GENERAL GEOLOGY AND EFFECTS OF MOISTURE ON THE STRENGTH OF SOIL IN KAMPUNG LOHAN, RANAU, SABAH

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This research is performed to study the general geology and effect of moisture on the strength of soil from Crocker Formation and ultrabasic. The research area is located in the Ranau district which comprises the surrounding area of Kampung Lohan. The research area are bounded by latitude of 50 57' N to 060 03' N and longitude of 1160 40' E to 1160 45' E. The research area has 6 different rock units which are ultrabasic rocks (Cretaceous – Early Tertiary), Trusmadi Formation (Paleocene – Eocene), Crocker Formation (Eocene – Oligocene), acid–intermediate intrusive (Late Miocene – Pliocene), Pinosouk Gravel (Late Pleistocene) and Quaternary Alluvium (Holocene). Petrography analysis showed ultrabasic rocks showed peridotite (lherzolite) type, sandstones of Trusmadi and Crocker Formations were the type of lithic wacke and finally the acid–intermediate intrusive showed quartz rich granite. Based on the structural geology analysis, major deformation direction is North West – South East. Total of 5 soil samples were taken which 2 of them area Crocker Formation soil samples (K1 and K3) and other 3 were ultrabasic soil samples (K2, K4 and K5). From the soil physic-chemical analysis, soil moisture content obtained is in the range 16.66% to 52.11% while the range of soil organic matter content is from 0.99% to 9.22%. All the 5 samples are acidic and ranged of 4.05 to 5.92. Soil samples texture obtained are sandy clay with silt (K1), clay (K2 and K4) and clayey and sandy silt (K3 and K5). Soil gradation is poor (K1 and K4) and well at (K2, K3 and K5). Specific gravity analysis ranged between 2.48 to 2.58. Atterberg limit analysis showed the soil linear shrinkage ranges from 6.43% to 17.86%. Soil sample plasticity obtained was medium plasticity clay (K1), very high plasticity silt (K2 and K5), medium plasticity silt (K3) and extremely high plasticity clay (K4). Soil microstructure analysis shows the presence of mineral illite (K1 and K3), chlorite (K2 and K5), kaolinite (K1), goethite (K2) and montmorilonite (K4). Soil engineering analysis like Proctor compaction shows the value of maximum dry density range between 1.21 Mg/m3 to 1.70 Mg/m3 and optimum moisture content range between 18.00% to 45.00%. At the soil optimum moisture content, uniaxial compression strength value ranges between 25.67 kPa to 45.45 kPa. While, soil permeability analysis yielded between 1.53 x 10-8 m/s to 1.46 x 10-7 m/s. For analyzing the effect of moisture, optimum moisture content was altered with increment of 3% (K1 and K3) and 1% (K2, K4 and K5). The analysis yielded the strength of soil ranges from 6.13 kPa (K2) to 21.62 kPa (K1). The term 'Decrement Difference of Unconfined Compression Strength' is used and the highest value obtained was 90.18% in clayey soil (K2) because it is rich in minerals that are able to absorb and adsorb water like chlorite and goethite while lowest value was showed by sandy clay with silt (K1) which scored 50.32%. It is concluded that sand rich soils of Crocker Formation with non-expansive clay have higher compression strength than clayey ultrabasic soils with expansive clay while the effect of moisture of soil samples has a direct impact on its compression strength.