



**Infrastructure Innovators Since 1994**

**QuakeWrap, Inc.**

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## **PROJECT PROFILE**

### **Emergency PCCP Repair for the City of Baltimore**

**Repair System:** QuakeWrap CFRP technology applied for 48-in. PCCP

**Owner:** City of Baltimore

**FRP Installer:** FRP Construction

**Pipe Repair Design and Materials:** QuakeWrap, Inc.

**Consulting Engineers:** EBA Engineering, Inc., Arcadis.

**Location:** Baltimore, Maryland

#### **Project Synopsis:**

- A breach on a 48-in. prestressed concrete cylinder pipe (PCCP) on the north side of Baltimore (near I-83 / Jones Fall Pkwy) shut down water service, thereby causing a temporary outage for a large population. In addition to the disruption to water service, the situation was costing the City of Baltimore significant amount of money in bypassing and recovery efforts. QuakeWrap was contacted by project engineers from Arcadis and EBA Engineering for an emergency repair solution.
- A 5-layer carbon fiber reinforced polymer (CFRP) lining system was proposed by the QuakeWrap engineers. The design complied with the AWWA C305 standard on PCCP repair with CFRP. The CFRP lining system used is NSF 61 certified for potable water applications. A 20-mil, clear color top-coat was applied to reduce any abrasive effects and elongate service life without any maintenance.
- The CFRP end terminations were performed with steel compression seals that were embedded at joints. The proposed solution was received well by the project engineers with consultants and owner.
- The breach resulted in a hole that was about a foot wide. A custom-design steel plate with a curvature met the original steel cylinder was welded first to patch the hole by the general contractor, R.E. Harrington. Then the 5-layer CFRP liner was installed by QuakeWrap's construction arm, FRP Construction.
- This project was completed with success within a couple of weeks after the design was complete. The strong collaboration among the City of Baltimore/Department of Public Works, EBA Engineering, Arcadis, R.E. Harrington, QuakeWrap, and FRP Construction resulted in a smooth planning, design, and execution in a short-time frame without any issues encountered in the field.



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Blow hole on the pipe



Interior of the pipe before CFRP lining



Interior of the pipe after CFRP lining