

Hunter, J.A., B. Benjumea, J.B. Harris, R.D. Miller, S.E. Pullan, R.A. Burns, and R.L. Good, 2001, Surface and downhole shear wave seismic methods for thick soil site investigations [Ext. Abs.]: International Conference on Soil Dynamics and Earthquake Engineering (SDEE 2001), October 7-10, 2001, Philadelphia.

Shear wave velocity–depth information is required for predicting the ground motion response to earthquakes in areas where significant soil cover exists over firm bedrock. Rather than estimating this critical parameter, it can be reliably measured using a suite of surface (non-invasive) and downhole (invasive) seismic methods. Shear wave velocities from surface measurements can be obtained using SH refraction techniques. Array lengths as large as 1000 m and depth of penetration to 250 m have been achieved in some areas. High resolution shear wave reflection techniques utilizing the common midpoint method can delineate the overburden-bedrock surface as well as reflecting boundaries within the overburden. Reflection data can also be used to obtain direct estimates of fundamental site periods from shear wave reflections without the requirement of measuring average shear wave velocity and total thickness of unconsolidated overburden above the bedrock surface. Accurate measurements of vertical shear wave velocities can be obtained using a seismic cone penetrometer in soft sediments, or with a well-locked geophone array in a borehole. Examples from thick soil sites in Canada demonstrate the type of shear wave velocity information that can be obtained with these geophysical techniques, and show how these data can be used to provide a first look at predicted ground motion response for thick soil sites.