Case Study

Market
Water & Waste Water

Application
Concrete Repair

Focus
Carbonation Surface Erosion

Project: Joint Water Pollution Control Plant - LA County
Owner: Los Angeles County
Specifier:
Contractor:
Year: 2001

The Problem

The Joint Water Pollution Control Plant (JWPCP), owned by the Sanitation District of Los Angeles County is located in the City of Carson, California. The plant is on roughly 350 acres and treats 350 million gallons of wastewater per day. The plant is critical to supply the needs of over 3.5 million people and many industries in Los Angeles County. The primary concerns of the Owner were the noticeable erosion of the surface and alarming exposure of the coarse aggregate.
The problem was limited to the top ¼" of the surfaces. The cause of the cement paste softening and consequent surface erosion was the result of continuous exposure to the aggressive nature of the effluent with the pH ranging between 6.1 and 6.9.

The Sika Solution

Based upon the condition survey and the owner's requirements, the engineer proposed removal of the ½ of the concrete surface by high pressure water blasting. The section of the repair material would be based upon specific material properties that included minimum compressive strength maximum absorption, maximum pore space and maximum permeability. Several products were tested and screened based on project needs and material specifications. The contractor selected. SikaRepair 224, a prebagged machine/hand-applied repair as the product of choice. SikaRepair 224 is a one-component, pre-packaged, ready-touse, cementitious, silica fume, fiber reinforced, high strength shrinkage-compensated mortar. Formulated for application by trowel or low pressure spray, it is designed especially for repair of overhead and vertical surfaces.

Material Manufacturing
Because of the critical schedule requirements, the contractor purchased 5.1 million pounds of SikaRepair 224 instead of the estimated 2.5 million pounds needed to complete the job. Material manufacturing began on January 17, 2001. All of the material was manufactured in Sika Corporation's Santa Fe Springs, CA facility and

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stored in a warehouse near the construction site. Material was produced in 'super sacs', each of which weighed 2,500 pounds. An average of 40 sacs or 100,000 pounds was produced daily. The surfaces were prepared using high-pressure water blasting at 30,000 psi. The equipment was operated robotically. The profile resulting from the preparation was very aggressive, approximately +/- ¼" amplitude, matching an ICRI CSP 9 profile. Because of the aggressive nature of the preparation 1"-1¼" of concrete was removed rather than the ½" specified. Fortunately, the contractor had ordered double the amount of material originally estimated.

Crews of 60 men worked in 10-hour shifts. Two shifts worked six days per week. Between 5,000 and 10,000 pounds of SikaRepair 224 was applied every hour. The contractor averaged an amazing 120,000 pounds of SikaRepair 224 applied daily.

Vertical and overhead overlays were applied using wet process shotcrete equipment. Horizontal overlays were pumped and mechanically screeded to the proper thickness. As indicated previously, some areas due to manhole access logistics, required to be pumped 500 feet in order to be placed.

On-site Test Results

All of the areas tested passed all of the specified requirements. Pull-off strengths of SikaRepair 224 were between 300 and 800 psi, averaged 600 psi and always pulled substrate or failed in the epoxy adhesive of the testing device.

Summary of Jobsite QA/QC Test Results – SikaRepair 224:

Test	Test Identification	Acceptance Criteria	Jobsite Average
Compressive Strength	ASTM C 42	28 MPa (4,000 psi)	56 MPa (8,000 psi)
Pore Space	ASTM C 642	15% by volume	12%
Water Absorption	ASTM C 642	8% by weight	6%
Chloride ion permeabiltiy	ASTM C 1202	800 coulombs	300 coulombs
Overlay Bond Pull-Off	ACI 503 R, Appendix A	1 MPa (150 psi)	4 MPa (600 psi)

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