

CONTRACTOR, MUNICIPALITY, MANUFACTURER WORK TOGETHER SOLVE A UNIQUE PROBLEM IN NORWICH, CONNECTICUT

BY JOHN P. MANIJAK



City officials in Norwich, Connecticut, discovered an unusual problem involving 2,695 ft of 14-in. force main pipe in September 2019. The gritty materials, pumped on a regular basis, had worn away the bottom of the 45-year-old cast iron pipe. Over time, the pipe walls were breached by the materials, allowing an inflow of heavy amounts of ground water when the system was not pressurized, affecting its overall capacity.

Given the location of the pipe along a steep rocky embankment on one side and its proximity to active railroad tracks on the other, it would have been a costly dig and replacement. To add to the challenges of the situation, the deteriorated pipe lay buried just a few hun-



dred feet from the Thames River.

The City of Norwich contracted Michels Corp. to address the situation without the need for surface disruptions. Once under contract, Water Lining Program Manager Mark Lucas worked with the experts at Premier Pipe, Interplastic Corp. and North American Composites to engineer a 9-mm, two glass-layer designed liner that would be installed to repair the worn pipe. This liner produced a flex modulus of more than 1 million psi, allowing for a thinner CIPP composite to gain maximum flow through the force main.

Norwich Public Utilities (NPU) designed and installed five access pits and removed the air relief valves prior to the crew arrival. They

also installed the relief bypass system which stretched the entire project length to 2,700 ft. The 12-in. HDPE SDR17 bypass system had to be partially buried to allow for crew and railroad access to the entire site. NPU provided railroad flaggers and their crews also manned and maintained the bypass system throughout the duration of the project. Funding for the program was supported fully by NPU.

The initial CCTV inspections indicated that infiltration from the groundwater was intense in a section that lay directly under the existing railroad tracks. It was determined that without stopping the inward flow, the possibility of the CIPP resin being contaminated or washed out was a concern. Digging and replacement of the leaking sections wasn't an option. The best solution was to stop the water with a repair method that could test and seal several long sections of 14-in. diameter pipe while under heavy infiltration at the same time.

Logiball, Inc. custom-built an extended 14-in. flexible packer specifically for this job. The use of a special soft rubber skin allowed the packer to seat against the deformed pipe walls with a 60-in. long void span in between the expanded ends. Three ports to permit pressurization were set within the void area. This allowed the crew to conduct air testing and sealing of the pipe using AV-100 acrylamide grout.

"The design was unique, as we had never made a long-span, flexible packer for that pipe size and we had to go to the drawing board," said Logiball Inc. president Marc Anttil.

The packer had to be flexible enough to bend through confined spaces to get to the pipe and yet strong enough to take the full pulling force of 850 ft of grouting hoses, video cable and cameras.

The end caps were custom made to fit within the 14-in. pipe openings, allowing for a flow-through design while still providing enough space for the air and chemical hose connections. Within three weeks, the packer had been designed, manufactured, tested and shipped onsite.

Working from opposite sides of the pipe run, lining crews installed pressure pipe from

pits three and four while grouting crews tested and sealed using the latitudinal flexible packer from pits one and two.

Sealing at just one or two points in the pipe section would not prevent water migration. The decision to test and seal the entire length of pipe from pit one to pit two was made based on the ability of ground water to travel throughout the full length of the pipe section in the pipe trench. Approximately 150 air pressure tests were performed in the 750-ft section of pipe. Upon failure of the air test, AV-100 acrylamide grout was pumped through the open segment of pipe to the exterior of the pipe. After the chemical gelled, a second air test was performed to assure the pipe was sealed. After the grouting of the mainline section was completed, the fourth and final segment of the CIPP pressure liners was installed, cured and tested. The newly CIPP-lined force main was then handed back over to NPU's.

NPU reinstalled the blowoff valves, tied in the segments of line, performed site restoration, recommissioned the line and removed the bypass. The success of this job was only achieved by a collaborative effort of the Norwich Public Utilities, the engineering consultants at Jacobs, Premier Pipe, Interplastic Corp., North American Composites, Logiball and Michels Corp.

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Air testing and Sealing Mainline