

# PVC, HDD Team Up To Meet Water Line Challenge

The village of Lithopolis is a small, historic suburb of Columbus, OH, with a population of 1,200 but lives up to its name. Derived from Greek words, Lithopolis roughly translates to “stone city,” referring to the solid layers of sandstone and limestone that lie beneath the village.

These local rock strata recently presented a logistical challenge for the stone city last year, as it planned for a 7,200-foot line extension of its water utilities. The line extension was needed to feed the new Grottos at Lithopolis subdivision, now in its first phase of construction. Phase One consists of 19 houses, spaced 400 to 500 feet apart, all needing water service. The waterline would also need to provide for Grottos’ future lots and existing homes near the development. The rock would pose a big obstacle, whether the village used open-cut excavation or directional boring to install the pipe. Because the new pipeline would need to pass through the development and near other existing homes, the project would have to create as little disturbance as possible. Another hurdle to overcome was a deep ravine near the development. With all of the factors considered, the village of Lithopolis decided that horizontal directional drilling would be the best pipe installation method for this project.

“The terrain of the ravine crossing would have made open-cutting difficult and hazardous for the work crews,” says Ed Van Vickle, acting village administrator for Lithopolis. “Getting materials and equipment into and out of this wooded ravine would be a formidable task. Additional right-of-way easements for ingress and egress would have been necessary on an open-cut job. Plus, with directional boring, the pollution and sediment control issues could be avoided.”

Directional boring would also keep costs down for restoration of trenched areas, isolate tie-ins and present somewhat less difficulty than digging through rock.

The village hired Strand Associates Inc., a national engineering firm with an office in Groveport, OH, to design the pipeline and Kirk Excavating, of Columbus, as contractor. When it came to pipe choice, the village selected CertainTeed Certa-Lok C900/RJ PVC pipe which could meet pressure ratings while maintaining a smaller wall thickness in an eight-inch pipe and avoid higher installation costs. The village also preferred not to have several thousand feet



of pipe strung out above ground, crossing driveways and yards. Therefore, having a pipe with a strong restrained joint system was vital in the rocky soil conditions.

“In the bored sections of this project, a good restrained joint pipe was necessary, and we were impressed with the Certa-Lok C900/RJ,” Van Vickle says. “The restrained joint technology assured that joints are properly positioned and inspection is easily visually confirmed.”

## Work begins

Kirk Excavating began work with an open-cut section across a cornfield in June 2007, laying 1,640 feet of pipe with a crew of four. The crew then daylighted utilities and proceeded with the directional drilling portion of the project using a Vermeer 36x50 drill, with 36,000 pounds of pullback and 5,000 pounds of torque. They soon reached the ravine, which presented the biggest chal-

lenge of the project. The course the bore would follow involved a drop of 70 feet from the starting point, a 30-foot inflection point and an upward curve, all within the first 240 feet. The borehole was 700-feet long through solid rock strata, reaching a depth at several points of 24 feet beneath the surface.

“We made the first attempt to bore under the ravine using a Tri-Hawk drillhead,” says Chuck Kirk, owner of Kirk Excavating. “After about 140 feet of sandstone, we decided to switch to an air hammer.”

Kirk Excavating rented a Vermeer Hammerhead air hammer with a 5-inch pilot bit to break through the rock formations in a day and a half, using a pressure setting of 350 psi. An Astec dual 1,000-gallon mixing system was also used for bore lubrication. The high air pressure was necessary to operate the hammer and for use during the reaming process, but it caused significant

amounts of pressurized bore slurry to surface. The crew cleaned this up with a Ditch Witch FX-60 mud vacuum.

After breaking through the rock, drill operator Scott Heston, of Lancaster, OH, pulled back a 9-inch reamer, 12-inch reamer and a 14-inch reamer before pulling the 8-inch PVC pipe. Steering the bore was challenging during this portion of the drill, but the air hammer performed well and the crew stuck with it to complete the bore successfully.

### **More rock**

The crew later experienced another very rocky area while drilling a 640-foot run beside a ditch, where there was very little room for maneuvering equipment. The layered sandstone was no match for the air hammer though, and the crew was able to break through easier than in the ravine bore. All throughout the rocky conditions, the restrained joint PVC pipe assembly held up well. The Certa-Lok is easily assembled in 20-foot lengths, piece by piece, with spline-locked couplings that include elastomeric O-ring seals. To keep the pipeline moving faster, part of the crew pre-assembled the

20-foot pipe lengths into 100-foot sections in a nearby field, which they attached, one at a time, to the growing pipeline. Doing this further sped up the pullback process.

"We were worried that the couplings might snag in the rockier portions of soil, but we had absolutely no problems. In fact, we were able to pull back a 640-foot shot in just 32 minutes, a record for us," Kirk pointed out.

Once pipe was pulled through, the crew tied in fire hydrants and connected services to the development's first 19 homes, installed 15 taps to existing residences along the 7,200-foot water line and extended service beyond the development to four new homes. Adjacent land is available for a second construction phase of equal size and design to Phase One, as well as potential development of open land nearby.

The pipe passed pressure testing with flying colors in late September, completing the job. Kirk said that "when we pressure-tested the pipeline, we pumped it up to 150 pounds per square inch and left it overnight. When we came back the next morning, it was still at 150 – zero loss."

Because directional boring caused much

less disturbance than an open cut job would have, the project was finished before a lot of Lithopolis residents knew it started.

"When several residents called to aggressively argue against the upcoming disruption to their lives, I was happy to be able to tell them that the waterline beneath their property was not only installed, but pressurized and tested as well," Van Vickle says.

### **FOR MORE INFORMATION:**

#### **Consulting engineer:**

*Strand Associates Inc., (614) 835-0460, strand.com*

#### **Utility contractor:**

*Kirk Directional Boring & Excavating, (614) 444-4008, kirkexcavating.com*

#### **PVC pipe/joints:**

*CertainTeed, (866) CT4-PIPE, certainteeted.com*

#### **Directional drilling equipment:**

*Vermeer Manufacturing, (888) 837-6337, vermeer.com*

#### **Air hammer:**

*Hammerhead (Earth Tool Corp.), (800) 331-6653, hammerheadmole.com*