

Using HDD & HDPE Goes Deep & Long to Solve Leaks in Miami

By Steve Cooper

The goals were straightforward. Replace a leaking potable water line. Protect the environment. Provide customers with reliable water for many generations. The path to success, however, for Miami-Dade Water and Sewer Department's (MDWASD) Infrastructure Assessment and Replacement Program (IAARP) wasn't as straightforward as the goals.



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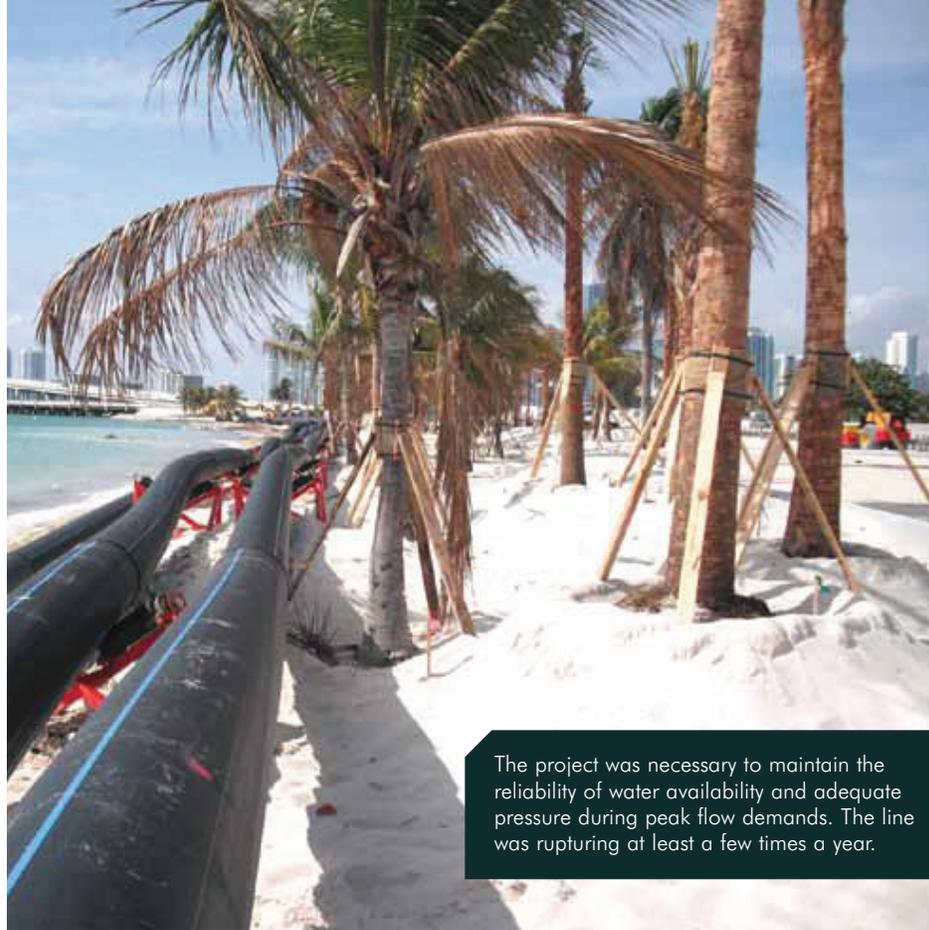
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The project was necessary to maintain the reliability of water availability and adequate pressure during peak flow demands. The line was rupturing at least a few times a year.

The new water pipeline would need to be embedded some 60 ft under the bottom of the Biscayne Bay and consist of one, 4,000-ft long line. The environment was fragile. Plus, the new line had to be leak-free and have a 100-year projected life span — the old one was just 25 years old. These issues were resolved because the county elected to use high-density polyethylene (HDPE) pipe for this trenchless installation, which it has also been using in its 2-in. water line replacement program for several decades.

The Miami-Dade Water and Sewer Department operates and maintains the largest water and sewer utility in the southeastern United States, providing drinking water to more than 2 million customers.

The project used a 20-in. diameter HDPE pipeline that was installed using horizontal directional drilling (HDD) to replace a 12-in. deteriorated cast iron transmission line attached to the Rickenbacker Causeway Intracoastal Waterway Bridge between Hobie Island and Virginia Key. This main delivers water to the Port of Miami, Fisher Island, Virginia Key and Key Biscayne. The project was necessary to maintain the reliability of water

availability and adequate pressure during peak flow demands. Typical pressure is 60 to 80 psi.

“This line was rupturing at least a couple of times a year and we estimated that every time this happened, we lose at least 2 million gallons of water,” stated Ralph Terrero, assistant director water, Miami-Dade Water and Sewer Department.

“Our study showed that by replacing the existing line, we’ll easily conserve 4 million gallons of water a year. Additional benefits include reductions in unnecessary pumping and operational and maintenance expenditures and eliminating potential health hazards associated with waterborne pathogens entering the distribution system. Based on our calculations that include the cost of water and energy savings, we estimate we will save our customers \$156,416 annually by replacing the existing 12-in. pipeline with the new 20-in. HDPE line.”

“Miami-Dade has always been a leader in finding ways to improve the water service to its customers,” said Tony Radoszewski, executive director of the Plastics Pipe Institute Inc. (PPI). “The MDWASD has an ongoing program of replacing water lines by

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Horizontal Directional Drilling Guide

using HDD and HDPE pipe. They found that this method is efficient and pleases its customers mainly because there is very little digging. The Rickenbacker project is basically the same, but using pipe that is 10 times larger and is still as efficient and easy to install with very little disturbance to the environment.”

The new HDPE pipeline was completed in March 2010 and used one 4,000-ft long length of pipe made up of 50-ft sections that were heat-fused together using a McElroy T-900 self-contained fusion unit. The JM Eagle HDPE pipe used was PE 3608/PE 3408 HDPE, DR9 with a 2.7-in. wall thickness and a 20-in. inside diameter and supplied by ISCO Industries, Louisville, Ky.

For Chris Lamb, who has 20 years of HDD work to his credit and his crew at Utility Service Authority (USA), which did the drill, the project was “about average.”

“It was difficult but typical for the projects we undertake

at USA,” Lamb said. “We were concerned about salt water intrusion and the varying subsurface conditions like limestone, coral and voids in the geological formation. I would say that the logistics of the project was our biggest concern. We had to lay out more than 4,000 ft of pipe, keep the traffic open during the prime season which is January until April, and we had a very small area for staging. The bore took two months — we had a crew of 16 split into shifts working around the clock. All of our concerns with the subsurface conditions were discounted, however, due to our pre-bore planning and we were able to just roll with the punches that Mother Nature gave us.”

The installation was done on a 10-degree entry angle starting from the entrance pit on Hobie Island.

Lamb’s crew used an American Augers DD-440T drill rig with 440,000 lbs of pull back, which uses 30-in. drill pipe and a Tulsa MC-1000 recycler. The crew installed a wash-over pipe to complete the pilot hole due to the softer formation in the shallow waters and back reamer to the size required for the product pipe. This back reaming process was done by push reaming to the limited work space available.

Along with the pipe, ISCO provided technical and fusion assistance on the project. “It was a great installation and team approach between USA and ISCO,” according to Bryan Fletcher, ISCO sales manager for Florida. “The project went very smoothly. And what most impressed me was the percentage of pull back force that USA was able use compared to the safe pull strength of HDPE. With HDPE being a very conservative industry, our safe pull is approximately 40 percent of yield, and on 20-in. DR 9, PE 3608 pipe that equates to 165,000 lbs. USA’s pull, because of its expertise and planning was less than 50,000 lbs for the entire 4,000-lf pullback. With PE 4710 material coming into the marketplace, the safe pull strength would have been 192,000 lbs. It just goes to show that using an experienced driller that understands his equipment, the job and all facets of the HDD installation, it doesn’t necessarily mean having to use the biggest equipment to make this kind of pull. Sure, there are some materials that have higher tensile yields, but at the end of the day the most important factor is using experienced, qualified HDD contractors.”

“HDD is the preferred method used in large scale crossings such as rivers or large bodies of water such as this project in Miami,” explained Radoszewski. “But the pipe must be able to withstand the force necessary to pull it through the bore and the resulting earth and groundwater forces applied after bore stabilization. As a result, it’s important to specify the appropriate strength pipe. To help design engineers and contractors in this critical step, we created an online tool called the

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BoreAid Analysis Software Program specifically for HDD applications.”

The BoreAid program can be used to make a preliminary evaluation of polyethylene pipe for use in a directional bore and can be found at the PPI website at www.plasticpipe.org.

“Miami-Dade continues to accomplish major water improvement goals that are cost-effective and will be long-lasting,” stated Radoszewski. “There are always many HDD projects under way here, keeping Luis Aguiar and his crews busy. This run of 4,000 ft is just one extremely long one that they consider ‘average.’ I want to know what they consider a challenge.”

Steve Cooper has been reporting on the water and pipe industries for several decades.



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