Site Classification with Geophysics

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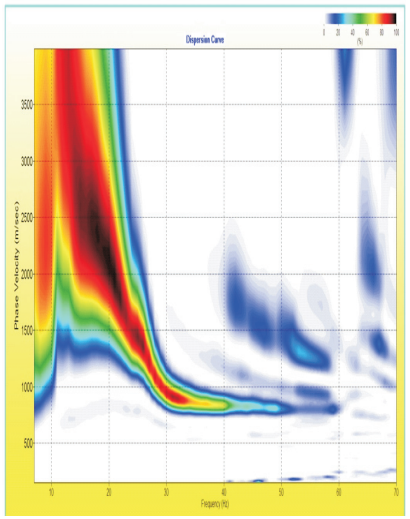
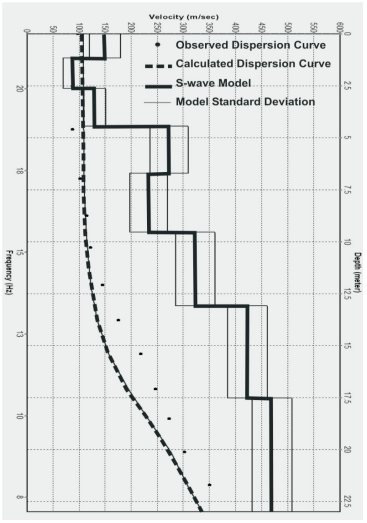
The Building Seismic Safety Council (BSSC) classifies sites according to the relative hardness of materials in the upper 30 meters. Geotechnical projects in seismic hazard zones must assess the seismic site classification through the use of standard penetration tests and/or shear-wave (S-wave) velocity measurements (Vs30). Geophysical methods provide a means to determine the S-wave velocity profile either non-invasively or with boreholes.

- ***Multi-channel Analysis of Surface Waves (MASW)*** is a non-invasive geophysical method to determine the S-wave velocity profile by analyzing seismic surface waves. Surface waves are generated by an impulsive source such as a sledgehammer and recorded by an array of geophones. The dispersive nature of the surface waves are then used to compute a 1D S-wave velocity profile. A 2D cross-section may be developed by making multiple measurements along a survey line. Advantages of this method are that it is non-invasive (no boreholes necessary) and can provide relatively quick measurements at multiple locations within a site.





- ***Downhole seismic testing*** is a method in which the seismic P-wave and S-wave velocities are determined between a source located on the surface and a receiver located down a borehole. The seismic source consists of a sledgehammer that impacts the ground to generate P-wave energy and the side of a plank (weighted down by a vehicle) to generate S-wave energy. The receiver is a tri-axial geophone that is mechanically clamped against the side of the borehole casing. Procedures are outlined in ASTM D7400-07. A 1D P-wave and S-wave velocity profile can then be computed from the data. An advantage of this method over MASW is that greater resolution can be obtained with depth. However, a borehole is needed and must be carefully grouted and pumped free of water to optimize the measurements.

For more information, contact Spotlight Geophysical Services at info@spotlightgeo.com on the web at www.spotlightgeo.com