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Cured in Place Pipe Repair

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CURED IN PLACE PIPE REPAIR

THE NEED

Pipes are getting older and more and more need to be replaced or repaired. This problem will increase in the foreseeable future as the underground infrastructure ages and as layers of pavement, sidewalk, landscaping, and other utilities are placed over it.

FIGURE 1 DURING INITIAL PIPE CLEANING, A SOFT PIG IS PULLED THROUGH THE LINE END WITH SUCTION FROM A MILLER VAC-HOC VACUUM EXCAVATOR TO REMOVE LOOSE SOIL

THE TECHNOLOGY

A solution that is being used more extensively involves renewing the existing pipe rather than replacing it. This can be accomplished in several ways, one of which encompasses various cured-in-place technologies to reline the pipe, restoring its ability to transport, and slowing or stopping further deterioration.

Insituform Technologies Inc. offers a pipe lining system called Paltem which uses a woven synthetic fiber covered with a polyester elastomer as the lining material. This system is used to rehabilitate pressure pipelines that have been damaged by corrosion or are experiencing leakage through joints, pinholes or other pipe defects. The liner is coated and impregnated with adhesive or a thermosetting resin and is actually turned inside out during installation. Steam is sometimes used to accelerate the cure time. This method has been used successfully by Consolidated Edison and by PECO Energy Co. Paltem can be used to line pipes ranging from 3/4" to 40" in diameter. It is a relatively

quick process that is able to handle bends in the pipe. However, it requires a careful cleaning of the pipe prior to installation.

FIGURE 2 THE AMEX 2000 POLYURETHANE LINER IS PULLED THROUGH ADJUSTABLE SQUEEZE ROLLERS AND PLACED INTO A PRESSURE BOX IN A LAYERED MANNER

Miller Pipeline Corp. has the AMEX 2000 and AMEX 32-400 pipe lining systems. They use three components: a textile reinforcement hose, a polyurethane membrane, and a two-part polyurethane adhesive. The textile hose is first pulled through the host pipe. The membrane is filled with adhesive and passed through rollers which distribute the adhesive. It is then inverted into the textile reinforcement where the adhesive binds the membrane, textile and host pipe wall together. These systems are also easy to install, but like all cured-in-place systems, extensive host-pipe cleaning is required prior to installation. The AMEX 2000 is designed of use on pipelines operating from low pressure up to 60 psig, while the AMEX 32-400 is designed for use on mains operating under 15 psig.

The city of Houston, with a reputation for trying new and innovative solutions, has renovated over one million feet of pipeline using cured-in-place methods. Their system of choice involves a resin-impregnated felt line that is pulled in and filled with hot water until the resin has set.

FIGURE 3 AFTER POLYMERIZATION OF THE ADHESIVE, THE PIPELINE IS READY FOR PRESSURE TESTING OR SERVICE INSTALLATIONS

Cured-in-place methods have also been used for point repairs rather than relining the whole length of a given pipe. The econoliner process was used in 1994 to repair composite sewer lines underneath the Walt Disney World Resort Complex. An "Economat" consisting of needled polyester sandwiched between layers of woven fiberglass, is saturated with epoxy resin and wrapped around a packer. This packer is then pulled through the pipe to the repair location and inflated with water to press the liner mat tightly against the host pipe walls. The water is then heated to facilitate the cure.

THE BENEFITS

Pipes can be replaced without digging a trench. This saves time and money and minimize disruption. The old pipe is left underground eliminating the need for its disposal.

STATUS

Cured-in-place repair methods are gaining popularity, especially with gas utility companies.

BARRIERS

Current codes and standards and insufficient knowledge are two barriers to cured-in-place pipe repair.

POINTS OF CONTACT

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REFERENCES

1. "New lining system upgrades Boston gas distribution system." Pipeline and Gas Journal. April 1995. p 24-29.

REVIEWERS

Peer reviewed as an emerging construction technology

DISCLAIMER

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