ABSTRACT

Weathering profiles over quartz-mica schists in the Seremban-Siliau area which are found along only the Seremban-Mambau-Siliau and Siliau-Rantau-Seremban roads are characterized by a vertical zonation of weathered materials with laterally similar features and properties. A complete weathering profile over quart-mica schist in the study area consists of Soil, Pedoplasmation Zone, Saprolite, Saprock and Rock. This complete profile can at first be divided into three main morphological zones, namely the upper ZI, the intermediate ZII and the lower ZIII zones.). ZI consists of Soil and Pedoplasmation Zone, ZII consists of Saprolite and Saprock and ZIII consists of Rock. ZI is pedologically and geochemically altered, ZII is geochemically altered and ZIII is unaltered and fresh. The weathering front is between ZIII (Rock) and lower ZII (Saprock) while the pedoplasmation front is between the upper ZII (Saprolite) and lower ZI (Pedoplasmation Zone). These mophological zones are then divided further into smaller subzones or horizons. ZI is further divided into horizons IA, IB and IC based on the hardness and grain size distribution. Horizons IA and IB consist of Soil and horizon IC consists of Pedoplasmation Zone. ZII is also divided further into subzones or horizons IIA, IIB and IIC based on the degree of weathering. Saprolite makes up the horizon IIA and upper horizon IIB. Saprock makes up the lower horizon IIB and horizon IIC. With the advance of weathering, vertical and lateral changes are noted in the inherent properties (grain size distribution, Atterberg limits, activity index) and engineering properties (shear strength parameters, cohesion (C) and angle of internal friction (ϕ)) of the weathered slope forming materials. Vertical variations are apparent between the various zones of the same cut slope and are especially distinct in the grain size distribution which varies from silty materials at the lower zones to clayey materials at the upper zones. The Atterberg limits too vary corresponding to these changes. Vertical variation is also seen in the type of clay minerals present in these zones. Illite is the main clay mineral found in the lower zones (least weathered) which alters into interstratified illite-montmorillonite in the intermediate zones (less weathered) and subsequently alters into kaolinite in the upper zones (more weathered). The C and ϕ values show general increase with weathering. Lateral variations are apparent amongst similar zones of profiles exposed on adjacent cut slopes. These variations though slight, can be seen in the grain size distributions that vary within their respective soil classifications. Other inherent and engineering properties vary in correspondence with these aforementioned lateral variations. Stability analyses on existing cut slopes and existing failures in quartz-mica schist show that most of the existing slopes are very stable slope with very high minimum factors of safety; except for an existing failure that is expected to fail again soon and another with an expected high possibility of failing again. On the risk ranking, two cut slopes are found to be less dangerous in case it fails because the spillage of debris onto the adjacent road would be minimal and of minor hindrance to the road users. All other existing cut slopes and failures are of no danger to the road users or adjacent premises since the computed potential failure would not involve the adjacent roads or premise and no spillage onto the adjacent road is expected. The existing instabilities are due to unsuitable slope geometry, high seasonal rainfall, exposed slope surface and the presence of poorly preserved relict structures.