

Model 288 Push Piers & Helical Tiebacks

Project: Billboard Foundation Stabilization
Location: St. Charles, MO
Date: November 2016

Challenge:

An area of land near a major interstate was under development with multiple buildings being constructed. The construction would also include a proposed retaining wall between the development and the interstate; however, the minimum set-back requirement for the wall would cause excavations to be within five feet from the base of an existing billboard. Fearing the large concrete foundation of the billboard would be compromised due to the adjacent retaining wall excavation/construction, the project engineers required the existing foundation be underpinned and laterally supported to prevent it from sliding and/or overturning. Due to the anticipated irregular shape of the 9-foot deep footing, a unique solution was needed to stabilize the billboard foundation ahead of the proposed retaining wall construction.

Solution:

A combination of two helical tiebacks and three hydraulically driven push piers was chosen to stabilize the billboard foundation. Each tieback was installed next to the existing foundation (one on each side) roughly five feet from the top of the footing at an angle of 16 degrees from horizontal. The helical tiebacks consisted of Model 288 (2.875-inch OD by 0.276-inch wall) hollow round shafts with an 8"-10"-12" helix plate configuration on the lead sections to support a design working tension load of 22 kips. Each tieback was installed to the maximum torsional rating of the Model 288 system (7,900 ft-lb) to achieve torque-correlated ultimate capacities of at least 3 times the design working load ($FOS \geq 3$). The installed tiebacks were then connected to a C10x25 steel waler which was also attached to the excavation-side of the footing.

The push pier system consisted of Model 288 (2.875-inch OD by 0.165-inch wall) pier tube and side-load retrofit brackets to support a design working compression load of 23.5 kips per pier. The push piers were advanced to a maximum depth of 27 feet below the bottom of the footing to achieve hydraulic fluid pressures of approximately 5,000 psi, corresponding to approximately 48 kips of drive force ($FOS \geq 2$). After the piers were driven individually, they were reloaded to the design working load and locked off to stabilize the billboard foundation against overturning. The irregularly shaped foundation was prepared by removing excess concrete to ensure proper bearing of both the retrofit brackets and the attached waler.

Project Summary

Structural Engineer: AEdifica Case Engineering
Geotechnical Engineer: SCI Engineering, Inc.
General Contractor: Pinnacle Contracting, Inc.
Pier / Tieback Installer: Foundation Supportworks® by Woods
Products Installed: (2) Supportworks® HP288 Helical Tiebacks, 8"-10"-12" Lead Section, Design Working Tension Load of 22 kips; (3) Supportworks® PP288 Push Piers, Installed Depths from 25 to 27 feet, Design Working Compression Load of 23.5 kips



Billboard and adjacent retaining wall construction



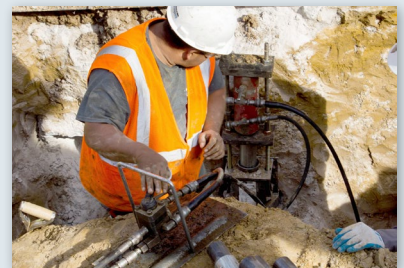
Positioning helical tieback lead section for advancement



Tiebacks and waler installed; Retrofit brackets positioned for push pier installation



Driving PP288 push pier



Reloading push pier to design working load