

CERAMAH TEKNIK TECHNICAL TALKS

2. Effects of Moisture and Clay Minerals on the Strength of Soil Along Kota Belud – Ranau Road, Tamparuli, Sabah

Mohd Ali Yusuf (UMS)

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School of Science & Technology, UMS

Abstract 2: The research area is located in the West Coast of Sabah, in a subdistrict of Kota Kinabalu known as Tamparuli, it is bounded by the longitude $6^{\circ} 05' N$ to $6^{\circ} 11' N$ and the latitude $116^{\circ} 24' E$ to $116^{\circ} 29' E$. The study area is underlain prominently by Crocker Formation aged from Eocene to Lower Miocene. The objective of the study is to determine the effects of moisture, mineral and microstructure on the strength of soil. Research samples cover the major landslides along the major road of Kota Belud – Ranau and sandstones of selected location. Moisture analysis was applied by using manipulation of Unconfined Compression Test by treating the samples with 5% of increment and decrement of moisture from the optimum moisture content. The analysis yielded the strength of soil ranges from 50.5 kPa to 131 kPa for optimum moisture, 20.5 kPa to 50 kPa for 5% increment and 98 kPa to 210.5 kPa for 5% decrement. The term Shear Strength Difference is introduced in this research, it is defined as the percentage of shear strength difference of the samples to its optimum moisture shear strength. The highest shear for strength difference gain is 201% and for shear strength difference loss is 81%. Sandy soil has a higher shear strength when subjected to less moisture and clay soil has a lower shear strength when more moisture is added. Mineralogy analysis is performed with petrography and X-Ray Diffraction (XRD) Analysis. Petrography analysis for rock sample shows dominant percentage of quartz grain and lithics in the rock sample all together, with minor amounts of muscovite, plagioclase, alkali feldspar and iron oxides. XRD analysis yielded that clay minerals such as montmorillonite, halloysite, rectorite and illite are abundant in the study area. Microstructure analysis is executed by Scanning Electron Microscopy (SEM) observation. Illite, rectorite and montmorillonite is often observed and characterized by their unique features. As a conclusion, this research shows that effect of moisture is characterized by the mineral and microstructure properties of the sample and it has a direct impact on the shear strength of soil.