



Parallel Seismic

A borehole test method developed for the determination of unknown depth for reuse of foundation elements.

The Parallel Seismic test method can determine the depth of a foundation for which as-built records are unavailable. The procedure includes an instrumented hand-held hammer impacting the exposed top of the foundation or the foundation's cap to generate compression waves in the pile and soil. The waves travel down the foundation and are refracted into the surrounding soil. The refracted wave arrival is tracked at regular intervals by a hydrophone in a PVC cased borehole. The depth of the foundation is determined by plotting the recorded wave forms as a function of depth and time and observing the depth where a change of slope in first arrival time occurs.

Parallel Seismic Test Method:

- Can be used to test drilled piles or driven piles without joints or splices
- Provides unknown depth of foundations substructure elements
- Can be used on concrete, timber, masonry, and steel foundations

Parallel Seismic Procedure:

The Parallel Seismic test method requires drilling a cased borehole parallel to and near the tested pile, usually within 1 to 5 feet of the foundation element and should extend at least 16 feet deeper than the anticipated foundation depth (unless solid bedrock is encountered during drilling). The borehole must be drilled as vertical as possible, cased with PVC pipes, capped at the bottom; and, for the hydrophone receiver, be filled with water prior to testing. The hydrophone is lowered into the borehole to a specified depth and the top of the foundation element is hit with the instrumented hammer producing a stress wave that propagates along the length of the element. Some of the wave's energy also propagates laterally into the surrounding soil.



A hydrophone lowered to a measured depth in the borehole receives the pressure wave, allowing the PIT Collector to record hammer and hydrophone data versus time. The hydrophone is then lowered to the next specified depth increment and the procedure is repeated. This process is repeated for the length of the borehole extending beyond the expected length of the foundation element. The analysis includes plotting the collected data sets versus time and depth. Due to the differences in the wave speeds between the foundation element and the surrounding soil, once the hydrophone has passed beyond the bottom of the foundation element there will be a change in the first arrival time. Parallel Seismic meets or exceeds the requirements of ASTM D8381- Standard Test Methods.