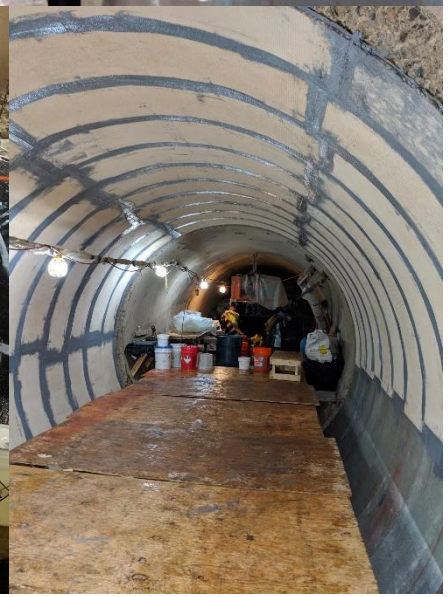
MNDOT 12-ft Tunnel Repair, MN

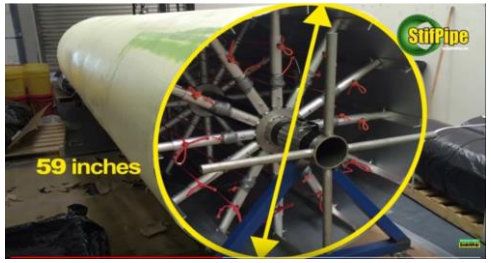


- This design is for the fully structural retrofit of a 20' long section of a 12' diam reinforced concrete tunnel. The retrofit designed for 100-psi external hydrostatic pressure. The StifPipe layers will be installed internally by the wet-layup method.

- The StifPipe design is comprised of 4 layers of carbon fiber, 2 layers of glass fiber, and 2 layers of core fabric with a total thickness of 1.25 inches.

- The project challenges include access to 95 ft deep tunnel with the closest access hole 3,900 ft away from the repair location.

Gillies Range Rd Culvert Repair with StifPipe® by Sliplining Method



* Please visit Quakewrap.com for further information and YouTube videos on these projects.

- StifPipe® was installed by the slip-lining method along an 80-ft long corrugated metal pipe culvert. The fully-structural design is withstanding all traffic loads exerted on the culvert.
- The deformed culvert had a diameter that ranged from 64” to 71”.The project site is in a remote mountainous area 1,000 miles north of Brisbane.
- The StifPipe® used for this project with an ID of 59” and 1” thickness was constructed near the job site.
- Four segments of 20-foot-long pieces of StifPipe® weighed around 1,000 lbs. each, which were light enough that two workers could easily push them into the position inside the culvert by hand, without any jacking equipment.
- The ends of the four segments were connected after installation using the wet-layup technique.
- The annular space between the culvert and StifPipe® was filled with grout.

Avelon Pump Station Upgrade Phase III Existing Pipe Rehab with StifPipe® Via Sliplining Method

- StifPipe® was installed by the slip-lining method for a 48-in concrete pipe. The fully-structural design is to withstand 30 psi internal pressure.
- The concrete pipe was located in Avelon Pump Station in Los Angeles County.
- The StifPipe® used for this project with an OD of 47-in and a 48-in length was constructed in QuakeWrap facility.
- StifPipe® ends were sealed with the tack coat.
- The annular space between the concrete pipe and StifPipe® was filled with non-shrink grout.

Arc Terminal 24-inch 60-ft Culvers, Mobile, Alabama

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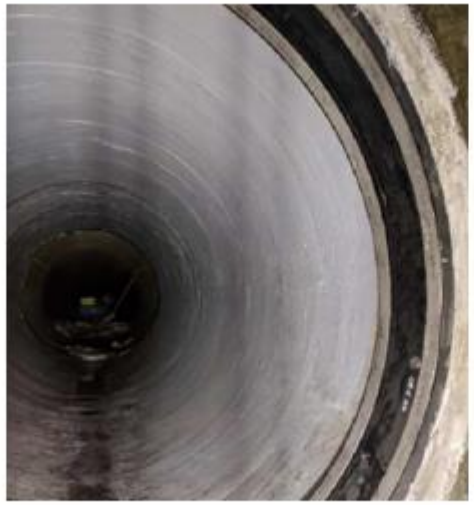
- The first installation of StifPipe by Sliplining method was completed at the Arc Terminal in Mobile, Alabama, to repair a 60-foot long 24-inch CMP that was corroded.
- Due to access limitation, sections that were only eight feet long.
- The construction of the pipe consisted of two layers of glass fabric on each face of a half-inch-thick 3D fabric. This resulted in a nominal wall thickness of 0.7 inches. In order to maximize the flow through the pipe, the internal diameter of the pipe was selected as 20 inches.
- To connect the pipe segments, a slightly larger diameter StifPipe of the same construction was built.
- The completed eight-foot-long pieces of the pipe weighing about 50 pounds each. The lightweight StifPipe segments were easily lifted by hand and assembled together.
- The finished segments were manually pushed into the pipe. The annular space around the liner was filled with grout.

8-ft Fiber Glass (Centrifugally Cast) Sewer Rehab for DC Water.

- The host pipe surface was cleaned and lightly abraded. A dam and pump were provided to internally bypass the flow creating a dry area over the 22-ft length of the pipe to be repaired.
- 50-inch wide bands of biaxial carbon fabric saturated with epoxy resin in overlapping rings around the entire circumference of the pipe were applied. Each band was 36-ft long, so it started at 3 o'clock position and after a full circle, it ended at the 9 o'clock position.
- 6 bands as described above with an overlap of approximately 6 inches in the direction of the flow were installed. This covered the 20-ft damaged pipe as well as a length of approximately 1-ft into each of the adjacent pipe sections.
- All overlapping joints were properly sealed.
- The system was cured undisturbed in ambient temperature for 24 hours.

New Jersey 66” RCP Storm Drain Repair With StifPipe®



- StifPipe® was used to retrofit a 66" reinforced concrete pipe (RCP) installed internally with the wet-layup installation method in 4 days.
- The standalone design was for retrofitting a damaged section of the host RCP. The StifPipe® used for this project was comprised of 3 layers of FRP and 1 layer of 3D core fabric.
- StifPipe® was installed by Spiniello with supervision from QuakeWrap®. A dual glass fiber layer served as an impervious barrier to stop the leakage of the pipe.
- QuakeWrap® fiber reinforced polymer (FRP) systems are designed for a minimum of 50-year service life without any failure or compromise in the level of service of the system.

Texas CRMWA Emergency Fully Structural Repair of Raw Water Pipeline With StifPipe®

- StifPipe® was installed to retrofit a 72” diameter x 10’ long concrete pipe internally with a wet-layup construction method in a couple of days.
- The standalone design was for retrofitting a deteriorated section of the host concrete pipe. The StifPipe® used for this project consisted of 3 layers of FRP and 1 layer of core mat fabric.
- StifPipe® was installed by FRP with supervision from QuakeWrap .
- QuakeWrap® fiber reinforced polymer (FRP) systems are designed for a minimum of 50-year service life without any failure or compromise in the level of service of the system.

48-inch Culvert Rehabilitation for Salt Lake City

- Debris was cleaned and removed at the inside of the culvert.
- #4 wire was installed where added concrete was 4” thick. All culvert section discontinuities were corrected by pouring concrete at these locations and a finished 3:1 slope was made, as well as a smooth finish was provided.
- The corners of the reinforced concrete box (RCB) section and bottom of masonry section were chamfered to a 6” radius.
- Patching work and the FRP installation were performed along the entire length of the culvert per design drawings.