Gannett Fleming
Quantum Geophysics

Excellence Delivered ***As Promised***

Multi-channel Analysis of Surface Waves (MASW)

MASW is a non-invasive, non-destructive, continuous profiling method that can explore to depths upwards of 100 feet, depending on the seismic source and site conditions. MASW determines the vertical distribution of shear wave velocities based upon the dispersion of Rayleigh Waves, a type of surface wave. Shear wave velocities, in turn, are a measure of material stiffness – the higher the velocity, the stiffer the material. Rocks have higher shear wave velocities than soil. Weathered materials, called saprolite, are characterized by shear wave velocities intermediate between rock and soil. Voids and cavities formed by sink activity and abandoned mines are observed as low shear wave velocity anomalies because air has no resistance to shear.

MASW has many advantages over other geophysical methods:

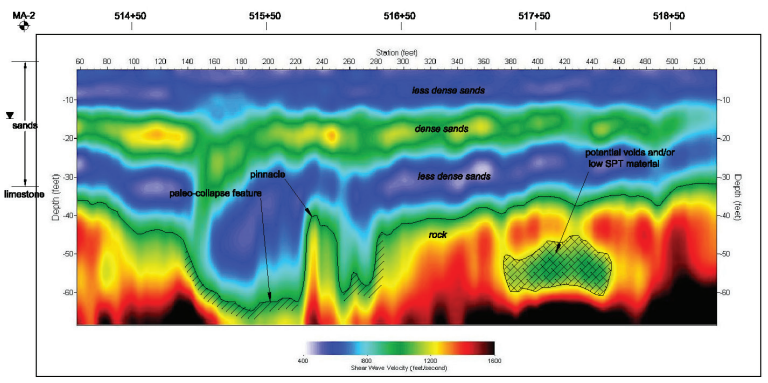
- Not impacted by buried piping or utilities
- Not constrained by the assumption inherent to seismic refraction that velocities increase with depth
- Not impacted by urban noise to the same extent as seismic methods that utilize body waves because surface waves have much larger amplitudes (bigger signal).

MASW has been successfully used in urban settings where traffic noise and 60 hertz noise from electrical lines make seismic refraction ineffective. Because MASW provides a continuous profile of the subsurface, it is ideal for exploring long, narrow easements and alignments, such as roads, dams, levees, and utility corridors. MASW is the only non-destructive geophysical method that can continuously profile to depths upwards of 100 feet over a reinforced concrete roadbed.

MASW is becoming an increasingly popular means for determining seismic site classification because it is more cost-effective than drilling or geophysical methods that require drilling like cross-hole seismic. It has also been shown that shear wave velocities can elevate a site to a more favorable classification in comparison with other seismic site classification parameters, such as N-values from drilling, thereby saving potentially tens to hundreds of thousands of dollars in construction costs.

Other Applications:

- Identify potential sink activity
- Map top of rock
- Identify fracture and fault zones
- Identify areas of enhanced weathering
- Locate buried waste pits and trenches
- Determine seismic site classification
- Identify low load bearing soils
- Identify abandoned mine workings
- Gauge deep dynamic compaction effectiveness
- Determine thickness of landfills
- Evaluate levees.



MASW-derived shear wave velocity profile showing soil stratification, bedrock surface, and karst, which includes a paleo-collapse feature (confirmed later from drilling), a pinnacle, voids, and/or low standard penetration test material within rock.

Richard Lee, P.G., R.GP. • rlee@gfnet.com • 484.433.3300
www.**gannettfleming**.com • **Offices Worldwide**

ISO 9001:2008 CERTIFIED

Printed on recycled paper

00384-0614