

Big Pipe Restores Function to Levee, Protects Florida Wetlands

St. Johns River Water Management District, Fellsmere, FL

Background

The St. Johns River is the longest river in the state of Florida. It is 310 miles long, forming numerous lakes and having lakes flow into it. The St. Johns River is also one of Florida's major interior wetlands. The river is separated into three major river basins and two watersheds (Lake George and Ocklawaha River), all managed by the St. Johns River Water Management District.

The Problem

Located along the St. Johns River on country road 512 in Fellsmere, Florida, levee S-251 was badly deteriorated due to corrosion. If left unrepaired, the structure would become inoperable. A drought exposed four damaged drainage culverts contained within the levee. Each of these culverts was 72 inches in diameter. The St. Johns River Water Management District contracted with Stanley Consultants to perform a diving inspection to determine the condition of the culverts. All four were badly corroded with numerous holes in the pipe, which threatened the wetland ecology.

"About two years ago, we were faced with some drought conditions," said Jimmy Rider, St. Johns Water Management District project manager and field supervisor. "The water had gone down considerably and revealed the culverts, which is when we saw how damaged and corroded they were."

These corroded corrugated metal pipe culverts were installed 22 years ago by the United States Army Corps of Engineers. The district, however, is the levee sponsor and therefore was deemed responsible for the current repairs. The district needed a no-dig economical solution. Completely replacing the structure would have required a considerable time period during which the structure was not available. This would threaten the wetlands during the dry season when water from the St. Johns River needs to flow through the structure in order to feed into the wetlands. Sliplining the pipes eliminated the need for temporary cofferdams and de-watering, thus reducing the environmental impact of the construction.

The Solution

ISCO Industries' large diameter sales manager Bob Kerr, Florida Snap-Tite representative Bruce Larson and Snap-Tite distributor Paul Blastic worked with the district and the district's chosen contractor, Shenandoah Construction, to



A view of the excavated deteriorated corrugated metal pipes with the new profile wall pipe liner in the background.

provide the best material for this culvert lining project. Snap-Tite is ISCO's culvert lining division.

"We looked at different repair options," said Rider. "Sliplining was the best. The divers we hired mentioned Snap-Tite's distributor Paul Blastic who showed us his products. We also looked at a couple of Blastic's projects. Then, we gave the information to our engineers to determine a viable solution to slipline the pipe. The district's Bureau of Engineering was impressed with the advantages of the proposed solution."

The material chosen to reline the pipe was 60-inch diameter ProCor profile wall pipe manufactured by Profile Pipe Technologies (PPT) and supplied by ISCO Industries.

"We wanted the ProCor pipe because of its hydraulics," said Bill Cote, the district's supervising professional engineer. "The hydraulics of this pipe are better than anything else we looked at."

The Installation

The pipe was delivered to the project site in 50-foot lengths. PPT electrofused some of the pipe joints in one of its manufacturing facilities before the pipe arrived onsite. ISCO's field technician Ron Frazier electrofused the rest of the joints on location. ISCO Industries also supplied the electrofusion and test equipment for this project.

"The voltage and time it takes to electrofuse a pipe joint depends on weather conditions," said Frazier. "Here I used 32 volts for 19 minutes to 'cook' the pipe. There is also a cooling down period. It takes 40 minutes to cool the joints.



The electrofused PPT pipe was placed in the water to be submerged under water and pushed into the old pipe.

After that, each joint is field tested to ensure joint integrity.”

The PPT profile wall pipe, once it was fused and tested, was placed into the water with the aid of two of Shenandoah’s divers. The divers then helped guide and submerge the pipe underwater.

Shenandoah Construction handles pipe rehabilitation, mostly trenchless sliplining. The company handles pipe diameters from 12-inch and up. Shenandoah also does prep work, cleans, televises and inspects pipe.

“We provide a full pipe and underground structure evaluation service. We also provide maintenance and trenchless repairs of pipes, culverts and underground structures. Sliplining is a process that returns an old deteriorated pipe into a brand new pipe, without the need to excavate,” said Danny DiMura, vice president and principal of Shenandoah Construction.

“We asked Shenandoah Construction if they could slipline underwater and submerge the pipe,” Rider commented. “They said they could and here we are.”

The pipe underneath the levee was in poor shape up to about five feet from the gate where it had completely worn out. Shaune Rogers, one of Shenandoah’s divers, had earlier excavated and removed the parts that had completely failed. In the sections where there was no old pipe, the new profile wall pipe extended past the culvert close to the gate.

The divers pushed and slipped the new pipe into the old pipe, stopping short of the flood gates.

Since the gates were 72 inches in diameter, Shenandoah hired a specialty contractor to design and make aluminum connecting bands that would connect the gates to the 60-inch profile wall pipe. The connecting bands went from a 72-inch diameter to a 60-inch diameter to make the connection.

After the pipes were submerged and slipped into the culverts, the divers came in and attached the aluminum

connecting bands to the pipe and the gate.

Then after the gates were attached to the pipe with the aluminum band, Shenandoah sealed the ends with a non-shrink mortar. Then they added a pump port and a vent port to add cellular grout to fill in any annular space between the old culverts and new liners. Each culvert was relined using a similar technique.

Conclusion

The district was very happy with how quickly the project went and the fact that they saved money by eliminating the need for temporary cofferdams and pumping/de-watering.

“Sliplining with PPT ProCor large diameter pipe represented a \$500,000 savings for us,” added Rider. “It would have cost us around \$800,000 to dig up and fully replace the pipe. Sliplining cost \$300,000 or less.”

In addition, more than 30 decision makers from the US Army Corps of Engineers, Water Management District and several counties visited the site and learned more about our culvert rehabilitation abilities.

Finally, due to the success of this installation and the long term benefits expected from the PPT ProCor product, the US Army Corps of Engineers and the St. John’s River Water Management District asked Kerr and Larson to inspect 10 additional culverts in the area which are in similar condition. These culverts also protect sensitive wetlands and are expected to be rehabilitated in the next one to two years.

About Profile Wall Pipe

- Made of high-density polyethylene.
- ID Controlled sizes up to 96-inches.
- Smooth yellow interior for high-visibility.
- Meets ASTM F894 performance requirements.
- Available for culvert lining applications.



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