

# Benefits and Uses of Helical Foundation Systems

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Many designers view helical foundation systems with some degree of skepticism as a fairly new technology, especially in applications such as deep foundation support for a structure. In actuality, the use of helical piles in construction dates back nearly 200 years. In the 1830's, the earliest versions of today's helical piles were used in England for moorings and for the foundations of lighthouse structures. Today, helical piles are gaining worldwide acceptance throughout the construction industry and engineering community due to the versatility of both the product and the installation equipment. In 2007, the International Code Council Evaluation Services, Inc. (ICC-ES) approved AC308, Acceptance Criteria for Helical Foundation Systems and Devices. Helical piles are also now included in the International Building Code (IBC).

Helical piles to support foundations of a school addition



With the use of helical foundation systems on the rise, let's consider a few situations where you may choose helical piles as the most appropriate deep foundation alternative:

**1. When deep foundations are required due to the site, soil, and/or construction conditions and allowable/service loads are within the typical range for helical foundations.** AC308 provides normal capacity limits of 6 kips lateral and 60 kips in axial compression and axial tension.

**2. As an alternative to deep excavations for the removal and replacement of foundation soils.** The break-even point for excavation versus deep foundations varies from project to project depending upon factors such as excavation depth, excavation volume, haul distance to a disposal site and availability of suitable backfill soils. The decision for or against a deep excavation may also be influenced by the elevation of the groundwater table and the construction schedule.

**3. As an alternative to other deep foundations such as auger-cast piles, drilled shafts and driven piles.** Helical piles may not achieve similar high capacities as the other deep foundation options. However, even if more helical piles are required, they may still be the more cost-effective option. Helical piles can be installed with relatively small installation equipment, so mobilization costs are much less. Helical piles are especially cost-competitive where pile numbers are limited, typically less than about 60 to 80. In larger quantities other factors, some of which are listed next, may still make helicals the favored option.

Helical piles to support crane pads at a construction site



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Retrofit helical piles to support an existing column at a school



**4. In conditions of limited or tight access.** Helical piles are selected for many projects simply because the piles and the installation equipment can be sized according to the accessibility of the job. Helical piles can be installed with hand-held equipment, mini-excavators, skid steers, rubber-tired back-hoes and large track equipment.

**5. Where minimal vibrations from installation are required.** Helical piles are typically installed with smaller equipment and the pile installation does not create vibrations. This means there is little impact to surrounding homes or businesses during this phase of construction.

**6. In areas of known or potential soil contamination.** The installation of helical piles does not auger soil to the surface to create spoils. Therefore, in most cases, if the contaminated soil remains in place, there are no additional costs to the project for treating this material or disposing of this material in designated landfills.

**7. For environmentally sensitive sites.** Installation with smaller equipment typically means there will be less disturbance to the project site. For wetland and boardwalk projects, a proper design and sequenced construction can allow pile installation and boardwalk construction in sections without ever disturbing the wetlands below.

**8. For schedule sensitive projects.** Helical piles install quickly, typically 15 to 25 per day per crew for a pile length of about 30 feet. With no time needed for pile concrete to cure, reinforcing steel can be placed and structural concrete poured immediately following pile installation.

**9. After the project is underway and additional support is determined.** Many helical projects develop this way. FSI carries millions of dollars in inventory and can quickly ship product to the installing contractor. The contractor can typically be installing piles within a few days notice to proceed.

Design professionals are becoming increasingly more aware of the benefits and applications of helical foundation systems. Please contact FSI or your local Foundation Supportworks installing contractor if you have any questions about helical products or your specific application.

Helical piles to support foundations of a medical center addition



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Jeff is involved in product design, product verification testing, preliminary design applications, project consulting, conducting installation, sales and marketing training, as well as developing and presenting education-based material. Jeff routinely travels throughout the United States and Canada to consult with local installing contractors about general or project-specific needs, and to present technical information to engineers, architects and general contractors.