R2R ENGINEERS

RIFFLES TO RIPPLES

MEMORANDUM

DATE:	November 30, 2023
TO:	Jane Clary, Wright Water Engineers, CCBWQA Technical Manager
CC:	Jon Erickson, CCBWQA Technical Advisory Committee Chairman
FROM:	Richard Borchardt, PE & CFM
SUBJECT:	Dove Creek Phase 1 from Otero Avenue to Chambers Road - Project Summary

Background and Purpose:

In 2021, the Southeast Metro Stormwater Authority (SEMSWA) and Cherry Creek Basin Water Quality Authority (CCBWQA) began stream reclamation on Dove Creek from Otero Avenue to Dove Creek Pond D-1 (Project), shown with the white line in **Figure 1**, about 5.2 miles upstream of Cherry Creek Reservoir. In 2022, the project was broken into 2 phases for construction, with Phase 1 being between Otero Avenue and Chambers Road and scheduled for construction in 2023, and Phase 2 being between Chambers Road and Dove Creek Pond D-1 with construction anticipated in 2024.

Figure 1

Existing Conditions:

Urbanization of the watershed upstream of the Project results in increased rate, frequency, and magnitude of storm flows in Dove Creek. The stream incised up to 6 feet with steep eroded banks within the Project, evidence of bed and bank erosion (see **Photos 1-3)**.

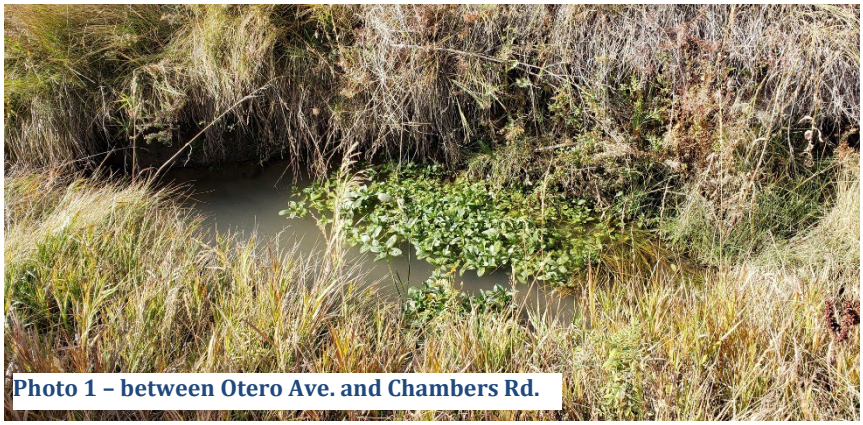

Photo 1 – between Otero Ave. and Chambers Rd.

Photo 2 – downstream of Chambers Rd.

Photo 3 – between Chambers Rd. and Pond D-1

Design Approach:

The goals of the design were to create a healthy stream, well connected to the adjacent wetland and riparian vegetation, and promote the natural and beneficial functions of filtration and infiltration to improve water quality. RESPEC is the design consultant. RESPEC designed stream reclamation which created a multi-stage stream planform that provides stability and conveys storm flows up to the 100-year recurrence interval. RESPEC designed four sediment capture areas based on Mile High Flood District's forebay criteria to capture coarser sediments entering the stream and the bank-full channel (aka active or low flow channel) to transport the smaller sediments. This stream reclamation and sediment capture/transport minimizes long-term maintenance and provides an environmentally sound and sustainable practice. RESPEC used step pool structures for grade control, bank protection (Void Filled Riprap, Soil Lifts, and Vegetation), and grading to create overbanks providing a wider stream corridor which stabilizes the stream and reduces erosion potential. The Project includes stream reclamation of approximately 2,700 linear feet.

Construction:

Construction of Phase 1 from Otero Avenue to Chambers Road was started in February 2023, completed in July 2023, and done by CEI. **Photos 4-6** show the constructed stream reclamation. **Photos 4-5** highlight the step pool structures, the graded overbanks, and the areas seeded with wetland and riparian vegetation. **Photo 6** shows the sediment capture area downstream of Otero Avenue.

Photo 4– looking downstream towards Chambers Rd.

Photo 5 – looking at step pool structure

Photo 6 – looking upstream at sediment capture near Otero Ave.

Funding:

SEMSWA and CCBWQA are partners on the Project. The Intergovernmental Agreement and Amendments for design of the Project and construction of Phase 1 include $2,800,000 with CCBWQA's participation being $238,000 or about 9%. SEMSWA's current project budget update shows a remaining balance of about $89,000 after construction, which can be used to establish vegetation and clear permits, afterwards any remaining balance if any would be refunded to the partners according to their participation level, and the final project cost will be known.

Water Quality Benefits:

The Project includes stream reclamation and sediment capture areas that provide water quality benefits for the stream and ultimately Cherry Creek Reservoir[1].

Stream reclamation reduces erosion and immobilizes nutrients (including phosphorus and nitrogen) in the soil, reducing the nutrient concentrations in the water. The Project's 2,700 linear feet immobilizes an estimated 46 pounds of phosphorus per year[2]. Phase 1 is 1,300 linear feet or 22 pounds of phosphorus per year.

The four sediment capture areas included with the Project provide additional water quality treatment above the stream reclamation. Phase 1 constructed the sediment capture area downstream of Otero Avenue (**Photo 6**); SEMSWA has cleaned it out three times between June and early September 2023 where they estimated a total of 100 cubic yards of sediment removed, which is a significant sediment reduction that also provides some degree of phosphorus reduction. The Project's sediment capture areas were designed similarly to MHFD's forebay criteria, which represent different assumptions than those used in CCBWQA's historical phosphorus reduction estimates[3] (mostly extended detention basins and water quality ponds with 40-hour drain times). Because the Project's sediment capture areas are not designed with a 40-hour drain time to allow for the broader range of sedimentation, they will be most effective at removing larger particle sizes (gross solids) and less effective for finer particles (clays) that tend to have higher phosphorus concentrations. CCBWQA's consulting staff is working on updated phosphorus reduction estimates for the Project's sediment capture areas and will provide an update once completed. This estimated benefit can be included in the Project Summary associated with the Phase 2 construction.

Summary:

Water Quality Benefit of reduction of ≈ 22 pounds of phosphorus per year
Total Project Cost = $2,800,000[4]
CCBWQA's Share = $238,000[5]
Engineer: RESPEC
Contractor: CEI

Additional information for the Project can be found on the websites below.
SEMSWA website link: https://www.semswa.org/our-work/
CCBWQA website link: https://www.cherrycreekbasin.org/library/

[1] CCBWQA Stream Reclamation, Water Quality Benefit Evaluation – Interim Status Report; CCBWQA Technical Advisory Committee; June 16, 2011.
[2] CCBWQA 2024-2033 Capital Improvement Program Supporting Data, Board Final Review, November 16, 2023
[3] CCBWQA 2024-2033 Capital Improvement Program Supporting Data, Board Final Review, November 16, 2023
[4] Final total project cost won't be known until after final vegetation establishment, permits are cleared, and any remaining balance if any refunded to partners.
[5] Final CCBWQA's share won't be known until after final vegetation establishment, permits are cleared, and any remaining balance if any refunded to CCBWQA.