ABSTRACT

An Investigation into the Use of Relative Permittivity For Evaluation and Monitoring of Expansive Clay Subgrades

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In road engineering, the ingress of moisture into expansive clay subgrades is of extreme importance because it can reduce pavement integrity, quickly changing subgrades from solid into a plastic state which is characterised by lower bearing capacity and pavement unevenness. One technology that is currently being considered for assessing pavement integrity is ground penetrating radar (GPR). In the research presented here, the relative permittivity that can be obtained from GPR scans was investigated to determine its effectiveness in providing useful information on the shear resistance of an expansive clay subgrade.

In this study a relationship between CBR and relative permittivity was utilized to create a multiple linear regression model to predict CBR.

The results of the study showed that the relative permittivity can be used to estimate expansive clay's shear resistance through soil specific calibration. The linear regression model developed can be used to predict the CBR value for the expansive clays soil.

The novel concept presented in this research is that GPR can be used as an additional tool to investigate and monitor expansive clay subgrades non-intrusively, thereby saving cost and time.

Keywords: Marc Cooper; Expansive clays; Percometer; Relative Permittivity; Lichtenecker Model; California Bearing Ratio.