



Recipient of the 2004 ICRI Award of Excellence,  
Repair of Transportation Structures!

## Product Information

**Market**

**Bridge**

**Application**

**Concrete Repair and Strengthening**

**Focus**

**Chloride Induced Corrosion**

Project: Hopkins & Clinton Street Bridge Rehabilitation  
 Owner: Defiance, OH  
 Specifier: Foster Engineering, Inc.  
 Contractor: Structural Preservation Systems  
 Year: 2003

### The Problem

The Hopkins and Clinton Street Bridges were suffering from significant corrosion damage brought on by the extensive use of de-icing salts in northern Ohio. An improperly designed drainage system allowed storm water to flow over the roadway and through a gap between the road and sidewalk. The storm water picked up all deleterious materials, especially de-icing salts, and deposited them onto the exposed side of the fascia box beams.



After nearly 25 years of exposure, the chlorides were able to penetrate the concrete to the depth of the strands in these precast, prestressed box beam structures. The corrosion caused the steel to expand, causing extensive cracking, spalling and delamination of the concrete. Approximately 25% of the tendons were either damaged or lost due to the corrosion on the bridge.

### The Sika Solution

Before the two bridges could be structurally strengthened, an extensive concrete repair and waterproofing program was undertaken. The areas that required the most concrete repair were the face of the abutments and the sides and the bottom of the fascia beams. Sika Armatec 110 EpoCem was used as an anti-corrosion coating and bonding agent. SikaTop 111 and 123 were used to repair the damaged concrete. Sikadur AnchorFix-3 was used to dowel in some anchors on the bridge as well.

The Sika CarboDur StressHead System was installed to actively strengthen the bridge in areas where the prestressed stands were damaged from corrosion. This was the first time a post-tensioned carbon fiber plate has been used in North America to strengthen a bridge. In addition to the StressHead System, a SikaWrap bi-directional carbon fiber fabric was applied to stiffen the concrete diaphragms.



Case Study



## Sika's System approach to Concrete Repair and Protection

Anti-Corrosion Primer and Bonding Bridge  
**Sika Armatec® 110 EpoCem®** - protects rebar in areas of inadequate cover.

High-Performance Repair Mortars  
**SikaTop® PLUS** - two-component, polymer modified mortar containing Sika FerroGard 901 corrosion-inhibitor. Sikacem mortars are machine-applied by dry-spray equipment for large scale repairs.

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.

Hard Wearing Epoxy Overlay  
**Sikadur® 22 Lo-Mod** epoxy resin will provide decorative hard wearing, slip resistant, overlay systems for balconies not requiring a crack bridge membrane.

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

Anti-Carbonation Coatings  
**Sikagard® 550W 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.

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 Polymer (CFRP) laminate strips. Stronger than steel, yet lightweight and non-corrosive, this system can solve unique strengthening problems in a variety of concrete structures.

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



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