FOUNDATION TESTING DATA SHEET 4
Parallel Seismic Testing

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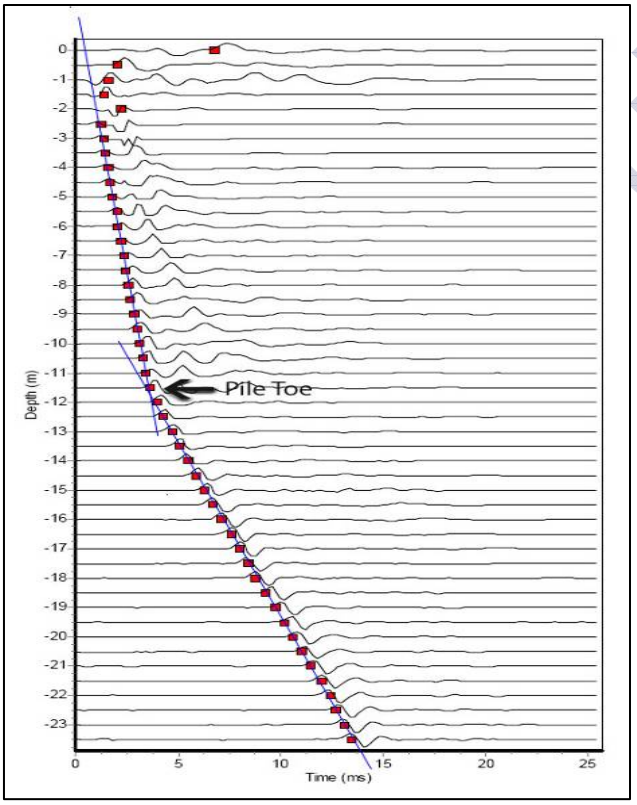
It occasionally happens that doubts about the integrity and length of concrete and sheet piling arise only after the structure is complete. The pile heads are no longer accessible and other non destructive test methods are of little use.

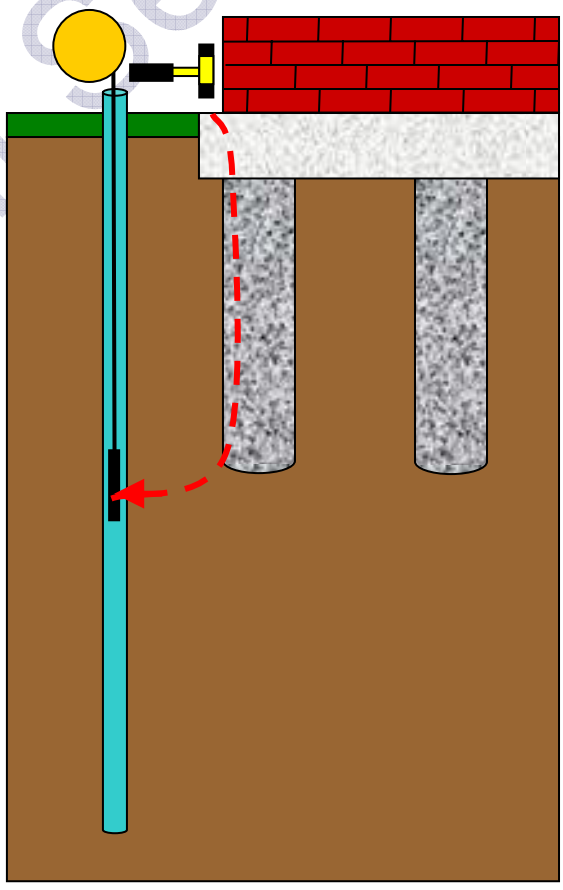
The Parallel Seismic test has been developed as a test that can be used in these situations, when the pile is still connected to the superstructure. Applications include:

- **Determining embedded depth of sheet piling**
- **Confirming depth of piles underneath caps and structures**
- **Checking the depth of masonry and footings**

PRINCIPLE OF THE TEST

The test works by measuring the time taken for a signal to travel from the top of the pile, or from a point near it on the structure, to a transducer, lowered in 0.5m increments, inside an access tube alongside the pile. At the level of the pile toe, the rate of increase in signal arrival time will increase. The signal is introduced using an instrumented hammer and detected using a hydrophone.





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METHODOLOGY

Before carrying out this test, it is necessary to install a plastic access tube to within 500mm (maximum) of the side of the pile or sheet piling to test. The tube should have a closed end and be taken to a depth beyond which you wish to prove and grouted in place using bentonite or similar. The tube is generally 50mm minimum diameter, and when installed, is filled with clean water to act as an acoustic coupling with the hydrophone.

To perform the test, the hydrophone is lowered down the tube in 500mm steps. At each step, the side of the pile/structure is struck, and the hydrophone records the resultant signal from the moment of impact. As the hydrophone descends, the signal will resolve itself and the arrival time will gradually increase linearly with depth as it passes through the pile and out to the hydrophone (provided that the tube is parallel with the pile). When the hydrophone reaches the base of the pile, the additional signal path is through soil, not steel or concrete, and the first arrival time will increase at a greater rate.

The depth of the foundation is determined by the depth the rate of first arrival changes.

COMPLIMENTARY TESTING

Depth of Steel Sheet Piling or Casing: Where sheet piles are to be tested or the depth of reinforcing or casing needs to be determined, an electromagnetic transducer can be lowered down the tube. This will determine the depth that ferrous material ends. This test will require the tube diameter to be a minimum of 100mm and the distance between the tube and the pile should be no more than 300mm.

Inclination of tube: To improve accuracy of the parallel seismic test, plastic inclinometer tubing can be used, and the deviation of the tube from the top measured using an inclinometer. The same tube is then filled with water and used for the hydrophone.

TDR Testing: Although usually used on individual piles, this method can sometimes produce a clear depth measurement on shorter sheet steel piles and could well be worth a try before going to the expense of installing tubes. See separate data sheet for details of this test.

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