

Trenchless TECHNOLOGY

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2021 Trenchless Technology Project of the Year New Installation Honorable Mention: City of Fort Lauderdale Large-Diameter HDPE Force Main



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The project entailed the installation of a new seven-mile, large-diameter (48- and 54-in.) HDPE force main. Utilizing the design-build delivery method to expedite the project, the project was divided into a north and south section and contracts were awarded to two teams. Approximately six miles – 85 percent of the total length – of HDPE pipe was installed using horizontal directional drilling (HDD) via 17 crossings through the heart of downtown Fort Lauderdale and adjacent residential areas. Of the 17 crossings, the most impressive were: The installation of 3,400 ft of 48-in. HDPE DR (Dimension Ratio) 13.5 pipe.; the installation of 3,100 ft of 54-in. HDPE DR 17 pipe with 22 fusion welds during pipe pull back; four HDDs with tight-radius compound curves using 48-in. HDPE DR 13.5 pipe, which included a 2,600-ft and a 1,400-ft S-curve; and three major waterway crossings (Tarpon River, 1,800 ft, New River, 2,500 ft and Middle River, 1,600 ft), reaching depths of over 60 ft. Due to depth and soil conditions, a 48-in. DR 11 pipe was used in the Middle River crossing making this one of the first projects in the United States to use this pipe size and DR. Other sections installed via HDD ranged from 1,100 to 1,300 ft. By using trenchless technology, the installation was completed in less than 18 months and included the added benefits of avoiding utility conflicts and environmental impacts, minimizing traffic and neighborhood disruptions, and requiring minimal restoration. In addition, the trenchless technology facilitated expeditious regulatory agency approvals and permitting from Federal, State, and County agencies including the United States Army Corps of Engineers, Florida Department of Environmental Protection and the Florida Department of Transportation.

Why Project is Outstanding:

In December 2019, the City of Fort Lauderdale experienced numerous breaks to its aging seven-mile major sewer transmission main resulting in more than 200 million gallons of sewage spilling into nearby waterways. After

these breaks, the City declared an emergency and awarded two design-build contracts within two months of the first break. Using this delivery method, the project was split into multiple phases to design, permit, and construct each phase concurrently. Using mostly trenchless technology and HDPE pipe provided significant cost savings from both material and installation perspectives. Using design-build delivery, trenchless technology, and HDPE pipe, the project was completed within just 18 months – an impressive feat considering that the project, which required procurement of pipe with unique sizing and DR, was executed during a pandemic. Moreover, the project team resolved numerous technical challenges throughout construction. There were a total of four water crossings that presented opportunities for ingenuity; three of the four were installed via trenchless technology. One example is the Tarpon River crossing that was adjacent to a bridge with only 8 feet of available right-of-way for installation. A precise compound curve was utilized in the design to achieve the desired HDD alignment. The project team paid special attention to the life span of the pipe considering that as its modulus of elasticity changes over time, the pipe may become weaker. A crucial parameter for the collapse resistance of pipelines is the ovality of the pipe cross-section so it was designed specifically to prevent future pipe failures. Due to space limits, a 60-in. borehole was drilled only a few feet away from professional-grade clay tennis courts at the Coral Ridge Country Club that were equipped with a unique subsurface irrigation system and were at risk of being undermined by the trenchless installation due to collapse. In response, the team developed a soil stabilization treatment plan which required the injection of rigid structural geotechnical polymers at 68 locations, which prevented soil movement or collapse.

Project Owner: City of Fort Lauderdale Engineer(s)

Engineers: Hazen and Sawyer; Design of North Section: Chen Moore and Associates; Designer of South Section: A&P Consulting Transportation Engineers/Craven Thompson & Associates

Contractor:

North Section: Murphy Pipeline Contractors LLC/DBE Utility Services; South Section: David Mancini & Sons Inc./Centerline Directional Drill

Manufacturers/Suppliers: JM Eagle and Agru America (HDPE pipe); Consolidated Pipe and Ferguson Water Works (HDPE distributors)

Value of Trenchless Project (US\$): \$65 million

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