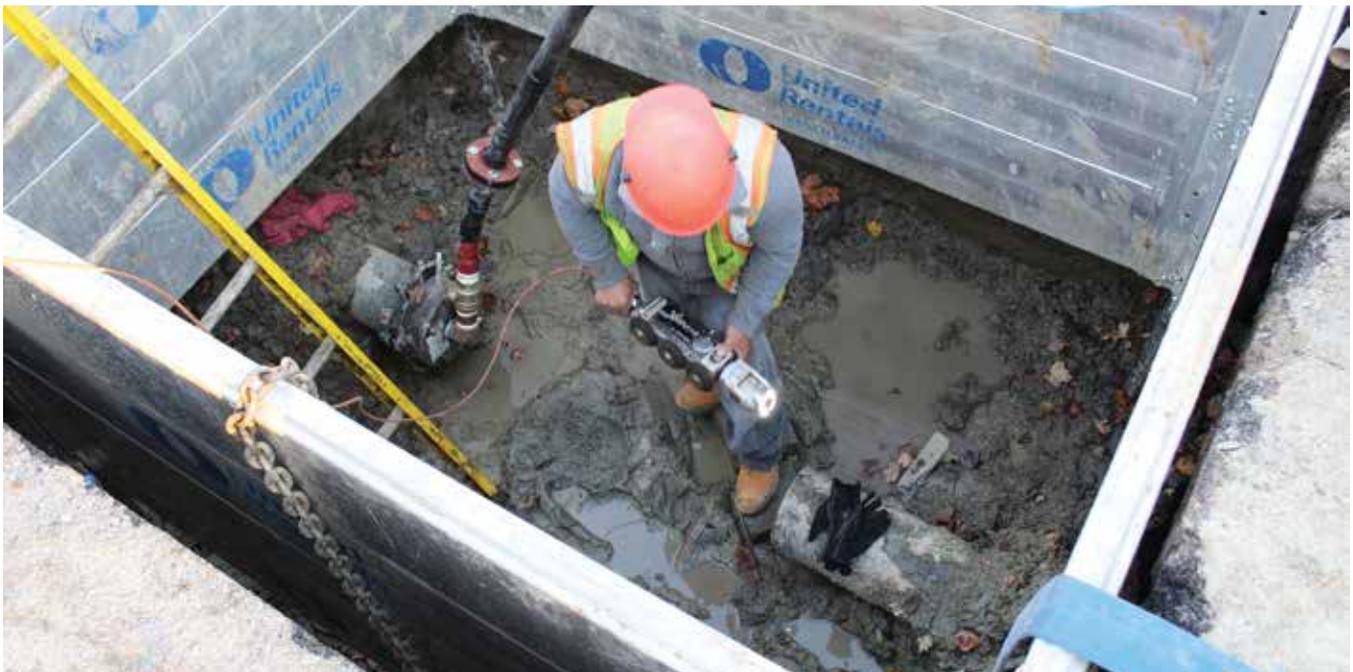


SPRAY-IN-PLACE PIPE REHABILITATION METHOD EXTENDS LIFE OF WATER MAINS

By: Audrey Leamy, SUEZ



Camera inspection before lining

As a community's water infrastructure ages, its many buried pipes approach the end of their useful life, and the incidence of leaks and water main breaks escalates. This results in an increase in water loss and costly repairs, thus causing disruption to consumers and the local economy.

In fact, problems with aging infrastructure cost municipalities hundreds of millions of dollars each year in maintenance, repair, replacement costs, and shutdowns. The deterioration of pipes causes water quality issues, like pipe corrosion and tuberculation in steel, cast iron, and ductile iron pipes, and the buildup of biological material.

Maintaining infrastructure assets such as water mains in a fit-for-purpose condition is a critical aspect of utility management. Today, pipeline asset management programs, which help communities optimize these assets as well as their annual pipe renewal budget, have become increasingly important. Moreover, advanced solutions such as the Spray-in-Place Pipeline (SIPP) rehabilitation process offered by SUEZ, provides a new tool to extend the life of existing underground pipes while creating an alternative to the traditional

solution dig-and-replace pipe or direct replacement. With SIPP, no major road or sidewalk tear-ups are necessary.

AN INNOVATIVE PROCESS

SIPP is an efficient and long-lasting pipe rehabilitation solution that scrubs underground pipes clean and then uses a state-of-the-art, computer-controlled robotic spray rig to apply an internal epoxy pipe lining on-site, to an already existing host pipe. The epoxy coating applied by SUEZ is NSF 61-approved for use in potable water systems. Once it has cured, the epoxy lining seals the pipe, preventing leaks and water contamination, and extending the pipes' service life.

This solution also minimizes future maintenance costs and increases the flow capacity for greater system efficiency, most important for firefighting.

Importantly, SIPP eliminates the need for major road or sidewalk tear-ups, requiring only a series of small access excavations along the pipeline to be rehabilitated. This process can be used



Pipe cleaned by drag scraping



SIPP Spray Head

to rehabilitate pipes made of different materials including cast iron, steel, and ductile iron, working in diameters ranging from 4 inches to 36 inches.

The SUEZ SIPP rehabilitation process consists of several steps:

- The first step is to agree with the utility on the access point locations to be used for the SIPP process. A small access pit is excavated one foot below the host pipe. A three-foot section of the host pipe is removed to allow access to safely launch the lining equipment inside the existing host pipe. A CCTV

inspection is performed to analyze the condition of pipe to be restored.

- Next, the pipe interior is prepared for restoration by drag scraping and/or hydro-jetting to create a clean, smooth dry surface.
- A second CCTV inspection follows to determine if there are any leaks, groundwater infiltration, or repairs that are needed outside of the SIPP scope of work. If so, any such repairs are done without requiring additional excavation. This process ensures

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that the pipe is properly prepared for the next step – the epoxy coating.

- The epoxy coating is applied to the interior of the host pipe using a computer-controlled robotic spray application rig to ensure a uniform coating at the correct ratios and the desired thickness. Once cured, this coating creates an internal seal that prevents leaks and helps protect against future corrosion and biological buildup. Because the epoxy coating bonds with the pipes, it also seals cracks and protects against the development of infiltration in the future. The two-component, 100% solid epoxy system used to coat water distribution systems exceeds ANSI/NSF 61 standards. The epoxy coating is a Zero VOC material with certified zero fish kill.
- A final CCTV inspection is performed to confirm the quality of the lining. The pipe can then be reinstated. The utility proceeds with the chlorination/disinfection before system restoration.

SIPP AND THE CITY OF WYANDOTTE, MICHIGAN

A look at the program utilized by the city of Wyandotte in southeastern Michigan provides insights into how SIPP works.

The city of Wyandotte is located approximately 11 miles south of Detroit. Situated on the Detroit River, its water source, it is part of the collection of communities known as Downriver. In 1867, the village of Wyandotte – a flourishing industrial community – was incorporated as a city. Twenty-two years later, the residents created the Wyandotte Municipal Water Utility to provide fire protection and a convenient, safe source of drinking water.

The Wyandotte Municipal Water Plant serves over 12,000 customers and can produce up to 15 million gallons of water per day. The distribution system consists of 110 miles of water mains ranging from 4 inches to 30 inches in diameter. Eighty hundred fifty fire hydrants throughout the community provide fire protection. The water system has a 500,000-gallon elevated storage tank and 4.5 million gallons of ground-level storage for peak demand periods such as fighting fires or other emergencies. The Wyandotte Municipal Water Utility has annual revenues of over

\$3.5 million and sells over 1.5 billion gallons of water annually.

According to Bill Weirich, Superintendent of the Wyandotte Water Department, the utility's traditional method of maintaining the water mains was open cutting and direct replacement, which entails trenching the entire length of pipe to be repaired or replaced and laying down new pipe in the trench. The downsides of this method are the high cost, the lengthy time involved in the process, and the disruption and inconvenience that customers encounter.

The presence of underground utilities presented another difficulty with the open cut and direct replacement method. "Having all the other utilities underground makes it almost impossible to relocate your mains without running into gas and electric, and we also have underground cable," Weirich says.

However, Weirich had heard about the SIPP process offered by SUEZ, with which Wyandotte already contracted to provide water tower maintenance through its Asset Management Program. "We started looking into SIPP and decided to give it a try on small areas and see what happened," he recalls.

At Weirich's suggestion, Wyandotte elected to use this system for pipe maintenance in the older part of the township. With aging cast iron pipes that dated back to the 1930s through the 1950s, this area had experienced numerous water main breaks and faced the potential for more. Wyandotte intended to remediate the aging infrastructure through SIPP with the goal of extending the life of the pipes by another 50-75 years.

Weirich describes how the process worked on the section of pipes marked for the SIPP. "We took some main on which we had about 10 to 15 repair clamps. We did three parts of the system – a four-inch pipe and two six-inch pipes. With the SIPP program, we were able to open up three holes to remediate the pipes rather than open cut the whole area and replace the main," he says.

After locating the pipe next to a valve on each end, SUEZ inserted a receiving pit for the robotic device that applied the epoxy coating. After one section was done, the valve was replaced, and spraying of the lining continued down the line to the next valve, and so on.

Weirich notes that "In essence, we were lining the pipe and

putting in two new operational, more up-to-date valves to replace the older ones that dated back to the 1950s. This gives us a more reliable way to shut the system down. And by sealing the inside of the pipes, I think we've greatly reduced the likelihood of main breaks in that area."

RESULTS

According to Weirich, the SIPP program has yielded numerous benefits.

"In all, Wyandotte rehabbed approximately 3,500 feet of main in only about one month. If we would have open cut that, we would have likely worked on it all summer," he says. He also notes that "We were getting only about 1500-2000 feet for the same amount of money with the open-cut method."

"When we talk about cost savings with SIPP, we compare it to traditional dig-and-replace pipe, or direct replacement, where you dig up the entire length of the pipe that needs attention and replace it all. That causes a lot of disruption, whether you're digging up a roadway, someone's yard, driveway, and so forth. We estimate that, on average, SIPP can yield a cost saving of about 30 percent when compared to direct replacement," he says.

Weirich also notes a benefit that transcended cost: the ability to minimize inconvenience to consumers by using SIPP rather than open cut and direct replacement. "I look at SIPP as being unobtrusive to the customer because you are not creating a

major construction zone. We try as much as we can to prevent inconvenience our customers."

Because it is a trenchless technology application, SIPP requires only two access points: the first point, where the equipment is inserted, and the second at the other end of the segment – the discharge – where equipment is, in essence, attached and pulled through. And because only very small access points are required, disruption is minimal. There is no need to dig up the whole length of the road. SIPP is great for applications underneath railroads, interstates, highways, buildings, and so forth. That provides a huge benefit to communities and their customers.

"I believe we were the first water department in Michigan to use SIPP. That's why we started small, so we could make sure that the process was going to work. We took a worst-case scenario to see how this would work. Going forward, we're going to expand on where we started and begin expanding out to the whole system from those three points," adds Weirich. †

ABOUT THE AUTHOR:



Audrey Leamy is Project Manager for Concrete, Plant, and Pipeline Services for the Advanced Solutions division of SUEZ North America.

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