

# CaseHistory

## Crescent City rebirth includes CIPP



Felt tubing was impregnated inside a protective tent then conveyed out for inversion.

<b>Market Segment:</b>	Sewer Rehabilitation
<b>Composite Application:</b>	Liner for steel force main
<b>Resin:</b>	Vipel® L010 bisphenol A epoxy vinyl ester
<b>Manufacturing Process:</b>	Cured-in-place pipe
<b>Diameter:</b>	50 inches (127 centimeters)
<b>Total length:</b>	4,660 feet (1,420 meters)
<b>Service pressure:</b>	30-40 psi (2.1-2.8 bar)
<b>Installed:</b>	2007
<b>Location:</b>	New Orleans, LA, USA

Hurricane Katrina may have deluged New Orleans, but it did not extinguish the spirit of those who continue to rebuild. One example of the rebuilding process was the relining of the Metropolitan Street sanitary sewer force

main in New Orleans East, the area of the city hardest hit by Katrina. To refurbish the steel force main without having to dig trenches, the Sewerage and Water Board of New Orleans specified cured-in-place pipe (CIPP) technology.

CIPP is specified over alternatives such as inserting polyvinyl chloride liners inside the host pipe or centrifugal casting a liner of fiberglass/mortar onto the inner wall. Either of these “slip-liner” techniques would have reduced the inside diameter of the force main and brought about an unwanted loss of wastewater flow capacity.

The pipe rehabilitation was led by the Sewerage and Water Board whose primary partner was contractor Boh Bros. Construction Co. LLC, New Orleans. Boh Bros. made the new CIPP liner using non-woven polyester felt impregnated with Vipel® L010 bisphenol A epoxy vinyl ester from AOC.

### Gravity sewers won’t work

Because almost all of New Orleans is below sea level, force mains are needed to convey sewage to a higher elevation for treatment. Sewer force mains move wastewater under pressure between

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lift stations that are equipped with pumps. When New Orleans East lost power during Katrina, lift station pumps shut down to create a system failure.

“While inspecting our facilities after the flood waters receded, we discovered small pinholes along a length of the Metropolitan Sewer Force Main,” said Joseph Becker, who oversaw the project for the Sewerage and Water Board. “Further investigation found that this line was one-half to two-thirds filled with sediment and debris, which was mostly sand.”

The Metropolitan force main is 50-inch (127-centimeter) diameter steel pipe that is part of a system that was installed in the 1940s. To restore the pipe for maximum ongoing use, the Board hired construction specialist Boh Bros. to install a new CIPP liner. It was the second phase of a project that followed rehabilitation of 30- and 36-inch (76- and 91-centimeter) diameter pipe.

When the force mains were originally installed, the interiors were coated with coal tar epoxy. Using National Liner® technology licensed from National Envirotech Group, Boh Bros. lined the pipe with a more advanced material system based on nonwoven felt tube and thermoset resin

The resin was supplied in a liquid state that allowed the felt to be wet-out before the tube was inserted into the pipe. Because the Metropolitan Street force main does not have manholes, access pits needed to be excavated to accomplish the insertions. The Metropolitan Street project involved 4,660 feet (1,420 meters) of pipe that was accessed through five pits strategically located to minimize surface disruption and facilitate insertion. Applied Felts supplied the 50-inch diameter tube sections. Each section length corresponded with the length of a planned insertion. The longest single insertion was 1,120 feet (341 meters).

### Vipel® vinyl ester performance

Most CIPP liners are fabricated with isophthalic polyesters, a resin family with proven resistance to the chemical environment of municipal wastewater. However, the internal pressure of the New Orleans



The host pipe was accessed through excavated pits.



A crane positioned the impregnated felt over the hole.

force main required Vipel® L010 bisphenol A epoxy vinyl ester to take advantage of the resin’s higher tensile properties.

“One of the most important resin attributes for resisting the force main pressure is tensile elongation,” explained David Treadwell, CIPP resin product leader for AOC. “Using test method ASTM D638, a typical cast specimen of Vipel L010 vinyl ester exhibits a tensile elongation 4.6 percent, compared to 3.0 percent for our Vipel L704 isopolyester.”

To keep wastewater moving forward, the pressure in the Metropolitan Street force main generally operates in the 30 to 40 psi (2.1 to 2.8 bar) range. To ensure sufficient performance, the pipe with liner was designed to withstand an internal pressure of at least 65 psi (4.5 bar).

Boh Bros. workers resin-impregnated the felt inside

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a protective tent. The felt was then conveyed to a crane which lifted the tube over the hole for insertion. “The Vipel L010 vinyl ester offered good

handling characteristics and processed very well in the field,” said Marlin Gonzales, Operations Manager for Boh Bros. “The AOC resin was provided through specialty distributor CIPP CON. As part of his great technical support, CIPP CON President Jim McCormick came out to observe the first inversion.”

As the resin-impregnated felt was inserted into the access points, water was pumped into the interior of tube. This created pressure that moved the felt forward and inverted it against the inner wall of the host pipe.

### Pinholes sealed, pipe strengthened

At the end of each inversion cycle, the water was heated to initiate the chemical reaction that caused the resin to cure into a solid state in which the resin’s molecular structure is irreversibly crosslinked. At the conclusion, a new seamless liner was formed against the host pipe inner wall to seal off the pinholes and strengthen the pipe for efficient operation.

The pipe rehabilitation included a minor system redesign to improve flow. Bends in the original system that were no longer needed were removed and replaced with new ductile iron pipe. Application of the CIPP liner included the new pipe sections.

Rebuilding the infrastructure is essential to bringing a sense of normalcy back to the residents of “The Crescent City.” While much of the activity is happening where all can readily see, essential underground sewer enhancement technologies are just as much a part of the post-Katrina rebirth.

### 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\_

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The felt tube was secured to a frame over the hole (top) prior to inversion (bottom).



The tube was inverted through the host pipe.

