



DID YOU KNOW:
GRL ENGINEERS TURNED 30
YEARS OLD IN 2006?



Assuring Quality Under Challenging Circumstances

by Gina Beim, PE

The deep foundations industry frequently faces the need to test foundation elements in challenging locations. Developments in electronic testing tools have enabled the industry to tackle these situations. For example, in projects where static testing was difficult or impossible to perform, such as on foundations over water, high strain dynamic testing became a routine solution for performing load tests. In restricted or hard to get to locations that once complicated any type of testing, high strain dynamic testing may now be done remotely. On job sites where power availability would once hamper pile integrity testing (this test once required a relatively large vibrator connected to a large power source), the current pulse echo method test has been performed for some time with a portable, battery operated device using a small hand-held hammer.

Cross-hole Sonic Logging (CSL) now joins the testing methods that can be performed in challenging situations, thanks to the advent of the Cross Hole Analyzer model CHAMP. The recently introduced portable, light-weight CHAMP is battery operated and has allowed engineers to perform CSL on job sites where such a test would otherwise be difficult. Three such project examples will illustrate where the CHAMP has facilitated CSL testing.

A cable-stayed bridge supported by drilled shafts is currently under construction over the Potengi River that separates the cities of Natal and Redinha in northeastern Brazil. CSL was specified to assure the quality of the shafts. The first part of the testing program consisted of performing CSL on 12 drilled shafts that were 2 m (6.6 ft) in diameter and about 53 m (174 ft) in length. PDI Engenharia, who performed the tests, initially used the CHA-QX but later switched to the CHAMP and reported that traveling to the site and testing the shaft with the smaller instrument was much easier. The battery lasted all day and no additional power source was required.



CSL testing with CHAMP in Brazil



Drilled Shafts, bridge over Potengi River

The California office of GRL Engineers was retained to perform cross-hole sonic logging in Baja, Mexico. Anytime testing is required in locations that require airline transportation, recently imposed more stringent airline restrictions on baggage weight present a potential cost increase. GRL was able to avoid excess baggage fees and transfer the transportation cost savings to its client by offering the CSL service with a much lighter piece of equipment that does not exceed airline baggage weight limits.

Certainly the most challenging of the projects was the Blennerhassett Island Bridge over the Ohio River (side note for American history students: this island was made infamous by Aaron Burr). This bridge is supported by 10.7 m (35 ft) long 2.3 m (7.5 ft) diameter drilled shafts that were drilled from a barge and included access tubes for CSL testing. In the river piers, the top of the concrete was 9 m (30 ft) below water level, at the river bottom, and steel shells rose 12 m (40 ft) above the concrete to provide access for construction and testing. Six access tubes were installed in each of the shafts. The only way to perform the CSL test was from a 1 m by 1 m (3 ft by 3 ft) basket that was lowered into the shafts. Engineers from the GRL Ohio office carried the CHAMP as they rode in the basket. They welcomed the low weight of the instrument and the fact that it had sufficient battery life for the entire test.



Blennerhassett Island Bridge, mid river shaft

CSL is frequently required by US Departments of Transportation for situations of shafts installed with slurry, and is recommended in manuals issued by the Deep Foundations Institute, ADSC and the FHWA. CSL testing procedures are standardized by ASTM D6760-02.