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## Tropical Clayey Sand Soil's Behaviour Analysis and Its Empirical Correlations via Geophysics Electrical Resistivity Method and Engineering Soil Characterizations

PDF (Size: 1503KB) PP. 111-116 DOI: 10.4236/ijg.2012.31013

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### ABSTRACT

Soil is a heterogeneous medium which consist of liquid, solid, and gaseous phases. The solid and liquid phases play an essential role in soil spontaneous electrical phenomena and in behaviour of electrical fields, artificially created in soil. Soil electrical properties are the parameters of natural and artificially created electrical fields in soils and influenced by distribution of mobile electrical charges, mostly inorganic ions, in soils. Geophysical method of electrical resistivity was used for measuring soil electrical properties and tested in different soil studies. Laboratory tests were performed for the numbers of clayey sandy soil samples taken from Batu Uban area. The empirical correlations between electrical parameter, percentage of liquid limit, plastic limit, plasticity index, moisture content and effective soil cohesion were obtained via curvilinear models. The ranges of the soil samples are changed between 229  $\Omega$ m to 927  $\Omega$ m for resistivity ( $\rho$ ), 6.01 kN/m<sup>2</sup> to 14.27 kN/m<sup>2</sup> for effective soil cohesion ( $C'$ ), 35.08 kN/m<sup>2</sup> to 51.47 kN/m<sup>2</sup> for internal friction angle ( $\phi'$ ), 38% to 88% for moisture content ( $W$ ), 33% to 78% for liquid limit ( $WL$ ), 21% to 43% for plastic limit ( $Wp$ ) and 11% to 35% for plasticity index ( $PI$ ). These empirical correlations model developed in this study provides a very useful tool to relate electrical resistivity with effective cohesion, internal friction angle (strength), void ratio, porosity, degree of saturation, moisture content, liquid limit, plastic limit and plasticity index in context of medium-grained of clayey sandy soil that is, its fluid behaviours.

### KEYWORDS

Empirical Correlations; Regression Coefficient; Resistivity; Moisture Content; Fluid Behaviours

### Cite this paper

A. Bery and R. Saad, "Tropical Clayey Sand Soil's Behaviour Analysis and Its Empirical Correlations via Geophysics Electrical Resistivity Method and Engineering Soil Characterizations," *International Journal of Geosciences*, Vol. 3 No. 1, 2012, pp. 111-116. doi: 10.4236/ijg.2012.31013.

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