



Case Stories



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Hydrodemolition on Wabash bridge resurface job speeds work, reduces cost



A US \$ 1.67 million bridge rehabilitation project in Indiana was utilizing hydrodemolition technology instead of jackhammers for concrete removal and finished up in record time and saved the Indiana Dept. of Highways an estimated US \$ 500.000 in direct costs. The bridge is the Wabash Memorial Toll Bridge, a 4.932 ft (1.480 m) total length, two-lane span over the Wabash River. seven miles west of Mt Vernon, Ind., connecting Indiana State Highway 62 with Illinois State Highway 141.

The rehabilitation job called for removal of 118.296 sq.ft. (10.650 square metre) of concrete to a minimum depth of 1- 1/2" (35 mm), up to full deck removal at 7"(175 mm).

Prime contractor for the total rehabilitation job was E.H. Hughes Co., Inc., headquarter in Louisville, Ky., with concrete hydrodemolition sub-contracted to Hydro-Tech, Inc., of Jeffersonville, Ind. The job was under contract to the Division of-roll Bridges. Indiana Dept. of Highways.

Hydro-demolition, cost saving and efficient without causing damage

Hydro-demolition was specified by the division of-roll Bridges following a one year study to determine if the through steel truss and girder structure built in 1955 would require a complete new deck at an estimated cost of US \$7 million, or more resurfacing, more than 4 times cost of rehabilitation, and would have inconvenienced the public and farmers trying to move harvest to grain elevators on the Ohio River.

Following examination of the 52 core samples, the study recommended resurfacing of the existing surface with hydrodemolition specified for concrete removal. Nicholas Van Nielsen, chief, Division of Toll Bridges, states

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that hydrodemolition was specified for two primary reasons. The new method saved the Division an estimated half a million dollars in direct costs normally associated with labor intensive Jack hammer demolition, and two, hydrodemolition has the ability to selectively remove unsoiled concrete to specified depths at high rates of speed without causing further damage to the structure.

Minimal interference with traffic flow

Van Nielen makes the point further that hydrodemolition has resulted in minimal interference with traffic flow of the kind normally associated with jackhammer concrete removal. As a result, there has been no noticeable switch in traffic patterns to alternative routes, and toll collections normally amounting to an average of US \$ 45,000 a month have remained constant.

Work began on the first phase removal of 1- 1/2" (35 mm) of delaminated and sound (but high chloride content) concrete from one lane of the two-lane bridge on July 13th. Conjet hydrodemolition equipment was brought onto the job for a specified three class concrete removal procedure.



Picture shows Class III, full deck removal, made by Conjet equipment.

Hydrodemolition is a relatively new technology that utilizes high pressure water (17,000 psi/ 1,200 bar) to remove deteriorated or sound concrete surface material from bridges, highways and parking structures.

The Conjet equipment consisted of two diesel driven high pressure pumps in two 20 ft container at a remote location, a robot on rubber-tired wheels and a diesel generator.

The robot unit on the Wabash Memorial Bridge job was equipped with two cross-mounted feeds for the high pressure nozzles.

According to Gary Ottman, Operations Manager for Hydro-Technology, the tandem feed arrangements utilized a total of 62 gal/min (240 lit/min) of water pumped from a nearby 60 ft well, and provided three times the productivity of just one feed.

In the class I removal procedure the water jets were calibrated to cut down through 1,5 inch (35 mm) of deteriorated and sound concrete.

The Conjet equipment has removed an average of between 100 to 300-plus sq.ft. of concrete per hour, depending upon the operators skill, depth and density of the concrete (ranging between 3,000 psi and 6,100 psi 20 MPa resp. 40 MPa).

The hydrodemolition work was continued, operating 24 hours a day, six days a week, operators working 12-hour shifts. A Vac-All truck with a street vacuum sled attachment cleaned up loose concrete and remaining water in a 1-1/2 hour operation between shifts.

Conjet Hydrodemolition equipment saved over three months work

Following Class 1 removal, an inspection was made by Wilbert Renking, an engineer from the Engineering Consulting firm of Parsons Burkenhoff of Chicago.

Areas of remaining delaminated concrete were marked with red spray paint for further removal in the Class II removal procedure.

After the Class II pass, a final inspection was made to determine areas for Class III full deck removal.

According to Bobby Shaver, E.J. Hughes Job Superintendent, the Conjet equipment succeeded on a cubic yard basis in removing 90-95 percent of the delaminated concrete in the Class I removal. Phase I removal of delaminated concrete from 13 ft 6 inch (4,1 m) wide area specified in the contract required two Conjet passes,



since the feed bar of the robot covers 13 ft (3,9 m) width. Two passes of 9 ft (2,7 m) and 4 ft 6 inch (1,4 m) were made.

Following completion of Phase I, II and III, the bridge surface was water blasted in preparation for a latex concrete overlay.

The latex concrete was wet-cured for one day, then dry cured for three days. Once the surface was ready and other incidental work was completed, the repair lane was opened for traffic, and Phase II began (Sept. 15) on the second lane James P. Hughes, Vice President of Hydro-Tech Inc., agrees with Van Nielen and Deputy Director of Toll Facilities Ken Hoover that hydrodemolition has provided many advantages.

"To accomplish with jackhammers what we have accomplished with the



Above the Conjet Robot in full action equipped with 13 ft (3,9 m) width.

Conjet equipment, we would have required as many as 70 or more men working 24 hours a day, six days a week," Hughes says. "This would have been a very difficult operation to manage both for the contractor and the Toll Authority."

"We used three men per 12-hour shift, one electrician, one operator and one laborer. Furthermore, we could not have done the job as fast. We would have had to start back in March or April, instead of July 13th.

Van Nielen points out further that as a result of hydrodemolition there was no damage to the rebars. In fact, the Conjet equipment cleaned them as the delaminated concrete was removed from around them. And because the



Below two Powerpacks and service truck parked along the 4,932 ft (1,480 m) long Wabash bridge.

method resulted in less sound concrete removal (selectivity), the amount of latex concrete required to be poured into the resulting voids and the amount of full depth forms required to be made were substantially reduced. More over noise was kept to a minimum, and the operation was dustfree. Hughes adds that indirect benefits of hydrodemolition to the contractor and public include the elimination of variable risk, higher quality work, selective removals, control of operation, insurance costs, corporate overhead, cash flow, payroll distribution and tabulation.

"We pay our employees by the week, but submit out own bills to the state by the month. It's pretty obvious that with an additional 70 jackhammer operators on the payroll that puts a strain on resources." In addition to resurfacing the deck, the job calls for replacing 15 modular joints, plus patchwork on the piers, tightening and/or replacing anchorbolts, replacing 21.500 of hand rails, repairing the curbs and sand blasting and

painting. The full job originally was scheduled to be completed by Dec.1st, but was completed in mid-November. Which means that they beat the deadline, thanks of Conjet Hydrodemolition equipment.

Equipment used

Conjet Hydrodemolition equipment in tandem operation.

1 Conjet Robot 230 equipped with a 13 ft (3,9 m) feed beam.

2 Powerpacks, each at 400 hp, 31 gpm, 17,100 psi (120 lit/min 1,200 bar).

1 Diesel generator



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