REPRINTED FROM JUNE 2010

Trenchless TECHNOLOGY

Bright Lights

of Madison Avenue Shine on Trenchless Rehab Project

By Benoit Cote

The Madison Avenue relining project was completed at night to minimize disruption to businesses and residents.

Yes, it's *that* Madison Avenue — and the new trenchless technology worked better than claimed and did everything promised, plus a whole lot more.

This Mad Ave story is about a pilot project on, or more specifically, beneath, the famed thoroughfare in New York City and spotlights a successful pilot project to rehabilitate a decaying drinking water pipeline. Interestingly, part of the rehabilitation utilized a structural trenchless technology exclusively for drinking water distribution systems. The technology was developed by the Aqua-Pipe division of Sanexen Environmental Services. More than 1.2 million ft of Aqua-Pipe has been installed throughout North America.

The successful outcome from this project now has officials at the NYC Department of Design and Construction (DDC) impressed enough to try it again, this time on a full-scale basis.

The saga began many years ago when officials at DDC put out a request for bids to repair deteriorating water mains along Madison Avenue. The original 48-in. cast iron pipe, some 9,000 ft, was installed back in the late 1800s. The project was awarded to Halcyon Construction Corp., Pleasantville, N.Y., which had the lowest bid. The firm is a multi-million dollar corporation that specializes in solutions for the water, sewer, pipeline, communications and power line construction industries.

According to Purnima Dharia, director of Design Section 3 for the Infrastructure Division at DDC, three solutions were to be completed by the contractor and were part of the original contract documents with plans, specifications and design by DDC. Two of the three solutions have been implemented. The first was lining the larger 48-in. cast iron pipe with HDPE; the second, a significantly shorter and 12-in. diameter section, utilized an Aqua-Pipe structural liner as a pilot project to test the potential of this new technology. The third approach — pipe bursting — has not yet been undertaken.

"The technologies were pre-approved by the New York Department of Environmental Protection (DEP), but had never been tried here in New York," Dharia said.

While the contractor inserted the HDPE lining into the larger 48-in. diameter pipe sections along the avenue, crews also inserted and formed an Aqua-Pipe structural liner as a test, covering a one-block section (on Madison Avenue in the 60s) that had only a 12-in. diameter main. There was no controversy in that the liner has mechanical properties that exceed all specifications and meet drinking water requirements throughout the Americas (certified by NSF to standard NSF/ANSI 61).

Criteria of New York City

The reasons for trying this approach with the Aqua-Pipe ran deeper. Sal Leopoldo, project manager for Halcyon Construction Corp., noted that the needs of the City and the promise of the technology included:

- Little excavation compared to open-cut rehabilitation — a small access pit was excavated at each end of the section.
- Quick repair to reduce complaints by residents and minimize traffic disruption (work was performed over three nights — one to clean the existing pipe, one to line and cure the new liner, and one to test the system and close the small access pits).
- Once installed, no future maintenance would be required.
- The possibility to line through bends (not needed in this application).
- Adjacent infrastructures would not be disturbed by the work.
- New materials could handle increased pressure and flow capacity and be corrosion resistant.
- Regain structural capacity of the pipe.
- Reduced costs as compared to open-cut technologies.
- Low emissions of carbon dioxide when compared to traditional construction methods.

"Our experience with the Aqua-Pipe structural liner system enabled us to be confident enough to convince city officials that better water pipe rehabilitation approaches were available," Leopoldo said.

The project was completed by a combined team of the contractor and Sanexen Aqua-Pipe personnel comprising a crew of four, plus a foreman. Project steps included:

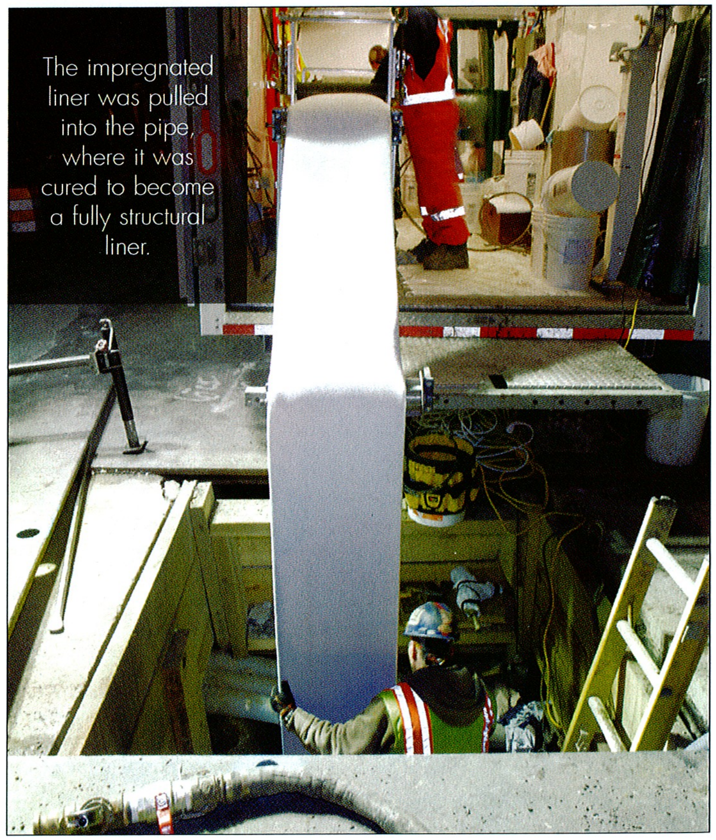
1. Installing a temporary bypass while the work was being done.
2. Evacuating access pits at each end of the three-block section.
3. Cleaning pipe with a metal chain reamer.
4. Conducting a closed-circuit television (CCTV) inspection to chain the service connections.
5. Using specialized robotic equipment to insert a plug in every service connection from inside the pipe.
6. Impregnating the liner onsite in a refer truck by injecting the epoxy between the two layers of liner while pulling the liner in place (with a pig).
7. Forming the liner by sending swabs from one end to the other.
8. Curing the liner by circulating hot water.
9. Performing a hydrostatic pressure test.
10. Reinstating service connections with specialized robotic equipment.
11. Disinfecting the pipe.
12. Reconnecting the water distribution system.
13. Removing the temporary bypass, and finally,
14. Restoring the site.

The installation of the Aqua-Pipe liner and reinstatement of the water flow only took three days or more specifically, three nights.

While technology of this type was once only applicable for gas and sewer rehabilitation projects, new materials make it possible to restore water mains. The composites used — a woven polyester jacket with a polymeric membrane that is bonded to the interior with a special epoxy resin — achieve the desired results. It is a standalone structural liner than can withstand all dead and live loads. Additionally, it can withstand internal operating pressures of up to 150 lbs, including vacuum, without the help of the residual strength of the existing pipe.

Benoit Cote is vice president at Aqua-Pipe, a division of Sanexen Environmental Services, Varennes, Quebec, Canada.

The American Society of Civil Engineers (ASCE) estimates that 6 billion gal of treated potable water are lost each day due to leaking, deteriorated pipes. In the United States alone, some 700 water main breaks occur each day.



The impregnated liner was pulled into the pipe, where it was cured to become a fully structural liner.