COLORADO
Colorado Water Conservation Board
Department of Natural Resources

Colorado Water Conservation Board

Water Plan

Water Project Summary

Name of Applicant	Trout Unlimited_Denver
Name of Water Project	Project-01886 - Upper Gunnison Stream Restoration
Grant Request Amount	**$137,170.00**
Primary Category	$137,170.00
Watershed Restoration & Recreation	
Additional Funding Category	
Watershed Restoration & Recreation	
Total Applicant Match	**$239,400.00**
Applicant Cash Match	$230,400.00
Applicant In-Kind Match	$9,000.00
Total Other Sources of Funding	**$239,400.00**
NRCS	$160,000.00
Partners for Fish and Wildlife	$30,000.00
UGRWCD	$15,000.00
L&P Ranch	$7,000.00
UGRWCD	$15,400.00
Trout Unlimited	$10,000.00
Trout Unlimited	$2,000.00
Total Project Cost	**$615,970.00**

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
Email: danielle.typinski@tu.org
Phone: 7032849429

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

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

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	38.538175
Longitude	-106.942911
Lat Long Flag	Default/Proponent headquarters: If the location cannot be defined with flags above, use location of project proponent headquarters
Water Source	Tomichi Creek, Cebolla Creek
Basins	Gunnison
Counties	Saguache; Gunnison
Districts	28-Tomichi Creek; 62-Upper Gunnison River

Water Project Overview

Major Water Use Type	Environmental
Subcategory	Construction
Scheduled Start Date - Design	5/1/2022
Scheduled Start Date - Construction	5/1/2022

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 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.

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.

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)
7,500	Length of Stream Restored or Protected (linear feet)
	Efficiency Savings (dollars/year)
200	Efficiency Savings (acre-feet/year)
10	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
	Number of Coloradans Impacted by Engagement Activity

Water Project Justification

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
Colorado Water Conservation Board
Department of Natural Resources

Last Updated: May 2021

Colorado Water Conservation Board
Water Plan Grant – Statement of Work – Exhibit A

Statement Of Work	
Date:	**11/20/2021**
Name of Grantee:	**Trout Unlimited**
Name of Water Project:	**Tomichi and Cebolla Creeks Restoration Package**
Funding Source:	**Water Plan Grant Watershed Restoration and Rec Category**
Water Project Overview:	

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.

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:

Last Updated: May 2021

Tasks
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:

Last Updated: May 2021

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 lager woody debris will be sources 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 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 an 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.

Last Updated: May 2021

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 serval rock structures, sod mats and transplanted willows to maintain channel grade and stability. The majority of rock has been purchased and stage at the site. Excavation contactor has been selected and will begin work 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 points 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 contactors, reimbursement invoices to CWCB, and accounting of project expenses.

Last Updated: May 2021

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.

Last Updated: May 2021

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.

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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.

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Water Plan Grant - Exhibit C
Budget and Schedule

Prepared Date:

Name of Applicant:

Name of Water Project:

Project Start Date:

Project End Date:

Task No.	Task Description	Task Start Date	Task End Date	Grant Funding Request	Match Funding	Total
1						$0
2						$0
3						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
						$0
			Total	$0	$0	$0

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Water Plan Grant - Detailed Budget Estimate
Fair and Reasonable Estimate

Prepared Date: 11/20/2021
Name of Applicant: Trout Unlimited
Name of Water Project: Tomichi and Cebolla Restoration Package

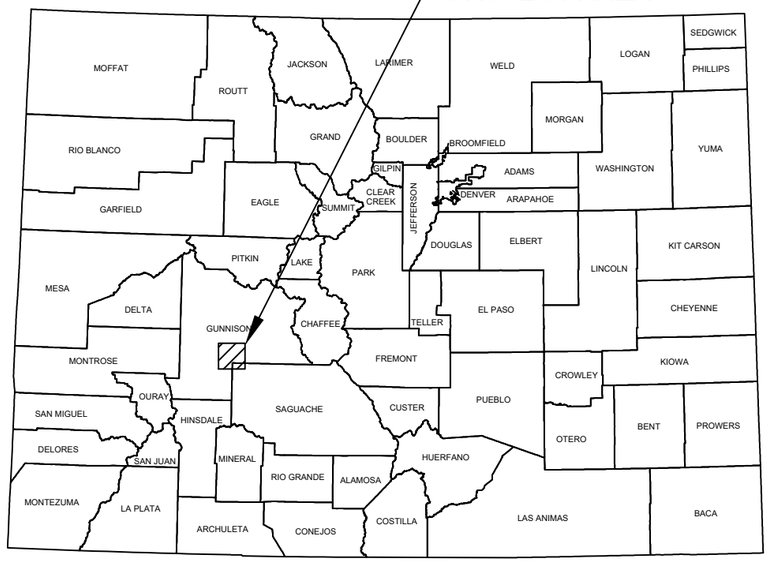
EXAMPLE C: Construction

Sub-task	Unit	Quantity	Unit Cost	Total Cost		CWCB Funds	Matching Funds
Task 1 - L&P Ranch Stream and Irrigation Improvement Restoration							
Pasture/Riparian Fence	LF	7,000	$ 8	$ 56,000		$ 20,000	$ 36,000
Inchannel Structure	EA	8	$ 4,000	$ 32,000		$ 16,000	$ 16,000
Water Control Structure	EA	2	$ 9,000	$ 18,000		$ 9,000	$ 9,000
Task total				$ 106,000.00	$ -	$ 45,000.00	$ 61,000.00
Task 2 - Tomichi Preserve Stream Restoration							
Sub-task							
Excavation	HR	600	$ 250.00	$ 150,000.00		$ 45,000.00	$ 105,000.00
Rock Material	CY	1200	$ 85.00	$ 102,000.00		$ 30,600.00	$ 71,400.00
Task Total				$ 252,000.00	$ -	$ 75,600.00	$ 176,400.00
Task 3- Grant Management							
Admin and indirect	Percent	0.1374	$ 120,600.00	$ 16,570.44		$ 16,570.44	$ 2,000.00
TOTAL				$ 374,570.44		$ 137,170	$ 239,400

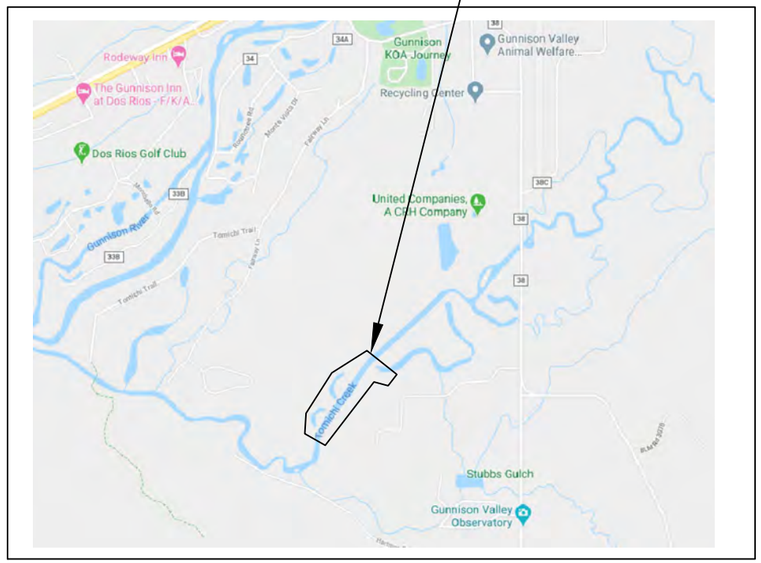
TOMICHI CREEK
STREAM RESTORATION
TOMICHI CREEK LOWER REACH SITE

GUNNISON COUNTY, COLORADO
Drainage Area = 1,061 SQ MI
Funding Program: ACEP
USDA NRCS

PROJECT AREA



PROJECT LOCATION



COLORADO MAP

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OBJECTIVES & REFERENCES

GOAL: STREAMBANK PROTECTION

STANDARDS/REFERENCES:
1. NRCS NEH 654, STREAM RESTORATION DESIGN
2. STREAMBANK & SHORELINE PROTECTION (580)
3. CRITICAL AREA PLANTING (342)
4. MULCHING (384)
5. FENCE (382)
6. CHANNEL BED STABILIZATION (584)

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

	DESCRIPTION	SPEC	QTY	UNIT
1	Pollution Control	805	1.0	LS
2	Toe Wood Anchor Rock, 24"	861	24.0	TN
3	Structure Rock, 30"	861	1,302.0	TN
4	Rock Riprap, 18", CDOT Type "H"	861	216.0	TN
5	Earthwork (Cut/Fill), Channel Shaping	822	4,785.0	CY
6	Earthfill, Compacted, Berm	823	1,620.0	CY
7	Earthfill, Compacted, Berm, Imported Mate	823	385.0	CY
8	Seeding & Mulching	806	3.0	AC
9	Removal of Water	811	1.0	LS
10	Salvaging Gravel-Cobble	822	1.0	LS
11	Root Wads, 18" Min. Diameter, 12 ft Stems	867	29.0	EA
12	Foundation Logs, 16" Min. Diameter x 40 ft	867	18.0	EA
13	Filler Wood, 3" - 12" Diameter	867	460.0	EA
14	Willow Cuttings from On-Site	869	2,070.0	EA
15	Transplanting Willow Clumps	869	30.0	EA
16	Salvaging and Transplanting Sod	869	12,790.0	SF
17	Erosion Control Fabric	895	2,947.0	SY
18	Geotextile Fabric, Non-woven, Class 1	895	875.0	SY
19	Mobilization & Demobilization	808	1.0	LS

CONTRACTOR SHALL INDEPENDENTLY ESTIMATE QUANTITIES BASED ON REVIEW OF DRAWINGS, SPECIFICATIONS, & SITE CONDITIONS.

COOPERATOR 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.

I REALIZE 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 (UNCC) 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 BEFORE START OF CONSTRUCTION.

UNCC TICKET NUMBER: _____

TABLE OF CONTENTS

CONSTRUCTION DATA & AS-BUILT DRAWINGS

CONSTRUCTED BY:

_____ DATE:_____

CONTRACTOR NAME AND ADDRESS:

_____

_____

_____

CONSTRUCTION COMPLETED DATE:_____

THE PRACTICE MEETS THE STANDARDS AND SPECIFICATIONS.

_____ DATE:_____

_____

TITLE

AS-BUILT DRAWINGS REVIEWED AND APPROVED BY:

_____ DATE:_____

TITLE

SUBMITTAL

DESCRIPTION		DATE	APPROVED
CONCEPTUAL	⬭	2/16/2018	TJB
50% PRELIMINARY DESIGN	⬭		
75% PRELIMINARY DESIGN	⬭	4/3/2020	
90% PRELIMINARY DESIGN	⬬	5/29/2020	
FINAL DESIGN	⬭		

REVISIONS

DESCRIPTION	DATE	APPROVED

		Date
Designed by:	TJ BURR	3/28/2020
Drawn by:	TJ BURR	5/29/2020
Checked by:	M. GUTEKUNST	__/__/__
Approved by:	J. ANDREWS	__/__/__

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

COVER SHEET

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

SHEET REVISED: 5/29/2020

SHEET 01 OF 17

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

FILE NAME: Drawings_Tomichi_Lower.dwg

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

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 rootwads.
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 water (seeps, springs, streams, rivers, lakes, and wetlands). See erosion control notes for more information.
7. Preserve existing vegetation to greatest extent possible. Save and replace plants and sod patches when practical, especially willow clumps.
8. When fence is present within work areas, remove and replace as needed to complete work.
9. Accomplish in-stream work during low flow conditions. Minimize the disturbance.
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 bankfull elevations at the work site before installing structures or other work. The Engineer will provide bankfull elevations by station, or will help identify bankfull 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 reset disturbed property 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

Telephone: 720-930-9011 (cell)

Email: Tee.Burr@usda.gov

ABBREVIATIONS

BKF: Bankfull elevation. The approximate flow elevation of stream flow occurring every 1.5 years on average.
BMP: Best management practice
CMP: 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 lowest 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 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 bankfull 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 soil 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 ½-inch or more, or snow-melt of 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 stilling 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 SHALLOW 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 SLOPES, INSTALL SILT FENCE ACROSS DISTURBED AREAS (PERPENDICULAR TO FLOW) AT 100 FOOT INTERVALS.
4. FOLLOW A LOGICAL SEQUENCE OF WORK TO LIMIT THE AMOUNT OF EXPOSED DISTURBED AREA. INSTALL ALL DOWNSTREAM 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 FLOW AROUND WORK AREAS USING TEMPORARY PIPES, DIVERSION DITCHES, BERMS, PUMPS, OR OTHER BEST MANAGEMENT PRACTICES.
6. REMOVE ROCK CHECK DAMS AS DOWNSTREAM AND UPSTREAM PORTIONS OF CHANNEL ARE STABILIZED.
7. TEMPORARILY SEED AND MULCH SITE AS REQUIRED THROUGHOUT CONSTRUCTION. PERMANENTLY SEED AND MULCH 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 STABILE.

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Date 3/28/2020	5/29/2020	__/__/__	__/__/__

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

GENERAL NOTES

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

SHEET REVISED: 6/14/2019

SHEET 02 OF 17

DESIGN DRAWINGS (REV: 5/29/2020)

FILE NAME: Drawings_Tomichi_Lower.dwg

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SYMBOL LEGEND

RIFFLE

FLOW DIRECTION ARROWS

EXISTING POOL

CONSTRUCTED RIFFLE

J-HOOK VANE (SEE TYP. DETAIL)

ROCK TOE PROTECTION (SEE TYP. DETAIL)

HABITAT BOULDER, (SEE TYP. DETAIL)

ESTIMATED BOUNDARY LINE

FENCE, EXISTING

1+00 PROFILE STATIONING (100 FT.)

POINT BAR SHAPING/GRADING

DECIDUOUS TREE, EXISTING

WILLOW OR SHRUB, EXISTING

TRANSPLANTED SHRUB

X-7500.2 SPOT ELEVATION

CONSTRUCTION LIMITS

EARTHFILL

PLANTING AS SPECIFIED

NEW POOL

STAGING AREA

ROOTWAD

TOE WOOD

TEMPORARY BENCHMARK, WOOD HUB

SURVEY BENCHMARK, REBAR

DESIGN DRAWINGS (REV: 5/29/2020)

		Date
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Drawn	TJ BURR	5/29/2020
Checked	M. GUTEKUNST	__/__/__
Approved	J. ANDREWS	__/__/__

TOMICHI CREEK
STREAM RESTORATION
STREAM RESTORATION

SYMBOL LEGEND

United States Department of Agriculture
Natural Resources Conservation Service

Job Class
V

REVISED:
4/2/2020

Sheet 03 of #

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DESIGN DRAWINGS (REV: 5/29/2020)

EXIST. DRAINAGE

EXIST. DRAINAGE

DURING CLEARING AND EXCAVATION, SALVAGE WOOD, TREES, WILLOWS, GRAVEL, COBBLE, BOULDERS, TOPSOIL, & SEDGE/SOD FOR USE ON PROJECT. STOCKPILE WILLOW CLUMPS TO TRANSPLANT AS INDICATED ON THE SITE PLANS.

REMOVE SEDIMENT FROM OLD CHANNEL & SHAPE AS NEEDED TO MEET CROSS-SECTION DIMENSIONS & GRADE (STA 45+50 TO 61+50)

SURVEY PT. AP12 FOUND ON 10-17-17 ALUM CAP (PARCEL "B" WEST BOUNDARY)

TRANSPLANTED SOD, WILLOW CUTTINGS, & WILLOW TRANSPLANTS (3,700 SF)

HAY FIELD

R153.00

PROVIDE COMPACTED EARTH BERM (1,105 FT) (SEE TYPICAL DETAIL & CROSS SECTIONS)

BOULDER TOE (125 FT) PER TYPICAL DETAIL & CROSS SECTION XS 5578

STRIP SOD TO 15" THICK & TRANSPLANT TO BANK AREAS FOR STABILIZATION (1,250 SF) (TYPICAL FOR NEW POINT BARS)

EXCAVATE POOL PER TYPICAL DETAIL & CROSS SECTIONS

TOE WOOD (330 FT) ANCHORED BY ROCK, PLANTINGS, & TRANSPLANTED SOD (4,500 SF) - FOR ALTERNATIVE, SEE NOTE BELOW*.

* ALTERNATIVE TO TOE WOOD: USE BOULDER TOE PROTECTION WITH TRANSPLANTED SOD CLUMPS. THIS MAY BE NECESSARY IF A RELIABLE WOOD SOURCE ISN'T AVAILABLE.

R158.00

END BERM 59+00

4,040 SF

PLANT SALVAGED SOD (1,950 SF) & TRANSPLANTED WILLOW CLUMPS (7)

R175.00

CLEAR TREES & SALVAGE FOR USE AS TOE WOOD

SHAPE CHANNEL PER CROSS-SECTIONS. THERE ARE 2 DIFFERENT CROSS SECTIONS, ONE FOR RIFFLES & ONE FOR POOLS

S = 0.00215 FT/FT

RIFFLE

EX FENCE

POINT BAR GRADING (EARTHWORK)

BUILD 3 FT HIGH MOUND FOR HABITAT DIVERSITY (OPTIONAL)

BUILDUP OUTSIDE BANK TO ELEV: 7576.0

R130.00

BOULDER TOE PROTECTION (186 FT) & TRANSPLANTED SOD (4,350 SF) (SEE TYPICAL DETAILS & SECTIONS)

NATURAL GRASSLAND

EXISTING BACKWATER HABITAT

STA 45+60: START

COMPACTED EARTHFILL BERM, IMPORTED APPROX. 2.5 FT HIGH (EARTHWORK 385 CY) L = 376 FT

TOMICHI CREEK

CHANNEL OVERTOPS

1133
7576.48
START

CONSTRUCTION ACCESS FROM RED TAIL LN OR AS ARRANGED WITH LANDOWNER

POINT BAR GRADING (CHANNEL EARTHWORK)

GRADE CONTROL RIFFLE AT STA 46+59

FILL TO ELEVATION OF EXISTING BANK TOPS. SALVAGE GRAVEL-COBBLE FROM EXISTING CHANNEL TO PLACE IN NEW CHANNEL STREAMBED, RIFFLES, & POINT BARS. SEED & MULCH AREA OF 12,000 SF. PLANT SALVAGED SOD.

PROTECT THE END OF COMPACTED EARTHFILL WITH ROCK RIPRAP, 18", CDOT TYPE "H" (SEE TYP. DETAIL FOR ROCK RIPRAP) KEY INTO UNDISTURBED EARTH 8 FEET ON EACH END

CONSTRUCTION LIMITS (TYP.)

EXISTING S = 0.0027 FT/FT

EXISTING DEPOSITION (SANDY LOAM)

EXIST. DITCH RETURN FLOW

HAY FIELD

HAY FIELD

HAY FIELD

N

0 100 200 Feet

Date	3/28/2020	5/29/2020	/ /	/ /
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Checked by:			M. GUTEKUNST	
Approved by:				J. ANDREWS

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

SITE PLAN 1

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

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DESIGN DRAWINGS (REV: 5/29/2020)

4,040 SF

XS5826

END BERM 59+00

59+00

59+52

60+00

60+10

SURFACE RUNOFF
FROM FIELD

CREATE A MOUND FOR DRY LAND HABITAT
WASTE AREA FOR EXCAVATED SOIL (2,680 SF)
30-INCHES HIGH ABOVE SURROUNDING GRADE

TRANSPLANTED SOD (1,000 SF)

61+00

s = 0.0016 ft/ft

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

540 SF

x 7571.0

x 7570.9

62+00

62+00: END OF CHANNEL SHAPING & PROJECT - TIE INTO EXISTING STREAMBED

HAY FIELD

OXBOW POND BUILT WITH FUNDING
FROM PARTNERS WITH WILDLIFE

63+00

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

64+00

65+00

66+00

67+00

68+00

69+00

70+00

71+00

72+00

TOMICHI CREEK

HAY FIELD

HAY FIELD

TBM 2
EL: 7579.16
N: 13,991,219.580
E: 1,082,975.472

TBM 3
EL: 7578.29
N: 13,991,201.480
E: 1,082,850.741

N

0 100 200 Feet

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TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

SITE PLAN 2

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

SHEET REVISED: 4/3/2020

SHEET 05 OF 17

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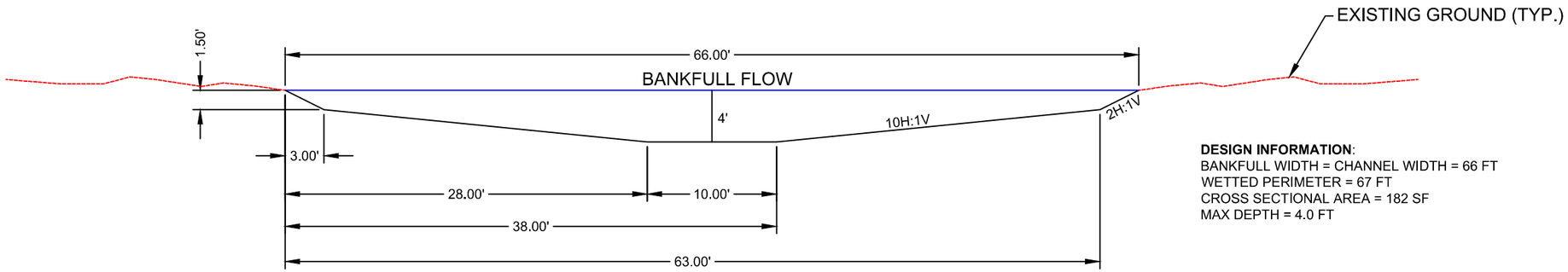
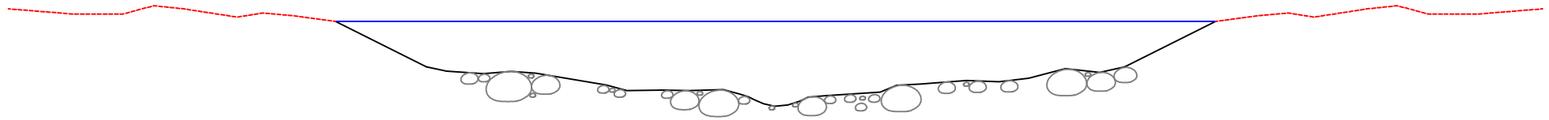


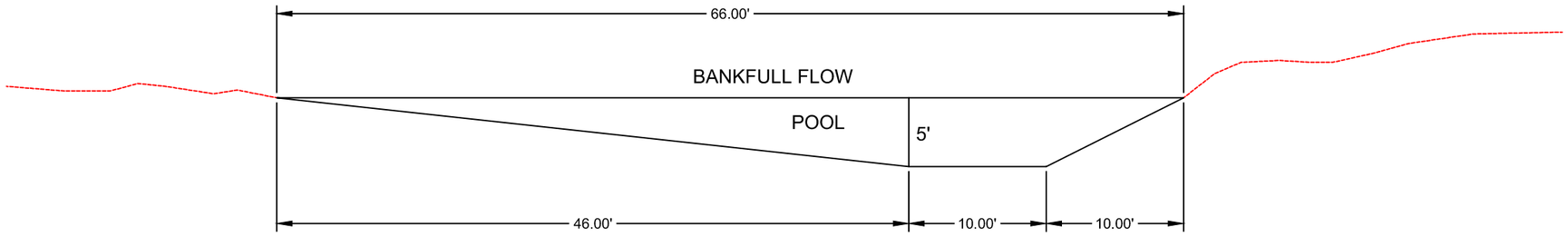
TYPICAL "RIFFLE" CROSS-SECTION (DESIGN)

DESIGN INFORMATION:
BANKFULL WIDTH = CHANNEL WIDTH = 66 FT
WETTED PERIMETER = 67 FT
CROSS SECTIONAL AREA = 182 SF
MAX DEPTH = 4.0 FT



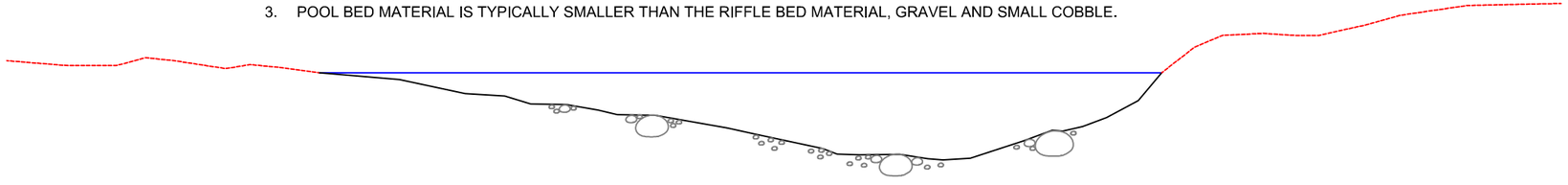
TYPICAL "RIFFLE" CROSS-SECTION (CONSTRUCT)

CHANNEL NOTES:
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 (DESIGN)

POOL NOTES:
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 "POOL" CROSS-SECTION (CONSTRUCT)

0 10 20 Feet

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TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

TYPICAL CHANNEL SECTIONS

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

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SHEET 06 OF 17

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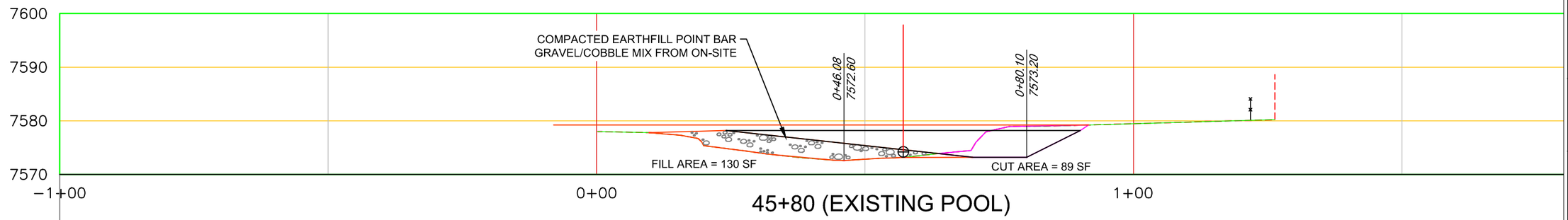
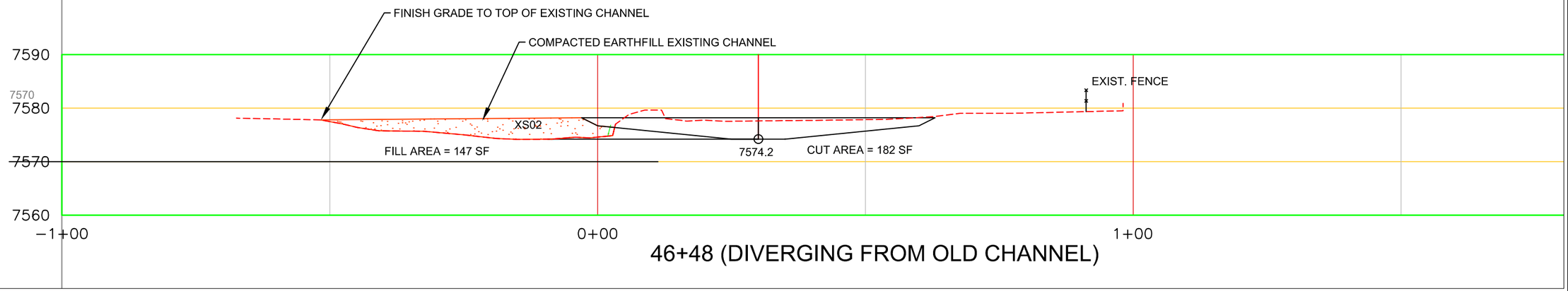
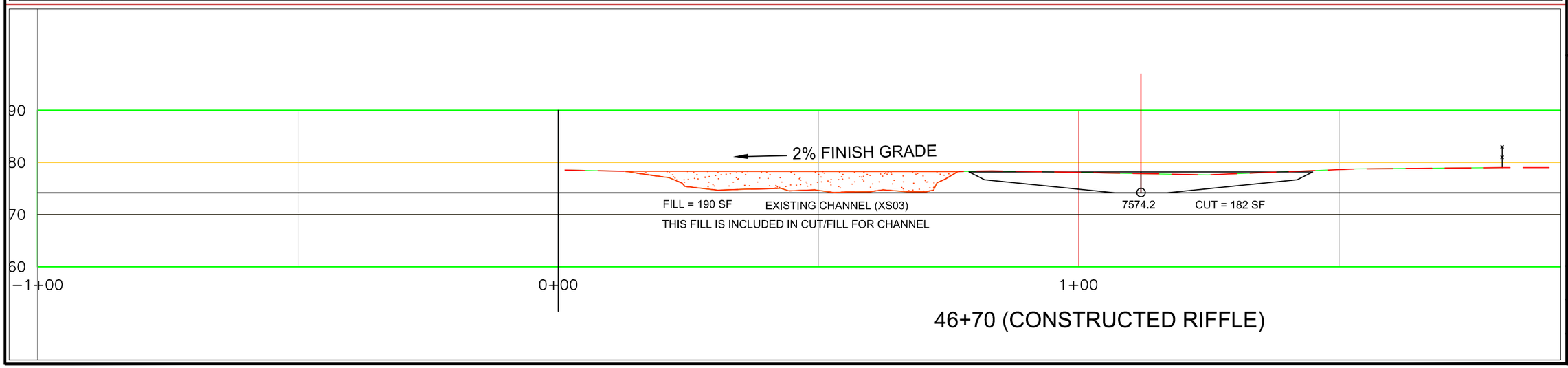


45+80 (EXISTING POOL)

XS4580 PROFILE



46+48 (DIVERGING FROM OLD CHANNEL)



46+70 (CONSTRUCTED RIFFLE)

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TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

CHANNEL SECTIONS 1

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

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SHEET 07 OF 17

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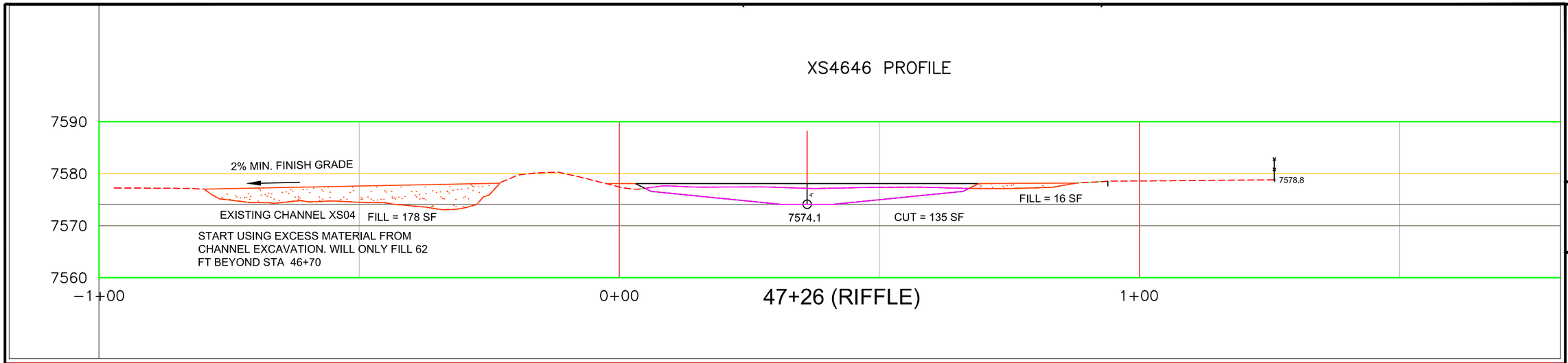

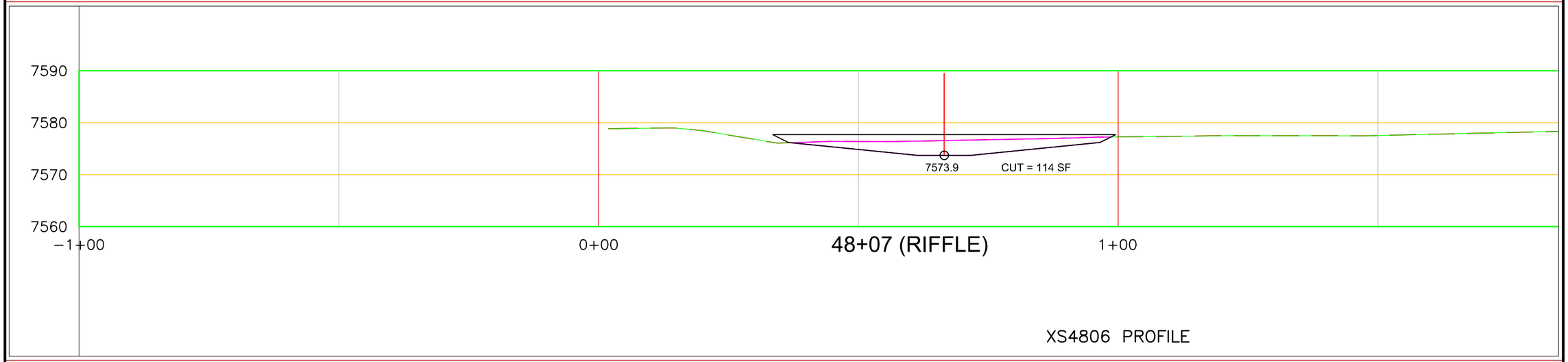

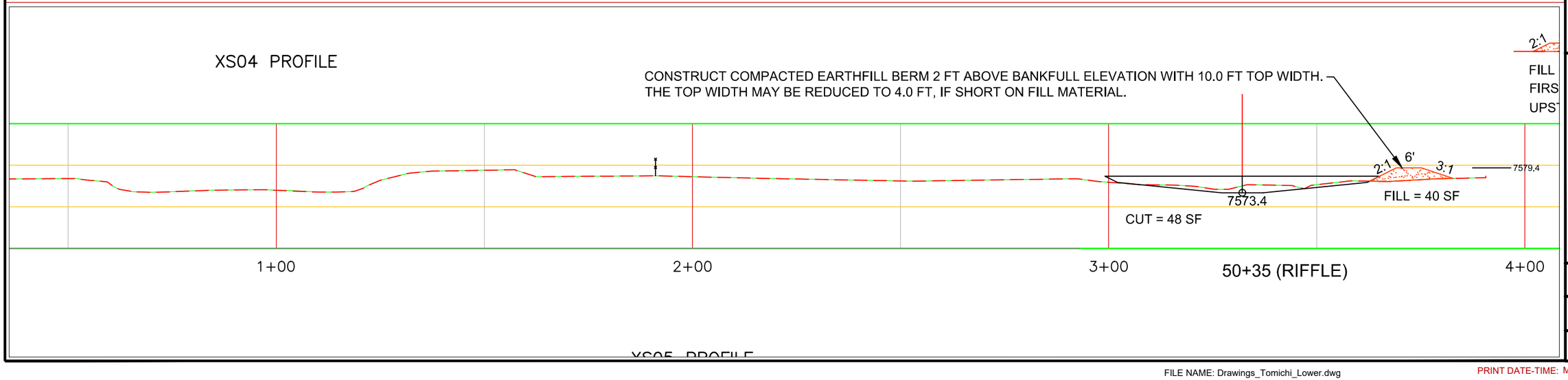

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TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

CHANNEL SECTIONS 2

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

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SHEET 08 OF 17

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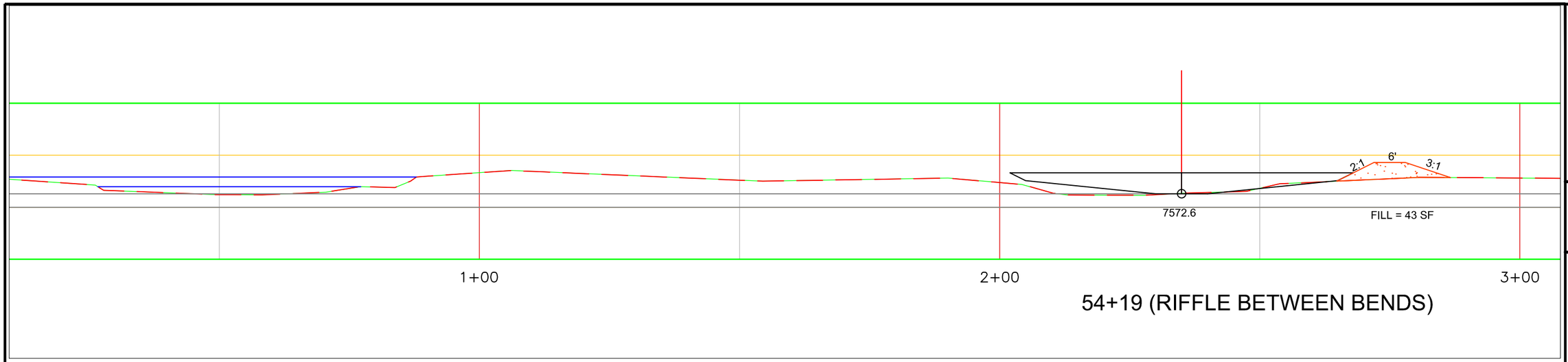
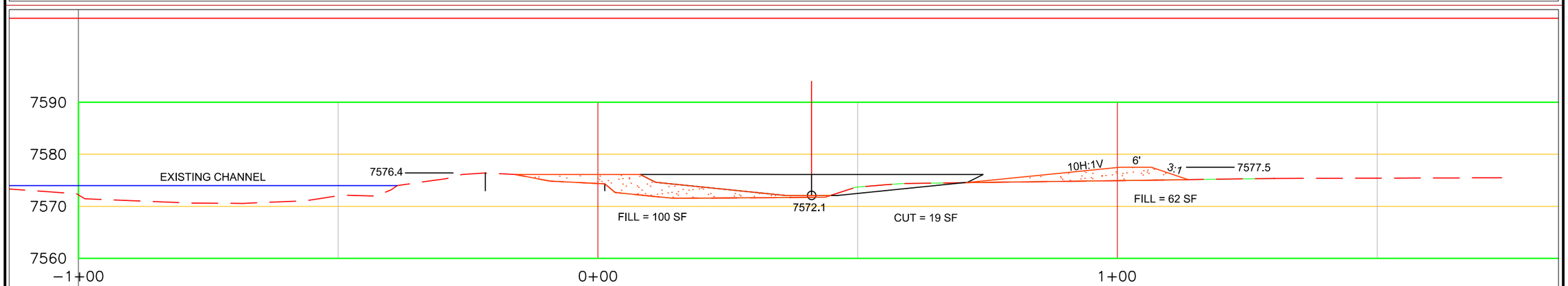
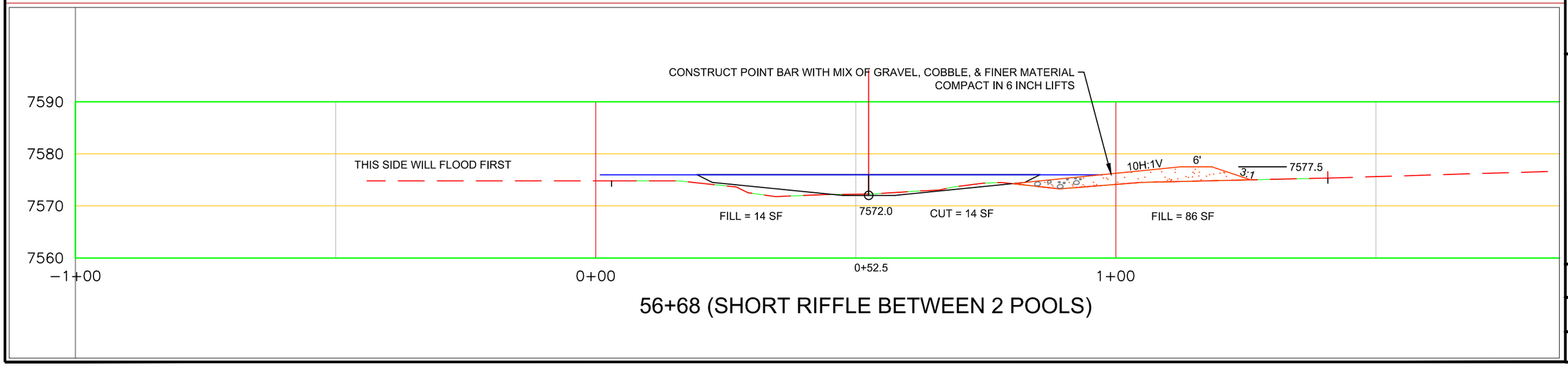


54+19 (RIFFLE BETWEEN BENDS)



56+28 (END OF GLIDE TO RIFFLE)



56+68 (SHORT RIFFLE BETWEEN 2 POOLS)

DESIGN DRAWINGS (REV: 5/29/2020)

		Date
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Approved by:	J. ANDREWS	__/__/__

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

CHANNEL SECTIONS 3

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

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SHEET 09 OF 17

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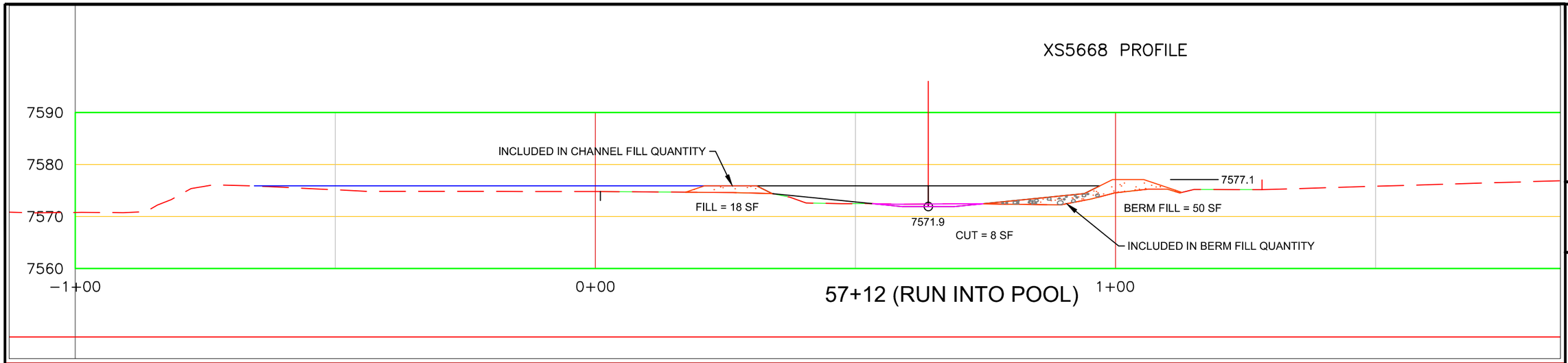

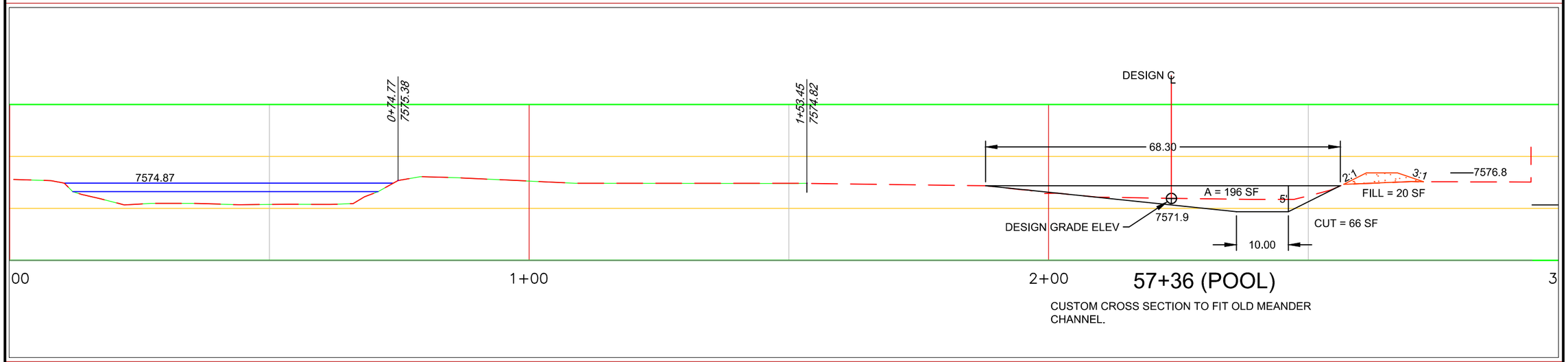

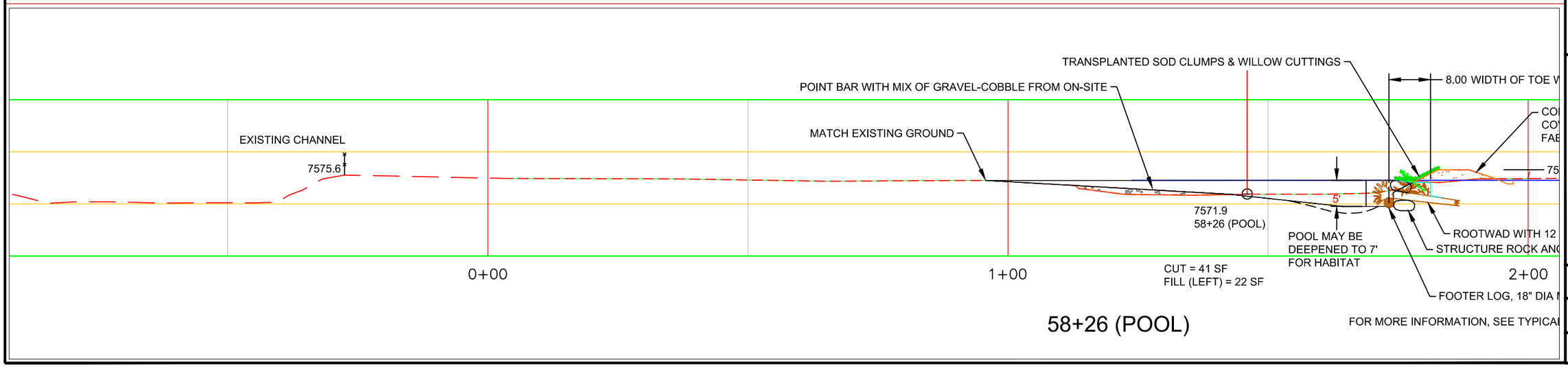

DESIGN DRAWINGS (REV: 5/29/2020)

	Date
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Drawn by: TJ BURR	5/29/2020
Checked by: M. GUTEKUNST	__/__/__
Approved by: J. ANDREWS	__/__/__

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

CHANNEL SECTIONS 4

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

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SHEET 10 OF 17

FILE NAME: Drawings_Tomichi_Lower.dwg

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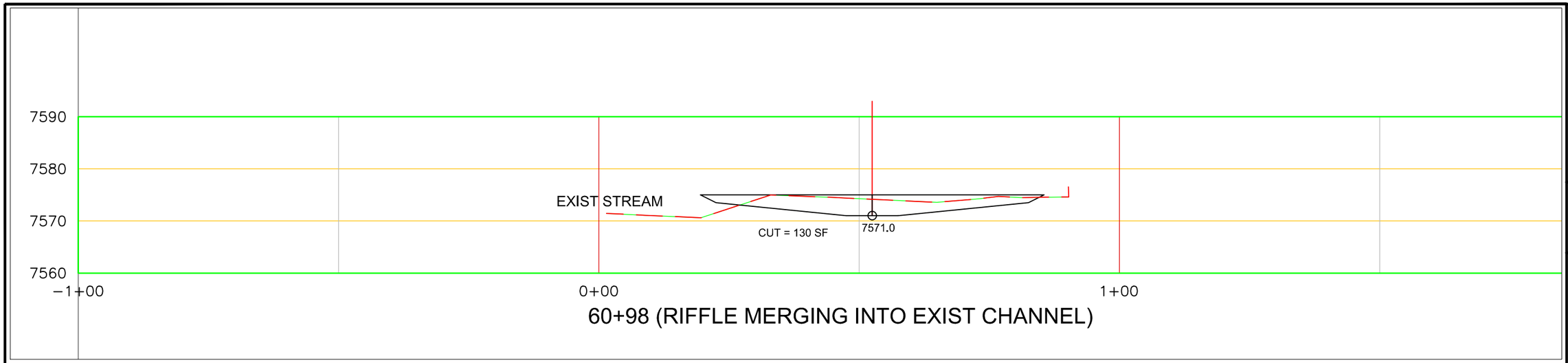
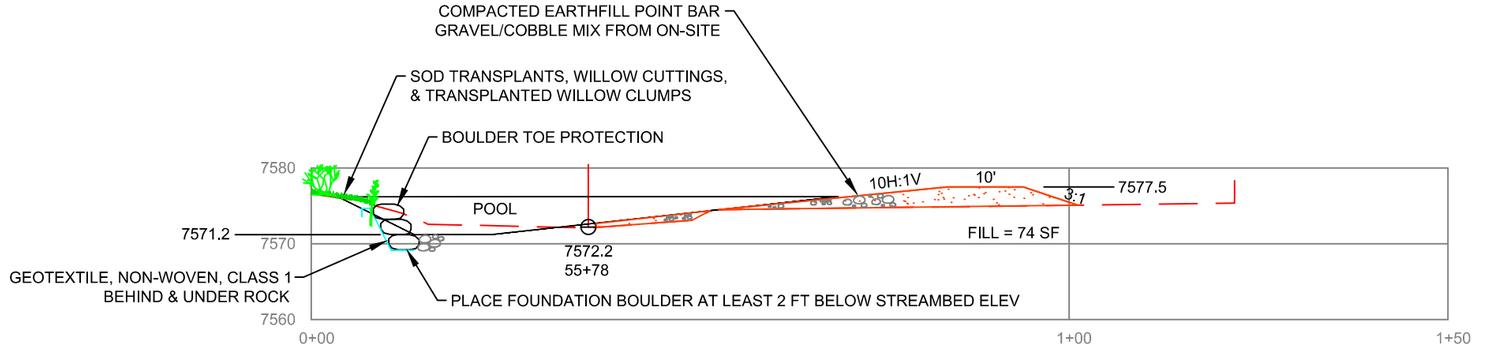
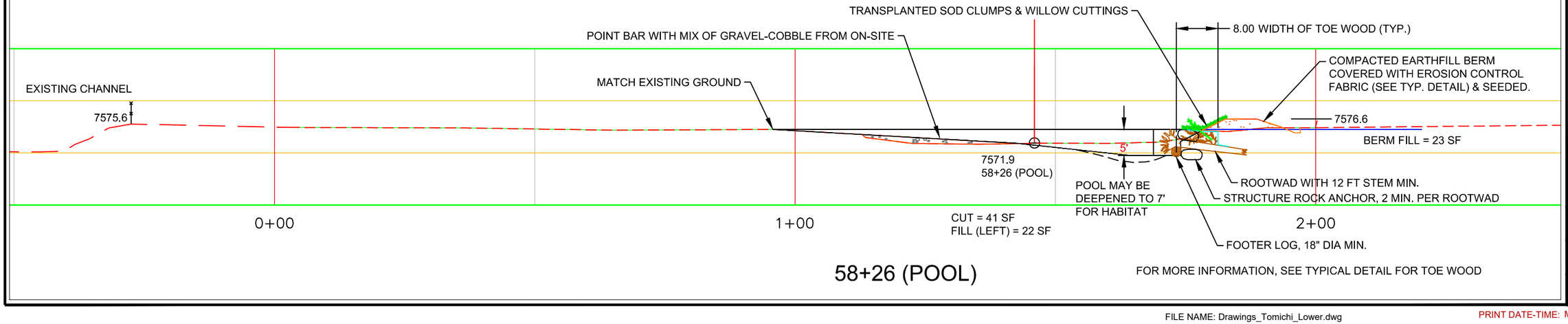


60+98 (RIFFLE MERGING INTO EXIST CHANNEL)



XS5578 POOL AT MID-PT OF BEND



58+26 (POOL)

FOR MORE INFORMATION, SEE TYPICAL DETAIL FOR TOE WOOD

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TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

CHANNEL SECTIONS 5

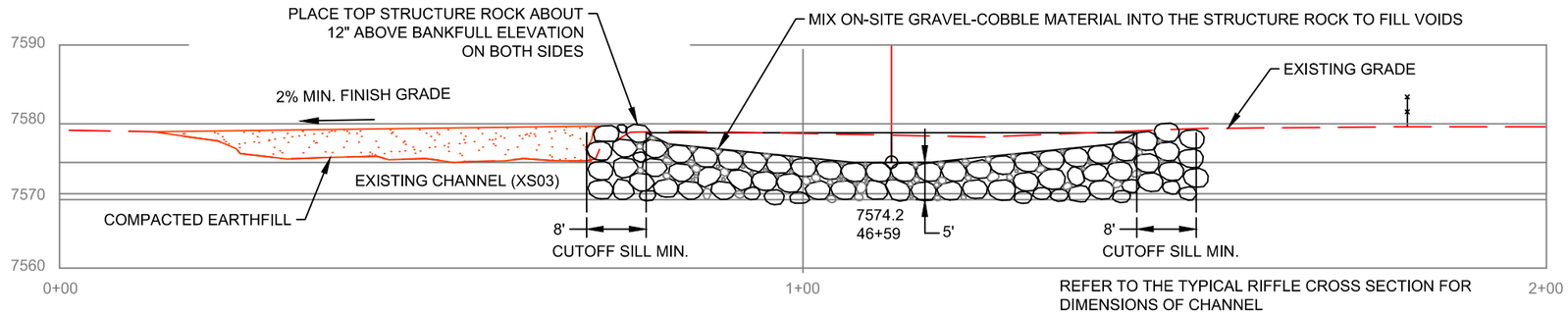
United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

SHEET REVISED: 4/2/2020

SHEET 11 OF 17

DESIGN DRAWINGS (REV: 5/29/2020)



46+59 (CONSTRUCTED RIFFLE CREST)

DESIGN DRAWINGS (REV: 5/29/2020)

Designed by:	TJ BURR	Date 3/28/2020		
Drawn by:	TJ BURR	5/29/2020		
Checked by:	M. GUTEKUNST	__/__/__		
Approved by:	J. ANDREWS	__/__/__		

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

CHANNEL SECTIONS 6

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

SHEET REVISED: 4/2/2020

SHEET 12 OF 17

FILE NAME: Drawings_Tomichi_Lower.dwg

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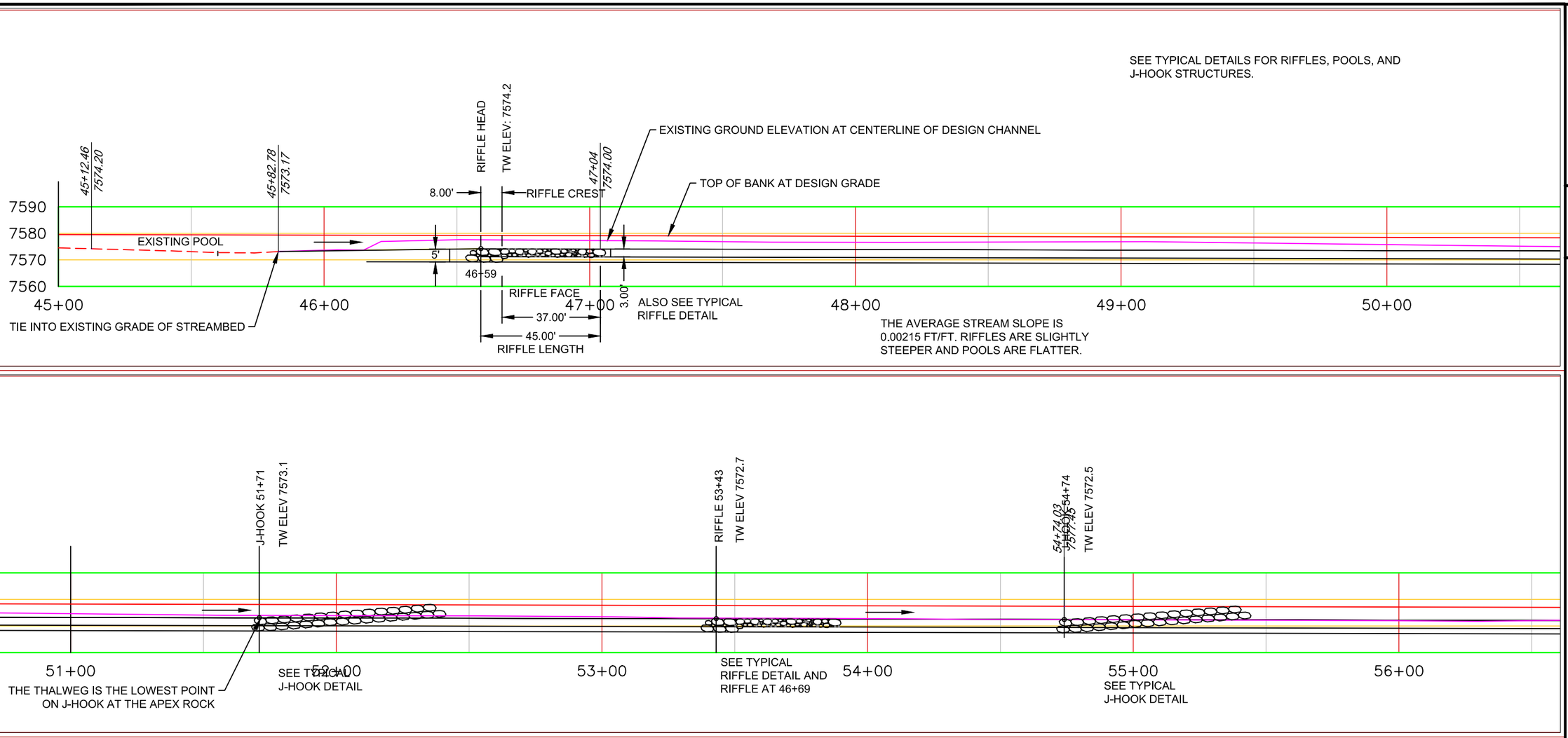


DESIGN DRAWINGS (REV: 5/29/2020)

Designed by: TJ BURR	Date 3/28/2020		
Drawn by: TJ BURR	5/29/2020		
Checked by: M. GUTEKUNST	__/__/__		
Approved by: J. ANDREWS	__/__/__		

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

CHANNEL PROFILE

United States Department of Agriculture
Natural Resources Conservation Service

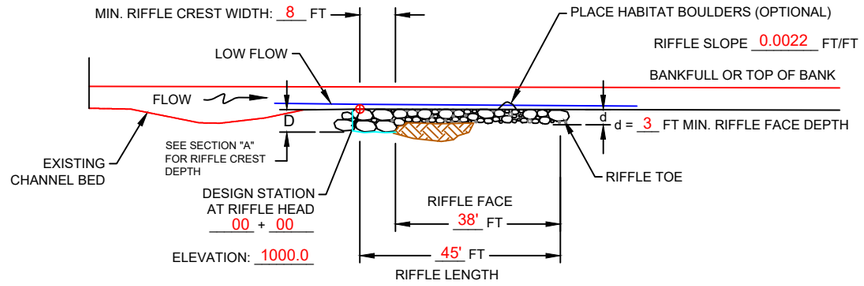
JOB CLASS: V

SHEET REVISED: 4/2/2020

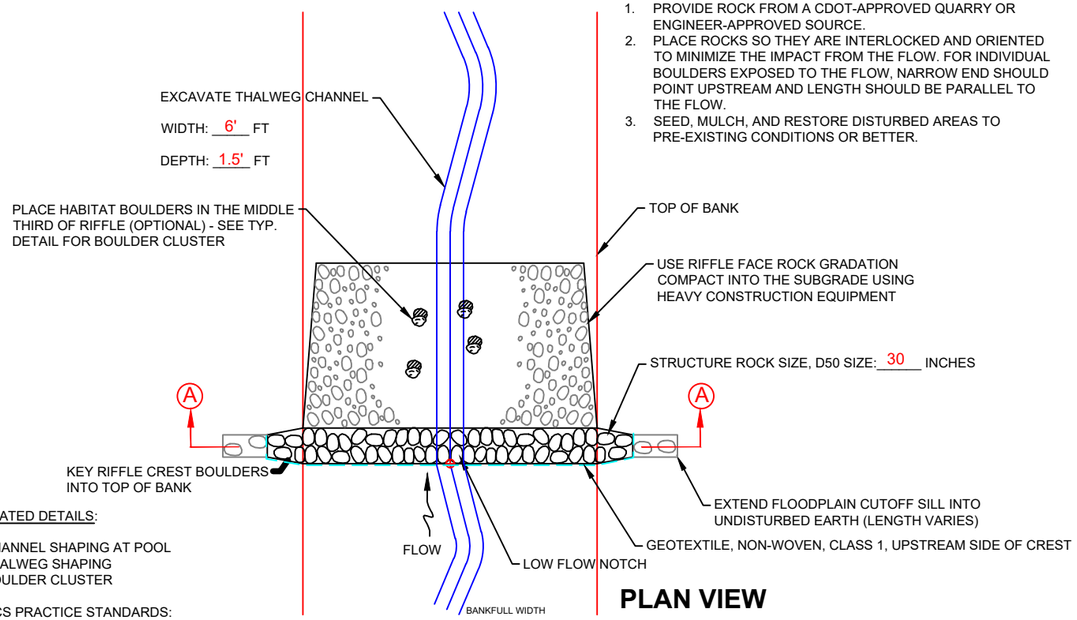
SHEET 13 OF 17

FILE NAME: Drawings_Tomichi_Lower.dwg

PRINT DATE-TIME: May 29, 2020 - 5:15 PM



PROFILE VIEW
(ALONG CENTERLINE OF RIFFLE)



PLAN VIEW

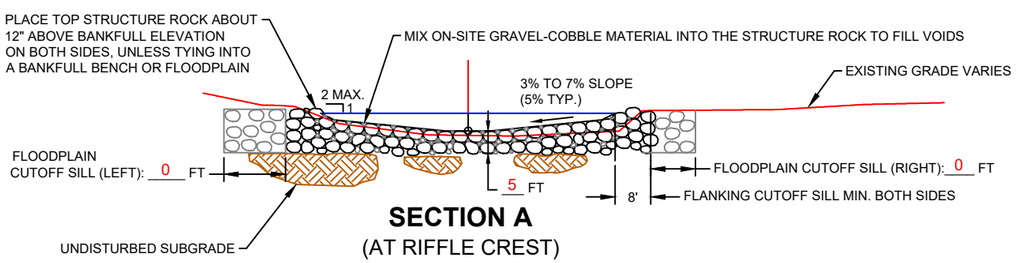
NOTES:

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.

RELATED DETAILS:

- CHANNEL SHAPING AT POOL
- THALWEG SHAPING
- BOULDER CLUSTER

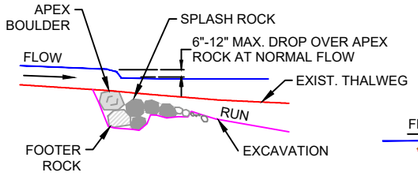
NRCS PRACTICE STANDARDS:
- OPEN CHANNEL (582)
- CHANNEL BED STABILIZATION (584)



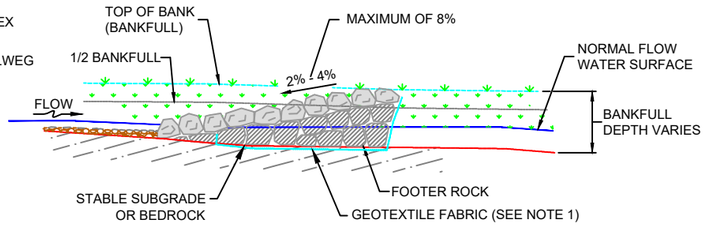
SECTION A
(AT RIFFLE CREST)

TYPICAL RIFFLE DETAIL TYPE "B"
NOT TO SCALE

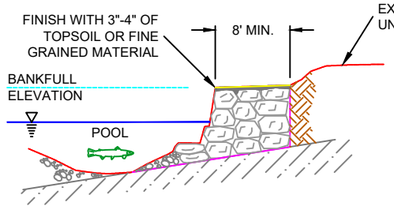
TYPICAL J-HOOK VANE DETAIL
NOT TO SCALE



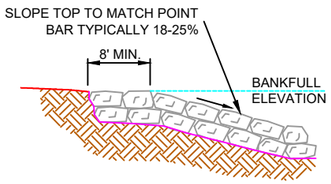
SECTION A
(AT APEX OF HOOK)



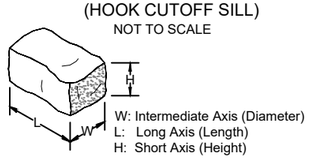
PROFILE
(ALONG ARM)



SECTION B
(AT CUTOFF SILL)



SECTION C
(HOOK CUTOFF SILL)
NOT TO SCALE



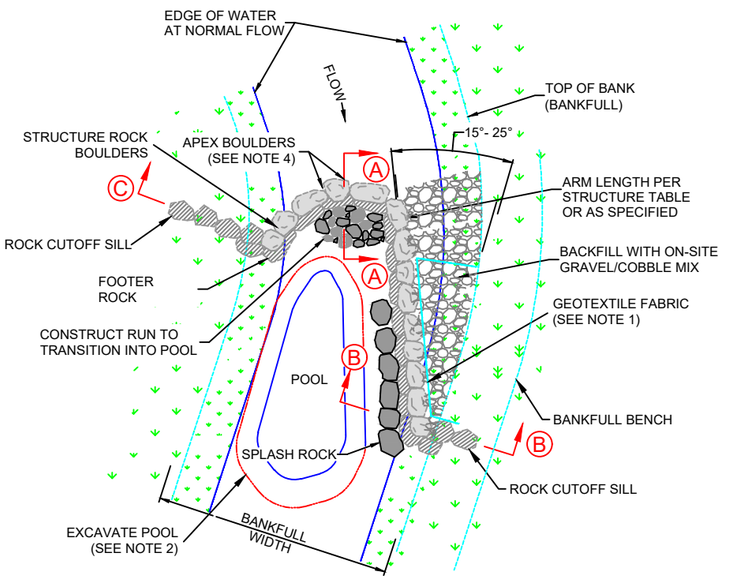
W: Intermediate Axis (Diameter)
L: Long Axis (Length)
H: Short Axis (Height)

STRUCTURE ROCK SIZE				
	Representative Size			
	W or Dia (Feet)	Length (Feet)	Height (Feet)	Weight (Ton)
Minimum	2.8	4.2	2.2	1.83
Average (D50)	3.2	4.8	2.6	2.78

Assumed Rock Density: 165 LB/CU-FT

ROCK NOTES:

A. 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.
B. SMALLER HEIGHT ROCKS ARE REQUIRED TO TAPER STRUCTURES AT APEX ON BEDROCK. FOOTER ROCKS SHALL MEET STRUCTURE ROCK REQUIREMENTS.
C. FOR MAIN STRUCTURE ROCK, SILL, AND FOOTER ROCK, THE ROCK SOURCE SHALL BE FROM AN ACCEPTABLE CDOT QUARRY OR FROM ENGINEER APPROVED SOURCE.
D. ON-SITE COBBLE AND BOULDERS MAY BE USED TO FILL VOIDS AND FOR SPLASH ROCKS, BUT NOT FOR USE AS ANY MAIN STRUCTURE ROCK.



PLAN VIEW

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 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 IS 12 INCHES MEASURED ALONG THE STREAM PROFILE. SEE SECTION A.
4. BUTT THE APEX BOULDERS TIGHTLY AGAINST EACH OTHER. USE SHAPE OF ROCKS TO PROVIDE A LOW FLOW GAP NEAR THE MIDDLE.

	Date	
Designed by: TJ BURR	3/28/2020	
Drawn by: TJ BURR	5/29/2020	
Checked by: M. GUTEKUNST	__/__/__	
Approved by: J. ANDREWS	__/__/__	

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

RIFFLE & J-HOOK

United States Department of Agriculture
USDA
Natural Resources Conservation Service

JOB CLASS: V

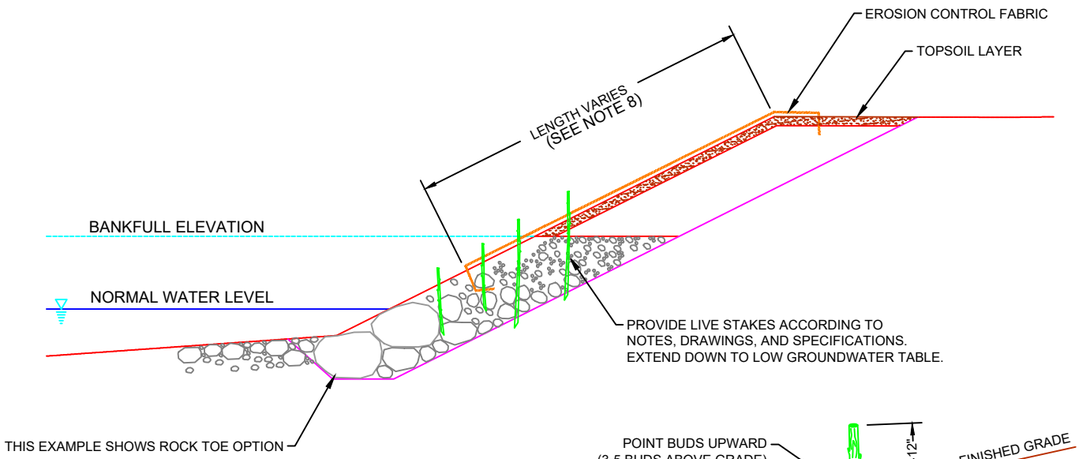
SHEET REVISED: 4/2/2020

SHEET 14 OF 17

DESIGN DRAWINGS (REV: 5/29/2020)

FILE NAME: Drawings_Tomichi_Lower.dwg

PRINT DATE-TIME: May 29, 2020 - 5:16 PM



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 FOR A MINIMUM OF 24 HOURS. REMOVE THE STAKES FROM WATER BEFORE ROOT TIPS EMERGE.
5. DRIVE A PILOT HOLE IN FIRM SOIL AT RIGHT ANGLES WITH BUDS ORIENTED UP.
6. TAMP SOIL AROUND LIVE STAKES TO ELIMINATE AIR POCKETS.
7. PLANT STAKES RANDOMLY OR ON TRIANGULAR SPACING.
8. CUT THE BASAL OR BUTT ENDS AT AN ANGLE FOR EASY INSERTION INTO THE SOIL. CUT THE TOP SQUARE OR BLUNT.
9. LIVE STAKE PLACEMENT ON BANK: FROM NORMAL WATER LEVEL UP TO TOP OF BANK. USE STAKES LONG ENOUGH TO REACH LOW GROUNDWATER TABLE. USE WATER TOLERANT SPECIES BELOW NORMAL FLOW LINE.
10. RECOMMENDED SPECIES FOR THIS SITE (CHOOSE AT LEAST 3 AS AVAILABLE FROM NURSERY OR OTHER APPROVED SOURCES). IF NOT LISTED BELOW, REFER TO PLANTING PLANS OR RECOMMENDATIONS FROM PLANTING SPECIALIST:

ROCKY MOUNTAIN WILLOW, NARROWLEAF WILLOW, WHIPLASH WILLOW, COYOTE WILLOW, DRUMMOND'S WILLOW, GEYSER'S WILLOW, COTTONWOOD, OR BLUESTEM WILLOW

DIAMETER RANGE = ~~0.5~~ 1.5 TO 1.5 INCHES

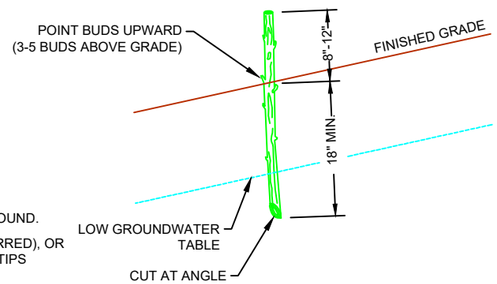
LENGTH RANGE = ~~3~~ 3 TO 4 FEET*

PLANTING DENSITY, EVERY ~~3~~ _____ FT ON DIAMOND SPACING

* LENGTHS SHORTER THAN 3 FT REQUIRE PRIOR APPROVAL OF NRCS TECH. REPRESENTATIVE. IN SOME CASES A 2 FT LONG STAKE MAY BE ADEQUATE. COMMON LENGTHS ARE 3', 4', & 6', BUT CAN BE UP TO 12'.

TYPICAL USES:

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



LIVE STAKE CLOSE-UP

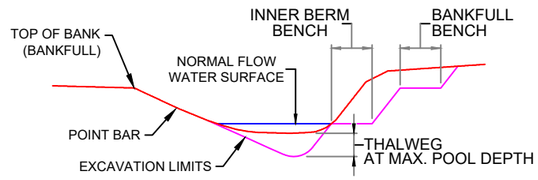
50% TO 80% OF LIVE STAKE LENGTH SHOULD BE BELOW FINISH GRADE

ASSOCIATED DETAILS:

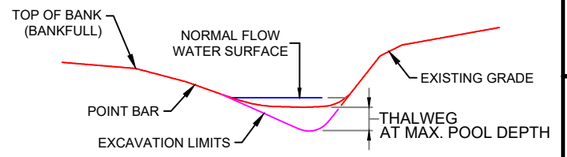
- Erosion Control Fabric
- Rock Toe (If Specified)
- Streambank Shaping

TYPICAL LIVE STAKE DETAIL
(With Bank Shaping & Rock Toe)

NOT TO SCALE

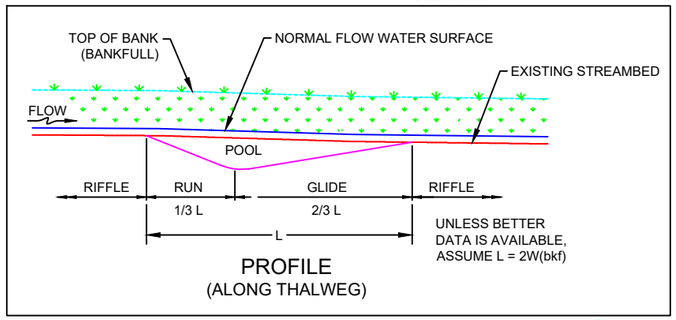


SECTION A
(BENCHED OPTION)

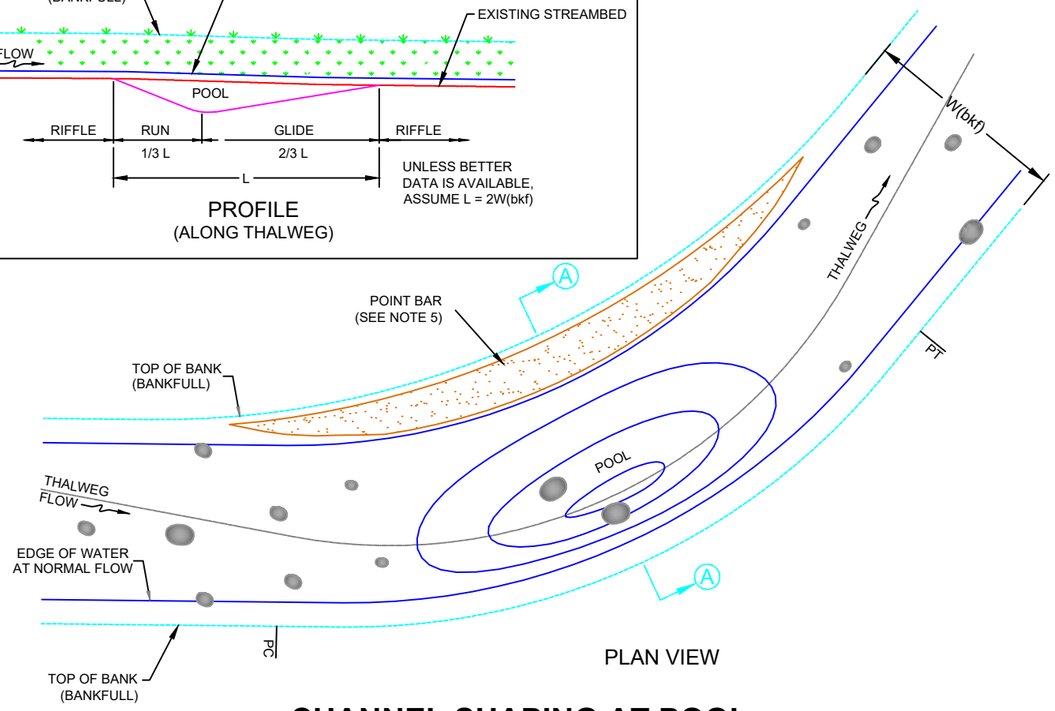


SECTION A
(WITHOUT BENCH)

EXCAVATE DEEPEST PART OF POOL TO A MINIMUM DEPTH OF 2 FEET BELOW EXISTING STREAMBED OR DOWN TO BEDROCK.



PROFILE
(ALONG THALWEG)



PLAN VIEW

CHANNEL SHAPING AT POOL
TYPICAL DETAIL

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. USE THIS DETAIL WITH OTHER STREAM RESTORATION MEASURES TO SHOW FEATURES OF A NATURAL CHANNEL SHAPE.
5. 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

	Date
Designed by: TJ BURR	3/28/2020
Drawn by: TJ BURR	5/29/2020
Checked by: M. GUTEKUNST	__/__/__
Approved by: J. ANDREWS	__/__/__

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

LIVE STAKES & SHAPING

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

SHEET REVISED: 3/30/2020

SHEET 15 OF 17

DESIGN DRAWINGS (REV: 5/29/2020)

FILE NAME: Drawings_Tomichi_Lower.dwg

PRINT DATE-TIME: May 29, 2020 - 5:16 PM

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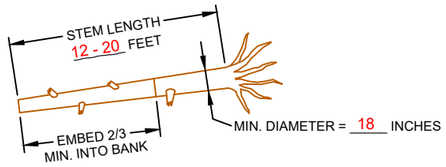
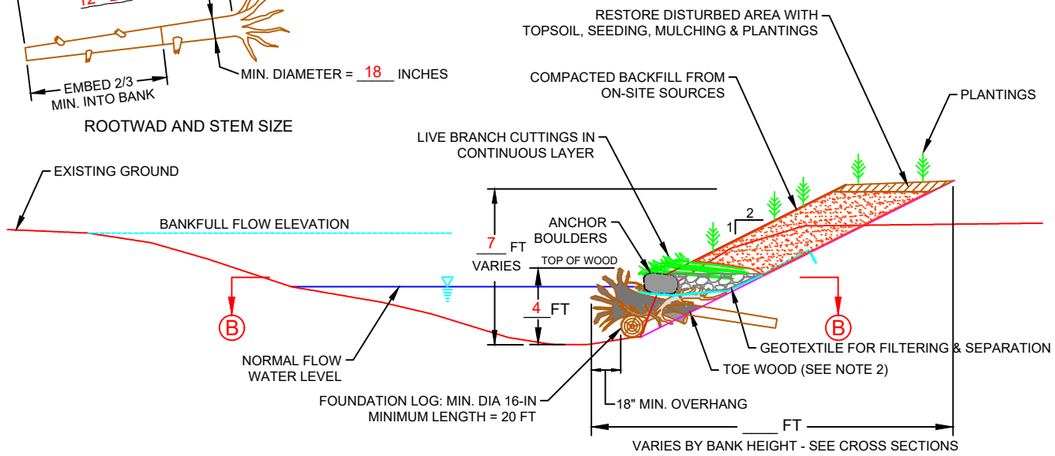
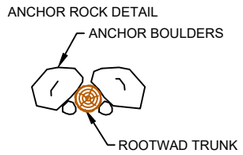
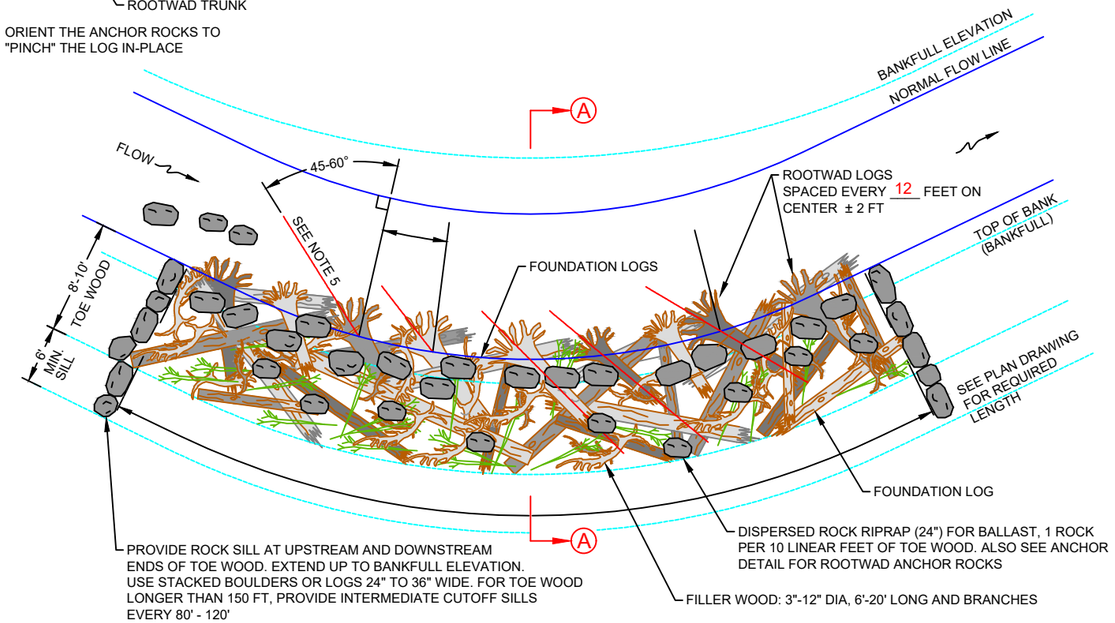


ROOTWAD AND STEM SIZE



SECTION A





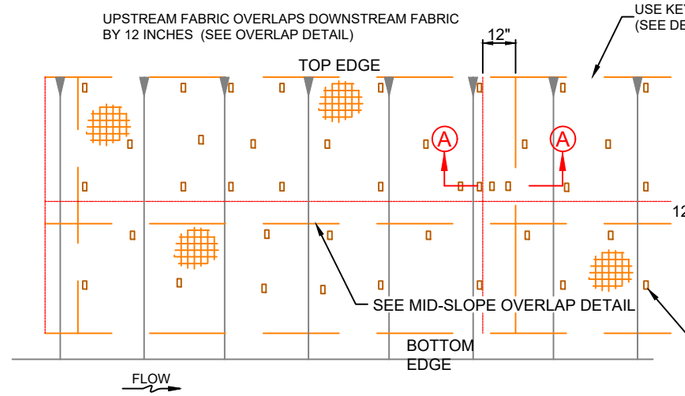
PLAN VIEW B

TOE WOOD DETAIL 1

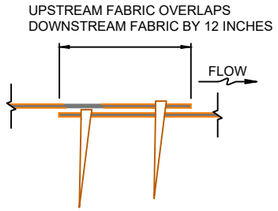
NOT TO SCALE

NOTES:

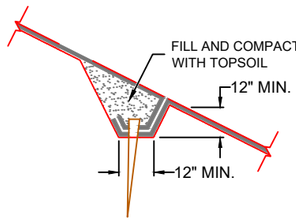
1. IF AVAILABLE FROM ON-SITE EXCAVATION, SOD MAT LAYERS MAY BE INCORPORATED TO FINISH SURFACES TO PROVIDE IMMEDIATE VEGETATION.
2. TOE WOOD CONSISTS OF A MIX OF LOGS, BRANCHES, WOODY SHRUBS, AND OTHER WOOD SALVAGED FROM ON-SITE OR IMPORTED. INSTALL THE WOOD AT VARIOUS ANGLES, BUT NOT PARALLEL TO WATER FLOW. LAYER WOOD WITH LARGER MATERIAL ON THE BOTTOM AND FORM A MAT OF BRANCHES ON THE TOP LAYER.
3. PLACE THE TOP LAYER OF WOOD AT OR UP TO 12 INCHES ABOVE NORMAL FLOW ELEVATION.
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.



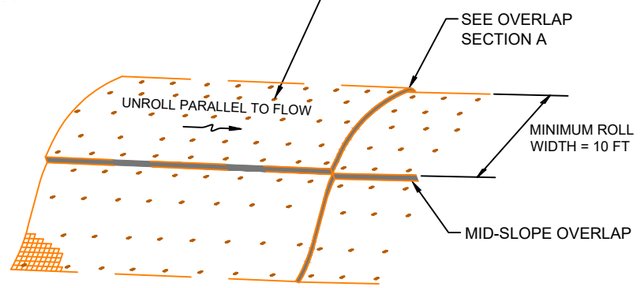
PLAN VIEW



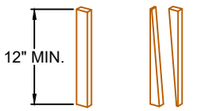
OVERLAP SECTION A



MID-SLOPE OVERLAP DETAIL

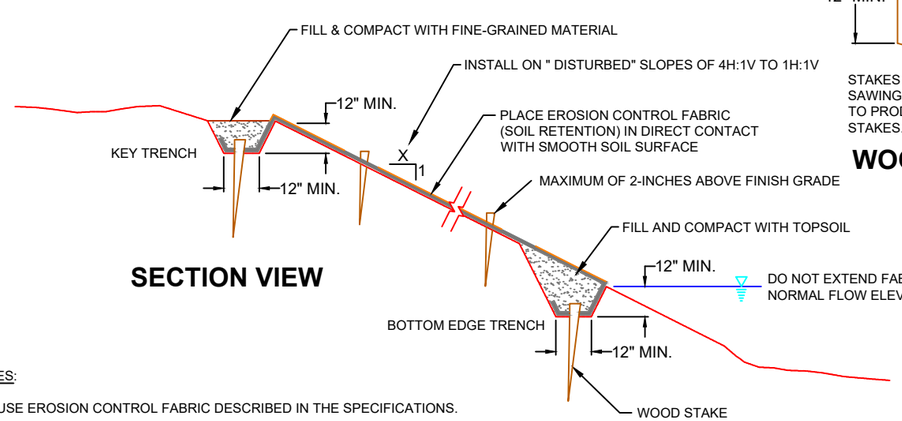


ISOMETRIC VIEW



STAKES MAY BE MADE BY SAWING A 2 x 4 DIAGONALLY TO PRODUCE 2 DEAD STOUT STAKES.

WOOD STAKE



SECTION VIEW

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. SCARIFY 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.

EROSION CONTROL FABRIC (ECF) DETAIL

(Soil Retention Fabric, Biodegradable)

NOT TO SCALE

	Date	Designed by:	Drawn by:	Checked by:	Approved by:
	3/28/2020	TJ BURR	TJ BURR	M. GUTEKUNST	J. ANDREWS
	5/29/2020				
	__/__/__				
	__/__/__				

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

TOE WOOD & ECF

United States Department of Agriculture
Natural Resources Conservation Service

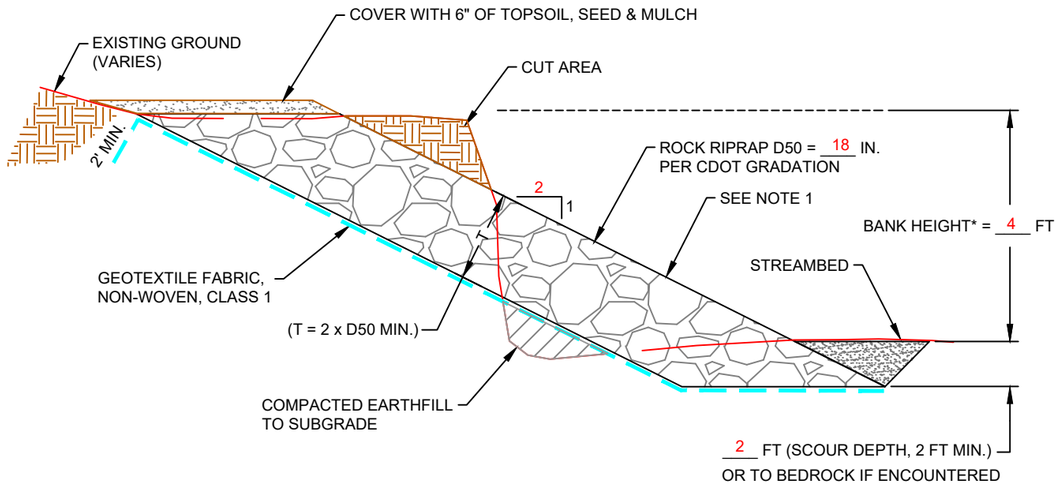
JOB CLASS: V

SHEET REVISED: 3/31/2020

SHEET 16 OF 17

FILE NAME: Drawings_Tomichi_Lower.dwg

PRINT DATE-TIME: May 29, 2020 - 5:16 PM

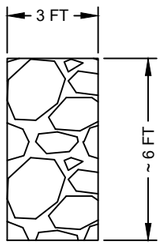


TYPICAL ROCK RIPRAP SECTION

(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

CDOT TYPE	MEDIAN ROCK SIZE (D50) INCHES	% OF MATERIAL SMALLER THAN TYPICAL ROCK	TYP. ROCK SIZE (INCHES)	TYP. ROCK WEIGHT (POUNDS)
H	18	100	42	3,500
		50-70	24	650
		35-50	18	275
		2-20	6	10
VH	24	50-70	33	1,700
		35-50	24	650
		2-10	9	35

DESIGN DRAWINGS (REV: 5/29/2020)

		Date
Designed by:	TJ BURR	3/28/2020
Drawn by:	TJ BURR	5/29/2020
Checked by:	M. GUTEKUNST	__/__/__
Approved by:	J. ANDREWS	__/__/__

TOMICHI CREEK
TOMICHI CREEK LOWER REACH SITE
STREAM RESTORATION

ROCK RIPRAP DETAIL

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

SHEET REVISED: 5/29/2020

SHEET 17 OF 17

FILE NAME: Drawings_Tomichi_Lower.dwg

PRINT DATE-TIME: May 29, 2020 - 5:16 PM

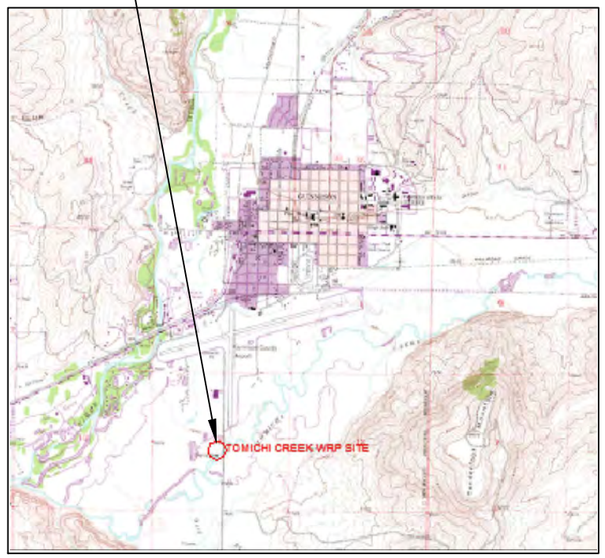
US DEPARTMENT OF AGRICULTURE

NATURAL RESOURCES CONSRVATION SERVICE

TOMICHI CREEK STREAM RESTORATION - UPPER REACH

Drainage Area = 1,061 SQ MI

PROJECT LOCATION



N

LATITUDE: N 38.517, LONGITUDE: W -106.945

PROJECT LOCATION MAP

NOT TO SCALE

TABLE OF CONTENTS	
SHEET NO.	SHEET TITLE
1	COVER SHEET
2	GENERAL NOTES, SYMBOLS & STRUCTURE TABLE
3	SITE PLAN 1 & GEOMORPHIC DESIGN DATA
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6	CROSS-SECTIONS 1
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11	DETAILS 1 - J-HOOK
12	DETAILS 2 - ROCK TOE
13	DETAILS 3 - ROCK DEFLECTOR
14	DETAILS 4 - CROSS VANE

REVISIONS		
DESCRIPTION	DATE	BY
CLARIFICATIONS AFTER PRE-BID MTG	3/3/2021	TJB
MINOR ADJUSTMENTS TO ELEV & DIMENSIONS	4/23/2021	TJB
MAJOR ADJUSTMENTS FOR CHANNEL CHANGES	11/16/2021	TJB

SUBMITTAL			
DESCRIPTION		DATE	APPROVED
PRELIMINARY LAYOUT	⬭	3/14/2018	TJB
50% PRELIMINARY DESIGN	⬭	5/1/2019	TJB
75% PRELIMINARY DESIGN	⬭	7/29/2019	TJB
90% PRELIMINARY DESIGN	⬭	5/27/2020	TJB
FINAL DESIGN - APPROVED	⬬	4/5/2021	JEA

SURVEY CONTROL POINTS

Pt #	Northing	Easting	Elev	Description
4	13,993,474.540	1,084,826.900	7587.912	TBM-4 RBR
5	13,994,128.330	1,085,422.855	7592.367	TBM-5 T STK
6	13,993,505.130	1,085,324.552	7590.978	TBM-6 T STK
7	13,991,894.240	1,082,704.744	7576.628	TBM-7 T STK
8	13,991,995.640	1,082,664.048	7577.946	TBM-8 T STK
9	13,991,490.290	1,082,379.466	7575.913	TBM-9 T STK
498	13,992,543.500	1,082,987.778	7580.064	TBM PIN
527	13,992,128.560	1,082,764.703	7578.434	HUB 15/14
532	13,991,995.560	1,082,664.130	7577.914	TBM 8
3004	13,993,474.540	1,084,826.900	7587.910	TBM4 RBR
6001	13,991,770.470	1,082,617.552	7576.872	INSTRUMENT
6002	13,991,490.320	1,082,379.277	7575.896	TBM 9B

ESTIMATED QUANTITIES FOR MAJOR WORK ITEMS

DESCRIPTION	SPEC	QTY	UNIT
Pollution Control & Dewatering	805	1.0	LS
Seeding & Mulching	805	1.0	AC
Earthwork & Channel Shaping	822	869	CY
Rock Riprap, 15"	861	35	TN
Structure Rock	861	952	TN
Geotextile Fabric	895	160	SY
Salvage & Transplant Sod	822	1,767	SF
Transplant Willow Clumps	869	28	EA
Mobilization & Demobilization	808	1.0	LS

COOPERATOR AGREEMENT

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

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.

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 (UNCC) 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: _____

CONSTRUCTION DATA & AS-BUILT DRAWINGS

LAYOUT BY:

_____ DATE: _____

CONTRACTOR NAME AND ADDRESS:

_____

_____

_____

CONSTRUCTION COMPLETED _____ DATE: _____

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

_____ DATE: _____

_____

TITLE:

AS-BUILT DRAWINGS REVIEWED AND APPROVED BY:

_____ DATE: _____

TITLE:

	Designed by:	Drawn by:	Checked by:	Approved by:
	TJ BURR	TJ BURR	J. ANDREWS	J. ANDREWS
Date	3/3/2021	3/3/2021	4/5/2021	4/5/2021

TOMICHI CREEK WATERSHED

TOMICHI CREEK STREAM RESTORATION - UPPER REACH

GUNNISON COUNTY, CO

COVER SHEET

United States Department of Agriculture

Natural Resources Conservation Service

Job Class: V

FILE NO.: Drawings_Tomichi_Upper Reach.dwg

REVISED: 11/16/2021

SHEET 1 OF 14

DRAWINGS (REV: 11/16/2021)

FILE: J:\PROJECTS_ACTIVE\TOMICHI CREEK\DRAWINGS_TOMICHI_UPPER REACH\DRAWINGS_TOMICHI_UPPER REACH.DWG DATE: 11/16/2021 11:29 PM BY: BURR, TJE - NRCS, DENVER, CO

DRAWINGS (REV: 11/16/2021)

GENERAL NOTES:

1. All work shall comply with the constriction specifications, drawings, and other contract requirements.
2. All notes on the drawings and information in specifications are directed to the Contractor, unless stated otherwise.
3. Contact the Owner or NRCS representative for any conflicts or discrepancies among the drawings, details, and specifications.
4. Verify site conditions at the work site before mobilization.
5. Accomplish in-stream work during low flow conditions.
6. 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.
7. Provide erosion control measures and best management practices to prevent runoff from disturbed areas and exposed soils from entering surface waters or wetland areas. Muddy runoff or discharges from disturbed areas shall be filtered to prevent an increase in turbidity of surface water (seeps, springs, streams, rivers, lakes, and wetlands).
8. 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.
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. 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.
11. All excavation work is unclassified (See Construction Specification 822 for the definition of "unclassified excavation"). All earthwork required by and shown on the drawings is included in the work.
12. Stake bankfull elevations at the work site before installing structures or other work. NRCS will provide bankfull elevations by station, or will help identify bankfull in the field.
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:

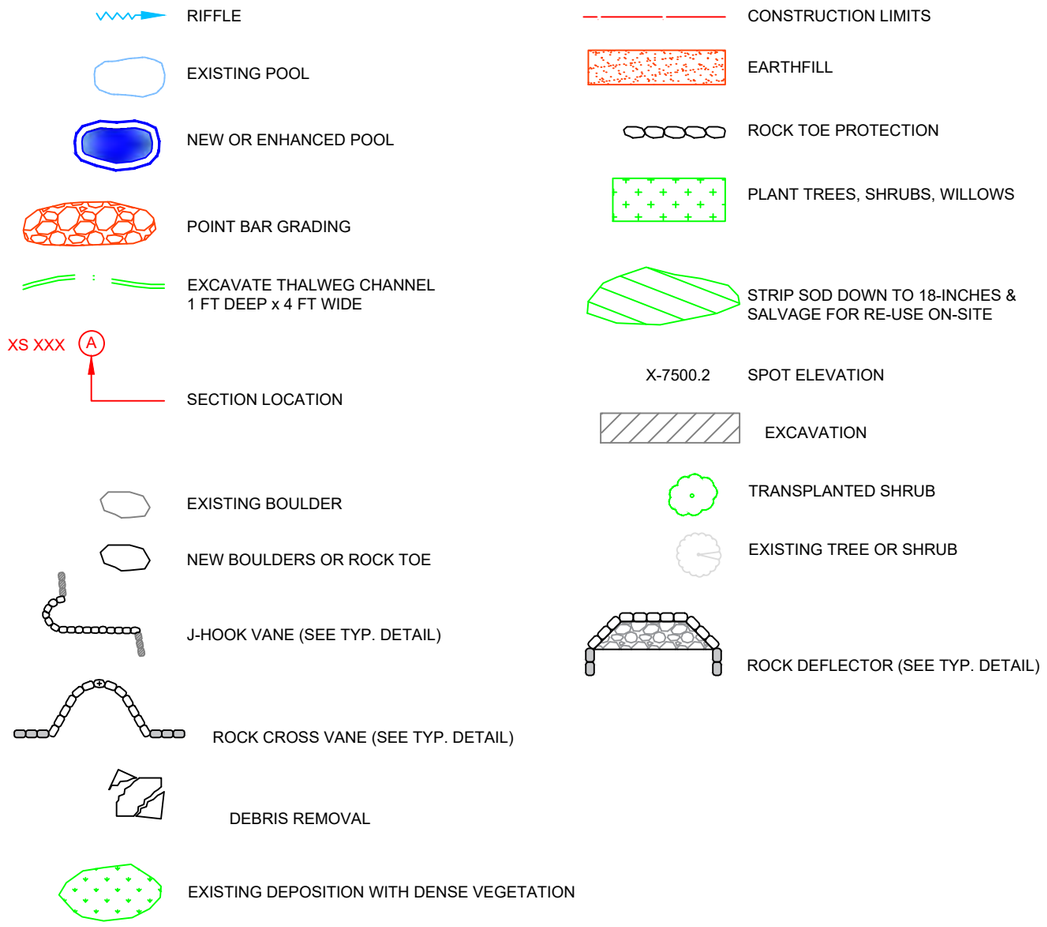
XS: CROSS SECTION

ECF: EROSION CONTROL FABRIC

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 E&S 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 drawing or 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. Seed and mulch finish graded areas within 5 days.
8. 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.
9. When pumps are used for dewatering operations, filter the discharge through a properly sized stilling basin.
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.

SYMBOL LEGEND



STRUCTURE TABLE

STRUCTURE	STA	ARM L (FT)	HOOK DIA	ARM SLOPE	ELEV PT. 1	ELEV PT. 2	ELEV PT. 3
CROSS VANE 1	7+23	27	13.3'	5.0%	7587.8	7586.5	7586.0
CROSS VANE 2	0+42	21	10.7'	6.0%	7587.8	7586.5	7586.0
J-HOOK	11+37	38	13.3'	5.6%	7585.9	7584.2	7583.6

STRUCTURE STATION (STA) IS AT APEX OF HOOK OR POINT 3

		Date
Designed by:	TJ BURR	3/3/2021
Drawn by:	TJ BURR	3/3/2021
Checked by:	J. ANDREWS	4/5/2021
Approved by:	J. ANDREWS	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO
NOTES & SYMBOLS

United States Department of Agriculture
Natural Resources Conservation Service

Job Class
V

FILE NO.
Drawings_Tomichi_Upper Reach.dwg

REVISED:
11/16/2021

PRINT DATE-TIME: Nov 16, 2021 - 11:30 PM

DRAWINGS (REV: 11/16/2021)

KEY GEOMORPHOLOGICAL CHARACTERISTICS

Characteristic	Existing	Design	Reference
Valley Type		VIII(b)	
Valley Width, feet		7,900	
Stream Type		C3/C4	
Drainage Area, Square Miles		1,061	
Bankfull Discharge, cfs (Qbkf)		570	
Mean Velocity, ft/sec		2.95	
Bankfull Slope, ft/ft (S)		0.0027	
Bankfull Width, ft (Wbkf)		60.9	
Mean Depth, ft (dbkf)		2.76	
Width/Depth Ratio (W/D)		19	
Cross-Sectional Area, ft2 (Abkf)		192.4	
Maximum Depth (dmax)		5.00	
Width of Flood-Prone Area, ft (Wfpa)		500	
Entrenchment Ratio (Wfpa/Wbkf)		8.21	
Sinuosity (k) (SL/VL)		1.42	
Stream Length Assessed for Erosion (ft)		130	
Streambank Erosion (tons/yr)		5	
Pool-to-Pool Spacing		365	
Bankfull Shear Stress, psf		0.50	

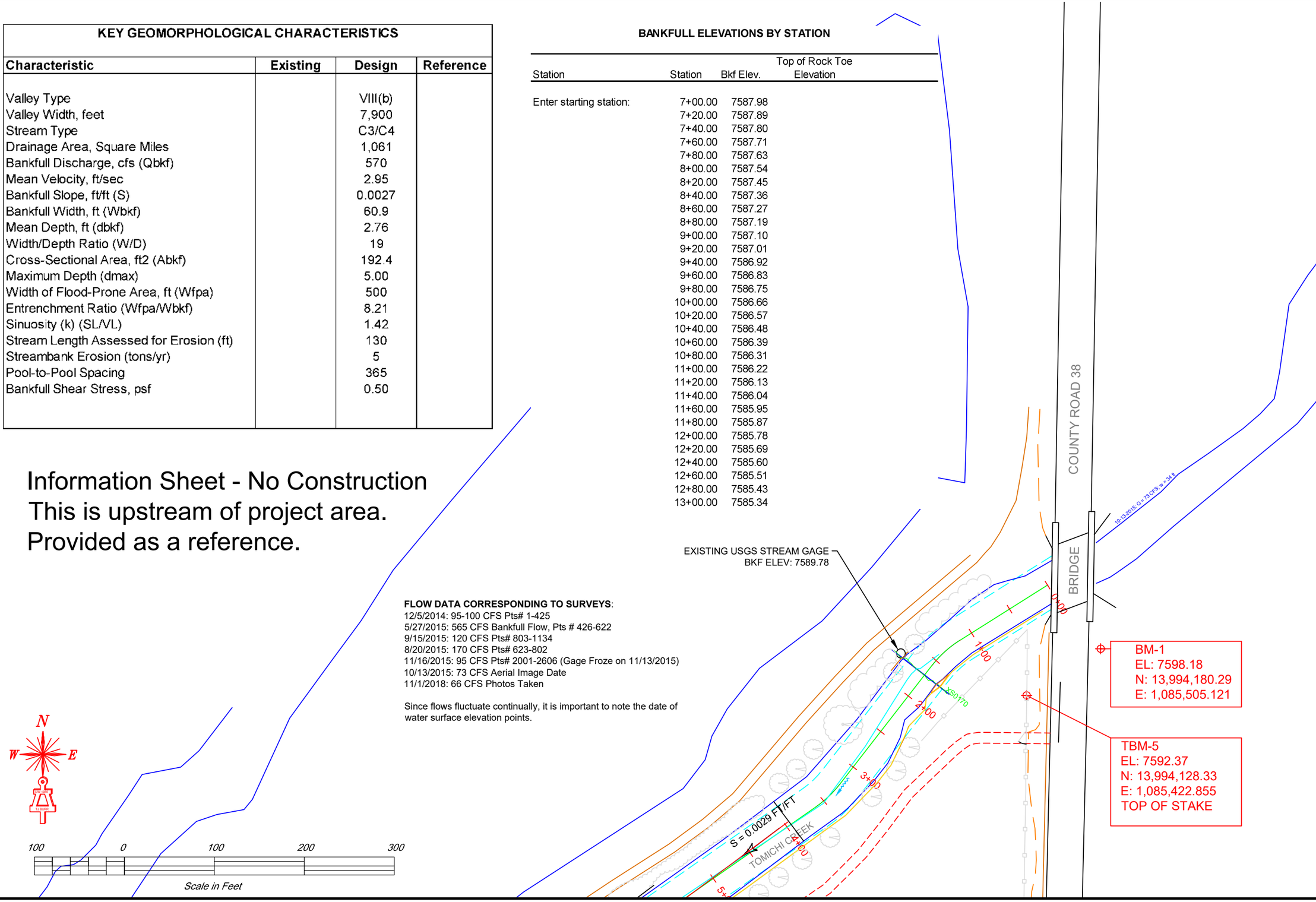
Information Sheet - No Construction
This is upstream of project area.
Provided as a reference.

BANKFULL ELEVATIONS BY STATION

Station	Station	Bkf Elev.	Top of Rock Toe Elevation
Enter starting station:	7+00.00	7587.98	
	7+20.00	7587.89	
	7+40.00	7587.80	
	7+60.00	7587.71	
	7+80.00	7587.63	
	8+00.00	7587.54	
	8+20.00	7587.45	
	8+40.00	7587.36	
	8+60.00	7587.27	
	8+80.00	7587.19	
	9+00.00	7587.10	
	9+20.00	7587.01	
	9+40.00	7586.92	
	9+60.00	7586.83	
	9+80.00	7586.75	
	10+00.00	7586.66	
	10+20.00	7586.57	
	10+40.00	7586.48	
	10+60.00	7586.39	
	10+80.00	7586.31	
	11+00.00	7586.22	
	11+20.00	7586.13	
	11+40.00	7586.04	
	11+60.00	7585.95	
	11+80.00	7585.87	
	12+00.00	7585.78	
	12+20.00	7585.69	
	12+40.00	7585.60	
	12+60.00	7585.51	
	12+80.00	7585.43	
	13+00.00	7585.34	

FLOW DATA CORRESPONDING TO SURVEYS:
12/5/2014: 95-100 CFS Pts# 1-425
5/27/2015: 565 CFS Bankfull Flow, Pts # 426-622
9/15/2015: 120 CFS Pts# 803-1134
8/20/2015: 170 CFS Pts# 623-802
11/16/2015: 95 CFS Pts# 2001-2606 (Gage Froze on 11/13/2015)
10/13/2015: 73 CFS Aerial Image Date
11/1/2018: 66 CFS Photos Taken

Since flows fluctuate continually, it is important to note the date of water surface elevation points.



	Designed by:	Drawn by:	Checked by:	Approved by:
	TJ BURR	TJ BURR	J. ANDREWS	J. ANDREWS
Date	3/3/2021	3/3/2021	4/5/2021	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO

SITE PLAN 1

United States Department of Agriculture
Natural Resources Conservation Service

Job Class
V

FILE NO.
Drawings_Tomichi_Upper Reach.dwg

REVISED:
6/24/2021

DRAWINGS (REV: 11/16/2021)

DESIGN NOTES:
RIGHT CHAN: 66% OF FLOW; 380 CFS
LEFT: 34%; 190 CFS
6+60 BKF EL: 7588.5

REMOVE POINT BAR - USE MATERIAL TO BACKFILL ROCK TOE

PROVIDE ROCK CROSS VANE #2 (SEE DETAIL)

PROVIDE ROCK TOE (116 FT WITH SILLS) ON RIGHT BANK

TRANSPLANT 18 WILLOWS AT APPROXIMATE LOCATIONS SHOWN

EXISTING QUARRY POND

S = 0.0046 FT/FT

RIGHT CHANNEL

Q = 570 CFS

CONSTRUCTION ACCESS 1

PROVIDE ROCK TOE (126 FT) TO SPLIT CHANNEL FLOW. SEE DETAIL & XS 757. BACKFILL WITH MATERIAL FROM CHANNEL SHAPING. TRANSPLANT WILLOW & SOD CLUMPS (1,767 SF) INTO BACKFILL AREA.

PROVIDE ROCK TOE (162 FT), LEFT CHANNEL, LEFT BANK

PROVIDE ROCK CROSS VANE #1 (SEE DETAIL)

EXCAVATE POINT BAR & SHAPE CHANNEL. USE MATERIAL FOR BACKFILL WHERE NEEDED.

EXCAVATE POOL TO MAX DEPTH ELEV OF 7582.5 (SEE POOL DETAIL)

BANK SHAPING AND ROCK DEFLECTOR (SEE DETAIL)

SHAPE CHANNEL TO PROVIDE MINIMUM BANKFULL WIDTH OF 40.0 FEET.

R = 150 FT (OUTSIDE BANK RADIUS)

PROVIDE HARDENED LOW POINT IN BANK TO ALLOW OVERFLOW INTO OLD MEANDERS (100 CU-FT ROCK, 6") ELEV: 7586.7 (SEE DETAIL). PROVIDE 100 FT OF DITCH TO CONNECT TO OLD CHANNEL

PLUG SIDE CHANNEL WITH ON-SITE GRAVEL-COBBLE FILL (20 CY EARTHWORK)

FILL SCALLOPED AREAS WITH GRAVEL-COBBLE EARTHFILL TO MAINTAIN 40 FT WIDE CHANNEL WHERE NEEDED

S = 0.0044 FT/FT

Q = 190 CFS

Q = 380 CFS

EXCAVATE MID-CHANNEL BAR TO BACKFILL ROCK TOE FOR BANKFULL BENCH

EXIST. ROCK VANES

BOULDERS

TOMICHI CREEK

TBM 4 (REBAR)
EL: 7587.91
N: 13,993,474.540
E: 1,084,826.900
24.3' FROM BANK

BURY CONCRETE DEBRIS (~5 CY) IN LOWER PORTIONS OF ROCK TOE

REMOVE DEPOSITION & SHAPE CHANNEL

DEEPEN EXISTING POND BY 2.0 FT. SALVAGE SOD CLUMPS TO COVER DISTURBED AREAS AS NEEDED. EARTHWORK 100 CY.

CONTRACTOR MAY USE EXISTING LEFTOVER BOULDERS FROM PAST PROJECT

STA 13+00: END OF UPPER REACH WORK

J-HOOK

R180.00

PLANT 10 WILLOW CLUMP TRANSPLANTS (100 FT OF BANK PROTECTION)

EXISTING WATER CONTROL STRUCTURE

IF NEEDED, USE EXCESS EARTH MATERIAL TO CREATE 3 FT HIGH MOUND FOR HABITAT DIVERSITY

COUNTY ROAD 38

CONSTRUCTION NOTES:
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.

N W E

0 100 200 Feet

	Designed by:	Drawn by:	Checked by:	Approved by:
Date	3/3/2021	3/3/2021	4/5/2021	4/5/2021
	TJ BURR	TJ BURR	J. ANDREWS	J. ANDREWS

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO

SITE PLAN 2

United States Department of Agriculture
USDA Natural Resources Conservation Service

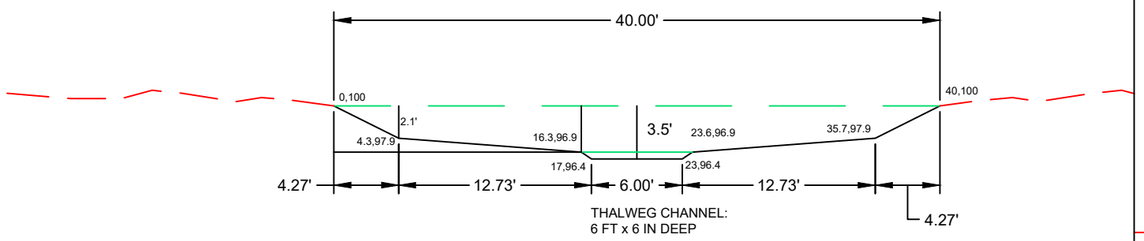
Job Class
V

FILE NO.
Drawings_Tomichi_Upper Reach.dwg

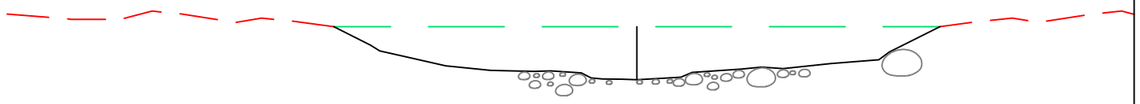
REVISED:
11/16/2021

SHEET 4 OF 14

DRAWINGS (REV: 11/16/2021)

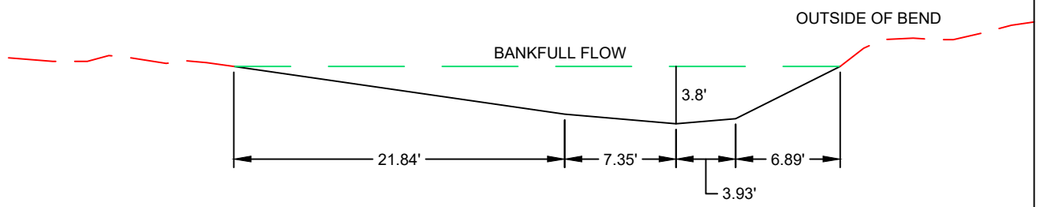


TYPICAL "RIFFLE" CROSS-SECTION (DESIGN)

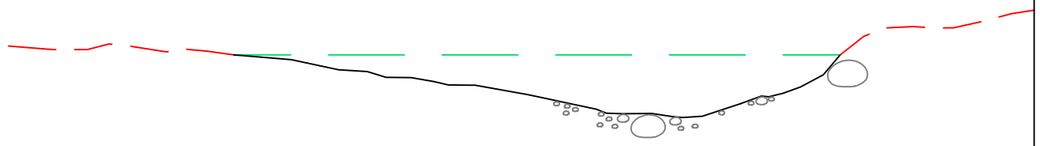


TYPICAL "RIFFLE" CROSS-SECTION (CONSTRUCT)

MAIN CHANNEL (LEFT) - SHAPING GUIDE

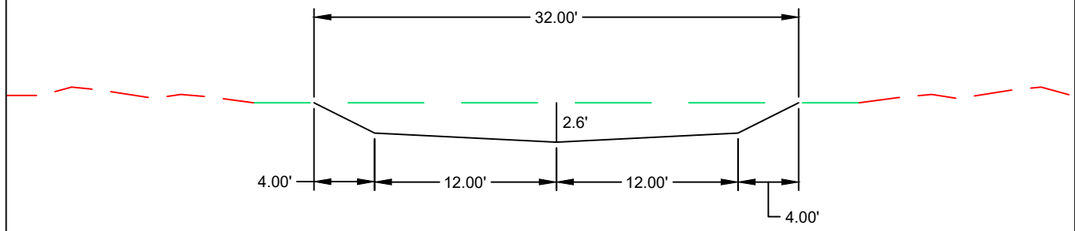


TYPICAL "POOL" CROSS-SECTION (DESIGN) AT BEND



TYPICAL "POOL" CROSS-SECTION (CONSTRUCT)

LEFT CHANNEL DESIGN INFO:
DA = 1,061 sq. mi
Q_{bkf} = 380 cfs
W_{bkf} = 40 ft
A_{bkf} = 97.6 sf
D_{max} = 3.5 ft
W_p = 41.4 ft
d = 2.44 ft
v = 3.9 ft/s
W/D = 16.4
n = 0.045
S = 0.0044 ft/ft



TYPICAL "RIFFLE" CROSS-SECTION (RIGHT CHANNEL)

RIGHT CHANNEL DESIGN INFO:
DA = 1,061 sq. mi
Q_{bkf} = 190 cfs
W_{bkf} = 32 ft
A_{bkf} = 63.2 sf
D_{max} = 2.6 ft
W_p = 33.0 ft
d = 1.98 ft
v = 3.5 ft/s
W/D = 16.2
n = 0.045
S = 0.0046 ft/ft
Shear Stress = 0.55 psf

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.

		Date
Designed by:	T.J BURR	3/3/2021
Drawn by:	T.J BURR	3/3/2021
Checked by:	J. ANDREWS	4/5/2021
Approved by:	J. ANDREWS	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO
TYP. CROSS SECTIONS

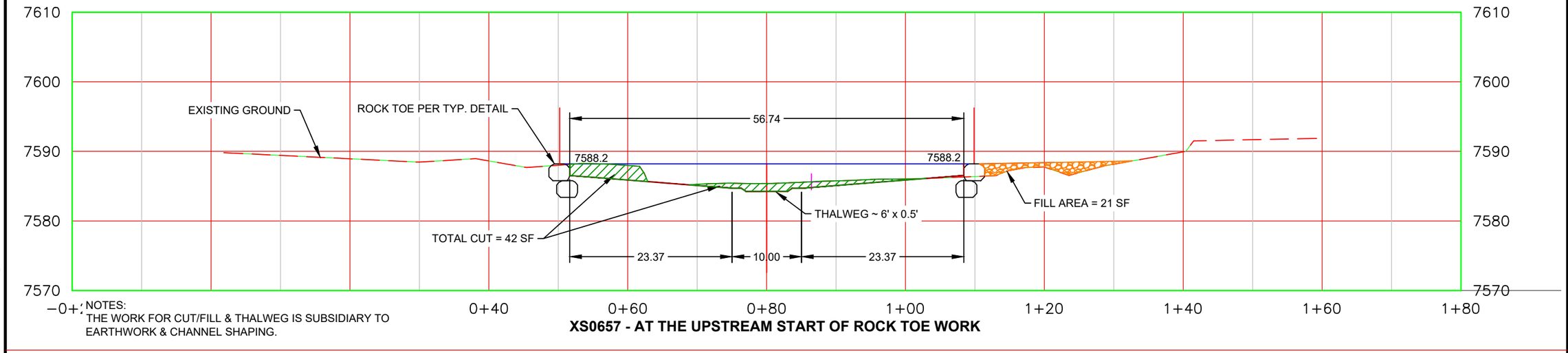
United States Department of Agriculture
Natural Resources Conservation Service

Job Class
V

FILE NO.
Drawings_TomichI_Upper Reach.dwg

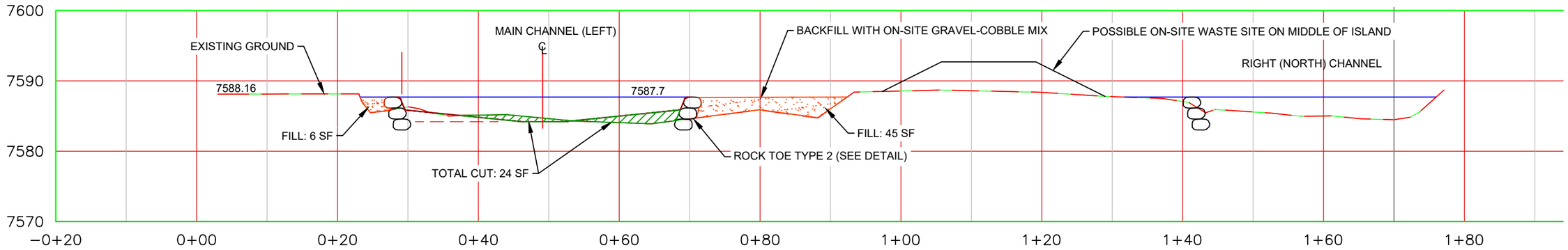
REVISED:
3/2/2021

DRAWINGS (REV: 11/16/2021)

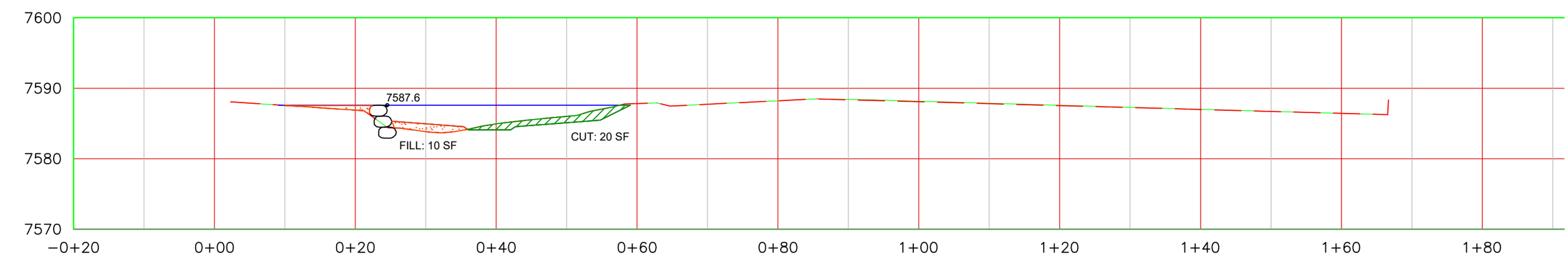


NOTES:
THE WORK FOR CUT/FILL & THALWEG IS SUBSIDIARY TO EARTHWORK & CHANNEL SHAPING.

XS0657 - AT THE UPSTREAM START OF ROCK TOE WORK



XS0757 - DOWNSTREAM OF CROSS VANE - POOL SECTION



XS0785 - ROCK TOE & CHANNEL SHAPING

		Date
Designed by:	T.J BURR	3/3/2021
Drawn by:	T.J BURR	3/3/2021
Checked by:	J. ANDREWS	4/5/2021
Approved by:	J. ANDREWS	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO
CROSS SECTIONS 1

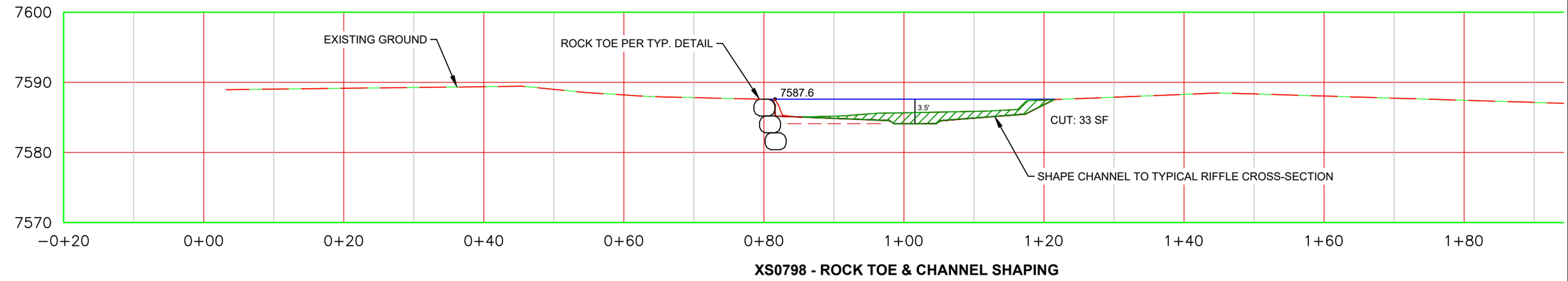
United States Department of Agriculture
Natural Resources Conservation Service

Job Class
V

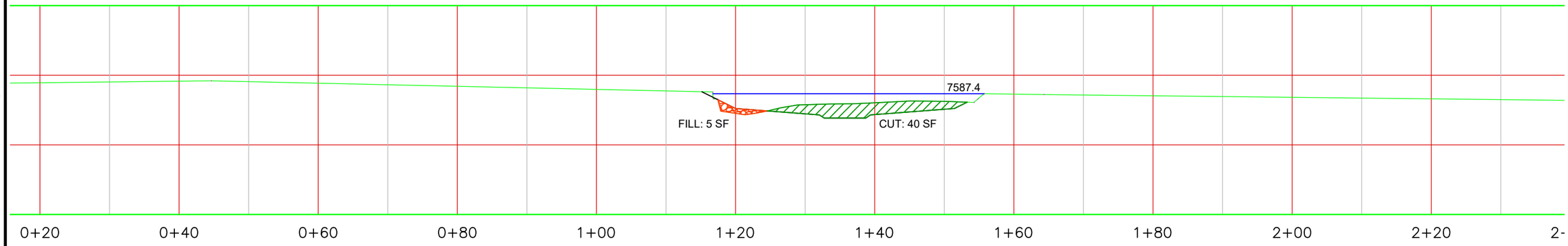
FILE NO.
Drawings_Tomichi_Upper Reach.dwg

REVISED:
11/16/2021

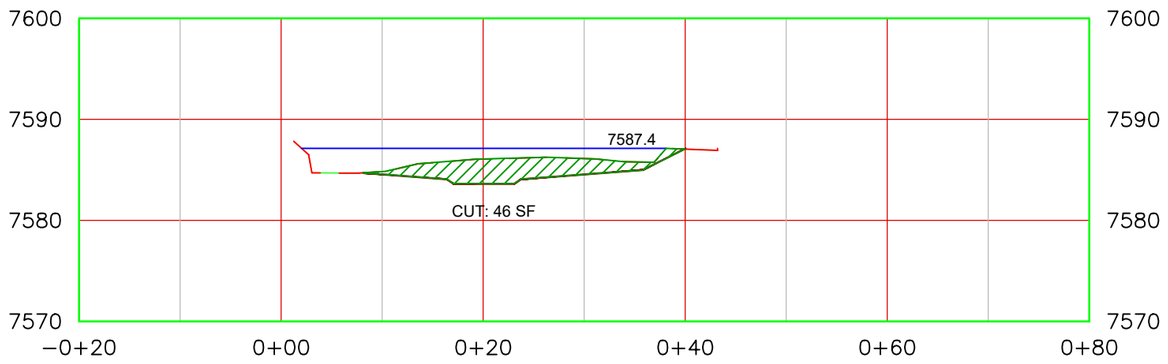
DRAWINGS (REV: 11/16/2021)



XS0798 - ROCK TOE & CHANNEL SHAPING



XS0826 - CHANNEL SHAPING



XS0840 - CHANNEL SHAPING

		Date
Designed by:	TJ BURR	3/3/2021
Drawn by:	TJ BURR	3/3/2021
Checked by:	J. ANDREWS	4/5/2021
Approved by:	J. ANDREWS	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO

CROSS SECTIONS 2

United States Department of Agriculture
Natural Resources Conservation Service

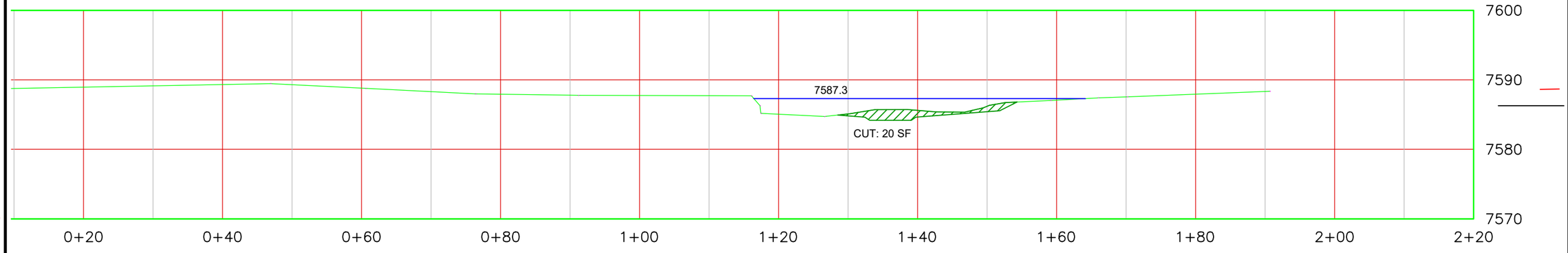
Job Class
V

FILE NO.
Drawings_TomichI_Upper Reach.dwg

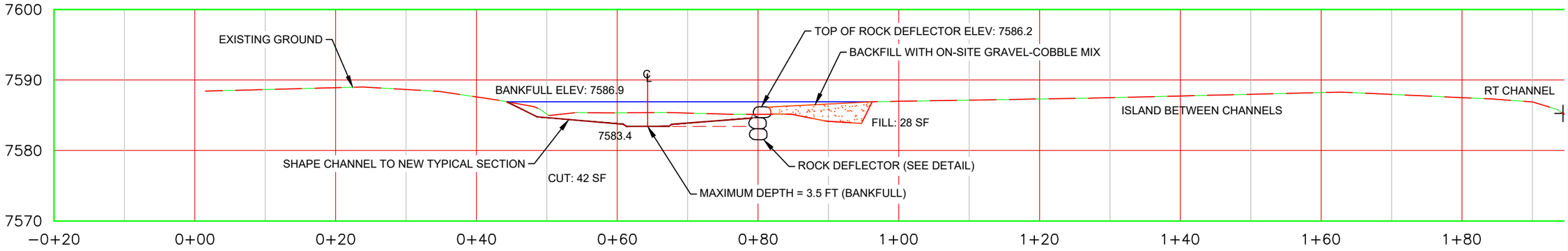
REVISED:
11/16/2021

SHEET 7 OF 14

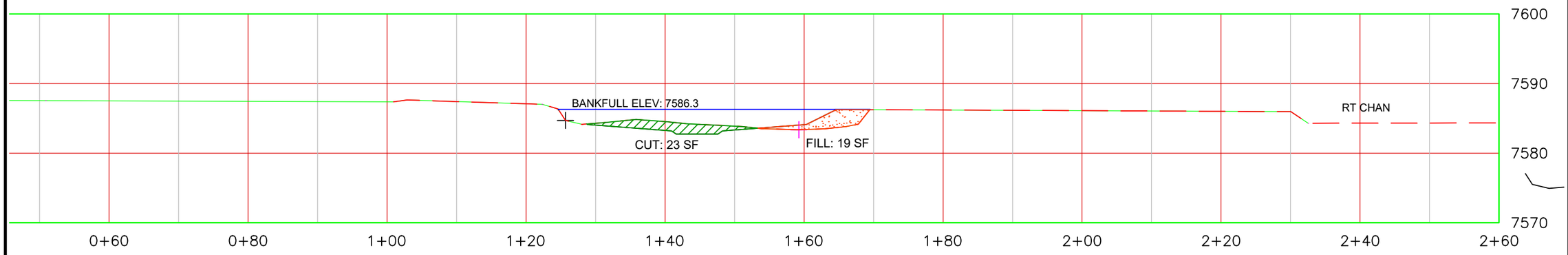
DRAWINGS (REV: 11/16/2021)



XS0862 - CHANNEL SHAPING



XS0945 - AT ROCK DEFLECTOR IN RIFFLE SECTION



XS1088 - CHANNEL SHAPING

		Date
Designed by:	TJ BURR	3/3/2021
Drawn by:	TJ BURR	3/3/2021
Checked by:	J. ANDREWS	4/5/2021
Approved by:	J. ANDREWS	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO

CROSS SECTIONS 3

United States Department of Agriculture
Natural Resources Conservation Service

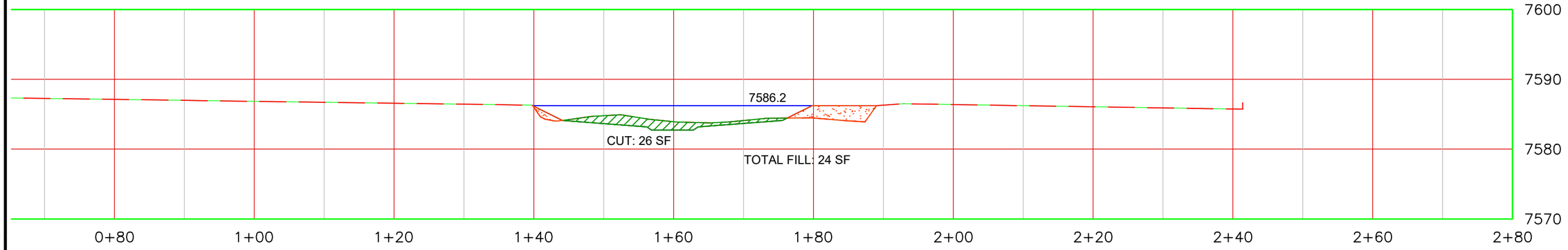
Job Class: V

FILE NO.: *Drawings_TomichI_Upper Reach.dwg*

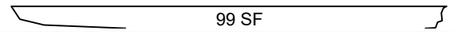
REVISED: 11/16/2021

SHEET 8 OF 14

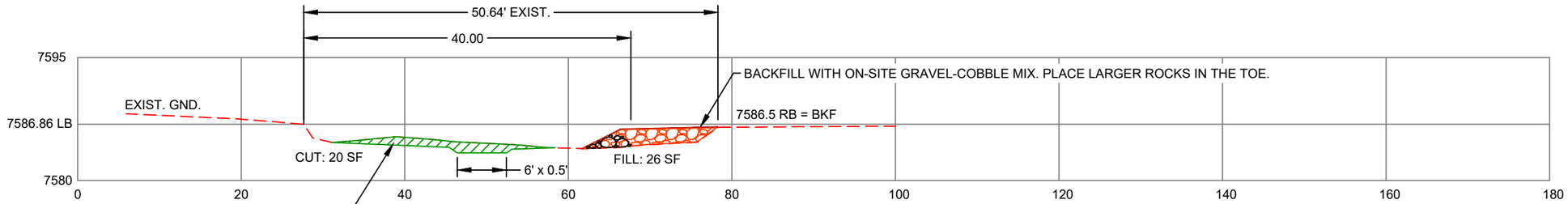
DRAWINGS (REV: 11/16/2021)



XS1100 - CHANNEL SHAPING



XS1100 PROFILE



XS1045 - CHANNEL SHAPING

		Date
Designed by:	T.J BURR	3/3/2021
Drawn by:	T.J BURR	3/3/2021
Checked by:	J. ANDREWS	4/5/2021
Approved by:	J. ANDREWS	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO

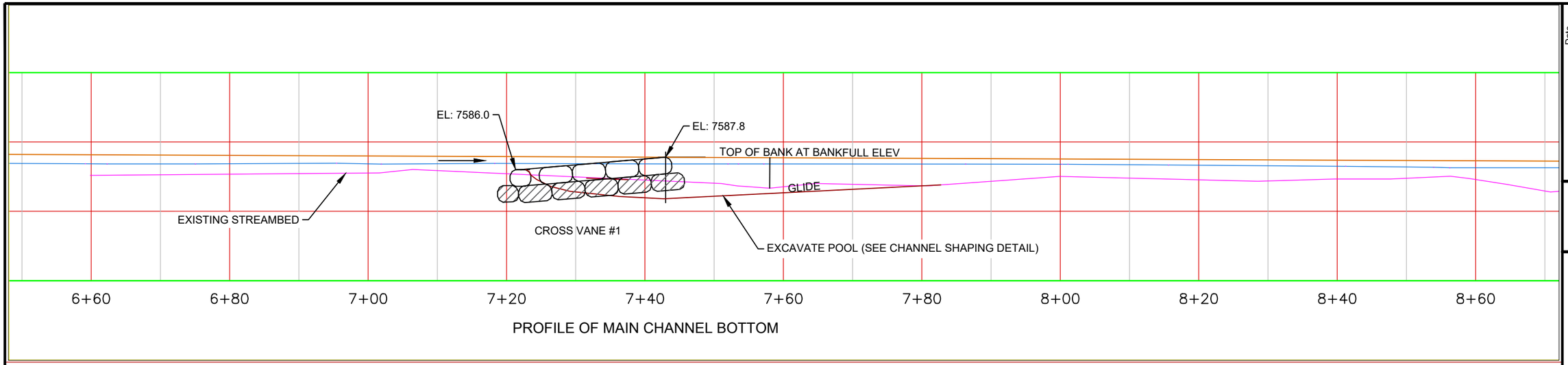
CROSS SECTIONS 4

United States Department of Agriculture
Natural Resources Conservation Service

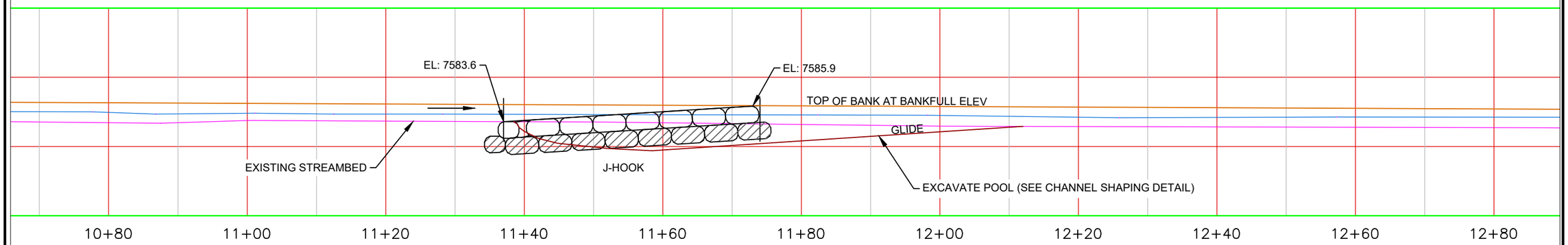
Job Class
V

FILE NO.
Drawings_Tomichi_Upper Reach.dwg

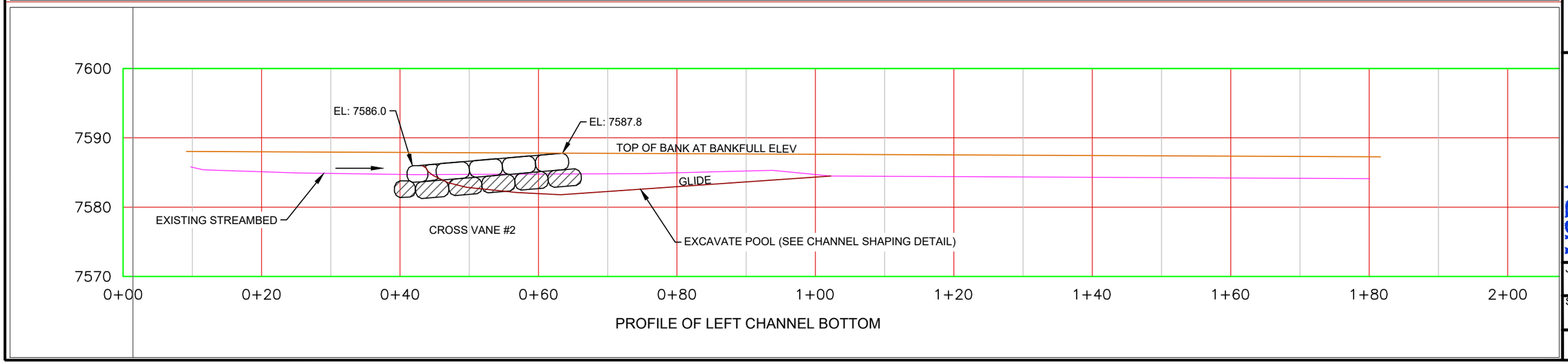
REVISED:
11/16/2021



PROFILE OF MAIN CHANNEL BOTTOM



PROFILE OF MAIN CHANNEL BOTTOM



PROFILE OF LEFT CHANNEL BOTTOM

		Date
Designed by:	T.J BURR	3/3/2021
Drawn by:	T.J BURR	3/3/2021
Checked by:	J. ANDREWS	4/5/2021
Approved by:	J. ANDREWS	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK UPSTREAM REACH SITE
TOMICHI CREEK STREAM RESTORATION - UPPER REACH

PROFILES

United States Department of Agriculture
Natural Resources Conservation Service

JOB CLASS: V

SHEET REVISED: 11/09/2021

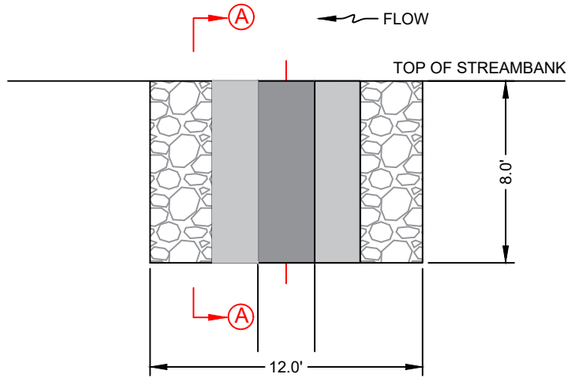
SHEET 10 OF 14

DRAWINGS (REV: 11/16/2021)

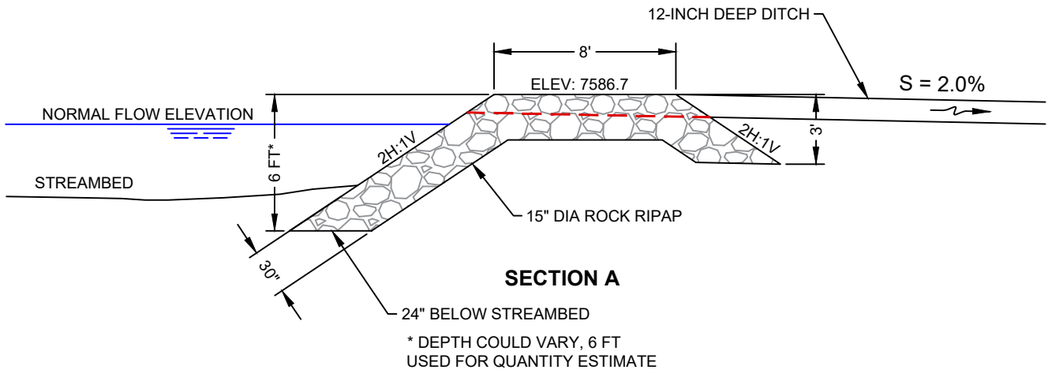
FILE NAME: Drawings_Tomichi_Upper Reach.dwg

PRINT DATE-TIME: Nov 16, 2021 - 11:32 PM

DRAWINGS (REV: 11/16/2021)

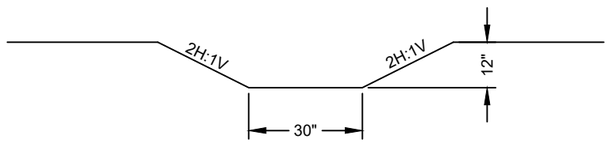


PLAN VIEW



SECTION A

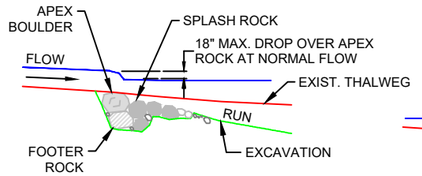
* DEPTH COULD VARY, 6 FT
USED FOR QUANTITY ESTIMATE



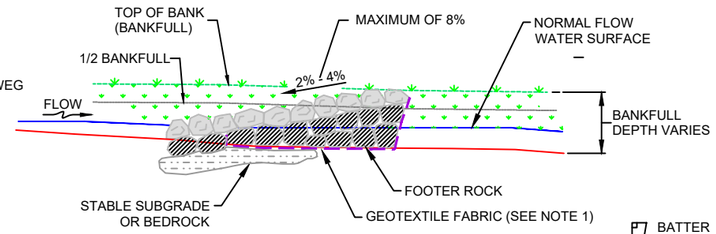
DITCH CROSS-SECTION

HARDENED BANK OVERFLOW DETAIL

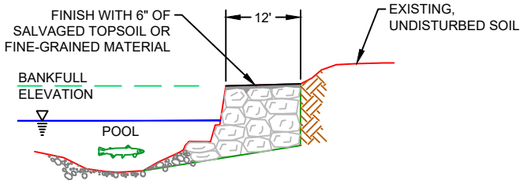
(NOT TO SCALE)



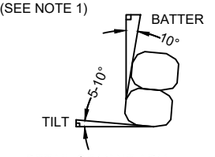
SECTION A
(AT APEX OF HOOK)



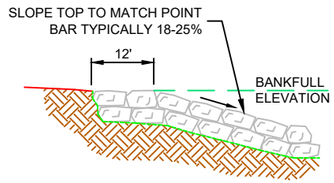
PROFILE
(ALONG VANE ARM)



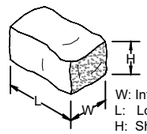
SECTION B
(AT ROCK SILL)



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



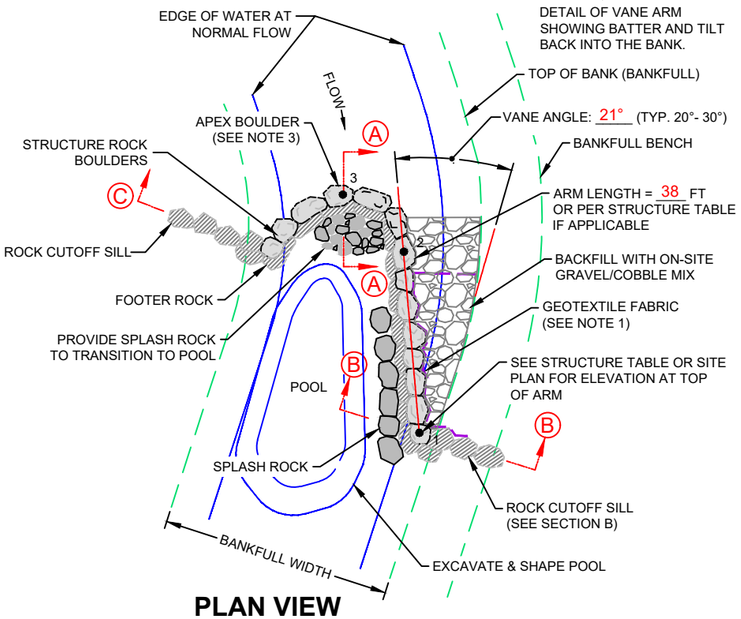
SECTION C
(HOOK CUTOFF SILL)



W: Intermediate Axis (Diameter)
L: Long Axis (Length)
H: Short Axis (Height)

STRUCTURE ROCK SIZE				
	Representative Size			
	W or Dia (Feet)	Length (Feet)	Height (Feet)	Weight (Ton)
Minimum	2.8	4.2	2.2	1.83
Average (D50)	3.0	4.8	2.4	2.42

Assumed Rock Density: 165 LB/CU-FT



PLAN VIEW

EXAMPLE J-HOOK VANE DETAIL

NOT TO SCALE

ROCK NOTES:

A. 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.
B. SMALLER HEIGHT ROCKS ARE REQUIRED TO TAPER STRUCTURES AT APEX ON BEDROCK. FOOTER ROCKS SHALL MEET STRUCTURE ROCK REQUIREMENTS.
C. FOR MAIN STRUCTURE ROCK, SILL, AND FOOTER ROCK, THE ROCK SOURCE SHALL BE FROM AN ACCEPTABLE CDOT QUARRY OR FROM ENGINEER APPROVED SOURCE. USE LARGER ROCK, IF AVAILABLE.
D. ON-SITE COBBLE AND BOULDERS MAY BE USED TO FILL VOIDS AND FOR SPLASH ROCKS, BUT NOT FOR USE AS ANY MAIN STRUCTURE ROCK.

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 HALF THE TRENCH BOTTOM WIDTH. TRIM EXCESS OR VISIBLE FABRIC.
2. MAXIMUM WATER SURFACE GRADE DROP ACROSS THE APEX OF ROCK HOOK IS 12 INCHES MEASURED ALONG THE STREAM PROFILE. SEE SECTION A.
3. CAREFULLY SELECT THE APEX ROCK TO FIT THE GAP. THE APEX ROCK IS EQUIVALENT TO A KEYSTONE IN AN ARCH. WEDGE THE ROCK INTO PLACE. THE APEX ROCK IS ALSO THE THALWEG OF THE CHANNEL. PLACE SO THE LOW POINT ON TOP OF THE ROCK (PT 3) IS 0.5 FT BELOW THE END OF THE VANE ARM (PT 2).

Date	3/3/2021	3/3/2021	4/5/2021	4/5/2021
Designed by:	TJ BURR			
Drawn by:		TJ BURR		
Checked by:			J. ANDREWS	
Approved by:				J. ANDREWS

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO

DETAILS 1 - J-HOOK

United States Department of Agriculture
Natural Resources Conservation Service

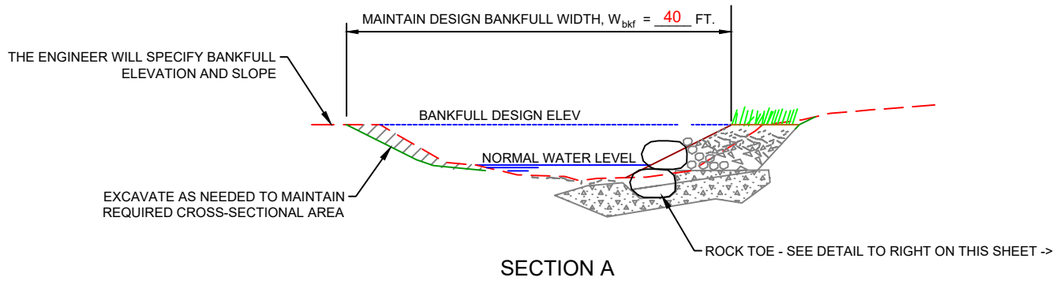
Job Class
V

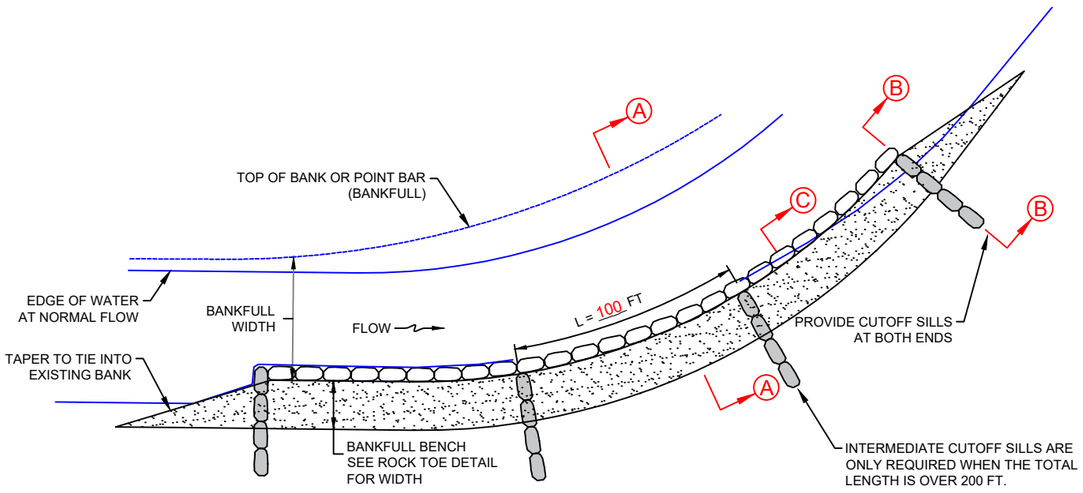
FILE NO.
Drawings_TomichI_Upper Reach.dwg

REVISED:
11/16/2021

SHEET 11 OF 14

DRAWINGS (REV: 11/16/2021)





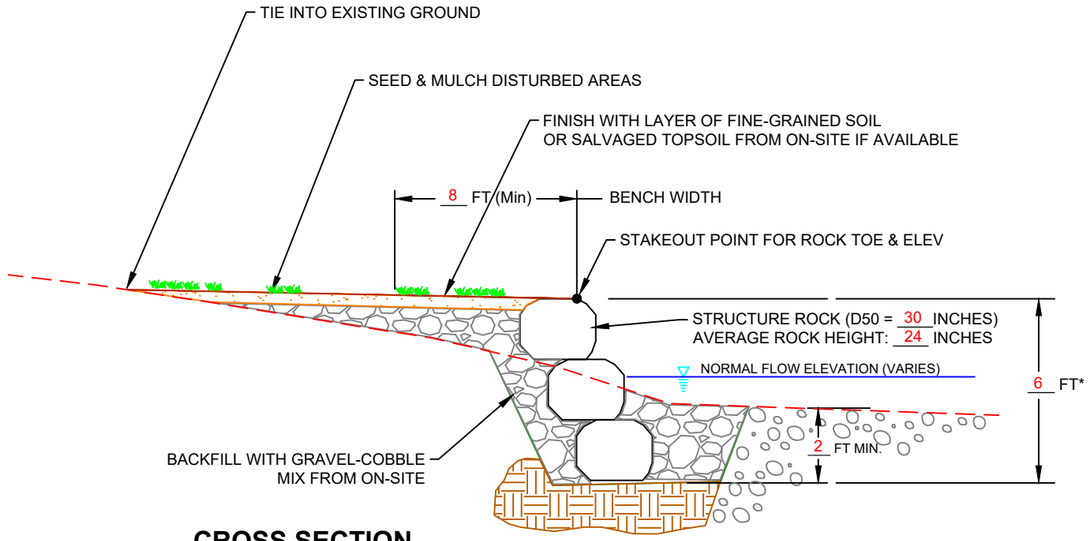
PLAN VIEW

NOTES:

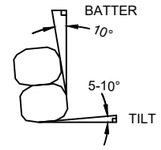
1. FINISH GRADE THE BANKFULL BENCH TO THE SPECIFIED ELEVATION AND SLOPE. THE SLOPE SHOULD MATCH THE BANKFULL FLOW SLOPE.
2. USE ON-SITE MATERIAL OR DESIGNATED BORROW FOR THE BANKFULL BENCH FILL. USE FINER GRAIN MATERIAL ON TOP.
3. COMPACT BANKFULL BENCH IN 12-18 INCH LIFTS USING EQUIPMENT. ADD WATER FROM THE STREAM TO ACHIEVE GOOD COMPACTION.
4. "WASH" THE BENCH FILL USING THE EXCAVATOR BUCKET TO CONSOLIDATE THE MATERIAL.
5. START AND END BENCH IN STABLE BANKS WITH NATURAL ANCHOR POINTS WHEN POSSIBLE.

DETAIL OF BANKFULL BENCH WITH ROCK TOE

NOT TO SCALE



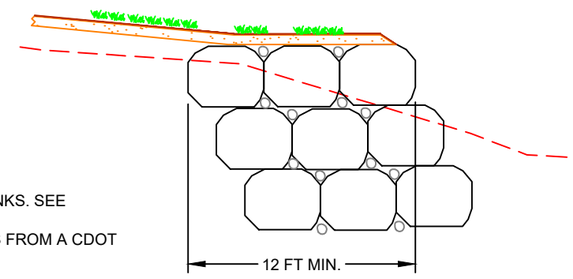
CROSS SECTION
(SECTION C)



DETAIL OF ROCK TOE WALL SHOWING BATTER AND TILT BACK INTO THE BANK.

NOTES:

1. KEY UPSTREAM AND DOWNSTREAM ENDS INTO STABLE BANKS. SEE SECTION VIEW FOR CUTOFF SILL.
2. PROVIDE STRUCTURE ROCK MEETING THE SPECIFICATIONS FROM A CDOT APPROVED QUARRY OR ENGINEER APPROVED SOURCE.
3. STAGGER THE ROCK JOINTS OF EACH ROW OF ROCK.
4. FILL VOIDS WITH ON-SITE GRAVEL-COBBLE MIX.
5. SCHEDULE IN-STREAM WORK DURING LOW FLOW CONDITIONS.
6. SEED & MULCH ALL DISTURBED EARTH SURFACES ACCORDING TO THE SPECIFICATIONS. PROVIDE EROSION CONTROL FABRIC ON SLOPES STEEPER THAN 3H:1V OR AS SPECIFIED BY THE EROSION CONTROL FABRIC DETAIL.
7. IF NO ON-SITE DISPOSAL AREAS ARE AVAILABLE, THE CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND PROPER DISPOSAL OF EXCESS MATERIAL.



CUTOFF SILL
(SECTION B)

PROVIDE CUTOFF SILLS AT UPSTREAM & DOWNSTREAM ENDS OF ROCK TOE. ONE ROCK WIDTH WIDE BY THREE ROCK LENGTHS PERPENDICULAR TO FLOW. IF TOTAL LENGTH IS 200 FT OR MORE, PROVIDE INTERMEDIATE ROCK SILLS EVERY 100 FT

ROCK TOE TYPE 2 DETAIL
(With bench, live stakes, & bank shaping)

(NOT TO SCALE)

	Designed by:	Drawn by:	Checked by:	Approved by:
Date	TJ BURR	TJ BURR	J. ANDREWS	J. ANDREWS
	3/3/2021	3/3/2021	4/5/2021	4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO
DETAILS 2 - ROCK TOE

United States Department of Agriculture
Natural Resources Conservation Service

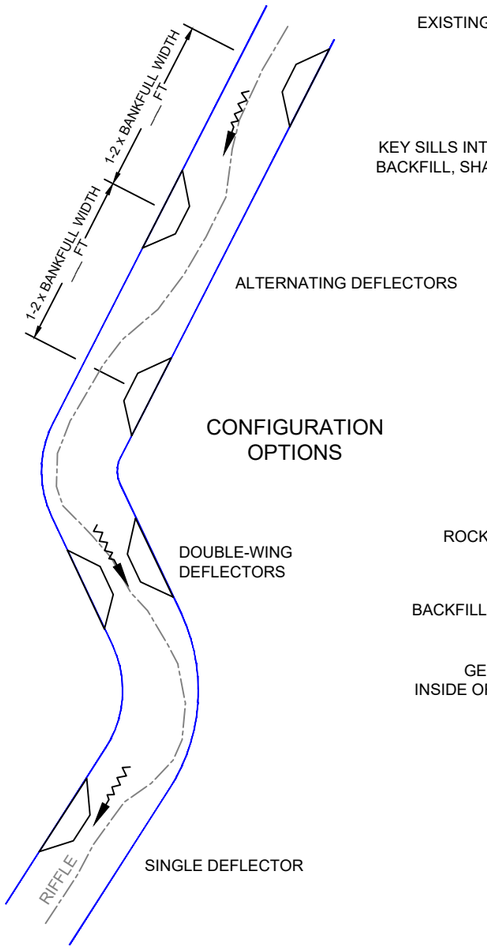
Job Class: V

FILE NO.: *Drawings_TomichI_Upper Reach.dwg*

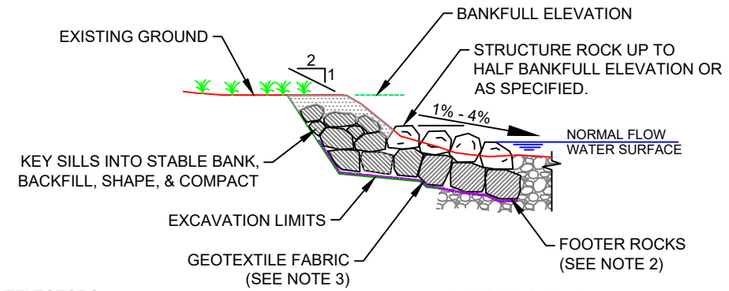
REVISED: 3/3/2021

SHEET 12 OF 14

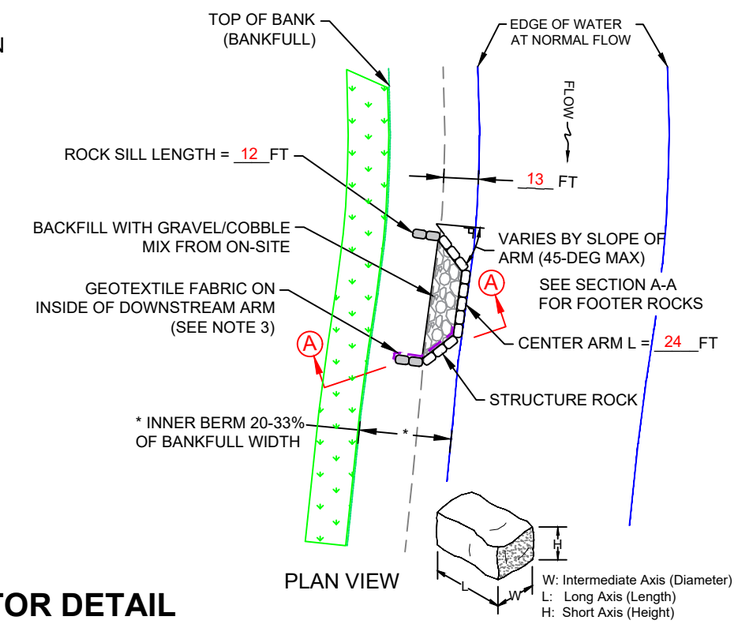
DRAWINGS (REV: 11/16/2021)



CONFIGURATION OPTIONS



SECTION A
(AT DOWNSTREAM ARM)



STRUCTURE ROCK SIZE				
	Representative Size			
	W or Dia (Feet)	Length (Feet)	Height (Feet)	Weight (Ton)
Minimum	2.8	4.2	2.2	1.83
Average (D50)	3.0	4.8	2.4	2.42

Assumed Rock Density: 165 LB/CU-FT

ROCK DEFLECTOR DETAIL

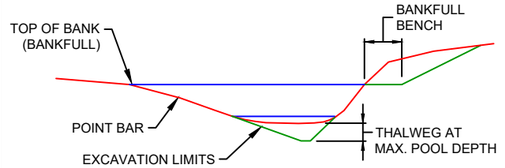
NOT TO SCALE

NOTES:

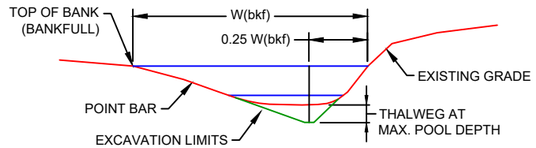
1. THE EDGE OF WATER AT NORMAL FLOW IS TYPICALLY ALONG INNER BERM FEATURES AT ⅓ TO ½ BANKFULL DEPTH.
2. EXTEND FOOTER ROCKS TO SCOUR DEPTH OR LOWER. THIS COULD REQUIRE ONE OR MORE ADDITIONAL ROCK LAYERS.
3. USE CLASS I, NON-WOVEN GEOTEXTILE FABRIC PER THE SPECIFICATIONS.
4. BACKFILL SHALL MEET THE REQUIREMENTS 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 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.
B. SMALLER HEIGHT ROCKS ARE REQUIRED TO TAPER STRUCTURES AT APEX ON BEDROCK. FOOTER ROCKS SHALL MEET STRUCTURE ROCK REQUIREMENTS.
C. FOR MAIN STRUCTURE ROCK, SILL, AND FOOTER ROCK, THE ROCK SOURCE SHALL BE FROM AN ACCEPTABLE CDOT QUARRY OR FROM ENGINEER APPROVED SOURCE.
D. ON-SITE COBBLE AND BOULDERS MAY BE USED TO FILL VOIDS AND FOR SPLASH ROCKS, BUT NOT FOR USE AS ANY MAIN STRUCTURE ROCK.

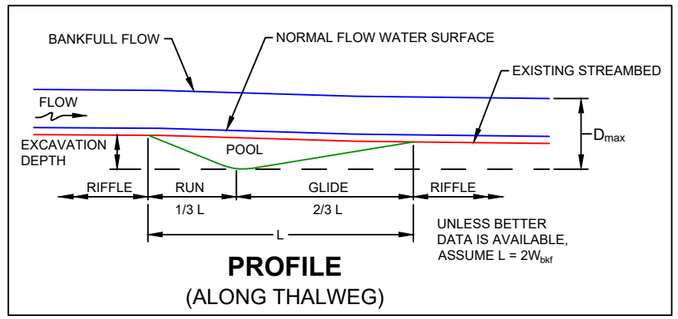


SECTION A
(WITH BENCH)

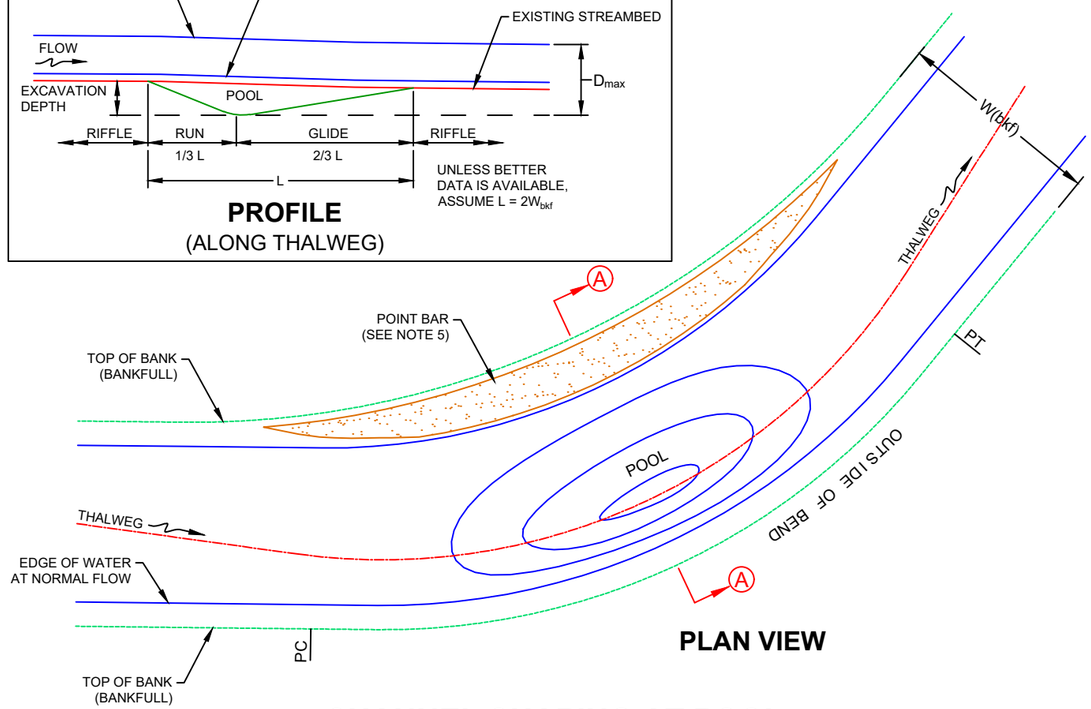


SECTION A
(WITHOUT BENCH)

EXCAVATE DEEPEST PART OF POOL TO A MINIMUM DEPTH OF 2 FEET BELOW EXISTING STREAMBED OR DOWN TO BEDROCK. SEE NOTE 6.



PROFILE
(ALONG THALWEG)



PLAN VIEW

CHANNEL SHAPING AT POOL

EXAMPLE DETAIL
(NOT TO SCALE)

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. USE THIS DETAIL WITH OTHER STREAM RESTORATION MEASURES TO SHOW FEATURES OF A NATURAL CHANNEL SHAPE.
5. 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.
6. NOTE THE ELEVATION OF EXISTING STREAMBED BEFORE STARTING EXCAVATION TO GET THE CORRECT FINISH POOL DEPTH.

Date	3/3/2021	3/3/2021	4/5/2021	4/5/2021
Designed by:	TJ BURR			
Drawn by:		TJ BURR		
Checked by:			J. ANDREWS	
Approved by:				J. ANDREWS

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO

DETAILS 3 - DEFLECTOR

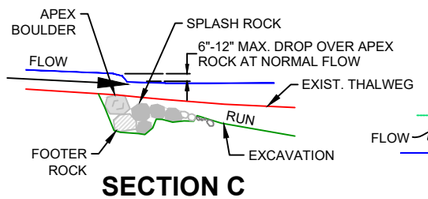
United States Department of Agriculture
Natural Resources Conservation Service

Job Class
V

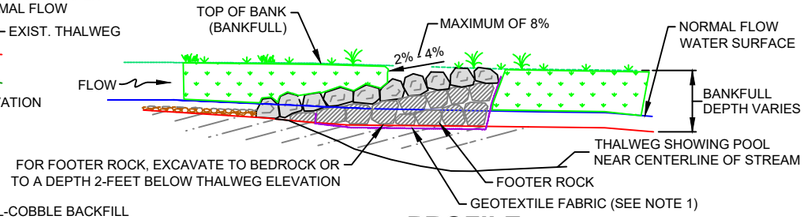
FILE NO.
Drawings_Tomichi_Upper Reach.dwg

REVISED:
7/15/2021

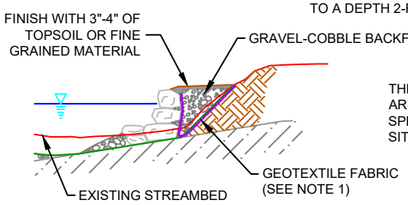
DRAWINGS (REV: 11/16/2021)



SECTION C
(AT APEX)

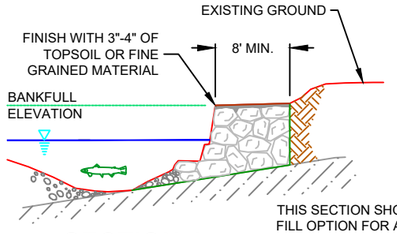


PROFILE
(ALONG ARM)



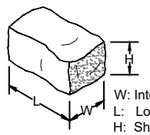
SECTION B
(AT VANE ARM)

THE SLOPE AND ANGLE OF THE VANE ARMS MAY BE ADJUSTED WITHIN THE SPECIFIED RANGE TO MEET EXISTING SITE CONDITIONS.



SECTION A
(AT CUTOFF SILL)

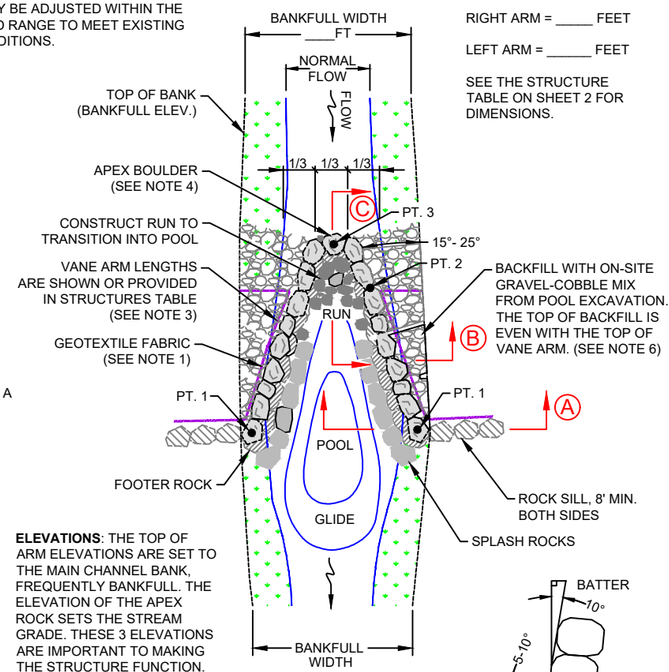
THIS SECTION SHOWS A FILL OPTION FOR AN OVERWIDE CHANNEL. STRUCTURES MAY BE INSTALLED AS CUTS, CUT/FILL, OR FILL.



W: Intermediate Axis (Diameter)
L: Long Axis (Length)
H: Short Axis (Height)

STRUCTURE ROCK SIZE				
	Representative Size			
	W or Dia (Feet)	Length (Feet)	Height (Feet)	Weight (Ton)
Minimum	2.0	3.2	1.6	0.7
Average (D50)	3.0	4.8	2.4	2.4

Assumed Rock Density: 165 LB/CU-FT



ELEVATIONS: THE TOP OF ARM ELEVATIONS ARE SET TO THE MAIN CHANNEL BANK, FREQUENTLY BANKFULL. THE ELEVATION OF THE APEX ROCK SETS THE STREAM GRADE. THESE 3 ELEVATIONS ARE IMPORTANT TO MAKING THE STRUCTURE FUNCTION.

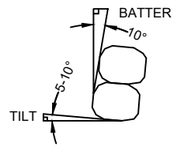
PLAN VIEW

LENGTHS

RIGHT ARM = _____ FEET

LEFT ARM = _____ FEET

SEE THE STRUCTURE TABLE ON SHEET 2 FOR DIMENSIONS.



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

ROCK NOTES:

A. 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
B. BE MINIMUM TO AVERAGE SIZE; AND 5% MAY BE SMALLER FRAGMENTS USED TO FILL GAPS.
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 SOURCE SHALL BE FROM AN ACCEPTABLE CDOT QUARRY OR FROM ENGINEER APPROVED SOURCE.
E. ON-SITE COBBLE AND BOULDERS MAY BE USED TO FILL VOIDS AND FOR SPLASH ROCKS, BUT NOT FOR USE AS ANY MAIN STRUCTURE ROCK.

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 HALF 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. IT 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.

TYPICAL CROSS VANE DETAIL
NOT TO SCALE

Date	
Designed by:	TJ BURR 3/3/2021
Drawn by:	TJ BURR 3/3/2021
Checked by:	J. ANDREWS 4/5/2021
Approved by:	J. ANDREWS 4/5/2021

TOMICHI CREEK WATERSHED
TOMICHI CREEK STREAM RESTORATION - UPPER REACH
GUNNISON COUNTY, CO
DETAILS 4 - CROSS VANE

United States Department of Agriculture
Natural Resources Conservation Service

Job Class
V

FILE NO.
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REVISED:
11/09/2021

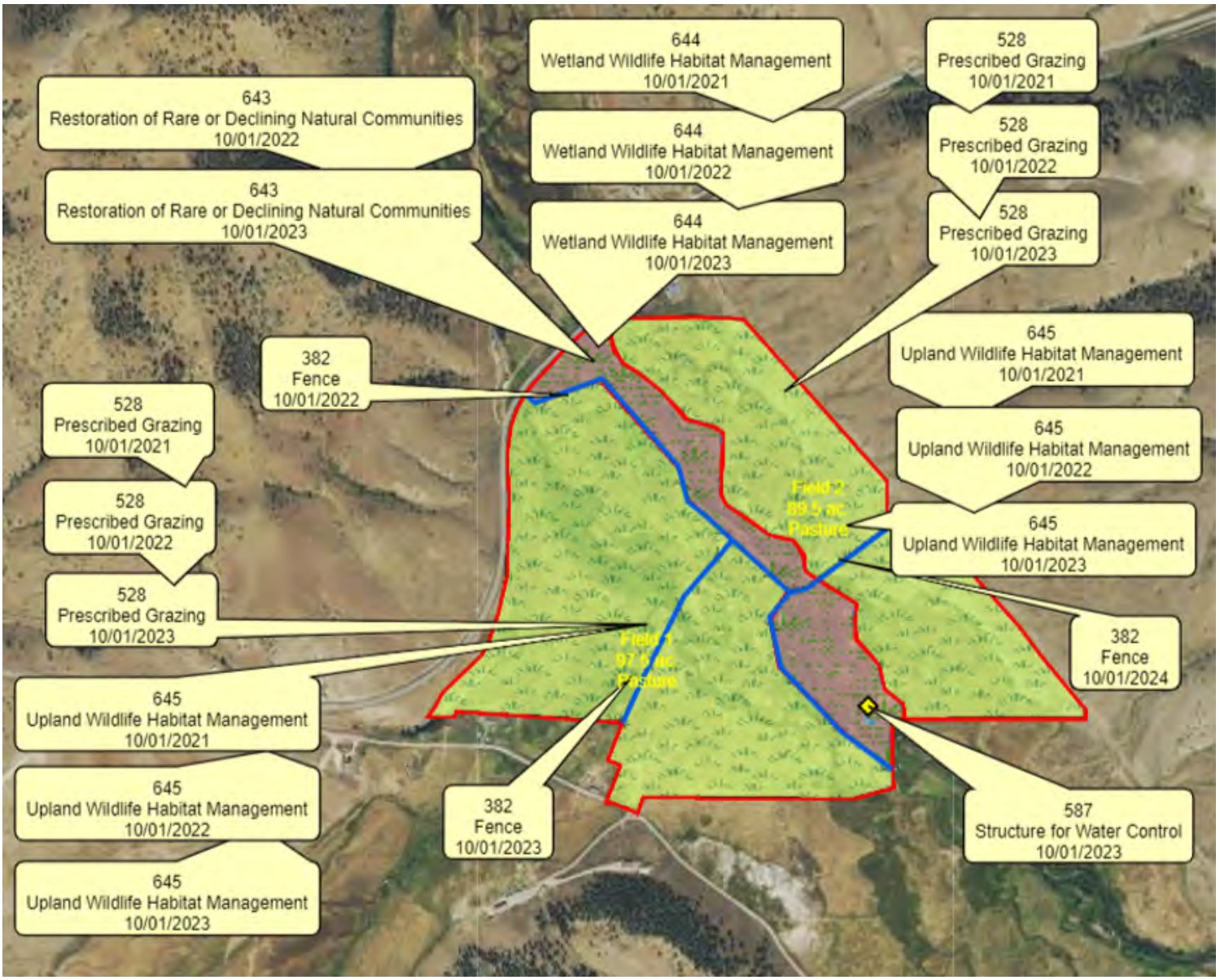
Date: 4/28/2021

Conservation Plan Map

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

Assisted By: DANIEL OLSON
NATURAL RESOURCES CONSERVATION SERVICE
GUNNISON SERVICE CENTER
GUNNISON CONSERVATION DISTRICT

Land Units: Tract 5, Fields 1,2



USDA-NRCS-NGCE & USDA-FSA-APFO

Prepared with assistance from USDA-Natural Resources Conservation Service

0 750
Feet

Practice Schedule PLUs

Conservation Practice Points
Structure for Water Control (587)

Conservation Practice Lines
Fence (382)

Conservation Practice Polygons
Restoration of Rare or Declining Natural Communities (643)
Wetland Wildlife Habitat Management (644)
Upland Wildlife Habitat Management (645)
Prescribed Grazing (528)

N

USDA

Tomichi Preserve

November 30, 2021

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

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

Jesse Kruthaupt

Maxar | Esri, HERE, Garmin, iPC

USDA NRCS
U.S. Department of Agriculture
Natural Resources Conservation Service

Gunnison Service Center
216 North Colorado Street
Gunnison, CO 81230
(970) 707-3045

November 30, 2021

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