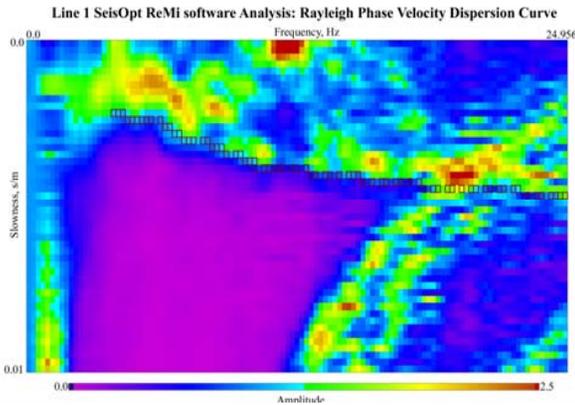
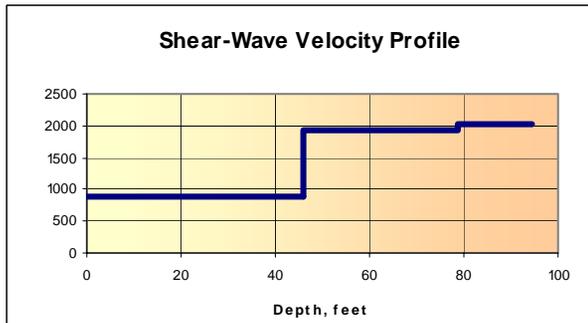


- SHEAR-WAVE SURVEYS -

Terra Geosciences performs shear-wave surveys that use both active (MASW) and passive (MAM and ReMi) methods. These methods economically and efficiently estimate subsurface shear-wave velocities up to 100-meters in depth, using data collected from standard primary-wave (P-wave) refraction surveys. These methods use induced and ambient background “noise” as the energy sources for data collection, making these survey techniques an ideal tool for both urban and quiet settings. These surveys can provide the appropriate CBC Site Classifications, used for seismic design purposes. Typical output data is illustrated below.



p-f Image with Dispersion Modeling Picks



**Average 100-foot shear-wave velocity
1,254 feet/second; Site Class “C”**

- ABOUT THE COMPANY -

Terra Geosciences is an independently-owned firm that provides various earth science related consulting services. This firm was established in 1989 by Donn C. Schwartzkopf, and is based in the City of Loma Linda, California. Mr. Schwartzkopf has been performing geologic and geophysical studies since 1980 in the southern California region, and is a State of California Licensed Professional Geologist, Certified Engineering Geologist, and a Professional Geophysicist.

During his professional career, Mr. Schwartzkopf has been involved with numerous geophysical studies involving residential, commercial, school, and industrial projects. He has acquired a specialized expertise in performing seismic surveys for all types of geologic, geotechnical, engineering and environmental projects, with respect to both existing and proposed developments.

Terra Geosciences is a firm dedicated to providing quality services with a broad range of applications suited for your project needs. Supplemental information regarding seismic or other geophysical services is available upon your request.

If we can provide you with our professional services or have any questions, please contact us at your earliest convenience.

Tel. (909) 796-4667

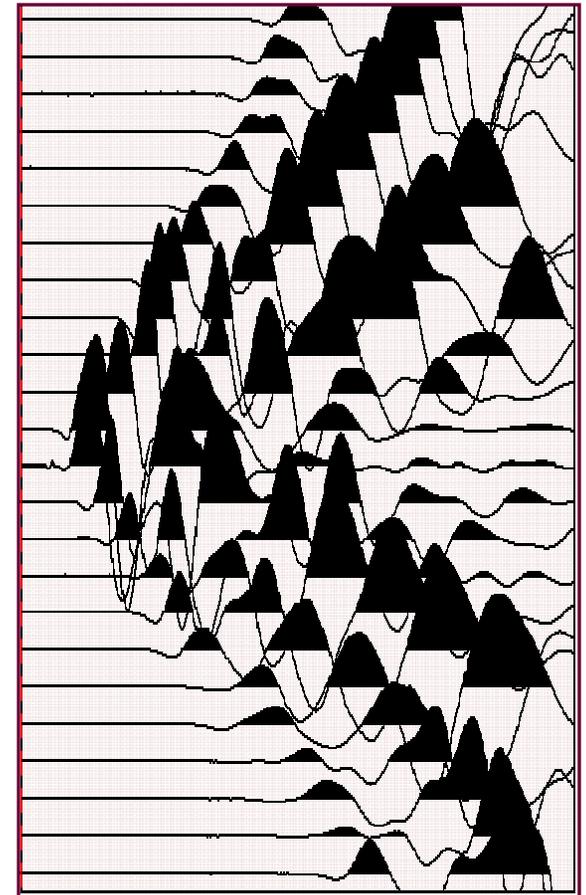
Fax. (909) 796-7615

Email: terrageo@terrageosciences.com



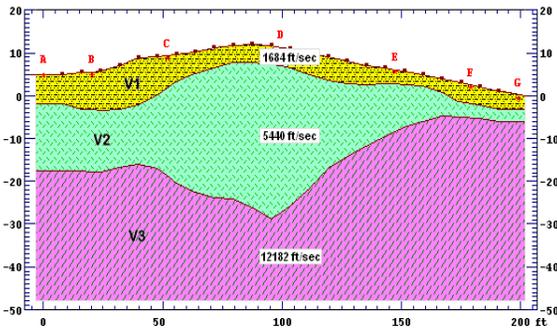
SEISMIC REFRACTION SURVEYS

**For:
Geologic,
Geotechnical,
Environmental, and
Engineering Applications**

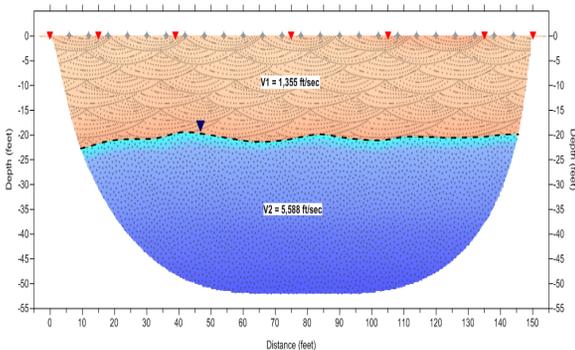


LAYER MODELING

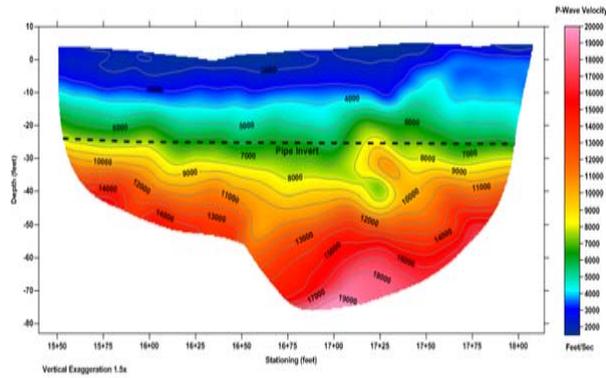
The basic seismic survey utilizes a 12-channel spread typically with five to seven shot points that can obtain depths up to 65± feet. This survey method is intended to provide simple velocity layer models typically used to determine the depth to bedrock and groundwater, thickness of overburden, and generalized seismic velocity layers for rippability evaluation, such as illustrated below. Surveys that require a higher-degree of layer definition or need to image deeper than 65± feet can also be performed using a 24-channel spread.



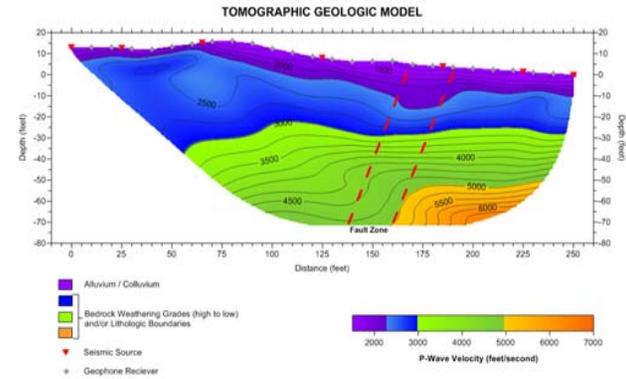
Typical velocity layer profile



Groundwater table in sandy soils



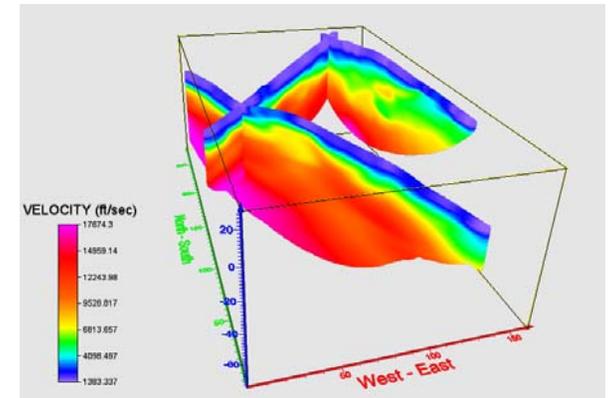
Typical tomographic model of bedrock



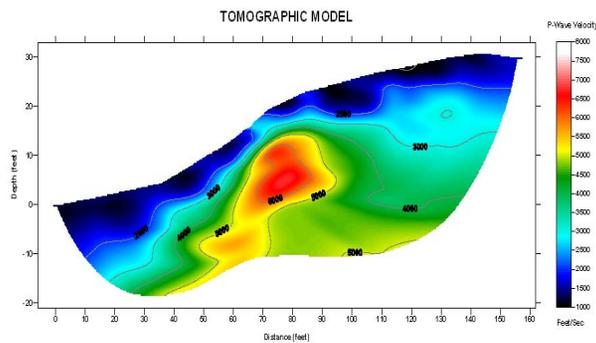
Tomographic image of fault zone

TOMOGRAPHIC MODELING

The standard seismic survey is performed using a 24-channel spread with seven shot points and lengths up to 500 feet. This survey method is intended to provide velocity gradient models that are typically used to evaluate bedrock rippability potentials and help illustrate stratigraphic and structural characteristics. These models also aid in detecting lateral velocity contrasts up to 100± feet in depth, such as illustrated above and below. These surveys can also include overlapping of numerous seismic spreads to produce one continuous long uninterrupted profile.



3-D depiction of three survey lines



Velocity model showing buried corestone

HIGH-RESOLUTION SURVEYS

This detailed seismic survey utilizes a 24-channel spread (or greater depending on project needs) with seven or more shot points. This survey method is intended to provide high-resolution tomography typically used to perform structural imaging, which aids in identifying faults, landslides, stratigraphic layering, and other related subsurface features. In addition, 3-D imaging is also available for projects requiring a higher degree of analysis, such as illustrated above.