

AN INTEGRATION OF ELECTRICAL RESISTIVITY METHOD AND
GEOTECHNICAL ANALYSIS FOR FOUNDATION INVESTIGATION: A CASE
STUDY OF TALBA ESTATE, MINNA, NIGERSTATE

S. H. Waziri^{1*}, A. Idris-Nda², I. O. Okunlola³, J. T. Akano⁴, I. Yusuf⁵

¹⁻⁴Department of Geology, Federal University of Technology, Minna, Niger State.

⁵Department of Geology & Mining, Ibrahim Badamasi Babangida University, Lapai, Niger State.

*E-Mail: salomewaziri@yahoo.com

Abstract

An integration of electrical resistivity and geotechnical analysis were deployed in studying the subsurface geology of Talba estate along Minna - Bida road. Electrical resistivity profiling and sounding (HRP and VES) were conducted from AB/2 of 1m to 15m using the ABEM Terrameter SAS 300C. Schlumberger array was deployed for the vertical electrical sounding. Soil samples were obtained from trial pits dug to 1.5m deep. The results indicated an area comprising basically of granitic rocks covered in some places by top soil. Electrical resistivity revealed a two layer case comprising of the top soil and bedrock. The topsoil has a mean resistivity of 102 Ωm at average depth of 2.1m. The bedrock (granite) has a mean resistivity of 341.1 Ωm . The Atterberg limit test indicates inorganic clay of low to medium plasticity. The California Bearing Ratio shows a moderate bearing capacity. The maximum dry density ranges from 1.80 to 1.98 % and optimum moisture content ranges from 8.0 to 14.0 %. The sieve analysis indicates a well graded gravel. The soil samples analyzed shows relatively good geotechnical characteristics. Shallow foundation is recommended to be designed for the Talba Estate and the foundation should be placed firmly on the bedrock for firm support. This will require striping of the topsoil of about 2.1m average thickness.

1.0 Introduction

For any engineering construction work to be done, full geological information of the site where the work is to be done should be obtained. Engineering structures can be defined as any man-made object that is fixed to the earth's surface as a result of construction. Examples of engineering structures are the buildings and non-building structures. Building structures are those that have been designed to carry relatively static load, while the non- building structures are those designed to carry dynamic load. e.g. highways, bridges, etc. The materials to be utilized for construction purpose which are mostly geological must also be checked to ascertain their