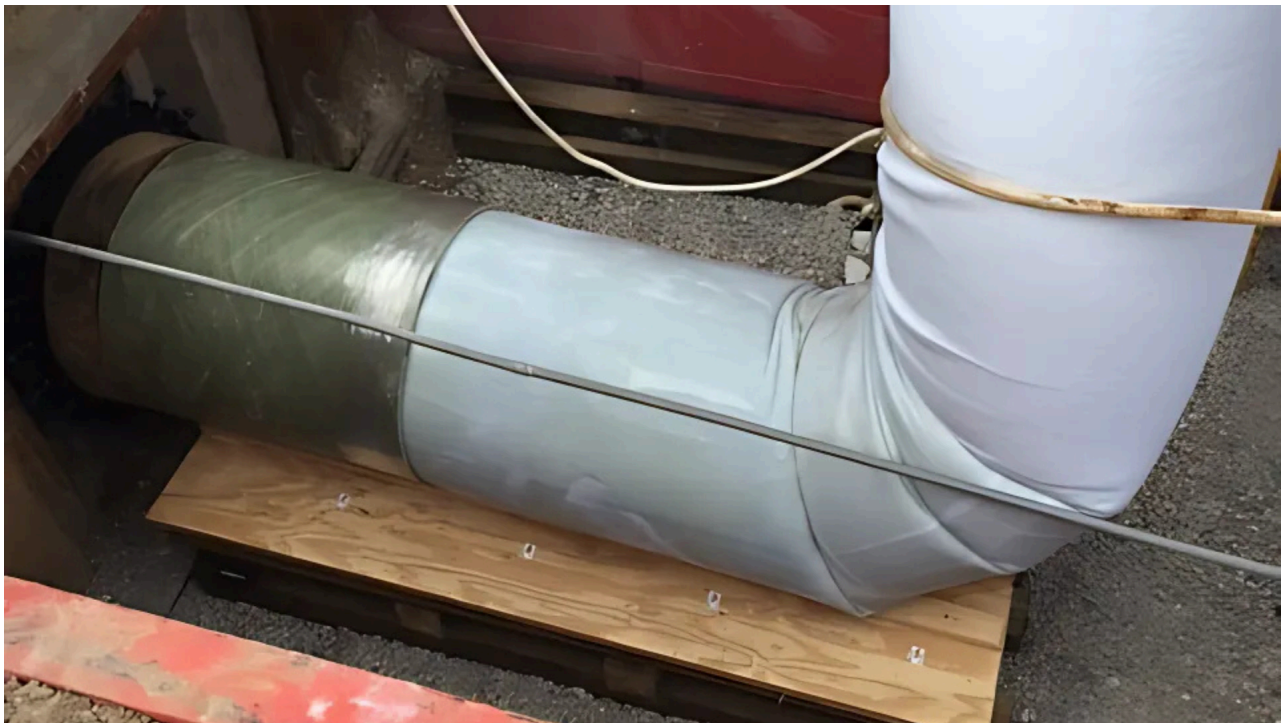
East Central Regional Water Reclamation Facility



Construction work began to remediate approximately 1,000 linear feet of a return activated sludge (RAS) line at the East Central Regional Water Reclamation Facility (ECRWRF) in fall 2017. RAS lines are an integral part of the wastewater treatment process. The facility can treat up to 70 million gallons of water per day, and services wastewater flows from West Palm Beach, Lake Worth, Riviera Beach, Palm Beach, and Palm Beach County.

This critical piece of infrastructure is currently undergoing a 3-year Biosolids Improvement Project involving needed upgrades to several components, including the anaerobic digestion facilities, a new septage/fats, oils and grease (FOG) receiving station, the conversion of the aerobic digester to an aeration basin, as well as additional facility upgrades. As part of the construction activities, new 42-inch aeration lines were being installed directly above the plant's existing parallel 30-inch RAS lines.

The Challenge

As the construction progressed, there were growing concerns about the condition of the existing 30-inch ductile iron RAS lines, the impact of construction activities of laying the new 42-inch aeration lines directly above the RAS lines and the ability to perform future maintenance, replacement or rehabilitation of the RAS lines once the new 42-inch aeration lines were installed. The design engineers at Hazen, who are overseeing the Biosolids Improvement Project, were then tasked with fast-tracked feasibility, design and management of the twin RAS pipeline rehabilitation component of the project.

Expedited Turnaround

An accelerated timeline for procurement and remediation of the RAS lines was implemented in order to prevent delays in construction activities. The solicitation for proposals went out in late May 2017, and Insituform was selected to perform
rehabilitation for the project using its fibre-reinforced cured-in-place pipe product known commercially as InsituMain® CIPP. The work was subcontracted through Poole & Kent, the general contractor working onsite as part of the larger overall plant construction project. Contracts were finalised and lining activities commenced in July 2017. Just a few weeks later, the CIPP lining portion was completed with closeout dates in early August 2017.

Materials

Insituform employed its second-generation fibre-reinforced CIPP product for the project. The product, known as the InsituMain® CIPP system, is ideal for force mains and water pipelines up to 96 inches in diameter, can negotiate bends and is pressure-rated up to 250 psi. It is suitable for rehabilitation in a variety of host pipes, including cast iron, ductile iron, steel, asbestos cement, reinforced concrete pipe and thermoplastic.

Engineered to restore existing pipelines, the InsituMain® CIPP system withstands internal pressure and external load requirements while also eliminating leakage and corrosion. Composed of an epoxy composite layer reinforced with glass materials and/or polyester fibre, the InsituMain® CIPP tube provides added strength and stiffness to pressurised pipelines. A polypropylene layer on the inside of the pipe surface increases the pipe's smoothness, reduces surface friction and provides an additional corrosion barrier for the pipe.

The most recent iteration of the InsituMain® CIPP system is certified to meet the NSF/ANSI Standard 61 and provides the following benefits:

- Better expansion capabilities and fit to host pipe
- Repairable liner coating
- Longer shot lengths
- Increased diameter ranges
- Improved liner flexibility
- Ease of installation
- Reduced layer construction and decreased resin usage (15 percent less)
- Higher pipe burst strength (up to 1,400 psi)
- Greater composite strength
- E-CR fibreglass for improved long-term corrosion resistance

Installation

In order to gain access to the twin pipelines, the return activated sludge lines had to be bypassed while keeping plant operations functioning smoothly. Shutting down these lines was not an option. High-density polyethene (HDPE) lines were set up above ground, rerouting the flow of sludge. With their close proximity to the access pits and existing aeration basins and clarifiers, the HDPE lines created additional challenges to work around when staging equipment and performing the CIPP installations.

Once onsite and ready for installation, the liners are fed from the reefer truck and staged on a conveyor that helps move the heavy material to the top of the installation tower. The tube is installed using water and hydrostatic head pressure, which causes the tube to invert and travel the distance of the host pipe, taking the cylindrical shape of the host pipe as it presses tightly against the inside wall.

One of the more recent innovative approaches to CIPP lining in pressure pipe applications was utilised in this installation. The use of fibreglass reinforced plastic (FRP) spool pieces was used to terminate the CIPP liner. When the epoxy resin of the CIPP marries with the bonding agent of the FRP, and the liner is cured, a very aggressive CIPP/FRP bond is formed.

The final step prior to the installation of the mechanical fittings and closure piece is a hydraulic pressure test to verify that the liner has been installed properly and can withstand the internal 25 psi operating pressures. CIPP liners were pressure tested according to ASTM F1216, and both project installations had no issues passing the pressure test.

The Result

The project was completed in just a few short weeks in August 2017. The project included roughly 1,000 linear feet of 30-inch fibre-reinforced CIPP lining, done in just two installation shots. The rehabilitation project served to mitigate any potential issues with the newly installed 42-inch lines, providing the client with a structural solution that required minimal excavation on a complex jobsite.