

Teamwork Key to Virginia Sewer Project



By James W. Rush

Founded in the 17th Century, Alexandria, Va., is one of the United States' oldest and most historic communities. Alexandria's port once teemed with tall ships laden with tobacco and other agricultural goods bound for points north and the Old World. The city was at the heart of the Revolutionary and Civil wars, and was part of the original boundary of Washington, D.C.

Today, Alexandria retains its colonial charm despite the explosive growth of the greater Washington area. So, it came as no surprise that the City turned to non-disruptive trenchless methods when a new trunk sewer needed to be built through the town.

Background

In March 2001, Crescent Resources LLC, a subsidiary of Duke Energy, acquired a 300-acre parcel of land, formerly a railroad-switching site known as Potomac Yard. Crescent's plan was to convert the property into a mixed-use facility comprising a town center, 1.9 million sq ft of office space, a 625-room hotel, 135,000 sq ft of neighborhood retail space, 2,000 residential units and a 25-acre park.

Prior to issuance of building permits, however, the City of Alexandria required that Crescent Resources design and build new sewer infrastructure to support the proposed development. Upon completion, the new sewer would be transferred to the City.

Crescent Resources turned to Jacobs Civil Inc., a civil engineering firm, to assist with the planning, design and construction of the new sewer. Crescent Resources and Jacobs worked closely with christopher consultants and the City to ensure that the project met with the approval of all parties.

The first order of business was addressing the schedule. Crescent Resources needed a firm completion date due to commitments to potential buyers and renters, while the City wanted to minimize the effects to the community. The City also requested that trenchless techniques be evaluated to minimize disruption.

Crescent Resources and Jacobs developed a modified design-build approach to accelerate the schedule. Jacobs prepared 75 percent design documents in 90 days and released them to three short-listed contractors. The contract was awarded to Shirley Contracting Corp. and its microtunneling subcontractor, Huxted Tunneling.

Upon selection of the contractor, Jacobs and the contractor worked together to complete the 100 percent design in a period of three months and then offered a final bid to Crescent, which had the right of denial.

This partnering approach improved contractibility and minimized the potential for change orders, according to Tom Meinhart, project manager for Jacobs Civil. The benefits of this approach were shown as construction was completed on schedule and approximately \$2 million under the original project budget.

Construction

The Jacobs design specified microtunneling as the method of choice due to the ground conditions, the urban setting, the preference for a gravity pipeline and the need to reduce impacts on the community. The \$10 million project consisted primarily of constructing 8,300 lf of 30-in. diameter clay pipe from the Potomac Yard site to the Alexandria Sanitation Authority's wastewater treatment facility.

Most of the route crossed through streets of the Alexandria's Old Town historic district. The project also required crossing under CSX railroad tracks and the Washington Metropolitan Area Transit Authority's commuter rail tracks.

Because of the age and density of the city, navigating existing utilities was a primary concern. The design team selected the route to minimize potential conflicts with existing utilities — both underground and overhead — after undergoing an extensive location program, which included test pitting in the shaft areas.

The project required the construction of 24 shafts, the majority of which had inverts well below the groundwater table. To avoid dewatering and thus reducing risk of set-



Project team members (seated from left): Bill Rice and Andy Robinson, both with Jacobs Civil Inc., (standing from left) Tony Jefferys, Don Adams, Jim Dunagan, Scott Smith, Chuck Smith and Joe Maguire, all with Shirley Contracting Corp.

PROJECT OF THE YEAR: New Installation



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crews and plated over the shafts so that tunneling could begin when ready without delay.

The drilled slurry method entailed drilling 10- or 15-ft diameter shafts (10 ft for receiving shafts, 15 ft for jacking) into which a smaller steel casing was inserted. Following the placement of the casing, the annulus outside the liner was grouted to form a watertight barrier. This approach also minimized the risk of encountering contaminated water, which was potentially present along some areas of the alignment.

When this method failed to control groundwater, dewatering was used to lower the groundwater table.

Once the liners were placed and grouted, steel rings with rubber gaskets were welded to the liner. Crews then cut out the ring to allow the machine to pass through the liner, at which point it was able to mine through the grout and into the ground.

Huxted Tunneling used an Iseki Unclemole TCC 700 to navigate the sandy, silty ground. The TCC 700 employs a slurry pressure balance to support the face of the tunnel during excavation. In addition to soft soils, pockets of stiff clays, gravels and dry sand were encountered.

Huxted ultimately employed three crews to install approximately 7,400 ft of pipe in 22 drives. To accelerate the schedule, Modern Continental was subcontracted to complete two runs totaling 900 ft (using a Herrenknecht AVN-700).

Mission Clay No-Dig pipe in 8-ft lengths was installed along the majority of the alignment. However, on one run that crossed under rail lines, 30-in. Hobas fiberglass reinforced pipe was placed inside 42-in. Permalok steel casing.

Despite the challenges, microtunneling was completed almost without a hitch, according to Steve Caneen, president of Huxted Tunneling. The job was awarded to Shirley Contracting in March 2002 with microtunneling commencing in June. By the end of November, the project was completed — on time.

Team Effort

Successful completion of the project required a team effort to overcome technical, political and social challenges. The project required cooperation between public and private parties in selecting the means, methods and alignment for the pipeline construction, as well as coordinating between Alexandria's businesses and residents.

Alexandria is home to some 130,000 residents, who are known for their involvement in local government. It contains 133 registered civil and neighborhood associations and 54 registered professional and business associations. Therefore, any project needed the support of the public to proceed.

tlement and consequent damage to nearby utilities, roadways and buildings, Shirley Contracting utilized a drilled slurry method (subcontracted to Case Foundation Co.). To maximize efficiency, shaft-sinking crews worked ahead of tunneling

As a result, the project team developed a Community Outreach Program to educate the community about the project, while demonstrating Crescent Resources long-term commitment to the community. The team conducted more than 40 presentations to public groups in addition to creating a Web page and a telephone hotline number.

"We wanted to be proactive and responsive when problems did occur," said Bobby Zeiller, Crescent Resources' project manager. "As a result, we were able to do things that would normally be opposed because people had a better understanding of what we were doing."

One unique aspect of the project was the implementation of a Student Mural Program, the objective of which was to enhance the traditionally unappealing fencing of the construction sites. Students ranging from elementary school to high school participated to create artwork that adorned shaft sites along the alignment.

The successful completion of the project allows the construction of a new facility that will contribute to the continued growth of the region, while adding valuable underground infrastructure that will serve the community for generations to come.

The Potomac Yard Offsite Sanitary Trunk Sewer Project demonstrated that, with proper planning and design, trenchless construction can be cost-effectively used in complex ground conditions within urban settings to minimize community disruption.

Other key personnel on the project included Steven Kramer, project principal for Jacobs Civil; Andy Robinson, senior design engineer for Jacobs Civil; Bill Rice, resident engineer for Jacobs Civil; Chuck Smith, contract manager for Shirley Contracting; and Kevin Washington, project manager for christopher consultants.

James W. Rush is editor of *Trenchless Technology*.



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Contact info