Concrete Protection & Restoration

The Pentagon: Restoration of Courtyard & Lightwell Walls
Interior Structural Repairs

Location

Arlington, Virginia

Project Size

$30,000,000.00

Owner

PENREN (Pentagon Renovation & Construction)

Engineer

Tadjer-Cohen-Edelson Associates, Inc

Problem

During the initial structural condition analysis, it was noted that existing concrete walls were carbonated to a depth of 3 to 4 inches and destructive testing pointed out that the outer layer of reinforcing walls was placed approximately 1/2" from the finished exterior surface mainly due to the fast-paced construction of the Pentagon. This improper placement of the reinforcing steel, coupled with years of carbonation, had created an environment ideal for corrosion. Also, the last minute addition of a fifth floor after construction was well underway led to inadequate reinforcing bar splices between the fourth and fifth floors. All of these factors contributed to the fact that the lightwell walls indicated telltale signs of concrete spalling and exposed reinforcing steel corrosion. Approximately 20-30% of the exterior wall was in need of repair.

Solution

◊ Delaminated, spalled, and cracked concrete related to steel corrosion was removed down to sound concrete

◊ Reinforcing steel was cleaned, treated with corrosion-inhibiting coating, and relocated to provided adequate concrete coverage

◊ Concrete repair material were installed mainly by form and pump methods. Intricate formwork was installed to match the existing rough cut board finish. Result was that the final product matched in color and texture.

◊ Exposed concrete surfaces of the building were treated with an amino-based penetrating corrosion inhibitor, silane sealer, and mineral based anti-carbonation protective coating.

◊ Full and partial depth column and beam repair requiring extensive use of shoring

◊ Removal and replacement of miscellaneous floor coatings, expansion joints, and window sills.

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Saving the life of concrete!

2811 Lord Baltimore Drive
Baltimore, MD 21244

601 NE 44th Street
Oakland Park, FL 33334

www.concretecpr.com
Toll Free: 800-452-3137
E-mail: info@concretecpr.com