The use of seismic refraction method in slope failure investigation

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The seismic refraction method has been widely applied in civil engineering projects as a preliminary site investigation tool in order to provide general subsurface information before detailed investigations and other *in situ* tests are employed. This study is focused on a complex slope failure investigation at a site of Semantan Formation, at km 7 of Jalan Termeloh-Mentakab, Pahang. A 12 channel Bison seismograph with a 14 pound hammer energy source were employed. Geophone spacing of 3 m were used in order to obtain an accurate velocity profile from the seismic sections. A total of 12 spread lines were employed in order to provide maximum coverage of the site. The seismic data were latter processed using Firstpix (Interprex Ltd.) for an accurate picking of the first arrival times and Refract (RTA, Australia) for the seismic velocity profiles.

Preliminary site investigation work using the JKR probe and drilling with standard penetration test (SPT) were initially undertaken. Geotechnical laboratory tests of the classification, laboratory drained shear box and the consolidated undrained triaxial tests with pore pressure measurements were also conducted from the samples taken at the failure site.

Results from the velocity profile of several spread lines have indicated a possible shallow failure from a weak soil material that overlies a deeper sliding failure mass. The two possible sliding surfaces interpreted from seismic velocity profiles were found to correlate well with the profile from the standard penetration test (SPT) conducted at an adjacent borehole. A lateral variation of the velocity profiles from several spread lines have also shown that the dominantly argillaceous material could be delineated from the dominantly arenaceous material that has been little affected by the failure slide and conforms well with the geological facies of the site. The topography of the post failure ground level and the probable failure surface, interpreted from the seismic refraction profiles were then compared using a 3-D graphic software (Surfer-Golden Software) in order to evaluate the nature of the sliding surface.

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