

### Models 288 and 350 Helical Piles

**Project:** *Bowe Machine Building Renovation*  
**Location:** *Bettendorf, IA*  
**Date:** *October 2015*

#### Challenge:

The renovation of a 15,000-square-foot building was planned at the Bowe Machine facility. New foundations were required at 39 new column locations and for a large gantry milling machine. A geotechnical investigation identified a general subsurface profile consisting of one to four feet of fill over low-strength alluvial silt, sand, and clay to depths from ten to 15.5 feet. Weathered shale, siltstone, and limestone bedrock was identified below the alluvial deposits to the maximum explored depth of 33.5 feet.

Auger cast piles were originally considered to support the proposed columns and a large mat foundation for the gantry mill. However, many of the pile locations were in areas of limited access and/or relatively close to sensitive equipment within the existing building. The project designers had to consider deep foundation alternatives that would not require large installation equipment or cause excessive vibration.

#### Solution:

Helical piles were selected as the ideal deep foundation solution. Helical piles can be installed quickly, using relatively small equipment within limited working space. Helical piles are also installed with minimal vibration and do not produce spoils. The foundation design included pile caps with one, three, four, or five helical piles to support the proposed column loads. The pile cap proposed to support the gantry mill would include 16 helical piles. One full-scale, compression load test was performed on a sacrificial pile to verify helical pile capacity and the deflection-to-load response. With shallow bedrock, two large excavators were parked over the load frame to provide the necessary reaction for the load test.

Sixty eight (68) Model 288 (2.875-inch OD by 0.276-inch wall) hollow round shaft helical piles were installed to support a design working compression load of 30 kips. Ninety four (94) Model 350 (3.50-inch OD by 0.313-inch wall) hollow round shaft helical piles were installed to support design working compression loads of 40 and 50 kips. Both shaft sizes utilized a 10"-12"-14" triple-helix lead section. Standard extensions then advanced the piles to depths up to 20 feet to bear on or within the competent weathered bedrock. The piles were advanced to torque-correlated ultimate capacities of at least twice the design working loads ( $FOS \geq 2$ ) or to spin-off on competent bedrock. The piles were fitted with standard new construction brackets to be cast within the pile caps. The helical pile installation was completed within 16 days.

### Project Summary

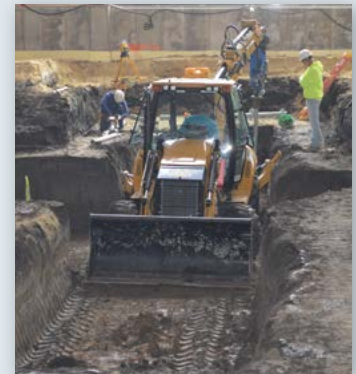
**Structural Engineer:** *Select Structural Engineering*  
**Geotechnical Engineer:** *Terracon Consultants, Inc.*  
**General Contractor:** *Bush Construction Company, Inc.*  
**Certified Pile Installer:** *MidAmerica Basement Systems*  
**Products Installed:** *(68) FSI HP288 and (94) FSI HP350 Helical Piles, 10"-12"-14" Helix Plate Configuration, Installed Depths up to 20 feet, Design Working Compression Loads from 30 to 50 kips*



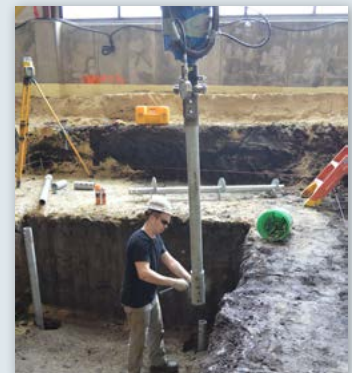
Positioning test pile lead section for installation.



Load test using 50,000 lb. excavators as reaction



Installing production piles within existing building



Preparing to connect extension to installed pile