

291 MYSTIC AVENUE

Location: Medford, MA

Project Type: Commercial



DUROTERRA™



DUCTILE IRON PILE ADVANTAGES

- Rapid installation
- Low overhead installation
- Low vibrations for interior work
- High capacity

PROJECT DESCRIPTION

The single-story building on Mystic Avenue in Medford, Massachusetts was formerly a commercial property with various uses including a lumber yard. Additions to the property over the years included a high-bay, single-story, steel-framed building supported on caissons. The floor of the addition remained asphalt until recent renovation work to accommodate a new tenant included construction of a new pile-supported concrete structural slab.

GEOTECHNICAL CONDITIONS

The subsurface conditions encountered at the site consisted of 9 feet of urban fill followed by up to 9 feet of peat. The fill and peat were underlain by stiff to very soft clay extending to about 74 feet below grade. Medium dense to very dense glacial till (sand and gravel) was then encountered to the maximum explored depth of 84 feet. Groundwater was encountered at a depth of about 6 feet below grade.



PROJECT CHALLENGES

Installation of a low-vibration, deep foundation system within an existing high-bay building to support the new concrete slab.

DESIGN AND CONSTRUCTION SOLUTION

Construction of the new pile-supported concrete slab required foundation installation within the existing building interior. Equipment headroom clearance was limited to about 20 feet from ground level to the underside of the roof structure. Traditional options to work within the headroom limitations included helical piles and micropiles terminating in the clay. A total of 42 micropiles were designed with 20 ton working capacities. The micropiles were planned to be installed to about 40 feet and develop bonding within the clay after 2 rounds of post-grouting.



Helical Drilling, Inc. initially bid the project based on the recommended micropile solution. After completing an additional boring to identify the depth to reach the underlying glacial till / rock layers, an alternate solution consisting of Ductile Iron Piles was also proposed. The Ductile Iron Pile (DIP) option was designed to penetrate the fill, organics and clay to terminate in end-bearing on glacial till or rock.

The Ductile Iron Pile solution was selected for foundation support based on cost savings and, more importantly, over 2 weeks of schedule savings. DIPs are installed using low-vibration driving energy combined with medium-sized excavators that are able to work within the limited headroom situation. Accommodations for the limited headroom included pre-excavation at grade beam locations. The 5 meter long modular pile sections were also cut in half and connected with couplers to assist with the tight working conditions.

A total of 42 Ductile Iron Piles were installed on a 1:1 basis to replace the micropiles. The Ductile Iron Piles were installed to depths of over 85 feet to achieve "set". Even with greater than twice the length of piles, the DIP solution provided cost savings and was completed in only 7 working days – saving over 2 weeks in the construction schedule.

PROJECT TEAM

DIP Design/Build Partner: Helical Drilling, Inc.
Geotechnical Engineer: Geotechnical Consultants, Inc.
Site Contractor: Rhino Construction Company
General Contractor: New England Construction Company
Structural Engineer: Amolins Structural Consultants