TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/TX-82/33+256-1		

4. Title and Subtitle COMPARISON OF THE FALLING WEIGHT DEFLECTOMETER AND THE DYNAFLECT FOR PAVEMENT EVALUATION	5. Report Date November 1982 6. Performing Organization Code
7. Author(s) Bary Eagleson, Scott Heisey, W. Ronald Hudson, Alvin H. Meyer, and Kenneth H. Stokoe	8. Performing Organization Report No. Research Report 256-1
9. Performing Organization Name and Address Center for Transportation Research The University of Texas at Austin Austin, Texas 78712-1075	10. Work Unit No. 11. Contract or Grant No. Research Study 3-8-80-256
12. Sponsoring Agency Name and Address Texas State Department of Highways and Public Transportation; Transportation Planning Division P. O. Box 5051 Austin, Texas 78763	13. Type of Report and Period Covered Interim 14. Sponsoring Agency Code

15. Supplementary Notes

Study conducted in cooperation with the U. S. Department of Transportation, Federal Highway Administration.
Research Study Title: "The Study of New Technologies for Pavement Evaluation"

16. Abstract

A comparison between the Dynaflect and a Falling Weight Deflectometer was made. Field testing on pavements of (1) continuously reinforced concrete, (2) jointed reinforced concrete, (3) asphalt cement concrete, and (4) continuously reinforced concrete with an asphalt concrete overlay was performed with both instruments. The testing was performed to investigate the suitability of a Falling Weight Deflectometer to Texas conditions and to determine if the dynamic load it can provide could yield information not available from Dynaflect measurements. The data from each field test are recorded in the Appendix for those who wish more complete analyses. This test, although not broad enough to be totally conclusive, did not seem to indicate significant benefits of a Falling Weight Deflectometer over the Dynaflect for determination of inplace structural properties. It is recommended that more complete studies be made. The particular concerns which were not addressed by these tests were the effects of varying temperature and moisture conditions on concrete pavements and thick asphalt pavements. Also the effect of measurement error for very small deflections (very stiff pavements) when the Dynaflect is used was not considered. A study of an improved wave propagation technique was also made. This technique is based on determining the velocities of Rayleigh waves propagating through the pavement structure at different frequencies. The various moduli of elasticity of the pavement system are related to the wave velocities. After the velocity versus depth relationship is established, a modulus versus depth relationship is defined. Thus, layer thickness can be determined by examination of the modulus profile. The prospect of using a Falling Weight Deflectometer to generate the Rayleigh waves is examined in this report as is the use of a smaller drop hammer for similar comparative purposes.

17. Key Words	18. Distribution Statement
pavements, deflections, Dynaflect, Falling Weight Deflectometer, Rayleigh waves, Digital Signal Analyzer	No restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	167	

Form DOT F 1700.7 (8-69)

COMPARISON OF THE FALLING WEIGHT DEFLECTOMETER AND THE DYNAFLECT FOR PAVEMENT EVALUATION

by

Bary Eagleson
Scott Heisey
W. Ronald Hudson
Alvin H. Meyer
Kenneth H. Stokoe

Research Report 256-1

The Study of New Technologies for
Pavement Evaluation

Research Project 3-8-80-256

conducted for

Texas State Department of Highways and
Public Transportation

in cooperation with the
U. S. Department of Transportation
Federal Highway Administration

by the

CENTER FOR TRANSPORTATION RESEARCH
BUREAU OF ENGINEERING RESEARCH
THE UNIVERSITY OF TEXAS AT AUSTIN

November 1982

The contents of this report reflect the views of the authors, who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

PREFACE

This is the first report describing the work done on the project entitled "The Study of New Technologies for Pavement Evaluation." This project is being conducted at the Center for Transportation Research, The University of Texas at Austin, as part of the Cooperative Highway Research Program sponsored by the State Department of Highways and Public Transportation and the Federal Highway Administration.

This report presents the results of analytical and experimental studies undertaken to determine if there is one model for pavement evaluation which is clearly superior to all others, based on the criteria of cost, operational characteristics, and suitability.

The writers are particularly grateful to the entire staff of the Center for Transportation Research, who provided support throughout the analysis and preparation stages of this report.

Bary Eagleson

Scott Heisey

W. Ronald Hudson

Alvin H. Meyer

Kenneth H. Stokoe II

November 1982

LIST OF REPORTS

Report No. 256-1, "Comparison of the Falling Weight Deflectometer and the Dynaflect for Pavement Evaluation," by Bary Eagleson, Scott Heisey, W. Ronald Hudson, Alvin H. Meyer, and Kenneth H. Stokoe, presents the results of an analytical study undertaken to determine the best model for pavement evaluation using the criteria of cost, operational characteristics, and suitability.

ABSTRACT

A comparison between the Dynaflect and a Falling Weight Deflectometer was made. Field testing on pavements of (1) continuously reinforced concrete, (2) jointed reinforced concrete, (3) asphalt cement concrete, and (4) continuously reinforced concrete with an asphalt concrete overlay was performed with both instruments. The testing was performed to investigate the suitability of a Falling Weight Deflectometer to Texas conditions and to determine if the dynamic load it can provide could yield information not available from Dynaflect measurements. The data from each field test are recorded in the Appendix for those who wish more complete analyses.

This test, although not broad enough to be totally conclusive, did not seem to indicate significant benefits of a Falling Weight Deflectometer over the Dynaflect for determination of inplace structural properties. It is recommended that more complete studies be made. The particular concerns which were not addressed by these tests were the effects of varying temperature and moisture conditions on concrete pavements and thick asphalt pavements. Also the effect of measurement error for very small deflections (very stiff pavements) when the Dynaflect is used was not considered.

A study of an improved wave propagation technique was also made. This technique is based on determining the velocities of Rayleigh waves propagating through the pavement structure at different frequencies. The various moduli of elasticity of the pavement system are related to the wave

velocities. After the velocity versus depth relationship is established, a modulus versus depth relationship is defined. Thus, layer thickness can be determined by examination of the modulus profile. The prospect of using a Falling Weight Deflectometer to generate the Rayleigh waves is examined in this report as is the use of a smaller drop hammer for similar comparative purposes.

KEY WORDS: Pavements, deflections, Dynaflect, Falling Weight Deflectometer, Rayleigh waves, Digital Signal Analyzer

SUMMARY

A literature search was made for the purpose of comparing deflection measuring devices. The Dynaflect, Road Rater, and Falling Weight Deflectometer (FWD) ranked highest when compared, using the criteria of cost, operational characteristics, and suitability. Field testing proved the Dynaflect and FWD were nearly equal in overall ability except in operational speed. Here the Dynaflect was superior primarily due to the the automated sensor placement.

The correlation coefficients obtained showed good agreement between the deflections measured by the two devices on all pavements tested except overlaid CRCP. Additional analysis of the FWD deflection versus load data showed there was essentially no stress sensitivity in the pavements tested, under loads varying from 6000 to 11000 pounds. A study of the FWD impulse load using a Digital Signal Analyzer showed that the major frequencies generated by the FWD were less than 250 Hz, thus making it impractical to use the FWD and signal analyzer to determine layer moduli of in-situ pavements by wave propagation techniques.

This study indicates that there may be pavements and conditions for which the Dynaflect does not provide useful information or where present methods of data interpretation do not appear to be adequate. Additional research is needed to delineate these pavements and conditions, and other methods of interpreting the data may prove beneficial. The report shows the potential value of more study of wave propagation techniques.

IMPLEMENTATION STATEMENT

Currently the Dynaflect is the instrument most commonly used by the Texas State Department of Highways and Public Transportation and other agencies to obtain data concerning the in-situ properties of the pavement. It was thought that the Falling Weight Deflectometer, because of the higher loading capabilities, might be able to detect problems within the pavement structure which were not identified by the Dynaflect. Results from the analyses of the data described in this report to date indicate that the results obtained from the FWD are not significantly better than those from the Dynaflect. Because of this and the fact that a large data base exists relating Dynaflect measurements to pavement performance, it is suggested that the FWD should not be implemented at this time as part of a new testing technique in the SDHPT design method.

TABLE OF CONTENTS

PREFACE iii

LIST OF REPORTS v

ABSTRACT vii

SUMMARY ix

IMPLEMENTATION STATEMENT xi

CHAPTER 1. INTRODUCTION

Dynaflect 1
Road Rater 3
WES Vibrator 4
Falling Weight Deflectometer 5
FHWA Thumper 6
Summary 7

CHAPTER 2. PREVIOUS WORK 9

CHAPTER 3. FIELD STUDY

Equipment 17
CRCP Testing 20
Overlaid CRCP Testing 28
JRCP Testing 32
TTI Test Track 43
Summary 50

CHAPTER 4. WAVE PROPAGATION STUDY

Special Study 53
Wave Propagation in an Elastic Half-Space 53
Fourier Transform 56
Time Record Averaging 60
Autocorrelation 61
Cross-Correlation 61
Linear Spectrum Averaging 62
Auto Power Spectrum 62

Cross Power Spectrum 63
Transfer Function 63
Coherence 64
Test Results 66

CHAPTER 5. DISCUSSION OF RESULTS

Evaluation of Dynaflect 74
Discussion of Falling Weight Deflectometer Results 75
Static Analysis of Dynaflect and FWD Results 75
Surface Wave Propagation Method 76
Closing Discussion 77

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS 79

REFERENCES 81

APPENDIX: DATA SUMMARY 85

THE AUTHORS 151

CHAPTER 1. INTRODUCTION

The Texas State Department of Highways and Public Transportation currently uses a Dynaflect to perform nondestructive testing of pavement sections. Recently, critics have argued that the load applied by the Dynaflect is inadequate for providing accurate information for the structural evaluation of thick rigid pavements. Because of this and since several other nondestructive testing devices which deliver heavier loads are currently available, it has become necessary to evaluate them to determine if they are more suitable for pavement evaluation than the Dynaflect.

The following paragraphs describe five deflection measuring devices which are currently available: the Dynaflect, the Road Rater Models 2000 and 2008, the WES 16-kip Vibrator, the Falling Weight Deflectometer (FWD), and the FHWA Thumper. Basically, all the devices except the Falling Weight Deflectometer impose a sinusoidal vibratory loading on a static preload. The falling weight device uses a weight dropped from a predetermined height to apply a load impulse to the pavement.

DYNAFLECT

The Dynaflect apparatus consists of a force generator and five geophones housed in a small trailer, which is towed by a light vehicle. Additionally, a remote control and readout meter unit are carried in the towing vehicle, which allows all operations to be conducted from the driver's seat. The 12V power source is supplied by the towing vehicle and the approximate electrical drain is 100A while starting and 8A while operating.

The loading system consists of two counter rotating eccentric masses. Initially, these are in a horizontal position. As the force generator is set in motion, the masses begin rotating. The masses are automatically raised to the vertical position and the load is simultaneously transferred to two rigid wheels. The resultant force produced is in the vertical direction and varies sinusoidally with time. When the frequency of rotation is set at 8 Hz, a 1000-lb peak-to-peak oscillating load plus a base load of 1000 lb is transmitted to the pavement through the loading wheels.

The resulting deflection basin is measured by five geophones, which are mounted on the trailer draw bar at 12-inch intervals. These geophones are lowered to the pavement surface by the remote control unit. The output voltages of the geophones are proportional to the velocity of the movement of the pavement surface. The output voltages are filtered and amplified and fed to a unit calibrated to read in deflection units.

The standard Dynaflect operates at 8 Hz and delivers a peak-to-peak load of 1000 lb. Some modifications can be made to the standard unit to increase the rotation speed to 12 Hz, which will increase the load delivered to the pavement. A 5000-lb-force Dynaflect could easily be designed and built by the manufacturer, although none now exists.

ROAD RATER

The Model 2000 Road Rater system is totally self contained in a tandem axle trailer, which can be towed by a car or a light truck. The system has a total weight of 4000 lb. It has an overall length of 150 inches, width of 86 inches, and height of 66 inches. The system is powered by a hydraulic system which is driven by a 20-horsepower gasoline engine, which also drives a generator to provide electrical power.

The dynamic force is generated by a vibrator and can be varied between 500 and 2000 lb. This dynamic load acts about a pre-set static load which can be varied from 1500 to 3500 lb. These loads are transferred to the pavement surface through an 18-inch-diameter steel plate. (Other sizes are available.)

The deflection basin is measured by a set of four velocity transducers. The output signals of these transducers are amplified and integrated to indicate the peak-to-peak vertical deflection or motion of the pavement surface. One sensor is located at the center of load and the others are located at 12-inch spacings along a line passing through the center of loading.

Two control systems are available for the Road Rater. The first is a manual analog system, which mounts in the trailer for transport and storage and is placed on the seat by the operator during testing. The system includes five analog meters, which simultaneously display force output and the four deflections. Manual switches lower and raise the force generator and sensor assembly and activate the vibrator.

The second system available, the Model 2008, is an automatic digital system. This system features a fully automatic operation sequence which includes the lowering and raising of the force generator, activation of the vibrator, and the printing out of test number (location), force, frequency, and deflection of each of the four sensors. Switches provide for manual operation of the system when desired.

WES VIBRATOR

The Waterways Experiment Station has developed a heavy dynamic deflection measuring device. This system uses an electrohydraulic-actuated vibrator to provide the dynamic loads.

This instrument is mounted in a 36-ft semitrailer that contains supporting power supplies and data recording systems. Electric power is supplied by a 25-kw, diesel-driven generator and hydraulic power is supplied from a diesel-driven pump, which can deliver 38 gpm at 3000 psi.

The force generator consists of an electrohydraulic actuator surrounded by a lead-filled steel box. Its total static weight is 16,000 lb. The actuator uses up to an 2-in. double-amplitude stroke to produce a vibratory load ranging from 0 to 30,000 lb (peak force) with a frequency range of 5 to 100 Hz for each load setting. When the force generator is lowered to the pavement, its entire weight rests on the pavement. The static and dynamic forces are transmitted to the pavement through three load cells that are connected to an 18-in.-diameter steel loading plate. The signal from each load cell is summed to produce the force output of the system.

A velocity sensor is mounted directly on the loading plate, and the integrated output of the sensor is used for deflection measurements. The actual measurement system consists of an 870-ohm, 3-Hz velocity sensor that is shunted to a damping factor of 0.7 and an 0.8-Hz integrator. The deflection basin is measured by placing four velocity sensors at specified distances away from the plate. A digital printer is used to record the output of the frequency counter, the summation of the three load cells, and each of the velocity sensors. In addition, data are plotted on an X-Y recorder to produce a load versus deflection plot (Ref 2).

FALLING WEIGHT DEFLECTOMETER

The Falling Weight Deflectometer has a 330.7-lb weight, which is mounted on a vertical shaft. This weight is hydraulically lifted to a predetermined height and is dropped onto a set of rubber springs, which results in a force impulse curve which closely approximates a half sine wave. The force duration is 26 msec, and its peak magnitude is directly proportional to the drop height. The drop height can be varied from 0 to 400 mm (0 to 15.7 in.), which results in a force range from 0 to 60,000 N (0 to 14,000 lb).

The force impulse is transferred from the spring system to the loading plate through a configuration of three circular, symmetrically located tubular columns. These columns are connected to a plate, which supports the springs, at the top and to a universal ball joint at the bottom. In turn, this ball joint is connected to a 300-mm (11.8-in.) diameter loading plate. This loading plate rests on a 5.5-mm (.22-in.) thick rubber pad, which helps distribute the load evenly over the loading area.

The peak force and maximum deflections are measured by load cells and velocity transducers. The signal conditioning equipment displays the resulting pressure in kilopascals and the maximum deflections in micrometers.

Currently, only three deflection sensors may be recorded by the standard equipment; however, the manufacturers can modify the equipment to monitor five velocity transducers.

The 150-kg weight and the hydraulic equipment are mounted in a compact trailer. This trailer weighs approximately 544 kg (1200 lb) and can be towed by most conventional passenger cars.

FHWA THUMPER

The Federal Highway Administration has a heavy load vibratory testing device which was manufactured for them by Cox and Sons of California. The unit is self contained in a GMC mobile home frame and has very sophisticated microcomputer capabilities onboard.

The vibratory loading is provided by an MTS system. This device is capable of providing a maximum static load of 15,000 lb and a maximum dynamic load of 10,000 lb peak-to-peak. The system can ideologically exert dynamic loads with frequencies ranging from 0.1 to 110 Hz but at higher loads the higher frequencies are not attainable (Ref 12). The load is transmitted to the pavement surface through an 18-inch-diameter steel plate and the deflections are monitored by 6 LVDT's. These transducers are mounted on a 12-foot-long steel reference beam, which is automatically lowered to the pavement surface before the loading is applied.

SUMMARY

The relative desirability of each of these devices must be determined on the basis of several criteria. Among these are

(a) safety,

(b) initial and operating costs,

(c) ease and speed of operation,

(d) robustness or dependability of the equipment, and

(e) usefulness of the information obtained.

For the purpose of comparison, the essential characteristics of each of the devices are summarized in Table 1.

TABLE 1. CHARACTERISTICS OF SELECTED DEFLECTION MEASURING DEVICES

Device	Static Load, lbf	Dynamic Load, lbf	Loading Concept	Load Frequency, Hz
Dynaflect	1000	1000	Counter-rotating weights	8
Road Rater 2000	1500-3500	1000-4000	Electrohydraulic vibrator	10-80
Road Rater 2008	3000-7000	2000-8000	Electrohydraulic vibrator	10-80
Falling Weight Deflectometer	330	0-14,000	Falling weight	
WES Vibrator	16,000	0-30,000	Electrohydraulic vibrator	5-100
FHWA Thumper	15,000	0-10,000	MTS vibrator	0.1-110

Device	Deflection Sensors	Spacing, in.*	Readout
Dynaflect	5 Velocity transducers	12	Analog or digital
Road Rater 2000	4 Velocity transducers	12	Analog or digital
Road Rater 2008	4 Velocity transducers	12	Analog or digital
Falling Weight Deflectometer	5 Velocity transducers***		Digital
WES Vibrator	5 Velocity transducers		Digital
FHWA Thumper	6 LVDT's	**	Digital

* The first sensor is located at the loading plate and the others at regular intervals as indicated.
**This machine has an LVDT at 12, 18, 24, 36, and 48 inches from the load.
***Available with later models.

CHAPTER 2. PREVIOUS WORK

Several studies have been done which compare various deflection devices. In a study conducted by WES (Ref 2), four of the candidate devices mentioned in Chapter 1 were compared on the basis of operational characteristics, cost, accuracy of measurements, depth of influence, and suitability. These devices were the Dynaflect, the Falling Weight Deflectometer, the Road Rater 2008, and the WES 16-kip Vibrator.

The study concluded that the Dynaflect with digital control is the easiest of the units to operate. The Road Rater 2008, with the digital control, unit was also simple to operate. The FWD tested required hand placement of the velocity transducers and, therefore, was more difficult to use than the other two.

A summary of the manpower requirement and speed of operation of each of the devices is contained in Tables 2 and 3. It can be seen that the Dynaflect with digital control required the least personnel and time per test.

Overall, the Dynaflect rated best in operational characteristics. However, it was noted that the rating of the FWD could be improved by providing mechanical placement of the sensors.

The cost data were presented in two parts, initial costs and operating costs. A revised initial cost table, which includes a wider range of devices than the WES study, is presented as Table 4. The cost range of the Dynaflect

TABLE 2. MANPOWER REQUIREMENTS (REF 2)

Device	Minimum No.	Optimum No.
Dynaflect		
Standard Control Unit	1	2
Digital Control Unit	1	1*
Falling Weight Deflectometer	1	2
Model 2008 Road Rater	1	2
WES 16-kip Vibrator	3	4

*With printer

TABLE 3. TIME REQUIREMENTS (REF 2)

Device	Set-up/Calibration Time, min	Time Per Test, min
Dynaflect		
Standard Control Unit	20	1-1/4
Digital Control Unit	20	3/4
Falling Weight Deflectometer	20	1-1/2*
Model 2008 Road Rater	15	1
WES 16-kip Vibrator	60	1-1/2

*Estimate -- no production tests run.

TABLE 4. APPROXIMATE INITIAL COSTS (REF 2)

Device	Approximate Cost
Dynaflect	$ 18,500 - 25,000
12 Hz Dynaflect	50,000
5000 lbf Dynaflect	150,000
Falling Weight Deflectometer	60,000
Road Rater 2000	40,000
Road Rater 2008	48,000
Custom Built Road Rater	80,000 - 120,000
WES Vibrator	200,000*
FHWA Thumper	69,000*

*Approximate cost at time of development, not replacement costs. Replacement costs may be significantly higher; e.g., the estimated replacement cost of the FHWA Thumper is $100,000-120,000.

TABLE 5. YEARLY LABOR COSTS (REF 2)

Device	Tests Per Day	Number of Operating Days	Cost/Year
Dynaflect			
Digital Control Unit	640	31	$ 3,100
Standard Control Unit	384	52	10,400
Falling Weight Deflectometer	320	63	12,600
Model 2008 Road Rater	480	42	8,400
WES 16-kip Vibrator	320	63	25,200

NOTE: Based on 20,000 tests and time per test in Table 3, optimum manpower in Table 2, and a $100 per person per day labor charge.

reflects options available, such as the digital control unit. Costs presented for the 12-Hz and 5000-lb Dynaflect reflect development costs plus the equipment cost. The FWD cost represents the price for a unit with six sensors which are mechanically placed. Once again the Dynaflect has the lowest initial cost of all the devices considered while the WES vibrator has the highest.

Operating costs were based on the speed and manpower estimates shown earlier. The costs reflect the time and manpower required to collect 20,000 tests per year using the optimum manpower from Table 3 and disregarding set up time. The labor charge was assumed to be $100 per person a day. Once again the Dynaflect is the best; the FWD could be improved with mechanical sensor placement. Results are summarized in Table 5.

The accuracy of the deflection measurements as well as of the applied force was considered. For the Road Rater, the accuracy measurements were taken at its usual operating frequency of 15 Hz. The results are summarized in Table 6 and indicate the FWD has the highest accuracy and the Dynaflect and Road Rater 2008 are almost equal.

The depth of influence measurements indicate that the FWD with a 11,000-lb peak force generates approximately 10 times the deflection of the Dynaflect with depth. The Road Rater also generates larger deflections at depth, when operating at 15 Hz with a 7000-lb peak-to-peak force, than the Dynaflect.

The suitability criteria were based primarily on judgement and correlations with the WES 16-kip Vibrator. In addition, the ability of a device to test at various loads and/or frequencies was considered a plus since this would enable the determination of stress sensitivity. The FWD and

TABLE 6. SUMMARY OF ACCURACY CHECKS ON MEASUREMENTS OF DYNAMIC FORCE AND DEFLECTION SIGNALS

Accuracy Check of Deflection Signal from Velocity Transducers	
Device	Percent Error at Operating Frequency*
Dynaflect	5.5
FWD	5.1
Road Rater 2008	6.8

Accuracy Check of Amplitude of Dynamic Force Signal	
Device	Percent Error*
Dynaflect	
Rigid pavements	-4.2
Flexible pavements	-12.9
FWD	-5.4
Road Rater 2008	
Unfiltered	-8.3
Filtered	+1.0

Road Rater were both ranked ahead of the Dynaflect in this category. Based on the results of their study, the following conclusions were reached:

(1) The Dynaflect is best in operational characteristics, and with the Road Rater 2008's close behind.

(2) When both initial and operating costs are considered, the Dynaflect ranks highest.

(3) The FWD is best in overall accuracy.

(4) The FWD and Road Rater 2008 have greater influences at depth than the Dynaflect, producing roughly 10 times the deflection at a 60-inch depth.

(5) The FWD and Road Rater 2008 were ranked highest under the evaluation parameter of suitability (based on ability to produce a pavement response of sufficient magnitude to achieve consistently reliable measurements for a full range of pavement thicknesses and foundation conditions).

The WES report suggests that the FWD, Road Rater 2008, and Dynaflect were the three best devices tested and that modifications to the Road Rater 2008 and the FWD would improve their rankings. They, therefore, recommend that additional data be collected with these machines, on both rigid and flexible pavements.

Lytton et al (Ref 3) performed a research study on pavement evaluation equipment which compared static methods of nondestructive testing with methods using dynamic deflection devices. The study showed reasonable correlation between static and dynamic methods. These are some of the conclusions expressed by Lytton et al:

(1) Low frequency excitation, below about 10 Hz, can be expected to produce deflection basins virtually identical to static deflection basins.

(2) Dynamic deflection devices mainly measure the effect of the subgrade on the overall deflection pattern. None of these devices can produce data which accurately represent the influence of thickness or material properties of the surface course.

(3) Varying the frequency of excitation gives an indication of the viscoelastic response of the pavement structure.

(4) Most pavements deflect approximately linearly with increasing loads even when the loads reach 16 kips.

A study completed by the California Department of Transportation (Ref 4) compared the Dynaflect, the WES 16-kip Vibrator, and the Cox Dynamic Deflection Device. This study showed that lighter dynamic testing devices appeared to be adequate for the evaluation of heavily constructed roadway pavement sections.

Treybig (Ref 5) compared the evaluations of heavy airfield pavements using the Dynaflect and the WES 16-kip Vibrator. He concluded that light loads can be used as effectively as heavy loads in the evaluation of airfield pavements. The advantages of the Dynaflect were summarized as follows:

(1) a cost savings for gathering basic nondestructive testing data;

(2) better coverage, i.e., more test points in a given time period than the Wes Vibrator;

(3) availability; and

(4) accuracy and repeatability.

Experiments performed with the FWD in Europe, where the device was originally developed, have led to the conclusion that the FWD can be effectively used to evaluate and design pavements.

Bohn et al (Ref 6) compared the FWD load to a moving truck wheel load on an instrumented pavement. They found the magnitude of the FWD load pulse compared well with that of the wheel load at all depths in the pavement. The duration of the pulses compared well at the surface, but the moving truck wheel produced a much wider load pulse.

Claessen (Ref 7) investigated the FWD deflections to determine whether elastic layer theory could be used to analyze basins. Due to the short loading time, it was felt that the deflection might be influenced by the inertia of the pavement structure, which would invalidate the use of layered systems in which inertia is ignored. The study concluded that inertial effects were not significant.

SUMMARY

The following results summarized from the previous comparison reports are of particular interest in the evaluation of the adequacy of the Dynaflect and the strengths of other deflection measuring devices.

(1) The Dynaflect, FWD, and Road Rater 2008 were the most promising devices evaluated by the WES study.

(2) The Road Rater and FWD seemed most suitable for the evaluation of light airfield pavements.

(3) The FWD has greater influence at depth than the Dynaflect.

(4) The advantage of variable load devices is in determining stress sensitivity.

(5) Variable frequency steady state equipment gives an indication of the viscoelastic response of the pavement.

(6) The FWD load pulse is similar to that produced by a moving wheel load.

(7) Inertial effects of the FWD seem minimum.

CHAPTER 3. FIELD STUDY

The Dynaflect has been a common pavement testing device in Texas for sometime. Based on this and similarities between it and the Road Rater 2008, the Dynaflect was choosen for field testing. A Falling Weight Deflectometer was leased for one week and field tested with the Texas Department of Highways and Public Transportation Dynaflect. These devices were tested on a variety of pavement test sections, including

(1) continuously reinforced concrete,

(2) continuously reinforced concrete overlaid with asphalt cement,

(3) jointed reinforced concrete, and

(4) asphalt cement concrete.

This testing was performed to determine the suitability of the FWD for Texas conditions and to determine if the higher dynamic load of the FWD could provide information not available from Dynaflect measurement.

EQUIPMENT

The Falling Weight Deflectometer used during the field study consisted of a 150-kg weight which was mounted on a cylindrical shaft approximately 7 feet in length. This shaft was mounted in a pivoting frame. The frame rested horizontally while the FWD was being towed, and pivoted to a vertical position when measurements were taken. The frame could be left in the upright position when traveling short distances at low speed.

The signal conditioning equipment is the heart of the Dynatest FWD. This self-contained unit internally processes the signals from the load cell and velocity transducers, and displays the force and deflections on LED digital readouts. The equipment uses a triggering signal supplied by a magnetic trigger mounted on the FWD to create a 45-msec measurement "window." Only the velocity signals which are generated during this 45-msec window are integrated to determine the deflections of the three sensors. This windowing technique allows the equipment to display the force and deflections resulting from the initial impact of the weight and cuts off the subsequent signals generated by the bouncing of the weight on the rubber springs.

The trigger, which is mounted between the rubber springs, generates a magnetic field. The falling weight disrupts this field just before it strikes the springs. This triggers the conditioning equipment, which then analyzes the velocity and load signals generated in the 45-msec window. The equipment integrates the velocity signals and displays the deflections on the readout panels. The data are then recorded by hand and the displays are re-zeroed before the next test.

The Dynaflect used in the field study was a standard unit which delivered a 1000-lb peak-to-peak oscillating load. It was equipped with a digital control panel and was towed by a Suburban truck.

During the field testing of the two devices, data were collected which would allow them to be compared on the basis of the following criteria:

(1) speed and ease of operation,

(2) safety, and

(3) the type of data provided.

Several factors must be considered when attempting to compare the two devices on the basis of speed and ease of operation. First, any special instruction or training which must be given to the operator must be considered. Then the time each device requires for calibration and setup must be considered, and, finally, the time required for a measurement must be added in.

Both devices are fairly simple and require very little initial instruction to the operator. Approximately 30 minutes of instruction and an examination of each device should be sufficient to enable an operator to follow the sequence of steps to setup the equipment and take a measurement. Of course, additional experience will be beneficial.

The Dynaflect and FWD both require a calibration of the velocity transducers during the setup. Additionally, the magnetic trigger on the FWD must also be set. The total time required for this calibration and setup is approximately 20 minutes for each of the devices.

The time required for a measurement with each device was the quantity which varied the most between the two devices. The Dynaflect was capable of taking a measurement and moving 100 ft to the next test point in approximately a minute and a half. The FWD, which required hand placement of the velocity transducers and multiple drops of the weight to check for repeatability, took twice that long. If two drop heights were used it could take three times as long, or roughly four and a half minutes. The difference in time required for a measurement with the FWD reflects the time required to manually place and pick up the sensors. If the sensors were automatically placed, the time to take a measurement with the FWD would be very near that required by the Dynaflect.

When used properly, both devices are safe; however, the potential for careless accidents is higher for the FWD. The force producing parts are completely enclosed on the Dynaflect, preventing contact with them during normal operation. The falling weight is not shielded from the operator and could cause serious injury should it accidentally drop on a hand or other part of the body.

CRCP TESTING

The CRCP section tested consisted of an 8-inch-thick portland cement concrete surface on a 6-inch-thick cement treated gravel base. The test section was located on IH 10 eastbound, east of Columbus, Texas. It extended from station 228 + 98 to station 239 + 02.

Testing was performed at approximately 100-foot intervals along the outside traffic lane, beginning at station 229 + 00 and ending at station 239 + 00. At each of these locations, which corresponded roughly with whole station numbers, deflections were measured at three transverse positions. These positions were the edge, 3 feet from the edge, and 6 feet from the edge. As each measurement was taken, the time, pavement temperature, and deflection measurements were recorded, along with the location and position data. This information is summarized in the Appendix.

The normalized deflection basins for the Dynaflect and FWD (40-cm drop height) are presented in Fig 1.

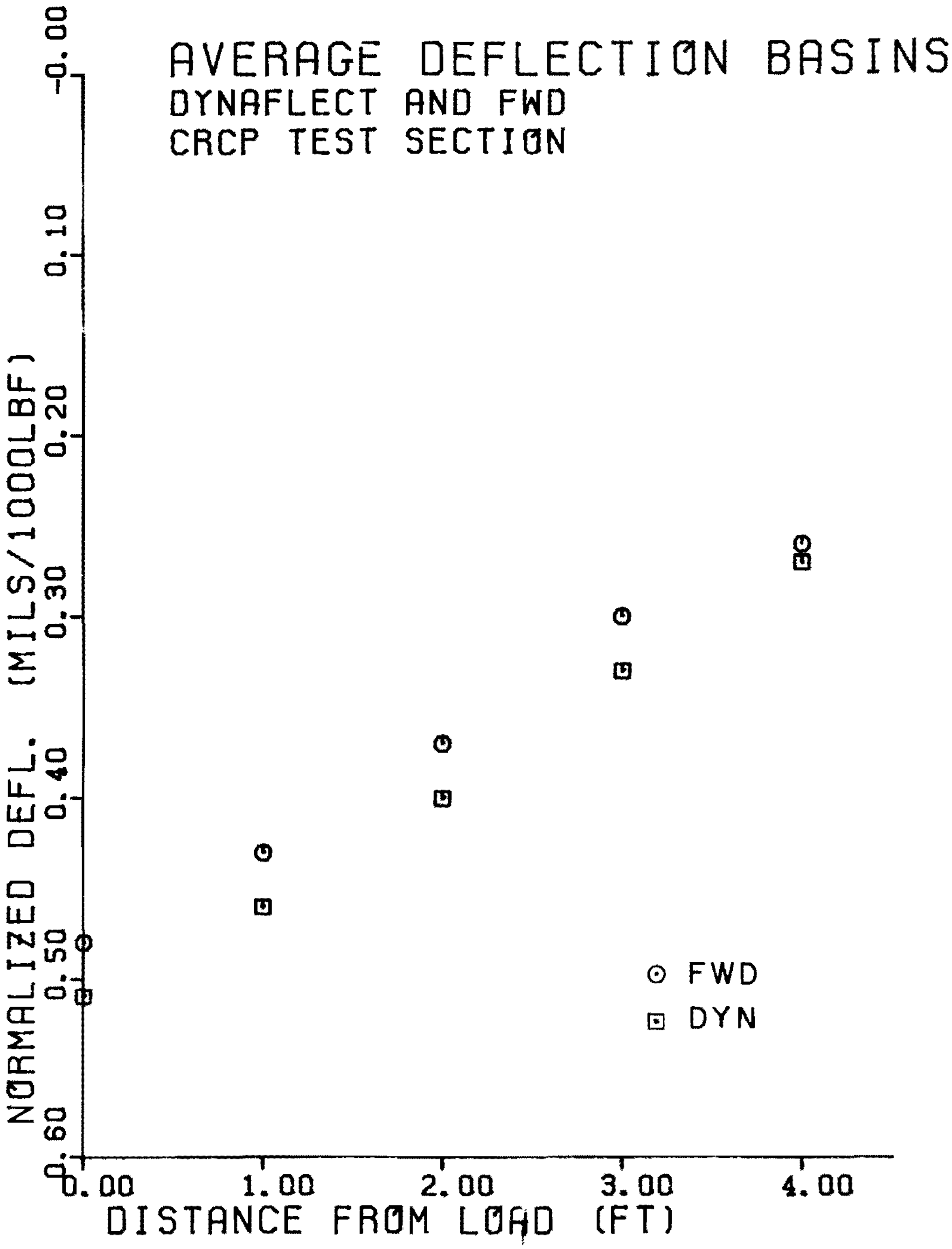

Fig 1. Average deflection basins, CRCP.

The deflection-position data collected gave predictable results. The deflection at sensor 1 (W1) was a minimum 6 feet from the edge and a maximum at the edge. The average maximum deflections and their standard deviations are summarized for each position in Table 7. The percent difference, expressed as a percentage of the average value 6 feet from the edge, was 35 percent for the Dynaflect and 24 percent for the FWD.

Repeat measurements were made at several locations with the FWD and at all test locations with the Dynaflect. Repeat Dynaflect observations coupled with pavement temperature data are summarized in Figs 2, 3, and 4. These diagrams do not show any clear trends in the data.

Recent overlay design methods have used maximum deflections, surface curvature (SCI), and slope measurements to divide pavements into design sections. For that reason correlations were made between these parameters comparing measurements obtained with the Dynaflect to measurements obtained with the FWD. Maximum deflection data collected by the two devices were highly correlated. A correlation coefficient of .892 was calculated for the maximum deflections under the Dynaflect and the FWD using a 40-cm drop height. The SCI's, the sensor 1 deflections minus the sensor 2 deflections, were only 53.2 percent correlated between the two devices on CRCP while the slopes were 75.7 percent correlated.

The high correlation between the maximum deflections of the two devices is illustrated in Fig 5. This figure shows the maximum deflection under each device 3 feet from the edge as a function of the station number. Although the magnitudes of the FWD deflections are nearly 13 times the magnitudes of the Dynaflect, it is apparent that an increase in one is usually accompanied by an increase in the other (R^2 = .892).

TABLE 7. AVERAGE MAXIMUM DEFLECTIONS* AND STANDARD DEVIATIONS FOR CRCP TEST SECTION

	Position					
	6 ft From Edge		3 ft From Edge		Edge	
Device	$\overline{X}$	C.V.	$\overline{X}$	C.V.	$\overline{X}$	C.V.
Dynaflect	.464	20.0	.515	21.4	.63	13.6
FWD**	6.994	17.1	6.664	15.0	8.686	15.4

NOTE: *All values are in mils.
**40 cm drop (appoximately 11,000-lb)

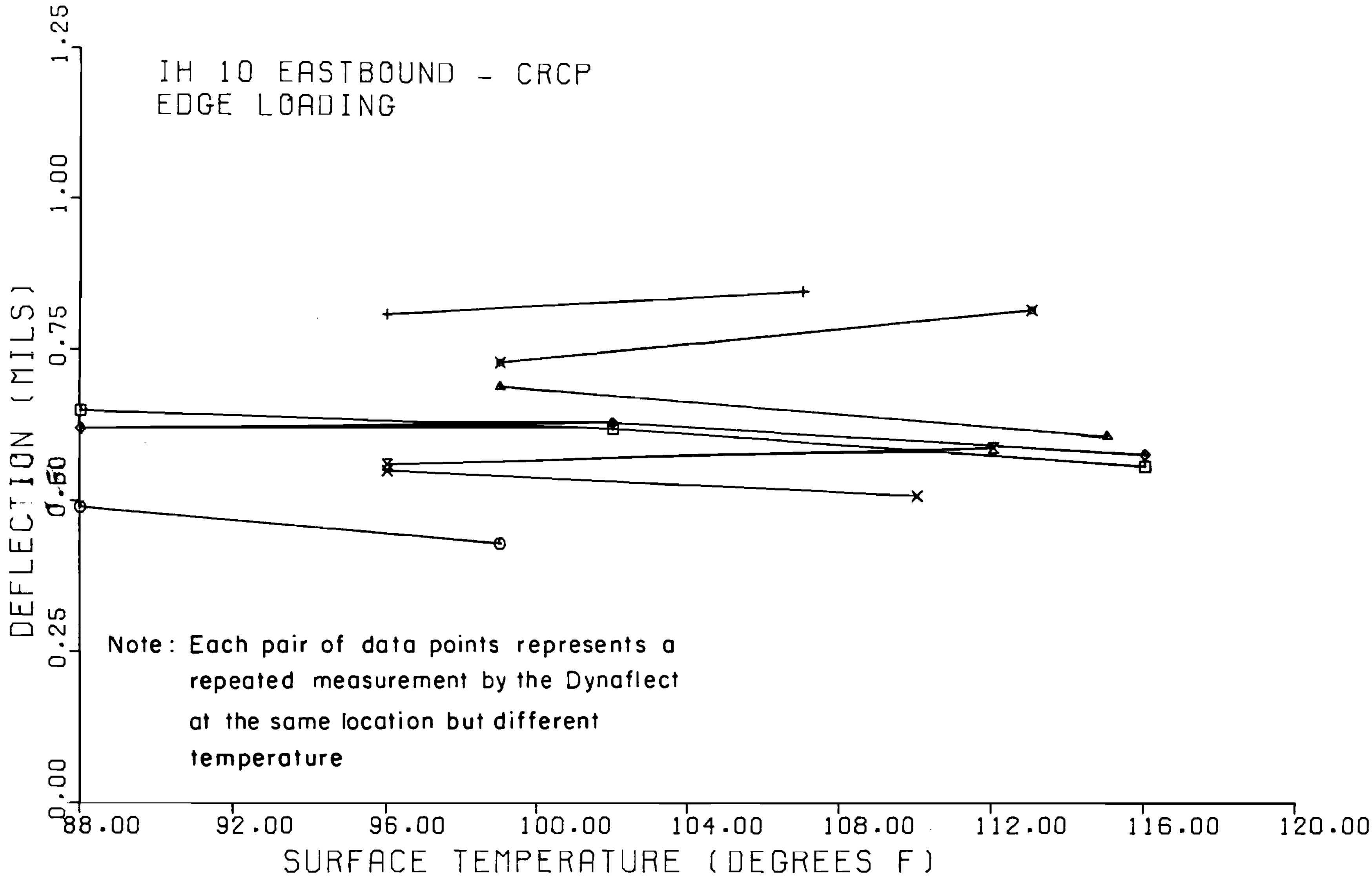

Fig 2. Maximum deflections vs temperature.

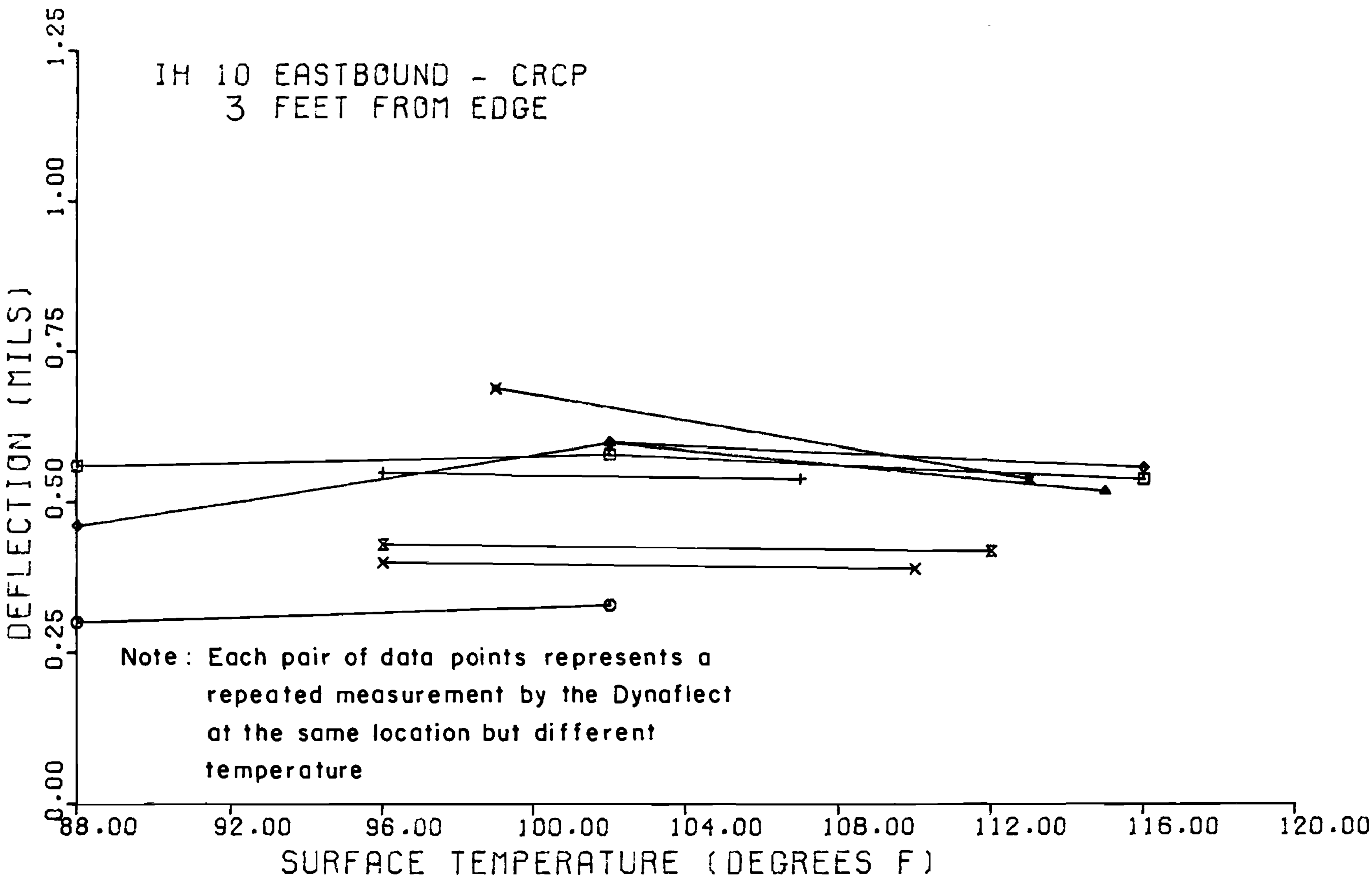

Fig 3. Maximum deflections vs temperature

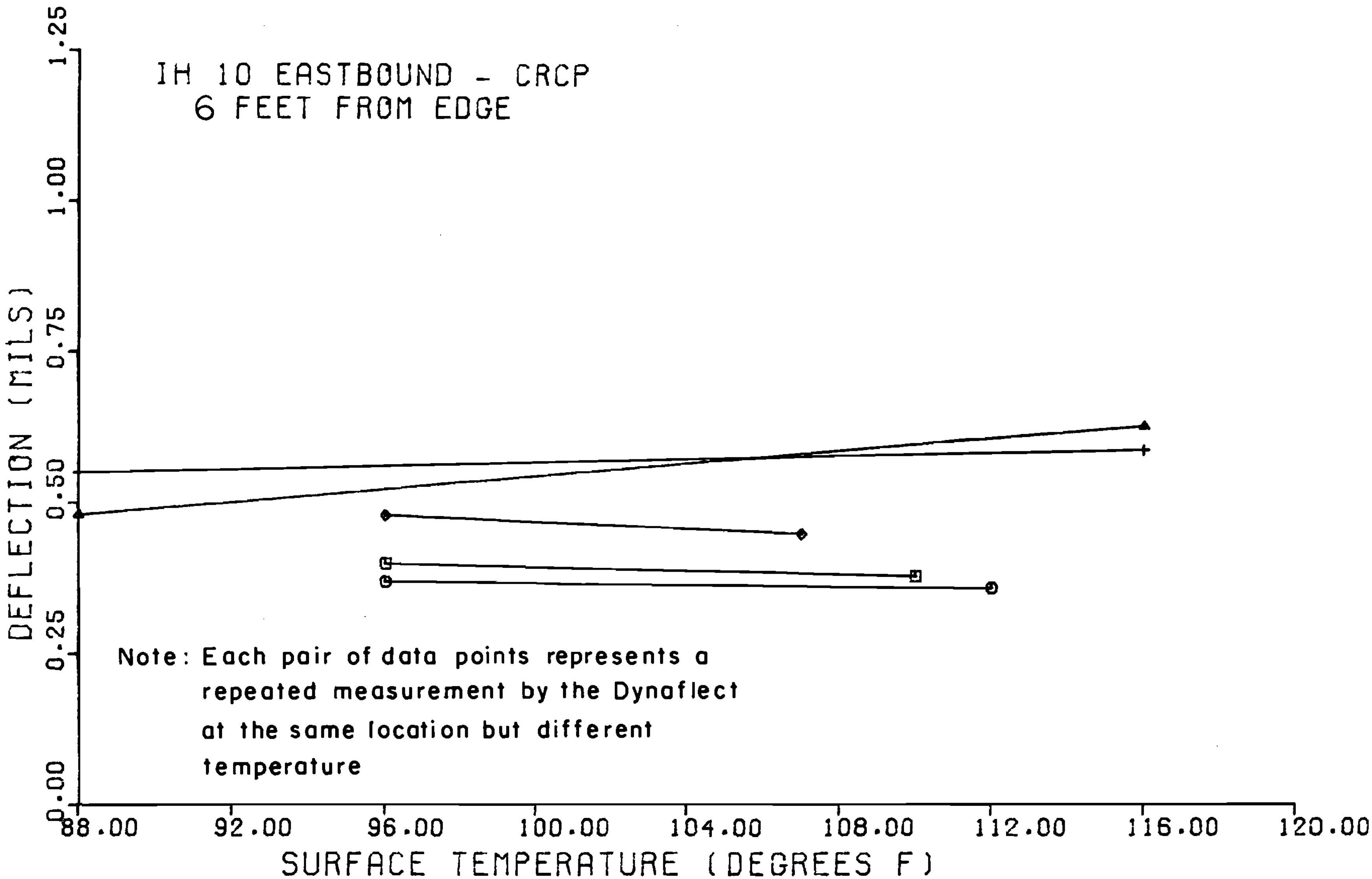

Fig 4. Maximum deflection vs temperature.

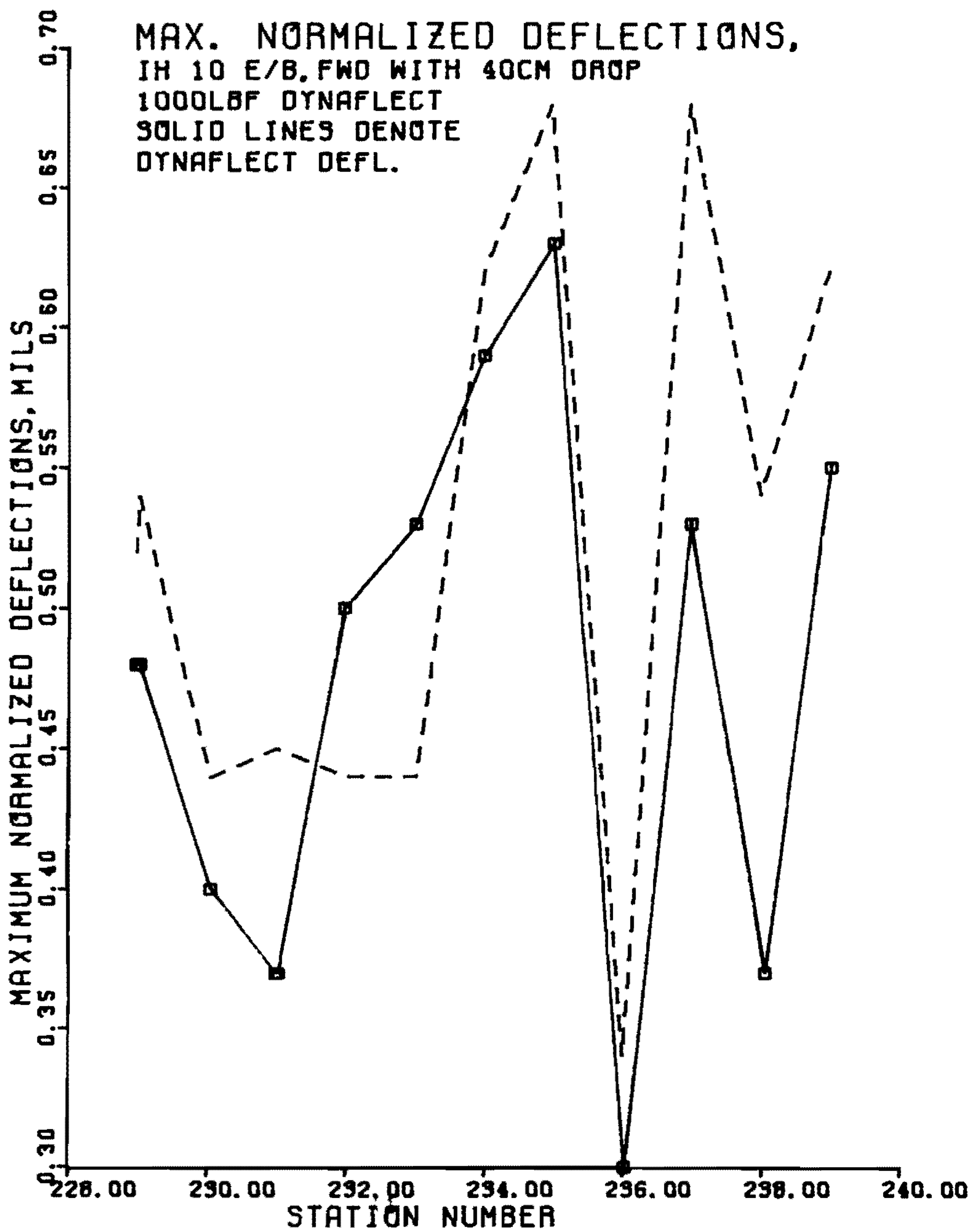

Fig 5. Maximum normalized deflection vs station number, CRCP.

The following trends emerged from the data collected in the CRCP section:

(1) The edge loading produced the maximum values of deflection and basin slope, while the load 6 feet from the edge produced the minimum value of these quantities.

(2) The maximum deflections obtained by the FWD and Dynaflect are highly correlated, yielding a correlation coefficient of .892.

(3) The SCI parameters obtained from the two devices were poorly correlated.

(4) The slopes (sensor 1 minus sensor 5 deflections) also showed poor correlation.

Care should be exercised when attempts are made to extrapolate any of these trends to other CRCP, due to the limited amount of data collected.

OVERLAID CRCP TESTING

Two sections of overlaid CRCP were examined in this study. Both sections were hot mixed asphalt concrete (HMAC) overlaying 8 inches of CRCP, which was supported by 6 inches of cement treated sand. Section one had 3.5 inches of HMAC and was located on IH 10 westbound, from station 970 + 00 to station 964 + 00. Section 2 had 2.5 inches of HMAC and was located on IH 10 eastbound, extending from station 965 + 00 to station 972 + 00. The additional thickness in the westbound section was due to a one-inch surface course, which had been placed several days before the deflection survey. Deflection measurements were taken 3 feet from the edge of the outside traffic lane at 100-foot intervals for the length of the sections.

The results of the testing with the FWD were quite unexpected. First, the deflection directly beneath the load tended to decrease with each successive drop of the weight. At some of the locations tested, up to six drops of the weight were required before the value became repeatable. This was not true for the deflections measured away from the load plate. These deflections remained fairly constant regardless of the number of times the weight had been dropped. The magnitude of the deflection under the load decreased by as much as 30 percent between the first measurement and the final repeatable value. This phenomenon was observed on both sections.

A typical deflection basin obtained by the FWD, using a 40-cm drop height, on the overlaid CRCP sections is shown in Fig 6. This clearly illustrates the large difference between the deflection beneath the load and the deflection 12 inches away. Such a drastic change in deflection over such a small distance seems to indicate a problem in load transfer in the pavement structure. It is impossible to determine from this limited study whether this represents an atypical FWD deflection basin for overlaid CRCP.

Deflection basins obtained using the Dynaflect were very flat and shallow, indicating a very stiff pavement structure. In six test locations, the deflection recorded by sensor 2 was greater than that registered by sensor 1. In the remaining locations, the SCI value exceeded .01 only once.

For the basis of relative comparison, the average sensor 1, sensor 2, and sensor 5 deflections for the CRCP test section and the two overlaid CRCP sections are tabulated in Table 8. The trends in the FWD data show that, with increasing overlay thickness, the average sensor 1 deflection increases and the average sensor 2 and sensor 5 deflections decrease. The Dynaflect data indicate an increase in overlay thickness is accompanied by a reduction in the deflection of all three sensors.

Both devices left visible impressions in the road surface, which indicated compression or distortion of the road under the test loads. This

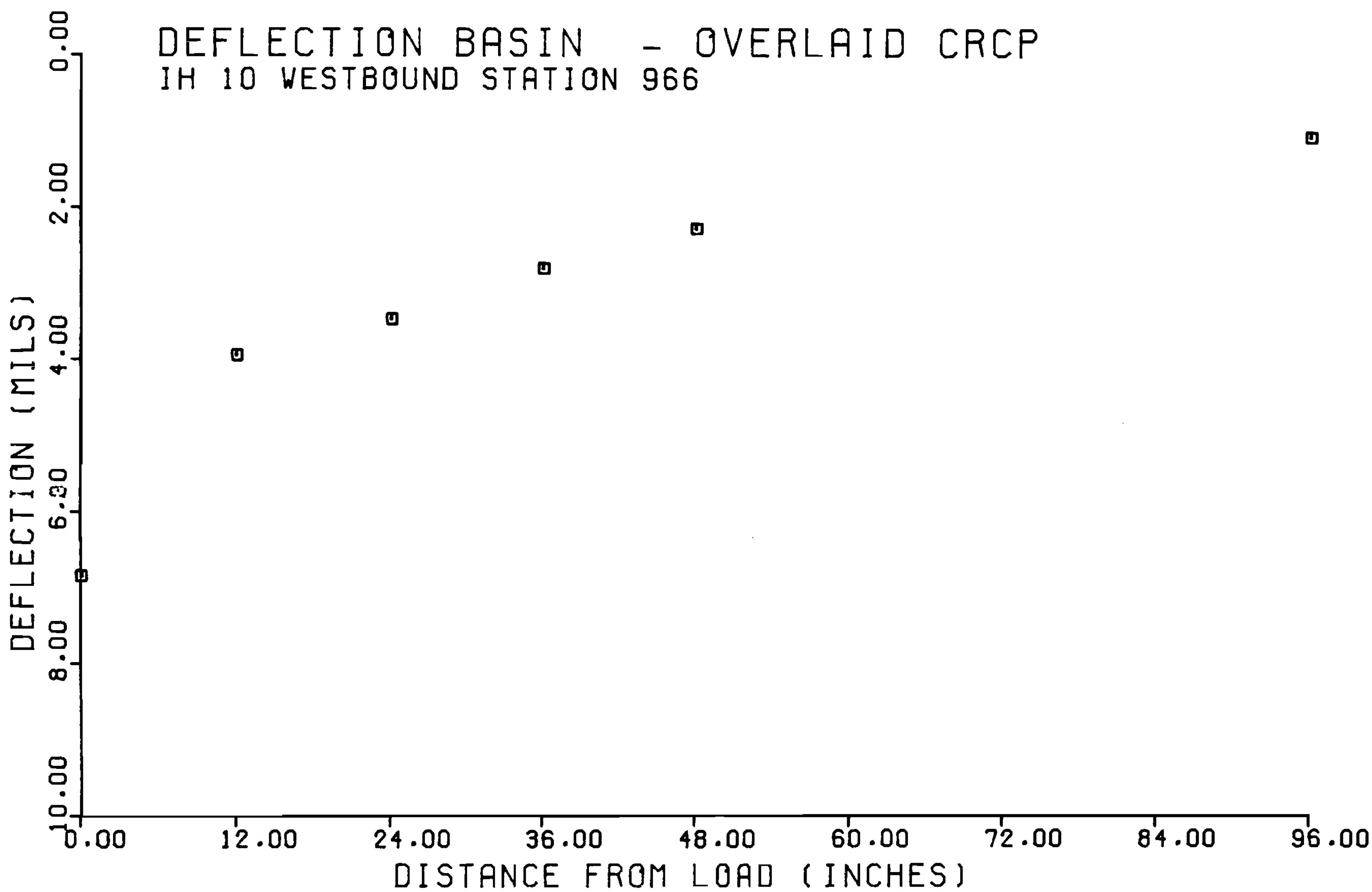

Fig 6. Typical deflection basin for Falling Weight Deflectometer, 40-cm drop.

TABLE 8. AVERAGE DEFLECTIONS

(a). AVERAGE DEFLECTION MEASURED BY THE FWD USING 40-CM DROP HEIGHT

Section Type	Sensor 1	Sensor 2	Sensor 5
CRCP	6.64	6.09	3.42
2.5-inch overlay	8.28	4.60	2.98
3.5-inch overlay	8.8	3.91	2.36

(b). AVERAGE DECLECTIONS MEASURED BY THE DYNAFLECT

Section Type	Sensor 1	Sensor 2	Sensor 5
CRCP	.52	.49	.28
2.5-inch overlay	.375	.362	.237
3.5-inch overlay	.356	.346	.198

cannot all be attributed to the newness of the HMAC as the eastbound lanes had been placed over 2 months before the survey and had been carrying traffic for the period.

The maximum deflections under the FWD and the Dynaflect as a function of station number are plotted in Figs 7 and 8. The maximum deflections and SCI's obtained using the two devices on the overlaid sections were poorly correlated. Surprisingly, the slopes obtained had a correlation coefficient of .88.

Subsequently, in the section of pavement tested the asphalt cement concrete overlay was found to be stripping and had to be removed. Both devices left depressions in the surface. Both devices indicated something was wrong. The FWD had excessively steep SCI's and the Dynaflect had negative SCI's (Sensor 2 was greater than Sensor 1). The deflection basins of Dynaflect on overlaid CRCP section indicate a different shape of deflection basin. This indicates a problem with this section. Neither device is intended to be nor has been used to identify a stripping aggregate in asphalt cement concrete overlays. It should be noted, however, that both devices indicated a problem.

JRCP TESTING

The JRCP test section extended from station 1514 + 64 to station 1517 + 34 of eastbound IH 10. The pavement structure consisted of a 10-inch reinforced portland cement concrete pavement resting on 6 inches of cement stabilized base. This particular section had 60-foot joint spacings.

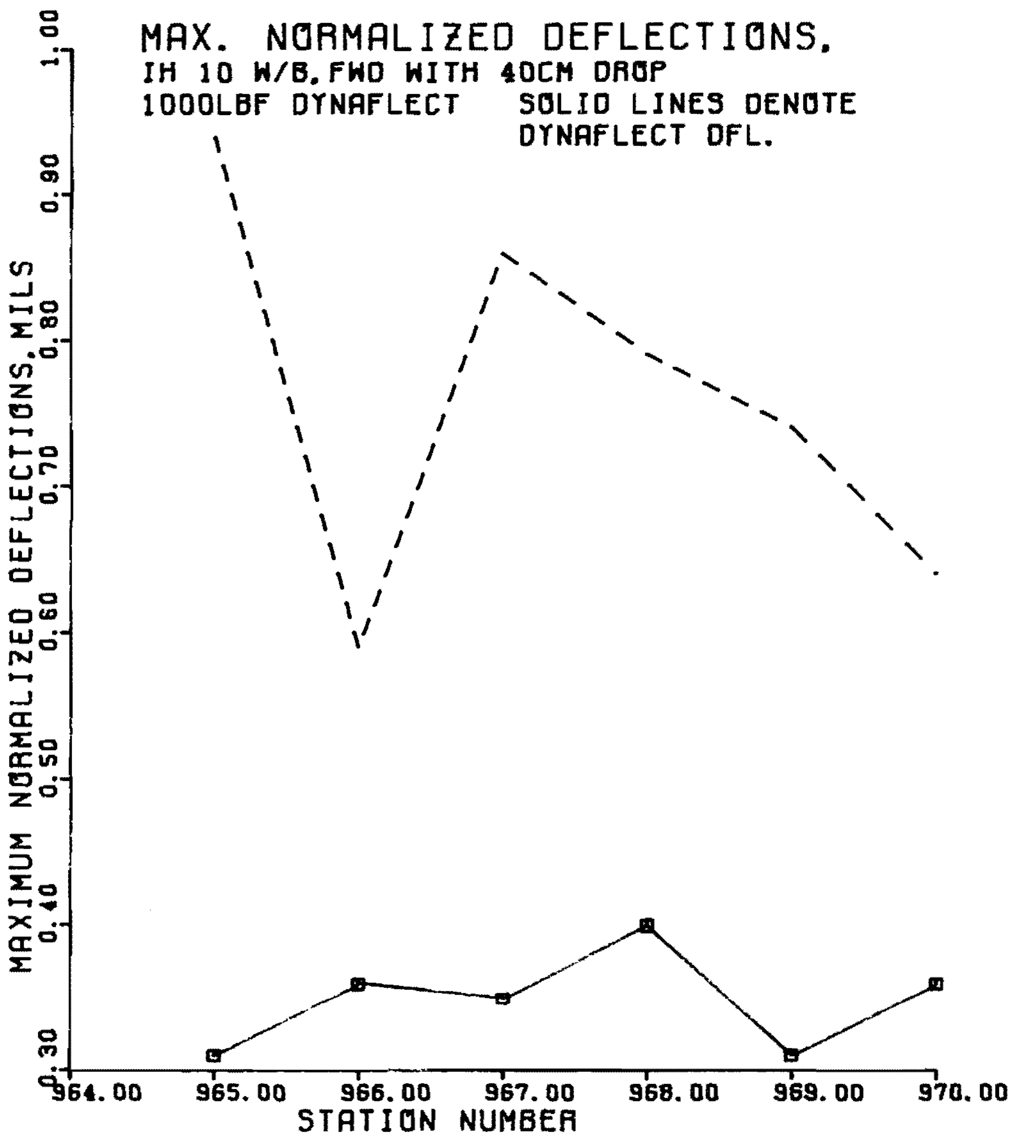

Fig 7. Maximum deflections vs station number, overlaid CRCP.

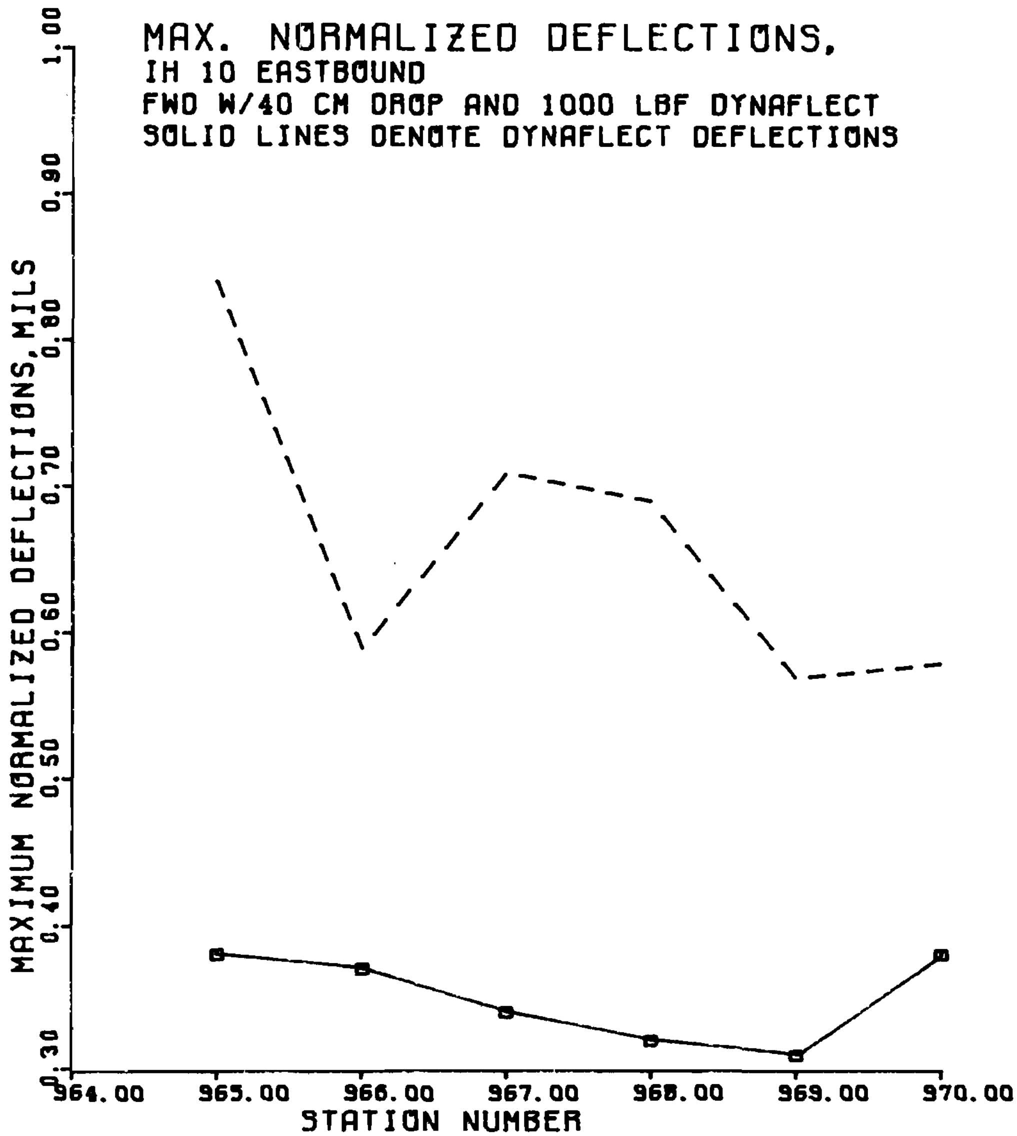

Fig 8. Maximum deflection vs station overlaid CRCP.

Measurements on this section were performed in a series of passes with both devices. First, measurements were taken along the outside edge of the pavement, and then the devices were moved to the center of the outside lane to perform measurements at the center of each slab. This was repeated as time permitted.

As the machines progressed along the edge of the pavement, measurements were taken at several locations, which included upstream and downstream of each joint and approximately midway between joints. The information obtained in this manner could possibly yield information on general pavement condition, void locations at the corners, and load transfer at the joints.

The measurement procedure at the joints differed slightly for the devices due to operational differences. The FWD was placed on the upstream side of a joint and two sensors were placed on the downstream side. Once a measurement had been completed, the FWD was moved to the downstream side and the sensors were placed upstream. The Dynaflect was positioned with sensor 1 on the upstream side and sensor 2 on the downstream side. After the first measurement, the Dynaflect was moved to the downstream side and another measurement was taken.

Once again, the effect of load position on maximum deflection is predictable. Table 9 presents the average maximum deflections under each device for the three locations tested. The corner exhibits the maximum mean value of deflection while the center load has the minimum.

Previous work in rigid pavements (Ref 8) has indicated that voids may be detected using surface deflection measurements. This work is based on the assumption that voids under a pavement will result in higher observed deflections at the surface. Using this assumption and the assumption that support conditions should not vary significantly across a joint, it should be

TABLE 9. MEAN VALUE AND STANDARD DEVIATION OF MAXIMUM DEFLECTIONS ON JRCP

	Position					
	Center		Edge		Corner	
Device	$\overline{X}$	S.D.	$\overline{X}$	S.D.	$\overline{X}$	S.D.
Dynaflect	.31	.027	.414	.092	.517	.118
FWD	4.307	.258	5.919	.592	7.789	2.19

NOTE: All values are in mils.

possible to detect the presence of a void under one of the corners. The maximum deflection on one side of the joint is compared to the one obtained on the other side and, if a large difference is observed, a void is assumed to exist under the side with the higher deflection. This method will not work if there are voids under both sides. Of the joints examined, only one exhibited a marked difference in deflection across the joint. The measurements made at this joint are summarized in Table 10. Notice that two repeat measurements were taken with the Dynaflect at this location and that the conclusion about the presence or absence of a void depends on which measurement is chosen for analysis. The FWD data are less conclusive, due to the large applied loads, which result in much greater deflections. A void one mil thick would represent more than 100 percent of the Dynaflect reading but less than 10 percent of the first FWD reading.

Table 10 also serves to point out another trend in the JRCP data. The deflection values recorded in each successive run did not appear to be independent of the time of measurement. This trend is attributable, in part, to pavement warping or curling due to temperature differentials which develop in the pavement. The maximum deflections under the Dynaflect are shown as a function of pavement temperature in Figs 9, 10, 11, and 12.

These figures indicate several trends. First, the corners seem to be the most sensitive to time of day, or temperature effects, while the center is the least sensitive. Secondly, the corner and edge deflections tend to decrease with increasing pavement temperatures.

This may be due in part to the closing of the joint as the slab expands to increase compression in the joint and increase load transfer. The decrease in relative deflections may also be due in part to the downward curl and warp of the slab as the surface temperature increases. This downward

TABLE 10. REPEAT MEASUREMENTS OF MAXIMUM DEFLECTIONS AT STATION 1514 + 64

Device	Position		Difference	% Change
	Upstream	Downstream		
Dynaflect	.94	.67	.27	40
	.60	.50	.10	20
FWD	12.40	13.29	-.69	-5
	7.15	6.79	.36	5

+ Temperature was 96°F and 98°F for the repeated measurements.

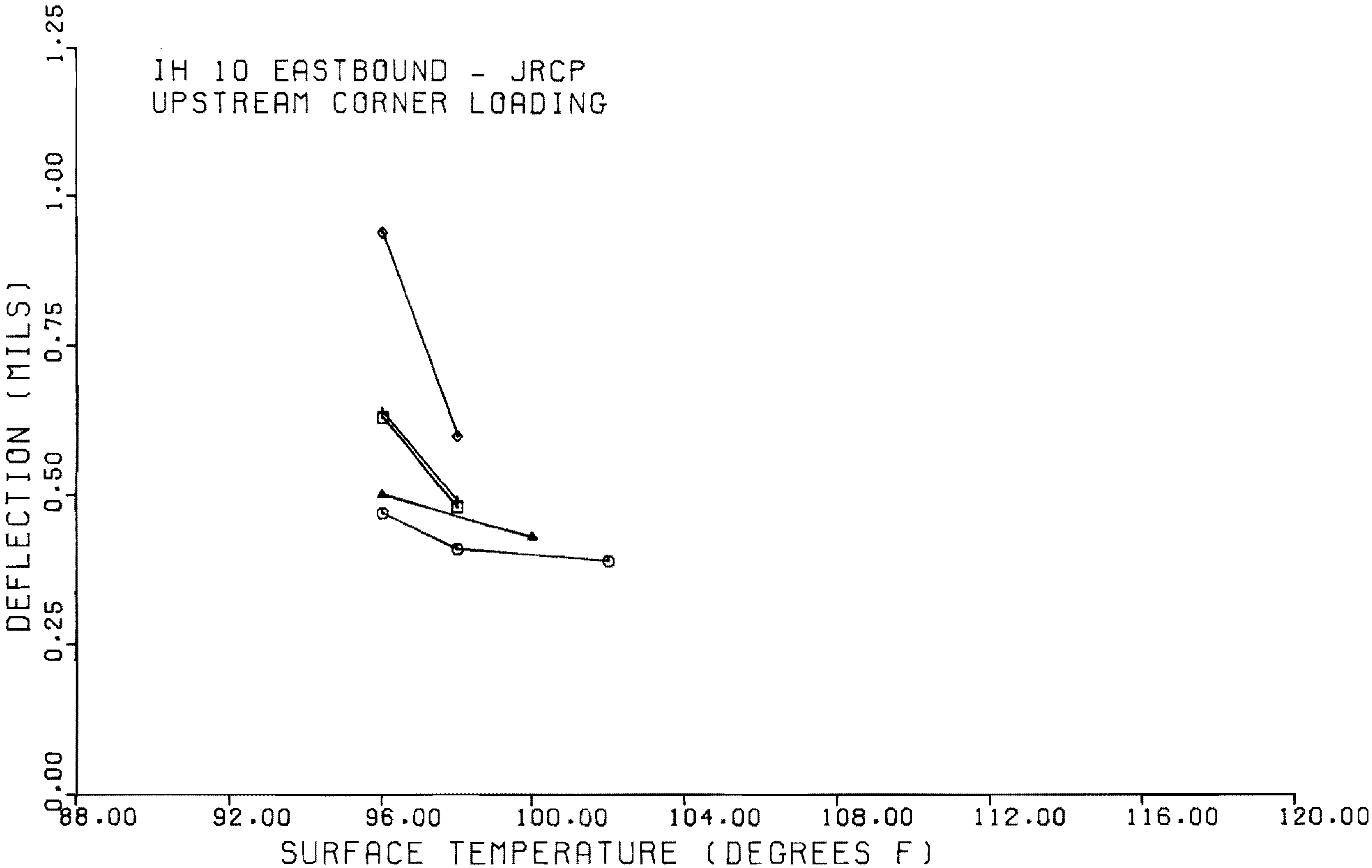

Fig 9. Maximum deflection vs temperature.

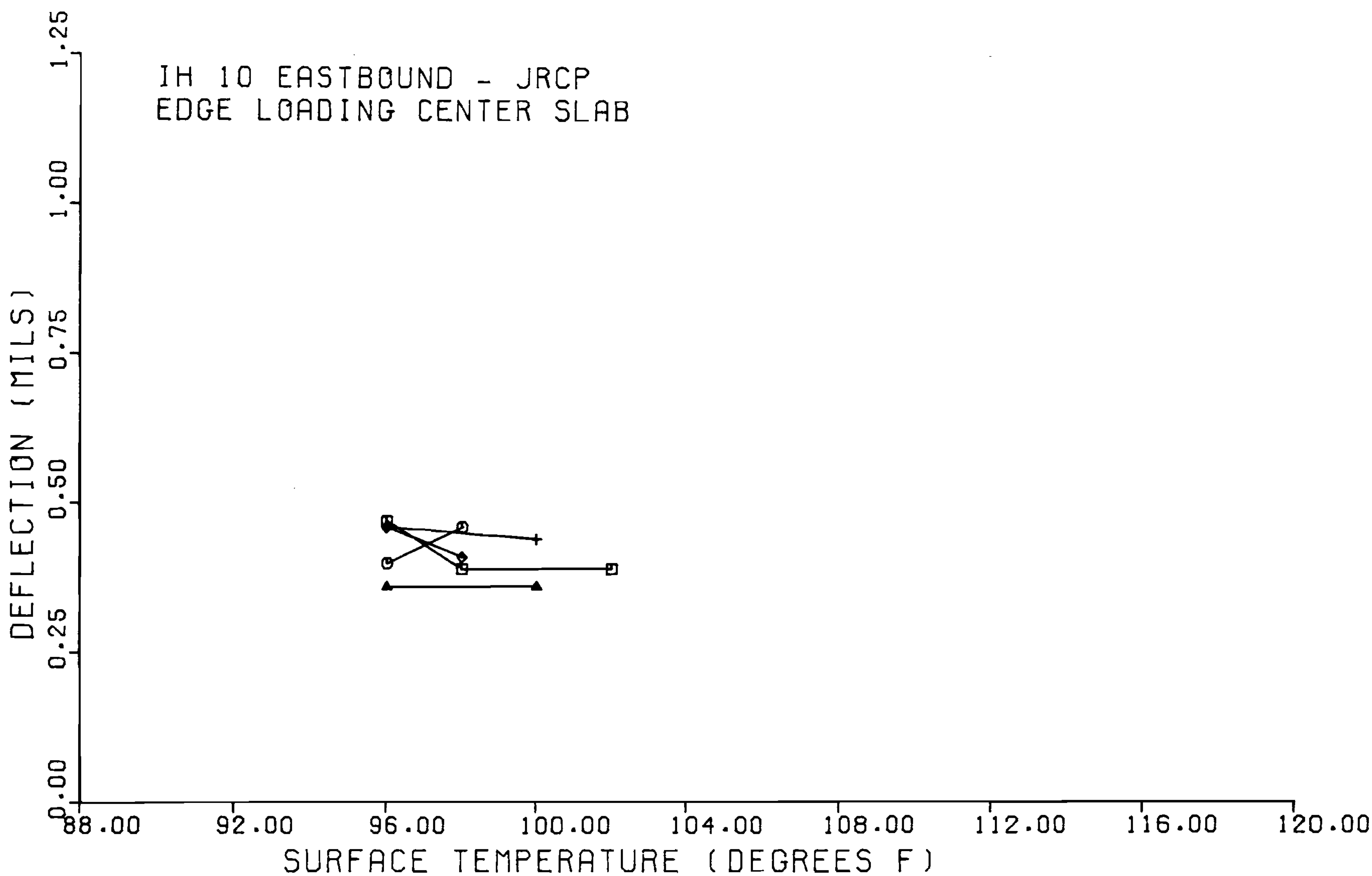

Fig 10. Maximum deflection vs temperature.

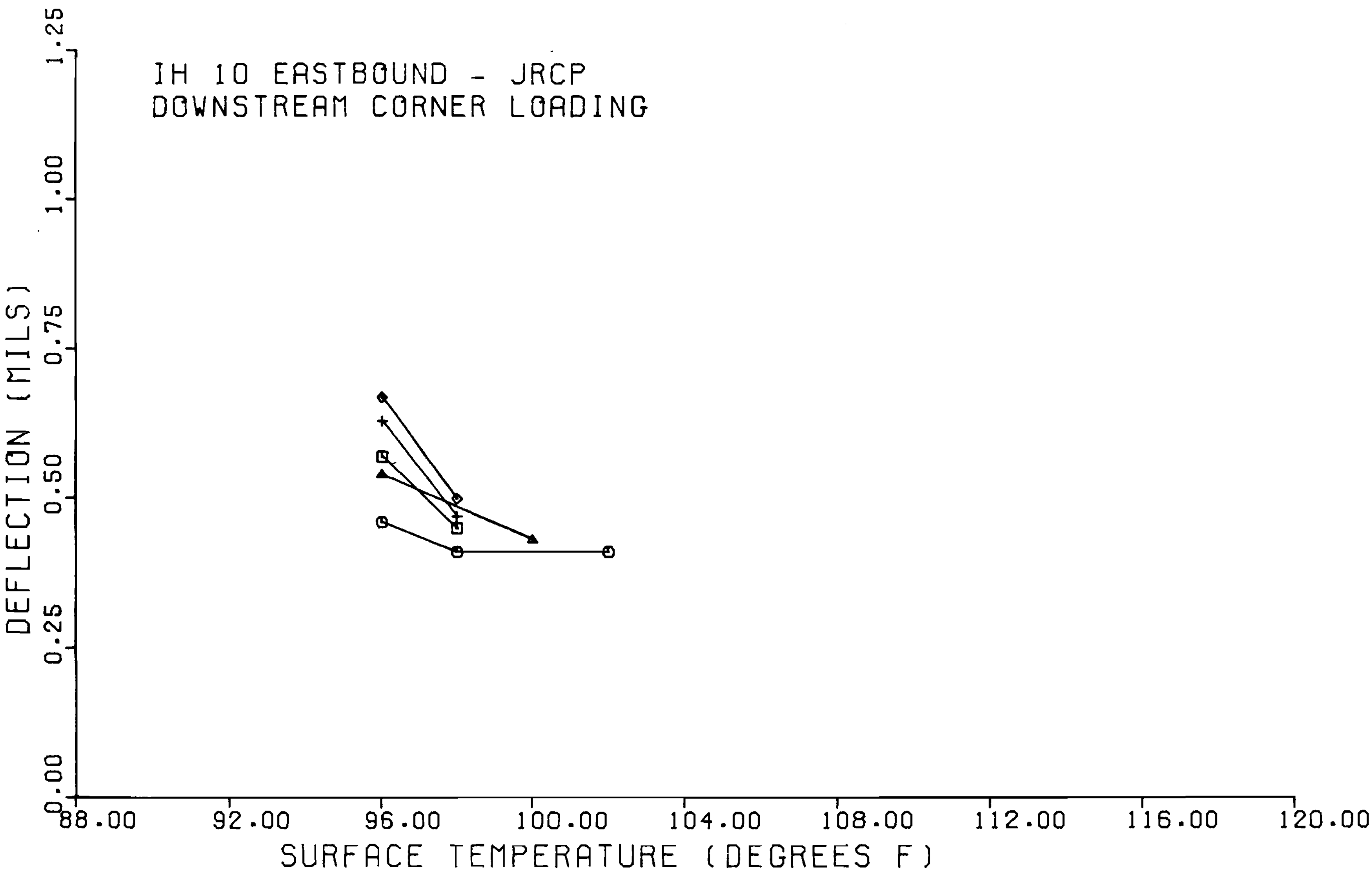

Fig 11. Maximum deflection vs temperature.

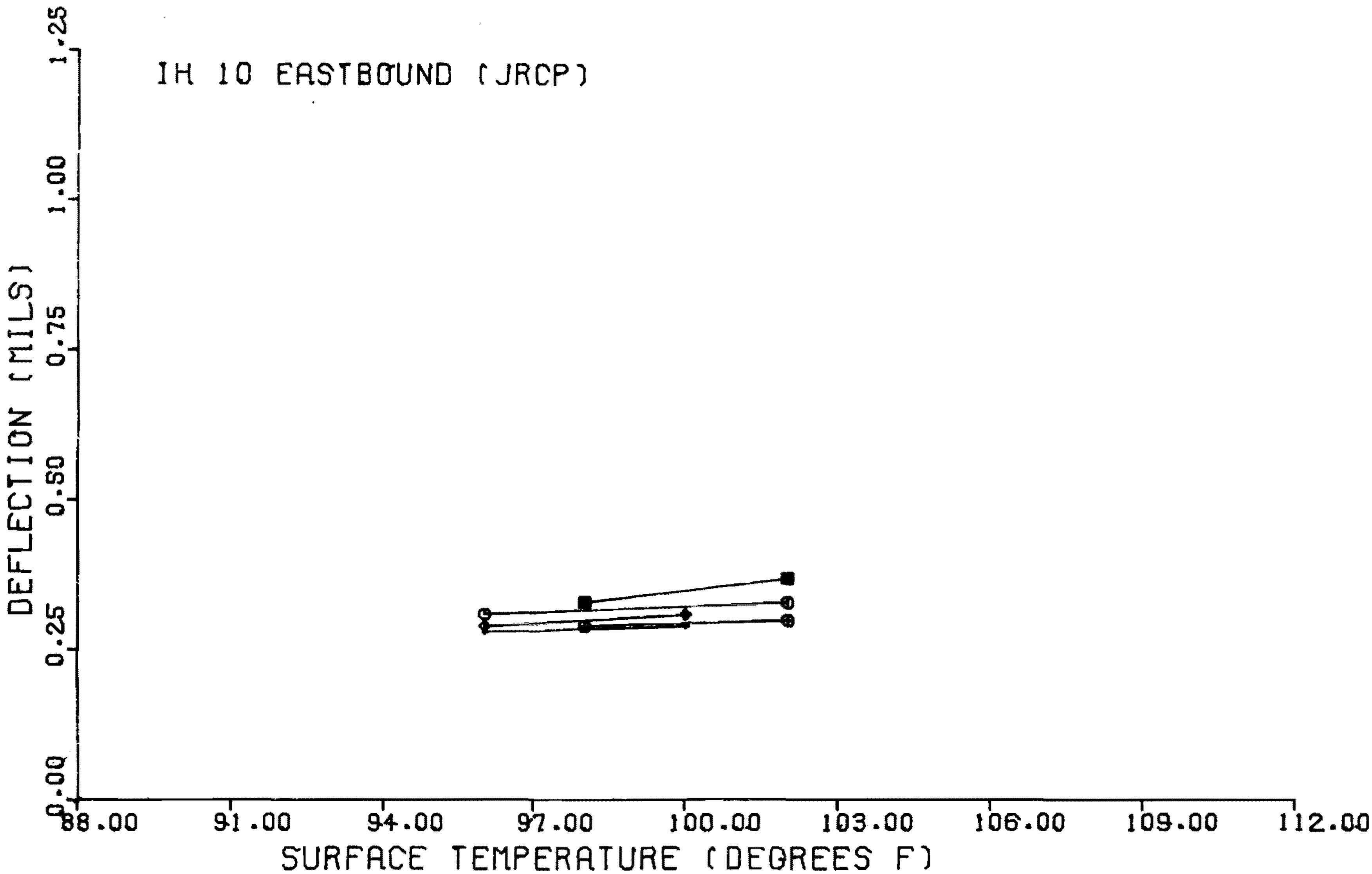

Fig 12. Maximum deflection vs temperature.

movement increases contact and depresses the base course, thus increasing the stiffness of the pavement system at that point.

Empirical data have shown that SCI can be used to evaluate the load transfer at joints. Studies indicate that SCI values from .05 to .10 show good transfer, SCI values from .11 to .23 represent marginal load transfer, and values in excess of .23 indicate poor load transfer. Mid-slab SCI values should range from .02 to .06. These criteria were used, the joints tested all fall within the good to marginal range, and the pavement is in good condition.

There is no empirical data base the existence of which would permit a similar analysis of the FWD data. The limited number of joints tested does not permit empirical relationships to be derived for the FWD. Thus, while it does have the potential for measuring load transfer, this potential cannot be evaluated here.

Certain trends emerged from the JRCP data:

(1) Corner loads produced the maximum deflections, and center loading produced the minimum.

(2) The corner and edge seemed more sensitive to time of day, or temperature, effects.

(3) The SCI values of the Dynaflect show good load transfer for this pavement.

(4) Dynaflect and FWD deflections were highly correlated in the JRCP section. This can be seen in Fig 13.

TTI TEST TRACK

Both devices were used to record deflection measurements on 29 of the asphalt pavement test sections located in the Texas Transportation Institute

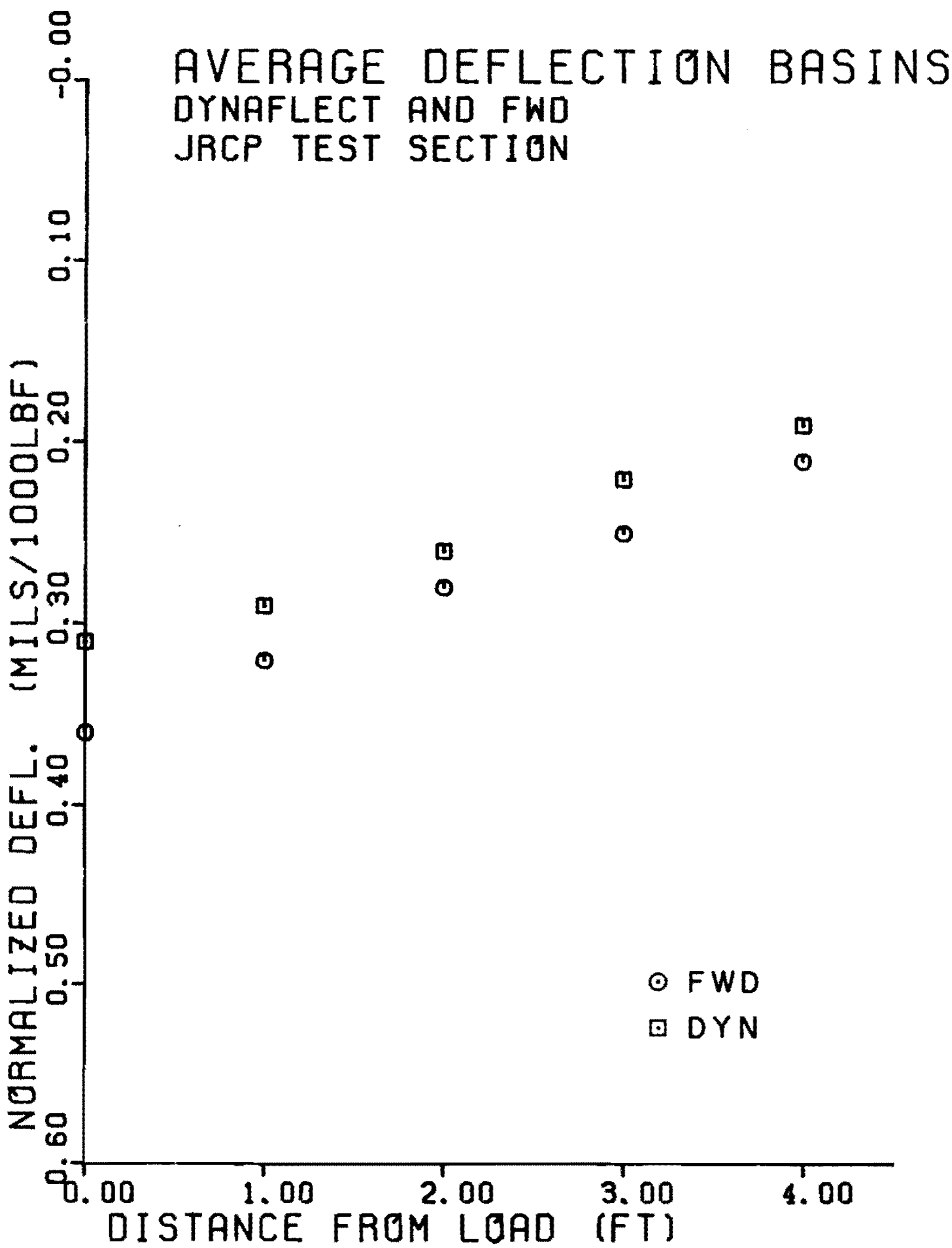

Fig 13. Average normalized deflection basins, JRCP.

test facility. This provided data on a wide variety of asphalt pavement cross sections as the basis for comparison.

The data collected by the two devices compared favorably. The maximum deflections measured by the Dynaflect and FWD, using a 40-cm drop height, had a correlation coefficient equal to .89. The slopes also were highly correlated, having a correlation coefficient of .91. The correlation coefficient of .76 for the SCI was somewhat lower but still indicates good agreement.

The following eight test sections were tested under several drop heights of the FWD to determine if stress sensitivity caused nonlinear behavior of the pavement structure. Sections 2, 3, and 8 were constructed using cement-treated base material and crushed limestone subbase material on a plastic clay subgrade. Sections 10, 11, and 12 had crushed limestone bases and subbases on a sandy gravel subgrade. The remaining two sections, 18 and 19, had stabilized limestone bases and subbases on sandy clay material. The thicknesses of the component layers of the sections are summarized in Table 11. The thickness of the subgrade is very large with respect to all of the other layers, so it is possible to assume that the subgrade is infinitely thick.

Drop heights of 10 cm, 25 cm, and 40 cm were used in the testing of the eight sections described above. The magnetic triggering device caused measurements taken using a drop height of less than 10 cm to be unreliable; thus, the 10-cm drop height represented a practical minimum for the particular FWD tested. The 40-cm drop height represented the maximum drop height, and 25 cm was the midpoint in the drop height range. This range in drop heights translates to a load range extending from 6000 to 11,000-lb.

TABLE 11. LAYER THICKNESS (INCHES)

Section	Surface	Base	Subbase
2	1	12	4
3	1	4	12
8	5	12	12
10	1	12	4
11	1	4	12
12	5	12	12
18	1	8	8
19	5	8	8

Regressions were performed on the load maximum deflection data obtained from these sections to determine if they were behaving linearly under increasing loads. The following models were considered:

$$\text{Model 1} \qquad Y = A_o + A_1 X$$

$$\text{Model 2} \qquad \log Y = A_o + A_1 \log X$$

where

Y = maximum deflection, in mils, and

X = maximum force in lbf.

The second model can also be expressed in the following form:

$$Y = 10^{A_o} (X^{A_1})$$

The constant A_1 as an exponent of the force variable indicates the nature of the force-deflection relationship. A value of A_1 equal to one would indicate a linear relationship. A value of A_1 less than one indicates stress hardening while a value greater than one shows stress softening.

The results of the regression using model 1 are summarized in Table 12. From these it can be seen that the sections tested behaved linearly in the region tested. This is consistent with results reported by Lytton (Ref 4) who concluded pavements behave linearly under loads up to 16,000 lb.

The results of the regression using model 2 appear in Table 13. Once again the model gives a good fit for all the sections. The value of the A_1

TABLE 12. SUMMARY OF REGRESSION RESULTS WITH MODEL 1 $Y = A_o + A_1X$

Section	A_o	A_1	R^2	Std. Error Residuals
2	-.320	5.14×10^{-4}	1.0000	.0129
3	-.776	1.62×10^{-3}	.9996	.0150
8	.617	6.74×10^{-4}	.9998	.044
10	9.69	9.33×10^{-8}	.9985	.2384
11	2.95	2.05×10^{-3}	.9988	.2773
12	.998	8.29×10^{-4}	.9993	.0824
18	2.665	5.440×10^{-8}	.9909	.3501
19	-.847	6.797×10^{-4}	.9992	.0752

TABLE 13. SUMMARY OF REGRESSION RESULTS WITH MODEL 2, $\log Y = A_o + A_1 \log X$

Section	A_o	A_1	R^2	Std. Error Residuals
2	-3.63	1.08	1.0000	.0002
3	-3.04	1.058	.9998	.0032
8	-2.73	.899	.9993	.0048
10	-1.88	.791	.9954	.0107
11	-1.97	.836	.9972	.0092
12	-2.55	.880	.9997	.0028
18	-3.52	1.109	.9639	.0426
19	-3.88	1.162	.9997	.0036

TABLE 14. NORMALIZED DEFLECTIONS UNDER THE FWD LOAD FOR 10, 20, AND 40-CM DROP HEIGHTS

TTI Section	Drop Height, cm*		
	10	20	40
2 Plastic	.46	.47	.49
3 Clay	1.50	1.51	1.56
8 Subgrade	.78	.74	.73
10 Sandy	2.18	1.99	1.91
11 Gravel	2.60	2.40	2.32
12 Subgrade	.98	.96	.91
18 Sandy clay	.80	.74	.86
19 Subgrade	.55	.57	.61

*10-cm drop ≃ 6000 lbf
20-cm drop ≃ 8000 lbf
40-cm drop ≃ 11000 lbf

terms indicates that the sections are slightly stress sensitive, although this sensitivity is not significant. The magnitude of this stress sensitivity can be seen by examining Table 14, which shows normalized deflections under the FWD for the test sections. These values represent deflection in mils per 1000 pounds of load. Of the three sections built on the plastic clay subgrade, two sections, 2 and 3, became slightly "softer" under heavier loads, while section 8 became harder. The three sections built on sandy gravel subgrades all became harder with increasing loads. Sections 18 and 19, built on sandy clay, both became softer under increased load. With the exception of section 8, these results are consistent with what would be expected from resilient modulus testing of subgrade soils.

The analysis clearly demonstrates the key advantage of the FWD, its variable force. A larger FWD, capable of delivering the design load for a pavement, could enable designers to determine whether stress sensitivity of the pavement structure is significant in that region of the deflection-load relationship.

SUMMARY

There was a high degree of correlation between the deflection data produced by the Dynaflect and the data generated by the FWD. Although the magnitudes of the FWD maximum deflections were much higher, they correlated well with the Dynaflect maximum deflections in all the pavement types tested, with the exception of the overlaid CRCP.

In the overlaid section, there was an unexplainable discrepancy between the deflection data generated by the two devices. This discrepancy warrants further investigation to determine whether it occurs in all overlaid rigid pavements or this is an isolated case.

The only significant difference between the devices is the ability of the FWD to test at several force levels. This feature allows investigators to determine the level of stress sensitivity of in-situ pavement structures rather than relying on resilient modulus testing.

CHAPTER 4. WAVE PROPAGATION STUDY

SPECIAL STUDY

A special test was performed using the FWD and a Digital Signal Analyzer to determine if wave propagation analysis techniques could be used with these devices to characterize pavement structures. Before the test results are discussed, a brief description of the concepts involved in wave propagation and digital analysis is provided for background.

Considerable work was done in the sixties and early seventies to determine pavement moduli from wave propagation techniques. The techniques are based upon determining the velocity of waves propagating along the surface of a mass or solid, such as the pavement, and using that information to estimate the material properties of the pavement structure.

WAVE PROPAGATION IN AN ELASTIC HALF-SPACE

In a homogeneous, isotropic, elastic half-space three types of wave motion are generated by an external disturbance (Ref 9). They are the compression, shear, and Rayleigh waves. The compression and shear waves are body waves which propagate along the surface and into the medium while the

Rayleigh wave is a surface wave which propagates only along the surface of the half-space.

The compression wave exhibits a push-pull motion in the direction of wave motion, and, hence, it is sometimes referred to as a dilatational wave. Another common name for compression waves is primary waves or P-waves. This results from the fact that compression waves travel at a higher velocity than the other waves and appear first on travel time records of wave motion. The velocity of a compression wave, V_c, is given by

$$V_c = \sqrt{\frac{E(1 - \mu)}{(1 + \mu)\ (1 - 2\mu)\rho}} = \sqrt{M/\rho} \tag{1}$$

where

E = Young's modulus,

μ = Poisson's ratio,

ρ = mass density of the elastic material,

γ = total unit weight,

g = acceleration due to gravity, and

M = constrained modulus.

Shear waves exhibit motion perpendicular to the direction of travel and are sometimes called distortional waves. These waves have a velocity, V_s, which is significantly lower than the compression wave velocity and are also referred to as secondary or S waves because they arrive second on a travel time record of wave motion. Shear wave velocity is given by the following relationship:

$$V_s = \sqrt{\frac{E}{2(1 + \mu)\rho}} = \sqrt{\frac{G}{\rho}}$$

where

G = shear modulus

and the other terms are as defined above.

The Rayleigh or surface wave propagates away from the disturbance along the surface of the elastic half-space. At large distances from the source, it can be considered as a two-dimensional plane wave. In materials with high values of Poisson's ratio, the Rayleigh wave velocity, V_r, approaches the shear wave velocity and can be approximated by

$$V_r = .95 V_s$$

Several properties of the Rayleigh wave make it very useful in wave propagation studies. First, the amplitude of the wave decreases rapidly with depth, decaying to about 30 percent of the surface amplitude at a depth of one wavelength. Second, its amplitude as it moves along the surface decays at a rate of $\sqrt{\frac{1}{r}}$ where r is the distance from the load. And finally, since the velocity is independent of the frequency in a constant velocity material, each frequency has a corresponding wavelength, determined by

$$V_r = f\lambda$$

where f is the frequency and λ is the wavelength. Thus, if any two of the above quantities are known the third can be determined.

This relationship between V, f, and λ is important because it indicates that high-frequency disturbances will cause Rayleigh waves with shorter wavelengths which will travel near the surface at a velocity dependent on the material properties near the surface. Low-frequency disturbances will cause long wavelengths which will travel at a velocity dependent on the material properties at greater depths. If the frequency and resulting wavelength are known the velocity of propagation can be determined, and the corresponding value of Young's modulus can be determined by combining Eqs 2 and 3 to form

$$E = \left(\frac{V_r}{0.95} \right)^2 [\, 2\,(1 + \nu)\, \rho \,]$$

Steady-state methods use a wave source which has a variable frequency and step through a range of frequencies to determine the wavelength and propagation velocity associated with each one. This procedure is time consuming and has not come into general use.

Recent advances in Fast Fourier Transform techniques and equipment have made it possible to perform Fourier analyses in the field or laboratory quickly and efficiently. New devices now available may eliminate the need for costly steady-state techniques.

FOURIER TRANSFORM

The Fourier transform is a mathematical tool which allows a time dependent signal to be broken into its component frequencies. This transform can be performed on any nonperiodic signal which is a function of time, f(t), that satisfies the following conditions:

(1) f(t) must have a finite number of discontinuities in the region

$$-\infty < t < \infty$$

(2) f(t) must have a finite number of minima and maxima in the region

$$-\infty < t < \infty$$

(3) f(t) must be absolutely intergratable in the sense that

$$\int_{-\infty}^{\infty} [f(t)]\, dt < \infty$$

Almost all nonperiodic functions, f(t), which can be physically generated meet these conditions.

The signal f(t) can be represented, through its inverse Fourier transform, as a function of frequency. This can be done by the use of the following equation:

$$f(t) = \int_{-\infty}^{\infty} F(f) \exp\, (j2\pi ft)df$$

where F(f) is the Fourier transform of f(t) defined by

$$F(f) = \int_{-\infty}^{\infty} f(t) \exp\, (-j2\pi ft)dt$$

Also notice that since

$$\exp(-j2\pi ft) = \cos(2\pi ft) - j\sin(2\pi ft)$$

the transform of f(t) contains a real cosine term and an imaginary sine term.

The use of real cosine and imaginary sine terms is a mathematical convenience which can be illustrated through the use of Fig 14. In this figure a phasor of magnitude A_n is rotated about the origin with frequency t. If the magnitude of the phasor in the x direction is plotted relative to time, a cosine wave results. Similarly, a phasor initially at rest on the y-axis will when rotated about the origin cause a sine wave. The y-axis is imaginary. The resultant of the sum of the two phasors has magnitude equal to

$$A_n = \sqrt{a_n^2 + b_n^2}$$

and begins its rotation at an angle

$$\phi_n = \tan^{-1}\left(\frac{b_n}{a_n}\right)$$

This angle is what is referred to as the phase angle and is always measured relative to the cosine. In this case the phase is delayed because it rotates behind the cosine. Thus, it can be seen that the Fourier transform of a

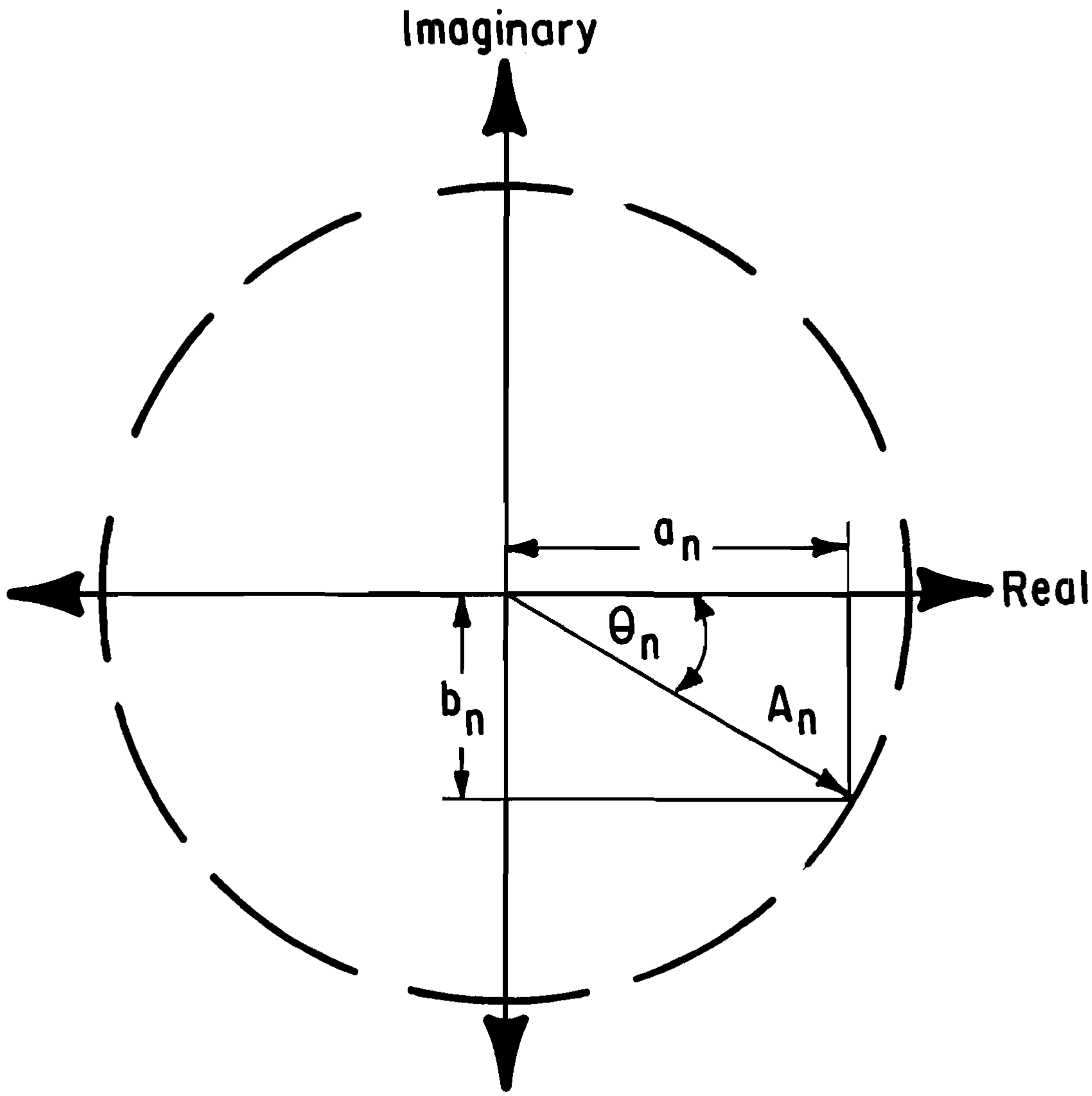

Fig 14. Representation of Fourier Coefficients by
a Rotating Phasor in the Complex Plane.

signal f(t), (Eqs 6-8) contains information about the magnitude and phase (Fig 14) of each of the frequency components of the original signal.

For a wave-complete development of the mathematics and concepts introduced above the reader is referred to Brigham (Ref 10), a text on Fourier analysis.

Digital signal analyzers which make use of Fourier analysis techniques are currently available. These devices can be used in the field and are capable of transforming measurements in the time domain into the frequency domain at the touch of a button. All the progamming necessary has been internalized. The following paragraphs describe the measurement techniques available and possible applications.

TIME RECORD AVERAGING

The time record of a signal is simply the representation of a signal in the time domain. For pure periodic signals one record adequately describes the signal. If there is noise present in the signal, several records may be averaged together to eliminate this noise. However, an accurate triggering device is necessary to perform this type of averaging. Signals which are synchronous to the trigger will average to their mean values while noise or non-synchronous signals average to zero. Time record averaging is useful in isolating a signal which may be buried in noise.

AUTOCORRELATION

The autocorrelation function for a random process x(t) is defined as the expected value of $[x(t)\ x(t+\tau)]$. Thus, the correlation function is found by taking a signal, displacing it in time, multiplying it by the original signal, and then averaging the product over all time.

The autocorrelation function can be used to improve the signal-to-noise ratio of periodic functions since the random noise component will concentrate near $\tau = 0$ while the periodic component will repeat with the same periodicity as the signal.

CROSS-CORRELATION

The cross-correlation function is a measure of the similarity between two signals. Statistically, the cross-correlation of two signals s(t) and Y(t), Rxy, can be expressed by

$$Rxy = E\,[x(t)\ y\ (t + \tau)].$$

Physically the cross-correlation indicates the similarities between two signals as a function of time shift (τ). Thus, the cross-correlation function is useful in determining time delays between two signals.

LINEAR SPECTRUM AVERAGING

The linear spectrum is the Fourier transform of the original time signal, f(t). As discussed earlier the linear spectrum gives magnitude and absolute phase information at each frequency in the analysis band. As with time record averaging, a trigger is required and any non-synchronous signals will average to zero.

AUTO POWER SPECTRUM

The auto power spectrum is the linear spectrum multiplied by its own complex conjugate and is represented as

$$Gxx\ (f) = X(f)\ X^*(f)$$

Gxx is a real valued function and, thus, contains no phase information. It is, therefore, independent of any trigger point and it can be averaged without a triggering device. The auto spectrum is the Fourier transform of the auto-correlation function and contains the same information in a different form.

The auto power spectrum is useful in extracting a signal from a noisy background when no trigger is available.

CROSS POWER SPECTRUM

The cross power spectrum is a measure of the mutual power between two signals and is defined by

$$G\underline{x}y\ (f) = X(f)\ Y^*(f)$$

This is the Fourier transform of the cross-correlation function.

$G\underline{x}y(f)$ is a complex valued function and thus, contains both magnitude and phase information. The phase Gxy at each frequency is the relative phase between the two signals at that frequency.

The magnitude of $G\underline{x}y(f)$ is simply the product of the magnitudes of the two signals. Thus, when both signals have large magnitudes the cross product will be high; when both are low the product will be low. Thus, the cross power spectrum is useful in isolating frequency components which are common to both signals.

The cross power spectrum can be used to analyze relationships between two signals caused by such things as time delays, propagation delays, and multiple signal paths between origin and destination.

TRANSFER FUNCTION

The transfer function describes the relationship between the input and output of a system. For linear systems, the response to each input can be considered independently and can be computed by dividing the transform of the output by the transform of the input, i.e.,

$$H(f) = \frac{Y(f)}{X(f)}$$

where

Y(f) is the transform of the output signal y(t),

X(f) is the transform of the input signal x(t), and

H(h) is the system transfer function.

An alternate method for obtaining the transfer function is with

$$H(f) = \frac{\overline{Gxy}(f)}{\overline{Gxx}(f)}$$

The transfer function gives both magnitude and phase information. The phase information is the same as that given by the cross power spectrum Gxy(f).

COHERENCE

The coherence function, γ^2 , is defined as

$$\gamma^2 = \frac{\text{response power caused by measured input}}{\text{total measured response power}}$$

and can be mathematically expressed as

$$\gamma^2 = \frac{Gyx\ (f)\ Gyx^*(f)}{Gxx(f) \cdot Gyy(f)}$$

The coherence is the fraction of the total output power due to the input. In the case where the noise is zero, γ^2 is equal to unity, which indicates a completely noise free measurement of a linear system. If the output power resulting from the input is zero, γ^2 equals zero and all the measured response is due to noise. Thus, the coherence is an indication of the causal relationship between the input and the output.

Several factors may cause the coherence function to be less than unity. Among these are

(1) extraneous noise present in the measurement,

(2) nonlinearities in the system,

(3) multiple inputs, and

(4) closely spaced resonances which cannot be detected without finer frequency resolution.

Another useful way of looking at the coherence function is in the form of a signal-to-noise ratio. This is defined as

$$\frac{\text{Signal}}{\text{Noise}} = \frac{\gamma^2(f)}{1 - \gamma^2(f)}$$

The significance of this term is somewhat easier to visualize and, therefore, it is sometimes presented instead of the coherence.

Both the coherence and the signal-to-noise ratio are used in conjunction with the transfer function as an indication of the quality of the measurement. A small value of the $\gamma^2(f)$ at a particular frequency does not mean the transfer function measured at that point is invalid. It may simply indicate that a great deal of averaging may be needed to improve the coherence at that frequency.

TEST RESULTS

An instantaneous impulse in the time domain when transformed into the frequency domain would theoretically contain components of all frequencies (Ref 11). This combined with the capabilities of Digital Signal Analyzers to provide both frequency and relative phase information could make it possible to perform wave propagation tests using impact testing.

Since the FWD provides an impact loading to generate deflections a special test was performed with a Digital Signal Analyzer to determine if wave propagation analysis could be applied to FWD data. This testing was done on the outside, northbound lane of IH 35 at station 670 + 00. The pavement structure consisted of a 2.5-inch HMAC surface over 4.5 inches of black base on three 5-inch lifts of flexible base.

The test setup was quite simple. The FWD was used as the source, and velocity transducers were connected to the road surface at distances of 2, 5, and 10 feet from the center of loading. The outputs of a pair of the velocity transducers were fed into the signal analyzer. The weight was dropped five times and cross-spectral averaging was performed.

The results of one of the tests are summarized below. In this particular test the output from the transducer one foot from the load was fed into Channel A of the analyzer and the output of the transducer at 5 feet was fed into Channel B. The weight was dropped five times and the cross spectrum was averaged to eliminate noise. The resulting cross-spectrum phase and coherence diagrams are shown in Fig 15.

These diagrams are the basis for the analysis to follow, and it is important to understand their meaning. The phase diagram indicates the phase shift, in degrees, of each frequency component over the distance between the sensors. The coherence at each frequency gives an indication of how good the data are at that frequency. In this particular case, the coherence is good up to approximately 250 Hz, except for a dip near 60 Hz. This indicates that the FWD excites the pavement primarily at frequencies less than 250 Hz.

All the information necessary to perform wave propagation analyses is contained in these diagrams. Phase shift-frequency relationships can be determined from the phase diagram, and the corresponding wavelengths can be calculated by

$$\lambda\ (f) = \frac{360°}{\Delta\ \phi\ (f)}\ X$$

where

$\lambda\ (f)$ = wavelength at frequency f,

$\Delta\ \phi\ (f)$ = relative phase shift at frequency f, and

X = distance between the velocity transducers.

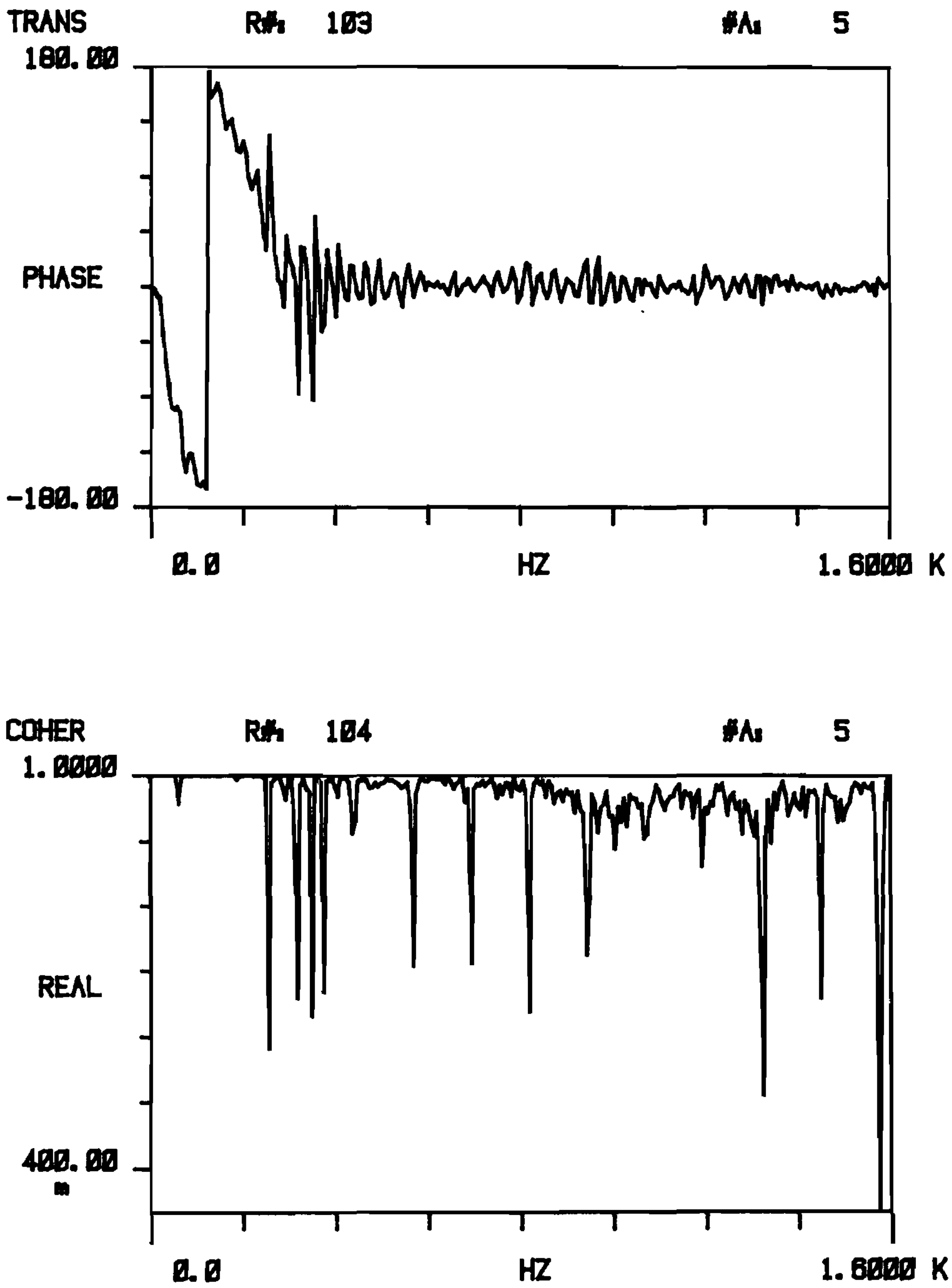

Fig 15. Cross spectrum phase and coherence diagrams for FWD.

Once the wavelength is known, the velocity can be determined using Eq 4. Table 15 was constructed using these relationships and represents a velocity profile of the test section.

In order to arrive at a wave velocity-depth relationship certain assumptions must be made to determine the depth at which the wave is sampling. Some investigators have used a sampling depth equal to one-half the wavelength with success while others have found a depth of one-third of the wavelength to be more suitable. For that reason, both values appear in the table.

Once the velocity-depth relationship is known, the modulus-depth relationship can be calculated using Eq 5 and solving for Young's modulus. For accurate calculations to be performed, Poisson's ratio and mass density must be known for each layer in the structure. Unfortunately, the relatively low frequencies generated by the FWD would not permit characterization of the surface layers using this technique.

Notice that the minimum depth sampled, even when the wavelength is divided by three, is 1.28 feet. This would place the material sampled in the flexible base material. A signal with higher frequency components is needed to decrease minimum depth of sampling so information can be obtained for the surface layer.

As mentioned earlier, an instantaneous impulse in the time domain theoretically contains components of all frequencies when transformed into the frequency domain. In practice, it is impossible to generate an instantaneous impulse; however, if impulses are generated which are short compared to the response time of the system, the Fourier transform of the displacement responses will contain all frequencies of practical significance. For most pavements, the duration of an impulse must be one

TABLE 15. VELOCITY PROFILE FOR FWD

Frequency, Hz	Phase, Degrees	Travel Time, msec	Velocity, fps	Wavelength, λ ft	Depth, ft 1/2 λ	1/3 λ
10.000	5.83	1.619	1903.9	190.394	95.197	63.465
14.000	8.29	1.645	1874.5	133.896	66.948	44.632
18.000	9.19	1.418	2174.1	120.783	60.392	40.261
20.000	14.66	2.036	1514.3	75.716	37.858	25.239
24.000	31.63	3.661	842.2	35.093	17.547	11.698
28.000	47.50	4.712	654.3	23.368	11.684	7.789
32.000	62.42	5.418	569.0	17.783	8.891	5.928
36.000	74.75	5.768	534.6	14.849	7.425	4.950
40.000	87.03	6.044	510.2	12.754	6.377	4.251
44.000	98.60	6.225	495.3	11.258	5.629	3.753
55.000	98.76	4.988	618.2	11.239	5.620	3.746
69.000	140.28	5.647	546.0	7.913	3.956	2.638
75.000	150.57	5.577	552.9	7.372	3.686	2.457
85.000	136.41	4.458	691.7	8.137	4.069	2.712
100.000	161.06	4.474	689.2	6.892	3.446	2.297
118.000	164.11	3.863	798.1	6.764	3.382	2.255
130.000	200.49	4.284	719.7	5.536	2.768	1.845
145.000	195.06	3.737	825.1	5.691	2.845	1.897
160.000	225.90	3.922	786.2	4.914	2.457	1.638
180.000	233.02	3.596	857.4	4.764	2.382	1.588
195.000	248.00	3.533	872.8	4.476	2.238	1.492
215.000	273.90	3.539	871.3	4.053	2.026	1.351
230.000	267.08	3.226	955.9	4.156	2.078	1.385
240.000	301.25	3.487	884.3	3.685	1.842	1.228

Distance between geophones = 3.08333 feet.

Apparent phase shift correction = 0.000 degree msec or shorter to be considered instantaneous. The FWD generates a pulse approximately 26 msec long and, therefore, does not generate frequencies high enough to characterize the surface layer. A hammer blow with a narrower pulse width should generate higher frequencies. For this reason the measurements were repeated using a small drop hammer, which generated a pulse of much shorter duration. The results were as expected; the higher frequency components decreased the minimum depth sampled to approximately 4.5 inches below the surface. Thus, it appears the technique itself holds much promise for becoming a valuable tool in the characterization of pavements but the FWD is not the ideal wave source.

CHAPTER 5. DISCUSSION OF RESULTS

A review of the available literature on comparisons of deflection measuring devices indicated that the most promising devices are the Dynaflect, the Road Rater, and the Falling Weight Deflectometer. The Dynaflect and the Road Rater are very similar in operation and, since Texas already utilizes the Dynaflect, the Dynaflect was selected in preference to the Road Rater for the comparisons. Much information and thought have been given to adaptation of the Falling Weight devices in the United States in the past three years and, since the Falling Weight Deflectometer delivers relatively heavy loads, it was decided to compare these two devices. This decision in no way implies that the Dynaflect or the Falling Weight Deflectometer is itself an absolute standard.

Subsequent field testing of a Dynaflect and a Falling Weight Deflectometer substantiated the findings of the literature review. The Dynaflect and FWD compared nearly evenly in the small study outlined here, except in operational speed; there the Dynaflect was superior to the FWD tested. This was primarily due to the fact that the Dynaflect tested had an automatic sensor placement, while the FWD tested did not.

Correlations were performed on the deflection data collected during the field testing. The correlation coefficients obtained showed good agreement between the deflections measured by the two devices on all the pavements except the overlaid CRCP. Additional analysis of the FWD deflection versus load data showed there was insignificant stress sensitivity in the pavements tested, under load varying from 6,000 to 11,000 pounds.

EVALUATION OF DYNAFLECT

Experience in using the Dynaflect in Texas has shown that the Dynaflect is not adequate for certain field conditions. Particularly, it is doubtful that the Dynaflect can properly evaluate the true deflections and true material properties of a portland cement concrete pavement slab with a void underneath. The nonlinearity of a concrete slab over a void invalidates the elastic layer theory, the assumption of which is required to utilize either the Dynaflect or Falling Weight Deflectometer measurements.

Experience in Texas and discussions with members of the Highway Design Division of the Texas State Department of Highways and Public Transportation show that apparently erroneous results have been obtained on heavily cracked Portland Cement concrete pavements using the Dynaflect. Additional research is needed to determine the conditions under which the Dynaflect can produce reliable information.

On the other hand, evidence that has been pointed out and is discussed in this study, shows that the Dynaflect does a reasonable job in predicting overlay requirements, particularly in asphalt cement concrete pavements. Extensive studies, cited in Refs 2, 3, and 5, showed that there was a correlation of up to 90 percent between the Dynaflect and other deflection measuring devices.

DISCUSSION OF FALLING WEIGHT DEFLECTOMETER RESULTS

There is a trend in the United States today to accept the Falling Weight Deflectometer as the new superior method in nondestructive testing of existing pavements. This study clearly points out that under test conditions, the Falling Weight Deflectometer correlates well with the Dynaflect. The acceptance of the FWD seems to be related to the heavier load delivered by the Falling Weight Deflectometer and the description in the literature of this load as "similar to actual traffic loading." In reality, the falling weight delivers an impulse dynamic loading. It should be evident that, where pavements are truly linearly elastic and where they are not so stiff that the accuracy of the Dynaflect is distorted by measurement error, the Dynaflect should provide data comparable to that from the falling weight.

STATIC ANALYSIS OF DYNAFLECT AND FWD RESULTS

One shortcoming of both the Dynaflect and Falling Weight Deflectometer methods is the assumption of static loading which is made in the elastic layered analysis of the measured deflections. In fact, both tests involve dynamic loading and wave propagation and, hence, should be analyzed accordingly.

The FWD generates compression, shear, and Rayleigh waves in the pavement structure during each test. These waves propagate at different velocities away from the loaded area, as discussed in Chapter 4, and the amount of material sampled during the test depends on the wave velocity and load duration. For instance, if the compression wave velocity is 1000 fps and the load duration is 26 msec, the maximum depth of material involved in the FWD test is 26 feet.

The Dynaflect generates all wave types, as does the FWD. The Dynaflect, however, generates mostly Rayleigh waves at a frequency of 8 Hz. For this type of test, the effective sampling depth is on the order of one-third of the wavelength. Hence, if the Rayleigh wave velocity of the material is 480 fps, the wavelength is 60 feet, and the material most important in the test is that within 20 feet of the surface.

In both test methods, the results are complicated by reflections and refractions in the pavement system which, of course, are not considered in any static analysis.

Dynamic analyses of these test methods should be developed. They can be used to show where the static solutions are correct and where they are inappropriate.

SURFACE WAVE PROPAGATION METHOD

As pointed out in Chapter 4, one of the main results of this study is the indication that modern wave propagation techniques using surface waves may be more useful in evaluating pavements than either the Falling Weight Deflectometer or the Dynaflect. The method shown to have much promise in this work involves a small hammer, used to apply transient impulses at the surface, and vertical receivers, placed on the surface and used to monitor the passage of Rayleigh waves. The Rayleigh waves are analyzed in the frequency domain to determine the velocity-wavelength relationship. From this relationship and wave propagation theory, the depths of the layers and the moduli of each layer can be determined for a complete pavement system.

A special study of the FWD impulse load using a Digital Signal Analyzer showed the major frequencies generated by the FWD load were less than 250 Hz. This makes it impractical to use the FWD as the source in the Rayleigh wave analysis in the frequency domain to determine layer moduli of in-situ pavements. A small hammer, which generates higher frequencies, is better for characterizing the surface layers.

It is also interesting to note that, for the testing performed in this study, the FWD and the impulse from a 10-lb hammer gave the same moduli for different layers below the pavement. This test shows that for this system the FWD did not load the pavement system in the nonlinear range.

CLOSING DISCUSSION

This study has confirmed both the experience of engineers and the information for other studies that in most pavements the Dynaflect provides deflection data that are comparable to other, heavier, and more expensive devices. It has also shown that there are some pavements and conditions for which comparable data were not obtained. Additional studies under controlled conditions are needed to determine the limits of where useful data from the Dynaflect can and cannot be obtained. The possibility exists that, in some cases, heavier deflection devices may provide more reliable information.

Other methods of interpreting the data should be explored, and further studies in the use of the surface wave propagation method should be made.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

An examination of the literature and the field study data leads to the following conclusions.

(1) The Dynaflect and FWD produce nearly equal results when evaluated on the basis of operational characteristics and cost.

(2) The Dynaflect's major advantage is the large existing empirical data base relating Dynaflect measurements to performance.

(3) The major advantages of the FWD lie in its load magnitude and its variable load force.

(4) The variable load potentially enables the detection of stress sensitivity of the pavement structure as it exists in the field.

(5) The Dynaflect and FWD data were highly correlated, indicating the two devices would yield similar design sections.

(6) Digital signal analyzers can yield information for wave propagation analysis.

Based on the above conclusions the following recommendations for further study are offered.

(1) Choose a section of roadway for overlay design and perform an overlay analysis with an FWD capable of delivering 18 kips and compare it with a design based on the Dynaflect and current SDHPT methodology.

(2) Investigate more thoroughly the capabilities of Digital Signal Analyzers to perform wave propagation tests.

The first study, involving an actual overlay design, would show whether the load magnitude of the FWD and its variability translate into significantly different overlay designs. This would clearly demonstrate whether the Dynaflect with its 1000-lbf peak-to-peak loading is sufficient to characterize pavements for overlay design.

REFERENCES

1. Potter, David W., "Evaluation of Dynaflect Dynamic Pavement Deflector System," Research Report No. 62, Australian Road Research Board, October 1976.

2. Bush III, A. J.., "Nondestructive Testing for Light Aircraft Pavements - Phase I," U. S. Army Waterways Experiment Station, Vicksburg, Mississippi, August 1979.

3. Lytton, R. L., "Pavement Evaluation: Phase I. Pavement Evaluation Equipment," Report No. FHWA-RD-75-8, Federal Highway Administration, March 1975.

4. Roberts, Donald, V., "Evaluation of the Cox Deflection Devices," Report No. FHWA-CA-TL-3150-77-14, CALTRANS, June 1977.

5. Treybig, Harvey J., "Comparison of Airfield Pavement Evaluation Using Light and Heavy Load NDT," November 1979.

6. Bohn, A., P. Ullditz, R. Stubstad, and A. Sorensen, "Danish Experiments with the French Falling Weight Deflectometer," Proceedings, 3rd International Conference on the Structural Design of Asphalt Pavements, University of Michigan, Ann Arbor, 1972.

7. Claessen, A. I. M., and R. Ditmarsch, "Pavement Evaluation with the Falling Weight Deflectometer," AAPT, New Orleans, 1976.

8. Majidzadeh, Kamran, "Dynamic Deflection Study for Pavement Condition Investigation," Report No. OHIO-DOT-16-74, Ohio Department of Transportation, June 1974.

9. Richart, F. E., Jr., J. Hall, Jr., and R. Woods, Vibrations of Soils and Foundations, Prentice-Hall, Englewood Cliffs, New Jersey, 1970.

10. Brigham, E. Orna, The Fast Fourier Transform, Prentice-Hall, Englewood Cliffs, New Jersey, 1974.

11. Thornhill, Joe, and C. C. Smith, "Fourier and Spectral Analysis: A Short Course," notes prepared to accompany 30 hours of lecture at The University of Texas at Austin, Austin, Texas, 1980.

12. May, Richard W., "Interpreting Dynamic Surface Deflections in the Granular Base Layer of the Pavement Structure," Report No.

FHWA/RD-80/149, Interim Report, Federal Highway Administration, February 1981.

APPENDIX

DATA SUMMARY

APPENDIX: DATA SUMMARY

The following pages contain a summary of the data collected during the field study. The following points are of importance:

(1) air temperature data are recorded with FWD data and pavement temperature data are recorded with the Dynaflect data and

(2) time is recorded using a 24-hour clock.

```
                     DEFLECTION DATA SUMMARY
                     -----------------------
CRCP TEST SECTION LOCATED ON IH 35 EB STATION 229+00 TO 239+00

*************************************************************
DIST:   13 CONT:  271 DATE:  19 AUG 80  HIGHWAY: IH 10 EASTBOUND
SECT:    1  JOB:      CFTR: 1301        COUNTY:   COLORADO
*************************************************************

*************************************************************
TEST SECTION: C1    TEST DATE: 21 MAY 80  PAVEMENT TYPE: CRCP
                    LAYERS: 3  THICKNESSES:  8.00  6.00
  -----------------------------------------------------------
  TEST: F1A   LOC:  228+99 (6"FROM EDGE) TIME: 12:15 TEMP: 79 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  7394.
    SENSOR POSITIONS (IN)      0    12    24    36    48    96
    DEFLECTIONS (MILS)      3.39  3.15  2.78  2.28  1.89  0.00
  -----------------------------------------------------------
  TEST: F1B   LOC:  228+99 (6"FROM EDGE) TIME: 12:35 TEMP: 79 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11419.
    SENSOR POSITIONS (IN)      0    12    24    36    48    96
    DEFLECTIONS (MILS)      5.93  5.45  4.84  3.98  3.25  0.00
  -----------------------------------------------------------
  TEST: F2A   LOC:  228+99 (3"FROM EDGE) TIME: 13:05 TEMP: 82 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11469.
    SENSOR POSITIONS (IN)      0    12    24    36    48    96
    DEFLECTIONS (MILS)      7.26  6.62  5.89  4.79  3.94  0.00
  -----------------------------------------------------------
  TEST: F2B   LOC:  228+99 (3"FROM EDGE) TIME: 13:19 TEMP: 82 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  7279.
    SENSOR POSITIONS (IN)      0    12    24    36    48    96
    DEFLECTIONS (MILS)      4.15  3.88  3.35  2.71  2.36  0.00
  -----------------------------------------------------------
  TEST: F3A   LOC:  228+99 (1"FROM EDGE) TIME: 13:39 TEMP: 82 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 10858.
    SENSOR POSITIONS (IN)      0    12    24    36    48    96
    DEFLECTIONS (MILS)     10.50 10.24  9.06  7.42  6.19  2.48
  -----------------------------------------------------------
```

```
--------------------------------------------------------------------
TEST: F3B   LOC:  228+99 (1#FROM EDGE) TIME: 13:43 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6868.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)        6.28   5.88   5.31   4.37   3.62   0.00
--------------------------------------------------------------------
TEST: F4A   LOC:  229+ 3 (1#FROM EDGE) TIME: 13:46 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7278.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)        6.50   6.38   5.75   4.76   4.06   0.00
--------------------------------------------------------------------
TEST: F4B   LOC:  229+ 3 (1#FROM EDGE) TIME: 13:48 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11403.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       11.50  11.49  10.04   8.69   7.05   2.68
--------------------------------------------------------------------
TEST: F5A   LOC:  229+ 3 (3#FROM EDGE) TIME: 13:52 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11399.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)        7.40   7.17   6.22   5.35   4.41   1.85
--------------------------------------------------------------------
TEST: F5B   LOC:  229+ 3 (3#FROM EDGE) TIME: 13:55 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7255.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)        4.19   4.17   3.62   3.06   2.56   0.00
--------------------------------------------------------------------
TEST: F6A   LOC:  229+ 3 (6#FROM EDGE) TIME: 13:57 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7195.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)        3.47   3.23   2.78   2.36   1.89   0.00
--------------------------------------------------------------------
TEST: F6B   LOC:  229+ 3 (6#FROM EDGE) TIME: 14:02 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11280.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)        6.06   5.65   4.93   4.20   3.37   1.42
--------------------------------------------------------------------
```

```
--------------------------------------------------------------------
TEST: F7A   LOC:  230+ 5 (6#FROM EDGE) TIME: 14:09 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11531.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      5.02   4.49   4.01   3.37   2.87   1.26
--------------------------------------------------------------------
TEST: F7B   LOC:  230+ 5 (6#FROM EDGE) TIME: 14:15 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7301.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      2.91   2.60   2.28   1.95   1.69   0.00
--------------------------------------------------------------------
TEST: F8A   LOC:  230+ 5 (3#FROM EDGE) TIME: 14:21 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7325.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      2.94   2.76   2.44   2.05   1.79   0.00
--------------------------------------------------------------------
TEST: F8B   LOC:  230+ 5 (3#FROM EDGE) TIME: 14:27 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11434.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      5.20   4.78   4.17   4.06   2.99   1.30
--------------------------------------------------------------------
TEST: F9A   LOC:  230+ 5 (1#FROM EDGE) TIME: 14:34 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11266.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      6.98   6.54   5.87   4.53   3.80   1.61
--------------------------------------------------------------------
TEST: F9B   LOC:  230+ 5 (1#FROM EDGE) TIME: 14:41 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7351.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.02   3.86   3.44   2.58   2.24   0.00
--------------------------------------------------------------------
TEST: F10A  LOC:  230+98 (1#FROM EDGE) TIME: 14:46 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7233.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.54   4.52   3.90   3.33   2.83   0.00
--------------------------------------------------------------------
```

TEST: F10B LOC: 230+98 (1"FROM EDGE) TIME: 14:52 TEMP: 82 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 11266.

SENSOR POSITIONS (IN)	0	12	24	36	48	96
DEFLECTIONS (MILS)	8.08	7.82	7.01	5.87	4.98	1.89

TEST: F11A LOC: 230+98 (3"FROM EDGE) TIME: 14:56 TEMP: 82 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 11237.

SENSOR POSITIONS (IN)	0	12	24	36	48	96
DEFLECTIONS (MILS)	5.90	5.53	4.96	4.21	3.62	1.61

TEST: F11B LOC: 230+98 (3"FROM EDGE) TIME: 14:59 TEMP: 82 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 7143.

SENSOR POSITIONS (IN)	0	12	24	36	48	96
DEFLECTIONS (MILS)	3.37	3.15	2.83	2.44	2.11	0.00

TEST: F12A LOC: 230+98 (6"FROM EDGE) TIME: 15:03 TEMP: 84 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 7244.

SENSOR POSITIONS (IN)	0	12	24	36	48	96
DEFLECTIONS (MILS)	2.93	2.72	2.57	2.16	1.97	0.00

TEST: F12B LOC: 230+98 (6"FROM EDGE) TIME: 15:11 TEMP: 84 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 11829.

SENSOR POSITIONS (IN)	0	12	24	36	48	96
DEFLECTIONS (MILS)	5.28	4.87	4.49	3.82	3.39	1.34

TEST: F13A LOC: 231+99 (6"FROM EDGE) TIME: 15:16 TEMP: 84 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 11164.

SENSOR POSITIONS (IN)	0	12	24	36	48	96
DEFLECTIONS (MILS)	4.88	4.52	3.82	3.16	2.65	1.26

TEST: F13B LOC: 231+99 (6"FROM EDGE) TIME: 15:22 TEMP: 84 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 7173.

SENSOR POSITIONS (IN)	0	12	24	36	48	96
DEFLECTIONS (MILS)	2.92	2.65	2.20	1.89	1.57	0.00

```
--------------------------------------------------------------------
TEST: F14A  LOC:  231+99 (3#FROM EDGE) TIME: 15:26 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7257.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       3.74   3.28   2.80   2.23   1.81   0.00
--------------------------------------------------------------------
TEST: F14B  LOC:  231+99 (3#FROM EDGE) TIME: 15:31 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11336.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       6.40   5.67   4.92   3.76   3.15   1.34
--------------------------------------------------------------------
TEST: F15A  LOC:  231+99 (1#FROM EDGE) TIME: 15:35 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11150.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       9.00   7.81   6.22   4.76   3.68   1.46
--------------------------------------------------------------------
TEST: F15B  LOC:  231+99 (1#FROM EDGE) TIME: 15:42 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7127.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       5.19   4.49   3.56   2.83   2.20   0.00
--------------------------------------------------------------------
TEST: F16A  LOC:  233+ 3 (1#FROM EDGE) TIME: 15:46 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7154.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       5.19   4.70   3.82   2.89   2.19   0.00
--------------------------------------------------------------------
TEST: F16B  LOC:  233+ 3 (1#FROM EDGE) TIME: 15:53 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11212.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       8.41   7.72   6.42   4.80   3.70   1.18
--------------------------------------------------------------------
TEST: F17A  LOC:  233+ 3 (3#FROM EDGE) TIME: 15:56 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11304.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       6.49   5.91   4.99   3.74   2.99    .91
--------------------------------------------------------------------
```

```
-----------------------------------------------------------------
TEST: F17B  LOC:  233+ 3 (3"FROM EDGE) TIME: 16:00 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7265.
  SENSOR POSITIONS (IN)     0     12    24    36    48    96
  DEFLECTIONS (MILS)      4.00  3.54  2.95  2.28  1.71  0.00
-----------------------------------------------------------------
TEST: F18A  LOC:  233+ 3 (6"FROM EDGE) TIME: 16:03 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7491.
  SENSOR POSITIONS (IN)     0     12    24    36    48    96
  DEFLECTIONS (MILS)      3.09  2.68  2.23  1.75  1.48  0.00
-----------------------------------------------------------------
TEST: F18B  LOC:  233+ 3 (6"FROM EDGE) TIME: 16:06 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11768.
  SENSOR POSITIONS (IN)     0     12    24    36    48    96
  DEFLECTIONS (MILS)      5.21  4.57  3.78  2.97  2.46   .87
-----------------------------------------------------------------
TEST: F19A  LOC:  234+ 1 (6"FROM EDGE) TIME: 16:10 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11570.
  SENSOR POSITIONS (IN)     0     12    24    36    48    96
  DEFLECTIONS (MILS)      6.79  6.32  5.35  4.40  3.37   .87
-----------------------------------------------------------------
TEST: F19B  LOC:  234+ 1 (6"FROM EDGE) TIME: 16:15 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7274.
  SENSOR POSITIONS (IN)     0     12    24    36    48    96
  DEFLECTIONS (MILS)      3.88  3.50  3.15  2.46  2.02  0.00
-----------------------------------------------------------------
TEST: F20A  LOC:  234+ 1 (3"FROM EDGE) TIME: 16:19 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7357.
  SENSOR POSITIONS (IN)     0     12    24    36    48    96
  DEFLECTIONS (MILS)      3.71  3.36  2.94  2.35  1.88  0.00
-----------------------------------------------------------------
TEST: F20B  LOC:  234+ 1 (3"FROM EDGE) TIME: 16:23 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11446.
  SENSOR POSITIONS (IN)     0     12    24    36    48    96
  DEFLECTIONS (MILS)      6.34  5.93  4.99  3.98  3.19   .94
-----------------------------------------------------------------
```

```
-----------------------------------------------------------------------
TEST: F21A  LOC:  234+ 1 (1#FROM EDGE) TIME: 16:27 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11495.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      7.22  6.69  5.78  4.57  3.57  1.02
-----------------------------------------------------------------------
TEST: F21B  LOC:  234+ 1 (1#FROM EDGE) TIME: 16:32 TEMP: 85 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7314.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      4.39  3.98  3.46  2.80  2.17  0.00
***********************************************************************
TEST SECTION: C1     TEST DATE:  22 MAY 80 PAVEMENT TYPE: CRCP
                     LAYERS: 3  THICKNESSES:  8.00  6.00
-----------------------------------------------------------------------
TEST: F22A  LOC:  234+ 1 (6#FROM EDGE) TIME:  9:20 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11495.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      6.52  5.83  4.99  3.94  3.11   .79
-----------------------------------------------------------------------
TEST: F22B  LOC:  234+ 1 (6#FROM EDGE) TIME:  9:23 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7306.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      3.99  3.54  3.07  2.50  1.97  0.00
-----------------------------------------------------------------------
TEST: F23A  LOC:  234+ 1 (3#FROM EDGE) TIME:  9:25 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7306.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      4.35  3.86  3.23  2.64  2.07  0.00
-----------------------------------------------------------------------
TEST: F23B  LOC:  234+ 1 (3#FROM EDGE) TIME:  9:27 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11422.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      7.19  6.31  5.39  4.40  3.35   .87
-----------------------------------------------------------------------
TEST: F24A  LOC:  234+ 1 (1#FROM EDGE) TIME:  9:30 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11520.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      8.80  7.68  6.61  5.16  4.06  1.06
-----------------------------------------------------------------------
```

```
------------------------------------------------------------------
TEST: F24B  LOC:  234+ 1 (1"FROM EDGE) TIME:  9:35 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7281.
  SENSOR POSITIONS (IN)      0     12    24    36    48    96
  DEFLECTIONS (MILS)      5.12  4.32  3.82  2.87  2.32  0.00
------------------------------------------------------------------
TEST: F25A  LOC:  235+ 0 (1"FROM EDGE) TIME:  9:40 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7408.
  SENSOR POSITIONS (IN)      0     12    24    36    48    96
  DEFLECTIONS (MILS)      5.03  4.72  4.25  3.52  2.81  0.00
------------------------------------------------------------------
TEST: F25B  LOC:  235+ 0 (1"FROM EDGE) TIME:  9:43 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11485.
  SENSOR POSITIONS (IN)      0     12    24    36    48    96
  DEFLECTIONS (MILS)      8.53  8.03  7.14  5.83  4.70  1.73
------------------------------------------------------------------
TEST: F26A  LOC:  235+ 0 (3"FROM EDGE) TIME:  9:46 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11428.
  SENSOR POSITIONS (IN)      0     12    24    36    48    96
  DEFLECTIONS (MILS)      7.39  6.93  6.06  4.88  3.94  1.54
------------------------------------------------------------------
TEST: F26B  LOC:  235+ 0 (3"FROM EDGE) TIME:  9:48 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7251.
  SENSOR POSITIONS (IN)      0     12    24    36    48    96
  DEFLECTIONS (MILS)      4.23  3.88  3.46  2.85  2.40  0.00
------------------------------------------------------------------
TEST: F27A  LOC:  235+ 0 (6"FROM EDGE) TIME:  9:50 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7262.
  SENSOR POSITIONS (IN)      0     12    24    36    48    96
  DEFLECTIONS (MILS)      4.45  4.02  3.46  2.85  2.34  0.00
------------------------------------------------------------------
TEST: F27B  LOC:  235+ 0 (6"FROM EDGE) TIME:  9:52 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11377.
  SENSOR POSITIONS (IN)      0     12    24    36    48    96
  DEFLECTIONS (MILS)      7.72  6.99  6.17  4.98  4.09  1.46
------------------------------------------------------------------
```

```
TEST: F28A  LOC:  236+ 0 (6"FROM EDGE) TIME:  9:55 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11393.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      3.89  3.27  2.76  2.22  1.87   .67
------------------------------------------------------------
TEST: F28B  LOC:  236+ 0 (6"FROM EDGE) TIME:  9:59 TEMP: 71 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7187.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      2.38  1.89  1.57  1.30  1.10  0.00
------------------------------------------------------------
TEST: F29A  LOC:  236+ 0 (3"FROM EDGE) TIME: 10:01 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7306.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      2.77  2.44  2.05  1.69  1.30  0.00
------------------------------------------------------------
TEST: F29B  LOC:  236+ 0 (3"FROM EDGE) TIME: 10:04 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11555.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      4.76  4.25  3.54  2.80  2.26   .83
------------------------------------------------------------
TEST: F30A  LOC:  236+ 0 (1"FROM EDGE) TIME: 10:08 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11571.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      7.31  6.61  5.55  4.13  3.32   .98
------------------------------------------------------------
TEST: F30B  LOC:  236+ 0 (1"FROM EDGE) TIME: 10:12 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7286.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      4.25  3.86  3.19  2.42  1.89  0.00
------------------------------------------------------------
TEST: F31A  LOC:  237+ 0 (1"FROM EDGE) TIME: 10:25 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7185.
  SENSOR POSITIONS (IN)      0    12    24    36    48    96
  DEFLECTIONS (MILS)      5.57  5.12  4.29  3.27  2.65  0.00
------------------------------------------------------------
```

```
==================================================================
TEST: F31B  LOC:  237+ 0 (1#FROM EDGE) TIME: 10:28 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11441.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      9.63   8.74   7.35   5.63   4.41   1.69
==================================================================
TEST: F32A  LOC:  237+ 0 (3#FROM EDGE) TIME: 10:30 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11406.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      8.10   7.36   6.30   5.02   4.07   1.50
==================================================================
TEST: F32B  LOC:  237+ 0 (3#FROM EDGE) TIME: 10:32 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7230.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.76   4.25   3.78   2.93   2.42   0.00
==================================================================
TEST: F33A  LOC:  237+ 0 (6#FROM EDGE) TIME: 10:34 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7235.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.54   4.17   3.70   2.99   2.48   0.00
==================================================================
TEST: F33B  LOC:  237+ 0 (6#FROM EDGE) TIME: 10:36 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11288.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      7.72   7.17   6.30   5.04   4.15   1.46
==================================================================
TEST: F34A  LOC:  238+ 0 (6#FROM EDGE) TIME: 10:40 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11558.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      6.28   5.63   4.75   3.66   2.87    .98
==================================================================
TEST: F34B  LOC:  238+ 0 (6#FROM EDGE) TIME: 10:43 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7333.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      3.62   3.23   2.72   2.15   1.67   0.00
==================================================================
```

```
******************************************************************
TEST: F35A  LOC:  238+ 0 (3#FROM EDGE) TIME: 10:45 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 7294.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.00   3.50   2.87   2.22   1.63   0.00
******************************************************************
TEST: F35B  LOC:  238+ 0 (3#FROM EDGE) TIME: 10:47 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11390.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      6.75   5.98   4.96   3.74   2.83    .98
******************************************************************
TEST: F36A  LOC:  238+ 0 (1#FROM EDGE) TIME: 10:49 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11406.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      8.46   7.60   6.22   4.66   3.56   1.06
******************************************************************
TEST: F36B  LOC:  238+ 0 (1#FROM EDGE) TIME: 10:52 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 7270.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.93   4.33   3.54   2.76   2.13   0.00
******************************************************************
TEST: F37A  LOC:  239+ 0 (1#FROM EDGE) TIME: 10:56 TEMP: 74 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 7341.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      5.28   4.72   4.17   3.07   2.56   0.00
******************************************************************
TEST: F37B  LOC:  239+ 0 (1#FROM EDGE) TIME: 11:02 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11568.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      8.61   7.98   6.88   5.24   4.21   1.57
******************************************************************
TEST: F38A  LOC:  239+ 0 (3#FROM EDGE) TIME: 11:09 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11420.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      7.65   6.98   6.06   4.59   3.64   1.26
******************************************************************
```

```
-----------------------------------------------------------------
TEST: F38B  LOC:  239+ 0 (3"FROM EDGE) TIME: 11:13 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7222.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.63   4.17   3.62   2.76   2.22   0.00
-----------------------------------------------------------------
TEST: F39A  LOC:  239+ 0 (6"FROM EDGE) TIME: 11:19 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7325.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.32   3.80   3.33   2.64   2.13   0.00
-----------------------------------------------------------------
TEST: F39B  LOC:  239+ 0 (6"FROM EDGE) TIME: 11:22 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11498.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      7.15   6.38   5.59   4.35   3.48   1.26
-----------------------------------------------------------------
TEST: F40A  LOC:  234+ 1 (1"FROM EDGE) TIME: 11:25 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11658.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      7.57   7.01   6.06   4.80   3.74   1.22
-----------------------------------------------------------------
TEST: F40B  LOC:  234+ 1 (1"FROM EDGE) TIME: 11:28 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7410.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.53   4.17   3.62   2.87   2.20   0.00
-----------------------------------------------------------------
TEST: F41A  LOC:  234+ 1 (6"FROM EDGE) TIME: 11:30 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11438.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      7.34   6.65   5.83   4.55   3.62   1.06
-----------------------------------------------------------------
TEST: F41B  LOC:  234+ 1 (6"FROM EDGE) TIME: 11:36 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7238.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.26   3.94   3.39   2.72   2.13   0.00
-----------------------------------------------------------------
```

```
-----------------------------------------------------------------------
TEST: F42A  LOC:  234+ 1 (3#FROM EDGE) TIME: 11:41 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7271.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       4.29   3.86   3.44   2.66   2.26   0.00
-----------------------------------------------------------------------
TEST: F42B  LOC:  234+ 1 (3#FROM EDGE) TIME: 11:47 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11349.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       7.09   6.67   5.64   4.52   3.54   1.10
-----------------------------------------------------------------------
TEST: F43A  LOC:  233+ 0 (3#FROM EDGE) TIME: 11:55 TEMP: 76 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11417.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       6.79   6.10   5.12   3.74   2.95   0.00
-----------------------------------------------------------------------
TEST: F44A  LOC:  232+ 0 (3#FROM EDGE) TIME: 12:00 TEMP: 79 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11425.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       7.22   6.26   5.16   4.00   3.13   0.00
-----------------------------------------------------------------------
TEST: F45A  LOC:  231+ 0 (3#FROM EDGE) TIME: 12:05 TEMP: 79 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11651.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       6.27   5.67   5.04   4.26   3.52   0.00
-----------------------------------------------------------------------
TEST: F45B  LOC:  231+ 0 (3#FROM EDGE) TIME: 12:11 TEMP: 79 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  9014.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       4.63   4.25   3.84   2.93   2.70   0.00
-----------------------------------------------------------------------
TEST: F45C  LOC:  231+ 0 (3#FROM EDGE) TIME: 12:16 TEMP: 79 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7378.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       3.57   3.21   2.91   2.40   2.09   0.00
*******************************************
```

DEFLECTION DATA SUMMARY

JRCP SECTION IH 10 EASTBOUND STATION 1514+64 TO 1517+34

****
DIST: 12 CONT: 271 DATE: 19 AUG 80 HIGHWAY: IH10 EASTBOUND
SECT: 2 JOB: CFTR: COUNTY: AUSTIN
****

****
TEST SECTION: J1 TEST DATE: 23 MAY 80 PAVEMENT TYPE: JRCP
LAYERS: 3 THICKNESSES: 10.00 6.00

TEST: F1A LOC: 1514+64 (UPSTREAM) TIME: 9:55 TEMP: 72 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 11218.

SENSOR POSITIONS (IN)	0	9	12	48	SHLD
DEFLECTIONS (MILS)	12.40	10.65	9.07	0.00	0.00

TEST: F1B LOC: 1514+64 (DOWNSTREAM) TIME: 9:57 TEMP: 72 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 11091.

SENSOR POSITIONS (IN)	0	9	12	48	SHLD
DEFLECTIONS (MILS)	13.29	11.06	9.27	0.00	0.00

TEST: F2A LOC: 1514+88 (CENTER EDGE) TIME: 9:59 TEMP: 72 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 11560.

SENSOR POSITIONS (IN)	0	9	12	48	SHLD
DEFLECTIONS (MILS)	6.40	6.05	5.43	2.99	4.17

TEST: F3A LOC: 1515+24 (UPSTREAM) TIME: 10:03 TEMP: 77 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 12267.

SENSOR POSITIONS (IN)	0	9	12	48	SHLD
DEFLECTIONS (MILS)	8.07	7.83	6.85	0.00	0.00

TEST: F3B LOC: 1515+24 (DOWNSTREAM) TIME: 10:06 TEMP: 77 F.
FALLING WEIGHT DATA --

FORCE (LBSF): 11345.

SENSOR POSITIONS (IN)	0	9	12	48	SHLD
DEFLECTIONS (MILS)	8.52	7.85	0.00	4.21	0.00

```
==========================================================================
TEST: F4A   LOC: 1515+54 (CENTER EDGE) TIME: 10:08 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11366.
  SENSOR POSITIONS (IN)       0      9     12     48   SHLD
  DEFLECTIONS (MILS)        6.09   5.56   0.00   3.75   4.96
==========================================================================
TEST: F5A   LOC: 1515+84 ( UPSTREAM  ) TIME: 10:12 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11123.
  SENSOR POSITIONS (IN)       0      9     12     48   SHLD
  DEFLECTIONS (MILS)        6.61   5.91   5.12   0.00   0.00
==========================================================================
TEST: F5B   LOC: 1515+84 (DOWNSTREAM ) TIME: 10:15 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11496.
  SENSOR POSITIONS (IN)       0      9     12     48   SHLD
  DEFLECTIONS (MILS)        6.52   6.02   0.00   2.95   0.00
==========================================================================
TEST: F6A   LOC: 1516+ 8 (CENTER EDGE) TIME: 10:17 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11377.
  SENSOR POSITIONS (IN)       0      9     12     48   SHLD
  DEFLECTIONS (MILS)        6.74   6.34   0.00   4.17   4.96
==========================================================================
TEST: F7A   LOC: 1516+44 ( UPSTREAM  ) TIME: 10:21 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 10901.
  SENSOR POSITIONS (IN)       0      9     12     48   SHLD
  DEFLECTIONS (MILS)        8.56   8.19   7.28   0.00   0.00
==========================================================================
TEST: F7B   LOC: 1516+44 (DOWNSTREAM ) TIME: 10:24 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11541.
  SENSOR POSITIONS (IN)       0      9     12     48   SHLD
  DEFLECTIONS (MILS)        8.73   8.62   0.00   4.37   5.59
==========================================================================
TEST: F8A   LOC: 1516+74 (CENTER EDGE) TIME: 10:27 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11698.
  SENSOR POSITIONS (IN)       0      9     12     48   SHLD
  DEFLECTIONS (MILS)        6.04   5.75   0.00   3.57   4.80
==========================================================================
```

```
------------------------------------------------------------------
TEST: F9A   LOC: 1517+ 4 ( UPSTREAM   ) TIME: 10:32 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11234.
  SENSOR POSITIONS (IN)      0     9     12    48   SHLD
  DEFLECTIONS (MILS)       6.81  6.06  5.31  0.00  0.00
------------------------------------------------------------------
TEST: F9B   LOC: 1517+ 4 (DOWNSTREAM ) TIME: 10:35 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11044.
  SENSOR POSITIONS (IN)      0     9     12    48   SHLD
  DEFLECTIONS (MILS)       6.77  5.88  0.00  3.04  4.49
------------------------------------------------------------------
TEST: F10A  LOC: 1517+34 (CENTER EDGE) TIME: 10:40 TEMP: 77 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11322.
  SENSOR POSITIONS (IN)      0     9     12    48   SHLD
  DEFLECTIONS (MILS)       4.95  4.62  0.00  2.87  4.17
------------------------------------------------------------------
TEST: F16A  LOC: 1514+64 ( UPSTREAM   ) TIME: 11:30 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11187.
  SENSOR POSITIONS (IN)      0     9     12    48   SHLD
  DEFLECTIONS (MILS)       7.15  6.81  5.81  0.00  0.00
------------------------------------------------------------------
TEST: F16B  LOC: 1514+64 (DOWNSTREAM ) TIME: 11:32 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11361.
  SENSOR POSITIONS (IN)      0     9     12    48   SHLD
  DEFLECTIONS (MILS)       6.79  6.85  0.00  3.72  0.00
------------------------------------------------------------------
TEST: F17A  LOC: 1514+88 (CENTER EDGE) TIME: 11:34 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11030.
  SENSOR POSITIONS (IN)      0     9     12    48   SHLD
  DEFLECTIONS (MILS)       5.70  5.35  0.00  2.83  4.41
------------------------------------------------------------------
TEST: F18A  LOC: 1515+24 ( UPSTREAM   ) TIME: 11:37 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11496.
  SENSOR POSITIONS (IN)      0     9     12    48   SHLD
  DEFLECTIONS (MILS)       6.54  6.18  5.55  0.00  0.00
------------------------------------------------------------------
```

```
--------------------------------------------------------------------
TEST: F18B  LOC: 1515+24 (DOWNSTREAM ) TIME: 11:39 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11759.
  SENSOR POSITIONS (IN)      0     9    12    48   SHLD
  DEFLECTIONS (MILS)      6.56  6.22  0.00  3.30  4.80
--------------------------------------------------------------------
TEST: F19A  LOC: 1515+54 (CENTER EDGE) TIME: 11:42 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11318.
  SENSOR POSITIONS (IN)      0     9    12    48   SHLD
  DEFLECTIONS (MILS)      5.51  5.00  0.00  3.30  4.65
--------------------------------------------------------------------
TEST: F20A  LOC: 1515+84 ( UPSTREAM  ) TIME: 11:45 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11452.
  SENSOR POSITIONS (IN)      0     9    12    48   SHLD
  DEFLECTIONS (MILS)      5.63  5.35  4.57  0.00  0.00
--------------------------------------------------------------------
TEST: F20B  LOC: 1515+84 (DOWNSTREAM ) TIME: 11:49 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11600.
  SENSOR POSITIONS (IN)      0     9    12    48   SHLD
  DEFLECTIONS (MILS)      5.67  5.35  0.00  2.72  0.00
*******************************************
```

DEFLECTION DATA SUMMARY

JRCP SECTION IH 10 EASTBOUND STATION 1514+64 TO 1517+34

```
****************************************************************
DIST: 12 CONT: 271 DATE: 19 AUG 80  HIGHWAY: IH10 EASTBOUND
SECT:  2  JOB:     CFTR:               COUNTY:   AUSTIN
****************************************************************

****************************************************************
TEST SECTION: J1    TEST DATE: 23 MAY 80 PAVEMENT TYPE: JRCP
                 LAYERS: 3  THICKNESSES: 10.00  6.00
--------------------------------------------------------------
 TEST: F11A  LOC: 1514+84 (6"FROM EDGE) TIME: 10:45 TEMP: 77 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF): 11430.
   SENSOR POSITIONS (IN)     0     12    24    36    48    96
   DEFLECTIONS (MILS)      4.40  3.94  3.43  3.02  2.48  1.06
--------------------------------------------------------------
 TEST: F11B  LOC: 1514+84 (6"FROM EDGE) TIME: 10:50 TEMP: 77 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  8220.
   SENSOR POSITIONS (IN)     0     12    24    36    48    96
   DEFLECTIONS (MILS)      3.03  2.68  2.28  2.05  1.71  0.00
--------------------------------------------------------------
 TEST: F11C  LOC: 1514+84 (6"FROM EDGE) TIME: 10:53 TEMP: 77 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  6205.
   SENSOR POSITIONS (IN)     0     12    24    36    48    96
   DEFLECTIONS (MILS)      2.12  1.81  1.57  1.42  1.18  0.00
--------------------------------------------------------------
 TEST: F12A  LOC: 1515+54 (6"FROM EDGE) TIME: 10:56 TEMP: 77 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  6361.
   SENSOR POSITIONS (IN)     0     12    24    36    48    96
   DEFLECTIONS (MILS)      2.08  1.69  1.50  1.38  1.18  0.00
--------------------------------------------------------------
 TEST: F12B  LOC: 1515+54 (6"FROM EDGE) TIME: 10:59 TEMP: 77 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  8342.
   SENSOR POSITIONS (IN)     0     12    24    36    48    96
   DEFLECTIONS (MILS)      2.72  2.36  2.13  1.91  1.63  0.00
--------------------------------------------------------------
```

```
----------------------------------------------------------------
TEST: F12C  LOC: 1515+54 (6"FROM EDGE) TIME: 11:02 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11536.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       3.94   3.54   3.23   2.83   2.40    .98
----------------------------------------------------------------
TEST: F13A  LOC: 1516+14 (6"FROM EDGE) TIME: 11:05 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11644.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       4.54   4.21   3.62   3.25   2.68   1.18
----------------------------------------------------------------
TEST: F13B  LOC: 1516+14 (6"FROM EDGE) TIME: 11:07 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  8369.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       3.02   2.73   2.44   2.22   1.89   0.00
----------------------------------------------------------------
TEST: F13C  LOC: 1516+14 (6"FROM EDGE) TIME: 11:09 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6213.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       2.12   1.89   1.65   1.57   1.32   0.00
----------------------------------------------------------------
TEST: F14A  LOC: 1516+74 (6"FROM EDGE) TIME: 11:11 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6416.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       1.98   1.76   1.50   1.43   1.18   0.00
----------------------------------------------------------------
TEST: F14B  LOC: 1516+74 (6"FROM EDGE) TIME: 11:13 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7397.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       2.36   2.09   1.85   1.63   1.40   0.00
----------------------------------------------------------------
TEST: F14C  LOC: 1516+74 (6"FROM EDGE) TIME: 11:15 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11643.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       4.15   3.74   3.27   2.91   2.50   1.02
----------------------------------------------------------------
```

```
-----------------------------------------------------------------------
TEST: F15A  LOC: 1517+34 (6"FROM EDGE) TIME: 11:18 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11315.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.62   4.12   3.55   3.15   2.55    .96
-----------------------------------------------------------------------
TEST: F15B  LOC: 1517+34 (6"FROM EDGE) TIME: 11:23 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7982.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      3.10   2.68   2.40   2.11   1.71   0.00
-----------------------------------------------------------------------
TEST: F15C  LOC: 1517+34 (6"FROM EDGE) TIME: 11:27 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6102.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      2.25   1.93   1.65   1.46   1.20   0.00
-----------------------------------------------------------------------
TEST: F21A  LOC: 1516+74 (6"FROM EDGE) TIME: 11:51 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11533.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.19   3.82   3.37   2.97   2.60   1.10
-----------------------------------------------------------------------
TEST: F21B  LOC: 1516+74 (6"FROM EDGE) TIME: 11:57 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  8241.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      2.83   2.52   2.26   2.01   1.72   0.00
-----------------------------------------------------------------------
TEST: F21C  LOC: 1516+74 (6"FROM EDGE) TIME: 12:02 TEMP: 82 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6226.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      1.96   1.73   1.57   1.42   1.20   0.00
********************************************
```

```
                     DEFLECTION DATA SUMMARY
                     -----------------------
 OVERLAYED CRCP IH 10 WESTBOUND 3.5 INCH SURFACE

******************************************************************
DIST:   13 CONT:  535 DATE:  19 AUG 80  HIGHWAY:  IH10 WESTBOUND
SECT:    8  JOB:       CFTR: 1302        COUNTY:   COLORADO
******************************************************************

******************************************************************
TEST SECTION: 01     TEST DATE:  22 MAY 80 PAVEMENT TYPE: OVLY CRCP
                     LAYERS: 4  THICKNESSES:  3.50  8.00  6.00
  ----------------------------------------------------------------
  TEST: F1A   LOC:  970+ 0 (3#FROM EDGE) TIME: 14:05 TEMP: 81 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11636.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      7.46   3.86   3.46   2.65   2.17    .98
  ----------------------------------------------------------------
  TEST: F1B   LOC:  970+ 0 (3#FROM EDGE) TIME: 14:09 TEMP: 81 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  7405.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      4.57   2.28   2.01   1.61   1.26   0.00
  ----------------------------------------------------------------
  TEST: F2A   LOC:  969+ 0 (3#FROM EDGE) TIME: 14:12 TEMP: 81 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  7411.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      5.56   1.89   1.73   1.46   1.21   0.00
  ----------------------------------------------------------------
  TEST: F2B   LOC:  969+ 0 (3#FROM EDGE) TIME: 14:16 TEMP: 81 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11708.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      8.72   3.31   3.07   2.52   2.13    .94
  ----------------------------------------------------------------
  TEST: F3A   LOC:  968+ 0 (3#FROM EDGE) TIME: 14:20 TEMP: 81 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  7452.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      6.08   2.99   2.76   2.20   1.71   0.00
  ----------------------------------------------------------------
```

```
TEST: F3B   LOC:  968+ 0 (3"FROM EDGE) TIME: 14:24 TEMP: 81 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11579.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       9.14   5.00   4.57   3.66   2.85    .98
--------------------------------------------------------------------
TEST: F4A   LOC:  967+ 0 (3"FROM EDGE) TIME: 14:29 TEMP: 81 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11500.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       9.89   3.94   3.57   2.81   2.20    .83
--------------------------------------------------------------------
TEST: F4B   LOC:  967+ 0 (3"FROM EDGE) TIME: 14:36 TEMP: 81 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  9046.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       7.52   3.07   2.76   2.13   1.65   0.00
--------------------------------------------------------------------
TEST: F5A   LOC:  967+ 0 (3"FROM EDGE) TIME: 14:40 TEMP: 81 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6157.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       5.16   1.97   1.73   1.38    .98   0.00
--------------------------------------------------------------------
TEST: F6A   LOC:  966+ 0 (3"FROM EDGE) TIME: 14:44 TEMP: 81 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6353.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       3.50   1.97   1.69   1.36   1.10   0.00
--------------------------------------------------------------------
TEST: F6B   LOC:  966+ 0 (3"FROM EDGE) TIME: 14:48 TEMP: 81 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11616.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       6.84   3.94   3.46   2.80   2.28   1.06
--------------------------------------------------------------------
TEST: F7A   LOC:  965+ 0 (3"FROM EDGE) TIME: 14:53 TEMP: 81 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11485.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)      10.75   3.39   3.50   2.95   2.54   0.00
--------------------------------------------------------------------
```

```
----------------------------------------------------------------
TEST: F7B   LOC: 965+ 0 (3"FROM EDGE) TIME: 14:58 TEMP: 81 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7274.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      5.96   1.93   2.01   1.75   1.46   0.00
*******************************************
```

DEFLECTION DATA SUMMARY

OVERLAYED CRCP EASTBOUND IH 10

```
******************************************************************************
DIST:   13 CONT:  535 DATE:  19 AUG 80  HIGHWAY:  IH10 EASTBOUND
SECT:    A  JOB:         CFTR: 1302          COUNTY:   COLORADO
******************************************************************************

******************************************************************************
TEST SECTION: 02     TEST DATE:  22 MAY 80 PAVEMENT TYPE: OVLY CRCP
                     LAYERS: 4  THICKNESSES:  2.50  8.00  6.00
------------------------------------------------------------------------------
  TEST: F8A   LOC:  965+ 0 (3#FROM EDGE) TIME: 15:40 TEMP: 82 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11476.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      9.63   4.65   4.52   3.82   3.15   1.50
------------------------------------------------------------------------------
  TEST: F8B   LOC:  965+ 0 (3#FROM EDGE) TIME: 15:48 TEMP: 82 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  7037.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      6.36   2.72   2.60   2.24   1.83   0.00
------------------------------------------------------------------------------
  TEST: F9A   LOC:  966+ 0 (3#FROM EDGE) TIME: 15:51 TEMP: 82 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  7370.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      5.05   2.60   2.28   2.03   1.65   0.00
------------------------------------------------------------------------------
  TEST: F9B   LOC:  966+ 0 (3#FROM EDGE) TIME: 15:55 TEMP: 82 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11422.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      6.75   4.33   3.91   3.35   2.76   1.30
------------------------------------------------------------------------------
  TEST: F10A  LOC:  967+ 0 (3#FROM EDGE) TIME: 15:58 TEMP: 82 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11465.
    SENSOR POSITIONS (IN)      0     12     24     36     48     96
    DEFLECTIONS (MILS)      8.18   4.57   4.15   3.49   2.81   1.10
------------------------------------------------------------------------------
```

```
-------------------------------------------------------------------
TEST: F11A  LOC:  968+ 0 (3'FROM EDGE) TIME: 16:01 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11326.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       7.77   4.09   3.99   3.48   2.89   1.10
-------------------------------------------------------------------
TEST: F12A  LOC:  969+ 0 (3'FROM EDGE) TIME: 16:04 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11368.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       6.50   4.17   3.81   3.21   2.56    .79
-------------------------------------------------------------------
TEST: F12B  LOC:  969+ 0 (3'FROM EDGE) TIME: 16:07 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  9189.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       5.15   3.31   3.03   2.52   1.91   0.00
-------------------------------------------------------------------
TEST: F12C  LOC:  969+ 0 (3'FROM EDGE) TIME: 16:09 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7286.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       4.13   2.52   2.28   1.93   1.54   0.00
-------------------------------------------------------------------
TEST: F13A  LOC:  970+ 0 (3'FROM EDGE) TIME: 16:12 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7235.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       5.14   2.60   2.36   2.19   1.77   0.00
-------------------------------------------------------------------
TEST: F13B  LOC:  970+ 0 (3'FROM EDGE) TIME: 16:14 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  9110.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       5.51   3.31   3.15   2.72   2.32   0.00
-------------------------------------------------------------------
TEST: F13C  LOC:  970+ 0 (3'FROM EDGE) TIME: 16:17 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11269.
  SENSOR POSITIONS (IN)       0     12     24     36     48     96
  DEFLECTIONS (MILS)       6.52   4.25   3.99   3.46   2.91   1.26
-------------------------------------------------------------------
```

```
--------------------------------------------------------------------
TEST: F14A  LOC:  971+ 0 (3#FROM EDGE) TIME: 16:20 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11326.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      7.58   5.47   5.12   4.43   3.72   1.50
--------------------------------------------------------------------
TEST: F14B  LOC:  971+ 0 (3#FROM EDGE) TIME: 16:23 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  9192.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      6.11   4.25   4.02   3.43   2.97   0.00
--------------------------------------------------------------------
TEST: F14C  LOC:  971+ 0 (3#FROM EDGE) TIME: 16:26 TEMP: 84 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  7230.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)      4.81   3.15   2.91   2.60   2.17   0.00
--------------------------------------------------------------------
TEST: F15A  LOC:  972+ 0 (3#FROM EDGE) TIME: 13:28 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11279.
  SENSOR POSITIONS (IN)      0     12     24     36     48     96
  DEFLECTIONS (MILS)     12.67   5.24   4.75   3.86   3.05   1.14
*****************************************
```

```
                          DEFLECTION DATA SUMMARY

 TTI TEST SECTION

****************************************************************************
DIST:      CONT:      DATE:  19 AUG 80  HIGHWAY:
SECT:       JOB:      CFTR:             COUNTY:
****************************************************************************



****************************************************************************
TEST SECTION: A18   TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00   8.00   8.00
  --------------------------------------------------------------------------
  TEST: F2A   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:20 TEMP: 83 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11358.
    SENS POS (IN)      0      9     12     18     30     48     64     96
    DEFL (MILS)     9.78   8.14   7.80   7.32   5.47   3.82   2.28   1.34
  --------------------------------------------------------------------------
  TEST: F2B   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:23 TEMP: 83 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  8220.
    SENS POS (IN)      0      9     12     18     30     48     64     96
    DEFL (MILS)     6.06   5.51   5.20   4.88   3.70   2.56   1.38   1.02
  --------------------------------------------------------------------------
  TEST: F2C   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:26 TEMP: 83 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  5956.
    SENS POS (IN)      0      9     12     18     30     48     64     96
    DEFL (MILS)     4.78   3.90   3.70   3.39   2.68   1.77   1.10    .71
****************************************************************************
TEST SECTION: A10   TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  12.00   4.00
  --------------------------------------------------------------------------
  TEST: F3A   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:32 TEMP: 83 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11167.
    SENS POS (IN)      0      9     12     18     30     48     64     96
    DEFL (MILS)    21.28  12.44   9.17   6.85   4.09   2.72   1.81   1.30
  --------------------------------------------------------------------------
  TEST: F3B   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:35 TEMP: 83 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  7964.
    SENS POS (IN)      0      9     12     18     30     48     64     96
    DEFL (MILS)    15.81   8.66   6.54   4.49   2.80   1.81   1.22    .91
  --------------------------------------------------------------------------
```

```
----------------------------------------------------------------------
 TEST: F3C   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:38 TEMP: 83 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  5838.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)   12.75   6.18   4.72   3.33   2.05   1.34    .94    .67
**********************************************************************
TEST SECTION: A02   TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                     LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
----------------------------------------------------------------------
 TEST: F4A   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:40 TEMP: 83 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF): 11755.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)    5.73   5.43   5.12   4.88   4.13   3.19   2.17   1.38
----------------------------------------------------------------------
 TEST: F4B   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:43 TEMP: 83 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  8303.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)    3.94   3.62   3.54   3.31   2.83   2.24   1.50    .98
----------------------------------------------------------------------
 TEST: F4C   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:46 TEMP: 83 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  6054.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)    2.80   2.52   2.44   2.36   1.97   1.57   1.06    .71
**********************************************************************
TEST SECTION: A03   TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                     LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
----------------------------------------------------------------------
 TEST: F5A   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:49 TEMP: 83 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF): 11330.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)   17.63  14.41  12.83  10.79   7.09   3.98   2.32   1.61
----------------------------------------------------------------------
 TEST: F5B   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:52 TEMP: 83 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  8085.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)   12.23   9.96   9.06   7.64   4.70   2.64   1.57   1.14
----------------------------------------------------------------------
```

```
------------------------------------------------------------------
 TEST: F5C   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:55 TEMP: 83 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  5816.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)    8.71   7.01   6.46   5.12   3.31   1.81   1.06    .79
********************************************************************
TEST SECTION: A11   TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
------------------------------------------------------------------
 TEST: F6A   LOC:   20+ 0 (6"FROM EDGE) TIME: 17:58 TEMP: 83 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF): 11072.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)   25.71  11.26   8.35   5.67   3.27   2.20   1.50   1.14
------------------------------------------------------------------
 TEST: F6B   LOC:   20+ 0 (6"FROM EDGE) TIME: 18:01 TEMP: 84 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  7807.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)   18.71   7.83   5.91   3.78   2.20   1.54   1.06    .79
------------------------------------------------------------------
 TEST: F6C   LOC:   20+ 0 (6"FROM EDGE) TIME: 18:04 TEMP: 84 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF):  5619.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)   14.59   5.80   4.25   2.68   1.65   1.14    .79    .59
********************************************************************
TEST SECTION: A02   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
------------------------------------------------------------------
 TEST: F7A   LOC:   20+ 0 (6"FROM EDGE) TIME:  8:00 TEMP: 75 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF): 11759.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)    5.52   5.02   4.88   4.57   3.82   3.03   2.13   1.30
********************************************************************
TEST SECTION: A03   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
------------------------------------------------------------------
 TEST: F8A   LOC:   20+ 0 (6"FROM EDGE) TIME:  8:05 TEMP: 75 F.
 FALLING WEIGHT DATA --

   FORCE (LBSF): 11447.
   SENS POS (IN)     0      9     12     18     30     48     64     96
   DEFL (MILS)   16.65  14.15  13.15  10.87   6.99   4.09   2.28   1.65
------------------------------------------------------------------
```

```
****************************************************************************
TEST SECTION: A11   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
  --------------------------------------------------------------------------
  TEST: F9A   LOC:   20+ 0 (6#FROM EDGE) TIME:  8:10 TEMP: 75 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11104.
    SENS POS (IN)     0      9     12     18     30     48     64     96
    DEFL (MILS)   23.57 10.35   8.74   5.51   3.19   2.17   1.54   1.10
****************************************************************************
TEST SECTION: A10   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
  --------------------------------------------------------------------------
  TEST: F10A  LOC:   20+ 0 (6#FROM EDGE) TIME:  8:15 TEMP: 75 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11412.
    SENS POS (IN)     0      9     12     18     30     48     64     96
    DEFL (MILS)   21.63 11.42   8.86   6.46   3.98   2.64   1.81   1.38
****************************************************************************
TEST SECTION: A18   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  8.00  8.00
  --------------------------------------------------------------------------
  TEST: F11A  LOC:   20+ 0 (6#FROM EDGE) TIME:  8:20 TEMP: 75 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11609.
    SENS POS (IN)     0      9     12     18     30     48     64     96
    DEFL (MILS)    9.24   7.56   7.32   6.69   5.20   3.70   2.24   1.34
****************************************************************************
TEST SECTION: A20   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  4.00  8.00
  --------------------------------------------------------------------------
  TEST: F12A  LOC:   20+ 0 (6#FROM EDGE) TIME:  8:25 TEMP: 75 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11751.
    SENS POS (IN)     0      9     12     18     30     48     64     96
    DEFL (MILS)    6.77   5.85   5.83   5.50   4.06   3.27   2.24   1.46
****************************************************************************
TEST SECTION: A19   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  8.00  8.00
  --------------------------------------------------------------------------
  TEST: F13A  LOC:   20+ 0 (6#FROM EDGE) TIME:  8:30 TEMP: 75 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11782.
    SENS POS (IN)     0      9     12     18     30     48     64     96
    DEFL (MILS)    6.55   5.59   5.28   4.96   4.13   3.11   2.13   1.46
  --------------------------------------------------------------------------
```

```
*****************************************************************************
TEST SECTION: A21   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00 12.00  8.00
  ---------------------------------------------------------------------------
  TEST: F14A  LOC:   20+ 0 (6#FROM EDGE) TIME:  8:35 TEMP: 75 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11978.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)    4.74   3.86   3.86   3.62   3.23   2.52   1.89   1.34
*****************************************************************************
TEST SECTION: A17   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  ---------------------------------------------------------------------------
  TEST: F15A  LOC:   20+ 0 (6#FROM EDGE) TIME:  8:40 TEMP: 75 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11835.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)    8.89   7.05   6.46   5.83   4.69   3.39   2.20   1.46
*****************************************************************************
TEST SECTION: A24   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  ---------------------------------------------------------------------------
  TEST: F16A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:00 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11034.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)   22.88  16.77  14.61  11.02   7.20   4.25   3.74   2.52
*****************************************************************************
TEST SECTION: A26   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  ---------------------------------------------------------------------------
  TEST: F17A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:04 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11862.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)    8.09   7.17   6.77   6.22   4.96   3.54   2.20   1.46
*****************************************************************************
TEST SECTION: A27   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  ---------------------------------------------------------------------------
  TEST: F18A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:08 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11994.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)    6.61   5.71   5.43   5.12   4.37   3.31   2.24   1.50
  ---------------------------------------------------------------------------
```

```
****************************************************************
TEST SECTION: A25   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  --------------------------------------------------------------
  TEST: F19A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:12 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11890.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)    4.82  4.02  3.86  3.42  3.15  2.52  1.81  1.30
****************************************************************
TEST SECTION: A29   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  --------------------------------------------------------------
  TEST: F20A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:16 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11906.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)    4.30  3.43  3.31  3.15  2.68  2.01  1.46  1.02
****************************************************************
TEST SECTION: A09   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  4.00  4.00
  --------------------------------------------------------------
  TEST: F21A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:20 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11493.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)   10.83  8.23  7.17  5.51  3.46  2.17  1.42  1.02
****************************************************************
TEST SECTION: A12   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
  --------------------------------------------------------------
  TEST: F22A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:24 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11542.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)   10.43  7.64  6.14  4.33  2.76  1.85  1.34  1.02
****************************************************************
TEST SECTION: A16   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
  --------------------------------------------------------------
  TEST: F23A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:28 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 12076.
    SENS POS (IN)    0      9     12     18     30     48     64     96
    DEFL (MILS)    2.87  1.89  1.81  1.81  1.69  1.46  1.18   .94
  --------------------------------------------------------------
```

```
*******************************************************************
TEST SECTION: A13   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  4.00  4.00
  -----------------------------------------------------------------
  TEST: F24A  LOC:  20+ 0 (6#FROM EDGE) TIME:  9:32 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11695.
    SENS POS (IN)     0     9    12    18    30    48    64    96
    DEFL (MILS)    6.31  5.04  4.72  4.41  3.43  2.44  1.57  1.06
*******************************************************************
TEST SECTION: A15   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
  -----------------------------------------------------------------
  TEST: F25A  LOC:  20+ 0 (6#FROM EDGE) TIME:  9:36 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11461.
    SENS POS (IN)     0     9    12    18    30    48    64    96
    DEFL (MILS)    8.00  6.61  5.67  4.88  3.74  2.52  1.54  1.06
*******************************************************************
TEST SECTION: A14   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
  -----------------------------------------------------------------
  TEST: F26A  LOC:  20+ 0 (6#FROM EDGE) TIME:  9:40 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11782.
    SENS POS (IN)     0     9    12    18    30    48    64    96
    DEFL (MILS)    3.98  3.31  3.15  2.99  2.52  2.01  1.42  1.02
*******************************************************************
TEST SECTION: A06   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
  -----------------------------------------------------------------
  TEST: F27A  LOC:  20+ 0 (6#FROM EDGE) TIME:  9:44 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11342.
    SENS POS (IN)     0     9    12    18    30    48    64    96
    DEFL (MILS)   19.19 13.68 12.20 10.39  7.28  4.33  2.44  1.69
*******************************************************************
TEST SECTION: A07   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
  -----------------------------------------------------------------
  TEST: F28A  LOC:  20+ 0 (6#FROM EDGE) TIME:  9:48 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11752.
    SENS POS (IN)     0     9    12    18    30    48    64    96
    DEFL (MILS)   15.21  9.53  8.54  7.05  6.34  4.88  3.29  2.05
  -----------------------------------------------------------------
```

```
*****************************************************************
TEST SECTION: A05   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  4.00  4.00
  ---------------------------------------------------------------
  TEST: F29A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:52 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11247.
    SENS POS (IN)    0     9    12    18    30    48    64    96
    DEFL (MILS)  25.54 21.44 18.74 15.01 10.31  5.39  2.80  1.81
*****************************************************************
TEST SECTION: A01   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  4.00  4.00
  ---------------------------------------------------------------
  TEST: F30A  LOC:   20+ 0 (6#FROM EDGE) TIME:  9:56 TEMP: 77 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 11314.
    SENS POS (IN)    0     9    12    18    30    48    64    96
    DEFL (MILS)  20.39 17.95 16.85 14.41  9.69  5.55  2.87  2.01
*****************************************************************
TEST SECTION: A04   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
  ---------------------------------------------------------------
  TEST: F31A  LOC:   20+ 0 (6#FROM EDGE) TIME: 10:00 TEMP: 80 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 12081.
    SENS POS (IN)    0     9    12    18    30    48    64    96
    DEFL (MILS)   3.63  3.15  3.07  2.91  2.60  2.17  1.61  1.18
*****************************************************************
TEST SECTION: A08   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
  ---------------------------------------------------------------
  TEST: F32A  LOC:   20+ 0 (6#FROM EDGE) TIME: 10:04 TEMP: 80 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF): 12029.
    SENS POS (IN)    0     9    12    18    30    48    64    96
    DEFL (MILS)   8.79  5.47  4.57  3.54  2.83  2.28  1.69  1.18
  ---------------------------------------------------------------
  TEST: F32B  LOC:   20+ 0 (6#FROM EDGE) TIME: 10:08 TEMP: 80 F.
  FALLING WEIGHT DATA --

    FORCE (LBSF):  8453.
    SENS POS (IN)    0     9    12    18    30    48    64    96
    DEFL (MILS)   6.28  3.86  3.15  2.36  1.93  1.65  1.18   .83
  ---------------------------------------------------------------
```

```
-----------------------------------------------------------------------
TEST: F32C  LOC:   20+ 0 (6"FROM EDGE) TIME: 10:12 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6202.
  SENS POS (IN)     0      9     12     18     30     48     64     96
  DEFL (MILS)    4.82   2.83   2.28   1.65   1.42   1.14    .87    .55
***********************************************************************
TEST SECTION: A28   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
-----------------------------------------------------------------------
TEST: F33A  LOC:   20+ 0 (6"FROM EDGE) TIME: 10:16 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11663.
  SENS POS (IN)     0      9     12     18     30     48     64     96
  DEFL (MILS)    7.02   5.94   5.83   5.51   4.61   3.54   2.32   1.54
***********************************************************************
TEST SECTION: A12   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
-----------------------------------------------------------------------
TEST: F34A  LOC:   20+ 0 (6"FROM EDGE) TIME: 10:20 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11533.
  SENS POS (IN)     0      9     12     18     30     48     64     96
  DEFL (MILS)   10.53   7.72   6.30   4.72   2.68   1.77   1.30   1.02
-----------------------------------------------------------------------
TEST: F34B  LOC:   20+ 0 (6"FROM EDGE) TIME: 10:22 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  8188.
  SENS POS (IN)     0      9     12     18     30     48     64     96
  DEFL (MILS)    7.85   5.63   4.57   3.23   1.65   1.26    .91    .67
-----------------------------------------------------------------------
TEST: F34C  LOC:   20+ 0 (6"FROM EDGE) TIME: 10:24 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6134.
  SENS POS (IN)     0      9     12     18     30     48     64     96
  DEFL (MILS)    6.04   4.25   3.31   2.36   1.38    .91    .63    .47
***********************************************************************
TEST SECTION: A19   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  8.00  8.00
-----------------------------------------------------------------------
TEST: F35A  LOC:   20+ 0 (6"FROM EDGE) TIME: 10:30 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF): 11806.
  SENS POS (IN)     0      9     12     18     30     48     64     96
  DEFL (MILS)    7.20   5.83   5.67   5.28   4.37   3.27   2.13   1.77
-----------------------------------------------------------------------
```

```
------------------------------------------------------------------------
TEST: F35B  LOC:   20+ 0 (6"FROM EDGE) TIME: 10:32 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  8339.
  SENS POS (IN)     0      9     12     18     30     48     64     96
  DEFL (MILS)    4.76   3.86   3.86   3.46   2.91   2.17   1.46    .94
------------------------------------------------------------------------
TEST: F35C  LOC:   20+ 0 (6"FROM EDGE) TIME: 10:35 TEMP: 80 F.
FALLING WEIGHT DATA --

  FORCE (LBSF):  6281.
  SENS POS (IN)     0      9     12     18     30     48     64     96
  DEFL (MILS)    3.46   2.72   2.68   2.52   2.05   1.54   1.02    .67
**************************************************************************
```

```
                      DEFLECTION DATA SUMMARY
                      -----------------------
 CRCP TEST SECTION LOCATED ON IH 35 FB STATION 229+00 TO 239+00

****************************************************************
DIST:   13 CONT:  271 DATE:  19 AUG 80  HIGHWAY: IH 10 EASTBOUND
SECT:    1  JOB:      CFTR: 1301         COUNTY:   COLORADO
****************************************************************

****************************************************************
TEST SECTION: C1    TEST DATE: 21 MAY 80  PAVEMENT TYPE: CRCP
                     LAYERS: 3  THICKNESSES:  8.00  6.00
  --------------------------------------------------------------
  TEST: D   1 LOC:  228+98 (6#FROM EDGE) TIME: 11 50 TEMP:107 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12    24    36    48
    DEFLECTIONS (MILS)       .45    .43   .36   .30   .26
  --------------------------------------------------------------
  TEST: D   2 LOC:  228+98 (3#FROM EDGE) TIME: 11 51 TEMP:107 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12    24    36    48
    DEFLECTIONS (MILS)       .54    .51   .43   .35   .30
  --------------------------------------------------------------
  TEST: D   3 LOC:  228+98 (1#FROM EDGE) TIME: 12 00 TEMP:107 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12    24    36    48
    DEFLECTIONS (MILS)       .85    .80   .66   .52   .43
  --------------------------------------------------------------
  TEST: D   4 LOC:  229+ 3 (6#FROM EDGE) TIME: 11 45 TEMP:107 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12    24    36    48
    DEFLECTIONS (MILS)       .48    .46   .40   .34   .30
  --------------------------------------------------------------
  TEST: D   5 LOC:  229+ 3 (3#FROM EDGE) TIME: 11 52 TEMP:107 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12    24    36    48
    DEFLECTIONS (MILS)       .57    .55   .47   .39   .34
  --------------------------------------------------------------
```

```
------------------------------------------------------------------------
TEST: D   6 LOC:  229+ 3 (1'FROM EDGE) TIME: 12 02 TEMP:107 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .85    .82    .69    .56    .48
------------------------------------------------------------------------
TEST: D   7 LOC:  230+ 5 (1'FROM EDGE) TIME: 12 20 TEMP:110 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .51    .48    .40    .32    .27
------------------------------------------------------------------------
TEST: D   8 LOC:  230+ 5 (3'FROM EDGE) TIME: 12 24 TEMP:110 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .39    .37    .31    .25    .22
------------------------------------------------------------------------
TEST: D   9 LOC:  230+ 5 (6'FROM EDGE) TIME: 12 34 TEMP:110 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .38    .35    .30    .25    .22
------------------------------------------------------------------------
TEST: D  10 LOC:  230+99 (1'FROM EDGE) TIME: 12 40 TEMP:112 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .59    .56    .47    .37    .31
------------------------------------------------------------------------
TEST: D  11 LOC:  230+99 (3'FROM EDGE) TIME: 13 10 TEMP:112 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .42    .40    .34    .28    .24
------------------------------------------------------------------------
TEST: D  12 LOC:  230+99 (6'FROM EDGE) TIME: 13 15 TEMP:112 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .36    .34    .30    .25    .22
------------------------------------------------------------------------
```

```
--------------------------------------------------------------------
TEST: D  13 LOC:  231+ 2 (1'FROM EDGE) TIME: 12 52 TEMP:112 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .54    .51    .42    .32    .28
--------------------------------------------------------------------
TEST: D  14 LOC:  231+ 2 (3'FROM EDGE) TIME: 13 05 TEMP:112 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .43    .41    .34    .28    .24
--------------------------------------------------------------------
TEST: D  15 LOC:  231+ 2 (6'FROM EDGE) TIME: 13 16 TEMP:112 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .37    .36    .31    .26    .22
--------------------------------------------------------------------
TEST: D  16 LOC:  231+99 (6'FROM EDGE) TIME: 14 42 TEMP:113 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .43    .41    .35    .29    .26
--------------------------------------------------------------------
TEST: D  17 LOC:  231+99 (3'FROM EDGE) TIME: 14 45 TEMP:113 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .54    .50    .42    .34    .30
--------------------------------------------------------------------
TEST: D  18 LOC:  231+99 (1'FROM EDGE) TIME: 14 50 TEMP:113 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .82    .74    .59    .46    .39
--------------------------------------------------------------------
TEST: D  19 LOC:  233+ 3 (1'FROM EDGE) TIME: 15 00 TEMP:115 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .61    .56    .45    .34    .28
--------------------------------------------------------------------
```

```
----------------------------------------------------------------------
TEST: D 20 LOC: 233+ 3 (3#FROM EDGE) TIME: 15 06 TEMP:115 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .52   .49   .39   .30   .25
----------------------------------------------------------------------
TEST: D 21 LOC: 233+ 3 (6#FROM EDGE) TIME: 15 09 TEMP:115 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .44   .41   .33   .25   .23
----------------------------------------------------------------------
TEST: D 22 LOC: 234+ 1 (6#FROM EDGE) TIME: 15 12 TEMP:116 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .59   .56   .47   .38   .31
----------------------------------------------------------------------
TEST: D 23 LOC: 234+ 1 (3#FROM EDGE) TIME: 15 15 TEMP:116 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .54   .52   .44   .36   .30
----------------------------------------------------------------------
TEST: D 24 LOC: 234+ 1 (1#FROM EDGE) TIME: 15 18 TEMP:116 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .56   .52   .44   .34   .29
----------------------------------------------------------------------
TEST: D 25 LOC: 235+ 2 (1#FROM EDGE) TIME: 16 03 TEMP:116 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .58   .55   .47   .38   .31
----------------------------------------------------------------------
TEST: D 26 LOC: 235+ 2 (3#FROM EDGE) TIME: 16 06 TEMP:116 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .56   .54   .46   .38   .32
----------------------------------------------------------------------
```

```
--------------------------------------------------------------------------
  TEST: D  27 LOC:  235+ 2 (6"FROM EDGE) TIME: 16 10 TEMP:116 F.
  DYNAFLECT DATA --

    FORCE (LBSF): 1000.
    SENSOR POSITIONS (IN)       0     12     24     36     48
    DEFLECTIONS (MILS)        .63    .61    .52    .42    .35
**************************************************************************
TEST SECTION: C1    TEST DATE:  22 MAY 80 PAVEMENT TYPE: CRCP
                    LAYERS: 3  THICKNESSES:  8.00  6.00
--------------------------------------------------------------------------
  TEST: D  28 LOC:  235+ 1 (1"FROM EDGE) TIME:  9 00 TEMP: 88 F.
  DYNAFLECT DATA --

    FORCE (LBSF): 1000.
    SENSOR POSITIONS (IN)       0     12     24     36     48
    DEFLECTIONS (MILS)        .62    .60    .50    .38    .33
--------------------------------------------------------------------------
  TEST: D  29 LOC:  235+ 1 (3"FROM EDGE) TIME:  9 02 TEMP: 88 F.
  DYNAFLECT DATA --

    FORCE (LBSF): 1000.
    SENSOR POSITIONS (IN)       0     12     24     36     48
    DEFLECTIONS (MILS)        .46    .44    .37    .28    .24
--------------------------------------------------------------------------
  TEST: D  30 LOC:  235+ 1 (6"FROM EDGE) TIME:  9 04 TEMP: 88 F.
  DYNAFLECT DATA --

    FORCE (LBSF): 1000.
    SENSOR POSITIONS (IN)       0     12     24     36     48
    DEFLECTIONS (MILS)        .48    .45    .38    .29    .25
--------------------------------------------------------------------------
  TEST: D  31 LOC:  234+ 1 (6"FROM EDGE) TIME:  9 35 TEMP: 88 F.
  DYNAFLECT DATA --

    FORCE (LBSF): 1000.
    SENSOR POSITIONS (IN)       0     12     24     36     48
    DEFLECTIONS (MILS)        .55    .51    .44    .34    .29
--------------------------------------------------------------------------
  TEST: D  32 LOC:  234+ 1 (3"FROM EDGE) TIME:  9 37 TEMP: 88 F.
  DYNAFLECT DATA --

    FORCE (LBSF): 1000.
    SENSOR POSITIONS (IN)       0     12     24     36     48
    DEFLECTIONS (MILS)        .56    .53    .45    .35    .30
--------------------------------------------------------------------------
  TEST: D  33 LOC:  234+ 1 (1"FROM EDGE) TIME:  9 38 TEMP: 88 F.
  DYNAFLECT DATA --

    FORCE (LBSF): 1000.
    SENSOR POSITIONS (IN)       0     12     24     36     48
    DEFLECTIONS (MILS)        .65    .61    .49    .38    .34
--------------------------------------------------------------------------
```

```
---------------------------------------------------------------------
TEST: D  34 LOC:  236+ 3 (6#FROM EDGE) TIME:  9 40 TEMP: 88 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .26   .24   .20   .15   .14
---------------------------------------------------------------------
TEST: D  35 LOC:  236+ 3 (3#FROM EDGE) TIME:  9 45 TEMP: 88 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .30   .28   .23   .17   .15
---------------------------------------------------------------------
TEST: D  36 LOC:  236+ 3 (1#FROM EDGE) TIME:  9 47 TEMP: 88 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .49   .44   .37   .25   .21
---------------------------------------------------------------------
TEST: D  37 LOC:  237+ 0 (1#FROM EDGE) TIME:  9 48 TEMP: 88 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .67   .60   .48   .34   .28
---------------------------------------------------------------------
TEST: D  38 LOC:  237+ 0 (3#FROM EDGE) TIME:  9 49 TEMP: 88 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .56   .51   .42   .31   .26
---------------------------------------------------------------------
TEST: D  39 LOC:  237+ 0 (6#FROM EDGE) TIME: 10 00 TEMP: 88 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .53   .49   .41   .32   .26
---------------------------------------------------------------------
TEST: D  40 LOC:  238+ 5 (6#FROM EDGE) TIME: 10 10 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .37   .34   .29   .22   .18
---------------------------------------------------------------------
```

```
----------------------------------------------------------------
TEST: D  41 LOC:  238+ 5 (3'FROM EDGE) TIME: 10 12 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .43    .39    .32    .23    .19
----------------------------------------------------------------
TEST: D  42 LOC:  238+ 2 (1'FROM EDGE) TIME: 10 14 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .60    .35    .44    .31    .24
----------------------------------------------------------------
TEST: D  43 LOC:  239+ 2 (1'FROM EDGE) TIME: 10 16 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .67    .62    .52    .40    .34
----------------------------------------------------------------
TEST: D  44 LOC:  239+ 2 (3'FROM EDGE) TIME: 10 35 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .62    .58    .49    .38    .32
----------------------------------------------------------------
TEST: D  45 LOC:  239+ 2 (6'FROM EDGE) TIME: 10 36 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .55    .51    .45    .35    .30
----------------------------------------------------------------
TEST: D  46 LOC:  228+98 (1'FROM EDGE) TIME: 11 05 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .81    .74    .62    .49    .41
----------------------------------------------------------------
TEST: D  47 LOC:  228+98 (3'FROM EDGE) TIME: 11 06 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .55    .51    .44    .35    .31
----------------------------------------------------------------
```

```
-----------------------------------------------------------------------
TEST: D  48 LOC:  228+98 (6#FROM EDGE) TIME: 11 08 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .48    .45    .39    .32    .27
-----------------------------------------------------------------------
TEST: D  49 LOC:  230+ 5 (6#FROM EDGE) TIME: 11 10 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .40    .37    .32    .26    .23
-----------------------------------------------------------------------
TEST: D  50 LOC:  230+ 5 (3#FROM EDGE) TIME: 11 12 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .40    .38    .32    .26    .23
-----------------------------------------------------------------------
TEST: D  51 LOC:  230+ 5 (1#FROM EDGE) TIME: 11 14 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .55    .51    .43    .34    .29
-----------------------------------------------------------------------
TEST: D  52 LOC:  230+99 (1#FROM EDGE) TIME: 11 22 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .56    .53    .45    .35    .30
-----------------------------------------------------------------------
TEST: D  53 LOC:  230+99 (3#FROM EDGE) TIME: 11 25 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .43    .40    .35    .28    .25
-----------------------------------------------------------------------
TEST: D  54 LOC:  230+99 (6#FROM EDGE) TIME: 11 27 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .37    .36    .32    .26    .24
-----------------------------------------------------------------------
```

```
--------------------------------------------------------------------
TEST: D  55 LOC:  231+99 (6#FROM EDGE) TIME: 11 30 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .50    .47    .41    .33    .31
--------------------------------------------------------------------
TEST: D  56 LOC:  231+99 (3#FROM EDGE) TIME: 11 35 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .69    .62    .49    .38    .33
--------------------------------------------------------------------
TEST: D  57 LOC:  231+99 (1#FROM EDGE) TIME: 11 37 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .73    .67    .53    .42    .35
--------------------------------------------------------------------
TEST: D  58 LOC:  233+ 3 (1#FROM EDGE) TIME: 11 40 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .69    .62    .49    .36    .29
--------------------------------------------------------------------
TEST: D  59 LOC:  233+ 3 (3#FROM EDGE) TIME: 11 41 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .60    .55    .45    .33    .27
--------------------------------------------------------------------
TEST: D  60 LOC:  233+ 3 (6#FROM EDGE) TIME: 11 45 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .53    .47    .39    .28    .24
--------------------------------------------------------------------
TEST: D  61 LOC:  234+ 1 (6#FROM EDGE) TIME: 11 50 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .55    .53    .46    .36    .30
--------------------------------------------------------------------
```

```
------------------------------------------------------------------
TEST: D 62 LOC:  234+ 1 (3#FROM EDGE) TIME: 11 53 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)        .58   .56   .48   .38   .32
------------------------------------------------------------------
TEST: D 63 LOC:  234+ 1 (1#FROM EDGE) TIME: 12 00 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)        .62   .58   .49   .39   .31
------------------------------------------------------------------
TEST: D 64 LOC:  235+ 3 (1#FROM EDGE) TIME: 12 05 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)        .63   .59   .51   .40   .32
------------------------------------------------------------------
TEST: D 65 LOC:  235+ 3 (3#FROM EDGE) TIME: 12 06 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)        .60   .57   .49   .39   .32
------------------------------------------------------------------
TEST: D 66 LOC:  235+ 3 (6#FROM EDGE) TIME: 12 07 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)        .62   .59   .50   .40   .33
------------------------------------------------------------------
TEST: D 67 LOC:  236+ 3 (6#FROM EDGE) TIME: 12 09 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)        .30   .28   .23   .18   .16
------------------------------------------------------------------
TEST: D 68 LOC:  236+ 3 (3#FROM EDGE) TIME: 12 12 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)        .33   .31   .26   .19   .16
------------------------------------------------------------------
```

```
----------------------------------------------------------
TEST: D 69 LOC: 236+ 3 (1=FROM EDGE) TIME: 12 15 TEMP: 99 F.
DYNAFLECT DATA --

  FORCE (LBSF): 1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .43    .39    .32    .23    .18
****************************************
```

```
                    DEFLECTION DATA SUMMARY
                    -----------------------
 JRCP SECTION IH 10 EASTBOUND STATION 1514+64 TO 1517+34

*****************************************************************
DIST:   12 CONT:  271 DATE:  19 AUG 80  HIGHWAY:  IH10 EASTBOUND
SECT:    2  JOB:      CFTR:               COUNTY:    AUSTIN
*****************************************************************

*****************************************************************
TEST SECTION: J1     TEST DATE:  23 MAY 80 PAVEMENT TYPE: JRCP
                   LAYERS: 3  THICKNESSES: 10.00  6.00
  ---------------------------------------------------------------
  TEST: D   1 LOC: 1514+64 ( UPSTREAM  ) TIME:  9 35 TEMP: 96 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)     0    12    24    36    48
    DEFLECTIONS (MILS)      .94   .75   .58   .44   .34
  ---------------------------------------------------------------
  TEST: D   2 LOC: 1514+64 (DOWNSTREAM ) TIME:  9 35 TEMP: 96 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)     0    12    24    36    48
    DEFLECTIONS (MILS)      .67   .59   .47   .39   .29
  ---------------------------------------------------------------
  TEST: D   3 LOC: 1514+88 (CENTER EDGE) TIME:  9 35 TEMP: 96 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)     0    12    24    36    48
    DEFLECTIONS (MILS)      .46   .44   .38   .31   .26
  ---------------------------------------------------------------
  TEST: D   4 LOC: 1515+24 ( UPSTREAM  ) TIME:  9 37 TEMP: 96 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)     0    12    24    36    48
    DEFLECTIONS (MILS)      .63   .56   .44   .34   .27
  ---------------------------------------------------------------
  TEST: D   5 LOC: 1515+24 (DOWNSTREAM ) TIME:  9 37 TEMP: 96 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)     0    12    24    36    48
    DEFLECTIONS (MILS)      .57   .54   .42   .33   .27
  ---------------------------------------------------------------
```

```
=====================================================================
TEST: D  6 LOC: 1515+54 (CENTER EDGE) TIME:  9 45 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .47   .40   .37   .30   .26
=====================================================================
TEST: D  7 LOC: 1515+84 ( UPSTREAM   ) TIME: 10 45 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .47   .38   .31   .24   .19
=====================================================================
TEST: D  8 LOC: 1515+84 (DOWNSTREAM ) TIME: 10 45 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .46   .37   .30   .24   .19
=====================================================================
TEST: D  9 LOC: 1516+ 8 (CENTER EDGE) TIME: 10 45 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .40   .37   .34   .28   .24
=====================================================================
TEST: D 10 LOC: 1516+44 ( UPSTREAM   ) TIME: 10 10 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .64   .54   .45   .35   .28
=====================================================================
TEST: D 11 LOC: 1516+44 (DOWNSTREAM ) TIME: 10 10 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .63   .53   .45   .35   .28
=====================================================================
TEST: D 12 LOC: 1516+74 (CENTER EDGE) TIME: 10 10 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .46   .42   .39   .32   .27
=====================================================================
```

```
----------------------------------------------------------------
TEST: D  13 LOC: 1517+ 4 ( UPSTREAM   ) TIME: 10 15 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .50    .39    .32    .25    .20
----------------------------------------------------------------
TEST: D  14 LOC: 1517+ 4 (DOWNSTREAM ) TIME: 10 15 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .54    .40    .33    .25    .20
----------------------------------------------------------------
TEST: D  15 LOC: 1517+34 (CENTER EDGE) TIME: 10 15 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .36    .34    .31    .25    .21
----------------------------------------------------------------
TEST: D  21 LOC: 1514+64 ( UPSTREAM   ) TIME: 10 55 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .60    .51    .42    .32    .26
----------------------------------------------------------------
TEST: D  22 LOC: 1514+64 (DOWNSTREAM ) TIME: 10 55 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .50    .43    .36    .28    .23
----------------------------------------------------------------
TEST: D  23 LOC: 1514+88 (CENTER EDGE) TIME: 10 55 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .41    .38    .33    .27    .23
----------------------------------------------------------------
TEST: D  24 LOC: 1515+24 ( UPSTREAM   ) TIME: 11 55 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12     24     36     48
  DEFLECTIONS (MILS)       .48    .43    .35    .28    .23
----------------------------------------------------------------
```

```
============================================================
TEST: D  25 LOC: 1515+24 (DOWNSTREAM ) TIME: 11 55 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .45   .39   .33   .26   .22
============================================================
TEST: D  26 LOC: 1515+54 (CENTER EDGE) TIME: 11 55 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .39   .37   .33   .27   .24
============================================================
TEST: D  27 LOC: 1515+84 ( UPSTREAM  ) TIME: 11 15 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .41   .34   .28   .22   .17
============================================================
TEST: D  28 LOC: 1515+84 (DOWNSTREAM ) TIME: 11 15 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .41   .35   .29   .23   .19
============================================================
TEST: D  29 LOC: 1516+ 8 (CENTER EDGE) TIME: 11 15 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .46   .44   .39   .32   .28
============================================================
TEST: D  30 LOC: 1516+44 ( UPSTREAM  ) TIME: 11 17 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .49   .43   .36   .29   .24
============================================================
TEST: D  31 LOC: 1516+44 (DOWNSTREAM ) TIME: 11 17 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0    12    24    36    48
  DEFLECTIONS (MILS)       .47   .42   .37   .30   .25
============================================================
```

TEST: D 32 LOC: 1516+74 (CENTER EDGE) TIME: 11 17 TEMP:100 F.
DYNAFLECT DATA --

FORCE (LBSF): 1000.

SENSOR POSITIONS (IN)	0	12	24	36	48
DEFLECTIONS (MILS)	.44	.42	.37	.31	.27

TEST: D 33 LOC: 1517+ 4 (UPSTREAM) TIME: 11 29 TEMP:100 F.
DYNAFLECT DATA --

FORCE (LBSF): 1000.

SENSOR POSITIONS (IN)	0	12	24	36	48
DEFLECTIONS (MILS)	.43	.37	.31	.24	.20

TEST: D 34 LOC: 1517+ 4 (DOWNSTREAM) TIME: 11 29 TEMP:100 F.
DYNAFLECT DATA --

FORCE (LBSF): 1000.

SENSOR POSITIONS (IN)	0	12	24	36	48
DEFLECTIONS (MILS)	.43	.36	.31	.24	.20

TEST: D 35 LOC: 1517+34 (CENTER EDGE) TIME: 11 29 TEMP:100 F.
DYNAFLECT DATA --

FORCE (LBSF): 1000.

SENSOR POSITIONS (IN)	0	12	24	36	48
DEFLECTIONS (MILS)	.36	.34	.30	.25	.21

TEST: D 46 LOC: 1515+54 (CENTER EDGE) TIME: 11 55 TEMP:102 F.
DYNAFLECT DATA --

FORCE (LBSF): 1000.

SENSOR POSITIONS (IN)	0	12	24	36	48
DEFLECTIONS (MILS)	.39	.37	.34	.28	.24

TEST: D 47 LOC: 1515+84 (UPSTREAM) TIME: 11 55 TEMP:102 F.
DYNAFLECT DATA --

FORCE (LBSF): 1000.

SENSOR POSITIONS (IN)	0	12	24	36	48
DEFLECTIONS (MILS)	.39	.35	.30	.23	.19

TEST: D 48 LOC: 1515+84 (DOWNSTREAM) TIME: 11 55 TEMP:102 F.
DYNAFLECT DATA --

FORCE (LBSF): 1000.

SENSOR POSITIONS (IN)	0	12	24	36	48
DEFLECTIONS (MILS)	.41	.35	.31	.24	.20

```
----------------------------------------------------------------
TEST: D  16 LOC: 1514+88 (6"FROM EDGE) TIME: 10 27 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .29   .28   .25   .22   .19
----------------------------------------------------------------
TEST: D  17 LOC: 1515+54 (6"FROM EDGE) TIME: 10 30 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .28   .26   .23   .20   .17
----------------------------------------------------------------
TEST: D  18 LOC: 1516+ 8 (6"FROM EDGE) TIME: 10 33 TEMP: 96 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .31   .29   .36   .22   .19
----------------------------------------------------------------
TEST: D  19 LOC: 1516+74 (6"FROM EDGE) TIME: 10 35 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .29   .27   .25   .21   .18
----------------------------------------------------------------
TEST: D  20 LOC: 1517+34 (6"FROM EDGE) TIME: 10 37 TEMP: 98 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .33   .29   .27   .22   .19
----------------------------------------------------------------
TEST: D  36 LOC: 1514+88 (6"FROM EDGE) TIME: 11 29 TEMP:100 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .31   .29   .27   .23   .20
----------------------------------------------------------------
TEST: D  37 LOC: 1515+54 (6"FROM EDGE) TIME: 12 29 TEMP:100 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .29   .27   .25   .20   .10
----------------------------------------------------------------
```

```
--------------------------------------------------------------------
TEST: D 38 LOC: 1516+ 8 (6"FROM EDGE) TIME: 12 29 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0     12    24    36    48
  DEFLECTIONS (MILS)      .33   .31   .29   .23   .21
--------------------------------------------------------------------
TEST: D 39 LOC: 1516+74 (6"FROM EDGE) TIME: 12 29 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0     12    24    36    48
  DEFLECTIONS (MILS)      .30   .29   .27   .22   .20
--------------------------------------------------------------------
TEST: D 40 LOC: 1517+34 (6"FROM EDGE) TIME: 12 03 TEMP:102 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0     12    24    36    48
  DEFLECTIONS (MILS)      .37   .33   .30   .25   .22
******************************************
```

DEFLECTION DATA SUMMARY
=======================
OVERLAYED CRCP IH 10 WESTBOUND 3.5 INCH SURFACE

```
****************************************************************
DIST:   13 CONT:  535 DATE:  19 AUG 80  HIGHWAY:  IH10 WESTBOUND
SECT:    8  JOB:       CFTR: 1302        COUNTY:   COLORADO
****************************************************************

****************************************************************
TEST SECTION: 01     TEST DATE:  22 MAY 80 PAVEMENT TYPE: OVLY CRCP
                     LAYERS: 4  THICKNESSES:  3.50  8.00  6.00
  --------------------------------------------------------------
  TEST: D   1 LOC:  970+ 0 (6"FROM EDGE) TIME: 13 55 TEMP:118 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0    12    24    36    48
    DEFLECTIONS (MILS)       .36   .35   .30   .24   .21
  --------------------------------------------------------------
  TEST: D   2 LOC:  969+ 0 (6"FROM EDGE) TIME: 14  0 TEMP:118 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0    12    24    36    48
    DEFLECTIONS (MILS)       .31   .30   .27   .21   .19
  --------------------------------------------------------------
  TEST: D   3 LOC:  968+ 0 (6"FROM EDGE) TIME: 14 10 TEMP:118 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0    12    24    36    48
    DEFLECTIONS (MILS)       .40   .39   .34   .26   .21
  --------------------------------------------------------------
  TEST: D   4 LOC:  967+ 0 (6"FROM EDGE) TIME: 14 15 TEMP:118 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0    12    24    36    48
    DEFLECTIONS (MILS)       .35   .34   .29   .22   .18
  --------------------------------------------------------------
  TEST: D   5 LOC:  966+ 0 (6"FROM EDGE) TIME: 14 20 TEMP:118 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0    12    24    36    48
    DEFLECTIONS (MILS)       .36   .35   .30   .23   .20
  --------------------------------------------------------------
```

```
***************************************************************
TEST: D   6 LOC:  965+ 0 (6"FROM EDGE) TIME: 14 30 TEMP:115 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)       .30    .31   .28   .23   .21
***************************************************************
TEST: D   7 LOC:  964+ 0 (6"FROM EDGE) TIME: 14 35 TEMP:115 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)      0     12    24    36    48
  DEFLECTIONS (MILS)       .30    .31   .29   .23   .21
*******************************************
```

DEFLECTION DATA SUMMARY
========================

OVERLAYED CRCP EASTBOUND IH 10

```
**********************************************************************
DIST:   13 CONT:  535 DATE:  19 AUG 80  HIGHWAY:  IH10 EASTBOUND
SECT:    8  JOB:       CFTR: 1302         COUNTY:   COLORADO
**********************************************************************

**********************************************************************
TEST SECTION: 02     TEST DATE:  22 MAY 80 PAVEMENT TYPE: OVLY CRCP
                     LAYERS: 4  THICKNESSES:  2.50  8.00  6.00
======================================================================
  TEST: D   8 LOC:  965+ 0 (6#FROM EDGE) TIME: 15 30 TEMP:115 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)        .38    .38    .36    .30    .26
======================================================================
  TEST: D   9 LOC:  966+ 0 (6#FROM EDGE) TIME: 15 31 TEMP:115 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)        .37    .36    .34    .29    .25
======================================================================
  TEST: D  10 LOC:  967+ 0 (6#FROM EDGE) TIME: 15 35 TEMP:115 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)        .34    .33    .31    .25    .21
======================================================================
  TEST: D 115 LOC:  968+ 0 (6#FROM EDGE) TIME: 15 45 TEMP:115 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)        .32    .32    .31    .25    .22
======================================================================
  TEST: D  12 LOC:  969+ 0 (6#FROM EDGE) TIME: 15 50 TEMP:115 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)        .31    .29    .27    .21    .18
======================================================================
```

```
------------------------------------------------------------------------
TEST: D  13 LOC:  970+ 0 (6"FROM EDGE) TIME: 16  0 TEMP:115 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .37   .38   .36   .31   .28
------------------------------------------------------------------------
TEST: D  14 LOC:  971+ 0 (6"FROM EDGE) TIME: 16  5 TEMP:115 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .45   .46   .45   .39   .35
------------------------------------------------------------------------
TEST: D  15 LOC:  972+ 0 (6"FROM EDGE) TIME: 16 10 TEMP:115 F.
DYNAFLECT DATA --

  FORCE (LBSF):  1000.
  SENSOR POSITIONS (IN)     0    12    24    36    48
  DEFLECTIONS (MILS)      .48   .47   .43   .35   .31
************************************************************************
```

```
                        DEFLECTION DATA SUMMARY
                        -----------------------
 TTI TEST SECTION

**************************************************************************
DIST:   17 CONT:   21 DATE:  19 AUG 80  HIGHWAY:
SECT:       JOB:      CFTR:                COUNTY:    BRAZOS
**************************************************************************

**************************************************************************
TEST SECTION: A 18  TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  8.00  8.00
  ------------------------------------------------------------------------
  TEST: D1    LOC:    0+20 (6"FROM EDGE) TIME: 17  0 TEMP:110 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .66    .62    .50    .41    .32
**************************************************************************
TEST SECTION: A 10  TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
  ------------------------------------------------------------------------
  TEST: D2    LOC:    0+20 (6"FROM EDGE) TIME: 17  5 TEMP:110 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .88    .60    .39    .29    .23
**************************************************************************
TEST SECTION: A 11  TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
  ------------------------------------------------------------------------
  TEST: D3    LOC:    0+20 (6"FROM EDGE) TIME: 17  9 TEMP:110 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .91    .57    .33    .24    .20
**************************************************************************
TEST SECTION: A 2   TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
  ------------------------------------------------------------------------
  TEST: D4    LOC:    0+20 (6"FROM EDGE) TIME: 17 14 TEMP:110 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .55    .52    .45    .38    .31
  ------------------------------------------------------------------------
```

```
*****************************************************************
TEST SECTION: A 3   TEST DATE: 23 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
-----------------------------------------------------------------
  TEST: D5    LOC:    0+20 (6*FROM EDGE) TIME: 17 17 TEMP:110 F.
  DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)      0    12    24    36    48
     DEFLECTIONS (MILS)      1.17   .99   .65   .45   .32
*****************************************************************
TEST SECTION: A18   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  8.00  8.00
-----------------------------------------------------------------
  TEST: D6    LOC:    0+20 (6*FROM EDGE) TIME:  8  5 TEMP: 91 F.
  DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)      0    12    24    36    48
     DEFLECTIONS (MILS)       .63   .61   .52   .42   .33
*****************************************************************
TEST SECTION: A 2   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
-----------------------------------------------------------------
  TEST: D7    LOC:    0+20 (6*FROM EDGE) TIME:  8 14 TEMP: 91 F.
  DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)      0    12    24    36    48
     DEFLECTIONS (MILS)       .56   .55   .53   .49   .26
*****************************************************************
TEST SECTION: A 3   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
-----------------------------------------------------------------
  TEST: D8    LOC:    0+20 (6*FROM EDGE) TIME:  8 18 TEMP: 91 F.
  DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)      0    12    24    36    48
     DEFLECTIONS (MILS)      1.03   .85   .64   .44   .32
*****************************************************************
TEST SECTION: A10   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
-----------------------------------------------------------------
  TEST: D9    LOC:    0+20 (6*FROM EDGE) TIME:  8 22 TEMP: 91 F.
  DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)      0    12    24    36    48
     DEFLECTIONS (MILS)       .90   .60   .43   .31   .24
-----------------------------------------------------------------
```

```
**********************************************************************
TEST SECTION: A 11  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
----------------------------------------------------------------------
  TEST: D10   LOC:    0+20 (6"FROM EDGE) TIME:  8 29 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .90    .55    .36    .25    .20
**********************************************************************
TEST SECTION: A 14  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
----------------------------------------------------------------------
  TEST: D11   LOC:    0+20 (6"FROM EDGE) TIME:  8 34 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .31    .29    .27    .22    .20
**********************************************************************
TEST SECTION: A 15  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
----------------------------------------------------------------------
  TEST: D12   LOC:    0+20 (6"FROM EDGE) TIME:  8 36 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .73    .29    .25    .20    .17
**********************************************************************
TEST SECTION: A 13  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  4.00  4.00
----------------------------------------------------------------------
  TEST: D13   LOC:    0+20 (6"FROM EDGE) TIME:  8 39 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .44    .40    .34    .28    .23
**********************************************************************
TEST SECTION: A 16  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
----------------------------------------------------------------------
  TEST: D14   LOC:    0+20 (6"FROM EDGE) TIME:  8 41 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .25    .23    .22    .20    .19
----------------------------------------------------------------------
```

```
*****************************************************************
TEST SECTION: A 12  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
-----------------------------------------------------------------
  TEST: D15   LOC:    0+20 (6"FROM EDGE) TIME:  8 42 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .51    .38    .28    .21    .18
*****************************************************************
TEST SECTION: A  9  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  4.00  4.00
-----------------------------------------------------------------
  TEST: D16   LOC:    0+20 (6"FROM EDGE) TIME:  8 44 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .57    .44    .32    .23    .19
*****************************************************************
TEST SECTION: A 29  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
-----------------------------------------------------------------
  TEST: D17   LOC:    0+20 (6"FROM EDGE) TIME:  8 45 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .35    .33    .29    .24    .22
*****************************************************************
TEST SECTION: A  6  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00 12.00  4.00
-----------------------------------------------------------------
  TEST: D18   LOC:    0+20 (6"FROM EDGE) TIME:  8 51 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .98    .83    .66    .47    .34
*****************************************************************
TEST SECTION: A  7  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  1.00  4.00 12.00
-----------------------------------------------------------------
  TEST: D19   LOC:    0+20 (6"FROM EDGE) TIME:  8 52 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)      0     12     24     36     48
    DEFLECTIONS (MILS)       .84    .62    .55    .46    .38
-----------------------------------------------------------------
```

```
*****************************************************************
TEST SECTION: A  5  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  4.00  4.00
-----------------------------------------------------------------
  TEST: D20   LOC:    0+20 (6"FROM EDGE) TIME:  8 53 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)       0    12    24    36    48
    DEFLECTIONS (MILS)       1.49  1.18   .85   .59   .40
*****************************************************************
TEST SECTION: A  1  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  4.00  4.00
-----------------------------------------------------------------
  TEST: D21   LOC:    0+20 (6"FROM EDGE) TIME:  8 55 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)       0    12    24    36    48
    DEFLECTIONS (MILS)       1.31  1.12   .85   .60   .40
*****************************************************************
TEST SECTION: A  4  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
-----------------------------------------------------------------
  TEST: D22   LOC:    0+20 (6"FROM EDGE) TIME:  8 58 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)       0    12    24    36    48
    DEFLECTIONS (MILS)        .29   .29   .27   .23   .22
*****************************************************************
TEST SECTION: A  8  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00 12.00 12.00
-----------------------------------------------------------------
  TEST: D23   LOC:    0+20 (6"FROM EDGE) TIME:  8 59 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)       0    12    24    36    48
    DEFLECTIONS (MILS)        .46   .34   .29   .25   .22
*****************************************************************
TEST SECTION: A 28  TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
-----------------------------------------------------------------
  TEST: D24   LOC:    0+20 (6"FROM EDGE) TIME:  9 00 TEMP: 91 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)       0    12    24    36    48
    DEFLECTIONS (MILS)        .51   .48   .44   .37   .31
-----------------------------------------------------------------
```

```
****************************************************************
TEST SECTION: A20   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  4.00  8.00
   -------------------------------------------------------------
   TEST: D25   LOC:    0+20 (6#FROM EDGE) TIME:  9  5 TEMP: 91 F.
   DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)     0    12    24    36    48
     DEFLECTIONS (MILS)      .51   .48   .43   .35   .29
****************************************************************
TEST SECTION: A19   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  5.00  8.00  8.00
   -------------------------------------------------------------
   TEST: D26   LOC:    0+20 (6#FROM EDGE) TIME:  9  7 TEMP: 93 F.
   DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)     0    12    24    36    48
     DEFLECTIONS (MILS)      .49   .45   .41   .34   .28
****************************************************************
TEST SECTION: A21   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00 12.00  8.00
   -------------------------------------------------------------
   TEST: D27   LOC:    0+20 (6#FROM EDGE) TIME:  9  8 TEMP: 93 F.
   DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)     0    12    24    36    48
     DEFLECTIONS (MILS)      .38   .37   .34   .30   .26
****************************************************************
TEST SECTION: A17   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
   -------------------------------------------------------------
   TEST: D28   LOC:    0+20 (6#FROM EDGE) TIME:  9 11 TEMP: 93 F.
   DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)     0    12    24    36    48
     DEFLECTIONS (MILS)      .62   .54   .46   .38   .30
****************************************************************
TEST SECTION: A24   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
   -------------------------------------------------------------
   TEST: D29   LOC:    0+20 (6#FROM EDGE) TIME:  9 12 TEMP: 93 F.
   DYNAFLECT DATA --

     FORCE (LBSF):  1000.
     SENSOR POSITIONS (IN)     0    12    24    36    48
     DEFLECTIONS (MILS)     1.17   .85   .61   .44   .33
   -------------------------------------------------------------
```

```
*******************************************************************
TEST SECTION: A26   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  -----------------------------------------------------------------
  TEST: D30   LOC:    0+20 (6"FROM EDGE) TIME:  9 13 TEMP: 93 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)     0     12     24     36     48
    DEFLECTIONS (MILS)      .68    .61    .53    .42    .33
*******************************************************************
TEST SECTION: A27   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  -----------------------------------------------------------------
  TEST: D31   LOC:    0+20 (6"FROM EDGE) TIME:  9 15 TEMP:  0 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)     0     12     24     36     48
    DEFLECTIONS (MILS)      .48    .45    .40    .33    .28
*******************************************************************
TEST SECTION: A25   TEST DATE: 24 MAY 80  PAVEMENT TYPE: ASPHALT
                    LAYERS: 4  THICKNESSES:  3.00  8.00  8.00
  -----------------------------------------------------------------
  TEST: D32   LOC:    0+20 (6"FROM EDGE) TIME:  9 16 TEMP:  0 F.
  DYNAFLECT DATA --

    FORCE (LBSF):  1000.
    SENSOR POSITIONS (IN)     0     12     24     36     48
    DEFLECTIONS (MILS)      .38    .37    .34    .29    .25
**********************************************************************
```

THE AUTHORS

Bary Edward Eagleson was born in Pittsburgh, Pennsylvania, on November 20, 1956. After completing his study at Mountain Brook High School, Alabama, in 1974, he entered the Rice University in Houston, Texas. He received the degree of Bachelor of Science in Civil Engineering in May 1978. In August of 1978, he entered the Graduate School at The University of Texas at Austin, and accomplished much of his graduate research at the University's Center for Transportation Research under the Cooperative Research Program between The University of Texas and the Texas State Department of Highways and Public Transportation.

J. Scott Heisey was born in Lancaster, Pennsylvania, on October 16, 1956. After graduating from Elizabethtown Area High School, Elizabethtown, Pennsylvania, in 1974, he entered Drexel University in Philidelphia. He received the degree of Bachelor of Science in Civil Engineering from Drexel University in June 1979. In Sepetember 1979, he entered The Graduate School of The University of Texas at Austin.

W. Ronald Hudson is a Professor of Civil Engineering at The University of Texas at Austin. He has a wide variety of experience as a research engineer with the State Department of Highways and Public Transportation and the Center for Transportation Research at The University of Texas at Austin and was Assistant Chief of the

Rigid Pavement Research Branch of the AASHO Road Test. He is the author of numerous publications and was the receipient of the ASCE J. James R. Croes Medal. He is presently concerned with research in the areas of (1) design of pavement management systems, (2) measurement of pavement roughness and performance, (3) rigid pavement slab analysis and design, and (4) low volume roads.

Kenneth H. Stokoe II joined the faculty of the College of Engineering at The University of Texas at Austin in 1973. He is presently, an Associate Professor of Civil Engineering and is actively involved with several on-going research projects. He has been working in the areas of in situ seismic measurement, laboratory measurement of dynamic soil properties, and the relationship between field and laboratory dynamic measurements for the past fifteen years. He was instrumental in developing the in situ crosshole seismic method for shear wave velocity and shear modulus measurements to the method that is presently used by most geotechnical engineering firms.

In addition to his teaching and research activities, Dr. Stokoe has served as a consultant to federal, state and private organizations in the areas of soil dynamics and geophysics. He is currently serving as a consultant to the Civil Engineering Division and the Earthquake Hazards Mitigation Program of the National Science Foundation.

Alvin H. Meyer is a Senior Lecturer in the Department of Civil Engineering at The University of Texas at Austin. He serves as an investigator on several continuing projects through the Center for

Transportation Research. Before coming to The University of Texas at Austin in 1980, he was with the Civil Engineering Department and the Texas Transportation Institute at Texas A & M University. His area of specialization is in pavements (construction, evaluation, and maintenance) and pavement materials (portland cement concrete, rapid setting cements, and polymer concrete).

In addition to his teaching and research duties, Dr. Meyer is active in several professional and technical societies including the Texas Society of Professional Engineers, the American Society of Civil Engineers and the Transportation Research Board. He is a licensed professional engineer in Texas and has published more than 30 research reports and papers.