FOUNDATION SUPPORTWORKS™

CASE STUDY

Commercial

Model 350 Helical Piles

Project: Blue Cross Blue Shield Sculpture
Location: Omaha, NE
Date: March 2011

Challenge:

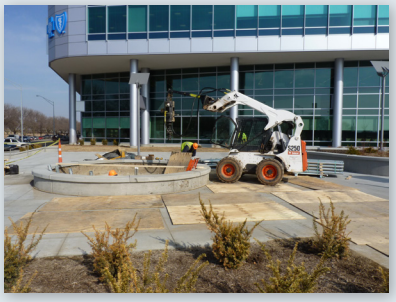
A 40-foot tall metal sculpture was planned near the main entrance of a building on the new Blue Cross Blue Shield business campus. Design of the sculpture was finalized during the last phases of the campus construction. Pavements, sidewalks and landscaping were nearly complete. As the design of the sculpture was finalized, various foundation options were considered. Two test borings completed for the adjacent building encountered 48.5 to 53 feet of soft to medium stiff lean clay and fat clay over medium dense to very dense sand to depths of 95 feet and 111.6 feet. Layers of very stiff sandy lean clay (glacial till) were also sampled in one boring below a depth of 73.5 feet. With weak clay soils near the surface, differential settlement was a concern for a mat foundation. The structure would have to be supported on a deep foundation system to penetrate the weak clay soils and bear within the competent sands below. However, large pile installation equipment could not access the planned sculpture location without risk of damage to the existing pavements and sidewalks. Auger-cast piles, driven piles and drilled shafts would also be expensive options considering the mobilization costs and the limited number of piles required for the project.

Solution:

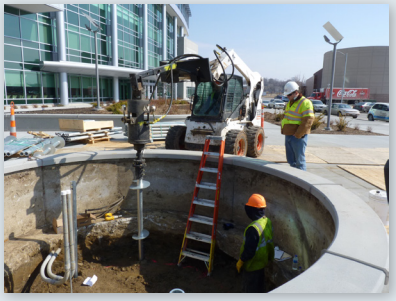
Foundation Supportworks by Thrasher was contacted to discuss the feasibility of supporting the sculpture with helical piles. Helical piles could support the combined structural loads of the sculpture and pile cap, while also being installed with smaller equipment. Determination of pile design loads considered anticipated pile movement, including elastic deformations, as well as potential bending or buckling of the pile shaft through the very soft clay layers. The foundation design included a 14-foot diameter, three-foot thick concrete pile cap and eight helical piles. The helical piles consisted of the HP350 (3.50” OD by 0.313” wall) hollow round shaft with 10”-12”-14” triple-helix lead sections to support a design working compression load of 30 kips and a design working tension load of 10 kips (per pile). The piles were installed with a rubber-tired skid steer to depths of 57 to 60 feet below grade, or 53 to 56 feet below bottom of pile cap elevation. Ultimate pile capacities, determined by correlation to installation torque, exceeded the design working loads with factors of safety greater than two. The tops of the piles were cut to the design elevation to provide six inches of embedment within the pile cap. New construction brackets were welded to the tops of the piles. The eight piles were completed in one day.

Project Summary

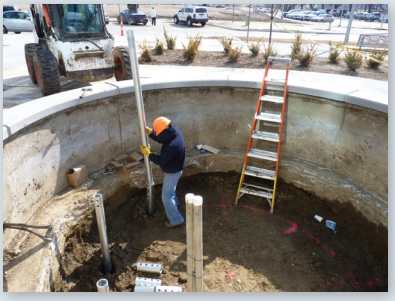
Architect: Leo A. Daly
Structural Engineer: Leo A. Daly
Geotechnical Engineer: Terracon Consultants, Inc.
General Contractor: Kiewit Building Group, Inc.
Certified Pile Installer: Foundation Supportworks by Thrasher
Products Installed: (8) Foundation Supportworks™ Model 350 Helical Piles, 10”-12”-14” Lead Section, Installed to Depths of 57 to 60 feet, Design Working Loads of 30 kips Compression and 10 kips Tension



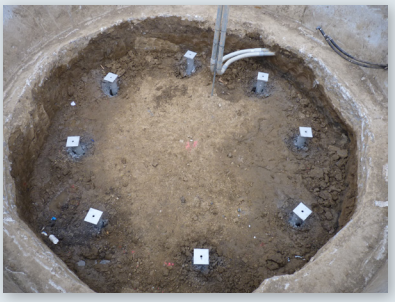
Location for new sculpture



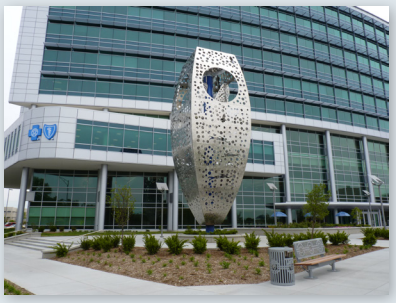
Advancing lead section



Plain helical extension added



Piles cut to design elevation; brackets welded to shafts



Completed sculpture