

# Helical Piles Support New Building Addition

## Project

Scenic Regional Library Addition

## Location

Warrenton, MO

### CHALLENGE ▾

A 3,000 square foot building addition was planned for the main entrance of the Warrenton Scenic Regional Library. Four soil borings were advanced within the building addition footprint. The borings identified very soft to soft clay to depths of about 3 to 9 feet. Medium stiff to very stiff clay and medium dense sand layers were observed below the soft clay extending to the termination depth of the borings at 20 feet. Groundwater depths were from 5 to 7 feet during the investigation. Based on the presence of the upper very soft to soft clay, the geotechnical recommendations included a shallow footing design with over-excavation and replacement with select fill to a depth of at least 3 feet below the bottom of the proposed footings. During the over-excavation activities, soil conditions were found to

be worse than what was anticipated from the geotechnical investigation. The poor soil conditions would require deeper over-excavation and additional shoring along with underpinning of the existing foundation. There were also problems performing the over-excavation and compaction due to high groundwater levels and cold weather conditions. The combination of these issues was going to significantly delay the project.

To minimize the project delay, the design team pursued options for a deep foundation system with pile caps and grade beams. The redesigned pile caps included column compression loads ranging from 15 to 65 kips and tension loads ranging from 15 to 25 kips. Some of the pile cap locations also included 15 kip lateral loads to be resisted by the piling system.



Front entrance at the start of construction

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Continued

## SOLUTION

Helical piles were selected as the preferred deep foundation option given the site accessibility, low vibration installation, quick installation, and the ability to pour grade beams and pile caps immediately after pile installation. The design included multiple piles per pile cap with a combination of vertical and battered piles to support the compression, tension and lateral loading.

The helical pile design consisted of the Model 288 (2.875-inch OD by 0.276-inch wall) hollow round shaft with 8"-10" double-helix lead sections. The vertical piles required termination torques of either 6,000 or 7,900 ft-lb and the battered piles required termination torques of 6,000 ft-lb to provide a factor of safety of 2 for the various loading conditions. The piles were fitted with new construction brackets and cast into the concrete pile caps and grade beams. The pile leads, extensions and brackets were hot-dip galvanized for corrosion protection. Thirty-four helical piles were installed in one day.



Excavations for grade beams and pile caps



Vertical and battered helical piles within pile cap



Installing helical piles with a skid steer



Pile cap and grade beam reinforcement installed around helical piles

## PROJECT SUMMARY

- Architect:** JEMA
- Structural Engineer:** AEdifica Case Engineering, Alper Audi Inc.
- Geotechnical Engineer:** Cochran Engineering
- General Contractor:** Wright Construction
- Pile Installer:** Foundation Supportworks® by Woods
- Products Installed:** (34) Foundation Supportworks® Model 288 Helical Piles, Installed Depths of 21 to 30 feet, Design Working Loads of 15 to 65 kips Compression, 15 to 25 kips Tension, and 15 kips Lateral

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