

Model 288 Helical Piles

Project: Smithsonian Stamp Gallery

Location: Washington, D.C.

Date: December 2012

Challenge:

A renovation at the Smithsonian's William H. Gross Stamp Gallery included the construction of a new interior elevator shaft. A single soil boring was advanced outside the building approximately 75 feet from the elevator addition. The test boring encountered loose sand fill to a depth of 20 feet, soft sandy clay to a depth of 33.5 feet, and loose to low-end medium dense sand to 75 feet. The presence of low-strength fill and marginal deep bearing soils were therefore anticipated at the proposed elevator location.

The design team recommended that the elevator be supported on helical piles. Helical piles appeared to be an ideal deep foundation solution due to the restricted access to the work area and equipment size and type limitations. Installation equipment had to cross marble tiled floors through portions of the active museum and pass through narrow hallways and standard doorways. The equipment could not create exhaust fumes within the building from combustion engines or generators. Mobilization would also occur at night when the building and museum were closed.

To supplement the limited soil boring information, a helical test probe was completed at the proposed elevator location with a compact electric excavator. A calibrated torque transducer was used in line with the drive head and the test probe to monitor torque continuously so soil strengths could be back-calculated.

Solution:

The foundation design included seventeen (17) helical piles embedded in a concrete pile cap. The helical pile configuration consisted of the Model 288 (2.875-inch OD by 0.276-inch wall) hollow round shaft with an 8"-10"-12" triple-helix lead section to support a design working compression load of 23.5 kips per pile. The piles were advanced using standard five foot extensions to depths ranging from 21.5 feet to 40 feet, and to ultimate torque-correlated soil capacities of at least twice the design working load (FOS \geq 2). Installation torque was monitored throughout the installation process using a calibrated torque transducer. The piles were installed with a specialized battery and hydraulically powered unit with a telescoping arm and outriggers for stability. The drive head was run by a remote hydraulic source outside the building. The tops of the piles were cut to the required elevation and fitted with standard new construction brackets.

Project Summary

Architect: Cho Benn Holback & Associates

Structural Engineer: Spiegel Zamecnick & Shah

Geotechnical Engineer: ECS/Hillis-Carnes

General Contractor: Clark Construction Group, LLC

Certified Pile Installers: JES Construction, Inc.

Specialized Installation Equipment: Adirondack Basement Systems

Products Installed: (17) Foundation Supportworks® HP288 Helical Piles, 8"-10"-12" Lead Sections, Installed to Depths From 21.5 to 40 feet, Design Working Load of 23.5 kips in Compression



The Smithsonian National Postal Museum



Installing HP288 lead section



Remote hydraulic source located outside the building



Monitoring torque during installation



Installed piles fitted with new construction brackets