

### Model 288 Helical Piles

**Project:** Ellis Park Road Forcemain Construction  
**Location:** Toronto, Ontario  
**Date:** February 2015

#### Challenge:

A sanitary sewer forcemain was planned along an existing roadway. A 280 meter long section of the forcemain would include two 200 millimeter (nominal 8") PVC pipelines set on concrete grade beams supported by a pair of helical piles spaced roughly three meters apart. Excavations would then be backfilled with engineered fill.

A geotechnical investigation included six soil borings advanced to depths from 6.7 to 8.2 meters. The subsurface profile generally consisted of very loose to dense granular fill to depths of 0.3 to 5.3 meters, underlain by very loose to dense sand with silt seams to the maximum explored depths. Groundwater was encountered from 1.2 to 6.6 meters from grade.

#### Solution:

Helical piles were considered to be the most viable deep foundation solution as they can be installed quickly with relatively small equipment. The helical piles for this project could be installed from above the excavation and around the trench shoring system with minimal disruption to roadway traffic. Two hundred and sixteen (216) Model 288 (2.875-inch OD by 0.276-inch wall) round shaft helical piles with a 10"-12"-14"-14" helix plate configuration were installed to depths ranging from 21 to 35 feet to support the proposed forcemain cradles. The helical piles were designed in accordance with the Ontario Building Code using Limit State Design (LSD) methodology. The helical pile factored compression loads were determined to be 174 kN ( $\approx$  39 kips), resulting in a required nominal resistance (ultimate pile capacity) of 290 kN ( $\approx$  65 kips) using a resistance factor of 0.6. Prior to the installation of the production piles, two compression load tests were performed on sacrificial piles to determine the load-versus-displacement response and to verify the helical pile configuration. The test and production piles were installed to a final installation torque of at least 7,300 ft-lb for torque-correlated ultimate capacities of at least 290 kN. Compression-only new construction pile caps were fitted to the tops of the installed piles to be cast onto the concrete grade beams.

### Project Summary

**Structural Engineer:** URS Canada, Inc.  
**Geotechnical Engineer:** Coffey Geotechnical, Inc.  
**General Contractor:** Metric Contracting Services Corporation  
**Certified Pile Installer:** Foundation Supportworks® of Ontario  
**Products Installed:** (216) Foundation Supportworks® HP288 Helical Piles, 10"-12"-14"-14" Lead Sections; Installed Depths from 21 to 35 feet, Design Ultimate Capacity of 290 kN



Installing helical pile lead from above excavation



Installed piles within forcemain excavation



Piles cut to specified elevation and fitted with compression-only brackets



Steel reinforcement placed over installed piles for poured foundations