

SHORELINE STABILIZATIONS

East Shade Shelter, East Boat Ramp, Tower Loop, and Dixon Grove

Memorandum

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To: Chuck Reid, Manager, CCBWQA
CC: Rick Goncalves, Chairman, TAC
From: William P. Ruzzo, P.E.
Date: December 27, 2013
Re: Early Shoreline Stabilization PRFs – Project Summary Report

Presented in this memorandum is a summary of the early (pre 2000) shoreline stabilization pollutant reduction facilities (PRFs, see Figure 1 Location Map).

BACKGROUND AND PURPOSE

The Authority began constructing shoreline stabilization PRFs in 1996 with the East Shade Shelter and East Boat Ramp projects, which were followed by the Tower Loop and Dixon Grove projects in 1999 (see Figure 1 *PRF Location Map*). The most recent project at Mountain and Lake Loop was completed in 2013¹ and design of the West Shade Shelter PRF is projected for 2016. To date, the total cost of shoreline PRF's exceeds \$1,214,000.

The dominant shoreline stabilization method is to use riprap and large boulders supplemented with willow, bushes, trees, and other suitable vegetation plantings. See Photos 1, 2, and 3. Runoff from parking lots is addressed by creating wetland retention areas (see Photo 1) or infiltration areas that filter pollutants in the runoff minimizing the discharge into the reservoir.

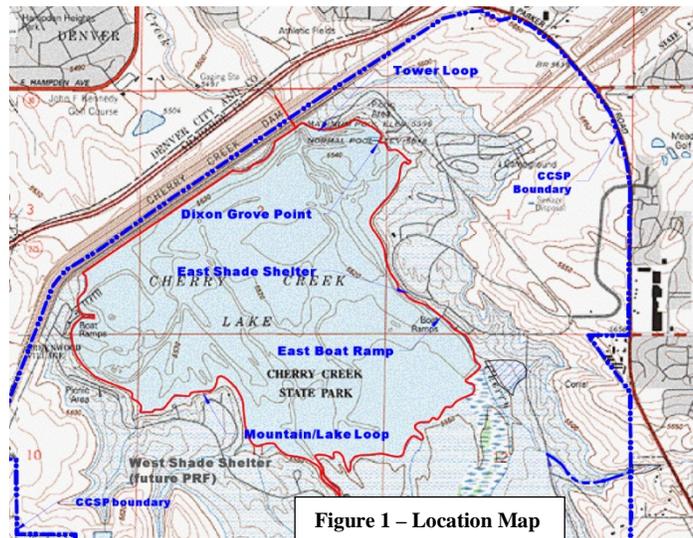


Figure 1 – Location Map

The earlier shoreline PRF's placed large boulders, typically 36" or larger, along the water's edge with the top of the boulder about 18" above the normal maximum water surface (i.e.: 5550 feet) in the Reservoir. For the Tower Loop project (Photo 3), boulders were stacked two and three high creating a wall that raised the fishing platforms constructed along the steep shoreline slope.

¹ See separate project summary report.

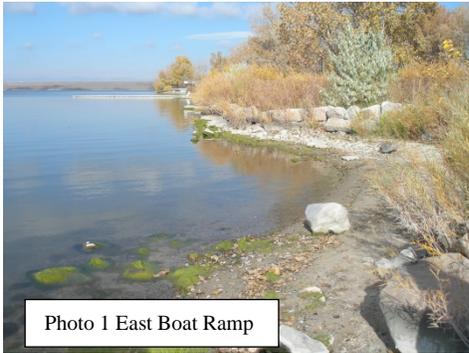


Photo 1 East Boat Ramp



The boulder sizes exceed rock sizes needed to protect the shoreline from wave erosion. However, it was observed during some winter and early spring periods that ice forces were able to move and displace some large boulders at the east shoreline projects and, for



Figure 3 Tower loop

Tower Loop, resulted in failure of the boulder walls. The impact of ice forces on shoreline erosion was investigated and changes to the design approach have evolved over the years. See report² for findings and recommendations regarding the Authority's approach.

PROJECT PARTNERS AND FUNDING

All PRFs within the limits of Cherry Creek State Park are designed, constructed, and maintained by the Authority without funding assistance from other local governments.

WATER QUALITY BENEFITS

Shoreline stabilization projects qualify as PRF because they minimize the quantity of soil, with attached phosphorus and other pollutants, eroded along the edge of the reservoir that become deposited directly into the lake. In many cases, shoreline erosion and pollutant discharges to the reservoir are aggravated by parking lots that discharge pollutants directly to the reservoir. Discharges from parking areas are directed to wetland detention areas or infiltration retention areas to immobilize pollutants. Erosion is primarily the result of



wave and ice forces acting on the shoreline soils, but also from pedestrian and domestic animal uses that destroy vegetation exposing bare soils that are more readily eroded. Examples of shoreline erosion at Cherry Creek are shown on the Photos 4 and 5.



CONCLUSIONS

Stabilization of the reservoir shoreline continues to be a priority PRF for the Authority as it represents the "first line of defense" when managing pollutant discharges into the Reservoir.

² William P. Ruzzo, PE, LLC November 11, 2013. *Shoreline PRF Design Approach at Cherry Creek Reservoir.*