Seismic Refraction

The **Seismic Refraction method** is a type of **geophysical** soil exploration methods is based on the principle that elastic shock waves travel at different velocities in different materials. It does this by measuring the travel times of P-waves which are created by striking the ground with a large hammer. The P-waves travel through the subgrade and refract back to surface geophones when they encounter a material with a greater seismic velocity. A Geode multi-channel data logger is employed to collect the vibration traces from 24 equally spaced geophones, and this time-distance information is uploaded to a computer. The depth of detection is limited by the length of the traverse and the energy of the wave source (or shot). In this case, using a sledge hammer as the energy source and a traverse length of 69 m, a depth of up to 25 m can be investigated. A higher energy source (such as a truck mounted hammer or explosives) and longer traverse length would be required to investigate to greater depth..

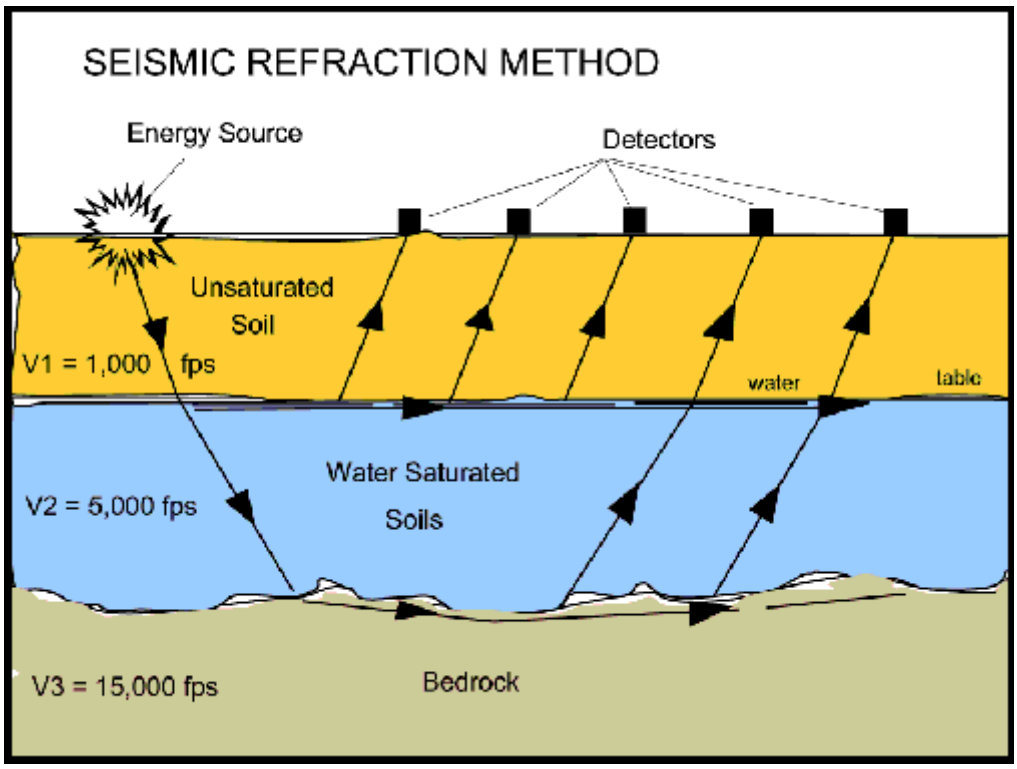
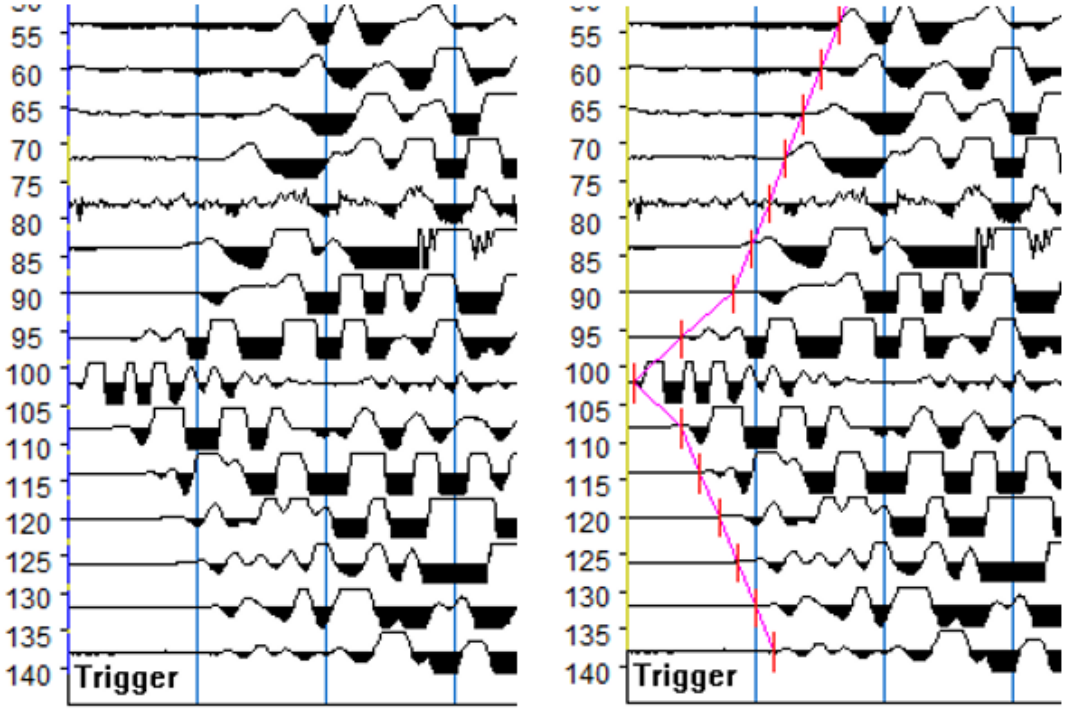


Table: Survey setup

Geophone spacing	**3 m**	**4 m**	**5 m**	**6 m**
Survey length	69 m	92 m	115 m	138 m
Depth of interest	15 – 18 m	20 m	25 – 30 m	30 – 35 m
Equipment setup point	34.5 m	46 m	58.5 m	69 m

The shear wave velocity is calculated from the P-wave velocity and subsequently the shear moduli of subsurface materials are calculated from the shear wave velocity. Interpretation of the survey traverses is presented in Figure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60
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Trigger
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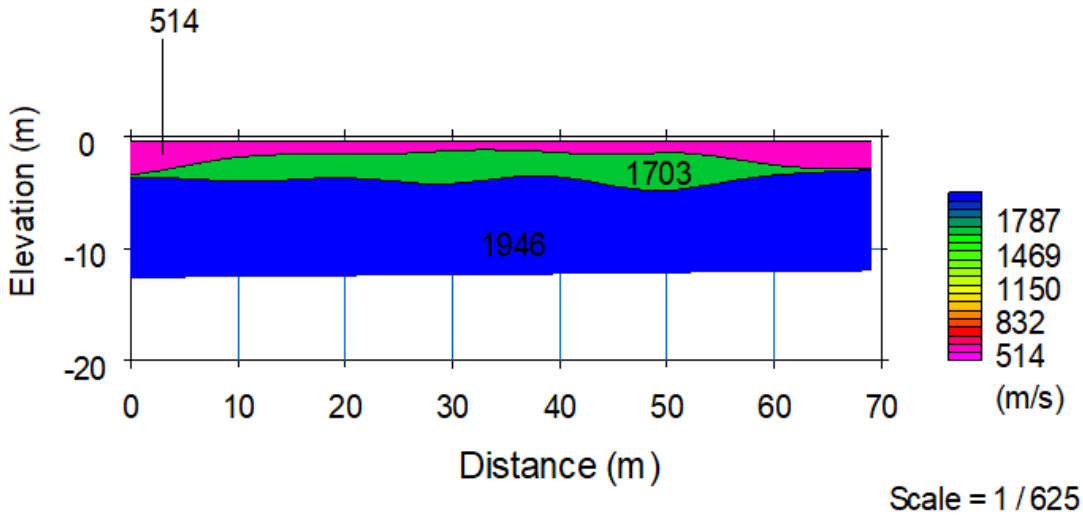
514
Elevation (m)
0
-10
-20
1703
1946
0
10
20
30
40
50
60
70
Distance (m)
1787
1469
1150
832
514
(m/s)

Scale = 1 / 625