



Low Strain Dynamic Testing (PIT Testing)

Low Strain Dynamic Testing is a non-destructive pile testing method for integrity assessments of augered cast-in-place piles, drilled shafts or driven concrete or timber piles. Also, known as Pile Integrity Test (PIT), it encompasses the Pulse Echo Method (using a non-instrumented hand-held hammer) and the Transient Response Method (a hammer instrumented with an accelerometer). Tests by either method are normally performed after foundation installation and curing and require minimal pile preparation. Length/depth ratios and soil types may limit its applicability.

Test Procedure

The GRL engineer attaches an accelerometer to the top of the foundation and impacts the foundation with a small hand held hammer. The impact of the hammer produces a stress wave that travels down the pile and the engineer observes the wave propagation signals on the screen of the Pile Integrity Tester. The pattern of wave propagation and reflection along the pile or shaft is directly affected by discontinuities along the shaft.

GRL may also employ more complex variations of the low strain dynamic testing method:

- GRL engineers may place two accelerometers on top of the foundation when testing shafts of large diameter.
- GRL engineers may use two accelerometers, one placed on top and one on the side of the shaft, or two placed on the side, in an attempt to evaluate foundations of unknown depth. Other length evaluation options include the Parallel Seismic and Length Inductive Testing methods.
- Certain situations require testing with one accelerometer plus an instrumented hand-held hammer that measures the force applied to the top of the pile. In this case data is analyzed by the Transient Response Method in the frequency domain, which may help identify potential defects.

Benefits of PIT Testing

- Allows for simplicity, speed execution and relatively low testing cost
- PIT testing may be quickly performed on 100% of piles per job
- Estimate of location of major cracks, necking, soil inclusions and voids
- Estimate of severity of major defects
- Evaluation of integrity within the cross section of the pile
- Applicable to piles that are part of an existing structure

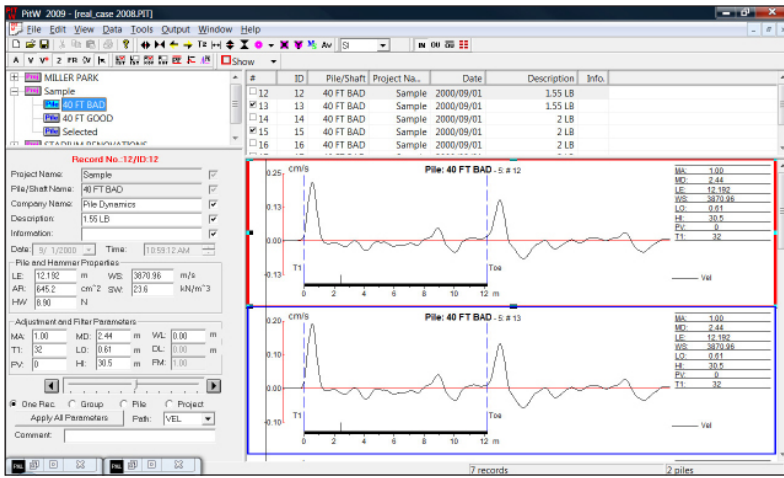
GRL Engineers, Inc.

Corporate Office
Ohio

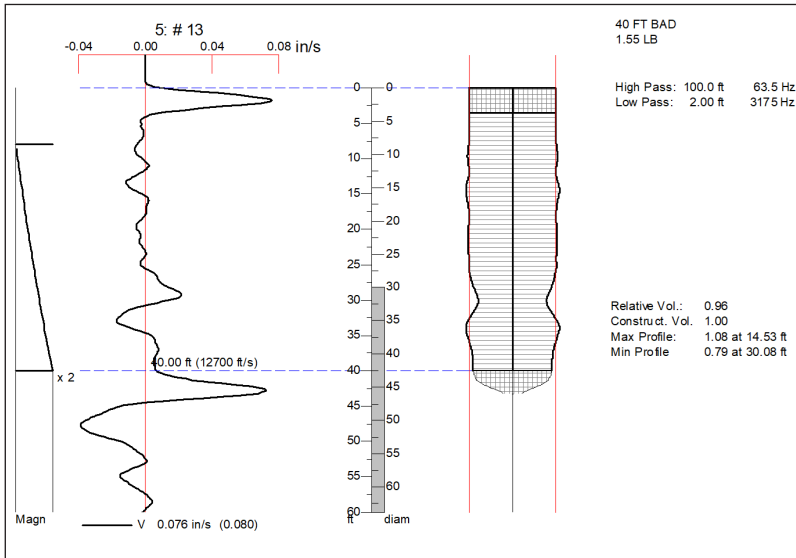
Office Locations

California	Georgia	Pennsylvania	Louisiana
Colorado	Hawaii	Texas	North Carolina
Florida	Illinois	Washington	

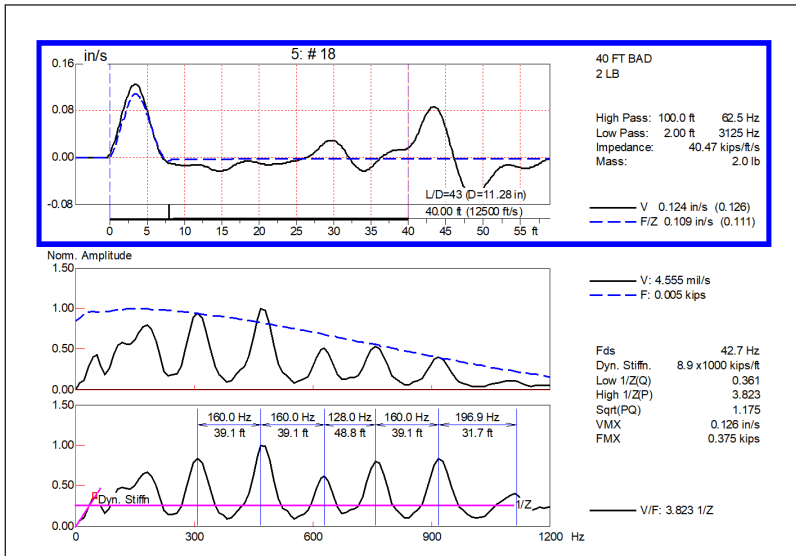




PIT-W Analysis



Pile Profile



Frequency Domain Analysis

Data Collection and Analysis

The reflections collected by the hammer impact cause a change in the acceleration signal measured on the pile top, which is picked up and processed by the PIT equipment and interpreted by an experienced GRL engineer. Back in the office, the engineer processes the signals with the PIT-W Software to enhance and interpret test results, and issues a test report.

PIT-W Software

PIT-W software processes the PIT data, averages, filters and magnifies records. It analyzes records in the time domain and outputs user-customized tables, plots and reports. A Pile Profile can also be developed, illustrating multiple piles in one single screen. The PIT-W software interprets wave speed calculations and frequency domain analyses.

For additional information on Pile Integrity Testing or any other GRL Engineers service please contact info@GRLengineers.com or visit us at www.GRLengineers.com.



ASTM Standard

GRL Engineers perform low strain dynamic testing in general accordance with the latest version of ASTM D5882, Standard Test Method for Low Strain Impact Integrity Testing of Deep Foundations.

GRL
Engineers, Inc.