

Model 288 Helical Piles

Project: Heatherwood Elementary School
Location: Boulder, CO
Date: January 2010

Challenge:

The renovation project for the Heatherwood Elementary School in Boulder, Colorado included repair work in an existing area of the building as well as the construction of two additions. Apparent settlement in an area of the existing structure caused widening of expansion joints and cracking within the brick and mortar exterior veneer. Differential settlement and cracking of interior slabs was also observed. A geotechnical investigation at the site identified up to 10 feet of variable and low-density fill material (silty sand and sandy clay) over residual sandy clay over interbedded sandstone and claystone bedrock. The bedrock was encountered at depths of 16 to 17 feet below grade. The geotechnical report provided two foundation support options for the new additions. The first option was to place shallow spread footings on at least seven feet of new compacted and tested fill. This option would involve both deep excavations and excavations adjacent to the existing building. The second option was to support the structures with deep foundations.

Solution:

Helical piles were selected to penetrate the upper fill and residual soils for end-bearing within the bedrock. Helical piles proved to be the most cost-effective approach, partly due to the relatively low mobilization costs compared to other deep foundation alternatives. The smaller installation equipment could also access and maneuver more easily within the congested construction site. The foundation design for the new additions included twenty-one new construction helical piles. Twelve retro-fit helical piles were also proposed to support and stabilize the existing structure against further settlement. The helical piles were designed for a working load of 15 tons (30 kips). The helical pile configuration consisted of 2 7/8-inch OD by 0.276-inch wide round shaft with an 8-inch diameter, single-helix lead section. Standard extensions were used to advance the piles to depths ranging from 18 to 23 feet. The pile installation and all related prep and finish work were completed in 4 days and ahead of schedule, even with exterior temperatures reaching negative twelve (-12) degrees Fahrenheit.

Project Summary

Architect: Slaterpaul
Geotechnical Engineer: Ground Engineering Consultants, Inc.
Structural Engineer: JVA
General Contractor: FCI Constructors, Inc.
Certified Pile Installer: Complete Basement Systems
Products Installed: (33) Foundation Supportworks Model 288 Helical Piles, 8" Lead Section, Installed to depths of 18 to 23 feet, 30 kip Working Load



Retrofit helical pile installation



Retrofit helical pile installation



Attaching helical pile extension



Insulation blankets to prevent further frost penetration