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Geotechnical characterization of dolomite byproducts as geomaterial for road embankment

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ABSTRACT

Dolomite byproducts are waste spillages obtained from mining sites of sedimentary rock with high mineral content called dolomite. This study aims to find the practical application of this waste material to address their disposal problem. The geotechnical characteristics of dolomite byproducts are determined to assess their suitability as geomaterial for road embankments. Laboratory tests following ASTM standards were conducted to evaluate its microfabric structure, particle size distribution, compaction behavior, load-bearing capacity, and hydraulic conductivity. Test results showed that the dolomite byproduct is a well-graded sand with silt and has low plasticity. The microstructure of the dolomite byproduct shows that its particles are angular and blocky in shape with sharp angles that go in a random direction. Through the Standard Proctor test, the dolomite byproducts have a maximum dry unit weight of 18.2 kN/m^3 and an optimum moisture content of 8.42%. Its value as an embankment material is reasonably stable when dense. As described by the California Bearing Ratio (CBR) values, the load-bearing capacity ranges from 14.33% to 16.80%, with a general rating of fair to good as subgrade material. The hydraulic conductivity test was performed at varying void ratios considering the anticipated relative compactions of 60%, 70%, 80%, and 90% on-site. The hydraulic conductivity of the dolomite byproducts ranges from 0.0417 cm/sec to 0.0187 cm/sec, which can be described as a medium degree of permeability (Fig. 1). An analytical model to predict the hydraulic conductivity as a function of void ratio was formulated from test results. The study concluded that dolomite byproducts have the potential as an embankment material and have a fair to good rating for sub-base use in road pavements.

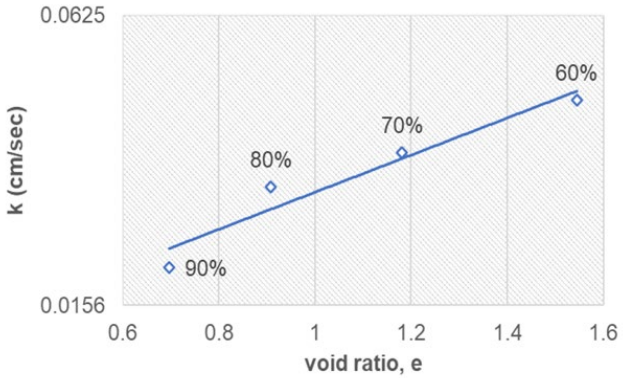

Fig. 1 Coefficient of permeability, *k* vs. void ratio, *e*

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