

APPENDIX E: DESCRIPTIONS OF PILE FOUNDATION CONSTRUCTION TECHNIQUES

Cast in Drill Hole

A cast in drill hole (CIDH) pile consists of concrete and rebar cast in a hole drilled into the ground. There is no pile driving for the installation of these types of piles. These piles can range from 12 to 126 inches in diameter and from 10 to 120 feet long, depending on ground conditions. Although this type of pile causes minimum vibration, optimum ground conditions are needed for the hole to stay open to prevent caving. If ground conditions are weak, this type of pile may not be used.

Slurry may be used for the installations of CIDH piles in wet ground conditions. This makes the installation more complex and requires that tanks be used to store the water/slurry.

Cast in Steel Shell

A cast in steel shell (CISS) pile is a steel shell that is driven into the ground and then cleaned and filled with concrete and rebar for a specified depth. These piles are driven into the ground and can accommodate longer distances. They are commonly used for bridge structures in questionable soil. The installation of this type of pile results in vibration and noise.

Oscillated Pile

This is a steel shell pile that has a drill ring attached at the tip so that the pile can be rotated/oscillated into the ground. Ground vibrations and noise are much lower than driven piles. The installation process is slower and, consequently, costlier than driven piles. The use of this method would result in lower vibration transferred to adjacent buildings.

GeoJet Foundations

Also known as soil cement, a GeoJet installed pile is when the hole is drilled while mixing cement with the natural soil to produce a soil-cement column/shaft. A circular steel pile is then lifted and lowered into the soil-cement shaft. After setup of the soil cement, the pile reacts like CISS. This is a newer technology of pile installation; the diameter is limited to 48 inches and the depth is limited to 150 feet. Ground vibrations are almost eliminated, and noise is minimal when compared to pile driving; however, there is flow of geogROUT to the surface during drilling operations.

Tubex Grout Injections

This is a steel shell pile that has a drilling tip installed and is screwed/drilled into the ground while injecting grout to form a bond with the soil. This is a closed-end system, which may cause soil heaving/displacement depending on soil type. Also, it is a newer technology, and the pile diameter is limited to 30 inches. There is minimal vibration and noise with this system, but ground monitoring is required due to the potential for soil displacement, which may lift adjacent buildings.

Micropiles

These are smaller, tubular piles of 4 to 12 inches that are drilled into the ground with grout. There is minimal vibration, but numerous piles must be used. They are used primarily for retaining wall systems. They are also used for underpinning existing structures.