

ABSTRACT

Determine the characteristics of the rock mass is very important to determine the stability of rock slopes. The characteristics of rock mass are strongly affected by weathering factors. Therefore, this research aims to analyze the rock weathering characteristics, weathering relationships with geotechnical parameters, and to analyze the effect of weathering on rock slope stability.

This research took place in Kokap Sub-District, Kulon Progo Regency, Special Region of Yogyakarta. This research was conducted on 15 slope points with the same rock type and varying weathering conditions. Field measurements and laboratory tests were carried out in order to obtain the research data. The field measurements employed scanline method while the laboratory test used mechanical properties test (UCS and ultrasonic), physical properties test, petrographic test and XRD test.

The results showed that the rock mass was composed of porphyry andesite rocks with mineral composition in the form of plagioclase, biotite and hornblend. Referring to the classification of Ceryan (2008) and Momeni (2015), rock mass weathering at the study site consisted of three classes, namely: class I (fresh rock), class III (moderately weathered) and class IV (highly weathered). The results also showed that there were compositions of secondary minerals of 12.4% in fresh rocks, 41.7% in moderate weathered rocks and 52.2% in high weathered rocks. This was supported by the results of XRD test which showed that there were clay minerals such as smectite and albite in fresh rocks. There were several clay minerals such as mineral smectite, illite, melanterite, cristobalite, crysolite and appophyllite in moderate weathered rocks. And there were clay minerals in the form of smectite, chlorite and vermiculite in high weathered rocks.

The characteristics of rock mass and intact rock showed the difference between fresh rock mass, medium rock mass, and high weathered rock mass. The results of the research indicate that the value of the discontinuity distance, discontinuity conditions, GSI, RQD, RMR, UCS, rock mass cohesion, rock mass sliding angles and weight of rock contents, decreased with increasing weathering class.

The increasing weathering class further impacts on rock mass stability. This is shown in the results of slope stability analysis using slope dimension simulation. For example, at a slope height of 10 m and an angle of 60 degrees, FK values from fresh rocks to weathered rocks are decreasing by 39.45%. The FK values from fresh rock mass to high weathered rocks decreased by 57.81%. The results of this simulation indicate that there are significant differences between the slopes of fresh rock mass and weathered rock mass slopes.

Keywords: rock mass weathering, slope stability