TECHSUMMARY *January 2020*

SIO No. 30000425 / LTRC Project No. 12-2P

Assessment of Environmental, Seasonal, and Regional Variations in Pavement Base and Subgrade Properties

INTRODUCTION

LTRC has conducted an extensive research project to determine the seasonal variation in the subgrade resilient modulus (M_R) from 14 sites throughout Louisiana. The study was initiated to determine how well the Enhanced Integrated Climatic Model (EICM) of the Mechanistic Empirical Pavement Design Guide (MEPDG), renamed to PavementME, represented the actual changes in the subgrade M_R seasonally. The MEPDG was developed and refined by the National Cooperative Highway Research Program under projects 1-37A, 1-40D, and 9-23.

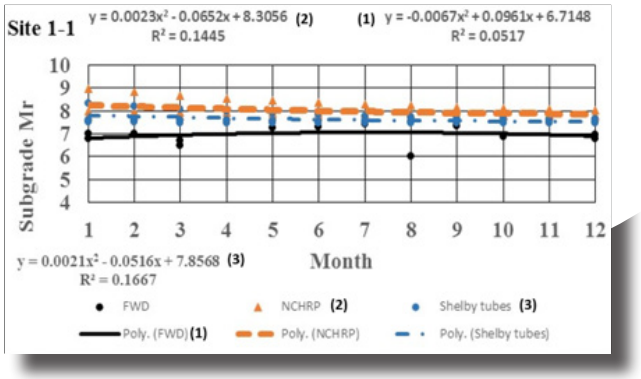

Figure 1
Output from the PavementME software with the results from FWD testing

OBJECTIVE

The objectives of this study were to obtain the seasonal variation of the subgrade M_R from FWD tests, collect Shelby tube soil samples, and determine the accuracy of the EICM using the data from the FWD as the control.

SCOPE

Fourteen research sites were selected from the four major geologic regions in Louisiana. Field testing was conducted on the roadway shoulders at a distance of approximately 4 ft. from the edge of the travel lane. All 14 sites were assessed with the FWD seasonally for a period of at least 3 years. Shelby tube samples were taken from 7 of the 14 research sites.

METHODOLOGY

Soils data from the 14 research sites were obtained from two sources: Shelby tube sampling and NCHRP soil unit data. Shelby tube sampling was conducted at 7 of the 14 research sites to a depth of approximately 24 ft., while soils data were available for all 14 sites from the NCHRP soil unit data. The soils data from the two sources was used as an input into the PavementME software. The output from the PavementME software along with the results from FWD testing were plotted on a graph as presented in Figure 1. This allowed the authors to determine how well the results from PavementME matched the results from FWD testing. Soil strata from Shelby tube sampling and NCHRP soil unit data were plotted a graph as presented in Figure 2.

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CONCLUSIONS AND RECOMMENDATIONS

PavementME was used to conduct an analysis of the seasonal changes in the subgrade M_R from the 14 sites using soils data from both the NCHRP soil units and Shelby tube samples. These results were compared with the results from FWD tests, which was also used as the control.

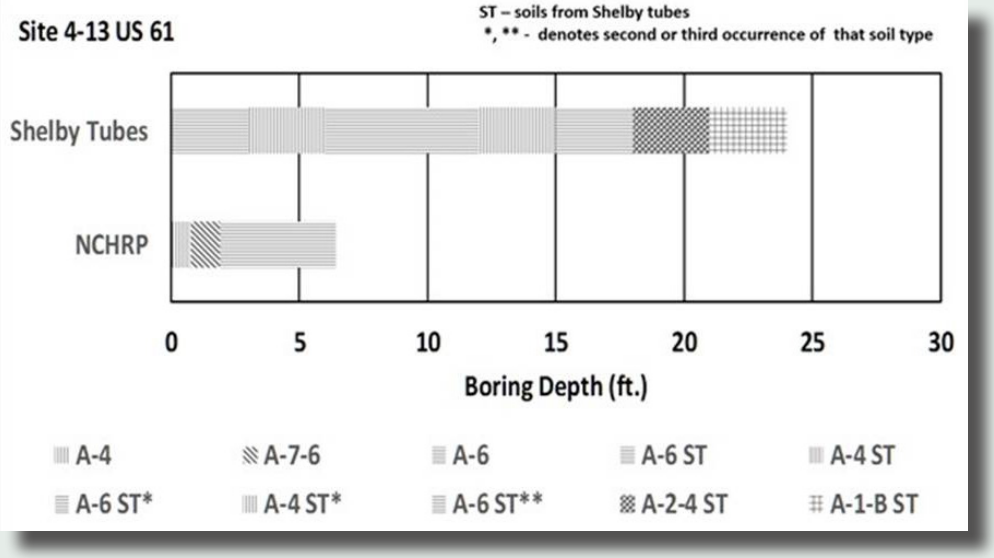

Figure 2
Soil strata from Shelby tube sampling and NCHRP soil unit data

Based upon the results, 43 percent of the PavementME results where the soil types and depths were taken from the NCHRP soil units were similar to the results from FWD testing. Regarding the PavementME results using soil types and depths from the Shelby tube samples, 43 percent were similar to the results from FWD testing. Therefore, based upon the locations of testing within Louisiana, soil types with associated strata depths, and number of samples used in the analyses, the NCHRP soil unit and Shelby tube samples equally matched the FWD test results. This implies that the NCHRP soil unit samples may be used with confidence.

Based upon the results of this study, it is feasible to use NCHRP soil unit data as a substitute for Shelby tube samples. Comparisons between subgrade M_R data obtained from FWD tests and PavementME, indicated that PavementME may be used to adequately model the seasonal changes in the subgrade M_R.