An Investigation into the Geotechnical Engineering Properties of Laterite Soils in Nilai, Malaysia

Prepared by: Ahmed Sujeeth

ABSTRACT

An increase in construction and material use in tropical environments has made way for engineering knowledge of related basic properties of soils within those areas. One such soil found abundantly are the laterite soils. This study is based on determining the engineering geotechnical properties of laterite soils which are observed to occur in the town of Nilai, Malaysia. These basic properties were generally determined for non-problematic laterite soils. Experimental analysis of earlier research as well as related journals on the same subject were reviewed. Five sites were randomly chosen throughout Nilai from which disturbed and undisturbed laterite soil samples at a depth of 1m were collected. The objectives of this study were satisfied by a series of standardized tests done on the soil using laboratory equipment.
Comparison of the determined engineering properties were compared with properties of similar studies done on laterite soils found in parts of the world.

The findings show particle distribution of laterite soils found throughout Nilai are very similar in nature. While less than 10% of aggregates were present, the predominant material consisted of sands of either medium or fine grains. Fines ranging from 4% to 21% were encountered while the overall classification could be said as Sandy Clay (SC) or Sandy Silt (SM) material. Natural moisture content range between 18 to 34% and mean value was observed at 26%. Maximum dry unit weight (MDD) and optimum moisture content (OMC) were found to be 16.4 KN/m3 and 16.4% respectively. The specific gravity ranges between 2.66 and 3.02 with an average of 2.78. Plastic limits range between 18 to 28%, liquid limits 22 to 43% and plasticity index 4 to 16%. Almost all samples lie above the A-Line meaning they are mostly inorganic clays of either low or medium plasticity. Average cohesion and angle of internal friction are 16.2 KN and 25.2°. The unsoaked CBR ranges from 5.8 to 24%. Unconfined compression strength (UCS) and undrained shear strength cohesion parameter (Cu) were found to be within the range of 38 to 134 kPa and 19 to 67 kPa respectively.

Calculations of experimental data and its analysis with the use of spreadsheets have been summarized in chapters 3, results published in chapter 4 and in depth workings shown in the appendix.

Keywords: (Keywords: Laterite, Lateritic soil, particle size analysis test, Atterberg limit test, British standard light compaction test, specific gravity, California bearing ratio, soil classification, geotechnical engineering properties).