

CASE STUDY



PROJECT SNAPSHOT

PROJECT

University of Pittsburgh –
5th Avenue Steam Tunnel
Rehabilitation (Pittsburgh, PA)

SCOPE

94 LF of 84-inch steel plated tunnel

OWNER

University of Pittsburgh

SOLUTION

Spray apply QLS GeoKrete®
Geopolymer for full circumference
lining after floor was raised and leveled
by Quad-Flow.

ENGINEER

CJL Engineering

CONTRACTOR

Wayne Crouse, Inc.

CONTACT

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TIMEFRAME

June 2019

Corroded Steel Plate Tunnel, Buried in Front of the Cathedral of Learning, Structurally Restored Via Innovative Trenchless Solution

50 YEAR-OLD, DETERIORATED STEAM TUNNEL ON UNIVERSITY OF PITTSBURGH CAMPUS STRUCTURALLY REHABILITATED WITH GEOKRETE® GEOPOLYMER

VORTEX PRODUCTS USED

GeoKrete®
 Quad-Flow



THE CHALLENGE

Located below and in front of the University of Pittsburgh's prestigious Cathedral of Learning, a 50 year-old steam tunnel serving the campus's utilities was in dire condition. The 84-inch diameter, 94-foot long steel plate tunnel was extremely deteriorated and corroded.

As opposed to direct burying steam, chilled water, electrical utilities, district energy systems across the country often create tunnel systems to carry these utilities through. This is done for ease of access and maintenance. Adding to the urgency of its repair was the location of the tunnel which was directly beneath the university's most high-profile building on campus. Any repair or restoration would need to be completed with minimal disruption and no excavation.



Condition of steam tunnel proper to QLS GeoKrete® installation.

THE SOLUTION

Given the the condition and location of the tunnel, University officials sought the services of CJL Engineering to identify the best possible rehabilitation solution. Early considerations for this project included both CIPP and an epoxy coating system. However the expanded footprint and excavation needed for CIPP ruled out this approach. The epoxy coating system, while offering a small footprint, was not a fully structural solution and exceeded budget. Seeking a better solution, CJL was put in touch with the Vortex Companies to discuss a Geopolymer lining solution to address the problem.



After the steam tunnel is lined with GeoKrete and floor leveled with Quad-Flow.



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The Vortex Companies recommended its Quadex Lining System® (QLS), powered by GeoKrete geopolymer, which has proven to be an extremely versatile application process for structurally restoring large pipes and odd-shaped infrastructure. A key advantage of QLS is its ability to spin, spray or trowel apply GeoKrete®. For this project, a fully structural, monolithic and leak-free lining was required, which is exactly what GeoKrete delivers. Impressed with the technology and its proven performance history, CJL and University officials sole specified the QLS system for the project.

THE PROCESS

Since the repair took place next to the University's most heavily trafficked venue, the Cathedral of Learning, Wayne Crouse and QLS construction crews needed to be timely and in sync.

Prior to the lining process, all piping and brackets needed to be removed. It was also determined that the invert of the pipe needed to be raised 1.5" and then leveled to a flat surface bottom to make it safer for maintenance crews to walk through the tunnel in the future.

To achieve this, the QLS crew recommended Quadex Quad-Flow for its high-build, self leveling properties. Once the floor was cured, Wayne Crouse was ready to install the supports for brackets and piping. QLS then lined around these supports, allowing them to follow with bracket and piping installation.

THE RESULTS

Truly a collaborative effort, all parties worked together to achieve the desired results: A fully structural restoration, using a monolithic liner to eliminate all possibilities for future leaks and corrosion. Finally, it was completed by trenchless means, allowing the University to keep the Cathedral of Learning open throughout the entire process.



Condition of the tunnel and placement of the conduit prior to removal and rehabilitation.



Severe corrosion threatened the structural integrity of the old steam pipe.



The old piping and conduit was removed prior to relining the tunnel with QLS GeoKrete.



The original rounded floor of the steam tunnel was not only slippery, it was difficult for maintenance crews to gain purchase.



After 1.5" of QLS GeoKrete was spray-applied to structurally renew the deteriorating steam tunnel.