

# Market

**Bridge Hwy/Ramps/Aviation/Airport**

# Application

**Repair and Waterproofing**

# Focus

**Corrosion-Erosion**

<b>Project:</b>	ITTS 3rd Level Roadway Strengthening at Honolulu International Airport
<b>Owner:</b>	State of Hawaii, Department of Transportation
<b>Specifier:</b>	Wilson Okamoto Corporation
<b>Contractor:</b>	Kiewit Pacific
<b>Year:</b>	2002

## The Problem

The Wiki-Wiki shuttle service is the primary people mover connecting arriving and departing passengers with the baggage claim area at the Honolulu International Airport. This shuttle service makes stops at the main terminal, outlying gates, baggage claim, and interisland terminal. The shuttle travels on a dedicated two lane elevated roadway constructed of a series of overpasses and steep ramps. This roadway is comprised of a reinforced cast-in-place concrete structure at the outlying gates and pre-stressed double-tees at the main terminal. The structure was built in the early 1970's.

After approximately 35 years of service, the elevated roadway decks and ramps showed signs of deterioration with a significant amount of cracking, spalling and delamination. The reasons for this deterioration include: corrosion of the embedded reinforcement due to chloride attack from the salt air environment, water intrusion, and lack of concrete cover. Concrete cover over the rebar was further reduced over the years by the repeated number of groves that had been tined in the steep ramps. The groves that were tined at the time of construction wore out and repeated saw cuts were made to maintain the groves. This was necessary to provide skid resistance on a 15% slope for the buses operating during Hawaii's tropical rain showers.



## The Sika Solution

The objectives of the repair strategy was to achieve a long term durable and skid resistant surface for the shuttle which include:

1. Removal and replacement of unsound concrete
2. Cleaning and treating of the exposed reinforcement
3. Patching spalls - adding effective cover over the whole deck
4. Waterproofing the deck with a long term durable and skid resistant system

Sika Armatec 110 was chosen as the anti-corrosion coating for exposed steel reinforcement. A total of 8 cu.yds of small to medium sized spalls were repaired with Sika Roadway Patch 2000. Larger spalls amounting to almost 200 cu.yds were repaired with ready mix concrete fortified with Sika Rapid-1 for rapid strength gain. A two inch overlay was considered for adding concrete cover. However, the 1970's vintage structure did not have capacity for the additional dead load. Structural upgrades were considered but ruled out due to financial constraints.



The Sikadur 22 Lo-Mod Epoxy Broadcast Overlay System was chosen for its ability to add effective cover, waterproof the deck and provide a robust skid resistant surface. These benefits were achieved without adding significant dead load to the ramp areas over the 23,000 sq.ft area. A double broadcast system was employed using a locally sourced reflective #8 copper slag aggregate that provided excellent abrasion and skid resistant. This local aggregate was instrumental in enhancing the appearance of the old ramps by masking typical oils stains and tire marks. Its color and texture remind arriving passengers of the lava flows that created the islands.

### Anti-Corrosion Primer and Bonding Agent

**Sika Armatec® 110 EpoCem®** - a 3-component, solvent-free, moisture-tolerant, epoxy-modified, cementitious product specifically formulated as a bonding agent and an anti-corrosion coating.

### High Performance Repair Mortars

**SikaQuick® 1000, 2500 Roadway Patch 2000** - single component, rapid hardening cement based patching materials for concrete repair. Excellent physical properties coupled with very low shrinkage make these products very contractor friendly.

### Hard Wearing Epoxy Overlay

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

### Joint Sealing

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

### Anti-Carbonation Coatings

**Sikagard® 550W Elastocolor and 670W** - protect concrete facades from the damaging effects of carbon dioxide (carbonation), water and pollutants. Crack-bridging (550W) or rigid (670W), are both 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.

**Sika Rapid-1®** - a non-chloride hardening accelerator formulated to increase the early strength of concrete without affecting the initial workability. Sika Rapid-1 meets the requirements of ASTM C-494 Type C accelerating admixtures.



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