

Some engineering properties of Charnockite-derived laterite subgrade soils in parts of Southwestern Nigeria.

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Abstract:

Vertical variations in Engineering and Geochemical properties in laterite profiles developed over charnockite, in two different climatic areas of Nigeria, were studied in close relation to the geological and physiographic factors operating in the areas. The variations showed clear and systematic trends, determined by the operation of key geochemical properties and processes, which are themselves influenced by mineralogical, topographical, climatic and drainage conditions. In both profiles studied, properties such as specific gravity, uniformity coefficient, maximum dry density, and C.B.R., decreased with depth, from the upper mottled horizon while properties such as percentage finer than B.S.S. sieve 200, liquid limit, optimum moisture content etc., increased. The plasticity index showed no clear trend. The research clearly revealed that the key factors influencing the vertical variation in engineering properties are; The accumulation of sesquioxides and redeposition of silica in the upper layers. Oxidation of iron and formation of iron oxide (iron stone) concretions also in the upper layers. Strong leaching of silica and bases, and Concentration of kaolinite at the top and Montmorillonite at the bottom of the profiles. Lower values of uniformity coefficient, C.B.R., dry density etc., and higher values of liquid limit, optimum moisture content, percentage fines, etc., were obtained for the profile in the wetter climatic area, than for the drier climatic area.

These are explained by more advanced chemical decomposition in the wetter climatic area, resulting from higher annual rainfall and poorer drainage. The water absorption coefficient was found to increase with depth in both profiles studied and also with increase in the amount of annual rainfall. Appraisal of the sub-base properties of the profiles, based on Federal Ministry of Works specifications for roads and bridges disallows the use of any of the horizons as a sub-base.

Keywords: Engineering/ properties/ charnockite/ geochemical

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