



FOUNDATION TEST GROUP, Inc.

Incorporated in 2002, Foundation Test Group, Inc. is a certified WBE engineering and testing firm. We specialize in deep foundation design and inspection, deep foundation load testing, instrumentation and integrity testing services.

Crosshole Sonic Logging (CSL)



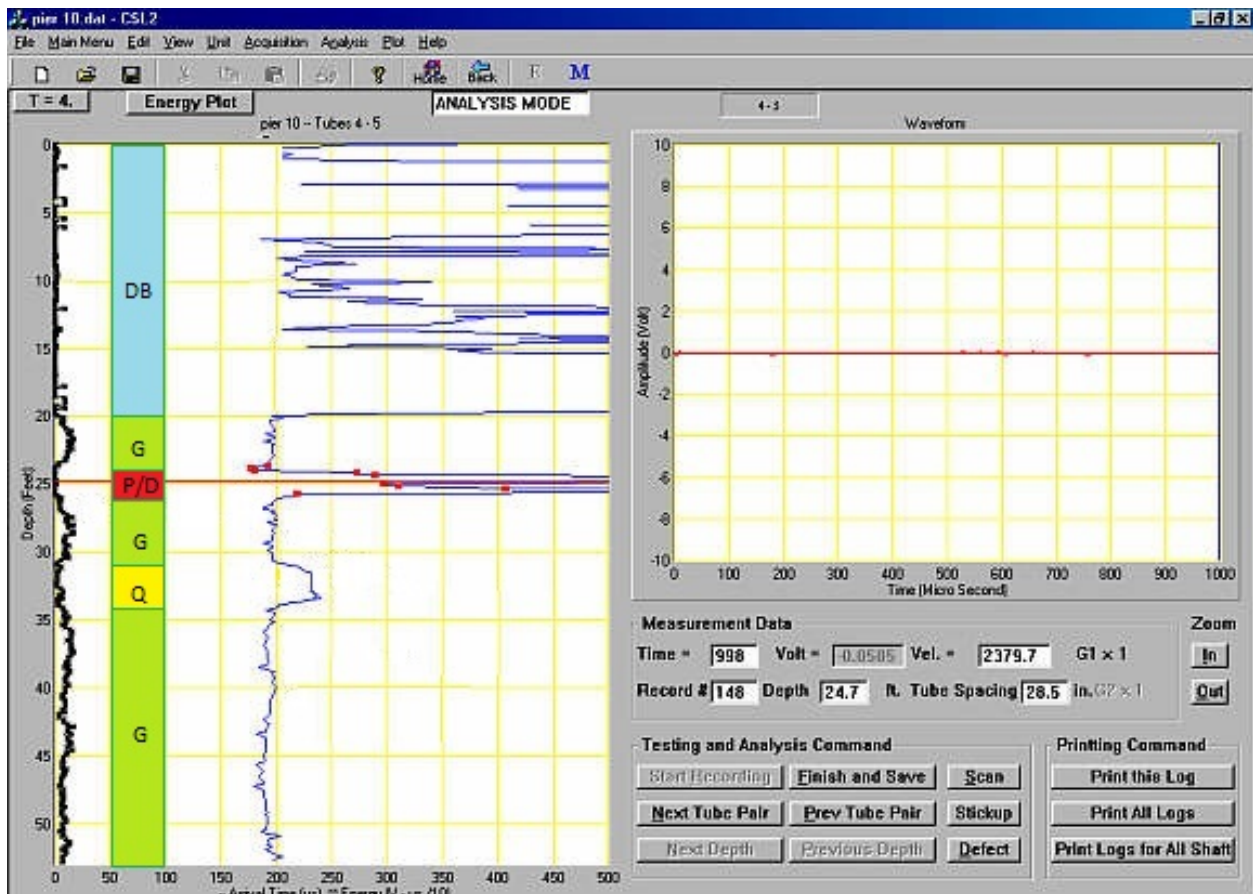
Crosshole Sonic Logging (CSL) is the most accurate and reliable technique for assessing the integrity of deep foundation elements constructed on-site from concrete or grout. The crosshole sonic logging method is normally applied as a quality assurance (QA) technique for newly placed drilled shafts and auger cast piles, but can also be applied to slurry walls, mat foundations, and mass concrete pours. CSL testing provides assurance that the foundation concrete is sound with no defects such as soil intrusions, necking, sand lenses, voids, etc. The extent, nature, depth, and approximate lateral location of a defect(s) can be determined with the CSL method. The CSL method is typically performed in access tubes (steel or PVC) of 1.5 inch I.D. or greater which are tied to the rebar cage and cast into the shaft at the time of construction. The test can also be performed using core holes(if available).

FTG's lead Geophysical Engineer has performed Crosshole Sonic Logging since 1996. Mr. Jeff Goodwin, P.E. is a recognized expert in the field and has made numerous presentations on CSL testing and drilled shaft remediation for the ADSC, DFI & ASCE.

Foundation Test Group, Inc. has performed CSL testing in over 20 states for agencies including: US Army Corp of Engineers, Maryland Aviation Administration, Maryland DOT, Virginia DOT, PennDOT, New Jersey DOT, New York DOT, Indiana DOT, Kentucky DOT, Ohio DOT, West Virginia DOT, Arkansas DOT, Louisiana DOT, North Carolina DOT, New York DOT, Connecticut DOT, Oklahoma DOT, New Hampshire DOT Delaware River Authority, Pennsylvania Turnpike Authority, New Jersey Transit New Jersey Turnpike, Texas DOT, and various commercial projects.



Procedures For Cross Hole Sonic Logging



Rating	CSL Results Indicative of Drilled Shaft Concrete Condition
Good (G)	No signal distortion and decrease in signal velocity of 20% or less are indicative of good quality concrete.
Questionable (Q)	Minor signal distortion and a lower signal amplitude with a decrease in signal velocity between 20% and 30%. Results indicative of minor contamination or intrusion and/or questionable quality concrete. Investigations of anomalies with 20-25% reductions in velocity have identified sound concrete at some sites and flawed concrete at others.
Poor/Defect (P/D)	Severe signal distortion and much lower signal amplitude with a decrease in signal velocity of 30% or more. Results indicative of water slurry contamination or soil intrusion and/or poor quality concrete.
No Signal (NS)	No signal was received. Highly probably that a soil intrusion or other severe defect has absorbed the signal (assumes good bonding of the tube-concrete interface). If PVC tubes are used or if the measurement is from near the shaft top the tube-concrete bonding is more suspect.
Water (W)	A measured signal velocity of nominally $V = 4,800$ to $5,000$ fps. This is indicative of a water intrusion or of a water-filled gravel intrusion with few or no fines present.
Tube Blocked (TB)	Tube blocked or broken at depth – unable to test beyond that depth. Remainder of data from shaft (or additional logs if possible) are used to analyze/approve shaft.
Tube Debonding (DB)	Tube has delaminated from concrete, typically caused by tube being bumped or water seeping from tube during curing of concrete.



Drilled Shaft Remediation

Based upon our unique experience in the interpretation and application of CSL testing results and drilled shaft design and construction methodology, FTG has designed, coordinated and help implement the remediation of over 200 drilled shafts for the US Army Corp of Engineers and State Highway Departments. Each site poses its own specialized set of problems and potential solutions. FTG works hand and hand with the contractor to deliver a turnkey solution that is designed, inspected and approved. The engineers at FTG will prepare design calculations and submittals and then either line up a team or prepare the contractor's personnel to remediate the problem foundations. Foundation Test Group, Inc. is a recognized leader in the field of drilled shaft remediation.



For more information contact **Jeff Goodwin, P.E.**
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