

Pipeline under a bridge
towards the abutment



PPM Crew
installing SRS
sleeve between
abutment wall
and gas main



PPM PROGRESSIVE
PIPELINE
MANAGEMENT
THE INFRASTRUCTURE RENEWAL SPECIALISTS

MARKET SEGMENT
NATURAL GAS

LOCATION
EAST ORANGE, NEW JERSEY

DATE
JULY 2020

CLIENT
PUBLIC SERVICE ELECTRIC & GAS

PROJECT PROFILE

REPAIRING BRIDGE PIPELINE WITH CURED-IN-PLACE-LINING AVOIDS COSTLY REPLACEMENT 12" MAIN

BACKGROUND & SITUATION

The PSE&G 12-inch gas main pipeline along Park Ave. in East Orange NJ, travels directly through a bridge concrete abutment wall. The segment crossing the bridge had evidence of corrosion and leakage. PSE&G looked to PPM to recondition the segment within the abutment wall without removing the pipeline or interfering with the bridge structure.

Bridge or overpass crossings with a pipeline through the concrete abutment wall of the structure often have accelerated corrosion. When a pipeline is weakened from corrosion at the concrete abutment wall juncture, there is frequently a gas leak. Conventional methods for corrosion and leak repair require the pipe to be removed and replaced.

Bridge owners, city and county regulators and Department of Transportation (DOT) will not permit pipe in an abutment wall to be removed. Pipe removal interferes with the structure of the bridge and requires drilling through the foundation of the abutment wall. Even if permission could be obtained by the multiple layers of approvals and restrictions, replacing a pipeline structurally integrated into a bridge is extremely expensive and, in many cases, impossible.

SCOPE

After reviewing the drawings to identify where the pipe connected to the road, an excavation point was created at the beginning and end points where the liner would be reconditioned. The pits were outside the limits of the bridge domain and did not interfere with the bridge structure. The main was cut and capped from the two points, giving access to the interior of the pipeline so PPM could execute the Starline® Cured-in-Place-Lining.

Prior to lining, the section where the pipe enters the abutment wall was reinforced with a structural reinforcement sleeve (SRS) made of a high strength carbon fiber laminate with a glass outer skin/coating. The sleeve was installed robotically using an inflatable bladder, inserted into the pipeline and held in place, overnight, until the adhesive which holds the sleeve cured. Laminate composite material and glass outer coating prevent corrosion where the sleeve meets the abutment wall.

The carbon fiber material bonds to the interior of the pipeline, essentially becoming the host pipe for the Starline® Cured-in-Place-Lining (CIPL) installation. The pipeline internal surface was inspected with CCTV and prepared for lining using an abrasive sandblasting operation. The liner was loaded into the drum and installed into the main using air pressure.



Preparation of the structural reinforcement sleeve (SRS) liner

Crew prepares to invert Starline® liner into 12" low pressure main

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CHALLENGES

PSE&G was required to obtain permits and approvals by the bridge owner prior to any repairs. Pipelines at bridge crossings require multiple layers of approvals and restrictions from the owner and regulators. Existing pipelines are grandfathered into the bridge, but replacing a pipeline or hanger is not. The structure of the bridge may or may not support a new pipe. Traditional pipeline replacement methods for bridge pipelines present engineering hurdles, safety risks and excessive costs, while the issues of corrosion and gas leaks continue.

The excessive corrosion on the pipeline where it entered the abutment wall bridge was another problem. The segment could not be repaired without removing the pipe. PPM's solution was to reinforce the corroded pipe without needing to remove or excavate the pipeline. By using a carbon fiber SRS sleeve into the pipe directly at the bridge abutment wall, PPM was able to reinforce the corroded pipe. The SRS material and adhesive has been tested at pressures to 250 PSI and approved by the Gas Technology Institute for its strength, durability and compatibility with the Starline® liner.

OUTCOMES & RESULTS

During the entire process of installing the SRS and lining, the host pipe remained in the bridge, without interfering with the bridge structure. The process did not disturb the pipeline, affect the supporting hangers, or disturb the pipeline within the abutment wall. Complete reconditioning of the entire segment plus the reinforcement of the pipeline at the abutment wall was completed within a few days.

Starline® Cured-in-Place-Lining along with the carbon fiber laminate SRS was a perfect marriage and ideal solution for renewing the bridge pipeline. Significant cost savings were realized while preventing future corrosion and eliminating leaks. Reconditioning the segment added an additional 100 years of reliable life to the pipeline with reinforcement at the abutment walls.