

## Model 287 Helical Piles

**Project:** Admission Center Addition

**Location:** De Pere, WI

### Challenge

St. Norbert College planned a \$1,175,000 addition and renovation to their existing admission center. The new addition consisted of a 60-foot diameter rotunda to be supported on deep pile foundations and grade beams. A small area of the addition included a stairwell to connect the main floor of the rotunda to the basement level of the existing building. The bottoms of the grade beams stepped up from below the basement level to 4 feet below grade for frost protection. The geotechnical investigation included the advancement of three soil borings, with one boring located in the area of the rotunda addition. The soil profile observed at this location consisted of 5 feet of uncontrolled fill underlain by soft to medium stiff clay to approximately 20 feet. Very stiff to hard clay was then sampled from 20 to 27.5 feet over medium stiff to stiff clay. Since the boring terminated at a depth of 30 feet, the thickness of this weaker layer was not determined.

A helical test probe was performed to further characterize the thickness of the very stiff to hard clay stratum and the soil conditions below the bottom of the boring. The helical test probe identified relatively weak soils from the bottom of the test boring to a depth of at least 42 feet. The deep foundation option would therefore bear within the very stiff to hard clay from 20 to 27 feet, or likely extend to depths exceeding 42 feet.

### Solution:

Helical piles were selected as a cost effective option to support the design working load of 15 kips. The helix plate size and spacing could also be designed to bear in the very stiff to hard clay layer, and torque can be monitored during installation as a verification of capacity.

A full scale compression load test was performed to document the load to deflection characteristics prior to installation of production piles. The test pile consisted of a Model 287 (2.875-inch OD by 0.203-inch wall) helical pile with a 12"-14" double-helix lead section installed to a tip depth of 25 feet. The load test confirmed an ultimate capacity of 52 kips at a net deflection of 10 percent of the average helix diameter. Total deflection, including elastic compression, was only 0.13 inch at the design working load. Based on the successful results of the load test, the project moved forward with the installation of 28 production piles, similar in configuration, depth and installation torque as the test pile. A skid steer on rubber tracks was used to install the piles due to the wet, slick ground conditions and the congested working space. The load test and installation of the production piles were completed within 1 week.

## Project Summary

<b>Architect:</b>	C. Reiner Architects
<b>Structural Engineer:</b>	ddk Engineering
<b>Geotechnical Engineer:</b>	AECOM
<b>General Contractor:</b>	The Boldt Company
<b>Pile Installer:</b>	Foundation Supportworks of Wisconsin
<b>Products Installed:</b>	(28) Supportworks® Model 287 Helical Piles, 12"-14" Lead Section, Installed to a Depth of 25 feet, 15 kip Design Working Load



Load test arrangement



Helical piles advanced; congested working space



Piles in stepped grade beam



Pile caps tack-welded to shafts



Column rebar installed