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Compaction Grouting to the Rescue

Adapted from Information by Compaction Grouting Services, Inc.

The Valley Forge Apartment Complex project in King of Prussia, Pennsylvania, is a multistage project which has taken place over the course of three years. Stage one and two have been completed, with one more to go. The complex consists of multiple condominium buildings and parking garages. The area is known for sinkhole development which is why compaction grouting was chosen as the premier method of soil stabilization prior to construction.

Compaction grouting consists of injecting a low-slump, low-mobility, soil-cement grout into loose soils at high pressures. To limit soil hydrofracture and maintain grout control, slow injection rates are used. The process compacts loose coarse-grained soils, and soft fine-grained soils are made more dense or displaced. A column of grout is injected into each hole location in a grid-style pattern designed by the engineer.

For the first portion of this series of projects, Compaction Grouting Services, Inc. (CGS) provided proof drilling and pressure grouting to minimize sinkhole activity in what is now the upper northern section of the apartment structure. The multifamily development was to include 339 residential units with a 500-space, eight-story parking garage. CGS worked together with the project engineers to develop grouting refusal criteria. As expected, test borings revealed areas of weathered limestone with varying depths of silts and clay. Rock and subsurface characteristics resembled potential sinkhole activity. By the time the first stage of the project was concluded, CGS drilled over 11,500 linear feet and injected grout into 298 hole locations.

The second stage of the project involved construction for a proposed six-story residential building with attached seven-story parking garage, and CGS provided test proof drilling and grouting. It took four days to drill over 500 linear feet into a total of 12 grout injection locations. The grouting program included preparing the soil to handle the proposed residential building and garage. The company planned according to the test proof drilling, test boring results, and the work they performed during the first stage of the project on the adjacent property. They also considered the engineers' subsurface investigation information.

CGS worked with the engineer to develop a pressure grouting program to treat the subsoils beneath the proposed foundations and floor slab areas under the northeast quadrant of the residential structure. Shallow spread column footings and continuous wall footings were used to support the residential building and garage. The subject area of the project site seemed fairly level with minor fills, two to three feet high expected. They estimated up to 389 total grouting locations and over 14,700 linear feet of drilling, but included in this total was the possibility of secondary and tertiary locations.

CGS was able to successfully complete the project by injecting grout into 266 hole locations and performing 10,660 linear feet of drilling. The intent was to perform the work using as many as two drilling crews and four grouting crews full time. The project was completed in four working weeks (less time than quoted).

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