An integration of geophysical and geotechnical methods in the assessment of slope stability at Kamsis G, UKM

KHAIRUL ANUAR MOHD. NAYAN, ABD. RAHIM SAMSUDDIN, ABD. GHANI RAFEK, UMAR HAMZAH, MEGAT ISKANDAR MEGAT ISMAIL & MOHD. ZAMZURI ZAIN

Jabatan Geologi
Universiti Kebangsaan Malaysia
43600 Bangi, Selangor

A study was undertaken to investigate the possible cause of slope failure at Kamsis G, UKM that had occurred on 20th October 1997 after a period of heavy rainfall. The failed section of the slope was part of a fill ground that was constructed about a year before the failure had occurred. An integration of geophysical and geotechnical methods was selected comprising several *in situ*, laboratory and slope stability analysis in order to deduce the possible failure mechanism. Geophysical tests encompassing P and S wave seismic refraction and the electrical resistivity imaging were conducted to cover extensive areas of the site. Both P and S wave seismic refraction have shown a first layer of distinct low velocities to depths of 1 to 6 m at various locations of the site which can be correlated to the fill material. The electrical resistivity imaging has also revealed an extensive high resistivity area of the site that has reinforced the result from the seismic refraction on the fill material. Geotechnical site investigations encompassing boreholes, Mazier sampling, standard penetration testing, stand pipe piezometer and sand cone density test were conducted covering both the fill and the original ground. Mazier samples from various depths of the borehole has shown that the top portion of the fill is of loose material which is further supported by low standard penetration values (SPT) and low *in situ* density obtained from the sand cone test. Occasional measurements from the piezometer have shown that there is no water recorded during the day without rainfall. Laboratory test that includes basic sieve analysis and Atterberg limits has classified the fill material to be sandy silt of low plasticity. Drained shear box test from both the vertical and horizontal orientation of the undisturbed samples have shown that the fill material is of low cohesion values of 9.5 to 61.7 kN/m^2 with a friction angle of 23 to 40 degrees. The *in situ* density an the shear strength parameters are then used in a slope stability analysis using the computer program SLOPE/W that

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 25, No. 3, May-June 1999

employs various limit equilibrium methods. Almost all the limit equilibrium methods used have revealed the anticipated slip failure planes to be almost consistent with each other. Further analysis using the finite element program SIGMA/W based on linear elastic material has shown the possible displacement, stress and the strain distributions of the slope profile based on assumed elastic properties of the soil.