1 @ jetty	6195.5	6196.3	6197.7	6199.5
Bank 2	6196.9	6198.6	6200.1	6202.2
Bank 3	6197.6	6199.9	6201.8	6203.9
Bank 4	6198.5	6200.9	6203.4	6205.5
Bank 5 ds end	6201.6	6202.8	6204.3	6206.4
Bank 5 us end	6201.9	6203.4	6204.8	6206.8
Bank 6	6202.2	6204.7	6206.3	6208.4

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS - OVERVIEW

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



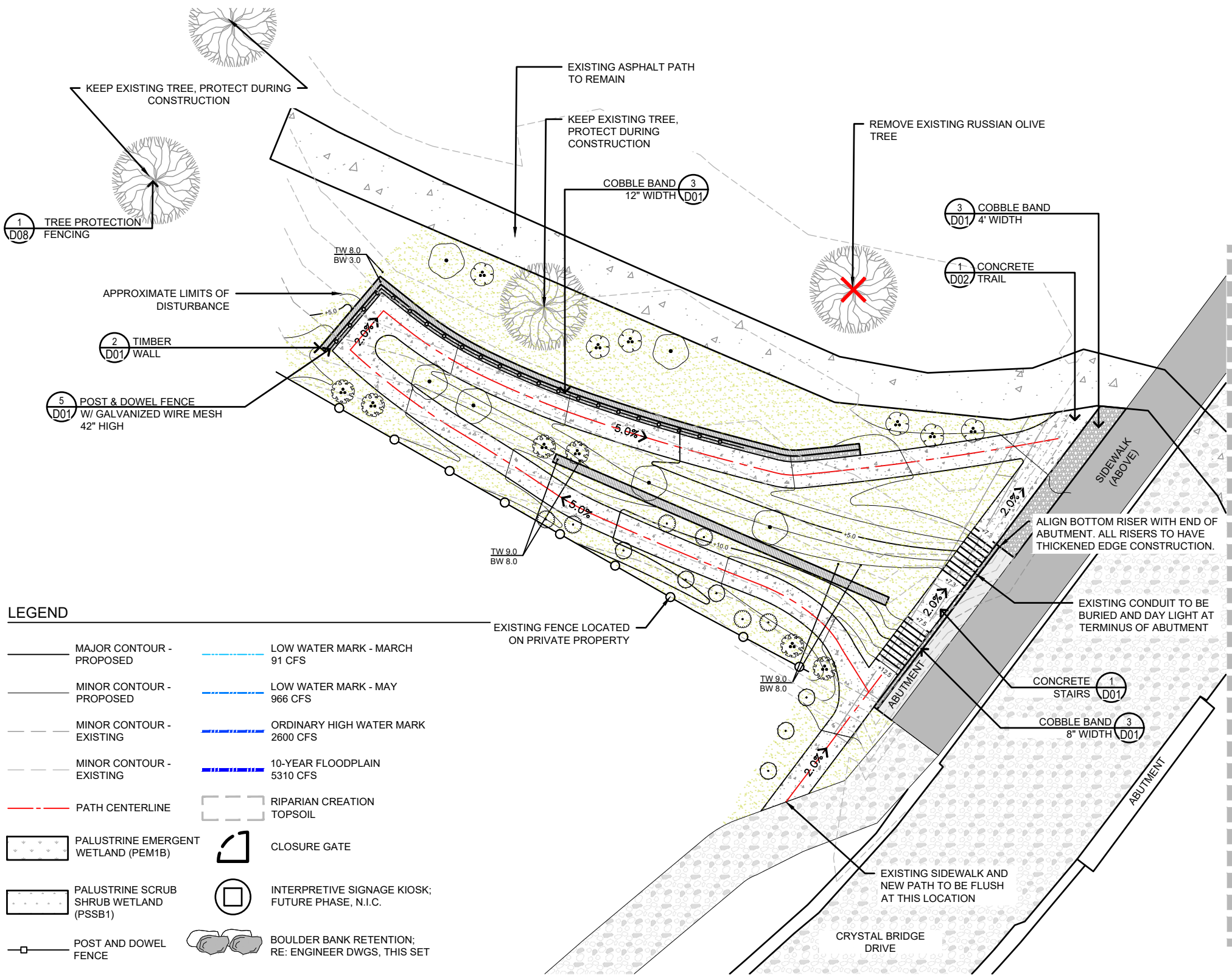
RiverRestoration.org, LLC
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PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	LOO
Scale	1"=20' AT FULL SIZE	





LEGEND

- MAJOR CONTOUR - PROPOSED
- MINOR CONTOUR - PROPOSED
- MINOR CONTOUR - EXISTING
- MINOR CONTOUR - EXISTING
- PATH CENTERLINE
- PALUSTRINE EMERGENT WETLAND (PEM1B)
- PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- POST AND DOWEL FENCE
- FENCE - EXISTING
- CONCRETE - PROPOSED
- CONCRETE - EXISTING
- GRAVEL MULCH
- TIMBER WALL
- LOW WATER MARK - MARCH 91 CFS
- LOW WATER MARK - MAY 966 CFS
- ORDINARY HIGH WATER MARK 2600 CFS
- 10-YEAR FLOODPLAIN 5310 CFS
- RIPARIAN CREATION TOPSOIL
- CLOSURE GATE
- INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.
- BOULDER BANK RETENTION; RE: ENGINEER DWGS, THIS SET
- EXISTING TREES

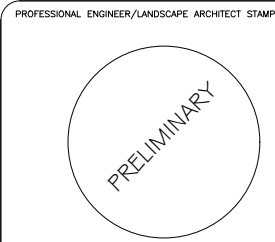
PLANT SCHEDULE L01		
UPLAND	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ACER GLABRUM ROCKY MOUNTAIN MAPLE	1 GAL - 4 5 GAL - 2
	ARTEMISIA TRIDENTATA VASEYANA MOUNTAIN BIG SAGEBRUSH	1 GAL - 4 5 GAL - 2
	CHRYSOETHAMNUS NAUSEOSUS RUBBER RABBITBRUSH	1 GAL - 4 5 GAL - 2
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 4 5 GAL - 2
	PRUNUS VIRGINIANA MELANOCARPA WESTERN CHOKEBERRY	1 GAL - 4 5 GAL - 2

CONCEPT PLANT SCHEDULE L01

	NON-IRRIGATED SEED MIX ACHNATHERUM HYMENOIDES / INDIAN RICE GRASS BOUETLOUA GRACILIS / BLUE GRAMA ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS NASSELLA VIRIDULA / GREEN NEEDLEGRASS PASCOPIRUM SMITHII / WESTERN WHEATGRASS PSEUDOROEGNERIA SPICATA / BLUEBUNCH WHEATGRASS	2,146 SF 215 SF 322 SF 537 SF 322 SF 537 SF 215 SF
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CONSTRUCTION NOTES:

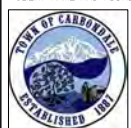
- OVERALL PLANTING AND SEED SCHEDULES, AND RESTORATION DETAILS ARE CONTAINED IN THE SUBSEQUENT PAGE SETS INCLUDING OVERALL SITE SPECIES, QUANTITIES, AND LANDSCAPE UNIT REQUIREMENTS.
- THIS SHEET CONTAINS THE PLANT QUANTITIES FOR THIS ENLARGEMENT AREA ONLY, SEE PLANT SCHEDULE FOR THE DETAILED LIST OF PLANTS IN THIS RESTORATION ZONES.
- PLANT LABELS ARE FOR INCREASED CLARITY AND ARE INCLUDED WHERE POSSIBLE. CONTRACTOR TO VERIFY OVERALL PLANT COUNTS IN EACH AREA BASED ON THE PLANT SCHEDULE.
- LAYOUT OF THE ACCESS RAMP AND STAIRS MUST BE LAID OUT IN THE FIELD AND EVALUATED ONSITE. FIELD MODIFICATIONS MAY BE NECESSARY BASED ON CONDITIONS ENCOUNTERED IN THE FIELD. CONTRACTOR TO COORDINATE DIRECTLY WITH PROJECT LANDSCAPE ARCHITECT AND TOWN REPRESENTATIVE.
- EXISTING DEADFALL WITHIN THE DISTURBANCE AREA TO BE STOCKPILED AND FIELD LOCATED FOR HABITAT PER PROJECT ECOLOGIST.
- ALL INTERPRETIVE AND KIOSK SIGNS TO BE DESIGNED AND INSTALLED IN A SUBSEQUENT PROJECT PHASE.
- TRAILS ARE TO BE 24"-30" WIDE, OF COMPACTED NATIVE SOIL. PREPARE TRAIL BED BY REMOVING EXISTING VEGETATION, SURFACE ROOTS AND ROCKS, AND SUBSURFACE ROOTS TO A DEPTH OF 6". LOOSEN AND RAKE SOIL TO ACHIEVE A CONSISTENT TRAIL BED. COMPACT WITH PLATE, JUMPING JACK, OR HAND TAMP.
- GRADES ARE SHOWN FOR ILLUSTRATIVE PURPOSES. SEE ENGINEERING PLANS FOR ALL GRADING AND SPOT ELEVATIONS.



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
ACCESSIBLE RAMP

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



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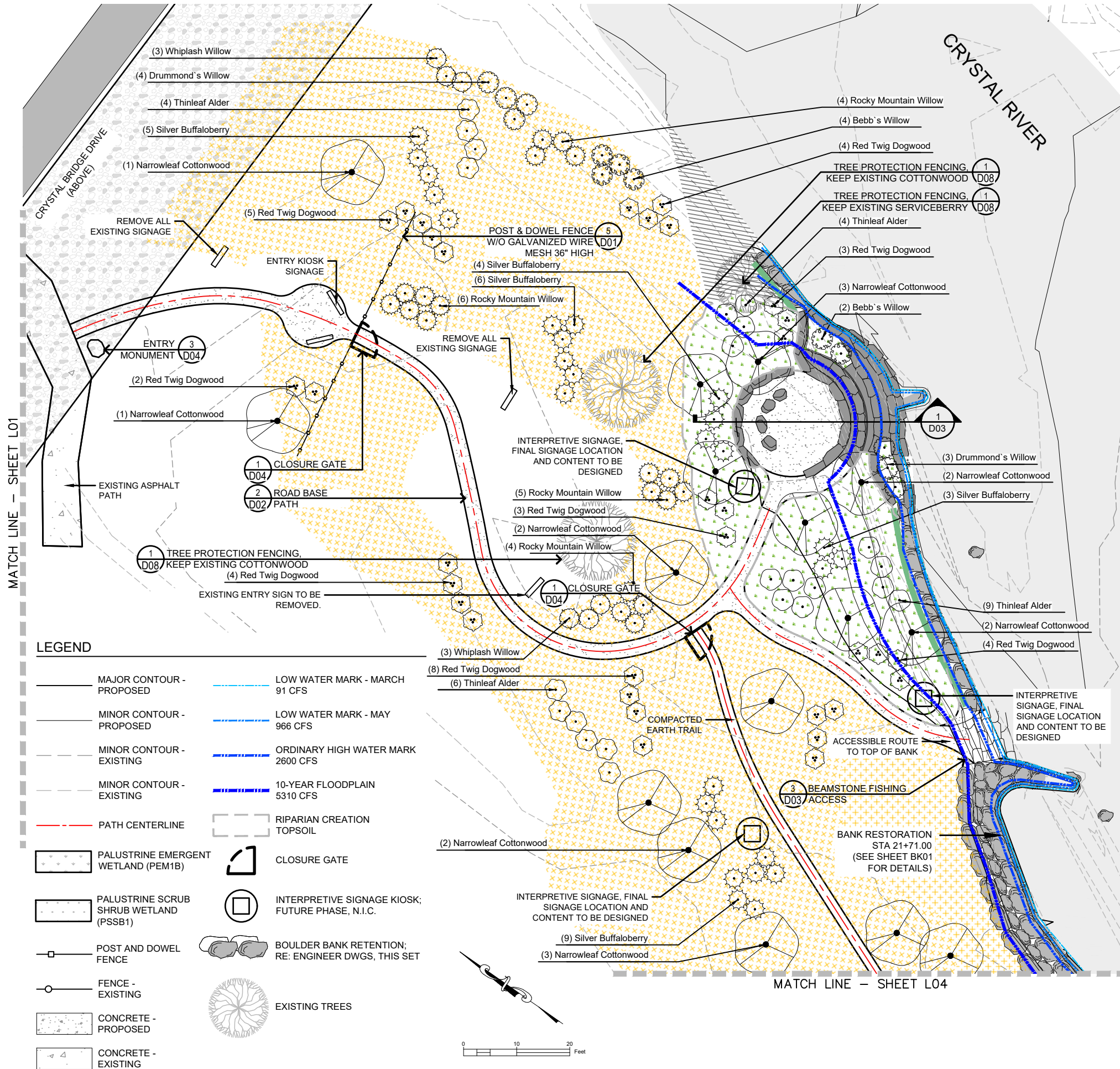
PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	LO1
Scale	1" = 10' AT FULL SIZE	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



MATCH LINE - SHEET L01

MATCH LINE - SHEET L03



PLANT SCHEDULE L02		
RIPARIAN CREATION TYPE 1	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUFOLIA	1 GAL - 8
	THINLEAF ALDER	5 GAL - 5
	CORNUS SERICEA	1 GAL - 6
	RED TWIG DOGWOOD	5 GAL - 4
	POPULUS ANGUSTIFOLIA	1 GAL - 4
	NARROWLEAF COTTONWOOD	5 GAL - 3
	SALIX BEBBIANA	1 GAL - 1
	BEBB'S WILLOW	5 GAL - 1
	SALIX DRUMMONDIANA	1 GAL - 2
	DRUMMOND'S WILLOW	5 GAL - 1
	SHEPHERDIA ARGENTEA	1 GAL - 4
	SILVER BUFFALOBERRY	5 GAL - 3
RIPARIAN ENHANCEMENT	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUFOLIA	1 GAL - 6
	THINLEAF ALDER	5 GAL - 4
	CORNUS SERICEA	1 GAL - 14
	RED TWIG DOGWOOD	5 GAL - 9
	POPULUS ANGUSTIFOLIA	1 GAL - 6
	NARROWLEAF COTTONWOOD	5 GAL - 3
	SALIX BEBBIANA	1 GAL - 3
	BEBB'S WILLOW	5 GAL - 1
	SALIX DRUMMONDIANA	1 GAL - 3
	DRUMMOND'S WILLOW	5 GAL - 1
	SALIX LASIANDRA	1 GAL - 4
	WHIPLASH WILLOW	5 GAL - 2
	SALIX MONTICOLA	1 GAL - 12
	ROCKY MOUNTAIN WILLOW	5 GAL - 7
	SHEPHERDIA ARGENTEA	1 GAL - 12
	SILVER BUFFALOBERRY	5 GAL - 8

CONCEPT PLANT SCHEDULE L02

	LIVE STAKES	264 SF
	POPULUS ANGUSTIFOLIA / NARROWLEAF POPLAR	21
	RIPARIAN SEED MIX - CREATION	1,787 SF
	CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS	179 SF
	DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS	357 SF
	ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS	357 SF
	GLYCERIA STRIATA / FOWL MANNA GRASS	179 SF
	JUNCUS ARCTICUS / WIRE RUSH	179 SF
	PASCOPYRUM SMITHII / WESTERN WHEATGRASS	357 SF
	POA SECUNDA / BLUEGRASS	179 SF
	RIPARIAN SEED MIX - ENHANCEMENT	6,902 SF
	CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS	690 SF
	DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS	690 SF
	ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS	1,380 SF
	GLYCERIA STRIATA / FOWL MANNA GRASS	690 SF
	JUNCUS ARCTICUS / WIRE RUSH	690 SF
	PASCOPYRUM SMITHII / WESTERN WHEATGRASS	1,380 SF
	POA SECUNDA / BLUEGRASS	690 SF
	WILLOW FASCINES	52 LF

CONSTRUCTION NOTES:

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- GRADES ARE SHOWN FOR ILLUSTRATIVE PURPOSES. SEE ENGINEERING PLANS FOR ALL GRADING AND SPOT ELEVATIONS.
- TEMPORARY ABOVE GROUND IRRIGATION REQUIRED FOR ALL RESTORATION ZONES.

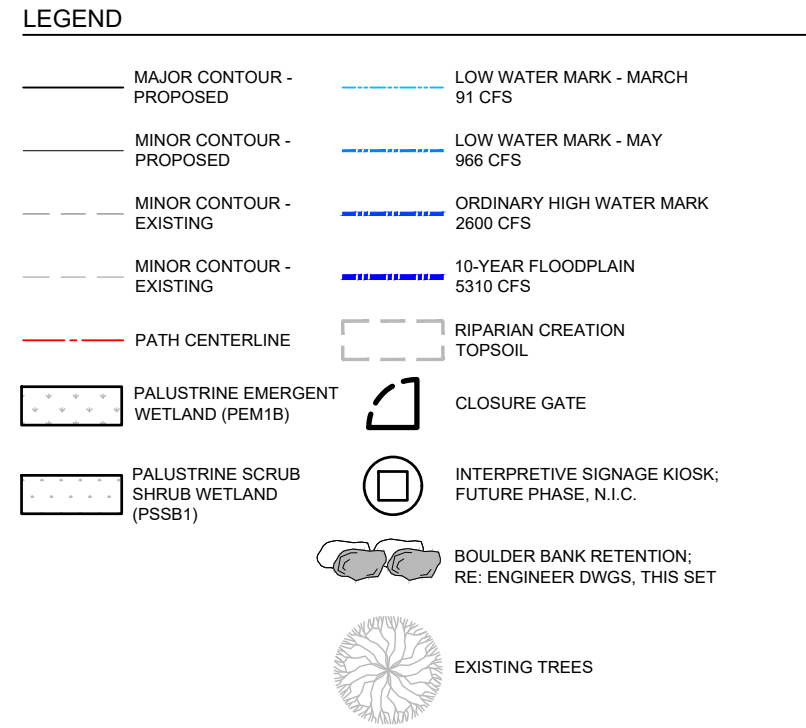
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


PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS

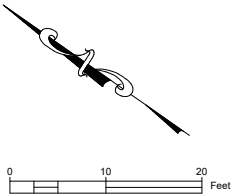
No.	REVISION/UPDATE	Date
CLIENT NAME AND ADDRESS		
 Town of Carbondale 511 Colorado Ave Carbondale, CO 81623		
DESIGN FIRMS NAME AND ADDRESSES		
 RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org		
 311 Main St, Suite 102 Carbondale, CO 81623 970.963.6520 www.dhmdesign.com		
PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L02
Scale	1"=20' AT FULL SIZE	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION




PLANT SCHEDULE L03		
RIPARIAN CREATION TYPE 2 (COBBLE ISLAND)	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	SALIX BEBBIANA BEBB'S WILLOW	1 GAL - 30 5 GAL - 20
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 30 5 GAL - 20
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL - 36 5 GAL - 24
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL - 36 5 GAL - 24

1. OVERALL PLANTING AND SEED SCHEDULES, AND RESTORATION DETAILS ARE CONTAINED IN THE SUBSEQUENT PAGE SETS INCLUDING OVERALL SITE SPECIES, QUANTITIES, AND LANDSCAPE UNIT REQUIREMENTS.
2. THIS SHEET CONTAINS THE PLANT QUANTITIES FOR THIS ENLARGEMENT AREA ONLY. SEE PLANT SCHEDULE FOR THE DETAILED LIST OF PLANTS IN THIS RESTORATION ZONES.
3. PLANT LABELS ARE FOR INCREASED CLARITY AND ARE INCLUDED WHERE POSSIBLE. CONTRACTOR TO VERIFY OVERALL PLANT COUNTS IN EACH AREA BASED ON THE PLANT SCHEDULE.
4. EXISTING DEADFALL WITHIN THE DISTURBANCE AREA TO BE STOCKPILED AND FIELD LOCATED FOR HABITAT PER PROJECT ECOLOGIST.
5. ALL INTERPRETIVE AND KIOSK SIGNS TO BE DESIGNED AND INSTALLED IN A SUBSEQUENT PROJECT PHASE.
6. TRAILS ARE TO BE 24"-30" WIDE, OF COMPACTED NATIVE SOIL. PREPARE TRAIL BED BY REMOVING EXISTING VEGETATION, SURFACE ROOTS AND ROCKS, AND SUBSURFACE ROOTS TO A DEPTH OF 6". LOOSEN AND RAKE SOIL TO ACHIEVE A CONSISTENT TRAIL BED. COMPACT WITH PLATE, JUMPING JACK, OR HAND TAMP.
7. GRADES ARE SHOWN FOR ILLUSTRATIVE PURPOSES. SEE ENGINEERING PLANS FOR ALL GRADING AND SPOT ELEVATIONS.
8. TEMPORARY ABOVE GROUND IRRIGATION REQUIRED FOR ALL RESTORATION ZONES.



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

A circular professional stamp for a Professional Engineer or Landscape Architect. The word "PRELIMINARY" is written diagonally across the center of the circle.

CRYSTAL RIVER RESTORATION AND WEAVER DITCH EFFICIENCY PROJECT UPLAND IMPROVEMENTS

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Carbondale, CO 81623

Project

38047

Date _____

MAR 2021

1"=20' AT FULL SIZE

Sheet

L03

CRYSTAL RIVER

BANK RESTORATION
STA 23+81.00
(SEE SHEET BK02
FOR DETAILS)

- (3) Narrowleaf Cottonwood
(3) Bebb's Willow
(3) Red Twig Dogwood
(3) Drummond's Willow

(7) Thinleaf Alder

(2) Narrowleaf Cottonwood

(4) Whiplash Willow

(4) Red Twig Dogwood

(3) Red Twig Dogwood

(4) Thinleaf Alder

(4) Water Birch

(2) Narrowleaf Cottonwood

(2) Silver Buffaloberry

(3) Water Birch

(4) Thinleaf Alder

(3) Red Twig Dogwood

COMPACTED EARTH TRAIL

(3) Water Birch

(4) Water Birch

(9) Silver Buffaloberry

(5) Water Birch

(5) Silver Buffaloberry
(4) Thinleaf Alder

(4) Thinleaf Alder

(2) Narrowleaf Cottonwood

(9) Red Twig Dogwood

LEGEND

- MAJOR CONTOUR - PROPOSED
MINOR CONTOUR - PROPOSED
MINOR CONTOUR - EXISTING
MINOR CONTOUR - EXISTING
PATH CENTERLINE
PALUSTRINE EMERGENT WETLAND (PEM1B)
PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
LOW WATER MARK - MARCH 91 CFS
LOW WATER MARK - MAY 966 CFS
ORDINARY HIGH WATER MARK 2600 CFS
10-YEAR FLOODPLAIN 5310 CFS
RIPARIAN CREATION TOPSOIL
CLOSURE GATE
INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.
BOULDER BANK RETENTION; RE: ENGINEER DWGS, THIS SET
EXISTING TREES

PLANT SCHEDULE L04

RIPARIAN CREATION TYPE 1	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUFOLIA THINLEAF ALDER	1 GAL - 9 5 GAL - 6
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 9 5 GAL - 5
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 5 5 GAL - 4
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 3 5 GAL - 2
	SALIX BEBBIANA BEBB'S WILLOW	1 GAL - 2 5 GAL - 1
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 2 5 GAL - 1
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 7 5 GAL - 4
RIPARIAN ENHANCEMENT	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUFOLIA THINLEAF ALDER	1 GAL - 5 5 GAL - 3
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 3 5 GAL - 2
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 8 5 GAL - 5
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 3 5 GAL - 1
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL - 3 5 GAL - 1
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 3 5 GAL - 2

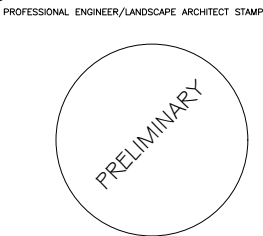
CONCEPT PLANT SCHEDULE L04

	LIVE STAKES POPULUS ANGUSTIFOLIA / NARROWLEAF POPLAR SALIX SPP / WILLOW	305 SF 24 56
	RIPARIAN SEED MIX - CREATION CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS GLYCERIA STRIATA / FOWL MANNA GRASS JUNCUS ARCTICUS / WIRE RUSH PASCOPIRUM SMITHII / WESTERN WHEATGRASS POA SECUNDA / BLUEGRASS	3,718 SF 372 SF 744 SF 744 SF 372 SF 372 SF 744 SF 372 SF
	RIPARIAN SEED MIX - ENHANCEMENT CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS GLYCERIA STRIATA / FOWL MANNA GRASS JUNCUS ARCTICUS / WIRE RUSH PASCOPIRUM SMITHII / WESTERN WHEATGRASS POA SECUNDA / BLUEGRASS	14,267 SF 1,427 SF 2,853 SF 2,853 SF 1,427 SF 1,427 SF 2,853 SF 1,427 SF
	WILLOW FASCINES	54 LF

CONSTRUCTION NOTES:

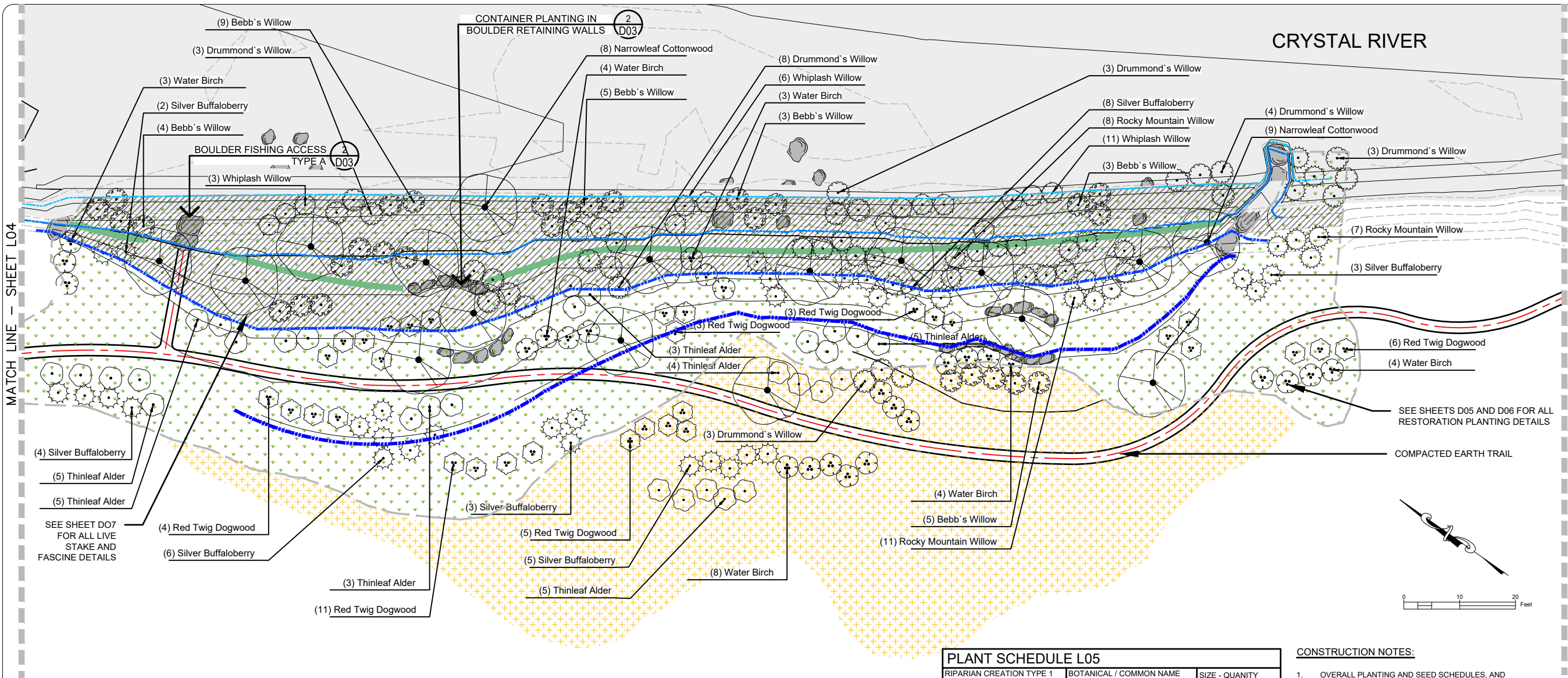
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Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L04
Scale	1"=20' AT FULL SIZE	



LEGEND

- MAJOR CONTOUR - PROPOSED
- MINOR CONTOUR - PROPOSED
- MINOR CONTOUR - EXISTING
- MINOR CONTOUR - EXISTING
- PATH CENTERLINE
- PALUSTRINE EMERGENT WETLAND (PEM1B)
- PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- LOW WATER MARK - MARCH 91 CFS
- LOW WATER MARK - MAY 966 CFS
- ORDINARY HIGH WATER MARK 2600 CFS
- 10-YEAR FLOODPLAIN 5310 CFS
- RIPARIAN CREATION TOPSOIL
- CLOSURE GATE
- INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.
- BOULDER BANK RETENTION; RE: ENGINEER DWGS, THIS SET
- EXISTING TREES

CONCEPT PLANT SCHEDULE L05

LIVE STAKES	3,829 SF
POPULUS ANGUSTIFOLIA / NARROWLEAF POPLAR	299
SALIX SPP / WILLOW	697
RIPARIAN SEED MIX - CREATION	9,281 SF
CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS	928 SF
DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS	1,856 SF
ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS	1,856 SF
GLYCERIA STRIATA / FOWL MANNA GRASS	928 SF
JUNCUS ARCTICUS / WIRE RUSH	928 SF
PASCOPYRUM SMITHII / WESTERN WHEATGRASS	1,856 SF
POA SECUNDA / BLUEGRASS	928 SF
RIPARIAN SEED MIX - ENHANCEMENT	5,135 SF
CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS	513 SF
DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS	1,027 SF
ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS	1,027 SF
GLYCERIA STRIATA / FOWL MANNA GRASS	513 SF
JUNCUS ARCTICUS / WIRE RUSH	513 SF
PASCOPYRUM SMITHII / WESTERN WHEATGRASS	1,027 SF
POA SECUNDA / BLUEGRASS	513 SF
WILLOW FASCINES	179 LF

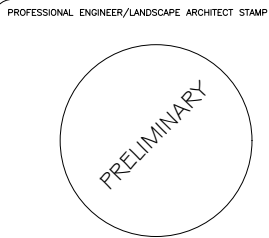
PLANT SCHEDULE L05

RIPARIAN CREATION TYPE 1	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUFOLIA THINLEAF ALDER	1 GAL - 13 5 GAL - 8
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 11 5 GAL - 7
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 16 5 GAL - 11
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 10 5 GAL - 7
	SALIX BEBBIANA BEBB'S WILLOW	1 GAL - 15 5 GAL - 9
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 13 5 GAL - 8
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL - 6 5 GAL - 4
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL - 16 5 GAL - 10
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 16 5 GAL - 10
RIPARIAN ENHANCEMENT	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUFOLIA THINLEAF ALDER	1 GAL - 6 5 GAL - 3
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 5 5 GAL - 3
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 3 5 GAL - 2
	SALIX BEBBIANA BEBB'S WILLOW	1 GAL - 3 5 GAL - 2
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 2 5 GAL - 1
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 3 5 GAL - 2

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PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

Town of Carbondale
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Carbondale, CO 81623

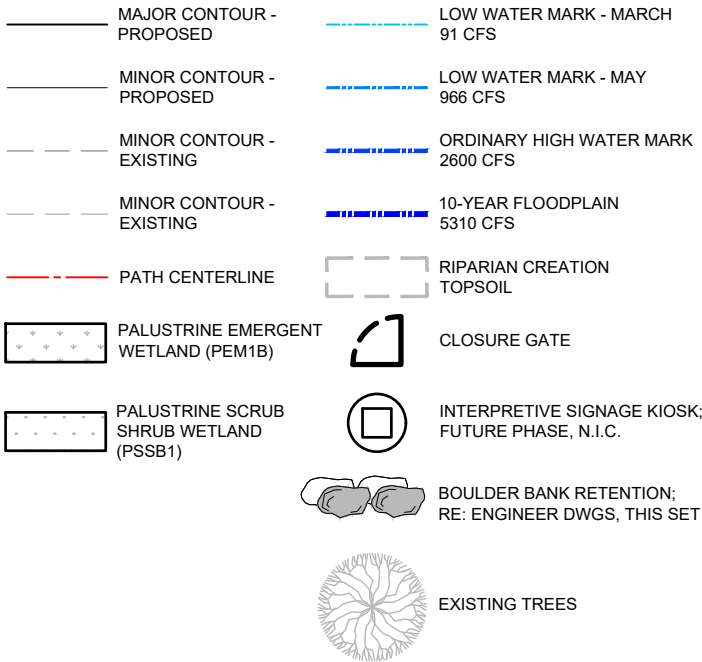
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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project	38047
Date	MAR 2021
Scale	1"=20' AT FULL SIZE
Sheet	L05

LEGEND



PLANT SCHEDULE L06

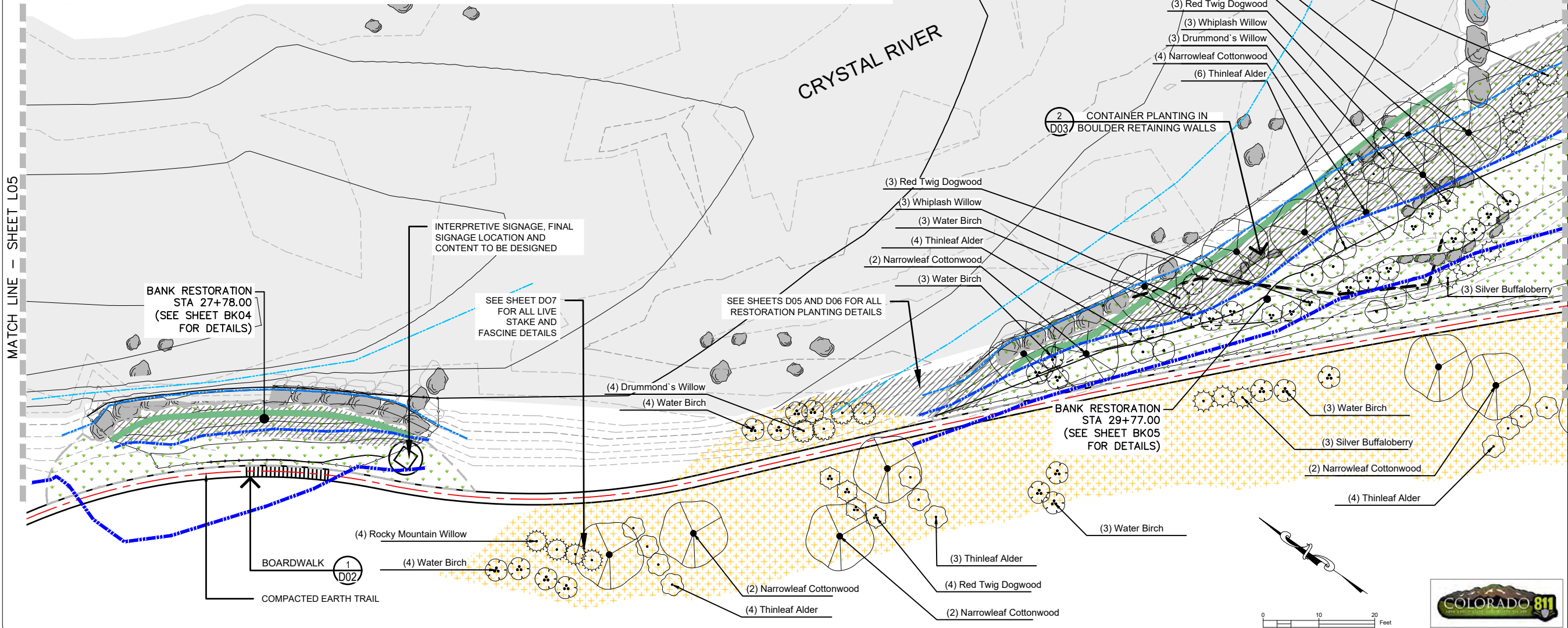
RIPARIAN CREATION TYPE 1	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUIFOLIA THINLEAF ALDER	1 GAL - 6 5 GAL - 4
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 8 5 GAL - 5
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 4 5 GAL - 2
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 6 5 GAL - 3
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 2 5 GAL - 1
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL - 4 5 GAL - 2
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL - 3 5 GAL - 2
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 2 5 GAL - 1
RIPARIAN ENHANCEMENT	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUIFOLIA THINLEAF ALDER	1 GAL - 7 5 GAL - 4
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 9 5 GAL - 5
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 3 5 GAL - 1
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 4 5 GAL - 2
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 3 5 GAL - 1
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL - 3 5 GAL - 1
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 2 5 GAL - 1

CONCEPT PLANT SCHEDULE L06

	LIVE STAKES POPULUS ANGUSTIFOLIA / NARROWLEAF POPLAR SALIX SPP / WILLOW	1,693 SF 132 308
	RIPARIAN SEED MIX - CREATION CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS GLYCERIA STRIATA / FOWL MANNA GRASS JUNCUS ARCTICUS / WIRE RUSH PASCOPYRUM SMITHII / WESTERN WHEATGRASS POA SECUNDA / BLUEGRASS	5,316 SF 532 SF 1,063 SF 1,063 SF 532 SF 532 SF 1,063 SF 532 SF
	RIPARIAN SEED MIX - ENHANCEMENT CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS GLYCERIA STRIATA / FOWL MANNA GRASS JUNCUS ARCTICUS / WIRE RUSH PASCOPYRUM SMITHII / WESTERN WHEATGRASS POA SECUNDA / BLUEGRASS	8,203 SF 820 SF 1,641 SF 1,641 SF 820 SF 820 SF 1,641 SF 820 SF
	WILLOW FASCINES	151 LF

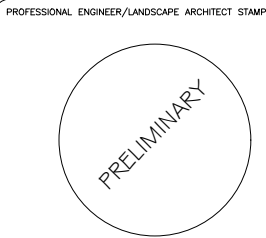
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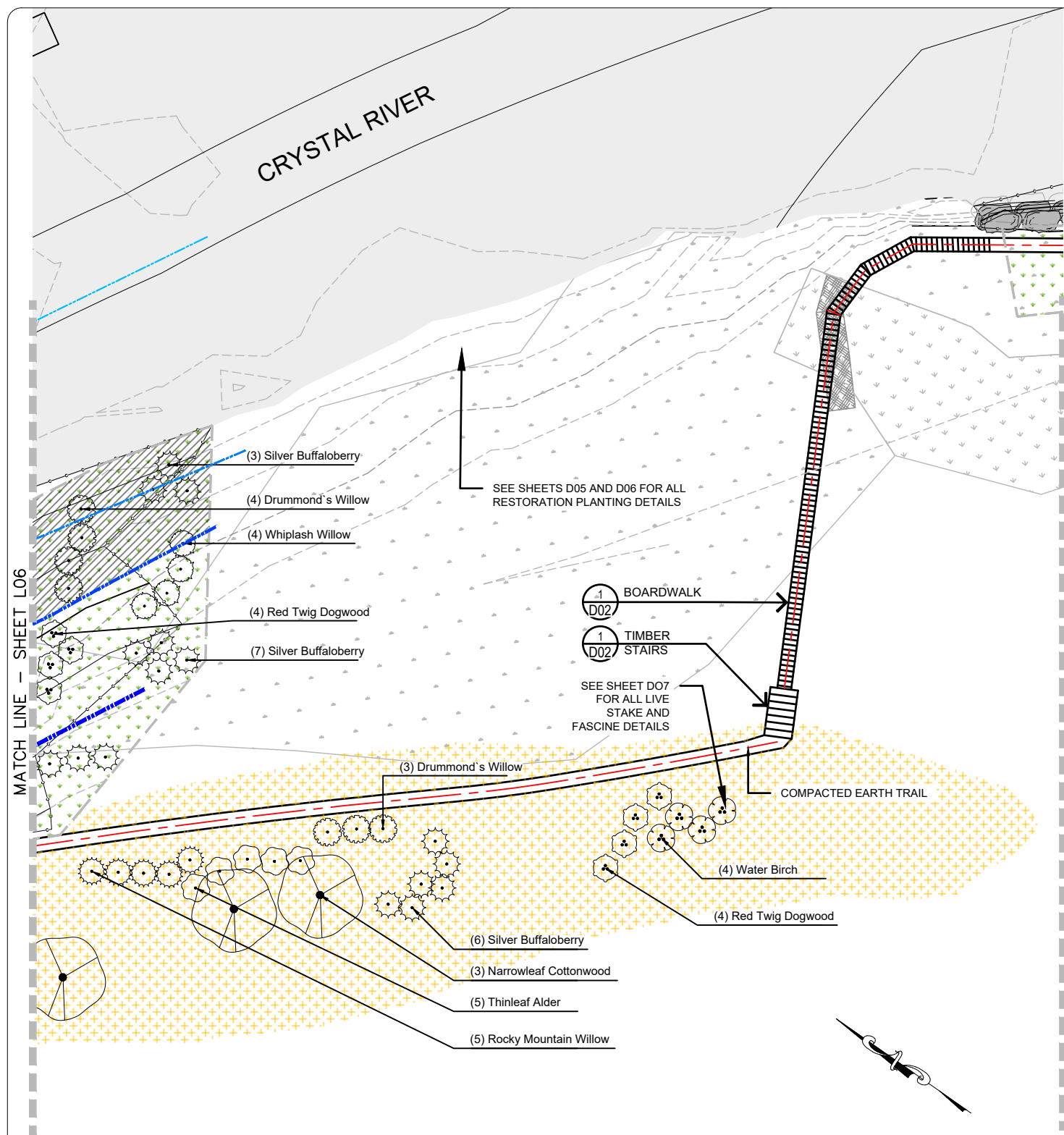
MATCH LINE - SHEET L07

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MATCH LINE - SHEET L06

MATCH LINE - SHEET L08

LEGEND

- MAJOR CONTOUR - PROPOSED
- MINOR CONTOUR - PROPOSED
- MINOR CONTOUR - EXISTING
- MINOR CONTOUR - EXISTING
- PATH CENTERLINE
- PALUSTRINE EMERGENT WETLAND (PEM1B)
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- INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.
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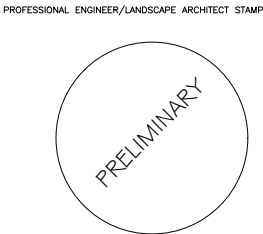
PLANT SCHEDULE L07		
RIPARIAN CREATION TYPE 1	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 3 5 GAL - 1
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 3 5 GAL - 1
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL - 3 5 GAL - 1
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 6 5 GAL - 4
RIPARIAN ENHANCEMENT	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUIFOLIA THINLEAF ALDER	1 GAL - 3 5 GAL - 2
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 3 5 GAL - 1
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 3 5 GAL - 1
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 2 5 GAL - 1
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 2 5 GAL - 1
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL - 3 5 GAL - 2
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 4 5 GAL - 2

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- TRAILS ARE TO BE 24"-30" WIDE, OF COMPACTED NATIVE SOIL. PREPARE TRAIL BED BY REMOVING EXISTING VEGETATION, SURFACE ROOTS AND ROCKS, AND SUBSURFACE ROOTS TO A DEPTH OF 6". LOOSEN AND RAKE SOIL TO ACHIEVE A CONSISTENT TRAIL BED. COMPACT WITH PLATE, JUMPING JACK, OR HAND TAMP.
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- TEMPORARY ABOVE GROUND IRRIGATION REQUIRED FOR ALL RESTORATION ZONES.
- FIELD FLAG AND ADJUST BOARDWALK TO ACHIEVE BALANCE OF MINIMIZING DISTURBANCE AND PREFERRED ALIGNMENT.



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

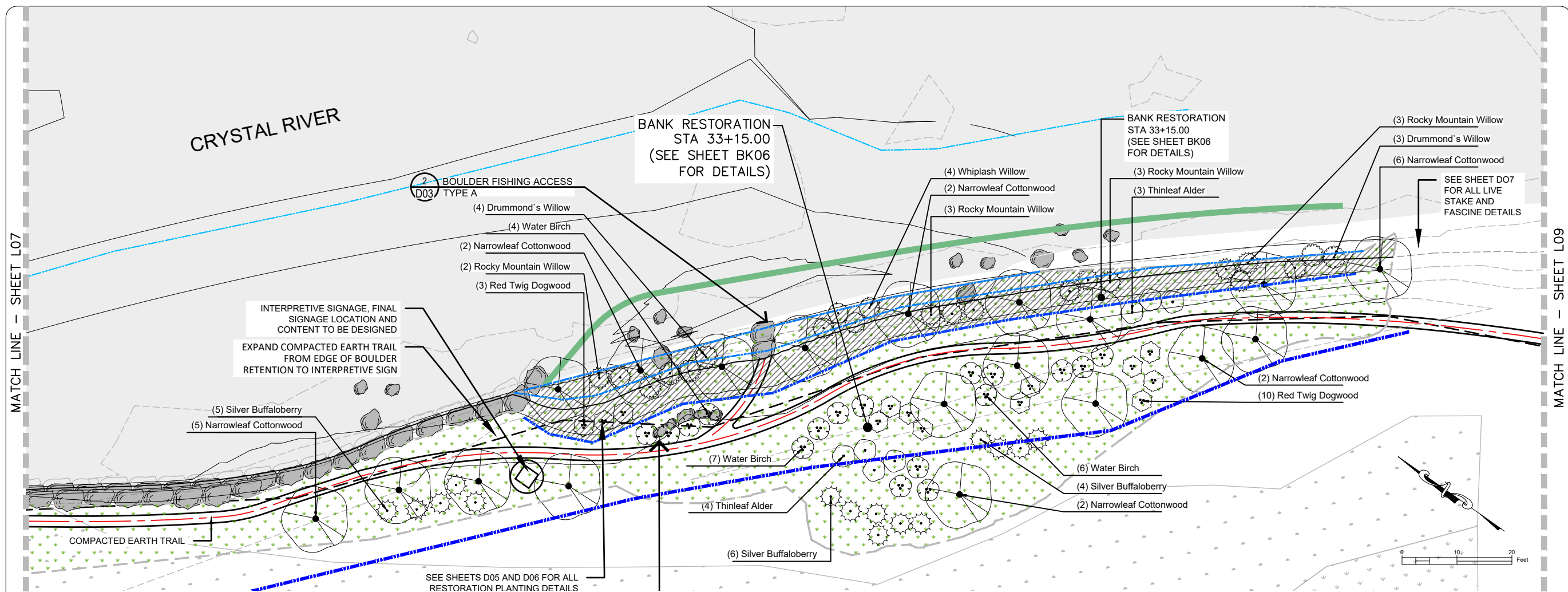


RiverRestoration.org, LLC
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org



311 Main St, Suite 102
Carbondale, CO 81623
970.963.6520
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PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L07
Scale	1"=20' AT FULL SIZE	



LEGEND

- MAJOR CONTOUR - PROPOSED
MINOR CONTOUR - PROPOSED
MINOR CONTOUR - EXISTING
MINOR CONTOUR - EXISTING
PATH CENTERLINE
PALUSTRINE EMERGENT WETLAND (PEM1B)
PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
CLOSURE GATE
INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.
BOULDER BANK RETENTION; RE: ENGINEER DWGS, THIS SET
EXISTING TREES

PLANT SCHEDULE L08

RIPARIAN CREATION TYPE 1	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUFOLIA THINLEAF ALDER	1 GAL - 4 5 GAL - 3
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 10 5 GAL - 7
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 8 5 GAL - 5
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 12 5 GAL - 7
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 4 5 GAL - 3
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL - 3 5 GAL - 1
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL - 7 5 GAL - 4
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL - 9 5 GAL - 6

CONCEPT PLANT SCHEDULE L08

	LIVE STAKES POPULUS ANGUSTIFOLIA / NARROWLEAF POPLAR SALIX SPP / WILLOW	1,175 SF 92 214
	RIPARIAN SEED MIX - CREATION CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS GLYCERIA STRIATA / FOWL MANNA GRASS JUNCUS ARCTICUS / WIRE RUSH PASCOPIRUM SMITHII / WESTERN WHEATGRASS POA SECUNDA / BLUEGRASS	5,474 SF 547 SF 1,095 SF 1,095 SF 547 SF 547 SF 1,095 SF 547 SF
	WILLOW FASCINES	153 LF

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PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

 Town of Carbonade
511 Colorado Ave
Carbonade, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

 River
RiverRestoration.org, LLC
P.O. Box 248
Carbonade, CO 81623
www.RiverRestoration.org

 DHM DESIGN
311 Main St, Suite 102
Carbonade, CO 81623
970.963.6520
www.dhmdesign.com

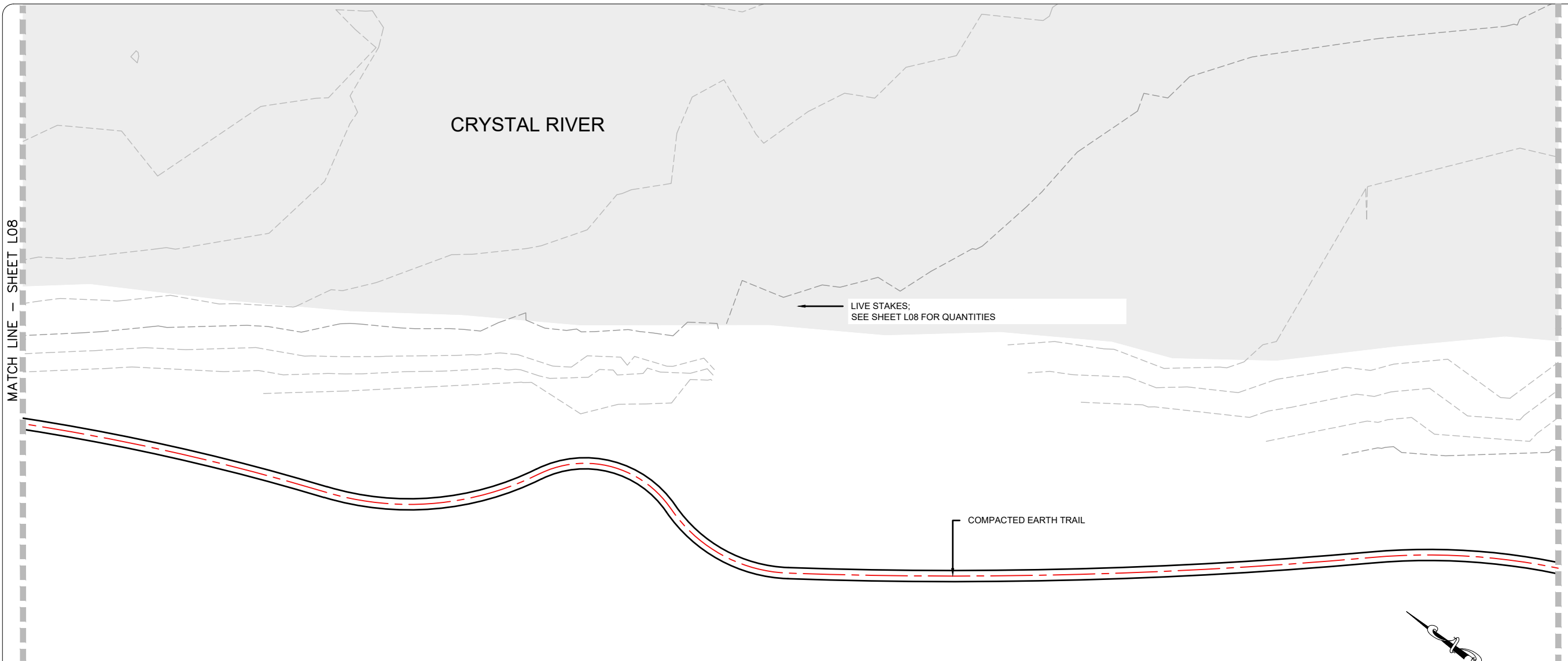
PROJECT NAME AND ADDRESS

Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbonade, CO 81623

Project	38047	Sheet	L08
Date	MAR 2021		
Scale	1"=20' AT FULL SIZE		

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



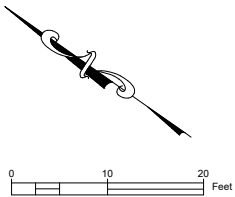


LIVE STAKES;
SEE SHEET L08 FOR QUANTITIES

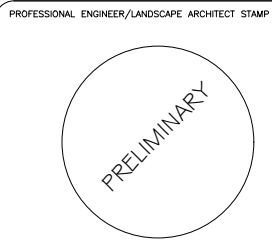
COMPACTED EARTH TRAIL

LEGEND

- MAJOR CONTOUR - PROPOSED
- MINOR CONTOUR - PROPOSED
- MINOR CONTOUR - EXISTING
- MINOR CONTOUR - EXISTING
- PATH CENTERLINE
- PALUSTRINE EMERGENT WETLAND (PEM1B)
- PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- LOW WATER MARK - MARCH 91 CFS
- LOW WATER MARK - MAY 966 CFS
- ORDINARY HIGH WATER MARK 2600 CFS
- 10-YEAR FLOODPLAIN 5310 CFS
- RIPARIAN CREATION TOPSOIL
- CLOSURE GATE
- INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.
- BOULDER BANK RETENTION; RE: ENGINEER DWGS, THIS SET
- EXISTING TREES



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

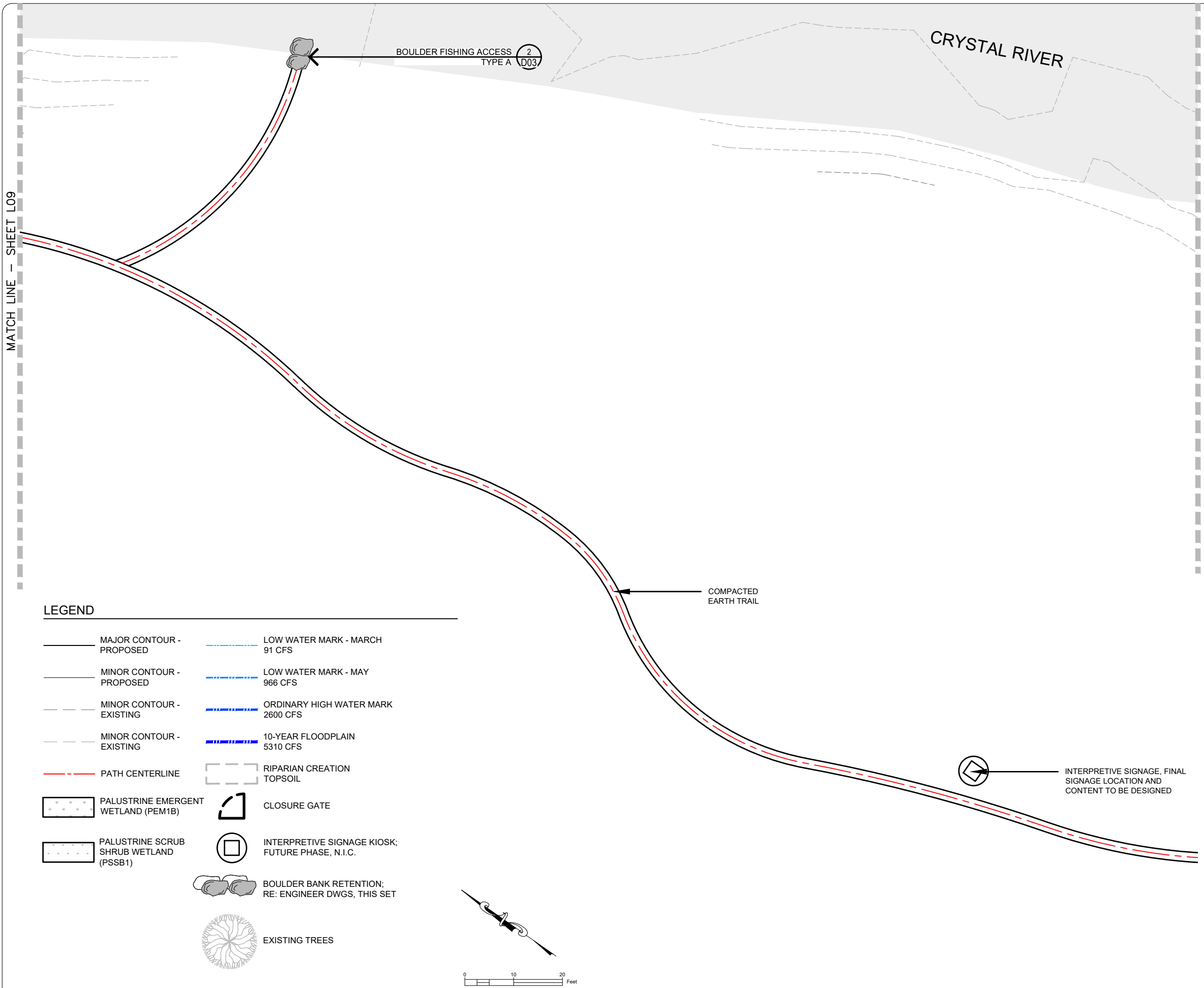


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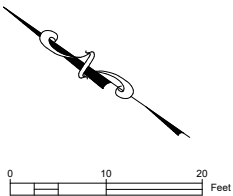
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Carbondale, CO 81623
970.963.6520
www.dhmdesign.com

PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L09
Scale	1"=20' AT FULL SIZE	

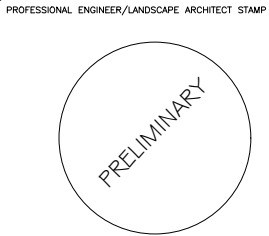


LEGEND

- MAJOR CONTOUR - PROPOSED
- MINOR CONTOUR - PROPOSED
- MINOR CONTOUR - EXISTING
- MINOR CONTOUR - EXISTING
- PATH CENTERLINE
- PALUSTRINE EMERGENT WETLAND (PEM1B)
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- EXISTING TREES



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS

No.	REVISION/UPDATE	Date

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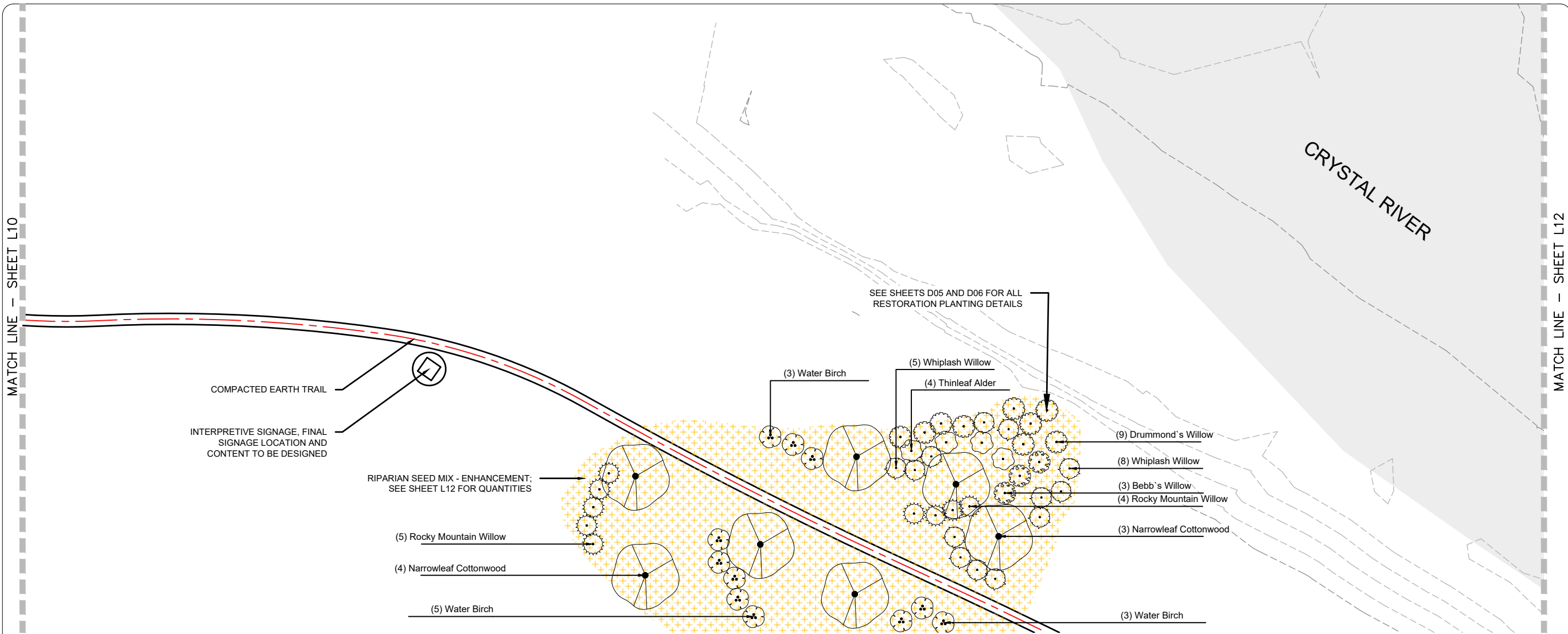
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Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L10
Scale	1"=20' AT FULL SIZE	



MATCH LINE - SHEET L10

MATCH LINE - SHEET L12



LEGEND

- MAJOR CONTOUR - PROPOSED

MINOR CONTOUR - PROPOSED

MINOR CONTOUR - EXISTING

MINOR CONTOUR - EXISTING

PATH CENTERLINE
- LOW WATER MARK - MARCH 91 CFS

LOW WATER MARK - MAY 966 CFS

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10-YEAR FLOODPLAIN 5310 CFS

RIPARIAN CREATION TOPSOIL
- PALUSTRINE EMERGENT WETLAND (PEM1B)

PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)

CLOSURE GATE

INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.

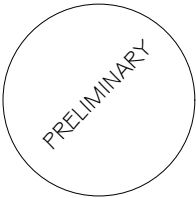
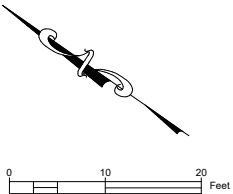
BOULDER BANK RETENTION; RE: ENGINEER DWGS, THIS SET

EXISTING TREES

PLANT SCHEDULE L11		
RIPARIAN ENHANCEMENT	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUIFOLIA THINLEAF ALDER	1 GAL - 3 5 GAL - 1
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 7 5 GAL - 4
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 4 5 GAL - 3
	SALIX BEBBIANA BEBB'S WILLOW	1 GAL - 2 5 GAL - 1
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 6 5 GAL - 3
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL - 8 5 GAL - 5
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL - 6 5 GAL - 3

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CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



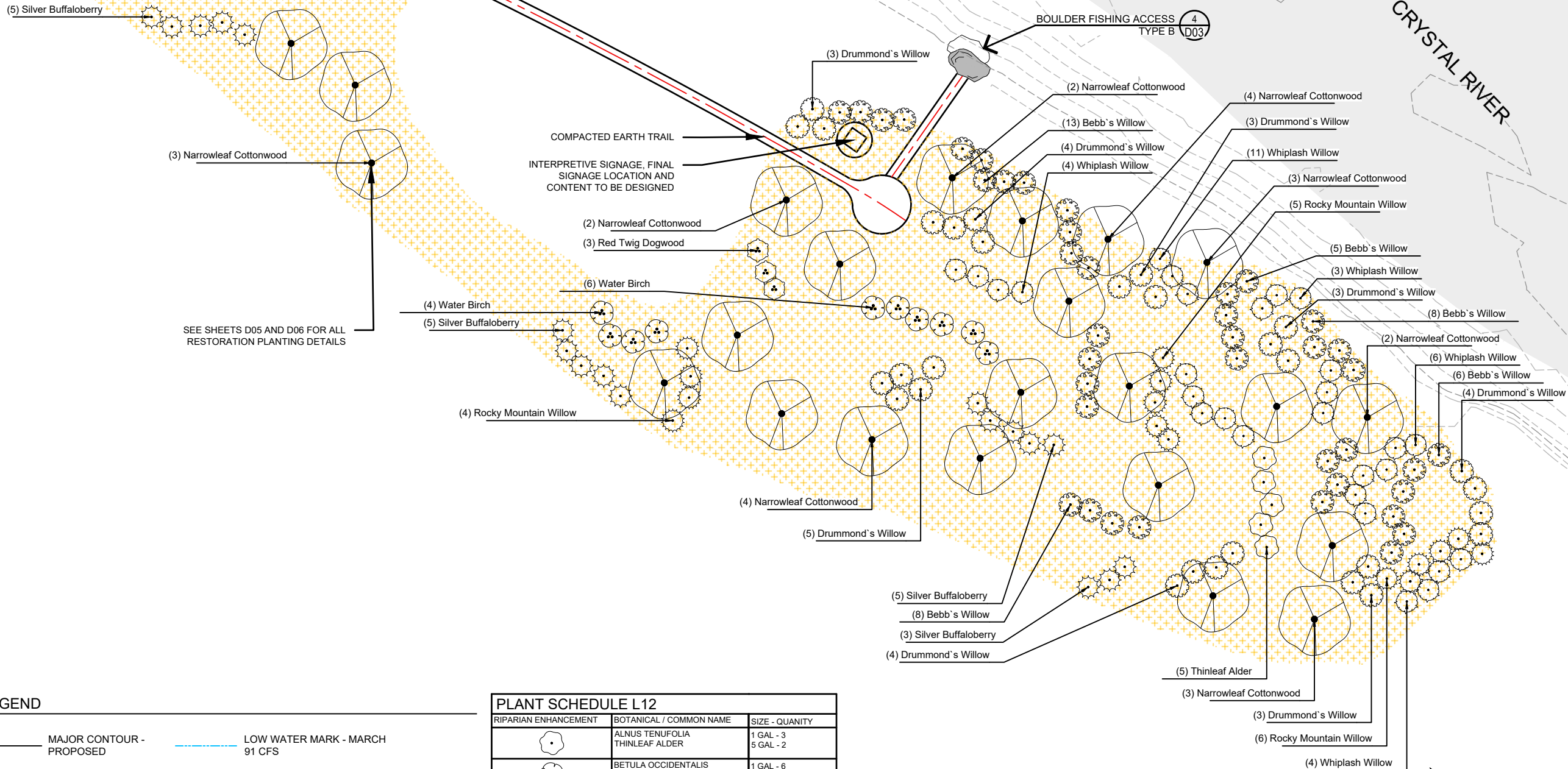
RiverRestoration.org, LLC
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PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L11
Scale	1"=20' AT FULL SIZE	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



LEGEND

- MAJOR CONTOUR - PROPOSED

MINOR CONTOUR - PROPOSED

MINOR CONTOUR - EXISTING

MINOR CONTOUR - EXISTING

PATH CENTERLINE

PALUSTRINE EMERGENT WETLAND (PEM1B)

PALUSTRINE SCRUB SHRUB WETLAND (PSSB1)
- LOW WATER MARK - MARCH 91 CFS

LOW WATER MARK - MAY 966 CFS

ORDINARY HIGH WATER MARK 2600 CFS

10-YEAR FLOODPLAIN 5310 CFS

RIPARIAN CREATION TOPSOIL

CLOSURE GATE

INTERPRETIVE SIGNAGE KIOSK; FUTURE PHASE, N.I.C.

BOULDER BANK RETENTION; RE: ENGINEER DWGS, THIS SET

EXISTING TREES

PLANT SCHEDULE L12

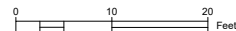
RIPARIAN ENHANCEMENT	BOTANICAL / COMMON NAME	SIZE - QUANTITY
	ALNUS TENUFOLIA THINLEAF ALDER	1 GAL - 3 5 GAL - 2
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL - 6 5 GAL - 4
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL - 2 5 GAL - 1
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL - 14 5 GAL - 9
	SALIX BEBBIANA BEBB'S WILLOW	1 GAL - 24 5 GAL - 16
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL - 18 5 GAL - 11
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL - 18 5 GAL - 10
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL - 9 5 GAL - 6
	SHEPHERDIA ARGENTEA SILVER BUFFALOERRY	1 GAL - 11 5 GAL - 7

CONCEPT PLANT SCHEDULE L12

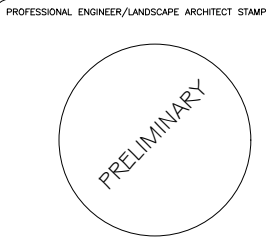
	RIPARIAN SEED MIX - ENHANCEMENT	13,125 SF
	CALAMAGROSTIS CANADENSIS / BLUEJOINT REED GRASS	1,312 SF
	DESCHAMPSIA CESPITOSA / TUFTED HAIR GRASS	2,625 SF
	ELYMUS TRACHYCAULUS / SLENDER WHEATGRASS	2,625 SF
	GLYCERIA STRIATA / FOWL MANNA GRASS	1,312 SF
	JUNCUS ARCTICUS / WIRE RUSH	1,312 SF
	PASCOPYRUM SMITHII / WESTERN WHEATGRASS	2,625 SF
	POA SECUNDA / BLUEGRASS	1,312 SF

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PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENTS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



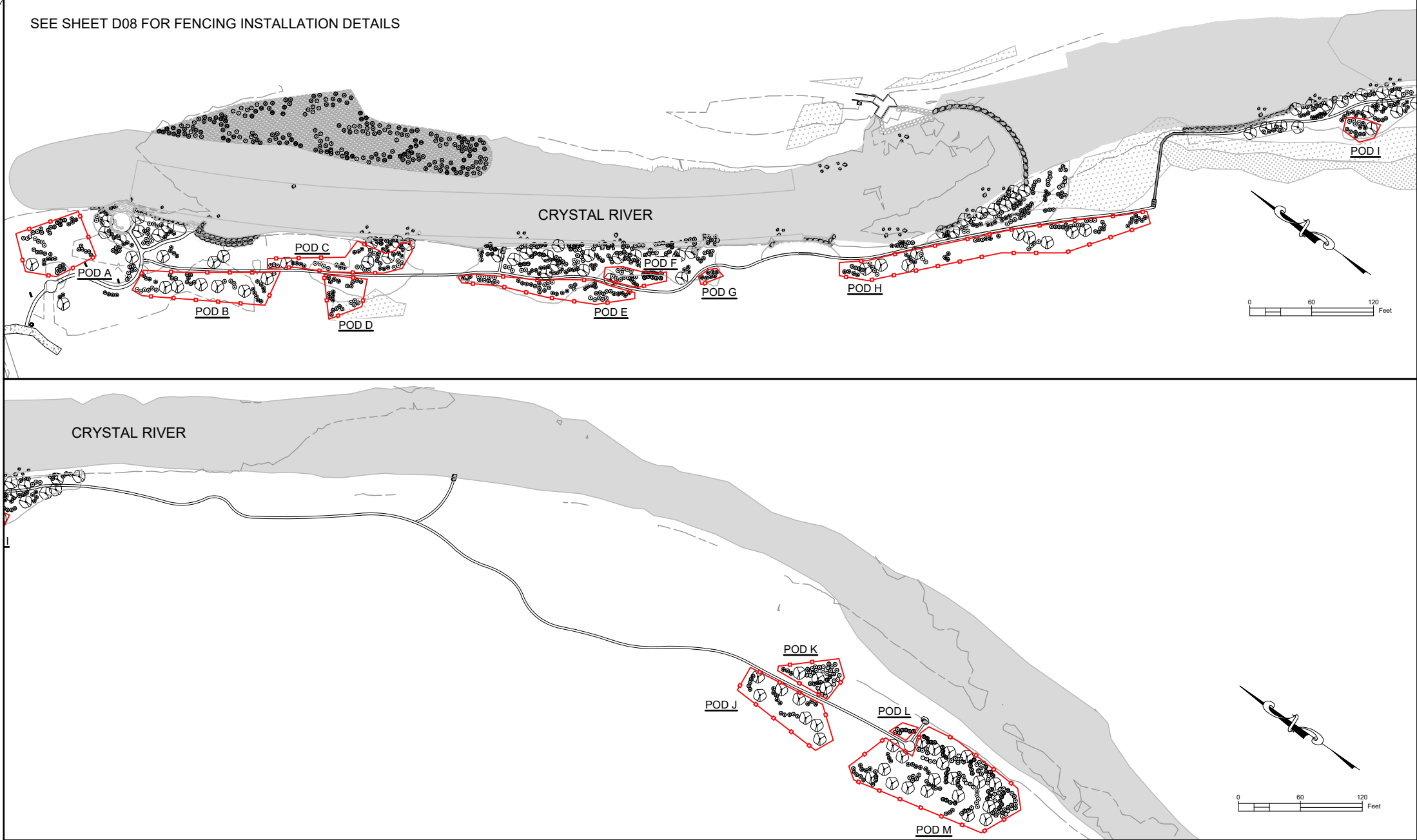
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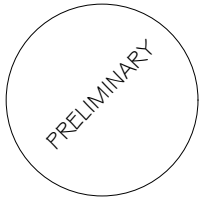
PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L12
Scale	1"=20' AT FULL SIZE	

SEE SHEET D08 FOR FENCING INSTALLATION DETAILS



FENCING - APPROXIMATE AREAS AND QUANTITIES						
POD	AREA (SF)	FENCE LENGTH (FT)	APPROXIMATE FENCE MATERIAL (8'x100')	APPROXIMATE POSTS	WIRE MESH TIES	GROUND STAKES
A	3210	222	3	28	84	45
B	3634	322	4	41	123	65
C	2281	323	4	41	123	65
D	1292	147	2	19	57	30
E	2417	357	4	45	135	72
F	811	142	2	18	54	29
G	209	61	1	8	24	13
H	6380	637	7	80	240	128
I	586	95	1	12	36	20
J	3232	256	3	33	99	52
K	1440	165	2	21	63	34
L	243	66	1	9	27	14
M	9180	429	5	54	162	86
TOTALS	34,915	3,222	39	409	1205	653

PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
WILDLIFE PROTECTION FENCING PLAN

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



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PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L13
Scale	1"=20' AT FULL SIZE	

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TOTAL RESTORATION AREA
95,334 SF

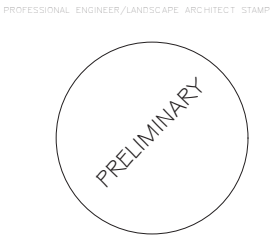
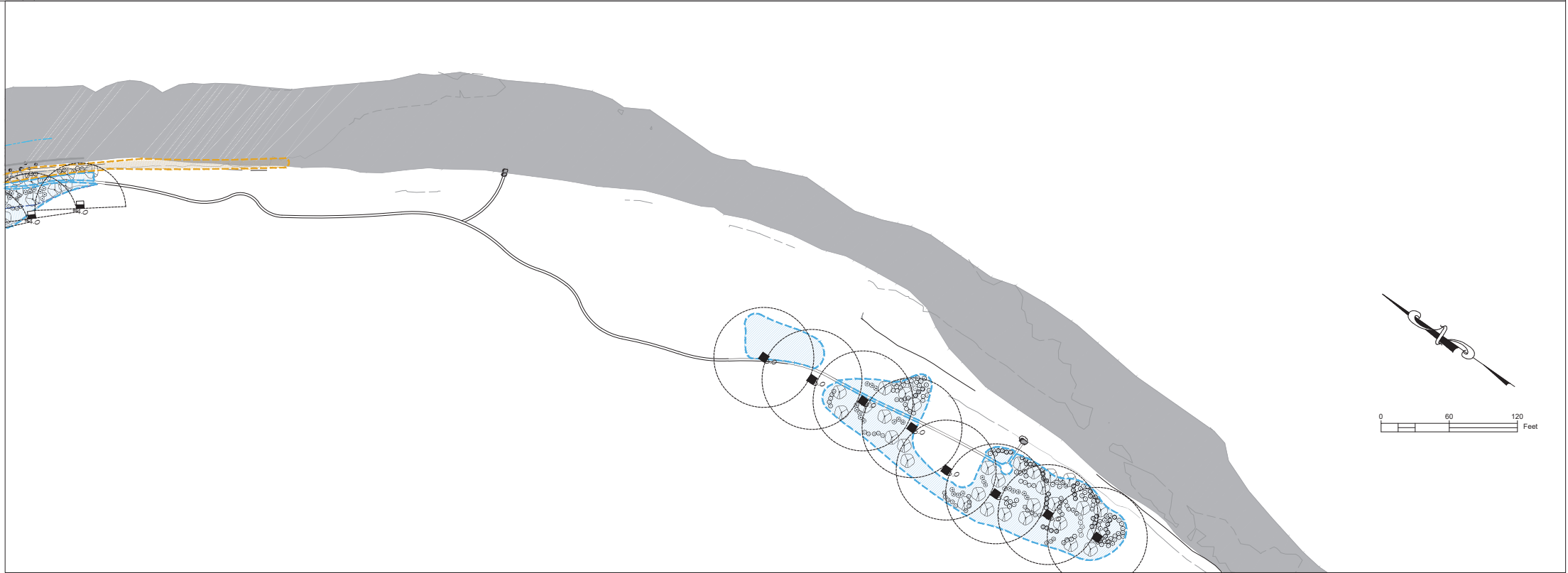
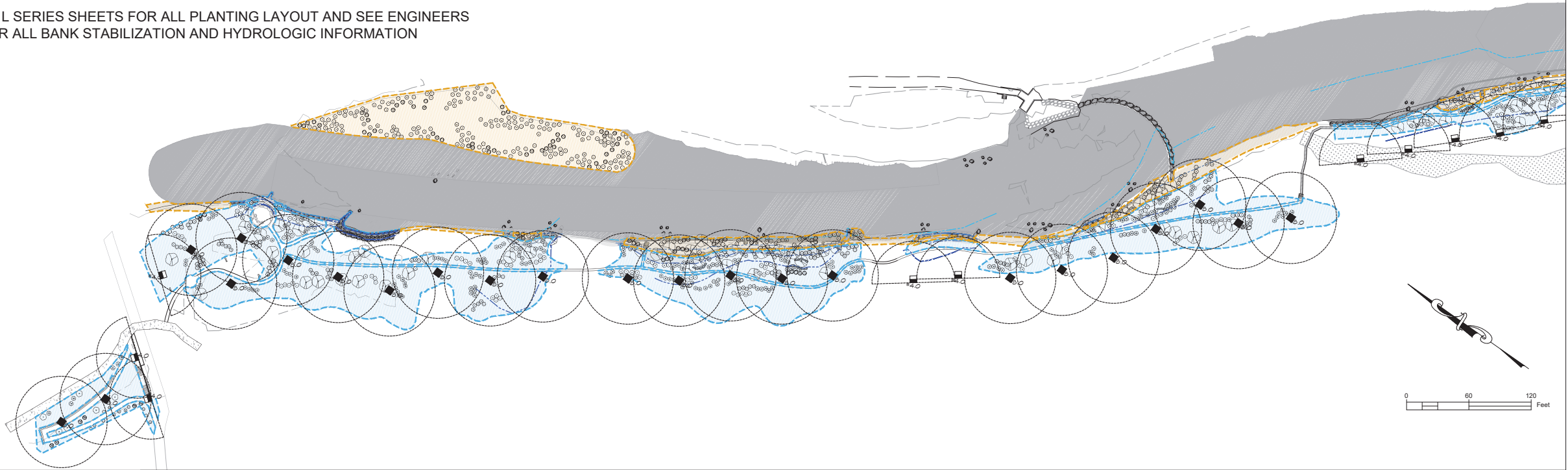
TOTAL IRRIGATED AREA (TEMPORARY ABOVE GROUND MIN 2 YEARS)
72,089 SF

TOTAL NON-IRRIGATED AREA
23,245 SF

1. SEE SHEET L SERIES SHEETS FOR ALL PLANTING LAYOUT AND SEE ENGINEERS SHEETS FOR ALL BANK STABILIZATION AND HYDROLOGIC INFORMATION

DRAFT SYSTEM LAYOUT AND REQUIRMENTS


42 HEADS: 8.0 GPM AT 50 PSI
292 GPM TOTAL
8 ZONES, 40 GPM PER ZONE
2" SOURCE LINE FROM RVR GOLF COURSE AT 100 PSI
RUNTIME: 1/2 HOUR PER ZONE. 4 HOURS TO RUN ALL ZONES. (ESTABLISHMENT RUN TWICE PER DAY FOR MAX. 3 WEEKS WITH SLOW REDUCTIONS TO 1 CYCLE EVERY OTHER DAY)



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
IRRIGATION DIAGRAM

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



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Carbondale, CO 81623

DESIGN FIRM NAME AND ADDRESS



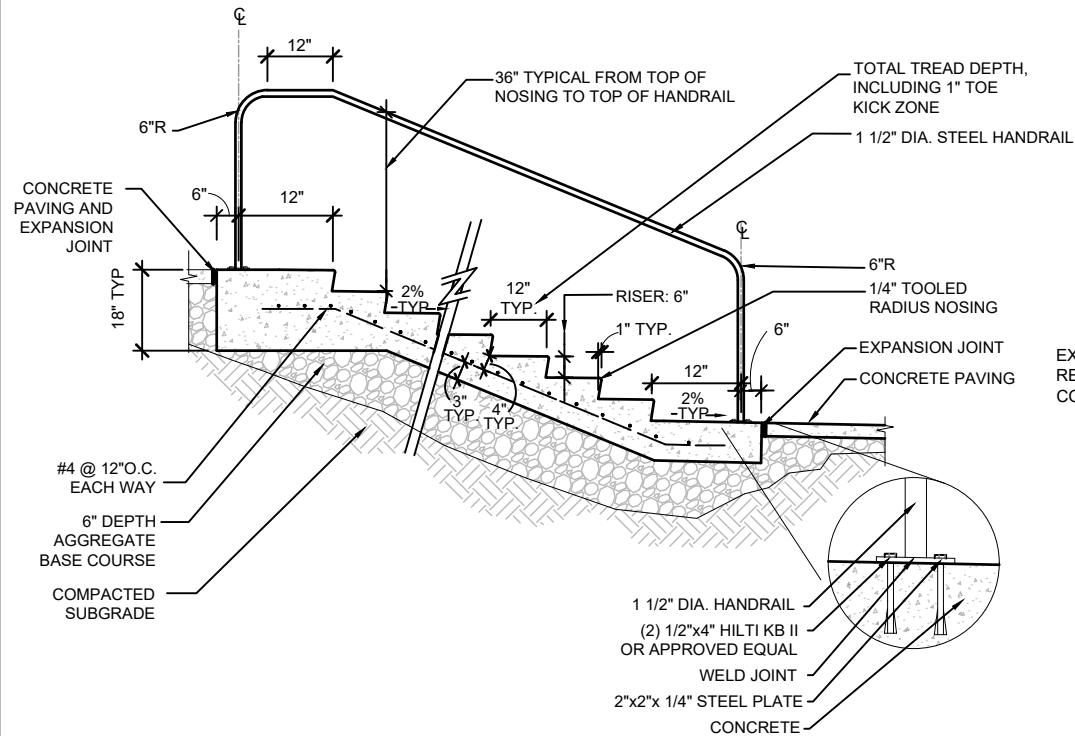
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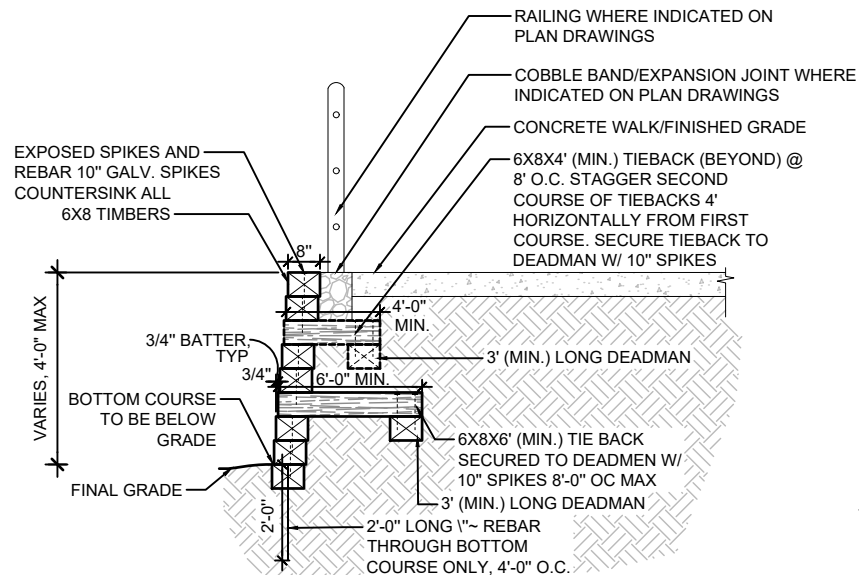
PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	L14
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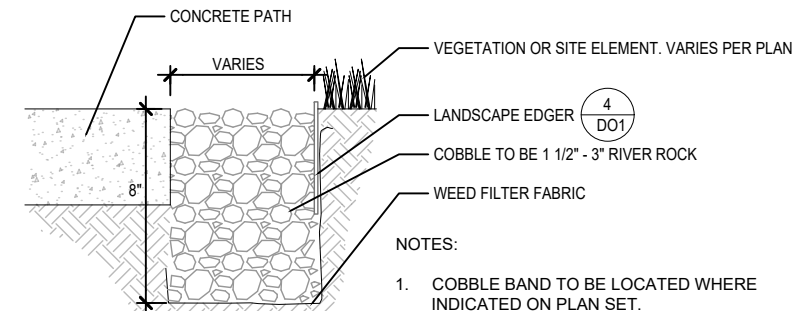
- NOTES:
1. SEE PLAN SET FOR NUMBER AND LOCATION OF TREADS AND RISERS.
 2. PROVIDE SHOP DRAWINGS FOR HANDRAIL ASSEMBLY FOR APPROVAL BY A LICENSED STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION.
 3. STAIRS WITH 3 OR MORE RISERS REQUIRE HANDRAIL ON BOTH SIDES.
 4. STAIR SETS WITH 6 OR MORE RISERS REQUIRE INTERMEDIATE POSTS. SET POSTS EQ. DISTANCE APART. INTERMEDIATE POST MATERIAL, ANCHOR, AND FINISH TO MATCH REST OF HANDRAIL.
 5. ALL CONCRETE TREADS TO HAVE 1/4" RADIUS TOOLED EDGE NOSING.
 6. ALL HANDRAIL JOINTS TO BE WELDED. GRIND WELDS SMOOTH. HANDRAIL TO BE WELDED AND FINISHED PRIOR TO INSTALLATION.
 7. THE ABOVE IS A STANDARD DETAIL AND ASSUMES SUITABLE SOIL CONDITIONS IN ABSENCE OF A GEOTECHNICAL REPORT.

1 CONCRETE STAIRS
D01 NOT TO SCALE



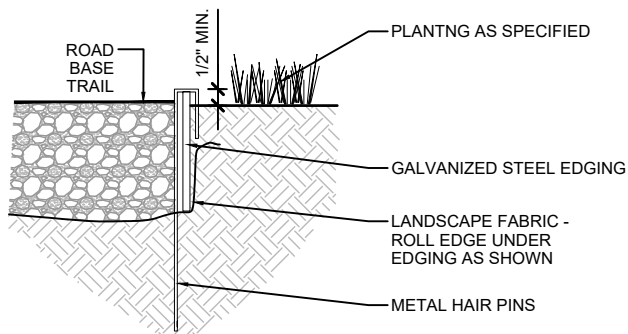
- NOTES:
1. ALL TIMBERS WILL BE 6"x8"x8' SELECT, PRESSURE TREATED, FREE OF MAJOR SURFACE DEFECTS, CRACKS & WARPING.
 2. EACH 8'-0" LENGTH OF TIMBER TO RECEIVE A MINIMUM OF FOUR (4)- 10" GALVANIZED SPIKES (MIN. 2" O.C.). SHORT LENGTHS WILL RECEIVE AS MANY SPIKES AS NECESSARY TO PROPERLY SECURE TIMBERS. STAGGER TIMBERS AT JOINTS 2'-0" MIN.
 3. THE ABOVE IS A STANDARD DETAIL AND ASSUMES SUITABLE SOIL CONDITIONS IN ABSENCE OF A GEOTECHNICAL REPORT.

2 TIMBER WALL
D01 SCALE: 1" = 1'-0"



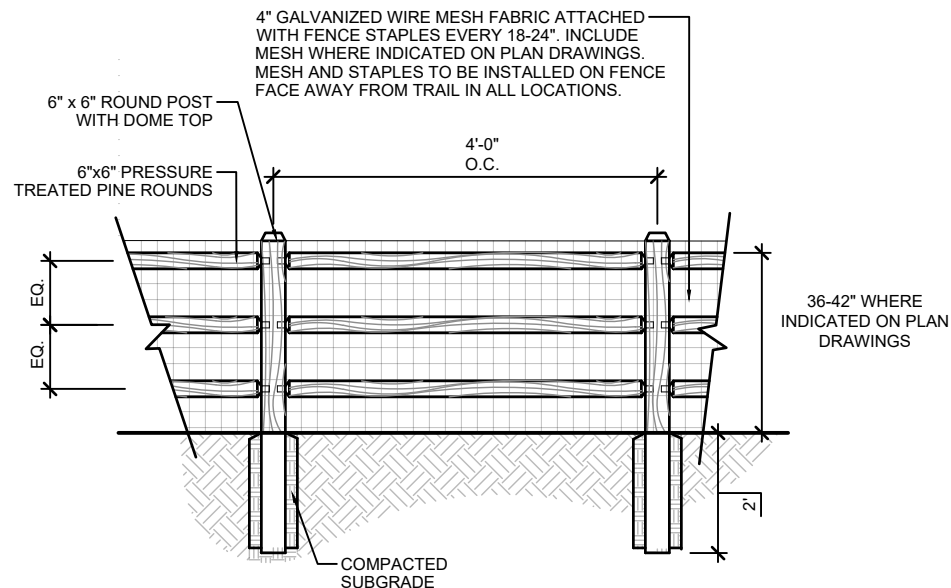
- NOTES:
1. COBBLE BAND TO BE LOCATED WHERE INDICATED ON PLAN SET.
 2. ADDITIONAL COBBLE TO BE LOCATED BETWEEN NEW PATH INTERSECTION, ABUTMENT AND CRYSTAL RIVER BRIDGE.
 3. TOP OF COBBLE TO BE LEVEL WITH ADJACENT CONCRETE

3 COBBLE BAND
D01 SCALE: 1" = 1'-0"



- NOTES:
1. SET ALL EDGING 1" ABOVE FINISH GRADE AS SHOWN.
 2. EDGING SHALL ABUT ALL CONCRETE CURBS AND WALKS PERPENDICULAR, AND FLUSH W/ GRADES OF CONCRETE.
 3. ALL JOINTS TO BE SECURELY STAKED.
 4. EDGER TO BE 12 GAUGE, 4" DEPTH; GALVANIZED INSTALLED WITH HAIR PINS

4 STEEL EDGER
D01 NTS




5 POST & DOWEL FENCE
D01 GALVANIZED WIRE MESH (WHERE INDICATED ON PLAN) SCALE: 1" = 1'-0"

PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
ACCESS IMPROVEMENT DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS	
	Town of Carbondale 511 Colorado Ave Carbondale, CO 81623

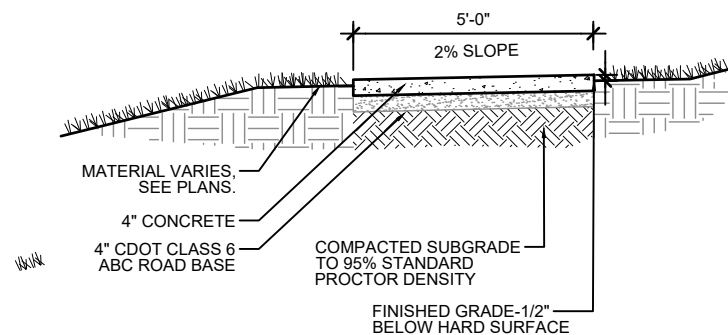
DESIGN FIRMS NAME AND ADDRESSES	
	RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org
	311 Main St, Suite 102 Carbondale, CO 81623 970.963.4520 www.dhmdesign.com

PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project	38047
Date	MAR 2021
Scale	NOT TO SCALE
Sheet	D01



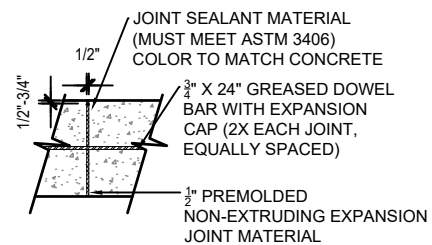
PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

PRELIMINARY

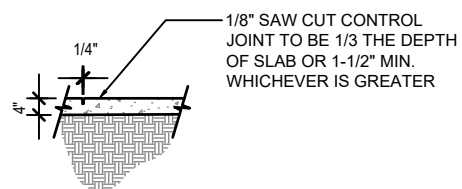
CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
TRAIL IMPROVEMENT DETAILS

NOTES

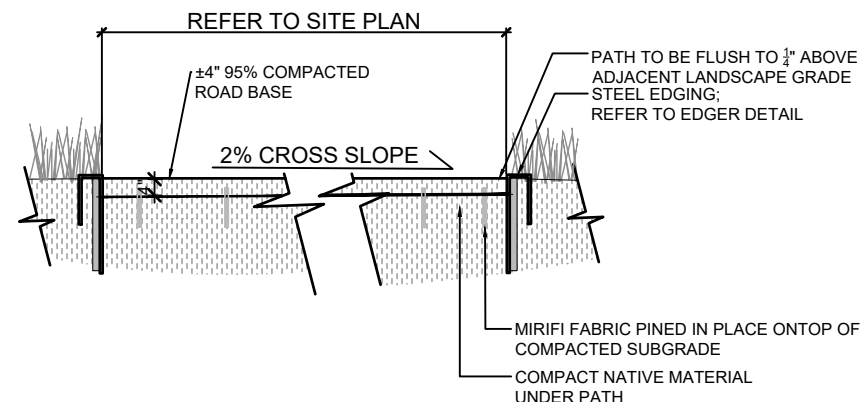
1. CONCRETE TO BE 4" (DEPTH).
2. SAWCUT JOINTS AT REGULAR INTERVALS MATCHING WALK WIDTH.
3. LOCATE EXPANSION JOINTS AS SHOWN ON PLAN AND STAIR DETAIL.
4. CONCRETE TO ACHIEVE 3000 PSI AT 28 DAYS, INCLUDE FIBER MESH.
5. SEE PLANS FOR LAYOUT.
6. ALL CONCRETE WALKS TO HAVE BROOM FINISH.
7. LONGITUDINAL SLOPE TO BE 5% MAX.



EXPANSION JOINT



CONTROL JOINT



NOTES:

1. APPLY CLASS 6 ABC OVER COMPACTED SUBGRADE (REMOVE LARGE ROOTS AND ORGANIC MATERIAL FROM SURFACE OF SUB-GRADE.) INSTALL CLASS 6 ABC TO A DEPTH OF 4" IN TWO EQUAL LIFTS, MOISTEN AND COMPACT. COMPACT WITH PLATE OR VIBRATORY ROLLER.
2. PROVIDE SAMPLES OF MATERIAL FOR OWNER SELECTION.
3. WIDTH OF PATH VARIES, SEE SITE PLANS.
4. CROSS SLOPE DIRECTION TO BE DETERMINED IN FIELD.

1
D02 CONCRETE TRAIL

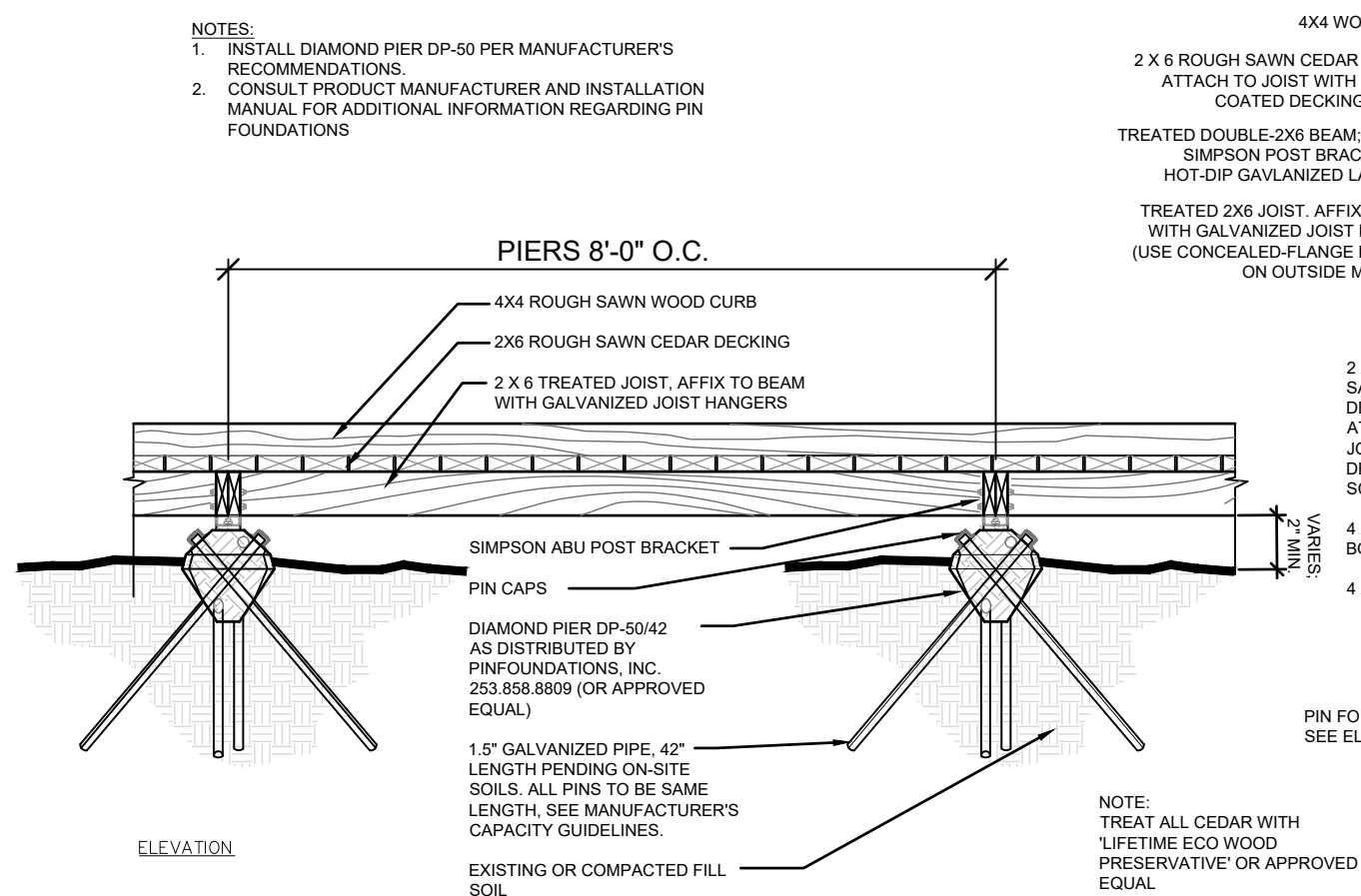
SCALE: 1/2" = 1'-0"

2
D02 ROAD BASE PATH

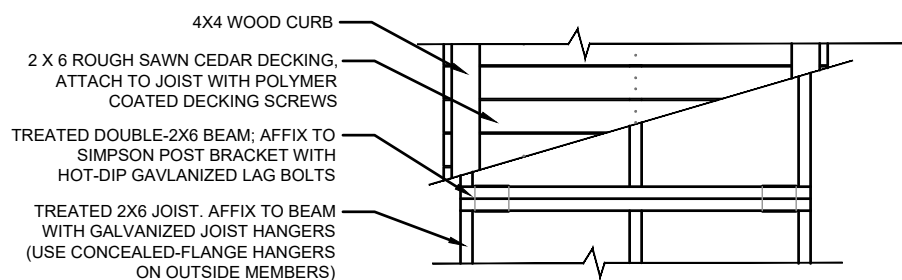
NTS

NOTES:

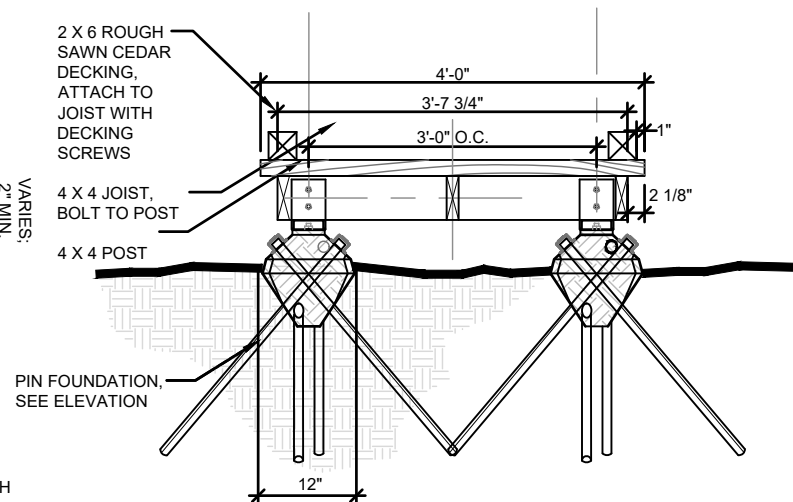
1. INSTALL DIAMOND PIER DP-50 PER MANUFACTURER'S RECOMMENDATIONS.
2. CONSULT PRODUCT MANUFACTURER AND INSTALLATION MANUAL FOR ADDITIONAL INFORMATION REGARDING PIN FOUNDATIONS



ELEVATION



PLAN



SECTION

3
D02

BOARDWALK

SCALE: 1" = 1'-0"



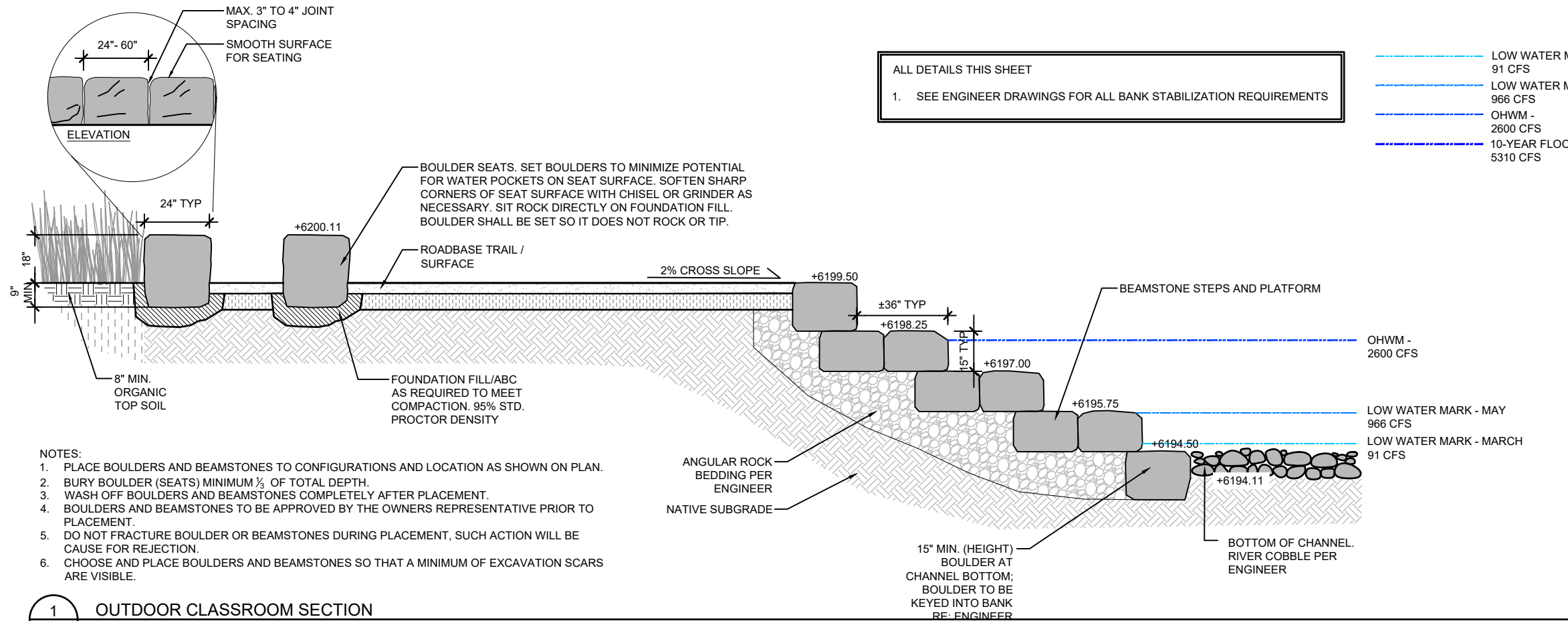
PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

No.	REVISION/UPDATE	Date

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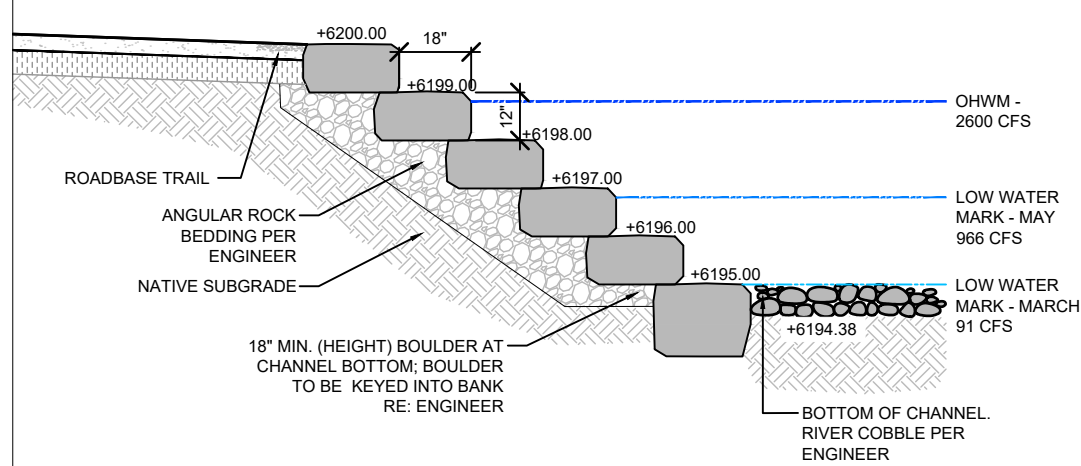
DESIGN FIRMS NAME AND ADDRESSES
 RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org
 311 Main St, Suite 102 Carbondale, CO 81623 970.963.4520 www.dhmdesign.com

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Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet D02
Date MAR 2021	
Scale NOT TO SCALE	



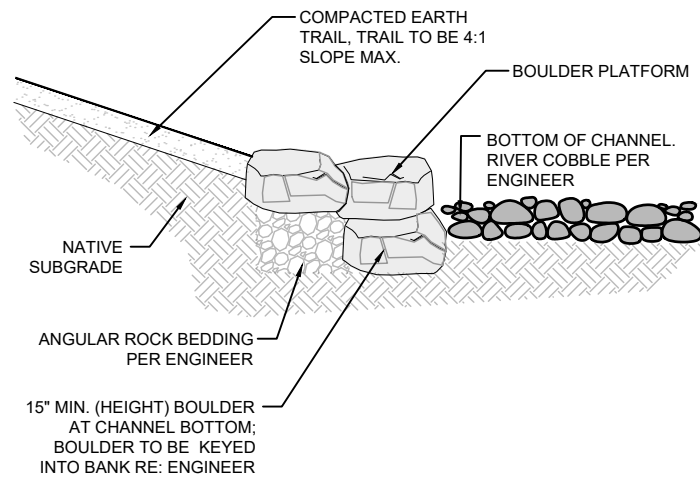
1
D03 OUTDOOR CLASSROOM SECTION

SCALE: 1/2" = 1'-0"



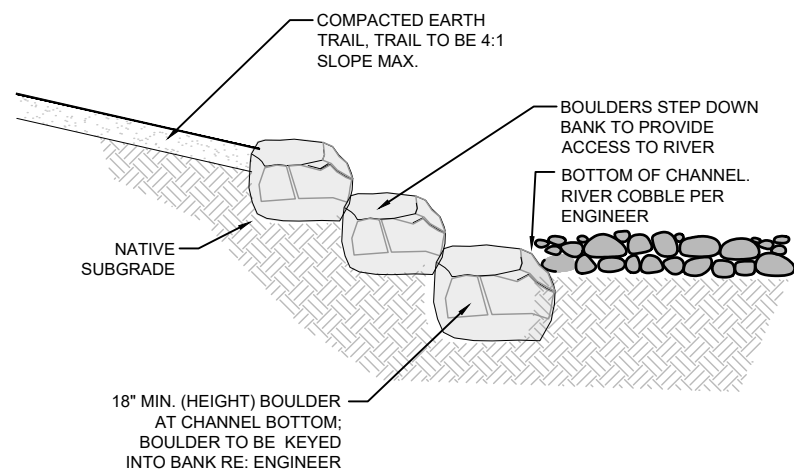
2
D03 BEAMSTONE FISHING ACCESS

SCALE: 1/2" = 1'-0"



3
D03 BOULDER FISHING ACCESS TYPE A

SCALE: 1/2" = 1'-0"

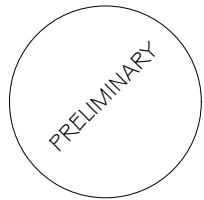


4
D03 BOULDER FISHING ACCESS TYPE B

SCALE: 1/2" = 1'-0"




PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENT AND
RIVER ACCESS DETAILS

No.	REVISION/UPDATE	Date

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511 Colorado Ave
Carbondale, CO 81623

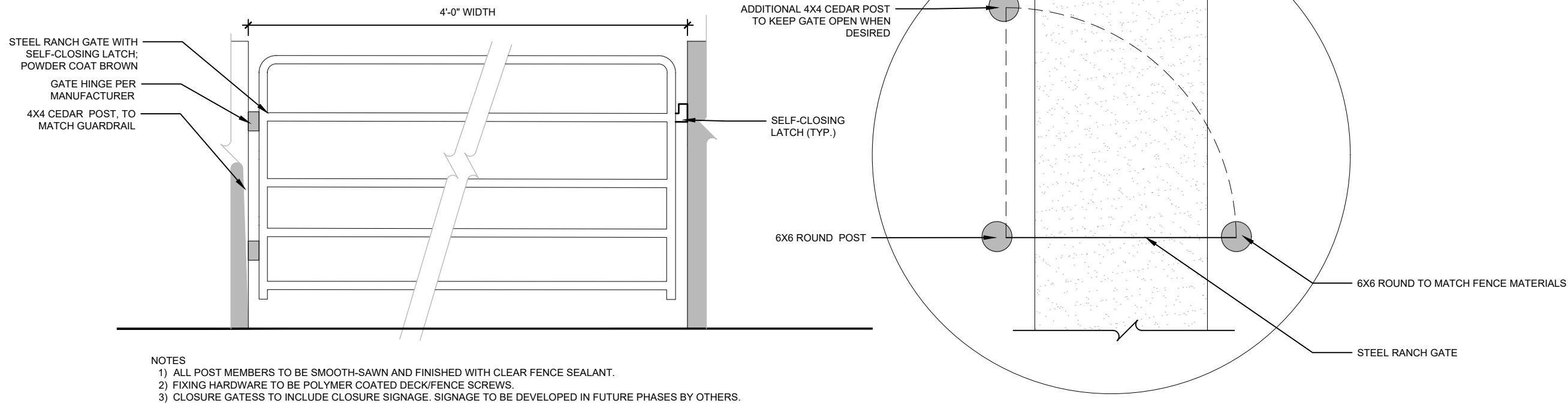
DESIGN FIRMS NAME AND ADDRESSES

 RiverRestoration.org, LLC
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Carbondale, CO 81623
www.RiverRestoration.org

 DHM DESIGN
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Carbondale, CO 81623
970.963.4520
www.dhmdesign.com

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Project	38047
Date	MAR 2021
Scale	NOT TO SCALE

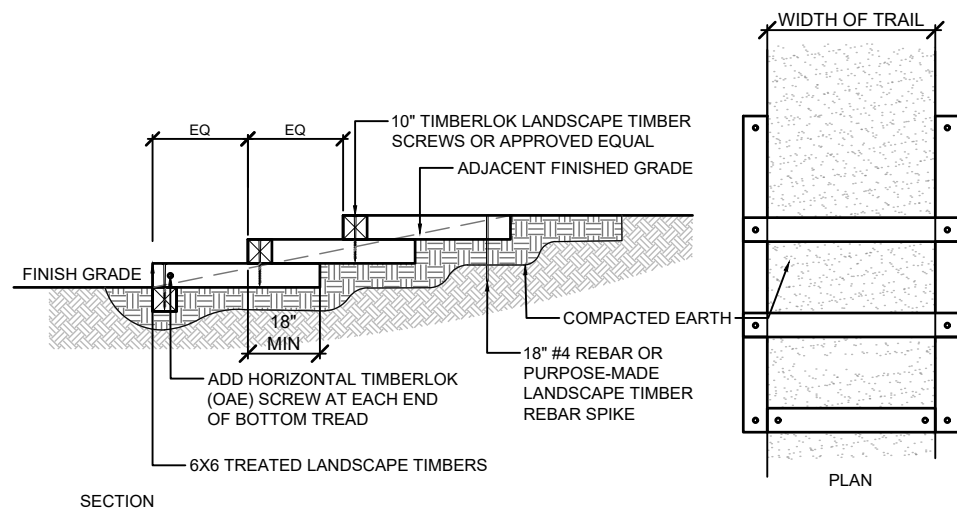
D03



- NOTES
- 1) ALL POST MEMBERS TO BE SMOOTH-SAWN AND FINISHED WITH CLEAR FENCE SEALANT.
 - 2) FIXING HARDWARE TO BE POLYMER COATED DECK/FENCE SCREWS.
 - 3) CLOSURE GATES TO INCLUDE CLOSURE SIGNAGE. SIGNAGE TO BE DEVELOPED IN FUTURE PHASES BY OTHERS.

1
D04 CLOSURE GATE

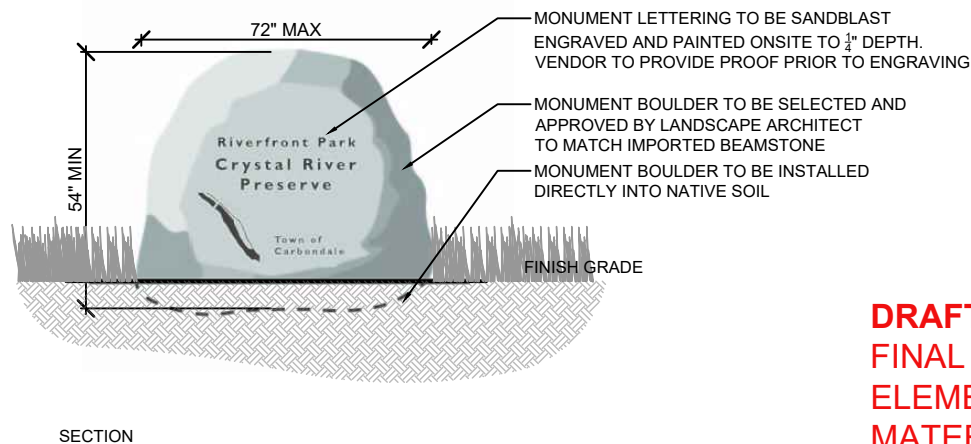
SCALE: 1" = 1'-0"



- NOTES:
- 1) INSTALL LIFTS OF TIMBER STAIRS INDIVIDUALLY, BACKFILLING EACH LIFT.
 - 2) LENGTH AND WIDTH OF TREAD WILL VARY PENDING GRADE AND TRAIL WIDTH. MINIMUM WIDTH OF TREAD (INCLUDING LANDSCAPE TIMBERS) TO BE 3'. MINIMUM TREAD LENGTH 12". TREADS TO BE EQUAL LENGTH FOR ENTIRE RUN OF STAIR.

2
D04 TIMBER STAIRS

SCALE: 1/2" = 1'-0"



**DRAFT FOR DISCUSSION
FINAL LANGUAGE, GRAPHIC
ELEMENTS, DESIGN AND
MATERIALITY TBD**

PLAN

3
D04 ENTRY MONUMENT

SCALE: 1/2" = 1'-0"

- NOTES:
- 1) MONUMENT BOULDER TO BE NATURAL BOULDER TO MATCH IMPORTED BEAM STONE. BOULDER TO BE SELECTED BY LANDSCAPE ARCHITECT.
 - 2) ENGRAVING VENDOR TO PROVIDE SHOP DRAWINGS/PROOF TO LANDSCAPE ARCHITECT FOR APPROVAL PRIOR TO ENGRAVING.
 - 3) MONUMENT GRAPHIC AND INSTALLATION TO BE COMPLETED BY THE TOWN OF CARBONDALE.


PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
UPLAND IMPROVEMENT AND
ACCESS DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

 Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

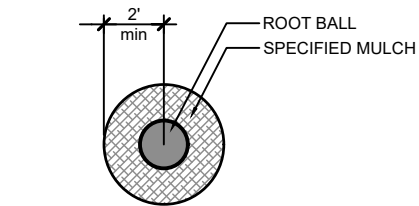
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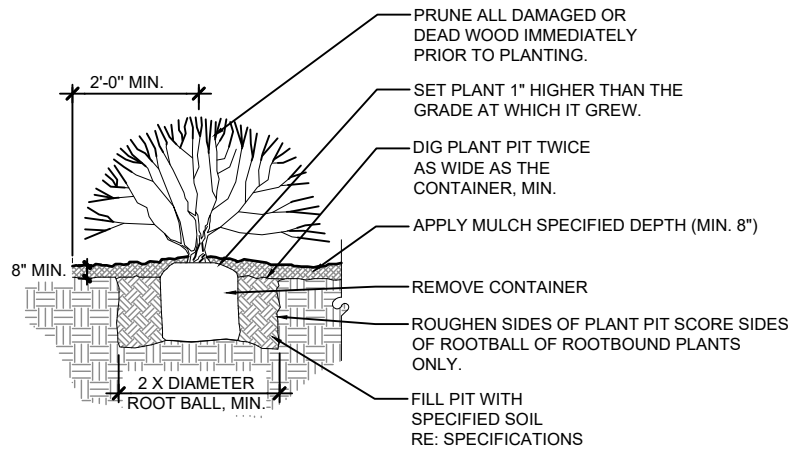
PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project	38047
Date	MAR 2021
Scale	NOT TO SCALE
Sheet D04	

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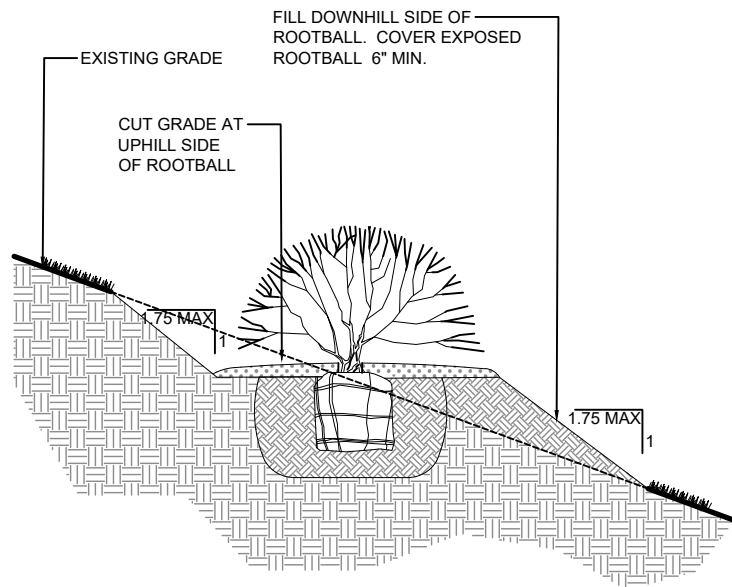
MULCHING CONTAINERIZED PLANTS IN NATIVE SEED AREAS



- NOTES:
1. ANY BROKEN OR CRUMBLING ROOTBALLS WILL BE REJECTED.
 2. REMOVING THE CONTAINERS WILL NOT BE AN EXCUSE FOR DAMAGED ROOTBALLS.

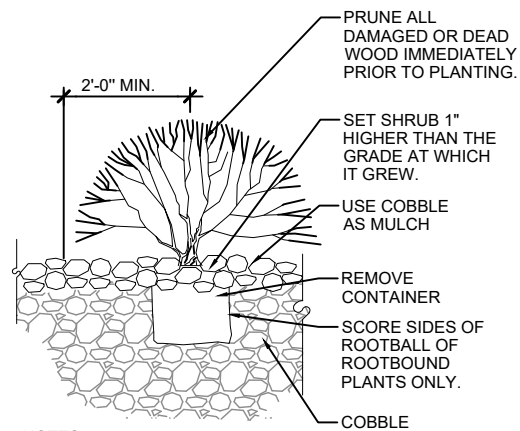
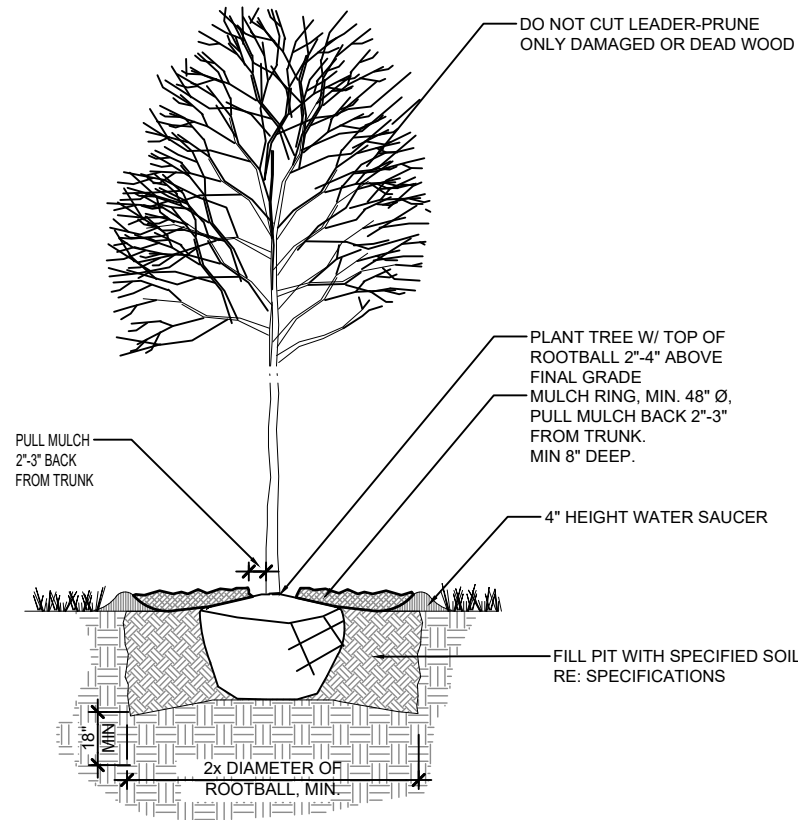
1 D05 CONTAINER PLANTING IN NATIVE AREAS

2 D05 CONTAINER PLANTING ON A SLOPE



- NOTES:
1. REFER TO VARIOUS SPECIFIC CONTAINER PLANTING INSTALLATION DETAILS AND TO SPECIFICATIONS FOR MULCHING, BACKFILL, ETC.
 2. THIS INSTALLATION SHALL APPLY (AS NEEDED) TO ALL PLANT TYPES AND SIZES PLANTED ON SLOPES GREATER THAN 8:1.

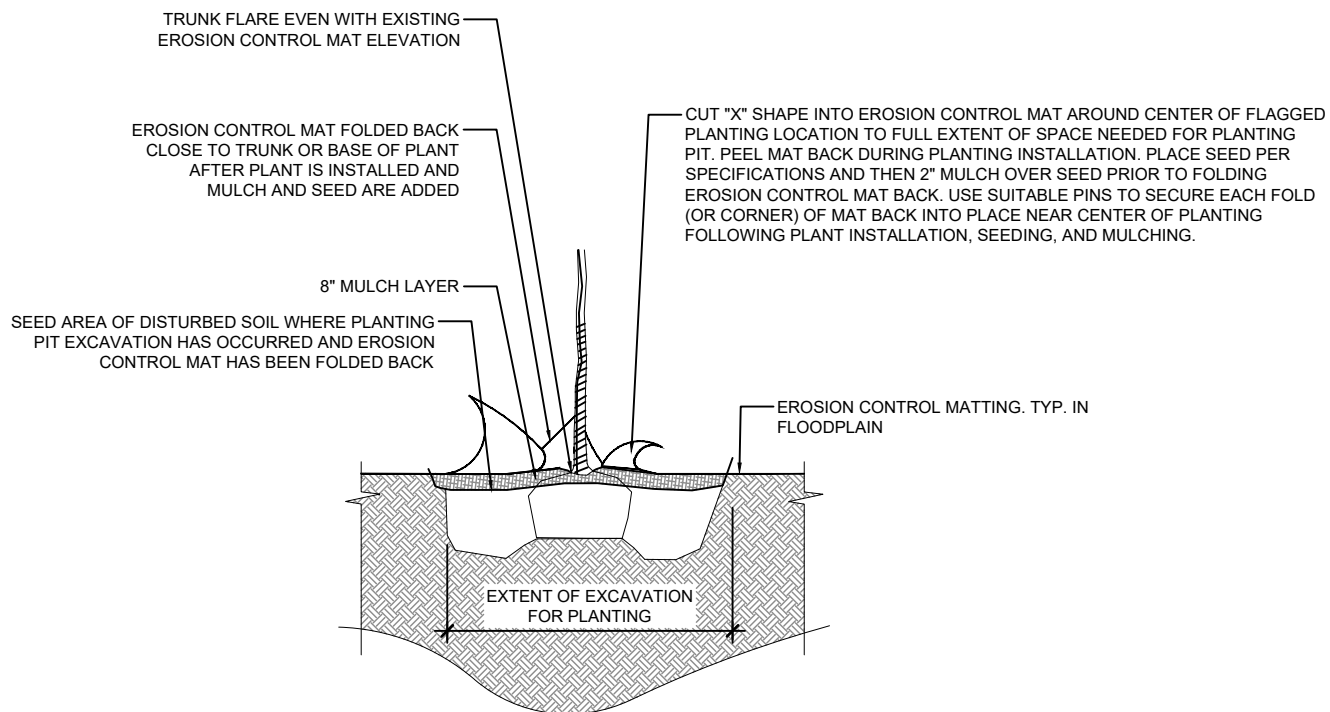
3 D05 TREE PLANTING (CONTAINERIZED)



- NOTES:
1. ANY BROKEN OR CRUMBLING ROOTBALLS WILL BE REJECTED.
 2. REMOVING THE CONTAINERS WILL NOT BE AN EXCUSE FOR DAMAGED ROOTBALLS.

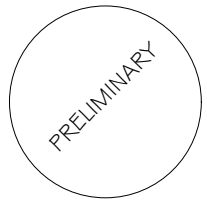
4 D05 SHRUB PLANTING AT COBBLE ISLAND

- NOTES:
1. PLANT MATERIAL TO BE PLACED IN APPROPRIATE, FIELD VERIFIED ZONE. SEE RESTORATION PLANTING PLAN FOR DETAILED LOCATION AND ORGANIZATION OF RESTORATION PLANTING AND FEATURES.
 2. ALL PLANT MATERIAL TO BE INSPECTED AND APPROVED BY LANDSCAPE ARCHITECT/ECOLOGIST PRIOR TO INSTALLATION.
 3. ALL PLANTING ZONES TO BE MARKED IN FIELD AND APPROVED BY LANDSCAPE ARCHITECT/ECOLOGIST PRIOR TO PLANT INSTALLATION.
 4. SEE CIVIL FOR ADDITIONAL INFORMATION ON BOULDER EXTRACTION, INSTALLATION AND QUANTITIES.



- NOTES:
1. THIS DETAIL APPLIES TO ALL PLANTING (TREE OR SHRUB) IN FLOODPLAIN AREAS WHERE EROSION CONTROL MAT EXISTS.
 2. REFERENCE TREE AND SHRUB PLANTING DETAILS FOR PLANT INSTALLATION.

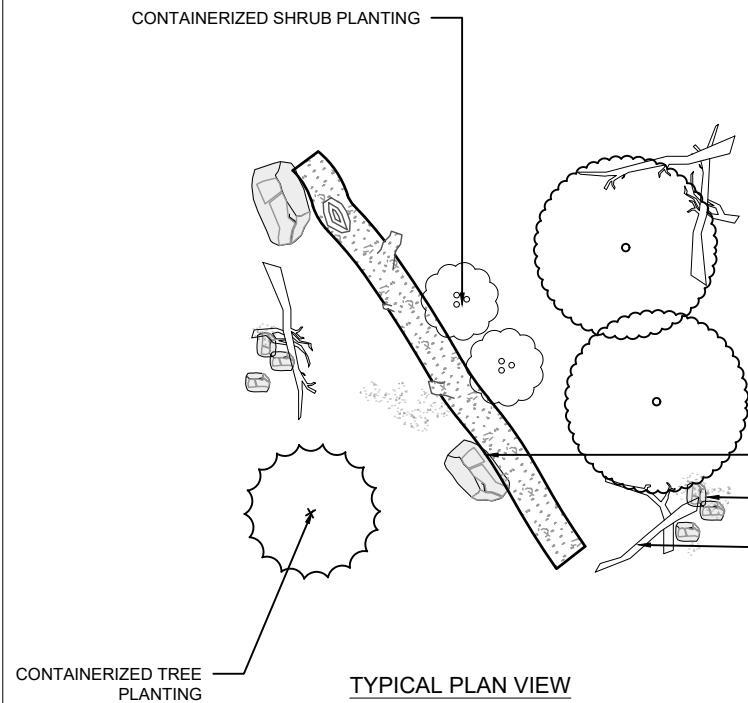
5 D05 EROSION CONTROL BLANKET MODIFICATIONS (CONTAINERIZED PLANTS)



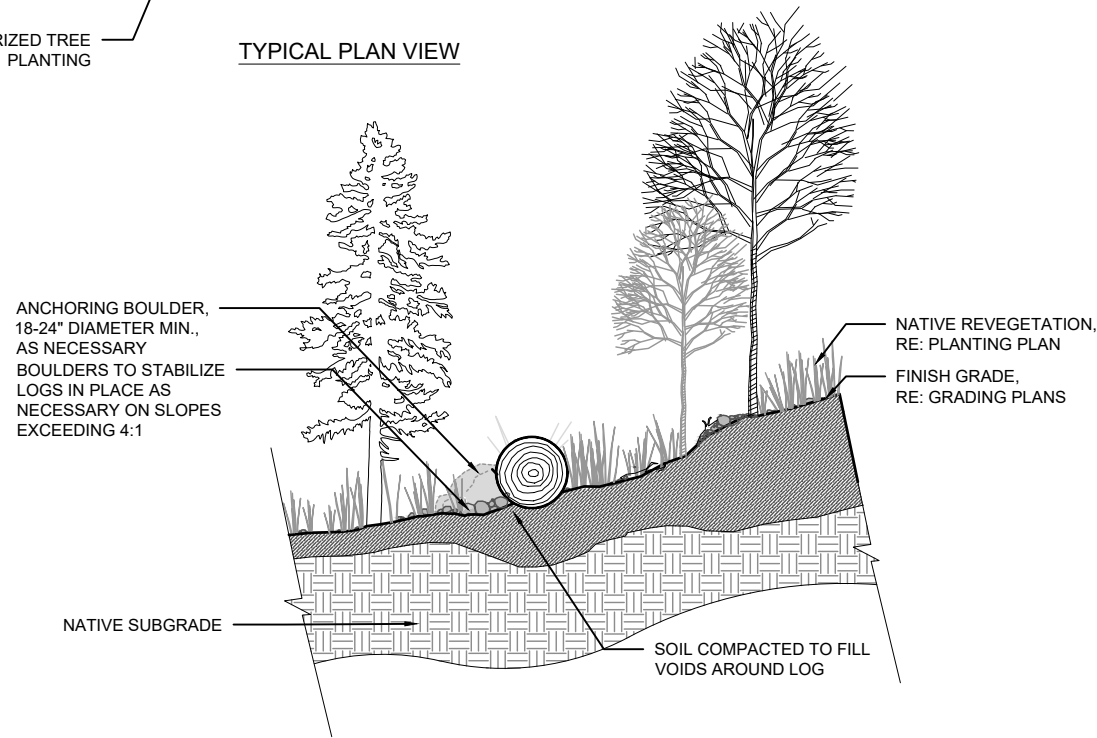
CRYSTAL RIVER RESTORATION AND WEAVER DITCH EFFICIENCY PROJECT CONTAINERIZED PLANTING DETAILS

No.	REVISION/UPDATE	Date
CLIENT NAME AND ADDRESS		
 Town of Carbondale 511 Colorado Ave Carbondale, CO 81623		
DESIGN FIRMS NAME AND ADDRESSES		
 RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org		
 311 Main St, Suite 102 Carbondale, CO 81623 970.963.4520 www.dhmdesign.com		
PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	D05
Scale	NOT TO SCALE	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



- NOTES:
1. DETAIL HAS BEEN PROVIDED TO ILLUSTRATE DESIGN INTENT
 2. REFER TO GRADING PLANS FOR ALL GRADING INFORMATION.
 3. LOGS HARVESTED ON SITE. LOGS TO BE 12" (MIN) IN DIAMETER. CONTRACTOR TO COORDINATE WITH LANDSCAPE ARCHITECT/PROJECT ECOLOGIST TO LOCATE LOGS AND ESTABLISH PROTOCOL FOR HARVESTING.
 4. ALL LOGS TO HAVE ENDS CRUSHED TO SIMULATE NATURAL FALL AND MASK ALL SAW CUTS
 5. STICKS AND SMALL SCALE ROCKS ARE INTENDED TO BE PLACED ON TOP OF FINAL SURFACE TO NATURALIZE AND ROUGHEN THE RESTORATION SITE PER PROJECT ECOLOGIST
 6. REFER TO PLANTING DETAILS FOR ALL PLANTING INSTALLATION NOTES.
 7. REFER TO BOULDER DETAILS FOR INSTALLATION NOTES.

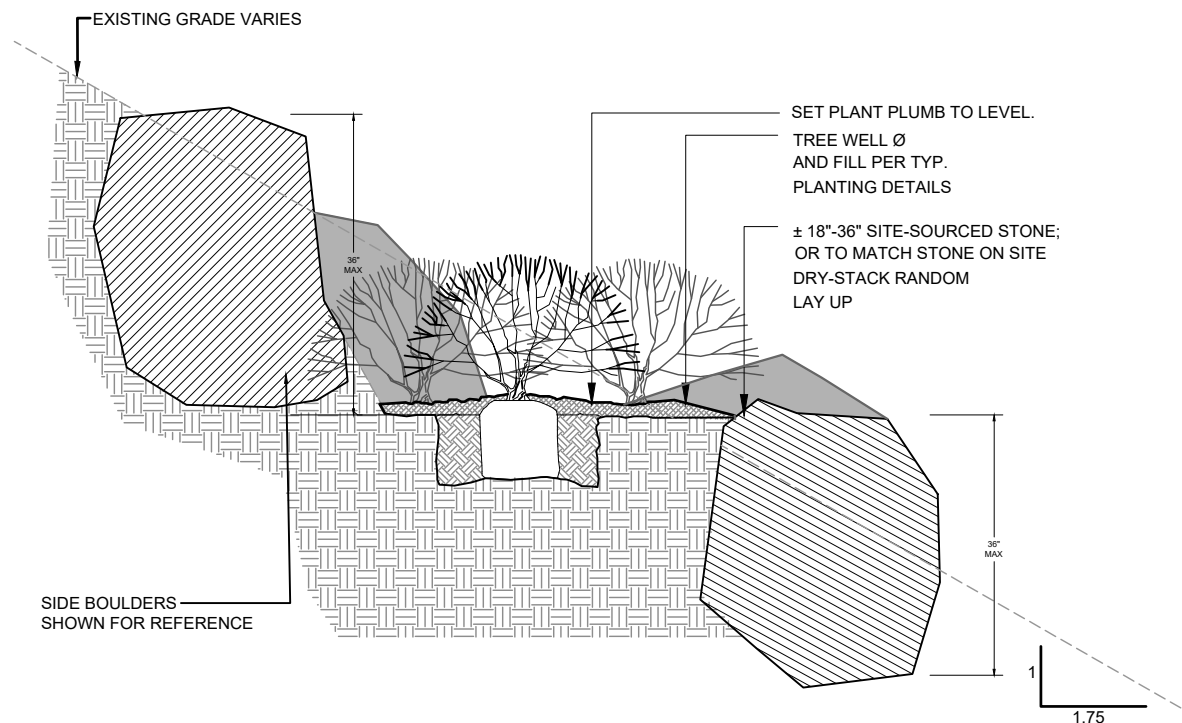
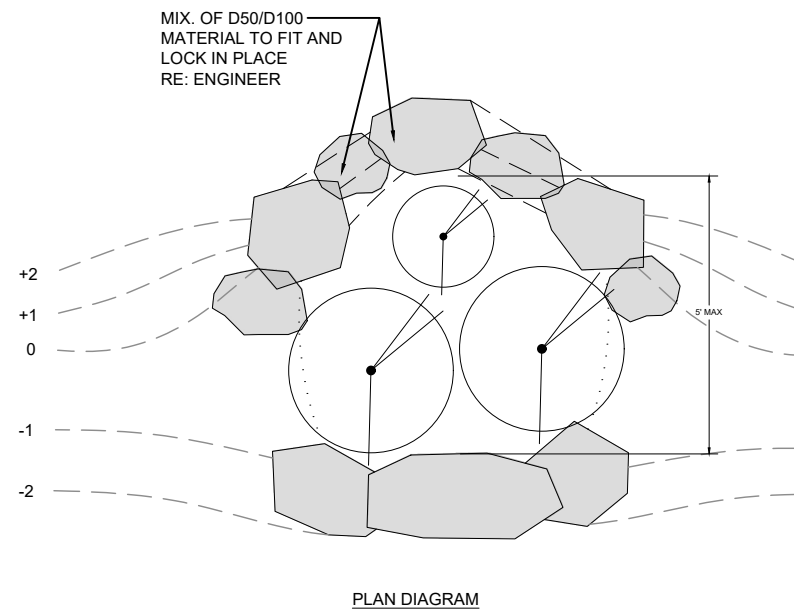


DEADFALL LOG PLACEMENT AND SURFACE NATURALIZATION

1
D06

NTS

- NOTES:
1. PLANT MATERIAL TO BE PLACED IN APPROPRIATE, FIELD VERIFIED ZONE. SEE RESTORATION PLANTING PLAN FOR DETAILED LOCATION AND ORGANIZATION OF RESTORATION PLANTING AND FEATURES.
 2. ALL PLANT MATERIAL TO BE INSPECTED AND APPROVED BY LANDSCAPE ARCHITECT/ECOLOGIST PRIOR TO INSTALLATION.
 3. ALL PLANTING ZONES TO BE MARKED IN FIELD AND APPROVED BY LANDSCAPE ARCHITECT/ECOLOGIST PRIOR TO PLANT INSTALLATION.
 4. SEE CIVIL FOR ADDITIONAL INFORMATION ON BOULDER EXTRACTION, INSTALLATION AND QUANTITIES.

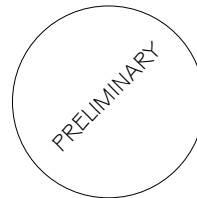


- NOTES:
1. REFER TO VARIOUS SPECIFIC CONTAINER PLANTING INSTALLATION DETAILS AND TO SPECIFICATIONS FOR MULCHING, BACKFILL, ETC.
 2. MINIMIZE USE AND APPEARANCE OF STONE RETAINING AROUND PLANTS AS MUCH AS POSSIBLE.
 3. BURY BOULDERS 1/3 DIAMETER AROUND PLANTS.
 4. BOULDER RETAINING WALLS SHOULD BE NATURALIZED WHEREVER POSSIBLE BY VARYING DISTANCE, SPACING AND ELEVATIONS OF BOULDER PLACEMENT. CIVIL ENGINEER AND LANDSCAPE ARCHITECT TO APPROVE BOULDER PLACEMENT.

CONTAINER PLANTING IN BOULDER RETAINING WALLS

2
D06


NTS



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
RESTORATION DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

 Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

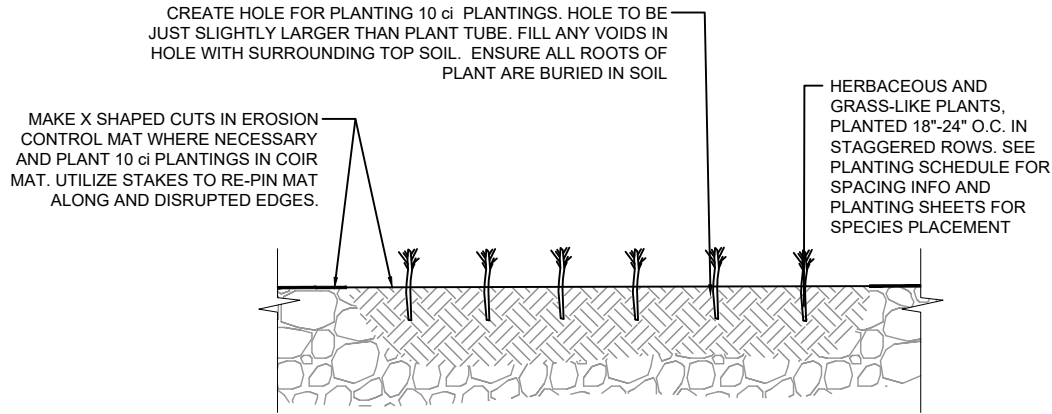
DESIGN FIRMS NAME AND ADDRESSES

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RiverRestoration.org, LLC
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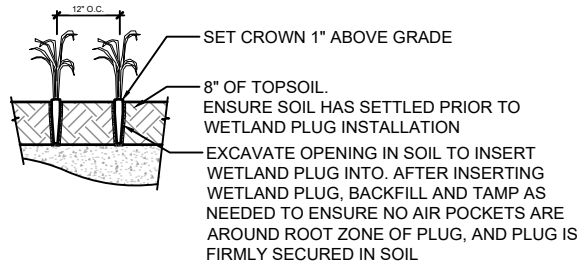
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Project	38047
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D06	



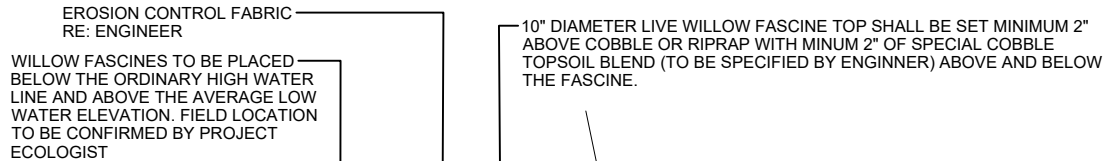
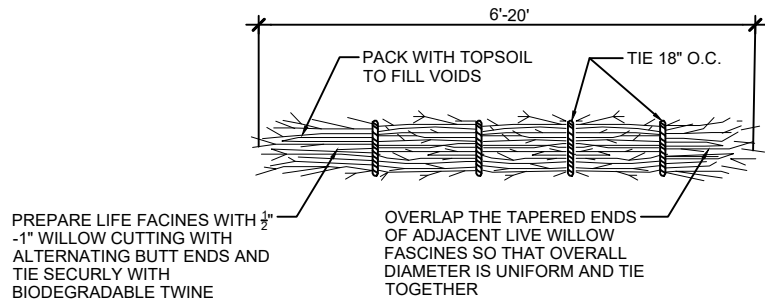
SECTION- PLANTING IN FLAT AREAS



- NOTES:
1. ALL WOODY AND HERBACEOUS PLANT MATERIAL TO BE PLACED IN APPROPRIATE, FIELD VERIFIED HYDROLOGIC ZONE.
 2. ALL WETLAND PLANT MATERIAL TO BE INSPECTED AND APPROVED BY LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
 3. ALL WETLAND PLANTING ZONES TO BE MARKED IN FIELD AND APPROVED BY LANDSCAPE ARCHITECT PRIOR TO PLANT INSTALLATION.
 4. COORDINATE WETLAND PLUG DELIVERY, WATER LEVELS PRE AND POST PLANTING, AND SEQUENCE OF WETLAND PLUG AND OTHER PLANT INSTALLATION WITH DHM DESIGN.

1 D07 WETLAND PLUG INSTALLATION

NTS



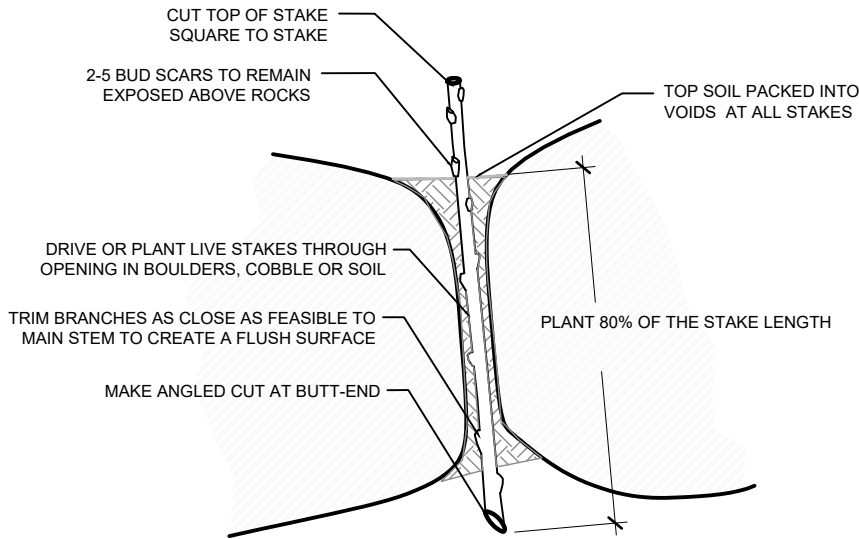
ANCHOR WILLOW FASCINE WITH 3/4" LONG WOOD STAKED @ 24" O.C.

FASCINE TO BE INSTALLED IN MIN 6" DEEP TRENCH

- NOTES:
1. SEE ENGINEER'S DRAWINGS FOR SPECIFIC EROSION CONTROL BLANKET MODIFICATIONS AND REQUIREMENTS AT FASCINES
 2. SEE ENGINEER'S DRAWINGS FOR FASCINE INSTALLATION BY BANK RESTORATION TYPE

4 D07 LIVE WILLOW FASCINES

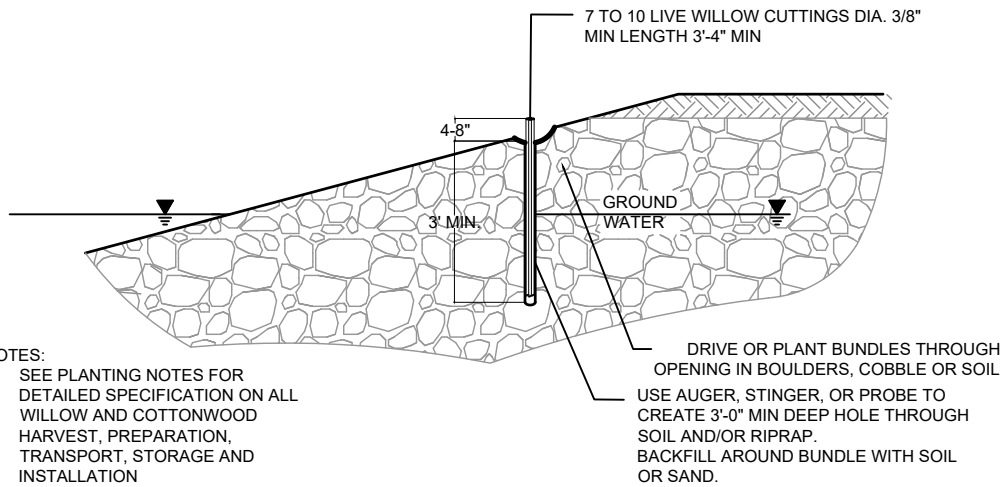
NTS



- NOTES:
1. SEE PLANTING NOTES FOR DETAILED SPECIFICATION ON ALL WILLOW AND COTTONWOOD HARVEST, PREPARATION, TRANSPORT, STORAGE AND INSTALLATION

2 D07 LIVE STAKES

NTS



- NOTES:
1. SEE PLANTING NOTES FOR DETAILED SPECIFICATION ON ALL WILLOW AND COTTONWOOD HARVEST, PREPARATION, TRANSPORT, STORAGE AND INSTALLATION


3 D07 WILLOW BUNDLE

NTS

- NOTES:
1. PLANT MATERIAL TO BE PLACED IN APPROPRIATE, FIELD VERIFIED ZONE. SEE RESTORATION PLANTING PLAN FOR DETAILED LOCATION AND ORGANIZATION OF RESTORATION PLANTING AND FEATURES.
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CRYSTAL RIVER RESTORATION AND
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 RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org
 311 Main St, Suite 102 Carbondale, CO 81623 970.963.4520 www.dhmdesign.com

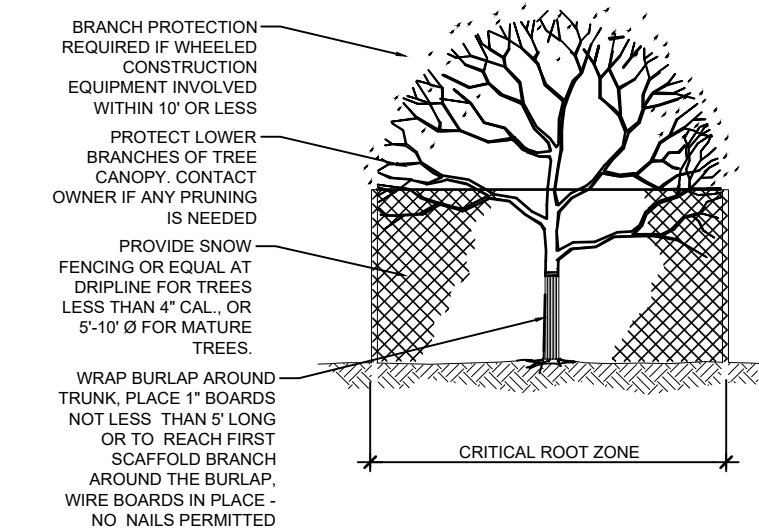
PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet D07
Date MAR 2021	
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PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

PRELIMINARY

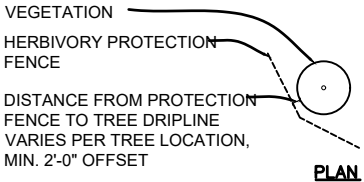
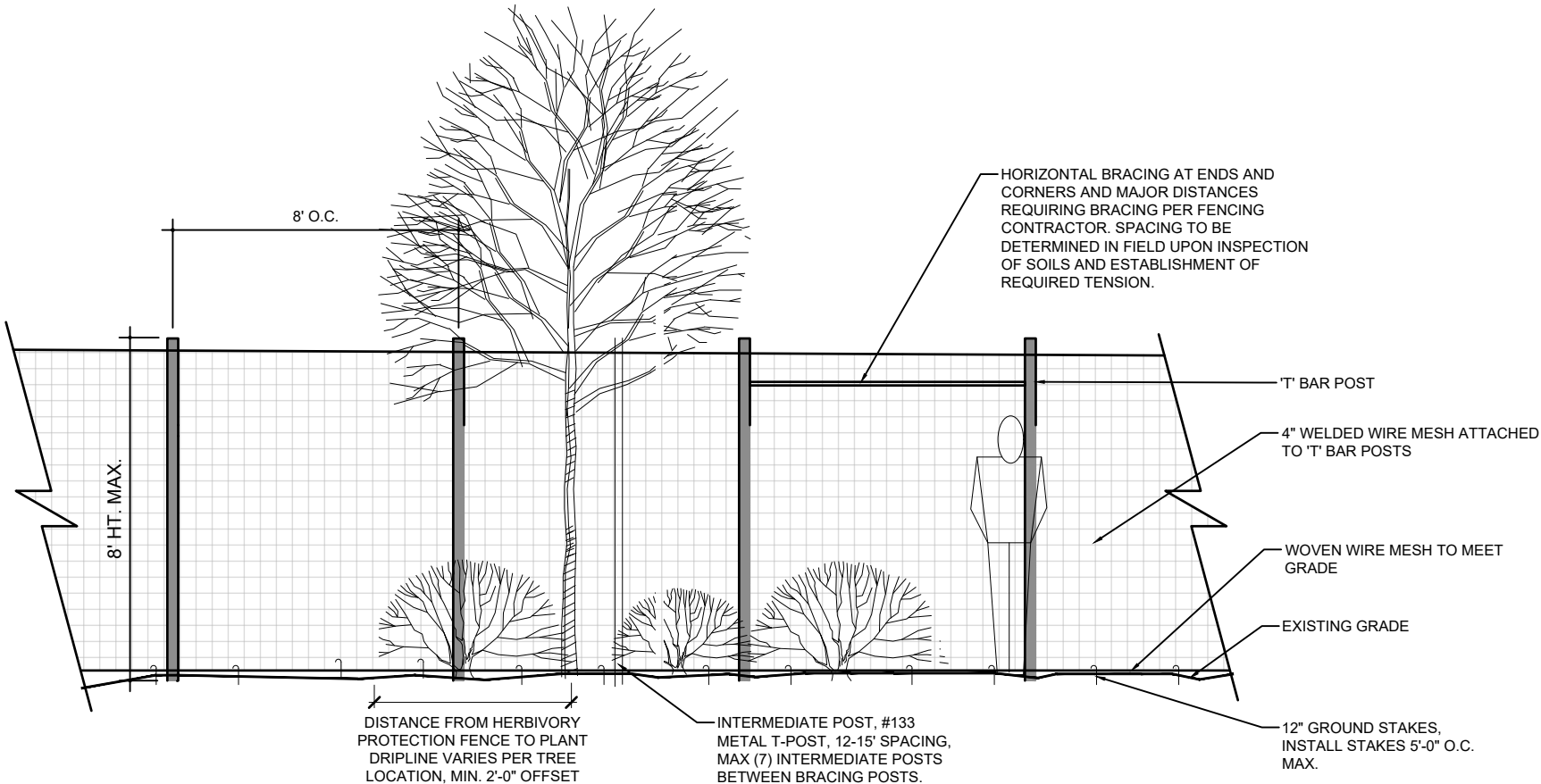
PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP



- NOTES
1. CONTRACTOR WILL PRESERVE & PROTECT EXISTING TREES ON SITE, DURING DEMOLITION AND CONSTRUCTION OPERATIONS AS NECESSARY, INCLUDING CANOPIES, TRUNKS, AND ROOT SYSTEMS.
 2. TREES THAT ARE IN PERIL OF DAMAGE, OR TREES WITHIN 10' OF DEMOLITION OF CONSTRUCTION ACTIVITIES, OR TREES IDENTIFIED SPECIFICALLY BY OWNER, SHALL RECEIVE TREE PROTECTION.
 3. CONTRACTOR SHALL CONTACT OWNER IF FIELD CONDITIONS ARE SIGNIFICANTLY DIFFERENT THAT WHAT IS SHOWN ON THE PLANS.
 4. IT IS ACKNOWLEDGED THAT CONSTRUCTION AND DEMOLITION ACTIVITIES WILL OCCUR CLOSE TO TRUNKS AND OVER CRITICAL ROOT ZONES. HOWEVER, THE CONTRACTOR WILL AVOID ALL UNNECESSARY DAMAGE TO TREES.
 5. IN AREAS WHERE FENCING WILL INTERFERE WITH TRAIL CONSTRUCTION, OR WHERE FENCING CANNOT BE INSTALLED, WRAP TRUNK WITH BURLAP AS PER DETAIL. CONSULT WITH OWNER PRIOR TO APPLYING PROTECTIVE WRAP TO VERIFY CONDITIONS.
 6. ALL DISTURBED ROOTS SHALL BE TRIMMED TO BE CLEAN CUTS. DO NOT LEAVE BARE ROOTS EXPOSED. COVER WITH A BREATHABLE TEMPORARY COVER SUCH AS GEOTECH FABRIC AND A 1" LAYER OF SOIL IF ROOTS ARE TO BE UNCOVERED FOR MORE THAN ONE DAY. WATER AS NECESSARY TO KEEP ROOTS ALIVE.

1
D08
EXISTING TREE PROTECTION

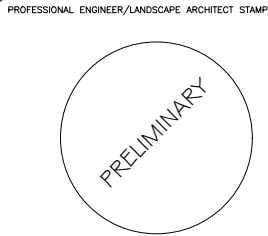
NTS



- NOTES:
1. REFER TO LANDSCAPE PLANS FOR WILDLIFE PROTECTION FENCING PLAN
 2. FENCING PER AREAS OF PLANTING I.E. "PLANTING PODS".
 3. "T" BAR POSTS TO BE SPACED APPROPRIATELY TO ENSURE INTEGRITY OF FENCE.
 4. LOCATION OF FENCING TO BE APPROVED BY ECOLOGICAL TEAM IN FIELD.
 5. DRIVE 12" ALUMINUM STAKES EVERY 5'-0" O.C. MAX AT FENCE LINE. INSTALL VERTICALLY PLUMB.
 6. FENCING TO BE REMOVED ONCE PLANTING IS ESTABLISHED

2
D05
WILDLIFE PROTECTION FENCING

NOT TO SCALE



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
FENCING DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

 Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES

 RiverRestoration.org, LLC
P.O. Box 248
Carbondale, CO 81623
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Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project	38047
Date	MAR 2021
Scale	NOT TO SCALE

D08

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

RESTORATION NOTES

1.

THE LANDSCAPE PLANS AND DETAILS ARE TO BE USED IN CONJUNCTION WITH CIVIL PLANS TO FORM COMPLETE INFORMATION REGARDING SITE WORK. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COORDINATION WITH SUBCONTRACTORS AS REQUIRED TO ACCOMPLISH ALL CONSTRUCTION OPERATIONS.
2.

THE CONTRACTOR IS RESPONSIBLE FOR WEED CONTROL UNTIL FINAL ACCEPTANCE. NOXIOUS VEGETATION SHALL BE CONTROLLED THROUGHOUT THE SEEDING ZONES AS WELL AS THE ENTIRE PROJECT SITE. THE AGGRESSIVE ESTABLISHMENT OF NEW PLANT MATERIAL IS INTENDED TO DISCOURAGE FUTURE NOXIOUS VEGETATION ENCROACHMENTS.
3.

CONTRACTOR SHALL NOT WILLFULLY PROCEED WITH CONSTRUCTION AS DESIGNED WHEN IT IS OBVIOUS THAT UNKNOWN OBSTRUCTIONS, AREA DISCREPANCIES AND/OR GRADE DIFFERENCES EXIST THAT MAY NOT HAVE BEEN KNOWN DURING DESIGN. SUCH CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE AN AUTHORIZED REPRESENTATIVE. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ALL NECESSARY REVISIONS DUE TO FAILURE TO GIVE SUCH NOTIFICATIONS.
4.

CONTRACTOR SHALL BE RESPONSIBLE FOR MAKING HIMSELF FAMILIAR WITH ALL UNDERGROUND UTILITIES, PIPES AND STRUCTURES. CONTRACTOR SHALL TAKE SOLE RESPONSIBILITY FOR COSTS INCURRED DUE TO DAMAGE AND THE REPLACEMENT OF SAID UTILITIES. LOCATION OF EXISTING UTILITIES SHALL BE VERIFIED BY THE CONTRACTOR PRIOR TO ACTUAL CONSTRUCTION. FOR INFORMATION CONTACT: UTILITY NOTIFICATION CENTER OF COLORADO, 303.232.1991 OR 8-1-1.
5.

ALL EXISTING IMPROVEMENTS TO REMAIN SHALL BE PROPERLY AND ADEQUATELY PROTECTED FROM DAMAGE DURING CONSTRUCTION OPERATIONS. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO RESTORE TO THE ORIGINAL CONDITION ANY EXISTING ITEMS THAT ARE DAMAGED OR DISTURBED IN ANY WAY.
6.

PROTECT ALL EXISTING HEALTHY, NATIVE VEGETATION, EXCEPT WHERE REMOVAL IS DEEMED NECESSARY DUE TO DISTURBANCE CAUSED BY BANK STABILIZATION ACTIVITIES. ANY NON-NATIVE VEGETATION SHOULD BE REMOVED IN SPECIFIC TARGETED RESTORATION AREAS. PROVIDE CONSTRUCTION FENCING AROUND THE DRIP LINE OF EACH TREE OR GROUP OF TREES TO REMAIN. DO NOT STORE EQUIPMENT OR SUPPLIES INSIDE FENCE LINE. SEE CIVIL PLANS FOR TREE REMOVAL AND PROTECTION IDENTIFICATION AND GUIDELINES.

LANDSCAPE MATERIALS

1.

CONTRACTOR SHALL USE LOCAL BEST MANAGEMENT PRACTICES FOR OBTAINING AND INSTALLING LANDSCAPE MATERIALS. COMPLETE THE WORK USING SKILLED PERSONNEL, PROFICIENT IN THE TRADES REQUIRED & IN A NEAT , ORDERLY AND RESPONSIBLE MANNER & WITH RECOGNIZED STANDARDS OF WORKMANSHIP.
2.

ALL PLANTS TO BE APPROVED BY LANDSCAPE ARCHITECT/ECOLOGIST PRIOR TO INSTALLATION. NOTIFY FOR INSPECTION AND APPROVAL OF PLANT MATERIAL AT TIME OF DELIVERY. ANY PLANT NOT MEETING APPROVAL MAY BE REJECTED AT ANY TIME PRIOR TO FINAL ACCEPTANCE.
3.

PLANT MATERIAL MUST MEET CURRENT LANDSCAPE NURSERY STANDARDS &/OR ANSI Z60.1.
4.

IF PLANTS ARE NOT AVAILABLE, NOTIFY LANDSCAPE ARCHITECT/ECOLOGIST FOR APPROVAL OF CHANGE BEFORE MAKING SUBSTITUTIONS.
5.

LANDSCAPE ARCHITECT OR PROJECT ECOLOGIST WILL PROVIDE PLANT LAYOUT DIRECTION FOR PLANTS IN TERMS OF CONCEPT FOR GENERAL LAYOUT. PLANTING SYMBOLS AND GROUPINGS ARE REPRESENTED HERE AS GENERAL LAYOUT. ACTUAL ARRANGEMENT TO BE LAID OUT BY LANDSCAPE ARCHITECT OR PROJECT ECOLOGIST IN THE FIELD WITH LANDSCAPE CONTRACTOR. PLANTINGS ARE INTENDED TO FLOW TOGETHER IN A CONTEMPLATED ECOLOGICAL SYSTEM. BOUNDARIES BETWEEN GROUPS OF PLANTS ON PLANS ARE REPRESENTED WITH HARDER EDGES THEN WILL BE ACCOMPLISHED IN THE FIELD.
- 5.1.

MINOR FIELD ADJUSTMENTS TO THE PLANTING PLANS MAY BE NECESSARY BASED ON THE ACTUAL LOCATION OF EXISTING VEGETATION, WALKWAYS AND SIMILAR FEATURES. CONTRACTOR MUST OBTAIN APPROVAL FROM THE LANDSCAPE ARCHITECT/ECOLOGIST E PRIOR TO ADJUSTING THE DESIGN.

- 5.2.

PROPOSED SHRUB AND TREE LOCATIONS TO BE FIELD ADJUSTED TO ENHANCE EXISTING WOODY VEGETATION.
6.

CONTRACTOR SHALL FOLLOW THE LANDSCAPE PLAN. ANY DISCREPANCIES BETWEEN THE PLAN AND FIELD CONDITIONS SHALL BE REPORTED TO THE LANDSCAPE ARCHITECT/ECOLOGIST. BEFORE PROCEEDING WITH IF THERE IS A DISCREPANCY BETWEEN THE PLANT COUNTS ON THE CALL-OUTS ON THE PLANS & THE ACTUAL NUMBER OF PLANT SYMBOLS DEPICTED ON THE PLANS, THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING THE ACTUAL NUMBER OF PLANTS AS SYMBOLICALLY DEPICTED ON THE PLANS.
7.

MULCH:

7.1.

DO NOT BURY PLANTS WITH MULCH.

7.2.

PULL MULCH BACK 6" FROM TRUNK OF TREES AS PER DETAILS.

7.3.

MULCH RINGS AROUND CONTAINERIZED PLANTS IN NATIVE AREAS SHALL BE MINIMUM 8' Ø.
8.

TO THE MAXIMUM EXTENT POSSIBLE, TOPSOIL THAT IS REMOVED DURING CONSTRUCTION ACTIVITY SHALL BE STOCKPILED ON-SITE FOR LATER USE.
9.

BOUNDARY OF RESTORATION SEEDING TO BE OUTLINED IN THE FIELD BY THE LANDSCAPE ARCHITECT/ECOLOGIST. APPLY SEED TO LIMITS OF DISTURBANCE (SEE PLANT LIST FOR SEED MIX AND PLANS FOR DISTRIBUTION OF TYPES). IMMEDIATELY FOLLOWING SEEDING OPERATIONS OF SPECIFIC ZONES, THE AREAS SHALL BE PROTECTED FROM TRAFFIC OR OTHER ACTIVITIES.
10.

THE CONTRACTOR SHALL STAKE ALL KEY RESTORATION AREAS AND SHALL RECEIVE APPROVAL FROM THE PROJECT LANDSCAPE ARCHITECT/ECOLOGIST PRIOR TO PROCEEDING WITH CONSTRUCTION.
11.

WHERE PLANT MATERIALS INDICATED INTO NATIVE UNDISTURBED SOILS, MATERIAL SHOULD BE INSTALLED TO MINIMIZE DISTURBANCE TO ADJACENT VEGETATION AND INSTALLED BY HAND WITH HAND TOOLS. HAND SEED ALL DISTURBED SOIL AND FOLLOW SEEDING PROTOCOL AS PROVIDED IN THE SEEDING RESTORATION NOTES.

SOIL AMMENDMENTS AND GRADING

1.

CONTRACTOR IS TO CONDUCT A SOIL NUTRIENT ANALYSIS PRIOR TO ANY SOIL AMENDMENTS. THIS ANALYSIS WILL FORM THE BASELINE DATA FOR ANY FUTURE APPLICATION OF NUTRIENTS.
2.

ALL AREAS TO BE SEEDED WILL HAVE THE TOP SOIL LOOSENED TO A DEPTH OF 4 TO PREPARE THE SEEDBED. APPLY GRANULAR BIOSOL OR TRITON RICHLAWN AT THE MANUFACTURER'S SPECIFICATIONS PRIOR TO SEED INSTALLATION.
3.

CONTRACTOR TO SUBMIT A SOIL TEST REPORT TO BE APPROVED BY PROJECT ECOLOGIST.
4.

GRADING

4.1.

LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR ROUGH GRADING, AND FINE GRADING AFTER SOIL AMENDMENT OPERATIONS TO ALLOW FOR SEEDING, STRAW MULCH, AND HYDROMULCH INSTALLATION AND EROSION CONTROL BLANKETS WHERE INDICATED.

4.2.

CONTRACTOR SHALL OBTAIN APPROVAL OF THE LANDSCAPE ARCHITECT/ECOLOGIST OF THE GRADING PRIOR TO PLANTING.

IRRIGATION

1.

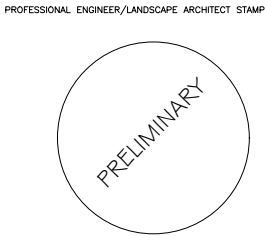
REFERENCE IRRIGATION PLAN FOR ALL IRRIGATION INFORMATION.
2.

TEMP IRRIGATION TO BE UTILIZED AND MAINTAINED AT A MINIMUM OF TWO YEARS STARTING IN THE 2022 GROWING SEASON
3.

IRRIGATION SYSTEM TO BE MAINTAINED AND MONITORED BY THE TOWN OF CARBONDALE



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
GENERAL RESTORATION NOTES
MATERIALS SCHEDULE

No.	REVISION/UPDATE	Date
CLIENT NAME AND ADDRESS		
<div><div></div><div>Town of Carbondale 511 Colorado Ave Carbondale, CO 81623</div></div>		
DESIGN FIRMS NAME AND ADDRESSES		
<div><div></div><div>RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org</div></div> <div><div></div><div>311 Main St, Suite 102 Carbondale, CO 81623 970.963.4520 www.dhmdesign.com</div></div>		
PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	D09a
Scale	NOT TO SCALE	

RESTORATION NOTES cont.

RIPARIAN VEGETATION AND WETLAND CUTTINGS/STAKES NOTES
SUMMARY

RIPARIAN PLANTING COVERS THE RIVER BANKS FROM THE EDGE OF WATER AT OR NEAR LOWFLOW WATER SURFACE ELEVATION UP TO AND INCLUDING PART OF THE OVERBANK/FLOODPLAIN. AREAS DESIGNATED FOR RIPARIAN PLANTING OF CONTAINERIZED MATERIALS AND WILLOW STAKES ARE SHOWN ON THE DRAWINGS AND PLANT SCHEDULES.

SOURCE MATERIAL

- CONTAINERIZED PLANTS: CONTAINERIZED PLANT MATERIALS WILL BE GROWN FROM SEED OR CUTTINGS SOURCED WITHIN THE ROCKY MOUNTAIN REGION.
- WILLOW CUTTINGS / STAKES: CUTTINGS / STAKES WILL BE COLLECTED IN A MANNER CONFORMING TO FEDERAL AND STATE LAW. MATERIALS WILL BE COLLECTED WITHIN THE STATE OF COLORADO, IN THE SAME WATERSHED AND AREAS OF SIMILAR ELEVATION AND HYDROLOGY TO THOSE EXISTING AT THE PLANTING SITE (I.E. ECOTYPIC MATERIAL).
- COLLECTIONS MADE ON PUBLIC LANDS MUST BE PERMITTED AND CARRIED OUT IN ACCORDANCE WITH STATE AND FEDERAL LAW.

INSTALLATION

- CONTRACTOR SHALL BE ABLE TO DEMONSTRATE EXTENSIVE EXPERIENCE WITH PROJECTS OF SIMILAR HYDROLOGY, SPECIES COMPOSITION AND SOIL CONDITIONS.
- CONTRACTOR SHALL BE ABLE TO DEMONSTRATE EXTENSIVE EXPERTISE IN THE ECOLOGY OF NATIVE PLANTS, PARTICULARLY IN THE IDENTIFICATION AND HYDROLOGIC PREFERENCES OF RIPARIAN WOODY SPECIES
- CONTRACTOR SHALL BE ABLE TO DEMONSTRATE EXTENSIVE EXPERIENCE IN THE HARVEST AND MAINTENANCE OF VIABLE WILLOW STAKES PRIOR TO PLANTING.

DELIVERY / TRANSPORT

- ALL PLANT MATERIALS ARE TO BE DELIVERED DIRECTLY TO THE PLANTING SITE FROM STORAGE OR THE NURSERY FACILITY.
- PLANT MATERIALS ARE TO BE DELIVERED TO THE PLANTING SITE IN THE SPECIES, SIZE AND QUANTITIES IDENTIFIED BY THIS DOCUMENT. PLANT MATERIALS WILL BE ACCOMPANIED BY A BILL OF LADING STATING SAME.
- THE SUBCONTRACTOR SHALL COUNT AND CONFIRM THE DELIVERY IS ACCURATE AND INSPECT PLANT MATERIAL TO ENSURE THE PLANT MATERIAL IS IN GOOD CONDITION AND HEALTH.
- ALL PLANTS WILL BE CHECKED AND APPROVED BY THE DESIGNER & CONTRACTOR PRIOR TO PLANTING TO ENSURE CONFORMITY OF SPECIES, QUALITY AND QUANTITY. PLANT MATERIAL SHALL:
 - BE WELL SHAPED, VIGOROUS AND HEALTHY WITH A WELL BRANCHED ROOT SYSTEM, FREE FORM DISEASE, HARMFUL INSECTS AND INSECT EGGS, SUN-SCALD INJURY, DISFIGUREMENT OR ABRASION;
 - BE CHECKED FOR UNAUTHORIZED SUBSTITUTION AND EXHIBIT TYPICAL FORM OF BRANCH TO HEIGHT RATIO;
 - MEET THE CONTAINER, CALIPER AND HEIGHT MEASUREMENTS SPECIFIED AND NOT BE CROPPED;
 - SHOW NEW FIBROUS ROOTS AND MAINTAIN ITS SHAPE WHEN REMOVED FROM THE CONTAINER AND NOT HAVE BROKEN OR CRACKED ROOTBALLS, OR BROKEN CONTAINERS;
 - CONFORM TO THE AMERICAN ASSOCIATION OF NURSERYMEN'S AMERICAN STANDARD FOR NURSERY STOCK.
- IF WITHIN 24 HOURS OF DELIVERY THE DESIGNER DETERMINES THAT THE PLANT MATERIAL DOES NOT MEET THESE SPECIFICATIONS, THE UNACCEPTABLE MATERIAL SHALL BE REJECTED, REMOVED, AND REPLACED AT NO EXPENSE TO THE CLIENT.
- IF OVER THE COURSE OF THE PROJECT THE DESIGNER DISCOVERS THE CONTRACTOR HAS FAILED TO PROPERLY STORE, INSTALL & MAINTAIN ANY PREVIOUSLY ACCEPTED PLANT MATERIAL, SAID MATERIAL WILL BE REMOVED AND REPLACED WITH ACCEPTABLE MATERIAL AT THE EXPENSE OF THE SUBCONTRACTOR.
- DELIVERY IS TO BE MADE USING A VEHICLE WITH AN ENCLOSED, COVERED CARGO AREA TO PREVENT DAMAGE FROM WIND, RAIN, HAIL AND DEBRIS.
- CONTAINERIZED MATERIALS ARE TO BE SECURED IN A RACK SYSTEM DESIGNED SPECIFICALLY FOR THE TRANSPORTATION OF PLANTS, IN ORDER TO PREVENT DAMAGE CAUSED BY SHIFTING LOADS.
- PLANT MATERIAL SHALL BE STAGED BY SPECIES IN SEPARATE AND IDENTIFIABLE GROUPS DURING UNLOADING.
- PLANT MATERIAL SHALL BE IDENTIFIED WITH ATTACHED, DURABLE, WATERPROOF LABELS AND WEATHER RESISTANT INK, STATING THE CORRECT SCIENTIFIC AND COMMON NAME.

STORAGE

- CUTTINGS / STAKES: CUTTINGS / STAKES MUST BE STORED AT 32-40 DEGREES FAHRENHEIT IN A HUMID, DARK ENVIRONMENT. IMMEDIATELY AFTER HARVESTING, WILLOW STAKES SHALL BE FULLY SUBMERGED AND STORED IN A COLD/COOL WATER (EITHER IN A TANK OR NATURAL WATER BODY) IN A DARK OR SHADED LOCATION FOR A MINIMUM OF 5 TO 7 DAYS. FAILURE TO PROPERLY STORE AND HYDRATE WILLOW CUTTINGS OR IF CUTTINGS LINGER ON SITE MORE THAN 2 DAYS BEFORE PLANTING WILL BE REPLACED BY THE CONTRACTOR AT NO COST TO THE CLIENT IF SAID CUTTINGS FAIL TO THRIVE.
- CONTAINERIZED MATERIALS: PRIOR TO PLANTING, CONTAINERIZED MATERIALS MUST BE STORED IN A LICENSED, QUALIFIED NURSERY (SEE 1.02, B-1). MATERIALS SHALL BE PROPERLY PRUNED IN ACCORDANCE WITH RECOGNIZED STANDARD PRACTICE. ROOT SYSTEMS WILL BE KEPT MOIST AT ALL TIMES.
- PLANT MATERIAL SHALL BE KEPT SHADED, WATERED AND MAINTAINED IN GOOD HEALTH DURING TRANSPORT AND THEREAFTER UNTIL THE PROJECT IS APPROVED.
- COMMERCIALY AVAILABLE PLANT MATERIALS NOT INSTALLED WITHIN 5 DAYS OF ARRIVAL AT THE SITE SHALL BE STORED AND PROTECTED IN DESIGNATED TEMPORARY ON-SITE NURSERY AREA. NURSERY GROWN PLANT MATERIAL SHALL NOT BE STORED ON SITE LONGER THAN 15 CALENDAR DAYS. PLANT MATERIAL SHALL BE PROTECTED FROM DIRECT EXPOSURE TO WIND AND SUN, KEPT SHADED AND MOIST BY WATERING, EITHER BY HAND OR A TEMPORARY IRRIGATION SYSTEM UNTIL INSTALLED.

HANDLING

- CUTTINGS / STAKES: CARE WILL BE TAKEN TO AVOID DAMAGE TO BUDS DURING HANDLING. BARK MUST NOT BE SEPARATED FROM THE CAMBIUM LAYER. ONLY THE NUMBER OF WILLOW STAKES THAT CAN BE PLANTED IN ONE DAY WILL BE DELIVERED TO THE PLANTING SITE.
- CONTAINERIZED MATERIALS: DO NOT INJURE PLANTS BY DROPPING THEM OR HANDLING THEM BY THE TRUNK, STEMS OR FOLIAGE. CONTAINERIZED MATERIALS ARE TO BE HAND-CARRIED BY THE CONTAINER ONLY. THESE MATERIALS SHALL BE KEPT MOIST AT ALL TIMES AND NOT ALLOWED TO DRY OUT.

MATERIALS

WILLOW STAKES

- IDENTIFICATION: WILLOW STAKE COLLECTION MUST BE PERFORMED BY OR UNDER THE SUPERVISION OF AN ECOLOGIST OR BOTANIST EXPERIENCED IN THE IDENTIFICATION OF NATIVE WILLOW SPECIES.
- COLLECTION: WILLOW STAKE COLLECTION/HARVESTING SHALL BE PERFORMED WHILE WILLOWS ARE DORMANT ACCORDING TO THE FOLLOWING PRIORITY:
 - IMMEDIATELY PRIOR TO SETTING BUD (APPROXIMATELY MID - MARCH TO MID - APRIL; THEN
 - FALL DORMANT SEASON (APPROXIMATELY NOV.1 TO MID-DEC) IMMEDIATELY AFTER LEAF DROP.
- QUALITY: CUTTINGS SHOULD ONLY BE HARVESTED FROM HEALTHY, LIVE PLANTS THAT ARE AT LEAST TWO YEARS OLD AND ARE: RELATIVELY STRAIGHT, COVERED WITH SMOOTH BARK, AND HAVE NO INSECT/PATHOGEN DAMAGE. NO MORE THAN ONE-THIRD OF A LIVE PLANT SHOULD BE HARVESTED AND STEMS SHOULD BE HARVESTED EVENLY THROUGH THE STAND AND WITH INDIVIDUAL WILLOW PLANTS (I.E. DO NOT REMOVE $\frac{1}{3}$ OF THE STEMS FROM THE SAME SIDE OF AN INDIVIDUAL PLANT).
- SIZE:
 - CUTTINGS SHOULD BE A MINIMUM OF $\frac{1}{2}$ INCH IN DIAMETER TO ENSURE SUFFICIENT ENERGY FOR ROOTING. CUTTINGS SHALL BE 24"-36" IN LENGTH. THE BOTTOM OF THE STEMS TO BE CUT WITH A CLEAN DIAGONAL CUT TO DIFFERENTIATE THE ROOTING END FROM THE ABOVE GROUND END, AND TO AID IN INSTALLATION.
 - WHEN PLANTED, CUTTINGS SHOULD EXTEND 6-8 INCHES INTO THE WATER TABLE OR CAPILLARY FRINGE.
 - THREE QUARTERS OF THE CUTTING SHOULD BE BELOW GROUND TO PREVENT BEING DISLODGED DURING HIGH FLOWS.
- FORM: ALL SIDE BRANCHES WILL BE REMOVED, AVOIDING ANY DAMAGE TO THE STEM. THE TERMINAL BUD SHALL BE TRIMMED FROM STAKES WITH A HORIZONTAL CUT. THIS WILL DIVERT ENERGY TO THE LATERAL BUDS FOR EFFICIENT ROOT AND STEM SPROUTING.
- BUNDLING: AT THE TIME OF HARVESTING, WILLOW STAKES SHALL BE BUNDLED IN GROUPS OF 10, 25, OR 50 BY LIKE SPECIES FOR EASE OF COUNTING.
- SOAK WILLOWS PRIOR TO PLANTING, MAINTAINING WATER CONTACT WITH 50-80% OF THE LENGTH OF THE CUTTING.
- INTERIM MAINTENANCE: HARVESTED WILLOW CUTTINGS SHOULD BE STORED AND MAINTAINED AT A QUALIFIED, LICENSED NURSERY FACILITY IN THE MANNER DESCRIBED IN 1.03, B-1 FOR NO MORE THAN SIXTY DAYS PRIOR TO PLANTING.

PLANTING/INSTALLATION

- CUTTINGS: PLANTING OF RIPARIAN CUTTINGS SHALL OCCUR IN THE SPRING BEFORE BUD BREAK, AND AS SOON AS GROUND CONDITIONS PERMIT OR IMMEDIATELY AFTER SPRING RUN-OFF.

SITE PREPARATION

- SITE SHALL BE FINISHED GRADED, TOPSOIL PLACED, AND FREE OF DEBRIS AND HEAVY EQUIPMENT IN PLANTING AREAS PRIOR TO THE COMMENCEMENT OF PLANTING OPERATIONS.
- CONTRACTOR SHALL BECOME FAMILIAR WITH SITE HYDROLOGY AND SOIL CONDITIONS PRIOR TO BEGINNING RIPARIAN SEEDING AND PLANTING WORK.
- PLANT LOCATIONS WILL BE DETERMINED PRIMARILY BY THE PROJECT DRAWINGS. PRECISE LOCATIONS FOR INDIVIDUAL PLANTS AND WETLAND SHRUBS WILL BE DETERMINED BY THE ECOLOGIST BASED ON IN-FIELD MACRO- AND MICRO-SITE AND HYDROLOGIC CONDITIONS AND PLANT ZONATION REQUIREMENTS.
- PLANTING SITES WILL BE FLAGGED OR SPRAYED WITH GROUND PAINT BY THE ECOLOGIST AS TO PRECISE PLANT LOCATIONS PRIOR TO THE OCCURRENCE OF PLANTING WORK.

WILLOW & WILLOW STAKE & BUNDLE PLANTING PROCEDURE

- PLANTING HOLES FOR WILLOW STAKES SHALL BE CREATED WITH A PUNCH BAR, STINGER OR SIMILAR EQUIPMENT AS DESIGNATED BY THE CONTRACTOR. HOLES SHALL BE DEEP ENOUGH TO EXTEND WILLOW STAKE $\frac{2}{3}$ OF THE LENGTH OF THE CUTTING INTO THE GROUND (PRIOR TO ANY NECESSARY TRIMMING).
- CUTTINGS SHALL BE PLANTED IN A MANNER SO AS TO EXTEND ABOVE COMPETING HERBACEOUS VEGETATION, BUT SHOULD BE SHORT ENOUGH TO MINIMIZE THE CHANCE OF BEING RIPPED FROM THE GROUND BY HIGH FLOWS OR WIND - BLOWN DEBRIS. THE LENGTH OF CUTTINGS SHOULD BE TRIMMED TO WITHIN 6 TO 9 INCHES OF THE GROUND. TRIMMING THE TOPS OF WILLOW STAKES DOES NOT RELIEVE THE CONTRACTOR FROM INSTALLING $\frac{2}{3}$ RDS OF THE CUTTING IN THE GROUND.
- ONE WILLOW CUTTING SHALL BE PLACED IN EACH HOLE. SPACING SHOULD BE 18"-24" O.C. IN DESIGNATED AREAS, AND SHOULD BE PLACED RANDOMLY TO APPEAR MORE NATURAL.
- WILLOW BUNDLES WILL BE INSTALLED PER DETAIL, WITH MULTIPLE STAKES INSERTED INTO EACH HOLE. LOCATION TO BE FIELD VERIFIED BY LANDSCAPE ARCHITECT OR ECOLOGIST.
- AFTER PLANTING, THE HOLE SHALL BE FILLED WITH A THICK MUD / WATER SLURRY IN ORDER TO PREVENT THE FORMATION OF AIR POCKETS AROUND THE STAKE.
- AT LEAST TWO ROWS OF STAKES SHALL BE USED IN A PARTICULAR AREA TO COVER THE RANGE OF WATER LEVELS. ROWS SHALL BE STAGGERED TO CREATE DIAGONAL ON CENTER SPACING.
- QUALIFIED CONTRACTOR PERSONNEL WITH EXTENSIVE EXPERTISE IN THE FIELD OF ECOLOGICAL RESTORATION SHALL REMAIN ON - SITE TO SUPERVISE PLANTING CREWS AND TO PROMPTLY

LIVE WILLOW FASCINES

- A CONTINUOUS FASCINE SHALL BE BUILT IN A PREPARED TRENCH, AS OPPOSED TO INDIVIDUAL WILLOW BUNDLES LAID END-TO-END. CONTRACTOR SHALL CONTACT ENGINEER OR PLANT ECOLOGIST PRIOR TO BEGINNING THE WORK TO ARRANGE FOR OVERSIGHT AND GUIDANCE DURING THE CONSTRUCTION OF FASCINES. TRIMMINGS OF YOUNG SUCKERS AND SOME SMALLER BRANCHES MAY BE INCLUDED IN THE FASCINES, BUT HALF OF THE STEMS IN THE FASCINES SHALL BE AT LEAST ONE-HALF (1/2) INCH IN DIAMETER. COMPLETE LIVE WILLOW FASCINES SHALL BE AT LEAST TEN (10) INCHES IN DIAMETER, WITH THE GROWING TIPS AND BUTT ENDS ORIENTED IN ALTERNATING DIRECTIONS. CUTTINGS SHALL BE STAGGERED IN THE FASCINES SO THAT THE GROWING TIPS ARE EVENLY DISTRIBUTED THROUGHOUT THE LENGTH OF THE BUNDLE. SOIL SHALL BE WORKED INTO THE FASCINES TO FILL THE VOIDS (STEMS SHALL BE IN CLOSE CONTACT) AND FASCINES SHALL BE COMPRESSED AND TIGHTLY TIED WITH BIODEGRADABLE ROPE OR TWINE OF SUFFICIENT STRENGTH AND DURABILITY. FASCINES SHALL BE TIED AT TWO- (2-) FOOT INTERVALS.
- THE TRENCH SHALL BE DUG INTO THE BASE OF THE SLOPE APPROXIMATELY ONE- (1-) FOOT DEEP OR AS SPECIFIED IN DRAWINGS. THE COIR MAT SHALL BE LAID IN THE EMPTY TRENCH WITH THE BULK OF THE FABRIC

ALONG THE LOWER (WATER) SIDE OF THE TRENCH. THE FABRIC SHALL BE STAKED SECURELY INTO THE TRENCH ON TWO- (2-) FOOT INTERVALS WITH TWO- (2-) FOOT WOODEN STAKES. LAY TWINE CROSSWAYS IN THE TRENCH AT APPROXIMATELY TWO- (2-) FOOT INTERVALS, OVERLAPPING THE SIDES OF THE TRENCH SUFFICIENT LENGTH TO WRAP AROUND THE FASCINE AND TIE. LAY THE CUTTINGS WITHIN THE TRENCH AS NOTED ABOVE. BACKFILL THE TRENCH WITH SAND OR SOIL; FILLING VOIDS BETWEEN THE CUTTINGS. TIE THE TWINE SECURELY AROUND THE FASCINE. THE COIR MAT BLANKET FOR THE ADJACENT SLOPE SHALL BE WRAPPED AROUND THE FASCINE AS SHOWN IN THE DRAWINGS. THE TRENCH ON EACH SIDE OF THE FASCINE SHALL BE BACKFILLED WITH COMPACTED TOPSOIL. THE TOP OF THE FASCINE SHALL BE SLIGHTLY VISIBLE WHEN THE INSTALLATION IS COMPLETE.

FASCINES SHALL BE STAKED FIRMLY IN PLACE WITH ONE ROW OF TWO- (2-) FOOT LONG DIAGONALLY CUT TWO- (2-) INCH BY FOUR- (4-) INCH WOODEN STAKES EVERY TWENTY-FOUR (24) INCHES, ALTERNATING SIDES OF THE FASCINE. TAPERED ENDS OF ADJACENT FASCINES SHALL BE OVERLAPPED SO THAT THE OVERALL FASCINE DIAMETER IS UNIFORM AND CONTINUOUS. TWO (2) STAKES SHALL BE USED AT EACH FASCINE OVERLAP SUCH THAT A STAKE IS DRIVEN BETWEEN THE LAST TWO TIES OF EACH FASCINE.

WILDLIFE PROTECTION FENCE

- REFER TO DETAILS FOR FENCING DETAILS.
- FENCING TO BE INSTALLED AROUND ALL TREES.

SEEDING NOTES

SEEDING AREA PREPARATION

- LIMIT SUBGRADE PREPARATION TO AREAS TO BE PLANTED WITHIN TWO WEEKS OF SUBGRADE PREPARATION. FOLLOWING SUBGRADE PREPARATION, NO VEHICLE TRACKING, EQUIPMENT ACCESS OR MATERIALS STAGING IS TO OCCUR IN PREPARED AREAS, EXCEPT FOR OPERATIONS DIRECTLY RELATED TO SEED INSTALLATION.
- MOISTEN PREPARED AREA BEFORE PLANTING IF SOIL IS DRY. WATER THOROUGHLY AND ALLOW SURFACE TO DRY BEFORE PLANTING. DO NOT CREATE MUDDY SOIL.
- LOOSEN THE SURFACE OF AREAS TO BE SEEDED WITH HAND RAKES BEFORE APPLYING SEED.

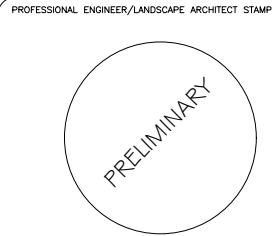
BROADCAST SEEDING

- BROADCAST SEEDING PROTOCOL TO INCLUDE ALL NATIVE REVEGETATION ZONES.
- DO NOT USE WET SEED OR SEED THAT IS MOLDY OR OTHERWISE DAMAGED IN TRANSIT OR STORAGE. DELIVER SEED TO JOB SITE IN THE ORIGINAL UNOPENED CONTAINERS AND SAVE LABELS.
- SEED SHALL BE UNIFORMLY SOWN BY BROADCASTING.
- BROADCAST SEEDING RATES SHALL BE TWICE THE AMOUNT SPECIFIED. BROADCAST SEEDING SHALL BE RAKED INTO THE SOIL TO A DEPTH OF APPROXIMATELY ONE-QUARTER INCH (1/4") TO ONE-HALF INCH (1/2").
- THE SEEDING SHALL BE DONE IN TWO (2) SEPARATE APPLICATIONS CROSSING THE AREA AT RIGHT ANGLES TO ONE ANOTHER TO GUARANTEE EVEN COVERAGE.
- DO NOT SEED DURING HIGH WINDS OR WHEN THE GROUND IS FROZEN OR OTHERWISE UNABLE TO BE WORKED.
- STRAW MULCH SHALL BE STRAW BLOWER BLOWN, CERTIFIED WEED-FREE STRAW. AT LEAST SEVENTY PERCENT (70%) OF THE MULCH BY WEIGHT SHALL BE TEN (10) INCHES OR MORE IN LENGTH. MULCH SHALL NOT CONTAIN ANY NOXIOUS WEED, MUST, MOLD, CAKE, OR DECAY. NO HAY MAY BE USED ON THE PROJECT UNLESS APPROVED IN ADVANCE BY ECOLOGIST OR LANDSCAPE ARCHITECT.
- PROTECT SEEDED AREAS AGAINST EROSION BY UNIFORMLY SPREADING STRAW MULCH AFTER COMPLETION OF SEEDING OPERATIONS. SPREAD UNIFORMLY AT A MINIMUM RATE OF 2 TONS PER ACRE (45 KG PER 100 SQ. M) TO FORM A CONTINUOUS BLANKET 1-1/2-INCHES (38-MM) LOOSE DEPTH OVER SEEDED AREAS. SPREAD BY HAND, BLOWER, OR OTHER SUITABLE EQUIPMENT.
- FOLLOW STRAW APPLICATION BY BONDED FIBER MATRIX. ATTACH FIBER VIA. HYDRO MULCH AT MANUFACTURER RECOMMENDED RATES. HYDRO MULCH EXAMPLES: RAINIER FIBER PLUS TACKIFIER
- PROTECT SEEDED SLOPES EXCEEDING 3:1 AGAINST EROSION WITH EROSION-CONTROL BLANKETS INSTALLED AND STAPLED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
- PROTECTION OF SEEDED AREAS: PROVIDE BARRIERS AS REQUIRED TO PREVENT PEDESTRIAN OR VEHICULAR TRAFFIC OVER NEWLY SEEDED AREAS UNTIL COMPLETION.
- AT THE END OF ONE GROWING SEASON, ALL SEEDED AREAS SHALL ACHIEVE 85% GERMINATION AND BE FREE OF WEEDS AND OTHER UNDESIRABLE VEGETATION.
- USE SPECIFIED MATERIALS TO REESTABLISH SEEDING AREA THAT DOES NOT COMPLY WITH REQUIREMENTS AND CONTINUE MAINTENANCE UNTIL ESTABLISHMENT IS SATISFACTORY.

IF THERE IS A DISCREPANCY BETWEEN THE PLANT COUNTS ON THE CALL-OUTS ON THE PLANS & THE ACTUAL NUMBER OF PLANT SYMBOLS DEPICTED ON THE PLANS, THE CONTRACTOR IS RESPONSIBLE FOR INSTALLING THE ACTUAL NUMBER OF PLANTS AS SYMBOLICALLY DEPICTED ON THE PLANS, WETLAND PRESERVATION AREAS TO BE SURVEYED AND FENCED PRIOR TO CONSTRUCTION. DISTURBANCE TO WETLANDS NOT EXPRESSLY IDENTIFIED AS WITHIN AREAS OF DISTURBANCE IS NOT PERMITTED AT ANY TIME UNDER ANY CIRCUMSTANCE. SHOULD DISTURBANCE TO ANY WETLANDS OUTSIDE OF DISTURBANCE AREAS BECOME NECESSARY, CONTRACTOR IS TO CONTACT LANDSCAPE ARCHITECT/ECOLOGIST PRIOR TO COMMENCING WORK IN THAT AREA.



PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
PLANTING AND SEEDING NOTES

No.	REVISION/UPDATE	Date



Town of Carbondale
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PROJECT NAME AND ADDRESS		
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623		
Project	38047	Sheet
Date	MAR 2021	D09b
Scale	NOT TO SCALE	




PLANT SCHEDULE

Symbol	Botanical	Size	Quantity	Total
	ACER GLABRUM ROCKY MOUNTAIN MAPLE	1 GAL	4	6
		5 GAL	2	
	ALNUS TENUFOLIA THINLEAF ALDER	1 GAL	71	118
		5 GAL	47	
	ARTEMISIA TRIDENTATA VASEYANA MOUNTAIN BIG SAGEBRUSH	1 GAL	4	6
		5 GAL	2	
	BETULA OCCIDENTALIS WATER BIRCH	1 GAL	68	114
		5 GAL	46	
	CHRYSOTHAMNUS NAUSEOSUS RUBBER RABBITBRUSH	1 GAL	4	6
		5 GAL	2	
	CORNUS SERICEA RED TWIG DOGWOOD	1 GAL	73	121
		5 GAL	48	
	POPULUS ANGUSTIFOLIA NARROWLEAF COTTONWOOD	1 GAL	69	115
		5 GAL	46	
	PRUNUS VIRGINIANA MELANOCARPA WESTERN CHOKEBERRY	1 GAL	4	6
		5 GAL	2	
	SALIX BEBBIANA BEBB'S WILLOW	1 GAL	79	131
		5 GAL	52	
	SALIX DRUMMONDIANA DRUMMOND'S WILLOW	1 GAL	86	143
		5 GAL	57	
	SALIX LASIANDRA WHIPLASH WILLOW	1 GAL	87	145
		5 GAL	58	
	SALIX MONTICOLA ROCKY MOUNTAIN WILLOW	1 GAL	92	154
		5 GAL	62	
	SHEPHERDIA ARGENTEA SILVER BUFFALOBERRY	1 GAL	77	129
		5 GAL	52	
		GRAND TOTAL		1,194
		TOTAL 1 GAL		716
		TOTAL 5 GAL		478

SEED MIXES

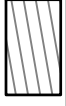

Symbol	Scientific Name	Common Name	Variety	% of Mix	Pounds
 ENHANCEMENT	Riparian Seed Mix (Enhancement: 47,631 SF and Creation:25,576 SF)- 1.7 ACRES at 60 LBS/ACRE				
	Calamagrostis canadensis	Bluejoint reed grass		10%	10.2
	Deschampsia cespitosa	Tufted hair grass		20%	20.4
	Elymus trachycaulus	Slender wheatgrass		20%	20.4
	Glyceria striata	Fowl manna grass		10%	10.2
	Juncus arcticus	Wire rush		10%	10.2
	Pascopyrum smithii	Western wheatgrass		20%	20.4
 CREATION	Poa secunda	Bluegrass		10%	10.2
	Total Pounds - Riparian Seed Mix			100%	102.0
	Non-Irrigated Seed Mix - .07 ACRES at 60 LBS/ACRE				
	Achnatherum hymenoides	Indian ricegrass		10%	0.4
	Bouteloua gracilis	Blue grama		15%	0.6
	Elymus trachycaulus	Slender wheatgrass		25%	1.1
	Nassella viridula	Green needlegrass		15%	0.6
 CREATION	Pascopyrum smithii	Western wheatgrass		25%	1.1
	Pseudoroegneria spicata	Bluebunch wheatgrass	secar	10%	0.4
	Total Area - Non-Irrigated Seed Mix			100%	4.2
	Wetland Seed Mix - .01 ACRES at 80 LBS/ACRE				
	Deschampsia cespitosa	Tufted hair grass	Peru Creek	30%	0.24
	Elymus trachycaulus	Slender wheatgrass	Sodar	30%	0.24
	Calamagrostis canadensis	Bluejoint reed grass		5%	0.04
 CREATION	Juncus arcticus	Wire rush		10%	0.08
	Poa palustris	Fowl Bluegrass		25%	0.20
	Total Area - Non-Irrigated Seed Mix			100%	0.80

WETLAND PLUGS


Symbol	Botanical	Common Name	Size	% of Mix	Quantity
Wetland Creation Type A Plugs Spaced 12" O.C.					
	Carex aquatilis	Water sedge	10 ci plug	16%	35
	Carex lanuginosa	Wooly sedge	10 ci plug	17%	37
	Carex nebraskensis	Nebraska sedge	10 ci plug	17%	37
	Carex utriculata	Beaked sedge	10 ci plug	17%	37
	Schoenoplectus acutus	Hardstem bulrush	10 ci plug	17%	37
	Sparganium eurycarpum	Common bur reed	10 ci plug	16%	35
	Total Wetland Creation Zone 1			100%	220
Wetland Creation Type B Plugs Spaced 12" O.C.					
	Carex microptera	Small winged sedge	10 ci plug	14%	16
	Eleocharis palustris	Great spike rush	10 ci plug	14%	16
	Juncus arcticus	Wire rush	10 ci plug	14%	16
	Juncus confuses	Colorado rush	10 ci plug	15%	17
	Juncus ensifolius	Swordleaf rush	10 ci plug	15%	17
	Juncus tracyii	Torrey's rush	10 ci plug	14%	16
	Schoenoplectus pungens	American threesquare bulrush	10 ci plug	14%	16
	Total Wetland Creation Zone 2			100%	113
Wetland Creation Type C Plugs Spaced 12" O.C.					
	Calamagrostis canadensis	Bluejoint reed grass	10 ci plug	34%	105
	Festuca thurberi	Thurber's fescue	1 GAL	33%	102
	Glyceria striata	Fowl manna grass	1 GAL	33%	102
	Total Wetland Creation Zone 3			100%	308

WETLAND PLANTINGS AND SEEDING IS NOT DEPICTED ON PLAN SET. ALL WETLAND PLANTINGS AND SEEDING AREAS ARE TO BE FIELD IDENTIFIED, FLAGGED AND APPROVED BY PROJECT ECOLOGIST.

LIVE STAKES AND FASCINE

Symbol	Restoration Element	NOTES	Total
	Live Stakes Salix spc (70%), Populus Angustifolia (30%)	Stakes are to be spaced 24" O.C. where indicated in bank restoration zones. All other stake locations are to be field identified, flagged, and staked per project ecologist. Create bundles using 10% of total stakes (276 stakes grouped to create roughly 35 live stake bundles)	1200 INDIVIDUAL STAKES
	Willow Fascines Salix spc	Build and install willow fascines re: details and notes. Fascines to be minimum 6" in diameter	590 LINEAR FEET

SOILS

 RIPARIAN CREATION TOPSOIL (IMPORTED, 6" DEPTH)
TOTAL: 237 CF

*ALL OTHER AREAS (RIPARIAN ENHANCEMENT, WETLAND CREATION, AND UPLAND PLANTING) TO USE EXISTING TOPSOIL ON SITE.

PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
OVERALL PLANTING SCHEDULE AND
SEED MIXES

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



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PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project	38047
Date	MAR 2021
Scale	NOT TO SCALE
Sheet	
D09c	

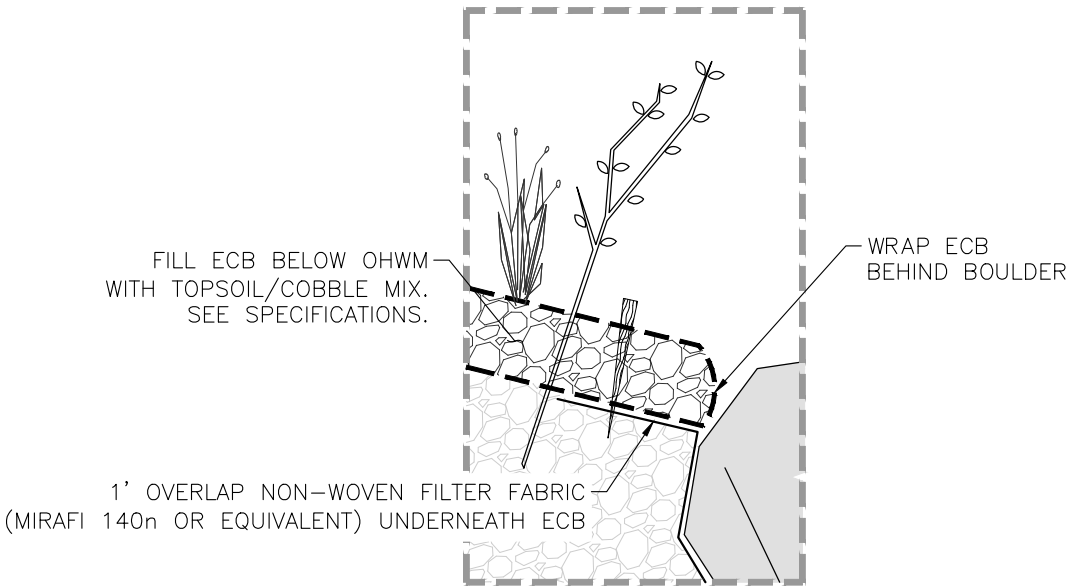


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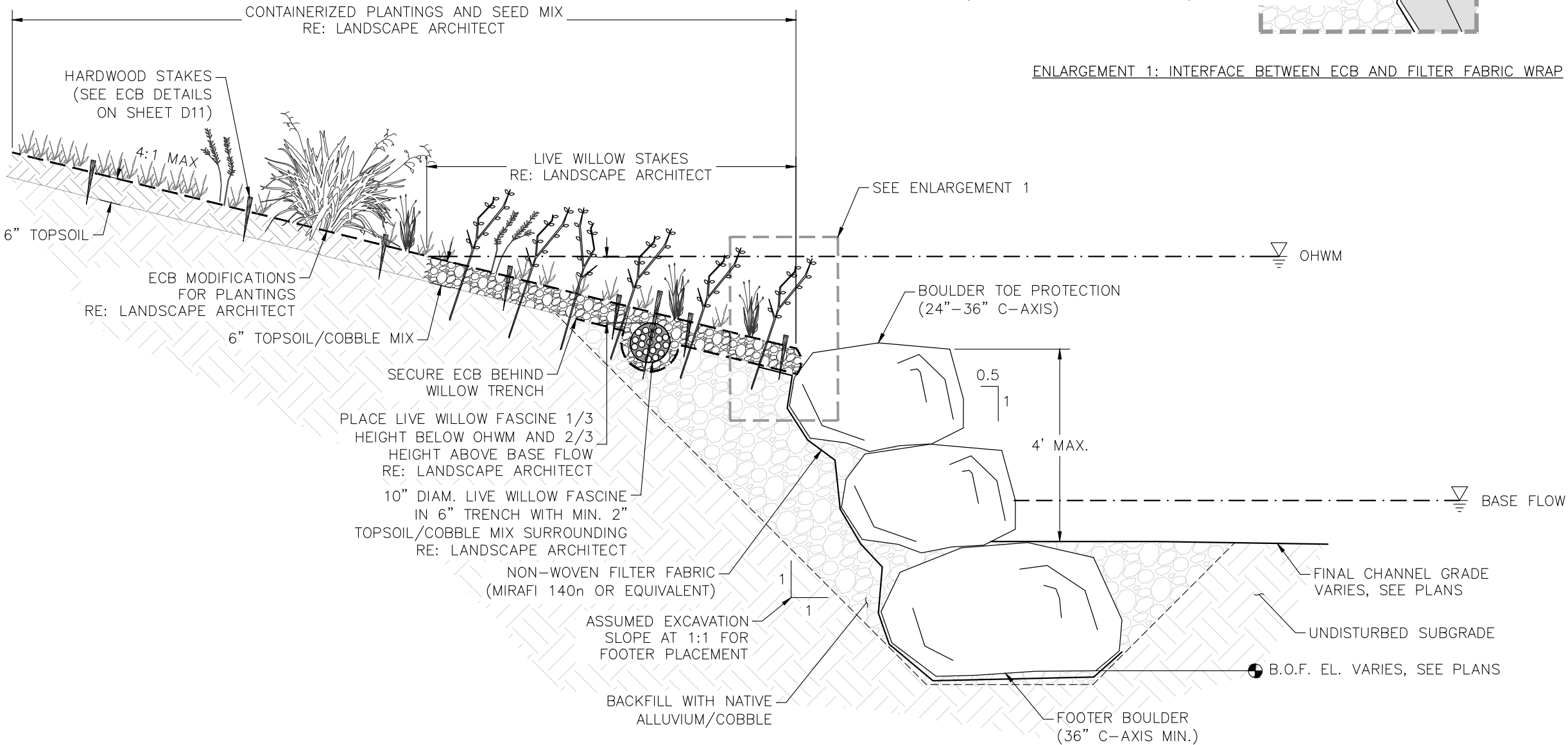
BANK RESTORATION AREA	TREATMENT TYPES	WSE (FT)	
		BASEFLOW	OHWM
BANK 1 D/S ROCK BARB	TYPE C	6195.0	6196.7
BANK 1 U/S ROCK BARB	TYPE D	6195.5	6197.7
BANK 2	TYPE C, E	6196.9	6200.1
BANK 3	TYPE E	6197.6	6201.8
BANK 4	TYPE C	6198.5	6203.4
BANK 5 D/S GRADE CONTROL	TYPE C, E	6201.6	6204.3
BANK 5 U/S GRADE CONTROL	TYPE E	6201.9	6204.8
BANK 6	TYPE C, E	6202.2	6206.3

NOTES:

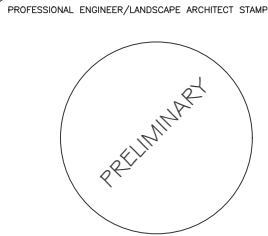
- EROSION CONTROL BLANKET (ECB) SHALL BE COARSE BIODEGRADABLE WOVEN COIR 700 OR EQUIVALENT. ECB SHALL BE ANCHORED AND MODIFIED FOR PLANTINGS PER LANDSCAPE ARCHITECT DIRECTION. SEE SHEET D11.
- SEED, STRAW MULCH, AND BONDED FIBER MATRIX ARE TO BE INSTALLED BELOW ECB, RE: LANDSCAPE ARCHITECT. TO THE GREATEST EXTENT POSSIBLE, LMIT ACTIVITY IN THESE ZONES POST-SEEDING.



ENLARGEMENT 1: INTERFACE BETWEEN ECB AND FILTER FABRIC WRAP




1 BANK RESTORATION – TYPE “C” (TYP)
D10a PROFILE VIEW – NTS



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION DETAILS - TYPE C

No.	REVISION/UPDATE	Date

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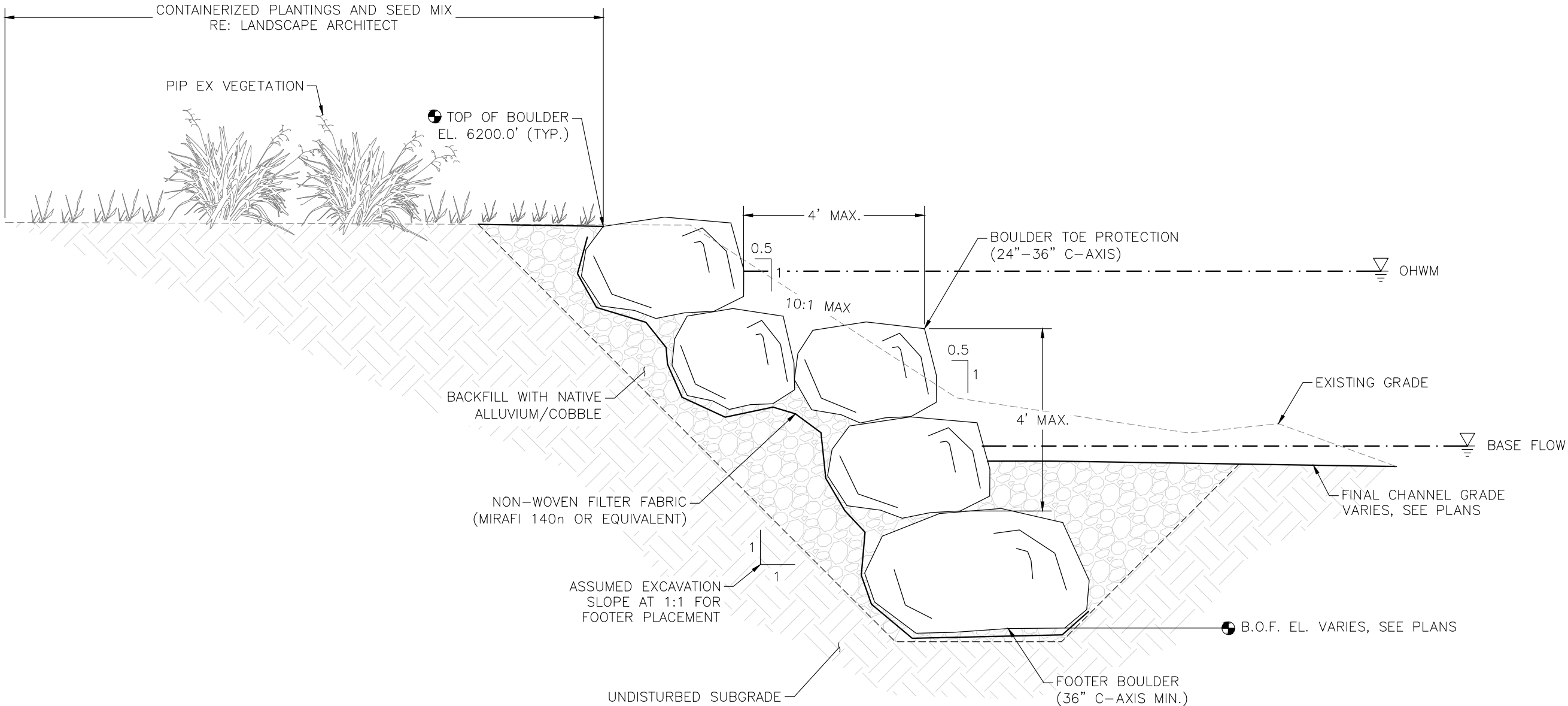
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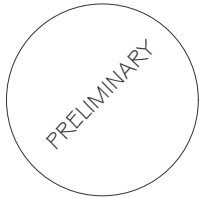
PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet D10a
Date March 2021	Scale NOT TO SCALE

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION

BANK RESTORATION AREA	TREATMENT TYPES	WSE (FT)	
		BASEFLOW	OHWM
BANK 1 D/S ROCK BARB	TYPE C	6195.0	6196.7
BANK 1 U/S ROCK BARB	TYPE D	6195.5	6197.7
BANK 2	TYPE C, E	6196.9	6200.1
BANK 3	TYPE E	6197.6	6201.8
BANK 4	TYPE C	6198.5	6203.4
BANK 5 D/S GRADE CONTROL	TYPE C, E	6201.6	6204.3
BANK 5 U/S GRADE CONTROL	TYPE E	6201.9	6204.8
BANK 6	TYPE C, E	6202.2	6206.3



1 BANK RESTORATION – TYPE "D" (TYP)
D10b PROFILE VIEW – NTS



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
BANK RESTORATION DETAILS - TYPE D

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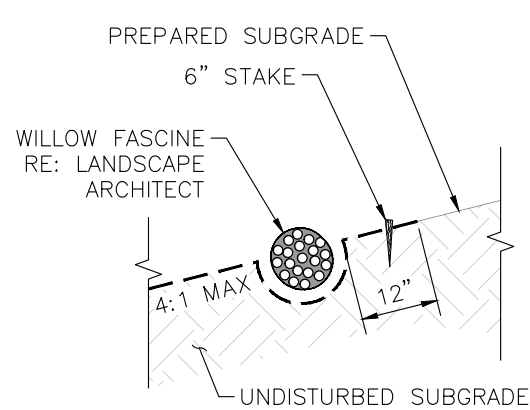


FIGURE A: KEY-IN BEHIND WILLOW TRENCH – NTS

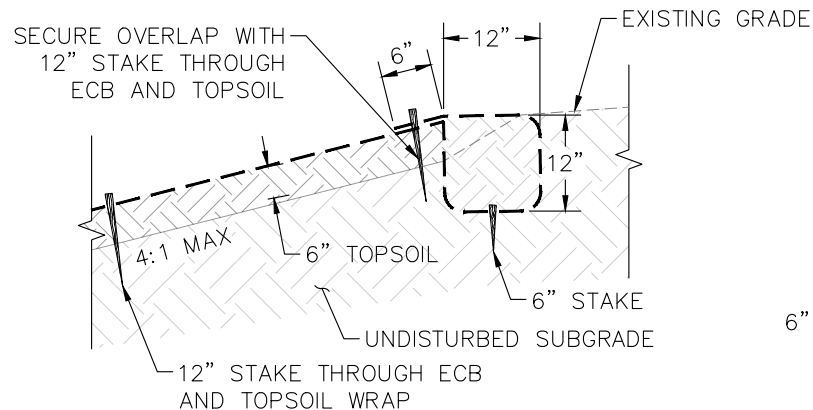


FIGURE B: SECURE ECB AT TOP OF BANK – NTS

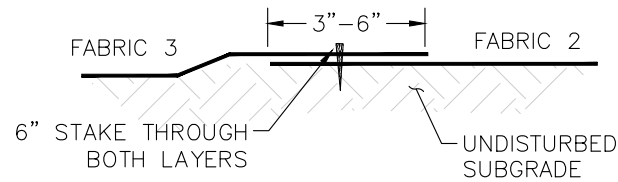


FIGURE C: CROSS SECTION VIEW OF OVERLAP – NTS

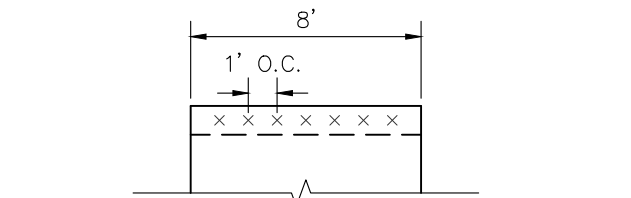
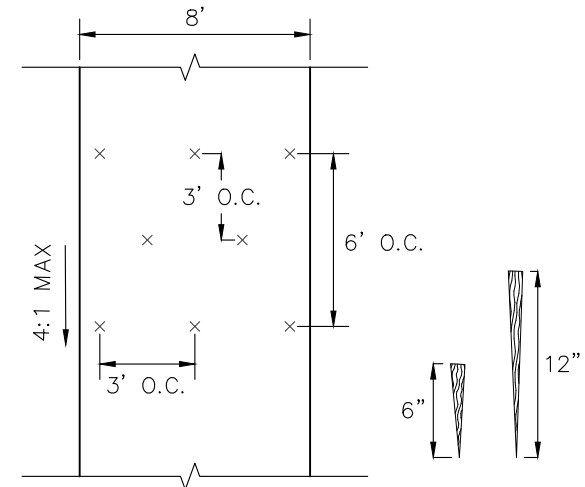


FIGURE D: TOE STAKE SPACING PLAN VIEW – NTS



× DENOTES STAKE LOCATION
(APPROXIMATELY 0.7 STAPLES PER SY)

FIGURE E: STAKE SPACING PLAN VIEW – NTS

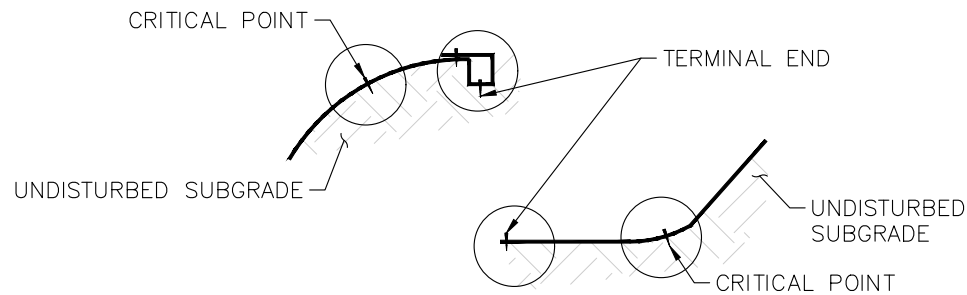


FIGURE F: CRITICAL POINT SECURING – NTS

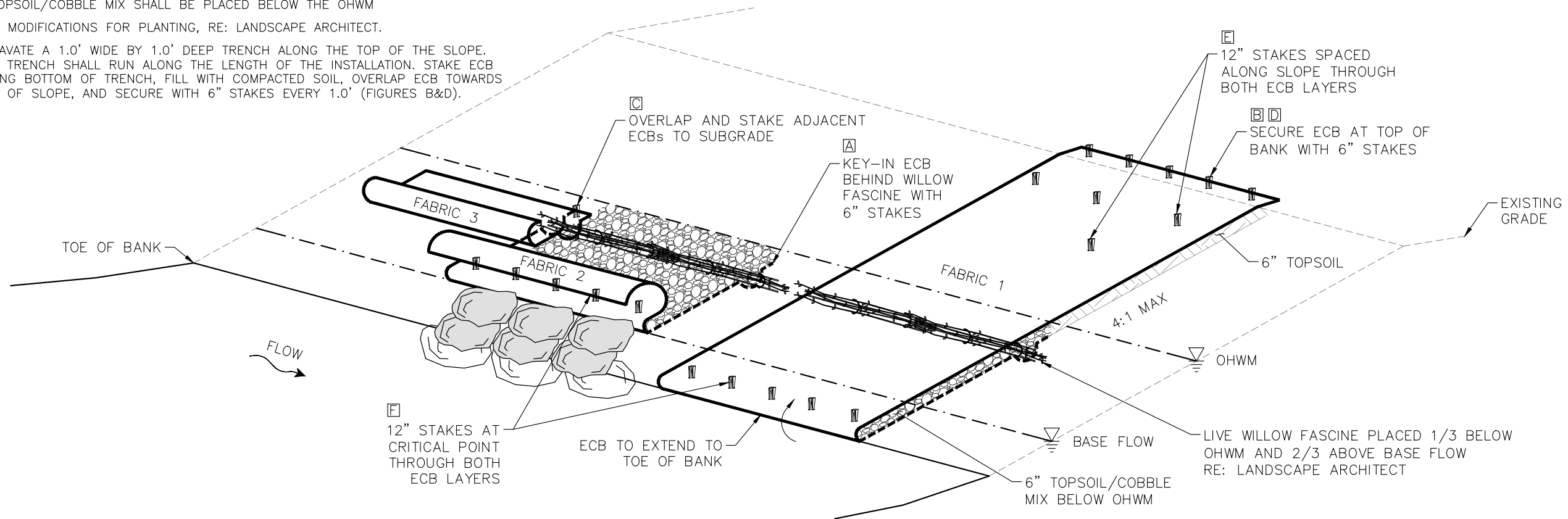
ECB INSTALLATION NOTES:

- CONTRACTOR SHALL USE ALL NATURAL 100% BIODEGRADABLE COIR 700 EROSION CONTROL BLANKETS (ECBs). STAKES SHALL ALSO BE 100% BIODEGRADABLE. SEE SPECIFICATIONS AND MANUFACTURER'S INSTALLATION GUIDELINES FOR ADDITIONAL INFORMATION.
- FOR TYPE C AND TYPE E BANK RESTORATION TREATMENT, EXCAVATE A 1.0' WIDE BY 0.5' DEEP TRENCH 1/3 DISTANCE BETWEEN ORDINARY HIGH WATER AND BASE FLOW ELEVATIONS FOR LIVE WILLOW FASCINE PLACEMENT.
- ROLL ECB DOWNSLOPE AND SECURE IN PLACE PER STAKING PLAN (FIGURE E). ECB MUST BE PLACED LOOSELY OVER GROUND SURFACE. DO NOT STRETCH.
- EDGES OF PARALLEL ECBs MUST BE STAKED WITH AN APPROXIMATE 2"–5" OVERLAP (FIGURE C). IF NEEDED, CONSECUTIVE ECBs SPICED DOWNSLOPE MUST BE OVERLAPPED END–OVER–END (SHINGLED) WITH AN APPROXIMATE 3" OVERLAP.
- IN THE FOLLOWING ORDER, APPLY TOPSOIL*, SEED MIX, STRAW MULCH AND BFM, THEN WRAP ECB AT THE TOE TOWARDS THE TOP OF BANK.

* TOPSOIL/COBBLE MIX SHALL BE PLACED BELOW THE OHWM

- ECB MODIFICATIONS FOR PLANTING, RE: LANDSCAPE ARCHITECT.

- EXCAVATE A 1.0' WIDE BY 1.0' DEEP TRENCH ALONG THE TOP OF THE SLOPE. THE TRENCH SHALL RUN ALONG THE LENGTH OF THE INSTALLATION. STAKE ECB ALONG BOTTOM OF TRENCH, FILL WITH COMPACTED SOIL, OVERLAP ECB TOWARDS TOE OF SLOPE, AND SECURE WITH 6" STAKES EVERY 1.0' (FIGURES B&D).



1
D11 EROSION CONTROL BLANKET INSTALLATION (TYP)
NTS



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
EROSION CONTROL BLANKET DETAILS

No.	REVISION/UPDATE	Date

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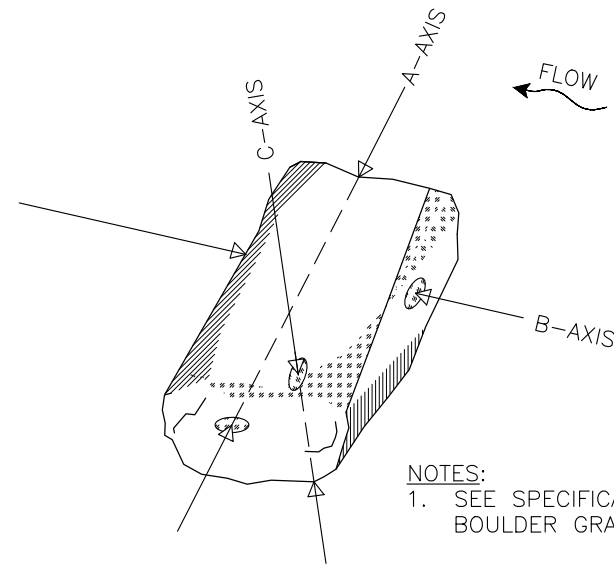
DESIGN FIRMS NAME AND ADDRESSES

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Project 38047	Sheet D11
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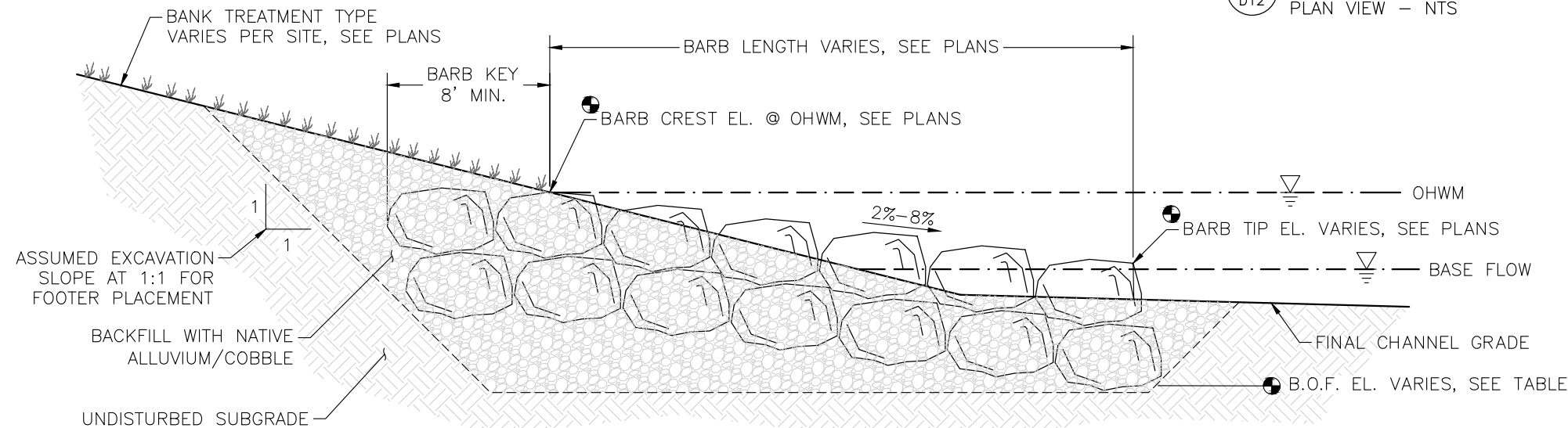
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NOTES:
1. SEE SPECIFICATIONS FOR BOULDER GRADATION.

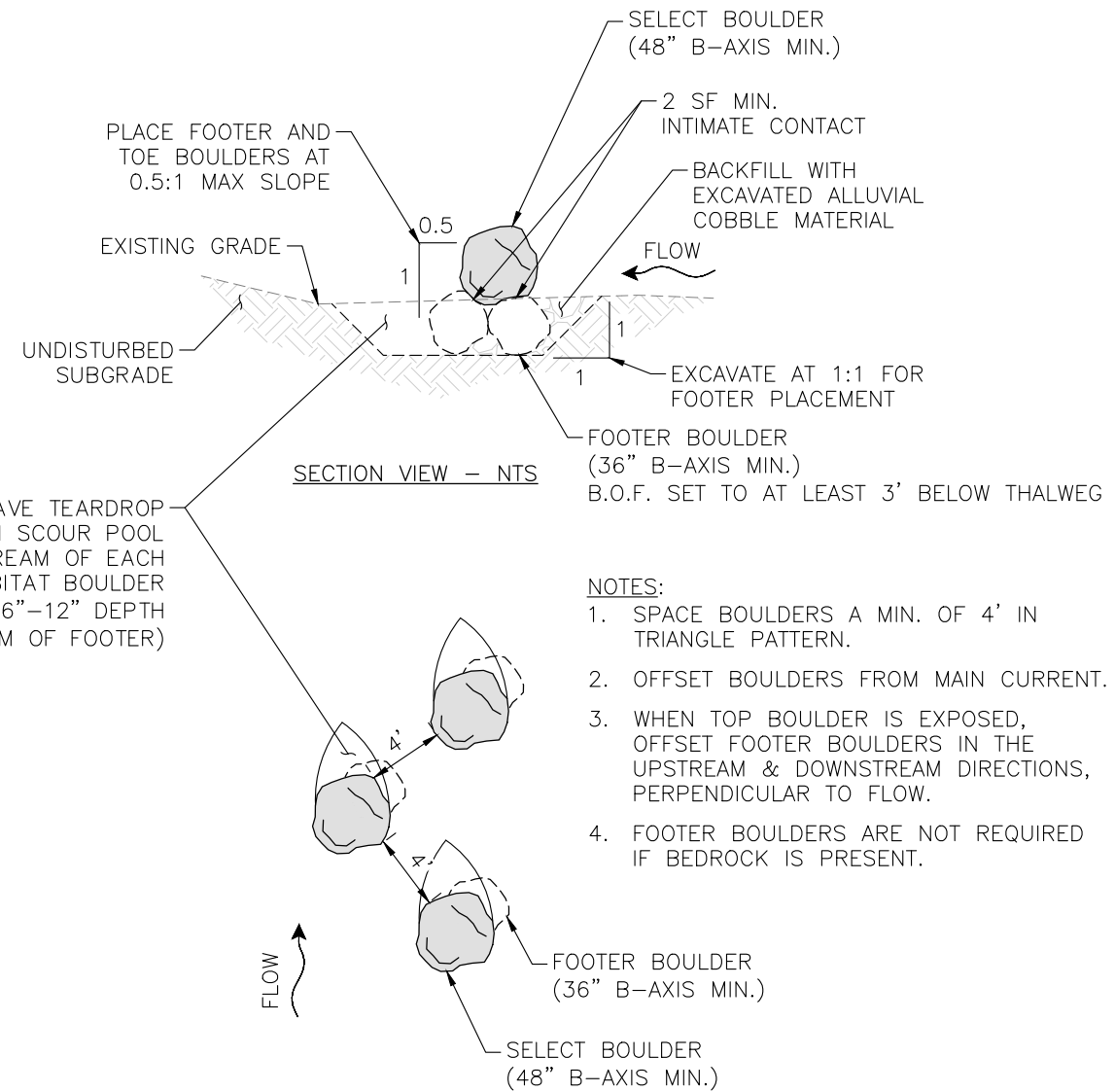
1 BOULDER AXIAL PLACEMENT (TYP)
D12 NTS

NOTES:
1. ROCK BARB SHALL CONSIST OF 36" B-AXIS SELECT BOULDER.



2 ROCK BARB (TYP)
D12 NTS

EXCAVATE/LEAVE TEARDROP SHAPE MINI SCOUR POOL DOWNSTREAM OF EACH HABITAT BOULDER (2'-3' LENGTH, 6"-12" DEPTH ABOVE BOTTOM OF FOOTER)



NOTES:
1. SPACE BOULDERS A MIN. OF 4' IN TRIANGLE PATTERN.
2. OFFSET BOULDERS FROM MAIN CURRENT.
3. WHEN TOP BOULDER IS EXPOSED, OFFSET FOOTER BOULDERS IN THE UPSTREAM & DOWNSTREAM DIRECTIONS, PERPENDICULAR TO FLOW.
4. FOOTER BOULDERS ARE NOT REQUIRED IF BEDROCK IS PRESENT.

3 HABITAT BOULDER CLUSTER (TYP)
D12 PLAN VIEW - NTS


PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND WEAVER DITCH EFFICIENCY PROJECT IN-CHANNEL BOULDER DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES



RiverRestoration.org, LLC
P.O. Box 248
Carbondale, CO 81623
www.RiverRestoration.org



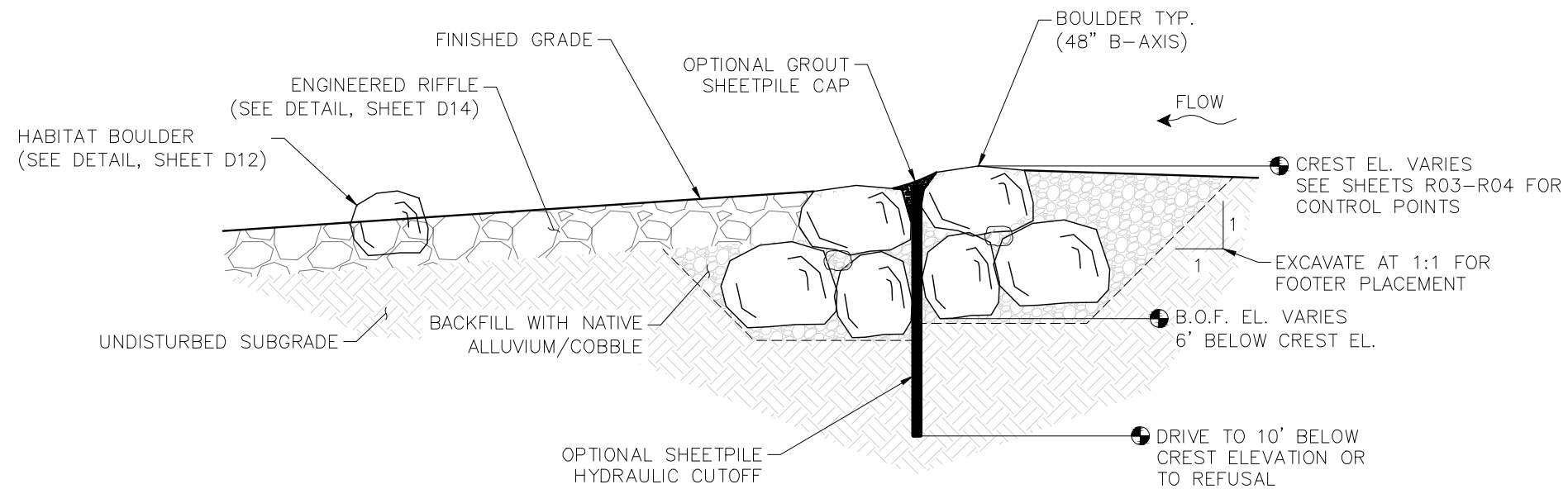
311 Main St, Suite 102
Carbondale, CO 81623
970.963.4520
www.dhmdesign.com

PROJECT NAME AND ADDRESS Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet D12
Date March 2021	Scale NOT TO SCALE

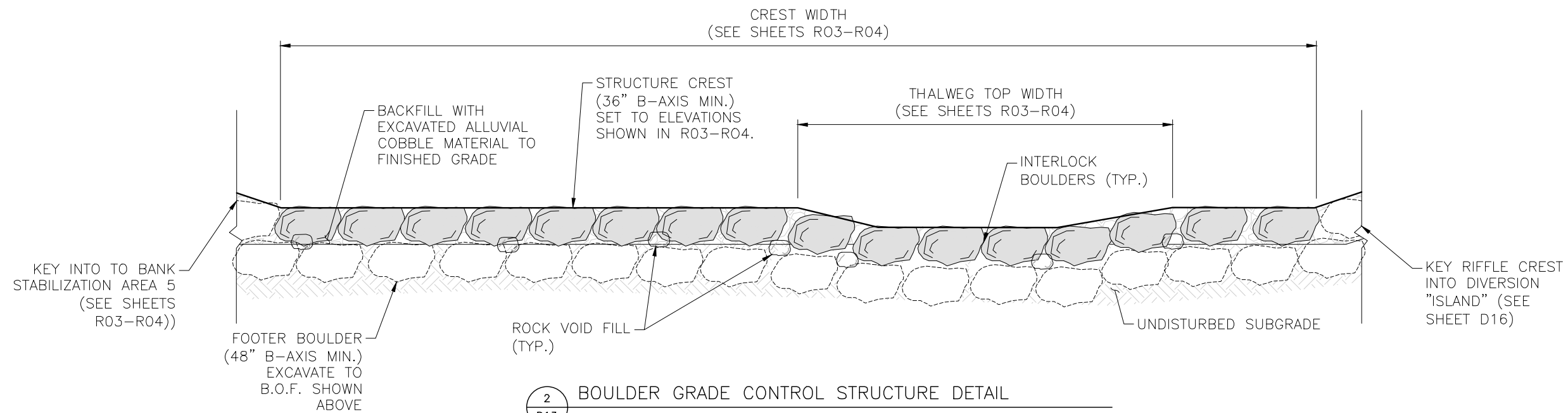
PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



PRELIMINARY



1 BOULDER GRADE CONTROL STRUCTURE DETAIL
D13 PROFILE VIEW - NTS



2 BOULDER GRADE CONTROL STRUCTURE DETAIL
D13 SECTION VIEW - NTS

No.	REVISION/UPDATE	Date

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511 Colorado Ave
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DESIGN FIRMS NAME AND ADDRESSES



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PROJECT NAME AND ADDRESS

Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

Project
38047Date
March 2021Scale
NOT TO SCALE

Sheet

D13

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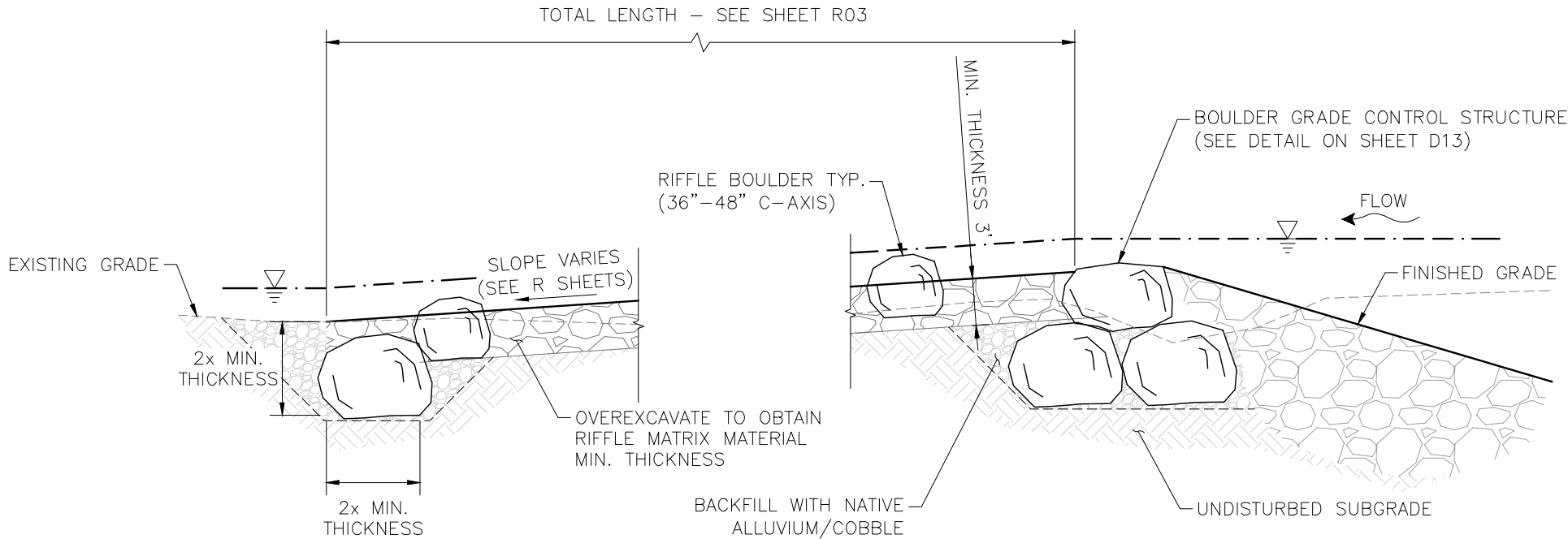
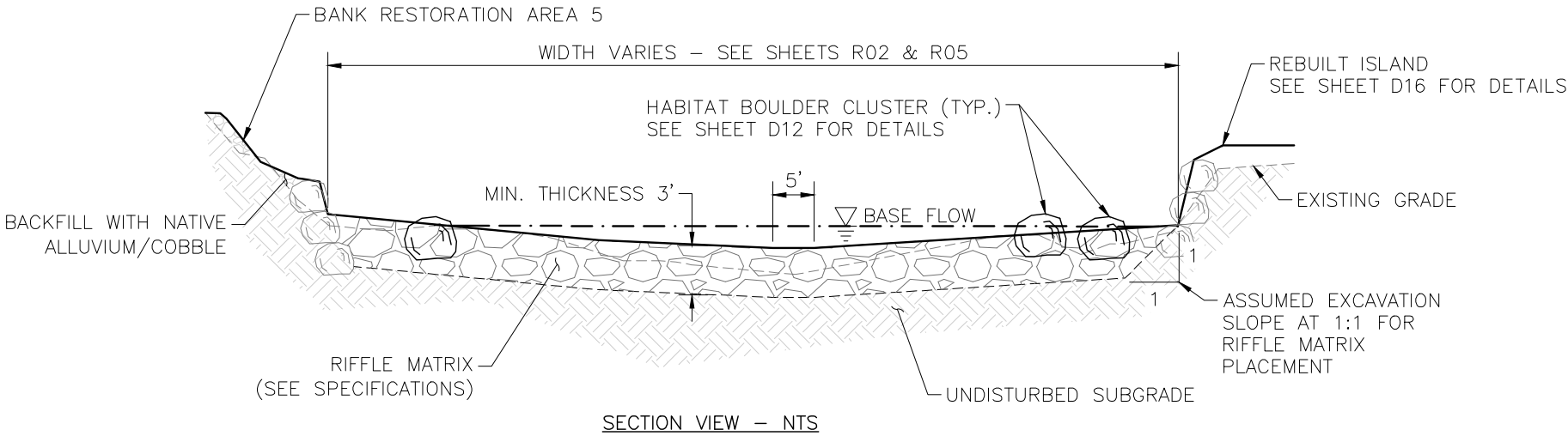
TYPE I RIFFLE MATRIX GRADATION	
PERCENT PASSING	SIZE CLASS RANGE (INCHES)
100%	36
84%	18 TO 24
50%	10 TO 12
16%	2 TO 4
10%	FINES <1 (W/SAND)

TYPE II RIFFLE MATRIX GRADATION	
PERCENT PASSING	SIZE CLASS RANGE (INCHES)
100%	24
84%	8 TO 12
50%	6 TO 8
16%	1 TO 2
10%	FINES <1 (W/SAND)

GRADATION NOTES:

1. PERCENT PASSING SIZE CLASS IS BASED ON NOMINAL DIAMETER OF ROCK.
2. NOMINAL DIAMETER SHALL BE MEASURED AS THE INTERMEDIATE AXIS WHERE THE SMALL AND LARGE AXIS SHALL NOT BE MORE THAN 3 TIMES LESS THAN OR GREATER THAN THE NOMINAL DIAMETER.
3. ACCEPTABLE RIFFLE MATERIAL MAY BE CREATED FROM STOCKPILES OF VARIOUS SIZED SCREENED MATERIALS, EXCAVATED MATERIALS, OR IMPORTED MATERIALS. SEE SPECIFICATIONS FOR MIXING RECOMMENDATIONS BASED ON ESTIMATED ONSITE MATERIALS AND SPECIFIED IMPORTED MATERIALS.

ROUGHNESS BOULDER CLASSIFICATION	
BOULDER SIZE	SIZE CLASS RANGE (INCHES)
CLASS I	> 24



1 ENGINEERED RIFFLE (TYP.)
D14 PROFILE VIEW - NTS



CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
ENGINEERED RIFFLE DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS



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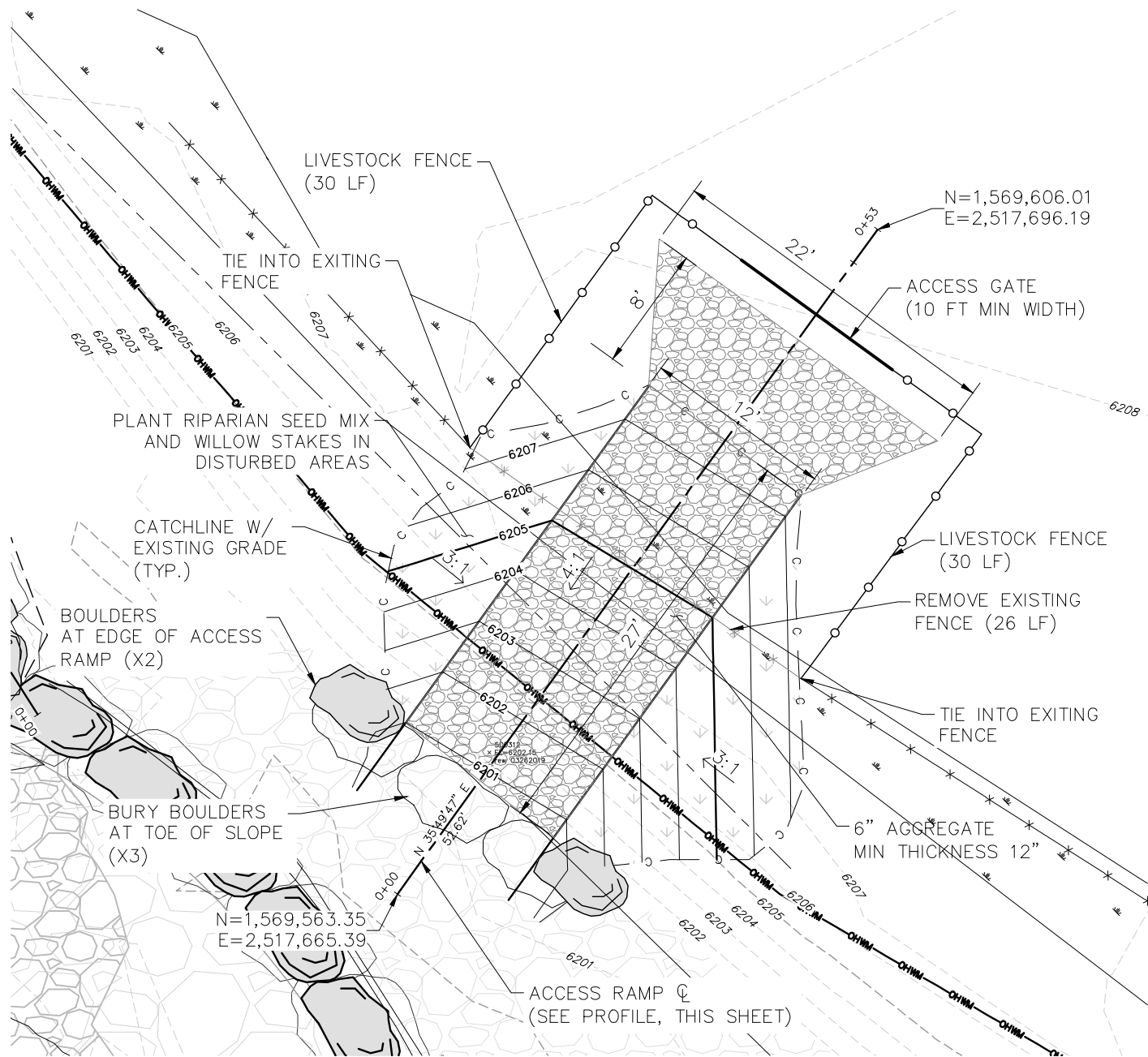


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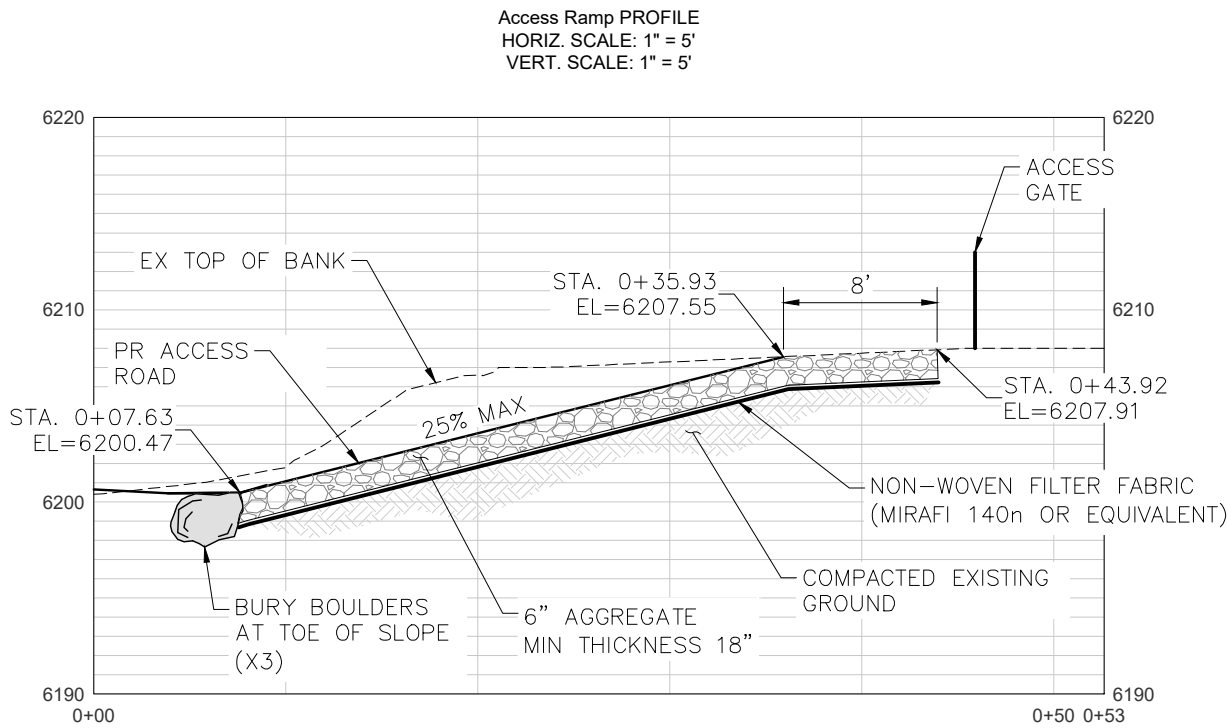
PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet D14
Date March 2021	Scale NOT TO SCALE



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MAINTENANCE ACCESS RAMP - PLAN VIEW



MAINTENANCE ACCESS RAMP - PROFILE VIEW

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
MAINTENANCE ACCESS RAMP DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS

 Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623

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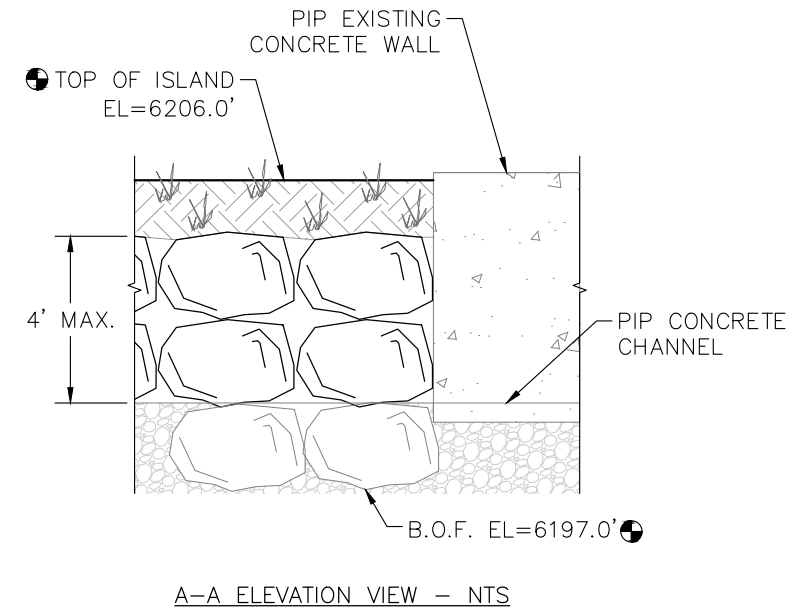
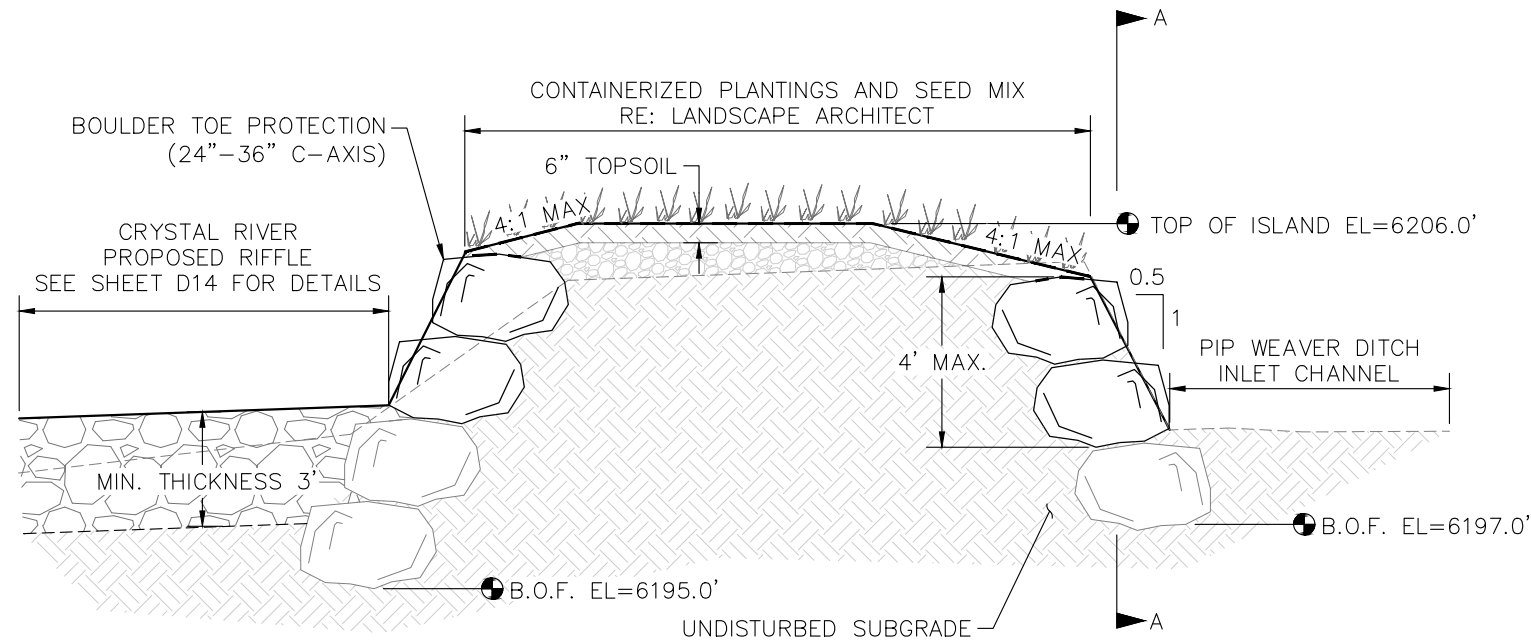
PROJECT NAME AND ADDRESS

Crystal River Restoration
and Weaver Ditch Efficiency Project
Carbondale, CO 81623

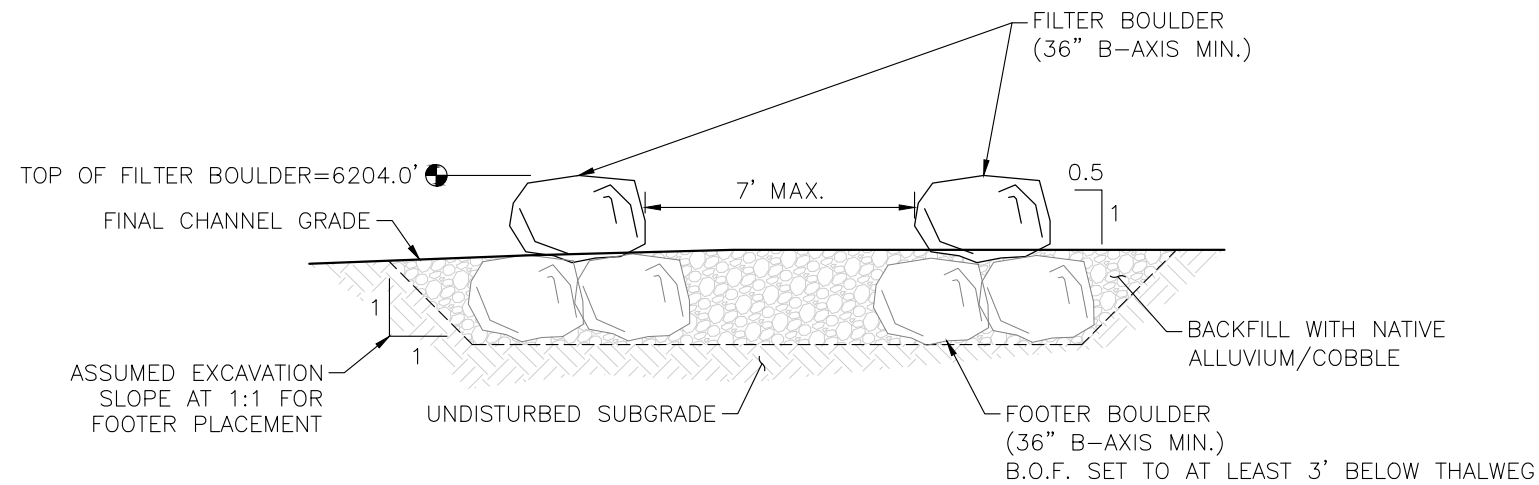
Project 38047	Sheet D15
Date March 2021	
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PRELIMINARY DESIGN - NOT FOR CONSTRUCTION





1 DIVERSION "ISLAND" REHABILITATION
D16 SECTION VIEW - NTS




2 FILTER BOULDER (TYP)
D16 SECTION VIEW - NTS

PROFESSIONAL ENGINEER/LANDSCAPE ARCHITECT STAMP

PRELIMINARY

CRYSTAL RIVER RESTORATION AND
WEAVER DITCH EFFICIENCY PROJECT
DIVERSION ISLAND DETAILS

No.	REVISION/UPDATE	Date

CLIENT NAME AND ADDRESS
 Town of Carbondale 511 Colorado Ave Carbondale, CO 81623

DESIGN FIRMS NAME AND ADDRESSES
 RiverRestoration.org, LLC P.O. Box 248 Carbondale, CO 81623 www.RiverRestoration.org  311 Main St, Suite 102 Carbondale, CO 81623 970.963.6520 www.dhmdesign.com

PROJECT NAME AND ADDRESS	
Crystal River Restoration and Weaver Ditch Efficiency Project Carbondale, CO 81623	
Project 38047	Sheet D16
Date March 2021	
Scale NOT TO SCALE	

PRELIMINARY DESIGN - NOT FOR CONSTRUCTION



TECHNICAL SPECIFICATIONS

Crystal River Restoration and Weaver Ditch Efficiency Project, Crystal River, Carbondale, Colorado



90% Percent Review Set - March 10, 2021

OWNER:

**Town of Carbondale
511 Colorado Ave
Carbondale, CO 81623**

ENGINEER:

**RiverRestoration.org, LLC
P.O. Box 248
Carbondale, CO 81623**

ARCHITECT:

**DHM Design
311 Main St
Carbondale, Colorado 81623**

Contents

SECTION 1	SCOPE OF WORK	4
1.01	GENERAL	4
1.02	KEY PROJECT PERSONNEL CONTACTS	1
1.03	CONTRACTOR QUALIFICATIONS	1
1.04	BID SCHEDULES	2
1.04.A	BID TABULATION	2
1.04.B	GENERAL	2
1.05.A	GENERAL	2
1.05.B	BID ITEM DESCRIPTIONS.....	3
SECTION 2	GENERAL CONSTRUCTION METHODS	4
2.01	PROJECT LIMITS	4
2.02	PERMITS AND REQUIREMENTS	4
2.03	CONTRACTOR SUBMITTALS	4
2.03.A:	Erosion and Sediment Control (ESC) Plan	5
2.03.B:	Spill Prevention, Control and Countermeasure (SPCC) Plan.....	5
2.03.C:	Natural Resource Protection (NRP) Plan	6
2.03.D:	Traffic Control (TC) Plan.....	6
2.03.E:	Care of Water (CW) Plan.....	6
2.03.F:	Look Ahead Construction Schedule	7
2.03.G:	Construction Materials and Products Form.....	7
2.03.H:	List of Qualified Sub-Contractors Form	7
2.03	SITE INTEGRITY	7
2.04	UTILITIES.....	8
2.05	TEMPORARY FACILITIES.....	8
2.05.A:	Staging Areas	8
2.05.B:	Dewatering Areas	8
2.05.C:	Equipment Fueling, Greasing, and Maintenance Areas	9
2.05.D:	Hauling Routes.....	9
2.05.E:	Channel Access Areas	9
2.05. F:	Temporary Bridges	9
2.05. G:	Disposal Area	10
2.06	CONSTRUCTION STAKING	10
2.09	TURBIDITY MONITORING	10
2.10	UTILIZING IN-CHANNEL MATERIALS	10
2.11	TEMPORARY DIVERSION STRUCTURES	11
2.12	HYDROLOGY	11
2.13	APPROXIMATE WSEL.....	1
SECTION 3	BEST MANAGEMENT PRACTICES.....	2
3.01	GENERAL.....	2
3.02	CHANNEL ACCESS	2
3.03	CONSTRUCTION SEQUENCING	2
3.03 A.	Initial Site Setup.....	2
3.03 B.	Staging.....	3
3.03 C.	In-Channel Structure Construction	3
3.03 D.	Final Site Restoration	4
3.04	EQUIPMENT OPERATING IN WET CHANNELS.....	4
3.05	OIL BOOM.....	5
3.06	PERMEABLE TURBIDITY BARRIER	5
3.07	STRAW BALES.....	5

3.08	SILT FENCE	6
3.09	FILTERING OF PUMPED WATER	6
3.10	REMOVAL OF BMPS	6
3.11	STRAW WATTLES	6
3.12	RIPARIAN PROTECTION	6
3.13	MATURE TREE PROTECTION	7
3.13.A.	Hand Excavations under the drip line	7
3.13.B.	Treatment of cut and exposed roots	7
3.13.C.	Root Care	8
3.13.D.	Areas of fill near PIP trees	8
3.14	ENVIRONMENTAL PROTECTION	8
3.15	BARRIERS	8
3.16	PROJECT SITE REHABILITATION	8
3.17	CULTURAL RESOURCES	8
SECTION 4	IN-CHANNEL AND BANK CONSTRUCTION	10
4.01	CONSTRUCTION OF IN-CHANNEL BOULDER STRUCTURES	10
4.04	FILTER FABRIC SPECIFICATION	11
4.05	IMPORTED BOULDERS SPECIFICATION	10
4.08	PROPOSED GRADING	12
4.09	ACCEPTABLE AS BUILT ELEVATION VARIATIONS (FEET)	12
SECTION 5	CONSTRUCTION OF CONCRETE STRUCTURES	13
5.01	GENERAL	ERROR! BOOKMARK NOT DEFINED.
SECTION 7	LANDSCAPE INSTALLATION	14
7.01	PLANTINGS	14
7.01.A.	Erosion Control Grasses	14
7.01.B	Riparian Plantings	14
5.	Transplanting On-site Vegetation	Error! Bookmark not defined.
7.01.C.	Fertilizers	Error! Bookmark not defined.
7.03	MULCH TACKIFIER	ERROR! BOOKMARK NOT DEFINED.
7.04	EROSION CONTROL BLANKET	15
7.05	TOP SOIL	15
7.05. A.	Top Soil Application	15
7.05. B.	Top Soil Material	15
SECTION 8	MODIFICATIONS TO TIME OF COMPLETION	17
8.1	CONSTRUCTION WINDOW	17
SECTION 9	DEFINITIONS	18

SECTION 1 SCOPE OF WORK

1.01 GENERAL

The purpose of this project is to rebuild the Weaver Diversion and regrade the thalweg of the Crystal River to reduce sediment deposition downstream.

The scope of this project includes constructing and/or installing the following:

- 2 boulder grade control structures
- Riffle bed forms including the grading of Boulder and Cobble and Gravel Alluvial material.
- Bank restoration areas including an outdoor classroom and fishing access points.

The project scope also includes the following tasks associated with major in-channel installations:

- Identify and maintain Erosion Control Measures and Best Management Practices (BMPs) and provide a detailed Erosion and Sediment Control Plan (ESC) Plan to be submitted prior to construction and reviewed and accepted by the Owners Representative.
- Identify and maintain Care of Water (CW) plan and BMPs involved with protecting river from construction related activities.
- Provide a detailed Spill Prevention Control and Countermeasure Plan (SPCC) Plan to be submitted prior to construction and reviewed and accepted by the Owners Representative.
- Identify and maintain measures necessary to Protect in Place (PIP) Trees, Wetlands, and other Natural Resources, and provide a detailed Natural Resource Protection Plan (NRP) Plan to be submitted prior to construction and reviewed and accepted by the Owners Representative.
- Identify and maintain Traffic Control Measures and BMPs involved with maximizing construction traffic efficiency, limiting interruption to public roadways, and protecting the public and construction personnel from construction related activities. Also provide a detailed Traffic Control Plan (TC) Plan to be submitted prior to construction and reviewed and accepted by the Owners Representative.
- PIP all driveways, utilities, parking lots, power lines, flood walls, and other structures not identified for removal.
- Install and enhance Riparian plants.
- Install Erosion Control Blankets with topsoil and seeding.
- Haul off and dispose of unclassified excavation removed from the channel and banks and dewater as necessary.
- Restore construction staging areas and access areas to equal or better than pre-construction condition.

In accordance with these Specifications and as shown on the Project Drawings.

1.02 KEY PROJECT PERSONNEL CONTACTS

References to the OWNER and/or OWNERS REPRESENTATIVE are to Town of Carbondale. The following is a list of Project stakeholders and their contact information. CONTRACTOR shall notify all stakeholders 5 days prior to construction:

1. Town of Carbondale (OWNER)
Mark O'Meara
Utility Director
0171 Hwy 131
Carbondale, CO 81623
(970) 963-3140 (w)
momeara@carbondaleco.net
2. Quinn Donnelly, PE (ENGINEER)
RiverRestoration.org, LLC.
PO Box 248
Carbondale, CO 81623
(970) 947-9568 (w)
quinn.donnelly@riverrestoration.org
3. Jason Jaynes, PLA (ARCHITECT)
DHM Design
311 Main St
Carbondale, Colorado 81623
(970) 963-6520 (w)
jjaynes@dhmdesign.com

1.03 CONTRACTOR QUALIFICATIONS

Prospective bidders shall qualify as follows: A CONTRACTOR must possess adequate tenacity, perseverance, experience, integrity, reliability, timeliness, capacity, facilities, equipment, and credit. The determination of whether a CONTRACTOR possesses these criteria is at the sole discretion of the OWNER.

CONTRACTOR shall demonstrate record of successful and timely completion of river work completed during the last three years. CONTRACTOR shall submit a Statement of Qualifications (SOQ) that describes 3 relevant projects of similar scope and experience in River related work. Up to date project owner references shall be included. The SOQ shall demonstrate extensive experience in the care of natural river flows and Best Management Practices that significantly reduce environmental impacts associated with construction. The SOQ shall identify the key personnel and all subcontractors that shall perform work. The SOQ shall be submitted at part of the bid package.

1.04 BID SCHEDULES

1.04.A BID TABULATION

(To be included with Construction Drawings) – See 90% Cost Estimate for review

1.04.B GENERAL

- i. Bidder submits quantities and prices of items aggregating the Contract Price. The following articles summarize the quantities and prices. The total of work to be completed is inclusive in the Bid Schedule.
- ii. Bidder shall provide additional breakdown of quantities at the OWNER's request when considering Bidder's bid or authorizing future pay requests.
- iii. Bid Schedule quantity approximations in the Bid Documents are stated as a basis for determining bids, and they do not fix the amount of work to be done or materials to be furnished. Stated quantities are estimates for the purpose of estimating the class of work required. Actual quantities may vary as Amended by OWNER in writing. The Owner may deviate in either direction from any indicated quantities. The Bidder shall have no claim for any variation in quantity, except to the extent permitted in the General Conditions or Amended by OWNER.
- iv. Contract SHALL be awarded on a "TOTAL LUMP SUM" total contract amount, with-in available funds. OWNER may choose to omit items to fit work within available budget.

1.05 MEASUREMENT AND PAYMENT

1.05.A GENERAL

- i. ENGINEER will compute all quantities based on measurements made by CONTRACTOR or ENGINEER.
- ii. ENGINEER shall make limited and intermittent observations of the progress and content of the work to determine if the work is proceeding in general accordance with the Contract Documents.
- iii. CONTRACTOR will provide equipment, workers, and survey crews to assist ENGINEER in making measurements.
- iv. Units of measurement are listed in the bid schedule(s).
- v. Refer to Technical Specifications and Details for more detailed information to the following bid items, if applicable.

vi. Bids shall encompass any costs associated with each bid item, which in aggregate, represent the complete bid.

vii. Payment for all Lump Sum (LS) items will be made on a percentage basis as follows.

Percent of Original Contract Amount Earned	Percent of Amount Bid Item to be Paid
5	20
20	20
40	20
60	20
100	20

1.05.B BID ITEM DESCRIPTIONS

(To be included with Construction Drawings)

SECTION 2 GENERAL CONSTRUCTION METHODS

2.01 PROJECT LIMITS

The Project Limits are defined in the plans. No construction related activities or impacts shall occur outside of the project limits, excepting road access, materials acquisition and spoils haul-off and disposal, unless otherwise authorized by the OWNER in writing. Protect in place (PIP) all structures, vegetation, drainages and other within the Project Limits that are not specifically identified for construction. Mark, flag and sign all Project Limits.

2.02 PERMITS AND REQUIREMENTS

The CONTRACTOR shall comply with all applicable requirements set forth in all permits obtained for this project. Obtained permits, with associated terms and conditions, include:

U.S. Army Corps of Engineers 404 Permit number – TBD

Regional General Permit 12

Approval Date – TBD

Permit Expiration Date – TBD

Town of Carbondale Floodplain Development Permit – pending from Town

2.03 CONTRACTOR SUBMITTALS

The CONTRACTOR shall submit for review by the OWNER the following plans, schedules, and documentation. All plans and documentation shall be submitted a minimum of 5 days prior to beginning construction. Rejected plans and documentation shall be modified per review comments and re-submitted. Plans shall incorporate detailed BMPs, means, methods, and materials necessary for achieving project performance, safety, and protection targets.

Spec Section	Submittal Item	Date Due
2.03.A	Erosion and Sediment Control (ESC) Plan	5 days prior to the start of construction
2.03.B	Spill Prevention, Control and Countermeasures (SPCC) Plan	5 days prior to the start of construction
2.03.C	Natural Resource Protection (NRP) Plan	5 days prior to the start of construction
2.03.D	Traffic Control (TC) Plan	5 days prior to the start of construction
2.03.E	Care if Water (CW) Plan	5 days prior to the start of construction
2.03.F	Look Ahead Construction Schedule	Each Monday by 10:00 AM
2.03.G	Construction Materials and Product forms for approval	5 days prior to delivery
2.03.H	Qualified Sub-Contractors List	At start of construction. Changes/additions should be submitted

Spec Section	Submittal Item	Date Due
		3 days prior to start of work by specific sub-contractor
2.04	Existing Conditions Documentation	Prior to the start of construction activities.

2.03.A: Erosion and Sediment Control (ESC) Plan

CONTRACTOR shall submit an Erosion and Sediment Control (ESC) Plan which shall detail all of the proposed BMPs, means, methods, and materials used to prevent and/or control storm water and potential erosion and sediment mobilization above the OHWM including surrounding construction, dewatering and staging areas. The ESC Plan shall include a detailed narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors and Notifications.

2.03.B: Spill Prevention, Control and Countermeasure (SPCC) Plan

CONTRACTOR shall submit a Spill Prevention, Control and Countermeasures (SPCC) Plan which shall detail all of the proposed BMPs, means, methods, and materials used to prevent and/or mitigate spills or other releases of fuels, chemicals, oils, sewage, and other contaminants within and surrounding all in-channel and upland construction and staging areas, and from entering Waters of the US. SPCC Plan shall include a detailed Narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors. SPCC Plan shall identify and provide contacts for all Qualified Subcontractors, OWNER, and ENGINEER.

- A. A Spill Cleanup Plan is wholly the responsibility of the CONTRACTOR and shall be posted and available at all times on site for all work areas prior to any construction activities and shall include coordination with local emergency response agencies. CONTRACTOR shall submit Spill Cleanup Plan to ENGINEER for review 5 days prior to the start of construction.
- B. A release of any chemical, oil, petroleum product, sewage, etc., which may enter waters of the State of Colorado (which include surface water, ground water and dry gullies or storm sewers leading to surface water) shall be reported to the Colorado Department of Public Health and Environment (CDPHE) immediately (25-8-601 CRS) and form <http://www.cdphe.state.co.us/hm/spillselfreportform.pdf> and/or Toll-Free 24-hour Environmental Emergency Spill Reporting Line 1-877-518-5608 may be used. Written notification to the Department shall follow within five (5) days (5 CCR 1002-61, Section 61.8(5)(d)). Releases of petroleum products and certain hazardous substances listed under the Federal Clean Water Act (40 CFR Part 116) must be reported to the National Response Center as well as to Colorado Department of Public Health and Environment as required under the Clean Water Act and the Oil Pollution Act. Furthermore, contact must be made immediately, reporting any spill incident, with CPW, the OWNER and ENGINEER.

- C. Any incident spills that do not threaten water resources shall be reported to: Colorado Emergency Planning Committee (CEPC)(members include Colorado Department of Health and Environment - Hazardous Waste Division, Colorado Department of Public Safety - Division of Homeland Security and Emergency Management, and Colorado Department of Public Safety - Colorado State Patrol), at **Toll-Free 24-hour Colorado Environmental Release and Incident Reporting Line 1-877-518-5608**, <https://www.colorado.gov/pacific/cdphe/wq-environmental-spills>. Furthermore, contact must be made immediately, reporting any spill incident, with the Eagle County Health Department, the OWNER and ENGINEER. The CONTRACTOR shall submit within 14 calendar days of knowledge of the release a written description of: the release (including the type and estimate of the amount of material released), the date that such release occurred, the circumstances leading to the release, the measures taken and/or planned to be taken to clean up the release, and steps to be taken to minimize the chance of future occurrences to the Executive Secretary.

2.03.C: Natural Resource Protection (NRP) Plan

CONTRACTOR shall submit a Natural Resource Protection (NRP) Plan which shall detail all of the proposed BMPs, means, methods, and materials used to Protect-In-Place and maintain Vegetation, Wetlands, Riparian Corridor, Soils and Waters, Cultural Resources and Environmental Quality on and surrounding all Construction and Staging Areas prior to and during all stages of construction.

2.03.D: Traffic Control (TC) Plan

CONTRACTOR shall submit a Traffic Control (TC) Plan, to include the Roads, Parking Areas, Walking Paths, Boat Ramps, River Navigation, and Construction Access to be approved by the OWNER. The (TC) Plan shall detail all of the proposed BMPs, means, methods and materials used to maintain street traffic surrounding all construction and staging areas, and to isolate construction and staging areas from the public. TC Plan shall include Site Access, Traffic Control, and Public Safety plans for all stages of construction, and shall include a detailed Narrative as well as specific Locations, Maps, and Schedules. TC Plan shall identify and provide contacts for all Qualified Subcontractors, OWNER, ENGINEER, and 24-Hour Emergency Traffic Control Technician. No construction activities shall impede public traffic patterns prior to written approval from the OWNER. If CONTRACTOR finds it necessary to close any Paths or re-route traffic, the OWNER shall work with CONTRACTOR approve a reasonable alternative route.

2.03.E: Care of Water (CW) Plan

CONTRACTOR shall submit a Care of Water (CW) Plan which details all of the proposed BMPs, means, methods, and materials used to manage and treat waters below the OHWM in order to access the work. The ENGINEER will provide a recommended construction sequencing strategy and typical on-site water management details in the project plans for reference; however, it is wholly the responsibility of the CONTRACTOR to design, submit for approval, and implement a comprehensive and site-specific CW Plan. The CW Plan shall include a detailed

Narrative as well as specific Locations, Maps, and Schedules for all stages of construction, and shall identify and provide contacts for all Qualified Subcontractors. The Plan shall include a specific and detailed plan for returning on-site waters to the active channel which includes settling, pumping, and filtration methods and locations. The CW Plan should incorporate the details of the provided SW Plan. The final accepted CW Plan shall provide a reliable means to conform to allowable construction discharge turbidity regulations and shall include methods and schedules for turbidity monitoring.

2.03.F: Look Ahead Construction Schedule

The CONTRACTOR shall submit an updated construction Look Ahead Schedule each Monday morning by 10:00 AM during construction via email. The Look Ahead Schedule shall list activities for the next 2 weeks and should include the following:

- All forecasted tasks associated with in-channel and upland construction, mobilization, staging and access, and materials acquisition and delivery.
- Completed construction tasks
- Report submittals
- Permit timeframes and deadlines
- Anticipated Inspections

2.03.G: Construction Materials and Products Form

All construction materials shall conform to the requirements detailed in project plans and specifications. All materials shall be submitted to the OWNER and ENGINEER for approval at least 5 days prior to delivery to the construction site.

2.03.H: List of Qualified Sub-Contractors Form

At the start of construction, the CONTRACTOR shall submit a list of all Qualified Sub-Contractors to be used during any and all stages of Mobilization, Site Access, and Construction. The List shall include contractor license numbers and contact phone numbers and email addresses. If changes or additions are needed, these modifications shall be submitted to the OWNER and ENGINEER for approval at least 3 days prior to that specific sub-contractor beginning work on the project.

2.04 SITE INTEGRITY

The CONTRACTOR is required to document the condition of Utilities, Adjacent Streets and Sidewalks, Recreation Area Facilities, Construction Access Areas on the banks, Wetlands, Mature Vegetation and the general area with pictures and video recordings, submitted to OWNER and ENGINEER prior to any construction phase and after each phase of construction is completed. The pictures and video recording shall document the surface integrity of the structures with clear and recognizable reference features or established and repeatable reference markers in the field of view. The CONTRACTOR is responsible for rehabilitating, repairing or replacing, to better than pre-construction conditions, any damage to the structures, roads, and vegetation not specifically identified for disturbance.

2.05 UTILITIES

CONTRACTOR shall field-locate and mark all utilities within or adjacent to the Project. Any utility locations marked on plans are approximate and actual field location of any utility is wholly the responsibility of the CONTRACTOR. Any temporary interruption to utilities shall be planned and coordinated with the appropriate utility provider by the CONTRACTOR. OWNER shall be notified of any such interruptions 10 days prior. CONTRACTOR shall protect in place all utilities.

2.06 TEMPORARY FACILITIES

CONTRACTOR shall provide all temporary facilities required for performing the work. Temporary construction facilities and temporary utility connections are solely the CONTRACTOR's responsibility based on his selected method of operation and schedule. CONTRACTOR is responsible for providing a clean and safe environment for all workers on the job site. CONTRACTOR is responsible for providing sanitary facilities. CONTRACTOR shall follow Occupational Safety and Health Administration (OSHA) regulations. CONTRACTOR is responsible for providing all electrical, water and utility needs. CONTRACTOR shall keep the Project Limits in a neat and orderly manner. CONTRACTOR is responsible for removing temporary facilities and controls after completion of all Work.

2.06.A: Staging Areas

Preliminary Staging Areas are shown on the Plans. All construction staging, stockpiling of materials, equipment storage, equipment fueling and maintenance, and other, shall take place in designated areas with adequate barriers to protect the public from entry. Staging areas shall have a designated office or contact information posted for public inquires. Staging areas shall provide employees all necessary facilities, legal postings, and safety protocol. Staging area shall include temporary restroom facilities maintained and serviced as necessary. The CONTRACTOR is responsible for maintaining a clean and organized staging area and restoring all disturbed areas equal to pre project conditions.

2.06.B: Dewatering Areas

Construction activities are anticipated to produce clean fill materials, as well as some other waste materials. All excess materials produced by construction activities shall be properly disposed. Prior to construction activities CONTRACTOR shall report any materials disposal locations to the OWNER. All disposal locations, and means and methods of disposal, shall be in accordance with any applicable regulations and permits, and it is solely the responsibility of the CONTRACTOR to acquire any applicable permits. Dewatering areas shall have adequate BMPs in place to stockpile material prior to disposal. Any temporarily stockpiled materials shall be covered and protected from wind and rain-drop erosion with durable plastic sheeting and sandbags prior to and during storm events. Dewatering areas may also be configured to include a Washout Area for concrete pours. Pours shall not be conducted during or before an anticipated storm event. All excess concrete and concrete washout slurries from the concrete mixer trucks

and chutes shall be discharged off site, or temporarily into a washout area designated in an unvegetated upland location and completely isolated from stormwater and drainage. All concrete residues shall be hauled off-site and properly disposed. Returning water from dewatering areas to surface flow routes may require a dewatering permit from the CDPHE and is wholly the responsibility of the CONTRACTOR.

2.06.C. Equipment Fueling, Greasing, and Maintenance Areas

Any and all fueling and greasing of equipment shall be in designated upland locations, with adequate BMPs to contain any potential spill. All major equipment/vehicle maintenance shall be performed off-site. Fuel tank may be kept on-site in the staging area with drip pans underneath the fueling area. All equipment fluids generated from maintenance activities shall be disposed of into designated drums stored on spill pallets in accordance with hazardous waste management practices. Drip pans shall be placed under all equipment receiving minor or routine maintenance. All equipment shall be inspected daily for leaks and proper function. Leaking or otherwise improperly functioning equipment shall not be used in any capacity for construction activities. Any equipment found to be leaking upon inspection shall be immediately taken out of service for maintenance.

2.06.D. Hauling Routes

The import and export of materials from the project limits shall occur at designated locations on defined haul routes. The access routes to construction sites shall be maintained by the CONTRACTOR with standard maintenance activities, including minimizing and mitigating for equipment Track Out. Loads shall be covered while hauling where necessary. Haul routes shall be repaired, at the completion of the work, to pre project conditions as determined by OWNER.

2.06.E. Channel Access Areas

CONTRACTOR shall be responsible for establishing and maintaining channel access sites for equipment and workers within Project Limits defined on plans and for rehabilitating access sites once construction is complete. Channel access ramps will be graded per plan in order to protect flood walls and other bank structures from equipment damage. Gravel berms shall be installed at the top of the access ramp and other areas to eliminate sheet flow or drainage onto the exposed or disturbed Riverbanks. A silt barrier shall be erected along the toe of any and all out-of-channel open cuts to eliminate the migration of material outside of the limits of work. Straw Bales or wattles shall be used at the toe of the ramp when the access is not in use to prevent the migration of material into the River.

2.06. F. Temporary Bridges

Coffered, in-channel construction areas will require access through the use of temporary culvert or bridges spanning the remaining active channel. The CONTRACTOR is solely responsible for installing and maintaining temporary culverts/bridges where necessary. Culverts/bridges must adequately sized and load rated to safely accommodate the planned equipment traffic. The CONTRACTOR is responsible for obtaining any necessary permits for the installation and

operation of temporary culverts/bridges and is responsible for facilitating any required inspections.

2.06. G. Disposal Area

CONTRACTOR to provide for an offsite disposal area for inert, clean fill materials required to be removed from the site such as alluvium and bank material.

2.07 CONSTRUCTION STAKING

The ENGINEER shall provide adequate horizontal and vertical control points for the CONTRACTOR to establish the lines and grades shown on the plans. The ENGINEER shall provide initial construction staking. Grade elevations and additional construction staking shall be wholly the responsibility of the CONTRACTOR.

Established control points shall be provided with special colored flagging and it shall be the responsibility of the CONTRACTOR to protect those control points. In the event they are lost, due to any cause, the CONTRACTOR shall re-establish adequate and permanent control markers.

The ENGINEER will provide a proposed XML compatible digital surface model and river alignment to the CONTRACTOR. The CONTRACTOR shall have the means to load the alignment and surface into a field survey controller, for use in layout, checking, and as-builts of any location in the project area. Surveyor shall be available for ENGINEER'S request. Prior to construction grading activities, CONTRACTORs site localized survey/stake-out equipment will be validated as accurate with the ENGINEER or Surveyor's equipment to within the following tolerances:

See Sheet G02 for Horizontal Control and Datums.

2.08 TURBIDITY MONITORING

During periods of in-river construction turbidity of the water 200 yards downstream of the Project Limits shall not be visually greater than the turbidity of the water upstream of the Project Limits. BMPs to limit turbidity increases shall include: intermittent excavation; construction during periods of elevated background turbidity; Care of Water, and structural BMPs such as turbidity curtains. CONTRACTOR shall regularly monitor and daily record any turbidity increases. ENGINEER or OWNER may stop construction during ineffective BMPs and visual increases of downstream turbid conditions. The CONTRACTOR is wholly responsible for time delays associated with inadequate BMPs, inadequate Care of Water, or stopped work. CONTRACTOR is wholly responsible for environmental damage associated with uncontrolled sedimentation outside of the Project Limits.

2.09 UTILIZING IN-CHANNEL MATERIALS

Clean Native Alluvium that is excavated for structure placement and is to be backfilled in the

channel may be utilized in channel as temporary cofferdams or for other water control practices. Exposed Alluvium resulting in noticeable downstream turbidity shall be isolated from the flow of the channel.

Excavated clean native alluvium, boulders and clean bedrock may be allowed to be backfilled in the channel around structures within the limits of excavation as defined in plans. All other excavated material including fines and bank material shall not be placed in any flow path, shall be properly disposed of in designated disposal area and shall have appropriate erosion control measures in place. All in-stream structures shall be constructed in sections sized to minimize open excavation area. Each day of work shall be a completed work and no excavations of the bank or streambed shall be left open to erosion.

2.10 TEMPORARY DIVERSION STRUCTURES

Control of the River stage and associated access to work during construction is wholly the responsibility of the CONTRACTOR. The CONTRACTOR is responsible for designing, installing and maintaining any temporary flow diversion structures and coffer dams. Some tasks may be performed in the wet or flowing channel, however, if the CONTRACTOR selects to construct any in-channel work in an isolated area, it is the responsibility of the CONTRACTOR to design, permit and implement any isolation and dewatering measures. The project plans provide a permitted means, method, and materials for coffer dam construction for CONTRACTOR's reference. However, the CONTRACTOR shall be wholly responsible for designing, permit compliance and implementing any final Care of Water plan.

In addition to controlling the stage of the river, seepage and ground water may require additional control methods, such as pumping and discharging. The CONTRACTOR shall be wholly responsible for the selection of suitable method(s), and for design, installation, and operation of the diversion and care of the river required during the performance of the work under these specifications. The CONTRACTOR is required to design and install adequate diversion and care of water facilities in a timely fashion in accordance with his/her schedule of construction and the requirements of these specifications. All means, methods, and materials used for work area isolation and for the care of on-site waters below the OHWM shall be included in the Care of Water (CW) Plan submitted by the CONTRACTOR.

Areas disturbed for temporary diversion practices shall be restored and stabilized to pre project conditions. Failure of the CONTRACTOR to become adequately familiar with and address the existing structures, access and river conditions which impact the work may result in unnecessary construction delays and associated increased efforts for which the CONTRACTOR shall be solely responsible. Pumping and returning of coffered water may require a dewatering permit from the CDPHE and is wholly the responsibility of the CONTRACTOR.

2.11 HYDROLOGY

Hydrology herein is based on Gage USGS 09081600 CRYSTAL RIVER ABV AVALANCHE CRK, NEAR REDSTONE, CO for water years 2000 thru 2021. The 09081600 gauge may be accessed online for daily discharge data and flood prediction.

https://waterdata.usgs.gov/co/nwis/uv?site_no=09081600

There is also a stream gauge immediately upstream of the site operated by the State of Colorado. There are not enough years of record on this gauge for a statistical analysis but does provide a more accurate measurement of streamflow through the site.

Crystal River at DOW Fish Hatchery AB Carbondale - CRYDOWCO

<https://www.dwr.state.co.us/Tools/Stations/CRYDOWCO?params=DISCHRG>

Real time data may be seasonal and is provisional, subject to change. Statistical Analysis of historical data is not a guarantee for the flow rates during construction and are provided herein solely for the information of the CONTRACTOR. Maintenance of the river flows, Care of Water, diversions, erosion, environmental protection, BMPs and river stages during the construction period, and damage or delays due to, are wholly the responsibility of the CONTRACTOR.

TABLE 2-11. Percent of record that average daily flows were exceeded on the Crystal River near the Project Area (cfs)

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
1-Jan	91	27	50	73	67	60	56	47	42	40	36	35
2-Jan	93	22	49	77	65	56	55	46	42	40	36	32
3-Jan	96	21.3	50	76	69	59	57	48	40	40	35	30
4-Jan	94	24	51	82	72	61	59	49	42	40	35	32
5-Jan	90	28.1	51	76	70	62	58	49	43	40	36	31
6-Jan	89	34.2	52	80	67	60	57	50	44	41	37	36
7-Jan	93	33	51	76	66	57	56	49	43	42	38	36
8-Jan	96	29	51	68	67	62	57	49	41	40	35	33
9-Jan	99	31	51	77	66	60	58	48	41	39	38	35
10-Jan	98	34	51	76	67	61	56	49	43	41	39	37
11-Jan	97	28	51	73	68	62	57	49	42	41	38	34
12-Jan	92	35	51	78	69	61	58	49	41	40	38	36
13-Jan	80	33	50	76	68	62	56	48	41	40	37	35
14-Jan	87	25.4	51	74	66	62	60	49	42	41	37	32
15-Jan	85	33	50	73	63	59	57	48	42	41	38	35
16-Jan	87	32.2	50	78	63	57	55	48	42	41	37	35
17-Jan	88	31.5	49	78	63	58	55	47	42	40	36	34
18-Jan	96	30.8	49	79	64	57	55	47	40	39	35	34
19-Jan	92	23.5	50	79	66	57	56	46	41	41	37	35

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
20-Jan	94	33	50	80	66	59	56	47	42	40	38	35
21-Jan	92	31	49	75	63	55	55	46	40	39	36	35
22-Jan	89	34	48	74	62	58	55	45	40	39	36	34
23-Jan	84	31	48	74	65	58	55	45	40	38	34	33
24-Jan	78	23.7	48	74	64	59	55	46	41	39	36	33
25-Jan	81	23	49	68	65	61	58	47	42	40	36	31
26-Jan	80	31	50	70	66	60	57	49	41	39	36	35
27-Jan	90	27.9	49	66	63	56	55	48	42	40	36	34
28-Jan	82	26	47	65	61	57	53	46	40	39	36	32
29-Jan	87	28	47	67	62	58	53	45	40	40	35	32
30-Jan	86	26	47	67	61	56	54	44	40	37	36	31
31-Jan	86	24	48	67	63	57	55	47	41	39	35	32
1-Feb	85	23.3	49	67	62	57	55	46	41	40	39	34
2-Feb	85	28	47	69	62	57	54	46	38	37	34	32
3-Feb	85	25	47	66	62	55	54	46	40	38	35	30
4-Feb	80	25	47	71	60	57	54	45	40	40	35	32
5-Feb	78	29	48	70	61	58	56	45	39	37	34	32
6-Feb	82	27.5	47	68	60	57	55	44	39	38	33	30
7-Feb	76	26.1	48	69	62	56	55	47	40	39	35	30
8-Feb	76	29	48	70	60	56	55	47	40	38	35	30
9-Feb	76	29	48	72	63	56	55	47	40	37	35	32
10-Feb	76	28	49	74	62	58	58	47	40	39	35	32
11-Feb	107	29	48	74	63	57	56	45	40	39	36	34
12-Feb	89	29	48	75	64	56	55	44	38	37	35	33
13-Feb	98	25	49	77	65	59	58	46	41	40	35	32
14-Feb	84	30	49	73	65	58	57	47	41	40	36	34
15-Feb	80	22	49	77	64	57	56	46	41	40	35	32
16-Feb	82	29	48	78	62	58	56	46	40	40	35	32
17-Feb	88	22	49	75	63	56	55	47	40	39	37	33
18-Feb	96	22	49	73	65	59	55	47	41	39	37	34
19-Feb	110	30	49	69	65	58	57	47	40	39	35	32
20-Feb	130	29	50	74	66	58	57	47	41	40	36	34
21-Feb	123	24	50	76	66	61	56	47	40	39	36	33
22-Feb	119	29	50	74	68	59	56	47	41	38	36	34
23-Feb	96	27	50	71	66	62	59	48	40	40	34	32
24-Feb	98	25	50	74	65	61	59	48	40	39	36	31
25-Feb	110	30	50	73	66	61	59	48	40	39	36	34
26-Feb	120	26	50	74	65	60	58	46	40	40	36	31
27-Feb	110	30	50	70	65	58	57	48	41	40	37	33
28-Feb	110	28	50	73	66	56	55	50	42	40	37	34

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
29-Feb	75.6	31	49	0	62	59	58	46	42	40	37	0
1-Mar	110	31	51	77	69	61	57	48	41	39	37	36
2-Mar	120	26.6	51	78	69	62	59	50	42	40	36	34
3-Mar	120	30	51	77	67	60	58	48	42	40	34	32
4-Mar	130	27	51	77	68	60	58	49	42	41	37	35
5-Mar	140	30	52	80	71	59	56	48	42	42	36	34
6-Mar	150	30	53	86	68	60	59	50	41	40	38	35
7-Mar	150	30	54	96	74	62	61	50	41	40	36	34
8-Mar	160	30	55	88	74	64	61	53	42	40	39	36
9-Mar	160	23	55	96	78	63	60	51	43	42	41	36
10-Mar	150	25	56	98	76	65	62	51	45	43	40	38
11-Mar	150	27	58	109	82	69	63	52	45	44	38	36
12-Mar	140	31	60	115	91	75	67	54	45	43	40	34
13-Mar	140	30	61	115	92	77	70	54	45	43	41	37
14-Mar	142	30	62	128	92	81	73	52	44	44	41	39
15-Mar	153	31	63	116	95	85	76	54	45	44	40	34
16-Mar	168	30	66	125	101	87	83	56	46	45	41	36
17-Mar	187	34	69	136	115	89	83	60	46	44	41	38
18-Mar	228	34	72	150	119	92	83	59	46	44	42	41
19-Mar	257	33	74	160	128	95	88	60	46	45	42	39
20-Mar	277	31	75	152	131	94	82	59	49	47	42	39
21-Mar	275	33	78	183	134	89	83	62	52	50	46	38
22-Mar	281	33	81	202	142	93	89	65	55	52	45	42
23-Mar	250	33	84	206	157	107	93	65	58	54	46	42
24-Mar	230	33	85	205	155	108	93	68	55	52	49	41
25-Mar	243	33	86	202	160	120	105	70	56	52	46	38
26-Mar	277	31	89	204	164	120	104	70	57	54	46	43
27-Mar	259	31	91	217	162	118	106	78	56	55	49	44
28-Mar	331	31	94	217	156	123	116	75	59	56	49	44
29-Mar	390	35	96	202	172	121	111	77	59	55	50	41
30-Mar	443	36	96	192	171	124	109	82	59	54	51	45
31-Mar	555	38	101	199	187	126	115	80	60	56	51	46
1-Apr	561	36	104	215	181	127	120	85	62	60	51	45
2-Apr	638	35	107	230	185	125	119	88	66	63	51	49
3-Apr	527	35	107	198	182	143	134	91	65	63	52	46
4-Apr	409	35	107	191	184	143	135	94	68	64	51	45
5-Apr	351	38	111	217	182	155	141	97	74	62	55	50
6-Apr	336	44	116	223	185	153	148	104	73	67	59	54
7-Apr	355	44	124	246	193	165	159	110	78	75	59	54
8-Apr	352	43	134	267	219	193	172	124	82	74	59	54

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
9-Apr	373	44	144	277	247	199	197	127	86	80	61	57
10-Apr	445	47	151	290	254	225	193	134	85	80	67	57
11-Apr	472	49	157	327	274	216	204	138	92	84	68	55
12-Apr	461	51	164	342	319	219	208	147	91	81	65	56
13-Apr	485	48	170	376	312	233	210	168	90	77	70	60
14-Apr	538	52	179	391	334	244	227	165	98	83	73	59
15-Apr	608	47	189	442	391	261	234	160	101	93	73	67
16-Apr	648	49	197	473	377	269	236	171	103	97	82	70
17-Apr	652	55	208	498	412	260	235	192	119	99	90	85
18-Apr	698	68	221	481	427	281	256	192	127	120	92	74
19-Apr	770	66.5	233	530	404	325	285	200	138	122	95	77
20-Apr	842	70.6	241	530	456	336	329	201	138	117	92	80
21-Apr	807	69.9	252	593	466	379	344	206	128	118	90	83
22-Apr	722	76.5	264	653	492	392	366	197	132	126	101	80
23-Apr	782	78	278	589	537	428	388	208	149	143	105	87
24-Apr	831	79.9	290	634	511	464	403	240	158	145	117	99
25-Apr	863	81.2	292	617	512	436	380	250	164	158	125	106
26-Apr	863	86.3	298	594	548	415	364	261	169	164	140	108
27-Apr	782	87	301	689	481	385	362	276	192	173	148	105
28-Apr	771	90	310	718	480	405	395	278	193	182	155	112
29-Apr	820	108	327	707	561	465	418	276	195	180	156	136
30-Apr	859	125	346	724	639	498	460	274	210	201	162	146
1-May	887	125	368	728	676	567	540	285	220	214	188	144
2-May	932	140	384	827	750	603	523	293	228	217	180	145
3-May	982	149	409	916	818	640	518	318	226	208	172	157
4-May	1240	130	439	942	801	638	595	385	235	225	183	159
5-May	1290	120	463	931	872	650	575	436	259	244	198	162
6-May	1240	109	490	927	798	680	627	471	288	277	219	176
7-May	1240	107	514	958	855	740	704	470	285	274	211	176
8-May	1310	116	530	1070	935	759	740	489	297	282	215	189
9-May	1300	109	539	1090	908	780	710	488	317	282	234	197
10-May	1400	147	556	1060	906	794	691	506	359	329	249	210
11-May	1360	192	584	1110	907	841	744	550	358	335	274	237
12-May	1490	201	613	1060	998	867	809	573	415	377	272	237
13-May	1390	211	633	1220	1070	886	833	562	428	392	289	243
14-May	1410	202	654	1260	1130	965	800	578	384	373	341	276
15-May	1700	223	684	1320	1160	942	886	638	435	419	317	289
16-May	1670	223	736	1480	1340	979	944	718	460	451	321	276
17-May	1730	206	788	1510	1330	1050	1000	759	526	430	343	246
18-May	1960	196	817	1430	1310	1140	1020	798	546	500	355	260

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
19-May	2020	180	854	1470	1360	1190	1090	809	595	551	420	277
20-May	1950	175	900	1560	1430	1290	1230	817	539	532	422	317
21-May	1900	162	951	1750	1610	1370	1310	893	578	509	417	352
22-May	1930	162	983	1790	1580	1500	1300	921	638	528	454	382
23-May	2210	217	990	1840	1620	1370	1240	922	666	617	455	380
24-May	2480	257	1000	2050	1630	1370	1260	929	719	607	437	383
25-May	2470	266	994	1880	1640	1410	1270	922	659	626	449	341
26-May	2130	261	1000	1840	1680	1400	1280	923	697	657	467	354
27-May	2190	216	1050	1980	1690	1460	1320	946	742	702	496	458
28-May	2360	200	1090	1970	1700	1490	1360	980	746	670	539	499
29-May	2260	215	1130	1940	1830	1510	1460	1110	787	718	562	485
30-May	2210	360	1150	1940	1870	1600	1540	1070	783	684	579	484
31-May	2020	505	1130	1930	1790	1560	1470	1040	803	725	596	542
1-Jun	2180	522	1150	1950	1750	1570	1480	1070	843	770	650	572
2-Jun	2130	513	1200	2010	1870	1620	1470	1150	856	835	707	597
3-Jun	2010	546	1230	1980	1840	1660	1450	1170	975	863	731	703
4-Jun	2100	601	1250	1960	1860	1550	1500	1220	980	884	738	679
5-Jun	2220	528	1300	2100	1960	1640	1560	1250	962	899	764	666
6-Jun	2550	560	1360	2400	2080	1720	1580	1310	930	911	793	694
7-Jun	3080	598	1380	2520	2130	1720	1590	1380	1040	873	750	701
8-Jun	3110	572	1370	2450	2140	1670	1600	1320	1060	990	700	604
9-Jun	2850	475	1340	2450	1950	1690	1570	1300	1050	923	645	587
10-Jun	2750	465	1310	2340	1920	1640	1550	1300	978	902	672	502
11-Jun	2490	403	1280	2310	1940	1650	1580	1250	935	875	634	464
12-Jun	2570	367	1270	2000	1870	1710	1480	1290	919	865	729	472
13-Jun	2520	363	1270	2110	1950	1660	1590	1270	905	876	749	458
14-Jun	2560	348	1300	2380	2160	1760	1670	1200	932	879	684	439
15-Jun	2660	317	1310	2370	2180	1840	1660	1220	897	882	682	406
16-Jun	2980	287	1300	2370	2120	1800	1670	1180	911	824	585	384
17-Jun	2970	265	1290	2460	2040	1860	1650	1190	886	804	581	394
18-Jun	2480	244	1270	2180	1990	1890	1680	1160	857	811	552	377
19-Jun	2440	221	1270	2310	2050	1850	1750	1210	840	819	565	344
20-Jun	2500	200	1280	2250	2050	1860	1800	1240	843	816	603	318
21-Jun	2490	185	1290	2200	2130	1930	1790	1200	863	808	567	297
22-Jun	2500	164	1270	2280	2070	1900	1750	1220	802	740	561	275
23-Jun	2640	161	1240	2400	2040	1800	1680	1150	729	671	548	255
24-Jun	3030	145	1220	2280	1970	1780	1750	1110	687	673	523	238
25-Jun	3500	147	1200	2270	2020	1840	1610	1050	662	637	474	222
26-Jun	2790	159	1160	2430	2000	1770	1640	1010	654	592	469	210
27-Jun	2620	156	1130	2320	2100	1660	1570	940	637	555	455	201

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
28-Jun	2890	146	1120	2340	2100	1770	1620	938	586	528	430	195
29-Jun	3170	135	1120	2380	2010	1830	1630	936	542	509	400	192
30-Jun	3370	127	1100	2520	2120	1720	1690	935	569	492	371	175
1-Jul	3340	119	1060	2640	2110	1770	1550	897	549	478	330	160
2-Jul	3030	112	1010	2350	1990	1740	1500	840	495	441	322	154
3-Jul	2960	111	968	2210	2000	1590	1410	762	445	410	322	146
4-Jul	3020	109	914	2120	1820	1460	1320	751	410	389	312	149
5-Jul	2750	122	857	1950	1820	1270	1220	717	406	362	293	158
6-Jul	2660	113	814	1890	1730	1250	1120	669	383	343	276	161
7-Jul	2800	101	797	2050	1670	1180	1140	638	357	318	269	165
8-Jul	2770	95	794	2250	1660	1210	1070	661	343	312	257	175
9-Jul	2600	90	768	2160	1650	1170	1070	598	311	302	252	153
10-Jul	2400	86	737	2170	1580	1120	994	574	310	292	236	138
11-Jul	2390	81	696	1920	1600	1060	951	520	295	283	219	133
12-Jul	2570	78	670	1870	1530	1020	944	475	288	270	207	126
13-Jul	2380	81	636	1650	1460	1020	967	462	273	260	195	121
14-Jul	2200	77	604	1670	1360	997	840	419	260	239	194	116
15-Jul	1870	74	571	1470	1300	951	761	415	259	233	191	119
16-Jul	1810	71	544	1440	1180	871	746	400	243	225	182	132
17-Jul	1730	71	531	1440	1180	843	767	400	231	222	182	122
18-Jul	1950	71	503	1320	1100	789	729	364	230	220	173	113
19-Jul	1810	77	482	1270	1060	705	652	345	228	214	165	106
20-Jul	1610	80	457	1200	1010	691	638	322	207	194	156	101
21-Jul	1430	79.8	437	1170	943	690	603	325	197	179	153	100
22-Jul	1330	75.1	415	1010	837	713	611	310	184	171	144	105
23-Jul	1360	74.1	396	966	759	674	599	296	176	163	142	99
24-Jul	1180	74.4	378	908	770	606	590	282	186	159	139	110
25-Jul	1210	70.9	361	855	705	600	548	266	177	164	134	112
26-Jul	1240	80.7	352	822	682	574	531	268	171	165	121	101
27-Jul	1300	76.8	338	757	663	529	450	254	165	158	125	91
28-Jul	1200	75.9	330	732	645	491	456	266	161	149	128	87
29-Jul	1310	72	321	700	615	471	457	246	150	146	125	84
30-Jul	1210	67.3	307	698	617	435	391	224	150	140	123	81
31-Jul	1180	64.1	299	713	598	413	373	226	151	143	118	76
1-Aug	1090	61.7	286	680	528	406	363	226	158	145	113	74
2-Aug	984	62.7	269	600	479	389	346	214	145	140	109	73
3-Aug	931	64	260	555	448	371	347	217	145	134	108	80
4-Aug	937	63	255	655	470	356	327	214	148	137	111	81
5-Aug	923	70.1	250	722	476	347	299	195	144	134	106	80
6-Aug	926	67	249	633	507	349	317	193	134	131	102	75

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
7-Aug	836	61	238	571	451	328	300	192	133	126	97	77
8-Aug	877	65.7	230	544	418	321	298	186	127	120	94	76
9-Aug	856	63.1	219	550	397	305	284	166	124	114	93	71
10-Aug	781	59.6	210	549	410	288	273	168	118	111	92	66
11-Aug	848	58.4	207	560	374	289	260	160	117	108	92	63
12-Aug	824	56	200	468	342	285	256	160	125	109	90	61
13-Aug	757	53	193	473	333	265	231	153	123	109	91	61
14-Aug	665	52	186	410	349	257	227	149	114	107	91	62
15-Aug	559	52.2	180	420	315	250	231	148	110	103	89	61
16-Aug	528	51.1	174	339	307	233	225	147	110	104	89	63
17-Aug	486	49.3	168	311	271	226	218	144	111	103	87	64
18-Aug	507	48.6	163	323	266	228	199	145	108	102	90	66
19-Aug	496	48.3	162	299	280	226	194	140	110	100	89	65
20-Aug	489	56.8	164	349	276	224	198	135	112	102	89	66
21-Aug	476	59.4	158	324	276	212	195	129	106	100	83	69
22-Aug	466	64	155	340	243	213	197	131	98	96	88	70
23-Aug	469	57.1	152	280	235	208	197	130	102	92	81	70
24-Aug	467	53.1	153	304	261	209	191	130	102	99	82	70
25-Aug	439	50.2	150	334	241	199	177	125	99	92	80	67
26-Aug	411	48.3	147	316	272	181	168	124	99	94	76	68
27-Aug	421	46.3	145	314	243	182	172	125	100	90	75	68
28-Aug	406	44.9	138	265	235	171	162	119	95	87	75	69
29-Aug	371	45.2	133	255	209	168	158	119	94	85	75	71
30-Aug	364	47.2	131	241	203	159	151	115	95	90	71	68
31-Aug	445	45.3	128	220	194	159	148	113	92	89	70	65
1-Sep	396	43.6	127	267	206	153	148	112	89	88	70	63
2-Sep	323	43.5	124	262	201	153	141	108	88	86	70	61
3-Sep	302	42.2	121	271	193	144	140	105	89	83	69	61
4-Sep	282	44.6	119	242	199	149	141	104	86	82	70	62
5-Sep	289	43.5	120	244	201	167	137	104	84	81	70	62
6-Sep	661	43.7	128	262	195	156	140	107	85	84	70	61
7-Sep	342	48.7	122	267	182	157	143	112	88	83	68	59
8-Sep	330	52	125	319	236	153	138	107	86	82	70	60
9-Sep	306	52	127	267	225	165	155	108	85	81	71	59
10-Sep	446	54.8	131	281	226	168	147	106	81	79	74	65
11-Sep	289	52.5	123	243	203	169	148	101	81	79	73	64
12-Sep	325	50	126	227	210	171	158	104	87	81	75	66
13-Sep	712	48.2	133	297	201	171	156	109	88	84	74	64
14-Sep	598	47.7	124	246	182	151	137	108	85	84	72	62
15-Sep	405	47.9	123	236	210	159	140	106	87	84	68	61

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
16-Sep	314	47.3	121	265	197	157	139	103	86	83	67	60
17-Sep	372	47.6	120	246	196	153	130	100	84	82	69	58
18-Sep	283	47.6	115	219	182	156	128	100	82	80	68	59
19-Sep	280	50.1	117	238	199	161	147	99	84	80	68	56
20-Sep	329	52.8	119	268	193	155	140	100	81	79	71	55
21-Sep	324	52.1	116	260	184	150	130	97	81	79	70	54
22-Sep	381	50.7	121	274	206	155	142	95	81	78	68	53
23-Sep	477	49.6	125	325	223	148	137	94	80	76	66	56
24-Sep	376	50	119	311	207	144	138	98	79	72	66	56
25-Sep	349	50.6	113	248	192	139	130	93	77	72	68	54
26-Sep	338	49	110	243	184	138	129	92	76	73	65	53
27-Sep	338	48	110	274	172	137	124	91	75	73	64	53
28-Sep	394	47	116	330	221	134	127	88	73	72	63	54
29-Sep	309	46	111	262	237	135	123	89	73	70	62	55
30-Sep	282	45.5	108	223	188	134	126	90	73	72	61	53
1-Oct	355	47.4	107	201	184	135	124	91	71	70	61	57
2-Oct	309	47	106	235	178	131	123	89	72	70	60	58
3-Oct	409	46	112	261	192	145	122	90	73	71	60	55
4-Oct	312	46	109	235	178	152	123	90	72	70	63	54
5-Oct	268	47	110	247	202	147	124	94	73	69	63	53
6-Oct	281	49	108	232	196	135	126	97	72	67	59	53
7-Oct	506	49	113	253	192	131	123	92	72	68	60	55
8-Oct	395	49.8	111	276	181	128	120	93	71	65	59	54
9-Oct	330	48.9	109	264	193	127	121	91	70	66	59	54
10-Oct	317	48.1	107	267	188	132	120	87	69	64	60	52
11-Oct	302	48	106	280	186	131	119	86	69	65	57	49
12-Oct	285	48	103	255	174	131	127	85	69	63	58	50
13-Oct	264	47	102	230	174	134	122	83	69	66	60	51
14-Oct	251	47	101	223	169	133	126	80	70	65	57	50
15-Oct	246	47	101	223	173	133	124	83	69	64	58	49
16-Oct	253	47	100	224	172	129	121	83	69	65	56	48
17-Oct	237	47	98	219	180	129	121	82	67	63	56	48
18-Oct	221	46.6	96	208	179	123	116	81	66	63	55	47
19-Oct	243	45.8	96	204	171	129	114	82	64	61	56	48
20-Oct	250	45.8	95	199	162	124	112	80	64	61	57	47
21-Oct	210	44	93	197	157	125	112	81	64	61	58	48
22-Oct	210	44	92	185	164	122	116	78	62	60	58	46
23-Oct	210	43	91	172	150	120	114	76	66	63	58	46
24-Oct	200	43.3	90	178	147	118	111	77	64	62	58	47
25-Oct	184	45	89	171	142	117	111	78	64	61	56	46

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
26-Oct	178	44.6	88	164	133	116	109	77	64	62	55	48
27-Oct	180	43	87	169	145	108	105	74	64	61	55	46
28-Oct	168	42	86	161	137	109	102	73	62	60	54	48
29-Oct	166	42	85	158	128	107	102	72	62	60	54	48
30-Oct	161	44.5	84	155	134	105	97	72	61	59	53	47
31-Oct	169	44	84	151	131	103	98	75	61	58	54	49
1-Nov	181	42	83	149	131	106	100	73	60	58	53	49
2-Nov	177	41	81	138	125	105	95	74	60	58	52	47
3-Nov	177	43	80	141	112	99	93	73	59	56	54	45
4-Nov	172	42	79	137	118	101	95	72	58	57	54	45
5-Nov	166	42	78	130	117	98	93	71	58	57	52	46
6-Nov	167	42	77	125	116	95	91	72	57	55	52	50
7-Nov	165	43.7	77	123	112	96	92	70	57	56	54	49
8-Nov	157	41.7	78	126	114	98	91	72	58	58	52	49
9-Nov	151	36	77	131	115	92	88	68	59	56	52	49
10-Nov	156	37	75	125	110	92	89	70	57	55	52	50
11-Nov	150	41	75	128	104	90	87	68	58	57	52	48
12-Nov	150	39.2	75	127	112	92	90	66	57	54	49	48
13-Nov	145	38	74	124	103	91	86	68	58	55	50	48
14-Nov	145	38	73	127	107	88	85	68	57	55	50	47
15-Nov	160	30	72	113	94	87	84	70	57	56	48	47
16-Nov	140	30	71	114	99	87	84	65	54	53	48	40
17-Nov	141	37	70	120	100	85	83	65	54	52	48	46
18-Nov	144	38	70	115	96	84	83	65	54	53	49	45
19-Nov	183	39	69	112	96	82	81	64	52	52	48	45
20-Nov	163	34	68	110	93	82	79	62	54	52	48	41
21-Nov	154	30	69	112	92	84	79	65	54	51	49	41
22-Nov	167	42	69	112	100	81	78	63	54	51	46	43
23-Nov	154	40	68	117	99	82	78	61	52	50	46	43
24-Nov	141	38	66	116	96	79	78	61	52	48	46	43
25-Nov	140	39	67	112	103	80	78	61	51	50	47	42
26-Nov	137	32	65	105	97	81	78	61	49	48	43	39
27-Nov	127	36.1	63	113	90	77	73	58	49	47	41	39
28-Nov	126	26	62	108	84	73	72	61	48	47	41	38
29-Nov	124	30	63	109	87	74	73	61	51	46	38	35
30-Nov	123	33	62	106	82	73	71	57	50	48	41	38
1-Dec	146	35	63	109	93	77	72	56	48	47	44	38
2-Dec	113	36.8	62	105	86	78	74	60	48	46	42	40
3-Dec	120	27	61	100	77	74	70	59	48	47	42	35
4-Dec	110	28	59	94	78	72	69	56	48	46	42	39

	MAX	MIN	MEAN	95%	90%	80%	75%	50%	25%	20%	10%	5%
5-Dec	109	22	59	96	79	74	68	55	48	47	38	38
6-Dec	175	31	60	107	78	74	68	56	48	47	41	33
7-Dec	210	28	61	105	88	72	70	55	47	46	42	37
8-Dec	113	28	59	102	90	74	70	59	46	44	38	34
9-Dec	103	27.2	58	100	81	71	67	55	47	44	38	34
10-Dec	103	23.2	57	94	76	70	66	54	47	43	39	36
11-Dec	103	35	58	94	78	70	68	55	47	45	39	38
12-Dec	97	30.6	57	87	72	69	65	55	46	45	39	35
13-Dec	96	28.9	56	88	71	66	65	55	44	43	37	33
14-Dec	99	30	56	91	74	65	64	54	43	41	39	36
15-Dec	93	32	55	89	79	65	61	51	44	43	38	35
16-Dec	109	32.3	55	86	82	66	61	51	44	43	38	37
17-Dec	103	27	55	85	79	66	61	52	44	42	39	33
18-Dec	99	35	54	86	76	64	61	51	45	42	39	37
19-Dec	95	33	55	87	75	66	63	52	45	44	38	36
20-Dec	121	21.6	55	93	78	63	62	52	44	43	37	32
21-Dec	112	25	55	93	76	64	60	50	44	43	41	34
22-Dec	101	32	54	83	73	63	61	52	44	43	38	35
23-Dec	103	23.9	53	84	72	64	63	49	42	42	38	32
24-Dec	101	23.1	53	91	70	62	60	48	41	41	38	35
25-Dec	95	25	53	82	71	62	60	51	44	42	39	36
26-Dec	105	27.1	53	86	68	63	58	52	44	43	37	34
27-Dec	116	29	53	82	69	60	58	50	43	42	40	34
28-Dec	136	29.2	53	80	71	60	58	50	42	41	39	38
29-Dec	116	31	53	80	71	63	61	52	42	41	37	32
30-Dec	113	26	53	78	70	64	61	52	41	40	37	32
31-Dec	113	32.1	52	73	67	60	58	49	43	42	38	35

2.12 APPROXIMATE WSEL

Water Surface Elevations (WSEL) are based on survey and hydraulic modeling. Actual WSELs in the field may vary from those listed herein. Approximate WSELs are provided herein solely for the information of the CONTRACTOR.

Water Surface Elevations would be affected an unknown degree with temporary flow obstructions of equipment, coffer, temporary alluvium placement or other construction activities. The CONTRACTOR is wholly responsible for monitoring and controlling WSELs during construction and any associated erosion, flooding, structure integrity or environmental damage.

Table 2-12 below provides estimated water surface elevations for flows ranging from 91 cfs (baseflow) to 5310 cfs (OHWM).

TABLE 2-12 - Care of Water - Approximate Water Surface Elevations (feet)

BANK RESTORATION AREA	Approximate Water Surface Elevations* (FT)			
	91 cfs	966 cfs	2600 cfs	5310 cfs
BANK 1 D/S ROCK BARB	6195.0	6195.5	6196.7	6198.8
BANK 1 U/S ROCK BARB	6195.5	6196.3	6197.7	6199.5
BANK 2	6196.9	6198.6	6200.1	6202.2
BANK 3	6197.6	6199.9	6201.8	6203.9
BANK 4	6198.5	6200.9	6203.4	6205.5
BANK 5 D/S GRADE CONTROL	6201.6	6202.8	6204.3	6206.4
BANK 5 U/S GRADE CONTROL	6201.9	6203.4	6204.8	6206.8
BANK 6	6202.2	6204.7	6206.3	6208.4

** Based on two-dimensional hydraulic modeling results.*

SECTION 3 BEST MANAGEMENT PRACTICES

3.01 GENERAL

The Work covered by this section includes the furnishing of all labor, materials, equipment and incidentals for installation, maintenance and inspection of all on shore and in-channel BMPs. Within the Project Limits all disturbed surfaces shall utilize best management practices such as Turbidity Curtains, Silt Fences, Construction Sequencing, Care of Water, etc.; to minimize potential environmental damage, turbid conditions, locations of ponding, sediment loading in any flow path, dust, noise, light, etc. Adequate numbers, locations and properly functioning BMPs and erosion control are wholly the responsibility of the CONTRACTOR. CONTRACTOR is responsible for maintaining all BMPs during construction activities, and for the removal post-construction activities and/or adequate stabilization periods. All construction activities shall be performed in accordance with; guidelines set out in the project plans and specifications, specifications in applicable permits, and any local, state, and federal regulations. CONTRACTOR shall inspect all BMPs daily. The OWNER or ENGINEER may stop work in any area due to improperly installed, inadequate, or non-functioning BMPs based on OWNER's or ENGINEER's sole discretion. CONTRACTOR is responsible for coordinating and participating in any inspections of BMPs by appropriate regulatory authorities.

3.02 CHANNEL ACCESS

Berms shall be installed at the top of the access ramp and other areas to eliminate sheet flow or drainage onto the exposed or disturbed banks. A silt barrier shall be erected along the toe of any and all out-of-channel open cuts to eliminate the migration of material outside of the limits of work. Straw Bales and/or wattles shall be used at the toe of the ramp when the access is not in use to prevent the migration of material into the body of water.

3.03 CONSTRUCTION SEQUENCING

Prior to starting construction, the CONTRACTOR shall notify the ENGINEER, and the OWNER of the date the CONTRACTOR intends to start construction with a written notice delivered a minimum 5 days in advance. Additionally, Look-Ahead schedules and updates shall be submitted every 7 days during active construction periods as described in Section 2.03F.

The sequence of the critical construction processes is defined by the ENGINEER and CONTRACTOR shall follow the sequence.

3.03 A. Initial Site Setup

1. Submit all required plan documentation and construction schedules.
2. Notify OWNER, and ENGINEER of start date.
3. Document with photographs and video the project vicinity, structures, haul road and vegetation and submit to ENGINEER.
4. Develop methods to prevent cement entering flowing waters.
5. Establish and post construction site safety protocol.

6. Place Barriers, Post Signs, Install Safety Fencing and Isolate Project Site.
7. Locate, in field, all Utilities.
8. Protect in place structures, roads, utilities, boulders, trees and other in accordance with submitted plans.
9. Install temporary erosion control measures.
10. Locate and isolate construction staging and stockpile areas.
11. Install oil booms across wet channel downstream of work area; replace used oil booms per manufacturer's specifications.
12. Locate area for storage of spare oil booms and designate oiling and petroleum handling areas with appropriate and adequate BMPs outside of the riparian zone.
13. Establish and post protocol for potential oil spill cleanup and emergency response.
14. Clean and inspect equipment for leaks, improper function and invasive species.

3.03 B. Staging

1. Install temporary portable toilet.
2. Identify and mark out the location for a job trailer, concrete wash out area, stockpile area, dewatering area, and fueling area as needed.
3. Implement approved Traffic Control Plan.
4. Install BMPs
 - i. Control erosion and concentrated runoff
 - ii. Maintain and facilitate any and all existing Drainage Channels
 - iii. Identify and install any other BMPs as necessary
5. Protect in Place Mature Vegetation, Wetlands and other Natural Resources
6. Locate, Mark, and Protect in Place utilities
7. Locate and Protect in Place Survey Control
8. Locate and Protect in Place public infrastructure such as signs, curbs, sidewalks, and lights
9. Grade Access and Staging Areas
10. Maintain, add and repair BMP structures as necessary throughout project

3.03 C. In-Channel Structure Construction

All construction activities shall follow U.S. Army Corps of Engineers permit. In-stream work shall be performed during annual low water periods. Best Management Practices (BMPs) shall be in place in order to minimize turbidity and sedimentation, as well as prevent pollution and the potential release of contaminants from equipment. Construction activities shall be sequenced and sized to minimize temporary impacts to flowing water.

1. Obtain all necessary approvals and permits, which may include CDPHE dewatering permit.
2. Pre-order materials and Structures and submit shop drawings as necessary.
3. Install any above water BMPs as per plans and specs.
4. Place Cofferdam structures to isolate designated in-channel areas.
5. Implement Care of Water Plan.
6. Install dewatering basins.
7. Stage pump with sediment filter and adequate hose length to filter water before return

flow.

8. Stake out grades, lines, offsets and spot elevations as necessary.
9. Remove all non-native channel debris including slag and metal.
10. Prepare in advance protocol for rapid removal of sections of cofferdam in the event of a flood flow, and stage or make available equipment, materials, and facilities necessary for such an event.
11. Install boulder structures.
12. Install Concrete Structures
13. Reset care of water and temporary storm-water measures as necessary.
14. Remove temporary diversion structures.
15. Finalize boulder structures and grading in wet.
16. Remove care of water and temporary storm-water structures.
17. Finalize work above ordinary high-water line.

3.03 D. Final Site Restoration

1. Remove water control structures in accordance with Project Specifications and Project Drawings.
2. Plant remaining stream-bank riparian vegetation areas.
3. Dispose of any excess materials at designated disposal location.
4. Restore Temporary Equipment and Haul Routes to original grade and vegetation if requested by OWNER.
5. Remove all materials from staging areas.
6. Re-grade or repair staging areas to pre-construction condition.
7. Remove un-necessary temporary erosion control measures.
8. Identify and install or maintain BMPs down-gradient from all disturbed areas until establishment of vegetation (approx. 1 yr).
9. Remove all waste materials.
10. Remove utilities protection.
11. Remove temporary signs, barriers and safety fencing.
12. Repair damage to any adjacent property, structures or vegetation.
13. Establish erosion control grasses in all disturbed areas above the Ordinary High-Water Mark.
14. Remove non-biodegradable BMPs after the establishment of vegetation (approximately 1 year).

3.04 EQUIPMENT OPERATING IN WET CHANNELS

Equipment shall be allowed to operate in the wet channels. Equipment operating in or adjacent to any wet channels shall be free of any fluid leaks and in excellent operating condition. Biodegradable hydraulic fluids shall be utilized for any equipment operating in the flowing river channel. CONTRACTOR shall submit a list of equipment operating with certified biodegradable hydraulic fluids to the ENGINEER prior to use of the equipment in the flowing channel. No equipment shall be left unattended at any time in any wet channel or below the Ordinary High-Water Mark. Any and all fueling and oiling of equipment shall be in a designated upland location, with adequate BMPs to contain any potential spill.

All equipment shall be cleaned prior to being on-site to minimize potential for spreading of invasive species. Equipment shall be power-sprayed and free of weeds, soil and untreated water. If any equipment being used for the Project has been previously working in another stream, river, lake, pond or wetland, one of the following disinfection practices is necessary prior to construction to prevent the spread of whirling disease, New Zealand mud snails, zebra mussels, didymosphenia, and other aquatic hitchhikers. These practices are also necessary after project completion, prior to the equipment being used in another stream, river, lake, pond, or wetland, for the same purpose:

Offsite, remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, hand tools, boots, etc.) and spray/soak equipment in a 1:15 solution of Sparquat institutional cleaner and water. Keep equipment moist for at least 10 minutes; or

Offsite, remove all mud and debris from equipment (tracks, turrets, buckets, drags, teeth, hand tools, boots, etc.) and spray/soak equipment with water greater than 140 degrees Fahrenheit for at least 10 minutes.

The excavators and backhoes may need to be cleaned on site to remove excess native sediments stuck to the track or hoes. Sediments that are removed with a shovel shall be placed in designated clean fill material storage areas. Sediments removed with clean water shall be washed into the dewatering area. All dewatering areas shall have erosion control logs staked at flow lines before discharge into.

3.05 OIL BOOM

An adequate number of oil boom SPC 5510 manufactured by SPC (<http://www.sorbentproducts.com>) or equivalent shall be placed in a designated location onsite, visible and unobstructed at all times. Any spills shall be contained and cleaned by the CONTRACTOR. Oil booms shall be installed across the channel at the downstream end of the Project Limits at all times equipment is working in or crossing the flowing river. All Booms shall be replaced as needed, approximately weekly with new Oil Booms.

3.06 PERMEABLE TURBIDITY BARRIER

All exposed bank excavations not contained by coffer dams and disturbances shall be separated from the main flow of the river by a Permeable Turbidity Curtain. The turbidity curtain shall have a non-woven 8 oz filter fabric (Mirafi 180N or equivalent) for at least 50% of the curtain area between the float and the ballast.

3.07 STRAW BALES

Straw Bales shall be certified “Weed-Free” and not hay bales. Bales shall be secured with wood or metal stakes driven 2 feet into ground. 4 inches of 3 inch minus washed gravel shall be placed on the up-gradient toe of the bales. Bales can be removed when vegetation is established.

3.08 SILT FENCE

Silt Fences shall be placed to contain construction activities on land. Silt Fence shall be constructed with 4oz. Non-Woven Filter Fabric (Mirafi 140n or equivalent) with a 6 inch by 6-inch anchor trench up-grade (i.e. uphill) of the fence line and fence posts on 6 ft centers. The anchor trench shall be backfilled to existing grade with native material compacted to 95% of maximum as determined by the Standard Proctor Method (ASTM D-698-66T or AASHTO T 99).

3.09 FILTERING OF PUMPED WATER

Any pumped water being returned to the main flow of the river or other drainage shall first be processed through a Filter. Turbid waters that are clean of containments or concrete residue shall be filtered to prevent excessive turbidity. Waters with contaminants or concrete residue shall be filtered clean before returning to the natural flow. Dewatering permits may be required. It is the responsibility of the CONTRACTOR to obtain these permits.

3.10 REMOVAL OF BMPs

All BMPs below the Ordinary High-Water Mark are to be removed prior to the completion of the work. All BMPs above the Ordinary High-Water Mark are to remain in place until the establishment of vegetation, approximately one year. Any non- biodegradable BMPs shall be removed after the establishment of vegetation cover at least 70%, approximately one year. All non-biodegradable BMPs are the property of the CONTRACTOR. The locations of the BMP installations shall be graded, seeded and restored to preconstruction conditions after removal.

3.11 STRAW WATTLES

Straw Wattles (Wattles) shall be certified “Weed-Free” and in sound new condition. Temporary Wattles are to be removed within one year of installation. Any non-temporary Wattles shall be fully biodegradable and have Burlap or Jute fabric netting. Wattles shall be installed in an approximately 2” – 3” deep rounded trench. Spoils from the excavated trench should be deposited and “Knifed In” on the up-hill side of the Wattle to direct flow into the Wattle and prevent under-cutting. Ends should overlap by 1’. Wattles shall be staked at approximately 4’ o.c. and at every end with 1” width 16” long wood stakes.

3.12 RIPARIAN PROTECTION

Any and all riparian areas and riparian vegetation outside of the limits of excavation shall be protected in place. No construction supplies, fuels nor oils shall be stored in riparian areas, no vehicles nor heavy equipment shall be allowed into riparian areas other than the designated channel access sites. No discharge of any materials shall be allowed into any riparian areas. Riparian areas shall be traversed only by foot and leak free hoses may cross riparian vegetation. Any incidentally disturbed riparian areas shall be restored to better than pre-construction conditions.

3.13 MATURE TREE PROTECTION

The preservation of existing mature trees is an important component of the work and a measure of the successful completion thereof. The healthy mature native trees that are adjacent to excavating activities shall be Protected in Place (PIP). The work shall include the preservation from injury or defacement of all vegetation that is NOT designated for removal by the ENGINEER in the field. ENGINEER shall mark all trees and large shrubs approved for removal prior to excavation work. Areas of tree removal shall be determined and marked in collaboration between the CONTRACTOR and the ENGINEER.

- a) CONTRACTOR shall develop and submit a Natural Resources Protection (NRP) Plan which details the means, methods, and materials to be used to protect in place all mature vegetation not designated for removal.
- b) CONTRACTOR guarantees that care, caution and best management techniques are implemented to maximize the survivability of native mature trees not designated for removal.
- c) All Protect in Place trees shall have 100% success rate, showing vigor and general health, for one year after PIP measures are conducted.
- d) Post construction monitoring may recommend additional pruning, irrigation, or fertilizer to restore health to the marked tree. The CONTRACTOR is responsible for all measures to restore the health of trees for one year after construction disturbances around protect-in-place trees.
- e) If negligence results in potential mortality of trees, as determined by the ENGINEER, the CONTRACTOR shall replace all damaged trees with new native trees to reclaim an equivalent canopy cover at CONTRACTOR's sole expense.

CONTRACTOR shall notify the OWNER or ENGINEER if machine access is needed within the radius of a tree dripline, and approval is needed to proceed. Special care shall be applied when working under driplines or near the toe of the riverbank. The majority of critical roots are expected to run parallel to the River. The CONTRACTOR shall take great care when any earth disturbing activities beneath the drip line of trees are conducted. Protect in Place mature trees shall follow the below guidelines:

3.13.A. Hand Excavations Under the Drip Line

Under the drip line, or at a minimum of 10 feet from the base of a PIP Tree, all necessary excavating activities shall be done by hand to expose the roots.

- a. Expose all roots greater than 1" and preserve.
- b. If it is necessary for the removal of concrete litter, or for the installation of bank and in-channel features, the roots may be cleanly cut, and shall not be ripped or torn.

3.13.B. Treatment of Cut and Exposed Roots

Backfill all cut and exposed roots the same day of root cutting, and water until backfilling is accomplished.

3.13.C. Root Care

Roots can be up to 2-3 times the diameter of the drip line.

The CONTRACTOR shall take as much care as possible to preserve roots.

- a. All roots that are necessary to remove for excavation activities shall be cleanly cut.
- b. The CONTRACTOR shall apply all root cuts with approved root stimulator.

3.13. D. Areas of Fill near PIP Trees

- a. If necessary, any fill material shall be held away from PIP trees with a boulder retaining wall with a discontinuous footing.
- b. If fill is necessary adjacent to the PIP tree, then air vents shall be installed.
- c. No soils shall be compacted under the drip line without ENGINEER approval.

3.14 ENVIRONMENTAL PROTECTION

The construction site shall be maintained to minimize dust, noise, erosion, and water ponding. Any and all fuel operated equipment near or within drainage areas, wetlands, riparian areas or open water areas shall be leak-free and in excellent operational condition. Equipment operating in the riparian zone shall also use biodegradable fluids when feasible. The CONTRACTOR shall incorporate all proposed means, methods, and materials utilized to protect the environment and natural resources into the Natural Resources Protection (NRP) Plan. The CONTRACTOR is wholly responsible for any environmental damage directly or indirectly related to storage of supplies and equipment, equipment operation, any fluid spills or any other construction activities.

3.15 BARRIERS

The CONTRACTOR shall furnish, install and maintain suitable barriers, as required to prevent public entry, and to protect the work, facilities, trees and wetland areas from any associated construction activities. Remove temporary barriers at the completion of work.

3.16 PROJECT SITE REHABILITATION

After all other construction activities are completed; all disturbed areas are to be rehabilitated to pre-construction conditions. Clean the site of trash and debris and remove all construction measures, equipment and supplies. Permanent riparian plantings and seeding shall be installed immediately after the final design grades are achieved, but no later than 14 days after construction activities have permanently ceased at the disturbed area.

3.17 CULTURAL RESOURCES

The project area has been disturbed by bank construction, road alignments, multiple utilities, pedestrian path construction and is within the main channel of the Crystal River. No cultural resources are anticipated to be impacted by the project. If potential cultural resources in the project area are discovered during construction and cannot be avoided, CONTRACTOR shall

suspend construction activities in that area until the properties can be evaluated for listing in the National Register of Historic Places in consultation with Colorado State Historical Preservation Office. The CONTRACTOR shall notify the ENGINEER and OWNER immediately if potential cultural resources are discovered during construction.

SECTION 4 IN-CHANNEL AND BANK CONSTRUCTION

4.01 CONSTRUCTION OF IN-CHANNEL BOULDER STRUCTURES

All Boulder Structures constructed In-Channel or below the Ordinary High-Water Mark (OHWM) shall be constructed with Footer Rocks and Keying Techniques (See Project Drawings). Construction of Boulder Structures shall include selection, rotation, placement and adjustment of each individual rock to minimize void spaces and maximize interlocking of boulders. The ENGINEER shall identify each imported boulder that may affect surface flow and observe the placement of as SELECT BOULDERS.

Boulder Structures shall be constructed by placing individual boulders in designed cross-sections of the channel. Each cross-section has specific elevations and alignments for the placement of rock as shown on the Project Drawings. Each structure shall include footer boulders extending to the depths shown in the plans. Stacked boulders shall have a minimum 0.5:1 horizontal to vertical slope with the footer offset in the upstream direction when buried and footer offset in all directions when exposed.

Each individual boulder shall be set with the “B” axis in the direction of flow when exposed or the “A” or “B” axis when the boulder is interlocked between other boulders (See Drawing Details). Minimum acceptable boulder size is 36 inches along the B-axis. Larger boulder sizes are required in specific areas as shown in the plans.

4.02 IMPORTED BOULDERS SPECIFICATION

Imported Boulders may be quarried or excavated and generally smooth in shape with the largest rock faces being approximately flat. Boulders shall be of a consistent material for the entire project and shall be a color that is aesthetically neutral with the native landscape. Boulder gradations shall conform to Table 2 by number, and measurement of the intermediate axis (“B”-Axis). The minor axis (shortest dimension or “C”-Axis) shall not be less than indicated in Table 2. Boulders exposed in the grade controls and keyed into the toe of each structure shall have a minimum intermediate axis (B-Axis) of 48 inches unless specified in the plans.

Table 2. B-Axis Rock Gradations (inches)

Percent of Stones	Indicator	24 inch (2 foot)	36 inch (3 foot)	48 inch (4 foot)	60 inch (5 foot)
< 10%	Greater	36	48	60	72
> 75%	Between	32&18	42&30	54&36	54&72
0%	Less	15	21	28	48
C-Axis	Greater	10	15	20	30

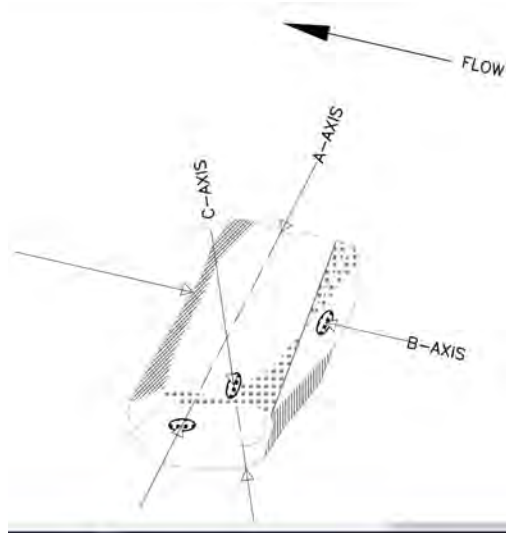


Fig 4.02-1 Dimensional axes of a boulder

Natural Boulders shall consist of hard, dense durable stone, resistant to weathering. Surface stones must have an aesthetic, neutral color and be consistent material throughout the project unless specified in plans. Stone shall be suitable for incidental human contact. CONTRACTOR shall submit source information and samples to ENGINEER.

The Engineer may require Contractor to furnish laboratory results if, in the Engineer's opinion, the material is marginal or unacceptable. At the request of the Engineer, the Contractor shall furnish laboratory test results indicating that the material meet the requirements including those for abrasion resistance and soundness as indicated below:

---Boulders shall have a minimum specific gravity of 2.65.

---Abrasion resistance by Los Angeles Machine; Test Method ASTM C535; Specification Requirement: 20% loss, maximum.

--Soundness by use of Sodium/Magnesium Sulfate, Test Method ASTM D5240-04 Standard Test Method for Testing Rock Slabs to Evaluate Soundness of Riprap by Use of Sodium Sulfate or Magnesium Sulfate; Specification Requirement: 5% loss, maximum.

--Soundness by Freezing and Thawing, Test Method ASTM D5312-04 Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions; Specification Requirement: 5% loss, maximum.

4.03 FILTER FABRIC SPECIFICATION

An undamaged Filter Fabric with Geo-Composite shall underlie all Exposed earthen embankment materials. Filter Fabric shall be placed to eliminate migration of fines through the boulder structures and allow water to drain from structure. A composite that provides drainage, **Hydrodrain 300** by, or approved equivalent shall be used at a minimum of 4 feet width on 10 feet center (approximately 40% of total Filter Fabric coverage). An acceptable non-woven 8oz

Filter Fabric, Mirafi 140N or equivalent, may be used for the bank coverage not overlaid by drainage. Filter Fabric shall be placed to have intimate contact with intact bank material. Washed Gravel bedding may be used to protect Filter Fabric from damage during boulder placement.

4.04 COARSE ALLUVIUM

Coarse alluvium is required in designated areas as shown on plans. The material will be produced by sorting excavated alluvium through a grizzly or other mechanical device. The spacing between the bars shall be set to 6 inches. Material not passing through the grizzly (i.e. diameter greater than 6 inches) shall be collected and used as Coarse Alluvium.

Coarse Alluvium shall be installed in areas shown on plans to a minimum thickness of 18-inches. Excavation of existing alluvium and replacement with Coarse Alluvium may be required to achieve the finished grade elevations shown on plans.

4.05 PROPOSED GRADING

CONTRACTOR shall establish and identify required lines, levels, contours and datum. Grade site to match all lines, elevations and grades shown on the Project Drawings. CONTRACTOR is required to accomplish all site grading through the use of GPS Control. The ENGINEER will provide a proposed XML compatible digital surface model and alignments to the CONTRACTOR. The CONTRACTOR shall have the means to load the alignments and surface into field survey controllers to establish proposed elevations and grades.

4.06 ACCEPTABLE AS BUILT ELEVATION VARIATIONS (feet)

Average Elevations across each Cross-Section shall be exact according to Plans. With natural building materials variances are expected and shall be allowed for average locations of individual particles. The following As-Built Variances are allowed.

Table 4.06-1. Acceptable As-Built Variances for Average Locations of Individual Particles (feet)

<u>Description</u>	<u>Variance Elevation</u>	<u>Variance Horizontal</u>
Top of Boulder Toe Protection	+0.5;-0.5	+/-2.0 bank alignment
Cross Section Average	+0.0;-0.0	+/-0.0 bank alignment
Finished Grade – Alluvium*	+0.5;-0.5	Match average grading shown in plans
Finished Grade –Select Boulders*	+0.25;-0.25	+/-0.5

SECTION 5 CONSTRUCTION OF CONCRETE STRUCTURES

There are no proposed concrete structures for this Project.

SECTION 7 LANDSCAPE INSTALLATION

7.01 PLANTINGS

The CONTACTOR is responsible to provide water suitable for establishment of vegetation. Water shall be free from pollutants harmful to plants.

7.01.A. Erosion Control Grasses

All upland soil areas within the Project Limits, disturbed by construction activities, shall be seeded with erosion control grasses. All mixes shall be Certified Seed that is weed free and native strands of Pure Live Seed (PLS). See plans for

Table 7.01.A – Type 1 Upland Seed Mix

Species	PLS/Acre*
Western wheatgrass var. Arriba	35%
Thickspike wheatgrass var. Critana	25%
Alkali sacaton	10%
Bluebunch wheatgrass	10%
Indian ricegrass var. Rimrock	5%
Sideoats grama	5%
Bottlebrush squirreltail	10%
*drilled application=17lbs per acre, *broadcast application= 34 lbs. per acre.	

- a) Soil Preparation: Place topsoil to a minimum of 6 inches in depth. Soil shall be graded and raked to 0.25'' to 0.5'' to create a seed bed. Soils must be moist prior to seed application. Sprinkle areas to be seeded with water, using fine spray to avoid washing or erosion of soil.
- b) Seed Application: Within 48 hours of soil placement, broadcast seed at the specified rate and lightly rake into soil. Do not apply seeds when weather is too windy, hot or drying, or other adverse conditions exist. Immediately after seed application all areas shall have an Erosion Control Blanket overlaid and installed as specified in Section 3.8.
- c) All areas that are not covered by erosion control blanket shall apply weed free straw 2 inches thick over the seeds to reduce erosion and wind losses. Do not use straw containing noxious weeds and foreign materials.
- d) Broadcast hay or straw mulch and apply hydromulch in all seed areas except for areas covered by erosion control blanket.

7.01.B Riparian Plantings

See L sheets in plan set for Riparian Plantings Information, including transplanting on-site vegetation, live willows plantings, and fascines.

7.02 EROSION CONTROL BLANKET

All-natural biodegradable Erosion Control Blankets (ECB) shall be placed on all cut bank slopes as directed by the ENGINEER. Material shall be North American Green (800-772-2040) C700BN, or approved equivalent that is all natural coir fabric with a tensile strength 1271 lbs./ft, permissible shear force of 2.3 lbs./sqft, and mass of 26.61 oz./sqyd.

Install per manufactures recommendations. Store all coir fabric elevated off the ground and ensure that it is adequately covered to protect the material from damage. Protect fabric from sharp objects that may damage the material. Materials damaged during transport, storage or placement shall be replaced at the CONTRACTOR expense. The ENGINEER shall inspect and approve all materials prior to installation.

7.03 TOPSOIL

Topsoil shall be salvaged a minimum of 6 inches in depth from all disturbed areas. Salvaged topsoil shall be stockpiled in areas that shall not interfere with construction phases and at least 15 feet away from areas of concentrated flows or pavement. The slopes of the stockpile shall not exceed 2:1 horizontal to vertical. A silt fence or other adequate erosion control shall be installed around the perimeter of each stockpile.

7.03. A. Topsoil Application

Topsoil shall be applied to all areas for seeding and planting. Topsoil shall be applied at a minimum of 6 inches depth on all seeded areas and shall be used to backfill all shrub and tree plantings to the depth and twice the width of the root ball. Topsoil shall not be placed when the ground or Topsoil is frozen, or excessively wet. Following the spreading operation, the Topsoil surface shall be raked to final grades without surface irregularities that could contribute to concentrated waterflow downslope. Topsoil shall be raked with 0.5 inch undulations for a seed bed.

7.03. B. Topsoil Material

Imported topsoil shall be a natural sandy loam that is weed free. Imported Topsoil shall be properly stored and protected, and shall be free of roots, hard clay and stones which shall not pass through a 1-inch square opening. It shall be a loamy mixture having at least 90 percent passing No. 10 sieve. Below list the soil properties:

1. Contain no less than 2 percent nor more than 13 percent organic matter, as determined by the test for organic matter in accordance with ASTM D2974.
2. Contain no less than 12 percent or more than 40 percent clay, as determined in accordance with ASTM D422.
3. Sand content shall not exceed 55 percent, as determined in accordance with ASTM D422.
4. The pH shall not be lower than 5.0 or higher than 8.0. The pH shall be determined with an acceptable pH meter on that portion of the sample passing the No. 10 sieve, in

accordance with the —Suggested Methods of Tests for Hydrogen Ion Concentration (pH) of Soils, included in the ASTM Procedures for Testing Soils issued December 1964.

5. One hundred percent shall pass the 1-inch screen; 97-100 percent shall pass the 1.5-inch screen, and 40-60 percent shall pass the No. 100 mesh sieve.

6. Topsoil shall be free of clods, gravel, and other inert material. It shall be free of thistle, reed canary grass, creeping foxtail, noxious vegetation and seed. Should such regenerative material be present in the soil, the CONTRACTOR shall remove, at his expense and in a manner satisfactory to the Owner's Representative, all such growth, both surface and root, which may appear in the imported Topsoil within 1 year following acceptance of the work.

7. All soil to be seeded shall be amended with Humate and fertilizer product. The method of incorporation of amendments shall result in a uniform application of material as approved. Humate shall be applied at a rate of 1500 pounds per acre. The humate shall be applied using approximately 1 gallon of water for 1 pound of dry powder. The fertilizer product shall be applied at a rate of 2000 pounds per acre.

SECTION 8 MODIFICATIONS TO TIME OF COMPLETION

8.1 CONSTRUCTION WINDOW

Construction is permitted through **TBD**. The IN-STREAM construction window is limited to **TBD**. If IN-STREAM construction is anticipated to take place outside of these dates, CONTRACTOR shall notify OWNER in writing and seek approvals and extensions of permits. Upland construction may take place outside of these dates with OWNER approval. OWNER shall be notified 14 days in advance of any work anticipated outside of these dates.

All work on the ditch inlet channel and island shall be complete by the beginning of the 2022 irrigation season, which typically begins on April 15th of each year. CONTRACTOR shall coordinate with the Town of Carbondale staff about the anticipated start of the 2022 irrigation season. The CONTRACTOR shall notify the owner 14 days in advance of any work anticipated within the irrigation season window.

No construction activities shall be performed on soil during periods when the soil is too wet to adequately support construction equipment as measured by ruts greater than 4 inches deep.

The date of beginning and the time for completion of the work are essential conditions of the Contract Documents and the work embraced shall be commenced on a date specified in the Notice to Proceed. The Contractor will proceed with the work at such rate of progress to ensure full completion within the Contract time. It is expressly understood and agreed, by and between the Contractor and the Owner, that the Contract time for the completion of the work described herein is a reasonable time, taking into consideration the climatic and other factors prevailing in the locality of the work. Every effort shall be made by the Contractor to complete the project within the "Contract Time" shown in the bid, quote or proposal. The "Contract Time" anticipates "Normal" weather and climate conditions in and around the vicinity of the Project site during the times of year that the construction will be carried out, which may include freezing conditions or high water.

SECTION 9 DEFINITIONS

B-Axis - The intermediate (and overturning) axis on a boulder.

Best Management Practices (BMPs) - Water and Soil Care Measures designed to prevent sediment soil erosion, minimize turbidity and protect wetlands.

Coffer Dam - Structure used to isolate an area for dewatering.

Ordinary High Water Mark (OHWM) - Approximate Water Surface Elevation at the 1 ½ year Flood.

In-Channel Work - All construction work occurring below the ordinary high-water mark or one and a half year flood or in a wet channel.

Invert - The cross-section that controls water flow.

On-Shore Work - All construction work occurring above the ordinary high-water mark or one and a half year flood.

Protect-In-Place - Protection of Structures or Vegetation by not disturbing them with adjacent construction activities.

Thalweg - Lowest elevation of the river channel in cross section perpendicular to the direction of the main current flow.

Toe - Point where a ground slope meets a low point and flattens out. Most commonly in rivers it refers to the point where the bank slope meets the channel bottom slope.

River Right - The right side of the channel when looking downstream.

River Left - The left side of the channel when looking downstream.

Riparian Vegetation - Vegetation which is rooted in the water table of the adjacent river.

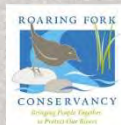
Water Surface Elevation - Elevation on the project datum, of the surface of water at a specified location and flow rate.

Current Site Conditions



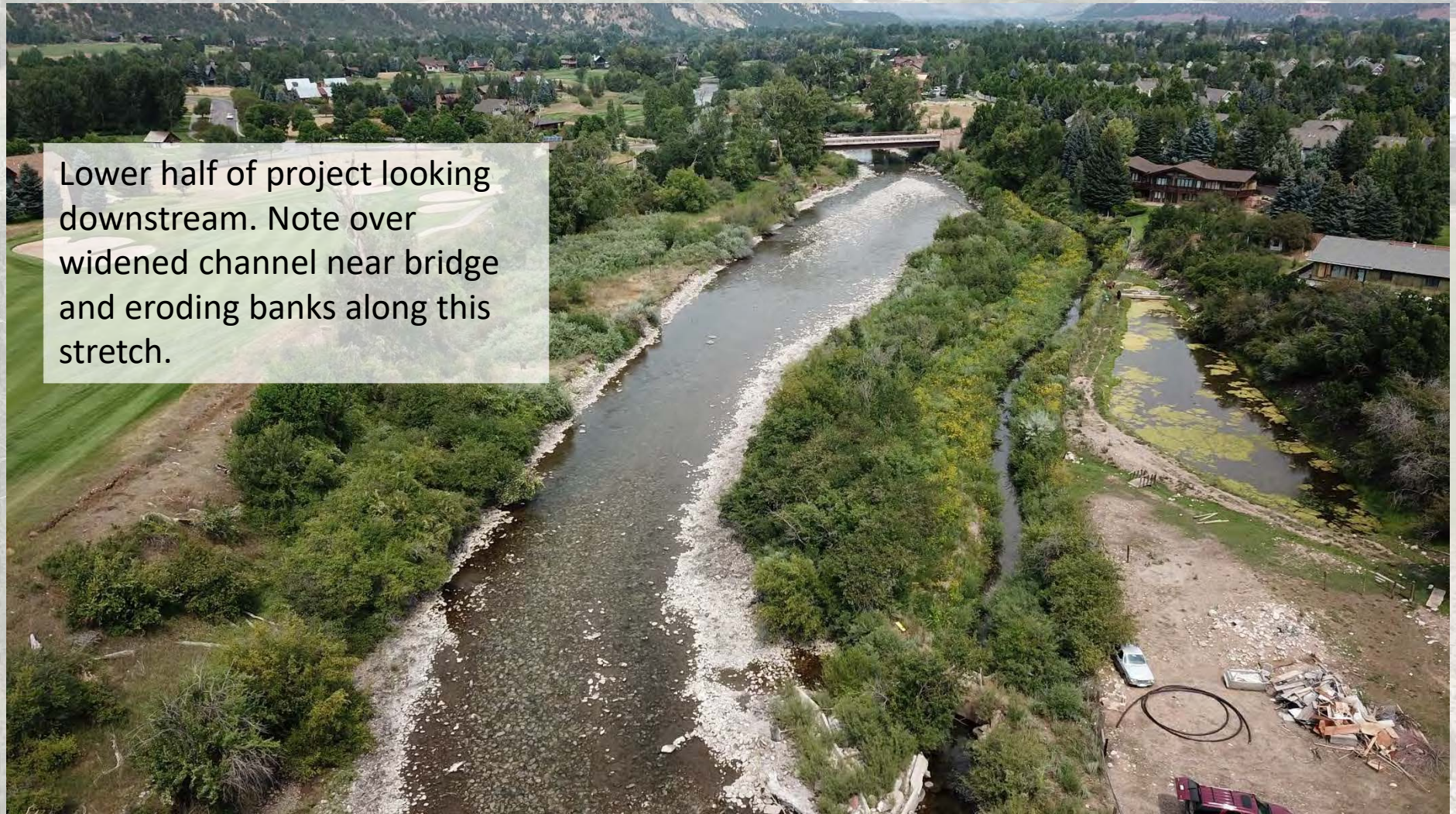
Upper Half of project looking
downstream towards Weaver
Diversion

Crystal River Restoration Project

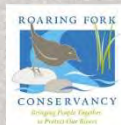


Current Site Conditions

Lower half of project looking downstream. Note over widened channel near bridge and eroding banks along this stretch.



Crystal River Restoration Project



Current Site Conditions



Channel widening due to sediment deposition and lack of upland vegetation has resulting in significant bank erosion.



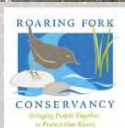
Crystal River Restoration Project

Current Site Conditions

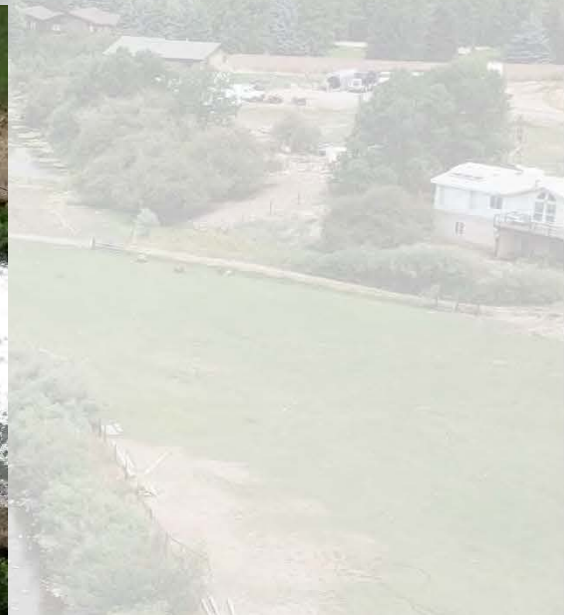
Bank Erosion occurring throughout project reach. Primarily in non-vegetated areas.



Crystal River Restoration Project



Current Site Conditions



Above - Weaver Diversion requires annual channel disturbance for push up dam.
Right – headgate entrance with degrading concrete traffic barrier.

Crystal River Restoration Project



Current Site Conditions



Degraded upland area near north end of project. Invasive vegetation will be removed and replaced with native plants.



Crystal River Restoration Project



LAND TRUST

Bringing People Together
to Protect Our World

WY

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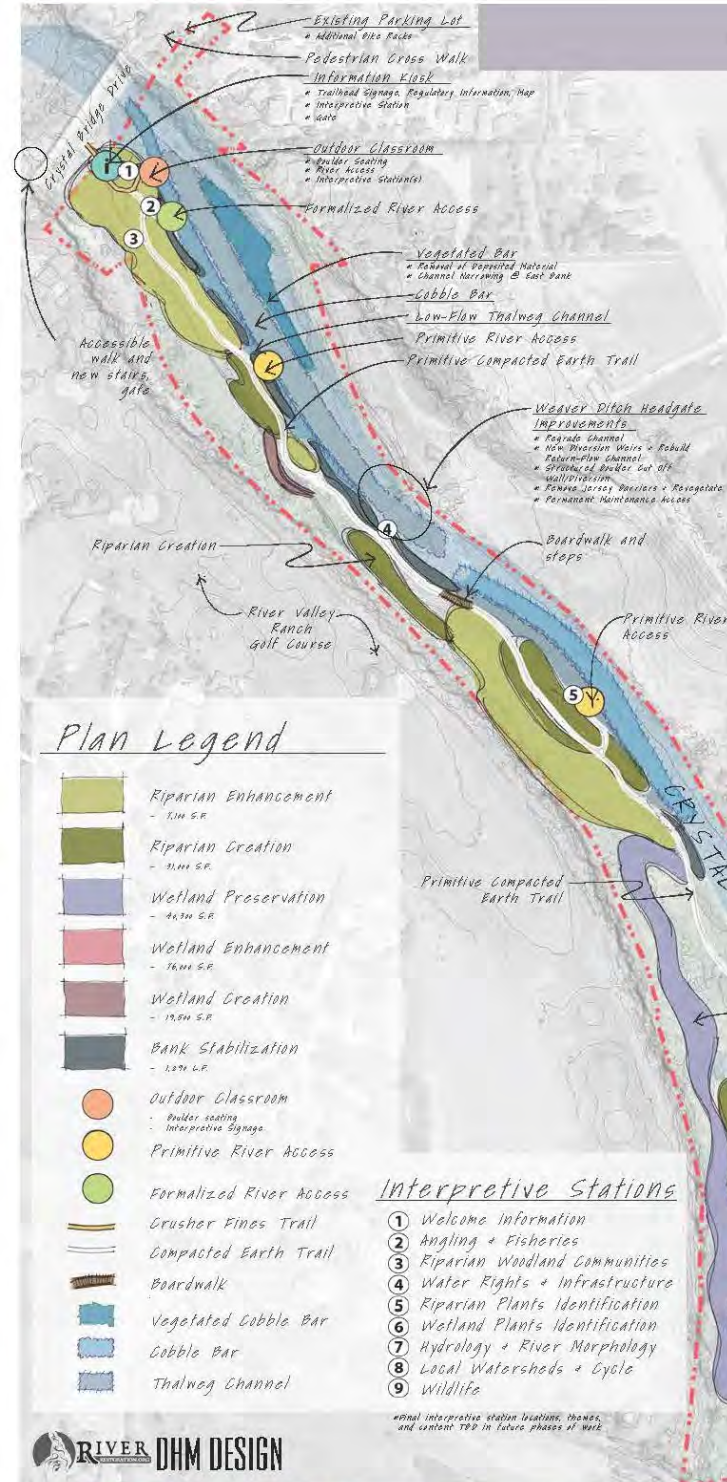
Current Site Conditions



Mature cottonwood and wetland area near south end of project. Area like these will be enhanced or protect as-is.

Crystal River Restoration Project





PROGRAM CATEGORY	PREFERRED ALTERNATIVE
CHANNEL/IN-STREAM	<ul style="list-style-type: none"> Enhance thalweg to provide low-flow connectivity, 1,400 LF Cobble bars, 125 AC Create Vegetated Bar, 0.3 AC 4-boulder river training structures
RIVER BANKS / RIVER ACCESS	<ul style="list-style-type: none"> 1,295 linear feet of bank stabilization (west bank of river) 2 "formal" access points (outdoor classroom and adjacent fishing access) 3 "primitive" river/fishing access points
HEADGATE	<ul style="list-style-type: none"> Install gates which can be automated Boulder grade control cut-off wall Enhance riffle downstream at cut off wall Rebuild "concrete barrier" island Permanent maintenance access ramp
PARKING	<ul style="list-style-type: none"> Bike racks at parking lot
PROJECT ACCESS	<ul style="list-style-type: none"> Striped crosswalk at parking Seasonal closure gate Paved accessible route from Crystal Bridge Dr.
TRAIL HEAD AND KIOSK	<ul style="list-style-type: none"> Map board and regulatory information Interpretive kiosk (park entry) Seasonal closure gate
OUTDOOR CLASSROOM	<ul style="list-style-type: none"> Boulder seating Interpretive sign panels (2) Teraced river access
SOUTH MEADOW	<ul style="list-style-type: none"> Picnic tables (2 - existing)
TRAILS	<ul style="list-style-type: none"> Out-and-back trail layout Crusher fines to outdoor classroom and first fishing access Compacted earth beyond first (north) fishing access Expanded boardwalk where necessary
INTERPRETIVE STATIONS	<ul style="list-style-type: none"> 9 individual stations plus trail head kiosk



TOWN OF CARBONDALE

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Carbondale, CO 81623
www.carbondalegov.org
(970) 963-2733 Fax: (970) 963-9140

June 21, 2021

To whom it may concern,

The Town of Carbondale strongly supports the Crystal River Restoration and Weaver Ditch Headgate project. The Town has committed funding for this project in our 2021 budget which is split between the Water Fund and the Rec Use and Sales Tax Fund. The Water Fund includes \$200,000 in matching funds and the Rec Use and Sales Tax Fund has \$20,000 in matching funds and could be increased if necessary to complete the project.

Thank you for your support of this project.

Sincerely,



Jay Harrington
Town Manager



Pitkin County Healthy Rivers
530 East Main Street Suite 301
Aspen Colorado 81611
970 920 5191 office
970 379 865 cell
pitkincountyrivers.com

June 30, 2021

Town of Carbondale
Mark O'Meara
Utilities Director
511 Colorado Avenue
Carbondale, CO 81623

Re: Funding for the Weaver Ditch Telemetry Project

Dear Mr. O'Meara:

Funds have been appropriated for \$62,000.00 within the Pitkin County Healthy Rivers Program's 2021 budget line items for joint efforts with the Town of Carbondale on its Weaver Ditch Telemetry Project.

Please let me know if you need anything further.

Sincerely

Lisa MacDonald
Administrator



Grant Award Spring 2020

Applicant: Town of Carbondale

Project: Planning, Design and Permitting for the Riverfront Park Restoration Project

Amount: \$ 50,000.00

Date: June 22, 2020

This Grant Agreement, is made this 22nd day of June 2020 by and between the Town of Carbondale, ("the Town") Attn: Jay Harrington -Town Manager, 511 Colorado Ave. Carbondale, CO 81623 and the Pitkin County Healthy Rivers Board ("Pitkin County") 530 E. Main St. Ste 301 Aspen, CO 81611.

The purpose of the Grant Agreement is to provide a process for payment of public funds to be used exclusively for costs incurred by in connection with the Town of Carbondale's Riverfront Park Project planning, design and permitting.

Through this Agreement, the Town and Pitkin County have agreed that:

The Town shall:

Complete the planning, design, and permitting for the project while simultaneously fundraising for construction.

The grant monies will be used to fund the final design based on the current 60% plans, and interpretive and educational program development.

The Town will report to the Pitkin County Healthy Rivers Board upon completion of the planning phase- anticipated by the end of 2020. The Town of Carbondale and/or other project team members will be available to answer questions, tour the site, and provide additional information for Healthy Rivers Board members upon request.

Pitkin County shall:

Grant \$ 50,000.00 to the Town of Carbondale approved for funding by the Healthy Rivers Board on April 16, 2020 and authorized by the Board of County Commissioners on June 16, 2020.

CRS §8-17.5-101. *[Not Applicable to agreements relating to the offer, issuance, or sale of securities, investment advisory services or fund management services, sponsored projects, intergovernmental agreements, or information technology services or products and services]* Contractor certifies, warrants, and agrees that it does not knowingly employ or contract with an illegal alien who will perform work under this contract and will confirm the employment eligibility of all employees who are newly hired for employment in the



United States to perform work under this contract, through participation in the E-Verify Program or the Department program established pursuant to CRS §8-17.5-102(5)(c), Contractor shall not knowingly employ or contract with an illegal alien to perform work under this contract or enter into a contract with a subcontractor that fails to certify to Contractor that the subcontractor shall not knowingly employ or contract with an illegal alien to perform work under this contract. Contractor (a) shall not use E-Verify Program or Department program procedures to undertake pre-employment screening of job applicants

while this contract is being performed, (b) shall notify the subcontractor and the contracting State agency within three days if Contractor has actual knowledge that a subcontractor is employing or contracting with an illegal alien for work under this contract, (c) shall terminate the subcontract if a subcontractor does not stop employing or contracting with the illegal alien within three days of receiving the notice, and (d) shall comply with reasonable requests made in the course of an investigation, undertaken pursuant to CRS §8-17.5-102(5), by the Colorado Department of Labor and Employment. If Contractor participates in the Department program, Contractor shall deliver to the contracting State agency, Institution of Higher Education or political subdivision a written, notarized affirmation, affirming that Contractor has examined the legal work status of such employee, and shall comply with all of the other requirements of the Department program. If Contractor fails to comply with any requirement of this provision or CRS §8-17.5-101 et seq., the contracting State agency, institution of higher education or political subdivision may terminate this contract for breach and, if so terminated, Contractor shall be liable for damages.

PUBLIC CONTRACTS WITH NATURAL PERSONS. CRS §24-76.5-101. Contractor, if a natural person eighteen (18) years of age or older, hereby swears and affirms under penalty of perjury that he or she (a) is a citizen or otherwise lawfully present in the United States pursuant to federal law, (b) shall comply with the provisions of CRS §24-76.5-101 et seq., and (c) has produced one form of identification required by CRS §24-76.5-103 prior to the effective date of this contract.

IN WITNESS WHEREOF, the parties hereto have caused this Agreement to be executed as of the latest date written below:

Pitkin County Healthy Rivers

Town of Carbondale

/s/ Lisa Macdonald

 6/25/20
Judy Harrington

From: [Sullivan - DNR, Brian](#)
To: [Connor Coleman](#)
Cc: [John Groves - DNR](#); [Kendall Bakich - DNR](#); [Perry Will - DNR](#)
Subject: Fwd: AVLT grant application
Date: Tuesday, July 14, 2015 1:33:50 PM
Attachments: [2015_05_29 - AVLT application to CPW Wetland-Riparian Grant.pdf](#)

Hi Connor:

I am writing to let you know that your wetland grant application for the Carbondale - Crystal River project was approved for partial funding of \$20,000 (vs. \$50,000 grant request).

Specifically, the funding is approved for on-the-ground project implementation costs for wetland/riparian components, and not planning/design costs or in-stream fish habitat components.

Please let me know if you can accept this funding under these conditions. If so, I will work with you to develop a Scope of Work so we can request a state purchase order. No costs to be reimbursed by the grant may be incurred before we have a purchase order.

Thanks, congrats, and let me know if you have any questions, comments, or concerns.

Brian Sullivan
Wetlands Program Coordinator
Terrestrial Section - Statewide Programs Unit



P 970.472.4306 | brian.sullivan@state.co.us
317 W. Prospect Rd., Fort Collins, CO 80526
cpw.state.co.us/aboutus/Pages/Wetlands.aspx

----- Forwarded message -----

From: **Connor Coleman** <Connor@avlt.org>
Date: Fri, May 29, 2015 at 7:19 PM
Subject: AVLT grant application
To: "brian.sullivan@state.co.us" <brian.sullivan@state.co.us>

Brian,

Attached is our grant application for the CPW Wetlands for Wildlife Program.

Thanks,

Connor

CONNOR P. COLEMAN
STEWARDSHIP DIRECTOR

ASPEN VALLEY LAND TRUST

320 Main St., Suite 204

Carbondale, CO 81623

[970.963.8440](tel:970.963.8440)|o

[970.963.8441](tel:970.963.8441)|f

connor@avlt.org



Saving the best....to last!



GRANT AGREEMENT

Project Name: Connecting Communities to Conserved Lands
Project Completion Date: March 31, 2022
Great Outdoors Colorado
Contract No.: 21029

PARTIES TO AGREEMENT

Board/GOCO: The State Board of the Great Outdoors Colorado Trust Fund
Address: 1900 Grant Street, Suite 725
Denver, CO 80203

Telephone: (303) 226-4520
Contact name: Matt Brady

Grantee: Aspen Valley Land Trust
Address: 320 Main Street, Ste 204, Carbondale, CO 81623

Contact name: Suzanne Stephens

Date: January 15, 2021

EXHIBITS

Exhibit A Project Summary
Exhibit B Resolution
Exhibit C Approved Budget
Exhibit D Approved Workplan/Timeline

RECITALS

A. The State Board of the Great Outdoors Colorado Trust Fund ("GOCO" or "Board") is a political subdivision of the State of Colorado, created by Article XXVII of the Colorado Constitution, adopted at the November 1992 General Election, which article appropriates a portion of the net proceeds of the Colorado Lottery to GOCO and directs GOCO to invest those proceeds in the state's parks, wildlife, open space, and recreational resources.

B. In 2020, GOCO created a statewide grant program pursuant to which eligible entities could apply for grants for resilient communities projects. Grantee listed above ("Grantee") submitted a detailed project application ("Project Application") that contemplates the execution of the project entitled above and described in GOCO's project summary ("Project Summary"), attached and incorporated as Exhibit A ("Project"). GOCO approved Grantee's Project Application, which is incorporated into this Agreement by reference, on November 17, 2020, subject to the execution of a detailed grant agreement. GOCO and Grantee each have on file a copy of the Project Application.

C. The parties intend this agreement to be the detailed grant agreement required by GOCO ("Agreement").

AGREEMENT

NOW, THEREFORE, in consideration of the parties' mutual covenants contained in this Agreement and other good and valuable consideration, the receipt and sufficiency of which are acknowledged, the parties agree as follows:

SECTION 1 – PROJECT

1. Incorporation of Recitals. The Recitals set forth above are incorporated into this Agreement.
2. Representations and Warranties of Grantee. Grantee is a Land Trust, duly organized in accordance with the laws of Colorado and has full and lawful authority to enter into, and comply with the terms of, this Agreement. Grantee's governing body has authorized entering into this Agreement as evidenced by the resolution attached and incorporated as Exhibit B.
3. Grant and Project. GOCO awards to Grantee a grant in the amount not to exceed \$399,665.00 ("Grant"), subject to the terms and conditions set forth in this Agreement. The Grant shall be used by Grantee solely to complete the Project in substantial conformity with the final plans, specifications, designs, and uses approved by GOCO. In the event of a conflict between the Project Application and the Project Summary, the parties shall resolve the conflict by mutual agreement.
4. Project Scope. Grantee shall not materially modify the Project without the prior written approval of the Executive Director of GOCO ("Executive Director") or the Executive Director's designee, such approval to be in GOCO's sole discretion. Any material modification to the Project undertaken without GOCO's prior written consent may be deemed a breach of this

Agreement, entitling GOCO to all remedies available under this Agreement. If Grantee determines with reasonable probability that the Project will not or cannot be completed as approved by the Board, Grantee will promptly so advise the Board and cooperate in good faith to seek a resolution before any further funds are advanced.

5. Grantee Efforts. Grantee agrees to use its best efforts to complete the Project in a timely fashion, in a good and workmanlike manner, and consistent with this Agreement and GOCO's approvals related to the Project.

6. Approved Budget. Grantee has completed a detailed budget that reflects all anticipated sources and uses of funds for the Project, including a detailed accounting of Grantee's anticipated direct costs associated with the Project, a copy of which is attached and incorporated as Exhibit C ("Budget"). Eligible costs are described in Paragraph 12 of this Agreement. Grantee has also completed a Workplan/Timeline that reflects Grantee's anticipated dates for completing all aspects of the Project, a copy of which is attached and incorporated as Exhibit D ("Workplan/Timeline"). The Project Application contains a budget and a workplan/timeline that may not match the approved versions attached as Exhibits C and D and which, therefore, shall not be relied upon by GOCO or Grantee. Where discrepancies exist, the approved Budget and Workplan/Timeline in Exhibits C and D, respectively, shall control until such time as GOCO approves the final versions of both documents.

7. Waiver. Prior to the disbursement of funds, the Executive Director in his or her discretion may waive certain conditions set forth in this Agreement. Anything else to the contrary notwithstanding, the exercise by GOCO staff ("Staff"), the Executive Director, or GOCO of any right or discretion reserved to them under this Agreement shall not be deemed a waiver. Furthermore, no waiver by them under this Agreement shall constitute a waiver of any other requirements, actions, or conditions, nor shall any waiver granted be deemed a continuing waiver. No waiver by the Staff, the Executive Director, or GOCO shall be effective unless in writing executed by them. Additionally, any failure by the Staff, the Executive Director, or GOCO to take any actions as set forth in this Agreement shall have no legal effect on the contractual duties of Grantee. Further, no waiver with respect to this Project, Grant, or Agreement shall constitute a waiver in any other GOCO-funded project.

8. Project Operation and Maintenance.

A. Subject to annual appropriations, Grantee shall operate, manage, and maintain the Project in a reasonable state of repair for the purposes specified and for the useful life of the Project stated in the Project Application, in accordance with product warranties and/or the generally accepted standards in the parks/recreation community. GOCO has estimated a useful life of 15 years. Grantee also shall provide and maintain access to the Project and to the Property, regardless of the Property's ownership. Failure to comply with this paragraph may be deemed a breach by Grantee under Paragraph 22 below.

B. GOCO shall not be liable for any ongoing cost of maintenance, management, or operation of the Project.

C. Within 60 days of a reasonable request by the Board, Grantee will provide the Board with adequate records reflecting the operating and maintenance costs of the Project and provide the Board with such other information concerning the use of the Project by the public and the impact of the Project.

D. Grantee's staff shall request during the Grantee's annual budget process an appropriation sufficient to meet the financial obligations of Grantee under this Agreement. Grantee will use its best efforts to fully consider such appropriation. The parties understand that the Board is relying upon fair and full consideration of annual appropriation in its decision to extend its resources and the Grant and to enter into this Agreement. In the event that Grantee fails to appropriate sufficient funds to meet the obligations of this Agreement, Grantee shall provide notice to the Board of the specific reason(s) for any decision not to appropriate funding. Grantee's staff shall notify the Board of any recommendation not to fund or to partially fund the annual appropriation necessary to fulfill Grantee's obligations under this Agreement.

9. Public Access. Grantee agrees, for itself and its successors in interest, to allow reasonable public access to the Project for the term specified in Paragraph 8.A. Grantee may temporarily close such public access for construction, maintenance, emergency situations, or other reasonable purposes.

10. Insurance. Grantee shall maintain general liability insurance or self-insure for the entire period of the Project for protection in the event of injury and/or damage. The insurance limits shall not be less than \$1,000,000 per occurrence and \$2,000,000 aggregate. If the Grantee contracts with another organization to complete the Project, it is the responsibility of the Grantee to ensure its contractor carries insurance that fulfills this requirement.

11. Future Funding. This Agreement and the Grant only apply to the Project specifically described in this Agreement. GOCO makes no representations regarding future funding for future phases of the Project, whether or not described in the Project Application, Project Summary, or otherwise.

SECTION 2 – GRANT PAYMENT

12. Eligible Costs. The Grant and all matching funds shall be used only for the cost outlined in Exhibit C ("Budget"); these costs are eligible for reimbursement on the basis of costs actually incurred by Grantee and supported by written documentation (receipts, bills, etc.). The Grant and all matching funds may not be used to pay for any other costs deemed to be ineligible by the Board, at the Board's sole discretion.

13. Payment of Grant.

A. *Progress Payment.* Grantee may opt to receive a portion of the Grant after starting but prior to completing work on the Project ("Progress Payment"). Grantee shall provide GOCO with a progress report detailing expenditures and progress made to date ("Progress Report"). The Progress Report must be submitted using GOCO's Progress Report form (available at

www.goco.org or by contacting GOCO). GOCO may, in its discretion, request additional documentation to support making a Progress Payment. A Progress Payment shall not exceed 50% of the Grant or the maximum percentage of funds GOCO can expend for the project to date based on the program's matching requirements, whichever is less. A Progress Payment shall be considered a loan until the Project is complete and Final Payment (as defined below) has been made.

B. *Final Payment.* Grantee shall submit a final report to GOCO detailing the accomplishments of and expenditures related to the Project and its completion ("Final Report"). The Project is "complete" when all facilities, trails, or other improvements included in the GOCO-approved Project scope have been built and are ready for their intended use. The Final Report must be submitted using GOCO's Final Report form (available at www.goco.org or by contacting GOCO). GOCO may, in its discretion, request additional documentation before its approval of the contents of the Final Report. Upon GOCO's review and approval of the Final Report, GOCO shall pay the outstanding balance on the Grant ("Final Payment"), subject to any reductions contemplated by any provision of this Agreement.

C. *GOCO Review.* GOCO shall have 30 days to review any Progress Report and Final Report and respond to Grantee.

D. *Waivers of Liens and Claims.* GOCO may, in its discretion, depending on the nature of the Project, require documentation of mechanics' lien waivers or waivers of claims to public project performance bonds as a precondition to any disbursement under this Agreement.

E. *Modifications.* Payment of the Grant is subject to the Project being completed with no material modifications made, except as otherwise agreed to in advance by GOCO in accordance with this Agreement. The Grant will not be increased, but GOCO may reduce the Grant if the Project changes in any way that GOCO deems material. "Material modifications" may include, but are not necessarily limited to, a reduction in the total cost of the Project, a reduction in the size or number of recreational development components to be constructed, changes to the nature of the recreational development components to be constructed, or any other variance from the Project as presented in the Project Application. It is the sole responsibility of Grantee to inform GOCO of any such modifications to the Project. GOCO strongly encourages Grantee to contact GOCO in writing when it becomes aware of or wishes to make any such modifications, however seemingly minor, to the Project.

F. *Net Lottery Proceeds.* Payment of the Grant is also subject to GOCO's determination in its sole discretion that it has received and has available sufficient net lottery proceeds to fund the Grant. In determining the sufficiency of net lottery proceeds, GOCO may consider all facts and circumstances as it deems necessary or desirable, including but not limited to adequate reserves, funding requirements, and/or commitments for other past, current, and future grants, and past, current, and future GOCO operating expenses and budgetary needs.

14. Withdrawal of GOCO Funding; Termination of Agreement. Anything in this Agreement to the contrary notwithstanding, with prior notice to Grantee, GOCO reserves the right to

withhold or withdraw all or a portion of the Grant, to require a full or partial refund of the Grant, and/or to terminate this Agreement if GOCO determines in its sole discretion that:

A. *Altered Expectations.* Facts have arisen or situations have occurred that fundamentally alter the expectations of the parties or make the purposes for the Project or the Grant as approved by GOCO infeasible or impractical;

B. *Material Project Changes.* Material changes in the scope or nature of the Project have occurred from that which was presented in the Project Application, approved by GOCO and reflected in the Project Summary, without prior written approval of the Executive Director;

C. *Inaccuracies.* Any statement or representation made or information provided by Grantee in the Project Application, this Agreement, the Progress Report, the Final Report, or otherwise is untrue, inaccurate, or incomplete in any material respect;

D. *Reporting.* The results of GOCO's review of the Progress Report or the Final Report are not acceptable to GOCO;

E. *Conditions Precedent Not Fulfilled or Unsatisfactory.* Any of the conditions precedent to funding listed in Section 3 below is not fulfilled by Grantee or is unsatisfactory to GOCO, in its sole discretion;

F. *Delays.* The Project will not or cannot be completed by the Completion Date or any extensions granted, or delays in the implementation of the Project have occurred that make the Project impracticable in the Board's judgment;

G. *Costs.* The Project will not or cannot be completed within the Budget or any approved modifications, or the total Project cost and/or Grantee's matching funding are reduced; or

H. *Property.* Title to or encumbrances against the Property are or become such that Grantee is unable to complete the Project, or the Project and/or the Property are or become unavailable for public use.

SECTION 3 – CONDITIONS PRECEDENT

15. Completion Date. Grantee shall complete the Project and submit its Final Report no later than March 31, 2022 ("Completion Date"). Grantee may request an extension of the Completion Date in compliance with GOCO's *Overdue Grants* procedure, as may be amended from time to time by GOCO in its sole discretion. GOCO may elect to terminate this Agreement and deauthorize the Grant in the event this Completion Date is not met and/or Grantee fails to comply with the *Overdue Grants* procedure.

16. Conditions Precedent to Funding. Anything else in this Agreement or otherwise to the contrary notwithstanding, the Grant is expressly conditioned upon Grantee's fulfillment of all

terms and conditions of this Agreement to GOCO's satisfaction in its sole discretion, including but not limited to the following:

A. *Matching Funds.* Matching funds in the minimum amount required by GOCO policy or procedure and as set forth in the approved Budget, or as modified and approved in compliance with GOCO procedures, must have been received by Grantee, or the status of efforts to secure matching funding was disclosed and has been deemed satisfactory by Staff. Grantee shall provide evidence of matching funds as GOCO may require in its reasonable discretion.

B. *GOCO Policies and Procedures.* The Project must comply with all of GOCO's policies and procedures, which may be amended from time to time by GOCO in its sole discretion, and must meet any special Board conditions as listed in the attached Project Summary (Exhibit A).

SECTION 4 – OTHER PROVISIONS

17. Publicity and Project Information. GOCO has the right and must be provided the opportunity to use information gained from the Project; therefore, Grantee shall acknowledge GOCO funding in all news releases and other publicity issued by Grantee concerning the Project. If any events are planned in relationship to the Project, GOCO shall be acknowledged as a contributor in the invitation for the event. GOCO shall be notified of any such events 30 days in advance. Grantee shall cooperate with GOCO in preparing public information pieces, providing access to the Property for publicity purposes, and providing photos or other imagery of the Project from time to time, which GOCO reserves the right to use and duplicate in any print or electronic publication or platform for publicity, illustration, advertising, web content, and other purposes at any time without the need to seek pre-approval from Grantee. Grantee shall give timely notice of the Project, its inauguration, significance, and completion to the local members of the Colorado General Assembly and members of the board of county commissioners of the county or counties in which the Project is located, as well as to other appropriate public officials. At no time shall Grantee represent in any manner to the public or to any party that it is affiliated with GOCO or acting on behalf of GOCO.

18. Signage. Grantee shall erect one or more signs at a prominent location(s) on the Project site acknowledging the assistance of Great Outdoors Colorado and the Colorado Lottery. GOCO will provide such signs at no cost to Grantee. Alternatively, GOCO will provide reproducible samples of its logo to Grantee for custom signs. GOCO shall approve in advance the design of any permanent sign materially varying from the signs provided by GOCO. To obtain such approval, Grantee shall submit to GOCO plans describing the number, design, placement, and wording of signs and placards prior to completion of the Project. The Board may withhold Final Payment pending evidence of placement of permanent signage.

19. Liability.

A. *Indemnity.* To the extent allowed by law, Grantee shall be responsible for and shall indemnify, defend, and hold harmless GOCO, its officers, agents, and employees from any and all liabilities, claims, demands, damages, or costs (including reasonable attorneys' fees)

resulting from, growing out of, or in any way connected with or incident to Grantee's performance of this Agreement. Grantee waives any and all rights to any type of express or implied indemnity or right of contribution from the State of Colorado, GOCO, its members, officers, agents, or employees for any liability resulting from, growing out of, or in any way connected with or incident to this Agreement. Grantee acknowledges that Grantee is the owner of the Project and the Property upon which it is located, or has control of the Project and the Property, and that GOCO neither possesses nor controls the Project, the Property, nor the operations of the Project.

B. *No CGIA Waiver.* No term or condition of this Agreement shall be construed or interpreted as a waiver, either express or implied, of any of the immunities, rights, benefits or protections provided to GOCO under the Colorado Governmental Immunity Act as amended or as may be amended in the future (including without limitation any amendments to such statute, or under any similar statute that is subsequently enacted) ("CGIA"). This provision may apply to Grantee if Grantee qualifies for protection under the Colorado Governmental Immunity Act, C.R.S. § 24-10-101, et seq. GOCO and Grantee understand and agree that liability for claims for injuries to persons or property arising out of the negligence of GOCO, its members, officials, agents, and employees may be controlled and/or limited by the provisions of the CGIA. The parties agree that no provision of this Agreement shall be construed in such a manner as to reduce the extent to which the CGIA limits the liability of GOCO, its members, officers, agents, and employees.

C. *Compliance with Regulatory Requirements and Federal and State Mandates.* Grantee assumes responsibility for compliance with all regulatory requirements in all applicable areas, including but not limited to nondiscrimination; worker safety; local labor preferences; preferred vendor programs; equal employment opportunity; use of competitive bidding; permits; approvals; local, state, and federal regulations and environmental laws; and other similar requirements. To the maximum extent permitted by law, Grantee agrees to indemnify, defend, and hold harmless GOCO, Executive Director, and Staff from any cost, expense, or liability for any failure to comply with any such applicable requirements.

D. *Nondiscrimination.* During the performance of this Agreement, Grantee and its contractors, subcontractors, and agents shall not unlawfully discriminate against any employee or applicant for employment because of race, religion, color, national origin, ancestry, physical handicap, medical condition, marital status, age, sex, or any other basis prohibited by local, state, or federal law. Grantee and its contractors shall ensure that the evaluation and treatment of their employees and applicants for employment are free of such discrimination. Further, Grantee and anyone acting on behalf of Grantee shall not engage in any unlawful discrimination in permitting access and use of the Project.

20. Audits and Accounting Records. Grantee shall maintain standard financial accounts, documents, and records relating to the use, management, operation, and maintenance of the Project. Grantee shall retain the accounts, documents, and records related to the Project for five years following the date of disbursement by GOCO of the Grant funds, and they shall be subject to examination and audit by GOCO or its designated agent during this period. While Grantee is not required to use GAAP (Generally Accepted Accounting Principles), Grantee shall use

reasonable and appropriate accounting systems in maintaining the required records under this Agreement.

21. Inspection. Throughout the term of this Agreement, GOCO shall have the right to inspect the Project to ascertain compliance with this Agreement.

22. Breach. In addition to other remedies available at law or in equity, in the event that Grantee breaches any of the terms or conditions of this Agreement, GOCO shall have the following non-exclusive remedies:

A. *Prior to Payment of Grant.* GOCO reserves the right to withdraw funding, terminate this Agreement, and/or deny Grantee eligibility for participation in future GOCO grants, loans, or projects.

B. *After Any Payment of Grant.* GOCO reserves the right to seek specific performance of Grantee's obligations under this Agreement, receive reimbursement in full of any disbursements made under the Grant, including in the event that Grantee does not fulfill its obligations under Paragraph 8 due to lack of annual appropriations, and/or deny Grantee eligibility for participation in future GOCO grants, loans, or projects.

In the event GOCO must pursue any remedy under this Agreement and is the substantially prevailing party, GOCO shall be awarded its costs and reasonable legal fees, including costs of collection.

23. GOCO Policies and Procedures. With regard to all named GOCO policies and procedures referenced in this Agreement, Grantee acknowledges it has received a copy of the policies and procedures or otherwise has access to the documents in connection with this Agreement and is familiar with their requirements.

24. Miscellaneous Provisions.

A. *Good Faith.* Both parties have an obligation of good faith, including the obligation to make timely communication of information that may reasonably be believed to be of interest to the other party.

B. *Assignment.* Grantee may not assign its rights or delegate its obligations under this Agreement without the express written consent of the Executive Director, who has the sole discretion to withhold consent to assign. Any assignment shall require that, at a minimum, the assignee is eligible to receive grants from the Board and assumes Grantee's ongoing obligations under this Agreement.

C. *Applicable Law.* Colorado law applies to the interpretation and enforcement of this Agreement. Venue for any dispute under this Agreement shall lie exclusively in the state courts of the City and County of Denver.

D. *No Joint Venture.* Nothing in this Agreement shall be construed to create a joint venture, partnership, employer/employee, or other relationship between the parties other than independent contracting parties. Except as permitted under the remedies provisions of this Agreement, neither party shall have the express or implied right to act for, on behalf of, or in the name of the other party.

E. *Status of Grantee.* The parties acknowledge that GOCO lacks the power and right to direct the actions of Grantee. Grantee acts in its separate capacity and not as an officer, employee, or agent of GOCO or the State of Colorado.

F. *Time is of the Essence.* Time is of the essence in this Agreement.

G. *Survival.* The terms and conditions of this Agreement, including but not limited to Grantee's obligations, shall survive the funding of the Grant and the completion of the Project.

H. *Fax and Counterparts.* This Agreement may be executed in one or more counterparts, each of which shall be an original, but all of which when taken together shall constitute one agreement. In addition, the parties agree to recognize signatures to this Agreement made electronically and transmitted electronically or by facsimile as if they were original signatures.

I. *Third-Party Beneficiary.* GOCO and Grantee acknowledge and agree that this Agreement is intended only to cover the relative rights and obligations between GOCO and Grantee and that no third-party beneficiaries are intended.

J. *Notice.* Any notice, demand, request, consent, approval, or communication that either party desires or is required to give the other shall be in writing and either served personally or sent by first class mail, postage prepaid, to the addresses shown on Page 1 of this Agreement.

K. *Construction; Severability.* Each party has reviewed this Agreement, and therefore any rules of construction requiring that ambiguities be resolved against a particular party shall not be applicable in the construction and interpretation of this Agreement. If any provision in this Agreement is found to be ambiguous, an interpretation consistent with the purpose of this Agreement that would render the provision valid shall be favored over any interpretation that would render it invalid. If any provision of this Agreement is declared void or unenforceable, it shall be deemed severed from this Agreement, and the balance of this Agreement shall otherwise remain in full force and effect.

L. *Entire Agreement.* Except as expressly provided, this Agreement constitutes the entire agreement of the parties. No oral understanding or agreement not incorporated in this Agreement shall be binding upon the parties. No changes in this Agreement shall be valid unless made in writing and signed by the parties to this Agreement.

M. *Termination of the Board.* If Article XXVII of the Colorado Constitution, which established GOCO, is amended or repealed to terminate GOCO or merge GOCO into another entity, the rights and obligations of GOCO under this Agreement shall be assigned to and

assumed by such other entity as provided by law, but, in the absence of such direction, by the Colorado Department of Natural Resources or its successor.

IN WITNESS WHEREOF, the parties by signature below of their authorized representatives execute this Agreement effective as of 1/15/2021

STATE BOARD OF THE GREAT
OUTDOORS COLORADO TRUST FUND

GRANTEE:
Aspen Valley Land Trust

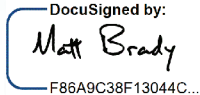
By: 7DFD6A65E1034F5...

Chris Castilian
Executive Director

By: 

Title: *Exec Director*

GOCO Program Staff:
Route Grant Agreement to
Executive Director for signature:

F86A9C38F13044C...

NOTE Signee should be the same individual authorized to sign the grant agreement per Grantee's resolution

EXHIBIT A
Project Summary

Project Summary

Applicant: Aspen Valley Land Trust
Project Title: Connecting Communities to Conserved Lands
County: Garfield, Gunnison, Pitkin

<u>Funding Summary:</u>	Matching Funds	\$269,000.00
	GOCO Recommended Amount	\$399,665.00
	Total Project Cost	\$668,665.00

Project Description: Aspen Valley Land Trust (AVLT) is collaborating with the towns of Silt, Carbondale, and Marble along with other community partners to invest in five conserved properties throughout its service area that have the highest potential for community benefit during the COVID-19 pandemic and beyond. The partners will enhance wildlife habitat, improve trail resources, make safety and accessibility improvements, and enhance the functionality of outdoor educational spaces with infrastructure improvements ranging from water treatment to kiosks to outdoor classroom benches and shade structures. GOCO will support AVLT’s direct role in coordinating this community conservation initiative and enhance previous GOCO investment such as Marble Basecamp.

Reviewer Comments:

- The breadth of projects spearheaded by a land trust in collaboration with various partners is compelling.
- The communities to benefit from this work have a demonstrated need and the partners as well as those communities will be more resilient for having worked collaboratively to achieve these outcomes.

EXHIBIT B Resolution

ASPEN VALLEY LAND TRUST RESOLUTION

APPROVAL OF GOCO RESILIENT COMMUNITIES GRANT AGREEMENT

Connecting Communities to Conserved Land

At a regular meeting of the Board of Directors of Aspen Valley Land Trust, a Colorado non-profit corporation, held Wednesday, December 9, 2020, the following Resolution was duly moved, seconded, and adopted by a majority vote of the members:

BE IT RESOLVED by the Board of Directors that the Aspen Valley Land Trust, a Colorado non-profit corporation, approves a resolution supporting the agreement between Aspen Valley Land Trust and The State Board of the Great Outdoors Colorado Trust Fund.

WHEREAS, Aspen Valley Land Trust and its Board of Directors supports the completion of the "Connecting Communities to Conserved Land" project (the "Project"), which will improve recreational and educational infrastructure as well as land management and restoration at Marble Basecamp, Marble Children's Park, Silt River Preserve, Red Hill, Riverfront Park, and Highwater Farm.

WHEREAS, Aspen Valley Land Trust has received a grant from Great Outdoors Colorado to fund the Project, subject to the execution of a grant agreement.

NOW, THEREFORE, BE IT HEREBY RESOLVED BY THE BOARD OF DIRECTORS OF ASPEN VALLEY LAND TRUST THAT:

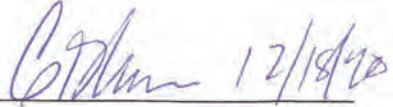
SECTION 1: The Board of Directors of Aspen Valley Land Trust hereby authorizes the Executive Director to sign the grant agreement with Great Outdoors Colorado, and all related documentation.

SECTION 2: The Board of Directors of Aspen Valley Land Trust hereby authorizes the expenditure of funds as necessary to meet the terms and obligations of the grant agreement and application.

SECTION 3: This resolution to be in full force and effect from and after its passage and approval.

The undersigned, being the duly elected and acting President of Aspen Valley Land Trust, a Colorado non-profit corporation, certifies that the above and foregoing is a full and correct copy of the Resolution adopted by the Board of Directors of Aspen Valley Land Trust, at the time set forth above.

WITNESS my hand and official seal.



Gary Knaus, President
Aspen Valley Land Trust,
a Colorado non-profit corporation

EXHIBIT C
Approved Budget

,608/325Ä-5914671Ä.,(Ä *\$*--\$Ä) & Ä#%*Ä&- , Ä&,\$")+,-"!

Aspen Valley Land Trust PROJECT BUDGET								
Connecting Communities on Conserved Lands								
CASH	Source of Funds	Date Secured		GOCO Funds	Applicant Funds	Partner Funds	Total Funding	NOTES
	GOCO Resilient Communities Grant	Awarded		\$399,665			\$399,665	
	Aspen Valley Land Trust	Oct-Dec 2020			\$100,000		\$100,000	
	Town of Carbondale	Oct-20				\$56,000	\$56,000	
	Town of Marble	Pending				\$53,000	\$53,000	
	Town of Silt	Oct-20				\$10,000	\$10,000	
	Highwater Farm	Dec-20				\$5,000	\$5,000	
	Middle Colorado Watershed Council	Pending				\$15,000	\$15,000	
	Colorado Parks & Wildlife	Aug-20				\$30,000	\$30,000	
IN-KIND / PARTNERS								
TOTAL SOURCE OF FUNDS				\$399,665	\$100,000	\$169,000	\$668,665	
1. Chapin Wright Marble Basecamp	Use of Cash Funds	# of Units	Cost Per Unit	GOCO Funds	Applicant Funds	Cumulative Partner Funds	Total Funding	NOTES
Vendor/service provider				\$134,200	\$75,000	-	\$209,200	
DHM Design	Site planning for Gunnison County land use permit	1	\$50,000	-	\$50,000	-	\$50,000	\$46K spent to date on permitting; total proposed budget is \$50k for permitting
Ken's Tree Service	Hazard tree removal & forest management for infrastructure	1	\$15,000	\$10,000	\$5,000	-	\$15,000	\$108K spent on forestry, program equipment & land management, \$15,600 spent on Driveway to date
TBD	Onsite wastewater treatment system (potable water tank, 2 toilets, backcountry septic & leachfield)	1	\$140,000	\$120,000	\$20,000	-	\$140,000	2 Toilet Tech units, building structures around toilets, installation of leechfield and septic and associated materials
AVLT staff	Project Management @ \$35/hr	120	\$35	\$4,200	-	-	\$4,200	
2. Marble Children's Park								
Vendor/service provider				\$66,750	\$5,000	\$53,000	\$124,750	
Rocky Mountain Custom Landscapes	Irrigation system, weed control, landscaping and site planning	1	\$33,000	\$30,000	\$3,000	-	\$33,000	bid received
TBD	Fencing, benches, shade structure, ballfield backstop, portapot shelters	1	\$30,000	\$25,000	\$2,000	\$3,000	\$30,000	Partner funds:Town of Marble
Town of Marble	Historic Marble Jailhouse restoration	1	\$100,000	\$10,000	-	\$50,000	\$60,000	Partner funds: Town of Marble submitted grant to Colorado Historical Fund for \$50,000 (+\$40K still to be raised)
AVLT staff	Project Management @ \$35/hr	50	\$35	\$1,750	-	-	\$1,750	
3. Silt River Preserve								
Vendor/service provider				\$88,715	\$5,000	\$30,000	\$123,715	
DHM Design	Site planning for outdoor classroom, habitat & wetlands enhancement	1	\$17,565	\$12,565	-	\$5,000	\$17,565	Partner funds: Town of Silt (bid recieved)
NRCS	Water rights evaluation & infrastructure rehabilitation	1	\$15,000	-	-	\$15,000	\$15,000	Partner funds: Middle Colorado Watershed Council
TBD	Outdoor classroom & interpretive signs	1	\$20,000	\$15,000	\$2,500	\$2,500	\$20,000	Partner funds: Town of Silt
Goat Green, LLC	& fall integrated weed management & native seed	2	\$20,000	\$35,000	\$2,500	\$2,500	\$40,000	Partner funds: Town of Silt (Goat Green discount of 20%)
Roaring Fork Outdoor Volunteers	Trail maintenance in 2021	1	\$3,000	\$3,000	-	-	\$3,000	
Highwater Farm	Community farm infrastructure (irrigation improvements, shade structure for classes, hedgerow windbreaks for crops)	1	\$25,000	\$20,000	-	\$5,000	\$25,000	Partner funds: Highwater Farm fundraising
AVLT staff	Project Management @ \$35/hr	90	\$35	\$3,150	-	-	\$3,150	
4. Carbondale: Red Hill Trailhead								
Vendor/service provider				\$55,000	\$5,000	\$31,000	\$91,000	
DHM Design	Shade structure & seating	1	\$33,000	\$30,000	\$3,000	-	\$33,000	
DHM Design	Native vegetation & landscaping	1	\$22,000	\$20,000	\$2,000	-	\$22,000	
TBD	Graphic design & trailhead signage	1	\$5,000	\$5,000	-	-	\$5,000	
Board by Design	Trail kiosk, trash, bike rack, toilet sheds	1	\$31,000	-	-	\$31,000	\$31,000	Partner funds: Town of Carbondale
5. Carbondale: Riverfront Park								
Vendor/service provider				\$55,000	\$10,000	\$55,000	\$120,000	
TBD	ADA Access construction	1	\$25,000	\$15,000	-	\$10,000	\$25,000	Partner Funds: Fishing is Fun (CPW)
River Restoration, LLC	Outdoor Classroom construction	1	\$95,000	\$40,000	\$10,000	\$45,000	\$95,000	Partner Funds: Fishing is Fun (\$20K), Town of Carbondale (\$25K)
USE OF FUNDS - CASH SUBTOTAL				\$399,665	\$100,000	\$169,000	\$668,665	
USE OF FUNDS - IN-KIND SUBTOTAL				\$0		\$0	\$0	
Contingency - up to 10% (not required, cannot be GOCO funds)				GOCO Funds	Applicant Funds	Cumulative Partner Funds	Total Funding	NOTES
Contingency					N/A	N/A	\$0	
USE OF FUNDS - CONTINGENCY SUBTOTAL				\$0		\$0	\$0	
TOTAL PROJECT COST				\$399,665	\$100,000	\$169,000	\$668,665	
Remember: the Total Project Cost row must equal the Total Source of Funds row								

MATCHING REQUIREMENTS	Required	Actual	Status
Overall Match (% based on total cost)	10%	40%	Pass
Overall Match (\$ based on total cost)	\$66,867	\$269,000	Pass

EXHIBIT D

Approved Workplan/Timeline

[illegible]

AMENDMENT TO THE GRANT AGREEMENT

Project Name: Connecting Communities to Conserved Lands
Great Outdoors Colorado
Contract No.: 21029

PARTIES TO AGREEMENT

Board/GOCO: The State Board of the Great Outdoors Colorado Trust Fund
Address: 1900 Grant Street, Suite 725
Denver, CO 80203

Telephone: (303) 226-4520
Contact name: Matt Brady

Grantee: Aspen Valley Land Trust
Partner: Town of Carbondale

Date: January 19, 2021

RECITALS

- A. The State Board of the Great Outdoors Colorado Trust Fund ("GOCO" or "Board") and Grantee entered into a grant agreement dated effective January 15, 2021 ("Agreement"). The Agreement establishes the requirements pursuant to the delivery of project outcomes as outlined in Grantee's Project Application, as defined in the Agreement.
- B. The Town of Carbondale is recognized as a formal partner ("Partner") in the Project Application with certain responsibilities for executing various project elements as outlined therein.
- C. Partner is eligible to receive grant funds from the Board.
- D. The parties intend this amendment to be the amendment required by GOCO ("Amendment").

AGREEMENT

NOW, THEREFORE, the parties wish to amend the Agreement.

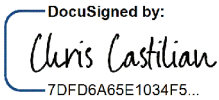
SECTION 1 – PROJECT

- 1. Incorporation of Recitals. The Recitals set forth above are incorporated into this Agreement.
- 2. The parties wish to recognize Partner as a party to the Agreement with the same duties and responsibilities reserved to Grantee.
- 3. Partner intends to bind itself to the duties and responsibilities of the Agreement and to assume all current and ongoing obligations under the Agreement pursuant to performing its duties proposed in the Project Application.
- 4. Partner shall be eligible to receive payments of up to one hundred ten thousand dollars (\$110,000.00) subject to Section 2 Paragraph 13 of the Agreement, Payment of Grant. Partner and Grantee shall coordinate payment requests to meet all requirements specified within Section 2 Paragraph 13.
- 5. All appropriate references to Grantee in the Agreement shall equally apply to Partner heretofore.
- 6. All Recitals and terms of the Agreement shall remain in full force and effect unless specifically amended in this Amendment.

IN WITNESS WHEREOF, the parties by signature below of their authorized representatives execute this Agreement effective as of 2/10/2021.

STATE BOARD OF THE GREAT
OUTDOORS COLORADO TRUST FUND

GRANTEE:
ASPEN VALLEY LAND TRUST

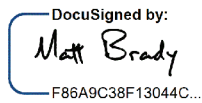
By: 
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Chris Castilian
Executive Director

By: 
AFD88BE23B33467...

Title: Executive Director

GOCO Program Staff:
Route Grant Agreement to
Executive Director for signature:


F86A9C38F13044C...

PARTNER:
TOWN OF CARBONDALE

By: 
1B6EBF6C28284AE...

Title: Mayor

**RESOLUTION NO. 3
SERIES OF 2021**

**A RESOLUTION OF THE BOARD OF TRUSTEES OF THE TOWN OF CARBONDALE,
COLORADO, SUPPORTING THE APPROVAL OF A GRANT AGREEMENT AS A GRANT
PARTNER WITH ASPEN VALLEY LAND TRUST FOR A GRANT RECEIVED FROM THE
STATE BOARD OF THE GREAT OUTDOORS COLORADO TRUST FUND FOR THE
RESILIENT COMMUNITIES GRANT**

WHEREAS: The Town of Carbondale supports the completion of the Connecting Communities to Conserved Land Project;

WHEREAS: Great Outdoors Colorado requires that the Board of Trustees of the Town of Carbondale state its support for the Great Outdoors Colorado Resilient Communities Grant, specifically the Red Hill Trailhead and the Riverfront Park portions of the project, which are on Town of Carbondale parklands, subject to the execution of a grant agreement.

NOW, THEREFORE BE IT HEREBY RESOLVED BY THE BOARD OF TRUSTEES OF THE TOWN OF CARBONDALE THAT:

1. The above recitals are hereby incorporated as findings by the Board of Trustees of the Town of Carbondale.
2. The Board of Trustees of the Town of Carbondale hereby authorizes the Mayor to sign a Grant Agreement with Great Outdoor Colorado.
3. The Board of Trustees of the Town of Carbondale strongly support the grant partnership with Aspen Valley Land Trust .
4. The Board of Trustees of the Town of Carbondale hereby authorizes the expenditure of funds as necessary to meet the terms and obligations of a grant agreement and application in regards to the Red Hill Trailhead (\$55,000) and Riverfront Park portion (\$55,000) of the Connecting Communities to Conserved Land Project.
5. The Board of Trustees of the Town of Carbondale acknowledges that the grant application includes matching funds which Town of Carbondale bears the responsibility to provide.

The effective date of this Resolution to be in full force is the date passed and approved below.

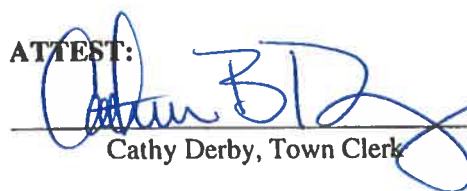
INTRODUCED, READ AND ADOPTED this 26th day of January, 2021

TOWN OF CARBONDALE

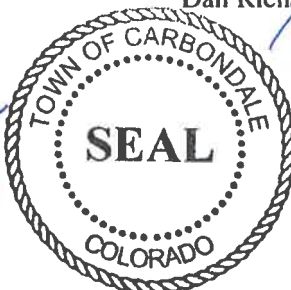


Dan Richardson, Mayor

ATTEST:



Cathy Derby, Town Clerk



**ASPEN VALLEY LAND TRUST
RESOLUTION**


APPROVE R3 FUND DISTRIBUTION FOR CRYSTAL RIVER PROJECT

At a regular meeting of the Board of Directors of Aspen Valley Land Trust, a Colorado non-profit corporation, held Wednesday, April 15, 2020, the following Resolution was duly moved, seconded and adopted by a majority vote of the members:

BE IT RESOLVED by the Board of Directors that the Aspen Valley Land Trust, a Colorado non-profit corporation, approves release and payment of \$20,000 from AVLTT's donor restricted House R3 Fund for planning and implementation of the Crystal River Restoration Project; \$10,000 for planning, payable in 2020 and \$10,000 for implementation, payable in 2021 or later as needed, upon successful completion of the planning phase of the project.

The undersigned, being the duly elected and acting President of Aspen Valley Land Trust, a Colorado non-profit corporation, certifies that the above and foregoing is a full and correct copy of the Resolution adopted by the Board of Directors of Aspen Valley Land Trust, at the time set forth above.

WITNESS my hand and official seal.



Gary Knaus, President
Aspen Valley Land Trust, a Colorado
non-profit corporation



United States Department of the Interior

BUREAU OF RECLAMATION
P.O. Box 25007
Denver, CO 80225-0007



IN REPLY REFER TO:

84-27133

March 25, 2021

1.3.11

VIA ELECTRONIC MAIL

Roaring Fork Conservancy
Attn: Heather Lewin
22800 Two Rivers Road
Basalt, CO 81621-9330

Subject: Funding Opportunity No. BOR-DO-21-F002 – WaterSMART Cooperative Watershed Management Program Phase II for Fiscal Year 2021 – Application Review Status, Your Application Titled, “Crystal River Restoration and Weaver Ditch Efficiency Project” (CWMP2-011)

Dear Ms. Lewin:

The Bureau of Reclamation is pleased to inform you that your application for WaterSMART Cooperative Watershed Management Program Phase II funding was among those receiving the highest scores and is now being considered for award of a financial assistance agreement. Reclamation anticipates awarding Federal funds in the amount of \$252,091 for your proposed project. In working with you to develop your financial assistance agreement, Reclamation will closely review the activities outlined in your proposal to ensure that all activities are eligible for funding and that the proposed costs are allowable under financial assistance regulations. If some costs or activities are determined to be ineligible or unallowable, Reclamation will work with you to refine the scope of work and budget for the project.

In the coming months, we will work with you to gather the information needed to enter into a financial assistance agreement. Please note that this letter is not a final commitment of funding and all pre-award clearances and approvals must be obtained as described in Section E.2.5 of the Funding Opportunity, including compliance with all Federal environmental and cultural resource laws. In addition, no on-the-ground activities can occur prior to September 1, 2021, as stated in *Section C.3.3. Construction Start Date Restrictions* of the Funding Opportunity. Reclamation must also have sufficient evidence prior to award that non-Federal cost share will be available. The final funding amount may be adjusted if necessary.

Please be advised that your application has been ranked, in part, based on your description of the expected benefits of your project. Revisions to the scope of the project identified in your application can be made only after Reclamation determines that revisions would not impact the overall ranking or the expected benefits of the project.

To demonstrate the success of the program and to provide a guide for future applicants, as stated in *Section F.7. Release of Applications* of the Funding Opportunity we will post copies of all successful

Cooperative Watershed Management Program applications as examples on Reclamation's website. While this generally does not raise any issues, we find it prudent to provide successful grant applicants with an opportunity to redact any sensitive information from their proposals prior to posting them on our website. As a rule, we remove the SF-424s; however, if there are any other items you would like to request be redacted, please let us know by Friday, May 14, 2021. If we do not hear from you by this date, we will assume that there are no objections to posting the full application.

If you have any questions about the program, please contact Ms. Robin Graber, Program Coordinator, at rgraber@usbr.gov or 303-445-2764. We will contact you in late May 2021 to set up an initial call to discuss the timeline for the development and award of your financial assistance agreement. Thank you for your interest and participation in the WaterSMART Program. We look forward to working with you.

Sincerely,

Ned Weakland
Grants Officer



November 11, 2020

To whom it may concern:

I am writing to you in support of the Roaring Fork Conservancy's request to the WaterSMART Watershed Restoration Grant program entitled "Crystal River Restoration and Weaver Ditch Efficiency Project."

Having been a Roaring Fork Conservancy backer and stakeholder throughout an extended and detailed Crystal River Management Plan process I believe partnering with them to implement its significant goals including riparian restoration and ditch efficiency improvements would be highly beneficial to the severely compromised lower Crystal River.

As the owner of a Flyfishing company, board member of the Roaring Fork Fishing Guide Alliance, Town of Carbondale Trustee, and former general manager of the River Valley Ranch Homeowners Association, I have discussed Crystal River Management Plan implementation objectives on numerous occasions with the Roaring Fork Conservancy and enthusiastically endorse this project as both a stakeholder and twenty-two year resident of the Crystal River Watershed.

Efficient use of our water resources is essential to ensure that we maintain adequate consumptive water supplies and strive toward the protection and enhancement of stream flows in our local rivers. Equally important to our community and its visitors is the effective rehabilitation of the ever important riparian habitat. An improved Crystal River will provide sustainable recreational opportunities, as well as critical instream and enriched riparian habitat for resident and migrating wildlife.

I support the RFC and the Town of Carbondale's combined efforts to enhance the Riverfront Park area that borders the Crystal River which will result in a valuable demonstration of beneficial projects to many other water users throughout this region and beyond. I look forward to continuing to provide technical advice, community input and a recreational user perspective to the implementation team.

Sincerely,

A handwritten signature in dark ink, appearing to read "L. Kitching", with a long horizontal line extending to the right.

Lani R. Kitching

Town of Carbondale, elected official
Proudline Guided Fly Fishing, owner/operator
Roaring Fork Fishing Guide Alliance, board member
Ruedi Water and Power, board member
River Valley Ranch HOA, former general manager



COLORADO

Parks and Wildlife

Department of Natural Resources

Glenwood Springs Service Center
88 Wildlife Way
Glenwood Springs, CO 81601
P 970.947.2920 | F 970.947.2936

November 29, 2021

RE: Crystal River Restoration and Weaver Ditch Efficiency Project

To Whom It May Concern,

Colorado Parks and Wildlife (CPW) is writing in support of Roaring Fork Conservancy's (RFC) request for funding of the Crystal River Restoration and Weaver Ditch Efficiency Project. CPW's statutory mission to perpetuate the wildlife resources of the State, to provide a quality State parks system, and to provide enjoyable and sustainable outdoor recreation opportunities that educate and inspire current and future generations to serve as strategic stewards of Colorado's natural resources. CPW is a stakeholder in the 2016 Crystal River Management Plan (CRMP) and have provided funding for two components of this project through our Fishing Is Fun grant.

The Crystal River Restoration: Riverfront Park project aligns with CPW's mission, as it will perpetuate the wildlife resources that use the Crystal River corridor and provide an example of natural resource stewardship that will inspire others. The project goals intends to restore the ecological integrity of the reach, improving water efficiency at the Town of Carbondale's Weaver Ditch, mitigate seasonal dewatering of the river channel by upstream diversions, and enhance recreational and interpretive opportunities.

CPW values the project team's collaborative project approach, holistic goals and dedication to wildlife habitat and recreation. The proposed restoration and efficiency project reflects an integrated and collaborative approach to river restoration; building on multiple recommendations of the CRMP and CPW, Roaring Fork Conservancy, American Rivers and the Town of Carbondale. We applaud the substantial planning, public outreach, and consensus building that has culminated in the pending implementation of a highly supported restoration project. CPW is optimistic that this pioneer project of the CRMP will lay the groundwork for future restoration and improvement in the ecological health of the Roaring Fork Valley and Colorado River Watershed. In fact, CPW has pursued engineering designs for river improvements at our nearby property to amplify the ecosystem benefits upstream along the Crystal River and further increase opportunities for anglers.

Local CPW staff have served as resource advisors for this project and we look forward to our continued involvement in project development around the Riverfront Park as it balances community needs while providing meaningful protections to the important ecological functions inherent to the area. As such, CPW recommends a standard construction window for instream projects of August 15 - September 30 to avoid impacts to spawning resident fishes. However, the scope of this project requires both consideration for targeted protection of the locally declining population of mountain whitefish and the 4-5 months of instream work needed to construct. Therefore, CPW has been collaborating with the project team to find a functional work window for the project utilizing a phased approach over two different years during CPW's standard work window with allowance for an earlier instream start date if warranted. Concluding instream disturbance by the end of September will avoid impacting the spawning activities and egg incubation period of Mountain Whitefish in the lower Crystal River, thus allowances will be considered to begin instream construction as early as mid-July. The project team will provide the rationale and need to CPW prior to each phase for early construction allowances.



The Crystal River Restoration and Weaver Ditch Efficiency Project will have meaningful, long-lasting benefits to this reach of the Crystal River and for future projects. We strongly encourage your support. If there are any questions or needs for additional information, please contact Aquatic Biologist Kendall Bakich at 970.947.2924 or District Wildlife Manager John Groves at 970.947.2933.

Sincerely,

A handwritten signature in black ink, appearing to read 'Matt Yamashita', with a stylized, flowing script.

Matt Yamashita
Area Wildlife Manager
Glenwood Springs, Wildlife Area 8

Cc: Matt Yamashita, Area Wildlife Manager; John Groves, District Wildlife Manager; Kendall Bakich, Aquatic Biologist, Lori Martin, Senior Aquatic Biologist; File



November 11, 2020

RE: Support for the Crystal River Restoration and Weaver Ditch Efficiency Project.

To whom it may concern;

American Rivers strongly supports the Crystal River Restoration and Weaver Ditch Efficiency Project. American Rivers has been engaged in efforts to improve conditions of the Crystal River for several years. Part of this work also means improving irrigation efficiencies for the many ditches that divert water from the Crystal. The Crystal River Management Plan provides a sound framework from which projects such as this can be accomplished.

We also are very excited about the proposed improvements to the Town of Carbondale's Riverside Park. Restoring the river, improving the ditch headgate, reconnecting the flood plane and riparian with the river gain added value with the ability of people and educational groups to access the site.

We urge the you to support this project with the requested funding.

Thank you!

Ken Neubecker

Ken Neubecker, Colorado Projects Director
American Rivers Upper Colorado Basin Program within Colorado
24 S Meadow View Ct.
Glenwood Springs, CO 81601
(970) 230-9300
Kneubecker@americanrivers.org



November 9, 2020

To whom it may concern,

Aspen Valley Land Trust (AVLT) is proud to support the Crystal River Restoration and Weaver Ditch Efficiency Project. AVLT has been a partner on the project since its inception in 2013 and has invested over \$40,000 and countless hours in previous planning efforts that have moved the project to this critical juncture. We are happy to say that the project partners have raised all necessary funding for planning and design, and we are excited to be raising funds now for implementation of the plan, toward which AVLT has committed an additional \$10,000.

This is an opportunity for the Town of Carbondale to act on the recommendations of the 2015 Carbondale Parks, Recreation, and Trails Master Plan (CPRT) and the stakeholder-driven 2016 Crystal River Management Plan (CRMP). The CPRT recommended, *"increased river trail opportunities for everyone and encouraging conservation and restoration projects within Carbondale's riparian corridors."* The CRMP classified the project reach's ecological health as "severely to unsustainably impaired."

Our goal is to restore this reach to a healthy native condition. Furthermore, the site's proximity to several Carbondale schools offers our community an incredible opportunity to serve our citizens as an engaging "wildland park" that educates visitors and serves as a model for future river restoration projects in the watershed. This project will realize that vision.

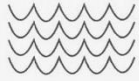
The strength of this community proposal lies in the collaboration that was necessary to create it. The Town of Carbondale and its partners have worked tirelessly to arrive at a consensus approach to the project. We have that consensus now and have done our planning. Our opportunity to act is now.

This implementation project is an opportunity for Roaring Fork Conservancy, the Town of Carbondale, and the project team to leverage previous master planning investments and bring identified community priorities to life. The Crystal River Restoration and Weaver Ditch Enhancement Project is an ambitious but well thought out proposal, and we are grateful to you for your consideration of this important project.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Suzanne Stephens', is located below the 'Sincerely,' text.

Suzanne Stephens
Executive Director



RUEDI WATER & POWER AUTHORITY

0238 Fawn Drive
Carbondale, Co 81623
970.963.4959
www.rwapa.org

To Whom It May Concern,

I write to express Ruedi Water and Power Authority's (RWAPA) support for Roaring Fork Conservancy's (RFC) request for funding of the "Crystal River Restoration: Riverfront Park" project. RWAPA is a regional water agency in the Roaring Fork Watershed, directed by a Board with an elected official from each local government within the watershed – Aspen, Snowmass Village, Basalt, Carbondale, Glenwood Springs, Pitkin and Eagle Counties. Our mission is to mobilize resources and influence to protect and enhance the waters and communities of the Roaring Fork Watershed.

The Crystal River is one of the world's most beautiful rivers and is an extremely valuable resource for our communities because of its natural beauty, rich environment, and recreational opportunities. Unfortunately, it suffers severe impairments and is in dire need of restoration and improvement. The Riverfront Park project will improve the Crystal through restoration and creation of a significant stretch of riparian area along the river, which will in turn improve the water quality and habitat within that stretch. It will additionally improve a significant diversion structure of the town of Carbondale and provide education for the Carbondale community about the value of rivers and riparian areas.

RWAPA and RFC have partnered for many years to create and foster implementation of watershed plans and projects throughout the Roaring Fork watershed. We are excited to see this project come to fruition as it is not only a high priority project identified in the Crystal River Management, but also addresses many of the action items identified in the more broad Roaring Fork Watershed Plan. It is an outstanding example of a project that brings together many partners and provides multiple benefits for the Crystal River and the Carbondale community. It is easily supported by RWAPA's member jurisdictions and we encourage your full support of this valuable project as well.

Sincerely,

April Long, Director
Ruedi Water and Power Authority

November 13, 2020

To whom it may concern:

I am writing this letter in support of Roaring Fork Conservancy's request to the BOR WaterSMART Grant program entitled "Crystal River Management Plan Implementation." Having been involved with the preceding Coal Basin project, and present as a stakeholder throughout the Crystal River Management Plan process, I believe partnering with them to implement plan goals- including increasing flows and riparian restoration would be highly beneficial to the lower Crystal.

I have discussed Crystal River Management Plan Implementation with Roaring Fork Conservancy, and strongly support the project as a stakeholder and long-standing resident of the Crystal River Watershed.

After experiencing another drought year in 2020, we are reminded that the efficient use of water resources is essential to ensure that we maintain adequate consumptive water supplies and strive toward the protection and enhancement of stream flows in our local rivers. Restoring riparian and instream habitat benefits all aspects of our community- from agriculture, to recreation, to environment. Improving this reach of the Crystal River will provide enhanced recreational opportunities, as well as critical instream and riparian habitat for resident and migrating wildlife, and serve as an example for what other riverfront property owners may accomplish.

I appreciate the work RFC and the Town have done to move this project forward, and will continue to provide technical advice, agricultural perspective, and other assistance whenever possible.

Sincerely,

Bill Fales
Cold Mountain Ranch

November 12, 2020

Snowmass, Colorado

To whom it may concern:

I would like to express my endorsement of the proposed Crystal River Restoration and Weaver Ditch Efficiency project by Roaring Fork Conservancy (RFC) as a key implementation of the Crystal River Management Plan and Roaring Fork Watershed Plan.

I have followed this project from my position as a Pitkin County Commissioner, through my participation in the Colorado River Basin Roundtable, and as a water rights owner and irrigator on Capitol Creek. This creek has very similar issues to the Crystal River, with very low water flow levels in the lower stretches of the creek late in the irrigating season. I have thought a lot for many years about how to help solve this problem and leave more water in the creek in order to improve the stream health, so I fully understand the issues involved on the Crystal River.

Many people in Colorado are working hard to find solutions to our water problems. This project is worthy of funding because it seeks to address many of the constraints surrounding improved environmental conditions while taking into account the concerns and needs of municipal water rights holders along with recreational and educational components.

Efficient use of our water resources is essential to ensure that we maintain adequate consumptive water supplies and strive toward the protection and enhancement of stream flows in our local rivers. Equally important to our community and its visitors is rehabilitating the ever important riparian habitat. An improved Crystal River will provide enhanced recreational opportunities, as well as critical instream and riparian habitat for resident and migrating wildlife.

I look forward to seeing the benefits of plan implementation in this watershed.

Sincerely, Steve Child

Rancher, irrigator, and Pitkin County Commissioner