The Waterfront Accessibility Project

Background
The Waterfront is a former steel mill site turned popular riverside shopping destination, located in Homestead, PA. The property is approximately 256 acres along the Monongahela River. Completed in 2009, the site generates roughly $4 million dollars per year in revenues, taking what was once a financially distressed area out of municipal bankruptcy. However, accessibility to the site is limited due to the multiple active railroad tracks which separate the development from the surrounding Homestead Area.

Transportation
Fifth By Forbes Consulting completed a detailed analysis of existing traffic conditions utilizing recent market and traffic studies to determine the probable impacts from this new Waterfront access. Site constraints necessitated the design of a unique curved bridge, as well as two signalized intersections, and construction of an additional Sandcastle Extension right-of-way.

Proposed Design Advantages
- Increase safety of W 8th Ave. intersection
- Improve Waterfront and Sandcastle access
- Alleviate Homestead congestion
- Decrease speedings (increase safety)
- Alternative truck delivery route
- Better access for emergency personnel

Structural
A preliminary design for a curved girder bridge was completed by the structures team. The geometry of the bridge was determined, and a complete 3-D analysis was performed using LEAP Bridge Steel, a bridge design software. The bridge spans the five railroad tracks as it curves, then slopes down to grade where it joins Sandcastle Drive.

Bridge Specs
- Two 12 foot travel lanes
- Two 6 foot shoulders
- Curve Radius: 900 feet
- Total Length: 945 feet
- Seven spans
- Six hammerhead piers
- Two abutments

Girder Dimensions
- Four steel plate girders
- Top Flange Thickness: 1.25"
- Top Flange Width: 26"
- Web Thickness: 0.625"
- Web Depth: 72"
- Bottom Flange Thickness: 1.25"
- Bottom Flange Width: 26"

Geotechnical
Our bridge will utilize a foundation similar to the one depicted below. This design will occur at every pier location.
- Steel H-Piles will be used
  - HP 12 x 74
  - Pile Capacity of 381 kips/pile
- Piles will be driven into the bedrock about 70 ft below the superstructure
- Will only support the vertical loads
- Battered piers will also be used to support horizontal loads
- Pile capacity of 92 kips/pile

Using a program called GRLWEAP, it was determined that an APE D12-42 hammer will be the most efficient option for driving piles.

Project Scope
Site: West Homestead, PA
Project Estimate: $8 Million
Project Duration: 2 years

Design Deliverables:
- Accessibility Alternative Analysis
- Horizontal and Vertical Bridge Alignment
- Complete Intersection Analysis
- Full Signal Warrant Analysis
- Curved Steel Plate Girder Bridge Design
- Bridge concrete Deck Design
- Hammerhead Pier Design
- Preliminary Design Schedule
- Preliminary Design Estimate

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Project Overview
The overall goal of the project was to find an efficient and sensible way for the communities surrounding the Waterfront to have better access to the popular development. More accessibility means more citizens visiting and a continued increase in economic growth within the Waterfront & surrounding communities. Through a rigorous alternative analysis, Fifth by Forbes was able to select a plan to design a “West Flyover Bridge” that would increase access, as well as bypass the restrictive railroads in the area.