FOUNDATION SUPPORTWORKS®

CASE STUDY Commercial

Models 288 and 350 Helical Piles

Project: Science Museum of Virginia
Location: Richmond, VA
Date: May 2013

Challenge:

The Science Museum of Virginia planned to open a new permanent exhibit called "Speed". The centerpiece of this exhibit would be a full-size SR-17 Blackbird spy plane. The 107-feet-long, 43,000-pound jet would be suspended from steel framework extending through the first floor to the basement level. The columns of the frame would be supported by deep foundations.

A subsurface investigation identified a soil profile generally consisting of very loose to medium dense clayey sand to a depth of 15 feet below the basement floor elevation, underlain by medium dense to dense sand with gravel to a depth of 28 feet, over medium dense to very loose clayey sand.

Solution:

Helical piles were selected as the ideal deep foundation solution since they could be installed quickly and easily within the confined indoor space. Concrete pile caps supporting the steel columns included three, six, eight, or ten helical piles. Thirty-five (35) Model 288 (2.875-inch OD by 0.276-inch wall) hollow round shaft helical piles with an 8"-10"-12" triple-helix plate lead section were installed to support a design working compression load of 25 kips and a design working tension load of 10 kips. Twenty-two (22) Model 350 (3.50-inch OD by 0.313-inch wall) hollow round shaft helical piles with an 8"-10"-12"-14" helix plate configuration were installed to support a design working compression load of 40 kips and a design working tension load of 20 kips. Standard extensions advanced the Model 288 piles to depths from 13 to 16 feet and the Model 350 piles to depths from 23 to 25 feet to bear the helix plates in competent material above the very loose clayey sands. The piles were installed to achieve torque-correlated ultimate capacities of at least twice the design working loads (FOS ≥ 2). Installation torque was monitored with a calibrated torque transducer. The helical piles were hot-dip galvanized for corrosion protection. The piles were fitted with standard new construction brackets and cast into the pile caps.

Project Summary

Structural Engineer: Dunbar Milby Williams Pittman & Vaughan, PLLC
Geotechnical Engineer: Draper-Aden Associates
General Contractor: Century Construction, Inc.
Certified Pile Installer: JES Construction, Inc.
Products Installed: (35) FSI HP288 Helical Piles, 8"-10"-12" Lead Sections, Design Working Loads of 25 kips (compression) and 10 kips (tension) (22) FSI HP350 Helical Piles, 8"-10"-12"-14" Lead Sections, Design Working Loads of 40 kips (compression) and 20 kips (tension); Installed Depths from 13 to 25 feet

Science Museum of Virginia


Installing helical piles within basement


Advancing helical pile


Installed piles capped and rebar placed to pour footing


Completed Exhibit