

CFRP Upgrade of Large Diameter Pipelines to Address Emergent Repair Needs

It is late December in a Bay Area, California community, and a challenge is developing for an agency which owns and operates several large diameter pressurized transmission mains. After an inspection has shown the need to structurally upgrade over 1,800 lineal feet of 78-inch piping, the agency is rapidly assembling and reviewing options. The pre-stressed concrete cylinder pipe (PCCP) line is segmental and the specific pipes in need of repair are spread throughout miles of piping. The emergent need and schedule restraints drive the agency to consider and ultimately select the carbon fiber-reinforced polymer (CFRP) repair methodology to provide a fully structural long-term upgrade to the critical line. The project is planned and successfully implemented within an approximately 60-day time frame.

This is a story playing out with more regularity across North America, along with the adoption and use of CFRP repair as an effective pipeline upgrade method. Why is this trend occurring? With the onset of more effective asset management programs, municipal water and wastewater agencies are identifying distressed large diameter pipelines prior to failure. Pipelines, or pipeline segments, in need of immediate upgrade are being prioritized, discussed and immediate action taken to avoid failures. This increase in the quality of pipeline asset management programs represents significant progress in the industry. As a provider and constructor of emergent repair products and installation, it is apparent that this trend is growing.

In cases of emergent pipeline repair needs where access to the line via excavation is not feasible, or where it causes unacceptable disruption, water and wastewater agencies search out trenchless repair options. The number of fully-structural trenchless repair options for pressure pipelines is limited, especially in cases where hydraulic capacity cannot be impacted. CFRP repair of pipelines originated in the late 1990s and now has a 20-year track record of performance along with an AWWA standard (C305) which has been published. The CFRP method has been utilized by many major water and wastewater agencies across North America, and while there is no repair method available to address all pipeline needs, CFRP has been proven to be highly effective in addressing emergent repair needs.

This presentation will provide valuable information to attendees on the proper approach to material selection, design, installation and quality control for CFRP repairs through a series of case studies demonstrating the use of the system for emergent water and wastewater pipeline needs. The case studies will include projects completed on a 210-inch diameter pipeline in the Washington DC area, 54-inch piping both in Miami and Tucson, and the 78-inch diameter pipeline in the Bay Area. Each of these case studies will include details on how the project developed, and how each owner addressed their specific emergent pipeline need by successfully implementing a long-term upgrade using CFRP.