

WALMART STORE ADDITION

Location: Lynn, MA

Project Type: Commercial



DUROTERRA™



DUCTILE IRON PILE ADVANTAGES

- Installation in limited access conditions
- Driven system to penetrate urban fill
- Low vibration installations adjacent to active retail store
- Rapid installation to deep bearing layer

PROJECT DESCRIPTION

The project consists of a 2,000 square foot addition to the front of the existing store. Loads on the grade beam and pile cap foundation system were up to 200 kips. Construction needed to proceed while the store was in operation.

GEOTECHNICAL CONDITIONS

Soil conditions consisted of 5 feet of fill, 11 feet of stratified marine deposits (sand and clay) underlain by 4 feet of organics followed by a thin medium dense sand layer and then stiff to very soft marine clay extending to 52 feet below grade. Glacial till was then encountered. The glacial till was initially medium dense (SPT N = 20 bpf) and became very dense (SPT N = 170 bpf) below 58 feet. Groundwater was measured at 9 feet below grade during drilling.

PROJECT CHALLENGES

Provide a deep foundation system to work within the limited footprint while limiting vibrations or impacting usage at the existing store.



DESIGN AND CONSTRUCTION SOLUTION

The project geotechnical engineer provided recommendations for Ductile Iron Piles as well as micropiles for support of the small addition. Structural plans showed a total of 36 piles with design capacities of 50 kips (compression). Design recommendations required piles penetrate the fill, organics and marine soils to terminate with bonding or end-bearing in the very dense glacial till.

A Series 118/9.0 (118 mm OD with 9 mm wall thickness) was designed to meet the 50 kip capacity. Following installation, the interior of all piles would be filled with 4,000 psi neat cement grout. Based on previous load testing in similar conditions, the project team waived the requirement for load testing of the piles on the small project, provided a typical set of less than 1" of pile movement in 50 seconds or more was achieved.

Helical Drilling, Inc. installed the production piles using a Tramac (Montabert) V1800 hammer mounted on a CAT 335F excavator. The resulting drive energy generated low vibrations that avoided issues with the adjacent active store. During installation, the piles extended deeper than anticipated to achieve a set of 1" or less in 50 seconds. Using the Plug and Drive connection, additional pile sections were added and the piles advanced to terminate in end-bearing in the glacial till without delays to the work. The 36 piles were installed in 6 working days with pile lengths ranging from 76 to 106 feet with an average of 86 feet. Daily production was on the order of 500 to 600 LF/day due to the slow advancement through the thick glacial till deposit.



PROJECT TEAM

DIP Design/Build Installer: Helical Drilling, Inc.
Geotechnical Engineer: Sanborn, Head & Associates
General Contractor: RL Spencer, Inc.
Structural Engineer: HFA-AE, LTD.