

Model 287 Helical Piles

Project: Menard Hall Renovation
Location: Springfield, IL
Date: December 2013

Challenge:

Menard Hall on the Lincoln Land Community College campus is a two-story structure with offices, classrooms, and student dining. Renovations to the building included the repair of the first floor men's and women's restrooms. The restrooms are located within a slab-on-grade portion of the building. Cracks were observed in the CMU partition walls within the restrooms, indicating settlement of the shallow foundations.

A soil boring completed outside the building identified 7.5 feet of clay fill over medium dense silt and stiff silty clay to a depth of 21 feet, underlain by very dense sand and hard clay till to the maximum explored depth of 25 feet. New partition walls were planned with deep foundation support to bear below the fill and within competent soils.

Solution:

Helical piles were selected as the ideal deep foundation solution for this project given their ability to be installed within the confined space of the existing building using relatively small equipment. Model 287 (2.875-inch O.D. by 0.203-inch wall) hollow round shaft helical piles with an 8"-10" double-helix lead section were selected to support the design working load of 9 kips per pile. A 500 pound lateral design load at the pile heads was also specified. Finite element analysis software was used to evaluate the lateral capacity of the Model 287 shaft.

Prior to installation of the production piles, a compression load test was performed outside the building to verify pile capacity. The test pile would be accepted if the total deflection was less than one inch at 18 kips and if permanent deflection less than 0.5 inch was observed after loading was removed. The load test resulted in a total pile head deflection less than 0.6 inch at twice the design working load and less than 0.4 inch after the test.

The interior walls within the restrooms were demolished and portions of the floor slabs broken out for pile installation. Twenty (20) helical piles were installed to be cast into structural grade beams. A hand held drive unit, powered by a remote hydraulic source, was used to install the production piles to an average depth of 23 feet below grade to achieve installation torques correlating to at least twice the design working load ($FOS \geq 2$). A V-style cut on the leading edge of the 8-inch helix plate was used to help penetrate the very dense to hard bearing soils. The interior installation of all 20 production piles was completed in just four days.

Project Summary

Architect: FWAI Architects, Inc.
Structural Engineer: Allen Henderson & Associates, Inc.
Geotechnical Engineer: Professional Service Industries, Inc.
General Contractor: Evans Construction
Certified Pile Installer: Foundation Supportworks® by Woods
Products Installed: (20) Foundation Supportworks® HP287 Helical Piles, 8"-10" Lead Section, Average Installed Depth of 23 feet, Design Working Loads: 9 kips (Compression), 0.5 kip (Lateral)



Cracks observed in CMU partition walls



Compression load test



Demolition completed for pile installation



Helical piles installed with hand held equipment



Installed piles to be cut to design elevation