

Case Study: Repairing damaged manhole cover using QuakeWrap FRP

District of Columbia Water and Sewer Authority contracted QuakeWrap and FRP Construction to strengthen one of their manholes to withstand a backflow event. QuakeWrap engineers designed a retrofit plan increasing the manhole's tensile strength utilizing a combination of carbon and glass Fiber Reinforced Polymer (FRP).

Scope

To accomplish this repair, specialty installers FRP Construction first exposed the foundation of the manhole (Fig. 1).



Fig. 1 Exposure of manhole for surface prep.







Next, the foundation and manhole were cleaned for installation of grout slope (Fig. 2).

Fig. 2 Foundation cleaned.





High-strength, non-shrink grout was placed around the perimeter of the manhole sloping towards the top (Fig. 3).

Fig. 3 Placement of High-Strength Non-Shrink Grout





All exposed concrete was surface prepared for installation of FRP. The manhole was wrapped in containment plastic to protect it from epoxy (Fig. 4).



Fig. 4 Placement of Carbon FRP





Glass fiber was then placed over the top of the carbon fiber anchors (Fig. 5).



Fig. 5 Placement of Glass FRP



FRP CONSTRUCTION, LLC • 6840 S. Tucson Blvd. •Tucson, AZ •85756 (520) 861-3331 www.FRPConstruction.com



Carbon FRP was then placed over the top of the glass for tensile strengthening purposes (Fig. 6).



Fig. 6 Placement of Carbon FRP Over Glass FRP

FRP CONSTRUCTION, LLC • 6840 S. Tucson Blvd. •Tucson, AZ •85756 (520) 861-3331 www.FRPConstruction.com







Seams of fabric were covered in thickened epoxy for protection of FRP installation (Fig. 7).

Fig. 7 All FRP installation areas and thickened epoxy were coated for final concrete gray finish.







Fig. 8. Coating of Final Installation

