

Model 350 Helical Tiebacks

Project: Pi Beta Phi Sorority House Retaining Wall

Location: Tallahassee, FL

Challenge:

The Pi Beta Phi sorority house property included masonry block retaining walls along the south and east property lines to provide grade transition from the higher elevation of the lot to the lower elevations of the public right-of-way and streets. The south retaining wall, which retained as much as 10 to 11 feet of soil, showed excessive movement and cracking, making the parking lot in this area unsafe and unusable. The failed wall was also located about 20 feet south of the sorority house, causing some concern that the shallow footings of the building may be affected if wall movement continued. On the lower elevation side of the wall, the wall face was as close as 15 feet from a major street. The existing retaining wall needed to be removed and replaced. The lack of reliable soil information and the limited access were particular challenges for the design and constructability of several potential wall options.

Solution:

Rosenbaum Engineering designed a new cast-in-place concrete retaining wall with helical tiebacks to resist the lateral forces. The design included two rows of tiebacks; eleven (11) near the top of the wall with an 8-foot spacing and an installation angle of 30 degrees downward from horizontal, and eighteen (18) near the bottom of the wall with 4, 5, and 6-foot spacings and a horizontal orientation. Design working loads for the angled and horizontal tiebacks were 40 kips and 37.5 kips, respectively. The helical tieback configuration consisted of 3 1/2-inch OD round shaft with 10"-12"-14" triple-helix lead sections. The angled and horizontal tiebacks were installed to torque values of at least 8,600 ft-lb and 8,100 ft-lb, respectively, to provide torque-correlated ultimate capacities of at least 1.5 times the design working loads. Due to the soil variability, the tiebacks were advanced to lengths ranging from 17 to 46 feet in order to achieve the target torque values. The correlation between installation torque and ultimate capacity was verified with two load tests. One retrofit helical pier was also installed to vertically support the footing of an existing block wall against undermining and settlement at the connection to the new wall. The pier configuration consisted of a 2 7/8-inch OD round shaft with a 10"-12" lead section. The pier was installed to a depth of 14 feet and to a torque-correlated ultimate capacity of 30 kips for a factor of safety of 2.



Pi Beta Phi sorority house



Installation of helical tieback



Load test set up (tension)

Project Summary

Structural Engineer: Rosenbaum Engineering

General Contractor: Childers Construction Delaware

Tieback/Pile Installer: Alpha Foundations, Inc.

Products Installed: (29) Model 350 Helical Tiebacks, 10"-12"-14" Lead Section, Installed to Lengths of 17 to 46 feet, 37.5 and 40 kip Working Loads. (1) Model 288 Helical Pier, 10"-12" Lead Section, Installed to Depth of 14 feet, 15 kip Working Load



Helical tiebacks completed and ready to be cast into new concrete retaining wall