

# The Value Proposition For Rehabilitating vs. Replacing Pipelines

By Chris MacDonald and Paul Gagliardo

In the U.S. water mains are, on average, 50 years old. As pipelines age, they are more susceptible to failure. The American Society of Civil Engineers (ASCE) gives water infrastructure a C- grade in its [2025 report card](#). A Utah State University report documented over [260,000 water main breaks annually](#), an average of 11.1 breaks per 100 miles of pipeline. In addition, it noted from its survey of over 800 utilities that 20% of installed water mains have not been replaced due to lack of funding. There is a \$452 billion funding shortfall to manage this critical infrastructure.

Municipal pipeline rehabilitation using a liner system generally offers significantly greater value compared to a total replacement. It is typically much less expensive, and requires no permitting as it is considered maintenance to existing pipes or infrastructure, causes minimal disruption to the community, and takes less time to complete. It can extend the life of existing infrastructure while still maintaining functionality, making it a more cost-effective option for most situations where the pipeline is not structurally deficient (pressure pipes typically leak and are still structurally sound for 100s to 1000s of years).

Rehabilitation methods often cost 50–75% less than full pipe replacement, resulting in substantial savings. In pressure pipe applications, cured-in-place pipe (CIPP) relining is more expensive than flexible fabric reinforced plastic pipe (FFRPP) relining due to the fact that it requires more access points, has to be QA/QC in the field, and needs additional time to cure before being tied back in with additional materials required for the tie-ins. FFRPP is the lowest cost relining



option as it requires less access points (it can be pulled further in a section of pipe than CIPP), it can navigate complex geometry, and it can be used in all types of pipes. It also has a 50-year design life and 5-year warranty on the lining, which stands out compared to all other rehab options, or even new construction pipe options for that matter.

AWWA Manual M28, Rehabilitation of Water Mains describes and analyzes rehabilitation options that are available. The goal of the manual is to provide engineers, contractors, and decision-makers with an overview of the process for water main rehabilitation. Different pipe installations and types require different rehabilitation options. CIPP solutions can be classified into three groups; felt-based systems, woven hose systems, and membrane systems. Slipping and modified slipping solutions can be classified into three main groups as well:

symmetrical reduction systems, folded and formed systems, and expanded PVC systems.

CIPP is a trenchless method for repairing pipes that involves inserting a flexible liner into an existing pipe, inflating it, and then hardening it with heat or ultraviolet light. CIPP is suitable for repairing pipes that do not need to be upsized and can be completed in less time than other methods. CIPP is the technology of choice for rehabilitating gravity sewer mains but can also be used on force mains. Since its invention, it is estimated that 50,000 km of cured-in-place pipe lining has been installed worldwide. This technology is currently the most common method used in gravity type pipelining projects due to its class four structural capabilities.

The close-fit FFRPP solution is a long-lasting, corrosion-resistant alternative to CIPP, designed for both low-pressure and

high-pressure applications that extends the lifespan of pipelines without the need for full replacement. This close-fit solution is a three-layer system comprised of an inner woven layer of polyester or aramid with an outer jacket and inner liner layer embedded through the woven fabric layer, creating a seamless, high-strength, semi-structural liner inside the pipe. This, combined with the structural capacity of the host pipe, creates a structural system. This process restores pipelines while preserving their flexibility and preventing leaks, making it ideal for force main applications and water distribution and transmission main applications. These type of liner systems have been internationally proven for over 25 years.

Trenchless rehabilitation techniques require minimal excavation, reducing surface disruption and inconvenience to residents and businesses. FFRPP systems can be pulled 2000 feet or more between access pits depending on size and geometry. In some cases, when pipe is straight, it can be pulled up to 8000 feet. Minimizing access pits reduces costs and impact on the surrounding community and traffic. When using an FRPPP or CIPP pipelining for pressure applications, the restoration takes place from access pit to access pit. Digging to replace pipes will require more time, be more disruptive, and increase expenses. Having to have water or gas service shut off for prolonged periods makes it hard for companies to go

about their business as usual. There are also other factors to consider, including diverting traffic away from the area where the contractors are digging. Another factor with the dig and replace method is that surface restoration is also necessary and expensive.

Because relining projects only have access pits and not open trenches, the permitting requirements are much lower. This reduces time to completion, cost, and complexity.

Properly rehabilitated pipelines can have their lifespan extended by 50 years or more, delaying the need for complete replacement.

Utilities should consider using pipe-liner rehabilitation methods when analyzing options for pipeline improvements. They offer attractive alternatives to full replacement of pipelines from financial, timing, and disruption perspectives. ■



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