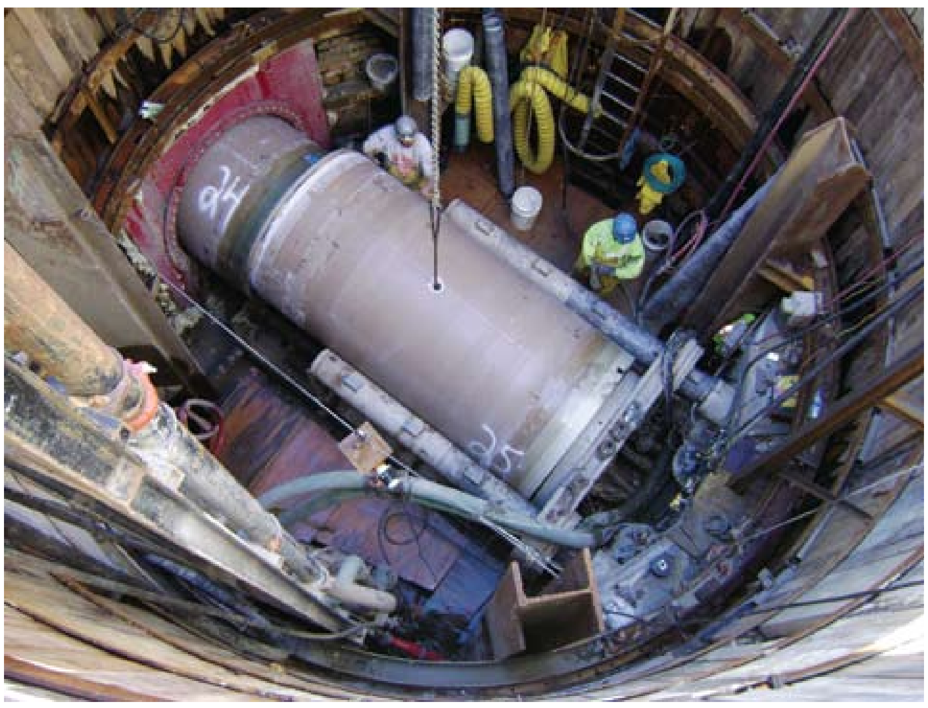
trenchless necessity

By Erin Boudreaux

The city of Marysville, Ohio, maintains and operates a wastewater system that serves a population of 19,000. Included in its service area are several industrial contributors, including Scotts Miracle-Gro Co., Nestle Corp., Goodyear Tire and Rubber Co. and Honda of America Mfg.

The city of Marysville, Ohio, completes Trunk Interceptor Project


Design of the Truck Interceptor Project was based on the Marysville Wastewater Master Plan.


The project team significantly reduced contamination issues using trenchless installation methods.

To serve the existing population and meet future wastewater requirements, the city identified the need for a new water reclamation facility. In addition, a new wastewater conveyance system was planned in order to eliminate lift stations throughout the existing collection system and lessen the number of future pump stations. In turn, the city of Marysville would reduce maintenance costs and increase future reliability of its conveyance system.

The city accomplished this through the execution of five contracts. One of the contracts was the Trunk Interceptor Project, with a cost of $35 million. The Trunk Interceptor Sewer discharges into Crosses Run Pump Station, which conveys flow to the WRF. Consulting engineering firm DLZ, Columbus, Ohio, designed the Truck Interceptor Project.

"The design considerations for the project were based on the Marysville Wastewater Master Plan and included assumptions based on the existing residential and commercial/industrial demographics and predicted future growth," said Debarati Bardhan, public works project manager with DLZ. "We had a good distribution of residential and commercial contributors within the various sheds."

Trenchless Techniques

The presence of industrial sites also posed design challenges. Within the project alignment, the potential for contaminated soils and water existed.

"This was one of the reasons we chose to specify trenchless installation techniques for the majority of the project," Bardhan said. "Other reasons included depth, issues related to easement acquisition and subsurface utility interferences. Even in areas where we were in a wide-open field, the depth dictated that the most economic method of construction would be trenchless."

A variety of easements were necessary for construction of the new line. These easements were both permanent and temporary (construction easements). In some situations, open-surface easements were possible, while in others only subsurface easements were allowed.

"In Marysville, we had some situations where subterranean easements were utilized," Bardhan said. "These types of easements allow the owner to have access confined to a specific length around the installed utility/sewer. The easement rights do not extend all the way to the surface. As in the case of the temporary easement, if additional work is required in the future, the utility owner has to negotiate with the property owner for a new temporary work easement."

By choosing trenchless installation and placing the shaft locations outside the possible contamination zones, the difficulties associated with managing the contamination, if it was encountered, were reduced significantly.

Construction Challenges

Super Excavators Inc., Menomonee Falls, Wis., installed 20,500 ln ft of 60-in.-diameter pipe with 14,000 ln ft installed by microtunneling methods. Jacking pipe with an allowable capacity of 540 tons was supplied by Hobas Pipe USA. The contractor requested shorter (10-ft) jacking pipe lengths, which decreased the size of the installation shaft as compared to the standard 20-ft pipe section. The remaining 6,500 ln ft of 60-in., 72-psi line was constructed by open-cut methods.

The 14,000 ft of jacking pipe was installed in 18 drives, with the longest drive equaling 1,056 ft. Super Excavators averaged less than 100 tons of jacking load during installation of the 60-in., 540-ton jacking pipe.

For the longer jacking runs, intermediate jacking stations were installed to complement the main jacks at the installation pit. These intermediate jacking stations were used to distribute the thrusting force along the pipe string by dividing the string into independent reaches. The jacks were installed inside a steel casing fabricated to the same outside diameter as the pipe.

A microtunneling boring machine (MTBM) was the equipment utilized on the tunnel portion of the Trunk Interceptor Project. It operates as a remote-controlled, earth pressure balance machine. This project consisted of varying and difficult ground conditions (e.g., cobbles, boulders, gravels and sticky clays). The MTBM performed well and was equipped with disc cutters to handle the large quantity of rocks.

CCFRPM pipe and RCP were specified for this project.

"Initially there were no intermediate jack stations used and we did not plan on using any," said Jake Keegan, project manager with Super Excavators. "On the second tunnel run, we had to excavate a recovery shaft because the machine was stuck due to ground conditions. Therefore… intermediate jack stations had to be installed on three of the longer runs over 800. However, they proved unnecessary. We did not need to extend the jacks on any of the runs, as no surge in jacking pressure occurred."

Installation Savings

There were two pipe materials specified for this project: centrifugally cast, fiberglass-reinforced polymer mortar (CCFRPM) and reinforced concrete pipe (RCP) with internal polyvinyl chloride lining. CCFRPM was utilized for the majority of this project instead of RCP due to the cost savings. The utilization of CCFRPM fittings for some of the manholes also contributed to cost savings.

"The initial material cost increase of the CCFRPM over the concrete was offset by the decreased labor cost we expected to see with the Hobas fittings," Keegan said. This was due in part to the easy connections with the supplied couplings, which reduced the amount of labor needed to install the manholes.

Once the line was installed, a series of tests was conducted to ensure proper installation and performance of the installed line. The installed line was checked for ovality and leakage, per the project specifications.

"A proof stick with a length equal to 97% of the internal diameter of the installed pipe was utilized by the CMT [construction management team] to check for deflection," Bardhan said. "DLZ Inspectors walked through the installed Hobas pipe with the stick to ensure that minimum acceptable internal diameter and shape were maintained throughout the length of the project and deflection was within the limits allowed in the contract documents and the pipe manufacturer."

In addition, the installed pipe was tested for pipe joint leakage. "All tests were conducted in accordance with the latest specifications, and results were found to be acceptable and within the limits specified in the contract documents," Bardhan said.

"Actually, in the jacking installation, we didn't find a single joint leak," Keegan said. "When the job was completed, all parties were pleased with the project success." WWD

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