West Creek and Fox Creek

EWP Stream Stabilization Project

Project Sponsor
Larimer County, Colorado

Prepared on 08/24/2016
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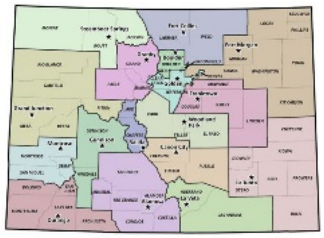
QUALITY ASSURANCE PLAN



USDA United States Department of Agriculture
Natural Resources Conservation Service

UNITED STATES DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

Denver, Colorado

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Overview

This *quality assurance plan* is for an Emergency Watershed Protection (EWP) project using the following components:

X	Streambank Shaping (excavation & fill)	X	Bioengineering
X	In-Stream Rock Structures	X	Live Stakes
X	Toe Rock and/or Rock Riprap		Brush Mattresses
X	Toe Wood Along Bottom of Bank	X	Tree Planting
X	Large Woody Debris Structures	X	Boulder Clusters
X	Combination Rock & Wood Structures		Bottomless Culvert
	Open Drainage Ditches	X	Constructed Riffles
X	Tree Revetments		Water Diversions
X	Bankfull Bench Construction	X	Sediment Removal
X	Stream Crossing	X	Grade Control Structures

Personnel assigned to the project should have experience observing the installation of the components identified in the above table.

QA Personnel

Sponsor's Representative: someone with the authority to act on behalf of the sponsor.

Technical Representative (Tech Rep): someone with construction experience to assist with construction implementation of the project. This may be a soil conservation technician, soil conservationist, civil engineering technician, district conservationist, or consultant's representative.

Surveyor: someone with survey equipment and experience to assist with spot-checking structure grades and elevations; establishing survey control points for use by the contractor; and for completing as-built survey.

Stream Restoration Specialist (SRS): a person assigned to the project with specialized skills, training, education, and experience implementing stream restoration projects.

Design Engineer: the engineer, stream restoration specialist, or other qualified person responsible for designing the project.

Plant Specialist: person responsible for implementing the project's vegetation plan. They shall have education and experience with selecting and installing native riparian plant species. They shall oversee all re-vegetation activities.

Specific Personnel Recommended for this Project

Edit as needed to fit the project needs.

Sponsor's Representative:	Erich Purcell
Technical Representative:	Dennis Black or Micah Leadford or County Inspector
Stream Restoration Specialists:	Katie Jagt, Michael Blazewicz, and/or or representative
Design Engineer:	TJ Burr and/or representative
Vegetation Specialist:	Randy Mandel and/or representative
Surveyor:	Rob Molacek and/or representative

Quality Control (QC)

The Contractor is responsible for quality control (QC) to build the project according to the construction specifications and drawings. This responsibility is required by the general specifications section. Quality Assurance personnel will verify that QC tasks are being done. Major QC items include:

1. **Surveys**: The Contractor is responsible for construction stakeout of the work, and meeting grades and elevations required by the drawings.
2. **Utilities**: Verify that the Contractor has located utilities before starting work at the project site. Ask the Contractor, visit the site to see the utility markings, and request utility locate reference number.
3. **Pollution Control**: The Contractor is responsible for preventing pollution of surface and ground water from contamination or from sediment runoff. See specifications for pollution control.
4. **Dewatering**: The Contractor is required to divert or remove water from the work site, as possible, or to work in low flow conditions.
5. **Excavations and Embankments**: The Contractor needs to meet the grades and slopes required by the drawings.
6. **Rock and Aggregates**: The rock must come from a CDOT-approved quarry (with a copy of test results or certifications), or from a source approved by the design engineer.

7. **Material Certifications**: The Contractor shall provide documentation, which certifies that the materials provided comply with the contract requirements. If specified for this project, material certifications for the following are required (items not required for this project are shown in light gray):

    (a) Crushed aggregates – the material used to resurface any road should be tested for gradation..
    (b) Erosion Control Fabric – manufacturer's product data showing compliance with specifications.
    (c) Geotextile – manufacturer's information showing compliance with specifications.
    (d) Structure Rock –visual inspection by the Technical Representative or Inspector..
    (e) Seeding and mulching materials – documentation of a weed-free seed mix
    (f) Silt fence or Erosion Control Wattles – manufacturer's product data showing compliance with specifications.
    (g) Trees & shrubs – invoice showing source, species, and quantity.
    (h) Erosion Control Wattles – manufacturer's product data showing compliance with specifications.

Quality Assurance Plan (QAP)

The *Natural Resources Conservation Service* (NRCS) Quality Assurance Program assures that the specified contract quality of materials and workmanship is attained. The primary responsibility of the QA personnel is to observe the operations of the Contractor to assure compliance with the construction contract. This includes the physical examination of materials brought on to the site; observation of the placement of materials; observation of the construction techniques; observation of quality control and construction management operations by the Contractor; periodic and continuous observation of construction work. The Quality Assurance Plan may be updated to include changing project conditions and to reflect lessons-learned during construction.

The intensity/frequency of the quality assurance activities is shown in Table 1 - Frequency of QA Inspections. Conduct periodic quality assurance observations and checks of the Contractor's Quality Control to verify that measurable qualities of the work meet the contract requirements.

The following is a description of the **minimum** quality assurance activities required:

1. The design engineer and stream restoration specialist and technical representative shall attend the **preconstruction meeting** arranged by the sponsor to include the contractor. Design engineer will give an overview of the project with the drawings and answer questions related to the design.
2. The design engineer and stream restoration specialist (or technical representative) shall spot check **construction staking** and survey control to ensure the work is properly staked before work starts. They will also assist the Contractor with establishing survey control for each major work item, particularly in the identification of normal flow and bankfull flow elevations.
3. All listed personnel shall read the construction specifications, drawings, design report, and the QAP.
4. Sponsor and/or Technical Rep shall review required **submittals** for compliance with the contract requirements. Contact the design engineer if or sponsor if there is a problem.

5. The Technical Rep should be in daily communication with the contractor to stay abreast of work in progress and upcoming work activities, including work requiring quality control tests. All onsite personnel shall keep a weekly log of construction activities to provide to the design engineer to keep them informed on project status and concerns.
6. All onsite personnel shall be familiar with sensitive plant and animal species and know how to identify them. Specific concerns for this project are: none.
7. Technical Representative should provide oversight of inspection of **equipment and materials** to ensure they are clean and free of any material that could contain or hold seeds. This should be a continual process and referenced in daily logs. Do this before contractor starts work, and whenever new materials and equipment arrive on-site.
8. Technical Representative should verify that the contractor is meeting **pollution control specifications** and only disturbing ground and vegetation as needed for construction. This should be referenced in daily logs.
9. Technical Representative should ensure the contractor has a **spill-response kit** on-site on a weekly basis and after use.
10. Take **digital photographs** of work progress to provide a representative photo record of the project. Photo-document key stages of major work items to record images of foundation preparations, installation of buried features, and completed work. Photographs should include date/time stamp. Share photographs with design engineer and SRS on a weekly basis.
11. Design Engineer shall review/observe **subgrade preparations** for all rock structures to ensure compliance with the drawings and specifications before contractor places the rock structure. Accomplish this in a timely manner to avoid delaying the contractor's work. Visually check the stability of the subgrade and foundation; rock, filter, fill, and/or geotextile.
12. Design Engineer shall review/observe proper **placement and use of geotextile**. The geotextile must be installed properly to prevent backfill washout under the structures.
13. Design Engineer or SRS or Vegetation Specialist shall review and observe proper placement of **erosion control fabric** according to drawings and specifications.
14. Design Engineer or SRS shall verify the **backfill material** for rock structures is an acceptable mix of gravel and cobble per specifications. Check for proper compaction or consolidation of backfill materials.
15. Design Engineer or SRS shall spot check **cut and fill slopes** to verify elevations with the drawings. Completed structural elevations (cross vanes, log vanes, etc.) must be within 0.25' of the specified elevations on the drawings unless the material or subgrade (bedrock) prevents this; final grade for benches, floodplains, and slopes must be within 0.5' of the specified elevations on the drawings.
16. SRS and Design Engineer may direct the creation of micro-topography at their discretion to create small scale river and landscape features not shown on the plan set provided they are in-line with the vision of the project and not time intensive.
17. SRS and Design Engineer may direct the installation of rock and wood features at their discretion to create small scale river and landscape features not shown on the plan set provided they are in-line with the vision of the project and not time or material intensive.
18. Design Engineer and Technical Representative shall observe the installation of all stream crossings to verify construction and material specifications are met for foundation material, invert elevations, size and type of flow conveyance structure, fill material, compaction and protective armoring.

19. Vegetation Specialist shall be present for the initiation of all seeding and mulching operations as well as the initiation of the planting of container plants.
20. Vegetation Specialist shall be present for the initiation of all bioengineering treatments that include live staking.

Preconstruction Meeting

The *Sponsor* should work with the technical representative, stream restoration specialist, and design engineer to establish a mutually agreeable date and time for meeting. Communications to the contractor should be through any of the personnel listed in this document. Someone should be identified to take notes. Include a discussion of the following items in addition to standard pre-construction agenda items.

(1) Introductions and lines of communications.

(2) Overview of the drawings and specifications by *design engineer*.

(3) Point out temporary benchmarks and any layout work accomplished, such as staking for major work items (structures, project start, and end).

(4) Site conditions, special constraints, and site-specific safety concerns.

(5) Contractor is responsible for utility locates. Ask the contractor to provide a copy of confirmation for utility locates.

(6) Remind the contractor to limit disturbance to the site. Discuss **pollution control** requirements to include erosion and sediment control.

(7) **Permit requirements** and conditions. Other special environmental concerns? Cultural Resources? Historical sites?

(8) Discuss tree planting, seeding, and live stakes. Live stakes should be installed during dormant season, but realize that isn't always possible.

(9) Discuss working from bank or during low flow conditions whenever possible.

(10) Discuss any time restrictions, such as winter shutdown, high flow months, and avoiding disturbance during spawning seasons.

(11) Review equipment and material **cleaning requirements**. Importance of preventing spread of invasive species, such as didymo.

(12) Construction surveying requirements – contractor is responsible for meeting lines, grades, and elevations for structures and bank shaping.

(13) Discuss **rock source** – provided from the temporary rock storage site in Glen Haven or from acceptable on-site sources.

(14) Identify and discuss access routes and staging areas.

(15) Discuss harvesting of on-site materials as applicable. Are on-site materials available?

(16) Get contractor's estimate of **construction duration**. Some contractors may have a construction schedule they are trying to meet.

(17) Other:_____.

(18) Project Specific: _____

Equipment

The QA personnel should have a minimum of the following equipment available when needed:

1. Survey Equipment

    a. GPS, total station, or laser level for setting survey control points, temporary benchmarks, spot-checks, and for as-built survey.
    b. Survey level
    c. Hand level for quick elevation checks
    d. Survey rod, reflector, receiver, etc.
    e. Measuring tape, 200 foot minimum.
    f. Weather resistant field books for taking notes and pens or pencils
    g. Stakes, flags, ribbon, permanent markers, etc.

2. Photographic Equipment

    a. Digital camera with the following minimum features: date/time stamping, video recording, and some zoom capability.

3. Special Clothing

    a. Backpack and clothing suitable for working at remote sites with highly variable weather conditions,
    b. Chest waders and personal safety equipment for working in stream, if necessary
    c. Studded wading boots
    d. Other clothing as appropriate to provide the required services

4. Other Special Equipment

    a. Mobile telephone
    b. Notebook computer or similar device for making notes while on-site (optional – nice-to-have).

5. Safety Gear

    a. Hard hat
    b. Bright-colored safety vest.
    c. Appropriate footwear, such as boots with toe and ankle protection.
    d. Other applicable safety gear for site-specific conditions

Performance Time

For estimated project duration, see the performance time in the design report. Actual construction times vary due to weather, site conditions, flow levels, contractor efficiency, material delivery times, quantity of equipment, size of equipment, size of labor force, fuel availability, unforeseen problems, mechanical problems, personnel availability, traffic, accidents, and other unpredictable factors.

Desirable Skills for QA Personnel

1. Skills

    a. Ability to understand the plans and specifications.
    b. Ability to maintain construction records.
    c. Basic photography.
    d. Basic math and reading.
    e. Ability to assist with basic layout, staking, quantity, and “as-built” surveys.
    f. Ability to get to the project site and walk across uneven terrain.
    g. Ability to operate the equipment required to meet the QAP requirements.
    h. Good communications skills to communicate with the Contractor, sponsors, and personnel of other federal, state, and local government agencies. Ability to communicate in person, by email, written reports, telephone, and through legible handwritten documentation.

2. Training & Experience

    a. On-the Job Training for stream restoration work.
    b. Attend stream restoration related training when it is made available.
    c. Some experience on a stream restoration project site.
    d. Some knowledge or training in geomorphic stream design, such as Rosgen Level I or equivalent.

Inspection and Requirements Checklist

At a minimum, periodically observe all work for compliance with the construction documents. The following are items of work and QA activities for this project.

Table 1 – Quality Assurance Activities and Frequencies

✓	Description	Staff	Inspection Frequency
	Field verification of design, setting or checking survey control for structures, and staking out structure locations	SRS and Design Engr & Surveyor	Once
	Attend **preconstruction meeting** – good opportunity for everyone to get familiar with project	SRS and Design Engr	Once
	Mobilization and coordination with the sponsor	Tech Rep or SRS	Periodic
	Approve clearing limits; make sure the contractor has coordinated access route with sponsor; and make sure contractor doesn't disturb more vegetation than necessary.	Tech Rep or SRS	Periodic
	Monitoring of materials and equipment being delivered to the project site – random weekly spot checks with documentation in job diary. Frequency will vary depending on Contractor's delivery schedule and level of trust established.	Tech Rep or SRS	Weekly
	Pollution control work, including erosion & sediment control measures	Tech Rep	Weekly
	Conformance with grades, structure geometry, & elevations. Make sure contractor is using a level, tape, or other survey equipment. If in doubt, contact Design Engineer.	Tech Rep	Periodic
	Seeding and mulching of disturbed areas after grading is completed and before work shutdowns (before holidays & weekends)	Tech Rep	Weekly
	Ensure the site is stabilized before predicted rainstorms. Banks protected. Wood structures anchored. Equipment and materials out of flow path of rising stream levels.	Tech Rep	Periodic
	Coordination of tree removal with sponsor and trees for project use flagged and approved by sponsor	Tech Rep	Once
	Rock riprap and rock toe installation – verification of keys, proper geotextile installation, etc.	Tech Rep	Periodic
	Geotextile installation	Tech Rep	Continuous
	Seeding, mulching, and erosion control fabric	Tech Rep	Periodic
	Periodic site visits and at critical times during construction	Design Engr or SRS	Periodic
	Tree planting and restoration of temporary access roads/staging areas	Tech Rep	Periodic
	Call or email the *design engineer* to discuss any work that doesn't seem right or to relay questions from the contractor	Tech Rep	As Needed
	Pre-completion inspection of work while contractor still has equipment and materials on-site	Tech Rep & Design Engr or SRS	Once
	Keep written field notes and take digital photographs of work progress	Tech Rep	Periodic
	Final inspection and certification of work completed	Design Engr or SRS	Once
	Construction status updates to design engineer or SRS via email	Tech Rep	Weekly

	Assist with data collection for as-built drawings	Tech Rep & Surveyor	Once
	Submit as-built drawings to NRCS	Design Engineer	Once