

FOCUS: WATER

BURSTING WITH PRIDE

A fast-growing Texas city uses prechlorinated pipe bursting to fix breakage-prone asbestos cement mains with minimal disruption for residents

By Greg Ehm

Round Rock, 15 minutes north of Austin in the hill country of central Texas, has seen its share of change since it was founded in 1851. The community, a major hub for cattle drives in the 1800s, is now a technology center for companies like Dell Computer.

Once a sleepy town of 1,000 residents, Round Rock is one of the fastest-growing cities in Texas, with more than 90,000 people. During the late 1980s, the city began expanding its water infrastructure, installing more than 100 miles of asbestos cement water lines and hundreds of miles of blue polybutylene service lines to accommodate residential growth.

Those lines have seen better days, especially the mains, which tend to break when the soil shifts and heaves. Now, those lines are being replaced with a relatively new trenchless technique: prechlorinated pipe bursting.

In late 2007 and early 2008, a city contractor used the technology with success on 17,000 feet of old mains in three older neighborhoods. Crews repaired the old lines with a minimum of disruption to homeowners and without the cost of installing temporary service lines. The project was so successful that the city plans to use the same technology in future years to replace more asbestos cement mains where there are breakage issues.

Services come first

Round Rock draws its water supply from Lake Georgetown, which contains more than 124,000 acre feet, or 40 billion gallons. At the end of 2007, after five years of work, the city was just completing replacement of its troublesome polybutylene service lines, which also experienced excessive breaks. "We systematically went through

PROFILE:

City of Round Rock, Texas

FOUNDED:
1851

POPULATION:
93,000

AREA:
23.6 square miles

WATER CUSTOMERS:
115,000

WATER CAPACITY:
48 mgd

INFRASTRUCTURE:
500-plus miles of water lines

WEB SITE:
www.roundrocktexas.gov



A bursting crew excavated the launch and burst pits, decommissioned an old main, then placed a HammerHead HB100 static bursting machine. (Photography by John Boykin)

the city and replaced those service lines over time,” says David Freireich, senior utility engineer. “In the process, we began to look at other issues in the water system distribution system, and we decided to address the asbestos cement mains in the older residential areas.”

Many of those mains were laid in soils made up mostly of heavy clay and rocks and subject to heaving, shrinking and swelling. In tracking repair patterns, Freireich noticed three neighborhoods had a higher frequency of main breaks than others.

the presenters from Murphy Pipeline Contractors of Jacksonville, Fla., the first contractor in the nation to use prechlorinated bursting. Since 2000, the firm had replaced more than 150,000 feet in the United States and more than one million feet worldwide.

The method costs less than open-cut main replacement or relocation methods. It also eliminates the need for temporary water supplies because the new HDPE pipe is chlorinated and pressure-tested above ground before installation.

No one in Texas had used

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Andy Mayer

“These areas had a higher incidence of clay and rocky soil, so we decided to undertake the water main replacement in these areas in conjunction with the service line replacement project,” says Freireich. “It dovetailed together and worked out well from an economic standpoint.”

Checking repair options

It was the city’s first big main replacement project in 20 years, so the engineering staff looked at various options. At the 2007 Underground Technology Conference (UCT) in Houston, they learned about prechlorinated pipe bursting.

“We are always looking for new and better ways to do things,” Freireich says. He first contacted

prechlorinated bursting, so a great deal of time went into education and project design. “Some communities need a lot of hand-holding,” says Todd Grafenauer of Murphy Pipeline. “Through education, most regulatory authorities and community officials understand that everything we do follows American Water Works Association (AWWA), Plastics Pipe Institute (PPI), ASTM and NSF standards. In fact, we go above and beyond their requirements.”

The firm began by walking city officials through the history of prechlorinated pipe bursting and related engineering, design and construction issues. Then they reviewed the regulatory guidelines and presented a case study. Once the education phase was complete,



Round Rock successfully replaced 17,000 feet of old water mains in three older neighborhoods using pre-chlorinated pipe-bursting technology. Here, a bursting head is shown attached to a replacement pipe and ready for a pull to begin.

EXPERIENCED HANDS

Andy Mayer, president of Murphy Pipeline Contractors, has more than 25 years of experience with prechlorinated pipe bursting. Mayer began his career at age 16 as an apprentice with British Gas and later worked there as an engineer.

During that time, British Gas developed the pipe bursting method for its utility line installation projects. During the mid-1990s, U.K. water companies privatized. At the time, many cast-iron water mains were leaking up to 30 percent of the water pumped into them, creating hefty repair costs and huge revenue losses for water companies.

As a result, the water companies made a large-scale investment and installed new mains to reduce leaks. Today, nearly 90 percent of all water mains in the U.K. are replaced using prechlorinated pipe bursting. Mayer says a single contractor in his native country typically bursts up to 80 miles of water main annually.

With the U.K. market maturing, Mayer moved to Jacksonville, Fla., in 2000 and formed Murphy Pipeline Contractors. Today, he travels the country, educating decision makers about the process and helping communities upgrade their water systems.

Grafenauer conducted a feasibility study for the city.

“The main point that we emphasize is that prechlorinated pipe bursting may not be the only solution, as there are so many technologies available today,” Grafenauer says. “However, as communities are discovering across North America, this process will be used to replace more pipe every year in an efficient, aesthetically pleasing and customer-friendly way.”

A big burst

The Round Rock project involved repairing or upsizing 17,000 feet of 6- and 8-inch asbestos cement pipe to 8-inch HDPE pipe in three neighborhoods affecting 415 homes, at a total cost of \$1.3 million. The service line replacement portion cost just over \$700,000.

“The feasibility study showed that this project was an ideal candidate for bursting,” Freireich says. “I estimated that it would save 23 percent over conventional replacement methods, such as open-cut.”

Andy Mayer, president of Murphy Pipeline, stresses that planning is vital to pipe bursting projects. “If you plan correctly, the project’s going to go smoothly 90 percent of the time,” he says. “It’s relatively simple because we follow the existing utility path. You know where valves and hydrants are, because you’re on the job and can see it up top.”

It’s important to know if any line breaks exist and whether any breaks have been repaired using clamps or by installing a 20-foot section of ductile iron. Round Rock had a good set of as-built drawings, and so Mayer and his team had a good picture of where valves and hydrants were located.

“We always try to burst from valve to valve or from valve to hydrant,” Mayer says. “It makes isolating that section of pipe easier.” Mayer’s goal is to spend only one day in front of any affected home. That reduces disturbance to the homeowners and eliminates the need for temporary service lines. He and his team typically burst 300 to 600 feet a day.

The Murphy team reviewed the as-builts and created a detailed burst plan that resembled a spread-



A member of the service crew works to attach a service line to a newly installed main using a mechanical service saddle.

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David Freireich

sheet of burst entries numbered 1 through 50. Each daily burst plan included the number of feet to be installed and the number of valves, hydrants, service lines and crosses, as well as each house number. The information gives inspectors and installation crews a clear understanding of what they must accomplish each day.

Planning for productivity

Several weeks in advance, homeowners received a letter from the city informing them of the project. Murphy Pipeline maintained communications with the

residents during the project. The day before each burst, Murphy Pipeline personnel went door-to-door to let homeowners know their water would be turned off for up to eight hours.

Crews prepared the HDPE pipe in a staging area near each neighborhood. They butt-fused 40-foot sections with McElroy fusing equipment to form continuous 300- to 600-foot sections. Then they pressure-tested, chlorinated, capped and sealed the fused pipe. Following AWWA requirements, they drew two 24-hour samples from the lines and tested them for

bacteriological clearance.

Murphy Pipeline began each day with a crew meeting at 7 a.m. to review the bursting plan. There were two crews on site — one responsible for the burst and the other for the service line connections. “We did increase our service crew a little bit for this project, because our goal was to be in front of a customer’s house for only one day,” says Mayer. “Those open-cut boys can be in front of a house for weeks at a time.”

The bursting crew excavated the launch and burst pits and decommissioned the old main by 8 a.m. Once the pits were excavated, the crew placed a HammerHead HB100 static bursting machine.

Mayer was the first contractor in the country to use the 100-ton HB100 on a project, and he helped design the machine. It is engineered to replace potable water, sewer and gas lines as large as 16 inches, and is compact enough for efficient replacement of pipes as small as 3 inches. “The unit had more than enough muscle for this project,” says Mayer. “And it is compact, so it was easy for our crew to operate.”

Pulling the pipe

Once the bursting machine was ready, the bursting crew began the rod payout procedure and pulled the prechlorinated pipe into position near the launch pit. During this time, the service connection crew began replacing the service lines to each home.

“Our service line connection procedure would be considered far above standard,” says Freireich. “We require that our service lines be encased in a 4-inch sleeve, especially for the long-haul lines that run underneath the road.”

The service connection crew used a compact excavator and ride-on trencher to create a 6-inch-wide trench where the sleeve was installed. The trench was 4 feet deep at the main and shallowed out to 2 feet at the meter box. Once the sleeve was in place, the crew pulled a new 1 1/2-inch polyethylene service line inside.

By 9:30 a.m., the bursting crew began pulling back the prechlorinated pipe using a 10-inch bursting head and a ductile splitter to shatter the old asbestos cement

line. By noon, the new 8-inch HDPE main was in place. The service connection crew then began attaching the new service lines to the main using mechanical service saddles, while the burst crew made hydrant and crossover connections using ductile fittings.

“Most communities believe that you have to fuse the service saddle to the main when using HDPE pipe,” says Mayer. “This is a misconception. We used a standard mechanical service saddle that you would use on PVC pipes, as well as DI (ductile iron) fittings to make connections to valves, tees and crosses.”

Challenging ground

The neighborhood was congested, and the project affected 10 to 12 homes daily. The infrastructure design also included a number of bends that required extra attention.

“We had a number of reservations about the rocky ground conditions,” Mayer says. “The whole line was under the sidewalk and the driveways. We were displacing a lot of ground because of the upsizing, and we became concerned that the driveways and sidewalks may be damaged. Fortunately, we were able to keep that to a minimum.”

They also discovered that none of the original asbestos concrete pipe was restrained. When they tried to re-energize the lines, they blew out joints farther up the line. To overcome this challenge, they worked from valve to valve, capped off as they went, and tied the whole system back together at the end of the project.

“There were more line breaks

and repairs in the system than we anticipated,” Mayer says. “But that’s all part of our planning. We tried to get as much information as possible up front and identify where there were previous issues with these pipes, but it doesn’t always work out that way.”

Ripple effect

The project began on Dec. 1, 2007, and ended on Feb. 9, 2008. Freireich counts it as a success. The city plans to systematically replace the remaining asbestos cement pipe where there are issues. “We foresee doing this over a period of several years,” he says. “The town is also dedicating up to \$1 million a year to replace the asbestos concrete pipe in areas with clay and rocky ground.”

Freireich regards Round Rock as different from many cities. “The city relies on the technical staff to make the decisions and has always been willing to try new products and processes,” he says. “This has been the case since we began to grow back in the 1980s.”

Mayer observes, “Education is the key. We brought in 40 to 50 city engineers from across Texas to learn more about this process. It’s such great technology, and once communities fully understand, they see how easy it is to install pipe and get customers back in service in a day.” ♦

MORE INFO:

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