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PREDECTION OF RURAL ROAD PAVEMENT PERFORMANCE USING DCP

S. Shankar, B. Ranjith Kumar Reddy, DSNV Amar Kumar and C. S. R. K Prasad

ABSTRACT

For a new design, resilient modulus values are generally obtained by conducting repeated triaxial tests on reconstituted/undisturbed cylindrical specimens. Because of the complexities encountered with the test, in-situ tests would be desirable, if reliable correlation can be established. In evaluating existing pavements for rehabilitation selection, the pavement layers characterization is even more complex. The main focus of this study is to develop a model which correlates the California bearing ratio (CBR) with dynamic cone penetration index (DCPI). In support of the study, dynamic cone penetration tests were performed at selected locations for all the rural road pavement layers each selected test section and laboratory CBR tests were conducted for the same materials at field moisture content and density in the laboratory. Resilient modulus is calculated for the pavement layers using Heukelom equation. Damage analysis was performed for both fatigue cracking and permanent deformation. In this case only permanent deformation is considered. The secondary objective is to develop a failure criterion for permanent deformation. In support of this objective, the average rutting values of the test sections, the damage caused by all commercial vehicles (VDFs) are considered. The cumulative standard axles are estimated at 20mm rut depth, and the compressive strain on the top of the subgrade is calculated using bitumen stress analysis in roads (BISAR) software.

1. INTRODUCTION

Pavement layer characterization is expressed in terms of Resilient Modulus (M_R) has become crucial for pavement design. Nondestructive test procedures have limitations, such as repeatability of the test results and the identification of layer properties when underlain by softer layers. The shortcomings of these test methods signify the need for an in-situ test that can estimate the resilient modulus of pavement subgrade soils. In the present project, the application of the dynamic cone penetrometer test (DCPT) is further investigated. However, the use of the resilient modulus (Mr) has become mandatory for pavement design. To find the (M_R) in laboratory, a time-consuming testing procedure is required which demands significant effort. Therefore a faster and easier alternative method for road construction practice is desired. Among the present in-situ methods, the dynamic cone penetration (DCP) test which was a simple, fast and economical geotechnical test, has been widely used in geotechnical investigations for several decades (Kleyn, 1975). This test provides an estimate of strength, pavement condition and variability of granular bases and subgrade soils of existing pavements (Kleyn, 1975; Kleyn *et al.*, 1982) used the DCP to locate potential collapsible soils. DCP uses

* National Institute of Technology, Transportation Division, Department of Civil Engineering, A. P., Warangal, India-506004, *E-mail: shreebunty@gmail.com*