Hydraulic Conductivity Prediction of Cement Stabilized Pavement Base Incorporating Recycled Plastics and Recycled Aggregates

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Abstract : Saturated hydraulic conductivity is one of the most significant attributes of pavement base course. Determination of hydraulic conductivity is a routine procedure for regular aggregate base courses. However, in many cases, a cement-stabilized base course is used with compromised drainage ability. Traditional hydraulic conductivity testing procedure is a readily available option which leads to two consequential drawbacks, i.e., the time required for the specimen to be saturated and extruding the sample after completion of the laboratory test. To overcome these complications, this study aims at formulating an empirical approach to predicting hydraulic conductivity based on Unconfined Compressive Strength test results. To do so, this study comprises two separate experiments (Constant Head Permeability test and Unconfined Compressive Strength test) conducted concurrently on a specimen having the same physical credentials. Data obtained from the two experiments were then used to devise a correlation between hydraulic conductivity and unconfined compressive strength. This correlation in the form of a polynomial equation helps to predict the hydraulic conductivity of cement-treated pavement base course, bypassing the cumbrous process of traditional permeability and less commonly used horizontal permeability tests. The correlation was further corroborated by a different set of data, and it has been found that the derived polynomial equation is deemed to be a viable tool to predict hydraulic conductivity.