ASSESSMENT OF ASPHALT PAVEMENT STRUCTURE USING INTEGRATED GEOPHYSICAL TECHNIQUES

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Pavement quality is a major concern to transport engineers, where the pavement thickness and sub-grade material are key items associated with the in-situ pavement conditions. Most pavement structure in Nigeria today fail few years after construction, hence they are of great concern to road users. However, the Ijebu-Ode Ibadan road in Southwestern Nigeria has been found stable for decades with little repair. Its stability has prompted an investigation using integrated geophysical techniques to assess its integrity.

The study carried out on some selected portions of the 65 km asphalt pavement involves use of GSSI 400 MHz Ground Penetrating Radar (GPR) equipment and electrical resistivity method of Vertical Electrical Sounding (VES) using Schlumberger array. The 400 MHz antenna system was ran on seven longitudinal profiles with average length of 1.4 km along the selected portions of the road. The GPR data were analyzed using Radan7 software to delineate pavement structure layers, defects and thicknesses. The VES was carried out on four of the seven profiles at 100 m interval between VES points to determine the composition of the sub-grade materials and the data analyzed with Winrest software. Test pits were dug on the road and measurements of thickness of various layers were taken to validate the GPR results.

The GPR data reveals that the pavement structure had three distinct layers which are the asphalt layer, base and sub-base with average thickness of 620 mm and was confirmed by the test pits result. The geo-electric sections obtained from the VES results revealed the geological composition of the sub-grade to be lateritic clay of varying thickness along the section which supports the structure under investigation. The integrated techniques have provided useful information that could be used as a quality control check and could assist government to formulate appropriate policies to improve and standardize future asphalt pavement construction.