

Hydrodemolition Advantages and Advancements

NH Good Roads Members Collaborate to Solve Project Challenges

Hydrodemolition, also known as water jetting, water blasting, and hydro milling, is a concrete removal technology that uses high-pressure water (15,000 – 40,000 psi) to erode the cement, sand, and aggregate from the concrete surface while also penetrating existing cracks, voids or delaminations to remove compromised concrete to prescribed depths at rates upward of 800 sq ft per hour.

Paired with a skilled operator, the robotically-controlled process selectively and thoroughly removes only damaged concrete from any part of a structure – without the detrimental effects of mechanical removal – as it simultaneously cleans and descales rebar, resulting in a clean, textured surface profile that promotes a superior concrete bond.

Advantages

Extended Repair Life – The life expectancy of concrete repairs prepared with hydrodemolition is 3 times greater than mechanical chiseling (21-36 years versus 7-12 years).

Labor Savings and Increased Productivity – The robotically-controlled hydrodemolition process removes damaged concrete up to 25 times faster than handheld jackhammers and does not induce microfractures into the remaining concrete. Productivity increases with a consistent performance level that achieves the limits of repair in less time.

Safety – Use of remote-controlled versus handheld equipment minimizes the occurrence of labor fatigue and musculoskeletal injuries. Hydrodemolition virtually eliminates the risk of silica dust exposure, and skilled operators remain safely distanced from potential hazards and flying debris.

Advancements

Recent advances in hydrodemolition technology combine powerful robotic equipment, specialty lances, high pressure pumps, and a self-contained water treatment system to benefit projects in many ways.

Cost-effective, Eco-friendly Process – On-site treatment of used water with an **automated water treatment system** cost-effectively treats hydrodemolition wastewater by neutralizing pH levels and removing suspended solids. Treated water can be safely discharged into the environment or recirculated into the hydrodemolition process. This especially benefits projects in remote work areas.

As concrete repair contractors turn to robotic hydrodemolition for fast, safe, efficient concrete removal, the rise of the automated water treatment system is a game-changer for people, projects, and the environment.



Collaborating with Good Roads Members

As NH general contractors face industry-wide challenges including record labor shortages, rising materials and disposal costs, employee health and safety concerns, and environmental protection issues, NH Good Roads members are collaborating on bridge restoration projects and using hydrodemolition to take advantage of more productivity with less investment of time, money, and effort.

General Contractors E.D. Swett, Inc. and R.M. Piper, Inc. successfully teamed with hydrodemolition services provider AK Industrial Services LLC on these recent bridge remediation projects.

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Hopkinton, NH – Tyler Road Bridge over the Contoocook River

E.D. Swett was contracted to perform typical repair and replacement services while this town-owned bridge was fully closed to the public. However, field observations found considerably more deterioration than design engineers anticipated. Estimates had called for approx. 80 SY of deck rehab, but once the pavement was removed, sounding identified upwards of 340 SY of deterioration.

This fourfold increase in required demolition, coupled with an acute labor shortage and tight deadline, prompted Chris Robert, President of E.D. Swett, to seek innovative means and resources to safely expedite the project. "What would have taken a month of manual labor to demolish, the AK Industrial Services team did in less than five [8-10 hour] shifts using hydrodemolition – a major increase in daily productivity," Chris explained.

"A big factor for me was crew morale," he continued. "Our carpenters were hired to build, not demo – but they were on jackhammers instead of carpentry, due to the shortage of laborers. We needed to make better use of our available resources, and AK really bridged that gap in terms of innovation and new technology. I was aware of hydrodemolition, but we hadn't yet implemented it for E.D. Swett projects. Their team and system removed 35 cubic yards of concrete to a 4-inch depth in less than a quarter of the time it would have taken us manually."

The project's location (over the river, on the bank line, adjacent to the Contoocook Creamery at Bohanan Farm) also presented environmental impact concerns. A key selling-point for the owner, Chris notes, was that AK's on-site water treatment system filtered and neutralized the used water, preventing risks of contaminating river water.

Lebanon, NH – NHDOT I-89 Exit 19 Interchange

E.D. Swett is nearing completion of a four-year, four-bridge repair and replacement project for NHDOT I-89 Exit 19 Interchange. The discovery of extensive deterioration of the curb/gutter lines on these river bridges resulted in the need to redesign the parapet and bridge rail components. Each bridge required partial-depth concrete removal of approximately 100 SY along the deck curb line to an average 4-inch depth.

"For the first three fascia, mechanical demolition took us an average of 2 weeks each. AK's hydrodemolition crew did the fourth one in just 2 working days," Chris Robert



explained. "Timeliness was critical on this project." It was mid-September, and his team faced the challenge of completing the phase in order to shift traffic before Thanksgiving and the onset of winter weather. "We gained back 8 working days that were built into the schedule from the previous 3 phases, which allowed us to successfully swap traffic on the Tuesday before Thanksgiving, just before bad weather hit. The efficiency and quality of AK's hydrodemolition work enabled us to finish the phase on time, and positioned us to complete the final two phases on schedule in 2023."

Repair Quality Concerns: Chris explained that repair quality was an important consideration in choosing AK for hydrodemolition services. "With the extent and randomness of deck deterioration, I was concerned that mechanical removal methods could damage rebar or create microfractures in the sound concrete adjacent to poor concrete. We know that hydrodemolition creates a consistent-quality concrete underlay for the new concrete to lie on and adhere to. The clean, rough surface it leaves behind is much better than what mechanical methods can do, and allows for better adhesion between new and old concrete."

Meredith, NH - US 3 over Maple Street and NHRR

R.M. Piper was contracted by NHDOT to perform bridge repairs on US 3 in Meredith prior to the busy summer season. During a shutdown of the southbound lanes of the bridge, AK Industrial Services provided partial depth removal of 4 inches of deteriorated concrete along the entire length and width of the lane closure. The use of hydrodemolition significantly aided the project schedule and left a superior bonding surface for the concrete overlay. The water used in the hydrodemolition process was filtered of suspended solids and pH-neutralized on-site, ensuring that there were no negative impacts to the surrounding environment during the process.

What's Next? NH contractors anticipate more bridge work from municipalities, DOT, and bridge preservation efforts. "AK is a great resource to help offset the labor shortage," said Chris Robert. "It's a teaming opportunity, especially with upcoming infrastructure reinvestment work, and a solution that mitigates demolition problems." AK Industrial Services President Mark McLellan and Vice President Jason Peddle explained, "We enjoy partnering with general contractors to provide innovative solutions that result in time and labor savings, while providing the project owner with a superior product."

For more information: Contact [AK Industrial Services](https://www.akindustrial.com) at 617.884.9252.