

In-situ and Laboratory Characterization of Fiji Lateritic Soils

Authors : Fajjal Ali, Darga Kumar N., Ravikant Singh, Rajnil Lal

Abstract : Fiji has three major landforms such as plains, low mountains, and hills. The low land soils are formed on beach sand. Fiji soils contain high concentration of iron (III), aluminum oxides and hydroxides. The soil possesses reddish or yellowish colour. The characterization of lateritic soils collected from different locations along the national highway in Viti Levu, Fiji Islands. The research has been carried out mainly to understand the physical and strength properties to assess their suitability for the highway and building construction. In this paper, the field tests such as dynamic cone penetrometer test, field vane shear, field density and laboratory tests such as unconfined compression stress, compaction, grain size analysis and Atterberg limits are conducted. The test results are analyzed and presented. From the results, it is revealed that the soils are having more percentage of silt and clay which is more than 80% and 5 to 15% of fine to medium sand is noticed. The dynamic cone penetrometer results up to 3m depth had similar penetration resistance. For the first 1m depth, the rate of penetration is found 300mm per 3 to 4 blows. In all the sites it is further noticed that the rate of penetration at depths beyond 1.5 m is decreasing for the same number of blows as compared to the top soil. From the penetration resistance measured through dynamic cone penetrometer test, the California bearing ratio and allowable bearing capacities are 4 to 5% and 50 to 100 kPa for the top 1m layer and below 1m these values are increasing. The California bearing ratio of these soils for below 1m depth is in the order of 10% to 20%. The safe bearing capacity of these soils below 1m and up to 3m depth is varying from 150 kPa to 250 kPa. The field vane shear was measured within a depth of 1m from the surface and the values were almost similar varying from 60 kPa to 120 kPa. The liquid limit and plastic limits of these soils are in the range of 40 to 60% and 20 to 25%. Overall it is found that the top 1m soil along the national highway in majority places possess a soft to medium stiff behavior with low to medium bearing capacity as well low California bearing ratio values. It is recommended to ascertain these soils behavior in terms of geotechnical parameters before taking up any construction activity.

Keywords : California bearing ratio, dynamic cone penetrometer test, field vane shear, unconfined compression stress.

Conference Title : ICASCE 2018 : International Conference on Advances in Sustainable Civil Engineering

Conference Location : Singapore, Singapore

Conference Dates : January 08-09, 2018