

MEMORANDUM

JRS ENGINEERING CONSULTANT, LLC

TO: Chuck Reid, Manager - CCBWQA
CC: Rick Goncalves, P.E. – TAC Chairman
FROM: James R. “Jim” Swanson P.E.
DATE: December 20, 2016
SUBJECT: Cherry Creek Stream Stabilization at Norton Farms Open Space

Presented in this memorandum is a summary of the Cherry Creek Stream Reclamation at the Norton Farms Open Space Project.

BACKGROUND AND PURPOSE:

In 2011, the Town of Parker requested Authority funding to assist with design and construction for the Cherry Creek Stream Reclamation Improvements through the Norton Farms Open Space. The project is located in Parker, Colorado, immediately upstream of the Cherry Creek Stream Reclamation project at 17 – Mile House beginning at the Douglas / Arapahoe County Line and extending upstream for a distance of approximately 2,500 linear feet. Cherry Creek in this area is a 20 to 50 foot wide sandy channel bed with incised banks between three and twelve feet tall. The Authority’s inspection of the Project area found that erosion and downcutting was resulting in steep bank slopes, lateral channel migration and loss of viable wetlands and upland vegetation due to lowering of the water table.

The Authority assessed the water quality benefits of the project and determined the Project met the Authority’s goals and objectives for stream reclamation. The Project was added to the Authority’s Capital Improvement Plan in 2012. On May 15, 2013, the Authority entered into an IGA with UDFCD and the Town of Parker contributing design funds in the amount of \$30,000. On September 18, 2014, the Authority approved a second IGA amendment contributing an additional \$225,000, for a total project contribution of \$255,000.

EXISTING CONDITIONS:

Urban growth and expansion of developed areas has resulted in an increase in the rate, frequency and duration of stormwater runoff accelerating degradation of the streambed and banks. Typical pre-project conditions are shown in Photo 1 documenting Cherry Creek’s degradation within this reach.



Photo 1 – Typical Existing Condition

DESIGN APPROACH:

The design approach to reclamation of this reach is a combination of a natural bioengineering approach connecting the streambed to the overbanks and a more engineered approach in areas where topography or site conditions constrain the channel geometry. In some locations, the existing channel bank and riparian vegetation was removed and replanted to meet the design detail for the constructed improvements. In other locations, the existing vegetation along the edge of stream corridor was determined to be stable and thus incorporated into the final design and construction.

Two constructed void filled rip-rap riffle drops were incorporated into the Project to flatten and control the longitudinal grade, with strategically located sheet-pile cut-off walls installed to protect the drops from damage during a larger flood event. The sideslopes along the stream channel mainstem was graded with flatter slopes to reconnect higher channel flows to the riparian corridor. The channel reconstruction reduces channel velocity, shear forces and stream power allowing for more filtration and infiltration.

The Project was designed to raise the streambed and re-establish the water table to prevent further loss of vegetation and down cutting, erosion and sediment transport. The overall project goal was to restore and enhance the aquatic, wetland and riparian functions of Cherry Creek. In-progress construction is shown in Photos 2 and 3.



Photo 3 - Channel Construction



Photo 2 – Water Diversion Channel

CONSTRUCTED PROJECT:

The overall project was split into two separate contracts; one for the stream civil reclamation and drop structures construction and the second for revegetation and landscaping. 53 Corporation (stream civil reclamation and drop structures construction) and Arrowhead Landscaping, Inc., (revegetation and landscaping) were awarded contracts in the combined amount of \$751,203.71. The Notice to Proceed was issued on January 25, 2016. The work was substantially complete on August 3, 2016. The final Project cost totaled \$799,790.27. The constructed improvements are shown in Photos 4, 5 and 6.



Photo 4 - Constructed Channel



Photo 5 Constructed Void Filled Rip-Rap Drop



Photo 6 Constructed Channel

WATER QUALITY BENEFITS:

An assessment of the stream stabilization and water quality benefits for the entire project was made by the Authority¹ and found to include reductions in sediment and other pollutant loads, including phosphorus and nitrogen. These benefits are supported by Authority data, literature research and quantitative analysis. Based on the outcome of this assessment, it is calculated that 38 lbs of phosphorus per year will be eliminated from being transported downstream from the Cherry Creek at Norton Open Space stream reclamation improvements. The project was found to lower stream velocities, channel shear and stream power from that found prior to the stream reclamation, all which minimizes the transport of sediment and pollutants.

SUMMARY:

Project Length = 2,500 linear feet.
Water Quality Benefits ≈ 38 # / year Phosphorus removal.
Total Construction Cost = \$799,790.
Authority's Share = \$225,000.
Project Partners: Town of Parker, UDFCD & CCBWQA.
Engineer: Olsson Associates.
Contractors: 53 Corporation & Arrowhead Landscaping, Inc.

¹ CCBWQA Technical Advisory Committee, June 16, 2011. *Stream Reclamation, Water Quality Benefit Evaluation – Interim Report.*