



How to Extend the Life of a Water Main

Best practices for executing a successful water main cleaning & lining project



By Steve Tagert

As the nation's infrastructure continues to require costly and extensive repairs and replacements to keep roads, bridges and water systems functional, it can be challenging to determine when to repair versus replace materials. When replacements are deemed necessary, funding can be difficult to balance with the other municipal needs of a community.

Over time, older water main can acquire iron oxide tuberculation, the development of small mounds of corrosion inside the pipe. Under the right circumstances, cleaning and lining water main, as opposed to replacing it, offers a cost-efficient and effective alternative.

Cleaning and lining water main offers two substantial benefits for a community: alleviating discolored water that, while safe, can be visually unappealing, and increasing firefighting capabilities. For example, a 6-in. main cleaned and lined could see an increase in flow from 400 gal per minute (gpm) to 1,000 gpm.

For larger projects spanning 4,000 to 6,000 ft, cleaning and lining can save as much as 50%, compared with a full main replacement. It is important to note that the main might still need eventual replacement and that smaller stretches of main are not as cost-efficient to clean. For smaller main, replacement typically is the best course of action.

There are several steps to a successful cleaning and lining project outlined in the guide below.

① Preparing for Water Main Cleaning

There are a few key areas on which to focus when starting a water main cleaning and lining project. First, it is recommended to review current piping within a water system and assess if cleaning the main is viable, or if a replacement or increase in size is needed. In cases where a replacement ultimately is needed, main cleaning can extend the life of the current system for a period of time. Cleaning and lining is most efficient for larger stretches of pipe.

Next, it is necessary to meet with municipal leaders to coordinate logistics for potential conflicting projects, traffic interruptions or similar obstacles for the community. Alert the fire marshal to ensure that firefighting capabilities are not disrupted during the main cleaning project.

Water main cleanings typically should be conducted between March and November, dependent on the region's climate, as pipe can freeze once the weather is too cold.

With a green light from the municipality, water company engineers then can plan how to run temporary aboveground lines for the life of the cleaning project to ensure water flow to customers is uninterrupted.

② Communication With Customers

With the groundwork in place to begin a main cleaning and lining project, the next step is reaching out to customers with a letter, letting them know what to expect during the process, the duration of the project and whom to contact in case of any questions or emergency situations.

The letter should include an explanation of the temporary hose connection and details of construction timing and roads impacted. In advance of the project, all outside hose lines should be checked for functionality and repaired prior to the start of the project. Every curb box also must be located and the curb stop operated.

Water flow is not interrupted at any time during a main cleaning and lining. Additionally, because the temporary bypass main set up does not measure water consumption, customers only pay their service fee during the project. Making sure that all parties are kept informed throughout the project is critical.

③ Getting Started

Depending on various factors, the process of cleaning and lining can be completed by the water company, a contractor or a combination of both.

The first step is to begin excavation. It is best to plan to replace all of the water valves on the main. Once excavation is complete, the team should insert a cable with scrapers into the pipe. As the cable pulls through the pipe, the scrapers remove the tuberculation on the sides of the water main. Over time, a 6-in. main could have enough buildup to reduce flow to that comparable to a 4-in. main.

This is the primary cause for poor water flow and potentially discolored water. It is important to note that tuberculation is not hazardous to public health, but can raise concerns among customers due to the discoloration it causes, along with the potential to stain laundry. Reduced water flow is a concern for firefighting capabilities. By cleaning and lining tuberculated main, both issues are resolved at a fraction of the cost of a full replacement.

After all debris have been removed, a squeegee is pulled through the pipe to make certain it is clean and free of any debris prior to the cement lining process. The interior pipe wall then is lined with a 3/8-in. coating of fresh cement.

Immediately following the cement lining, each water service is operated at the curb stop to flush the new cement out of the corporation. The cement lining takes 24 hours to dry. Once dried, the main is thoroughly flushed and filled with a 50-mg/L chlorine solution that remains in the pipe for 24 hours. Afterward, the main is flushed to remove the chlorine solution, making certain that the highly chlorinated water is neutralized with an agent such as sodium bisulfite or vitamin C to prevent the chlorinated water from entering waterways.

It is essential to take bacteria samples—typically, two samples 24 hours apart—which should be tested to ensure the water is ready for consumption and public use.

While the process of cleaning and lining water main can seem tedious, it is a proven way to extend the life of water main and save money in the long term. For example, Aqua Pennsylvania, the largest subsidiary of Aqua America, recently completed a \$150 million cleaning and lining replacement program that spanned more than four decades and addressed 364 miles of main. Aqua Pennsylvania credited the success of the program to clear ongoing communication with all parties throughout each of the projects. The program is estimated to have saved the company more than \$150 million in water main replacement costs and extended the life of the main by as many as 50 years. **w&wd**

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