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# CASE HISTORY

## Inlet Pipe for Wastewater Clarifiers

<b>Market Segment:</b>	Sewer Rehabilitation
<b>Composite Application:</b>	CIPP for concrete pipe and steel discharge elbows
<b>Resin:</b>	Vipel® Isophthalic Polyester
<b>Manufacturing Process:</b>	Cured-in-place pipe
<b>Diameter:</b>	48 and 54 inches (122 and 137 centimeters)
<b>Total Length:</b>	680 feet (207.3 meters)
<b>Installed:</b>	2008
<b>Location:</b>	Memphis, Tennessee, USA

Cured-in-place pipe (CIPP) technology and professional planning from Reynolds Inliner, LLC, provided a timely and cost-effective solution for damaged pipe at a wastewater treatment plant near the Mississippi River. User-friendly Vipel® polyester resin from AOC contributed to the project's success.

The T.E. Maxson Wastewater Treatment Plant of the City of Memphis, Tennessee, has four, 180-foot (55-meter) diameter primary clarifiers. Clarifiers 1, 2 and 3 were built in 1980 with 54-inch (137-centimeter) diameter concrete inlet pipes. Looking forward, engineers designed the splitter box that distributes influent to the clarifiers to allow for a fourth clarifier, which was added in 1996 with a 48-inch (122-centimeter) diameter concrete inlet.

After 27 years, the floor of Clarifier 2 started shifting enough to affect the operation of the clarifier's scraper arms. Inspections showed that the ground beneath the clarifier needed to be stabilized and the underground inlet pipes for Clarifiers 1 and 2 needed to be repaired.



*After the splitter box discharges were cleaned and prepared (left), they were lined with CIPP (right) and sealed.*

## Inlet Pipe for Wastewater Clarifiers, continued

“Over the years, the concrete pipe was exposed to highly corrosive sewer gases in a constantly moist environment,” said Ken Thompson, Operations Manager for Reynolds Inliner. “The most severe damage was an opening in the crown of one pipe that was approximately 70 feet (21.3 meters) in length and 15 to 18 inches (38 to 46 centimeters) wide. Inlet pipes for Clarifiers 3 and 4 were CIPP-lined as a proactive, precautionary measure.”

Steve Lindsey, Senior Pipelines Rehabilitation Specialist, Jordan, Jones & Goulding, Inc. (JJG), designed the pipe project. “Because the inlet pipes run under the clarifiers, excavation and replacement was out of the question,” he said. “It was essential to keep the plant running, so the repairs had to be scheduled to coincide with planned maintenance downtimes.”

No more than two clarifiers could be shut down at any given time and only short periods. The plant’s maximum flow rate is rated at 160 million gallons per day (605.7 million liters per day). The design average daily flow is 90 million gallons (340.7 million liters).

### Seamless liners from end-to-end

Reynolds Inliner repaired the entire lengths of the four inlet pipes, including the steel discharge elbows that taper out of the splitter box in a 20-foot (6-meter) long, sweeping 90-degree turn. Reynolds Inliner used the inversion process to install new, seamless liners into the discharge and pipe.

Each liner section consisted of a special felt tube that was impregnated with a Vipel unsaturated polyester resin in a wet-out facility. AOC chemists engineer CIPP resins to provide consistent wetting, handling and cure characteristics. The wet-out tubes were shipped to the job site in a refrigerated truck to prevent premature resin cure.

As the tube was installed through the splitter box opening, water pressure inside the tube moved it forward while inverting it along the host pipe interior. To effectively cover the damage in the inlet pipe crowns, the liner was designed to be 1.25-inches (32 millimeters) thick.

After each inversion was complete, the water in the tube was heated to accelerate the reaction that turns the resin into a permanent, chemically-stable solid with



*To minimize clarifier downtime, heated water from two boiler trucks accelerated resin cure.*



the superior corrosion resistance of Vipel technology. Reynolds supplied two boiler trucks to shorten the job's total cure cycle and thus minimize clarifier downtime.

The total linear feet of CIPP rehabilitation performed by Reynolds Inliner was 680 feet (207.3 meters). Before a clarifier was brought back on-line, the area where the splitter box connects with the discharge elbow was cleaned and sealed to improve resistance to corrosive wastewater being distributed from the box.

### **About Reynolds Inliner, LLC**

Reynolds Inliner is a full-service rehabilitation company specializing in its proprietary Inliner CIPP technology. In addition to that core business, Reynolds offers a variety of other rehabilitative measures including U-liner, manhole renewal, lateral rehabilitation and traditional excavation. For more information, contact Denise McClanahan at Reynolds Inliner in Orleans, Indiana, at (812) 865-3232, e-mail [dmccclanahan@reynoldsinc.com](mailto:dmccclanahan@reynoldsinc.com), or go to [www.reynoldsinliner.com](http://www.reynoldsinliner.com). or [www.inliner.net](http://www.inliner.net).

### **About JJG**

Based in metropolitan Atlanta, Georgia, and with offices in eight states, Jordan, Jones and Goulding, Inc., offers a broad range of engineering and other services. Areas of expertise include water, wastewater, water resources, and storm water management. For more information, phone corporate headquarters at (770) 455-8555 or go to [www.jjg.com](http://www.jjg.com).

### **About AOC**

AOC is a leading global supplier of resins, gelcoats, colorants, additives and synergistic systems for composites and cast polymers. AOC knows technology, lives quality and delivers service better than any other supplier. For more information, e-mail [CIPP@aoc-resins.com](mailto:CIPP@aoc-resins.com), phone (901) 854-2800 or go to [AOC-RESINS.com](http://AOC-RESINS.com).

