

## Putting the Support in “Support of Excavation”

The North Shore Tunnel Connector project is a light-rail train (LRT) expansion for Port Authority of Allegheny County. The proposed extension runs from downtown Pittsburgh, Pennsylvania, and under the Allegheny River to the north shore of the river where the Heinz Field and PNC Park sport complexes are located. The river crossing portion requires a Tunnel Boring Machine (TBM), but many other sections demand serious excavation. North Shore Constructors JV turned to Skyline Steel for structural steel solutions for support of excavation.

*Pictured on right: Corner bracing for excavated receiving pit*



24-inch wide flange beams arriving at the site near Heinz Field



Vertical and cross bracing beams supplied by Skyline Steel for support of excavation



Spiralweld pipe struts support the internal section of wall

### Problem

Although this project was a tunnel boring operation, support of excavation was required for the receiving pit and terminal locations. Material availability and limited staging areas were among the site concerns for general contractor North Shore Constructors JV. Once excavated, the temporary shoring systems had to be braced to limit deflection for control of soil movement and to provide a safe, open work environment.

### Solution

Designer DMJM Harris explored multiple shoring systems. Based on site conditions, water table, and depth of excavation, a combination of beam and lagging and soil mixing was incorporated throughout the site. The structural backbone for all these methods was steel.

Described as a cement/slurry cast-in-place wall, 24-inch wide flange beams spaced 4 feet on center provided critical support for the soil mixing columns. There may have been multiple beams for the shoring

support and waler details, but the bracing material would take a different shape. Steel beams are excellent vertical elements, but their shape is susceptible to buckling over horizontal spans under compressive loads. Vertical and cross supports would be required, thus making the excavation process more costly.

Steel pipe derives an inherent mechanical strength from its shape, offering better compressive load capacity while resisting lateral buckling for longer spans. DMJM Harris and North Shore Constructors JV recognized this and specified spiralweld pipe for the bracing.

In addition to the wide flange sections provided for the soldier pile, secant pile, and waler applications, Skyline Steel supplied quality 24-inch and 30-inch diameter spiralweld pipe.

### Result

With a high-profile transportation project in the heart of downtown

Pittsburgh, North Shore Constructors JV partnered with Skyline Steel for supply of angles, channels, wide flange, H-beams, and spiralweld pipe. Our mill partnerships, stocking facilities, pipe production, and fabrication capabilities allowed Skyline to deliver an all-inclusive material package like no one else. This proved invaluable to North Shore Constructors JV as they kept their foundation contractor on pace with a constant flow of steel for a very aggressive schedule.

### Project Details

#### Material:

- 1600 tons of wide flange beams ranging from 24 x 131 to 36 x 302
- 341 tons of 24-inch to 30-inch spiralweld pipe struts

#### Owner:

Port Authority of Allegheny County

#### General Contractor:

North Shore Constructors JV

#### Designer:

DMJM Harris