

# Market Application Focus

Parking

Concrete Repair &amp; Protection

Chloride &amp; Carbonation Induced Corrosion

**Project:** Philadelphia School District Bus Maintenance Garage-Broad Street  
**Owner:** Philadelphia School District  
**Specifier:** Maitra Associates, NJ  
**Contractor:** Masonry Preservation Group  
**Year:** 2006

## The Problem

Built in the early 1960's this garage serves as a repair and cleaning facility for the buses of the Philadelphia School District. The structure is a two story building with a waffle slab and masonry wall construction on the exterior. Each level consists of about 60,000 square feet of open space. Exposure of the concrete to deicing salts and water had resulted in extensive spalling on the top surface of the deck. Noticeable corrosion was seen on the underside of the waffle slab due to carbonation and water ingress. The slab was also under designed in certain areas for the weight of the buses. The spalling and corrosion on the top of the slab was extensive. The root cause of the problems on the top surface was rebar corrosion accelerated by water and on the underside was carbonation.



## The Sika Solution

The owner's goal was to Repair and Protect the existing structure as an alternative to replacing it. As a part of the repair strategy, it was agreed to remove 1" of the entire top slab and replace it with 2" of Sikacrete 211. The placement of the Sikacrete 211 was interesting, unique and challenging. Eight 2000 lb. supersacks of Sikacrete 211 were loaded "dry" into the Ready Mix trucks on an offsite location, 45 minutes from the jobsite. Water was added to the loaded Ready Mix truck on the site. Sikacrete 211 was mixed in the ready mix truck and then discharged using a pump into the building for placement and finishing. All of the exposed rebar was coated with Sika Armatec 110 prior to placement of the repair material. The spalls on the underside of the building were repaired using Sika Armatec 110 and Sikacem 133 along with some SikaTop 123 Plus.



### Quantities of Repair Material:

Sikacrete 211	500 Super Sacks	1,000,000 lbs.
Sikacem 133	500 bags	25,000 lbs.
SikaTop 123 Plus	300 bags	16,500 lbs.

**Protection:** FerroGard 903, an impregnating corrosion inhibitor was used on the underside of the waffle Slab. Sikagard 670W, a waterproofing and anti carbonation coating was used on the underside of the waffle slab. The top slab was protected with Sikadur 22 Lo Mod Epoxy Broadcast System for waterproofing and abrasion resistance. The waffle slab was structurally strengthened using 4" Sika Carbodur Strips.

Ferrogard 903	500 gallons
Sikadur 22 Lo Mod	2500 gallons
Sikagard 670W	400 gallons
Carbodur 4"	1500 feet

The entire project was completed in 12 weeks. The repair and protection strategy used to address the problems will result in extending the service life of this structure for many years to come.

# Sika's System Approach to Concrete Repair and Protection



## 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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