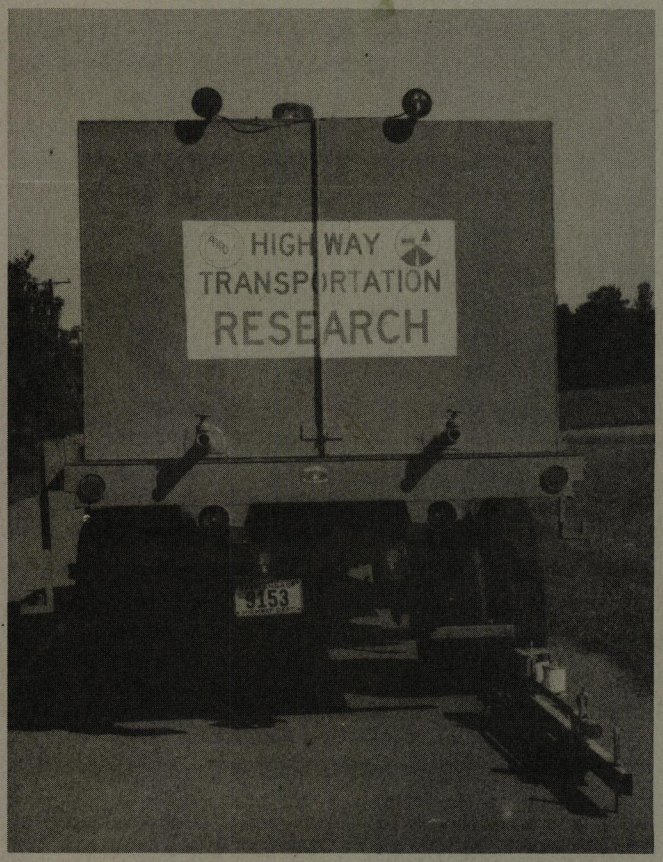
Design of ACHM Overlays by Deflection Analysis



TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
HRC-30		

4. Title and Subtitle	5. Report Date
DESIGN OF ACHM OVERLAYS BY DEFLECTION ANALYSIS	May 15, 1974
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Rogers, J.E.	

9. Performing Organization Name and Address	10. Work Unit No.
Arkansas Highway Department Division of Planning and Research P.O. Box 2261 Little Rock, Arkansas	11. Contract or Grant No.
	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address Department of Transportation Federal Highway Administration	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

Asphaltic concrete hot mix overlays used for improving load carrying quality of a roadway have not been designed according to specific criteria. Of the design procedures available, only deflections take into account structural strength of the in-situ pavement.

Eight test sections were tested during each season for a period of four years. Data was collected, reduced, and plotted on a series of graphs of temperature (pavement & ambient) vs. deflection (total & rebound). Regression analyses were performed on each set of data to fit a trend line and determine the relationship between temperature and deflection.

In most cases, ambient temperature influenced deflections to a greater degree than pavement temperature. For this reason, a flexible pavement design procedure should utilize ambient temperature.

17. Key Words	18. Distribution Statement
Flexible Pavement Design, Deflections, Benkleman Beam	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassfied			

Form DOT F 1700.7 (8-69)

DESIGN OF ACHM OVERLAYS BY DEFLECTION ANALYSIS

Final Report

HRC-30

Prepared by the Arkansas Highway Department
Division of Planning and Research
in cooperation with the Federal Highway Administration

SUMMARY

Asphaltic concrete hot mix overlays used to upgrade the load carrying qualities of an existing pavement structure have not been designed according to specific criteria. Of the procedures available, only deflections take into consideration in-situ structural strength.

Eight test sections were chosen for testing and evaluation. Test data included ambient temperature, pavement temperature, total deflection, and rebound deflection. Field data was reduced and plotted on a set of graphs. These graphs illustrate the relationships between temperature (both ambient and pavement) and deflection (both total and rebound). In order to establish these relationships, regression analyses were performed to fit a line to each plot.

Through investigation of these trend lines, it was determined that ambient temperature influences deflections to a greater extent than does pavement temperature. For this reason, ambient temperature should be used in lieu of pavement temperature in flexible pavement design utilizing deflections.

TABLE OF CONTENTS

LIST OF FIGURES

INTRODUCTION

Asphaltic concrete hot mix overlays used to improve the load carrying capacity of an existing roadway have not been designed by specific criteria. Most states base overlay design on experience only. The remaining states use some form of the AASHO guide or a deflection method.

From the many published reports it is apparent that much work has been done concerning flexible pavement and overlay design. There is, however, no design method which stands out as being "the best." Of the procedures available, only those using pavement deflections take into account structural strength and load carrying capacity of the in-situ pavement structure.

The primary objectives of this study were: (1) to provide some method for determining thicknesses of bituminous overlays, and (2) to evaluate the effectiveness of the selected procedure. A secondary objective was to determine what effect temperature had on deflections and apply a "correction factor" to the design if needed.

A previous literature search revealed several different types of equipment used. Benkleman Beams were the instruments predominately used to measure deflections of the roadway, and procedures varied only slightly from state to state. The most significant differences, however, were in the load vehicle. Most states filled a dump truck to 18,000 lbs with sand or some other type of bulk material. Roadway cross-slope as a weight variable was neglected. Evidently none of the load vehicles were weighed at each test section to determine whether the load remained constant or whether it had changed due to changes in slope.