

MEMORANDUM

JRS ENGINEERING CONSULTANT, LLC

TO: Chuck Reid, Manager - CCBWQA
CC: Rick Goncalves, Chairman, TAC
FROM: James R. "Jim" Swanson, P.E.
DATE: September 17, 2018
SUBJECT: Cherry Creek Stream Reclamation at Arapahoe Road - Reach 2

BACKGROUND AND PURPOSE:

In January 2011, the Southeast Metro Stormwater Authority (SEMSWA) issued a Request-for-Proposal stating that a group of stakeholders had been formed with shared interests in the Cherry Creek corridor upstream and downstream of Arapahoe Road. The stakeholders desired to update the Major Drainageway Plan completed by URS in 2014 to a preliminary design level through the reach of interest. Stakeholders included SEMSWA, Urban Drainage and Flood Control District (UDFCD), City of Aurora (COA), Cherry Creek Basin Water Quality Authority (Authority) and Arapahoe County (AC). In August 2013, the Cherry Creek Stream Reclamation – Eco Park to Cherry Creek State Park – Preliminary Design Report was prepared by Muller Engineering Company. This report serves as the design guideline for the 11,700 linear foot length of stream corridor identified above. Because of the extensive nature of the improvements in this corridor, the project has been divided into five phases (referred to as Reaches). Reach 2 is a downstream segment of this corridor (length \approx 1,515 linear feet) extending from the property boundary of Cherry Creek State Park, to a point located approximately 1,450 linear feet north of Arapahoe Road, See Exhibit 1.

The Authority's inspection of the Reach 2 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.

In 2015, SEMSWA requested Authority funding to assist with design / construction of the above referenced project, which was initially funded by the Authority in an IGA Agreement dated September 17, 2015 in the amount of \$60,000. To date, through two additional IGA amendments, the Authority's funding contribution has totaled \$480,000. The Valley Country Club also participated in funding this project to construct a new golf cart crossing over Cherry Creek.

EXISTING CONDITIONS:

Urbanization and the resulting increase in the rate, frequency, duration and magnitude of stormwater runoff accelerated degradation of the streambed and banks. Typical pre-project conditions are shown in Photos 1, 2 and 3 documenting that Cherry Creek's degradation within this reach.



Photo 1 - Typical Pre-project Condition



Photo 2 - Typical Pre-project Condition



Photo 3 - Typical Pre-project Condition

DESIGN APPROACH:

The design approach to reclamation of this reach is the 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. Design and permitting for the stream reclamation channel improvements started in 2015. Construction of the Reach 2 channel improvements started in the fall of 2017 and was completed in spring of 2018.

Four Grouted Boulder Drops, each installed with a sheet pile cut-off wall, protects the channel section from damage during larger flood events. The sideslopes along the stream channel mainstem were 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 while not adversely impacting access and operation of the Valley Country Club.

In-progress construction for the Cherry Creek Stream Reclamation Channel Improvements are shown in Photos 4, 5, 6 and 7.



Photo 4 – Channel Grading



Photo 5 – Channel Grading



Photo 6 – Channel Construction

CONSTRUCTED PROJECT:

The Cherry Creek Stream Reclamation Channel Improvements Project contract was awarded to ECI Site Construction Management in the amount of \$2,138,843.80. The Notice to Proceed was issued on September 18, 2017. The work was substantially complete on May 7, 2018. The final Project cost totaled \$2,125,468.61.

The constructed improvements are shown in Photos 8, 9, 10, and 11.



Photo 7 – Grouted Boulder Drop Construction



Photo 8 – Constructed Channel



Photo 9 – Constructed Grouted Boulder Drop



Photo 10 – Constructed Channel @ Golf Cart Bridge



Photo 11 – 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 26 lbs of phosphorus per year will be eliminated from being transported downstream from the Cherry Creek at Arapahoe Road – Reach 2 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:

Cherry Creek Stream Improvements – Reach 2:

Project Length = 1,515 linear feet.

Water Quality Benefits ≈ 26 # / year Phosphorus removal.

Total Construction Cost = \$2,125,469.

Authority's Share = \$480,000.

Project Partners: SEMSWA, CCBWQA & Valley Country Club.

Engineer: CH2M Hill Engineers, Inc.

Contractor: ECI Site Construction Management.

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

Exhibit 1

Cherry Creek Reach 2

**Cherry Creek Reach 2
Stream Reclamation
Project**



Caley Avenue

Parker Road

Arapahoe Road



2000 ft

