8. It was indicated that a reduction in thickness for a continuous pavement had slightly more effect on deflection than an equal reduction in thickness for jointed pavement. Although there is a slight variation, this effect of pavement thickness on deflection was found by: (1) this study, (2) the AASHO Road Test, and (3) Westergaard's theoretical analysis. These three are all in approximately the same range.

9. The use of lime stabilized subgrade as practiced in Texas to provide a working platform or moisture control, was found to give additional benefit of substantially reducing the deflections of a continuous pavement. Under certain conditions, the supporting characteristics of this layer may be considered in design.

10. From a deflection and stress standpoint, the design details presently being used by the Texas Highway Department for CRCP appear to be more than adequate for the conditions found in Texas.

11. This study developed two findings that contradict widely accepted beliefs concerning deflection of concrete pavement. These are:

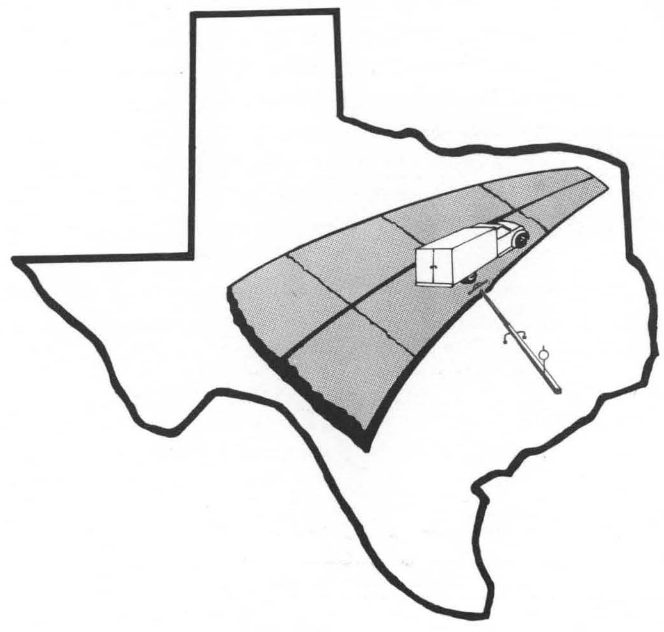
a. Pavements on moist, saturated foundations deflected less than when the support was dry or partially saturated.

b. Although the difference is small, deflection and stresses were lower on low modulus of elasticity concrete than on high modulus of elasticity concrete.

SUMMARY REPORT 46-5(S)

A STATEWIDE DEFLECTION STUDY OF CONTINUOUSLY REINFORCED CONCRETE PAVEMENT IN TEXAS

Project 1-8-63-46



Cooperative Research Study of the
Texas Highway Department and U.S.
Bureau of Public Roads

August, 1966

TEXAS HIGHWAY DEPARTMENT
Austin, Texas

SUMMARY REPORT 46-5(S)

A STATEWIDE DEFLECTION STUDY OF CONTINUOUSLY REINFORCED CONCRETE PAVEMENT IN TEXAS

by

B. F. McCullough
Harvey J. Treybig

Introduction

The AASHO Road Test experiment factorials did not include continuously reinforced concrete pavement. The deflection data obtained at the Road Test is difficult to extrapolate to a formula for continuous pavement in Texas because: (1) it is not directly applicable to this pavement type, (2) only one natural soil type and strength was considered, (3) only one concrete modulus of elasticity was used, and (4) lime stabilization was not included. In order to establish the effect of these parameters and verify the original design assumptions, a statewide deflection study was conducted on continuously reinforced concrete pavement in Texas.

The overall objective of this investigation was to determine the effects of the design variables on pavement deflection and radius of curvature. After establishing the parameters considered, statistical expressions were derived that can be used for calculating curvature and deflection. Original design assumptions are investigated to determine their validity.

Description of Experiment

The entire experiment was functional through a factorial design that encompassed the variables involved in pavement design. The variables which were represented in the factorial are called controlled variables which are the subgrade support, subbase type, concrete modulus of elasticity and concrete modulus of rupture.

For pavement thickness similar charts were prepared. Other variables which were considered in this analysis were referred to as semi-controlled variables. These being: season of the year and the general soil moisture condition.

Pavement test sections for this experiment were chosen on existing pavements throughout the state. Special criteria were developed in chosing the test sections. These criteria were rigorously followed in order that the factorial might be representative.

The equipment and experimental procedures used in this experiment are covered in a previous report.

Conclusions

1. The deflection is a function of the concrete modulus of elasticity, crack spacing, surface crack width, pavement slab thickness, pavement type, strength characteristics of the subgrade and subbase, and the sub-surface moisture conditions.

2. The variables affecting deflection are correlated into an empirical equation for predicting deflection under a given wheel load.

3. An empirical equation for radius of curvature was developed incorporating the same variables with the exception of crack width.

4. For continuous pavements longitudinally reinforced with 0.5 per cent steel, it was found under a wide variation of support and environmental conditions, that the transverse cracks were small enough to retain sufficient aggregate interlock to maintain approximately 100 per cent load transfer.

5. The transverse cracks were found to affect the continuity of a continuous pavement since measurements indicated that the curvature was smaller at a crack than at a point mid-way between two cracks.

6. From a deflection and curvature or stress standpoint, pavements with stabilized subbases are superior in performance to pavements with non-stabilized subbases.

7. From a deflection standpoint the present practice of using a two inch thinner pavement for continuous pavement in relation to jointed pavement as indicated by current design procedures, is correct and conservative.