UNIVERSITI TEKNOLOGI MARA

ROCK ABRASIVITY USING CERCHAR ABRASIVITY INDEX (CAI) AS AN ALTERNATIVE TO ROCK MATERIAL CHARACTERIZATION

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for the degree of
Master of Science in Geotechnical Engineering

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This topic has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

In the event that my dissertation be found to violate the conditions mentioned above, I voluntarily waive the right of conferment of my degree and agree be subjected to the disciplinary rules and regulations of Universiti Teknologi MARA.

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ABSTRACT

Demands towards underground tunneling as an alternative to sustainable infrastructures has led to studies of rock abrasivity using Cerchar Abrasivity Test. There were four rock type samples involved and those samples had been identified as Granite, Carbonate Mudstone, Limestone and Sandstone through Thin Section Test. The Cerchar Test is the main concern of this research as to achieves the objectives of the test studies including identifying Cerchar Abrasivity Index (CAI) values and abrasivity properties of these four type of rocks, and also as to correlate obtained CAI values with other rock physical and mechanical properties. The geological rock material physical properties of dry density and wave velocity were obtained from Dry Density Test and Ultrasonic Pulse Velocity respectively. The mechanical characteristic of tensile strength was obtained from Brazilian Tensile Strength Test. Based on the findings, Granite has the highest abrasivity as its CAI is equal to 5.70, and Limestone has the lowest abrasivity, CAI equal to 1.70. Besides that, it also shows that density and wave velocity does not affect the abrasivity quality. However, the tensile strength and Quartz content of rock does affect the rock abrasivity. Granite also has the highest tensile strength among all rock samples. In short, this can be concluded that, Granite is the hardest geological to be excavated compared to Limestone, Carbonate Mudstone and Sandstone. From this study, a prediction to selection of tunneling excavation method can be evaluated as well to planning the overall tunneling construction works.

Keywords: *Abrasivity, Cerchar Test, Cerchar Abrasivity Index (CAI), rock characterization, tunneling.*

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