

Sonic Echo/Impulse Response

Sonic Echo / Impulse Response (SE/IR) investigations are performed to evaluate integrity and determine the length of deep foundations. Sonic Echo is also commonly known as Pile Integrity Testing or Low Strain Dynamic Pile Testing and is covered by ASTM D5882-00 and AS 2159-2009.

The SE/IR test can be performed on concrete, wooden and steel piles. The test can also be performed on shallow wall structures. It can be used to determine the depth of a foundation, to locate defects, intrusions, and bulbs in the foundation or pile damage such as breaks or cracks. The beauty of these two methods is that they use the same raw data but treat it differently.

Sonic Echo

The Sonic Echo data is used to determine the depth of the foundation based on the time separation between the first arrival and the first reflection events or between any two consecutive reflection events.

A reflector can be the bottom of the foundation or any discontinuity along the embedded part of the foundation. Also, the Sonic Echo data can be used to determine the existence of a pile bulb, neck in a shaft or the end conditions of the shaft based on the polarity of the reflection events. This is shown in the SE data to the right where the troughs (reflections) in the data are used to calculate the pile depth.

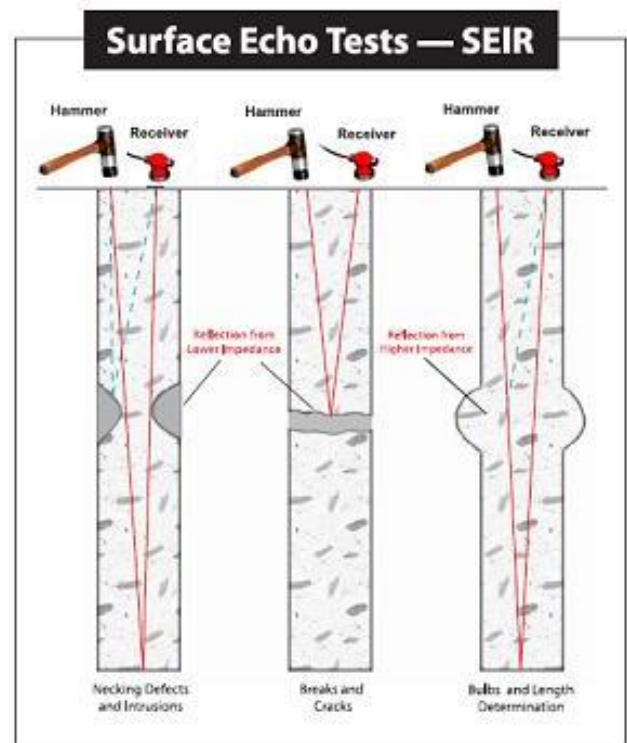
Impulse Response

The Impulse Response data is also used to determine the depth of reflectors. In addition, the IR data provides information about the dynamic stiffness of the foundation. This value can be used to predict foundation behaviour under working loads or correlated with the results of load tests to more accurately predict foundation settlement.



Applications

- Structural investigations of structures where a foundation or pile depth is unknown
- Assessing the condition of foundations or piles
- Investigation of damage to foundations or piles
- Investigation of bulbs in foundations or piles



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Platforms Available

We offer two testing platforms which support the SE/IR technique, the NDE 360 and Freedom Data PC. These offer differing levels of mobility and on-site analysis. Please see the individual brochures for more in depth specifications for the platforms.

How it works

In an SE/IR pile test, the foundation top is struck by a hammer and the response of the foundation is monitored by one or more receivers (geophone or accelerometer). An Olson Instruments Sonic Echo / Impulse Response (SE/IR-1) system and testing platform records the hammer input and the receiver output.

Effectiveness

The SE/IR method works best for columnar type foundations such as piles and drilled shafts. Reflection events are clearest if there is nothing on top of the foundations (such as a column). In cases where the superstructure is in place, the SE/IR data becomes more difficult to interpret because of the many reflecting boundaries and 2 or more receivers should be used to track reflections. Typically, SE/IR tests are performed on shafts or piles of length to diameter ratios of up to 20:1. Higher ratios (30:1 or greater) are possible in softer soils. Where a simple element such as a slab or footing rests on the pile, the thickness of the element must not exceed 1.7 times the diameter of the pile for the SE/IR analysis to be interpretable.

Accuracy

SE/IR tests are accurate to within 5% in the determination of the depth of the foundation provided an independent measurement of the wave velocity used in the depth calculation is made. In case the wave velocity is assumed based on the material type, SE/IR tests are normally accurate to within about 10%.



About PCTE

PCTE have over 30 years' experience in the measurement and testing of construction materials. PCTE can provide more than just the equipment, they can provide expert training. PCTE have a service centre in Sydney in which they can provide calibration, repairs and warranty repairs.

Other Equipment

PCTE supply three main ranges: NDT, Lab and Geotech Instrumentation.

NDT includes: Rebound Hammers, Covermeters, Ultrasonics, GPR, Corrosion Testing, Coating Testing and Foundation Testing

Lab includes equipment for: Concrete, Cement, Aggregate, Soil, Asphalt and Metal

Geotech Instrumentation includes: Strain Gauges, Piezometers, Inclometers, Extensometers, Tiltmeters, Load Cells and Dataloggers