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HPS Loads Up on Helical Pile Testing

December 15, 2009

Helical Pier Systems Ltd. (HPS), is proud to report that it recently completed the world's first Osterberg cell (O-cell) load test of a Helical Pile. The test was completed in a mere 4 hours by a team of engineers assembled by HPS and its development partner, LOADTEST (LTI), the internationally recognized leader in pile load testing. The test site was located in Fort Saskatchewan, Alberta, Canada, the centre of the industrial heartland of Alberta.

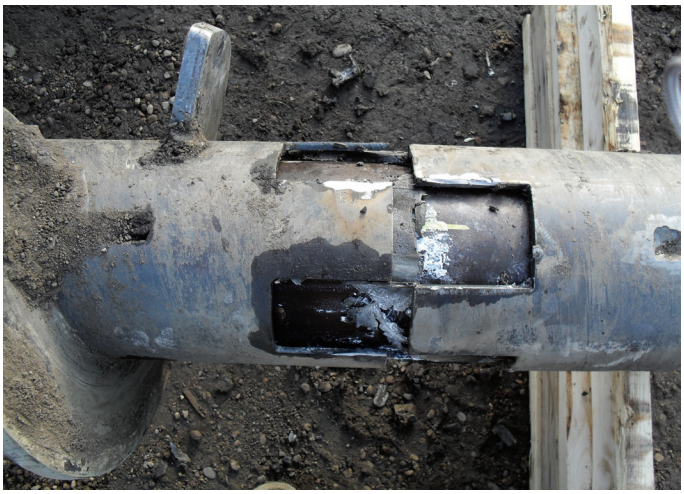

Figure 1 Two Piece Pile

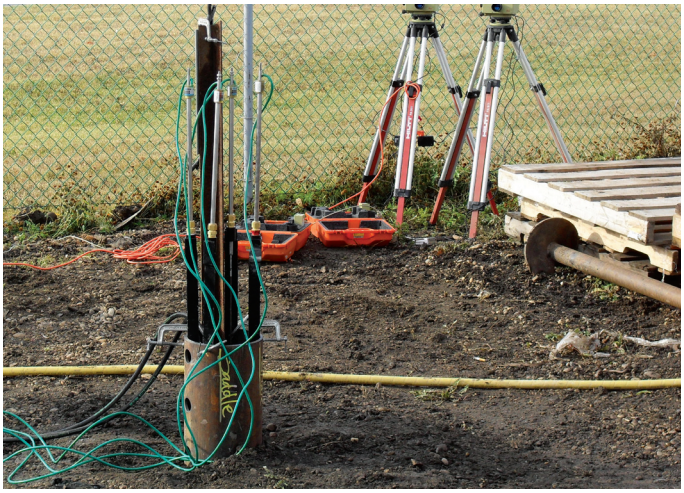

Figure 2 Test Apparatus

It was selected on the basis that a top down pile test was completed on that site at an earlier date. Having the top down test results allowed a comparison of the O-cell test results with the previous test data. A soil investigation was even available for the site, which also played a part in the selection. The helical piles designed for the test were 219mm in diameter and 6m long. These piles had unique characteristics that allowed the pile to separate into an upper and lower section near the bottom helix.

The Osterberg cell test method is a bi-directional test utilizing the O-cell, a patented technology developed by LOADTEST. It is a bi-directional testing method which until now was almost exclusively used to establish the bearing capacity of bored piles, augered-cast-in-place (ACIP) piles and driven concrete and steel piles. The O-cell test method involves installing the O-cell assembly in a predetermined location within the pile, either prior to driving or prior to casting concrete. After curing or set-up, the O-cell is hydraulically pressurized from the surface, simultaneously loading the pile section above the O-cell and the pile section below it. As the load is applied to the lower and upper sections of the pile measurement devices sense the movement of both sections of the pile. The true genius in the O-cell test is that both the end bearing capacity and sleeve friction capacity are tested simultaneously, with each of these bearing components quantified individually. The engineers of HPS believed that this method could also be applied to a helical pile. The traditional top down load test method prescribed by ASTM D1143, as illustrated in *Figure 3*, is currently the only method available to helical piling contractors for the determination of the true compressive capacity of a helical pile. Consider that this traditional test method requires the friction component of the pile under test be overcome

before the end bearing component engages. This has long been a limitation of the top down testing method. HPS and LTI engineers jointly developed a concept where the O-cell is installed in a space near the bottom of a 2-piece helical pile as illustrated in *Figure 1*. The pile is advanced into the ground using the traditional helical pile installation method. Once installed all of various test equipment is connected. The test method follows the standard D1143 test method of applying incrementally greater forces on the pile over specified time intervals. The difference here is that there is no need for a reaction beam or reaction piles. The complete test apparatus is shown in *Figure 2*. Once the test was complete the pile and O-cell were extracted. The look of amazement on the faces of the LOADTEST engineers tells the story. This was the first time in over 2,000 tests completed by LOADTEST that an O-cell was recovered for re-use. In fact all equipment was recovered without incident or damage, ready for re-use on another test.

This idea came to HPS Chief Engineer, Thomas Bradka, P.Eng., M.Eng. while attending a seminar on foundation engineering by Dr. Bengt H. Fellenius, a highly distinguished foundation engineer in the piling industry. Dr. Fellenius discussed the concept of bi-directional testing on CIP concrete and steel driven piles. Mr. Bradka latched on to the idea of applying the same method to helical piles. After performing the test in the fall of 2009, HPS and LTI signed a letter of understanding solidifying the companies relationship. This understanding allows for quick and inexpensive load testing of helical piles while maintaining an arm's length relationship between the test company and the piling contractor. HPS and/or its licensed users, once trained and certified by LOADTEST, are able to install the test piles anywhere in the world. Once the test equipment has been hooked up and LOADTEST has been contacted, they will perform, monitor, record and report the test results. This is all done remotely from their office using their patented remote testing technology. HPS and LTI have jointly applied for a patent of the technology with both US and Canadian Patent agencies and they are now pending.

Alvin Pyke, P.Eng. Chief Executive Officer for HPS, states that this test method will reduce the cost of load testing by as much as 80%. The engineering department of HPS is currently completing a more extensive test program to compare the traditional top down method to the O-cell test method.

Helical Pier Systems Ltd. is an employee owned company with the head office located in Fort Saskatchewan, Alberta, Canada. The company recently expanded it's US market by opening its first permanent office in Houston, Texas. HPS has been in business since 1977 and currently employs 95 personnel servicing over 100 installers worldwide. Along with helical piles, HPS capabilities also include driven steel, concrete and Cast-in-Place concrete servicing the residential to heavy industrial markets. The ability to engineer, sell and service all of the major pile technologies allows the company to be a one stop shop for optimized turn-key foundation design and installation. ■

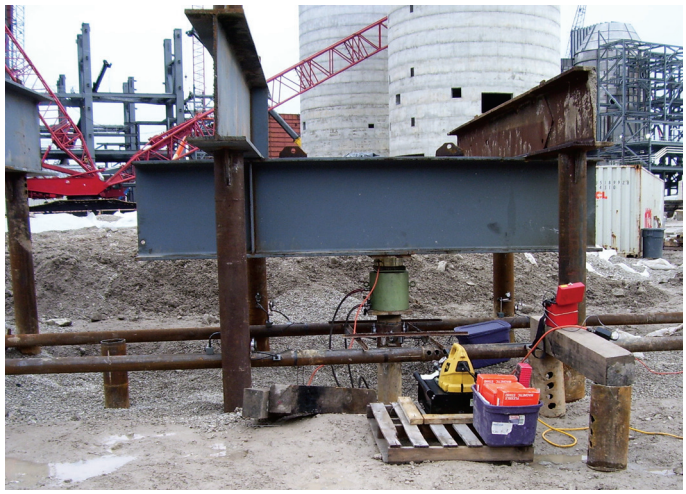

Figure 3 Traditional Top Down Load Test