Don Deardorff, P.E. Joins Foundation Supportworks, Inc.

We are excited to announce that Don Deardorff, P.E. has joined the FSI engineering department as Senior Application Engineer. Don brings a wealth of experience and industry knowledge to this new position. Don will provide preliminary design assistance for FSI installing contractors, specializing in large and challenging commercial and industrial applications involving helical piles, helical tiebacks, or hydraulically-driven push pier systems. With his industry knowledge and research experience, Don will also assist with product development and verification testing.

Don attended the University of Missouri-Rolla and graduated in 1993 with a Bachelor of Science degree in Civil Engineering. After obtaining his Bachelor's degree, he worked as a consulting environmental and geotechnical engineer in Missouri and Wisconsin.

Don was hired by Hubbell Power Systems/Chance Civil Construction in January 2005 as a Senior Engineer. He continued with graduate studies and obtained his Master of Science degree in Engineering in 2007. He is currently in the dissertation phase of the Ph.D. program.

Don is a licensed professional engineer in Missouri and Wisconsin and a member of the American Society of Civil Engineers (ASCE), the American Institute of Steel Construction (AISC), the Deep Foundations Institute (DFI) Helical Foundations and Tiebacks Committee, and the DFI Seismic and Lateral Load Committee. Don has written or co-written and published three technical papers regarding the design and installation of helical pile systems.

Don's product knowledge from past research and testing and his overall experience with the design and installation of helical foundation systems make Don an exciting addition to our growing company. Don's hire further positions FSI as the leader in the foundation stabilization industry."

For additional bio information about Don, please visit the FSI website. www.FoundationSupportworks.com

Your local dealer:

FOUNDATION NATION™
FSI NEWSLETTER FOR DESIGN PROFESSIONALS
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Contact Information:
For more information about Foundation Supportworks™ or to locate a Foundation Supportworks'™ dealer in your area, please visit our website at www.foundationsupportworks.com or call 800.281.8545.

FOUNDATION SUPPORTWORKS™

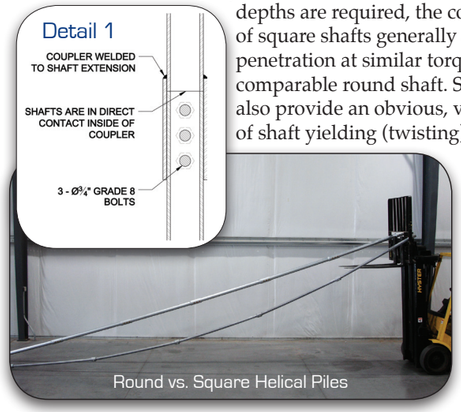
FOUNDATION NATION™
FSI NEWSLETTER FOR DESIGN PROFESSIONALS

WHAT YOU SHOULD KNOW:

When Specifying Hollow ROUND Shaft vs. Solid SQUARE Shaft Helical Piles

We often receive phone calls from designers and specifiers asking whether a hollow round shaft or solid square bar helical pile would be better suited for a certain application. This appears to be a great opportunity to provide some clarity and offer our opinions and recommendations to the masses.

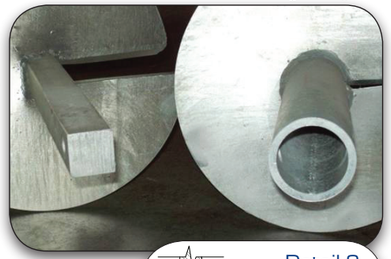
Solid square shaft helical piles have been used successfully for decades in tension applications; i.e., as anchors, tiebacks, and soil nails, and have proven to be a suitable and reliable support alternative for such projects. Where minimum tieback lengths or depths are required, the compact section of square shafts generally allow for greater penetration at similar torques than a comparable round shaft. Square shafts also provide an obvious, visible indication of shaft yielding (twisting) to allow less-experienced installers to decrease the applied torque before shaft damage may occur. Not surprisingly, some manufacturers have then adapted the use of square shaft helical piles to include support of compression loads.

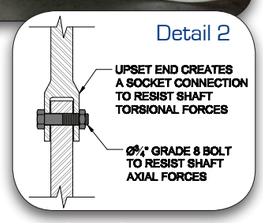


Round vs. Square Helical Piles

Foundation Supportworks (FSI) recommends that round shaft, rather than square shaft helical piles, be used in compression applications for the following reasons:

- Square shaft helical piles typically have a socket and pin coupling which increases variances from straightness, introduces additional eccentricity to the system, and increases buckling potential (See Photo 1).
- The FSI round shaft helical piles are designed so the pile shafts are in direct contact within the coupling connections (See Detail 1). The load path for round shaft piles in compression is then directly through the shafts without having to pass through welds or bolts at each coupling. Shaft to shaft contact is much more difficult to achieve within forged, upset couplings of square shaft (See Detail 2). The load is then transferred through double shear of the single coupling bolt.





For comparable round versus square sections:

- The area of steel for a round shaft is located outward from the neutral axis, thereby providing a higher moment of inertia (resistance to bending) (See Photo 2). This is even more critical in eccentric loading conditions.
- Round shaft typically has a higher installation torque rating.
- Round shaft offers higher lateral resistance due to larger surface area exposed to the surrounding soil.

Coupling details and section properties of seemingly similar helical pile systems can vary significantly from manufacturer to manufacturer. Variations are common in material properties, coupling bolt strengths, degree of oversize of bolt holes, upset couplings versus welded couplings for both round and square shafts, tolerances between couplings and shafts, etc. These variations can affect the overall strength and stiffness of the pile, and are often ignored by many manufacturers in the calculation and presentation of allowable capacities.

FSI offers both round and square shaft helical piles. Please contact FSI if you have any questions regarding our products or product applications.

Jeff Kortan, P.E.
Director of Engineering

FOUNDATION SUPPORTWORKS™

- New Construction and Retrofit Helical Piles
- Helical Tiebacks
- Hydraulically Driven "Push" Piers
- Wall Anchors
- SmartJacks™
- Slab Piers

Distribution Checklist

- ❑ _____
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- ❑ _____
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CASE STUDIES

New Construction Helical Piers

Commercial

Project: Central Decatur School Renovation Project
Location: Leon, IA
Foundation Supportworks™ Dealer/Installer: Midwest Basement Systems, Inc.

Challenge: The Central Decatur Community High School underwent a renovation project to repair distress in the building caused by settlement. Differential cracking in the floor slabs and cracked and settled partition walls were observed. A geotechnical investigation determined probable cause of the settlement to be wetting and subsequent collapse of fill soils as well as consolidation of buried topsoil beneath the weight of fill. Penetrating through hard, dry to damp fill soils at the site was a concern, as reaching the suitable bearing stratum could be difficult. Pile depths of at least 15 feet were required in order to reach the underlying native sandy clay (glacial till) and provide adequate support for the 20 kip design load per pile.

Solution: A helical pile configuration consisting of a 2-7/8 inch outside diameter round shaft with an 8"-10"-12" triple-helix lead section was selected. Extensions would advance the piles to minimum depths so the top helix blade was at least 15 feet below top of pile elevation. Helical piles were the ideal solution for this project because of limited access adjacent and within the existing building. Load tests were completed to verify performance (settlement) under load and confirm the initial calculated design capacities. Once the load tests were completed, sixty-six (66) helical piles were installed to support the new concrete masonry partition walls and a structural floor system. Ultimate capacities of the production piles, determined by correlation to installation torque, were at least twice the design load.

Load test set up prior to installation of performance piles.

Piles are installed in limited access areas within the building using small construction equipment.

Slab Piers

Residential

Project: Housing Authority of Russellville
Location: Russellville, KY
Foundation Supportworks™ Dealer/Installer: Frontier Basement Systems, Inc.

Challenge: The Russellville Housing Authority was established in the late 1950's. In the early 1960's they began constructing one-story, slab-on-grade duplexes with masonry block walls and brick veneer. Fill soil was placed over the original sloping ground surface to level the area for the construction of some of the first units. The floor slab of the unit in question rested on a layer of this fill soil. Over the years, the floor slab settled as the loosely-compacted fill soils consolidated. Differential settlements ranged from one to three inches, causing gaps to form between the floor and the base trim, interior doors to stick within racked door frames, and cabinets, countertops, and plumbing fixtures to settle and pull away from walls.

Solution: Due to the rocky soil conditions and the limited working space within the unit, hydraulically-driven slab piers and foundation piers were selected as the solution. Twenty-one (21) slab piers were installed in a grid pattern spacing of about 5 feet. The slab piers were driven individually to depths ranging from 8 to 12 feet, and each to a force of at least 9,000 pounds. Two (2) exterior foundation piers were installed and driven to over 45,000 pounds of force to stabilize the exterior footing. The interior slab and non-load bearing interior walls were lifted back toward a level position and the outside corner and foundation was lifted approximately one-quarter inch.

Push Piers

Commercial

Project: Fond du Lac YMCA
Location: Fond du Lac, WI
Foundation Supportworks™ Dealer/Installer: Foundation Supportworks of Wisconsin

Challenge: The existing YMCA building was constructed in the 1970's and generally consists of 12-foot high by 12-inch thick poured concrete foundation walls with integral column supports, 17-inch thick spread footings, and a steel-framed superstructure. Construction of a new 14 million dollar addition began in 2009 to house a new child care area, locker rooms, workout studios, and swimming pool. The design of the addition added 160 kips of structural load to one of the existing building columns. Hydraulically-driven push piers were selected to provide the necessary support of this column, due to limited access both inside and outside the existing building and the ability to load test each pier during the installation process.

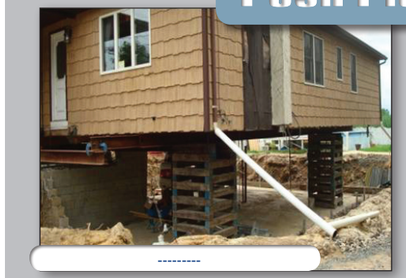
Solution: The pier design and layout consisted of six Foundation Supportworks Model 288 Push Piers, each designed to support 26.7 kips. Four piers were installed outside the existing building and two piers were installed inside the existing building. Test borings closest to the area of the proposed column support piers indicated competent soils at depths ranging from about 30 to 40 feet. Foundation Supportworks of Wisconsin installed the six piers in two days to an average depth of 37.5 feet. The piers were driven to an average ultimate capacity of 57.2 kips, thereby providing a factor of safety of at least two. The ultimate driving pressure/load was held on each pier to monitor the pier for any creep movement. The drive pressure was released, all the piers connected in series, and a uniform seating pressure/load was applied.

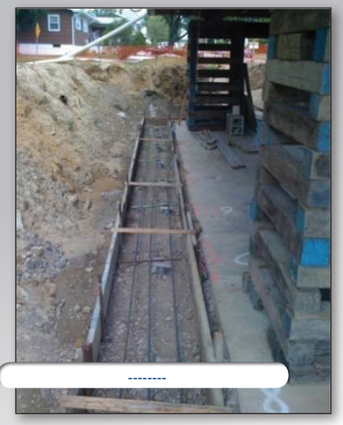
Footing prepared and bracket set

Piers are driven to stable soils

Push Piers and New Construction Helical Piers

Residential





Project: Coyle Residence
Location: Sayreville, NJ
Foundation Supportworks™ Dealer/Installer: Foundation Supportworks of New Jersey

Challenge: The Coyle home is a ranch-style home built in the 1960's. Settlement of 16 inches was observed in the right rear corner of the house, and settlement of more than 4 inches was observed on the north side of the garage. Due to the severe settlement, the homeowner was seeking to replace the foundation to bring the home to a level position. However, foundation replacement alone would not be enough as the homeowner wanted assurance that settlement would not occur again with their new foundation.

Solution: Foundation Supportworks of New Jersey, working with the homeowner's mason, recommended twenty-eight (28) new construction helical piers and eight (8) retrofit push piers to effectively transfer the weight of the home and garage to deep, suitable soils. The house was raised off its original foundation and the footing and foundation wall were removed. Foundation Supportworks of New Jersey then installed the new construction helical piers along the house perimeter to depths of 36 feet. The tops of the helical piers were cast into the new footing/grade beam. To stabilize the sunken footing on the garage wall, eight (8) push piers were hydraulically driven to suitable soils. Foundation Supportworks of New Jersey lifted the garage wall approximately 4" towards a level position.