



## MARKET APPLICATION FOCUS

*Parking Garages*

*Concrete Repair & Protection*

*Chloride-Induced Corrosion*

**The Project:** Union Carbide World Headquarters  
Danbury, CT  
**The Owner:** Union Carbide Chemical Company  
**The Specifier:** Hoffman Architects  
**The Year:** 1996

### ***THE PROBLEM***



Reinforced concrete access ramps, approximately 20 years old, were suffering from water and deicing salt penetration causing corrosion of reinforcing steel. The chlorides had penetrated by diffusion to reach the steel and caused spalling and delamination in the topping slab. In other areas, cracks allowed the chlorides through the slab leading to corrosion of the steel closest to the underside of the ramps, as well as in the beams and columns.

While the spalling was clearly visible in many areas, there was also concern about underlying (latent) corrosion ongoing in other areas not yet visible. For this reason, a diagnostic condition survey of the structure was recommended first before selection of the rehabilitation strategy.

### ***THE SIKA SOLUTION***

The condition survey confirmed that the chloride levels exceeded the corrosion threshold - identifying them as the root cause of the problem. Carbonation (pH loss) was also identified in some areas.

To achieve a long-term solution to the corrosion problem, a "repair and protect" approach was selected:

**Repair** - the visibly spalled/delaminated areas were repaired and restored using Sika MonoTop® 611, a polymer-modified, silica fume enhanced repair mortar, extended with coarse aggregate for deep repairs (greater than 1 1/2 inches). On the underside and columns, forms were erected and the material was pumped into place. A total of 3,000 cubic feet of repairs were made.

**Protect** - to address latent corrosion in surrounding areas, a spray-applied, corrosion inhibiting impregnation was applied to all areas after repairs were completed. This water-based material is able to penetrate to the reinforcing steel by liquid and vapor diffusion. It then forms a protective layer on the steel which dramatically slows the corrosion process. Over 100,000 square feet of surface area was treated.







## **For Parking Garages...**

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

#### **Anti-Corrosion Primer and Bonding Bridge**

***Sika Armatec® 110 EpoCem®*** - protects the steel from corrosion in areas of inadequate cover. Improves bond of repair mortar to both the substrate and steel.

#### **High-Performance Repair Mortars**

***SikaTop® PLUS mortars*** - two-component, polymer-modified materials containing Sika FerroGard 901 corrosion-inhibiting admixture.

#### **Corrosion-Inhibiting Impregnation**

***Sika FerroGard® 903*** - spray-applied to protect areas outside the repair zone against future damage. Proven to penetrate and reduce corrosion effects of carbonation and salt exposure.

#### **Surface Levelling/Pore-Filling Mortars**

***SikaTop levelling mortars*** - achieve a level surface by filling pores, bugholes, or other irregularities in the surrounding substrate. Also provides additional effective concrete cover.

#### **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 protective coatings, available in a variety of decorative colors.

#### **Crack-Bridging Deck Coatings**

***Sikafloor® Traffic Systems*** - protect decks, ramps, grandstands, and walkways with a durable wearing surface which waterproofs and prevents chloride ingress.

#### **Joint Sealing/Waterproofing**

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

#### **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 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.



#### **1-800-933-SIKA NATIONWIDE**

#### ***Regional Information and Sales Centers***

*For the location of your nearest Sika sales office, contact your regional center.*



##### **USA Headquarters**

201 Polito Avenue  
Lyndhurst, NJ 07071  
Phone: 1-800-933-7452  
Fax: 201-933-6225

##### **Eastern Region**

14 Summit Place  
Suite 201  
Branford, CT 06405  
Phone: 1-800-933-7452

##### **Central Region**

2190 Gladstone Court  
Suite A  
Glendale Heights, IL 60139  
Phone: 630-924-7900  
Fax: 630-924-8508

##### **Western Region**

12767 East Imperial Hwy.  
Santa Fe Springs, CA 90670  
Phone: 562-941-0231  
Fax: 562-941-4762

##### **Sika Canada Inc.**

601 Delmar Avenue  
Pointe Claire  
Quebec H9R 4A9  
Phone: 514-697-2610  
Fax: 514-694-2792