

PROJECT OVERVIEW

In early 2013, Henrico County, Virginia, identified a 120-linear foot section of 66-inch steel culvert running under Byrdhill Road in need of structural repair. The pipe was approximately 25 feet under the road and was suffering from severe rust and corrosion that is common in metal pipes over 25 years old. While the pipe was still structurally sound, the county was concerned about long-term life, so it took preventative measures to create a new structural pipe that would meet the water conveyance needs for decades to come.

SOLUTION

In May 2013, the county specified that it would use a cementitious liner for the repair of the culvert. The key requirements for the liner were that it be fiber-reinforced polymer, shrinkage-compensated and abrasion-resistant. Additionally, the county required that a one-half to three-inch thickness was achieved in a single application pass with a centrifugally applied process.

The contract was awarded to Inland Pipe Rehab, LLC to install the GeoSpray system, which met all of the material and structural requirements for the job. A certified engineer developed a structural repair design for the pipe that created a new geopolymer pipe inside the existing structure with a wall thickness of between one and a half and two inches.

The culvert was located beneath a severely curved section of Byrdhill Road. Due to heavy traffic in the area and the resulting safety concerns for the motorists and the workers, the small equipment footprint required to apply GeoSpray geopolymer was a major advantage. All the equipment could be located in the easement out of the way of traffic, which caused no disruption to the community.

In advance of lining, the county had installed a second 15-inch diameter pipe under the road to be used for bypass. This resulted in a short window for the contractor to time the installation around a potential weather event that could exceed the bypass capability. The project was completed during a three day period in November 2013. The contractor pressure-washed the length of the pipe to remove loose debris, rust and other materials. Missing sections of metal were hand-repaired, and any associated infiltration was mitigated with quick-setting plug material. Then, in a single application, the pipe was lined with GeoSpray to the engineered design thickness.

As a final clean-up measure, exposed areas of the exterior pipe were also coated with GeoSpray geopolymer to prevent further deterioration and present a homogenous appearance.

PROJECT DETAILS

Application: Culvert Lining

Client: Henrico County
Department of Special Services

Location: Byrdhill Rd; Henrico,
VA

Installation: November 2013

Contractor: Inland Pipe Rehab



Completed culvert lining with GeoSpray mortar.



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RESULTS

The new liner was installed in less than three days, on budget and to the satisfaction of the asset owner. The Virginia Department of Transportation (VDOT) also observed the project as its test project for the state. The GeoSpray lining allowed for the creation of a new monolithic structural pipe inside of the existing steel structure, thus resolving the issue. GeoSpray geopolymer is now an approved product by the VDOT.



View of the existing pipe outlet.



External view of the completed downstream outlet rehabilitation.



Upstream view of the completed repair.