

# **Effect of microfabrics on uniaxial strength of weathered volcanic rocks from Tawau, Sabah**

## **Abstract**

This paper discusses the effect of micro-fabrics on uniaxial strength of weathered volcanic rocks from Tawau, Sabah. Volcanic rocks consist of basalt and andesite, aged from Pliocene to Quaternary. Weathered rock samples with grade range from slightly weathered (II) to completely weathered (VI) were collected from the road-cut slopes. Micro-fabric analysis was performed using polarizing microscope and Scanning Electron Microscope (SEM) techniques. Uniaxial strength analysis involved Point Load Test index (PLT) and Unconfined Compression Strength (UCS) test. The petrography analysis of basalt showed the domination of plagioclase with existence of orthoclase and pyroxene in aphanite texture. Meanwhile andesite consists of plagioclase, feldspar and amphibole in porphyritic matrix. Basalt samples with weathering grade from II to V showed the alteration of primary minerals from 12% to 55% and Imp (micro-petrography index) value ranging from 8.8 to  $< 0.2$ . Meanwhile andesite showed alteration of primary minerals ranging from 15% to 60% with Imp value of 4.9 to  $< 0.4$ . Andesite contains 16.8% stable minerals of quartz and feldspar phenocrysts that remain intact throughout the weathering process. Uniaxial strength results indicated that andesite exhibited a higher strength with value from 181.2 to 87.7 MPa while basalt showed 127.2 to 35 MPa. The porosity of andesite with Grade II to V was 4.1% to 49.5% whereas basalt ranged from 2.5% to 47.8%. The uniaxial strength of Grade V showed basalt is slightly higher than andesite with 0.3 MPa and 0.2 MPa respectively. This is due to the presence of more clay minerals in basaltic soil (75.1%) than in andesite soil (65.2%). This study showed that the weathering process is able to alter the microfabric characteristics of rocks which contributes to the decrement of the strength of volcanic rocks.