CASE STUDY
BELLAIRE TOWER

Owner: The Bellaire Homeowners Association, San Francisco, California
Project Engineer/Designer: JFM Enterprises, Inc. (Consultant), San Francisco, California
Repair Contractors: Everest Waterproofing & Restoration, Inc., San Francisco, California
Material Supplier/Manufacturer: Sika Corporation, Lyndhurst, New Jersey
Wiss, Janney, Elstner Associates, Inc. (Consultant), Emeryville, California

INTERNATIONAL CONCRETE REPAIR INSTITUTE

ICRI Award Winner
Award of Excellence
High-Rise Category

BUILDING TRUST

Background

Bellaire Tower, also known as the "Jewel," sits 20 stories high on top of Russian Hill in San Francisco, CA. Built in 1930, Bellaire Tower was designed by architect H.C. Baumann, a prolific San Francisco architect who designed over 400 apartment buildings and hotels. The tower was one of the first residential high-rise buildings in San Francisco constructed to new seismic codes after an earthquake struck in 1906. Abiding by these new building codes allowed Bellaire Tower to hold strong through the 1989 Loma Prieta earthquake.

The Problem

Bellaire Tower is home to many affluent residents however over the past two decades it has become infamous for the most water leaks of any building in the Bay Area. The leaks occurred mostly around the windows and repeated attempts of recoating left over 90 mills of nonbreathable coating on the beguiling exterior. 'Dress' beads of sealant were also applied in failed attempts to correct the leaks. Furthermore, concrete spalling posed a safety hazard in addition to unappealing exterior inconsistent with a luxurious building. The columns and beams are framed with structural steel while the floor slabs and exterior walls are constructed of reinforced concrete. The exterior wall is 80,000 sf with 640 windows. The Art Deco exterior consists of a Portland cement parge finish with ornate columns and arches. As highlighted in the images above, most of the spalling occurring around the windows where leakage occurred and was caused by corrosion of the steel window flanges embedded within the surrounding concrete. Joints and cracks that came about due to corrosion of the reinforcing steel within the exterior wall were a potential source for leaking and spalling in the walls.

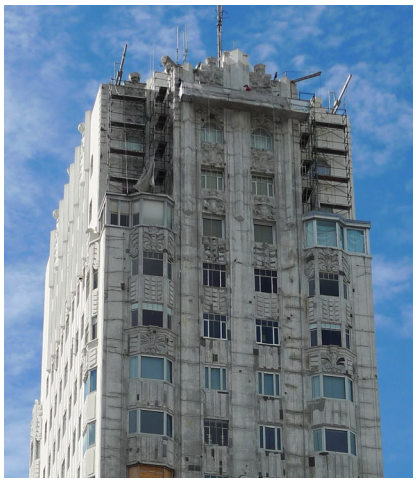
Good example of spalling caused by the window steel flange corrosion.

An old window showing signs of its age.

The Sika Solution

The planning department insisted on keeping the original appearance of the building and restoring the elaborate ornamental features while protecting the building from future damage. Moving cracks were routed and sealed with a polyurethane sealant, Sikaflex® 1A. Reinforcing steel was coated with an epoxy-cement coating, Sika Armatec® 110. Spall repairs were either hand-applied or formed and poured with polymer-modified repair mortars, SikaTop® 123+ and SikaRepair® 223. Sika® Galvashield® XP+ and CC galvanic anodes were used along with Sikacrete® 211 and SikaGrout® 212 to protect the steel window flanges and select areas of the reinforcing steel near the windows. On the north and east elevations, some windows had to be removed and replaced without refurbishment as they were beyond repair. After the windows were addressed, the exterior walls were power washed and coated with an elastomeric, breathable, waterproof coating, Sikagard® 550W.

Completed area with intricate detailing and ornamentation. The four vertical elements of the window are made of GFRC.



North facade: 1. coating removed, 2. Crack and concrete repair in progress

.

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

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® 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.

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

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

SikaRepair® 223 - is a one-component, early strength gaining, cementitious, patching material for vertical and overhead repair of concrete

Sikacrete® 211 - a single-component portland cement based concrete which contains factory blended aggregate. This product is available in 80 lb. bags and 2000 lb. supersacks.

SikaGrout® 212 - is a non-shrink, cementitious grout with a unique 2-stage shrinkage compensating mechanism. It is non-metallic and contains no chloride.

Sikaflex®-1a - One part polyurethane, elastomeric sealant/adhesive good for small joints and fillets in vertical, horizontal or submerged conditions.

SIKA CORPORATION
201 Polito Avenue
Lyndhurst, NJ 07071

Contact
Phone 800.933.SIKA
usa.sika.com