

Physico-mechanical characteristics of tropical granite boulders in weathered heterogeneous zones for geotechnical design purposes

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ABSTRACT

The presence of isolated or clustered granite boulders in tropical weathered masses commonly formed a very thick heterogeneous zone in weathering Zone 3 to 5. The boulders with various characteristics are always misinterpreted during the geotechnical design process due to being poorly understood and studied. This study aims to determine the physico-mechanical characteristics of boulders in different weathering zones for design purposes. The parameters studied include boulder types, porosity, density, durability, point load and uniaxial compressive strength. Results revealed boulders in weathering Zone 3, 4 and 5 can be classified into Type A, B and C, respectively. These boulders have significant differences in physical and mechanical properties. The boulders in Zone 4 and 5 consists of corestone, ringlets and saprolites and the boulders in Zone 3 have no ringlets. Corestones have the highest durability, point load and compressibility strength with a median of 94.5%, 7.80 MPa and 187.07 MPa, respectively. The ringlets possess the highest porosity range of 23.3%–31.3% compared with saprolite. Saprolite in Zone 5 has the lowest durability, point load and compressive strength with respectively less than 7%, 0.22 MPa and 1 MPa. The various characteristics of the boulders in different weathering zones could influence the geotechnical design model.

KEYWORDS

Heterogeneous zone; Granite weathering; Boulders; Physico-mechanical properties; Geotechnical design

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