

## NEW HAMPSHIRE DOT STORM PIPE REHABILITATION USING GEOPOLYMER LINING SYSTEM

### Snapshot

**Project:** New Hampshire DOT - Culvert Slipline Rehabilitation NH-114 Over Bowman Brook

**Location:** Bedford, NH

**Problem:** Damaged and deteriorated CMP installed beneath major roadway  
> 90" diameter  
> 210 ft.

**Solution:**  
The Quadex Lining System® featuring GeoKrete® geopolymer

**Timeframe:**  
1 week, October 2018

**Owner:** New Hampshire Department of Transportation (NHDOT)

**NHDOT - Highway Design Specialty**

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### STRUCTURAL REHABILITATION OF CORRUGATED METAL STORM PIPE USING QLS SPIN-CAST GEOKRETE PIPE LINING SYSTEM

#### SITUATION

A CMP storm culvert, installed by the New Hampshire DOT decades ago, had seen better days. Due to its age, the structural integrity of a 210 LF of 90" corrugated metal storm pipe had been compromised. There was so much corrosion, the invert had completely degraded and was missing; causing the culvert pipe to depress and take on more of an elliptical shape from the original 90" round shape. Complicating the issue was the discovery of missing pipe sections... again due to years of use and corrosion build-up over time. Left unrepaired, the roadway above would begin to sink and potentially lead to a collapse of the pipe and roadway.

#### SOLUTION

After assessing the condition of the failing CMP, two solutions were discussed. One, the old pipe could be slip-lined, a tried and true method, but would require extensive use of grout to fill the annular space, or two, it could be fully structurally rehabilitated using a spray applied geopolymer or cementitious lining process.

Ultimately, slip-lining was ruled out for a couple of critical reasons. First, a key downside to this process is the smaller diameter pipe used for slip-lining reduces flow capacity. Second, the site's restricted access was not well-suited for the space needed for slip-lining equipment.



*Compromised 90" Corrugated Metal Pipe*



*CMP Restored Using The Quadex Lining System*



Compared to Baseline for  
Trenchless Repair Systems for  
Structural Rehabilitation of  
Civil Infrastructure



Given the full structural restoration capability of the geopolymer lining process, along with its ability to work in confined areas; the general contractor selected the Quadex Lining System®. Critical to this selection was that QLS materials, equipment and personnel deliver a completely turnkey solution from a single source supplier. QLS crews are highly experienced in working with the material and operating the machinery. Since it all comes from the same company, typical issues between the product manufacturer and the contractor do not exist, as they are one in the same. In addition to this advantage, Quadex staff engineers and technical support help ensure a quality and consistent application from initial design to completion.

### THE QLS PROCESS

On this project, a bypass system was required to divert the brook and stormwater flow. Once operational, the culvert was cleaned, debris was removed and extensive invert repairs were made. In addition, the portions of missing pipe (at 3 o'clock and 9 o'clock) were also repaired. Typically a reinforcing mesh or grate, combined with hand-troweled GeoKrete®, fill these voids prior to the pipe relining. Once done, GeoKrete was precision spin-cast to a 2" thickness design. The completed project met all objectives and requirements set prior to repair and was the first approved and completed GeoKrete geopolymer lining installation with the New Hampshire Department of Transportation.



*NHDOT culvert required significant reinforcement as part of the entire rehab process.*



*Post installation inspection of the GeoKrete lined culvert shows precision and cleanliness of the application.*



*Previous attempts to reline the corroded invert had failed.*