DEVELOP AND COMPARE DCP/CBR CORRELATION FOR SRI LANKAN RESIDUAL SOILS

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This paper explains a method to obtain CBR value using an instrument called Dynamic Cone Penetrometer (DCP). It is an insitu test that has many advantages over the traditional California Bearing Ratio (CBR) test. CBR value is widely accepted as a measure of material stability. This test method is laborious, expensive and slow. On the other hand, the test results obtained from laboratory tests may be questionable because they do not represent the site conditions. Dynamic Cone Penetrometer is simple to use and inexpensive. It also can be used to measure the pavement layer thickness. As the DCP results depend on the soil type and the condition, this study tried to develop a correlation between DCP and CBR for Sri Lankan residual soils using a locally produced DCP.

Tests were carried out for two rural road projects under the Central provincial Council and within the Peradeniya engineering Faculty premises. The DCP tests were carried out for the selected sections and soil samples were collected from the same locations for Laboratory tests, with one undisturbed sample for undisturbed CBR test. Undisturbed Unsoaked CBR, Disturbed Unsoaked CBR, Disturbed Soaked CBR, Moisture Content test, Particle Size Distribution test and Compaction test were carried out as laboratory tests.

Regression analysis for the results shows that there is a significant correlation between DCP and CBR for Sri Lankan soils. The data was analyzed with Linear, logarithmic, Exponential and Power (Log/Log) models. Out of the four models, power model is the best model to describe this relationship. Three correlations were established between DCP and disturbed unsoaked CBR, DCP and Disturbed soaked CBR and DCP and Undisturbed Unsoaked CBR for clayey or silty sand. All three equations showed good correlations between DCP and CBR with coefficient of determination (R^2) more than 0.6. The equations derived are Log CBR=2.182–0.872 Log DCP- For DCP/DUCBR, Log CBR=1.145–0.336 Log DCP- For DCP/UUCBR and Log CBR=1.671–0.577 Log DCP- For DCP/DSCBR. Where DCP is in mm/blow. The data limits of the equation derived are, 2 mm/blow < DCP < 75 mm/blow and 3< CBR < 26.