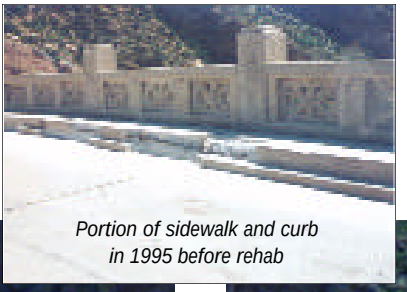
Case History

Rehabbed Concrete on Coolidge Dam: Nine Years and Still Holding

By Lori R. Huffman, JPCL-PCE

After their rehabilitation in 1995, the concrete curbs and pylons on the roadway atop the Coolidge Dam are in excellent condition, despite the original soluble salt contamination on concrete and rebar, says Jim Johnson of Chlor*Rid International (Chandler, AZ), who helped remediate the salt problem in 1995.

At that time, the concrete curbs and pylons of the roadway over the Coolidge Dam were severely cracked and spalling. As part of a larger project, which included work on the dam's spillway walls and sidewalls as well as the roof of the powerhouse, these areas were rehabilitated and brought back to their original appearance through pressure washing with a solution of liquid soluble salt remover, removal of damaged concrete, crack repair, concrete replacement, and the application of a protective coating, says Johnson.



Portion of sidewalk and curb in 1995 before rehab

At the time of the rehabilitation, high levels of chlorides in the concrete were

Curb and walkway on both sides of road 9 years after rehab

This sidewalk area has had puddled standing water since being repaired and recoated but the coating remains intact
*Photos courtesy of Chlor*Rid*

found to have accelerated the corrosion of the rebar, of particular concern for the pylons, which exhibited severe cracking. (See "Coatings on Dam Intact 4 Years after Rehab, Salt Removal, Repainting," *JPCL*, October 1999, pp. 56–71 for project details.). The Bureau of Reclamation approved the strategy of Johnson's former coatings application company to decontaminate the concrete, despite the Bureau's lack of established specifications for dealing with chloride contamination and the experimental nature of the treatment of the cracks in the concrete pylons.

According to Johnson, the damaged areas of the concrete curbs were saw-cut, chiseled out, pressure washed with salt removal solution, and replaced with epoxy-bonded concrete. The concrete surface was pressure washed with a 1:100 dilution of the liquid soluble

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Top: Pylon before rehabilitation in 1995. Center and bottom: Pylon in September 2004. There is minor rust staining from the fixture above. Completely intact as completed in 1995 with some small rust stain bleeding from above.

salt remover. Painters then applied a water-borne textured elastomeric with a fine aggregate added to the coating material to mimic the look of concrete.

The contractor used the same dilution of liquid soluble salt remover and pressure washed the cracks in the pylons at 3,000 psi. Johnson determined the amount of time needed for cleaning based on the length of the crack. The requisite time worked out to 10 to 15 minutes per linear foot, he says. The workers held the pressure washing nozzles directly on the cracks and as close to the surface as possible while cleaning. Johnson estimates that approximately 600 linear feet of cracks were cleaned. After cleaning, the contractor filled the cracks with a 100% solids epoxy that was injected through a system of ports located from the bottom to the top of each crack.

Delicate fill work had been performed on the pylons. The damaged scroll and crest pieces of these structures were also reconstructed. Once this work was complete, the pylons were also pressure washed to remove chlorides before painting with the same elastomeric coating.

When Johnson examined the curbs and pylons in September 2004, he was pleased with their appearance. He gave particular attention to the horizontal portions of the walkways on either side of the roadway and the "bird bath areas" where water tends to pool. According to Johnson, the concrete patching on the curbs was sound. Johnson's main concern for the pylons was the possibility of recracking due to rebar corrosion; however, inspection revealed that the structures remained sound. Johnson was able to find only two small areas of the pylons that had cracked, one measuring about four inches and the other measuring approximately six inches.

Terry Johnson, dam tender for the Coolidge Dam, confirms Johnson's inspection. Although the Dam has not undergone a formal inspection by the Bureau of Reclamation, Terry Johnson, an employee of the Bureau of Indian Affairs (which oversees the Dam), has observed its appearance. The concrete curbs and pylons are in good condition, with some minor flaking of the paint, he reports. Unfortunately, however, one of the pylons had been vandalized, and some of the decorative concrete was removed, he adds. Jeff Riley of the U.S. Bureau of Reclamation, who participated in the 1995 project, says that the Bureau expected the rehabilitation to provide 20 to 25 years' of service. Based on the current condition after almost a decade of exposure, the rehab efforts should continue to perform for several more decades, says Johnson.