Analysis of Slope in an Excavated Gneiss Rock Using Geological Strength Index (GSI) in Ilorin, Kwara State, Nigeria

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Abstract : The study carried out analysis on slope stability in an excavated gneiss rock using geological strength index (GSI) in Ilorin, Kwara State, Nigeria. A kinematic analysis of planar discontinuity sets in a gneiss deposit was carried out to ascertain the degree of slope stability. Discontinuity orientations in the rock mass were mapped using compass clinometers. The average result of physical and mechanical properties such as specific gravity, unit weight, uniaxial compressive strength, point load index, and Schmidt rebound value are 2.64 g/m3, 25.95 kN/m3, 156 MPa, 6.5 MPa, and 53.12 respectively. Also, a statistical model equation relating the rock strength was developed. The analyses states that the rock face is susceptible to wedge failures having all the geometrical conditions associated with the occurrence of such failures were noticeable. It can be concluded that analyses of discontinuity orientation in relation to cut face direction in rock excavation is essential for mine planning to forestall mine accidents. Assessment of excavated slope methods was evident that one excavation method (blasting and/or use of hydraulic hammer) is applicable for the given rock strength, the ease of excavation decreases as the rock mass quality increases, thus blasting most suitable for such operation.

Keywords : slope stability, wedge failure, geological strength index (GSI), discontinuities and excavated slope