



MARKET APPLICATION FOCUS

Wastewater Treatment

Concrete Repair & Protection

Corrosion Induced Cracking & Spalling

Project: Westerly Wastewater Treatment Plant
Cleveland, OH.
Owner: Northeast Ohio Regional Sewer District
Specifier: Dodson Stilson
Year: 1997 - 1998

THE PROBLEM

Built along the shore of Lake Erie in the early 1900's, the 100 MGD Westerly WWTP had 16 Combined Sewer Overflow (CSO) storage tanks added to the plant in the mid-1960's. The 16 concrete tanks were experiencing significant cracking and spalling on walls, floors, and deck walkways. Petrographic analysis revealed that the deterioration of the concrete was due mainly to corrosion of the rebar which had been accelerated by the lack of sufficient concrete cover.



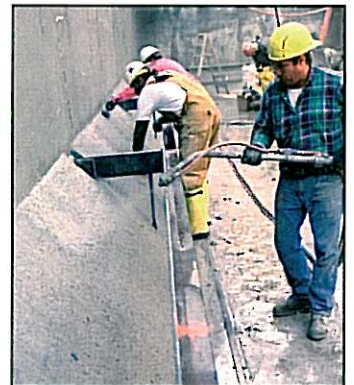
In addition to repairing all cracks and spalls inside the tanks, the owner desired a protective/waterproof coating which would not only protect the concrete from the physical and chemical effects of the wastewater, but could also be easily cleaned with high pressure fire hoses.

Adding to the difficulty of the project was the fact that the owner could only allow 4 tanks at a time to be taken out of service and those 4 tanks could only be shut-down for a maximum of 3 months.

THE SIKA SOLUTION

After all loose/deteriorated concrete was removed, the exposed rebar was coated with Sika Armatec 110 to protect the rebar against further corrosion. The visible damage was then repaired by using the wet-spray process with SikaRepair 224, a one component, silica fume and fiber reinforced cementitious repair mortar. Latent corrosion damage that had not yet resulted in cracking or spalling in the concrete was addressed by spray applying Sika FerroGard 903 which penetrated through the existing concrete to restore the passivating layer around the rebar. Cracks were sealed using the Sikadur Combiflex system which uses Sikadur 31 epoxy gel to bond a hypalon rubber strip across the crack. The hypalon/epoxy composite sealed the crack while still allowing the crack the freedom to move in any direction from changes in temperature and/or load.

To achieve the required surface protection and ease of cleaning required by the owner, the engineer specified Sikagard 62 epoxy coating. However, as with all epoxy coatings, the moisture content of the concrete substrate should be less than 4% in order to lessen the likelihood of blisters, pinholes and delaminations occurring in the coating. After 30 years of almost constant submerged conditions, it was very unlikely that the moisture content would be less than 4% within the 3 month time period allotted for completion. To overcome this obstacle, Sikagard 75 EpoCem, a combination of water-based epoxy and high performance mortar, was used to create a temporary moisture barrier that allowed the epoxy coating to be applied the following day.





For Wastewater Treatment Facilities... Sika's System approach to Concrete Repair and Protection

Anti-Corrosion Primer and Bonding Bridge

Sika Armatec® 110 EpoCem® - protects the steel from corrosion in areas of inadequate cover. Improves bond of repair mortar to both the substrate and steel.

High-Performance Repair Mortars

SikaTop® PLUS mortars - two-component, polymer-modified materials containing Sika FerroGard 901 corrosion-inhibiting admixture.

Sikacem mortars are machine-applied by dry-process shotcrete techniques for large scale repairs requiring a high level of concrete protection.

Leveling mortars for Coating Damp Concrete

Sikagard® 75 EpoCem® - can be used as temporary moisture barrier to allow application of epoxy coatings (even when the concrete cannot be made dry).

Problem Joints/Cracks Sealing System

Sikadur® Combiflex® - a unique strip and seal system used to seal problem joints and cracks, even those undergoing extreme movement. Failed joint sealants need not be removed prior to installing Combiflex (a great labor savings).

Joint Sealing

Sikaflex®, High Performance Sealants - are premium-grade polyurethane joint sealants that are fully compatible with Sika's concrete repair systems.

Surface Sealing/Waterproofing Mortar

SikaTop® Seal 107 - a polymer-modified waterproofing and surface sealing mortar for tanks and reservoirs. Used on the inside of the tank walls it prevents water-loss (seepage) and prevents surface erosion. Used on exterior walls it protects water quality by preventing infiltration.

Protective Epoxy Coating

Sikagard® 62 - a 100% solid, high-build protective coating used successfully on water projects for decades. It offers long-term protection to the concrete and easy maintenance.

Epoxy Injection and Bonding

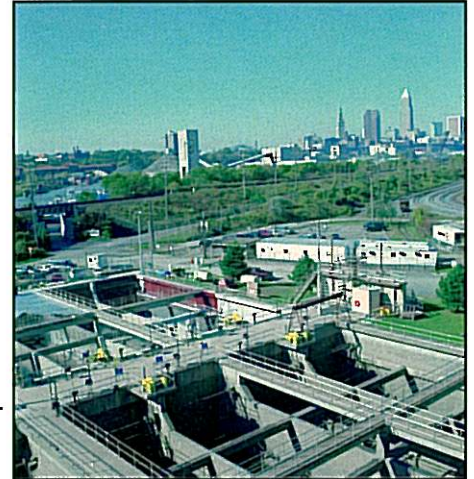
Sikadur® - epoxy resins help restore structural integrity by injection into cracks and voids. The most comprehensive range of epoxy products for structural bonding and grouting.

Structural Strengthening Systems CFRP

Sika CarboDur® - a proven system of external strengthening using epoxy-bonded Carbon Fiber Reinforced Plastic (CFRP) laminate strips. Stronger than steel, yet lightweight and non-corrosive, this system can solve unique strengthening problems in a variety of concrete structures.

Chemical Grouts for stopping water leaks

SikaFix® - chemical grouts are polyurethane-based and expand into a foam upon contact with water. When injected into leaking cracks, joints or crevices this expansion process forms a seal which stops water infiltration - fast!



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