

A seismic survey was carried out along certain sections of the Southern Outlet Road between Kingston and Longley on 13-15 October 1969. The sections tested were the sites of road cuttings shown on the Department of Public Works Drawing 371520/P6 and were at the positions mentioned below.

Ten 100 m seismic profiles with geophones at 7.5 m intervals were fired from both ends and the seismic velocities of significant near-surface layers and the approximate depths of layers with higher seismic velocities were determined.

Results were as follows (chainage in feet):

Ch. 20,000-20,800. Dolerite crops out in this section except in the paddocks near Ch. 20,000. Seismic velocities of 760-910 m/s were observed in a layer from 3-4 m thick in the east to 6-7 m thick in the west. Below this a variable layer from 3,000-4,900 m/s was observed.

The upper layer would appear to consist of dolerite scree or deeply weathered dolerite, with much clay material surrounding isolated though numerous dolerite weathering 'cores'.

The lower layer has a velocity consistent with that of fractured unweathered, or partly weathered *in situ* dolerite.

Ch. 19,000-19,300. This section has a very steep slope across the road line and shows basalt talus.

An upper layer having a velocity of about 610 m/s appears to represent the talus and to have a thickness, normal to the ground surface, of from 2 to over 6 m. A lower layer having a velocity of about 1,800 m/s was observed. Both layers are known to be present nearby.

Ch. 14,400-15,100. This section shows a well-defined surface layer with a seismic velocity of 760 m/s extending to a depth of 5-6 m in the east and to 5-8.5 m in the west. This layer is interpreted as deeply weathered mudstone or sandstone.

Beneath this surface layer a seismic velocity of 3,000 m/s is observed corresponding to unweathered sediments.

Ch. 6,600-6,800. Basalt is exposed in this section. It is likely that a seismic inversion (a decrease of velocity with depth) exists here. Seismic velocities are variable but are >2,500 m/s at 1.2-2.4 m below the surface, corresponding to hard though fractured basalt.

Because of the inversion velocities at lower levels could not be determined.

Ch. 3,900-4,300. Hard Permian mudstone is seen to crop out in this section.

A surface layer of weathered and jointed mudstone with a seismic velocity of 910 m/s varies in thickness from 0.6-2.4 m; beneath this a layer with an average seismic velocity of 1,800 m/s represents unweathered but probably jointed mudstone.