

# Helical Piles Support Substation Thrust Block And Superstructure

## Project

Blount Street Substation

## Location

Madison, WI

### CHALLENGE ▼

The Blount Street Substation project included the installation of a new underground transmission line. Upon completion of the new underground line, an existing high-voltage overhead line would be decommissioned. The work included installation of 1) a poured concrete thrust block to encase an 8-inch diameter cable pipe and 2) a poured concrete spread footing to support new superstructure. While excavating for the 9-foot deep thrust block, the contractor uncovered soft, wet peat soils. A geotechnical investigation then included one soil boring advanced to a depth of 21.5 feet. The soil profile was described as loose to very

loose silty sand fill from the surface to a depth of 9 feet, very loose clayey silt from 9 to 13 feet and soft to medium stiff silty clay from 13 feet to the bottom of the boring at 21.5 feet. Standard Penetration Test (SPT) blow count values throughout the explored profile ranged from 0 (weight of hammer) to 5 blows per foot.

The thrust block and spread footing were redesigned with deep foundation support. The thrust block redesign required four piles with ultimate compressive capacities of 17 kips per pile. The spread footing (pile cap) redesign required three piles with ultimate compressive capacities of 43 kips per pile and ultimate tensile capacities of 34 kips per pile. The piles

would be installed below overhead transmission lines carrying 69,000 volts and 137,000 volts of electricity. Although several deep foundation systems were considered, helical piles were selected as the ideal option given the extreme limited access and the ability to quickly mobilize equipment and product to the job site. Helical piles were to extend to depths necessary to provide torque-correlated ultimate capacities exceeding the design loads.

### SOLUTION ▼

Seven Model 288 (2.875-inch OD by 0.276-inch wall) round shaft helical piles were installed with 10"-12"-14" triple-helix lead sections.



Installation below 69,000 volts

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► *Continued*

Four helical piles were installed in the 9-foot deep thrust block pit to an average length of 28 feet and an average torque-correlated ultimate capacity of 24.3 kips. Three piles were installed in the pile cap at a 6V:1H batter to allow for proper spacing at the anticipated depth of the helix plates. The three piles were installed to an average length of 44 feet and an average torque-correlated ultimate capacity (compression and tension) of 64 kips. Foundation Supportworks of Wisconsin installed the seven piles in one day.



Piles advanced in shored pit for thrust block



Pile installation complete for pile cap



Piles installed at a batter of 6V:1H



Lead section advanced

## PROJECT SUMMARY ▼

<b>Owner:</b>	American Transmission Corporation
<b>Geotechnical Engineer:</b>	Midwest Engineering Solutions
<b>General Contractor:</b>	Intercon Construction
<b>Certified Pile Installer:</b>	Foundation Supportworks of Wisconsin
<b>Products Installed:</b>	(7) Foundation Supportworks® Model 288 Helical Piles, 10"-12"-14" Lead Section, Installed to Average Lengths of 28 feet and 44 feet, Design Ultimate Loads of 17 to 43 kips

For additional case study and technical information please visit [Commercial.Supportworks.com](http://Commercial.Supportworks.com).