

**Parallel Seismic » ACI 228.2R**

*When access to the top of the foundation is limited, the Parallel Seismic (PS) test is more accurate and more versatile than other nondestructive surface techniques for determination of unknown foundation depths.*



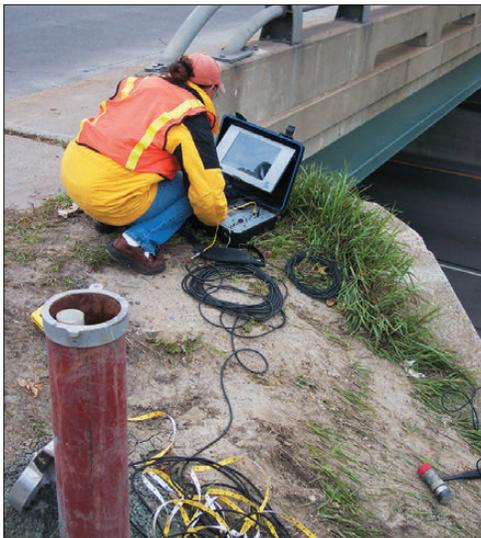
**Parallel Seismic (PS)** systems are designed to determine the length and integrity of foundations when the top is not accessible or when the pile is too long and slender to test with echo techniques, or below a buried pile cap. Ultimately, Parallel Seismic testing provides information concerning the length and compressional velocity of foundations and can be used on concrete, wood, masonry, and steel foundations. This method also provides information about the soil below the foundation bottom. It should be noted that this test method requires the installation of a water-filled or grouted cased borehole.



**Features**

- System design allows for fast and accurate field measurements - depth accuracy can be determined within 5% or better
- More economic and versatile than other equipment/techniques used for determination of unknown foundation depths
- Method and system allows for testing of piles without excavation
- System is compact, durable, and easily transported, allowing for multiple tests per day
- IX Foundation, a seismic analysis and display program allows the full range of data to be viewed at one time, improving the ability to identify the foundation bottom
- Test piles that are partially/totally submerged
- Determine the tip depths of foundations with complex geometries such as piles under pile caps

<b>» Applicable On:</b>
Abutment Piers
Deep Foundations
Sheet Piles and Footings
<b>» Test For:</b>
Foundation Type
Foundation Integrity
Length Determination
Scour Evaluation



Model	Advantages
PS-1 Model	Hydrophone in water-filled, ungrouted cased borehole
PS-1G Model	Hydrophone and triaxial geophone for grouted, cased borings and downhole seismic velocity measurements of soil and rock



*Freedom Data PC or NDE 360 Required, Sold Separately*



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## Method

The PS method is typically performed in a cased borehole of 2 inch I.D. (50 mm) or greater which is placed in the proximity of the foundation in question.

## Data Collection

The user friendly WinGEO-T software is written and tested at Olson Instruments' corporate office in Colorado. We do not outsource any tech support questions and, should you require software support, we welcome your questions and comments. It should be noted that PS data is usually displayed and analyzed in a program called IXFoundation® created by Interpex Limited.

## Available Models

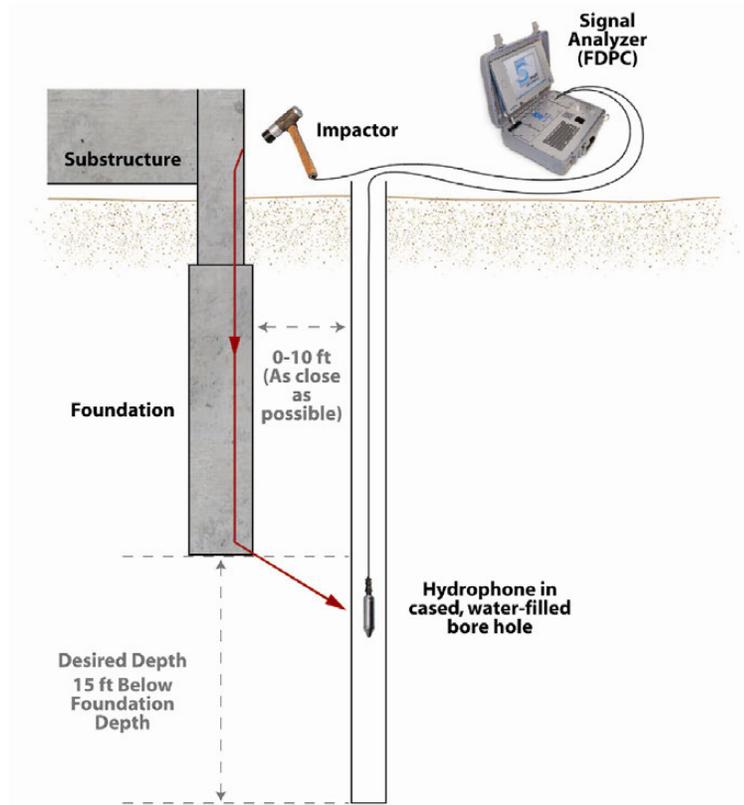
The Parallel Seismic system is available in two different models which can be run from Olson's Freedom Data PC or NDE 360 Platforms:

1. Parallel Seismic - 1 (PS-1)
2. Parallel Seismic - 1G (PS-1G)

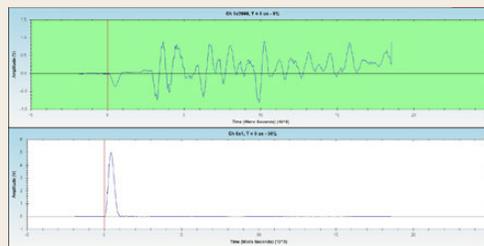
The **PS-1 Model** is the base model and is most frequently used for shorter piles, with a 3 lb instrumented hammer as the source and a hydrophone receiver. As a general rule, the longer the pile, the larger the required hammer.

The **PS-1G Model** includes a hydrophone and a triaxial geophone which can be used for PS and downhole seismic testing. This system can be used to test a wider distribution of pile lengths with a heavier sledge hammer used as the source.

The **PS-1 + SE/IR-1 Models** combine **Parallel Seismic (PS)** with **Sonic Echo/Impulse Response (SE/IR)** for complete foundation testing at a reduced price because the systems share many common components.



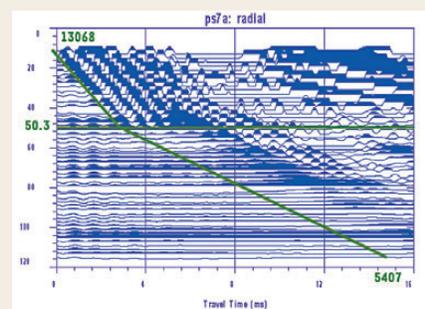
## Data Example » 1



PS data is acquired with Olson Instruments WinGeo-T software. This image illustrates good quality data as the signal to noise ratio is high and a clear compressional wave arrival is evident. These data are later imported into IXFoundation and displayed as stacked data (see example 2).

PS results showing good quality data

## Data Example » 2



The clear break is seen because the velocity of the concrete is much higher than the velocity of the surrounding soil. When the wave must travel through more soil below the pile tip, the wave arrives at the transducer later in time. This generates a difference in first wave arrival times that occurs at the tip of the pile indicating its depth at 50.3 ft in the PS data example from IX Foundation®.

PS results showing an example of a clear break in stacked data

