

## **CHERRY CREEK STREAM RECLAMATION AT 12-MILE PARK, PHASE I**

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# Memorandum

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**To:** Chuck Reid, Manager, CCBWQA  
**CC:** Rick Goncalves, Chairman, TAC  
**From:** William P. Ruzzo, P.E.  
**Date:** January 28, 2013  
**Re:** Cherry Creek Stream Reclamation @ 12-Mile Park Phase I – Project Summary

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Presented in this memorandum is a summary of the first phase of the Cherry Creek Stream Reclamation at 12-Mile Park (Project). The second and final phase of the Project, which is scheduled to begin construction in the fall of 2013, will be summarized in an addendum or separate memorandum.

## **BACKGROUND AND PURPOSE**

In 2007, Cherry Creek State Park (Parks) and the Authority inspected the reach of Cherry Creek along the “big-bend” in the Creek adjacent to the dog off-leash area near the south east area of the Park. Severe



**Photo 1 - Cherry Creek 01-28-2008**

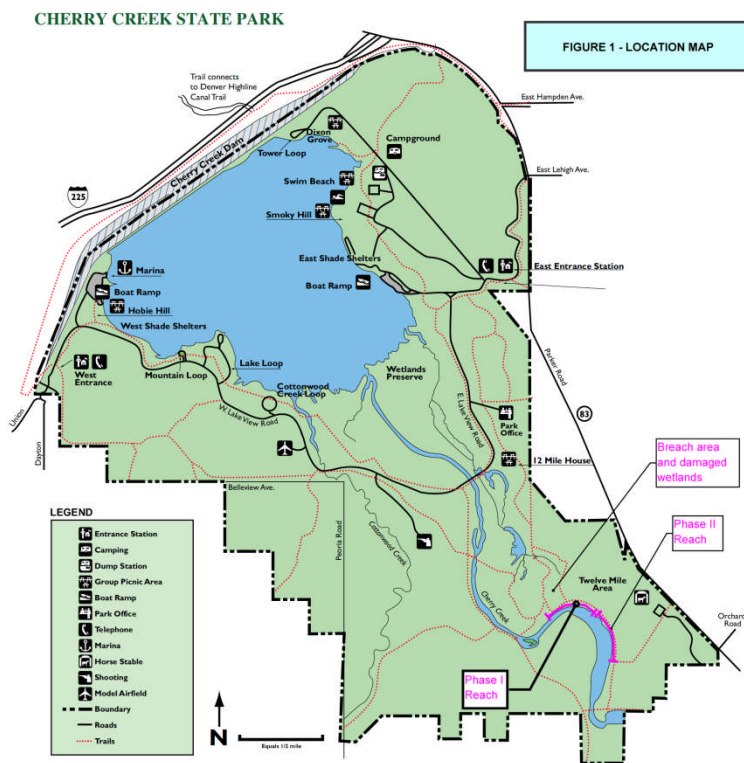
damage to bank vegetation and channel erosion were observed throughout the area where people, dog, and horse activity were concentrated (see Photo 1). The Authority evaluated the water quality impacts from these activities and decided to investigate the technical feasibility of stabilizing the channel banks. Funds for investigation were included in the 2008 capital improvement program (CIP).

On January 2008, the Authority met with Parks to discuss coordination between the Parks construction of a formal dog off-leash area (DOLA) and the Authority’s channel stabilization measures. The parties agreed to a design approach that would integrate stream stabilization measures with DOLA users by controlling access to the creek and creating a larger vegetated buffer between the

creek and the fenced-in DOLA for water quality purposes, but also to continue allow dogs and people to access the creek for recreation purposes in the same areas as existed at that time. Through 2008 and 2009, the Parks conducted a public process to review the DOLA improvement plans.

The Authority advertised for engineering consultants to prepare a stream reclamation plan for the entire reach of the Project (see Figure 1) and contracted with CH2M Hill for the work on May 20, 2010. Prior to selection of a consultant, the right bank of Cherry Creek breached causing the creek to change course through the downstream cottonwood grove, damaging the wetlands which is evident in Photo 2. Therefore, the engineering contract included a task to develop an immediate solution to repair the breached right-bank.

CH2M Hill provided a draft alternative evaluation report<sup>1</sup> and recommended permanent repairs to the breached bank area, dividing the Project into two phases. The Authority then amended the CH2M Hill contract on January 20, 2011 for final design of the breach area (Phase I) and again on October 1, 2011 for bidding and construction services.



## DESIGN APPROACH

The overall design approach is best described as “stabilization” rather than “reclamation”. First, no improvements are required along the left bank (looking downstream), which is a heavily vegetated, stable, wetlands and uplands area. Second, because the right bank is so high (up to 8-feet), reconnection of the channel and the floodplain is impractical along the right bank. However, because of the intensive use of the right bank of Cherry Creek by the DOLA users, stabilization measures were limited to “harder” structures such as rock toe and timber access points. The new and existing vegetated bank areas also require ingress/egress protection using various types of barriers such as fencing along the top of bank installed as part of the DOLA project. The final plans, however, include eight separate creek-access areas along the right bank constructed from boulders and/or timber to allow DOLA users to have the same experience as prior to DOLA and stream stabilization improvements.



Photo 2 - Wetlands damage from breach

<sup>1</sup> CH2M Hill April 2011. *Cherry Creek at 12- Mile Park DRAFT Alternatives Evaluation Report*

## CONSTRUCTION

Bids for the Project were opened on October 31, 2011 and the construction contract was issued to 53-Corporation, LLC of Castle Rock on December 8, 2011 in the amount of \$227,588. The notice to proceed was issued for January 23, 2012 and work was substantially complete as of June 6, 2012. Final project costs, which included additional work to restore the damaged wetlands, are \$236,778.



**Photo 3 - Boulder Toe Wall**

Repair to the breach along the right bank included a combination of a boulder toe wall (Photo 3) and sheet-pile cut-off wall along the upper bank (Photo 4).

During work on the 12-Mile Park Project, the Authority also had another project under construction by 53-Corporation within Cherry Creek State Park which had excess earth materials. After determining the suitability of the sediment

for use in the 12-Mile Park project, the Authority directed the contractor to haul sediment from the Cottonwood Wetlands project and place it at the 12-Mile Park project to reclaim the wetlands damaged during breach of the Cherry Creek channel. This exchange of material between projects reduced costs to import materials for the 12-Mile Park project and export materials from the Park to preserve flood storage volume<sup>2</sup>. Photo 5 shows the restored wetlands and Photo 6 shows the restored right bank of Cherry Creek that had breached.



**Photo 4 - Sheet Pile Cut-Off Wall**



**Photo 5 - Restored Wetlands**



**Photo 6 - Restored Breach Area**

<sup>2</sup> William P. Ruzzo, PE, LLC July 26, 2012. *Tower Loop, Cottonwood Wetlands, and Cherry Creek @ 12-Mile Park*

## June 6, 2012 Flood Event

At the time of inspection (~ noon 6-7-12), the flows in Cherry Creek had begun to recede. Photo 6 above is looking downstream at the right bank where the creek previously was breached. The high flow debris-line is clearly visible just to the right of the water surface. The top of newly restored bank is along the wooden fence posts. This clearly shows that the flood did not breach the repaired bank at the breach area. Analysis by CH2M Hill of the debris line using HEC-RAS developed for the Project suggests that peak flow on June 6, 2012 reached values near 2,000-cfs.



**Photo 7 - Bank Overflow Area**

Photo 7 shows the downstream end of the project where the grade was tied back into existing grade in front of the trees. The existing channel bank did overtop in this area, outside of the project limits, then flowed back into the project area and did result in some localized erosion. The area downstream of the breach (to the right of the photo) showed minor erosion and sedimentation and possibly some seeded areas were impacted.

Preliminary conclusion is that the project experienced minor local erosion damage and can be repaired during Phase II of the project at a minor cost. It is also my opinion that if the breach had not been repaired, the environmental damage in the breach area would have been extended wider and further downstream damaging

other wetlands and far exceeding the minimal damages observed.

## WATER QUALITY BENEFITS

An assessment of the water quality benefits for the entire Project was made by the Authority<sup>3</sup>. Water quality benefits from the combined 12-Mile Park and DOLA projects (combined projects) fall into one of two categories, stream stabilization or recreation management.

Stream stabilization benefits and evaluation procedures have been documented in the Authority's Stream Reclamation Interim Report<sup>4</sup>. Benefits include reductions in sediment and other pollutant loads and concentrations, including phosphorus and nitrogen. These benefits are supported by Authority data, literature research, and quantitative analysis.

The 12-Mile Park Stream Reclamation Plan also addresses the dispersed runoff from the DOLA by including a swale along the top of the east bank of Cherry Creek. This BMP is intended to capture minor storm events from the DOLA and provide filtration and infiltration treatment of the runoff. Because of the breach that occurred in the right bank of Cherry Creek, the 12-Mile Park project also includes repairs and restoration of Cherry Creek and the damaged wetland area.

<sup>3</sup> William P. Ruzzo, PE, LLC May 25, 2011. *Cherry Creek Stream Reclamation at 12-Mile Park – Water Quality Benefits and Costs*.

<sup>4</sup> CCBWQA Technical Advisory Committee, June 16, 2011. *Stream Reclamation, Water Quality Benefit Evaluation – Interim Report*.

The Park's DOLA project includes extensive improvements, relative to water quality, such as perimeter fencing, controlled access to Cherry Creek, and waste management practices. In addition to management of the dog use area, the overall DOLA project includes modifications to the horse boarding area, which is adjacent to the DOLA area on the west and south. The principal modification to the horse area, relative to water quality, will be an updated manure management plan.

The analysis by the Authority suggests that when concentrated nutrient (phosphorus) sources are addressed, along with stream reclamation, the water quality benefits are significantly increased, and can reduce water quality protect costs. This supports the Authority's approach of also addressing local sources of nutrients, when partnering with others on stream reclamation projects.



**Figure 2. Cherry Creek State Park Preferred Alternative**

