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16. Abstract

In 1985, approximately one mile of PCP pavement was placed on IH35 north of Waco, Texas. The project was an experimental installation to develop construction techniques for potential use of PCP in an urban installation. The PCP pavement was constructed as an overlay on an existing jointed pavement and placed in a group of sixteen test slabs. Seven of these slabs had a 440-foot joint spacing and nine slabs had a 240-foot joint spacing. There was a need to maximize the benefits of the investment made in the project (construction and design) and use the results of the study in the future development of behavior and design concepts; therefore, the primary objectives of this study were to study the performance of a prestressed concrete pavement overlay and calibrate prediction models of the prestressed concrete pavement overlay.

This report describes in detail the instrumentation techniques used in the collection of the horizontal and vertical displacements, the associated climatic changes, the non-destructive deflection tests and analyses, the background and theory of the analytical models, and the calibration of the models.

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PERFORMANCE TESTS ON A PRESTRESSED CONCRETE PAVEMENT— PRESENTATION OF DATA

by

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Research Report Number 556-1

Research Project 3-10-88/9-556

Prestressed Concrete Pavement (PCP) Overlay on IH35 in McLennan County

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 1989

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 represent the official views or policies of the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

PREFACE

This work is the first of four reports for Research Project 3-10-88/9-556, entitled "Prestressed Concrete Pavement Overlay." The research was conducted using the resources and facilities of the Center for Transportation Research at The University of Texas at Austin. The research was sponsored jointly by the Texas State Department of Highways and Public Transportation and the Federal Highway Administration under an agreement with The University of Texas at Austin and the Texas State Department of Highways and Public Transportation.

This report is concerned with the performance of an experimental Prestressed Concrete Pavement (PCP) placed on IH35 in McLennan County, Texas, during 1985. The project was part of an FHWA program to study the feasibility of PCP. As a part of the earlier project, an analytical model was developed, and, thus, the data from this subsequent study can be used to calibrate the model. The report describes the planning of the data collection, including the rationale for selection of specific PCP slabs for instrumentation. The report also describes the organization and data filing technique, as well as presents the data in tabular and graphical form. The data include the ambient and concrete slab temperatures at the top, middepth, and bottom of the slab. In addition, horizontal and vertical slab displacements are reported, along with the joint width movements, all as a function of time. Pavement deflection information is presented for two time periods before construction and two time periods after construction. Finally, the results of condition surveys are shown.

This report provides the background information for the three reports to follow, which present the data analysis and developments from it.

The authors express thanks to District 9 personnel (Waco), particularly Mr. Bill Wiese, and to Transportation Planning Division personnel, especially Mr. Steve Golding, all with the Texas State Department of Highways and Public Transportation.

The authors are indebted to Center for Transportation Research personnel who processed and produced this report.

LIST OF REPORTS

Research Report No. 556-1, "Performance Tests on a Prestressed Concrete Pavement—Presentation of Data," by Elliott Mandel, José Tena-Colunga, and Kenneth Hankins, presents the volumetric, thermal, condition survey, and deflection data which were collected in the subject project. November 1989.

ABSTRACT

In 1985, approximately one mile of PCP pavement was placed on IH35 north of Waco, Texas. The project was an experimental installation to develop construction techniques for potential use of PCP in an urban installation. The PCP pavement was constructed as an overlay on an existing jointed pavement and placed in a group of sixteen test slabs. Seven of these slabs had a 440-foot joint spacing and nine slabs had a 240-foot joint spacing. There was a need to maximize the benefits of the investment made in the project (construction and design) and use the results of the study in the future development of behavior and design concepts; therefore, the primary objectives of this study were to study the performance of a prestressed concrete pavement overlay and calibrate prediction models of the prestressed concrete pavement overlay.

This report describes in detail the instrumentation techniques used in the collection of the horizontal and vertical displacements, the associated climatic changes, the non-destructive deflection tests and analyses, the background and theory of the analytical models, and the calibration of the models.

KEY WORDS: concrete, prestressed concrete pavement, concrete pavement overlays, instrumentation, vertical movement, curling, warping, horizontal movement, thermal movements, temperature differential, deflection tests

SUMMARY

This is the first report of Research Project 3-10-88/9-556, "Prestressed Concrete Pavement (PCP) Overlay." This report presents the data collected on the project and explains the data collection methods. The data include horizontal and vertical movements of the prestressed concrete slab with time and temperature as well as the movement at the joints. In addition, pavement deflection and condition survey information are included. There are three other reports on this study. The second report, 556-2, describes the instrumentation, treats the horizontal thermal movement, and uses an analytical model to study the PCP. The third report, 556-3, considers the vertical movement (curl) and reports the calibration of the analytical model, PSCP-1. The final report reviews the design and construction and the previous associated studies. It also assimilates and summarizes the information included in the previous reports, and describes additional analyses.

IMPLEMENTATION STATEMENT

The collection of data in this study, and the resulting calibration of the previously developed computer model, will be used to determine the behavior and expected performance of prestressed concrete overlays. The more accurate models can be used to provide an improved design procedure. Therefore, more economical construction, more efficient consumption of materials, and reduced energy consumption will result.

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CHAPTER 1. INTRODUCTION

BACKGROUND

In 1988, the Center for Transportation Research of The University of Texas at Austin was asked by the Texas State Department of Highways and Public Transportation (SDHPT) to undertake a study of the in-situ behavior of prestressed concrete pavement (PCP). The study has served as a module in an ongoing investigation of PCP as an alternative to conventional pavements. The project incorporated field data collected from actual PCP slabs to characterize the behavior of the slabs. Thermal movements of the slabs were measured and were used to calibrate computer models. In addition, deflection tests and condition surveys were performed. The results of Project 556 will enhance our understanding of PCP and its potential as a cost-effective option for future highway pavements.

PREVIOUS RESEARCH

The present study on the behavior of PCP is an extension of previous research conducted at The University of Texas at Austin from 1983 to 1987. A series of conceptual and experimental investigations into the design and implementation of PCP was carried out during that time. These studies examined several separate aspects of PCP, including the application of special prestressing techniques, the evaluation of projected in situ parameters, and the formulation of design procedures. This previous research, designated Project 3-8-84-401, "Prestressed Concrete Pavement Design—Design and Construction of Overlay Applications," provided information required for the design, construction, and early-life instrumentation of a one-mile experimental prototype section of a PCP overlay located in McLennan County, on the southbound lane of Interstate Highway 35, about 15 miles north of Waco. The construction of the experimental pavement was carried out as Project 1-9D-84-556, "Prestressed Concrete Pavement IH35, McLennan County." In effect, the present study is a continuation of that construction project. The following paragraphs review the results of the previous investigations.

RESULTS OF PREVIOUS INVESTIGATIONS

Under the previous projects, a literature review was performed, along with an evaluation of the concept and performances of several previous prestressed pavement projects sponsored by the Federal Highway Administration. The collected information was used to develop design and construction details and procedures for the experimental pavement near Waco. In addition, several new PCP construction concepts were introduced which addressed problems encountered on previous projects and which were intended to improve constructability and performance on future projects (Ref 5).

An investigation into very early post-tensioning of concrete was conducted to examine the possibility of preventing temperature and shrinkage cracks in long PCP slabs during the first night after casting (Ref 4). Experiments on the capacity of the anchorage zone in slabs were performed considering slab thickness, tendon spacing, anchor size, and time from casting as test variables. Results of the tests indicated that partial post-tensioning can be applied to concrete pavement within 12 to 24 hours of casting. A recommended post-tensioning table was presented along with design aids. Later use of these recommendations for the actual construction of the McLennan County overlay was quite successful.

Experiments were performed to determine the amount of initial prestressing that is lost along the length of unbonded tendons (Ref 9). Prestress losses were measured for different arrangements of tendons, and were used to predict losses in actual PCP. The experimental losses were then compared to actual losses that were experienced in the McLennan County overlay.

An experimental study was carried out to evaluate the effectiveness of using polyethylene sheeting in reducing friction at the interface of a concrete overlay on an asphalt base. The maximum coefficient of friction for single and double layers of the sheeting was determined through pushoff tests carried out over a one-year period in varying seasonal conditions. Conclusions of the study indicate that a single layer of sheeting is adequate for reducing base friction enough to prevent detrimental tensile stress in PCP slabs (Ref 8).

An instrumentation program was conducted for the McLennan County overlay for the purpose of measuring early-life behavior of the PCP slabs (Ref 7). The program included the continuous measurement of ambient and concrete temperatures, horizontal slab movements, slab curling movements, concrete strains, and joint widths. Additional data were collected on tendon elongation, very early concrete strength and modulus of elasticity, and slab cracking.

A design methodology for PCP that incorporates procedures for determining slab thickness, prestress level, and slab length was presented (Ref 6). In addition, a computer model that uses a finite difference procedure to focus on slab length changes and longitudinal stresses in PCP as a result of changes in concrete temperature and base-friction was developed. The information generated by the computer model was then compared to measured short-term responses from the McLennan County PCP overlay.

A series of regression analyses carried out on data from both the Portland Cement Association and from The University of Texas at Austin's test program on fatigue of prestressed concrete beams was performed (Ref 10). Investigations included studies of the effect of prestress on the fatigue life of concrete, the interaction of prestress and stress due to vehicular loading, the effect of prestress in delaying microcracking in concrete, and the effect of prestress on elasto-plastic behavior of prestressed concrete. General conclusions of the study address whether current fatigue design procedure is appropriate for prestressed concrete, and whether the superposition of prestress and stress due to vehicular loads is valid.

SCOPE

This report is an introduction to the three subsequent reports of work performed for Project 556 (Refs 1, 2 and 3). It is a permanent record of the data collected at the McLennan County PCP during 1988-89.

First, the required planning at the initial stages of the project and the organization of the project data are outlined. Then, slab displacement and deflection data are presented in tabular and graphical form. Finally, condition survey data are presented through a series of figures and photographs. The information presented in this report is supplemented by Refs 1, 2, and 3. This report includes a presentation of raw results of a field-data collection program; Refs 1, 2, and 3 describe methods of data collection as well as methods for using the data for computer model calibration. Recommendations from analysis and use of the data are also presented in Refs 1, 2 and 3.

The order of presentation of the topics covered in this report is as follows:

(1) ***Chapter 2*** contains the planning of the data collection program, including the rationale for selection of specific PCP slabs for instrumentation; the locations of the instrumentation; and finally the organization and method of nomenclature of the data.

(2) ***Chapter 3*** contains the data from the first data collection period (the first field visit), including ambient and concrete pavement temperatures, horizontal and vertical slab displacements (thermal expansion and contraction and vertical slab curling), and joint width movements, all as a function of time. This chapter is supplemented by Appendices A through D, where similar data for all subsequent field visits are presented.

(3) ***Chapter 4*** contains pavement deflection information for four time periods, both before and after construction of the PCP overlay, and descriptions of the pavement and subbase materials, as well as the method of deflection data collection. This chapter is supplemented by Appendix E, where the deflection data are presented in tabular form.

(4) ***Chapter 5*** includes the results from condition surveys; slab conditions, presented through diagrams; and photographs of significant condition information.

(5) ***Chapter 6*** includes the potential uses of the data presented in this report, described through summaries of the two subsequent reports (Refs 1 and 2).

CHAPTER 2. COLLECTION OF DATA

The planning of the data collection program considered seasonal or environmental data collection, field schedule, and slab selection and locations, as well as requirements for instrumentation. Based on these factors, a field schedule was prepared and specific information was collected.

SEASONAL CONSIDERATIONS

Generally, measurements must be made in the periods that reflect the worst possible combination of factors for the prestressed slab. Factors such as moisture warping, thermal contraction/expansion of the concrete slab, and differential temperature curling of the concrete slabs, undergo cyclical changes on an everyday basis. They are susceptible to daily climatic variations, and these changes are different between seasons. Therefore, it is desirable to obtain the readings during those periods in which the hot and cold temperature conditions as well as the moisture cause the slab to undergo its maximum changes during the day and, likewise, during the year.

STRATEGY FOR THE DATA COLLECTION AND ANALYSIS

It was planned that data would be collected during cold, hot, and rainy seasons, and at random times, for checking purposes. The data collected during the cold season were for the study of the slab in circumstances of high contraction and full saturation. The data for the hot, dry condition were to provide information on the dry and fully-expanded slab with maximum prestress level. The rainy season data were to furnish the information required for a saturated slab.

A schedule was planned for the collection of 24-hour data sets in the field under hot, cold, and rainy weather conditions. The number of data sets was meant to provide a sufficient basis for a statistical analysis. The initial date for data collection was set for February, but the start was postponed until April. Since the date for each collection period depended on the occurrence of the desired environmental conditions, the field program was constantly updated.

LABOR TRIPS

Prior to the data collection, site conditioning trips were scheduled. During these trips, the tasks necessary for the installation of instrumentation at the site were performed, including the drilling of slabs for the positioning of thermocouples and the attachment of steel angles to the outside edge of the slab; the excavation, positioning, leveling, and casting of concrete to support the "dead man" cylinders used as a base for the displacement instrumentation; and finally, the positioning of the contact surfaces for the vertical measurements. These tasks were performed prior to the instrumentation stage. Two days were needed for the conditioning of the site for each stage, and this extra work paid off in the quality of the data, allowing the instrumentation to be

TABLE 2.1. SUMMARY OF THE DATA RECORDS FOR FIELD VISITS

	Dates of Trips					
Data Collected	**July 25**	**August 5**	**August 26**	**November 5**	**January 21 & 22**	**February 9**
Weather conditions	Hot Sunny/ Dry	Hot Sunny/ Dry	Hot Sunny/ Dry	Sunny/Dry	Cold Wet/Cldy	Cold Sunny/ Frost
Slab temperature:						
Middle (maximum-minimum)	113.0-84.0	112.4-84.5	107.6-82.8	79.3-54.9	61.2-37.5	59.1-35.7
Temperature change in middle	28.3	27.9	25.1	24.4	23.6	23.4
Differential top-bottom (max)	14.5	16.2	11.7	11.1	10.8	12.7
Temperature:						
(maximum-minimum)	112.9-75.5	127.6-77.6	120.2-70.1	92.8-30.5	75.9-21.3	76.5-26.7
Δ Temperature	37.4	50.0	50.1	54.3	54.6	49.8
Ambient temperature:						
(maximum-minimum)	106.2-76.1	102.3-76.9	106.1-71.7	79.4-41.7	64.2-29.3	62.9-30.9
Δ Temperature	30.1	25.4	34.3	37.6	34.9	31.9
Vertical displacements at edges (in.):						
240-ft slabs	0.1829	0.1469	0.1685	0.0954	0.0482	0.0409
440-ft slabs	0.1748	0.1395	0.1535	0.0851	0.0369	0.0312
Horizontal displacements at edges (in.):						
240-ft slabs	0.1298	0.1234	0.1434	0.1670	0.1287	0.0936
440-ft slabs	0.2795	0.3026	.03208	0.3026	0.2365	0.1716

installed rapidly. The setting of these permanent sites for the instrumentation will enable the use of the same spots in future monitorings with subsequent savings in time and money, not to mention the congruency and continuity of data collection.

DATA COLLECTION TRIPS

The number of 24-hour data sets initially proposed was nine. Later on, the quality of the data allowed the number of data sets to be reduced to seven. These seven sets of data were collected in six trips: five trips with a 24-hour period of data collection and one trip, in January 1989, with a 48-hour period of data collection. This 48-hour period permitted the analysis of two consecutive periods. Additional trips were made for the preliminary survey and site preparation and installation of the settings needed for the instrumentation.

Table 2.1 shows the final dates, weather characterization, and activities for each visit of the field schedule. This schedule was changed continually, since the departure dates depended on the weather conditions desired for each trip. A summary of the weather conditions is given later in this chapter.

In order to monitor the structural and riding qualities of the slabs, Dynaflect and profilometer measurements were scheduled. The Dynaflect measurements were made twice during the project, the first in November 198– and the second in January 198–. The data collected are reported in Chapter 4 of this report. Profilometer readings were included in the original plan for the monitoring of rideability aspects, but, unfortunately, they were not made because the profilometer was not available during the data collection period.

SLAB SELECTION

A very important part of the preparation was the selection of the slabs to be monitored, to assure the collection of representative data and to assure the maximum number of locations was monitored with the instrumentation available. The process for the selection of the slabs to be monitored is presented below.

The experimental prestressed concrete overlay in Waco is located on the southbound lane of Interstate Highway 35 between stations 696+00 and 749+00. Between September 17 and November 20, 1985, eighteen 240-foot and fourteen 440-foot PCP slabs were cast. The roadway is a typical rural depressed median interstate section, having two southbound lanes, each 12 feet in width, with an inside shoulder of 4 feet and an outside shoulder of 10 feet. The paving was accomplished in two passes of a 17-foot width and then a 21-foot width. The arrangement of the slabs in each of the southbound lanes of IH35 is presented in Fig 2.1. Joints were numbered from north to south. The original pavement consisted of a 12-inch jointed concrete pavement 24 feet wide with flexible base shoulders on each side for a total width of 38 feet. The entire width of pavement was sealed and overlaid with approximately 2 inches of asphalt concrete pavement (ACP). Subsequently, a single polyethylene layer and a 6-inch PCP slab were placed on the asphaltic concrete. The PCP overlay in Waco was opened to traffic in December 1985. The design and construction of the overlay are reported by Burns, McCullough, et al in Ref 11.

SELECTION PROCESS

The process of data collection was divided into three stages: The first stage was a visual survey of the experimental section, the second stage was for slab screening and data collection, and the third stage was the full instrumentation of the slabs. More information is available in Technical Memoranda 964-3 (Ref 12) and 556-10 (Ref 13).

First Stage. The first stage was the preliminary visual survey of the experimental section. The purpose was to record the actual state of the slabs and to try to detect whether there were slabs with signs of abnormal behavior. Additional tasks were the recording of the temperature at the beginning and at the end of the survey and the measuring of some slab joint openings to determine preliminary criteria about the ranges that could be expected during the data collection. Another survey was conducted towards the end of the field data collection period to determine whether or not crack growth was occurring, but additional crack development was not observed. Since manifestations of dubious slab behavior were not detected in the first stage, the selection of the slabs was made on the basis of safety, adequacy, and advantage of location for the instrumentation and field supervision. Therefore, the slab on the outside lane was selected because it was safer, since its broader shoulder provided more room for the instrumentation works. Using this reasoning, three 240-feet slabs and three 440-feet slabs adjacent to the center of the section were chosen for the slab screening.

Screening and Data Collection Stage. The second stage took place during the first three field trips (three trips were specified, since that number was considered the minimum needed to obtain the information required for a preliminary analysis of the data). The instrumentation for the screening stage consisted of dial gauges at twelve slab edges to measure the vertical and horizontal slab displacements. LVDTs were used to monitor Joint 10 (Fig 2.1). This allowed continuous automated measurement of edge displacements on one 240-foot slab and one 440-foot slab. The monitored locations are shown in Fig 2.2. In the second stage, data were collected for the final calibration, and this information was used in selecting those slabs to be fully instrumented in the final stage (Ref 12). The analysis of the collected data did not reveal abnormal data deviation. Therefore, selection of the slabs to be monitored along the slab length was made on the basis of operational convenience and supervision of data collection; accordingly, the 240-foot and the 440-foot slabs near the center of the site were chosen for the third stage.

Final Stage. In the third stage, two slabs were instrumented along their lengths. For this purpose, six additional sites were conditioned at selected locations along these two slabs. The conditioning consisted of installing foundations for the displacement transducers, steel angles, and vertical contact surfaces similar to those described previously. Their locations are also depicted in Fig 2.2. These locations were used to determine contraction, expansion, and curling profiles of the slab. This stage covers four sets of data.

LOCATIONS

Figure 2.2 shows the locations of the slabs selected for the second and the third stages. Each of the twelve locations selected in the second stage was at a slab corner. The movement or displacement measurements were made at the shoulder edge at 7S, 8N, 8S, 9N, 9S, 10N, 10S, 11N, 11S, 12N, and 12S, as shown in Fig 2.2.

In the final stage, three locations were established at the one-sixth points and three locations were established at the one-third points, as measured along the edge of the slab beginning at the corners. In the 240-foot slab, two locations were established at the one-sixth point and one location at the one-third point. In the 440-foot slab, one location was selected at the one-sixth point and two locations were selected at the one-third points. In addition, the six related corners were monitored. The locations were 9N, 9S, 9S/6, 10N3, 10N6, 10N, 10S 10S6, 10S3, 11N3, 11N, and 11S, as shown in Fig 2.2. These locations were intended to check the symmetry of the slab movements on each half of the slab. The joint numbering used is the same as that in Research Project 3-8-84-401. Settings at the same joint were differentiated with an "N" or "S," depending on whether they were on the north or the south edge of the slab. For the interior locations, the plan was to add "/6" or "/3," depending on whether the setting was located at one-sixth or one-third the slab length as measured from the closer slab corner.

ORGANIZATION AND CODING OF DATA

The size of the data base to be collected required clear organization to avoid confusion, prevent the loss of valuable data, and circumvent the improper handling of the information collected in the field. This section explains the code adopted for identification of the data. The code can be useful both as a key for future users and as a method for assuring uniformity in the data identification of future projects. The process for encoding and electronic filing of the collected data and the encoding guidelines for subsequent versions of processed data to be used in the calibration of the PSCP-1 program are discussed below.

CODING OF FILES

The original data were transferred to a computer-stored data base with proper coding for future reference. In addition, later manipulations or transformations were systematically processed.

Original Data. The data collected in the field were recorded manually on data sheets for the dial gauge readings and automatically on disks in the data acquisition system for the LVDTs and thermocouples. The data sheets contained the date, the hour of the recording, and the readings for the vertical and horizontal movements. For the data acquisition system, the data stored were the vertical and horizontal movements in the LVDTs and the temperature readings at the bottom and the top and in the middle of the slab, as well as the ambient temperature. The frequency of the recordings was ten minutes for the data acquisition system and two hours for the data sheets.

Transfer of Data from Data Sheet and From Acquisition System. Once the data collection was completed, a hard copy was obtained from the data acquisition system and backup files were transferred to the CDC and IBM mainframes. From there, the data were transferred to a Macintosh PC for analysis and handling. After each file was input, it was labeled with the corresponding code.

Encoding. The encoding for each file consists of four parts (see Fig 2.3). The first part (six numbers) corresponds to the date of the first day of data collection for each trip. The second part (two letters) identifies the type of movement. The third part is used only for graphs and it identifies

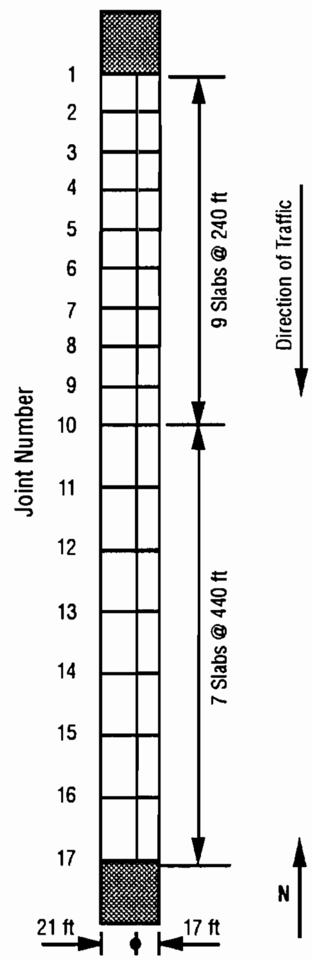

Fig 2.1. Layout plan of the McLennan County PCP experimental section.

the location of the setting. The fourth part contains the length of the slab and the version identification. This fourth part is separated from the other three by a blank space, and the version identification is separated from the slab length by a period. The original field data hold the number zero (0) for the version identification.

Subsequent Versions. The subsequent versions of the data files were numbered following a numeric progression: thus, for the next version the only modification in the file was in the last digit, and the rest of the file label remained the same. In this way, the handling of the files enabled the user to know at a glance which trip the file corresponds to as well as the kind of movement, the setting, the slab length, and the version of the data. This is exemplified in Fig 2.4(a). Figure 2.4(b) contains the stage of the data process that corresponds to each of the versions. The following versions were produced:

(1) version .0 (original raw data),
(2) version .1 (original data referred to a common axis),
(3) version .2 (data after the first correction),
(4) version .3 (data after temperature correction), and
(5) version .f (final data version).

The correction due to temperature was intended only for the vertical data since temperature expansion on the horizontal supports did not affect the horizontal data.

LENGTH AND CONTENT OF FILES

File lengths were kept small so that file handling would be easy and fast, with less chance of massive data loss. The data were split into files according to the slab length (240 and 440 feet) and the kind of movement. Therefore, there are two files for vertical movements (VM), two files for horizontal movements (HM), and two files for joint movements. Each file contains the hour and the movement recorded for each setting.

For the data from the data acquisition system, the first file obtained was the transfer from the IBM mainframe, which contained the vertical movement, horizontal movement, and temperature data for the joint monitored. This file was identified with the label "AUTO" in the second part of the code. From this file, the data required for the other files were selected and manually input into the other files for each length and kind of movement. Part of the analysis consisted of the development of plots and tables. The plots for each version were placed in an electronic folder, and the file folders for each version were placed in a trip folder for each version.

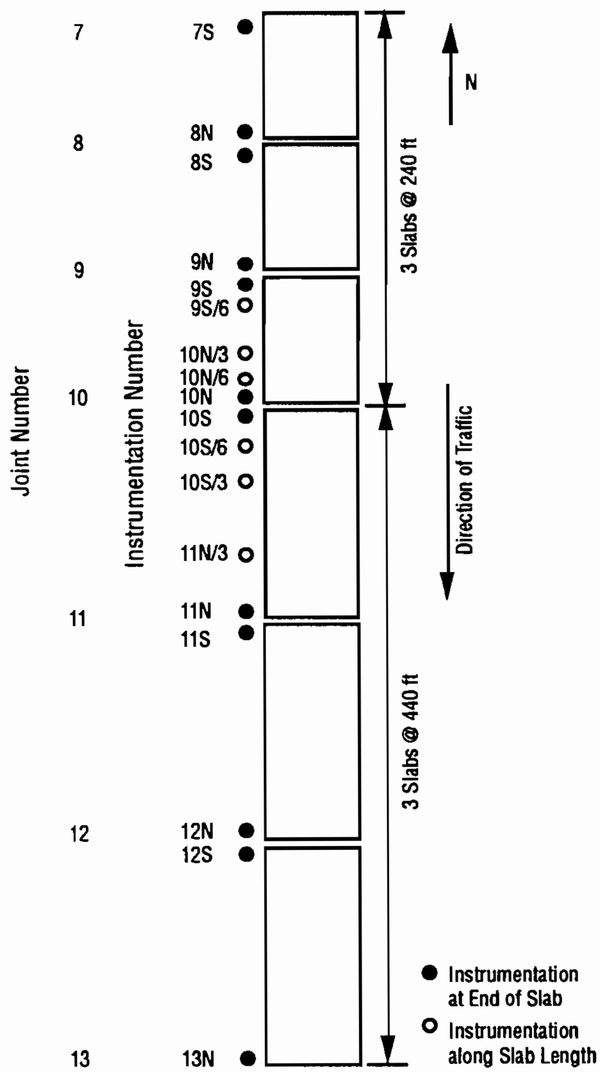

Fig 2.2. Instrumentation locations selected for monitoring the McLennan County PCP.

Date	Type of Movement	Measurement Location	Length Version
72688	VM	10S	440.0

Fig 2.3.File/Graph code.

72688VM10S 440.**0**

72688VM10S 440.**1**

(a) Change for subsequent versions.

72688VM10S 440.0

.0 (Original Data)

.1 (Common Axis)

.2 (First Correction)

.3 (Data after Temperature Correction)

.F (Final Version)

(b) Data versions.

Fig 2.4. Code development for file versions.

CHAPTER 3. DISPLACEMENT DATA

This chapter includes slab displacement data collected during the second field visit to the PCP site on July 25-26, 1988 (the first field trip consisted of a site survey for which no numerical data were collected). The data include tables and graphs of concrete temperatures at three depths in the slab, horizontal and vertical (curling) thermal movements of the slabs, and joint width movements, all as a function of time. The tables and figures are identified by the coding system described in Chapter 2. The methods of measurement are described completely in Ref 1, and the analysis of the data is performed in both Refs 1 and 2. This chapter is supplemented by Appendices A through F, where similar data are presented for all subsequent visits to the site. Throughout this chapter, column headings labelled 7S, 8N, 8S, etc., refer to slab locations described in Chapter 2.

During the initial data set collection period, observations were made within a time period from the 1500 hour on July 25 to the 1100 hour on the following day. For all the following collection periods, the cycle of readings overlaps from the 1400 hour of the first day to the 1400 hour of the next day. This last extra reading was recorded as a safety measure. The data presented for the vertical displacements in Joint 10 are the data from the linear variable differential transformer (LVDT), because a dial gauge was not set as a backup to the LVDT. For the horizontal data, the displacements were monitored with an LVDT and a dial gauge at Joint 10 south and north. The final values correspond to those of version 2 for the horizontal and version 3 for the vertical movements.

AMBIENT AND SLAB TEMPERATURES

Table 3.1 presents the temperatures recorded for the ambient conditions and the slab at the top, mid-depth, and bottom during the July 25-26, 1988, visit to the PCP sites. Figure 3.1 depicts the plot of these temperatures with time. Analysis of the temperature relationship to displacements and discussions of the temperature characteristics are presented in Refs 1 and 2. Appendix A supplements the temperature data for the remaining data sets.

HORIZONTAL DISPLACEMENT

Table 3.2 shows the horizontal movement data collected on the 240-foot PCP slab. Again, the July 25-26, 1988, data are presented. The time, air temperature, mid-depth slab temperature, and horizontal movement at each corner are shown. Table 3.3 shows similar information for the corners of the 440-foot slabs.

Figure 3.2 is a plot of the horizontal displacement with time. The movement at each of the corner locations for the 240-foot slabs is shown. Note that location 10N is adjacent to the 440-foot slab. In general, the movement at the corners is about the same. The overall movement at a corner during a 24-hour period is somewhat greater than 1.1 inches. Figure 3.3 is also a plot of the horizontal movement with time, but considers the 440-foot slabs. Again, the locations shown are at the corners. The 24-hour movement is generally greater than 0.3 inch. The horizontal displacement information for the other collection periods may be found in Appendix B.

VERTICAL DISPLACEMENT

Table 3.4 contains the vertical displacement information collected on the 240-foot slabs. The table shows the measurement location, the time of measurement, and the vertical movement in inches. Table 3.5 shows the vertical movement collected on the 440-foot slabs during this collection period.

TABLE 3.1. AMBIENT AND SLAB TEMPERATURES FOR JULY 25-26, 1988

Time	Ambient Temperature (°F)	Top Temperature (°F)	Middle Temperature (°F)	Bottom Temperature (°F)
16:00	107.132	117.455	111.803	107.636
18:00	106.556	110.750	110.615	107.789
20:00	91.472	98.789	102.758	103.613
22:00	85.226	92.426	97.673	98.663
0:00	80.798	88.331	93.227	95.279
2:00	80.258	85.901	89.627	91.724
4:00	79.106	83.561	87.305	89.663
6:00	76.100	81.410	84.317	87.287
8:00	87.782	83.773	83.399	85.262
10:00	88.700	97.700	90.815	89.474
12:00	93.650	111.290	101.057	96.791

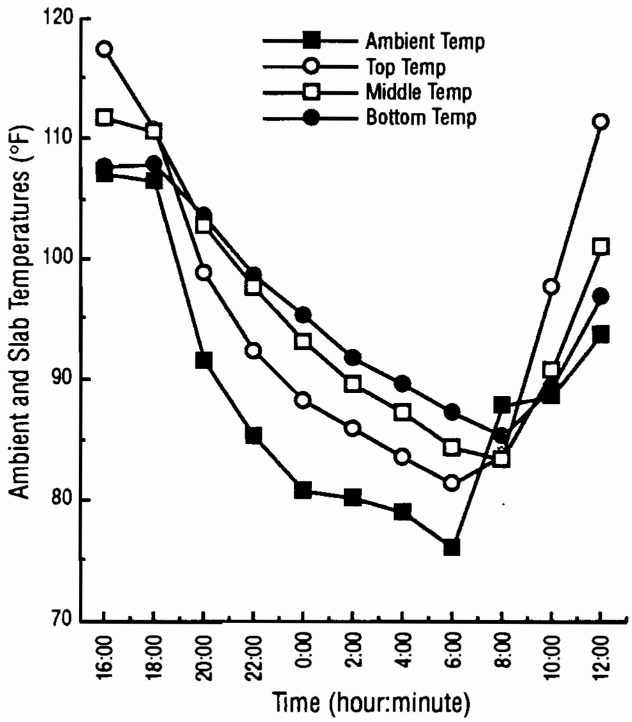

Fig 3.1. Ambient and slab temperatures for July 25-26, 1988.

Figure 3.4 shows the vertical displacement of the slab corners with time for the 240-foot slabs. The slab corners seemed to be at their lowest position during the warmer daylight hours and moved vertically during the cooler hours. The vertical movement was generally greater than 0.2 inch. Figure 3.5 shows similar information for the 440-foot slabs. The extent of the vertical movement is in the same range as that of the 240-foot slabs. A detailed analysis is available in Ref 2. Appendix C contains all the vertical displacement data collected, including the vertical movement at the one-sixth and one-third points.

JOINT WIDTH MOVEMENT

Table 3.6 shows the joint width movement collected at all the joint locations. The movement was measured with machinist calipers and reflects the horizontal movement of the slab on each side of the joint. Part of the reason for collecting the information was to compare the horizontal displacement data with the joint movement. The time, ambient temperature, mid-depth slab temperature, and joint movement (in inches) at each joint are presented.

Figure 3.6 is a plot of the joint movement with time. Note that each joint is shown. The measurements at the other collection periods are given in Appendix D.

TABLE 3.2. HORIZONTAL MOVEMENT FOR 240-FOOT SLABS FOR JULY 25-26, 1988

		Ambient Temperature	Slab Temperature	Horizontal Movement (in.)					
Hour	Time	(°F)	(°F)	7S	8N	8S	9N	9S	10N
0	16:00	107.132	111.803	0.000	0.000	0.000	0.000	0.000	0.000
2	18:00	106.556	110.615	0.000	-0.003	-0.001	-0.001	0.000	-0.007
4	20:00	91.472	102.758	-0.009	-0.013	-0.015	-0.016	-0.006	-0.041
6	22:00	85.226	97.673	-0.045	-0.046	-0.051	-0.037	-0.025	-0.089
8	0:00	80.798	93.227	-0.079	-0.077	-0.082	-0.070	-0.054	-0.125
10	2:00	80.258	89.627	-0.106	-0.103	-0.112	-0.095	-0.077	-0.150
12	4:00	79.106	87.305	-0.122	-0.120	-0.127	-0.110	-0.091	-0.163
14	6:00	76.100	84.317	-0.139	-0.136	-0.145	-0.122	-0.107	-0.182
16	8:00	87.782	83.399	-0.148	-0.143	-0.138	-0.134	-0.100	-0.186
18	10:00	88.700	90.815	-0.111	-0.091	-0.111	-0.085	-0.069	-0.132
20	12:00	93.650	101.057	-0.040	-0.031	-0.015	-0.020	-0.011	-0.053

TABLE 3.3. HORIZONTAL MOVEMENT FOR 440-FOOT SLABS FOR JULY 25-26, 1988

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	Horizontal Movement (in.) 10S	11N	11S	12N	12S	13N
0	16:00	107.132	111.803	0.000	0.000	0.000	0.000	0.000	0.000
2	18:00	106.556	110.615	0.009	0.000	0.000	0.000	0.000	0.000
4	20:00	91.472	102.758	-0.040	-0.114	-0.087	-0.110	-0.101	-0.106
6	22:00	85.226	97.673	-0.110	-0.201	-0.169	-0.180	-0.181	-0.179
8	0:00	80.798	93.227	-0.171	-0.270	-0.229	-0.261	-0.243	-0.240
10	2:00	80.258	89.627	-0.216	-0.319	-0.282	-0.297	-0.288	-0.283
12	4:00	79.106	87.305	-0.239	-0.345	-0.307	-0.316	-0.311	-0.306
14	6:00	76.100	84.317	-0.269	-0.380	-0.341	-0.357	-0.342	-0.337
16	8:00	87.782	83.399	-0.284	-0.391	-0.357	-0.367	-0.352	-0.348
18	10:00	88.700	90.815	-0.211	-0.290	-0.275	-0.271	-0.258	-0.247
20	12:00	93.650	101.057	-0.079	-0.150	-0.138	-0.141	-0.128	-0.119

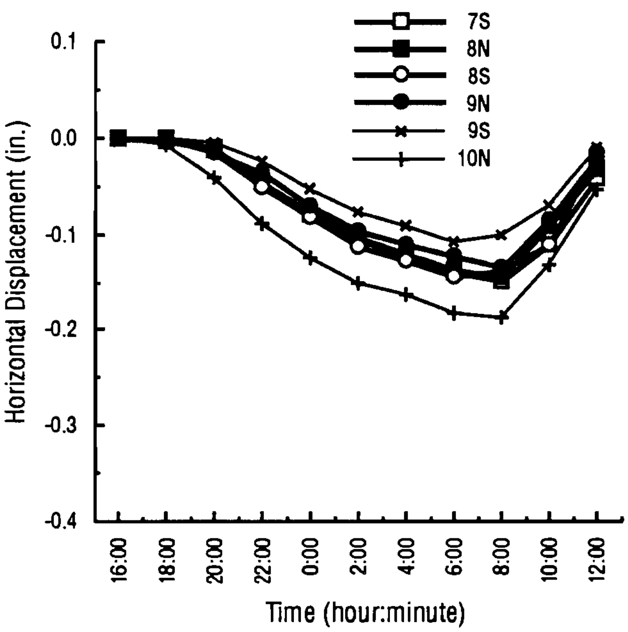

Fig 3.2. Horizontal displacement for 240-foot slabs for July 25-26, 1988.

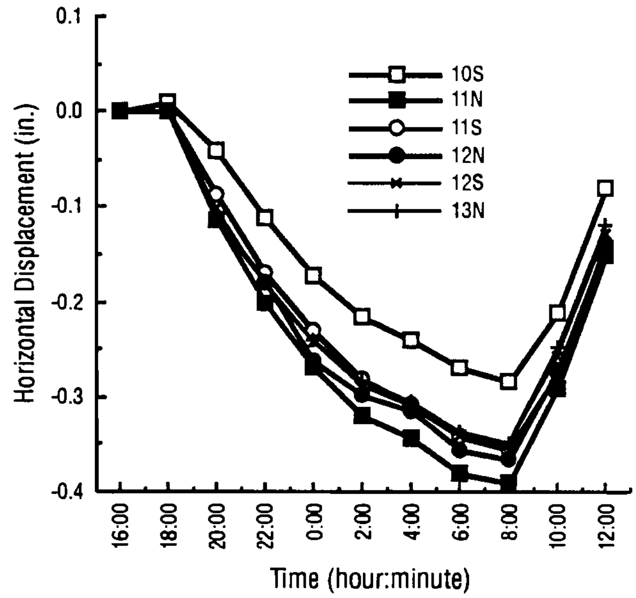

Fig 3.3. Horizontal displacement for 440-foot slabs for July 25-26, 1988.

TABLE 3.4. VERTICAL DISPLACEMENT FOR 240-FOOT SLABS FOR JULY 25-26, 1988

Hour	Vertical Displacement (in.) 7	8N	8S	9N	9S	10N (LVDT)
16:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
18:00	0.0327	0.0137	0.0321	0.0255	0.0326	0.048
20:00	0.0944	0.0996	0.1153	0.1020	0.1031	0.128
22:00	0.1339	0.1345	0.1507	0.1008	0.1524	0.157
0:00	0.1530	0.1398	0.1874	0.1211	0.1736	0.173
2:00	0.2032	0.1455	0.1834	0.1266	0.1801	0.174
4:00	0.2079	0.1248	0.1788	0.1464	0.2044	0.179
6:00	0.2134	0.1572	0.2045	0.1489	0.1909	0.183
8:00	0.2159	0.1365	0.1635	0.1005	0.1676	0.130
10:00	0.1165	0.0670	0.0885	0.0101	0.0823	0.045
12:00	0.0546	-0.0047	0.0152	-0.0249	0.0449	0.007

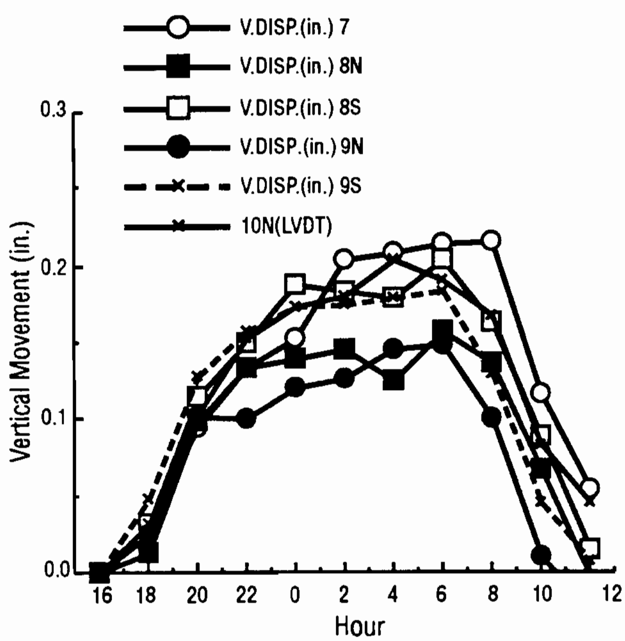

Fig 3.4. Vertical displacement for 240-foot slabs for July 25-26, 1988.

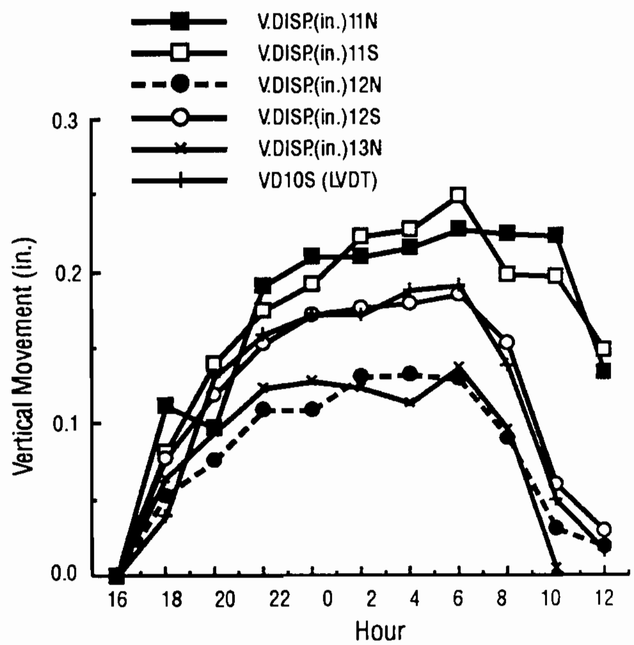

Fig 3.5. Vertical displacement for 440-foot slabs for July 25-26, 1988.

TABLE 3.5. VERTICAL DISPLACEMENT FOR 440-FOOT SLABS FOR JULY 25-26, 1988

	Vertical Displacement (in.)					
Hour	11N	11S	12N	12S	13N	10S (LVDT)
16:00	0.000	0.0000	0.000	0.000	0.000	0.000
18:00	0.113	0.0819	0.053	0.077	0.064	0.039
20:00	0.098	0.1401	0.076	0.119	0.094	0.131
22:00	0.190	0.1743	0.109	0.152	0.124	0.159
0:00	0.210	0.1919	0.109	0.172	0.128	0.172
2:00	0.210	0.2227	0.131	0.176	0.123	0.172
4:00	0.215	0.2277	0.133	0.180	0.114	0.188
6:00	0.228	0.2485	0.129	0.185	0.136	0.191
8:00	0.225	0.1979	0.090	0.153	0.097	0.139
10:00	0.222	0.1961	0.031	0.060	0.004	0.050
12:00	0.134	0.1489	0.019	0.030	-0.031	0.016

TABLE 3.6. JOINT WIDTH MOVEMENTS FOR JULY 25-26, 1988

		Ambient	Slab	Horizontal Movement (in.)						
Hour	Time	Temperature (°F)	Temperature (°F)	Joint 7	Joint 8	Joint 9	Joint 10	Joint 11	Joint 12	Joint 13
0	16:00	107.132	111.803	0.390	0.278	0.457	0.464	1.119	1.251	0.983
2	18:00	106.556	110.615	0.382	0.274	0.459	0.462	1.215	1.377	1.122
4	20:00	91.472	102.758	0.444	0.321	0.505	0.552	1.316	1.474	1.211
6	22:00	85.226	97.673	0.492	0.361	0.527	0.653	1.470	1.612	1.348
8	0:00	80.798	93.227	0.539	0.440	0.589	0.731	1.600	1.755	1.478
10	2:00	80.258	89.627	0.600	0.495	0.635	0.814	1.704	1.836	1.570
12	4:00	79.106	87.305	0.633	0.563	0.675	0.867	1.755	1.891	1.631
14	6:00	76.100	84.317	0.661	0.551	0.672	0.917	1.832	1.963	1.682
16	8:00	87.782	83.399	0.677	0.565	0.717	0.937	1.853	1.983	1.697
18	10:00	88.700	90.815	0.605	0.486	0.628	0.810	1.675	1.793	1.493
20	12:00	93.650	101.057	0.456	0.330	0.500	0.580	1.404	1.509	1.226

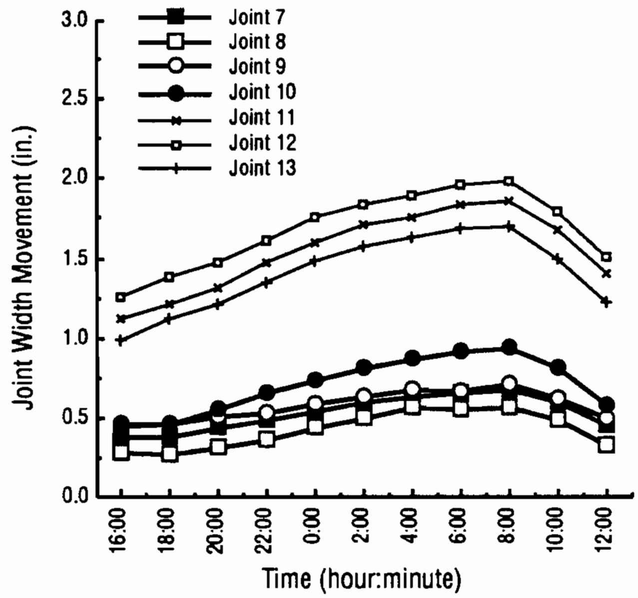

Fig 3.6. Joint width movements for July 25-26, 1988.

CHAPTER 4. SLAB DEFLECTION

The pavement deflection data included in this study were obtained during four different time periods, two prior to the prestressed concrete overlay and two after the overlay. The latter two collection efforts were planned and carried out as part of this subject project. The collection periods were September 1983, August 1985, August 1988, and January 1989. In the following discussion, the deflection information is identified by the year the information was obtained.

On each occasion the deflection data were collected using a Dynaflect operated by the Texas State Department of Highways and Public Transportation. It is believed the same Dynaflect unit was used during each collection period. The pavement deflections are measured by a sensor (geophone) near the load and at 1-foot intervals from the first sensor, for a total of 4 feet. Five sensors are normally used in this kind of data collection operation. If the reader is not familiar with the Dynaflect, additional information may be found in Research Report 187-6 (Ref 14).

1983 DEFLECTION INFORMATION

The 1983 deflection information was collected on the original pavement structure prior to the prestressed concrete overlay. The original pavement structure consisted of

a variable depth asphaltic concrete overlay over
12 inches of jointed Portland cement concrete pavement over
5 inches of select material over
6 inches of lime-treated subgrade.

The parent soil is a dark clay with very expansive properties. The select material is a poor-quality untreated gravel. The asphaltic concrete consisted of some material which was used as a "level-up" in addition to an overlay course. The thickness of the asphaltic concrete was generally about 4 inches.

The deflection information was obtained with the Dynaflect centered in the right wheel path of the outside southbound lane. The longitudinal location was established by engineering stations corresponding to the final location of the prestressed concrete overlay. The data were collected at the even station and at a point 10 feet from the station. The station location was noted at each interval. Data were collected only in the outside lane, for use in the engineering design of the overlay. The data collected during this period are given in Appendix E. The deflection data in this appendix include the engineering station in the first column, the value of sensor one (W1) in the next column, and the values of the remaining four sensors in the following four columns. Temperature, time, slab number, and location information follow if the items are available or applicable.

1985 DEFLECTION INFORMATION

The 1985 deflection data were collected while work on a construction job was being performed in the area. The original asphaltic concrete overlay had been removed and replaced with a new 2-inch asphaltic concrete designed to provide a level-up prior to the prestressed concrete overlay. Therefore, the pavement structure at the time of the 1985 deflection data collection was

2 inches of new asphaltic concrete level-up over
12 inches of jointed PC concrete pavement over
5 inches of foundation course over
6 inches of lime-treated subgrade.

Deflection information was collected with the Dynaflect positioned similarly to the position for the 1983 collection period. That is, the Dynaflect was centered in the right wheel path of the outside southbound lane. The longitudinal location was established using the same engineering station as for the 1983 period except that the data were collected at intervals of 50 feet. Again data were collected only in the outside lane. The original data are documented in Tech Memo 401-32 (Ref 15). A copy of the data can also be found in Appendix E.

1988 DEFLECTION INFORMATION

During the project, a portion of the work was directed toward collecting deflection information to (1) study changes or improvements in the structural strength and (2) observe the effect of seasonal or environmental changes in the pavement strength. As such, the 1988 deflection data were collected during the hot dry season, or during August. The pavement consisted of

6 inches of prestressed concrete over
2 inches of asphaltic concrete level-up over
12 inches of jointed PC concrete pavement over
5 inches of foundation course over
6 inches of lime-treated subgrade.

Deflection information was collected on both the shoulder and the outside southbound lane. Measurements were obtained in the direction of traffic. The Dynaflect unit was positioned as closely to the outside edge of the shoulder and to the edge of the outside lane as possible. The results of this positioning meant that the unit was centered about 3 feet from the outside edge of the shoulder and 3 feet from the edge of the outside lane. On the shoulder the Dynaflect load wheels were positioned just upstream (to the traffic flow direction) of a transverse joint, just downstream of the joint at the quarter points of the slab length, and at the midspan point. When measurements were obtained in the outside lane of the 240-foot slabs, the Dynaflect was positioned just upstream of a joint, just downstream of a joint, and midspan between the joints. The measurements collected on the outside lane of the 440-foot slabs contained an additional position approximately 30 feet downstream of the midspan point. It should be noted that, when the Dynaflect was positioned with the load wheels just upstream from the transverse construction joint, one sensor was upstream of the joint and the remaining four sensors were downstream of the joint. The deflection measurements on the shoulders were obtained on only six of the sixteen slabs (slabs 7, 8, 9, 10, 11, and 12). Deflection measurements on the shoulders were collected in the cooler hours of the morning and then later in the day. The original data were documented in Tech Memo 556-11 (Ref 16), and a copy of the data is given in Appendix E.

1989 DEFLECTION INFORMATION

The 1989 data were collected in January, or in the cold wet season. The pavement structure was the same as that for the 1988 deflection information. Also, the collection procedure and locations were the same as those for the 1988 data collections, except for the seasonal conditions, as previously stated. The original data are reported in Tech Memo 556-16 (Ref 17), and a copy of the information is found in Appendix E.

CHAPTER 5. CONDITION SURVEYS

The condition surveys performed in this project are visual observations of the pavement condition. The pavement condition was noted in terms of the extent of distress or types of failure modes. For the purposes of this report, the results of the condition surveys are subdivided into (1) the distress occurring in the pavement slab and (2) the general condition observations, which include the joints and seals.

SLAB CONDITION

For this project, condition surveys were obtained at the prestressed concrete locations on two occasions. The first survey was conducted in April 1988. On this occasion it was noted that the prestressed slabs were in good condition and the only distress was a small pothole in the outside lane of Slab #11. A small amount of longitudinal cracking was also noted. The pothole was obviously the result of the incorporation of debris or a "clay ball" in the concrete mix. The longitudinal cracking was very tight with only a small crack width. This cracking normally occurred near the outside edge of the outside lane and at times in the right wheel path. One transverse crack was found in the inside lane of Slab #5.

The second condition survey was made near the end of the data collection phase of the subject project on February 9, 1989. In this survey, observers checked the pavement for signs of distress while walking along the shoulders, near the pavement edge, throughout the entire length of the project. The observers checked the outside lane from the outside shoulder, walking in the direction of traffic. They checked the inside lane from the inside shoulder, walking facing the traffic. The pavement was found to be in very good condition. The results of the survey are shown in Appendix F. It should be noted that the plots shown in the figures in Appendix F are not to scale and that the longitudinal crack lengths shown are relatively short compared to the slab length of 240 or 440 feet. This survey revealed two potholes. One of these potholes was in the outside lane of Slab #11, as observed in the first survey, and the second pothole was in the outside lane of Slab #16. Both potholes were small, approximately one foot in diameter, and appeared to be formed as the result of disintegration of debris or clay balls which were inadvertently introduced into the concrete during mixing. Also, two transverse cracks were found. One transverse crack was in the inside lane of Slab #5, as noted in the first survey, and the second transverse crack was in the outside lane of Slab #15. The transverse cracks were very tight with small crack widths. The only other distress noted was the longitudinal cracking, which seemed to have been initiated at the leave-out pockets, where the stressing was applied to the steel strands during construction. There appeared to be more longitudinal cracking in the outside lanes and in the shorter-length (240-foot) slabs. The longitudinal cracking seemed more dominant near the outside edge of the outside lane and tended to be near the right wheel path. In several slabs, the longitudinal cracking was intermittent. However, there was probably a continuous crack that was so tight that in some of the length the crack width could not be observed from the shoulder with the naked eye.

GENERAL OBSERVATIONS

During the design of the prestressed pavement, considerable attention was given to the joints because of the large and unusual stress conditions that prevail in this area. Observations of the paving near the joint showed very little distress. There was no spalling or transverse cracking near the joints. Where there was longitudinal cracking that intersected a transverse joint, the crack did not Y or deviate near the joint. That is, the longitudinal crack approached and intersected the joint in a perpendicular manner. The joint design included a thick neoprene diaphragm which attached to the joint edges on each slab to cover the joint opening. Debris was found to lodge in the cavity formed by the neoprene. This debris cut the neoprene when the slabs expanded in the warmer temperatures. However, this damage was not excessive, and the diaphragm is performing well.

CHAPTER 6. SUMMARY

This report is an introduction to three subsequent reports of work performed for Project 556 (Refs 1, 2, and 3). This report describes the planning stages of the project and the organization of the presentation of project data collected in the field. It presents the field data in tabular and graphical form. This report serves as a permanent historical record of the data collected at the McLennan County PCP during 1988-89. The information presented in this report is supplemented by Refs 1, 2, and 3. This report includes a presentation of raw results of a field-data collection program; Refs 1, 2, and 3 contain descriptions of methods of data collection as well as use of the data for computer model calibration. Recommendations resulting from analysis and use of the data in this report are also presented in Refs 1, 2, and 3.

The planning of the data collection program is described in this report and includes the rationale for selection of specific PCP slabs for instrumentation. The organization and method of nomenclature of the data are also presented. Slab displacement data are presented in tabular and graphical form. The data include ambient and concrete temperatures, horizontal and vertical slab displacements (thermal expansion and contraction and vertical slab curling), and joint width movements, all as a function of time. Pavement deflection information is presented for four time periods, both before and after construction of the PCP overlay. The pavement and subbase materials are described, as is the method of deflection data collection. The results from condition surveys are presented. Slab conditions are presented through diagrams. Photographs of significant condition information are presented.

The following sections are summaries of Refs 1 and 2. In the two reports, specific work performed for Project 556 is explained in detail, analyses of data are presented, results of computer model formulation and/or calibration are presented, and results and conclusions of this study are discussed.

SUMMARY OF RESEARCH REPORT 556-2

In Research Report 556-2, the instrumentation program for the McLennan County PCP is described in detail. The instrumentation techniques used to collect field data are presented. The objectives of the instrumentation program are outlined along with constraints on the method of data collection. The data collection equipment and methods of data acquisition are described. In addition, variables that affected the accuracy of the data and methods of error prevention are presented.

An analysis of the horizontal displacement data is reported. Final results of the horizontal displacement data are presented through average horizontal displacement curves. Results of a regression analysis of horizontal displacements are outlined and discussed. The consistency and accuracy of the data are then addressed.

An analytical model for the horizontal displacements of PCP slabs is developed. The background and theory of the model are described. Then, the computational operation of the model is outlined. The use of the model is presented along with user guidelines. The model is implemented in three studies: a study of internal accuracy of the model, calibration of the model to the collected field data, and a study of stress concentrations in the PCP slabs. Results of the studies are presented. Finally, conclusions are presented. Recommendations based on the instrumentation program, the field data analyses, and the model studies are outlined.

SUMMARY OF RESEARCH REPORT 556-3

In Research Report 556-3, the theoretical basis for and a review of the existing models for prestressed concrete pavements are described. Next, the data collected for the experimental PCP sections are compared with those for the models used in the PSCP-1 program. An analysis of the collected data confirms the validity of the inelastic model of friction for the prediction of horizontal displacements caused by temperature changes, shows the occurrence of low values of the coefficient of friction in the field, and indicates the necessity for a different model to predict curling. A new model for the prediction of curling in slabs caused by temperature variations is developed and tested. Program PSCP-2 is the result of the upgrading and calibration of the models. Guidelines are suggested for the economic analysis of PCP slabs, and an example is offered showing the economic benefits from the use of PCP in highways.

SUMMARY OF RESEARCH REPORT 556-4F

Research Report 556-4F is the fourth and final report of Research Project 3-10-88/9-556, "Prestressed Concrete Pavement Overlay." The design, layout, and construction of the PCP sections are reviewed. This report then assimilates and summarizes the information included in the previous reports. The report summarizes the instrumentation and techniques used in the collection of performance information, reports the pavement deflection studies and the condition surveys, describes and evaluates the data collected, reveals the background and theory of analytical models for PCP, and calibrates the PCP model. Design recommendations are offered and discussed along with recommendations for further study.

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17. Hankins, Ken, José A. Tena-Colunga, and Elliott D. Mandell, "The 1/21/89 to 1/23/89 Trip to the Prestress Sites in West Texas," Tech Memo 556-16, Center for Transportation Research, The University of Texas at Austin, January 24, 1989.

APPENDIX A. TEMPERATURE DATA

Appendix A contains temperature records for field visits 3 to 7. Similar data for field visit 2 is presented in Chapter 3. The coded captions follow the data format described in Chapter 2.

TABLE A.1. TEMPERATURES FOR AUGUST 5, 1988

Time	Ambient Temperature (°F)	Top Temperature (°F)	Middle Temperature (°F)	Bottom Temperature (°F)
14:00	98.708	117.356	108.806	101.948
16:00	100.904	117.707	112.577	107.213
18:00	93.956	110.246	109.175	107.159
20:00	88.385	98.366	102.587	103.389
22:00	82.814	91.544	95.999	97.918
0:00	80.474	88.340	92.201	94.262
2:00	78.692	85.973	89.474	91.481
4:00	77.306	84.344	87.638	89.591
6:00	76.928	81.788	84.848	86.873
8:00	85.496	84.101	84.515	85.838
10:00	90.806	97.502	91.697	89.537
12:00	100.094	111.785	101.651	96.530
14:00	102.326	121.550	112.037	105.341

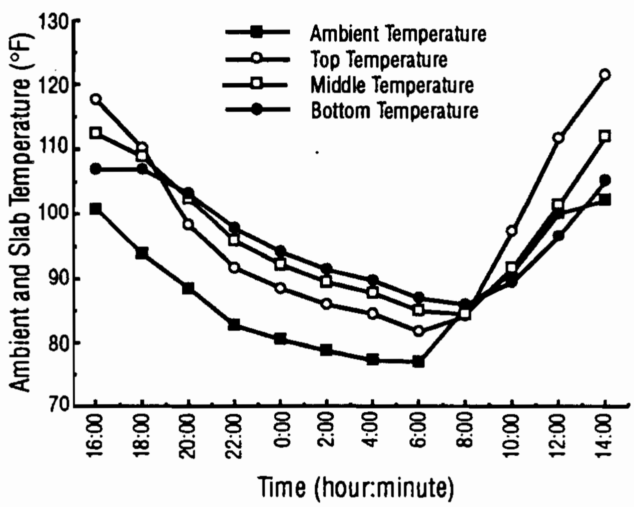

Fig A.1. Temperature plots for August 5, 1988.

TABLE A.2. TEMPERATURES FOR AUGUST 26, 1988

Time	Ambient Temperature (°F)	Top Temperature (°F)	Middle Temperature (°F)	Bottom Temperature (°F)
15:00	106.088	114.152	108.356	102.416
17:00	102.938	107.249	106.754	104.549
19:00	94.118	99.050	102.596	102.272
21:00	86.180	92.921	96.854	98.366
23:00	84.146	89.492	92.984	94.955
1:00	81.554	86.702	90.626	92.516
3:00	80.240	84.758	88.520	90.401
5:00	74.066	82.346	86.414	88.511
7:00	71.744	78.917	83.228	85.361
9:00	84.542	83.354	83.372	84.623
11:00	94.802	97.151	91.310	89.402
13:00	99.140	108.896	99.986	96.035
15:00	102.614	114.611	108.608	103.388

TABLE A.3. TEMPERATURES FOR NOVEMBER 5, 1988

Time	Ambient Temperature (°F)	Top Temperature (°F)	Middle Temperature (°F)	Bottom Temperature (°F)
14:00	75.686	85.010	79.331	77.080
16:00	74.984	78.359	78.341	77.963
18:00	57.632	68.360	73.868	73.094
20:00	51.404	63.275	68.477	68.585
22:00	49.982	58.766	62.942	66.983
0:00	48.164	57.119	61.988	62.933
2:00	44.276	54.509	59.054	60.818
4:00	46.940	52.709	57.614	58.829
6:00	41.738	53.060	54.977	58.154
8:00	61.934	53.816	55.427	56.966
10:00	74.984	66.596	62.384	59.828
12:00	79.358	80.150	72.329	69.143
14:00	72.698	84.470	77.972	75.119

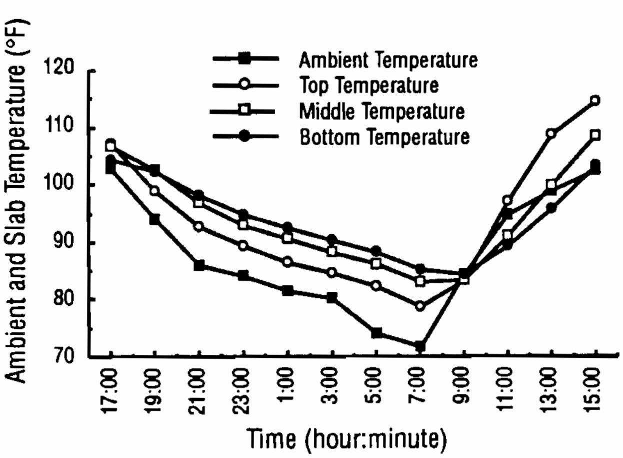

Fig A.2. Temperature plots for August 26, 1988.

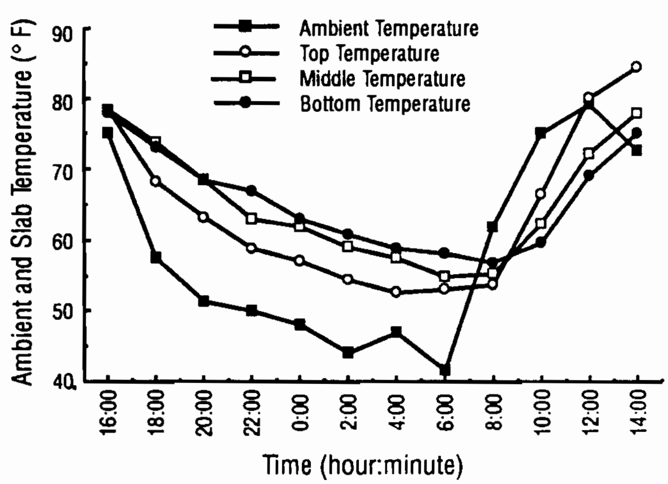

Fig A.3. Temperature plots for November 5, 1988.

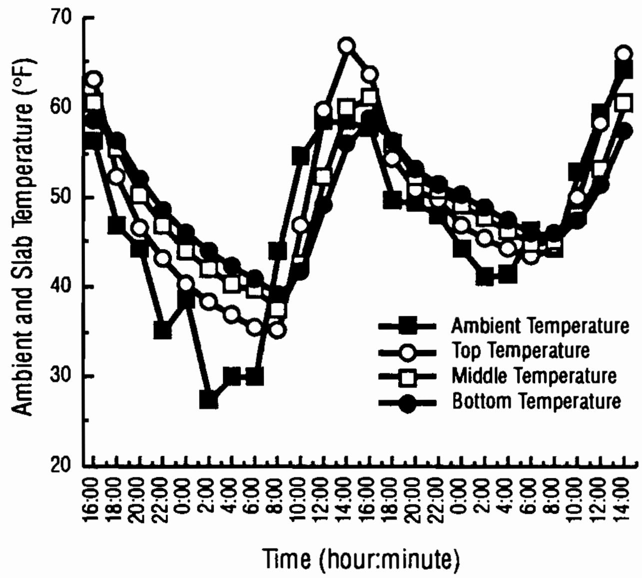

Fig A.4. Temperature plots for January 21 and 22, 1989.

TABLE A.4. TEMPERATURES FOR JANUARY 21 AND 22, 1989

Time	Ambient Temperature (°F)	Top Temperature (°F)	Middle Temperature (°F)	Bottom Temperature (°F)
14:00	53.078	65.696	58.964	55.430
16:00	56.282	63.176	60.521	58.559
18:00	46.778	52.412	55.391	56.192
20:00	44.384	46.553	50.189	51.863
22:00	35.096	43.097	46.947	48.713
0:00	38.480	40.388	44.042	45.959
2:00	27.392	38.282	41.900	43.916
4:00	30.002	36.770	40.235	42.200
6:00	29.882	35.375	39.707	40.835
8:00	43.898	35.060	37.535	39.190
10:00	54.500	46.832	42.674	41.585
12:00	58.622	59.792	52.223	49.025
14:00	58.568	66.848	59.945	56.138
16:00	57.740	63.680	61.178	58.865
18:00	49.640	54.275	56.003	56.327
20:00	49.478	50.981	52.304	53.156
22:00	48.002	49.631	50.954	51.539
0:00	44.366	46.967	49.073	50.153
2:00	41.252	45.482	47.678	48.860
4:00	41.378	44.375	46.382	47.462
6:00	46.184	43.457	44.978	45.977
8:00	44.330	44.465	45.194	45.970
10:00	52.862	50.126	47.912	47.395
12:00	59.450	58.334	53.240	51.380
14:00	64.220	65.876	60.701	57.479

TABLE A.5. TEMPERATURES FOR FEBRUARY 9, 1989

Time	Ambient Temperature (°F)	Top Temperature (°F)	Middle Temperature (°F)	Bottom Temperature (°F)
14:00	48.236	57.155	51.377	48.074
16:00	51.026	57.002	53.375	51.179
18:00	42.926	47.903	49.172	49.460
20:00	38.480	43.187	45.266	46.121
22:00	34.052	39.785	42.305	43.484
0:00	35.384	37.616	40.037	41.225
2:00	35.348	36.320	38.471	39.740
4:00	31.784	35.087	37.256	38.489
6:00	30.902	33.980	36.095	37.472
8:00	45.230	34.880	35.708	36.617
10:00	48.506	47.309	41.945	40.109
12:00	59.702	60.296	51.656	47.570
14:00	62.870	67.235	59.117	54.779

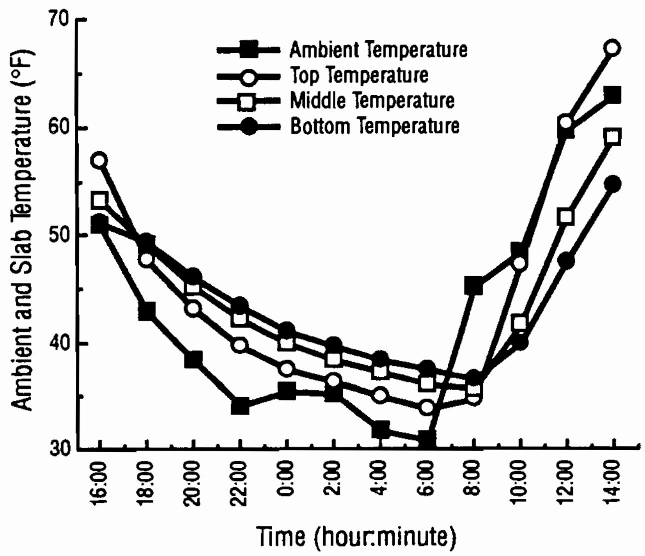

Fig A.5. Temperature plots for February 9, 1989.

APPENDIX B. HORIZONTAL DISPLACEMENT DATA

Appendix B contains horizontal displacement data for field visits 3 through 7. Similar data for field visit 2 is presented in Chapter 3 (this type of data was not collected during field visit 1). The coded captions follow the format described in Chapter 2.

FIELD VISIT 3

Table B.1	080688hm 240.2
Figure B.1	080688HM 240.2
Table B.2	080688hm 440.2
Figure B.2	080688HM 440.2

FIELD VISIT 4

Table B.3	080688hm 240.2
Figure B.3	080688HM 240.2
Table B.4	082688hm 440.2
Figure B.4	082688HM 440.2

FIELD VISIT 5

Table B.5	082688hm 240.2
Figure B.5	082688HM 240.2
Table B.6	110588hm 440.2
Figure B.6	110588HM 440.2

FIELD VISIT 6

Table B.7	110588hm 240.2
Figure B.7	110588HM 240.2
Table B.8	012189hm 440.2
Figure B.8	012189HM 440.2

FIELD VISIT 7

Table B.9	012189hm 240.2
Figure B.9	012189HM 240.2
Table B.10	020989hm 440.2
Figure B.10	020989HM 440.2

TABLE B.1. HORIZONTAL DISPLACEMENT FOR AUGUST 5, 1988, 240-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	7S	8N	8S	9N	9S	10N
0	14:00	98.708	108.806	0.000	0.000	0.000	0.000	0.000	0.000
2	16:00	100.904	112.577	0.013	0.007	0.007	0.008	0.008	0.016
4	18:00	93.956	109.175	0.014	0.007	0.005	0.006	0.006	0.013
6	20:00	88.385	102.587	-0.001	-0.011	-0.014	-0.011	-0.006	-0.039
8	22:00	82.814	95.999	-0.044	-0.052	-0.059	-0.042	-0.029	-0.090
10	0:00	80.474	92.201	-0.069	-0.076	-0.083	-0.064	-0.051	-0.119
12	2:00	78.692	89.474	-0.089	-0.098	-0.104	-0.084	-0.070	-0.141
14	4:00	77.306	87.638	-0.104	-0.113	-0.119	-0.100	-0.084	-0.157
16	6:00	76.928	84.848	-0.118	-0.126	-0.132	-0.116	-0.097	-0.169
18	8:00	85.496	84.515	-0.126	-0.132	-0.139	-0.119	-0.101	-0.176
20	10:00	90.806	91.697	-0.091	-0.088	-0.093	-0.070	-0.055	-0.117
22	12:00	100.094	101.651	-0.027	-0.030	-0.033	-0.014	-0.004	-0.042
24	14:00	102.326	112.037	0.011	-0.000	0.003	0.007	0.007	0.015

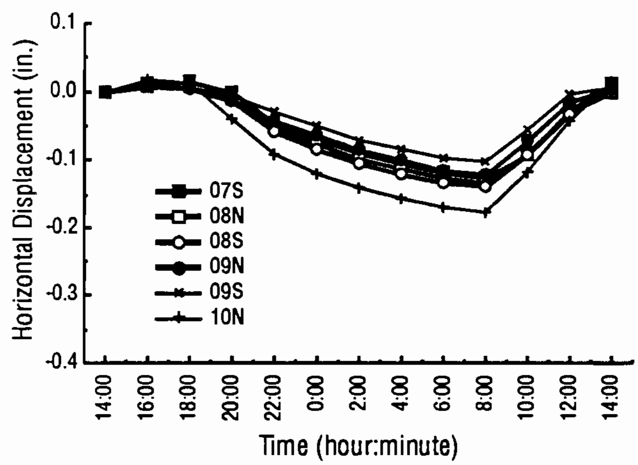

Fig B.1. Plot of horizontal displacement for August 5, 1988, 240-foot slabs.

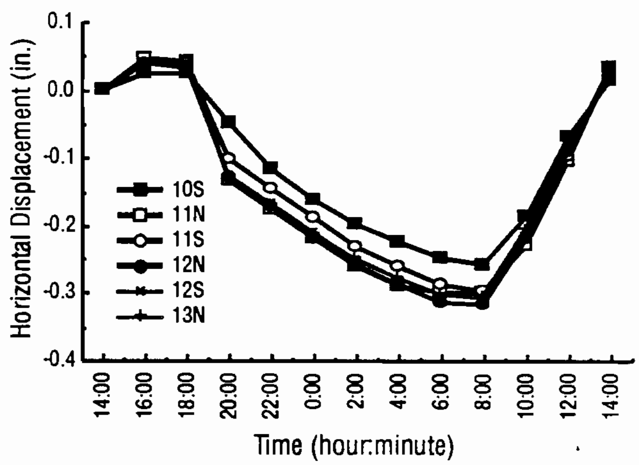

Fig B.2. Plot of horizontal displacement for August 5, 1988, 440-foot slabs.

TABLE B.2. HORIZONTAL DISPLACEMENT FOR AUGUST 5, 1988, 440-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	10S	11N	11S	12N	12S	13N
0	14:00	98.708	108.806	0.000	0.000	0.000	0.000	0.000	0.000
2	16:00	100.904	112.577	0.024	0.045	0.038	0.038	0.037	0.036
4	18:00	93.956	109.175	0.023	0.040	0.037	0.034	0.034	0.028
6	20:00	88.385	102.587	-0.048	-0.131	-0.100	-0.128	-0.126	-0.129
8	22:00	82.814	95.999	-0.115	-0.174	-0.144	-0.171	-0.166	-0.169
10	0:00	80.474	92.201	-0.160	-0.219	-0.186	-0.215	-0.209	-0.210
12	2:00	78.692	89.474	-0.197	-0.259	-0.229	-0.257	-0.249	-0.248
14	4:00	77.306	87.638	-0.224	-0.288	-0.259	-0.286	-0.277	-0.276
16	6:00	76.928	84.848	-0.248	-0.296	-0.285	-0.311	-0.302	-0.300
18	8:00	85.496	84.515	-0.257	-0.296	-0.295	-0.314	-0.306	-0.302
20	10:00	90.806	91.697	-0.184	-0.227	-0.217	-0.219	-0.214	-0.205
22	12:00	100.094	101.651	-0.068	-0.103	-0.095	-0.088	-0.087	-0.083
24	14:00	102.326	112.037	0.014	0.032	0.027	0.032	0.027	0.024

TABLE B.3. HORIZONTAL DISPLACEMENT FOR AUGUST 26, 1988, 240-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	7S	8N	8S	9N	9S	10N
0	15:00	106.088	108.356	0.000	0.000	0.000	0.000	0.000	0.000
2	17:00	102.938	106.754	-0.005	0.001	-0.002	-0.004	-0.008	-0.002
4	19:00	94.118	102.596	-0.023	-0.017	-0.021	-0.013	-0.014	-0.038
6	21:00	86.180	96.854	-0.056	-0.050	-0.056	-0.044	-0.040	-0.085
8	23:00	84.146	92.984	-0.082	-0.078	-0.086	-0.073	-0.065	-0.113
10	1:00	81.554	90.626	-0.101	-0.096	-0.104	-0.092	-0.081	-0.140
12	3:00	80.240	88.520	-0.118	-0.113	-0.122	-0.109	-0.096	-0.150
14	5:00	74.066	86.414	-0.133	-0.128	-0.138	-0.125	-0.111	-0.166
16	7:00	71.744	83.228	-0.148	-0.143	-0.154	-0.142	-0.125	-0.183
18	9:00	84.542	83.372	-0.151	-0.145	-0.154	-0.140	-0.127	-0.180
20	11:00	94.802	91.310	-0.111	-0.083	-0.091	-0.090	-0.082	-0.124
22	13:00	99.140	99.986	-0.053	-0.040	-0.045	-0.028	-0.025	-0.056
24	15:00	102.614	108.608	-0.009	0.000	-0.002	-0.003	-0.006	-0.006

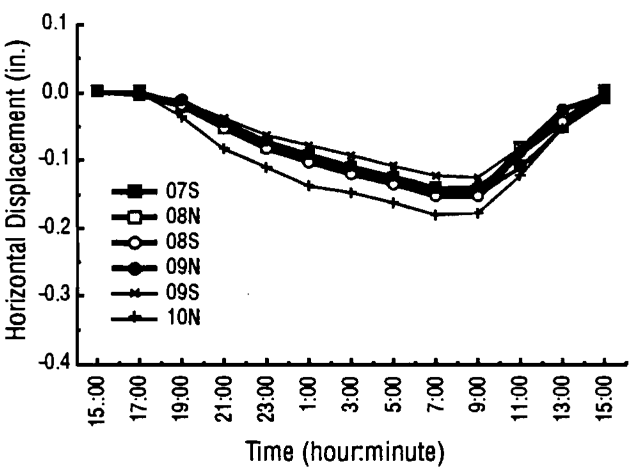

Fig B.3. Plot of horizontal displacement for August 26, 1988, 240-foot slabs.

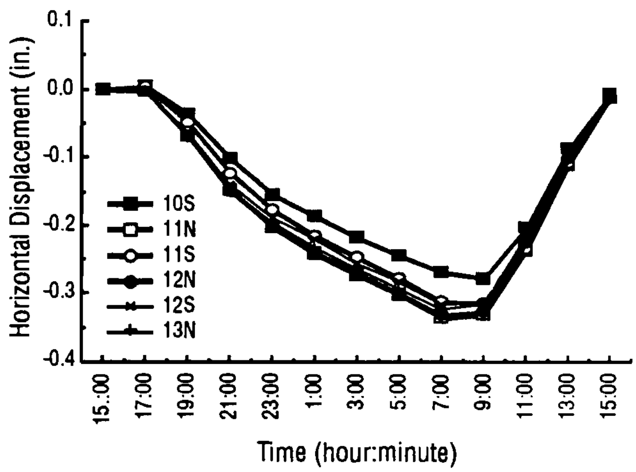

Fig B.4. Plot of horizontal displacement for August 26, 1988, 440-foot slabs.

TABLE B.4. HORIZONTAL DISPLACEMENT FOR AUGUST 26, 1988, 440-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	10S	11N	11S	12N	12S	13N
0	15:00	106.088	108.356	0.000	0.000	0.000	0.000	0.000	0.000
2	17:00	102.938	106.754	0.005	-0.004	0.004	-0.003	-0.003	-0.004
4	19:00	94.118	102.596	-0.037	-0.067	-0.048	-0.068	-0.062	-0.070
6	21:00	86.180	96.854	-0.102	-0.147	-0.123	-0.148	-0.139	-0.146
8	23:00	84.146	92.984	-0.153	-0.201	-0.176	-0.199	-0.186	-0.194
10	1:00	81.554	90.626	-0.185	-0.239	-0.213	-0.237	-0.219	-0.231
12	3:00	80.240	88.520	-0.215	-0.271	-0.244	-0.268	-0.253	-0.261
14	5:00	74.066	86.414	-0.241	-0.300	-0.276	-0.296	-0.281	-0.289
16	7:00	71.744	83.228	-0.266	-0.333	-0.309	-0.329	-0.313	-0.320
18	9:00	84.542	83.372	-0.275	-0.329	-0.312	-0.323	-0.311	-0.314
20	11:00	94.802	91.310	-0.201	-0.236	-0.232	-0.224	-0.220	-0.215
22	13:00	99.140	99.986	-0.086	-0.110	-0.108	-0.101	-0.101	-0.098
24	15:00	102.614	108.608	-0.008	-0.012	-0.013	-0.008	-0.012	-0.016

TABLE B.5. HORIZONTAL DISPLACEMENT FOR NOVEMBER 5, 1988, 240-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	8S	9N	9S	9S/6	10N/3	10N/6	10N
0	14:00	75.686	79.331	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	16:00	74.984	78.341	-0.002	-0.003	-0.003	0.000	0.000	0.000	-0.006
4	18:00	57.632	73.868	-0.038	-0.041	-0.040	-0.023	-0.014	-0.023	-0.047
6	20:00	51.404	68.477	-0.075	-0.077	-0.075	-0.046	-0.028	-0.046	-0.085
8	22:00	49.982	62.942	-0.100	-0.103	-0.100	-0.062	-0.036	-0.060	-0.111
10	0:00	48.164	61.988	-0.119	-0.123	-0.119	-0.075	-0.043	-0.073	-0.128
12	2:00	44.276	59.054	-0.135	-0.140	-0.135	-0.086	-0.048	-0.084	-0.143
14	4:00	46.940	57.614	-0.151	-0.156	-0.150	-0.095	-0.053	-0.093	-0.158
16	6:00	41.738	54.977	-0.161	-0.165	-0.159	-0.101	-0.055	-0.099	-0.167
18	8:00	61.934	55.427	-0.167	-0.170	-0.164	-0.106	-0.056	-0.105	-0.170
20	10:00	74.984	62.384	-0.124	-0.126	-0.122	-0.081	-0.041	-0.081	-0.123
22	12:00	79.358	72.329	-0.059	-0.061	-0.057	-0.040	-0.018	-0.039	-0.056
24	14:00	72.698	77.972	-0.013	-0.015	-0.014	-0.011	-0.004	-0.010	-0.014

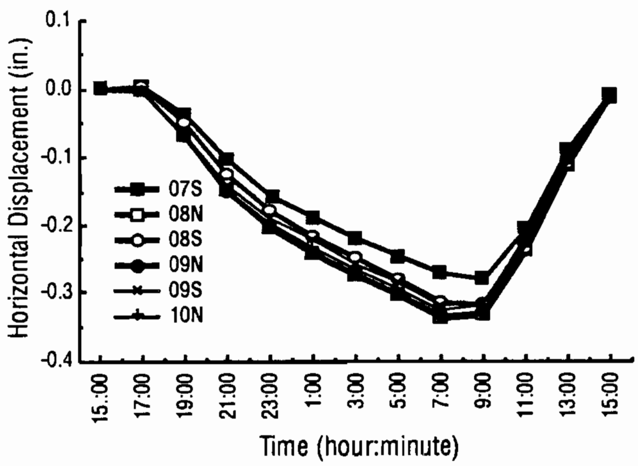

Fig B.5. Plot of horizontal displacement for November 5, 1988, 240-foot slabs.

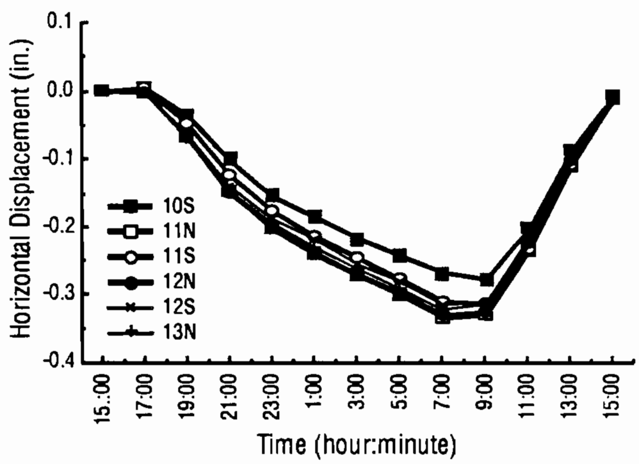

Fig B.6. Plot of horizontal displacement for November 5, 1988, 440-foot slabs.

TABLE B.6. HORIZONTAL DISPLACEMENT FOR NOVEMBER 5, 1988, 440-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	10S	10S/6	10S/3	11N/3	11N	11S	12N
0	14:00	75.686	79.331	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	16:00	74.984	78.341	0.000	0.003	0.003	0.003	-0.007	-0.002	-0.006
4	18:00	57.632	73.868	-0.057	-0.030	-0.009	-0.009	-0.073	-0.057	-0.068
6	20:00	51.404	68.477	-0.124	-0.079	-0.033	-0.035	-0.146	-0.127	-0.142
8	22:00	49.982	62.942	-0.173	-0.112	-0.048	-0.052	-0.198	-0.178	-0.194
10	0:00	48.164	61.988	-0.206	-0.132	-0.058	-0.065	-0.231	-0.211	-0.227
12	2:00	44.276	59.054	-0.233	-0.151	-0.066	-0.073	-0.257	-0.238	-0.253
14	4:00	46.940	57.614	-0.261	-0.169	-0.075	-0.084	-0.286	-0.267	-0.281
16	6:00	41.738	54.977	-0.276	-0.180	-0.080	-0.088	-0.303	-0.284	-0.297
18	8:00	61.934	55.427	-0.290	-0.190	-0.086	-0.093	-0.309	-0.296	-0.303
20	10:00	74.984	62.384	-0.229	-0.155	-0.076	-0.079	-0.233	-0.235	-0.228
22	12:00	79.358	72.329	-0.111	-0.076	-0.040	-0.041	-0.111	-0.115	-0.108
24	14:00	72.698	77.972	-0.030	-0.019	-0.012	-0.014	-0.030	-0.030	-0.027

TABLE B.7. HORIZONTAL DISPLACEMENT FOR JANUARY 21 AND 22, 1989, 240-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	8S	9N	9S	9S/6	10N/3	10N/6	10N
0	14:00	53.078	58.964	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	16:00	56.282	60.521	0.013	0.009	0.009	0.008	0.003	0.005	0.009
4	18:00	46.778	55.391	-0.013	-0.016	-0.017	-0.005	-0.006	-0.011	-0.019
6	20:00	44.384	50.189	-0.044	-0.048	-0.048	-0.024	-0.015	-0.029	-0.051
8	22:00	35.096	46.947	-0.068	-0.070	-0.070	-0.039	-0.023	-0.044	-0.073
10	0:00	38.480	44.042	-0.084	-0.087	-0.087	-0.049	-0.028	-0.055	-0.091
12	2:00	27.392	41.900	-0.098	-0.101	-0.102	-0.059	-0.032	-0.064	-0.105
14	4:00	30.002	40.235	-0.109	-0.112	-0.114	-0.066	-0.035	-0.071	-0.115
16	6:00	29.882	39.707	-0.118	-0.120	-0.122	-0.071	-0.037	-0.075	-0.122
18	8:00	43.898	37.535	-0.128	-0.128	-0.130	-0.076	-0.039	-0.080	-0.128
20	10:00	54.500	42.674	-0.102	-0.101	-0.104	-0.063	-0.032	-0.065	-0.100
22	12:00	58.622	52.223	-0.046	-0.045	-0.048	-0.028	-0.013	-0.030	-0.043
24	14:00	58.568	59.945	0.003	0.002	-0.002	0.002	0.000	-0.002	0.002
26	16:00	57.740	61.178	0.018	0.015	0.013	0.013	0.005	0.013	0.017
28	18:00	49.640	56.003	-0.006	-0.007	-0.010	0.000	-0.003	-0.006	-0.010
30	20:00	49.478	52.304	-0.032	-0.033	-0.036	-0.016	-0.011	-0.024	-0.037
32	22:00	48.002	50.954	-0.041	-0.043	-0.045	-0.023	-0.015	-0.030	-0.046
34	0:00	44.366	49.073	-0.054	-0.057	-0.054	-0.031	-0.019	-0.040	-0.060
36	2:00	41.252	47.678	-0.065	-0.068	-0.068	-0.037	-0.022	-0.045	-0.069
38	4:00	41.378	46.382	-0.073	-0.076	-0.077	-0.043	-0.025	-0.051	-0.070
40	6:00	46.184	44.978	-0.080	-0.083	-0.084	-0.047	-0.027	-0.055	-0.083
42	8:00	44.330	45.194	-0.080	-0.083	-0.084	-0.047	-0.027	-0.055	-0.083
44	10:00	52.862	47.912	-0.067	-0.068	-0.069	-0.040	-0.024	-0.048	-0.068
46	12:00	59.450	53.240	-0.038	-0.041	-0.042	-0.024	-0.015	-0.031	-0.042
48	14:00	64.220	60.701	0.012	0.012	0.008	0.007	0.002	0.001	0.011

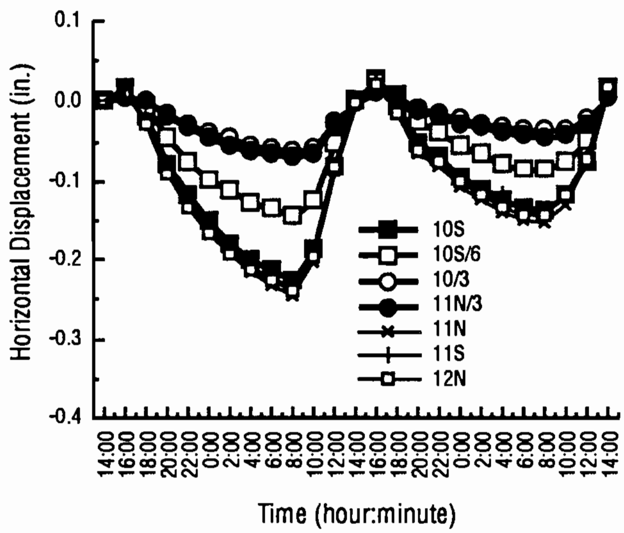

Fig B.7. Plot for horizontal displacement for January 21 and 22, 1989, 240-foot slabs.

TABLE B.8. HORIZONTAL DISPLACEMENT FOR JANUARY 21 AND 22, 1989, 440-FOOT SLABS										
Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	10S	10S/6	10S/3	11N/3	11N	11S	12N
0	14:00	53.078	58.964	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	16:00	56.282	60.521	0.017	0.012	0.005	0.006	0.012	0.014	0.012
4	18:00	46.778	55.391	-0.019	-0.005	0.002	0.001	-0.027	-0.021	-0.028
6	20:00	44.384	50.189	-0.077	-0.044	-0.015	-0.018	-0.090	-0.084	-0.090
8	22:00	35.096	46.947	-0.118	-0.073	-0.028	-0.033	-0.132	-0.128	-0.132
10	0:00	38.480	44.042	-0.151	-0.096	-0.039	-0.045	-0.167	-0.161	-0.166
12	2:00	27.392	41.900	-0.178	-0.112	-0.046	-0.053	-0.193	-0.186	-0.192
14	4:00	30.002	40.235	-0.198	-0.126	-0.053	-0.060	-0.217	-0.209	-0.213
16	6:00	29.882	39.707	-0.211	-0.134	-0.057	-0.064	-0.231	-0.221	-0.226
18	8:00	43.898	37.535	-0.225	-0.143	-0.062	-0.068	-0.245	-0.235	-0.238
20	10:00	54.500	42.674	-0.186	-0.123	-0.057	-0.063	-0.201	-0.194	-0.195
22	12:00	58.622	52.223	-0.082	-0.051	-0.024	-0.028	-0.088	-0.084	-0.082
24	14:00	58.568	59.945	0.000	0.001	-0.001	-0.002	-0.006	-0.002	-0.003
26	16:00	57.740	61.178	0.028	0.023	0.010	0.010	0.021	0.024	0.022
28	18:00	49.640	56.003	-0.004	0.007	0.006	0.004	-0.015	-0.008	-0.016
30	20:00	49.478	52.304	-0.052	-0.026	-0.008	-0.013	-0.063	-0.054	-0.060
32	22:00	48.002	50.954	-0.069	-0.037	-0.014	-0.019	-0.080	-0.069	-0.075
34	0:00	44.366	49.073	-0.093	-0.054	-0.022	-0.027	-0.106	-0.095	-0.101
36	2:00	41.252	47.678	-0.109	-0.065	-0.027	-0.033	-0.124	-0.112	-0.117
38	4:00	41.378	46.382	-0.125	-0.076	-0.032	-0.039	-0.139	-0.117	-0.134
40	6:00	46.184	44.978	-0.135	-0.083	-0.035	-0.042	-0.150	-0.139	-0.143
42	8:00	44.330	45.194	-0.137	-0.084	-0.036	-0.044	-0.152	-0.140	-0.144
44	10:00	52.862	47.912	-0.117	-0.075	-0.035	-0.041	-0.129	-0.118	-0.118
46	12:00	59.450	53.240	-0.073	-0.047	-0.023	-0.027	-0.079	-0.071	-0.071
48	14:00	64.220	60.701	0.017	0.013	0.003	0.003	0.013	0.018	0.019

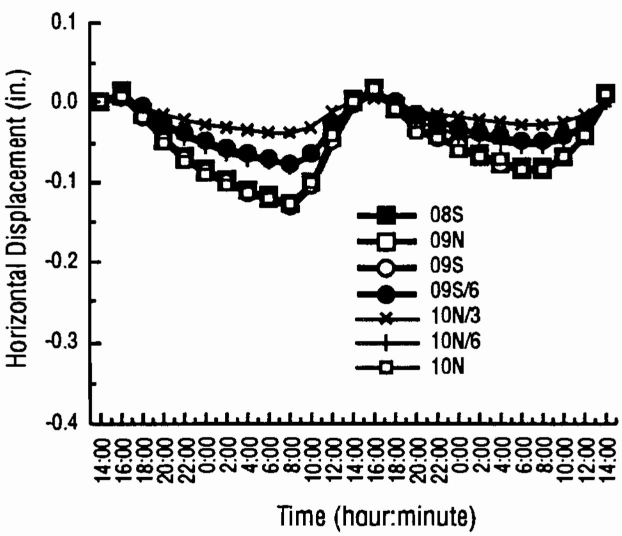

Fig B.8. Plot for horizontal displacement for January 21 and 22, 1989, 440-foot slabs.

TABLE B.9. HORIZONTAL DISPLACEMENT FOR FEBRUARY 9, 1989, 240-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	8S	9N	9S	9S/6	10N/3	10N/6	10N
0	14:00	48.236	51.377	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	16:00	51.026	53.375	0.017	0.017	0.015	0.011	0.005	0.009	0.016
4	18:00	42.926	49.172	0.000	0.000	-0.002	0.003	0.001	-0.003	-0.003
6	20:00	38.480	45.266	-0.026	-0.026	-0.028	-0.014	-0.007	-0.020	-0.028
8	22:00	34.052	42.305	-0.047	-0.045	-0.048	-0.028	-0.013	-0.034	-0.050
10	0:00	35.384	40.037	-0.064	-0.061	-0.065	-0.038	-0.018	-0.044	-0.064
12	2:00	35.348	38.471	-0.074	-0.072	-0.075	-0.044	-0.021	-0.050	-0.074
14	4:00	31.784	37.256	-0.082	-0.080	-0.083	-0.049	-0.023	-0.055	-0.081
16	6:00	30.902	36.095	-0.089	-0.088	-0.089	-0.055	-0.025	-0.060	-0.087
18	8:00	45.230	35.708	-0.094	-0.092	-0.095	-0.058	-0.026	-0.063	-0.093
20	10:00	48.506	41.945	-0.064	-0.061	-0.063	-0.040	-0.018	-0.046	-0.061
22	12:00	59.702	51.656	-0.006	-0.004	-0.005	-0.004	0.000	-0.008	-0.004
24	14:00	62.870	59.117	0.043	0.045	0.042	0.028	0.015	0.023	0.045

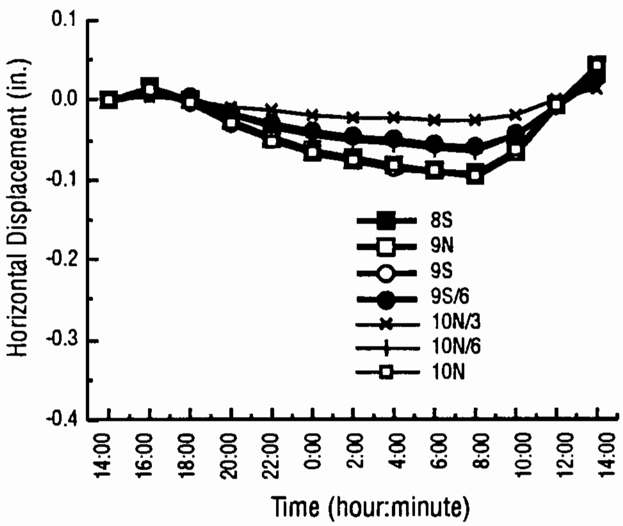

Fig B.9. Plot of horizontal displacement for February 9, 1989, 240-foot slabs.

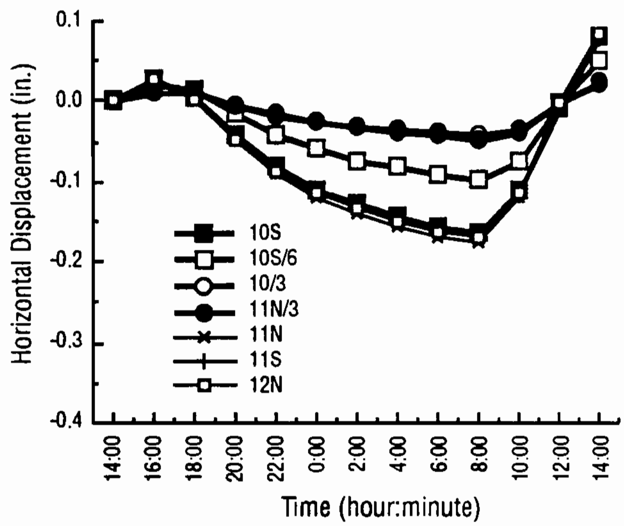

Fig B.10. Plot of horizontal displacement for February 9, 1989, 440-foot slabs.

TABLE B.10. HORIZONTAL DISPLACEMENT FOR FEBRUARY 9, 1989, 440-FOOT SLABS

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	10S	10S/6	10S/3	11N/3	11N	11S	12N
0	14:00	48.236	51.377	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2	16:00	51.026	53.375	0.029	0.021	0.010	0.012	0.028	0.028	0.026
4	18:00	42.926	49.172	0.004	0.015	0.010	0.011	0.001	0.006	0.001
6	20:00	38.480	45.266	-0.043	-0.015	-0.004	-0.004	-0.049	-0.045	-0.049
8	22:00	34.052	42.305	-0.082	-0.041	-0.016	-0.017	-0.091	-0.086	-0.088
10	0:00	35.384	40.037	-0.109	-0.059	-0.024	-0.026	-0.119	-0.115	-0.113
12	2:00	35.348	38.471	-0.127	-0.073	-0.031	-0.033	-0.139	-0.135	-0.133
14	4:00	31.784	37.256	-0.142	-0.082	-0.035	-0.039	-0.155	-0.149	-0.150
16	6:00	30.902	36.095	-0.155	-0.091	-0.038	-0.043	-0.169	-0.163	-0.163
18	8:00	45.230	35.708	-0.162	-0.096	-0.042	-0.047	-0.176	-0.169	-0.170
20	10:00	48.506	41.945	-0.112	-0.073	-0.034	-0.038	-0.120	-0.117	-0.114
22	12:00	59.702	51.656	-0.008	-0.003	-0.002	-0.003	-0.005	-0.007	-0.003
24	14:00	62.870	59.117	0.079	0.052	0.022	0.024	0.082	0.078	0.082

APPENDIX C. VERTICAL DISPLACEMENT DATA

Appendix C contains vetical displacement records for field visits 3 to 7. Data for field visit 2 is presented in Chapter 3. The coded captions follow the format described in Chapter 2.

TABLE	*C.3*	*080588VM*	*240.3*
Figure	*C.3*	*080588VM*	*240.3*
TABLE	*C.4*	*082688VM*	*440.3*
Figure	*C.4*	*082688VM*	*440.3*
TABLE	*C.5*	*110588VM*	*440.3*
Figure	*C.5*	*110588VM*	*440.3*
TABLE	*C.6*	*012289VM*	*440.3*
Figure	*C.6*	*012289VM*	*440.3*
TABLE	*C.7*	*020989VM*	*440.3*
Figure	*C.7*	*020989VM*	*440.3*

TABLE C.1. VERTICAL DISPLACEMENT FOR AUGUST 5, 1988, 240-FOOT SLABS

Hour	V.D7S	V.D8N	V.D8S	V.D9N	V.D9S	V.D10N (LVDT)
15:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
17:00	0.0022	0.0025	0.0033	0.0036	0.0022	0.005
19:00	0.0218	0.0194	0.0207	0.0208	0.0208	0.034
21:00	0.1044	0.0830	0.0849	0.0865	0.0850	0.100
23:00	0.1158	0.1160	0.1168	0.1392	0.1310	0.132
1:00	0.1156	0.1405	0.1409	0.1393	0.1308	0.136
3:00	0.1156	0.1454	0.1450	0.1394	0.1336	0.139
5:00	0.1155	0.1478	0.1469	0.1419	0.1361	0.140
7:00	0.1496	0.1493	0.1493	0.1478	0.1390	0.141
9:00	0.1320	0.1291	0.1278	0.1257	0.1199	0.114
11:00	0.0574	0.0518	0.0535	0.0542	0.0554	0.041
13:00	0.0170	0.0147	0.0171	0.0244	0.0270	0.006
15:00	0.0136	0.0030	0.0071	0.0104	0.0134	-0.003

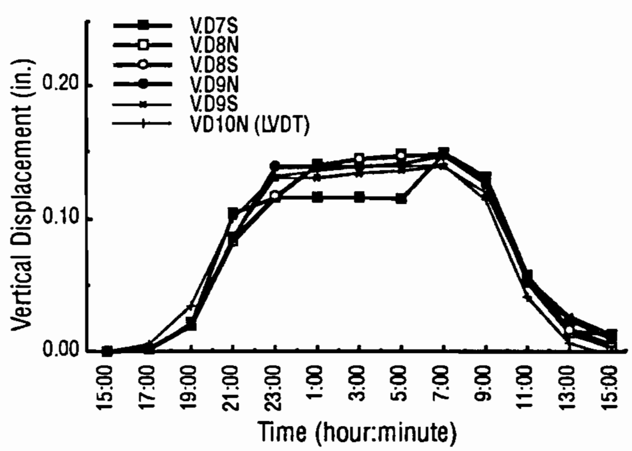

Fig C.1. Plot of vertical displacement for August 5, 1988, 240-foot slabs.

TABLE C.2. VERTICAL DISPLACEMENT FOR AUGUST 5, 1988, 440-FOOT SLABS

Hour	V.D11N	V.D11S	V.D12N	V.D12S	V.D13S	V.D10S (LVDT)
15:00	0.000	0.000	0.000	0.000	0.000	0.000
17:00	0.013	0.007	0.005	0.002	0.003	0.005
19:00	0.041	0.031	0.015	0.011	0.022	0.034
21:00	0.139	0.143	0.106	0.109	0.133	0.100
23:00	0.144	0.153	0.112	0.117	0.139	0.132
1:00	0.141	0.151	0.115	0.121	0.142	0.136
3:00	0.140	0.154	0.116	0.126	0.145	0.139
5:00	0.137	0.156	0.116	0.129	0.150	0.140
7:00	0.137	0.164	0.115	0.130	0.151	0.141
9:00	0.106	0.127	0.086	0.100	0.118	0.114
11:00	0.040	0.053	0.026	0.035	0.035	0.041
13:00	0.023	0.019	0.008	0.012	0.006	0.006
15:00	0.025	0.010	0.007	0.005	-0.001	-0.003

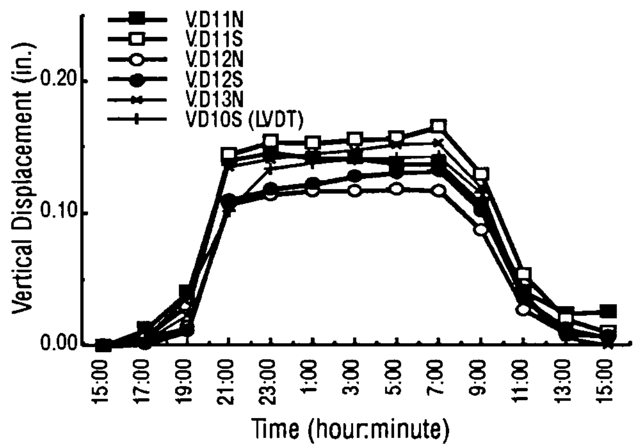

Fig C.2. Plot of vertical displacement for August 5, 1988, 440-foot slabs.

TABLE C.3. VERTICAL DISPLACEMENT FOR AUGUST 26, 1988, 240-FOOT SLABS

Hour	V.D7S	V.D8N	V.D8S	V.D9N	V.D9S	V.D10N (LVDT)
15:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.000
17:00	0.0312	0.0387	0.0363	0.0317	0.0399	0.033
19:00	0.0763	0.0862	0.0817	0.0789	0.0794	0.081
21:00	0.1201	0.1274	0.1206	0.1269	0.1206	0.124
23:00	0.1369	0.1424	0.1343	0.1447	0.1352	0.138
1:00	0.1423	0.1484	0.1390	0.1534	0.1414	0.139
3:00	0.1470	0.1542	0.1459	0.1605	0.1499	0.141
5:00	0.1501	0.1621	0.1528	0.1716	0.1555	0.148
7:00	0.1605	0.1727	0.1612	0.1838	0.1644	0.158
9:00	0.1252	0.1329	0.1123	0.1467	0.1282	0.113
11:00	0.0572	0.0635	0.0346	0.0712	0.0650	0.042
13:00	0.0349	0.0207	0.0120	0.0356	0.0335	0.014
15:00	0.0253	0.0150	0.0068	0.0279	0.0242	0.012

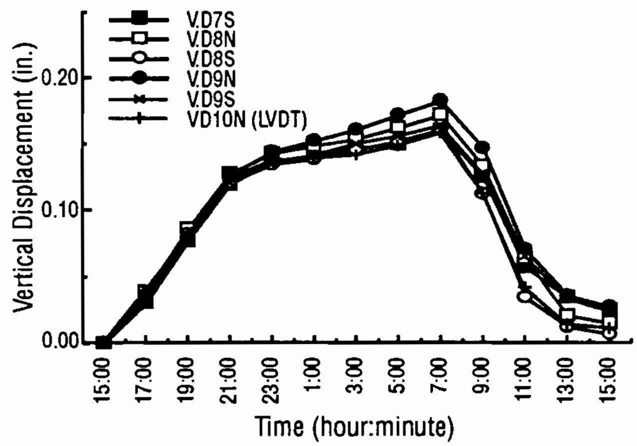

Fig C.3. Plot of vertical displacement for August 26, 1988, 240-foot slabs.

TABLE C.4. VERTICAL DISPLACEMENT FOR AUGUST 26, 1988, 440-FOOT SLABS

Hour	V.D11N	V.D11S	V.D12N	V.D12S	V.D13S	V.D10S (LVDT)
15:00	0.000	0.000	0.000	0.000	0.000	0.000
17:00	0.044	0.042	0.023	0.024	0.042	0.034
19:00	0.091	0.095	0.067	0.072	0.095	0.084
21:00	0.127	0.136	0.103	0.113	0.135	0.120
23:00	0.134	0.147	0.111	0.124	0.146	0.132
1:00	0.134	0.151	0.116	0.131	0.152	0.138
3:00	0.138	0.156	0.120	0.136	0.160	0.142
5:00	0.140	0.161	0.126	0.143	0.167	0.141
7:00	0.144	0.169	0.130	0.151	0.174	0.150
9:00	0.097	0.121	0.083	0.104	0.125	0.106
11:00	0.033	0.045	0.023	0.046	0.043	0.029
13:00	0.012	0.010	0.005	0.024	0.009	-0.002
15:00	0.012	0.004	0.004	0.021	0.004	-0.006

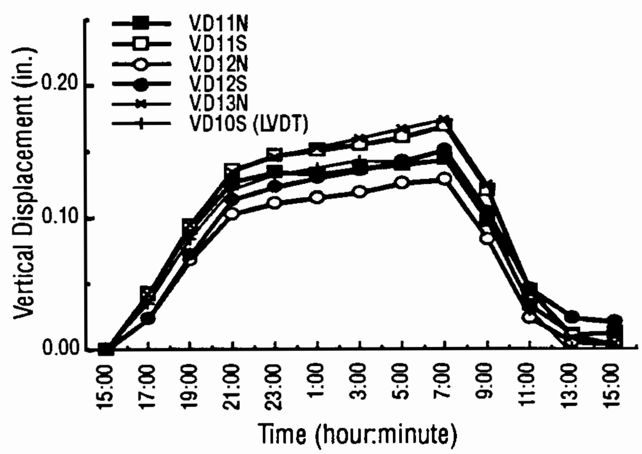

Fig C.4. Plot of vertical displacement for August 26, 1988, 440-foot slabs.

TABLE C.5. VERTICAL DISPLACEMENT FOR NOVEMBER 5, 1988, 240-FOOT SLABS

Hour	8S	9N	9S	9S/6	10N/3	10N/6	V.D10N (LVDT)
14:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16:00	0.015	0.018	0.018	0.009	0.008	0.010	0.018
18:00	0.049	0.063	0.055	0.034	0.031	0.038	0.057
20:00	0.066	0.085	0.078	0.048	0.043	0.052	0.076
22:00	0.073	0.096	0.089	0.052	0.046	0.056	0.083
0:00	0.075	0.101	0.093	0.055	0.047	0.057	0.083
2:00	0.078	0.104	0.097	0.057	0.047	0.059	0.086
4:00	0.080	0.105	0.097	0.059	0.047	0.059	0.085
6:00	0.081	0.107	0.097	0.060	0.047	0.060	0.086
8:00	0.076	0.092	0.090	0.054	0.040	0.051	0.063
10:00	0.022	0.035	0.049	0.023	0.014	0.019	0.010
12:00	0.000	0.006	0.039	0.009	0.005	0.004	-0.012
14:00	-0.002	0.004	0.047	0.007	0.002	0.004	-0.012

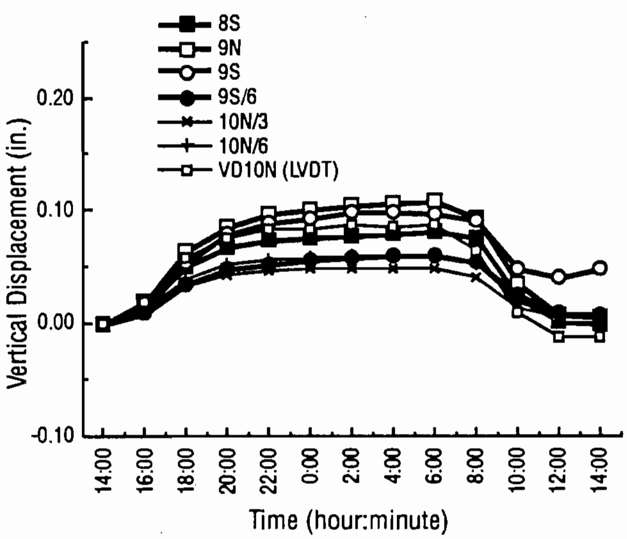

Fig C.5. Plot of vertical displacement for November 5, 1988, 240-foot slabs.

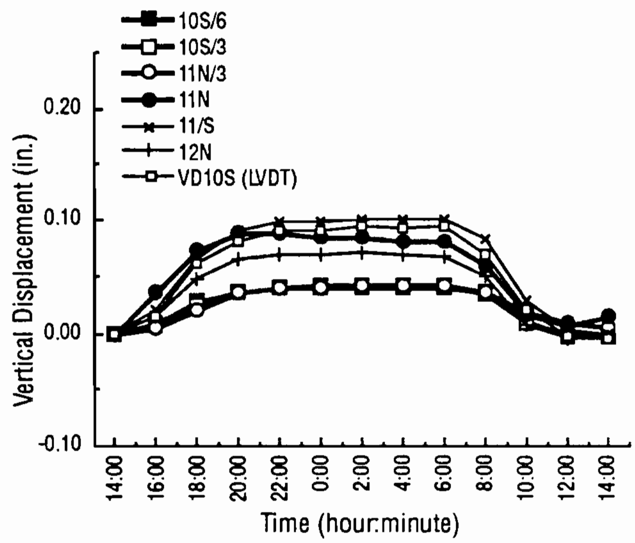

Fig C.6. Plot of vertical displacement for November 5, 1988, 440-foot slabs.

TABLE C.6. VERTICAL DISPLACEMENT FOR NOVEMBER 5, 1988, 440-FOOT SLABS

Hour	10S/6	10S/3	11N/3	11N	11/S	12N	V.D10S (LVDT)
14:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16:00	0.009	0.007	0.005	0.035	0.020	0.014	0.015
18:00	0.028	0.025	0.021	0.072	0.065	0.047	0.060
20:00	0.037	0.036	0.035	0.088	0.091	0.065	0.082
22:00	0.039	0.040	0.041	0.089	0.098	0.070	0.090
0:00	0.039	0.041	0.041	0.085	0.099	0.069	0.090
2:00	0.041	0.042	0.042	0.084	0.101	0.070	0.094
4:00	0.041	0.042	0.042	0.081	0.100	0.069	0.093
6:00	0.041	0.042	0.042	0.080	0.101	0.068	0.095
8:00	0.036	0.035	0.036	0.059	0.083	0.049	0.070
10:00	0.010	0.009	0.018	0.016	0.028	0.006	0.022
12:00	-0.003	-0.001	0.009	0.007	0.002	-0.004	-0.002
14:00	-0.003	-0.002	0.004	0.015	-0.002	-0.002	-0.005

TABLE C.7. VERTICAL DISPLACEMENT FOR JANUARY 21 AND 22, 1989, 240-FOOT SLABS

Hour	8S	9N	9S	9S/6	10N/3	10N/6	V.D10N (LVDT)
14:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16:00	0.002	0.007	0.007	0.001	0.003	0.003	0.007
18:00	0.023	0.030	0.026	0.010	0.015	0.014	0.029
20:00	0.029	0.044	0.038	0.016	0.022	0.022	0.041
22:00	0.030	0.051	0.043	0.019	0.025	0.023	0.045
0:00	0.033	0.055	0.046	0.022	0.026	0.025	0.046
2:00	0.033	0.057	0.048	0.023	0.026	0.025	0.047
4:00	0.034	0.059	0.049	0.024	0.026	0.026	0.048
6:00	0.035	0.060	0.049	0.025	0.026	0.026	0.047
8:00	0.035	0.059	0.049	0.024	0.024	0.024	0.043
10:00	0.016	0.028	0.028	0.013	0.016	0.012	0.016
12:00	0.002	0.010	0.011	0.003	0.008	0.004	0.002
14:00	-0.001	0.005	0.007	0.001	0.009	0.003	-0.000
16:00	0.004	0.009	0.007	-0.000	0.008	0.003	0.009
18:00	0.017	0.028	0.025	0.008	0.018	0.013	0.030
20:00	0.023	0.035	0.031	0.010	0.021	0.016	0.032
22:00	0.036	0.034	0.035	0.011	0.020	0.015	0.031
0:00	0.040	0.040	0.034	0.014	0.023	0.017	0.036
2:00	0.040	0.041	0.035	0.015	0.023	0.017	0.036
4:00	0.040	0.043	0.038	0.016	0.024	0.018	0.037
6:00	0.040	0.045	0.038	0.016	0.023	0.017	0.035
8:00	0.037	0.039	0.035	0.015	0.022	0.015	0.030
10:00	0.027	0.024	0.022	0.009	0.018	0.010	0.017
12:00	0.020	0.013	0.012	0.004	0.011	0.004	0.006
14:00	0.012	0.003	0.003	-0.001	0.007	-0.000	0.002

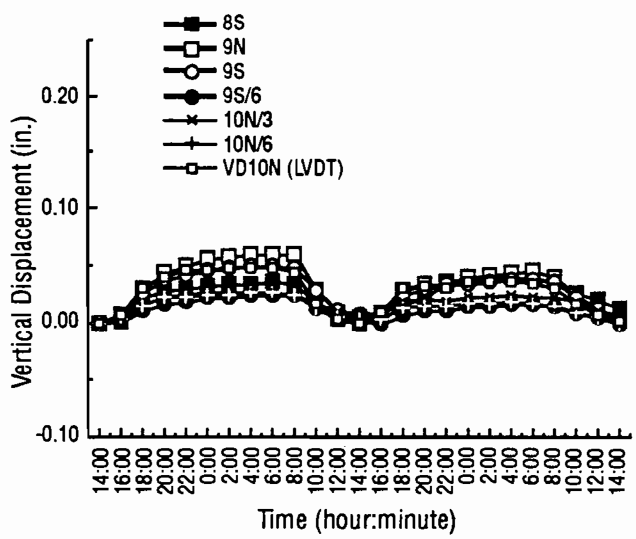

Fig C.7. Plot of vertical displacement for January 21 and 22, 1989, 240-foot slabs.

TABLE C.8. VERTICAL DISPLACEMENT FOR JANUARY 21 AND 22, 1989, 440-FOOT SLABS

Hour	10S/6	10N/3	11N/3	11N	11/S	12N	V.D10N (LVDT)
14:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16:00	0.002	0.002	0.001	0.007	0.007	0.007	-0.001
18:00	0.014	0.008	0.004	0.029	0.031	0.013	0.023
20:00	0.023	0.014	0.011	0.041	0.048	0.014	0.031
22:00	0.024	0.016	0.013	0.039	0.052	0.015	0.036
0:00	0.024	0.017	0.015	0.038	0.054	0.018	0.037
2:00	0.024	0.017	0.015	0.037	0.057	0.019	0.037
4:00	0.024	0.018	0.016	0.035	0.057	0.020	0.037
6:00	0.026	0.018	0.016	0.034	0.057	0.020	0.037
8:00	0.026	0.016	0.017	0.027	0.053	0.016	0.032
10:00	0.015	0.010	0.013	0.008	0.026	0.004	0.008
12:00	0.006	0.003	0.006	0.003	0.006	-0.003	-0.005
14:00	0.003	0.003	0.005	0.008	0.002	-0.001	-0.007
16:00	0.002	0.001	-0.000	0.010	0.008	0.003	0.009
18:00	0.012	0.007	0.001	0.026	0.029	0.012	0.027
20:00	0.016	0.007	0.004	0.026	0.033	0.018	0.028
22:00	0.016	0.008	0.005	0.026	0.034	0.018	0.027
0:00	0.019	0.010	0.007	0.026	0.040	0.020	0.031
2:00	0.019	0.010	0.007	0.026	0.041	0.021	0.031
4:00	0.022	0.011	0.009	0.025	0.042	0.022	0.032
6:00	0.019	0.010	0.008	0.023	0.041	0.021	0.029
8:00	0.017	0.009	0.007	0.020	0.038	0.018	0.025
10:00	0.011	0.006	0.006	0.009	0.023	0.016	0.013
12:00	0.008	0.003	0.003	0.004	0.012	0.008	0.004
14:00	0.001	-0.000	0.001	0.004	0.002	0.007	0.001

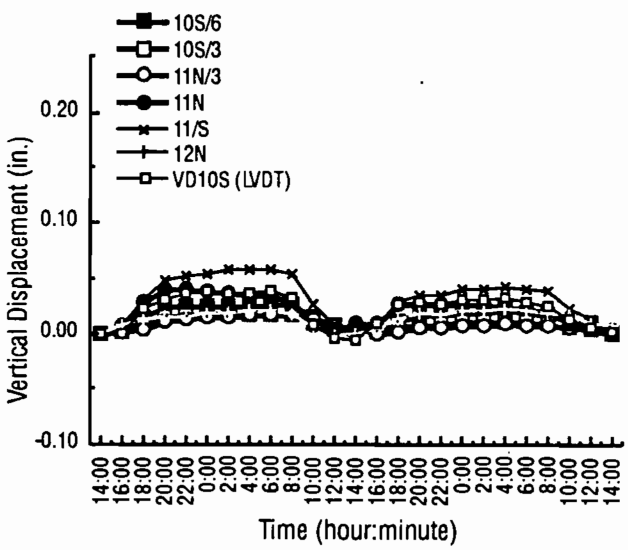

Fig C.8. Plot of vertical displacement for January 21 and 22, 1989, 440-foot slabs.

TABLE C.9. VERTICAL DISPLACEMENT FOR FEBRUARY 9, 1989, 240-FOOT SLABS

Hour	8S	9N	9S	9S/6	10N/3	10N/6	V.D10N (LVDT)
14:00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
16:00	0.002	0.004	0.004	0.000	0.001	0.003	0.001
18:00	0.010	0.023	0.025	0.006	0.010	0.015	0.015
20:00	0.021	0.032	0.034	0.012	0.015	0.021	0.021
22:00	0.026	0.040	0.038	0.015	0.018	0.024	0.024
0:00	0.028	0.045	0.043	0.017	0.018	0.024	0.024
2:00	0.029	0.045	0.043	0.017	0.018	0.024	0.023
4:00	0.029	0.045	0.044	0.020	0.018	0.024	0.022
6:00	0.030	0.047	0.045	0.021	0.019	0.026	0.023
8:00	0.027	0.044	0.043	0.020	0.019	0.024	0.019
10:00	0.012	0.016	0.019	0.010	0.009	0.013	0.001
12:00	0.003	0.000	0.006	0.002	0.003	0.011	-0.006
14:00	-0.001	-0.003	0.004	0.001	0.001	0.010	-0.008

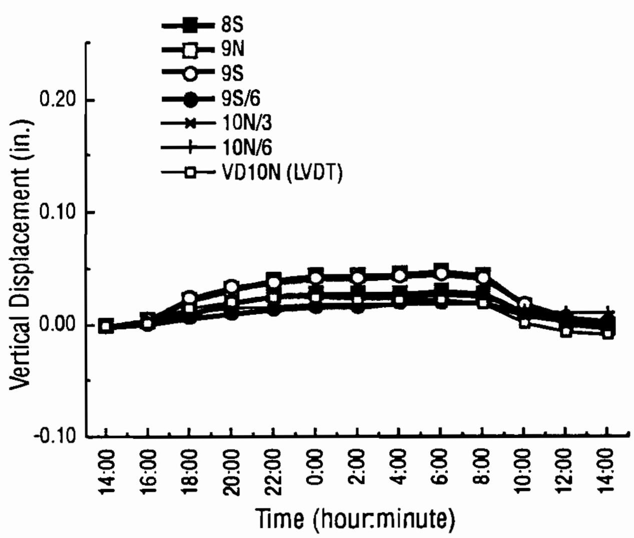

Fig C.9. Plot of vertical displacement for February 5, 1989, 240-foot slabs.

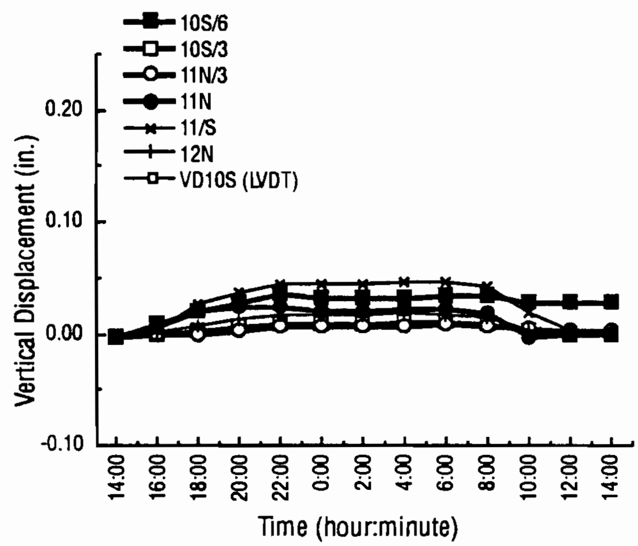

Fig C.10. Plot of vertical displacement for February 5, 1989, 440-foot slabs.

APPENDIX D. JOINT WIDTH DATA

Appendix D contains joint width displacement data for field visits 3 through 7. Similar data for field visit 2 are presented in Chapter 3 (this type of data was not collected during field visit 1). The coded captions follow the format described in Chapter 2.

FIELD VISIT 3

TABLE D.1 *080688JM.2*
Figure D.1 *080688JM.2*

FIELD VISIT 4

TABLE D.2 *082688JM.2*
Figure D.2 *082688JM.2*

FIELD VISIT 5

TABLE D.3 *110588JM.2*
Figure D.3 *110588JM.2*

FIELD VISIT 6

TABLE D.4 *012189JM.2*
Figure D.4 *012189JM.2*

FIELD VISIT 7

TABLE D.5 *020989JM.2*
Figure D.5 *020989JM.2*

TABLE D.1. JOINT WIDTHS FOR AUGUST 5, 1988

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	Joint 7	Joint 8	Joint 9	Joint 10	Joint 11	Joint 12	Joint 13	Avg 240 ft	Avg 440 ft
0	14:00	98.708	108.806	0.394	0.278	0.470	0.504	1.227	1.337	1.062	0.380	1.209
2	16:00	100.904	112.577	0.378	0.263	0.460	0.431	1.128	1.254	0.992		
4	18:00	93.956	109.175	0.401	0.271	0.461	0.443	1.124	1.256	0.999		
6	20:00	88.385	102.587	0.423	0.299	0.496	0.638	1.432	1.582	1.379		
8	22:00	82.814	95.999	0.508	0.432	0.551	0.696	1.535	1.655	1.387		
10	0:00	80.474	92.201	0.565	0.488	0.596	0.758	1.607	1.748	1.464		
12	2:00	78.692	89.474	0.604	0.508	0.627	0.804	1.703	1.847	1.552		
14	4:00	77.306	87.638	0.611	0.528	0.657	0.844	1.758	1.881	1.616		
16	6:00	76.928	84.848	0.650	0.539	0.668	0.889	1.805	1.937	1.684		
18	8:00	85.496	84.515	0.659	0.536	0.685	0.936	1.832	1.947	1.662		
20	10:00	90.806	91.697	0.584	0.466	0.624	0.802	1.650	1.753	1.462		
22	12:00	100.094	101.651	0.504	0.346	0.597	0.581	1.402	1.504	1.210		
24	14:00	102.326	112.037	0.405	0.264	0.488	0.446	1.141	1.266	1.001		

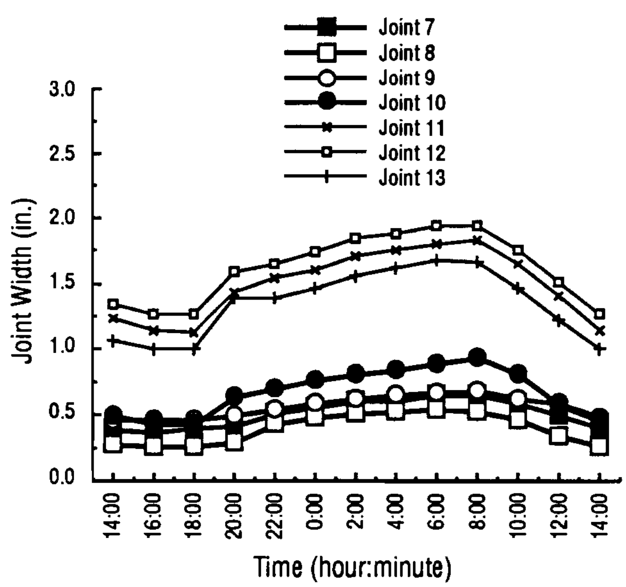

Fig D.1. Plot of joint widths for August 5, 1988.

TABLE D.2. JOINT WIDTHS FOR AUGUST 26, 1988

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	Joint 7	Joint 8	Joint 9	Joint 10	Joint 11	Joint 12	Joint 13
0	15:00	106.088	108.356	0.409	0.279	0.499	0.507	1.254	1.385	1.114
2	17:00	102.938	106.754	0.389	0.285	0.478	0.491	1.261	1.390	1.117
4	19:00	94.118	102.596	0.441	0.350	0.500	0.575	1.372	1.512	1.250
6	21:00	86.180	96.854	0.504	0.414	0.551	0.686	1.520	1.671	1.393
8	23:00	84.146	92.984	0.555	0.476	0.615	0.793	1.635	1.770	1.507
10	1:00	81.554	90.626	0.610	0.525	0.668	0.824	1.712	1.833	1.566
12	3:00	80.240	88.520	0.632	0.563	0.683	0.909	1.803	1.904	1.618
14	5:00	74.066	86.414	0.670	0.600	0.700	0.930	1.860	1.968	1.684
16	7:00	71.744	83.228	0.698	0.632	0.737	0.949	1.899	2.015	1.740
18	9:00	84.542	83.372	0.693	0.588	0.727	0.950	1.904	2.005	1.757
20	11:00	94.802	91.310	0.618	0.508	0.659	0.846	1.724	1.831	1.544
22	13:00	99.140	99.986	0.496	0.416	0.536	0.642	1.471	1.585	1.298
24	15:00	102.614	108.608	0.395	0.287	0.473	0.509	1.295	1.403	1.115

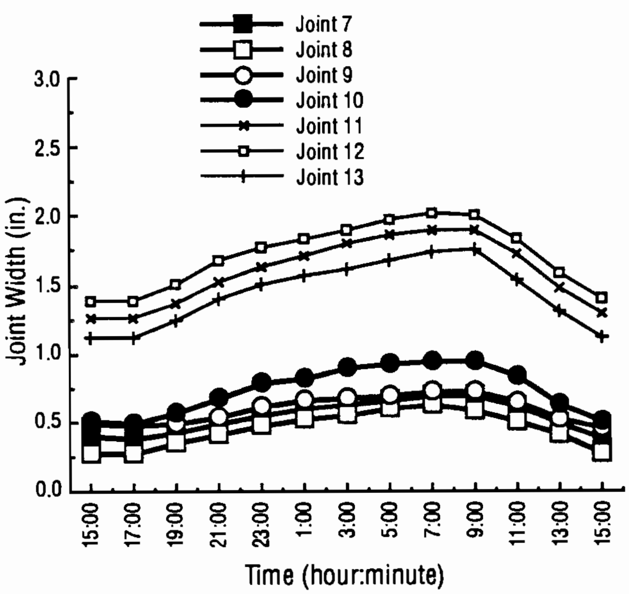

Fig D.2. Plot of joint widths for August 26, 1988.

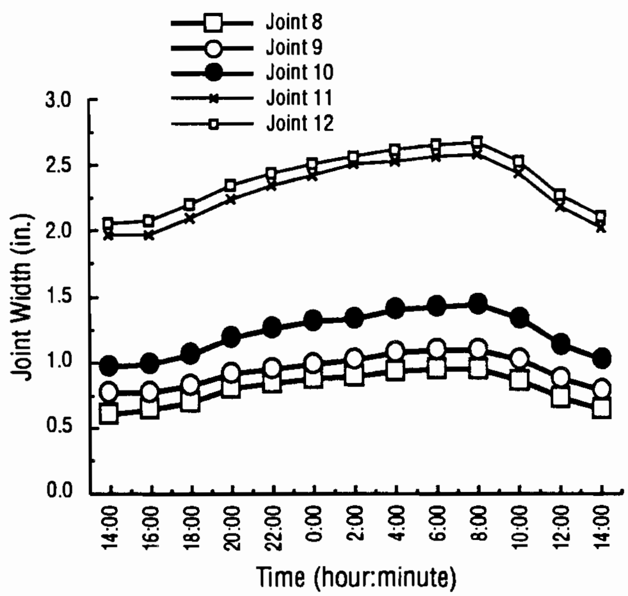

Fig D.3. Plot of joint widths for November 5, 1988.

TABLE D.3. JOINT WIDTHS FOR NOVEMBER 5, 1988

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	Joint 8	Joint 9	Joint 10	Joint 11	Joint 12
0	14:00	75.686	79.331	0.610	0.770	0.975	1.961	2.062
2	16:00	74.984	78.341	0.652	0.777	0.992	1.966	2.075
4	18:00	57.632	73.868	0.705	0.828	1.074	2.093	2.202
6	20:00	51.404	68.477	0.820	0.914	1.193	2.249	2.343
8	22:00	49.982	62.942	0.858	0.966	1.264	2.358	2.443
10	0:00	48.164	61.988	0.880	1.000	1.313	2.421	2.512
12	2:00	44.276	59.054	0.907	1.030	1.343	2.515	2.569
14	4:00	46.940	57.614	0.948	1.078	1.402	2.538	2.624
16	6:00	41.738	54.977	0.958	1.106	1.428	2.570	2.661
18	8:00	61.934	55.427	0.961	1.098	1.441	2.590	2.674
20	10:00	74.984	62.384	0.866	1.029	1.331	2.442	2.522
22	12:00	79.358	72.329	0.742	0.887	1.145	2.195	2.282
24	14:00	72.698	77.972	0.650	0.803	1.024	2.028	2.115

TABLE D.4. JOINT WIDTHS FOR JANUARY 21 AND 22, 1989

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	Joint 8	Joint 9	Joint 10	Joint 11	Joint 12
0	14:00	53.078	58.964	0.836	0.999	1.287	2.355	2.440
2	16:00	56.282	60.521	0.822	0.979	1.269	2.321	2.428
4	18:00	46.778	55.391	0.871	1.031	1.311	2.413	2.512
6	20:00	44.384	50.189	0.926	1.082	1.434	2.536	2.637
8	22:00	35.096	46.947	0.978	1.135	1.493	2.631	2.718
10	0:00	38.480	44.042	1.003	1.175	1.551	2.696	2.784
12	2:00	27.392	41.900	1.037	1.197	1.577	2.740	2.850
14	4:00	30.002	40.235	1.062	1.220	1.617	2.788	2.885
16	6:00	29.882	39.707	1.071	1.234	1.633	2.804	2.912
18	8:00	43.898	37.535	1.096	1.257	1.659	2.851	2.929
20	10:00	54.500	42.674	1.038	1.203	1.580	2.762	2.842
22	12:00	58.622	52.223	0.932	1.090	1.423	2.531	2.610
24	14:00	58.568	59.945	0.839	0.991	1.299	2.362	2.450
26	16:00	57.740	61.178	0.811	0.969	1.257	2.310	2.401
28	18:00	49.640	56.003	0.857	1.011	1.322	2.376	2.488
30	20:00	49.478	52.304	0.908	1.070	1.394	2.484	2.585
32	22:00	48.002	50.954	0.928	1.083	1.403	2.512	2.610
34	0:00	44.366	49.073	0.956	1.111	1.452	2.559	2.655
36	2:00	41.252	47.678	0.973	1.131	1.480	2.596	2.683
38	4:00	41.378	46.382	0.988	1.145	1.511	2.630	2.725
40	6:00	46.184	44.978	1.004	1.168	1.527	2.655	2.744
42	8:00	44.330	45.194	1.006	1.163	1.526	2.651	2.745
44	10:00	52.862	47.912	0.977	1.135	1.488	2.611	2.690
46	12:00	59.450	53.240	0.920	1.081	1.412	2.503	2.594
48	14:00	64.220	60.701	0.816	0.971	1.271	2.316	2.410

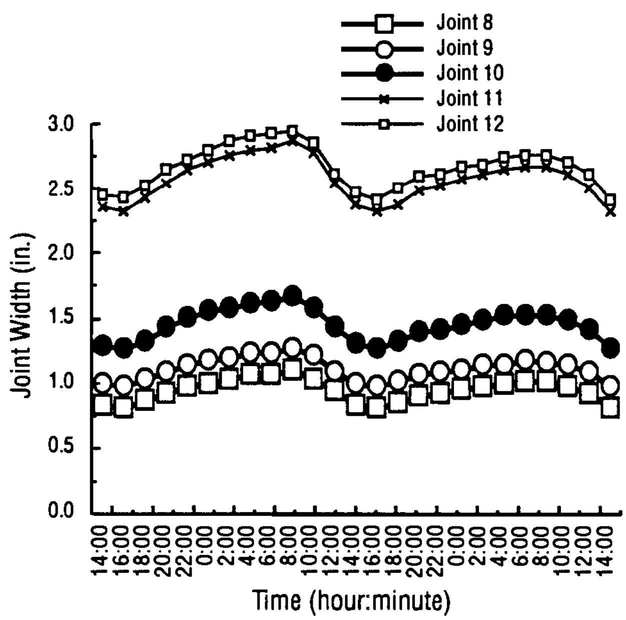

Fig D.4. Plot of joint widths for January 21 and 22, 1989.

TABLE D.5. JOINT WIDTHS FOR FEBRUARY 9, 1989

Hour	Time	Ambient Temperature (°F)	Slab Temperature (°F)	Joint 8	Joint 9	Joint 10	Joint 11	Joint 12
0	14:00	48.236	51.377	0.919	1.087	1.435	2.509	2.601
2	16:00	51.026	53.375	0.901	1.051	1.360	2.443	2.541
4	18:00	42.926	49.172	0.936	1.086	1.405	2.494	2.607
6	20:00	38.480	45.266	0.972	1.135	1.481	2.599	2.705
8	22:00	34.052	42.305	1.011	1.180	1.538	2.678	2.770
10	0:00	35.384	40.037	1.052	1.206	1.586	2.736	2.824
12	2:00	35.348	38.471	1.076	1.232	1.605	2.777	2.863
14	4:00	31.784	37.256	1.106	1.266	1.658	2.851	2.968
16	6:00	30.902	36.095	1.119	1.293	1.678	2.840	2.968
18	8:00	45.230	35.708	1.112	1.273	1.665	2.842	2.946
20	10:00	48.506	41.945	1.046	1.213	1.582	2.735	2.829
22	12:00	59.702	51.656	0.928	1.088	1.412	2.506	2.591
24	14:00	62.870	59.117	0.829	0.992	1.277	2.324	2.420

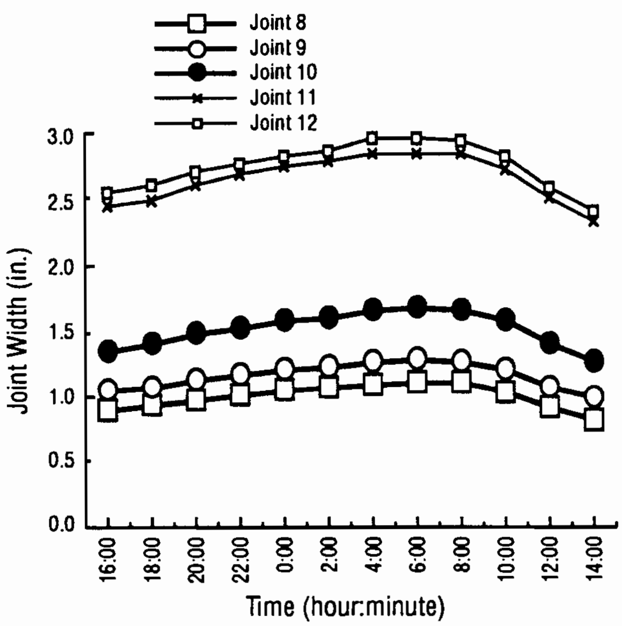

Fig D.5. Plot of joint widths for February 9, 1989.

APPENDIX E. DEFLECTION DATA

	DEFLECTION	DATA	COLLECTED	9/8/83	WITH	DYNAFLECT		
Station	W1	W2	W3	W4	W5	Temp	Time	Lane
770+00	0.24	0.22	0.19	0.16	0.14	80 F		Outside
769+90	0.2	0.18	0.15	0.14	0.12			Outside
769+00	0.2	0.19	0.16	0.14	0.12			Outside
768+90	0.21	0.19	0.16	0.14	0.12			Outside
768+00	0.25	0.23	0.19	0.17	0.14			Outside
767+90	0.21	0.19	0.17	0.14	0.12			Outside
767+00	0.22	0.21	0.18	0.17	0.15			Outside
766+90	0.3	0.28	0.23	0.21	0.18			Outside
766+00	0.36	0.34	0.28	0.24	0.2			Outside
765+90	0.2	0.19	0.16	0.15	0.13			Outside
765+00	0.33	0.32	0.28	0.27	0.24			Outside
764+90	0.35	0.32	0.27	0.24	0.21			Outside
764+00	0.19	0.17	0.14	0.12	0.1			Outside
763+90	0.3	0.26	0.21	0.18	0.14			Outside
763+00	0.23	0.2	0.15	0.14	0.12			Outside
762+90	0.21	0.19	0.17	0.16	0.14			Outside
762+00	0.17	0.15	0.12	0.11	0.09			Outside
761+90	0.17	0.15	0.12	0.1	0.08			Outside
761+00	0.19	0.17	0.14	0.12	0.1			Outside
760+90	2	0.19	0.16	0.14	0.12			Outside
760+00	0.27	0.26	0.21	0.19	0.16			Outside
759+90	0.24	0.23	0.2	0.18	0.16			Outside
759+00	0.28	0.26	0.22	0.2	0.17			Outside
758+90	0.27	0.25	0.21	0.19	0.16			Outside
758+00	0.36	0.34	0.3	0.27	0.24			Outside
757+90	0.34	0.32	0.28	0.25	0.22			Outside
757+00	0.33	0.31	0.28	0.26	0.23			Outside
756+90	0.33	0.32	0.28	0.27	0.24			Outside
756+00	0.33	0.31	0.28	0.26	0.23			Outside
755+90	0.46	0.43	0.38	0.35	0.3			Outside
755+00	0.41	0.38	0.34	0.31	0.27			Outside
754+90	0.38	0.36	0.32	0.3	0.27			Outside
754+00	0.34	0.32	0.29	0.27	0.24			Outside
753+90	0.29	0.28	0.24	0.23	0.21			Outside
753+00	0.33	0.31	0.28	0.26	0.23			Outside
752+90	0.37	0.35	0.3	0.28	0.25			Outside
752+00	0.37	0.35	0.3	0.28	0.25			Outside
751+90	0.36	0.35	0.31	0.3	0.27			Outside
751+00	0.49	0.48	0.41	0.38	0.33			Outside
750+90	0.48	0.47	0.41	0.39	0.35			Outside
750+00	0.53	0.52	0.46	0.44	0.4			Outside
749+90	0.63	0.6	0.52	0.49	0.44			Outside
749+00	0.42	0.41	0.37	0.35	31			Outside
748+90	0.42	0.4	0.36	0.34	0.31			Outside
748+00	0.52	0.5	0.45	0.44	0.4			Outside
747+90	0.53	0.52	0.46	0.44	0.41			Outside
747+00	0.49	0.47	0.41	0.39	0.35			Outside
746+90	0.41	0.39	0.34	0.32	0.29			Outside
746+00	0.47	0.46	0.41	0.39	0.36			Outside
745+90	0.47	0.45	0.41	0.039	0.36			Outside
745+00	0.5	0.48	0.43	0.41	0.37			Outside
744+90	0.51	0.48	0.42	0.39	0.36			Outside

744+00	0.44	0.41	0.36	0.34	0.3			Outside
743+90	0.43	0.42	0.36	0.34	0.3			Outside
743+00	0.39	0.38	0.34	0.32	0.29			Outside
742+90	0.42	4	0.34	0.31	0.28			Outside
742+00	0.3	0.29	0.26	0.25	0.23			Outside
741+90	0.49	0.45	0.38	0.34	0.29			Outside
741+00	0.46	0.42	0.36	0.33	0.3		DOWNSTREAM	Outside
740+90	0.35	0.34	0.29	0.27	0.25			Outside
740+00	0.35	0.33	0.3	0.28	0.26			Outside
739+90	0.35	0.33	0.29	0.27	0.23			Outside
739+00	0.38	0.36	0.31	0.29	0.26			Outside
738+90	0.41	0.39	0.34	0.31	0.28			Outside
738+00	0.41	0.4	0.36	0.32	0.29			Outside
737+90	0.35	0.34	0.3	0.28	0.25			Outside
737+00	0.38	0.37	0.32	0.3	0.26			Outside
736+90	0.41	0.38	0.32	0.3	0.26			Outside
736+00	0.43	0.41	0.36	0.34	0.3			Outside
735+90	0.46	0.44	0.39	0.36	0.3			Outside
735+00	0.45	0.44	0.39	0.36	0.33			Outside
734+90	0.45	0.44	0.39	0.37	0.34			Outside
734+00	0.48	0.47	0.42	0.39	0.36			Outside
733+90	0.49	0.47	0.42	0.39	0.35			Outside
733+00	0.47	0.46	0.41	0.38	0.34			Outside
732+90	0.51	0.5	0.44	0.41	0.37			Outside
732+00	0.43	0.42	0.37	0.35	0.31			Outside
731+90	0.46	0.44	0.39	0.36	0.32			Outside
731+00	0.42	0.4	0.35	0.33	0.29			Outside
730+90	0.41	0.39	0.34	0.32	0.28			Outside
730+00	0.38	0.32	0.28	0.26	0.23			Outside
729+90	0.34	0.33	0.29	0.27	0.23			Outside
729+00	0.38	0.37	0.33	0.31	0.27			Outside
728+90	0.35	0.33	0.29	0.28	0.24			Outside
728+00	0.33	0.31	0.28	0.26	0.24			Outside
727+90	0.36	0.34	0.29	0.27	0.24			Outside
727+00	0.35	0.33	0.29	0.27	0.24			Outside
726+90	0.36	0.35	0.31	0.29	0.26			Outside
726+00	0.42	0.41	0.37	0.35	0.31			Outside
725+90	0.46	0.45	0.39	0.37	0.34			Outside
725+00	0.42	0.4	0.36	0.34	0.31			Outside
724+90	0.46	0.44	0.39	0.37	0.34			Outside
724+00	0.56	0.52	0.47	0.44	0.4			Outside
723+90	0.51	0.5	0.45	0.43	0.39			Outside
723+00	0.52	0.5	0.45	0.43	0.4			Outside
722+90	0.56	0.54	0.48	0.45	0.41			Outside
722+00	0.28	0.27	0.23	0.22	0.19			Outside
721+90	0.35	0.34	0.3	0.29	0.26			Outside
721+00	0.43	0.42	0.38	0.36	0.33			Outside
720+90	0.47	0.46	0.42	0.4	0.36			Outside
720+00	0.49	0.47	0.43	0.41	0.37			Outside
719+90	0.53	0.52	0.46	0.44	0.39			Outside
719+00	0.5	0.49	0.44	0.42	0.38			Outside
718+90	0.51	0.49	0.44	0.42	0.39			Outside
718+00	0.39	0.37	0.33	0.32	0.29			Outside
717+90	0.41	0.4	0.35	0.33	0.3			Outside
717+00	0.42	0.39	0.34	0.31	0.28			Outside

716+90	0.52	0.51	0.46	0.44	0.4			Outside
716+00	0.45	0.43	0.38	0.36	0.32			Outside
715+90	0.43	0.41	0.37	0.35	0.32			Outside
715+00	0.44	0.42	0.37	0.34	0.31			Outside
714+90	0.42	0.4	0.35	0.33	0.29			Outside
714+00	0.35	0.33	0.29	0.27	0.23			Outside
713+90	0.37	0.36	0.31	0.29	0.25			Outside
713+00	0.4	0.38	0.34	0.32	0.29			Outside
712+90	0.43	0.42	0.36	0.34	0.31			Outside
712+00	0.41	0.39	0.35	0.32	0.29			Outside
711+90	0.41	0.39	0.34	0.32	0.28			Outside
711+00	0.46	0.41	0.36	0.33	0.29			Outside
710+90	0.42	0.4	0.35	0.33	0.29			Outside
710+00	0.45	0.44	0.39	0.37	0.34	85		Outside
709+90	0.44	0.43	0.38	0.36	0.32			Outside
709+00	0.35	0.34	0.3	0.29	0.26			Outside
708+90	0.39	0.36	0.31	0.28	0.25			Outside
708+00	0.47	0.43	0.37	0.33	0.29			Outside
707+90	0.37	0.36	0.32	0.3	0.27			Outside
707+00	0.31	0.3	0.27	0.25	0.23			Outside
706+90	0.36	0.34	0.29	0.27	0.24			Outside
706+00	0.31	0.29	0.25	0.24	0.21			Outside
705+90	0.35	0.32	0.28	0.26	0.23			Outside
705+00	0.36	0.34	0.3	0.29	0.26			Outside
704+90	0.4	0.39	0.35	0.32	0.28			Outside
704+00	0.38	0.36	0.32	0.3	0.27			Outside
703+90	0.39	0.37	0.33	0.31	0.28			Outside
703+00	0.4	0.38	0.34	0.32	0.3			Outside
702+90	0.45	0.42	0.36	0.33	0.3			Outside
702+00	0.39	0.37	0.32	0.3	0.27			Outside
701+90	0.39	0.38	0.34	0.32	0.28			Outside
701+00	0.4	0.38	0.34	0.32	0.29			Outside
700+90	0.45	0.43	0.38	0.35	0.31			Outside
700+00	0.43	0.41	0.37	0.35	0.32			Outside
699+90	0.48	0.46	0.4	0.37	0.34			Outside
699+00	0.44	0.43	0.39	0.36	0.33			Outside
698+90	0.44	0.43	0.38	0.36	0.33			Outside
698+00	0.4	0.38	0.34	0.32	0.29	86		Outside
697+90	0.38	0.37	0.33	0.3	0.28			Outside
697+00	0.42	0.4	0.35	0.33	0.3			Outside
696+90	0.41	0.4	0.35	0.33	0.3			Outside
696+00	0.4	0.39	0.35	0.33	0.3			Outside
695+90	0.45	0.43	0.38	0.36	0.32			Outside
695+00	0.41	0.39	0.35	0.32	0.29			Outside
694+90	0.42	0.4	0.35	0.33	0.3			Outside
694+00	0.45	0.44	0.39	0.37	0.33			Outside
693+90	0.48	0.47	0.42	0.39	0.36			Outside
693+00	0.38	0.37	0.32	0.3	0.28			Outside
692+90	0.53	0.48	0.4	0.36	0.32			Outside
692+00	0.42	0.4	0.36	0.33	0.29			Outside
691+90	0.47	0.46	0.4	0.38	0.34			Outside
691+00	0.4	0.39	0.35	0.32	0.29			Outside
690+90	0.39	0.38	0.33	0.3	0.27			Outside
690+00	0.77	0.41	0.34	0.31	0.28			Outside
689+90	0.46	0.42	0.35	0.32	0.28			Outside

689+00	0.45	0.42	0.27	0.33	0.29			Outside
688+90	0.4	0.38	0.34	0.33	0.3			Outside
688+00	0.47	0.45	0.39	0.36	0.32			Outside
687+90	0.43	0.41	0.36	0.34	0.3			Outside
687+00	0.44	0.43	0.38	0.36	0.33			Outside
686+90	0.48	0.45	0.39	0.36	0.33			Outside
686+00	0.45	0.43	0.38	0.35	0.32	89		Outside
685+90	0.44	0.43	0.37	0.35	0.32			Outside
685+00	0.43	0.41	0.37	0.35	0.32			Outside
684+90	0.44	0.42	0.37	0.35	0.32			Outside
684+00	0.41	0.4	0.35	0.33	0.3			Outside
683+90	0.43	0.41	0.36	0.34	0.31			Outside
683+00	0.39	0.38	0.33	0.31	0.28			Outside
682+90	0.42	0.4	0.35	0.33	0.3			Outside
682+00	0.41	0.4	0.35	0.33	0.3			Outside
681+90	0.43	0.42	0.37	0.36	0.33			Outside
681+00	0.4	0.38	0.34	0.33	0.29			Outside
680+90	0.44	0.42	0.36	0.34	0.31			Outside
680+00	0.45	0.43	0.38	0.35	0.32			Outside
679+90	0.43	0.41	0.36	0.33	0.3			Outside
679+00	0.43	0.42	0.36	0.34	0.31			Outside
678+90	0.42	0.39	0.34	0.32	0.28			Outside
678+00	0.36	0.35	0.32	0.29	0.26			Outside
677+90	0.34	0.33	0.31	0.29	0.25			Outside
677+00	0.33	0.31	0.27	0.25	0.22			Outside
676+90	0.34	0.32	0.28	0.25	0.22			Outside
676+00	0.4	0.37	0.31	0.29	0.25			Outside
675+90	0.37	0.36	0.31	0.29	0.25			Outside
675+00	0.36	0.35	0.31	0.28	0.25			Outside
674+90	0.37	0.35	0.3	0.27	0.24			Outside
674+00	0.38	0.36	0.32	0.3	0.27	91		Outside
673+90	0.4	0.38	0.33	0.31	0.28			Outside
673+00	0.4	0.39	0.34	0.32	0.29			Outside
672+90	0.44	0.42	0.37	0.34	0.3			Outside
672+00	0.4	0.38	0.33	0.31	0.27			Outside
671+90	0.39	0.38	0.32	0.3	0.27			Outside
671+00	0.38	0.36	0.32	0.3	0.26			Outside
670+90	0.52	0.42	0.33	0.31	0.27			Outside
670+00	0.44	0.43	0.38	0.35	0.32			Outside
669+90	0.45	0.43	0.39	0.37	0.34		EXIT RMP 349	Outside

	DEFLECTION	DATA	COLLECTED		Aug-85	WITH	DYNAFLECT	
Station	W1	W2	W3	W4	W5	Temp	Time	Lane
74845	0.56	0.55	0.54	0.52	0.48	91		I
74795	0.60	0.56	0.55	0.53	0.48	91		I
74745	0.56	0.53	0.52	0.50	0.46	91		I
74695	0.49	0.46	0.45	0.41	0.38	91		I
74645	0.50	0.47	0.46	0.45	0.42	91		I
74595	0.51	0.47	0.46	0.44	0.41	91		I
74545	0.54	0.48	0.47	0.43	0.40	91		I
74495	0.50	0.46	0.45	0.43	0.40	91		I
74445	0.50	0.46	0.45	0.42	0.40	91		I
74395	0.46	0.42	0.41	0.40	0.37	91		I
74345	0.45	0.41	0.40	0.38	0.35	91		I
74295	0.42	0.40	0.38	0.36	0.33	91		I
74245	0.40	0.36	0.35	0.33	0.30	91		I
74195	0.39	0.38	0.37	0.35	0.33	91		I
74145	0.34	0.30	0.29	0.27	0.25	91		I
74095	0.37	0.33	0.32	0.30	0.27	91		I
74045	0.35	0.33	0.31	0.29	0.27	91		I
73995	0.39	0.37	0.35	0.34	0.31	91		I
73945	0.51	0.48	0.47	0.44	0.41	91		I
73895	0.38	0.34	0.33	0.32	0.29	91		I
73845	0.36	0.32	0.31	0.30	0.27	91		I
73795	0.50	0.42	0.39	0.37	0.34	91		I
73745	0.51	0.44	0.42	0.39	0.35	91		I
73695	0.41	0.37	0.36	0.34	0.32	91		I
73645	0.49	0.45	0.44	0.43	0.42	91		I
73595	0.48	0.44	0.43	0.42	0.39	91		I
73545	0.50	0.47	0.46	0.44	0.41	91		I
73495	0.50	0.46	0.45	0.44	0.42	91		I
73445	0.52	0.48	0.47	0.45	0.42	91		I
73395	0.53	0.51	0.49	0.45	0.44	91		I
73345	0.60	0.55	0.54	0.51	0.47	91		I
73295	0.57	0.55	0.53	0.49	0.47	91		I
73245	0.63	0.58	0.55	0.51	0.46	91		I
73195	0.54	0.50	0.49	0.47	0.41	91		I
73145	0.58	0.52	0.50	0.48	0.42	91		I
73095	0.55	0.48	0.47	0.46	0.42	91		I
73045	0.42	0.38	0.37	0.35	0.33	91		I
72995	0.41	0.36	0.35	0.33	0.29	91		I
72945	0.40	0.35	0.34	0.33	0.26	91		I
72895	0.42	0.38	0.37	0.36	0.32	91		I
72845	0.41	0.38	0.37	0.36	0.32	91		I
72795	0.38	0.34	0.33	0.32	0.29	91		I
72745	0.33	0.30	0.29	0.27	0.24	91		I
72695	0.38	0.32	0.31	0.30	0.27	91		I
72645	0.39	0.35	0.34	0.33	0.30	91		I
72595	0.41	0.37	0.36	0.35	0.31	91		I
72545	0.42	0.39	0.38	0.37	0.34	91		I
72495	0.44	0.40	0.39	0.37	0.34	91		I
72445	0.51	0.47	0.46	0.44	0.39	91		I
72395	0.51	0.46	0.45	0.44	0.39	91		I
72345	0.47	0.42	0.41	0.40	0.36	91		I
72295	0.52	0.47	0.46	0.44	0.37	91		I

72245	0.38	0.34	0.32	0.30	0.27	91		I
72195	0.29	0.26	0.25	0.24	0.21	91		I
72145	0.54	0.50	0.49	0.47	0.43	91		I
72095	0.41	0.38	0.37	0.36	0.33	91		I
72045	0.49	0.44	0.43	0.41	0.38	91		I
71995	0.58	0.56	0.54	0.50	0.47	91		I
71945	0.50	0.45	0.44	0.42	0.39	91		I
71895	0.44	0.41	0.40	0.39	0.36	91		I
71845	0.46	0.42	0.41	0.40	0.37	91		I
71795	0.46	0.44	0.42	0.39	0.36	91		I
71745	0.47	0.44	0.43	0.40	0.37	91		I
71695	0.63	0.56	0.54	0.50	0.44	91		I
71645	0.40	0.36	0.35	0.33	0.30	91		I
71595	0.50	0.45	0.44	0.42	0.38	91		I
71545	0.43	0.39	0.38	0.36	0.33	91		I
71495	0.52	0.44	0.43	0.41	0.36	91		I
71445	0.42	0.37	0.36	0.34	0.31	91		I
71395	0.40	0.35	0.34	0.33	0.31	91		I
71345	0.47	0.43	0.42	0.40	0.37	91		I
71295	0.55	0.50	0.49	0.47	0.43	91		I
71245	0.51	0.42	0.41	0.40	0.36	91		I
71195	0.59	0.43	0.41	0.39	0.35	91		I
71145	0.44	0.40	0.39	0.37	0.33	91		I
71095	0.41	0.37	0.36	0.34	0.31	91		I
71045	0.45	0.41	0.40	0.37	0.34	91		I
70995	0.53	0.48	0.47	0.46	0.43	91		I
70945	0.43	0.39	0.38	0.37	0.34	91		I
70895	0.43	0.38	0.37	0.35	0.32	91		I
70845	0.36	0.34	0.33	0.32	0.30	91		I
70795	0.37	0.35	0.34	0.33	0.30	91		I
70745	0.33	0.30	0.29	0.27	0.25	91		I
70695	0.42	0.37	0.36	0.34	0.31	91		I
70645	0.37	0.32	0.31	0.30	0.28	91		I
70595	0.40	0.37	0.36	0.34	0.31	91		I
70545	0.39	0.36	0.35	0.34	0.31	91		I
70495	0.44	0.40	0.39	0.37	0.34	91		I
70445	0.43	0.39	0.38	0.36	0.33	91		I
70395	0.45	0.42	0.41	0.40	0.36	91		I
70345	0.48	0.42	0.41	0.38	0.35	91		I
70295	0.46	0.43	0.42	0.41	0.37	91		I
70245	0.44	0.40	0.39	0.37	0.34	91		I
70195	0.44	0.40	0.39	0.37	0.34	91		I
70145	0.51	0.47	0.46	0.45	0.42	91		I
70095	0.47	0.43	0.42	0.41	0.38	91		I
70045	0.58	0.54	0.52	0.51	0.46	91		I
69995	0.51	0.47	0.46	0.44	0.41	91		I
69945	0.53	0.50	0.48	0.47	0.44	91		I
69895	0.47	0.44	0.43	0.42	0.39	91		I
69845	0.50	0.46	0.44	0.43	0.39	91		I
69795	0.44	0.40	0.39	0.38	0.35	91		I
69745	0.46	0.42	0.41	0.40	0.38	91		I
69695	0.53	0.50	0.49	0.47	0.45	91		I
69645	0.48	0.44	0.43	0.42	0.38	91		I
69595	0.48	0.45	0.44	0.42	0.39	91		I
74845	0.58	0.52	0.51	0.46	0.44	97		O

74795	0.67	0.63	0.62	0.58	0.54	97		○
74745	0.72	0.68	0.66	0.64	0.59	97		○
74695	0.71	0.65	0.63	0.61	0.56	97		○
74645	0.72	0.60	0.54	0.50	0.43	97		○
74595	0.58	0.53	0.52	0.49	0.45	97		○
74545	0.59	0.54	0.52	0.50	0.46	97		○
74495	0.59	0.54	0.52	0.50	0.45	97		○
74445	0.67	0.60	0.58	0.55	0.49	97		○
74395	0.65	0.59	0.57	0.54	0.50	97		○
74345	0.58	0.51	0.49	0.46	0.41	97		○
74295	0.54	0.48	0.47	0.44	0.40	97		○
74245	0.42	0.38	0.36	0.34	0.31	97		○
74195	0.46	0.42	0.41	0.38	0.34	97		○
74145	0.42	0.38	0.37	0.35	0.32	97		○
74095	0.54	0.48	0.45	0.41	0.36	97		○
74045	0.50	0.44	0.42	0.40	0.36	97		○
73995	0.51	0.47	0.46	0.44	0.40	97		○
73945	0.54	0.49	0.46	0.44	0.39	97		○
73895	0.48	0.44	0.43	0.41	0.37	97		○
73845	0.54	0.42	0.40	0.37	0.33	97		○
73795	0.44	0.40	0.39	0.38	0.34	97		○
73745	0.56	0.50	0.48	0.45	0.39	97		○
73695	0.51	0.47	0.46	0.44	0.40	97		○
73645	0.58	0.54	0.53	0.51	0.46	97		○
73595	0.56	0.52	0.50	0.48	0.42	97		○
73545	0.67	0.62	0.60	0.56	0.50	97		○
73495	0.59	0.55	0.52	0.50	0.45	97		○
73445	0.62	0.57	0.55	0.53	0.48	97		○
73395	0.71	0.66	0.63	0.60	0.53	97		○
73345	0.59	0.55	0.54	0.51	0.46	97		○
73295	0.63	0.59	0.57	0.54	0.48	97		○
73245	0.70	0.66	0.64	0.61	0.54	97		○
73195	0.70	0.61	0.59	0.55	0.50	97		○
73145	0.64	0.59	0.56	0.53	0.47	97		○
73095	0.72	0.66	0.63	0.61	0.53	97		○
73045	0.56	0.52	0.50	0.48	0.43	97		○
72995	0.48	0.43	0.42	0.40	0.37	97		○
72945	0.42	0.37	0.36	0.34	0.31	97		○
72895	0.44	0.41	0.40	0.38	0.35	97		○
72845	0.49	0.45	0.43	0.42	0.38	97		○
72795	0.48	0.43	0.42	0.39	0.34	97		○
72745	0.36	0.32	0.31	0.29	0.26	97		○
72695	0.41	0.38	0.37	0.34	0.30	97		○
72645	0.41	0.37	0.36	0.34	0.31	97		○
72595	0.49	0.46	0.44	0.42	0.37	97		○
72545	0.54	0.50	0.48	0.45	0.41	97		○
72495	0.58	0.53	0.52	0.49	0.46	97		○
72445	0.63	0.58	0.57	0.53	0.49	97		○
72395	0.60	0.56	0.54	0.51	0.47	97		○
72345	0.54	0.50	0.49	0.46	0.42	97		○
72295	0.59	0.54	0.53	0.51	0.47	97		○
72245	0.56	0.48	0.44	0.41	0.36	97		○
72195	0.38	0.37	0.35	0.32	0.29	97		○
72145	0.54	0.50	0.49	0.47	0.43	97		○
72095	0.56	0.52	0.51	0.48	0.44	97		○

72045	0.51	0.47	0.45	0.43	0.39	97		O
71995	0.58	0.54	0.52	0.50	0.45	97		O
71945	0.54	0.50	0.49	0.47	0.43	97		O
71895	0.49	0.43	0.41	0.39	0.35	97		O
71845	0.52	0.49	0.47	0.45	0.40	97		O
71795	0.46	0.42	0.40	0.37	0.32	97		O
71745	0.51	0.47	0.45	0.42	0.37	97		O
71695	0.43	0.39	0.37	0.35	0.30	97		O
71645	0.43	0.39	0.37	0.35	0.31	97		O
71595	0.52	0.49	0.47	0.44	0.39	97		O
71545	0.45	0.41	0.40	0.37	0.33	97		O
71495	0.46	0.42	0.40	0.38	0.34	97		O
71445	0.49	0.45	0.43	0.39	0.35	97		O
71395	0.41	0.38	0.37	0.35	0.32	97		O
71345	0.50	0.45	0.44	0.41	0.37	97		O
71295	0.51	0.47	0.45	0.44	0.40	97		O
71245	0.50	0.45	0.43	0.41	0.36	97		O
71195	0.49	0.44	0.42	0.40	0.35	97		O
71145	0.46	0.42	0.41	0.38	0.34	97		O
71095	0.53	0.48	0.45	0.42	0.36	97		O
71045	0.41	0.38	0.37	0.35	0.32	97		O
70995	0.49	0.45	0.44	0.42	0.37	97		O
70945	0.51	0.46	0.43	0.41	0.37	97		O
70895	0.47	0.42	0.40	0.38	0.35	97		O
70845	0.49	0.41	0.39	0.37	0.33	97		O
70795	0.47	0.43	0.42	0.41	0.37	97		O
70745	0.53	0.47	0.46	0.43	0.39	97		O
70695	0.46	0.42	0.41	0.39	0.35	97		O
70645	0.40	0.36	0.34	0.32	0.29	97		O
70595	0.45	0.41	0.39	0.36	0.33	97		O
70545	0.41	0.37	0.36	0.34	0.31	97		O
70495	0.46	0.42	0.40	0.39	0.35	97		O
70445	0.41	0.36	0.35	0.33	0.27	97		O
70395	0.42	0.39	0.38	0.36	0.32	97		O
70345	0.49	0.44	0.42	0.39	0.34	97		O
70295	0.46	0.42	0.41	0.38	0.35	97		O
70245	0.39	0.36	0.34	0.33	0.30	97		O
70195	0.44	0.40	0.38	0.36	0.33	97		O
70145	0.46	0.42	0.40	0.39	0.36	97		O
70095	0.41	0.38	0.37	0.35	0.32	97		O
70045	0.48	0.46	0.44	0.42	0.39	97		O
69995	0.46	0.42	0.41	0.39	0.36	97		O
69945	0.51	0.47	0.46	0.44	0.41	97		O
69895	0.47	0.44	0.43	0.41	0.37	97		O
69845	0.60	0.55	0.52	0.49	0.44	97		O
69795	0.54	0.50	0.48	0.45	0.41	97		O
69745	0.49	0.45	0.44	0.42	0.37	97		O
69695	0.53	0.50	0.48	0.47	0.42	97		O
69645	0.49	0.45	0.44	0.42	0.38	97		O
69595	0.49	0.45	0.43	0.41	0.36	97		O

DEFLECTION	DATA	COLLECTED		8/25/88		WITH		DYNAFLECT	
Station	W1	W2	W3	W4	W5	Temp	Time	Slab No.	Ln Pos
734+07	1.71	1.5	1.22	0.097	0.078		11:00	SLAB #7	SHLD
734+06	1.41	1.35	1.15	0.93	0.74				SHLD
733+46	0.91	0.9	0.84	0.74	0.63				SHLD
732+86	1.01	0.98	0.83	0.73	0.62				SHLD
732+26	1.3	0.85	0.73	0.61	0.5				SHLD
731+67	1.22	1.09	0.84	0.7	0.63				SHLD
731+66	1.34	1.28	1.1	0.93	0.84			SLAB #8	SHLD
731+06	0.86	0.85	0.77	0.68	0.57				SHLD
730+46	1.06	1	0.8	0.65	0.5				SHLD
729+86	1.3	0.58	0.49	0.45	0.35				SHLD
729+27	1.28	1.07	0.76	0.6	0.57				SHLD
729+26	0.86	0.81	0.62	0.52	0.49			SLAB #9	SHLD
728+66	0.65	0.63	0.61	0.55	0.47				SHLD
728+06	0.61	0.56	0.45	0.38	0.33				SHLD
727+46	0.39	0.34	0.32	0.3	0.28				SHLD
726+87	0.37	0.33	0.31	0.3	0.28				SHLD
726+86	0.41	0.4	0.34	0.32	0.31			SLAB #1(	SHLD
725+76	0.69	0.65	0.56	0.49	0.43				SHLD
724+66	0.75	0.74	0.64	0.57	0.51				SHLD
723+56	0.75	0.74	0.52	0.49	0.52				SHLD
722+47	1.01	0.63	0.5	0.4	0.33				SHLD
722+46	1.13	0.89	0.51	0.43	0.32			SLAB #1	SHLD
721+36	0.76	0.75	0.65	0.59	0.53				SHLD
720+26	0.65	0.64	0.57	0.51	0.47				SHLD
719+16	0.71	0.68	0.57	0.5	0.43				SHLD
718+07	0.83	0.61	0.51	0.44	0.36				SHLD
718+06	0.94	0.78	0.6	0.47	0.37			SLAB #1	SHLD
716+96	0.6	0.57	0.47	0.4	0.34				SHLD
715+86	0.58	0.57	0.44	0.41	0.42				SHLD
714+76	0.6	0.57	0.5	0.43	0.39				SHLD
713+67	0.81	0.61	0.51	0.42	0.36				SHLD
713+66	0.79	0.66	0.51	0.41	0.33		13:30	SLAB #1	SHLD
								SLAB #1	
748+46	0.96	0.8	0.63	0.49	0.4				OUTSD LN
747+26	0.54	0.53	0.5	0.45	0.39		14:50		OUTSD LN
746+07	0.56	0.41	0.38	0.34	0.32				OUTSD LN
746+06	0.55	0.53	0.47	0.4	0.38			SLAB #2	OUTSD LN
744+86	0.48	0.47	0.44	0.4	0.38				OUTSD LN
743+67	0.51	0.4	0.35	0.32	0.32				OUTSD LN
743+66	0.67	0.6	0.51	0.41	0.37			SLAB #3	OUTSD LN
742+46	0.28	0.27	0.26	0.24	0.22		15:00		OUTSD LN
741+27	0.47	0.33	0.29	0.25	0.23				OUTSD LN
741+26	0.63	0.63	0.51	0.41	0.33			SLAB #4	OUTSD LN
740+06	0.4	0.39	0.35	0.3	0.26				OUTSD LN
738+87	0.58	0.43	0.4	0.34	0.38				OUTSD LN
738+86	0.67	0.61	0.54	0.45	0.39			SLAB #5	OUTSD LN
737+66	0.36	0.35	0.34	0.25	0.26				OUTSD LN
736+47	0.62	0.47	0.4	0.35	0.32				OUTSD LN
736+46	0.61	0.57	0.52	0.44	0.4			SLAB #6	OUTSD LN
735+26	0.44	0.43	0.41	0.37	0.33				OUTSD LN
734+07	0.57	0.46	0.44	0.35	0.33				OUTSD LN
734+06	0.73	0.72	0.62	0.52	0.44			SLAB #7	OUTSD LN

732+86	0.39	0.38	0.37	0.34	0.33				OUTSD LN
731+67	0.79	0.58	0.48	0.42	0.39		15:10		OUTSD LN
731+66	0.83	0.75	0.62	0.53	0.48			SLAB #8	OUTSD LN
730+46	0.43	0.42	0.41	0.38	0.35				OUTSD LN
729+27	0.48	0.37	0.33	0.28	0.24				OUTSD LN
729+26	0.53	0.51	0.46	0.38	0.31			SLAB #9	OUTSD LN
728+06	0.35	0.34	0.33	0.3	0.28				OUTSD LN
726+87	0.57	0.39	0.35	0.3	0.28				OUTSD LN
726+86	0.61	0.56	0.51	0.42	0.4			SLAB #10	OUTSD LN
724+66	0.48	0.47	0.44	0.4	0.37				OUTSD LN
724+51	0.52	0.51	0.47	0.41	0.38				OUTSD LN
722+47	0.88	0.86	0.55	0.43	0.35				OUTSD LN
722+46	0.92	0.72	0.48	0.36	0.32		15:30	SLAB #11	OUTSD LN
720+26	0.51	0.5	0.43	0.4	0.4				OUTSD LN
720+11	0.48	0.47	0.42	0.35	0.38				OUTSD LN
718+07	0.61	0.41	0.35	0.31	0.3				OUTSD LN
718+06	0.68	0.53	0.4	0.35	0.33			SLAB #12	OUTSD LN
715+86	0.38	0.38	0.36	0.32	0.38				OUTSD LN
715+71	0.43	0.42	0.38	0.33	0.29				OUTSD LN
713+67	0.74	0.7	0.42	0.35	0.32				OUTSD LN
713+66	0.9	0.73	0.52	0.39	0.34			SLAB #13	OUTSD LN
711+46	0.39	0.38	0.37	0.31	0.29				OUTSD LN
711+31	0.5	0.48	0.4	0.34	0.31				OUTSD LN
709+27	0.72	0.49	0.38	0.25	0.25				OUTSD LN
709+26	0.91	0.67	0.48	0.35	0.31			SLAB #14	OUTSD LN
707+06	0.42	0.4	0.36	0.31	0.29				OUTSD LN
706+91	0.43	0.4	0.33	0.27	0.26				OUTSD LN
704+87	0.47	0.39	0.33	0.28	0.26				OUTSD LN
704+86	0.54	0.46	0.38	0.3	0.28			SLAB #15	OUTSD LN
702+66	0.5	0.49	0.46	0.4	0.37				OUTSD LN
702+51	0.64	0.61	0.49	0.39	0.33				OUTSD LN
700+47	0.98	0.43	0.39	0.34	0.31				OUTSD LN
700+46	0.88	0.68	0.42	0.36	0.33			SLAB #16	OUTSD LN
698+26	0.38	0.37	0.43	0.31	0.3		15:45		OUTSD LN
698+11	0.55	0.52	0.44	0.37	0.36				OUTSD LN
696+07	0.64	0.37	0.35	0.32	0.31		15:50		OUTSD LN
								SLAB #7	
734+06	1.16	1.09	0.9	0.72	0.57		16:10	SLAB #7	SHLD
733+46	0.87	0.87	0.76	0.66	0.56				SHLD
732+86	0.9	0.92	0.82	0.73	0.65				SHLD
732+26	0.96	0.96	0.81	0.7	0.61				SHLD
731+67	1.1	1.07	0.84	0.68	0.56				SHLD
731+66	1.14	1.08	0.89	0.74	0.63		16:13	SLAB #8	SHLD
731+06	0.9	0.89	0.75	0.63	0.55				SHLD
730+46	0.92	0.95	0.82	0.73	0.67				SHLD
729+86	0.83	0.8	0.66	0.55	0.46				SHLD
729+27	1.08	0.65	0.53	0.44	0.4				SHLD
729+26	0.92	0.83	0.61	0.49	0.45		16:16	SLAB #9	SHLD
728+66	0.67	0.66	0.53	0.47	0.47				SHLD
728+06	0.55	0.56	0.48	0.43	0.41				SHLD
727+46	0.48	0.47	0.38	0.33	0.35				SHLD
726+87	0.47	0.44	0.35	0.33	0.34				SHLD
726+86	0.45	0.46	0.36	0.33	0.33		16:20	SLAB #10	SHLD
725+76	1.12	1.09	0.68	0.6	0.67				SHLD
724+66	0.64	0.67	0.52	0.45	0.52				SHLD

723+56	0.72	0.73	0.55	0.52	0.49				SHLD
722+47	0.94	1.13	0.57	0.48	0.45				SHLD
722+46	0.87	0.77	0.52	0.42	0.43		16:25	SLAB #1	SHLD
721+36	0.75	0.76	0.61	0.55	0.55				SHLD
720+26	0.71	0.7	0.62	0.56	0.51				SHLD
719+16	0.88	0.87	0.67	0.58	0.56				SHLD
718+07	0.83	0.92	0.55	0.47	0.44				SHLD
718+06	0.91	0.83	0.61	0.5	0.46		16:28	SLAB #1	SHLD
716+96	0.57	0.56	0.46	0.39	0.37				SHLD
715+86	0.5	0.48	0.43	0.36	0.37				SHLD
714+76	0.56	0.55	0.48	0.41	0.35				SHLD
713+67	0.86	0.8	0.6	0.45	0.36				SHLD
							16:35	SLAB #13	

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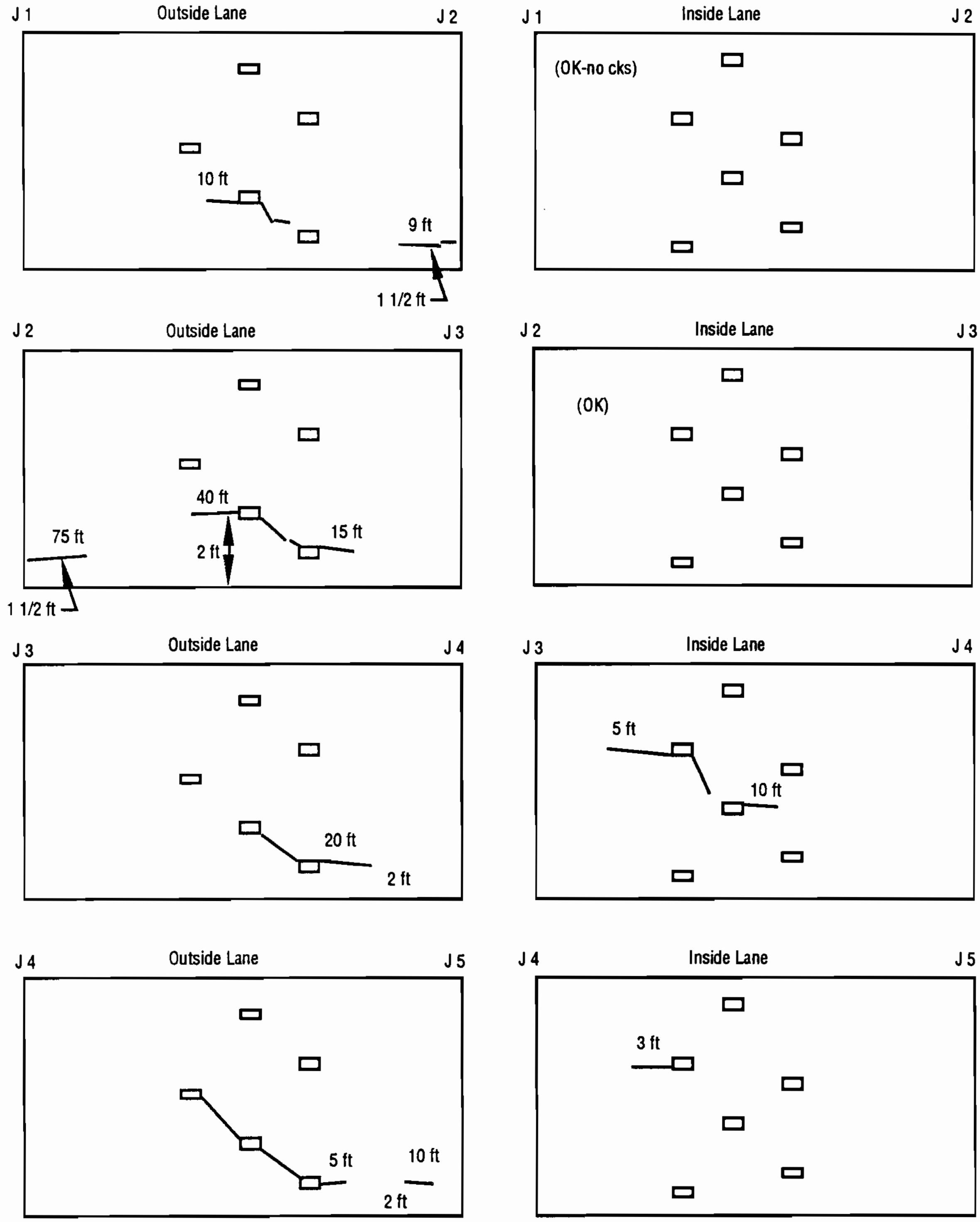
736+46	1.39	0.98	0.61	0.4	0.3			SLAB 60L
735+26	0.36	0.35	0.32	0.27	0.24			
735+16	0.42	0.4	0.33	0.28	0.24			
734+07	1	0.44	0.36	0.3	0.29			
734+06	1.16	0.88	0.57	0.39	0.29		10:50	SLAB 70L
732+86	0.33	0.32	0.3	0.26	0.23			
732+76	0.37	0.35	0.31	0.29	0.24			
731+67	1.13	0.83	0.45	0.36	0.29			
731+66	0.92	0.71	0.49	0.37	0.3			SLAB 80L
730+46	0.36	0.35	0.32	0.27	0.24			
730+36	0.44	0.41	0.35	0.29	0.25			
729+27	0.78	0.52	0.27	0.22	0.2			
729+26	1.39	0.98	0.61	0.37	0.26			SLAB 90L
728+06	0.33	0.32	0.29	0.24	0.2			
727+96	0.37	0.34	0.27	0.21	0.18			
726+87	0.81	0.63	0.48	0.36	0.26			
726+86	1.12	0.9	0.64	0.42	0.29			SLAB 100L
724+66	0.41	0.4	0.37	0.32	0.28			
724+51	0.54	0.52	0.45	0.37	0.31			
722+47	0.6	0.48	0.4	0.32	0.26			
722+46	1.02	0.86	0.61	0.42	0.28			SLAB 110L
720+26	0.4	0.39	0.35	0.31	0.27			
720+11	0.48	0.44	0.38	0.31	0.28			
718+07	0.72	0.4	0.33	0.26	0.25			
718+06	1	0.7	0.42	0.29	0.24			SLAB 120L
715+86	0.38	0.37	0.33	0.25	0.24			
715+71	0.36	0.34	0.3	0.23	0.21			
713+67	0.76	0.4	0.34	0.29	0.27			
713+66	0.68	0.53	0.4	0.29	0.24		11:25	SLAB 130L
711+46	0.32	0.31	0.28	0.22	0.19			
711+31	0.41	0.4	0.35	0.27	0.22			
709+27	1.06	0.59	0.41	0.28	0.23			
709+26	0.56	0.41	0.32	0.24	0.22			SLAB 140L
707+06	0.35	0.34	0.31	0.25	0.22			
706+91	0.31	0.3	0.27	0.21	0.2			
704+87	0.35	0.29	0.26	0.2	0.19			
704+86	0.54	0.43	0.33	0.26	0.22			SLAB 150L
702+66	0.39	0.38	0.34	0.26	0.21			
702+51	0.73	0.7	0.59	0.45	0.33			
700+47	0.95	0.4	0.35	0.28	0.25			
700+46	1.03	0.73	0.45	0.29	0.24			SLAB 160L
698+26	0.38	0.37	0.35	0.3	0.27			
698+11	0.67	0.63	0.52	0.41	0.3			
696+07	0.4	0.34	0.31	0.29	0.27			
696+06	0.4	0.38	0.34	0.28	0.26			
734+07	0.78	0.73	0.6	0.49	0.55		13:00	SLAB 7SH
734+06	0.87	0.78	0.64	0.52	0.46			
733+46	0.79	0.75	0.64	0.53	0.4			
732+86	0.68	0.67	0.59	0.49	0.39			
732+26	0.72	0.68	0.57	0.47	0.4			
731+67	0.81	0.67	0.58	0.46	0.34			
731+66	0.78	0.7	0.6	0.48	0.47			SLAB 8SH
731+06	0.78	0.75	0.65	0.53	0.46			
730+46	0.65	0.63	0.55	0.45	0.37			
729+86	0.78	0.72	0.59	0.45	0.35			

729+27		0.57	0.46	0.4	0.33	0.28		
729+26		0.57	0.5	0.42	0.33	0.28		SLAB 9SH
728+66		0.5	0.45	0.4	0.33	0.29		
728+06		0.52	0.46	0.36	0.28	0.23		
727+46		0.42	0.34	0.32	0.26	0.21		
726+87		0.36	0.32	0.3	0.25	0.22		
726+86		0.46	0.41	0.36	0.3	0.25		SLAB 10SH
725+76		0.48	0.47	0.42	0.36	0.3		
724+66		0.51	0.49	0.45	0.39	0.34		
723+56		0.65	0.61	0.51	0.39	0.32		
722+47		0.63	0.5	0.4	0.32	0.26		
722+46		0.73	0.6	0.46	0.33	0.26		SLAB 11SH
721+36		0.7	0.66	0.57	0.46	0.38		
720+26		0.6	0.58	0.5	0.41	0.33		
719+16		0.67	0.62	0.53	0.41	0.34		
718+07		0.54	0.46	0.39	0.31	0.26		
718+06		0.84	0.67	0.46	0.37	0.41		SLAB 12SH
716+96		0.52	0.49	0.41	0.32	0.37		
715+86		0.46	0.46	0.42	0.34	0.38		
714+76		0.51	0.48	0.37	0.31	0.22		
713+67		0.63	0.44	0.34	0.29	0.27		
713+66		0.56	0.51	0.39	0.32	0.22		SLAB 13SH

APPENDIX F. CONDITION SURVEYS

Condition Survey
Prestressed Concrete Paving - West, Texas
Obtained 2/9/89

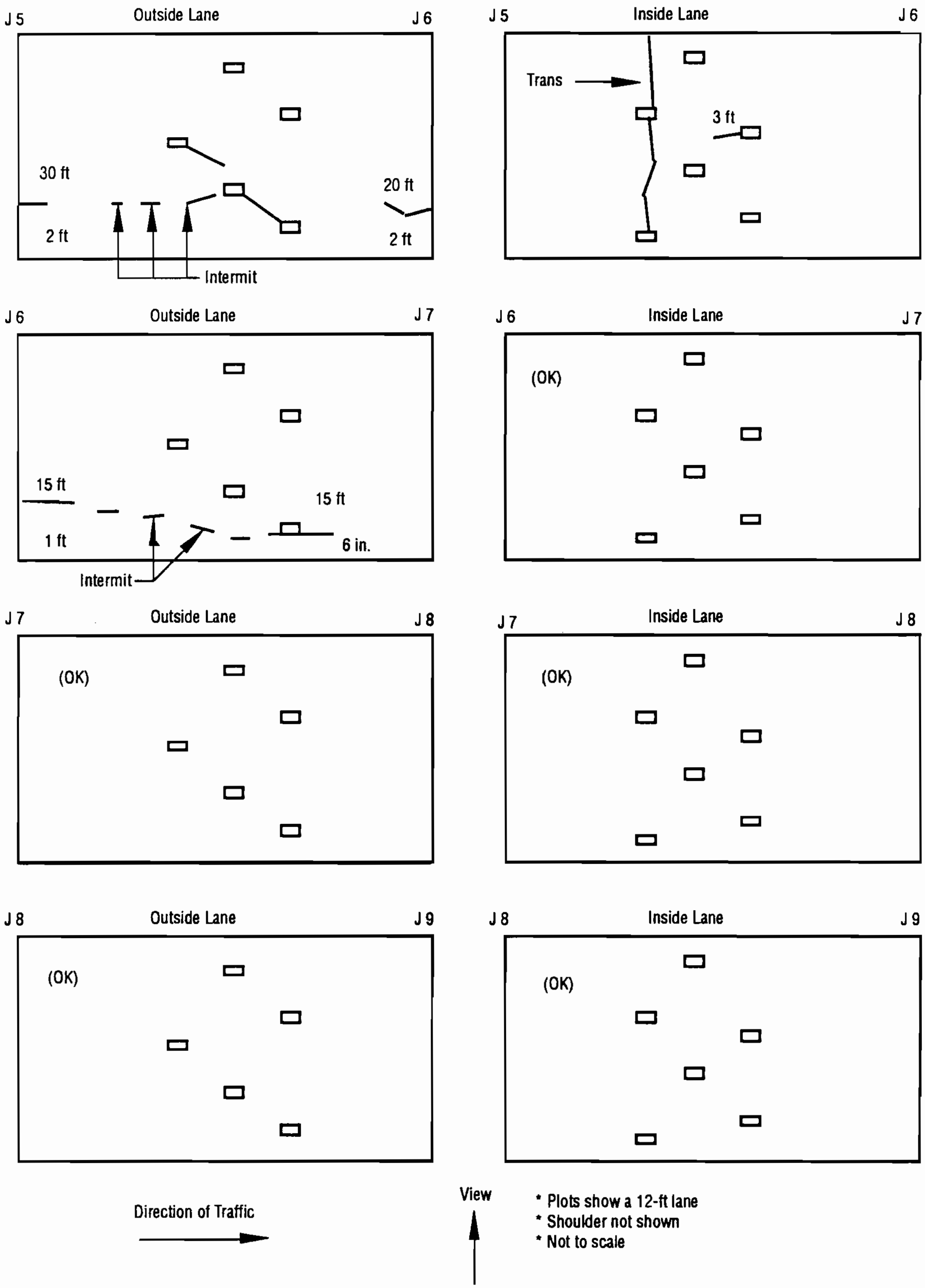


Direction of Traffic

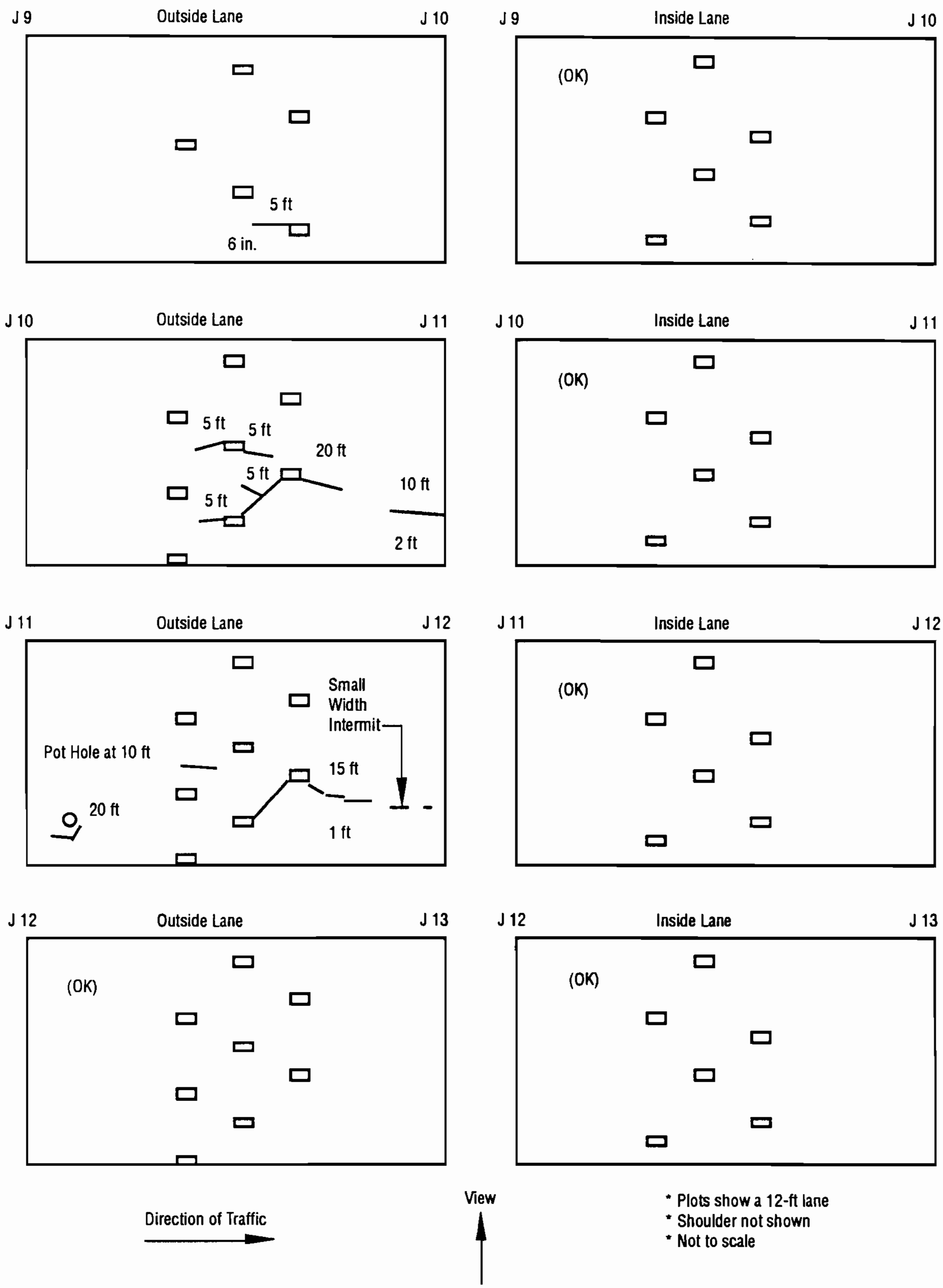
View

- Plots show 12-ft lanes
  Shoulders not shown
- Not to scale
- J1 = Joint 1, J2 = Joint 2, etc.

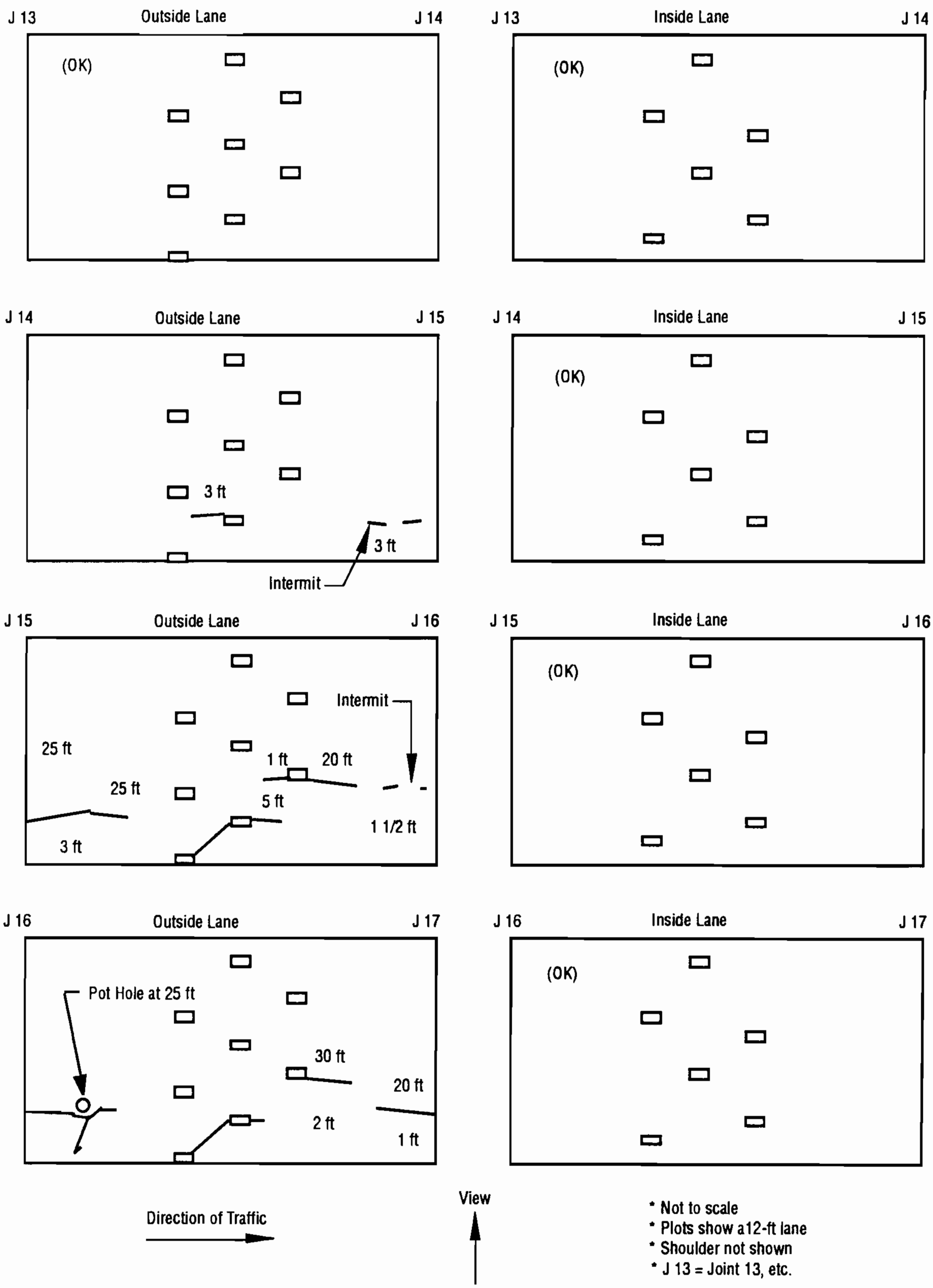
Condition Survey
Prestressed Concrete Paving - West, Texas
Obtained 2/9/89



Condition Survey
Prestressed Concrete Paving - West, Texas
Obtained 2/9/89



Condition Survey
Prestressed Concrete Paving - West, Texas
Obtained 2/9/89



* Not to scale
* Plots show a12-ft lane
* Shoulder not shown
* J 13 = Joint 13, etc.