

AMAZON DOB4 CANOPY ADDITION

Location: Stratford, CT

Project Type: Commercial



DUROTERRA™



DUCTILE IRON PILE ADVANTAGES

- Rapid design and installation – less than 2 weeks for submittal, mobilization and completion of piles with over 800 LF/day for installations.
- Low vibration driven piling system to penetrate dense layers while minimizing vibrations on the existing building.
- High confidence in pile capacity based on monitoring of driving penetration rates and grout-to-ground bonding in sand.

PROJECT DESCRIPTION

The project involved updates to an existing Amazon Warehouse. During the fast-track project, a new canopy structure was added to the scope of work – putting the foundation construction schedule on the critical path. A total of 14 new canopy foundations with compression loads ranging from 40 to 144 kips required support.

GEOTECHNICAL CONDITIONS

The subsurface conditions consisted of up to 6.5 feet of sand fill underlain by native sand followed by peat. The fill, sand and organic layers generally extended to depths of about 14 feet below existing grade. Loose to dense sand was then encountered to the maximum explored depth. Groundwater was encountered at depths around 7 feet during drilling.

PROJECT CHALLENGES

Provide a deep foundation system that could be rapidly designed, mobilized and installed to support the new canopy structure foundations with little chance for delays or installation/performance issues.



DESIGN AND CONSTRUCTION SOLUTION

The addition of the canopy structure to the project required intermediate or deep foundations to transfer the loads below the fill and peat. However, the original project scope of work used to develop the geotechnical investigation did not include a new canopy structure. Shallow borings had been performed and encountered fill and organics, but did not penetrate very deep into the underlying native sand.

Helical Drilling was contacted by RC Andersen about the project. Implementing a rapid design/build solution for the work was critical to meet the project deadlines. Helical Drilling considered ground improvement, helical piles and Ductile Iron Piles as options. The cost and time to mobilize the large ground improvement rigs for the small scope was prohibitive combined with the uncertainty of the deeper soil conditions. Further, while helical piles might be able to provide the capacity and mobilize quickly, there was uncertainty with the ground conditions due to the limited exploration depths and concern that the helical piles may either penetrate deeper than anticipated without developing torque or encounter shallow termination and spin-out. Grouted friction Ductile Iron Piles were selected for rapid installations, continuous drive monitoring to confirm penetration into appropriate bearing conditions and the grout-to-ground bonding to deliver high frictional capacity.

Helical Drilling completed the design submittal within one week from the initial call. The design featured Series 118/7.5 Ductile Iron Piles installed with a 220 mm conical grouting cap to construct 8.5-inch diameter grouted friction piles. The piles were designed to penetrate the fill and organics and terminate in the underlying sands with lengths ranging from 28 to 42 feet depending on the loading demand.

The crew immediately mobilized to the site. A total of 56 piles (4 piles per each canopy pile cap) were installed in only 3 days with production ranging between 800 and 1,100 LF/day. Within 8 days from the initial call, the deep foundations for the canopy were designed and safely installed to keep the project on-schedule.



PROJECT TEAM

DIP Design/Build Partner: Helical Drilling, Inc.

Geotechnical Engineer: Terracon

General Contractor: RC Andersen, LLC

Structural Engineer: BL Companies