

Piles & Deep Foundations

A Spotlight on Low Strain Impact Integrity Test

Concrete piles and drilled shafts are an important category of foundations. Despite their relatively high cost, they become necessary when we want to transfer the loads of a heavy superstructure (bridge, high rise building, etc.) to the lower layers of soil.

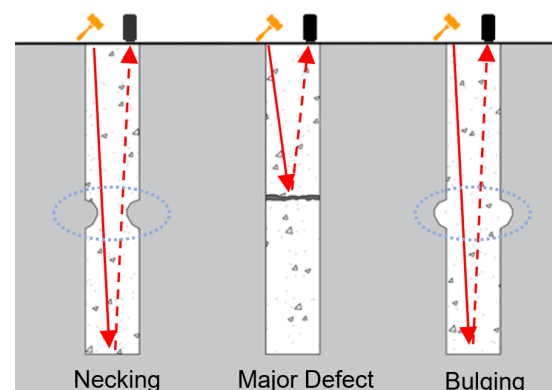
Pile integrity test (PIT), or as ASTM D5882 refers to it as "a low strain impact integrity test," is a common non-destructive test method for the evaluation of pile integrity and/or pile length. A pile integrity test can be used for forensic evaluations on existing piles, or quality assurance in new construction. The Integrity test is applicable to driven concrete piles and cast-in-place piles.



What is Pile Integrity Test (PIT) ?

Low strain impact integrity testing provides acceleration or velocity and force (optional) data on slender structural elements (ASTM D5882).

Sonic Echo (SE) and Impulse Response (IR) are employed for the integrity test on deep foundation and piles. The test results can be used for the evaluation of the pile cross-sectional area and length, the pile integrity and continuity, as well as consistency of the pile material. It is noted that this evaluation practice is approximate.



Use PIT Method To Evaluate :

- Integrity and consistency of pile material (concrete, timber);
- Unknown length of piles, or shafts;
- Pile cross-sectional area and length.

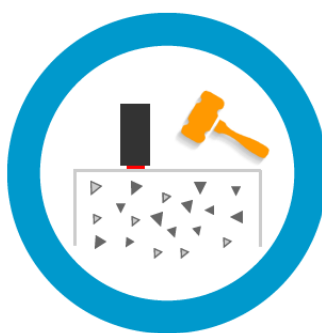
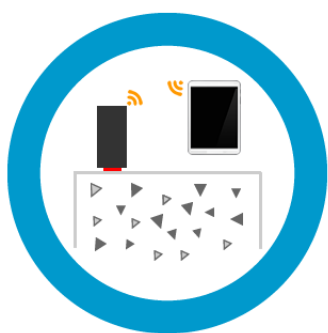
Limitations of Use :

Like all other non-destructive testing solutions, the low strain pile integrity test has certain limitations. These limitations must be understood and taken into consideration in making the final integrity evaluation.

- This test does not provide any information on the load bearing capacity of piles;
- PIT is generally not suitable for testing sheet piles, H-section, or unfilled pipe piles;
- PIT cannot be conducted over pile caps.

Technical and Practical Considerations

The integrity testing should be performed no sooner than 7 days after casting, or after concrete strength achieves at least 3/4 of its design strength, whichever occurs earlier. The pile head surface should be accessible, above water, and clean of loose concrete, soil or other foreign materials resulting from construction. Any type of contamination should be removed to reach to solid and sound surface. The sensor should be placed away from the edges of the pile.



An impact source (usually a hammer) is used to impact the pile head; the impact should be applied axially with the pile. Motion transducers should be capable of detecting and recording the reflected echos over the pile top.

The sensor should be placed away from the edges of the pile and the distance between the impact location and the sensor should be no larger than 300 mm. Several impacts are applied to the top of the pile. The reflected echos are then recorded.

