

Successful demonstration of two emerging cured-in-place pipe (CIPP) technologies

Demonstration and Evaluation of Innovative Wastewater Main Rehabilitation Technologies (INFR4R11)

The Central Issue

Utilities have limited access to information on the lowest cost, long-term, innovative rehabilitation methods for renewal of large diameter pipes. Cured-in-place pipe (CIPP) has been used as a wastewater pipe rehabilitation method since its development in London in the early 1970s. This research demonstrates a performance evaluation of two emerging, large-diameter pipe rehabilitation technologies: Ultraviolet (UV) CIPP and reinforced Water-Cured (WC) CIPP. As the names indicate, one method uses hot water for the curing process, while the other relies on ultraviolet light.

Context and Background

This research assessed the effectiveness, longevity, expected range of applications, and life-cycle cost of the two demonstrated technologies to assist wastewater utilities in deciding whether rehabilitation or replacement is more cost effective. If rehabilitation is selected, the research provides information for selecting which rehabilitation technology to use. The demonstrations resulted in the successful installation of:

- A UV-cured CIPP liner on 888' (271 m) of 10" (250 mm) VCP sewer in Frisco, TX.
- A large-diameter glass fiber-reinforced WC-CIPP liner on 17,200' (5,243 m) of 96" (2,400 mm) RCP sewer in Irving, Texas.

Findings and Conclusions

The results provide data on alternatives to traditional renewal and rehabilitation methods, as well as recommended procedures to follow. Key lessons were learned about both methods:

- The UV-cured demonstration illustrated the importance of using the proper test method when evaluating the liner's structural properties. Fiberglass liners must be tested according to ASTM F2019, which requires a 2" (50 mm) wide specimen and the orientation of the prepared specimen must come from the



Reline America Blue-Tek™ GRP UV-cured CIPP lining system.

circumferential or hoop direction in order to not cut through the fiberglass reinforcement.

- The large-diameter WC-CIPP demonstration illustrated the importance of proper planning and site access considerations. Careful attention is required to ensure proper and timely preparation in advance of the lining equipment setup for each installation. Also, many large pieces of equipment are required and access is needed to move the resin tankers in and out during wetout.

Technology and/or process-specific recommendations for improvement include:

- Use of better inner film for the UV-cured CIPP. The UV-cured CIPP vendor has started using an improved inner film.
- Optimization of the thermal sensor system for the large-diameter WC-CIPP. A sensor technology developer is working towards optimizing the thermal sensor for the large-diameter WC-CIPP.

Management and Policy Implications

This project successfully demonstrated two emerging wastewater rehabilitation technologies – UV-cured CIPP and large-diameter, reinforced composite WC-CIPP. The research report provides:

- Opportunities to compare performance and cost of similar products in a consistent manner.
- Access to standards and specifications for new technologies.
- Explanation of best practices on pre- and post-installation procedures and testing.

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Related WERF Research	
Project Title	Research Focus
Condition Assessment Strategies and Protocols for Water and Wastewater Utility Assets (03CTS20CO)	Provides information on how to effectively use condition assessment tools and techniques to improve both long-term planning and day-to-day management of assets. The report is structured for two distinct audiences: 1) Utility planning managers who want to use cost-effective condition and performance assessment programs to support long-term planning decisions. 2) Engineering/maintenance managers that want to identify and understand the advantages and disadvantages of tools and techniques for measuring the condition and performance of utility assets to support daily maintenance and operation of assets.
Web-Based Decision Support Tools for Selection of Condition Assessment and Rehabilitation Methods for Laterals (INFR2SG09)	Web-based portal provides sewer agencies and property owners with current information on sewer lateral condition assessment and inspection techniques, repair and rehabilitation methods, legal and financial issues, and a forum for resolving related issues.
WATERiD National Knowledge Database (INFR9SG09)	Provides a single-point information center for utilities to find relevant information that will aid in decision making for the selection of appropriate condition assessment and renewal technique technologies and cost information.
Condition Assessment for Wastewater Pipelines (INFR9SG09caww)	Describes technologies and methodologies currently in use for condition assessment of wastewater pipelines. Provides a synthesis of condition assessment technologies contained in WATERiD.
LIFT Collection Systems Focus Area (werf.org/lift/)	Provides an effective means to identify new technologies to assess, rehabilitate, operate, and maintain collection systems assets and move them into practice more quickly through collaborative pilots, demonstrations, and data sharing.

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