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SORB INDUSTRY

CASE STORIES

Everything in the tunnels had to be demolished and hauled out.

Subway tunnels to World Trade Center restored using compact demolition machines

Since it opened in 1908, the Port Authority Trans Hudson subway tunnel (PATH) has been a vital artery for thousands of commuters, connecting Jersey City and New York City. With stations at Exchange Street on the New Jersey side and the World Trade Center on the New York side, the PATH system was integral to joining the two cities.

In 2001, after operating faithfully for nearly a century, PATH had begun to look a little weathered. In addition, breakthroughs in transportation technology made the PATH lighting and signal systems obsolete. The Port Authority of New York and New Jersey decided it was time for restoration of the entire line and scheduled a project start-up date for 2005.
With face-lift plans on hold for a few years, PATH remained a reliable means of transportation. Its systems, although outdated, still functioned as needed.

Everything changed on September 11, 2001.

The fall of the Twin Towers permanently altered the city's skyline, damaging several city blocks and leveling many surrounding buildings. Consequently, the World Trade Center PATH station was

Brokk machines removed the concrete between the steel I-beams.

destroyed, sending mounds of debris into the tunnels and crippling the trans-Hudson commute. In addition to the damage at the World Trade Center station, the tunnels suffered extensive flood damage from broken water and sewer lines and the vast amounts of water used to fight the fires at the World Trade Center.

The flooding damaged tracks, cables, electrical components and concrete from Ground Zero to Exchange Street. If the Port Authority had maintained their plan to wait until 2005 to begin restoration, the PATH tunnels would lie completely closed and unused for four years. With 67,000 daily passengers passing through the World Trade Center station alone, waiting was not an option. Therefore, restoration plans were brought forward and cleanup crews mobilized almost immediately.

Both tunnels were severely damaged

Once the debris was cleared and the water drained, transportation experts entered the tunnels to assess the damages. They determined that the only useable portions left of the tunnels were the iron ring liners, which became known as the famous "Hudson Tubes" at the time of their original construction. Everything else in

Fitted with buckets, the Brokk machines were also used to clear o

»Extreme conditions limited the choice of equipment«

The compact size of the Brokk units made them the right fit in the narrow tunnels

both 1.5 mile long tunnels, including tracks, signal systems and inner walls, needed to be demolished and hauled out. Contractors from all over the city submitted bids for the PATH restoration project. Yonkers Tully Pegno, a joint venture of three contracting firms, submitted the lowest contractors' fee bid of $16.7 million, over $7 million less than the second lowest bid. Yonkers Tully Pegno was awarded the job - an outstanding opportunity for the joint venture, but a difficult challenge as well.

Space limitations

Concrete walls of varying thickness encasing the entire length of both tunnels needed to be demolished and removed to make way for the new construction. However, space limitations and other extreme conditions restricted the methods crews could use to break through the concrete. "We had a very narrow area to work in," said Lou Marino, vice president of equipment operations for Yonkers Contracting. "Parts of the tunnel were only 12 feet wide."

Manual labor would have taken too long and cost much more than the contractors or the Port Authority were willing to spend - not to mention the toll such intense physical labor would take on demolition crews. In addition, equipment options were limited due to confined spaces, ventilation and maneuverability. "It's tough anytime you're working in tunnels," said Marino, "you can't go down there with gas- or diesel-powered machines without proper ventilation."

Ten machines were used

For what seemed like such a large problem, Marino knew the solution was simple. A piece of equipment that had been a part of the Yonkers fleet for 15 years would once again prove it's value: the BROKK compact demolition machine.

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Dubbed the ”Swedish Army Knife” of demolition equipment, the BROKK machine operates several attachments by remote control, including clamshell buckets, grapples, crushers and shears, making them extremely versatile and efficient. Additionally, because they’re electric and do not produce fumes, they have been favored for demolition in areas such as bank vaults, stair wells, elevator shafts and, in this case, subway tunnels.

The BROKK’s compact size made it the right fit for the PATH restoration. BCA supplied the ten BROKK machines used on the PATH project. ”The BROKK machine is the only one that could have replaced hand labor,” said Jim Brady, vice president of BCA equipment. ”Because of its size, the Brokk model 330 was much more agile than a larger machine in such a confined space, there is no other machine out there to match its performance in that situation.”

Excellent maneuverability

Known for precision in tight quarters, BROKK machines lived up to their reputation on the PATH project by breaking concrete almost directly above their position through the use of a custom breaker attachment, an impossible feat for a less maneuverable piece of equipment. Manipulated via remote control, operators stood a safe distance away from falling debris. In addition, the BROKK machines were frequently hauled through the tunnels and operated on top of flatbed rail cars, a task not possible with a much heavier machine. ”We could have gone in there with a larger machine,” said Marino, ”but we wouldn’t have had the room or the maneuverability we had with the BROKK.”

»The Brokk machine is the only one that could have replaced hand labor»

Utilizing breaker attachments, crews were able to cut through the concrete walls with minimal maintenance and maximum stability, even when operating on uneven surfaces. ”Because it was such a small space, it didn’t take long for debris to stack up,” said Brady. ”The BROKKs were still able to perform to their maximum capabilities while often times sitting on piles of debris.” In addition to demolition functions, BROKK machines were equipped with a bucket attachment and utilized to removed debris from the site.

Brokk speeded up the process

By replacing hand labor with BROKK demolition machines and attachments, crews were able to finish the PATH demolition phase by November 2002 - not only on budget, but also ahead of schedule. ”Without a doubt, BROKK equipment helped speed up the process,” said Brady. ”The job was completed in approximately half the time.”

With the demolition of the inner walls complete, the debris cleared out and new construction underway, the Port Authority anticipates an early re-opening of the PATH system. Through the help of hundreds of laborers working around the clock, innovations and transportation technology and cutting edge BROKK demolition equipment, commuters will soon reunite with familiar faces from across the Hudson more quickly and efficiently than ever before.

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