

Correlations Between Electrical Resistivity and Some Properties of Clayey Soils

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Abstract : Application of electrical measurements to evaluate engineering properties of soils has gained a wide, promising field of research in recent years. So, understanding of the relation between in-situ electrical resistivity of clay soil, and their mechanical and physical properties consider a promising field of research. This would assist in introducing a new technique for the determination of soil properties based on electrical resistivity. In this work soil physical and mechanical properties of clayey soil have been determined by experimental tests and correlated with the in-situ electrical resistivity. The research program was conducted through measuring fifteen vertical electrical sounding stations along with fifteen selected boreholes. These samples were analyzed and subjected to experimental tests such as physical tests namely bulk density, water content, specific gravity, and grain size distribution, and Atterberg limits tests. Mechanical test was also conducted such as direct shear test. The electrical resistivity data were interpreted and correlated with each one of the measured experimental parameters. Based on this study mathematical relations were extracted and discussed. These results exhibit an excellent match with the results reported in the literature. This study demonstrates the utility of the developed methodology for determining the mechanical properties of soils easily and rapidly depending on their electrical resistivity measurements.

Keywords : electrical resistivity, clayey soil, physical properties, shear properties

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