

**Seismic Refraction  
Seismic Reflection  
Shear Wave Surveys  
ReMi / MAM  
MASW**



**Seismic Services**

For more information [ [www.hgiworld.com](http://www.hgiworld.com) ]



hydroGEOPHYSICS

Subsurface Imaging

Innovative Solutions

**About HGI Seismic Survey Methods**

Seismic methods are ideally suited for investigating layered media and hydroGeophysics, Inc. (HGI) employ a variety of techniques to perform both large- and small-scale surveys, including seismic refraction, seismic reflection, and multi-channel analysis of surface waves (MASW). HGI has experience with surveys ranging from large-scale seismic refraction surveys in rugged terrain to small-scale MASW surveys in dense urban areas. Seismic methods can be applied to many areas of study including: depth to bedrock investigations, rock rippability analyses, void detection, seismic hazard assessments, stratigraphic surveys, groundwater investigations, and fault mapping.

**Sesimic Refraction Surveys**

Seismic refraction involves measuring the travel time of seismic energy to determine P-wave velocity variations laterally and with depth. Seismic refraction can provide broad subsurface information such as depth to bedrock, thickness of fill or sediment overburden, rippability and excavation characteristics, the location of fractures, faults, or weak zones in bedrock, the geometry of soil - bedrock contacts, and can confirm geologic information between borings.

**Multi-Channel Analysis of Surface Waves**

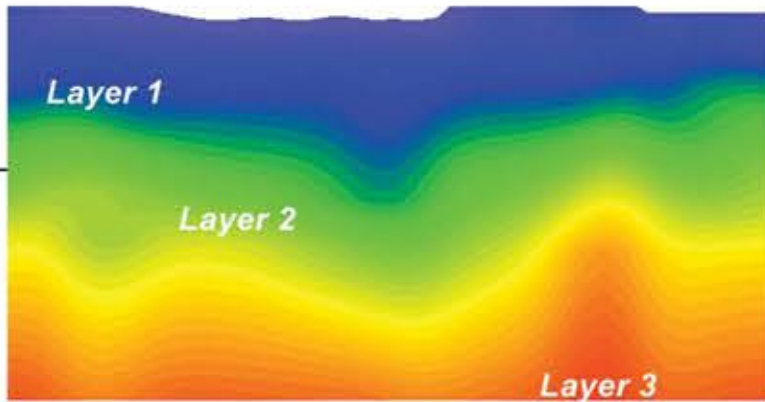
MASW is used to determine the variability of shear wave velocities in the subsurface. Since surface waves are dispersive, different wavelengths travel at different velocities, with the imaging depth proportional to this wavelength. Surface wave surveys use similar equipment to a refraction survey, requiring just a change to lower frequency geophones. An MASW survey can provide information on the presence of soft or compressible materials in foundation investigations, landslides and fault zones, voids and cavities, thickness of fill or sediment overburden, and low velocity zones (velocity inversions).

**ReMi /MAM Passive Surveys**

ReMi/MAM are passive seismic surveys that use ambient energy generated by cultural noise, wind, or wave motion to generate one-dimensional profiles of shear wave velocity. As such, they can be collected in dense urban areas where other methods may be problematic. ReMi/MAM surveys are used to provide the Vs100 measurement for the IBC Seismic Site Classification for project sites.



Seismic refraction surveying



2D MASW profile of shear-wave velocity



Downhole shear-wave survey for V<sub>s30</sub> measurement

Tucson, Arizona  
520-647-3315

Richland, Washington  
509-946-7111

Woodinville, Washington  
206-669-3730

Houston, Texas  
713-966-6169

Newport Beach, California  
949-274-7426

