



Water Main and Fire Line Rehabilitation

Dirty brown water and poor water flow were the first clues that a mid-Atlantic commercial property owner had a problem. Then the owner was put on notice by the local fire department that the water supply lines were no longer meeting the required flow requirements. Four hydrants on the owner's property were flowing between 200 to 300 gallons per minute -- well below the 1,000 gallons per minute required by code. A section was inspected revealing the pipes were almost completely clogged with corrosion induced tuberculation.

Cause: Corrosion causes most pipe problems including reduced flow, bacterial growth, red/dirty water and, ultimately, leaks and breaks. Corrosion can occur slowly or quickly depending on a myriad of variables including:

- Low or High pH, these can greatly accelerate corrosion
- Oxygen content is a primary facilitator of MIC (corrosion)
- Flow Rate – Standing water shortens pipe life by promoting accelerated corrosion
- Temperature – Higher water temperatures facilitate faster corrosion

Options and Concerns: The first option considered was traditional dig-and-replace. But the property enjoyed extensive, mature landscaping that the owner strongly wished to avoid damaging. The owner was very concerned about coordinating with other utilities, disrupting tenants and customers and insuring that future corrosion was prevented. Other critical factors in selecting the most suitable technology for the project included finding a solution that would provide long-term improved water quality and supply – all at an affordable price.



Before



After



Solution: The owner called his commercial plumbing contractor - Associates plumbing Inc - to see if there was an alternative to digging up and replacing the existing piping. To avoid digging up the larger underground pipes and destroying the extensive landscaping, the 6" and 8" water main pipes would require use of a proven trenchless pipe rehabilitation technology that could handle tough access on sensitive grounds as well as avoiding digging up numerous service connections.

Triton's proprietary Spray Lining Process was designed for non-structural and semi-structural renewal of 4" to 24" water mains and is one of the least disruptive rehabilitation technologies. The process applies a potable water certified epoxy to rehabilitate deteriorated, leaky and corrosion clogged pipes. At the AWWA standard 1 mm thickness¹, most typical pinhole leaks are sealed, pressure and flow ratings restored and the prevention of future corrosion is ensured. The property owner reviewed Triton's Spray Lining epoxy system and 10 year, 500,000+ linear feet history of successfully rehabilitating North American water mains. He was satisfied that Triton's Process offered proven long-term performance, attractive cost and time savings versus replacement, and offered the least disruption to tenants, other utilities and grounds. Note: Recent research by AWWA Research Foundation concluded that deteriorated old pipes lined with epoxy can expect an additional 50 year design life.²

Spray Lining Process: Pipes are first located, isolated and accessed. Access points are typically made at fittings (valves, tees, hydrants, bends, etc.) in conformance with applicable authorities including the local fire department. Pipes are then cleaned using a choice of several cleaning methods to eliminate debris and corrosion buildup. A post cleaning CCTV inspection is then typically conducted to check for appropriate cleanliness, water leaks coming back into the pipe, excessive service protrusions or other issues. Once cleared for lining, the epoxy lining hoses are inserted into the pipe and pulled to an exit pit at the far end of the isolated section of pipe, where the spray head is attached. The pre-calibrated spray rig is engaged, pumps actuated and the hose extracted at the rate calibrated to the size of the pipe and thickness of the lining. The spray head uses centrifugal force to spray line the epoxy resin in a uniform 360° pattern onto the inside surface of the pipe, creating a seamless and protective barrier. The system eliminates corrosion, prevents its reoccurrence, and restores water quality and flow to optimal levels. A post lining CCTV inspection ensures the application was done in accordance with expectations and requirements.

Results: Over 1,200 linear feet of tough access 6" and 8" cast iron mains were cleaned, lined and inspected in less than two weeks with no disruption in service to the owners' customers and only minor, temporary property impact.

The results were full restoration of all potable water and hydrant supply pipes on the property. Water flow was restored and all four fire hydrants now supply water at rates equal to or above code requirements of 1,000 gallons per minute.



Project Summary

- 1,200 linear feet of 6"/8" C/I Water Main
- System feeds water to multiple buildings and four fire hydrants
- Pipe system 70% to 90% constricted from corrosion-induced tuberculation
- System flow had fallen to 200 gallons per minute
- Full restoration took place in less than two weeks
- Restored mains now provide over 1,000 gallons per minute to all fire hydrants.

¹ **Rehabilitation of Water Mains (M28)**, Second Edition, American Water Works Association

² **Service Life Analysis of Water Main Epoxy Lining** - AwwaRF Research Report: Project # 2941 <http://www.awwarf.org/research/topicsAndprojects/execSum/2941.aspx>