CASE STUDY

FEATURING

GeoKrete® BY VORTEX

PROJECT SNAPSHOT

Project
- Madison-Riverside Drop Manhole Modification and Rehabilitation Project

Problem
- A 129′ deep brick manhole constructed in 1912, along with a 350′ brick culvert built in 1915, had reached the end of their useful lives and in a state of deterioration.

Owner
- City of Lakewood, OH

Dimensions
- Brick Manhole: 129′ deep and ranging from 4′ to 8′ in diameter
- Brick Culvert: Egg-shaped 78″ H x 66″ W, 350′ in length

Project Challenges
- Shear depth of the manhole would present its own problems
- Removal of 15 large baffles built into the manhole structure
- Culvert entrance at the bottom slope with 60 degree incline making access difficult

Solution
- The Quadex Lining System® featuring GeoKrete® geopolymer
- Job required varying thicknesses ranging from 1″ to 3″ to provide a fully structural renewal system and eliminate I&I pressure build up.

Contractor
- Marra Services, Inc

Sub-Contractor
- Quadex Lining Systems®

Engineering Firm
- AECOM (Cleveland, OH)

Completed
- April 2018. Took 23 working days, with some delays related to severe late spring weather that included heavy rain and snow.

CERTIFIED REDUCED CARBON FOOTPRINT

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

VORTEX

129′ DEEP MANHOLE AND 350′ LONG EGG SHAPED OUTFALL PRESENTED SEVERAL CHALLENGES

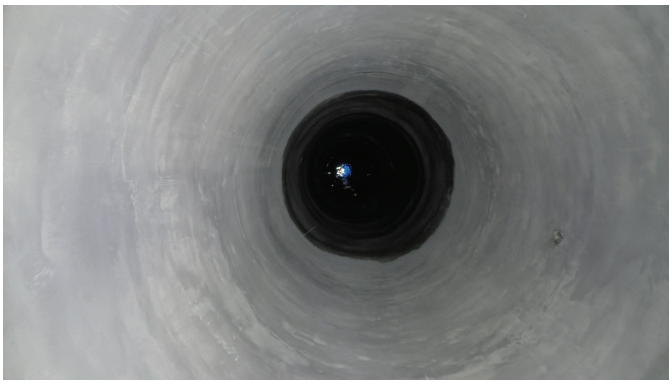
Superior Performance Properties of GeoKrete® Geopolymer Structurally Restores and Protects 100+ Year-Old Sewer

SITUATION

In the Lakewood suburb of Cleveland, Ohio, a 125′ brick manhole and 350′ long culvert system constructed between 1912 and 1915, had seen better days. Located along the West Branch Rocky River, at a t-section where Madison Avenue ends at Riverside Drive, it was time to repair these sewer sections.

The passage of time and the ever-present flow of roadway salt had caused severe corrosion to the manhole baffles and the intrusion of groundwater. The owner was also concerned

Mutiple baffles had to be removed prior to rehabilitating the noticably cracked 125′ deep manhole.



Manhole after QLS GeoKrete lined.

SITUATION (CONTINUED)

about the system's overall structural integrity. However, there was no simple solution for repair.

The manhole's original construction was impressive, not only in depth, but diameter as well. It expanded from 4′ to 8′ in diameter from top to bottom. In addition to the manhole, it was decided to rehab the egg-shaped brick culvert at the same time.

SOLUTION

Given the age and degraded condition of the manhole, the Quadex Lining System®, featuring GeoKrete geopolymer, was chosen for its excellent performance, handling and application characteristics. The Quadex Lining System and the sophisticated Geokrete Geopolymer mortar application process was able to address several critical and challenging issues: Extreme manhole depth, the gradual increase of I&I, and ability to start and stop the application with no adverse affects.

CHALLENGES DURING THE PROJECT

In addition to standard prep, which included pressure washing and patching of cracks and gaps, 15 crumbling concrete baffles built into the walls of the deep manhole had to be removed. The large voids created by their removal also had to be reinforced and filled. To accomplish this, a two-man crew was lowered into the manhole in a basket operated by a crane. This same procedure was used to apply the GeoKrete during the application process.

MINIMAL SURFACE DISRUPTION DURING REPAIR

Given all the activity, the QLS process only requires a small construction footprint. The roads meeting at the t-section remained open throughout the duration of the project.

RESULTS

From cleaning and prep to post-installation inspection, the project took only 23 working days to complete the 125′ manhole structure and 350′ long, 78″ H x 66″ W brick culvert. By using the GeoKrete geopolymer, both sections were fully restored to full structural integrity and will provide another 50+ years of service. The thickness of the applied GeoKrete throughout the structure and was based on the original assessment.

It should be noted that due to the depth and I&I present in the manhole, the QLS in-house engineering team used sophisticated engineering and finite element design methods to ensure the success of this project.

15 concrete baffles, like this damaged one shown, had to be removed from the manhole.

GeoKrete creates a new corrosion resistant and fully structural lining.

Before: Egg shaped brick outfall.

After: Oufall lined with QLS GeoKrete.

Before: Total restoration was required to bring the sewer back to original operating conditions.

After: Manhole completely restored and fully structural with QLS GeoKrete.