

**Vector™****Norcure® ASR Lithium Treatment****Project History****Lithium Impregnation of New Jersey Substructure**

- Structure:** 5 concrete pier footings  
bridge over Hackensack River
- Location:** East Rutherford, New Jersey, USA
- Client:** New Jersey Turnpike Authority
- Area Treated:** 10,182 ft<sup>3</sup> (288.35 m<sup>3</sup>)
- Duration:** 2 months
- Contractor:** Vector Construction Inc.

**Project Description:**

In the summer of 1999, the New Jersey Turnpike Authority undertook a rehabilitation project on Interstate 95 in East Rutherford, New Jersey. This project consisted of several areas of deck repairs, along with rehabilitation of 5 pier footings suffering from severe cracking and spalling. Previously, after much investigation and petro-graphic analysis, the Turnpike Authority had discovered that the cause of the damage on these pier footings was Alkali-Silica Reactivity (ASR). The damage that had occurred was of sufficient extent that, if left unchecked, would soon compromise the ability of the footings to support the piers. The costs associated with the removal and replacement of the pier footings were of considerable proportion. It was therefore decided to attempt to halt the effects of the ASR, and save the pier footings. Although lithium impregnation of hardened concrete as a means of combating ASR is experimental, much work has shown that lithium salts, when introduced into concrete, can negate the reaction of silica gel expansion. With this in mind, the experimental project was undertaken to see if enough lithium salts could be introduced in to the concrete by means of applying an electrical field across each structure with the aid of the Norcure System.

Conventional chip and patch repairs were performed on the delaminated and spalled areas of the pier footings. Also cementitious grout crack injection was performed to fill all existing cracks, before installation of the Norcure System was begun. The installation of the system on the 5 pier footings consisted of a series of 1½ inch x 3 foot holes drilled into the pier footings. A number of the holes had 3 foot lengths of 10M rebar grouted in to them. These were connected to the existing rebar and negatively charged, acting as additional cathodes to encourage lateral movement of the lithium. The remaining holes were filled with Lithium Lifetime N™, and had a strip of titanium inserted. These anodes were connected to a layer of titanium mesh covering the horizontal surface of each pier footing. A dam was then constructed around the perimeter of each footing, and the surface was flooded with the Lithium Lifetime N™. The system was then energized and ran for four weeks, with an average current passed of 62912 Amp hours/pier footing, and an average consumption of 1.6 US gallons of lithium solution per yd<sup>3</sup> of concrete. The long term benefits of this method are as yet undefined, however it may have provided the only viable option to removal and replacement, and thereby offered a substantial cost saving to the New Jersey Turnpike Authority.

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Vector Corrosion Technologies Ltd. 474 Dovercourt Drive Winnipeg, MB R3Y 1G4  
Vector Corrosion Technologies, Inc. 13312 N. 56th Street, #102 Tampa, FL 33617

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**VECTOR  
CORROSION  
TECHNOLOGIES**  
[www.vector-corrosion.com](http://www.vector-corrosion.com)

CAN: Phone: (204) 489-6300 Fax: (204) 489-6033  
USA: Phone: (813) 830-7566 Fax: (813) 830-7565

Email: [info@vector-corrosion.com](mailto:info@vector-corrosion.com)