

Siphon Spot Repairs in Tampa



Spot repairs, point repairs or sectional repairs all refer to a specific section of pipe to be repaired.

For years, a point repair meant excavating at a certain location to expose the pipe and repair the immediate defective piece. Now point repairs are categorized by conventional excavation or trenchless rehabilitation. Approximately a decade ago when *trenchless point repairs* were just starting to be recognized, defects were limited to small diameter pipes with typical lengths of three feet. The term “Trenchless Sectional Repair” has become adopted or used frequently in the past several years due the advancements in trenchless repairs. Diameters are now ranging from 4" to 48" and continuous lengths up to 30 feet.

The City of Tampa was faced with two sections of damaged pipe on two siphons that cross the Hillsborough River. The Perry Avenue Siphon consisted of a 36-inch and an adjacent 20-inch PCCP. The existing inverted siphons were severely corroded as evidenced by a cave-in near the upstream inlet chamber. After the flow was diverted from the pipes, visual inspections of the siphons revealed extensive corrosion, holes and exposed steel reinforcement in the 30-year old concrete pipeline. However, as expected, the corrosion was limited to the sections where the pipe was exposed to the hydrogen sulfide gases and thereby not flowing full. These corroded sections extended approximately 10 to 15 feet from the inlet and outlet structures into both pipes. The remaining portion of the pipe was not damaged since a siphon is always surcharged like a trap.

The City of Tampa evaluated the following methods for rectifying this problem:

The first method considered consisted of installing a cured-in-place liner for the full 350-foot length of the siphons. The estimated cost of this option was approximately \$230,000.

The second option consisted of open cutting the siphon at both ends and replacing the corroded sections with HDPE. This option required the fabrication of special transition pieces to connect the polyethylene and PCCP pipes. Furthermore, in order to connect to the existing PCCP joints at the downstream end of the siphons, a 16 feet deep excavation would be required. The deep excavation next to the river would require construction of a cofferdam and was considered very risky by the City and the Contractor. The estimated cost of this option was approximately \$150,000.

The third option consisted of installing a 20-foot cured-in-place sectional liner at each end of the siphons. The estimated cost of this option was approximately \$110,000.

In spring of 1999 Bay Area Environmental, Inc. of Tampa, Florida was awarded the contract to install two 36" x 20' and two 20" x 20' cured in-place sectional repairs at each upper end of the siphon.

Bay Environmental, Inc. is a licensed installer for the Performance Liner® system, a cured in-place sectional lining by LMK Enterprises, Inc. The lining kits were ordered and technical assistance was arranged from the licensor for the large diameter liners. In early April the liners were shipped and Larry Kiest, Jr. and Rich Fast from LMK Enterprises, Inc. mobilized to Tampa to coordinate the liner installations.

The pipe was missing several inches of wall material and was rebuilt to the original inner diameter using a quick setting mortar. Flows were diverted into an adjacent siphon while the two pipelines were being worked on. While the lining process that was used is cured at ambient temperatures, the 20-inch x 20 foot CIPP were installed during the day and the 36-inch x 20 foot CIPP were installed at night. The average temperature during the day was 90 to 95 degrees with high humidity.



The liners required a lot of manpower to manually position the large inversion tubes. One 36-inch x 20-foot repair contained 775 pounds of resin plus the lining tube and inversion launch tube for a total weight of nearly 1,000 lbs. The liners were vacuum impregnated onsite inside of a refrigerated semi trailer. A translucent inversion bladder surrounds the lining tube.

Once impregnated, the liner /bladder assembly was loaded into a launching device and connected to a source of compressed air. This type of sectional lining is unique with it's launching device that keeps the resin clean and contained. The delivery system uses an inversion installation similar to manhole to manhole systems. The inversion delivery system allows full resin migration.



However, the resin contacts the pipe only when it is positioned at the point of repair. The linings were positioned at the beginning of the pipe at the face of the vaults wall. Air pressure was introduced into the launch tube causing the lining to invert into the damaged section of pipe. The linings were each cured within 3 hours from the time the liners were impregnated.



The entire installation took two days and consecutive nights. The project was cost effective and an excellent candidate for trenchless sectional repairs. The city was very pleased with the finished product of the Performance Liner®. It provided a structurally sound and corrosion resistant liner that specifically resolved the deficiencies of the siphons.

Project's Prime Contractor:
Harvey-Taddeo, Inc.

Design Engineer:
Jack Ferras, P.E., City of Tampa

By: Larry Kiest, Jr.
President, LMK Enterprises, Inc.