DENSIPACT®

P.F. Chang's China Bistro

Mt. Pleasant, SC

The Geopier Densipact® system provides cost-effective verifiable ground improvement to control liquefaction and reduce settlement

Description: Mt. Pleasant is located just outside of Charleston, South Carolina, an area known for high seismic potential. Developers planning construction of a new P.F. Chang's Restaurant were faced with overcoming seismic issues at their site. Plans for the single-story, 11,000 square foot building included wall loads of 3 kips/foot and column loads of 90 kips and also featured an outdoor patio and service areas.

Subsurface Conditions: The soil conditions at the site consisted of loose to medium dense clean sand with trace to some fines (fines content < 10%) extending to depths of 20 feet. Interlayered stiff silt, clay and medium dense sand were encountered below 20 feet. Groundwater was measured at 6 feet below grade.

Geotechnical Challenge: While the static foundation loads for the structure posed little performance risk, the geotechnical engineer identified the potential for liquefaction at the site resulting from the design earthquake event of Mw = 7.3 and peak ground acceleration (PGA) of 0.35g. Liquefaction settlement upwards of 2.5 inches was predicted in the event of the design seismic event, requiring the developer to take action to minimize the seismic impacts on the structure.

Options: One option proposed by the geotechnical engineer included supporting the structure on shallow spread footings and designing the structure to accommodate the total liquefaction and static settlement potential. Alternatively, ground improvement techniques including Geopier's Rammed Aggregate Pier® system to provide reinforcement, densification and drainage were considered. Geopier® also offered a solution using Rammed Compaction® soil densification using the Densipact® system.

PROJECT TEAM

Owner:
P.F. Chang's

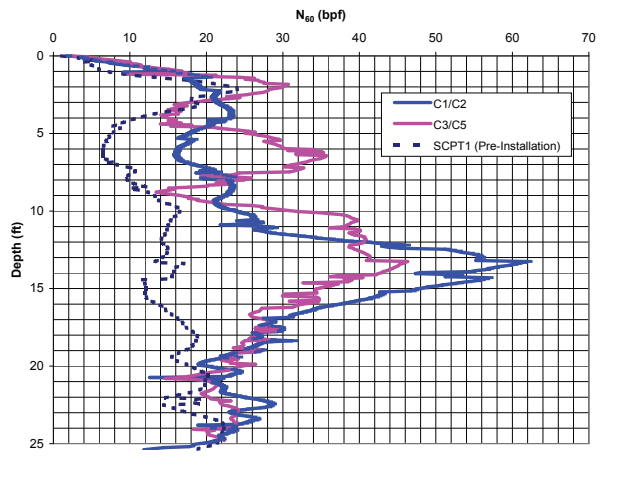
Geotechnical Engineer:
WPC, A Terracon Company

Structural Engineer:
Hart, Gaugler & Associates, Inc.

General Contractor:
Blanchard Construction

Geopier Installer:
Peterson Contractors, Inc.

DESIGN VERIFICATION



Geopier Solution: The Geopier Densipact™ system was selected as a cost-effective method to provide verifiable densification of the site to address both static and dynamic settlement and reduce the potential for liquefaction. Rammed Compaction® points were installed in a grid pattern across the site and beneath concentrated footing loads to improve the density of the existing sand in-place. The Densipact® tooling was installed beneath footing and floor slabs to treat the upper 18 feet of the profile.

Prior to Densipact® installations, the native sand exhibited Standard Penetration Test (SPT) N-values of 6 to 18 blows per foot (bpf). The seismic design required the post-installation equivalent SPT N-value (N60) range from 14 bpf at 6 ft up to 20 bpf at 18 feet. Results of a post-installation Cone Penetration Test (CPT) program demonstrated that the Densipact points densified the sand up to 2.5 times the unimproved equivalent N60 value to depths up to 20 feet. Further, the verification program results demonstrated that the sand had been densified sufficiently to mitigate the liquefaction concern at the site resulting in performance far exceeding the project criteria.

130 Harbour Place Drive, Suite 280, Davidson, NC 28036
800.371.7470 | www.geopier.com | info@geopier.com | marketing@geopier.com

GEOPIER®
Tensar.