Seismic Refraction

TERRA DAT
geophysical **innovation**

Seismic geophone array

"PEG" Elastic wave generator

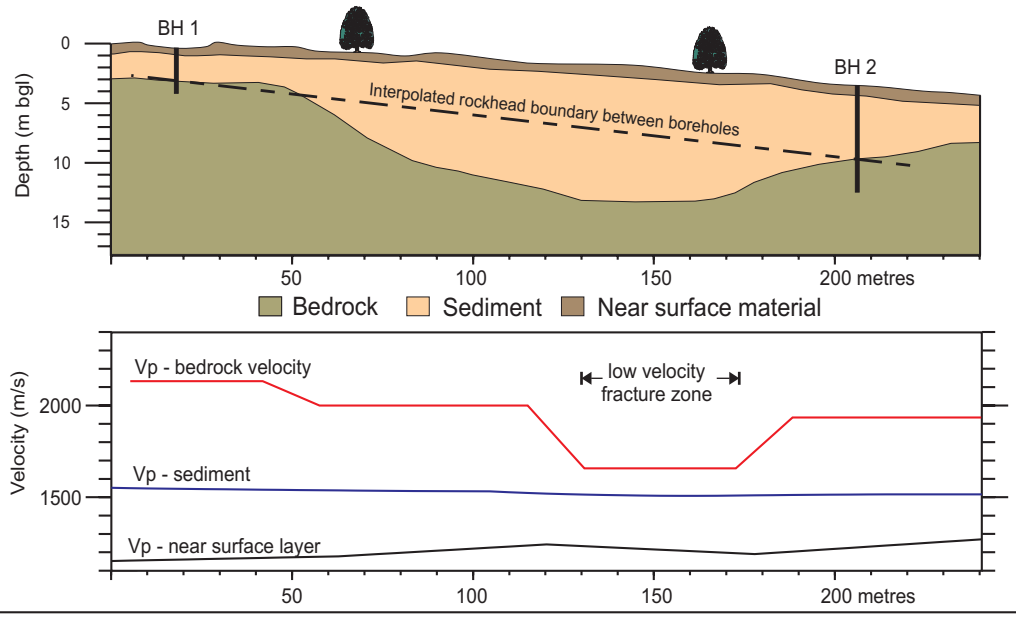
Seismic refraction is a useful method for investigating geological structure and rock properties. The technique involves the observation of a seismic signal that has been refracted between layers of contrasting seismic velocity. Shots are deployed using a hammer/gun/explosive source at the surface and shockwave data recorded via a linear array of geophone sensors. The travel-times of refracted signal are derived from the data and are then processed to determine depth profiles of the targeted geological boundary.

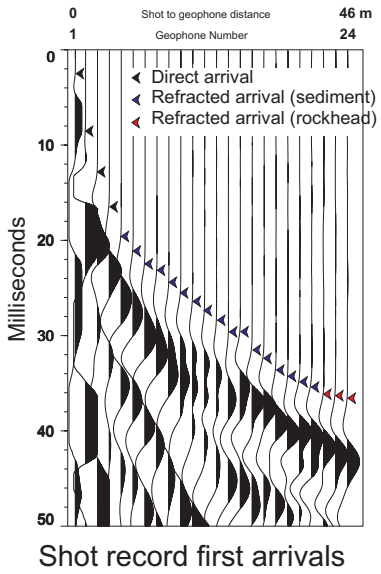
Typical Targets:

- **Engineering rockhead**
- **Weathered rockhead**
- **Bedrock structure**
- **Buried channels**
- **Rock strength & rippability**
- **Water table**

Benefits of seismic profiling:

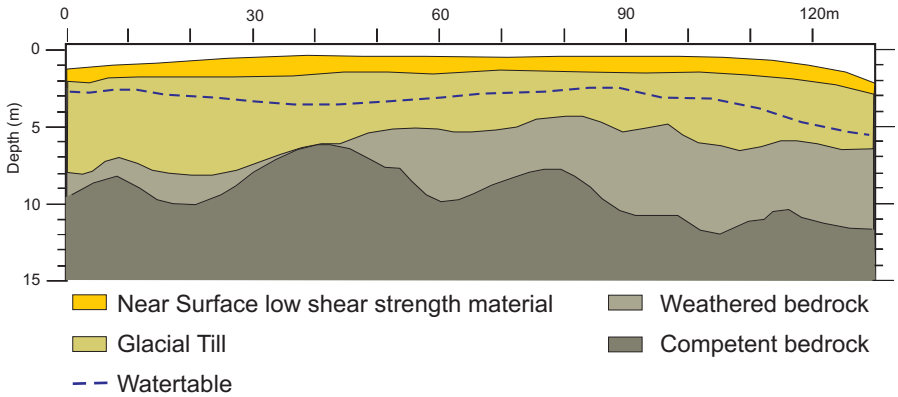
- **Low Cost**
- **High productivity**
- **Continuous profiles**
- **Non-invasive**
- **Environmentally friendly**





Shot record first arrivals

(ABOVE) The cross-section illustrates the advantage of carrying out a seismic refraction survey to map rockhead between exploratory boreholes. The results from the refraction survey identified a 'channel' feature at the bedrock interface, which also correlated to a zone of low seismic velocity. This was interpreted and subsequently proven to be preferential weathering along a bedrock fracture zone.



(LEFT) Combined P and S wave refraction survey. An S-wave survey may be used to profile boundaries where there is insufficient P-wave velocity contrast. An example of this type of boundary would be the top of highly weathered bedrock.

A combined P & S-wave survey also enables the determination of Poisson's Ratio for the sub-surface material.

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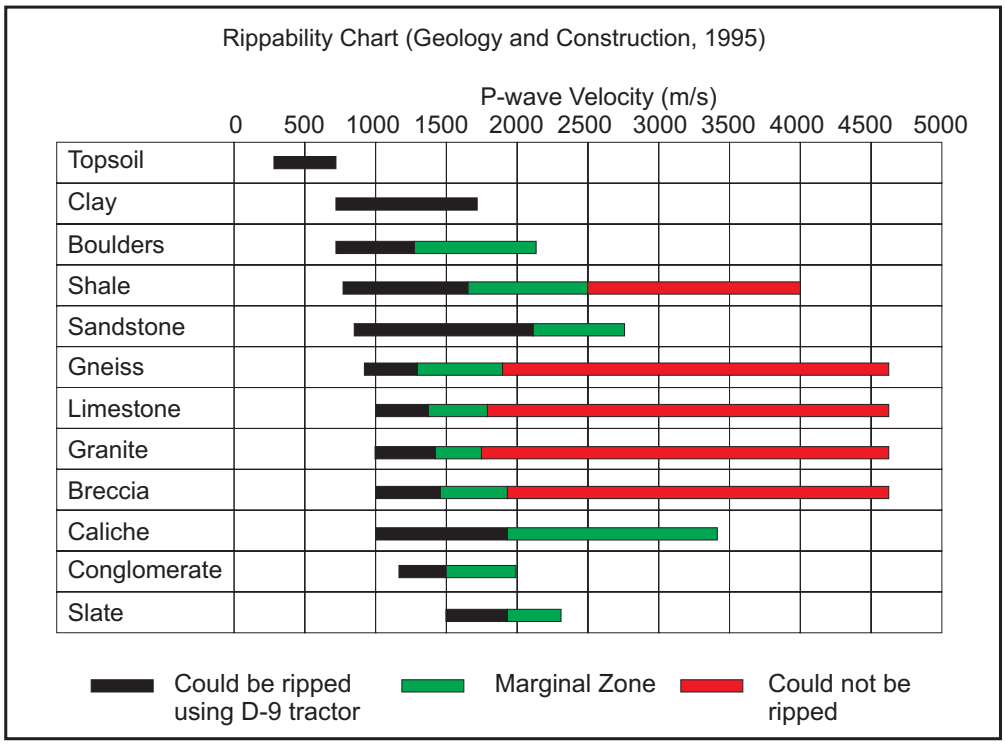

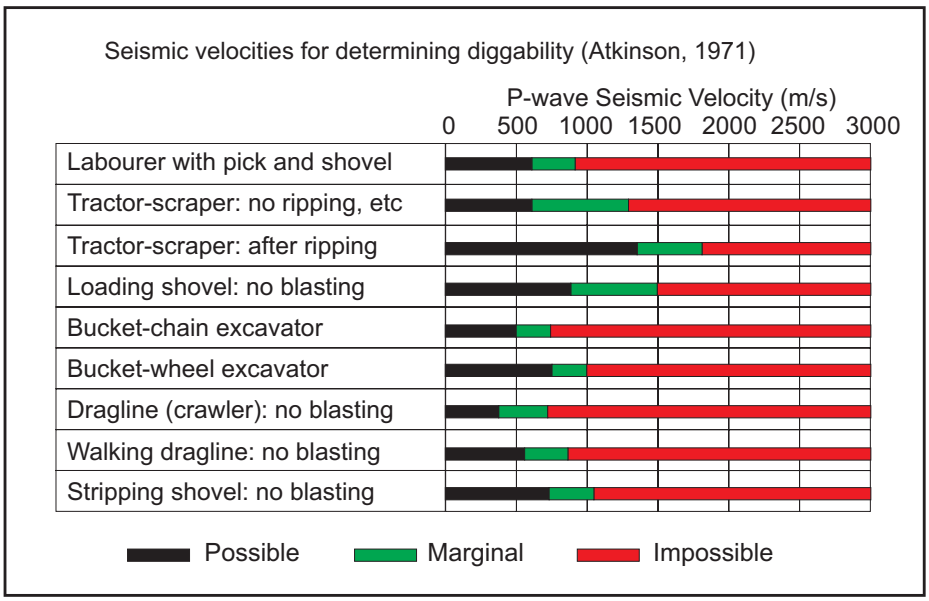

Seismic Velocity Tables

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