



R I F F L E S T O R I P P L E S

MEMORANDUM

DATE: August 28, 2019

TO: Rick Goncalves, P.E.; Cherry Creek Basin Water Quality Authority (Authority) – Technical Advisory Committee (TAC) Chairman
Chuck Reid, Authority – Manager

CC: Jason Trujillo, Cherry Creek State Park (CCSP) - Park Manager

FROM: Richard G. Borchardt PE, CFM

SUBJECT: 2019 Annual Inspection of Pollution Reduction Facilities (PRFs) at CCSP

Introduction

Annually, the Authority performs Inspection of the PRFs constructed by the Authority at CCSP. The annual inspection is a requirement of the Operations and Maintenance Agreement between the Authority and CCSP dated January 14, 2006 (Agreement). The West Boat Ramp PRF was excluded from the Agreement by the First Amendment dated April 18, 2013 (Amendment).

The purpose of the inspection is to assess whether the PRF's are functioning as designed and to identify routine, restorative, and rehabilitative maintenance requirements. The TAC of the Authority will use this report to provide recommendations to the Board for the following fiscal year budgeting of maintenance activities. Restorative and rehabilitative maintenance requirements are the responsibility of the Authority. Routine maintenance is the responsibility of CCSP. Other items, such as educational/interpretive sign replacement and weed control, as outlined in the Agreement, is shared 50% CCSP and the 50% Authority. The West Boat Ramp PRF routine, restorative, and rehabilitative maintenance is 100% CCSP and/or the Marina.

As defined in the Agreement, the term "Restorative and Rehabilitative Maintenance" shall mean all maintenance and repair reasonably necessary to keep the structural and other essential components or portions of a PRF in good working order and functioning as designed, including but not limited to the repair of walls, embankments, pipes, gates, monitoring facilities, erosion and riprap, the removal of sediment, and the replacement of vegetation within the disturbed area of a PRF as needed to maintain or restore the PRFs function. "Routine Maintenance" shall mean any and all maintenance that is necessary (other than Restorative and Rehabilitative Maintenance) to keep a PRF in a clean, visually appealing and safe condition, free from debris and rubbish, and protected from vandalism and malicious mischief to the same extent as any other public facility located within the CCSP.

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The PRFs that are part of the Stream and Drainage System are inspected at least annually and after storm events since they are more likely observe changes in their condition. The PRFs that are Shoreline Stabilization are inspected on an as needed basis or as the Authority, CCSP and/or USACE personnel identify issues or concerns during the year. The inspection frequency by PRF are shown in **Table 1**.

PRFs Inspected Annually and After Significant Storm Events (Part of Stream and Drainage System)	PRFs Inspected As Needed (Part of Shoreline Stabilization)
Shop Creek Cherry Creek at 12-Mile Park (Phases I and II) Cottonwood Creek Stream Reclamation Cottonwood Wetlands Quincy Drainage West Boat Ramp	Tower Loop East Shade Shelters East Boat Ramp Dixon Grove Mountain and Lake Loop

Table 1 – Frequency of Inspections by PRF

The PRFs were broken into groups to minimize trips and coordinate with schedules of attendees.

- **Group 1:** Mountain and Lake Loop were inspected on March 26, 2019 by Rich Borchardt on behalf of the Authority.
- **Group 2:** Tower Loop, East Shade Shelters, East Boat Ramp, Shop Creek, Cherry Creek at 12-Mile Park (Phases I and II), Cottonwood Creek Stream Reclamation, and West Boat Ramp were inspected July 16, 2019 by Rich Borchardt, on behalf of the Authority and Jason Trujillo, Larry Butterfield, Steven Stanton and Jon Kingery on behalf of CCSP.
- **Group 3:** Dixon Grove, Quincy Drainage, and Cottonwood Wetlands were inspected August 23, 2019 by Rich Borchardt on behalf of the Authority.

General Assessments

The 2019 annual inspection general assessments and photos are provided on the following pages.

Mountain and Lake Loop: Construction of this PRF was completed in 2013. Additional shoreline stabilization and restoration work was performed following the 2015 flooding; it was successful. No significant concerns or problems were identified with PRF. This project appears to be functioning effectively as a shoreline stabilization (**Photos 1 and 2**). A layer of course sand has deposited over rock of one of the Jetties (**Photo 3**). This PRF provides a BioRetention Area that treats access road and parking (**Photo 4**); this area is well vegetated and appears stable.



Photo 1



Photo 2



Photo 3



Photo 4

Tower Loop: No new concerns or problems were identified in 2019 on this PRF. Repairs from 2018 Annual Inspection (**Photos 5-7**) are scheduled for end of 2019. New for 2019, erosion was noted at Boulders near fishing area (**Photo 8**), and it is suggested that monitoring be done with future inspections.



Photo 5



Photo 6



Photo 7



Photo 8

East Shade Shelters: Maintenance identified in 2018 inspection (**Photo 9**); resulted in shoreline protection being budgeted and scheduled for end of 2019 or early 2020. Shifting riprap shown near steps in 2018 inspection (**Photo 10**) was monitored in 2019; suggest continued monitoring of this area. New for 2019, additional shoreline erosion was noted (**Photos 11-12**) continued monitoring of this area is suggested.



Photo 9



Photo 10



Photo 11



Photo 12

East Boat Ramp: Maintenance identified in 2018 inspection (**Photos 13-15**); resulted in budgeting for shoreline protection which is scheduled for end of 2019 or early 2020. New for 2019, additional shoreline erosion was noted (**Photo 16**) to south of previous shoreline stabilization projects; continued monitoring of this area is suggested.



Photo 13



Photo 14



Photo 15



Photo 16

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Shop Creek: Minor deterioration of the top of the roller compacted concrete drop structures #2 and #3 was noted (**Photo 17**) similar to 2018 inspection; continued monitoring of this area is suggested. CCSP performs regular maintenance by cleaning the trash racks, mowing/removing vegetation around the trash racks, and removing woody vegetation in areas that could impact the soil cement structures (**Photo 18**). Trash racks require frequent cleaning for proper operation. The Mile High Flood District is coordinating and scheduling a sediment removal for upstream pond outside of state park (**Photo 19**)¹. Weed control for noxious weeds is needed and a maintenance project is being developed for consideration by Authority’s TAC and Board.



Photo 17



Photo 18



Photo 19



Photo 20

¹ 1 The upstream drop structure is outside the park and is the responsibility of Aurora, but is included in the annual assessment since proper function of all drops is important to the overall performance of the Shop Creek system. Parks Structures are numbered 1 through 5 from upstream to downstream.

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Cherry Creek 12-mile Park Phase I: Phase I was completed in 2012. It has experienced significant sediment aggradation from the 2014 and 2015 storm events. Maintenance identified in 2018 inspection (**Photo 24**); resulted in budgeting for fencing and revegetation which is scheduled for end of 2019. New for 2019, stream sediment levels appear to have a visible improvement over 2018 inspection; continued monitoring is suggested (**Photos 21-22**). Noxious weed control has been performed annually since 2014, and a maintenance effort is being prepared to continue treatment (**Photo 23**); for consideration by Authority's TAC and Board in 2020. Social trails are being formed along bank closed to Dog Off Leash Area; continued monitoring is suggested.



Photo 21



Photo 22



Photo 23



Photo 24

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Cherry Creek 12-mile Park Phase II: Phase II was completed in 2014 and is experiencing high pedestrian / dog activity. It has experienced significant sediment aggradation from the 2014 and 2015 storm events. Stream sediment levels appear to have a visible improvement over 2018 inspection; continued monitoring of this area is suggested. Noxious weed control has been performed annually since 2014, and it was performed by CCSP and the Authority in 2019 (**Photo 25**). Traffic into the Creek has deteriorated the soil lifts (**Photo 26**) and created 10-12 foot wide social path at the edge of the stream damaging grasses and shrubs (**Photo 27**). A maintenance effort for continuing weed control and maintenance project for repairing damage is being developed for consideration by Authority's TAC and Board in 2020.



Photo 25



Photo 26



Photo 27



Photo 28

Cottonwood Creek Stream Reclamation: Noxious weed control identified in 2018 inspection was performed by the CCSP and the Authority (**Photos 29-30**), continued maintenance and monitoring of this area is suggested. There were no signs of erosion or unraveling to the main channel area or structures (**Photos 31-32**). A maintenance effort for continuing weed control, mowing, and fencing is being developed for consideration by Authority's TAC and Board in 2020.



Photo 29



Photo 30



Photo 31



Photo 32

West Boat Ramp: Construction of this PRF was completed in 2014. All maintenance for this PRF is the responsibility of CCSP. Routine maintenance including noxious weed control (mowing and spray application), outlet structure cleaning (box and screen) and clearing willows and woody vegetation from the detention pond and over pipe outfall is needed (**Photos 33-35**). The Marina is storing equipment and materials in spillway area (**Photo 36**); CCSP will follow-up with Marina to relocate these items.



Photo 33



Photo 34



Photo 35



Photo 36

Dixon Grove: No concerns were noted with the original project (**Photos 37-39**). An area to the south of the previous shoreline project shows some erosion (**Photo 40**); continued monitoring of this area is suggested.



Photo 37



Photo 38



Photo 39



Photo 40

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Quincy Drainage: No erosion or revegetation concerns were observed around the detention basin (**Photos 41-42**). CCSP is doing routine maintenance on dead and downed trees (**Photo 43**). Erosion was observed on Quincy Drainage upstream of the detention basin to the Perimeter Road (**Photo 44**).



Photo 41



Photo 42



Photo 43



Photo 44

Cottonwood Wetlands: No erosion or revegetation concerns were observed (**Photos 45-48**).



Photo 45



Photo 46



Photo 47



Photo 48

Conclusions

The conclusions and suggestions from the 2019 Annual Inspection of PRFs are:

1. All PRFs appear to be performing their function. Some maintenance needs are recommended, and continued monitoring of developing concerns/issues are suggested.
2. This 2019 Report has identified several maintenance efforts and projects for consideration by the Authority's TAC and Board are summarized as follows (**See Appendix A**).
 - a. The projected total O&M cost as the result of this inspection for 2020 is \$124,200 as compared to the 2019 budget of \$114,400.
 - b. The Authority's noxious weed control (herbicide application) can be more readily accomplished by using the CCSP vendor for weed control (i.e.: Vegetation Management Inc, aka. VMI). The Authority purchased a seed drill for CCSP. Seeding areas are identified and a quantity of seed is estimated herein for budgeting purposes. CCSP will perform the reseeding and over-seeding on behalf of the Authority.

Appendix A

