

MEMORANDUM

JRS ENGINEERING CONSULTANT, LLC

TO: Chuck Reid, Manager - CCBWQA
CC: Rick Goncalves, Chairman, TAC
FROM: James R. "Jim" Swanson P.E.
DATE: December 27, 2013
SUBJECT: Effects of September 2013 Flood Event on PRF's in the Cherry Creek Basin

This memorandum summarizes the effects of the September 2013 Flood Event on existing pollutant reduction facilities (PRF's) in the Cherry Creek Basin.

INTRODUCTION:

On September 14, 2013 the Colorado Front Range experienced an extreme rainfall event. The Cherry Creek Basin received accumulative rainfalls (measured during the seven day interval from September 10, 2013 to September 16, 2013) from 4.25-inches at Cherry Creek Reservoir, 6.25-inches at the Arapahoe/Douglas County Line to 5.35-inches in Parker, CO. NOAA records for the gage at Chery Creek Dam report the 7-day10-year event at 4.59-inches and the 7-day 100-year event at 6.96-inches. The Cherry Creek stream flow rate measured near Parker, CO (USGS 3933109104464500) was approximately 1,000 cfs.

OBSERVATIONS:

Inspection of existing PRF's found that all the structural components functioned well during high flow conditions. Previously constructed PRF's, where the vegetation was re-established experienced minimal erosion damage. Recently constructed PRF's, where the vegetation had not completely re-established, experienced moderate to significant erosion.

Cherry Creek Stream Reclamation @ Eco Park:

An on-site inspection of Eco Park captured the flooding in-progress at the pedestrian crossing near the downstream end of the project as shown in Photo 1. Photo 2 shows the post flooding condition of this crossing.



Photo 2 - Post Flooding @ Pedestrian Bridge



Photo 1 - Flooding @ Pedestrian Bridge



Photo 3 typifies the erosion damage to un-vegetated slopes and crusher fine trails. To date all eroded areas at Eco Park have been repaired. Seeding and mulching of all disturbed areas is complete.

Photo 3 - Typical Bank and Trail Erosion

Mountain / Lake Loop Shoreline Stabilization PRF:

The day prior to the the September 14th storm event, the water surface elevation of Cherry Creek Reservoir was 3.6 feet below "recreation pool" (i.e.: Elevation 5550). The day after the storm event the water surface was almost seven feet higher, at an elevation of 3.2 feet above "recreation pool". Approximately one week prior to this storm event. Messrs Ruzzo and Swanson had performed the annual PRF inspection of the projects located within the Park. After the storm event, a follow-up inspection was performed.



Photo 4 - Erosion from Local Rainfall



Photo 5 - High Water at a Shoreline Structural Feature

The Mountain / Lake Loop Shoreline Stabilization project sustained surface erosion on the graded side slopes where re-vegetation was not yet established and on the crusher fine trails. This type of damage was also observed on other facilities owned and operated by Parks.

The Authority has completed evaluation of all on-site erosion, prepared a restoration plan and negotiated a contract with the Mountain / Lake Loop Shoreline Stabilization project contractor to restore the site to its pre-flood condition. It is anticipated that the project will re-vegetate over the next few years and will then be armored for future high reservoir water events.

Shop Creek PRF:

Shop Creek PRF includes five stilling basin ponds, each with a soil concrete rundown at the upper end of each basin and a reed filled creek channel. This PRF sustained virtually no damage. During the high flows the reeds within the channel laid over and allowed the flow to pass over the top, as shown in Photo 6. The Shop Creek basins, see Photo 7, provided energy dissipation for the storm flow.



Photo 6 - Shop Creek



Photo 7 - Shop Creek Basin

Cottonwood Creek / Wetlands:

Cottonwood Creek / Wetlands performed as designed. No erosion was noted.

IN SUMMARY:

All on-site PRF's performed as designed. It was concluded that the PRF's perform their intended purpose once the vegetation has a opportunity to establish itself. Until the vegetation is established, budgeted funds are needed to annually fully establish the PRF's vegetation.

While the flooding eroded the graded slopes on newly constructed PRF's, it was confirmed that following adequate vegetation cover, the PRF's function well during peak flow conditions.



Photo 8 - Cottonwood Creek / Wetlands