

Integrated Geotechnical and Geophysical Investigation of a Proposed Construction Site at Mowe, Southwestern Nigeria

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Abstract : The subsurface of a proposed site for building development in Mowe, Nigeria, using Standard Penetration Test (SPT) and Cone Penetrometer Test (CPT) supplemented with Horizontal Electrical Profiling (HEP) was investigated with the aim of evaluating the suitability of the strata for foundation materials. Four SPT and CPT were implemented using 10 tonnes hammer. HEP utilizing Wenner array were performed with inter-electrode spacing of 10 - 60 m along four traverses coincident with each of the SPT and CPT. The HEP data were processed using DIPRO software and textural filtering of the resulting resistivity sections was implemented to enable delineation of hidden layers. Sandy lateritic clay, silty lateritic clay, clay, clayey sand and sand horizons were delineated. The SPT "N" value defined very soft to soft sandy lateritic (<4), stiff silty lateritic clay (7 - 12), very stiff silty clay (12 - 15), clayey sand (15- 20) and sand (27 - 37). Sandy lateritic clay (5-40 kg/cm²) and silty lateritic clay (25 - 65 kg/cm²) were defined from the CPT response. Sandy lateritic clay (220-750 Ωm), clay (< 50 Ωm) and sand (415-5359 Ωm) were delineated from the resistivity sections with two thin layers of silty lateritic clay and clayey sand defined in the texturally filtered resistivity sections. This study concluded that the presence of incompetent thick clayey materials (18 m) beneath the study area makes it unsuitable for shallow foundation. Deep foundation involving piling through the clayey layers to the competent sand at 20 m depth was recommended.

Keywords : cone penetrometer, foundation, lithologic texture, resistivity section, standard penetration test

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