



Crosshole Sonic Logging (CSL) Services

Crosshole Sonic Logging (CSL) is an alternative integrity testing method for drilled shafts. It is performed by transmitting and receiving an ultrasonic signal between two parallel access tubes cast into a deep foundation element. CSL integrity testing allows an evaluation of concrete integrity and homogeneity within the shaft area defined by the perimeter of the access tubes. CSL results are used to determine the location and severity of potential shaft anomalies. CSL is a relatively quick test that has no depth restrictions, and are typically performed three to seven or more days after concrete placement.

CSL Integrity Test Foundation Preparation

Drilled shafts are prepared for CSL integrity testing by attaching at least three two-inch diameter (5.08 cm) access tubes to the full length reinforcing cage. Typically, the number of access tubes is equal to the shaft diameter in feet. The cage with access tubes attached is placed into the shaft excavation and then the shaft excavation is filled with concrete. The steel or PVC access tubes are filled with water immediately after concrete placement. The access tubes must be installed in the shaft prior to concrete placement, or core holes must be drilled in the concrete following placement and curing.

CSL Test Procedure

The GRL engineer lowers a transceiver in one of the tubes that communicate with transceivers in other tubes as all probes are pulled upward from the bottom of the access tubes. The transceivers emit a pulse, and the engineer observes its propagation signal on the screen of a cross hole. The arrival time and the magnitude of the received signals identify the quality of concrete between the tube pairs. GRL scans the entire depth of the foundation in this fashion.

Benefits of CSL Testing

- Evaluates integrity and relative concrete quality of drilled shafts
- Identifies location of potential shaft anomalies
- 3D tomography provides better delineation of anomalous zones and their severity

GRL Engineers, Inc.

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Ohio

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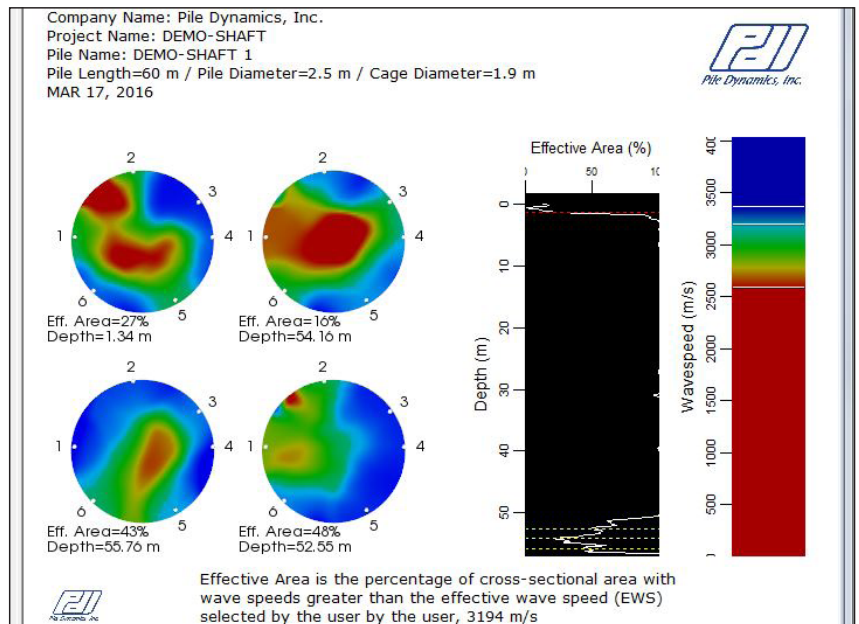
Pennsylvania
Texas
Washington



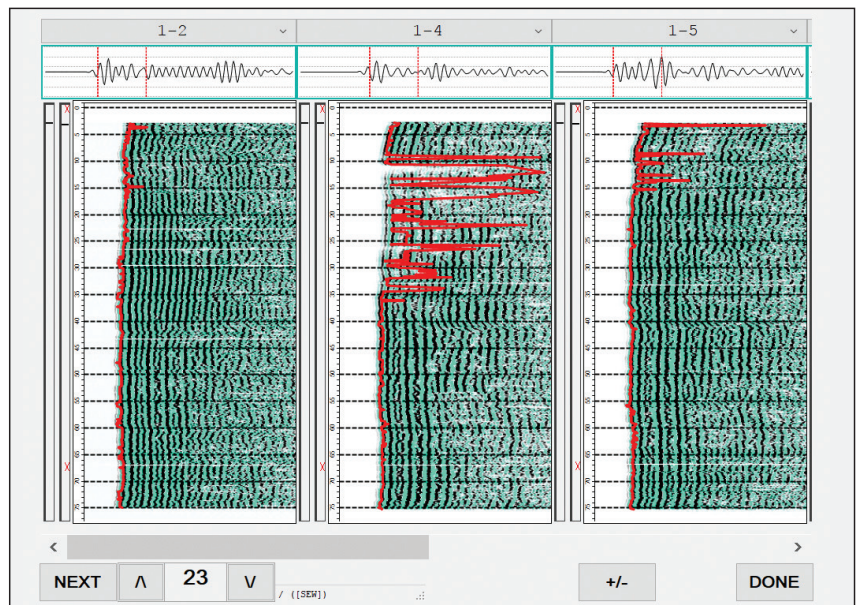
Data Collection and Analysis

The GRL engineer performs an initial interpretation of the CSL data in the field and later reprocesses it in the office for final reporting. GRL analyzes the CSL data with the CHA-W software. If an anomalous zone has been identified that needs additional evaluation, a 3-Dimensional tomographic analysis is performed using the PDI-TOMO software. This software combines arrival time data from the scans of all pairs of tubes, analyzes the data, and displays the analysis results in various 3-D views. Hence, the tomography analysis may help eliminate uncertainty that may otherwise lead to increased construction or remediation costs. The GRL engineer prepares a final report summarizing the CSL test details, CSL test results, tomography analysis (if performed) and recommendations.

For additional information on Crosshole Sonic Logging or any other GRL Engineers service please contact info@GRLengineers.com or visit us at www.GRLengineers.com.



PDI-TOMO / 3D tomography of shaft



CHA-W test results

ASTM Standard

GRL Engineers perform crosshole sonic logging integrity testing in general accordance with ASTM D6760 Standard Test Method for Integrity Testing of Concrete Deep Foundations by ultrasonic cross-hole testing.

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