



CASE STUDY

BAYSHORE BOULEVARD BALUSTRADE REHABILITATION

Owner: City of Tampa - Contracts Admin. Dept. Tampa, FL

Project Engineer/Designer: Weber and Tinnen, PA - Structural Engineers Tampa, FL

Repair Contractor: C.A. Lindman of South Florida, LLC Pompano Beach, FL

Material Suppliers/Manufacturers: Sika Corporation, Lyndhurst, New Jersey



INTERNATIONAL
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Background

Considered to be the world's longest continuous sidewalk, Bayshore Boulevard in Tampa FL, is a 5 mile stretch of concrete uninterrupted by any cross streets. This unbroken 10' wide pathway with breathtaking views of Tampa Bay and the skyline of beautiful downtown Tampa is the perfect venue for runners, walkers, skaters and bicyclists. Construction of Bayshore Blvd. and the seawall dates back to 1907. Supporting the sidewalk and separating the public walkway from the waters of Tampa Bay is a concrete seawall. On top of the seawall sits a 5 mile long ornate reinforced concrete balustrade (decorative railing), circa 1950, that provides a safe travel-way for pedestrians. However, chloride-induced corrosion was evident along the entire 5 mile length of the railing from 60 years of exposure to the Tampa Bay sea water environment. Cracks ranging from hairline to 1/4" wide were prevalent throughout the structure. Significant damage existed at the expansion joints formed in the original balustrade to help relieve stresses. The existing expansion joints were not large enough to accommodate the realized movement in the structure. Therefore, when the concrete balustrade would undergo thermal expansion, pressure would cause cracking and spalling of the concrete. Once cracked or spalled, water and chlorides could freely enter the concrete and accelerate the corrosion process. The northern most, 582 feet long section of the railing was in the worst condition, with badly spalled concrete and exposed reinforcing steel.



Damaged baluster revealing reinforced steel.



Damage to a post and rail section.

Sika Solution

The objective of the repair was to extend the life of the structure and lessen future maintenance costs and the need for significant repairs. The rehabilitation process consisted of many major items of work. The balustrades that were beyond repair were removed and replaced. Cracks between 1/16" and 1/4" wide were sealed with Sikadur® 31 and Sikadur® 35 epoxy, cracks less than 1/16" wide were sealed with SikaTop® Seal 107 - a flexible polymer modified cement based coating. 5 miles of the existing joint sealant between the base of the balustrade and the concrete sidewalk were removed and new silicone joint sealant installed. Vertical and horizontal spalls were patched with polymer-modified repair material SikaTop® 123 Plus. Newly Installed expansion joints relieved stress at selected locations and existing expansion joints that were closed were either re-cut or removed and re-formed. The deteriorated exposed rebar was replaced with stainless steel rebar to resist corrosion. Sika® Ferrogard® 903 migrating corrosion inhibitor was applied to all the concrete elements along the 5 mile long balustrade. The final step in the rehabilitation process was to coat the concrete railing with SikaTop® 144 - a breathable, polymer modified, cementitious protective coating. The purpose of this coating was to protect the reinforced concrete railing from the salt water spray from the bay and to provide a like-new appearance. Mineral color pigments were added to the 3,360 gallons of SikaTop® 144 on site to create an off-white color.

Common crack in the top rail of the balustrade attributed to expansion and contraction.



SikaTop® Plus Mortars - two component polymer modified materials containing Sika FerroGard® 901 corrosion inhibiting admixture.

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.

SikaTop® 144 - a cement based waterproofing coating, was used to protect all unrepaired areas of the building and to help hide the completed repairs.

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.

Sika® FerroGard®-903-as a dual action corrosion inhibitor, will reduce corrosion currents by penetrating through the concrete and forming a protective coating on the embedded steel bars.

Sikagard® 550W Elastocolor and 670W - protect concrete facades from the damaging effects of carbon dioxide (carbonation), water and pollutants. Either crack-bridging (550W) or rigid (670W), both are high-performance protection coatings, available in a variety of decorative colors.

Sikadur® 22 Lo-Mod - an epoxy resin that provides a hard wearing, slip resistant wearing surface. This overlay system seals the concrete and provides waterproofing protection.

Sika® Armatec® 110 EpoCem - protects rebar in areas of inadequate cover.

SikaWrap® - Carbon and Glass Fiber Fabrics wrap around concrete and masonry structures for repair and strengthening.