



CASE STUDY

Project:	Structural Engineer:	Geotechnical Engineer:	Contractor:
Falcon Drive Condo Complex. Coquitlam, B.C.	G. S. Sayers Engineers Burnaby, B.C.	Golder & Associates Burnaby, B.C.	Vickars Developments Burnaby, B.C.

Project description:

Two four unit complexes, in this 12 year old (multi residential - strata titled) complex were undergoing persistent settlement of theirs foundations and structural assemblies causing cracking of fit and finishes binding of doors and windows. These changes were associated with loss of resale value for the units of the complex as well as causing anxiety in tenants of the buildings, for the safety of their families. The complex was constructed as a three floor wood frame buildings astride reinforced concrete foundation with footings two feet below site grade. Ground floor of all units consisted of an un-reinforced concrete grade slab.

Soils:

Soil conditions were found to be 2-3' of fill over 4-5' of peat then soft silts and sandy silts to 12-20' overall depth, changing into dense sandy glacial till with occasional cobble after that.

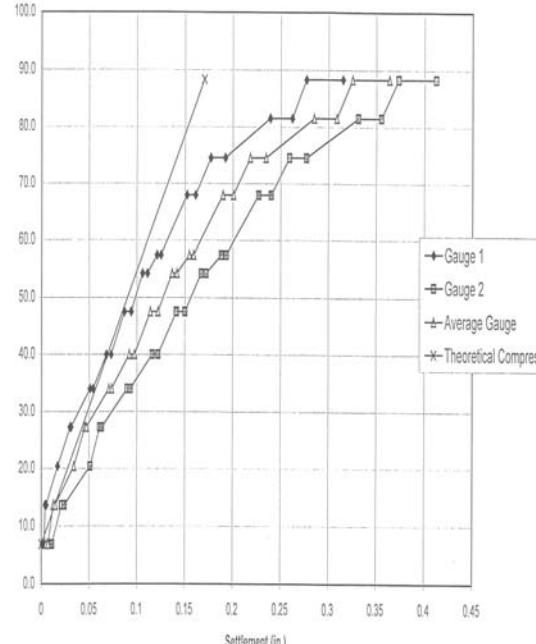
Underground obstructions around the site included drainage piping, sewage outflows, electrical supply and natural gas services.

Approximately 98 and 104 pilings were placed in the basements of each of the structures, to support each four unit complex. Pile design loads were 30 kips (135kN) with a two times safety factor for ultimate loads of 60 kips (270kN).

Repair:

Helical Pulldown™ Micropiles were selected due to the height restrictions on the site requiring pile placements in the basement of

Load - Settlement Curve - Test Pile 3 Unit 104



the existing structure. As well piles were required to be installed into the dense underlying glacial till soils with portable hand held equipment accessible to the basements on site.

The Helical Pulldown™ Micropile size and configuration used was ss5 6-8-10 inch helical triple lead section employing a 6" grout column placed through a PVC 6" pipe 5'- 10' long. The pile was turned into target soils between 14'- 24' below grade with final torques exceeding 5000 ft/lbs.

Load testing:

Two pile load tests were performed under the direction of Golder and Associates . The piles were loaded to a minimum of 200% of design load or up to 60 kips (270kN). At the request of Vickars one of the piles was tested to 90 Kips (405 kN). The test pile was installed using a hand held portable pile driving rig with pinned torque bar to resist torsional loads. It was placed to minimum torques of 5500 ft lbs at terminal depths and utilized a 6" grout column of silica fume grout reinforced with 30mm long polyfibres.

Final average displacement of the pile head was less than 0.25 inch at design loads and 0.75 inch at ultimate load.

Production Piling and Installation:

All production piling was placed (as with the test piles) using a hand held torque motor/driver resisting torques by using a telescoping torque bar pinned to immobile objects on the site. Hydraulic fluid supplied by a portable hydraulic pump for full site mobility, controlled through a foot pedal at the drive head. Grout used was a proprietary silica fume mixture, reinforced using polyfibrils, as supplied by Basilite Concrete Products Inc. of Vancouver, B.C. It is sold as Pulldown Pile Grout Type A.

