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## CASE PROFILE

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

**CORRODED STEEL PLATE TUNNEL, BURIED IN FRONT OF THE CATHEDRAL OF LEARNING, STRUCTURALLY RESTORED VIA INNOVATIVE TRENCHLESS SOLUTION**

#### SITUATION

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.

#### SEVERAL SOLUTIONS CONSIDERED

Given the the condition and location of the tunnel, University officials sought the services of Vortex to identify the best possible rehabilitation solution. Early project included both Cured-In-Place Pipe (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. Ultimately, Vortex recommended their proprietary Geopolymer lining solution to address the problem.



*Condition of steam tunnel proper to QLS/GeoKrete® installation.*



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



#### 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.

##### TIMING:

June 2019

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Vortex recommended its Quadex Lining System®, 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 VORTEX INSTALLATION CREW , AWARE OF THE HIGH PROFILE VENUE, ENSURED THE INSTALLATION WENT SMOOTHLY, WITH MINIMAL SURFACE DISRUPTION

Since the repair took place next to the University's most heavily trafficked venue, the Cathedral of Learning, crew needed to be proficient, clean and safe.

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 is safer for maintenance crews to walk through the tunnel in the future.

To achieve this, Vortex engineers recommended Quadex Quad- Flow for its high-build, self leveling properties. Once the floor was cured, the piping and bracket supports were installed. The crew then lined around these supports, while a second crew followed with bracket and piping installation.

### RESULTS

Truly a unique project, the Vortex team achieved 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.*



*Note the small construction footprint of the QLS system.*



*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.*