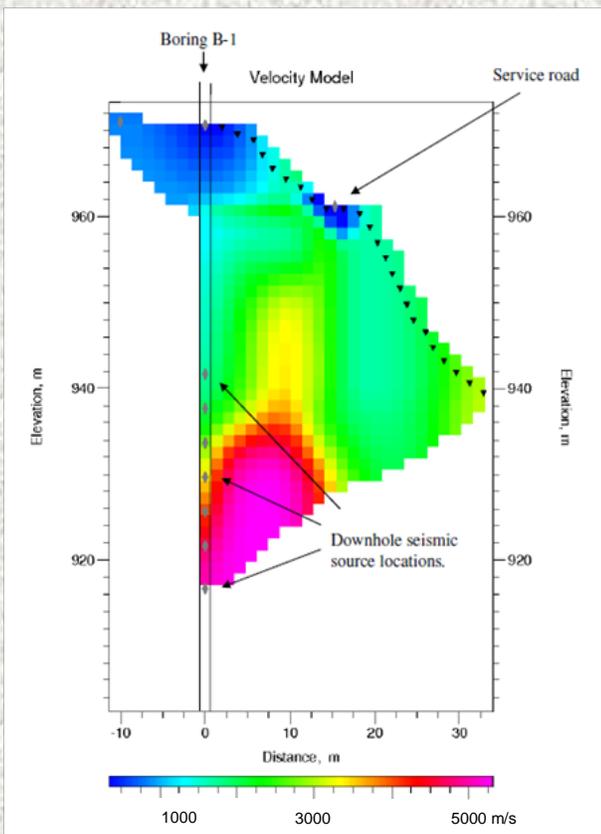


Geophysics and Geology

Seismic Tomography

Seismic methods utilize arrays of transducers (geophones) in conjunction with recorders (seismographs) to measure the travel of sound waves in the earth. These seismic waves are generated via impact sources, such as sledge hammers, shotgun shells or small explosive charges.

For most geotechnical investigations at Caltrans, site conditions and the targets of interest are amenable to the seismic refraction method, using the Generalized Reciprocal Method of interpretation (GRM).



Where geology is complex, however, the GRM may yield false results. This occurs because the GRM assumes moderate dip and continuity of refractor surfaces across a profile. Where these assumptions are not valid, inversion modeling of seismic data may provide better results.

Caltrans uses a linear-optimized, quasi-tomographic inversion algorithm (SeisOpt) to determine velocities of individual 2-D blocks (pixels) within a profile. Surface and borehole arrays can be employed simultaneously. Since layered strata are not required, geologic problems of greater complexity may be imaged using this method.

More information on seismic tomography is available from the Federal Highway Administration at the following link:

<http://www.cflhd.gov/resources/agm/geoApplications/SurfaceMethods/92SeismicMethods.cfm>