

Quantification of the influence of discontinuities on the compressive strength of Malaysian granite

GOH, T.L.*, GHANI RAFEK, A., BAIZURA YUNUS, N. & HARIRI ARIFFIN, M.

Geology Programme, School of Environmental and Natural Resource Sciences,
Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor
*Email Address: gdsbgoh@gmail.com

Geological discontinuities, weathering grade and compressive strength of rock material play a significant role in influencing the stability of both cut rock slopes as well as underground openings. In the actual scenario, the compressive strength characteristics of the rock material are influenced by both material strength as well as the presence of macro-fracture. This paper presents the results of one important aspect of a systematic research to quantify the mechanical characteristics of granite materials, which are the changes in the compressive strength of fresh as well as slightly weathered granites related to geological discontinuities. The weathering grades of rock material were determined by using Schmidt rebound hammer. The granitic rock samples were tested by uniaxial compressive strength test according to ISRM standard. From the examination on rock 167 samples after the tests, the modes of failures were classified as material failure as well as material and discontinuity failure. Statistical analysis of the results at 95% confidence level showed that the average values of uniaxial compressive strength for fresh as well as slightly weathered for material failure were 113.6 ± 7.0 MPa and 68.9 ± 3.6 MPa respectively. For material and discontinuity failure, the respective average values of uniaxial compressive strength for fresh and slightly weathered were 65.6 ± 4.1 MPa and 43.9 ± 1.3 MPa. The uniaxial compressive tests results exhibited measurable differences, both for the different the weathering grades as well as the failure modes. The results shown that the compressive strength for slightly weathered granite was 2/3 (67%) of the strength of fresh granite. The values of compressive strength for material and discontinuity failure was half (50%) of the strength of material failure.