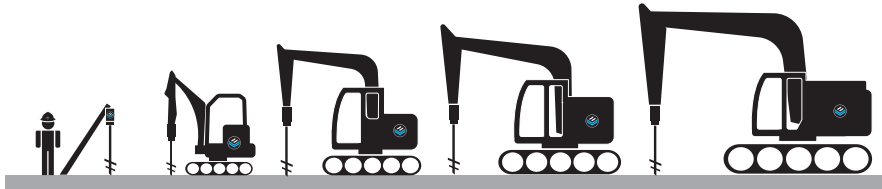


## Helical Pile Recommendation

These subsurface conditions are not conducive to the installation of conventional shallow concrete strip or pad foundations. A deep foundation system such as helical piles can be installed to a suitable bearing stratum or bedrock to support the structure. Helical piles can be used to resist compression, tension, and lateral loads. Helical piles support a variety of structures ranging from industrial, commercial, institutional, infrastructure and residential applications from one to thirty stories high, as well as hydro and telecommunication towers.

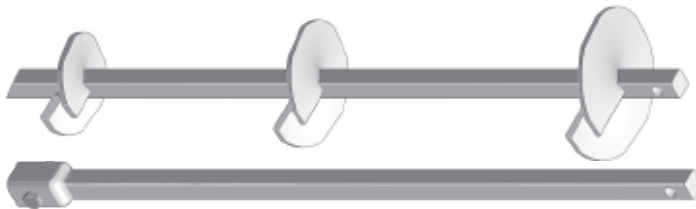
Installation advantages of Helical Piles are as follows:

- Minimal ground disturbance, no vibration, or spoils
- No engineered pad requirements for installation
- Adaptable to subsurface conditions for installation into cobbles and small boulders
- Tight access installation with varying types of equipment (*Figure 1*)



*Figure 1: Varying size of equipment to install helical piles, from man-portable to 20 ton excavator*

- Tight access installation because of modular system (site adaptable) (*Figure 2*)



*Figure 2: Modular Lead and Extension sections for helical pile*

- Installed successfully in high groundwater table applications
- Installed to any depth (from 2m to 60m, depending on soil parameters)
- Support of new or existing structures (*Figure 3*)



*Figure 3*

Typical configurations of helical piles in grade beams and pile caps are shown in Figure 4.

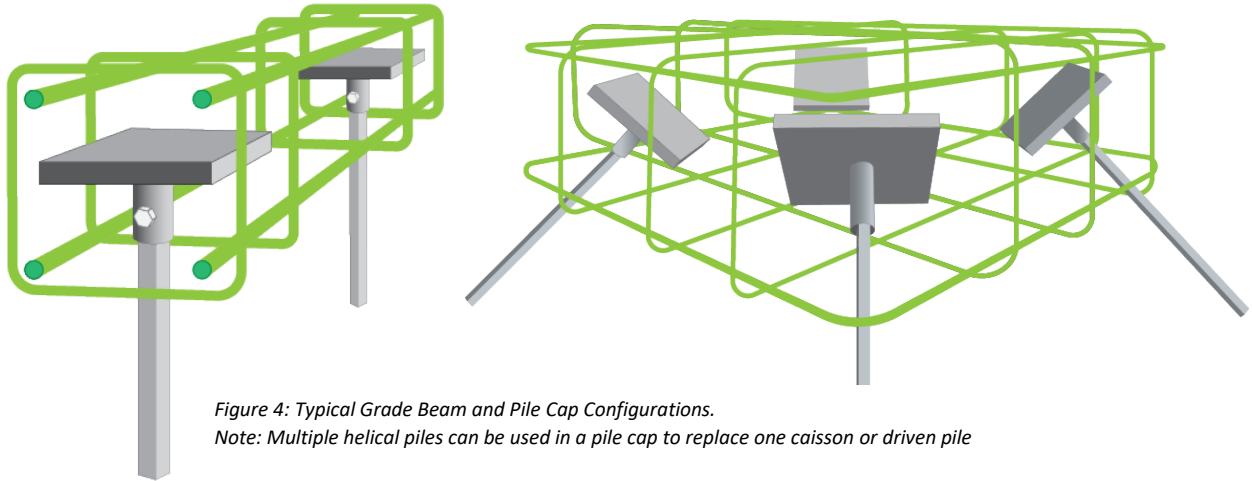


Figure 4: Typical Grade Beam and Pile Cap Configurations.  
 Note: Multiple helical piles can be used in a pile cap to replace one caisson or driven pile

The number and size of helical piles are determined based on the loading and configuration of the structure. The project geotechnical information and structural loading should be provided to a specialist design-build contractor such as EBS Geotechnical Inc. ([www.ebsgeo.com](http://www.ebsgeo.com)) to assess the feasibility of this foundation system and to determine probable helical pile installation depths, and capacities.

If sub-surface obstructions are encountered, or if the helical pile needs to be relocated for any reason, in most cases they can be retracted and re-installed.

Typical loading of helical piles in different soils (granular, silts, and clay) are shown in Table 1.

Table 1: Estimated Factored Geotechnical Resistances for Helical Piles

Soil Properties – SPT Count		Factored Helical Pile Capacities		
"N" Value Cohesive	"N" Value Non-cohesive	Square Shaft Size	ULS Compression	ULS Tension
25-35	25-30	38 mm (SS5)	270 kN	80 kN
35-45	30-35	44 mm (SS175)	500 kN	150 kN
50-60	40-50	51 mm (SS200)	670 kN	270 kN
65-100	55-100	57 mm (SS225)	915 kN	355 kN

It is recommended that a pile load test program be completed on site prior to completion of detailed design to verify or amend capacity of the helical piles.

The actual depth of each helical pile is determined on site based on depth and torque measurements during installation, and the load support requirements. It is recommended that the installation of the helical piles be inspected on a full-time basis by a qualified geotechnical consultant, as stated in the National and Ontario Building Code 4.2.2.2.{1}. Continuous monitoring of the installation torque and depth by a geotechnical consultant ensures “that the subsurface conditions are consistent with the design and that construction is carried out in accordance with the design and good engineering practice.”