GROUND IMPROVEMENT

GEOPIER GEOCONCRETE® COLUMN RIGID INCLUSIONS

PORTLAND AREA SUPER MARKET

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INTRODUCTION

The overall project included the construction of a supermarket to serve as the anchor amenity of a 2 million-square feet mixed-use development. Helical Drilling provided ground improvement services on the supermarket site by using Geopier GeoConcrete® Column (GCC) Rigid Inclusion elements that extended through the unsuitable fill and soft/sensitive clay layer. Given the challenges with the installation of rigid inclusion ground improvement in thick/sensitive clays, the project included a state-of-the-art pre-production testing program.

GEOTECHNICAL CHALLENGES

The soil profile included unsuitable fill material underlain by a thick, soft, sensitive clay layer that extended up to about 70 feet below the ground surface. Furthermore, the project required up to about 5(+) feet of filling to achieve the proposed ground floor elevation. Constructing grade-raise-fill, footings, and slabs-on-grade, over the existing soil profile would result in excessive settlement, leading the design team to consider ground improvement or deep foundations.

GEOTECHNICAL DESIGN SOLUTION

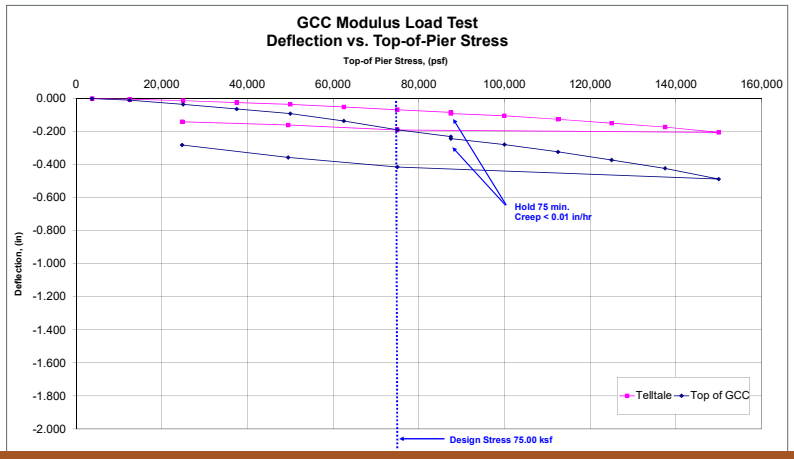
Helical and Geopier Foundation Company designed a rigid inclusion ground improvement solution consisting of a network of GeoConcrete Column (GCC) Rigid Inclusions that extended through the unsuitable fill and soft/sensitive clay layer. The design included finite element modeling of the GeoConcrete Column (GCC) Rigid Inclusion system to help ensure proper support of the grade-raise fill and slab-on-grade.

GROUND IMPROVEMENT CONSTRUCTION

Helical installed over 1,300 GCC Rigid Inclusions to depths up to ~ 70 feet below ground surface. Production was completed ahead of schedule with two rigs/crews and allowed the Developer to expedite building pad delivery to the supermarket tenant.

QUALITY ASSURANCE AND CONTROL

Installation of rigid inclusion ground improvement though thick/sensitive clays is somewhat rare in the Northeast due to challenges with ensuring proper rigid inclusion shaft integrity which is paramount for proper performance. As such, a thorough pre-production testing program was implemented. The pre-production testing program included installing and testing sacrificial rigid inclusions as single elements and in groups. The testing included six full-scale load tests to 200% design load, non-destructive sonic echo tests, and "proof" load tests on production elements. The full-scale load tests consistently resulted in <1/2" of deflection at the design load. Test and production elements were observed by Helical's full-time Quality Control employee, the Developer's geotechnical representative, and the Tenant's geotechnical representative. Concrete installation volumes were checked through careful monitoring of concrete pump strokes and mandrel extrusion pressures.



PROJECT DETAILS

Location: Portland area of Maine
Project Type: Mixed-Use Development
Service: Ground Improvement
Technique: Geopier GeoConcrete® Column Rigid Inclusion
Geotechnical Challenge: Compression Load Resistance, Insufficient Soil Bearing Capacity, Settlement Control, Shallow Groundwater Table, Unsuitable Soil Conditions