

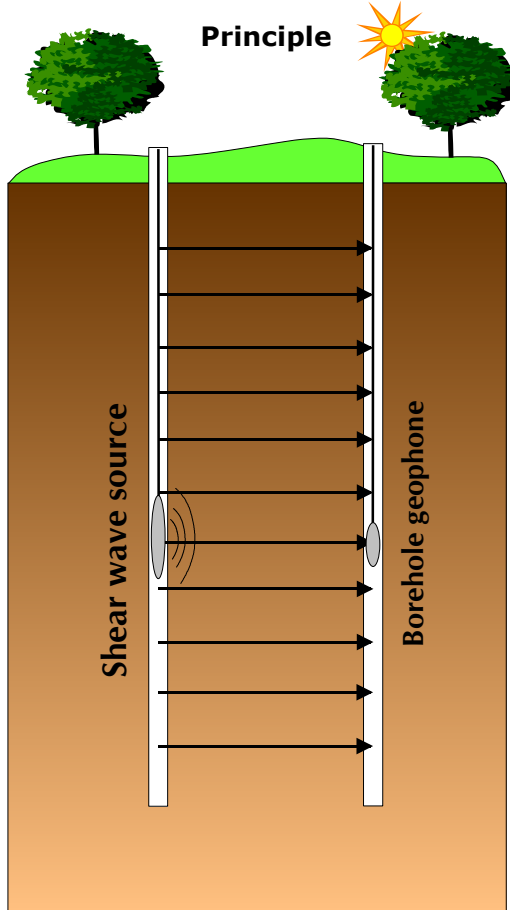


## Dynamic Soil Properties using Crosshole Testing

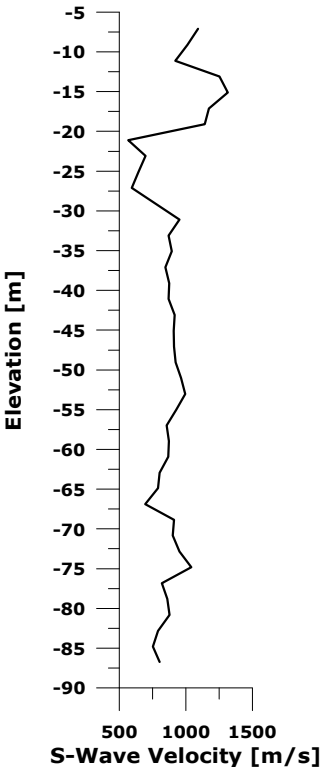
Seismic tests can be divided in two groups, surface tests and borehole tests. Surface tests are used to determine subsurface properties using geophones on surface and a surface seismic source. Borehole tests are bound to one or two boreholes which have to be drilled. Therefore, borehole tests are more expensive compared to surface tests but provide more accurate data with depth.

**The Crosshole Test is a method which determines soil stiffness properties by analyzing direct shear waves between boreholes down to about 100 m.**

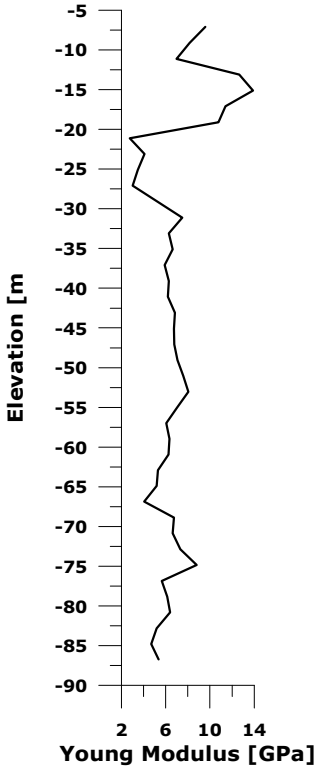
The crosshole testing method provides geotechnical engineers with information regarding seismic wave velocities of the foundation materials. Seismic velocities may be used as input for the calculation of shear modulus, Young's modulus, and Poisson's ratio. The crosshole method was published under "Standard Test Methods for Crosshole Seismic Testing", Designation: D 4428 / D 4428 M- 84 was published in the 1985 Annual Book of ASTM Standards, Volume 04.08, pp. 885-898. This standard is still current.



**Test Result**



**Soil Parameter**



The crosshole test is carried out between 2 boreholes spaced about 3 - 10 m. Both, the seismic source and borehole receiver are lowered parallel to each other down the holes. Typical intervals are 1 - 2 m. At each depth shear waves are generated by a specialised seismic source.

During data processing shear wave travel times are determined. As the borehole distance is known shear wave velocities can be computed. Shear wave velocity can be transformed to soil stiffness.