



Pile Dynamics, Inc.

Quality Assurance for Deep Foundations

Low Strain Dynamic Testing

Wave propagation theory can also be applied to situations where a light impact is applied to a pile, resulting in a low strain. A compression wave will still travel down the pile when it is impacted by a small hand held hammer. Much like in High Strain Testing, this wave will travel at a constant speed c . Changes in pile impedance Z produce wave reflections.

The application of the wave equation theory to waves caused by small impacts is the basis for Low Strain Dynamic Integrity Testing. This procedure is performed with a Pile Integrity Tester (PIT), a hand held hammer to generate an impact, and an accelerometer placed on top of the pile to be tested to measure the response to the hammer impact. Given a known stress wave speed, records of velocity (integrated from the accelerometer signals) at the pile head can be interpreted to reveal pile non-uniformities (changes in impedance). Interpretation is usually done in the time domain (Pulse echo, or Sonic echo) but data can also be evaluated by measuring the hammer force and analyzing in the frequency domain (Transient Dynamic Response). Pile length may also be determined. This non destructive testing method is usually applied to concrete piles, concrete filled pipe piles, drilled shafts, auger cast-in-place (continuous flight auger) piles, and sometimes timber piles. Usually the method is applied to piles not connected to a structure, but good results are often obtained for piles embedded in structures (such as cell-phone towers, transmission towers, and bridges). This method is covered under ASTM D5882.