THOMPSON PIPEGROUP

CASE STUDY - MIAMI DADE EMERGENCY SLIPLINING REHABILITATION PROJECT



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MIAMI DADE EMERGENCY SLIPLINING
Rehabilitation Project

Emergency Rehabilitation of a 72-Inch Raw Water Main Preston Water Treatment Plant – Miami-Dade County, Florida, Serving approximately 2.8 million residents



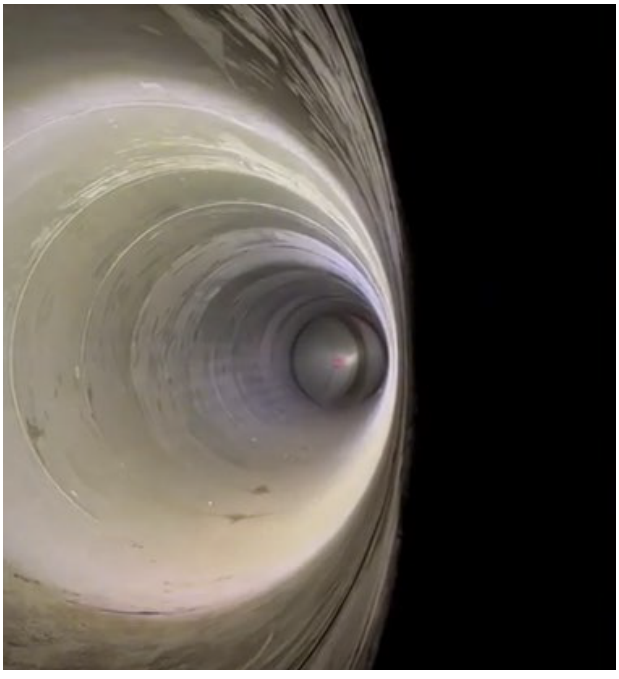
Project Summary

Miami-Dade Water and Sewer Department (MDWASD) successfully completed the emergency rehabilitation of a critical 72-inch raw water main serving the Preston Water Treatment Plant in the City of Hialeah, Florida. The pipeline is a key component of the regional water transmission system, delivering raw water that ultimately serves approximately 2.8 million people across Miami-Dade County. The 72-inch main operates in conjunction with a parallel 96-inch raw water main, which was required to remain fully operational throughout construction to ensure uninterrupted water supply to the treatment plant.

Originally installed in the late 1970s, the 72-inch PCCP had experienced increasing wire breaks and corrosion, raising concerns regarding long-term reliability and the risk of service interruption. Given the critical nature of this asset, MDWASD evaluated multiple repair alternatives, including full open-cut replacement, hybrid repair approaches, and trenchless rehabilitation. Based on constructability, schedule constraints, operational risk, and the requirement to maintain continuous service via the 96-inch main, MDWASD selected a trenchless slip-lining solution as the preferred and executed approach.

TECHNICAL DATA:

Year	**2025**
Pipeline Function	Raw water transmission main
Installation Method	Sliplining
Pressure	10 - 15 psi
Length	400 LF
Host Pipe Diameter	72″
Sliplined Pipe Diameter	60″
Owner	MDWASD
Contractor	DMSI
Facility Served	Preston Water Treatment Plant
Pipe Manufacturer	Thompson Pipe Group
Project Location	City of Hialeah, FL



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PROJECT BACKGROUND

Miami-Dade Water and Sewer Department (MDWASD), the largest water and sewer utility in the southeastern United States, provides drinking water and wastewater services to more than 2.8 million residents and visitors. As part of its long-term Capital Improvement Program (CIP), MDWASD continuously evaluates critical transmission assets to ensure system reliability, public health protection, and resilience.

One such asset is a 72-inch PCCP raw water main located near the Preston Water Treatment Plant in the City of Hialeah. Installed in the late 1970s, this pipeline conveys raw water from the Northwest Wellfield to the Preston facility and operates as part of a system that includes a parallel 96-inch raw water main supplying the plant through large-diameter interconnections.

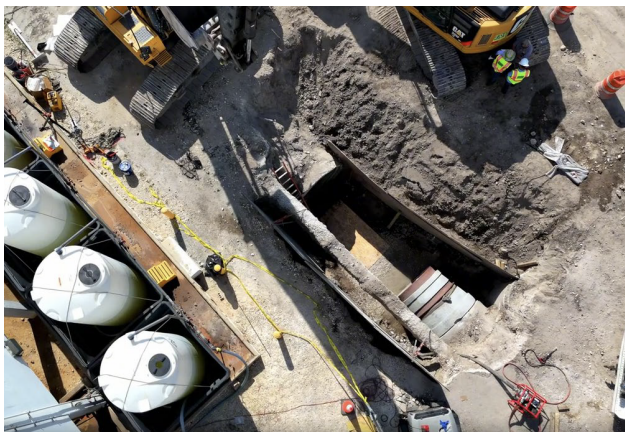
Existing Conditions and Project Need for Action

Condition assessments identified increasing wire breaks and corrosion of steel bands along a 400-foot segment of the 72-inch PCCP. The pipeline had previously undergone multiple localized repairs, including carbon fiber reinforcement, and was under continuous fiber-optic monitoring. These findings raised concern that continued deterioration could lead to a sudden failure, resulting in major service disruption and emergency response impacts.

Given the pipeline's critical role, MDWASD required a permanent rehabilitation solution that would:

- Be executable under emergency conditions
- Restore long-term structural integrity
- Minimize excavation and surface disruption
- Maintain continuous water service during construction
- Provide an expected service life exceeding 80 years







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Evaluation of Repair Alternatives

The contract documents allowed for multiple repair strategies, subject to MDWASD review and approval, including:

- Full open-cut replacement of the existing 72-inch PCCP
- Hybrid approaches combining open-cut replacement and trenchless methods
- Trenchless rehabilitation using fiberglass reinforced polymer (FRP) sliplining

Open-cut replacement was evaluated but presented significant challenges, including extensive excavation near critical plant infrastructure, interference with overhead electrical transmission lines, traffic and community impacts, and increased construction risk. Hybrid approaches were also considered but did not adequately reduce operational risk or construction duration.

Given the requirement to keep the 96-inch raw water main continuously in service and limit shutdowns of the 72-inch main to short-duration windows, trenchless sliplining was selected as the most effective and least disruptive solution.

Project Constraints

The project was executed under tight operational and physical constraints, including:

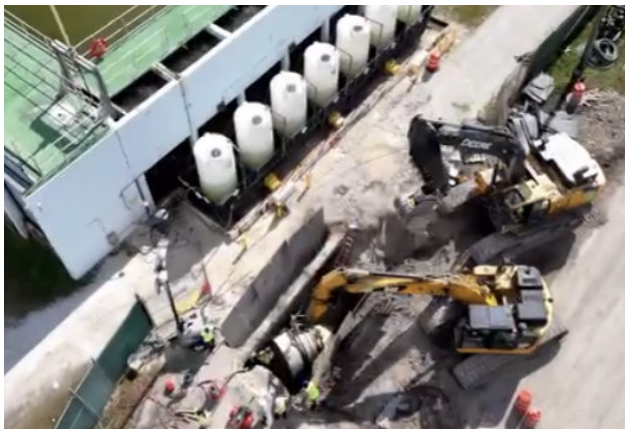
Continuous operation requirement: The parallel 96-inch raw water main feeding the plant had to remain in service at all times. Shutdown of the 72-inch main was limited to a brief 2–6 hour window solely for linestop installation.

Operating Condition: The raw water main operates at approximately 8–15 psi, influencing linestop selection and liner design requirements

Physical limitations: Overhead transmission power lines restricted the use of conventional knife-gate linestops.

Congested utility corridor: An adjacent 8-inch force main and an overlying 12-inch water main were present, with limited as-built documentation.

Complex geometry: The rehabilitation segment included bends, crossings beneath other PCCP mains, and limited access.





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Role of Thompson Pipe Group (TPG)

Thompson Pipe Group (TPG) was the only manufacturer capable of offering a complete package for this project. TPG's involvement extended well beyond the supply of FRP liner pipe and included comprehensive technical, manufacturing, and historical support critical to project success.

TPG's contributions included:

- Manufacture and supply of FRP pipe for trenchless sliplining
- Custom-fabricated FRP short pipes, mitered elbows, couplings, and flanges
- Engineered PCCP-to-FRP transition assemblies, reducers, and adapters
- Supply of PCCP-related components and fittings required by the rehabilitation scope
- Ownership and review of historical PCCP records, including 1978 Interpace pipe laying schedules
- Verification of existing pipe configuration, including elbow geometry and sweep radii
- Development and approval of liner layouts, fittings, and joint configurations
- Field technical support, including internal laminate work to support construction activities
- Coordination with the Engineer of Record and contractor to ensure constructability

Access to historical PCCP records and engineered transition details significantly reduced uncertainty, improved constructability, and ensured full compatibility between legacy PCCP infrastructure and newly installed FRP components.

Rehabilitation Approach

The selected solution involved trenchless sliplining, installing new pipe within the existing 72-inch PCCP. This approach allowed MDWASD to restore structural capacity while avoiding extensive excavation near the treatment plant and surrounding infrastructure.

Access Manholes and Internal Access

A minimum of two (2) access manholes were installed to provide internal access to the rehabilitated pipeline section.







These manholes facilitated liner installation, inspection, termination work, and future maintenance activities in accordance with MDWASD requirements.

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FRP Liner System

The FRP pipe system was designed and manufactured to meet both structural and operational requirements for the project.

Key liner characteristics included:

- Nominal Diameter: 60 inches
- Pressure Rating: 50 psi (minimum)
- Pipe Stiffness: SN 46
- Manufacturing Standard: ASTM D3754
- ASTM Cell Limits: Type 1 – Liner 1 – Grade 1
- (RPMP – Reinforced Liner – Reinforced Surface)
- Joint Type: Double bell FRP coupling with EPDM gaskets
- Allowable Joint Deflection: 1.0 degree
- Pushing Force to home the joint: 6,200 lb-force
- Ultimate Longitudinal Tensile Strength: 3,467 psi
- Ultimate Longitudinal Compressive Strength: 10,500 psi
- Manufacturing Quality: ISO 9001 certified

The liner system accommodated existing pipe geometry while providing a corrosion-resistant, pressure-rated solution suitable for long-term service.

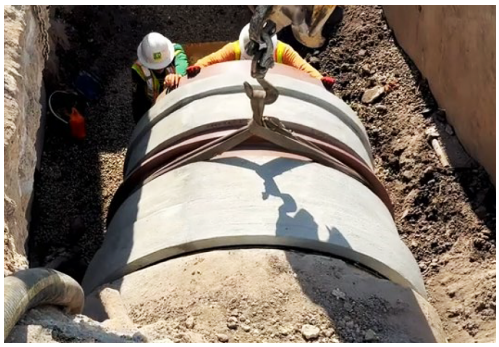
Thrust Restraint and Joint Stability at Existing Elbows

The rehabilitation segment included existing horizontal bends where thrust forces are generated under operating pressure conditions. TPG evaluated multiple restraint strategies to ensure longitudinal stability of the sliplined system at these locations.

Potential methods analyzed included:

- Internal laminate bonding at joints
- Mechanical key-lock joint systems
- External restraint concepts

Following engineering evaluation, TPG performed thrust force calculations based on operating pressure (10–15 psi) and bend geometry. Analysis demonstrated that the cementitious grout used to fill the annular space between the FRP liner and host PCCP provided sufficient axial resistance to counteract thrust forces generated at the elbows.







The grout confinement, combined with the host pipe geometry and frictional resistance, provided adequate restraint without requiring additional mechanical locking systems. This approach simplified installation while maintaining structural integrity and long-term performance.

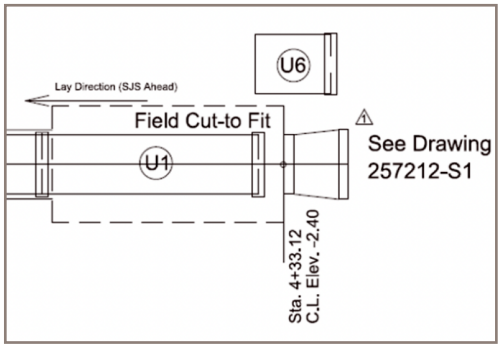
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PCCP-to-FRP Interface System – Engineered Transition Strategy

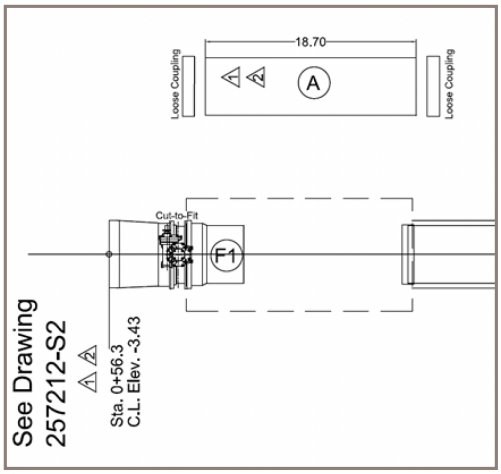
The transition between the existing 72-inch PCCP and the new 60-inch FRP liner required detailed custom engineering to ensure structural, hydraulic, and corrosion continuity. Because this pipeline was originally installed in the late 1970s, dimensional variability and undocumented field adjustments could have introduced significant uncertainty during rehabilitation. However, TPG's access to original 1978 Interpace pipe laying schedules and fabrication records allowed precise verification of pipe geometry, elbow configurations, steel cylinder details, and joint layouts. This historical validation reduced dimensional uncertainty, minimized field modifications, and significantly improved constructability planning under emergency conditions.

The sliplining system incorporated purpose-built,multi-material transition assemblies designed to maintain alignment and load transfer across the PCCP-to-FRP interface. These assemblies were engineered with defined tolerances, axial thrust transfer mechanisms, and internal lining continuity to accommodate field welding of PCCP steel components and sequencing constraints associated with limited shutdown windows. By carefully integrating FRP terminations with PCCP steel cylinder interfaces, the design ensured structural compatibility while preserving long-term corrosion protection. The result was a seamless integration of modern FRP technology with legacy PCCP infrastructure, maintaining hydraulic performance and system reliability.

At both the upstream and downstream ends of the rehabilitation segment, TPG proposed and supplied custom-fabricated steel adapter assemblies. These adapters were designed not only to transition between PCCP and FRP materials, but also to function as reducers accommodating the change from the 72-inch host pipe to the 60-inch liner system. The assemblies were engineered with PCCP-compatible weld interfaces, FRP termination geometry, and clearly defined axial load paths to ensure structural continuity and long-term durability. Additional fabrication and detailing information can be provided by Jim Fisher regarding these specialized components.





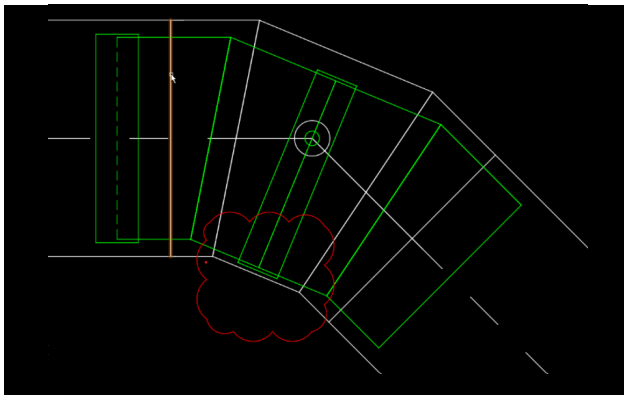


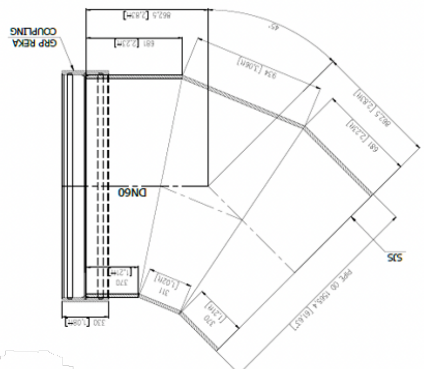
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Custom Short Pipes and Elbow Navigation

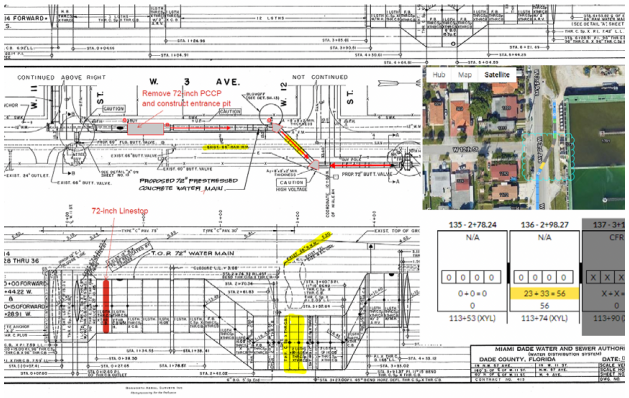
The rehabilitation segment included existing horizontal bends and geometric constraints that required careful navigation during liner installation. To address these challenges, TPG designed and manufactured custom short FRP pipe sections and fittings specifically dimensioned for internal transport and assembly within the host PCCP. These shortened sections allowed the liner to be maneuvered through existing elbows without requiring additional excavation or modification of the host structure.

Joint deflection limits, alignment tolerances, and hydraulic smoothness through bends were carefully considered in the design. By sequencing installation with controlled insertion and assembly of these short sections, the project team maintained structural continuity while minimizing installation risk. This approach preserved system alignment, avoided external disturbance near critical plant infrastructure, and ensured long-term performance of the sliplined system.









Installation Methodology

Construction was completed using trenchless techniques with limited surface access. Only two access pits were constructed to allow liner insertion and connection. A custom trolley system was used to manually advance the liner pipe through the host PCCP.

The installation sequence included:

- Construction of limited manholes and access pits
- Installation and subsequent removal of an engineered pill-bag linestop, selected due to overhead power line clearance limitations
- Controlled pipe insertion and joint assembly
- Navigation of existing bends based on verified historical geometry
- Locking liner joints and completing PCCP-to-FRP terminations
- Controlled grouting of the annular space between liner and host pipe, providing structural support and axial thrust restraint at bends