

Step 1 – Feasibility

Site Access

The proximity to other structures, rights-of-way and obstructions is one the earliest considerations one must consider in any construction or improvement. Access to the equipment may be restricted due to overhead limits and safety issues as well. The designer needs to factor in all the possible limitations when selecting a foundation system. The helical screw foundation system can generally be used anywhere a soil boring can be taken and is virtually the most access-problem-free foundation system available today. The restriction to access and similar concerns should be shown on the bid documents with the usual notes concerning site conditions.

Vibration and noise can be another limitation to conventional foundations (i.e., concrete foundations). Helical screw foundation systems have been installed inside office buildings, restaurants, retail shops and hospitals without interrupting their normal routines. Helical screw foundation system certified dealers/installers are able to assist the designer in determining the best type of helical screw foundation for the application.

Working Loads

Helical screw foundations have been used in the compressive mode to working (design) loads of 200 kips, in the form of the HELICAL PULLDOWN™ Micropile which is detailed elsewhere. In a “normal consolidated” soil, the working load per foundation is typically less than 100 kips, but special cases may apply.

Working tension loads are typically 100 kips or less. The soil is the limiting factor generally as the number and size of helical screw foundations can be varied to suit the application. The designer should determine the family of products to use from the charts in Step 8 – Product Selection.

Soils

Soil may be defined, for engineering purposes, as the unconsolidated earth material in the upper mantle of the Earth. Soil is variable by nature of its weathering and/or deposition. The better one can define the soil at a particular site, the better one can predict the behavior of any deep foundation, such as the helical screw foundation or micropile. In the absence of sufficient soil data, assumptions can be made by the designer. The field engineer or responsible person needs to be prepared to make changes in the field based on the soil conditions revealed during construction.

Helical screw foundations can be installed into residual soil and virgin or undisturbed soils other than rock, herein defined as having blow count (N) less than 80 blows per foot of set of the 2" OD sampler per ASTM D 1586. This implies that the correct family of helical helical screw foundations must be matched to the soil density. For example, a standard 1½" shaft Type SS helical screw foundation with a total helix area of 1 square foot may require so much installing torque that it may have difficulty penetrating into the bearing stratum without exceeding the torsional strength of the shaft.

Water-deposited soil, marine, riverene (terraces or delta) and lacustrine have a high degree of variability. They may be highly sensitive and may regain strength with time.

Very soft or very loose natural, virgin or undisturbed soils overlying unweathered rock present another challenge to the installation of helical screw foundations. The helices

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cannot develop enough downward thrust in these soils to penetrate into the hard underlying material. Down pressure applied to the shaft often can overcome this situation.

The use of helical screw foundations in controlled or engineered fill is another good application. For example, as tiebacks in the controlled fills of roadway and railway fills have been used to make improvements to the infrastructure.

Collapsible soils (such as loess) and poorly cemented granular soils in the southwestern U.S. should be penetrated by the helical screw foundations.

Equipment

Equipment suitability consideration and selection is the domain of the contractor. The certified dealer/installer is familiar with the various spatial requirements for his equipment and is best able to determine the type of mounted or portable equipment they can utilize to do the work. The designer may contact the local distributor or dealer for guidance on this matter. A wide variety of equipment can be utilized for projects based on such considerations as interior vs. exterior and headroom. Mini-excavators have been used indoors to install helical screw foundations.

Qualified Installers

Qualified contractors are available in nearly all areas. They should be experienced in the installation of the type of work specified. A current project list should be submitted as evidence of experience.

Codes

Model building codes at times have restrictions regarding the foundation type. Generally, the helical screw foundation falls under the category of deep foundations, such as driven piles or drilled piers. The underpinning family of helical screw foundations is approved by the three major model code agencies. Latest editions of their evaluation reports are located in the Appendix or may be found at www.abchance.com.