

Shear Strength Parameters of an Unsaturated Lateritic Soil

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Abstract : The geotechnical projects demand the appropriate knowledge of soil characteristics and parameters. The determination of geotechnical soil parameters can be done by means of laboratory or in situ tests. In countries with tropical weather, like Brazil, unsaturated soils are very usual. In these soils, the soil suction has been recognized as an important stress state variable, which commands the geo-mechanical behavior. Triaxial and direct shear tests on saturated soils samples allow determine only the minimal soil shear strength, in other words, no suction contribution. This paper briefly describes the triaxial test with controlled suction as well as discusses the influence of suction on the shear strength parameters of a lateritic tropical sandy soil from a Brazilian research site. In this site, a sample pit was excavated to retrieve disturbed and undisturbed soil blocks. The samples extracted from these blocks were tested in laboratory to represent the soil from 1.5, 3.0 and 5.0 m depth. The stress curves and shear strength envelopes determined by triaxial tests varying suction and confining pressure are presented and discussed. The water retention characteristics on this soil complement this analysis. In situ CPT tests were also carried out at this site in different seasons of the year. In this case, the soil suction profile was determined by means of the soil water retention. This extra information allowed assessing how soil suction also affected the CPT data and the shear strength parameters estimative via correlation. The major conclusions of this paper are: the undisturbed soil samples contracted before shearing and the soil shear strength increased hyperbolically with suction; and it was possible to assess how soil suction also influenced CPT test data based on the water content soil profile as well as the water retention curve. This study contributed with a better understanding of the shear strength parameters and the soil variability of a typical unsaturated tropical soil.

Keywords : site characterization, triaxial test, CPT, suction, variability

Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development

Conference Location : Chicago, United States

Conference Dates : December 12-13, 2020