

5th Avenue Bridge Reconstruction

Bay Ridge, Brooklyn, NY

HISTORY

Originally constructed in 1915, the 5th Avenue Bridge has long served as a critical transportation link in Brooklyn, connecting neighborhoods while spanning both the Long Island Railroad (LIRR) and the Sea Beach (N) Line. As a key component of New York City's infrastructure network, the bridge has supported more than a century of vehicular and pedestrian traffic.

The structure last underwent major reconstruction in 1962. Over the decades that followed, increasing traffic demands, evolving design standards, and natural material degradation placed growing strain on the aging bridge. Situated beneath the Gowanus Expressway (I-278), with only 19 feet of clearance in some areas, the bridge's location further complicated long-term maintenance and upgrades.

PROBLEM

Recognizing the need for a modern, resilient solution, the New York City Department of Transportation (NYCDOT), in partnership with AECOM, initiated a full reconstruction of the bridge in its existing footprint. John Civetta & Sons was selected as the general contractor, with Underpinning and Foundation Skanska leading the deep foundation work.

Reconstructing the 5th Avenue Bridge presented a highly complex set of engineering and logistical challenges including severely limited headroom, active rail constraints, restricted access, dense urban infrastructure, variable subsurface conditions, and the need to keep the traffic at a continuous flow.

Foundation installation had to occur beneath the existing bridge deck, with working clearances as low as 12 feet, with the maximum



clearance at 24 feet. The bridge spans ten active railroad tracks, requiring uninterrupted rail operations and strict safety protocols. There was only one staging area, several blocks from the bridge site along with two-way traffic having to be maintained throughout construction. All of these challenges made the 5th Avenue Bridge a unique project.

Initial construction approaches were evaluated—including underpinning the existing abutment, gravity wall installation, and alternative pile types—but each introduced additional risks to adjacent structures and rail operations. The project ultimately required a solution that minimized disruption while delivering structural performance in extreme constraints.

SOLUTION

Skanska partnered with Nucor Skyline to deliver a comprehensive, integrated steel

foundation system designed to meet the project's demanding conditions while optimizing constructability and efficiency.

Nucor Skyline supplied a full suite of deep foundation solutions, including:

- **Hollow Bar Micropiles** – Installed in low-headroom conditions, eliminating the need for temporary casing extraction and enabling efficient drilling through cobbles and boulders.
- **HP16x183 Bearing Piles** – Driven to depths of 50 feet to provide structural support for the integral abutment.
- **24" x 1.0" Steel Pipe Soldier Piles** – Used for both temporary and permanent earth retention, supporting excavation and stabilizing surrounding soils.

This integrated system allowed Skanska to

CASE STUDY

5th Avenue Bridge Reconstruction



PROJECT PARTNERS

Owner

New York Department of Transportation

General Contractor

John Civetta & Sons – Bronx, NY

Foundation Contractor

Underpinning and Foundation Skanska – New York, NY

Designer

AECOM – Dallas, TX

Construction Manager

LiRo-Hill – Syosset, NY

PRODUCT

H-piles: HP16x183;

Drilled shafts: 24" x 1.0" 50 ksi;

Geotechnical Products:

Micropiles: T76N hollow bars (3" outer diameter, 2" inner diameter) and couplers, 8" carbide cross cut hollow bar bits, and the 12.75" diameter, 0.5" thick, 50 ksi threaded joint casing

maintain the original design intent while minimizing enabling works and protecting adjacent structures.

To address access and clearance limitations, the project team implemented specialized equipment and sequencing strategies including low-headroom drilling operations for the micropiles. These were installed in segmented lengths, enabling precise installation in confined spaces. Skanska also used two dedicated Comacchio drill rigs, increasing productivity and maintaining the schedule of hollow bar installation.

An APE 8-3 low-headroom hydraulic impact hammer mounted to a Kalmar forklift provided the mobility and power required to drive H-piles in tight conditions. These H-piles were installed in 10-ft sections with full-penetration welds, supported by a coordinated welding and driving sequence to minimize downtime.

With only one access point to the site, material staging and delivery were tightly coordinated.

All Nucor Skyline products were manufactured across multiple facilities and delivered to a nearby laydown yard for phased transport to the project site. Just-in-time delivery ensured materials were available when needed, supporting simultaneous construction phases and preventing bottlenecks. Spoil containment systems were implemented to protect active rail lines during drilling and excavation.

Through collaboration and strategic execution, the project team successfully navigated these challenges, delivering a modern foundation system designed for long-term performance.

The 5th Avenue Bridge reconstruction demonstrates how engineered steel solutions—combined with thoughtful planning—can enable complex infrastructure projects to move forward, even in the most constrained urban environments.