



# Market Application Focus

Bridges

Concrete Repair & Protection

Fire Damage

**Project:** State Highway 183 MacArthur Emergency Bridge Repair  
**Owner:** Texas Department of Transportation  
**Contractor:** Gibson & Associates  
**Year:** 2005

## The Problem

State Highway 183 is a major east/west highway between Dallas and Fort Worth. The highway carries three lanes of traffic in each direction. The State Highway 183 bridge structure over MacArthur Boulevard, was constructed in 1953, consists of two abutments and three bents that support a series of parabolic beams. The beams are further strengthened by diaphragms and all this supports a concrete deck with an asphalt overlay. The bridge was widened in 1969 to make it 2- 36' wide roadways with 12' shoulders and a center traffic barrier. All of the elements are cast-in-place, reinforced-concrete.

The morning of Saturday, May 28, 2005, a 3,000 gallon fuel tanker heading east on State Highway 183 barreled through a guardrail and spiraled off the bridge landing upside down and exploding several times. Visual inspections defined the general areas of needed repairs. Sound tapping with hammers defined the damaged areas. Selected demolition was performed to gain a better understanding of the concrete quality, the bond of the concrete to the steel and to identify any possible voids between the steel and the concrete. Cores were taken from the columns and caps with the most severe fire damage. Examination of the cores revealed that the fire had not damaged the inner reinforcing steel and concrete. After the thorough evaluation TXDOT engineers concluded that although the damage was extensive, the core remained in tact and the bridge could be repaired.



## The Sika Solution



Repair solutions were evaluated and project documents developed and completed. Sealed plans were delivered to the area office on June 10th. The main goals of the project were to repair the damaged bridge as quickly as possible in order to reopen all lanes on State Highway 183 and MacArthur Blvd. Bids were due June 16th. June 18th was the official start date of the project. The project was to be a 24/7 operation including holidays. Project completion was scheduled for July 19th with a \$10,000 per day liquidated damage penalty.

Demolition of the beams started on June 19th. 1,000 cf of concrete was removed. Columns, beams, and the bridge deck were all repaired using high-velocity, wet-spray application of

SikaRepair 224, a silica fume, fiber reinforced, mortar. The diaphragms were repaired using Sika Mono Top 611, a polymer-modified, silica fume-enhanced, mortar, which was formed and pumped into place. Damaged bearing seats for the beams were originally specified to be repaired using conventional concrete; however, a decision was made in the field to inject the seats with Sikadur 52, a high-strength epoxy adhesive. This decision saved both time and money, eliminating the need to jack the entire bridge in order to complete the repairs. Damaged beams and columns were

Case Study



strengthened using SikaWrap Hex 117C, a unidirectional carbon fiber fabric. The carbon-fiber fabric was saturated with Sikadur 300, a high-strength, impregnating resin, and laid up wet by hand. The beams and columns were then coated with Sikagard 550W Elastocolor, a high performance, crack bridging acrylic protective coating, to provide UV protection to the epoxy/CFRP system and a more uniform appearance to the structure. The project was completed July 15, 2005; 4 days ahead of schedule and an amazing 47 days after the accident.



## Sika Products

### Anti-Corrosion Primer and Bonding Agent

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

### Single Component-Concrete Mix

**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.

### Hard Wearing Epoxy Overlay

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

### 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.

### 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/wet process shotcrete techniques for repair applications.

### Corrosion Inhibitors

**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.

### Anti-Carbonation Coatings

**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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