

DEEP FOUNDATIONS/PILES

DRILLED MICROPILES



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INTRODUCTION

A historic hotel located in Boston's residential Back Bay neighborhood required extensive renovation work to transform the building into a luxury condominium complex. The work included a new elevator and car lift which required a structural foundation solution to support the added load.

PROJECT CHALLENGES

The project team encountered challenging subsurface conditions that included penetrating unsuitable clay soils to terminate in glacial till. In addition, the work had to be efficiently completed in a constrained, tight access area with limited headroom in the basement of the historic building.



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Geotechnical Design/Build

CASE STUDY | DEEP FOUNDATIONS/PILES

GEOTECHNICAL DESIGN AND CONSTRUCTION SOLUTION

The soil conditions in the area of the site consisted of fill underlain by Boston Blue Clay, preventing the use of shallow foundations. Helical piles were considered due to their ease of installation but ruled out because the pile loads were too great to be effectively supported by helical piles. Other traditional pile options were evaluated, however were not well-suited for equipment access to the constrained area. After careful consideration of different foundation techniques, micropiles proved to be the optimal solution to support the added loads of the new structural renovations.

Micropiles were designed for a working load of 80 kips in compression. The design incorporated 8-inch nominal diameter micropiles to be advanced through the fill and clay to encounter glacial till at depths of around 30 to 35 feet, followed by the advancement of a minimum 15-foot bond length in the glacial till.

The basement installation presented significant logistical challenges to address. Prior to the installation of the micropiles, a temporary staircase was installed so that Helical's crew could mobilize the equipment to the basement of the historic building. The General Contractor then created access by cutting a hole in the exterior wall and in the first floor slab. Helical then craned in a small micropile drill rig from the adjacent street, through the access holes and lowered the rig into the basement to easily solve the access issues.

Installation was accomplished with 7-5/8-inch diameter micropile casing outfitted with teeth on the leading edge to construct the 8-inch diameter bond zone beyond the casing in the glacial till deposit. A #10 Grade 75 ksi threadbar was inserted in 10-ft sections and coupled together to extend full length into the cementitious grout as the core steel to transfer the load into the bond zone. The friction micropiles were designed to be cased through the unsuitable clay and bonded into the glacial till. Wash rotary techniques utilizing recycling "frac" tanks to recirculate drill water and contain drill spoils to reduce the mess from the drilling. A total of 10 micropiles were installed to support the new elevator and car lift.

PROJECT DETAILS

Location: Boston, MA

Project Type: Residential Development

Service: [Deep Foundations/Piles](#)

Technique: Drilled Micropiles

Geotechnical Challenge: Adding Loads to Existing Structures, Difficult Access

DRILLED MICROPILE ADVANTAGES

- High load carrying capacity
- Ability to work in tight site
- Pile versatility in varying soil conditions

