



## Florida Department of Transportation Research

### Durability of In Situ Pipe Repair

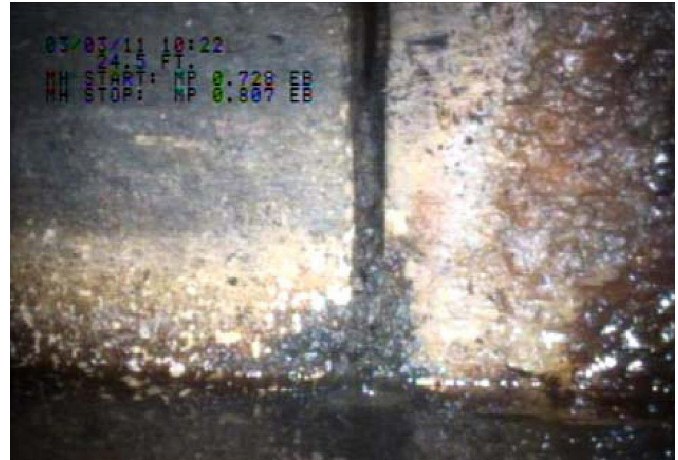
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The Florida Department of Transportation (FDOT) constructs, manages, and maintains much of the pipe infrastructure system in Florida. This activity requires a considerable investment of time and money each year. Pipes are expected to perform for many years, but repair operations can be difficult, disruptive, and expensive, so finding and implementing the most effective repair methods can yield significant savings.

In this project, researchers from the University of Florida examined a range of repair methods. Their goal was to determine repairs' effectiveness and the situations in which they were most successful at enhancing the durability of the pipe and the overall effectiveness of the pipe network, that is, without sacrificing flow. Results from the study were added to the FDOT Pipe Repair Matrix, a compilation of repair methods for metal, HDPE, PVC, and concrete pipe. The Matrix is a useful compendium, which engineers, FDOT personnel, and contractors can use as guidance to select the best in situ pipe repair method for their situation. Information in the Pipe Repair Matrix is drawn from manufacturers and specifications, but it is continuously enhanced by FDOT experience and research findings.

The research team began their efforts with an extensive literature review, compiling a list of pipe repair methods and solutions, with descriptions of their use, longevity, and efficiency. From this information, a number of common repair methods were selected, and Florida sites where these repairs had been used were sought. To do so, a database was created which contained pipe repair data covering the past fifteen years. Repair sites corresponding to major, commercially available repair types were identified in the database.

Sixteen sites were selected for further study. Repair types included were chemical grout, pipe liner, fiberglass liner, joint seal, band seal, and repair sleeve. Wherever possible, both closed-



*Closed circuit view of a pipe repair. This joint had been repaired with chemical grout, but none remains, as shown by this inspection.*

circuit television and laser profiling were used to evaluate the condition of repaired pipes. Field data was collected on infiltration of water or sediment, debris accumulations, corrosion of metal pipes and their repairs, staining cracking or deflection, alignment, seam and joint integrity, pitting, shape and thickness of repaired pipe. Soil sampling provided data on the influence of surrounding soil properties in repairs. Measurements included identification of soil type, pH, electrical conductivity, and other properties that can contribute to pipe degradation.

Findings of the research team were added to the Pipe Repair Matrix. Results of this type make it possible to design more cost-effective repairs and to schedule inspections to preempt future problems. The research team recommended that guidelines should be developed to formalize systematic tracking and assessment of pipe condition and repair integrity. This activity would promote better record keeping on pipe infrastructure activities. More detailed knowledge of repair performance would be the basis of a more efficient pipe management system.