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**DATE:** October 28, 2021

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**TO:** Jacob James, P.E.; Cherry Creek Basin Water Quality Authority (CCBWQA) – Technical Advisory Committee (TAC) Chairman  
CCBWQA Manager

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

**FROM:** Richard G. Borchardt PE, CFM

**SUBJECT:** 2021 Annual Field Observation of Pollution Reduction Facilities (PRFs) at CCSP

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## Introduction

Annually, the CCBWQA performs Field Observation (FO) of the PRFs constructed by the CCBWQA at CCSP. The annual FO is a requirement of the Operations and Maintenance Agreement between the CCBWQA 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 FO is to assess whether the PRF's are functioning as designed and to identify routine, restorative, and rehabilitative maintenance requirements. The TAC of the CCBWQA 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 CCBWQA. 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% CCBWQA. 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.

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

<b>PRFs Field Observation Annually and After Significant Storm Events (Part of Stream and Drainage System)</b>	<b>PRFs Field Observation As-Needed (Part of Shoreline Stabilization)</b>
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 Field Observation by PRF**

In 2021, only the PRFs on the Stream and Drainage System were observed as there were no new issues or concerns with the Shoreline Stabilization since the 2020 PRF FO. The FO was performed on 3 dates to coordinate schedules and minimize travel time.

- **July 7, 2021:** West Boat Ramp, Cottonwood Wetlands, and Cottonwood Creek Stream Reclamation were observed by R2R Engineers on behalf of CCBWQA.
- **July 16, 2021:** Cherry Creek at 12-Mile Park (Phases I and II), Shop Creek, and Quincy Drainage were observed by R2R Engineers on behalf of CCBWQA.
- **August 25, 2021:** Highlights from previous observations of West Boat Ramp, Cherry Creek 12-mile Park (Phases I and II), Shop Creek, and Quincy Drainage done were visited with CCSP Staff (Claudia Mead, Larry Butterfield, and Jonathan Kingery).

## General Assessments

The 2021 annual FO general assessments and photos are provided on the following pages.

West Boat Ramp (Reservoir Water Surface Elevation = 5551.1 on 7/7/21 and 5549.4 on 8/25/21):

Construction of this PRF was completed in 2014. All maintenance for this PRF is the responsibility of CCSP. Routine maintenance cleaning of the outlet structure box and screen and clearing of woody vegetation that was completed by CCSP staff between the 7/7/21 (**Photo 1**) and 8/25/21 (**Photo 2**) FOs. Marina continues to store equipment and materials in spillway area (**Photo 3**); CCSP staff will continue to work with the Marina to relocate these items. Some pooling of water in outlet structure was observed. Noxious weeds (Leafy Spurge, Musk and Canadian Thistle, etc.) are present. Lower Branches of Trees (Cottonwood and Peach-Leaf Willow) could benefit from trimming.



Photo 1



Photo 2



**Photo 3**

Cottonwood Wetlands: Weed Control efforts by CCBWQA and CCSP appear to be working. Continued Weed control is still needed, as noxious weeds (Leafy Spurge, Musk and Canadian Thistle, etc.) are present. (**Photos 4 and 5**). Some woody vegetation was observed around outlet (**Photo 6**) and water level was up (**Photo 7**) from recent storm, so lower grates of outlet structure were under water and not observed.



Photo 4



Photo 5

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**Photo 6**



**Photo 7**

Cottonwood Creek Stream Reclamation: Riparian and wetland vegetation along stream banks is thriving (**Photos 8 and 11**). Xcel Gas Line installation is disturbing adjacent upland vegetation to the stream (**Photo 9**). Weed Control efforts by CCBWQA and CCSP appear to be working. Continued Weed control is still needed, as noxious weeds (Leafy Spurge, Musk and Canadian Thistle, etc.) are present consider expansion of weed control to include Russian Olive Tree Removal (**Photo 10**).



Photo 8



Photo 9



**Photo 10**



**Photo 11**



Cherry Creek 12-mile Park Phase I: 2019 revegetation effort in fenced area is filling in (**Photo 12**). Phase I was completed in 2012 and it experienced significant sediment aggradation from the 2014 and 2015 storm events, appeared to have improved in 2020, now bed erosion is taking place with water now appearing at bottom of boulder edging and soil between trail and boulders is eroding leaving exposed riprap (**Photo 13**); the Cherry Creek 12-mile park 3 project currently under design will help provide grade control and prevent further bed erosion at the north end of Phase 1. Additional evidence of bank erosion is taking place (**Photos 14 and 15**).



Photo 12



Photo 13



**Photo 14**



**Photo 15**

Cherry Creek 12-mile Park Phase II: Phase II was completed in 2014 and is experiencing high pedestrian and dog activity. It did experience significant sediment aggradation from the 2014 and 2015 storm events, appeared to have resolved itself in 2020, and now appears to be experiencing bed erosion (**Photos 16**). Noted in 2019 and 2020 FO, traffic into along the banks of the Creek has denuded the vegetation and continued in 2021 (**Photo 17**). Area behind Boulder Edging is eroding, the Boulders have tipped, and a maintenance effort planned for 2021 has been deferred due to the increased bed and bank erosion that was observed (**Photo 18**) the extents may necessitate a larger Capital Project at some point. Social trails and bank protection were observed on side channel on south end of phase 2 (**Photo 19**), could be done as maintenance effort or part of the afore mentioned larger Capital Project. Noxious weed control and mowing was done by CCSP in 2021 and should be continued by CCSP, as additional noxious weeds are present (musk thistle in **Photo 20**).



Photo 16



Photo 17

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Photo 18



Photo 19



Photo 20

Shop Creek: Tree root intruded into roller compacted concrete drop structures #3 (**Photo 21**); CCSP staff will remove tree. CCSP performs regular maintenance by cleaning the trash racks and mowing and removing vegetation around inlets. Inlet box grate on upstream of drop structure #5 (**Photo 22**) has pulled away from structure breaking off a chunk of concrete. In addition, broken bolts for 2 grates were noted during follow-up visit with CCSP Staff. Maintenance work is needed to repair grates to replace broken bolts and pulled away concrete. Weed control activities were going on during 7/16/21 visit (**Photo 23**), it was started in 2020. Continuation of this weed control is included as several noxious weeds (Leafy Spurge, Musk and Canadian Thistle) are still present (**Photo 24**).



**Photo 21**



**Photo 22**



**Photo 23**



**Photo 24**

Quincy Drainage: CCSP Staff cleans outlet structure (**Photo 25**). No erosion was observed around the detention basin (**Photo 26**). Noxious weeds (Leafy Spurge) were observed on bank (**Photo 27**).



**Photo 25**

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**Photo 26**



**Photo 27**



## Conclusions

The conclusions and suggestions from the 2021 Annual FO of PRFs are:

1. All PRFs appear to be performing their function. Some maintenance is recommended, and continued monitoring of developing concerns/issues are suggested.
2. This 2021 Report has identified maintenance for consideration by the TAC and Board are summarized as follows (**See Appendix A**).
  - a. The projected O&M costs for CCBWQA as the result of this FO for 2022 is \$204,850 as compared to the 2021 budget of \$213,270.
3. The continued revegetation efforts on PRFs are included below.
  - a. The CCBWQA's noxious weed control (herbicide application) can be more readily accomplished a weed control contractor.
  - b. No tractor reseeding was identified for 2022. For reseeding areas that can be done by tractor, the CCBWQA purchased a seed drill for CCSP. These reseeding 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 CCBWQA.
  - c. No tree or shrub replacement were identified for 2022.
4. The Cherry Creek 12-mile Park phases 1 and 2 projects is experiencing bed and bank erosion. While the Cherry Creek 12-mile Park phase 3 is expected to provide grade control towards the north end of the phase 1 project, the additional bed and bank erosion is a concern and may eventually necessitate a larger rehabilitation project at some point. The high use by dogs and people continue to denude the vegetation in the area; rill erosion has been observed and several eroded travel paths around willows have formed (**Photo 28**). It suggested that this project be evaluated and prioritized with the other projects in the Cherry Creek Reservoir to Cherry Creek State Park Boundary Study.



**Photo 28**

## **Appendix A**

**Cherry Creek Basin Water Quality Authority**  
**Summary of Operation & Maintenance (O&M) Costs**  
 Prepared / Updated: October 12, 2021

Project	Quantity			CCSP Work	CCBWQA Purchases Seed with CCSP Installation	CCBWQA Work					Comments	Total Cost
	Each	Hours	Acres	Mowing <sup>1</sup>	Tractor Reseeding (Seed Cost Only) <sup>2</sup>	Herbicide Application <sup>1</sup>	Tree Planting <sup>3</sup>	Shrub Planting <sup>3</sup>	Misc.	Restorative / Rehabilitation work <sup>4</sup>		
Shop Creek			8			\$ 2,200					Stream Corridor Only, Remaining Areas done by CCSP	\$ 11,200
	1									\$ 9,000	Concrete Repair at Inlet Grate Connections	
Cottonwood Creek Ph I & Ph II			15			\$ 2,400					Stream Corridor Only, Remaining Areas done by CCSP	\$ 24,000
	1	4		\$ 1,600						\$ 20,000	Mowing done by CCSP Fencing, Erosion Control, Soil Amendment,	
Cottonwood Wetlands			10			\$ 2,000					Stream Corridor Only, Remaining Areas done by CCSP	\$ 2,000
CC @ 12-Mile Park Ph I		8		\$ 3,200							Mowing done by CCSP	\$ 3,200
CC @ 12-Mile Park Ph II		8		\$ 3,200							Mowing done by CCSP	\$ 57,200
	1									\$ 54,000	Riprap Bank Protection, Soil Amendment, Seed Bed Prep, Seed, Blanket, and Fencing	
Mountain/Lake Loop Shoreline <sup>5</sup>			4			\$ 1,200					Stream Corridor Only, Remaining Areas done by CCSP	\$ 24,850
	1									\$ 23,650	Carryover from 2021, Restore shoreline area	
East Boat Ramp <sup>5</sup>	1									\$ 90,400	Carryover from 2021, Restore shoreline area	\$ 90,400
East Shade Shelters											No Maintenance Planned for 2022	\$ -
West Boat Ramp											WBR is CCSP Maintenance Responsibility	\$ -

Subtotal \$ 8,000 \$ - \$ 7,800 \$ - \$ - \$ - \$ - \$ 197,050

**Totals**  
 CCSP = \$ 8,000  
 CCBWQA = \$ 204,850  
 Combined = \$ 212,850

Areas in Acres

37  
0

Note 1. Mowing Rate = \$400/hr. to meet shared 50/50 PRF maintenance participation between CCBWQA and CCSP; CCSP performs mowing and CCBWQA performs herbicide application for noxious weed control.  
 Note 2. Reseeding Rate = \$800/acre. CCBWQA purchases seed CCSP installs it with their tractor and the seed attachment purchased by CCBWQA.  
 Note 3. Tree Replacement = \$1,000/ea. Shrub Replacement = \$50/ea. CCBWQA Participation @ 100%.  
 Note 4. PRF Function Repair/Maintenance. Project Specific Estimate. CCBWQA Participation @ 100%.  
 Note 5. Projects are being carried over from 2021 to 2022.





