Effect of moisture on the strength of soil from crocker formation in Tamparuli, Sabah, Malaysia

Abstract

The objective of the study is to determine the effects of moisture on the strength of soil. The research area is located along Kota Belud – Ranau Road in Tamparuli, Sabah. The study area is underlain prominently by a sedimentary rock formation known as Crocker, aged from Late Eocene to Early Miocene. Soil of the area is a weathering product from the exposed sedimentary rock formation, the alternating different lithology of this formation from one sampling station to another reflects the diversity in terms of engineering properties. Moisture data obtained from the Proctor Compaction Curve is utilized using the manipulation of Unconfined Compression Test by treating the samples with 5% of increment and decrement of moisture from the optimum moisture content. The term Shear Strength Difference is introduce in this research, it is defined as the percentage of shear strength difference of the manipulated samples to its shear strength at optimum moisture. Sample S2 with clayey material scored 75%, the highest percentage of shear strength difference loss when treated with 5% increase of moisture. Whilst, sample S6 with sandy material scored 145%, the highest percentage of shear strength difference gain when treated with 5% decrease of moisture. Clay mineral analysis was determined by X-Ray Diffraction Analysis (XRD) and Scanning Electron Microscope, yielded clay minerals such as montmorillonite, illitemontmorillonite and illite, which are significant in selected samples. It is concluded that engineering properties of soil in the study area provide variety of results and this mainly controlled by the type of soil depending on the diverse alternating rock of Crocker Formation. This research shows that effect of moisture to the properties of the sample has a direct impact on the shear strength of soil.