

Model 450 Helical Piles

Project: Crane and Furnace Equipment Foundations
Location: Aurora, Illinois
Date: January 2017

Challenge:

Additions planned for an existing manufacturing facility included a large furnace and a 30-ton crane. Each addition would require its own foundation system, separate from the existing structure's foundations. All work would have to be done within the building without interrupting daily operations on the other end of the shop.

The general soil profile anticipated in the area of the proposed work included stiff to hard lean clay and medium dense silty sand. A layer of weak organic soils was also known to exist within the anticipated profile. Deep foundations were therefore proposed to support the new equipment. Access and allowable working space would be limited inside the building.

Solution:

Helical piles were selected as the ideal deep foundation solution to support the proposed furnace and crane equipment given their ability to be installed within the confined space of the existing building using relatively small equipment. Forty-two (42) Model 450 (4.50-inch OD by 0.337-inch wall) hollow round shaft helical piles with a 10"-12"-14"-14"-14"-14" helix plate configuration were selected to support design working loads of 60 kips in compression and 30 kips in tension. The piles were installed to depths on the order of 30 feet to achieve torque-correlated ultimate capacities of at least twice the design working compression load ($FOS \geq 2$).

The engineer specified strict pile deflection criteria to avoid differential movement between the equipment and existing foundations. However, a load test was unable to be performed within the building; therefore, the helical piles were grout-filled to add rigidity and limit deflections. The connections were also welded to prevent movement in the couplers due to load reversal. The installed helical piles were fitted with custom welded new construction caps to be cast within large spread footings.

Project Summary

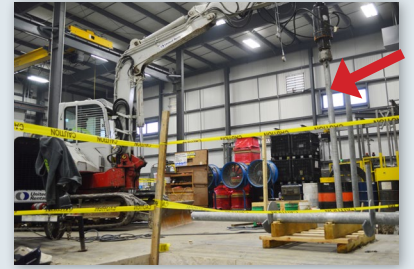
Structural Engineer: Cardinal Structural Design, Inc.

Geotechnical Engineer: Terracon Consultants, Inc.

General Contractor/Owner: Nitrex Metal, Inc.

Pile Installer: MidAmerica Basement Systems

Products Installed: (42) Supportworks® HP450 Helical Piles, 10"-12"-14"-14"-14"-14" Helix Plate Configuration, Installed Depths up to 30 feet, Design Working Loads of 60 kips (Compression) and 30 kips (Tension)



Installing HP450 helical piles with small excavator



Advancing lead section



Welding connections



New construction caps welded to installed piles to be cast in new equipment footings