Vacuum Technology Report

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"ACCURATE INVESTIGATION GUIDES THE PROPER REPAIR"

Topping is rebonded by vacuum

When heavy forklift equipment damaged a second story warehouse floor, vacuum technology was there to restore the composite bond with little disruption to tenants.

Foremost in the minds of the owner and management company was the disruption necessary to commercial tenants with any form of repair. Initial recommendations were to perform an entire removal and replacement of the topping. A number of concerns pointed to the obvious exposure of the tenants and their businesses below to the freshly placed concrete and the water associated with this form of repair.

This operation would necessitate vacating all of the tenant businesses beneath the warehouse to temporary facilities and then, when the repair was complete, moving the tenants back into their spaces. A costly endeavor to say the least but, without some alternative, there was no choice since the ceilings above would occasionally deposit concrete chunks on desks and equipment below.

A more accommodating and reasonable method of repair was proven to be vacuum injection. A complete and comprehensive condition survey was performed to establish the exact extent of the delamination. Impact-Echo was chosen to detect the void areas.

This technology is capable of detecting internal voids, linear cracking, fissures and honeycombing. From a 5' grid system layed out on the warehouse floor, each shot of the Impact-Echo was recorded. Where delamination was identified, the grid

Core examination of rebonded topping slab

was reduced to 2' square for more closely spaced readings.

The results were recorded and a color depiction of the entire area was presented. The color coding clearly identified the areas requiring repair. The final report revealed only 68% of the floor was delaminated and the proprietary repair was begun.

The "T" panel supporting panels were not closely constructed. In preparation, spaces between the panels were sealed and backed to retain the repair resins. Each delaminated area was drilled to access the debonded zone and porting devices were mounted to the surface and capped. Vacuum was applied to the delaminated areas and an acrylic polymer (methyl methacrylate) was installed to reestablish composite bond. Upon completion, the entire area was load tested to assure success and future performance.

Through a local independent engineer, and working at night, technicians repaired the 35,000sf of defects in just 20 days. Revenue conservation and the quick turn-key repair proved vacuum to render a most prudent choice for repair.

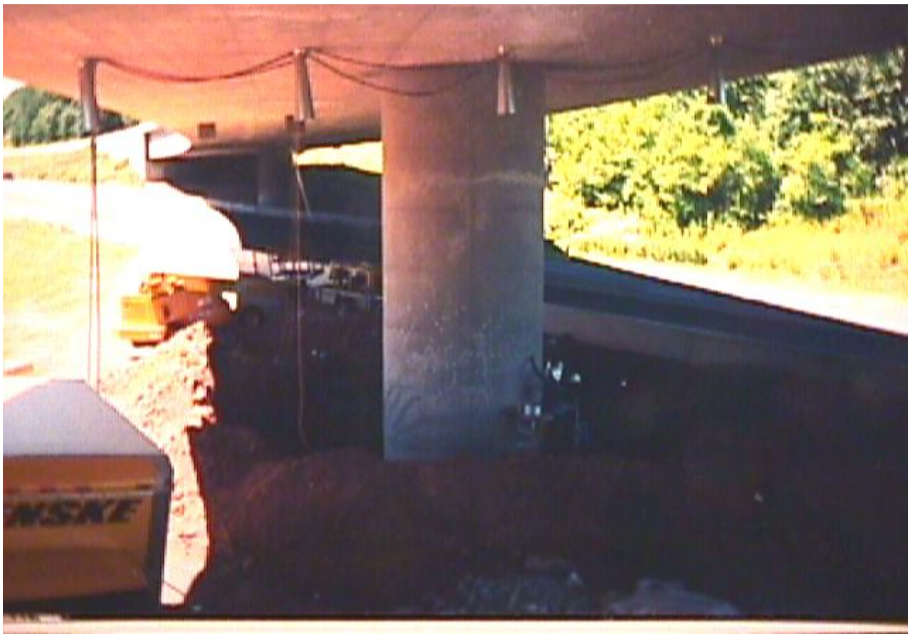
Connecticut DOT Repairs I-84 Pier Cap

After detecting serious cracking on a number of I-84 pier caps the Connecticut

Inside This Issue

1	Delamination of Topping Slab
2	CTDOT Pier Cap Repair
3	Bay Bridge Repairs
3	How Can You Know
Next	Historic Smithsonian Stone Repair

Department of Transportation sought a means of completely filling the fractures and voids.



The massive pier caps were eight feet high, thirty five feet wide and fourteen feet thick connecting five cells of the structure.

Observation inside the cells revealed the failure of previous pressure injection efforts.

This created a problem that most would agree has no apparent resolve. Failed epoxy, or insufficient fill of epoxy in individual fractures is something one is stuck with when discovered. Epoxy will not stick to epoxy which, when attempted, yields a construction joint and point of inevitable failure.

Notwithstanding, previous attempts fouled the mouth and fracture zone, seemingly prohibiting any hope of re-injection of the cracks.

Vacuum injection proves to be the answer

Technicians drilled behind the unsuccessful pressure injection and intersected the fracture zone.

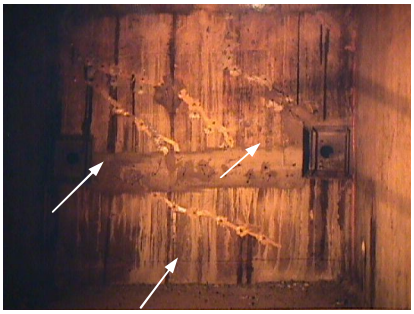
The existing epoxy seal, that had been left in place was inspected and all unbonded lengths were sealed. A special methodology of testing the length and extent of the cracking was employed on each individual crack in the pier cap prior to beginning the injection.

It was confirmed with Connecticut DOT that the previous injection of the cracks was at best marginal with penetration depths ranging from ¼" to 6".

Final preparation of the vacuum injection of the pier caps was begun. This preparation included the continuity audit of the existing cracks to determine the expected filling.

Of the five cells, two promised installation of new repair materials across the entire 14' thickness of the cap.

Upon beginning the injection of the first cell, the extent of the void areas began to develop. The first cell to be injected took in excess of 60 gallons of the low viscosity repair resin before reaching refusal.

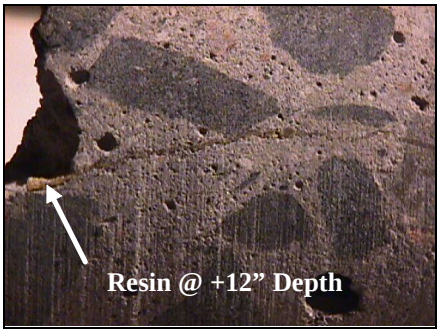


In all, the single pier cap was permeated with some 200 gallons of repair resins. In one of the cells, technicians successfully pulled resins through the entire thickness of the cap, some 14'.

Despite the surprising condition, previous failed attempts, confined space restraints and complicated access coordination this was a difficult job well done.

Bay Bridge Repairs Suspended Until Spring

The season has come and gone on the underwater repair of piles on the Chesapeake Bay Bridge.



Because of cold water and continuous inclement weather,

technicians have demobilized the void and crack repair project until spring. Not before performing a thorough survey of the pier where the work was begun however. From the extent of the disrepair encountered on just one of the two main piers, it looks like the spring will be a busy time.

After cleaning the face of the mammoth pier, a host of unscheduled cracks and voids were measured and documented. "Some of the cracks are huge and there is one void big enough to drive a car into." Says SMS dive technician supervisor James Michel. .

Indeed, a void in the support footing of the pier measures out at 35'wide, 19'deep and 7'-8' high. Technicians intend to begin filling the void upon their arrival in April 98'.

Additionally, diving repair technicians intend to employ TECVAC's[tm] proprietary method of underwater crack injection destined to revolutionize the underwater crack repair market.

Unlike conventional pressure systems currently used for these repairs, technicians will induce negative pressures in the fracture zone prior to the introduction of repair materials.

Analytical studies and test results have found that pressure injection will fill on 70% of the void area at 30psi and only increases to 85% level of fill at 105psi. Further, high pressures are proven to contribute significantly to the extension of repaired fractures and add to internal damage. In some cases the entire member has been destroyed with the application of higher pressures in an attempt to get repair material deeper into the fracture.

Promising deeper penetrations at competitive prices is just what the industry needs. Vacuum repair applications world wide attest to the success of these processes. Now, this "second generation" of proprietary vacuum processes by TECVAC[tm] will no doubt meet the challenges posed by the problems with concrete, masonry and stone.

Does It Go All The Way Through? How Do You Know?

That was the question presented when visual examination of a 12' diameter column displayed a crack on one side and a seemingly aligned crack on the other side. TECVAC[tm] technicians came up with the method to answer this question.

By installing a proprietary skirting method around the column and applying negative pressure to the skirt, the crack was found to, in fact, penetrate the entire thickness of the column. Moreover, technicians were able to confirm the ability to introduce repair resins into the fracture with total assurance of penetration through to the other side.

You are invited to pose your problem to a TECVAC[tm] representative.

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