SUMMARY REPORT 46-6(S)

A LABORATORY STUDY OF THE VARIABLES THAT AFFECT PAVEMENT DEFLECTION

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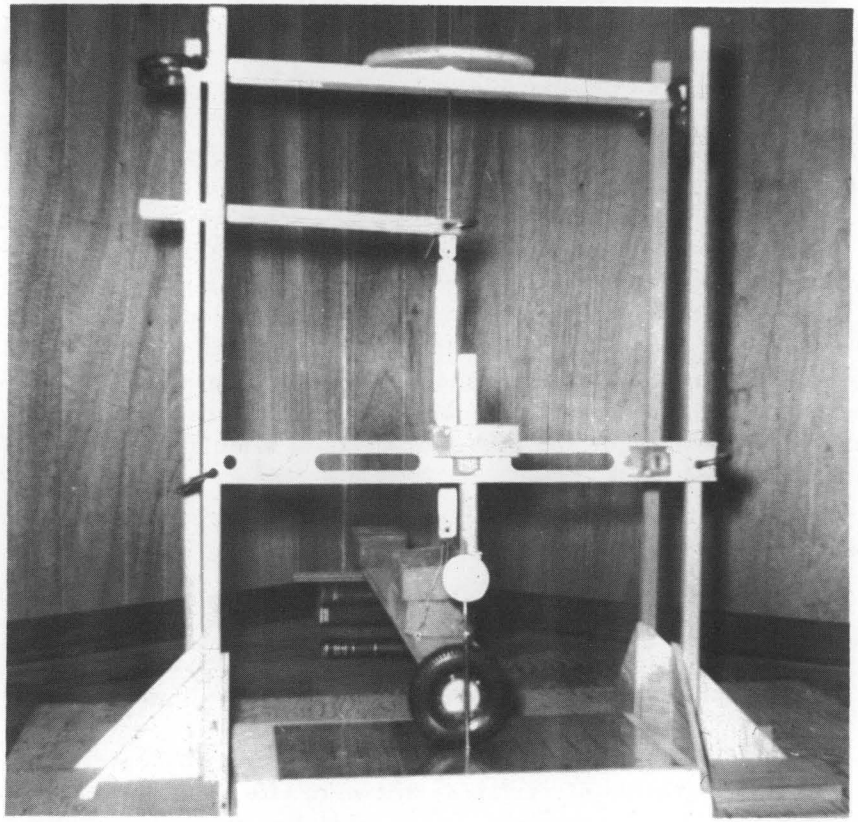

Cooperative Research Study of the
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TEXAS HIGHWAY DEPARTMENT
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A LABORATORY STUDY OF THE VARIABLES THAT AFFECT PAVEMENT DEFLECTION

by

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INTRODUCTION:

In the early part of 1963, the Texas Highway Department initiated a research study entitled, "A Performance Study of Continuously Reinforced Concrete Pavement". One phase of this project was to study the factors influencing pavement deflection and their effect on the performance of continuously reinforced concrete pavement. The preliminary results of these deflection studies indicate that low modulus of elasticity concrete pavement deflects substantially less than does high modulus of elasticity concrete pavements which is contrary to the established theory.

The need for more knowledge as to how the various variables affects deflection of pavement is apparent. This study of the known variables which affect pavement deflection, with special emphasis of modulus of elasticity of the pavement slab, was a laboratory effort to learn more about this phenomenon. The primary variables which are considered in this report are modulus of elasticity of the slab, thickness of simulated pavement, subgrade, and load.

OBJECTIVES:

The objectives of this study were as follows:

1. To develop a device that would simulate deflections obtained on pavements in the field due to wheel loads.

2. Investigate the pavement deflection characteristics in terms of variables known to effect deflection, with special emphasis of the modulus of elasticity of the pavement slab.

DESCRIPTION OF EXPERIMENT:

The laboratory test equipment was developed to correlate field conditions to the degree possible, and to the accuracy required so that measurements could be accurately reproduced. This was accomplished by constructing a model as shown on the cover.

The simulated support material was a fine pore synthetic foam rubber. Pavement surface was simulated by using steel, copper, aluminum, magnesium, and plexiglass flat plates.

EXPERIMENTAL PROCEDURE:

The data required to evaluate the simulated pavement's response was taken using the equipment shown on the cover. (Simulated subgrade, pavement slab, loading device and deflection measuring gauge).

Deflections were measured on the simulated pavement slab in the center, edge and basin. Approximately 1500 measurements were made. The simulated slabs were lacquered in order to eliminate friction as a variable between the simulated pavement slab and subgrade.

CONCLUSIONS AND RECOMMENDATIONS:

1. On the basis of this experiment, it was concluded that the variables considered correlate with Westergaard's theory, with the exception that deflection of the pavement surface does not, under all conditions, increase with a decrease in the modulus of elasticity of the pavement slab.

2. That a model can be constructed which is capable of correlating field pavement deflection measurements.

3. It was recommended that a pavement deflection formula be derived which will more accurately correlate actual field measurements as related to the modulus of elasticity of the pavement surface.

4. It was recommended that laboratory test models be considered, if feasible, for preliminary studies to aid in solving problems in pavement design.