

Helical Piles and Tiebacks

Project: Bearing Factory Press Foundations
Location: Cairo, GA
Date: March 2013

Challenge:

The Koyo Bearing Factory purchased a new 170 kip Minster machine press. The factory's original machine press was mounted to its foundation at the existing floor slab elevation and was difficult to operate because the press had to be loaded and unloaded by way of a 36-inch tall stairway. To prevent a similar condition, the concrete mat foundation of the new press would be recessed approximately seven feet below the bottom of the six-inch concrete slab. A soil investigation in the area of the proposed press identified weak clays to a depth of approximately 13 feet over very stiff to hard sandy clay to the bottom of the boring at 30 feet. A deep foundation was therefore required to transfer loads to the deeper, more competent soil. A large pit, approximately 20 feet by 24 feet by 7.5 feet deep, would be excavated within the building to install piles and the concrete foundation for the new press. A second pit with the same dimensions and depth as the first was then proposed to relocate and lower the original press and improve operational efficiencies. Two column footings adjacent to the proposed excavations would be underpinned to prevent undermining and settlement during construction.

Solution:

Six (6) Model 288 (2.875-inch OD by 0.276-inch wall) round shaft helical piers with an 8"-10" double-helix lead section were installed to support the existing column footings. The retrofit piers, three per column location, were advanced to approximate depths of 21 feet below the existing slab and to torque-correlated ultimate capacities of at least twice the design working load of 15 kips (FOS \geq 2). The piers were then fitted with standard retrofit brackets with a 30-inch external sleeve. The machine press foundations included thirty-two (32) Model 288 helical piles with a 10"-12" double-helix lead section to support a design working compression load 32 kips. The helical piles were advanced to depths of approximately 14.5 feet below the bottom of the excavation to achieve a torque correlated ultimate capacity of at least twice the design working load (FOS \geq 2). Sixteen (16) helical tiebacks with a 12" single-helix lead section were installed along the pit walls to support a design working tension load of 12.5 kips. The eight tiebacks installed in the pit for the new press consisted of Model 150 (1.5-inch round-corner square bar) shafts, while the eight tiebacks installed in the second pit consisted of Model 287 (2.875-inch OD by 0.203-inch wall) round shaft material. The tiebacks were advanced approximately 3.5 feet above the bottoms of the excavations and at a downward angle of 30 degrees from horizontal. The tiebacks were installed to lengths on the order of 21 feet and to torque correlated ultimate capacities of at least twice the specified design working load.

Project Summary

Foundation Engineer: T.W. Tucker & Associates
Shoring Engineer: Rosenbaum Engineering
Geotechnical Engineer: Geotech, Inc.
Certified Pile Installer: Alpha Foundation Specialists, Inc.
Products Installed: (6) FSI Model 288 Retrofit Helical Piers, 8"-10" Lead; (32) FSI Model 288 Helical Piles, 10"-12" Lead; (8) FSI Model 150 and (8) FSI Model 287 Helical Tiebacks, 12" Lead



Helical piles installed to support press foundations



Completed press pit one (background) and press pit two post-excavation (foreground)



Helical piles and tiebacks successfully installed in press pit two



Retrofit helical piers installed to support column footings