Renewing the Pipeline

By Michael Vellano

Texas water treatment plant renews its effluent lines with cured-in-place pipe

Top: The six water effluent lines in need of repair ran beneath the plant's treatment tanks. Bottom: The installation crew applied extra pressure to help the resin-saturated liner navigate the bends in the lines.

Common logic tells us there are some things that simply cannot be put off. The repair or renewal of our nation's water infrastructure is one of them. Statistics show that when a water main breaks it typically is found to be roughly 45 years old. It also is estimated that 25% of all water mains are more than 50 years old. Because most piping systems are only designed for a 50-year life span, the failure frequency is going to increase in the near future. Cities and towns across the country continue to face budget constraints.

This means that every dollar allocated to water infrastructure repairs must be more closely scrutinized. As these areas become more congested with buildings and populated with residents, conventional "dig-and-replace" methodology no longer applies. The key will be to provide a long-term solution that will not break the bank, and will minimize the environmental and social impacts on the community.

Necessary Repairs

The city of Dallas' Elm Fork Water Treatment Plant, located in the northern suburb of Carrollton, Texas, was faced with precisely these conditions. While the plant underwent an upgrade, it was determined that six 18-in. water effluent lines running beneath the plant's treatment tanks were in need of replacement or renewal. All six pipes of varying lengths totaled about 2,000 ft. The pipe, made of cast iron, had deteriorated over time. The inner lining originally placed inside the pipe—which is common in drinking water applications—had deteriorated and flaked off, resulting in significant tuberculation scaling. The location of this line was a cause for concern as well. The city could ill afford for the plant, which treats 330 million gal per day, to be shut down for too long.

Winning the Project

When the project went out for bid, several contractors responded. After reviewing the proposals, Jacobs Eng. ultimately selected Inland Pipe Rehabilitation (IPR) for the project. It was the only proposal that met all of the criteria for cost, time and NSF certification. According to Steve Lindsey, senior pipeline rehabilitation specialist for Jacobs Eng., IPR's solution was 100% trenchless and the cost savings were significant. A critical element of the winning proposal was the way IPR planned on renewing the six lines in question. IPR's use of its RS Technik technology and the NSF-certified RS BlueLine CIPP lining system also played an important role in securing the proposal.

"IPR's experience with this system, plus [its] commitment to meet the very aggressive three-week window to complete the project, is what really made the difference," Lindsey said.

A New Solution

Cured-in-place pipe (CIPP) technology has been around for more than 30 years and is widely accepted and used for sanitary sewer and gravity flow pipelines. CIPP systems for drinking water lines have only been in development for the past 10 to 15 years. CIPP systems for water main renewal have only recently begun to gain steam and become commercially viable.

The conditions at the water treatment plant were ideal for a CIPP solution.

"The primary considerations I had were, 1) time frame, 2) cost effectiveness and 3) a system or method that was NSF approved and could withstand internal pressures," Lindsey said. "The process that I settled on and proposed was a cured-in-place method."

Experience Required

When the Elm Fork plant was shut down, the daily water treatment was diverted to another plant. It was critical that the system not be overtaxed. Therefore, the three-week window had to be met. The experience of the IPR crew, combined with the advanced installation technology, made this happen.

IPR invested in the NSF 61-certified RS Technik system in 2012. "We are pleased with the headway we've made with the installation system," said Joe Cutillo, president and CEO of IPR. "The crew is well trained and we've already had a lot of success."

To the casual eye, this particular installation appears to be like any other CIPP method; however, stepping inside the onsite mobile wet-out unit shows something different. The liner material is carefully staged at the front of the stainless steel-lined trailer. Once the automated resin impregnation process begins, the custom Dow-formulated epoxy resins are computer monitored for quality control.

"The first thing one notices is [that] the epoxy resin emits no odor," said Jim Rorison, vice president of operations for IPR. "Our quality assurance and quality control enables you to visually monitor and oversee the entire wet-out process right on site. This significantly improves our quality control and installation efficiency."

Quick Installation

As each impregnated liner section was completed, it was fed into a refrigerated truck backed up against the end of the wet-out trailer. This helped keep the resin from catalyzing while it was immediately wound into a pressure drum and transported a short distance from the entrance to the water line. In this case, the line was located in a sludge pit more than 30 ft below ground.

Once in position, the liner was released from the pressure drum and inverted into the pipe through controlled air pressure. Because the pot life for epoxy resin is less than traditional CIPP resin formulations, it was important for the liner installation to go quickly and smoothly.

In this case, each of the six lines contained a 45-degree bend. Aware of this, the installation crew applied extra air pressure at the precise points to help the resin-saturated liner navigate the bends.

Once the liner emerged at the downstream end, it was plugged at both ends. Heat and steam generated from and IPR boiler unit were applied

to initiate and finalize the curing process.

Following the cure, the ends were trimmed, and industry-approved end seals were installed.

Ahead of Schedule

"To complete the job on time, a lot of things had to go right," Rorison said. "We had to design the system; order, ship and deliver materials to the site in a matter of days; and our installation team needed to perform flawlessly."

Lindsey added, "It was one of the best-delivered projects I've been involved with in my 27-year career, and everyone should be commended. I can't stress enough how important it is to not only have faith in the capabilities in your contractor, but in the technologies they employ to resolve a problem like we had here at the water plant." WWD

Michael Vellano is vice president of sales & marketing for Inland Pipe & Rehabilitation. Vellano can be reached at mvellano@teamipr.com.

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