CASE STUDY
JORDAN COMMONS

Owner: Miller Family Real Estate, Sandy, UT
Project Engineer/Designer: Dunn Associates Engineering, UT
Repair Contractor: D & D Reconstruction, Farmington, UT
Material Supplier/Manufacturer: Sika Corporation, Lyndhurst, NJ

INTERNATIONAL CONCRETE REPAIR INSTITUTE

ICRI Award Winner
Award of Merit
Parking Structures Category

BUILDING TRUST

Background

The Jordan Commons parking structures are part of a complex of multi-use, commercial buildings and entertainment facilities constructed in 1999 in Sandy, Utah, just south of Salt Lake City. The complex consists of a 10 story office building and a row of restaurants sandwiched in between two parking structures on the North and South sides as well as a movie theater complex to the West. Each parking structure consists of a slab on grade below two supported levels with enough spaces for approximately 1200 cars. At the time of construction, both structures were bisected from north to south with an expansion joint.

The Problem

In the spring of 2009, column cracking was observed which raised concerns about the structures stability. One column in the south structure's north east corner near the expansion joint had cracked near the base almost all the way through. The column had slid approximately 1 inch on the crack plane and was caught up on an adjacent curb wall. The reinforcing bar on the northwest corner had also buckled. It was concluded that large (80 °F) seasonal temperature stress cycles of Salt Lake City, causing a 395 foot slab an estimated 2 in of total length change, were the source of collapse and extreme cracking in some columns. In the garages, the sections east of the expansion joint were 395 ft and 359 ft on the north and south sides, respectively. Both of these values exceeded the PTI recommendations of 325 ft maximums for parking structures based on shear walls located at the center. Furthermore, both sections had shear walls at their east end, forcing the structures to act as a much longer slab, explaining why gaps were observed between the double column lines and the expansion joints. With the east end of both structures locked to significant shear walls, most of the slab length change was seen in the expansion joints.

Column Deflection at Expansion Joint

Column Displacement

The Sika Solution

The most significant remediation necessary to ensure a sound structure was the addition of new expansion joints in the east sections. The anticipated result of the new expansion joints was a decrease in temperature movement from 2" to only ½". The 395 foot long east portion of the north structure was transformed into independent sections separated by a new expansion joint to significantly reduce the formation of additional column cracking. Existing expansion joints were repaired with SikaQuick® 1000 and 2500 repair mortars. The owner's management team decided to help preserve their investment by applying a traffic bearing waterproofing system to the top levels of both structures. The elastomeric traffic membrane selected incorporated both single and two-component, fast-curing polyurethanes, Sikalastic® 710/715 and 720/745, respectively. In the main entrance aisles a more abrasion resistant epoxy broadcast overlay system Sikadur® 22 Lo-Mod, was selected to minimize maintenance requirements. Any cracks were routed and sealed and a surface applied corrosion inhibitor, Sika® FerroGard® 903, was used to reduce the ring halo effect around spall repairs. Two pedestrian bridges, about 70 feet long, leading from the parking structures to the office tower were also coated with a fast-curing, polyurethane Sikalastic® traffic system. Additional steel columns were installed and the post tensioned parapet wall ends, which had cracked due to thermal movement, were strengthened with SikaWrap® Hex 100 G glass fibers applied with Sikadur® 300 epoxy.

Installation of Glass FRP

Elastomeric Membrane Top Coat Application with Aggregate

Sikalastic® 710/715 - is a single component, crack-bridging, waterproofing traffic system

Sikalastic® 720/745 - is a two component, fast curing, solvent-free, crack-bridging, waterproofing traffic system with UV resistance.

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.

SikaWrap® - Carbon and Glass Fiber Fabrics wrap around concrete and masonry structures for repair and strengthening. Used in conjunction with Sikadur® 300 and 330 - two-component, 100% solids, moisture-tolerant, high strength, high modulus epoxy used as a seal coat and adhesive.

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.

Sikaflex® 2c NS EZ Mix - is a two-component, non-sag, polyurethane elastomeric sealant.

SikaQuick® 1000 - is a 1-component, rapid hardening, early strength gaining, cementitious, patching material for concrete.

SikaQuick® 2500 - A 1-component, very rapid hardening, early strength gaining, cementitious, patching material for concrete.

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.

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