FOUNDATION NATION

FSI NEWSLETTER FOR DESIGN PROFESSIONALS

LET'S GET TECHNICAL with the new FSI Technical Manual

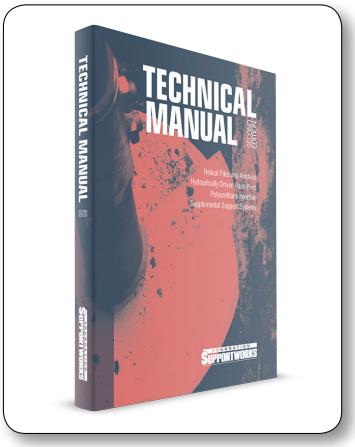
Jeff Kortan, P.E • *Director of Engineering*

The Foundation Supportworks, Inc. (FSI) technical manual received a major overhaul for 2014. The new 363-page, soft-cover manual is literally hot off the presses, with nearly 3,000 ordered by the FSI network of installing contractors the very first week it was offered. We suspect that most of those copies, as well as future orders, will make their way into the hands of design professionals across North America.

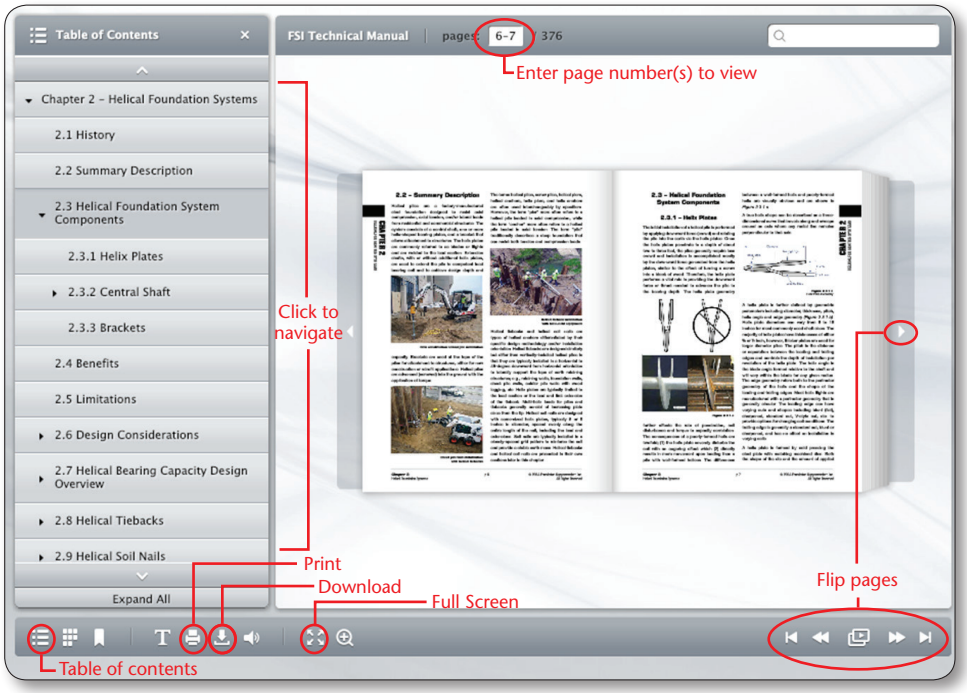
The original technical manual published in December 2010 focused on helical piles, tiebacks and soil nails. That helical section was refreshed and expanded for the second edition. We added helical shaft sizes, new construction brackets, and retrofit brackets to reflect our current standard offerings. Capacities are provided for all helical system components considering multiple levels of corrosion (plain, plain corroded, and galvanized corroded). The corroded capacities include a 50-year scheduled sacrificial loss in thickness per ICC-ES AC358. Appendix 2C is all about HelixPro®, our web-based helical foundation design software.

The list of revisions and updates to the helical chapter goes on and on….too much to list in this short article.

The manual now also includes chapters on hydraulically-driven push piers, polyurethane foam injection, and miscellaneous supplemental support products for stabilizing basement walls and floor joists within a crawl space. The system capacities of the basement wall and crawl space stabilization products are generally better suited to residential loading conditions for which they were originally considered and designed. However, these products have all found practical uses and applications on commercial and industrial projects as well, so we felt it appropriate to include brief sections on these products to inform designers of available options.



New FSI Technical Manual, Second Edition



Electronic version of the FSI Technical Manual at OnStableGround.com

An electronic version of the technical manual can be found on the FSI commercial website, OnStableGround.com. Click through the Technical Information and the Technical Manual links to launch the interactive technical manual. Navigate by flipping through the pages one by one, entering page numbers in the top toolbar, or clicking on the desired section from the table of contents (accessed from the bottom toolbar). The bottom toolbar also allows the user to print or download any or all of the manual. On the website page, below Technical Manual in the vertical dropdown menu, a Supplemental Materials link provides a list of any technical manual updates, new products, and other products not included in the current edition.

Contact your local FSI installing contractor to get your complimentary hard copy of the new technical manual. In the meantime, you can access all that information, and more, from the website.

FOUNDATION SUPPORTWORKS®

- New Construction & Retrofit Helical Piles
- Helical Tiebacks
- Helical Soil Nails
- Hydraulically Driven "Push" Piers
- Wall Stabilization Systems
- PolyLEVEL® Polyurethane Foam Injection
- StableFILL™ Cellular Concrete

CASE STUDIES - HELICAL PILES

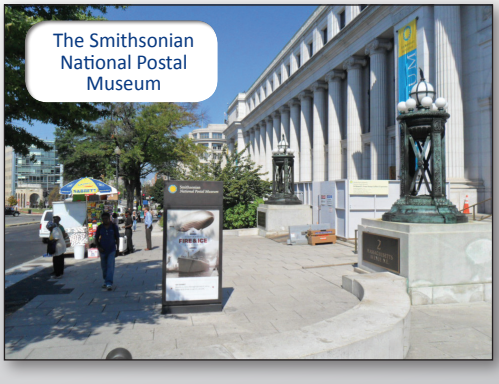
Project: Smithsonian National Postal Museum ● **Location:** Washington, D.C.
Pile Installer: JES Construction, Inc.

Commercial

Challenge: A renovation at the Smithsonian's William H. Gross Stamp Gallery included the construction of a new interior elevator shaft. A test boring encountered loose sand fill to a depth of 20 feet, soft sandy clay to a depth of 33.5 feet, and loose to low-end medium dense sand to 75 feet.

The design team recommended that the elevator be supported on helical piles. Helical piles appeared to be an ideal deep foundation solution due to the restricted access to the work area and equipment size and type limitations. Installation equipment had to cross marble tiled floors through portions of the active museum, pass through narrow hallways and standard doorways, and be powered by air or electricity (no combustion engines of any type allowed in the building). Mobilization would also occur at night when the building and museum were closed.

Solution: The foundation design included seventeen (17) helical piles embedded in a concrete pile cap. The helical pile configuration consisted of the Model 288 (2.875-inch OD by 0.276-inch wall) hollow round shaft with an 8"-10"-12" triple-helix lead section to support a design working compression load of 23.5 kips per pile. The piles were advanced using standard five foot extensions to depths ranging from 21.5 feet to 40 feet, and to ultimate torque-correlated soil capacities of at least twice the design working load (FOS ≥ 2). Installation torque was monitored throughout the installation process using a calibrated torque transducer. The piles were installed with a specialized rubber-tired, battery-powered unit with a telescoping arm and outriggers for stability. The drive head was run by a remote hydraulic source outside the building. The tops of the piles were cut to the required elevation and fitted with standard new construction brackets.


The Smithsonian National Postal Museum


Installing HP288 lead section

Project: Dollar Bank ● **Location:** Gibsonia, PA
Pile Installer: Baker's Waterproofing & Foundation Repair

Commercial

Challenge: A new single-story, slab-on-grade building was planned adjacent to the existing bank. When completed, banking operations would move to the new building and the old building would be demolished. Customers were to receive uninterrupted service between the two facilities.

A geotechnical investigation identified six to ten feet of fill and weak residual clay soils over very stiff to hard weathered shale bedrock. The geotechnical engineer recommended that the proposed structure be supported on helical piles to avoid deep excavations adjacent to the existing building. Helical piles were then proposed for the entire structure to provide uniform deep foundation support. Helical piles can also be installed with little to no vibration "felt" by surrounding structures. Vibrations caused during the proposed construction could activate the bank vault's sensitive alarm system.

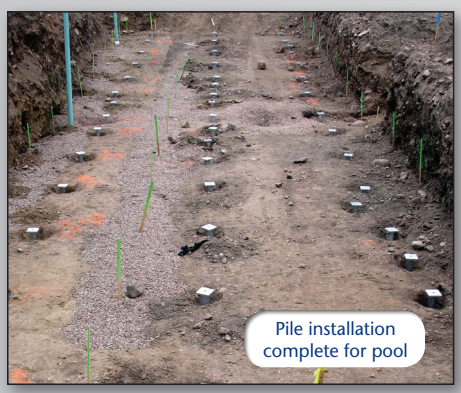
Solution: The foundation design included one hundred thirty-seven (137) Model 237 (2.375- inch O.D. by 0.154-inch wall) round shaft helical piles with a 14-inch diameter, single helix plate on the lead section to support a design working load of 10 kips per pile. The helical piles were advanced to depths up to 17 feet to achieve torque-correlated ultimate capacities of at least twice the design working load (FOS ≥ 2). The piles were generally taken to their torsional rating of 2,500 ft-lb. The tops of the piles were cut to design elevations and fitted with new construction brackets to be cast into the concrete grade beams and pile caps. A tight construction schedule dictated that equipment be mobilized quickly and pile installation be completed in five days. The 137 helical piles were installed in just four days despite the wet and soft ground surface conditions.

Connecting product adaptor to helical pile


Helical piles installed; ready to cut to design elevation

Residential

Preparing to advance ten-foot extension



Pile installation complete for pool

Project: Swimming Pool and Pool Deck ● **Location:** Aspen, CO
Pile Installer: Foundation Repair of Western Colorado

Challenge: A 20 foot by 40 foot in-ground swimming pool with surrounding concrete deck was planned. The pool would have a sloped bottom to provide water depths ranging from 4 to 6 feet. Typical of soil profiles along slopes in the Colorado Rocky Mountain Region, the upper native soils consisted of silty sandy clay with cobbles and boulders. Up to 10 feet of fill was also brought to the site to create the level area for the construction of the pool. The fill was comprised of similar silty sandy clay with hard fractions. The pool and deck would be designed with deep foundation support to penetrate the fill and weaker native soils.

Solution: The original design for the pool and deck included 41 Model 288 (2.875-inch OD by 0.276-inch wall) and 14 Model 349 (3.50-inch OD by 0.300-inch wall) round shaft helical piles with 8”-10”-12” triple-helix lead sections. The piles would support design working loads ranging from 14 to 40 kips. With the presence of the fill and weak native soils near the original ground surface, a minimum helical pile depth of 15 feet, as measured from pool deck subgrade elevation, was specified.

Cobbles and boulders were encountered during the helical pile installation, hindering pile advancement and affecting location accuracy. Piles were removed and relocated where they could not pass obstructions and reach the minimum specified depth. Seven additional Model 288 and seven additional Model 349 helical piles were required where pile relocation distances were beyond structurally-tolerable limits. The piles were advanced to depths ranging from 15 to 27 feet to achieve torque-correlated ultimate capacities of at least twice the design working loads (FOS ≥ 2). The tops of the piles were cut to design elevations and fitted with new construction brackets to be cast into the poured concrete slabs. The 69 helical piles were installed in six days.

Commercial

Predrilling at column locations prior to helical pile installation

Helical piles installed within grade beams at column locations

Project: Barale Ranch Lodge Stabilization ● **Location:** Colusa County, CA
Pile Installer: Foundation Repair of California

Challenge: The Barale Ranch duck hunting lodge experienced significant settlement up to nine inches over a period of several years. The large, elevated wood structure with the main floor level nearly two stories above grade was built along the bank of a natural creek. At the time of building construction, a wooden retaining wall up to five feet tall was built to retain a wedge of fill to create a level building pad. The lodge was then constructed on wood columns and shallow concrete footings. The settlement created an obvious lean to the building with sloped floor conditions across the width of the footprint. Deep foundations were required to support the building below fill and weak native clay soils. The project required a five week foundation design/construction schedule to ensure that the lodge would be ready in time for the upcoming hunting season.

Solution: The lodge would be supported on a completely new foundation consisting of grade beams, concrete piers/columns and steel braced frames. Eighty-eight (88) Model 288 (2.875-inch OD by 0.276-inch wall) hollow round shaft helical piles with an 8”-10”-12” triple-helix lead section were installed vertically and cast into the concrete columns to support design compression loads up to 24.5 kips. Seventeen (17) Model 288 helical piles with a 10”-12”-14” triple-helix lead section were installed at a 45-degree batter and cast into the grade beams to resist design lateral loads up to 20 kips. Thirty-two (32) Model 237 (2.375-inch OD by 0.154-inch wall) hollow round shaft helical piles with an 8”-10” double-helix lead section were installed vertically and cast into concrete columns to support design compression loads up to 8.7 kips for the surrounding wood deck. With the variable soil profile and the range in required pile capacities, vertical and battered pile lengths ranged from 18.5 to 50 feet. Installation of the 137 helical piles was completed within the allotted time frame to keep the project on schedule to reopen the lodge. With the new foundation system in place, the building was disconnected from the existing columns in sections, leveled, and then resupported on the new foundation.

LOOK INSIDE!

Cover Article

Let's Get Technical!

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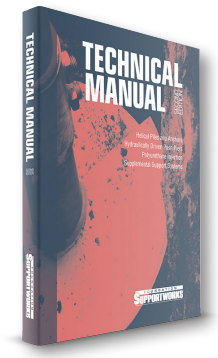

Featured Case

- Smithsonian National Postal Museum - Washington, D.C.
- Dollar Bank - Gibsonia, PA
- Swimming Pool and Pool Deck - Aspen, CO
- Barale Ranch Lodge Stabilization - Colusa County, CA

Upcoming Webinar Opportunities

An Introduction to Helical Foundation Systems
1st Wednesday of every month 11:30am(CST) and 1:30pm(CST)

An Introduction to Polyurethane Foam Injection
2nd Wednesday of every month 11:30am(CST) and 1:30pm(CST)

An Introduction to Hydraulically Driven Push Pier Systems
3rd Wednesday of every month 11:30am(CST) and 1:30pm(CST)

To sign up email us at *training@foundationsupportworks.com* with the following information:

- Name of the firm
- Location of firm
- Approximate number of engineers/architects/GCs that will be in attendance

*FSI is an approved provider through the AIA, RCEP and the Florida State Board of Engineers for continuing education credits

HELIXPRO
Helical Foundation Design Software For Professionals

HelixPro™ Design Software is a state-of-the-art program that allows you to calculate bearing and uplift capacities of FSI helical piles as well as tension capacities of FSI helical tiebacks as they pertain to specific site and soil parameters.

Register today to use this FREE state-of-the-art software program:
www.helixpro.foundationsupportworks.com

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