



New York, NY 1994 Tunnel Breezeway

Manufacturer:

Raven Lining Systems
13105 E. 61st Street,
Suite A
Broken Arrow, OK 74012
(918) 615-0020

Location:

New York, New York

Date of Project:

1994

Product(s):

[Raven 405](#)

Type of Structure(s):

Tunnel Breezeway

Condition of Structure(s):

There was corrosion due to saltwater infiltration.

Description of Application:

Consolidated Edison's Hudson Avenue Tunnel Breezeway in Lower Manhattan, New York was in desperate need of rehabilitation due to infiltrating sea water at high tide that filled the tunnel to over 3' in depth. The challenge was to identify a rehabilitation method that would restore structural integrity and prevent future corrosion inside the interior of the structure by eliminating seawater infiltration.

At high tide, cracks in the steel-reinforced concrete absorbed the seawater and exposed the concrete and steel to chloride and sulfate ions, and oxygen from inside the tunnel. As the concrete dried, the salts would crystallize which helped induced spalling of the concrete. Corrosion cells also developed allowing the formation of rust scale at the reinforcing steel. Continued cycling caused severe disintegration to occur on the inside wall of the tunnel, particularly along construction joints where infiltration was active. In these areas, rusting steel expanded and ruptured the concrete surface.

These actions, coupled with freeze-thaw conditions, caused the severe deterioration of the tunnel's interior walls. ConEd considered numerous rehabilitation methods; however, the only method which could provide a 100% solution was a composite system utilizing a high strength mortar, and hydraulic cements to fill large voids, stop leaks and restore sound surfaces which would be top coated with 125 mils of Raven 405 Ultra High Build Epoxy.



New York, NY 1994 Tunnel Breezeway

Raven epoxy was chosen for its unique composition (100% solids thixotropic epoxy system with zero solvents) and performance characteristics, including moisture tolerance (most failed products previously tried lacked this critical component) and single coat application, extremely low moisture vapor transfer rate, structural enhancement gained by superior physical strengths and increased visibility.

PIM Corporation, a Raven Certified Applicator, began the rehabilitation by removing spalled and loose concrete and rusted steel. Sound surfaces were then water blasted and active leaks stopped before applying one to 3" of high strength, fiber-reinforced, cement based mortar.

Approximately eight hours later, Raven 405 ultra-high build epoxy was spray applied at an average thickness of 125 mils (1/8").

In addition to Raven's light blue color providing illumination and ease in inspection, the final system supplied enhanced structural strength and superior infiltration and corrosion prevention.

The project was successfully completed with the composite system in 1994 and Consolidation Edison Company of New York approved this procedure for future tunnel restoration work.

