

**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,
KUMASI. GHANA.**

Abstract Title:

GEOPHYSICAL SURVEY TO DETERMINE PHYSICAL PROPERTIES AFFECTING RESISTIVITY OF SOIL AND ITS APPLICATION ON FOUNDATION STUDIES, USING DC RESISTIVITY METHOD.



A PROJECT REPORT SUBMITTED TO THE DEPARTMENT OF PHYSICS, COLLEGE OF SCIENCE, KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY, KUMASI IN PARTIAL FULFILMENT OF THE BACHELOR OF SCIENCE DEGREE IN PHYSICS.

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ABSTRACT

This project was carried out both in the laboratory and on the field to determine the resistivity of soil samples and some physical properties affecting them. This geophysical survey was carried out using the direct current (DC) electrical resistivity method and some methods of physics in the laboratory for the determination of the physical properties on each sample. Porosity, bulk density, moisture content and temperature were the physical properties whose effects on apparent resistivity of soil were considered. The samples were taken along different profiles at different sites at some communities along the Accra-Kumasi highway and Ejisu - Lake Bosomtwe road in the Kumasi metropolis. In all, hundred soil samples were taken from ten different sites with ten samples from each site. The samples were analysed in the laboratory and the variations of resistivity with distance, porosity, bulk density, moisture content and temperature considered by respectively plotting a graph of resistivity against each of the properties and their corresponding values determined and recorded. From results obtained, resistivity was found to vary from $(24.45 \pm 2.55) \text{ } \Omega\text{-m}$ to $(206.62 \pm 2.55) \text{ } \Omega\text{-m}$ and with an average resistivity of $(79.59 \pm 2.25) \text{ } \Omega\text{-m}$. The bulk density was found to vary from $(1.72 \pm 0.01) \text{ gcm}^{-3}$ to $(2.61 \pm 0.01) \text{ gcm}^{-3}$ and with an average value of $(2.20 \pm 0.01) \text{ gcm}^{-3}$. The porosity ranged from $(36.34 \pm 1.16) \%$ to $(80.40 \pm 1.16) \%$, with an average porosity of $(59.75 \pm 1.16) \%$. The moisture content was found to vary from $(6.99 \pm 0.55) \%$ to $(109.12 \pm 0.55) \%$ with an average value of $(26.30 \pm 0.55) \%$. The temperature of the samples was found to vary between 23°C to 27°C . It was found that soil physical properties, such as water (moisture) content and temperature, porosity and bulk density influence the mobility of electrical charges in soils. A low resistivity, low bulk density, high moisture content, high porosity and high degree of temperature were exhibited by the samples that are loosely bound hence can be considered for agricultural purposes. Soil samples containing gravel have high resistivity, high bulk density, low porosity and low moisture content and thus should be considered for road construction and other foundation studies.