



MICROTUNNELING

by Jeff Griffin • Senior Editor

Plays Key Role In Atlanta Construction

The city of Atlanta is engaged in one of the most ambitious and costly water and sewer improvement programs of any major city in the United States - Clean Water Atlanta is a \$3.9 billion collection of projects with the goal of completely overhauling the city's water and sewer infrastructure over a period of 10 years.

By spring 2007, Mayor Shirley Franklin reported Clean Water Atlanta is nearing the halfway point toward its goals of ensuring a clean, safe supply of drinking water and clean streams and rivers within Atlanta, Fulton County and downstream communities.

With many segments of the program already complete, three major sewer separation projects are scheduled for completion this year. Each involves construction of new sanitary or storm sewers within a combined sewer service area. The existing sewers then will serve as either sanitary or storm sewers, depending on the design intent of the newly constructed sewers.

By separating combined sanitary and storm sewer systems, storm water is conveyed to an outfall for discharge directly into the receiving water while sanitary flow is typically piped to a treatment plant for screening and disinfection before being discharged, reducing the potential for overflows during periods of heavy rainfall.

Scheduled for completion later this year are three sewer separation projects: • The Stockade Sewer Separation Project involves construction of 59,000 feet of new sewers, 360 new manholes and 400 storm-water inlets with traps;

- The McDaniel Sewer Separation Project includes construction of 65,000 feet of new sanitary sewers, 400 new manholes, 700 new sewer connections and 360 storm water inlets with traps. In addition, 55,000 feet of water lines are being replaced; and

- The Greensfery Sewer Separation Project involves construction of 56,700 feet of new sewers, 381 manholes, and more than 900 service connections and replacement of stormwater inlets with traps. The project also includes 48,000 linear feet of water distribution lines and service connections.

Most of the construction on the three sewer separation projects was open-cut necessitating numerous sidewalk and street closures, typical of other Clean Water Atlanta projects and area residents in most instances appear to be handling inconveniences with understanding and patience.

Microtunneling

However, trenchless construction has played a role in each of the projects with key segments. Where excavation was difficult or impossible, microtunneling was utilized.

In explaining the benefits of microtunneling to residents in project areas, Clean Water Atlanta describes microtunneling as a process using a remotely controlled microtunnel boring machine combined with the pipe jacking technique to directly install product pipelines underground. This typically occurs in a single pass, avoiding the need to have long stretches of open trench for pipe laying, which causes extreme disruption to the community.

Most new pipe installed on the projects utilizes ductile iron except for tunneled segments where pipe diameters were less than 42 inches; then, vitrified clay was used.

Huxted Tunneling, Palmetto, FL, had the tunneling contract for the McDaniel Basin project. Huxted crews made 17 drives to install 200 linear feet of 20-inch pipe, 1,145 linear feet of 24-inch pipe, and 3,531 linear feet of 30-inch pipe - all Mission Clay No-Dig vitrified clay jacking pipe installed by slurry microtunneling.

"Tunneling portions were specified by the project owner based on site conditions," said Steve Caneen, Huxted president. "Factors considered were depth, ground water, soil conditions, presence of existing utilities and degree of surface disruption that excavation would cause."

Pits were excavated at specified manhole locations. Drive lengths ranged from 150 to 570 feet. "Subsurface conditions ranged from silt, sand, gravel and weathered rock," Caneen continued. "Drives were completed without unexpected problems."

Slurry microtunneling equipment used was Iseki Unclemole models TCZ 500, TCC 600 and TCC 700. Huxted Tunneling has been in business as a utility contractor since 1975 with its primary focus since 1994 on slurry microtunneling. Huxted had the contract for all microtunneling on the McDaniel Basin project, and subcontracted an additional 2,204 feet of pipe installation completed by the pilot tube method to Allied Contracting, Sylvania, GA, a specialist in microtunneling, pipe jacking, auger boring and liner plate tunnels.

Pilot tube

Allied used the pilot tube method to install 2,207 feet of 12-inch diameter Mission Clay No-Dig jacking pipe. Ten drives were required to complete the installations which were in various locations throughout the project area. Drive lengths ranged from 60 to 277 feet through sandy soil conditions containing some clay. Depths ranged from 20 to 28 feet. Work was completed with an 80-ton Akkerman pilot tube microtunneling machine.

"Tunnel segments were selected to minimize disruption of surface improvements and to cross under existing utilities," said Allied owner John Burke.

On the project Allied also completed auger bores, 800 feet of 84-inch liner plate tunnel and 300 feet of 72-inch liner plate tunnel.

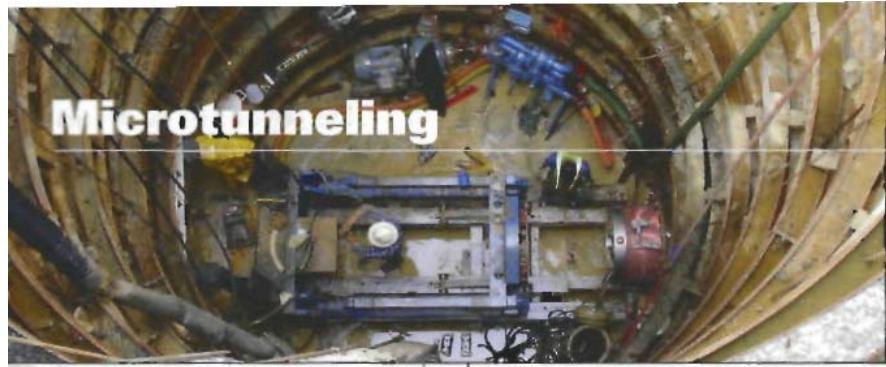
The pilot tube method is a variation of micro tunneling used for installation of smaller-diameter pipes at shorter distances. Pilot tube equipment is smaller and less expensive, requires smaller jacking pits and topside footprints require less space than conventional microtunneling machines. The pilot tube process differs from conventional microtunneling in several ways, including establishment of line and grade by installation of a small-diameter pilot tube before pipe is jacked into place. Steering is controlled by a slant-face cutting head similar to those used for horizontal directional drilling (HDD). The guidance system includes an electronic camera-mounted theodolite, LED target, and monitor screen which provides straight installations with a tolerance of 3/8-inch per 300 linear feet. Spoil is removed by an auger system, rather than in slurry form.

Westcon Microtunneling, Pleasant Grove, UT, used both conventional microtunneling and the pilot tube method on drives scattered throughout the Stockade and Greensferry projects. Pipe sizes and total lengths were:

- Stockade Basin-500 feet of 8-inch diameter pipe; 1,205 feet of 12-inch; 748 feet of 18 inch; and 200 feet of 36 inch. These segments all used Mission Clay No-Dig pipe. Approximately 1,575 feet of 42-inch clay pipe was microtunneled using Can Clay vitrified clay pipe; and
- Greensferry - 1,099 feet of 8-inch; 1,515 feet of 18 inch; 750 feet of 24-inch; 1,246 feet of 30-inch. All installations used Can Clay Denlok vitrified clay pipe.

Drives

Thirty-three drives were made in the two projects ranging in distance from 10 to 750 feet at depths ranging from 18 to 30 feet. Wherever possible, jacking pits were used to jack pipe in two directions. Soil conditions were a sloppy, wet silt-clay mixture with rock encountered in many areas. "Microtunneling was used on the proj-



ect for all deep-cut portions (more than 20 feet) of the job." said David Hancock, Westcon project manager. "Open-cut was impractical in many areas due to depth of cut and high water table. Conventional microtunneling was used for 24-, 30-, 36- and 42-inch pipe, and pilot tube microtunneling for everything 18 inches and smaller."

Equipment used for pilot tube work was an Akkerman GUM with powered cutting head for 18-inch pipe and Soltau RVS 80. A Herrenknecht AVN 600 and 1000 machines were used for the 24-inch and 42-inch pipe, and a Soltau RVS 600 used for the 30- and 36-inch pipe.

About the Greensferry project, Hancock added:

"One drive is a record for 24-inch outside-diameter pipe," he said. "Using the Herrenknecht AVN 600 with a new lubrication system, we went 750 feet with very minimal jacking force. Microtunneling allowed pipe installation under a school grounds without ever going onto the property. We went more than 20-feet deep to avoid obstacles."

Westcon has been in the microtunneling business for 17 years.

The physical properties of vitrified clay pipe suit it well for microtunneling construction, said Jeff Boschert, P.E., field engineer for the National Clay Pipe Institute,

"Clay pipe has high compressive strength for jacking, is chemically resistant to sewer gases, and short one-meter lengths are perfectly suited for pilot tube technology," he said. "Vitrified clay pipe is used for more pilot tube installations than any other type of pipe."

The McDaniel, Stockade and Greensferry projects are scheduled to be completed late this year at a total cost of just under \$100 million. Along with the West Area Combined Sewer Overflow tunnel, the separated sewers will dramatically reduce CSOs that have occurred with virtually every rain event.

FOR MORE INFORMATION

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Greensferry Drive Sets Record

Shortly after its completion, Westcon Microtunneling of Pleasant Grove, UT, announced that one of the microtunneling drives on a project in Atlanta is a world record for installation length of 24-inch clay pipe using a Herrenknecht AVN 600 microtunneling machine.

The 750-foot-long drive was installed for the city of Atlanta's Greensferry Basin Combined Sewer Separation Project. This job allowed the segment of a sewer line to be installed beneath a school without having to bring equipment onto school property. The maximum recommended drive length for the AVN 600 is 460 feet.

"The long drive was necessitated because intermediate shafts could not be installed in the school grounds during the school year where the crossing was located," said the press release. "The line was installed in very unstable silty fine sands and clays at depths over 18 feet with a high ground water table. Westcon was able to increase the distance substantially by using higher slurry pumping capacity and a special pipe lubrication system to greatly reduce jacking loads."