

CaseHistory

Reducing Infiltration in Fort Wayne



Insituform's wet-out facility uses start-of-the-art design and controls.

Application: CIPP liner for concrete and vitrified clay pipe

Resin: Vipel® isophthalic polyester

Diameters: 8 to 24 inches
(20.3 to 61 centimeters)

Length: 6,050 feet (1,844 meters)

Location: Flaugh Ditch Project
Fort Wayne, Indiana

Installed: 2008 (part of ongoing plan)

When it comes to predicting the future of its sewer infrastructure, the City of Fort Wayne, Indiana, has something better than a crystal ball - members of its Water Resources team. They run a forward-looking sewer repair and replacement program.

The team is under the leadership of Mike Hicks, Program Manager, Sewer Repair & Replacement, whose passion for predicting sewer futures has generational overtones. "I don't want to leave my grandchildren with problems that affect the quality of their lives," Hicks said. "Sewer rehabilitation is really economic development," he added. "It is an asset that opens up an area for new homes and businesses."

Hicks and the sewer rehab team handle the design end of sewer repair and maintenance. Construction Manager Ken Stempien handles the construction end. Both men and their coworkers are part of the City Utilities department which is directed by Kumar Menon.

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Resin-impregnated liners were shipped under controlled conditions to designated installation points.

Much of the city's complex analysis of its sewer system can be traced to residents' calls about basement sewer backup or flooding. Each individual datum is plotted into a master plan that analyzes the present status of the entire system, then projects twice into the future – 20 and 40 years out.

“We can't overemphasize the importance of education and information-sharing with other municipalities to learn new and better ways to solve problems,” Stempien said of the plan. “The Utility has given many of us the opportunity to attend conferences and classes. But few engineers, inspectors and others involved in these projects actually attend these classes. They are missing out on valuable information that will help them improve their specifications.”

The Water Resources team's vision is integrated into the city's consent decree with the U.S. Environment Protection Agency (EPA) to prevent and minimize Combined Sewer Overflow (CSO) and Sanitary Sewer Overflow (SSO) into receiving waters. The city's largest waterways are the Maumee River, the St. Mary's River and the St. Joseph River.

“Fort Wayne is one of the most proactive cities we work with,” says Jay Ferguson, Business Developer Manager for Insituform, Inc., a principal sewer rehabilitation services provider to Fort Wayne. “The city's Utility Department has a better lock on how to prevent a problem before it happens than many municipalities.”

Flaugh Ditch Project

Insituform is a global provider of cured-in-place pipe (CIPP) technology, the most common remedy for sewer rehabilitation in Fort Wayne. Using cured-in-place pipe (CIPP) technology, Insituform completed a major rehabilitation as part of Fort Wayne's Flaugh Ditch sanitary sewer project. The resin for the job was a Vipel® corrosion-resistant isophthalic from North American resin leader AOC.

This phase of the Flaugh Ditch project rehabilitated 2,900 linear feet (884 meters) of 24-inch (61 centimeter) diameter reinforced concrete pipe and 3,150 linear feet (960 meters) of vitrified clay pipe with diameters ranging from 8 to 12 inches (20.3 to 30.5 centimeters). Sections of the host pipe were initially installed in the late 1960s and early 1970s.

“Obviously, the best solution for sewer repair or upgrade is total excavation and replacement,” said Hicks. “However, that could cost over \$300 dollars per foot, not including large diameter pipe. Cured-in-place pipe, on the other hand, costs only forty dollars per foot. Trenchless technologies like CIPP are also significantly less disruptive. This is especially true where sewer easements are behind homes and where lines run under major roadways.”

Insituform is on the city's list of prequalified cured-in-place pipe providers. “We go through a Pre-qualification process every two years,” said Construction Manager Stempien. “There are plenty of qualified CIPP installers out there, but not that many who can consistently deliver quality of workmanship, reliability and competitive bids for larger jobs. In addition, contractors such as Insituform provide extensive and detailed documentation for our records.”

For the Flaugh Ditch project, the city and Insituform communicated with affected residences and businesses about the need to temporarily restrict water usage. This allowed each inversion to be accomplished within

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Insituform crews minimized disruption by using existing manholes for CIPP liner insertions.

a workday without the need for costly sewer flow by-passes. The work included a line that runs under Illinois Road, a major thoroughfare with an average daily traffic rating of 32,000. Trenches would have closed the road for approximately two months.

Improved sewage flow from the Flaugh Ditch CIPP allows 210 residences to get off their on-property septic systems and tap into the line that leads to the treatment facility. Increased capacity created by the rehabilitated line also opens the way for the expansion of local business and commerce.

More on CIPP

CIPP starts by thoroughly cleaning the host pipe to prepare it for a new liner. A resin-impregnated felt tube is then inverted through a predetermined section of the pipe. In most cases, excavation is eliminated by accessing the sewer through existing manholes. Computer calculations provide the appropriate length per insertion and ensure the diameter and shape of the tube will provide a compatible fit inside the host line.

The liners for the project were resin-impregnated in Insituform's wet-out facility in Indianapolis where Wet-out Manager Ralph Western works with AOC to improve performance.

"AOC has been extremely helpful in the development and testing of new technologies," he said. "Examples of these are projects promoting resin stability during production and projects that improve cost effectiveness."

The wet-out facility's controlled conditions ensure optimum wetting of liner sections before they are shipped in a refrigerated truck. Keeping the liner at a lower temperature prevents the resin chemistry from prematurely reacting before the liner is installed.

As the impregnated tube is inserted on site, water pressure is used to move the tube forward as it inverts and lines against the inner surface of the host pipe. When the tube has been completely inverted, the tube is heated, typically with hot water or steam, to raise the temperature of resin. Heat accelerates the chemical reaction that causes resin molecules to permanently crosslink into a highly corrosion-resistant solid.

In effect, the host pipe gets a liner that serves as a "pipe within a pipe" with a projected service life of at least 50 years. While inside dimensions are marginally reduced, flow rates are usually improved because the surface is smoother.

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Its seamless construction is not interrupted by joints, cracks and other damage that existed in the original pipe. To reinstate laterals into the sewer, access openings are robotically cut into the appropriate locations of the liner and connectors are bonded in place.

Mapping out the future

Hicks and his team members back their vision with a well-executed plan. Working with the Geographic Information Systems department, the Water Resources team divides the city into 352 quarter sections that have sewer problems. Each quarter section has its own statistics for basement backup and sewer calls. Plotting the number of calls on a map provides a visual analysis of the severity of the situation by core section.

A color code helps with planning. Sewer segments marked in Red are sewers that need to be fixed as soon as time and budget allow. Sewer segments marked in Yellow, are sewer sections that need to be re-televised in 10 years, and sewer segments marked in Green are sewers that need to be re-televised in 20 years.

“Seventy-six percent of all the calls come from the top 100 quarter sections out of the 352 quarter sections that have sewer problems,” Hicks pointed out. “Further analysis shows that the condition of the pipe has a lot to do with when it was built. There are points in time for major sewer pipe installations in Fort Wayne.

“The oldest sewer pipe is brick and some vitrified clay that was installed in 1865. The pipe material itself has stood up well over time, but there have been problems with failed mortar and loss of seal at the joints.”

The second major wave of sewer pipe installation was the laying down of clay pipe between 1918 and 1923. The next major installation wave was from 1953 to 1973.

“It is possible, that less than ideal installation was not so much a case of poor workmanship as it was rushed workmanship,” said Hicks. “There was boom in population around 1959, and the demand for homes was high. However, the process of trying to put a sewer line in fast could have led to more problems.”

With regards to the city’s sewer infrastructure, the Water Resources team is on a path to go beyond staying even, which is a daunting enough task by itself. Statistics present a formidable race with time. The average age of a rehabilitated pipe is 71 years. By 2048, more than half the city’s sewers will be more than 100 years old.

The master plan developed by Water Resources is designed to determine the optimal time to rehabilitate these aging sewer lines before they exhibit serious failure. Trying to stay on or ahead of schedule is Water Resources’ contribution to the future of Fort Wayne.

About Insituform®

Insituform Technologies® Inc. is a leading worldwide provider of proprietary technologies and services for rehabilitating sewer, water and other underground piping systems without digging and disruption. To learn more about the company, visit www.insituform.com.

About AOC

For cured-in-place pipe (CIPP), engineers and installers want a resin that processes smoothly and performs impeccably time after time. That’s why Vipel® resins from AOC are the leading choice for CIPP in North America. AOC knows technology, lives quality and delivers service better than any other supplier. To find out more, e-mail Bill Moore at wmoore@aoc-resins.com, phone him at (901) 854-7291 or go to www.cippresins.com.

