

96. IMPACT OF GEOLOGY ON THE PERFORMANCE OF MINNA- ZUNGERU ROAD, CENTRAL NIGERIA

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Abstract

Minna- Zungeru road is in constant deplorable condition despite frequent maintenance by the Nigerian government. Geological, geotechnical, groundwater inventory and geophysical studies were therefore employed with the view of understanding the geologic basis for the performance of Minna-Zungeru road. Rocks underlying the road include granites, migmatite-gneiss and metesediment (mica schist). These rocks are fractured and weathered into secondary minerals especially within the mica schist. Natural moisture content ranges between 5.1% and 10.2%, Liquid Limits (26.78% and 49.20%), plastic limits (9.40% and 25%), plasticity index (11.54% and 39.80%), maximum dry density (1.89 and 2.07g/cm³), optimal moisture content (9.0 and 14.9%). The soaked CBR of the soil from the stable portion of the road has a CBR of 13.21%, while the two soil samples from the unstable portion recorded CBR of 4.4% and 5.8% respectively. The soils from the stable portion of road have un-soaked CBR value of 19.2% while, the two soil samples from unstable portions have un-soaked CBR of 6.1% and 7.9% respectively. Vertical Electrical Sounding VES ranges from 34.9 Ω -m and 81.6 Ω -m in the unstable portions mostly underlain by schist, and 149 Ω -m to 429 Ω -m in the stable portions underlain by granite and gneiss. These low resistivity recorded within the schist are associated with soils characterized by medium to high plasticity such as sandy clays and clayey soils of poor engineering properties. Lower percentages of groundwater variation were recorded within the portion of the road underlain by schist. The clayey nature of the soils underlain by the schist makes the soils behave like aquitards that are associated with poor engineering properties. The capillarity property of the aquitard aids in the upward movement of groundwater to the sub base materials that leads to the reduction of the strength of the soils. Treatment of the soils to improve their engineering properties, replacement of the soils with soils having better engineering properties as well as the provision of proper drainage for the road will improve the performance of the road. Geology, aquitard, groundwater, resistivity