Trout Unlimited (TU) staff will work with landowners in the Tomichi Creek and Cebolla Creek watersheds to restore instream and riparian habitat, improve irrigation water management, improve watershed health, and drought resiliency. Tomichi Creek and Cebolla Creek are both headwater tributaries to the Upper Gunnison River. The proposed restoration activities will improve instream habitat and riparian health by reducing erosion, increasing vegetative cover on stream banks, reconnecting/re-establishing floodplains, to increase adjacent ground water levels. Restoration prescriptions will differ to suit specific land uses and management goals. Low-tech processed based restoration methods and grazing management will be used on the Cebolla Creek site and more traditional bank and channel stabilization technics used at the Tomichi site. Both locations will include irrigation water control improvements that are expected to improve irrigation water management, wetlands, and stream flows.

Project partners include private landowners, the National Resource Conservation Service (NRCS), USFWS Partners for Fish and Wildlife (PFW), Colorado Parks and Wildlife (CPW), and the Upper Gunnison River Water Conservancy District.
Colorado Water Conservation Board

Water Plan

Water Project Summary

<table>
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<tr>
<th>Name of Applicant</th>
<th>Trout Unlimited_Denver</th>
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Applicant & Grantee Information

Name of Grantee: Trout Unlimited_Denver
Mailing Address: 2032 Ivanhoe St. Denver CO 80207
FEIN: 381,612,715

Organization Contact: Danielle Typinski
Position/Title: Grant Compliance Coordinator
Phone: 7032849429
Email: danielle.typinski@tu.org

Grant Management Contact: Danielle Typinski
Position/Title: Grant Compliance Coordinator
Phone: 7032849429
Email: danielle.typinski@tu.org

Grant Management Contact - Alternate: Jesse Kruthaupt
Position/Title:
Phone: 970-209-0976
Email: jesse.kruthaupt@tu.org

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

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### Water Project Overview

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<tr>
<td>Scheduled Start Date - Construction</td>
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**Description**

Trout Unlimited (TU) staff will work with landowners in the Tomichi Creek and Cebolla Creek watersheds to restore instream and riparian habitat, improve irrigation water management, improve watershed health, and
drought resiliency. Tomichi Creek and Cebolla Creek are both headwater tributaries to the Upper Gunnison River.

The proposed restoration activities will improve instream habitat and riparian health by reducing erosion, increasing vegetative cover on stream banks, reconnecting/re-establishing floodplains, to increase adjacent ground water levels. Restoration prescriptions will differ to suit specific land uses and management goals. Low-tech processed based restoration methods and grazing management will be used on the Cebolla Creek site and more traditional bank and channel stabilization techniques used at the Tomichi site. Both locations will include irrigation water control improvements that are expected to improve irrigation water management, wetlands, and stream flows.

Project partners include private landowners, the National Resource Conservation Service (NRCS), USFWS Partners for Fish and Wildlife (PFW), Colorado Parks and Wildlife (CPW), and the Upper Gunnison River Water Conservancy District.

Funding from the CWCB Water Plan Grant will be used for, labor, excavation and materials. The two participating landowners are under contract with the NRCS and have utilized NRCS staff for restoration design and planning.

<table>
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<tr>
<th>Measurable Results</th>
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<tr>
<td>New Annual Water Supplies Developed or Conserved (acre-feet), Consumptive or Nonconsumptive</td>
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<tr>
<td>Existing Storage Preserved or Enhanced (acre-feet)</td>
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<tr>
<td>New Storage Created (acre-feet)</td>
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<tr>
<td>7,500 Length of Stream Restored or Protected (linear feet)</td>
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<tr>
<td>Efficiency Savings (dollars/year)</td>
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<tr>
<td>200 Efficiency Savings (acre-feet/year)</td>
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<tr>
<td>10 Area of Restored or Preserved Habitat (acres)</td>
</tr>
<tr>
<td>Quantity of Water Shared through Alternative Transfer Mechanisms or water sharing agreement (acre-feet)</td>
</tr>
<tr>
<td>Number of Coloradans Impacted by Incorporating Water-Saving Actions into Land Use Planning</td>
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<tr>
<td>Number of Coloradans Impacted by Engagement Activity</td>
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</table>

<table>
<thead>
<tr>
<th>Water Project Justification</th>
</tr>
</thead>
</table>

This project will improve watershed health and cold water trout habitat.

This project will help meet the following 3 of the goals listed in the Gunnison BIP, pp 30-31.

Primary Goal:
1. Protect existing uses: The infrastructure and habitat improvements planned will protect and improve environmental, and agricultural uses on properties located on headwater tributaries to the Gunnison River.

Complementary Goals

6. Maintain or, where necessary, improve water quality throughout the Gunnison Basin: The proposed in-channel improvements will reduce erosion and improve channel stability, eroded banks near the structures will recover and riparian vegetation established. Over time, it is expected that stream channels will transform to a narrower deeper profile leading to lower water temperatures and providing better refuge for trout.

The Colorado Water Plan Water Plan frequently references collaboration and multiple use projects. In section
6.6, page 6-157, the third goal listed is “Support the development of multipurpose projects and methods that benefit environmental and recreational water needs as well as water needs for communities or agriculture”. This project will involve coordination between NGO’s, private land owners, federal and local agencies to address environmental, recreational, and agricultural water needs.

On page 1-6 of the Colorado Water plan sites three core water values. The second value is “Efficient and effective water infrastructure promoting smart land use.” This project will upgrade ranch infrastructure and demonstrate how irrigation water management and wetland enhancement can be used to manage healthy riverine ecosystems and productive agriculture.

**Related Studies**

Upper Gunnison Integrated Water Management Planning
Tomichi Creek Riparian Assessment

**Taxpayer Bill of Rights**

None

**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.
Colorado Water Conservation Board

Water Plan Grant – Statement of Work – Exhibit A

Statement Of Work

<table>
<thead>
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<th>Date:</th>
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<tr>
<td>Name of Grantee:</td>
<td>Trout Unlimited</td>
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<tr>
<td>Name of Water Project:</td>
<td>Tomichi and Cebolla Creeks Restoration Package</td>
</tr>
<tr>
<td>Funding Source:</td>
<td>Water Plan Grant Watershed Restoration and Rec Category</td>
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Water Project Overview:

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Project partners include private landowners, the National Resource Conservation Service (NRCS), USFWS Partners for Fish and Wildlife (PFW), Colorado Parks and Wildlife (CPW), and the Upper Gunnison River Water Conservancy District.

Funding from the CWCB Water Plan Grant will be used for, labor, excavation and materials. The two participating landowners are under contract with the NRCS and have utilized NRCS staff for restoration design and planning.

Project Objectives:
Task 1 – L&P Ranch Stream and Irrigation Improvement

Description of Task:

L&P Ranch is located on 30 miles south of Gunnison in the Cebolla Creek Watershed. This task will include stream channel restoration, riparian pasture fencing, and irrigation management improvements. The work is coordinated effort between L&P Ranch, TU, NRCS, and Partners for Fish and Wildlife.

Low tech restoration techniques will be implemented on the ranch in Cebolla Creek and Powderhorn Creek in order to improve stream processes and hydrologic function. Structures will include bank attached and mid-channel PALS and wicker weirs. The fencing will split the property from one field into four and allow for grazing to be implemented in a way that benefits long term production of forage, riparian health, and wildlife habitat. Cross fencing will limit the duration of livestock access to Cebolla and Powderhorn Creeks. Two structures for water control will be installed to control and manage irrigation water from the MB and A Ditch more effectively. The structure on the MB ditch will allow irrigators to better distribute water on the irrigated meadow and direct tail water from neighboring upgradient fields back to Cebolla Creek thereby improving stream flows through the reach.

Method/Procedure:
L&P Ranch will hire a fencing contractor to construct 7,000 feet of fence during the summer of 2022. Plans for the fence were developed by NRCS to meet NRCS standards. The segment of fence that crosses Cebolla Creek will be a swing fence to allow debris and ice to pass unobstructed when livestock are not on the property.

L&P Ranch will hire a stream restoration contractor to construct PALS and wicker weirs on Cebolla and Powderhorn Creek. Willow material for the structures will be sourced on site. Logs and larger woody debris will be sourced from a neighboring property in coordination with fire mitigation efforts. Restoration work is planned for the fall of 2022 and expected to take 3-4 weeks. Two board stop water control structures will be fabricated by a local contractor to install in the MB and A ditch. L&P Ranch will use ranch labor and equipment to install the structures in fall of 2022.

Deliverable:

Final report documenting expenses and summarizing completion of riparian pasture fence, 2 water control structures. Before, after, during construction photos points of stream restoration structures 1.5 miles of stream protected/restored.

Tasks

Task 2 – Tomichi Preserve Stream Restoration

Description of Task:

This task is a joint effort between the NRCS, USFWS Partners for Wildlife Program, the Upper Gunnison Water Conservancy District, Trout Unlimited and Tomichi Creek Preserve LLC to restore and protect 2500 feet of Tomichi Creek stream channel and permanently protect 100 acres of degraded riparian/wetland habitat on Tomichi Creek Preserve. Tomichi Creek Preserve is a conservation subdivision designed to improve an ecologically degraded piece of property located 2 miles south of Gunnison on Tomichi Creek. The portion of Tomichi creek running through the property was channelized 60-80 years ago and became uniformly wide and shallow, with little bedform diversity. Over time it became increasingly entrenched and lost connectivity to lateral wetlands and numerous oxbows adjacent to the old channel. In 2005, the first phase of this project was initiated with a WRP easement on 80 acres of the property and a stream restoration project that returned 3,000 feet of Tomichi Creek back into its original meandering channel. This final phase, which CWCB funding is requested, will induce meandering on an additional 1500 feet of straightened channel near the western edge of the property and restore 1000 feet of stream near the eastern edge of the property.
**Method/Procedure:**

NRCS stream restoration engineering staff have completed survey and design of the two segments where restoration will take place. The latest design is included in as Exhibit B. The Upper Reach, located on the eastern end of the property, will include several rock structures, sod mats, and transplanted willows to maintain channel grade and stability. The majority of rock has been purchased and staged at the site. Excavation contractor has been selected and will begin work during the summer/fall of 2022.

Design of the Lower Reach, near the western end of the property, will be modified to avoid conflict with sewer line crossing under the creek in the middle of that reach. NRCS is currently working on an updated design that will include channel structures and excavation of designed meanders. Restoration of this segment is expected to take place in 2022 when the contractor is mobilized on site.

**Deliverable:**

Final report documenting expenses and before, after, during construction photos of stream restoration structures.
- 2500 feet of stream restored.
- 100 acres of wetland protected.

---

### Tasks

**Task 3 – Grant Admin NICRA**

**Description of Task:**

This task will involve contracting, insurance, payments to contractors, reimbursement invoices to CWCB, and accounting of project expenses.
Method/Procedure:

13.74% of project equipment and contracted expenses is included in the budget.

Deliverable:

Project oversight, reporting and management of tasks.

Repeat for Task 3, Task 4, Task 5, etc.

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 C. Per 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 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 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.
## Colorado Water Conservation Board

### Water Plan Grant - Exhibit C

#### Budget and Schedule

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**Total** $0  $0  $0
### Example C: Construction

#### Task 1 - L&P Ranch Stream and Irrigation Improvement Restoration

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#### Task 2 - Tomichi Preserve Stream Restoration

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#### Task 3 - Grant Management

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TOTAL  
$374,570.44 $137,170 $239,400
**TOMICHI CREEK**

**STREAM RESTORATION**

**TOMICHI CREEK LOWER REACH SITE**

---

**PROJECT AREA**

---

**COLORADO MAP**

---

**OBJECTIVES & REFERENCES**

- **GOAL:** Streambank Protection
  - **STANDARDS/REFERENCES:**
    1. NRCS NEH 654, Stream Restoration Design
    2. Streambank & Shoreline Protection (339)
    3. Critical Area Planting (342)
    4. Mulching (384)
    5. Fence (382)
    6. Channel Bed Stabilization (354)

---

**OBJECTIVES:** Restore Stream Channel to Historical Meander Pattern & Improve Riparian Habitat.

---

**SURVEY INFORMATION**

- Survey data is relative to a local benchmark established by the NRCS. Elevations are not tied to any official survey benchmarks. Coordinates for benchmarks will be on the site plan or provided separately.

---

**QUANTITIES**

**ESTIMATED QUANTITIES OF MAJOR WORK ITEMS**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>QTY</th>
<th>UNIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Control Dam</td>
<td>305</td>
<td>LS</td>
</tr>
<tr>
<td>2. Fish Weir</td>
<td>5101</td>
<td>FT</td>
</tr>
<tr>
<td>3. Stream Bank Stabilization</td>
<td>600</td>
<td>CYS</td>
</tr>
<tr>
<td>4. Woodland</td>
<td>300</td>
<td>CYS</td>
</tr>
<tr>
<td>5. Vegetation Management</td>
<td>600</td>
<td>CYS</td>
</tr>
</tbody>
</table>

---

**CONTRACTOR AGREEMENT**

This plan has been discussed with me by the NRCS and I agree to the calculations and design. I shall construct this project according to NRCS plans and specifications. Land and water rights, permits, easements and rights-of-way have been obtained for all properties involved. Any changes to the project design shall be approved by an NRCS representative and the landowner. 

To receive cost share payments, NRCS personnel must inspect the installation to ensure compliance with the design. I will contact NRCS to arrange the inspection of each project element during construction.

**COOPERATOR:** _______________________  **DATE:** _______________________

---

**UTILITY NOTIFICATION**

- NO REPRESENTATION IS MADE BY THE NATURAL RESOURCES CONSERVATION SERVICE AS TO THE EXISTENCE OR NONEXISTENCE OF UNDERGROUND UTILITIES.
- Call 2 business days in advance before you dig, grade, or excavate for the marking of underground member utilities. Call Utility Notification Center of Colorado at 1-800-922-1987 or 811. In the Metro Denver Area call 303-232-0491 or 811.
- The Cooperator shall provide NRCS with the UNCC ticket number acquired prior to start of construction.

**UNCC TICKET NUMBER:** _______________________

---

**DESIGN DRAWINGS (REV: 5/29/2020)**

**PRINT DATE-TIME:**  May 29, 2020 - 5:13 PM

---

**TITLE**

**DATE:**

**AS-BUILT DRAWINGS REVIEWED AND APPROVED BY:**

---

**TABLE OF CONTENTS**

<table>
<thead>
<tr>
<th>SHEET NO</th>
<th>SHEET TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>COVER SHEET</td>
</tr>
<tr>
<td>2</td>
<td>GENERAL NOTES</td>
</tr>
<tr>
<td>3</td>
<td>SYMBOL LEGEND</td>
</tr>
<tr>
<td>4</td>
<td>SITE PLAN 1</td>
</tr>
<tr>
<td>5</td>
<td>SITE PLAN 2</td>
</tr>
<tr>
<td>6</td>
<td>TYPICAL CHANNEL SECTIONS</td>
</tr>
<tr>
<td>7-12</td>
<td>CHANNEL SECTIONS</td>
</tr>
<tr>
<td>13-17</td>
<td>TYPICAL DETAILS</td>
</tr>
</tbody>
</table>

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**CONSTRUCTION DATA & AS-BUILT DRAWINGS**

**CONTRACTOR NAME AND ADDRESS:**

---

**CONSTRUCTION COMPLETED DATE:**

---

**THE PRACTICE MEETS THE STANDARDS AND SPECIFICATIONS.**

---

**DESIGN DRAWS (REV: 5/29/2020)**

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**DESIGN DRAWINGS (REV: 5/29/2020)**

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GENERAL NOTES

1. All work shall comply with the construction specifications, drawings, and other contract requirements.
2. All notes and specifications are directed to the Contractor, unless stated otherwise.
3. Keep at least one copy of final drawings, specifications, and stormwater management plan on-site during construction.
4. Use an excavator with a hydraulic thumb to place boulders, logs, and rockpiles.
5. Verify site conditions at the work site before mobilization. Locate and mark all underground and overhead utilities within the construction limits, including septic systems, water lines, irrigation pipes, wells, and underground tanks.
6. Provide erosion control measures and best management practices to prevent runoff from disturbed areas and exposed soils from entering surface waters or wetland areas. Filter muddy runoff or discharges from disturbed areas to prevent an increase in turbidity of surface waters (seeps, springs, streams, rivers, lakes, and wetlands). See erosion control notes for more information.
7. Preserve existing vegetation to greatest extent possible. Save and replant plants and sod patches when practical, especially willow clumps.
8. When feasible to prevent disturbed areas, remove and replace as needed to complete work.
10. Finish grade to slopes as specified on the drawings. Blend grades to match existing grades. Work includes minor grading, and sloping "flat" areas to at least 2% to provide positive drainage.
11. Take precautions to avoid spilling fuel or oil. If a fuel or oil spill occurs, properly clean the affected area and dispose of any contaminated soils to prevent surface or ground water contamination. A spill response kit is required while equipment is operating. See specifications for more details.
12. Store or stage equipment, fuels, lubricants, and other potential contaminants at least 50 feet away from the stream, surface waters, wetlands, or other sensitive habitats.
13. Remove, store, and replace topsoil to restore disturbed areas that do not have other specified surfacing. Seed and mulch all disturbed soil surfaces with native grass seed according to the specifications.
14. Restore access and staging areas used during construction to pre-existing conditions or better. Plan the movement of equipment and materials to minimize disturbance, and to limit the number of trips to and from each work site.
15. All excavation work is unclassified (See Specifications for the definition of "unclassified excavation"), unless noted otherwise. All earthwork required by and shown on the drawings is included in the work.
16. Stake bankful elevations at the work site before installing structures or other work. The Engineer will provide bankful elevations by station, or will help identify bankful in the field.
17. Provide structures according to typical details, structural tables, and proposed cross-sections, unless noted otherwise or changed in the field for site-specific conditions.
18. Typical details show the required components for the work, but existing site conditions will vary. Field-adjust to match existing conditions.
19. All plan dimensions are true horizontal, and vertical dimensions are true vertical.
20. Replace or re-establish properly corner pins or other survey monuments using services of a state-licensed professional land surveyor.
21. Property lines, if shown, are approximate.
22. Given the dynamic nature of natural streams and the highly variable topography of riparian areas, field adjustments are expected. Promptly notify the Owner or Engineer if a field adjustment is required. Design changes require the Engineer’s approval.
23. Whenever possible, get on-site assistance from the Engineer or Stream Restoration Specialist, especially for first installation of each type of stream structure or component.
24. Inform the Owner of any conflicts or discrepancies among the drawings, details, and specifications. The Engineer or engineer’s designated representatives are the only people authorized to make changes to the drawings, details, or specifications. This is a site-specific design. Do not use these drawings and specifications at a different location or for any other purposes.

Contact information is below:
Design Engineer: TJ Burr, PE
Phone: 720-930-0011 (cell)
Email: T.Burr@usda.gov

ABBREVIATIONS
BMP: Best management practice
CIP: Corrugated Metal Pipe
CY: Cubic yards
E&S: Erosion and Sediment
FT: Feet
PE: Professional Engineer
PLS: Professional Land Surveyor
SF: Square feet
STA: Stationing for alignments of existing stream channel and proposed work
SY: Square yards
TW: Thalweg, or least flow path in stream channel
TYP: Typical, as used in similar conditions.

GENERAL NOTES FOR EROSION & SEDIMENT CONTROL
1. All erosion and sediment (E&S) control measures without specific pay items are subsidiary to pollution control. For measures not defined by the contract documents, use best management practices (BMPs) for E&S control as defined by the authority having jurisdiction or the Urban Storm Drainage Criteria Manual, Volume 3, Denver CO, whichever is more stringent.
2. To help prevent the introduction of invasive, non-native plants and organisms to work areas, clean all construction equipment before initial arrival on site. There shall be no clumps of soil, mud, organic material, or plant materials on or in the equipment. A thorough power wash is normally adequate.
3. Biodegradable hydraulic fluid is not required, unless the authority having jurisdiction requires it or if it is required by permit conditions. Spill containment and an immediate response to stop fluid leaks is required by the general notes and construction specifications.
4. Use the following additional E&S control BMPs as required (subsidiary to pollution control): preserving existing vegetation, rock check dams, surface roughening, temporary seeding, mulching, erosion control wattles, biodegradable erosion control fabric (soil retention blanket), and temporary diversions. Provide other E&S controls as required by the drawings and specifications.
5. Erosion and sediment control measures shall be constructed, stabilized, and functional before site disturbance begins within the tributary areas of those measures.
6. After the finished site is stable, remove temporary E&S measures. Immediately stabilize areas disturbed during removal of the measures. Biodegradable measures above bankful flow line may remain.
7. Construction access to the site is restricted to the location(s) shown on the drawings. Do not clear and grub outside of the construction limits shown on the drawings or marked in the field. Only disturb areas as required for construction.
8. Stockpile heights shall not exceed 35 feet. Stockpile slopes shall be 2H:1V or flatter. Place a silt fence around low side (downstream side) of temporarily stockpiled soils left for 6 or more days. Use temporary seeding on stockpiles left for 21 days or more.
9. Seed and mulch disturbed areas or finish graded areas that will be left bare for 6 or more days.
10. Maintain all erosion control measures throughout construction and until the site is stable. Inspect erosion control measures weekly and after each runoff event (rainfall equal to 0.5-inch or more, or snow-melt of 0.6-inches or more). Accomplish remedial maintenance work immediately, including clean out, repair, replacement, re-grading, re-seeding, re-mulching, etc. Required maintenance is subsidiary to pollution control.
11. When using pumps for de-watering operations, filter the discharge with a special settling basin or other acceptable filtration method.
12. Additional requirements are included in the construction specifications, on the construction drawings, and in the storm water (or NPDES) permit. The contractor may use additional BMPs to limit erosion and control sediment incidental to pollution control.

GENERAL CONSTRUCTION SEQUENCE
THE FOLLOWING CONSTRUCTION SEQUENCE INCLUDES RECOMMENDATIONS TO SUPPLEMENT THE CONTRACTOR’S PLANS WITH REGARD TO EROSION AND SEDIMENT (E&S) CONTROL.
1. MOBILIZE EQUIPMENT AND MATERIALS TO THE SITE, AND ESTABLISH STAGING AREA. MAKE NECESSARY IMPROVEMENTS TO THE ACCESS ROAD AND ENTRANCE. KEEP ALL CONSTRUCTION TRAFFIC WITHIN THE CONSTRUCTION LIMITS.
2. INSTALL SILT FENCE OR WATTLES AROUND STAGING, STOCKPILE, AND PARKING AREAS TO FILTER SHELL SLOW SHEET FLOWS. INSTALL SILT FENCE, WATTLES, AND OTHER E&S MEASURES AT LOWER ENDS OF CONSTRUCTION LIMITS.
3. CLEAR AND GRUB AREAS WITHIN CONSTRUCTION AREAS AS REQUIRED TO COMPLETE THE WORK. FOR LARGE EARTHWORK AREAS FOLLOWING FINAL GRADING OPERATIONS.
4. FOLLOW A LOGICAL SEQUENCE OF WORK TO LIMIT THE AMOUNT OF EXPOSED DISTURBED AREA. INSTALL ALL DOWNSWEEP PROTECTION MEASURES BEFORE DISTURBING UPSTREAM AREAS. IF SPECIFIED, INSTALL SEDIMENT PONDS OR SIMILAR PRACTICES EARLY IN THE CONSTRUCTION SEQUENCE.
5. DIVERT STREAMS, DITCHES, OR OTHER CONCENTRATED FLOWS AROUND WORK AREAS USING TEMPORARY PIPES, DIVERSION DITCHES, BERM, PUMPS, OR OTHER BEST MANAGEMENT PRACTICES.
6. REMOVE ROCK CHECK DAMS AS DOWNSTREAM AND UPSTREAM PORTIONS OF CHANNEL ARE STABILIZED.
7. TEMPORARILY SEED AND MILCH SITE AS REQUIRED THROUGHOUT CONSTRUCTION. PERMANENTLY SEED AND MILCH GRADED AREAS FOLLOWING FINAL GRADING OPERATIONS.
8. CAREFULLY DEMOBILIZE EQUIPMENT FROM THE SITE. STABILIZE AND RESTORE SITE; RESTORE DISTURBED AREAS TO PRE-CONSTRUCTION CONDITIONS OR BETTER.
9. REMOVE NON-BIODEGRADABLE E&S MEASURES AFTER THE SITE IS STABLE.

FILE NAME: Drawings_Tomichi_Lower.cdr
DATE/TIME: May 28, 2020 - 4:14 PM
PRINT DATE/TIME: May 28, 2020 - 4:14 PM
DESIGN DRAWINGS (REV: 5/29/2020)
TOMICHI CREEK

OXBOW POND BUILT WITH FUNDING FROM PARTNERS WITH WILDLIFE

SURFACE RUNOFF FROM FIELD

WELL FORMED NATURAL POINT BAR (GOOD LOCATION FOR PTBAR SAMPLE)

TRANSPLANTED SOD (1,000 SF)

CREATE A MOUND FOR DRY LAND - HABITAT
WASTE AREA FOR EXCAVATED SOIL (2,080 SF)
30-INCHES HIGH ABOVE SURROUNDING GRADE

WOODY DEBRIS ANCHORED WITH ROCK (80 FT)
USE TOE WOOD DETAIL WITHOUT EARTH FILL OVER THE WOOD.
(OPTIONAL - NOT IN BASE PROJECT)

OXBOW POND BUILT WITH FUNDING FROM PARTNERS WITH WILDLIFE

END OF CHANNEL SHAPING & PROJECT - TIE INTO EXISTING STREAMBED

DESIGN DRAWINGS (REV: 5/29/2020)

FILE NAME: Drawings_Tomichi_Lower.dwg

DESIGNED BY: TJ BURR

M. GUTEKUNST

J. ANDREWS

DRAWN BY: TJ BURR

CHECKED BY: M. GUTEKUNST

APPROVED BY: J. ANDREWS

DATE: 3/28/2020

CHECKED DATE: 5/29/2020

APPROVED DATE: ___/___/_____

PRINT DATE-TIME: May 29, 2020 - 5:14 PM
TYPICAL "POOL" CROSS-SECTION (DESIGN)

1. THE FINISH GRADE OF CONSTRUCTED CHANNEL SHOULD BE ROUGH AND CONSIST OF GRAVEL, COBBLE, AND BOULDERS SALVAGED FROM THE EXISTING CHANNEL BED OR FROM THE OLD CHANNEL BED.

2. COMPACT THE CHANNEL BED AND BANKS WITH HEAVY EQUIPMENT AT THE FINISH ELEVATIONS AND GRADES TO HELP EMBED THE GRAVEL AND COBBLE.

TYPICAL "POOL" CROSS-SECTION (CONSTRUCT)

1. DEEPER PORTION OF POOL IS IN THE OUTER THIRD OF CHANNEL ON OUTSIDE OF BENDS.

2. SOME POOLS HAVE CUSTOM DIMENSIONS AS SHOWN ON THE SECTION DRAWINGS TO BETTER MATCH THE OLD CHANNEL AND REDUCE EXCAVATION.

3. POOL BED MATERIAL IS TYPICALLY SMALLER THAN THE RIFFLE BED MATERIAL, GRAVEL AND SMALL COBBLE.

TYPICAL "RIFFLE" CROSS-SECTION (DESIGN)

1. COMPACT THE CHANNEL BED AND BANKS WITH HEAVY EQUIPMENT AT THE FINISH ELEVATIONS AND GRADES TO HELP EMBED THE GRAVEL AND COBBLE.

TYPICAL "RIFFLE" CROSS-SECTION (CONSTRUCT)
45+80 (EXISTING POOL)

COMPACTED EARTHFILL POINT BAR GRAVEL/COBBLE MIX FROM ON-SITE

EXISTING CHANNEL (XS02)

FINISH GRADE TO TOP OF EXISTING CHANNEL

EXIST. FENCE

7572.60

7570

FILL AREA = 130 SF

COMPACTED EARTHFILL EXISTING CHANNEL

CUT AREA = 49 SF

46+48 (DIVERGING FROM OLD CHANNEL)

FINISH GRADE TO TOP OF EXISTING CHANNEL

COMPACTED EARTHFILL EXISTING CHANNEL

EXIST. FENCE

7572.60

7570

FILL AREA = 147 SF

2% FINISH GRADE

EXISTING CHANNEL (XS03)

CUT AREA = 182 SF

FILL = 190 SF

THIS FILL IS INCLUDED IN CUT/FILL FOR CHANNEL

46+70 (CONSTRUCTED RIFFLE)

2% FINISH GRADE

FILL = 190 SF

EXISTING CHANNEL (XS03)

CUT = 152 SF

THIS FILL IS INCLUDED IN CUT/FILL FOR CHANNEL

FILL AREAS:

130 SF

147 SF

190 SF

CUT AREAS:

49 SF

182 SF

152 SF

STREAM RESTORATION
TOMICHI CREEK LOWER REACH SITE
CHANNEL SECTIONS 1

TOMICHI CREEK

TJ BURR

M. GUTEKUNST

J. ANDREWS

3/28/2020

5/29/2020

___/___/_____

___/___/_____

DESIGN DRAWINGS (REV: 5/29/2020)

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FILE NAME: Drawings_Tomichi_Lower.dwg
EXISTING CHANNEL XS04

FILL = 178 SF

START USING EXCESS MATERIAL FROM CHANNEL EXCAVATION. WILL ONLY FILL 62 FT BEYOND STA 46+70

2% MIN. FINISH GRADE

FILL = 16 SF

CUT = 135 SF

CUT = 114 SF

7578.8

FILL = 16 SF

CUT = 114 SF

7574.1

CUT = 110 SF

CUT = 114 SF

7573.9

FILL = 40 SF

CUT = 48 SF

FILL = 178 SF

FILL = 40 SF

CUT = 48 SF

CONSTRUCT COMPACTED EARTH FILL BERM 2 FT ABOVE BANKFULL ELEVATION WITH 10.0 FT TOP WIDTH. THE TOP WIDTH MAY BE REDUCED TO 4.0 FT, IF SHORT ON FILL MATERIAL.
54+19 (RIFFLE BETWEEN BENDS)

56+28 (END OF GLIDE TO RIFFLE)

56+68 (SHORT RIFFLE BETWEEN 2 POOLS)
EXIST STREAM

60+98 (RIFFLE MERGING INTO EXIST CHANNEL)

XS5578 POOL AT MID-PT OF BEND

EXISTING CHANNEL

MATCH EXISTING GROUND

POINT BAR WITH MIX OF GRAVEL-COBBLE FROM ON-SITE

TRANSPLANTED SOD CLUMPS & WILLOW CUTTINGS

8.00 WIDTH OF TOE WOOD (TYP.)

COMPACTED EARTHFILL BERM COVERED WITH EROSION CONTROL FABRIC (SEE TYP. DETAIL) & SEEDED,

ROOTWAD WITH 12 FT STEM MIN.

STRUCTURE ROCK ANCHOR, 2 MIN. PER ROOTWAD

POOL MAY BE DEEPENED TO 7'

FOR HABITAT

FOR MORE INFORMATION, SEE TYPICAL DETAIL FOR TOE WOOD

POOL MAY BE DEEPENED TO 7'

58+26 (POOL)
PLACE TOP STRUCTURE ROCK ABOUT 12" ABOVE BANKFULL ELEVATION ON BOTH SIDES

MAX ONSITE GRAVEL-COBBLE MATERIAL INTO THE STRUCTURE ROCK TO FILL VOIDS

EXISTING GRADE

EXISTING CHANNEL (X830)

COMPACTED EARTHFILL

EXISTING GRADE

2% Min. Finish Grade

COMPACTED EARTHFILL

CUTOFF SILL MIN.

CUTOFF SILL MIN.

REFER TO THE TYPICAL RIFFLE CROSS SECTION FOR DIMENSIONS OF CHANNEL

46+59 (CONSTRUCTED RIFFLE CREST)
EXISTING POOL

TOP OF BANK AT DESIGN GRADE

EXISTING GROUND ELEVATION AT CENTERLINE OF DESIGN CHANNEL

TW ELEV: 7574.2

THE AVERAGE STREAM SLOPE IS 0.00215 FT/FT. RIFFLES ARE SLIGHTLY STEEPER AND POOLS ARE FLATTER.

SEE TYPICAL DETAILS FOR RIFFLES, POOLS, AND J-HOOK STRUCTURES.

TIE INTO EXISTING GRADE OF STREAMBED

45+82.78

TW ELEV 7573.17

45+12.46

TW ELEV 7574.20

47+04

TW ELEV 7574.00

45.00'

RIFFLE LENGTH

RIFFLE CREST

37.00'

RIFFLE FACE

3.00'

RIFFLE HEAD

THE THALWEG IS THE LOWEST POINT ON J-HOOK AT THE APEX ROCK

TW ELEV 7572.7

J-HOOK 54+74

TW ELEV 7572.5

J-HOOK 51+71

RIFFLE 53+43

TW ELEV 7571.3

TIE INTO EXISTING STREAMBED AT ELEVATION 7571.0

SEE TYPICAL RIFFLE DETAIL AND RIFFLE AT 46+69

SEE TYPICAL J-HOOK DETAIL

SEE TYPICAL J-HOOK DETAIL
**Related Details**

- Open Channel (SS)
- Channel Bed Stabilization (SB)
- NRCS Practice Standards
- Channel Shaping at Pool (SS)

**Notes:**

1. Provide rock from a CDOT-approved quarry or engineer-approved source.
2. Place rocks so they are interlocked and oriented to minimize the impact from the flow. For individual boulders exposed to the flow, narrow end should point upstream and length should be parallel to the flow.
3. Seed, mulch, and restore disturbed areas to pre-existing conditions or better.

**Section A**

- J-Hook Cutoff Sill
- Structure Rock Size
- Undisturbed Subgrade
- EXCAVATION

**Section B**

- Rod HOOK SILL (AT CUTOFF SILL)
- Structure Rock Size
- Undisturbed Subgrade
- EXCAVATION

**Section C**

- Hook Cutoff Sill (See Note 4)
- Structure Rock Size
- Undisturbed Subgrade
- EXCAVATION

**Typical J-Hook Vane Detail**

- Structure Rock Size
- Undisturbed Subgrade
- EXCAVATION

**Notes:**

1. Use class I non-woven geotextile fabric as described in the specifications. Place geotextile behind the arm (upstream side), directed from top of rock structures to bottom of foot rock structures, and extend a minimum of half the trench bottom width. Trim excess or visible fabric.
2. On bedrock stream beds, excavate pool before installing structure.
3. Maximum water surface grade drop across the apex of rock hook shall be 12% measured along the stream profile. See Section A.
4. Butt the apex boulders tightly against each other. Use share of rocks to provide a low flow gap near the middle.

**Typical Riffle Detail Type "B"**

- Structure Rock Size
- Undisturbed Subgrade
- EXCAVATION

**Notes:**

- Provide a range of rock sizes for flexibility to meet design grades & sizes. At least 60% of the rock shall meet or exceed the average size rock requirements. Up to 15% of rock may be in the minimum to average size category.
- Small rocks are required to be smaller than the structure rock requirements.
- Cotton-tail boulders and smaller fragments for chinking use.
- On-site cobble and boulders may be used to fill voids and for splash rocks but not for use as any main structure rock.
**LIVE STAKE NOTES:**

1. **SPECIES SELECTION MAY VARY DUE TO AVAILABILITY. USE ONLY NATIVE SPECIES.**
2. **DO NOT ALLOW STAKES TO DRY OUT.**
3. **PLANT WHILE DORMANT IN LATE FALL OR EARLY SPRING, BUT NOT ON FROZEN GROUND.**
4. **BEFORE PLANTING, SOAK CUTTINGS AND STAKES IN WATER FOR 5-7 DAYS (PREFERRED), OR CUT AT AN ANGLE FOR EASY INSERTION INTO THE SOIL.**
5. **DRIVE A PILOT HOLE IN FIRM SOIL AT RIGHT ANGLES WITH BUDS ORIENTED UP.**
6. **PLANT STAKES RANDOMLY OR ON TRIANGULAR SPACING.**
7. **TAMP SOIL AROUND LIVE STAKES TO ELIMINATE AIR POCKETS.**
8. **CUT THE BASAL OR BUTT ENDS AT AN ANGLE FOR EASY INSERTION INTO THE SOIL.**
9. **THIS EXAMPLE SHOWS ROCK TOE OPTION**

**RECOMMENDED SPECIES FOR THIS SITE (CHOOSE AT LEAST 3 AS AVAILABLE FROM NURSERY):**

- DRUMMOND'S WILLOW
- GEYSER'S WILLOW
- COTTONWOOD
- BLUESTEM WILLOW
- ROCKY MOUNTAIN WILLOW
- NARROWLEAF WILLOW
- WHIPLASH WILLOW
- COYOTE WILLOW
- M. GUTEKUNST
- J. ANDREWS
- AGRICULTURE
- NATURE RESOURCES
- CONSERVATION SERVICE

**CONSERVATION PRACTICES,** SUCH AS **STREAMBANK PROTECTION AND RIPARIAN BUFFERS.** **CRITICAL AREA PLANTING FOR STREAMBANK PROTECTION. TYPICALLY USED WITH OTHER**

**TYPICAL USES:**

- **STREAM RESTORATION MEASURES TO SHOW FEATURES OF A NATURAL CHANNEL SHAPE.**

**NOTES:**

1. **USE EXCAVATED MATERIAL TO RE-SHAPE BANKS, BUILD POINT BARS, OR FOR BACKFILL OF OTHER WORK.**
2. **USE THE 'BENCHED OPTION' WHENEVER PRACTICAL BASED ON SITE CONSTRAINTS.**
3. **TYPICAL POOL-TO-POOL SPACING IS EVERY 5-7 BANKFULL WIDTHS.**
4. **SHAPE THE POINT BAR TO MATCH EXISTING POINT BAR SLOPE OR NEARBY POINT BAR SLOPES. IF NO SLOPE IS AVAILABLE OR SPECIFIED, USE 4H:1V. THE FINISH GRADE OF THE POINT BAR SHOULD BE ROUGH, NOT SMOOTH AND COMPACTED. NOT TO SCALE.**

---

**TYPICAL LIVE STAKE DETAIL**

(With Bank Shaping & Rock Toe) **NOT TO SCALE**

**DIAMETER RANGE:** 4 TO 1.5 INCHES

**LENGTH RANGE:** 1 TO 4 FEET

**PLANTING DENSITY:** EVERY ______ FT ON DIAMOND SPACING

**LOW GROUNDWATER:**

- **EXISTING GRADE**
- **NORMAL FLOW**
- **BANKFULL**

**HORIZONTAL SCALE:** 1=30 FT

**VERTICAL SCALE:** 1=10 FT
NOTES:
1. USE EROSION CONTROL FABRIC DESCRIBED IN THE SPECIFICATIONS.
2. PREPARE SOIL SURFACE AND INSTALL ACCORDING TO THIS DETAIL, THE PLAN DRAWINGS, AND THE SPECIFICATIONS. SLAB THE TOP 6-INCHES OF SOIL, RAKE, AND SEED THE GROUND SURFACE BEFORE INSTALLING FABRIC.
3. REMOVE COBBLE-SIZE ROCK AND LARGER TO PREVENT HAVING VOIDS UNDER THE FABRIC. PLACE FABRIC FOR GOOD CONTACT WITH GROUND.
4. FILL BETWEEN ROOTWAD LOGS WITH MIX OF WOODY DEBRIS & FILLER WOOD.
5. ROOT WADS ARE ANGLED UPSTREAM AT 45-60 DEGREES FROM PERPENDICULAR TO FLOW.

EROSION CONTROL FABRIC (ECF) DETAIL
(Soil Retention Fabric, Biodegradable)

NOT TO SCALE
TYPICAL ROCK RIPRAP SECTION
(NOT TO SCALE)

* APPROXIMATE AVERAGE BANK HEIGHT

NOTE:
1. IF EXTRA EARTH MATERIAL IS AVAILABLE, USE IT TO FILL VOIDS IN ROCK TO PROMOTE VEGETATION GROWTH.

END CUTOFF KEYS/SILLS

DESIGN DRAWINGS (REV: 5/29/2020)
PRINT DATE-TIME: May 29, 2020 - 5:16 PM
CONTRACTOR NAME AND ADDRESS:

CONSTRUCTION COMPLETED

PRACTICE (DOES) (DOES NOT) MEET STANDARDS AND SPECIFICATIONS.

TITLE:

DATE:

DATE:

DATE:

AS-BUILT DRAWINGS REVIEWED AND APPROVED BY:

DATE:

DATE:

DATE:

COOPERATOR AGREEMENT

THIS PLAN HAS BEEN DISCUSSED WITH ME BY THE NRCS AND I AM IN AGREEMENT WITH THE CALCULATIONS AND DESIGN.

ANY CHANGES TO THE PROJECT DESIGN SHALL BE APPROVED BY AN NRCS REPRESENTATIVE AND THE LANDOWNER.

I SHALL CONSTRUCT THIS PROJECT ACCORDING TO NRCS PLANS AND SPECIFICATIONS. LAND AND WATER RIGHTS, PERMITS, EASEMENTS AND RIGHTS-OF-WAY HAVE BEEN OBTAINED FOR ALL PROPERTIES INVOLVED.

THE COOPERATOR SHALL PROVIDE NRCS WITH THE UNCC TICKET NUMBER ACQUIRED PRIOR TO START OF CONSTRUCTION.

I REALIZE TO RECEIVE COST SHARE PAYMENTS, NRCS PERSONNEL MUST INSPECT THE INSTALLATION TO ENSURE COMPLIANCE WITH SPECIFICATIONS. I SHALL CONTACT NRCS TO ARRANGE THE INSPECTION OF EACH PROJECT ELEMENT DURING CONSTRUCTION.

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EROSION & SEDIMENT CONTROL NOTES:

1. Provide erosion and sediment (E&S) control measures to minimize sediment runoff and soil loss from project site.
2. Use the following additional E&S control measures as required: limit area of disturbance; preserve existing vegetation where removal is not required by work; surface roughening; surface water control; biodegradable erosion control fabric; seeding and mulching; diversion of runoff around disturbed areas. See the specifications for additional information.
3. Provide erosion control measures before disturbing the site. Erosion control wattles or silt fence are not needed at this site due to vegetation, flat slopes, & granular soils.
4. After final site stabilization (re-vegetation), remove temporary E&S control measures. Immediately stabilize areas disturbed during removal of temporary measures.
5. Construction access and work limits are restricted to locations shown on the drawings as approved by the Owner.
6. Keep stockpile heights below 35 feet with slopes of 2H:1V or flatter. For stockpiles left for 5 or more days, place silt fence or wattles around the low side of the stockpile to filter the runoff. Seed and mulch stockpiles that will remain for 21 days or longer.
7. Maintain all erosion control devices throughout construction and until the site is stabilized. Inspect erosion control measures weekly and after each rainfall or snowmelt. Accomplish all remedial maintenance work immediately, including clean out, repair, replacement, re-grading, re-seeding, re-mulching, etc.
8. Remove, store, and replace topsoil to restore disturbed areas that do not have other specified surfacing. Seed and mulch all disturbed soil surfaces with native grass seed according to the specifications.
9. Remove, store, and replace topsoil to restore disturbed areas that do not have other specified surfacing. Seed and mulch all disturbed soil surfaces with native grass seed according to the specifications.
10. To help prevent the introduction of invasive, non-native plants to work areas, clean all equipment brought to the work site from outside of the project location watershed. Anytime equipment is moved to a stream in a different watershed, it should be cleaned to remove soil, seeds, sticks, and other potential contaminants.
11. Erosion control wattles or silt fence are not needed at this site due to vegetation, flat slopes, & granular soils.
12. Provide E&S control measures to minimize sediment runoff and soil loss from project site.
13. Provide all structures according to typical details and proposed cross-sections, unless noted otherwise.
14. NRCS representative will stake the approximate locations of major work items and structures.

DEFINITIONS are in the general requirements in the construction specifications.

ABBREVIATIONS:

- X: CROSS SECTION
- ECF: EROSION CONTROL FABRIC

EROSION & SEDIMENT CONTROL NOTES:

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Information Sheet - No Construction
This is upstream of project area.
Provided as a reference.

Since flows fluctuate continually, it is important to note the date of water surface elevation points.
1. MINIMIZE DAMAGE TO EXISTING VEGETATION.
2. DISCUSS ACCESS ROUTE & STAGING AREA WITH LANDOWNER BEFORE MOBILIZING EQUIPMENT.
3. SALVAGE AND RE-USE SOD AND WILLOW CLUMPS.
4. SHAPE CHANNEL AS REQUIRED TO MEET BANKFULL WIDTHS.

REVISION NOTES:
1. WHEN THE NRCS STaked THE SITE FOR CONSTRUCTION, THEY FOUND THAT THE CHANNEL HAD SIGNIFICANTLY CHANGED SINCE THE ORIGINAL SURVEY.
2. TO MAKE THE PROJECT WORK WITH THE NEW EXISTING CONDITIONS, THE ENGINEER HAD TO DESIGN A FLOW SPLITTING ROCK TOE STRUCTURE WITH CROSS VANES FOR GRADE CONTROL.
TYPICAL "RIFFLE" CROSS-SECTION (DESIGN)

TYPICAL "RIFFLE" CROSS-SECTION (CONSTRUCT)

TYPICAL "POOL" CROSS-SECTION (DESIGN)

TYPICAL "POOL" CROSS-SECTION (CONSTRUCT)

MAIN CHANNEL (LEFT) - SHAPING GUIDE

THALWEG CHANNEL: 6 FT x 6 IN DEEP

THALWEG CHANNEL: 6 FT x 6 IN DEEP

NOTES:
1. USE THIS AS A GENERAL GUIDE FOR CHANNEL SHAPING. IF SHOWN DIFFERENTLY AT A SPECIFIC CROSS-SECTION, FOLLOW THE CROSS-SECTION REQUIREMENTS.
2. THE "DESIGN" CROSS-SECTIONS SHOW THE DIMENSIONS, THE "CONSTRUCT" SECTIONS SHOW HOW IT SHOULD LOOK AFTER FINISH GRADING - ROUGHENED AND MORE NATURAL.

LEFT CHANNEL DESIGN INFO:
DA = 1,061 sq. mi
Q\text{bkf} = 380 cfs
W\text{bkf} = 40 ft
A\text{bkf} = 97.6 sf
D\text{max} = 3.5 ft
W = 41.4 ft
d = 2.4 ft
v = 3.9 ft/s
WD = 16.4
n = 0.045
S = 0.0044 ft/ft

RIGHT CHANNEL DESIGN INFO:
DA = 1,061 sq. mi
Q\text{bkf} = 190 cfs
W\text{bkf} = 32 ft
A\text{bkf} = 63.2 sf
D\text{max} = 2.6 ft
W = 33.0 ft
d = 1.98 ft
v = 3.5 ft/s
WD = 16.2
n = 0.046
S = 0.0046 ft/ft
Shear Stress = 0.55 psf
XS0657 - AT THE UPSTREAM START OF ROCK TOE WORK

Total Cut = 42 SF

Thalweg = 6' x 0.5'

Fill Area = 21 SF

Notes:
The work for Cut/Fill & Thalweg is subsidiary to Earthwork & Channel Shaping.

XS0785 - ROCK TOE & CHANNEL SHAPING

Fill: 10 SF
Cut: 20 SF

XS0757 - DOWNSTREAM OF CROSS VANE - POOL SECTION

Fill: 45 SF
Fill: 6 SF
Total Cut: 24 SF
Rock Toe Type 2 (See Detail)

Notes:
The work for Cut/Fill & Thalweg is subsidiary to Earthwork & Channel Shaping.
XS0862 - CHANNEL SHAPING

CUT: 20 SF

XS1088 - CHANNEL SHAPING

CUT: 23 SF

FILL: 19 SF

RT CHANNEL

MAXIMUM DEPTH = 3.5 FT (BANKFULL)

ISLAND BETWEEN CHANNELS

TOP OF ROCK DEFLECTOR ELEV: 7586.2
BACKFILL WITH ON-SITE GRAVEL-COBBLE MIX

ISLAND BETWEEN CHANNELS

SHAPE CHANNEL TO NEW TYPICAL SECTION

EXISTING GROUND

BANKFULL ELEV: 7586.2
CUT: 42 SF

ROCK DEFLECTOR (SEE DETAIL)

TOP OF ROCK DEFLECTOR ELEV: 7586.4
FILL: 28 SF

MAXIMUM DEPTH = 3.5 FT (BANKFULL)

CUS0945 - AT ROCK DEFLECTOR IN RIFFLE SECTION

XS1088 - CHANNEL SHAPING

BANKFULL ELEV: 7586.3
CUT: 23 SF

FILL: 19 SF

RT CHANNEL

EXISTING GROUND

BANKFULL ELEV: 7586.9
TOP OF ROCK DEFLECTOR ELEV: 7586.2
BACKFILL WITH ON-SITE GRAVEL-COBBLE MIX

ISLAND BETWEEN CHANNELS

SHAPE CHANNEL TO NEW TYPICAL SECTION

EXISTING GROUND

BANKFULL ELEV: 7586.2
CUT: 42 SF

ROCK DEFLECTOR (SEE DETAIL)

TOP OF ROCK DEFLECTOR ELEV: 7586.4
FILL: 28 SF

MAXIMUM DEPTH = 3.5 FT (BANKFULL)
BACKFILL WITH ON-SITE GRAVEL-COBBLE MIX. PLACE LARGER ROCKS IN THE TOE.

EXCAVATION TO MAINTAIN FLOW AREA & PROVIDE LOW FLOW CHANNEL IN THE MIDDLE
CROSS VANE #1
PROFILE OF MAIN CHANNEL BOTTOM
EL: 7587.8
EL: 7586.0
TOP OF BANK AT BANKFULL ELEV
EXCAVATE POOL (SEE CHANNEL SHAPING DETAIL)
GLIDE
EXISTING STREAMBED

CROSS VANE #2
PROFILE OF LEFT CHANNEL BOTTOM
EL: 7586.0
EL: 7587.8
TOP OF BANK AT BANKFULL ELEV
EXCAVATE POOL (SEE CHANNEL SHAPING DETAIL)
GLIDE
EXISTING STREAMBED
**TOMICHI CREEK STREAM RESTORATION - UPPER REACH**

**SECTION A (AT APEX OF HOOK)**

- **Profile (Along Vane Arm)**
  - Elevation: 7586.7
  - Bankfull Elevation: 7588.0

- **Flow**
  - 2% - 4%
  - Top of Bank (Bankfull)
  - 1/2 Bankfull

- **NOTES**
  - USE CLASS I, NON-WOVEN GEOTEXTILE FABRIC AS DESCRIBED IN THE SPECIFICATIONS. PLACE GEOTEXTILE BEHIND THE ARM (UPSTREAM SIDE), DRAPED FROM TOP OF ROCK STRUCTURE TO BOTTOM OF FOOTER ROCK AND EXTEND A MINIMUM OF HALF THE TRENCH BOTTOM WIDTH. TRIM EXCESS OR VISIBLE FABRIC.

**SECTION B (AT ROCK SILL)**

- **Profile (Along Vane Arm)**
  - Elevation: 7586.7
  - Bankfull Elevation: 7588.0

- **NOTES**
  - PROVIDE A RANGE OF ROCK SIZES FOR FLEXIBILITY TO MEET DESIGN GRADES & LINES. AT LEAST 80% OF THE ROCK SHALL MEET OR EXCEED THE AVERAGE SIZE ROCK REQUIREMENTS. UP TO 15% OF ROCK MAY BE IN THE MINIMUM TO AVERAGE SIZE CATEGORY. AND 5% MAY BE SMALLER FRAGMENTS FOR CHINKING USE.

**SECTION C (HOOK CUTOFF SILL)**

- **Profile (Along Vane Arm)**
  - Elevation: 7586.7
  - Bankfull Elevation: 7588.0

- **NOTES**
  - PROVIDE SPLASH ROCK TO TRANSITION TO POOL

**HARDENED BANK OVERFLOW DETAIL**

- **Profile (Along Vane Arm)**
  - Elevation: 7586.7
  - Bankfull Elevation: 7588.0

- **NOTES**
  - USE CLASS I, NON-WOVEN GEOTEXTILE FABRIC AS DESCRIBED IN THE SPECIFICATIONS. PLACE GEOTEXTILE BEHIND THE ARM (UPSTREAM), DRAPED FROM TOP OF ROCK STRUCTURE TO BOTTOM OF FOOTER ROCK AND EXTEND A MINIMUM OF HALF THE TRENCH BOTTOM WIDTH. TRIM EXCESS OR VISIBLE FABRIC.

**EXAMPLE J-HOOK VANE DETAIL**

- **Profile (Along Vane Arm)**
  - Elevation: 7586.7
  - Bankfull Elevation: 7588.0

- **NOTES**
  - USE CLASS I, NON-WOVEN GEOTEXTILE FABRIC AS DESCRIBED IN THE SPECIFICATIONS. PLACE GEOTEXTILE BEHIND THE ARM (UPSTREAM), DRAPED FROM TOP OF ROCK STRUCTURE TO BOTTOM OF FOOTER ROCK AND EXTEND A MINIMUM OF HALF THE TRENCH BOTTOM WIDTH. TRIM EXCESS OR VISIBLE FABRIC.

**ROCK NOTES**

- PROVIDE A RANGE OF ROCK SIZES FOR FLEXIBILITY TO MEET DESIGN GRADES & LINES. AT LEAST 80% OF THE ROCK SHALL MEET OR EXCEED THE AVERAGE SIZE ROCK REQUIREMENTS.
- SMALLER FRAGMENTS FOR CHINKING USE.
- PROVIDE SPLASH ROCK TO TRANSITION TO POOL.
**Designed by:** TJ BURR  
**Date:** 3/3/2021  
**Checked by:** TJ BURR  
**Approved by:** J. ANDREWS  
**Date:** 4/5/2021

**Section A**

- **Bench Width**: Maintain design bankfull width, \( W_{bkf} = 40 \) ft.
- **Extravate as Needed to Maintain Required Cross-Sectional Area**
- **Rock Toe**: See Detail to Right on This Sheet

**Notes**:
1. Finish Grade the bankfull bench to the specified elevation and slope. The slope should match the bankfull flow slope.
2. Use on-site material or designated borrow for the bankfull bench fill. Use finer grain material on top.
3. Compact bankfull bench in 12-18 inch lifts using equipment. Add water from the stream to achieve good compaction.
4. "Wash" the bench fill using the excavator bucket to consolidate the material. Start and end bench in stable banks with natural anchor points when possible.

**Rock Toe Type 2 Detail**

(With bench, live stakes, & bank shaping)  
NOT TO SCALE
1. The edge of water at normal flow is typically along inner berm.

2. Extend footer rocks to scour depth or lower. This could require one or more additional rock layers.

3. Use Class I, non-woven geotextile fabric per the specifications.

4. Backfill shall meet the requirements of the earthfill and earthwork specifications.

5. If shrubs and trees are specified for site restoration, refer to the planting drawing and specifications.

6. Typical spacing of double wing deflectors is 5-7 times bankfull width.

Notes:

1. The edge of water at normal flow is typically along inner berm features at 0.5 to 0.8 bankfull width.

2. Extend footer rocks to scour depth or lower. This could require one or more additional rock layers.

3. Use Class I, non-woven geotextile fabric per the specifications.

4. Backfill shall meet the requirements of the earthfill and earthwork specifications.

5. If shrubs and trees are specified for site restoration, refer to the planting drawing and specifications.

6. Typical spacing of double wing deflectors is 5-7 times bankfull width.

7. Extend cutoff sills into stable bank material height of sill at least twice the height of structure rock.
ROCK NOTES:

A. PROVIDE A RANGE OF ROCK SIZES FOR FLEXIBILITY TO MEET DESIGN GRADES & LINES. AT LEAST 50% OF THE ROCK SHALL MEET OR EXCEED THE SPECIFIED RANGE TO MEET EXISTING SITE CONDITIONS.

B. BE MINIMUM TO AVERAGE SIZE; UP TO 15% OF ROCK MAY BE SMALLER FRAGMENTS.

C. SMALLER HEIGHT ROCKS ARE REQUIRED TO TAPER STRUCTURES AT APEX ON BEDROCK. FOOTER ROCKS SHALL MEET STRUCTURE ROCK REQUIREMENTS.

D. FOR MAIN STRUCTURE ROCK, SILL, AND FOOTER ROCK, THE ROCK MUST BE FRAGMENT ACCEPTABLE CDT QUARRY OR FROM ENGINEER APPROVED SOURCE.

E. ON-SITE COBBLE AND BOULDERS MAY BE USED TO FILL GAPS AND FOR SPLASH ROCKS. BUT NOT FOR USE AS ANY MAIN STRUCTURE ROCK.

TYPICAL CROSS VANE DETAIL

NOT TO SCALE

PROFILE

(ALONG ARM)

LENGTHS

NORMAL FLOW

BANKFULL WIDTH

W

H

TOP OF BANK

(BANKFULL)

PLAN VIEW

DETAIL OF VANE ARM SHOWING BATTER AND TILT BACK INTO THE BANK.

NOTES:

1. USE CLASS I NON-WOVEN GEOTEXTILE FABRIC AS DESCRIBED IN THE SPECIFICATIONS. PLACE GEOTEXTILE BEHIND THE ARM (UPSTREAM SIDE), DRAPED FROM TOP OF ROCK STRUCTURE TO BOTTOM OF FOOTER ROCK AND EXTEND A MINIMUM OF 1/3 THE TRENCH BOTTOM WIDTH. TRIM EXCESS OR VISIBLE FABRIC.

2. FOR STEEP STREAM SLOPES OR WHERE ADDITIONAL GRADE DROP IS REQUIRED, STEPS MAY BE ADDED ACCORDING TO THE CROSS VANE (WITH STEP DETAIL).

3. BOULDER VANE ARMS MAY NOT BE SYMMETRICAL. ARM LENGTHS MAY BE SKewed TO MATCH EXISTING SITE CONDITIONS OR STREAM ALIGNMENT.

4. THE APEX BOULDER IS THE EQUIVALENT OF A KEYSTONE IN AN ARCH STRUCTURE. PLACE IT SO IT IS WEDGED IN PLACE BY THE FORCE OF THE WATER. IF SHOULD BE THE LOWEST BOULDER.

5. THE NUMBER OF ROCK COURSES VARIES BY BANK HEIGHT AND DEPTH TO STABLE SUBSTRATE.

6. USE THE EXCAVATOR BUCKET TO DUMP (“WASH”) WATER ACROSS THE BACKFILL TO CONSOLIDATE IT.

FINISH WITH 3"-4" OF GRAINED MATERIAL

B. BE MINIMUM TO AVERAGE SIZE; AND 5% MAY BE SMALLER FRAGMENTS.

ROCK NOTES:

E. ON-SITE COBBLE AND BOULDERS MAY BE USED TO FILL GAPS AND FOR

D. FOR MAIN STRUCTURE ROCK, SILL, AND FOOTER ROCK, THE ROCK

C. SMALLER HEIGHT ROCKS ARE REQUIRED TO TAPER STRUCTURES AT

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B. BE MINIMUM TO AVERAGE SIZE; UP TO 15% OF ROCK MAY BE SMALLER FRAGMENTS.

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TYPICAL CROSS VANE DETAIL

NOT TO SCALE

PROFILE

(ALONG ARM)

LENGTHS

NORMAL FLOW

BANKFULL WIDTH

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H

TOP OF BANK

(BANKFULL)

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Client(s): L & P RANCH INC  
Gunnison County, Colorado  
Approximate Acres: 187.0

Conservation Plan Map

Conservation Practice

- Structure for Water Control (587)
- Wetland Wildlife Habitat Management (644)
- Upland Wildlife Habitat Management (645)
- Prescribed Grazing (528)

Practice Schedule

- PLUs
- Conservation Practice Lines
- Conservation Practice Polygons

Points

- Restoration of Rare or Declining Natural Communities (643)
- Wetland Wildlife Habitat Management (644)
- Upland Wildlife Habitat Management (645)

Date: 4/28/2021  
Conservation Plan Map  
Prepared with assistance from USDA-Natural Resources Conservation Service

USDA-NRCS-NGCE & USDA-FSA-APFO

USDA is an equal opportunity provider, employer, and lender
To whom it may concern,

The proposed L&P Ranch project in the Powderhorn Valley has an obligated interest from the Natural Resources Conservation Service (NRCS). The NRCS holds a contract with the L&P Ranch for instream improvements, irrigation water control structures, and fencing to facilitate grazing management improvements. Low tech restoration techniques will be implemented on the ranch in Cebolla Creek and Powderhorn Creek in order to improve stream processes and hydrologic function. Structures will include bank attached and mid-channel PALS and wicker weirs. The fencing will split the property from one field into four and allow for grazing to be implemented in a way that benefits long-term production of forage and wildlife habitat. This cross fencing will also limit the duration of livestock access to Cebolla and Powderhorn Creeks.

In this project phase, one structure for water control will be installed to more effectively control and manage irrigation water from the MB and A Ditch. The structure will be a simple steel structure with stack boards that allow for irrigation water to be applied or to pass by to gain the desired soil moisture of approximately 10 acres. Additional irrigation improvements are planned, some needing immediate attention as issues are causing erosion that jeopardizes the integrity of the ditch system and pasture and hay fields. The development of this project has been successful due to the effective collaborative effort from cooperative landowners, US Fish and Wildlife Service, Trout Unlimited, Gunnison Conservation District, Colorado Parks and Wildlife, and the NRCS. Thank you for your consideration in the support of the L&P Ranch conservation project that will offer a suite of ecosystem services benefits for years to come.

Sincerely,

Daniel Olson – NRCS Resource Conservationist
Gunnison Field Office

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