Estimation of Some Geotechnical Properties of Tripoli Sand by Using Dynamic Cone Penetrometer (Dcp)

Abstract
Determination of the in-situ engineering properties of subsurface ground materials has always been a challenge for geotechnical engineers. Several in-situ test methods have been developed. Dynamic cone penetration test (DCPT) is one of the in-situ penetration tests which have been widely used to determine the geotechnical parameters of soil. The dynamic cone penetration test (DCPT) is a quick and easy to set up and run onsite. Due to the economy and simplicity of the test, better understanding of correlations between its results and the geotechnical parameters of soil can reduce significantly the efforts and cost to evaluate the engineering properties of ground materials. In this research, a light weight simple DCP device was used for evaluation of some engineering properties of Tripoli sand. The device consisted of an 8kg hammer that drops over a height of 575 mm and drives a 60o cone tip with 20 mm base diameter into the ground. The intention of this investigation is to obtain sufficient data to establish appropriate and reliable correlations among soil parameters and DCPT results. In order to investigate the effect of fine material content on the correlations between the geotechnical parameters and the penetration index (PI) of the DCPT of Tripoli sand, soil samples of different fine material content have been prepared and tested. This research presents the results of the laboratory tests as well as the analysis and discussion of these results. Based on the analysis of test results, the relationships between the DCPT results (penetration index, PI) and the geotechnical parameters of Tripoli sand such as relative density and CBR value are obtained. In this study penetration index of the dynamic cone penetration test from the laboratory prepared samples were correlated with laboratory CBR,s for a number of different soil types. Unique models were found for each type of soil with good coefficient of determination (R2). The combined data gave also a correlation between CBR and penetration index PI which compare very well with those obtained from other studies. There is no clear correlation between
the penetration index and both the dry density (gr/cm³) and relative density, with wide scatter and a low coefficient of determination (R²) value.