DC Water National Arboretum Aerial Sewer Crossing Renewal

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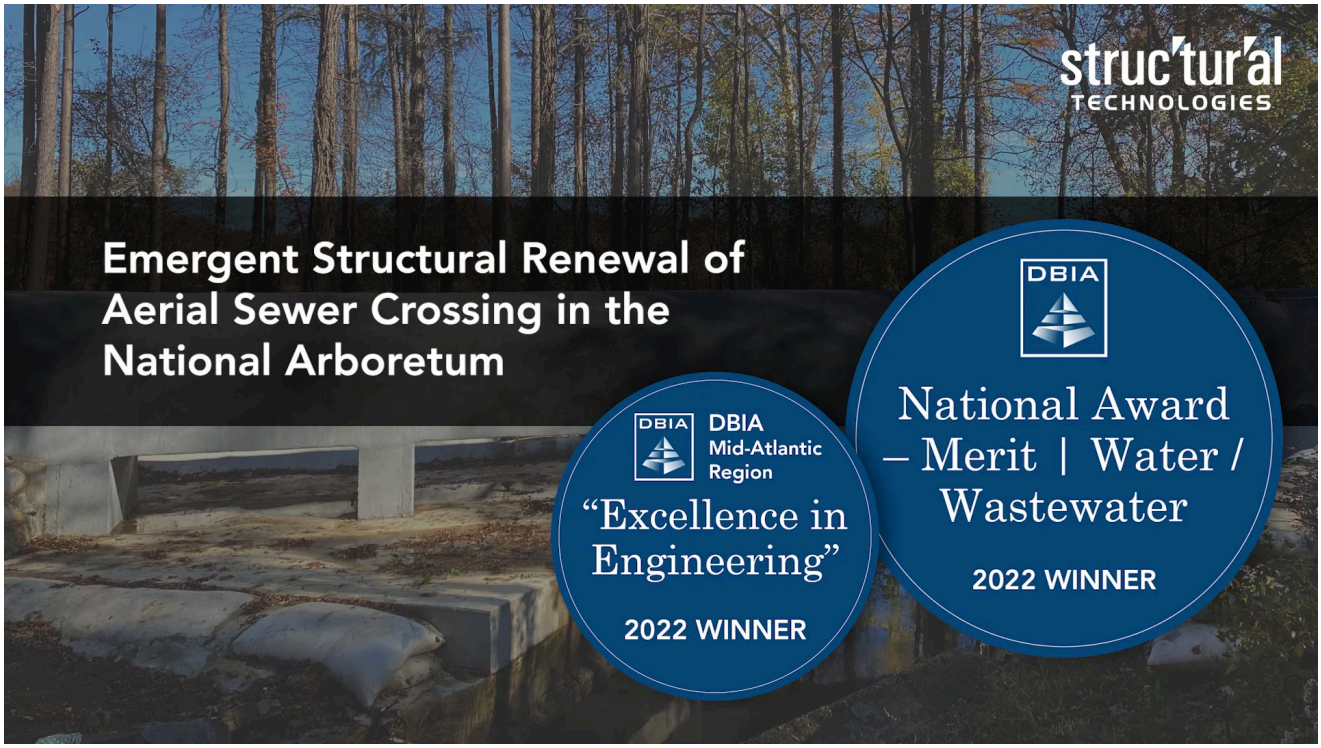

Project Overview

- Emergency design-build repair of aerial sewer crossing impacted by record-breaking flooding events/erosion
- In-situ rehabilitation of approximately 58 LF of aerial sewer crossing
- Application of StrongPIPE® V-WrapTM Carbon and Glass Fiber Systems on the exterior of the aerial sewer

In the National Arboretum in Washington, D.C., an aerial sewer crossing over Hickey Run was significantly impacted by record-setting flooding and erosion. The 51-in diameter Eastside Interceptor encased in concrete measures 6-ft 3-in by 6ft 2-in with a 58-ft span. Inspections revealed spalled concrete at the upstream abutment and that the foundation had become compromised. Along the embankment, crews discovered an eroded void beneath the footer and the exposed backside that had been subject to severe weather events and record-high creek levels.

DC Water sought an emergency design-build repair in lieu of planned CIP to restore capacity, extend the life of this asset and protect against future degradation. The Department of Energy and Environment of DC approved a “permitting later and urgent repair first”.

The design-build approach led by DC Water brought together the project team to collaboratively develop a multi-faceted solution for the renewal of the pipe encasement and five piers. The in-situ rehabilitation consisted of 58 LF of the aerial sewer crossing and critical support structure.

The team installed emergency shoring prior to constructing access roads and implementing repairs. The project involved extensive coordination to ensure minimal disruption to the Arboretum, protection of native trees as well as avoiding contamination of Hickey Run. As such, the design-build team developed a repair plan to avoid contact with the creek. Crews worked outside the creek bed, used scaffolding to span the width of the creek, strengthened piers outside of the creek, and isolated the work area to prevent debris and contaminants from interfering with the environment.

Micropiles were augured into the ground and cored into the existing concrete to stabilize the foundation and tied into the newly placed concrete enlargement for the foundation. To provide support for the addition of new piers, a 20-inch-thick foundation was placed on the north and south side of the crossing.
The top and bottom mats at the two foundations consisted of approximately 8,000LF of

rebar. Five new concrete pier-on-piles replaced in-situ piers. New stand-alone piers were installed adjacent to the stream and designed to support the load of the existing piers should they deteriorate.

The team also inspected the pipeline encasement and prepared the surface for 675 SF of concrete repair. STRUCTURAL TECHNOLOGIES designed and supplied an innovative strengthening system to minimize enlarging the pipeline while increasing its capacity to span the creek. The StrongPIPE® V-Wrap™ fiber-reinforced polymer (FRP) system was chosen for the repair for its ability to rapidly restore capacity and prevent future structural distress. The team installed 200 SF of the lining system on the pipeline encasement to address bending moment and strengthen the unsupported span over the creek. In addition, two layers of Glass Fiber Reinforced Polymer (GFRP) were installed along with a UV stable topcoat for durability and to protect against future corrosion. Lastly, grout bags were installed on the banks to prevent erosion.

The design-build approach allowed for team synergy throughout the project lifecycle. It also allowed for the team to quickly react to and overcome changed field conditions like modifying the design layout to relocate a micropile that would have conflicted with trees and the embankment without schedule delays.

The project was completed per the Owner's schedule, delivered under budget, and with zero safety incidents in the environmentally sensitive area. Together the design-build team was able to analyze the extent of structural damage to the crossing and collaborate to develop turnkey strategies to restore and extend the life of this critical wastewater asset.

PROJECT INFO

- **Owner:** DC Water
- **Location:** Washington DC
- **Contractor:** STRUCTURAL
- **Subcontractor:** STRUCTURAL TECHNOLOGIES

SOLUTIONS

StrongPIPE® V-Wrap™ Carbon Fiber

AWARDS

- **Excellence in Engineering** | DBIA Mid-Atlantic Region, 2022
- **National Award – Merit, Water/Wastewater** | DBIA, 2022

The aerial sewer crossing was significantly impacted by surge flow and required an emergency design-build repair

Emergency shoring was installed prior to access road construction and repairs.

Twenty-six micropiles were installed to stabilize the foundation and were tied into the newly placed concrete enlargement of the foundation.

Crews installed StrongPIPE® V-WrapTM Carbon and Glass Fiber Systems on the exterior of the aerial sewer.

Completed in-situ rehabilitation of 58 LF of the aerial sewer crossing and critical support structure.