



CHALLENGE

THE MCARDLE VIADUCTS, A HISTORIC FEATURE IN PITTSBURGH, WERE IN NEED OF AESTHETIC AND STRUCTURAL UPGRADES AFTER BEING RATED STRUCTURALLY DEFICIENT.

SERVICES

- Civil Engineering
- Environmental Engineering
- Geotechnical Coordination
- Right of Way
- Structural Engineering
- Structural Inspection
- Survey

MCARDLE VIADUCTS

Pittsburgh Public Works spent \$7 million replacing McArdle's Viaduct No. 1 in what was the city's largest road or bridge project in 2011. The project cost was

shared by the Federal Highway Administration (80%), Pennsylvania Department of Transportation (15%) and the City of Pittsburgh (5%).

THE HISTORY

Built in 1933, the bridge stretches over Norfolk Southern Railway tracks near Windom Street and is a gateway to the South Side for motorists coming from the Liberty Tunnel and Mt. Washington. It was rated structurally deficient.

The McArdle Viaducts are included in a Pittsburgh History and Landmarks Foundation survey of potentially important sites, structures, objects, and buildings in Allegheny County.

Viaduct No. 1 is a 541-foot-long structure consisting of eleven simple-span, multi-girder spans varying in length from 25 feet to 31 feet, and one 215-foot-long through truss span over railroad tracks.

The lower section of McArdle was closed for an extended period about seven years ago when crews replaced Viaduct No. 2, over a ravine near Arlington.

Viaduct No. 2 is a 300-foot-long structure consisting of twelve simple-span, multi-girder spans varying in length from 23 feet to 35 feet, with five tightly curved spans. Most of the spans are supported on steel bents with concrete pile foundations.

THE REHABILITATION

ms consultants provided complete consulting engineering services, including an in-depth inspection for both Viaducts 1 and 2 to determine the approach to rehabilitating these structures. This process included a general inspection, field inspection and material testing, and structural analysis. Design work for the rehabilitation included structural, roadway and traffic engineering. Final design involved reconstruction of the roadway approaches, including maintenance of alignment at the intersection with Arlington Avenue.

ms was responsible for collecting and analyzing data for development of the Categorical Exclusion Evaluation (CEE) and Preliminary Area Reconnaissance (PAR), which identifies the potential for contaminated areas. More specifically, the team collected deed information, assessed potential social impacts, located any known hazardous waste sites, conducted soil samples and developed a historical/archaeological submission for historic review at the Pennsylvania Historical and Museum Commission. The historical submission included additional coordination with a historical consultant for the development of a Historic Structures Survey, Criteria of Effects Report and a Historic American Engineering Record.

Rehabilitation of the viaducts included replacement of the superstructure and several of the steel bents. The simple-span superstructure, with the exception of the 215-foot-long through truss, was replaced with continuous girders, eliminating several existing expansion dams. The existing sidewalk was replaced, but due to the historic nature of the structure, the original pedestrian hand railing was modified and reused. New decorative light poles were designed to meet the original design. For Viaduct No. 2, the curved, variable width split deck required extensive geometric layout and challenging design details.

To verify the condition of the existing concrete piles supporting the foundations, test pits and pile integrity tests were performed. It was determined that the existing under-reinforced concrete piles supporting the steel bents and abutments were overstressed. To strengthen the substructure, rock anchors and caissons were utilized to reinforce the shear resistance of the foundations.

The viaducts are now completed and open to traffic.