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The barge operates with pipe in the water.

Directional Drilling

Effective Teamwork Results in Successful Completion of Outflow Pipeline

Jeff Griffin | Senior Editor

Teamwork of several organizations involved in this unique project played a key role in construction of a sewer outflow pipeline in the northwest corner of Pennsylvania.

H&H Enterprises, Andover, Ohio, was the primary contractor for the project which included three horizontal directional drilling (HDD) segments to install an 18-inch HDPE DR11 pipeline to carry treated wastewater from the North East Borough treatment plant into Lake Erie, in compliance with EPA standards.

Length of the outflow pipeline was

HDPE pipe on the beach.

5,600 feet, said Jason Hockran, H&H vice president/owner.

Project owner was the North East Borough Sewer Authority. The job was designed by engineering firm GPI's North East, Penn., office. S. St. George Enterprises, Fredonia, NY, was awarded the shore approach contract in partnership with H&H and played a crucial role in its successful completion.

Hockran said the project is a replacement line for an existing outflow that drains into a creek near the treatment plant.

Planning required careful consideration of multiple factors.

"Effluent limitations for discharge to a small stream were becoming too restrictive and could require major capital expenditures in the future," said Gus Maas, GPI brand manager. "Discharging directly to Lake Erie allowed for conventional effluent limitations, without treatment plant upgrades.

"A shale/rock plug near the drill exit in Lake Erie needed to be maintained during the drilling to prevent escape of drilling fluids. Several easements on private property had to be obtained. The pipeline drilling needed to go under a four-lane highway," he explained.

Employing directional drilling minimized earth disturbance and environmental impacts, and facilitated obtaining easements on private property.

Critical design

"The design," Maas continued, "required careful consideration of the drill entrance and exit angles and radius curvature to miss obstacles and obtain easements on private property. Due to the length of installation, multiple drill locations had to be accommodated.

"The project schedule had to accommodate a limited period of time in the summer for work in Lake Erie."

For the shore landing, escape of drilling fluids into Lake Erie and disturbance to the lake bottom had to be minimized.

"Two bores were necessary to get from the plant to the shore due to the terrain along the right-of-way," said Hockran. "The pipeline route was not straight."

Subsurface conditions were weathered, layered shale, encountered only a few feet from the surface, providing solid formation along the entire right-of-way.

To go from treatment plant to shore, an American Augers DD210 directional drill was used for the pilot hole and hole opening. An American Auger DD220 was the exit-side rig for pipe handling and string weights.

"Construction of each drill," Hockran said, "was designed and planned by the H&H team consulting with GPI. The entry and exit locations were based upon layout areas to fuse the pipe and place pipe on rollers in one section with the fewest number of sections as possible."

Each segment required three mid welds of the HDPE pipe sections during pullback. Length of the sections and pipe handling were planned to minimize impact to easement properties and to eliminate traffic disruption on this project.

"On the first section," Hockran continued, "we set up the drill near the beach approach entrance on the lakeshore and drilled back towards the sewer treatment plant roughly 1,700 feet."

Pipe was prepared and fused in a field near the exit location and carefully aligned for pullback, with proper mid-pullback fusion.

Second segment

The second segment extended from the exit location of the first drill, back to the sewer treatment plant, approximately 1,700 feet.

"The pipe handling area on this drill," Hockran continued, "was through the middle of the sewer treatment plant location and required H&H to coordinate with the plant operations team and another separate-contract contractor working on a plant building at the same time.

"We had to complete three mid fuses on this pullback, due to the tight constraints, to allow the sewer plant work of the other contractor to continue operations during our work."

Shore landings always are a challenge. The entry location for the DD210 drill unit was in a residential neighborhood with a public beach, park and playground on the shore of Lake Erie.

The drilling pad was constructed there, and pipe was prepared for the pullback. Beach operations were uninterrupted during the drilling process with access limited for two days during the pullback. The plan for this bore minimized environmental and social impact.

"The goal called for completion of the pilot hole within 175 feet of the planned exit location on the lake bottom," Hockran said, "then to complete all the hole opening for that section up to the 30-inch pass."

Hockran said the original plan was to

Jason Hockran (left) with Scott Kilgore, of H&H Enterprises

make up and breakout drill pipe joints on a barge, but due to the stable geological formation and success in controlling drilling fluids, the decision was made not to handle drill pipe on a barge.

"We tripped out of the hole and went back in with the steering equipment and pilot bit to complete the pilot hole breakout into the lake," said Hockran. "This was done primarily to maintain control of drilling fluids for recycling and hole cleaning capacity, and also to minimize the discharge of drilling fluids into the lake.

"Once we completed the pilot hole to breakout from the bottom of the lake at the required exit location, we would trip out to the barge and put on the hole opening equipment to complete the 30-inch pass for the last section of the drill to prepare for pipe installation."

The HDPE pipe was fused in segments on the beach.

"Once the hole drilling was completed, we pulled the pipe out in the water with a tugboat," said Hockran. "This was a particularly tense, several-hour period prior to and during pullback. We did not know how the lake and the weather were going to interfere with the pipe floating semi-submerged."

Key equipment, supplies

Pilot holes of each of the installations were made with 11-inch tricone bits. Additional equipment, supplies, and vendors involved included:

- Drilling fluid and shaker screens from Drilling Mud Direct
- Mixing system via an American Augers 500PD with pump
- Adtech supplied mud motors and drill bit
- Prime Horizontal provided Paratrack and Gyro steering equipment and a steering engineer
- Lee Supply supplied the HDPE pipe and McElroy fusion equipment and technician
- Deckhand/Toughhand pipe handling tools from LaValley Industries were used

S. St. George Enterprises played a critical part in the planning and

In Memoriam: Scott Kilgore

Scott and Maureen Kilgore

As in many projects, Scott Kilgore played a crucial role in the successful completion of the North East Borough sewer outflow line project. Unfortunately, he passed away before the project was completed.

Experienced in underground construction work when he joined H&H 14 years ago, Kilgore expanded his trenchless specialty career to become lead drill project designer and steering engineer.

"The East Borough beach approach went almost exactly as Scott and the H&H staff planned," said Jason Hockran, H&H vice president/owner.

"We nicknamed Scott 'Bullseye' and often placed wagers on his ability to knock the stake out of the ground at the exit location of a pilot hole. Most times, that was achieved.

"This project turned out to be the culmination of Scott's underground design services for the industry, but his legacy will live on in the way that he trained and cared for the people that he worked with. We were blessed to have him as a part of our team and his care and approach to work and people will live on." •

coordination of this shore approach to ensure timely completion. Administrative oversight was provided by Steve St. George and project management assistance and material procurement was organized by Kevin Reading.

Allen Marine Service provided marine support, including barge and divers.

"The marine team was instrumental in the efficiency and speed of completing the pullback section of this project," Hockran said. "Once the pipe was hooked to the tugboat and the 2,200 feet of HDPE was floating in the water, we were at their control. It took a few hours to maneuver the pipe to the proper location for pullback, but once in place, pullback installation of the pipe went very smoothly."

Local fire departments protected the lake shore during the handling of the pipe out into the lake and ensured that boat traffic would be safe and not cause any damage to the pipe in the water – a 12- to 16-hour process.

Hockran recognized key people involved in successful completion of the project, including John Morrison and Scott Kilgore (see adjacent sidebar), operations managers from H&H. Others were: Patrick Gehrlein and Julio Pazmino, North East Borough Sewer Authority; Steve St. George, S. St. George Enterprises; and John Bordner and Chris Busklaew, Allen Maine Service.

Bidding on the project was completed in late August 2019. The first drilling segment was competed in January 2020, the second in March 2020. The shore approach, marine support, and successful pipe installation were competed on July 1 and 2, freeing the beach of construction for much of the summer. •

FOR MORE INFORMATION

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