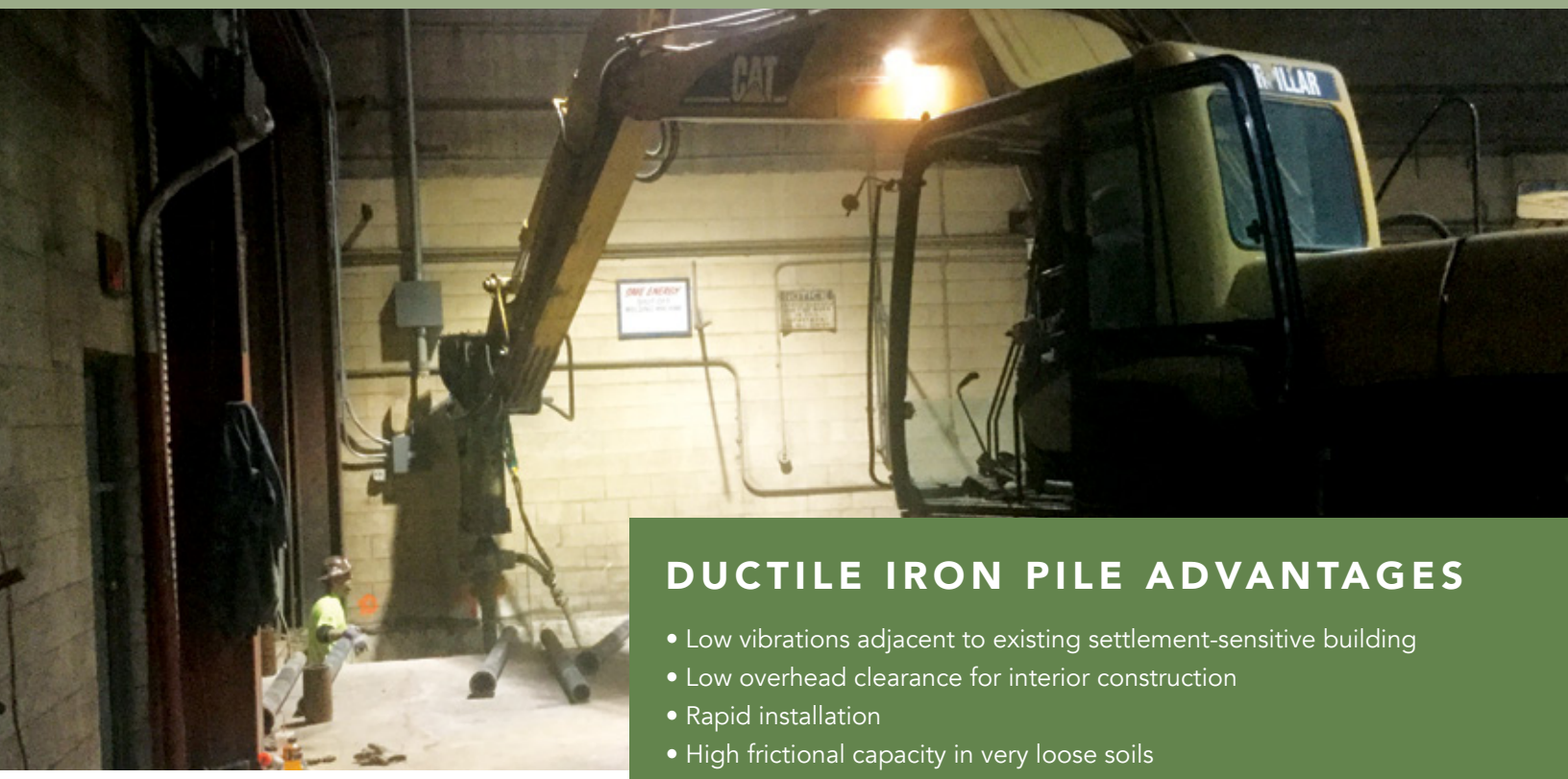
METHUEN CONSTRUCTION BUILDING

Location: Plaistow, NH

Project Type: Commercial

DUROTERRA™



DUCTILE IRON PILE ADVANTAGES

- Low vibrations adjacent to existing settlement-sensitive building
- Low overhead clearance for interior construction
- Rapid installation
- High frictional capacity in very loose soils
- Improved settlement compatibility with ground improvement

INTRODUCTION

A strategic move by Methuen Construction, Inc. to combine all three divisions of the company in one location started with the acquisition of a 170,000 square foot industrial facility. The move required renovation and expansion of the existing facility in areas immediately against portions of aging masonry block walls as well as within portions of the high-bay warehouse.

The new single-story building addition had foundation loads of 63 to 250 kips and wall loads of 3.5 to 7.7 kips/foot. Four building lines for the new addition involved working in or adjacent to existing structures.

GEOTECHNICAL CONDITIONS

The subsurface conditions encountered in the explorations performed by HTE Northeast, Inc. generally consisted of up to 4 feet of granular fill underlain by very loose to medium dense granular alluvial deposits up to 22 feet below grade. The alluvial sand was underlain by very soft to medium stiff clayey silt lacustrine deposits to the maximum explored depth of 61 feet. Groundwater was encountered around 4 feet below grade.

PROJECT CHALLENGES

Support of new interior and exterior construction adjacent to an existing settlement-sensitive building on very poor soil conditions.

METHUEN CONSTRUCTION BUILDING

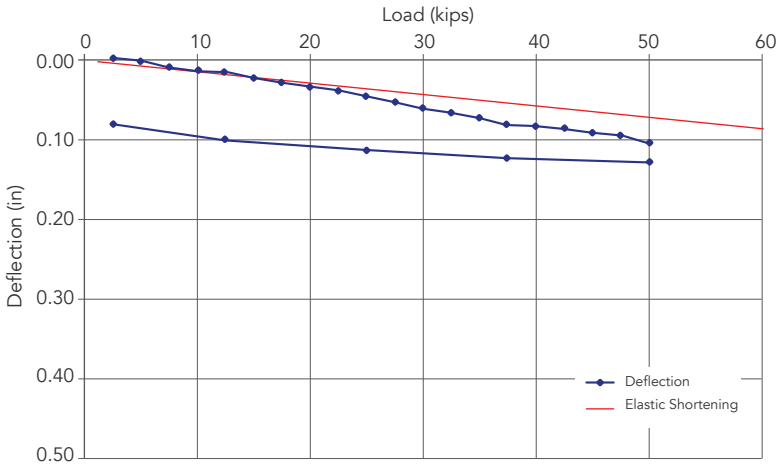
DESIGN AND CONSTRUCTION SOLUTION

Support of the single-story building addition over loose/soft soils was most cost-effectively addressed using Geopier® ground improvement. However, interior portions of the renovation work as well as exterior construction immediately adjacent to existing aging exterior masonry block walls required alternate construction approaches to address vibrations and access. Representatives with Helical Drilling, Inc. worked closely with the project's contractor/owner, structural engineer and geotechnical engineer to evaluate multiple foundation support technologies including helical piles, drilled micropiles and Ductile Iron Piles. Ultimately, a solution was selected that combined low vibration, modular Ductile Iron Piles at interior locations and along existing exterior walls with Geopier ground improvement in the main addition area at distances beyond 10 feet from existing structures. Of particular importance on the site was the ability to limit vibrations and also control differential settlement between the pile-supported footings and the shallow footings on ground improvement.

Helical Drilling, Inc. designed and installed a Ductile Iron Pile system using Series 118/6.0 (118 mm diameter with 6.0 mm wall thickness) piles to provide an allowable capacity of 25 tons. The piles were designed to generate capacity through friction in the alluvial sands by creating a grouted bond zone by driving a 220mm (8.7 inch) diameter conical grouting shoe. A minimum bond zone length of 14 feet below the fill was planned.

Installation of 42 production friction Ductile Iron Piles was accomplished in 2 days. At interior locations, piles were cut in half to help limit the overhead reach requirements. Couplers were used at straight pipe joints to make the connection. Piles were all driven to a length of 24 feet below footing.

A full-scale compression load test was performed to confirm the deflection of the friction pile at the design load of 25 tons to evaluate compatibility with the Geopier system. Deflection was limited to 0.14 inches at the design load of 50 kips. The results confirmed acceptable levels of differential settlement and angular distortion between the DIP and Geopier support systems.



PROJECT TEAM

DIP Design/Build Partner: Helical Drilling, Inc.
Geotechnical Engineer: HTE Northeast, Inc.
General Contractor: Methuen Construction, Inc.
Structural Engineer: The H.L. Turner Group, Inc.