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Fifth-Year Monitoring Program of the Prestressed Fibrous Concrete Pavement Constructed at the Greater Rockford Airport

August 2001

Final Report

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16. Abstract

This report describes the condition of the prestressed fibrous concrete pavement, fibrous concrete pavement and, conventional Portland cement concrete (PCC) pavement constructed in 1993 at the Greater Rockford Airport, Rockford, Illinois, for the period ending during the summer of 1998.

Also included is the data collected quarterly during the quarterly monitoring periods. The collected data includes pavement horizontal movement, daily temperature, stress-stain, crack surveys, pavement condition index (PCI) surveys, nondestructive testing (NDT), and other information. The gauges were placed in the prestressed pavement during construction.

The data collected was analyzed to report interesting trends in pavement performance and validate design assumptions.

The quarterly monitoring were conducted during November 1997, February 1998, April 1998, and August 1998.

The three pavements were constructed along Taxiway F in 1993 to demonstrate methods to minimize longitudinal and transverse joints in PCC pavements. The innovative paving techniques used to minimize joints, while standard construction techniques for bridges and buildings, had never before been tried in an airfield pavement. The techniques resulted in a 1,200-foot-long prestressed fibrous PCC pavement, a 900-foot-long fibrous PCC pavement with transverse joint spacing varying from 85 to 200 feet, and a 561-foot-long conventional PCC pavement with 12.5- by 15-foot joint spacing.

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PREFACE

This report is authorized under Indefinite Delivery Order DACA 45-91-D-0007 between the Corps of Engineers, Omaha District and Crawford, Murphy & Tilly, Inc. It presents the data and data analysis of instruments installed as part of the innovative pavements construction project at the Greater Rockford Airport during the summer of 1993. Also presented are the present conditions and performances of the various pavement sections, their typical sections, and nondestructive testing (NDT) data. The innovative pavements consisted of prestressed fibrous Portland cement concrete (PCC) pavement with type K cement, fibrous PCC pavement with type K cement and conventional PCC pavement.

This report presents the data collected during the fifth year after construction which was collected on a quarterly basis during November 1997, February 1998, April 1998, and August 1998.

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EXECUTIVE SUMMARY

Taxiway F at the Greater Rockford Airport was extended in 1993 with innovative paving techniques. The three constructed pavement sections consist of prestressed fibrous pavement with type K cement, fibrous pavement with type K cement, and a conventional Portland cement concrete (PCC) pavement.

The innovative pavements were constructed 75 feet wide, with one pass of the paver. The prestressed fibrous pavement with type K cement has no longitudinal joints and only transverse construction joints. The fibrous pavement with type K cement has no longitudinal joints and five transverse joints. The conventional PCC pavement has 18.75-foot longitudinal joint spacing and 20-foot transverse joint spacing.

A 5-year monitoring program was established to monitor the performance of the pavement and validate the design assumptions. This report is last of five annual reports, prepared as part of the monitoring program. The annual report presents the data obtained during the quarterly readings, an analysis of the data, a comparison of actual conditions to design and anticipated performance, and presentation of interesting observations.

The prestressed fibrous pavement with type K cement is performing excellently. Although some transverse hairline cracks have formed at various locations throughout the pavement, these cracks are not full width of the pavement. Most of the transverse cracks are longitudinally centered in the prestressed pavement. This may indicate either a relaxation of the stressing tendons or the effect of friction is greater than anticipated in the center of the slab. The cracks are not "growing" and therefore not considered structural cracks. Some short longitudinal cracks have formed. These cracks appear to be overtop of the stressing tendons. A longitudinal crack has formed 5 feet from the edge of the pavement, where a taxiway from the adjacent apron enters the pavement.

The fibrous pavement with type K cement is performing well. The main objective of the pavemen°t section is to see if joint spacing can be increased. Cracks have formed between the joints spaced at 85 to 200 feet. Three of the joints do not appear to be working. The pavement section is cracked transversely at approximately 50-foot intervals. Longitudinal cracking is beginning to occur on both sides of the centerline. The working joints move more than anticipated. The joint sealant in the joints have failed, and several have been replaced.

The conventional PCC pavement has deteriorated to a pavement condition index (PCI) of 67. Almost all of the transverse joints contain joint spalling. Five of the slabs contain transverse cracks.

The maximum temperature distribution (degrees Fahrenheit per inch) was greater than 2.5°/in for only a short period of time during the day. The greatest temperature distribution occurs during daylight hours when the sunlight warms the pavement surface or shortly after sunset.

Maximum curling stress only occurs during a short, 2 to 3 hour, period of the day.

Seasonally, the west end of the prestressed fibrous pavement with type K cement pavement moves more than the east end of the pavement. This is likely due to the west edge being a free edge. Daily, the movement of the pavement is not uniform. The west end moves more than the east end.

During some of the summer monitoring periods, the pavement movement was not uniform. The east end did not move proportionally. This may be due to a lack of expansion at the expansion joint.

A good relationship has been developed between a change in strain and a change in pavement temperature. As the pavement temperature decreases, the strain value increases. This relationship is not due to relaxation in the tendons, since the relaxation in the tendons occurs mostly the first year.

There appears to be a long-term decrease in the strain readings. This may indicate a relaxation of the stressing tendons or a creep in the pavement length.

Nondestructive Testing data for fall and spring are similar in magnitude. The winter readings are lower, indicating a frozen subgrade and the spring readings are higher due to spring thaw of the subgrade.

1. INTRODUCTION.

1.1 BACKGROUND.

During the summer of 1993, Taxiway F at the Greater Rockford Airport was extended approximately 2,660 feet using innovative paving techniques. These techniques, while standard construction techniques for bridges and buildings, had never before been tried in an airfield pavement. The techniques resulted in a 1,200-foot long prestressed fibrous Portland cement concrete (PCC) pavement and 900-foot-long fibrous PCC pavement with transverse joint spacing varying from 85 to 200 feet.

The objective of the innovative pavement designers was to minimize longitudinal and transverse joints in PCC pavements. Joints are required in PCC pavements to control cracking which naturally occurs in PCC pavements. For airfield pavements, joint spacing for conventional pavements varies with pavement thickness. For example, the Federal Aviation Administration (FAA) recommends for pavements greater than 12 inches in thickness, a maximum transverse joint spacing of 25 feet[1].

Normally, for a 2,100 foot long, 75 foot wide taxiway, a minimum of 81 transverse joints and 2 longitudinal joints are required. On Taxiway F, in the innovative pavement section, which was 2,100 feet long and 75 feet wide, 8 transverse joints were constructed. The longitudinal joints were eliminated by paving 75 feet wide in one pass.

The innovative pavement designs allowed a reduction in pavement thicknesses for several reasons. First, for the prestressed pavement, the pavement thickness was based on interior load stresses. Since the only working joints are 1,200 feet apart, and these joints are underlain by a sleeper slab, the slab was considered infinite. Edge stresses were ignored. Second, for the prestressed pavement, prestressing produces a compressive stress in the pavement which must be overcome to produce a crack. Third, the shrinkage compensating cement allowed the concrete to gain strength before frictional stresses occurred in the slab. And finally, for both the prestress and fibrous pavements, the fibrous concrete had a higher strength than conventional concrete, which provided a reduction in thickness.

The innovative aspects of the design of this project were made possible by previous FAA research regarding the potential of fibrous reinforced shrinkage compensating cement concrete[2]. The previous research validated the concept of fibrous reinforced shrinkage compensating cement with laboratory testing. This project validated the concept by constructing a full scale test section.

During construction of the prestressed fibrous PCC pavement, horizontal movement devices, thermocouples, and stress/strain gauges were installed in the fresh concrete.

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[1] FAA Advisory Circular No. 150/5320-6D, *Airport Pavement Design and Evaluation,* July, 1995, Table 3-7.

[2] Keeton, J.R., *Shrinkage-Compensating Cement for Airport Pavement Phase 3 - Fibrous Concrete* FAA Report FAA-RD-79-11 (Addendum), September 1980.

1.2 OBJECTIVE.

A short-term (5-year) monitoring program was developed during the design phase of this project to monitor the performance of the project and validate design assumptions. The monitoring program consisted of quarterly readings of all instruments, a crack survey of all pavements, and nondestructive testing (NDT) of all pavements. The monitoring was done on a quarterly basis for 5 years.

This report is the last of the five annual reports prepared as part of the monitoring program. This annual report presents the data obtained during the quarterly readings, an analysis of the data, a comparison of actual conditions to design and anticipated performance, and presentation of interesting observations. An additional report[3], presents the design issues and construction issues, problems and solutions.

2. PROJECT LOCATION AND LAYOUT.

2.1 LOCATION.

The Greater Rockford Airport is located approximately 4 miles south of downtown Rockford, Illinois, as shown in figure 1. Rockford is located in northern Illinois, approximately 17 miles south of the Illinois-Wisconsin boarder. The Greater Rockford Airport is 57 nautical miles west of Chicago's O'Hare Airport.

Taxiway F at the Greater Rockford Airport, parallels Runway 6/24, as shown in figure 2. The Greater Rockford Airport has two runways. The primary runway, Runway 18/36 is 8,200 feet long and 150 feet wide. The secondary runway, Runway 6/24 was extended from 5,000 to 6,500 feet in 1992, and extended again to 3,500 ft in 1997. The parallel taxiway, Taxiway F, was extended to the runway's 1992 threshold in 1993, and is scheduled to be extended to the 1997 threshold in 1999. The 1993 taxiway extension is the site of the innovative pavements.

2.2 AIRFIELD USAGE.

In 1994, United Parcel Service (UPS) selected the Greater Rockford Airport as the site for a new regional sort facility. This facility was built north of Taxiway F, adjacent to the innovative pavements. In the beginning and during the third monitoring year, and continuing through the fifth monitoring year, 23 nightly flights of commercial jet aircraft such as B-727, B-757, B-767, and DC-8 were traveling over the innovative pavement into the UPS sort facility. The number of nightly flights increases to 29 during the Christmas season.

In 1999, with the Taxiway F extension to the new Runway 6 threshold, Taxiway F (including the innovative pavement sections) will become the primary access to the primary runway threshold.

[3] Constructability Report, Prestressed, Fibrous Concrete Pavement, Prepared by Crawford, Murphy & Tilly, May 1995 for TSMCX and FAA.

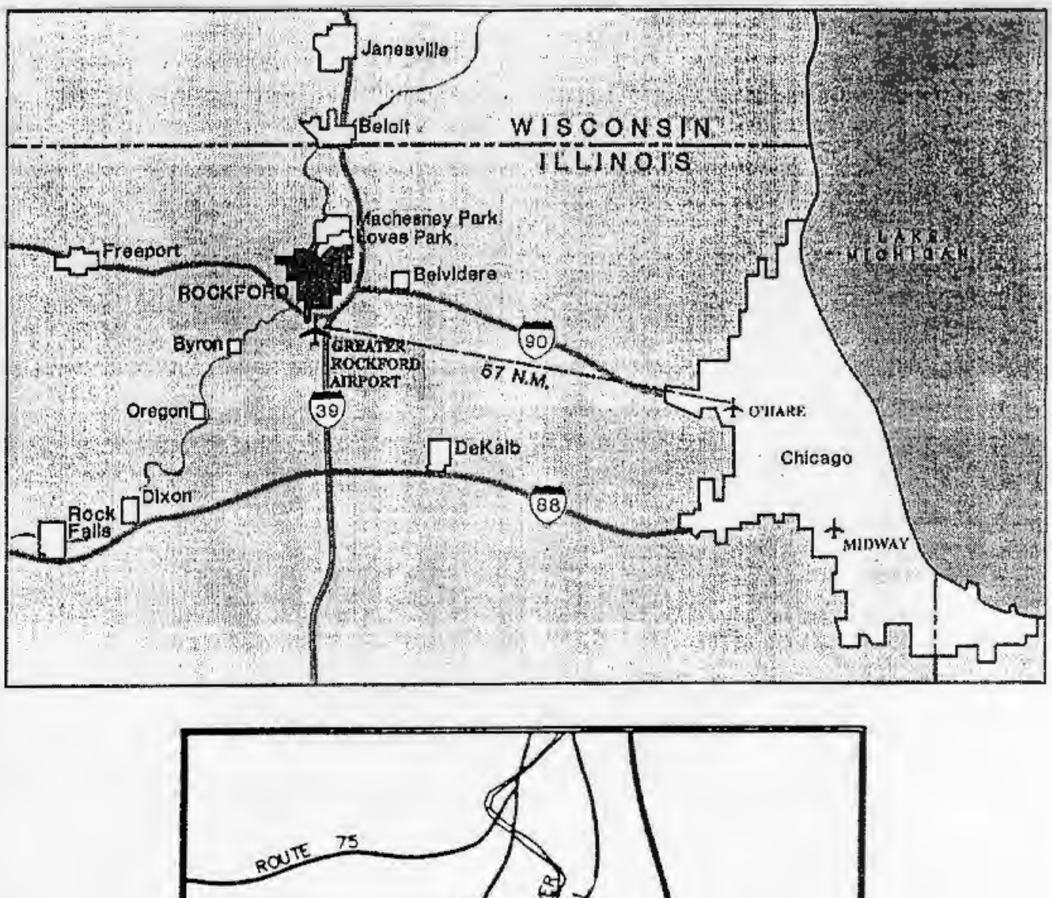


FIGURE 1. LOCATION OF THE GREATER ROCKFORD AIRPORT

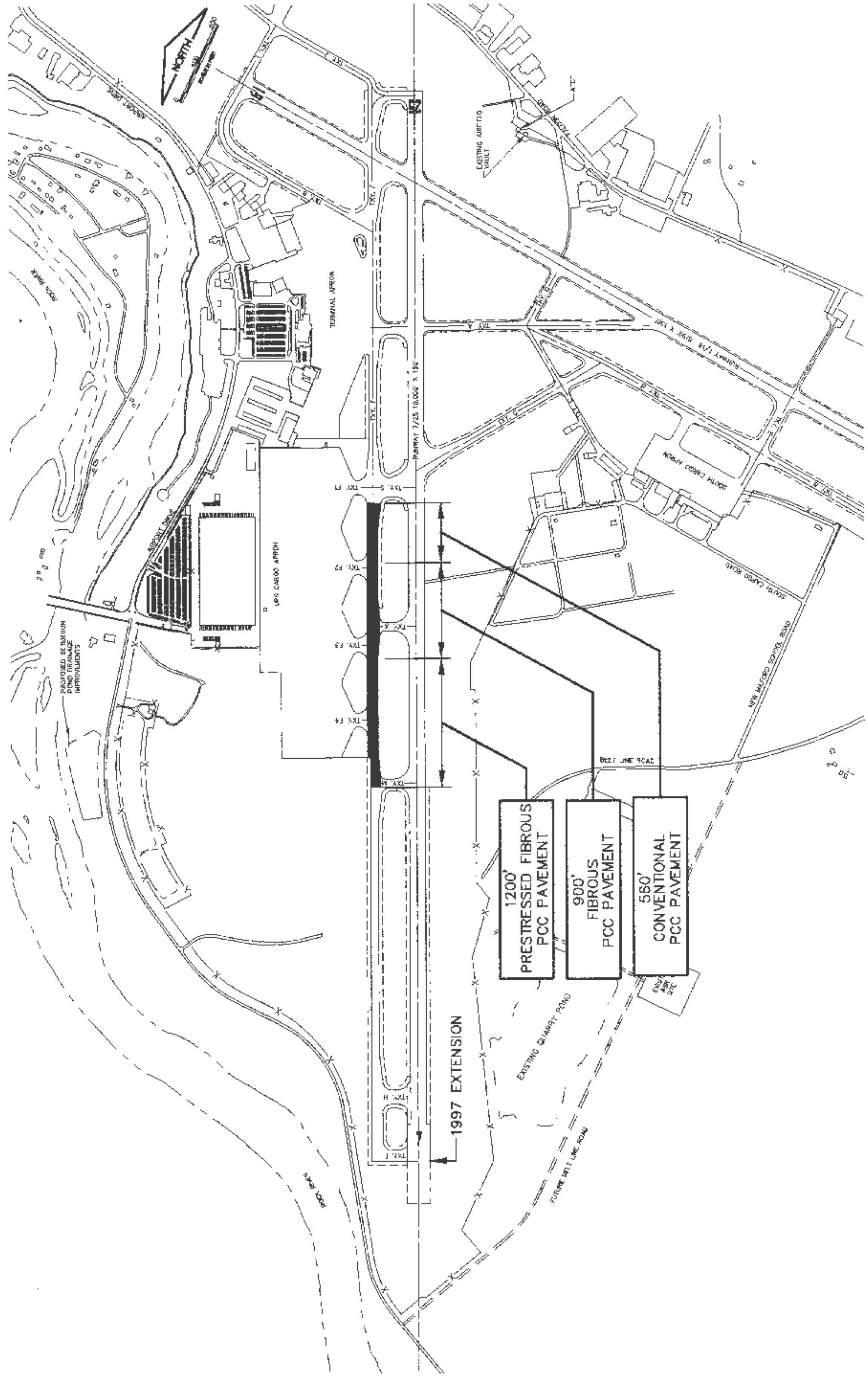


FIGURE 2. LOCATION OF TAXIWAY F AND THE INNOVATIVE PAVEMENTS

2.3 PROJECT LAYOUT AND TYPICAL SECTIONS.

The pavements constructed on Taxiway F as part of the project were

- Prestressed fibrous PCC Pavement with type K cement.
- Fibrous jointed PCC Pavement with type K cement.
- Conventional PCC pavement.

The paving limits for each pavement type are shown in figure 3. The pavement typical sections are shown in figures 4, 5, and 6 in summary

- Prestressed fibrous PCC pavement with type K cement
  - 7 inch thickness
  - 1200 feet long, 75 feet wide
  - No longitudinal joint
  - No transverse joint
  - Finger joint between pavements
  - 0.6-inch-diameter prestressing tendons at 12-inch spacing
  - Double layer of polyethylene film
  - Construction joints are located at the end of the day's pour

- Fibrous jointed PCC pavement with type K cement
  - 10 inch thickness
  - 900 feet long, 75 feet wide
  - No longitudinal joints
  - Variable 85- to 200-foot transverse joint spacing
  - 1 in. diameter, 19 in. long, 12-in. spacing, doweled transverse joints
  - Double layer of polyethylene film
  - 6-inch econocrete base course
  - 6-inch aggregate subbase course

- Conventional PCC Pavement
  - 15 inch thickness
  - 561 feet long, 75 feet wide (reduced to 520 feet in 1994)
  - 18.75-foot longitudinal joint spacing
  - 20-foot transverse joint spacing
  - 1 1/4 in. diameter, 20 in. long, 15-in. spacing, doweled transverse joints
  - 1 1/4 in. diameter, 20 in. long, 15-in. spacing, doweled longitudinal joints
  - 6-inch econocrete base course
  - 6-nch aggregate subbase course

Details of the gap slab between the prestressed fibrous PCC pavement with type K cement pavement and fibrous jointed PCC pavement with type K cement pavement, and between the fibrous jointed PC concrete with Type K PCC pavement and conventional PCC pavement are shown in figures 7 and 8.

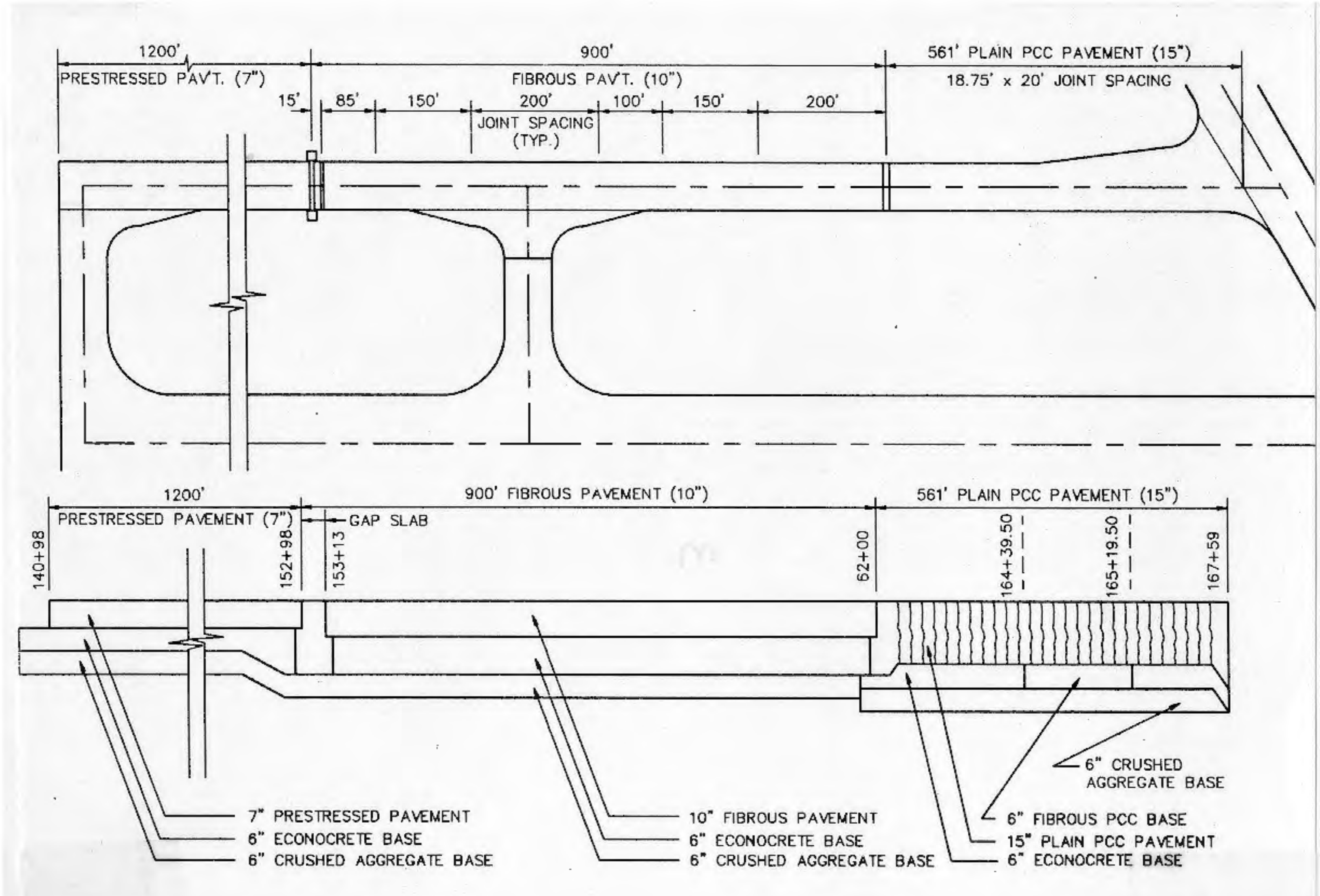
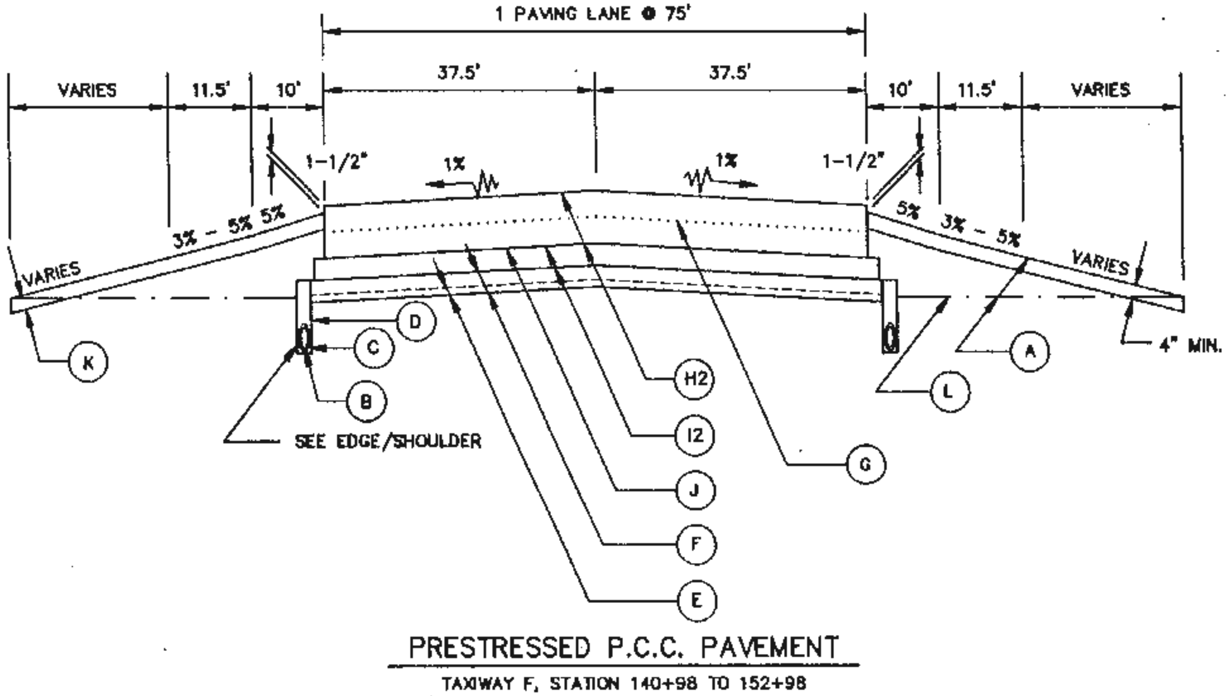


FIGURE 3. SITE PLAN TAXIWAY F IMPROVEMENTS



(A) EMBANKMENT FILL WITH A MINIMUM OF 4" TOPSOIL COVER (152)

(B) 4" C.P.P.U.P. UNDERDRAIN PIPE (705)

(C) FILTER FABRIC SOCK (705)

(D) NO. 2 POROUS BACKFILL (705)

(E) SUBBASE TRIMMING, 0.2 ± (152)

(F) 6" CRUSHED AGGREGATE BASE COURSE (209)

(G) PRESTRESSING TENDONS (SP-5)

(H2) 7" PRESTRESSED P.C.C. PAVEMEENT STRUCTURE (501)

(I2) 6" "ECONOCRETE" BASE COURSE (306)

(J) DOUBLE LAYER POLYETHELYNE FILM (SP-4)

(K) TOPSOIL EXCAVATION (152)

(L) EXISTING GROUND LINE

FIGURE 4. TYPICAL SECTION—PRESTRESSED FIBROUS PCC PAVEMENT WITH TYPE K CEMENT

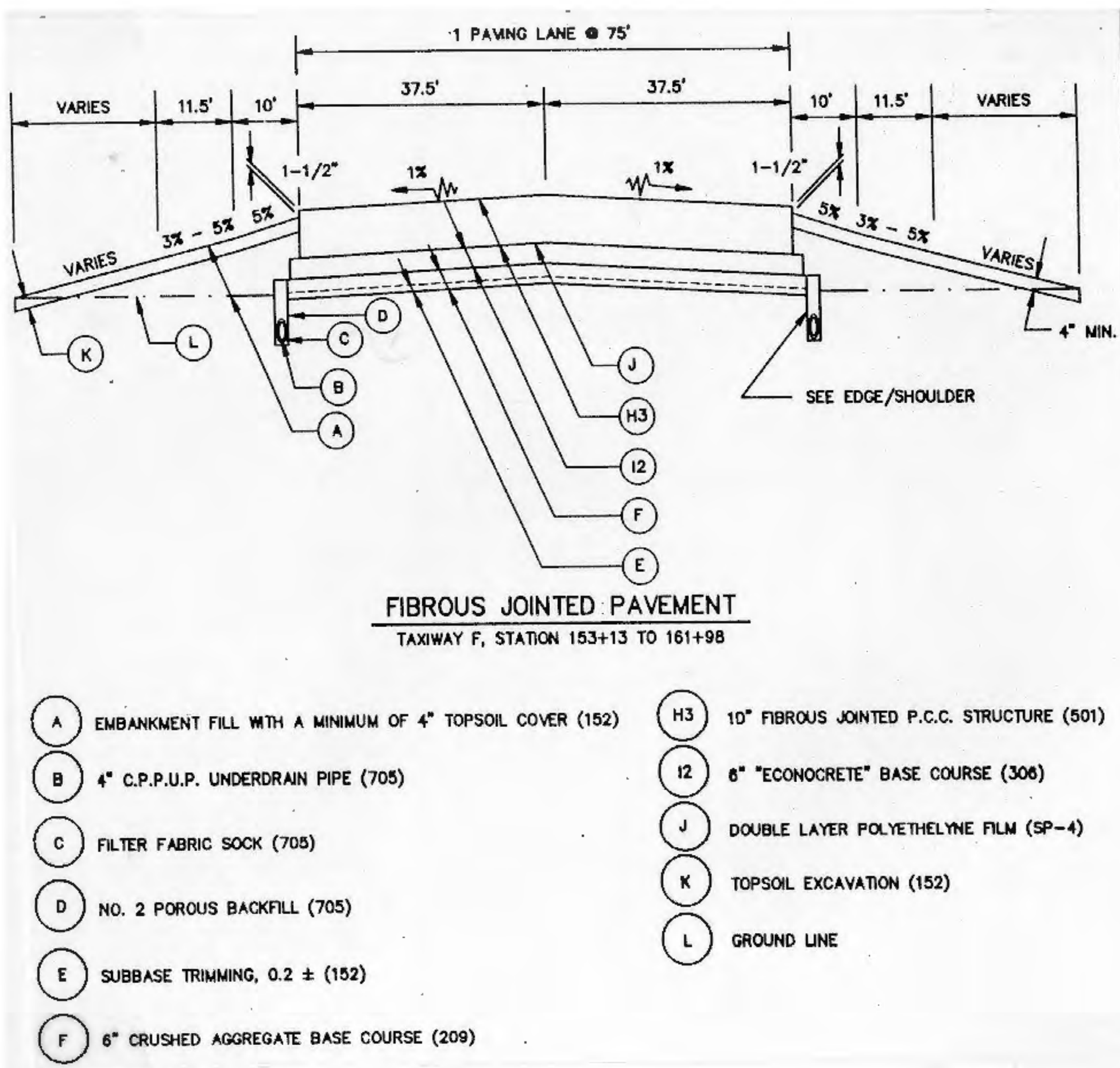


FIGURE 5. TYPICAL SECTION—FIBROUS PCC PAVEMENT

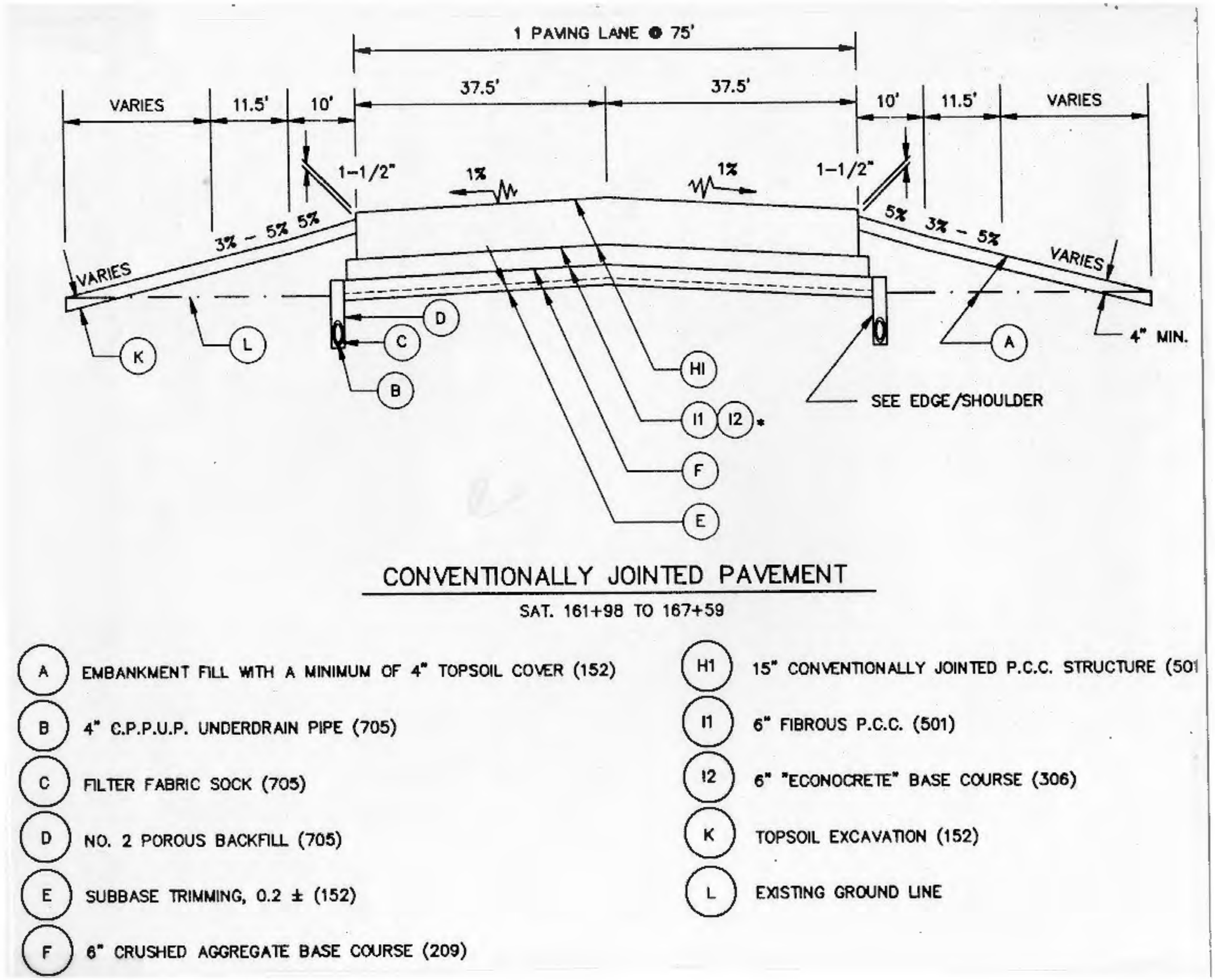


FIGURE 6. TYPICAL SECTION—CONVENTIONAL PCC PAVEMENT

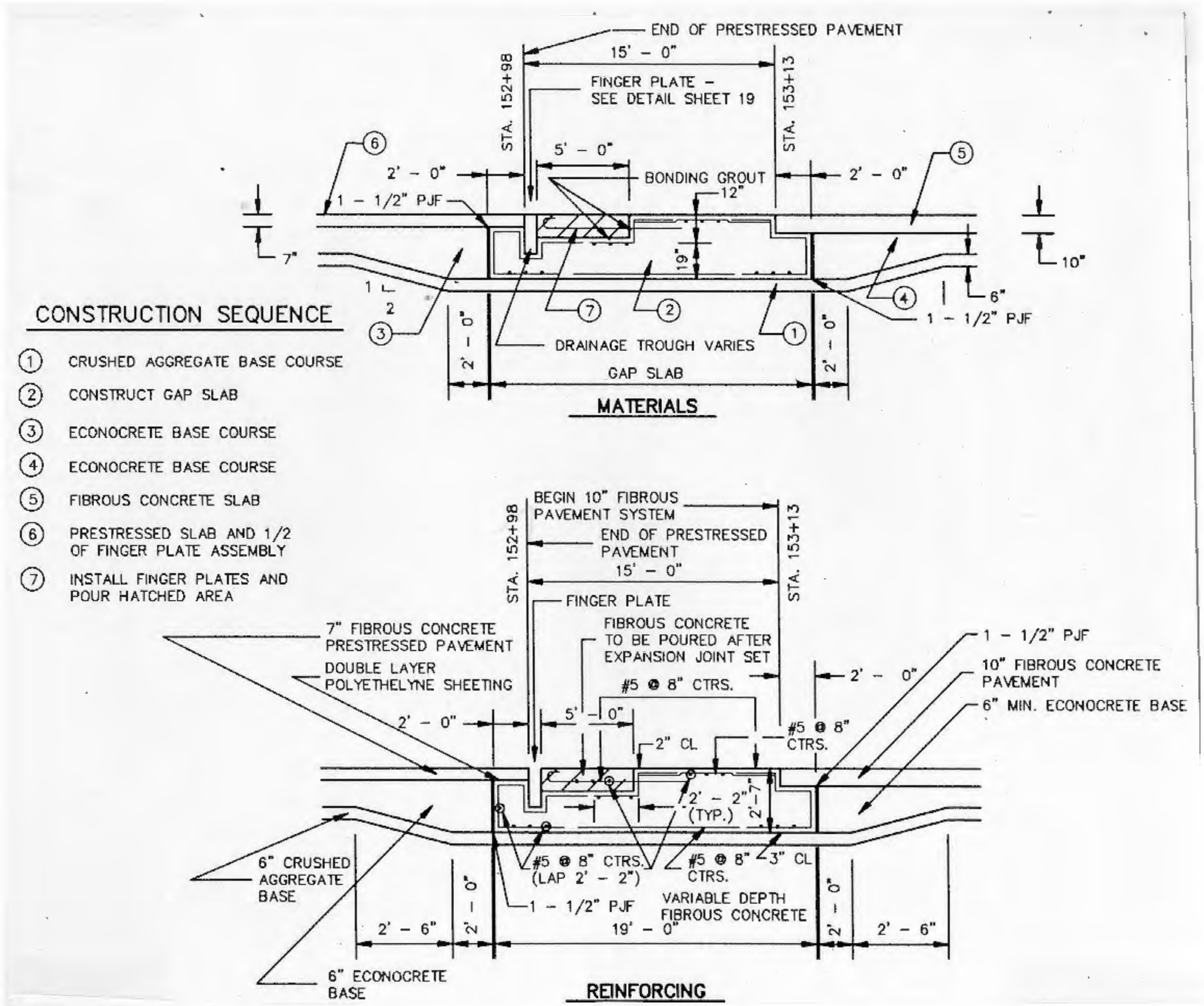


FIGURE 7. DETAIL OF GAP SLAB BETWEEN THE PRESTRESSED FIBROUS PCC PAVEMENT WITH TYPE K CEMENT AND FIBROUS JOINTED PCC PAVEMENT WITH TYPE K CEMENT

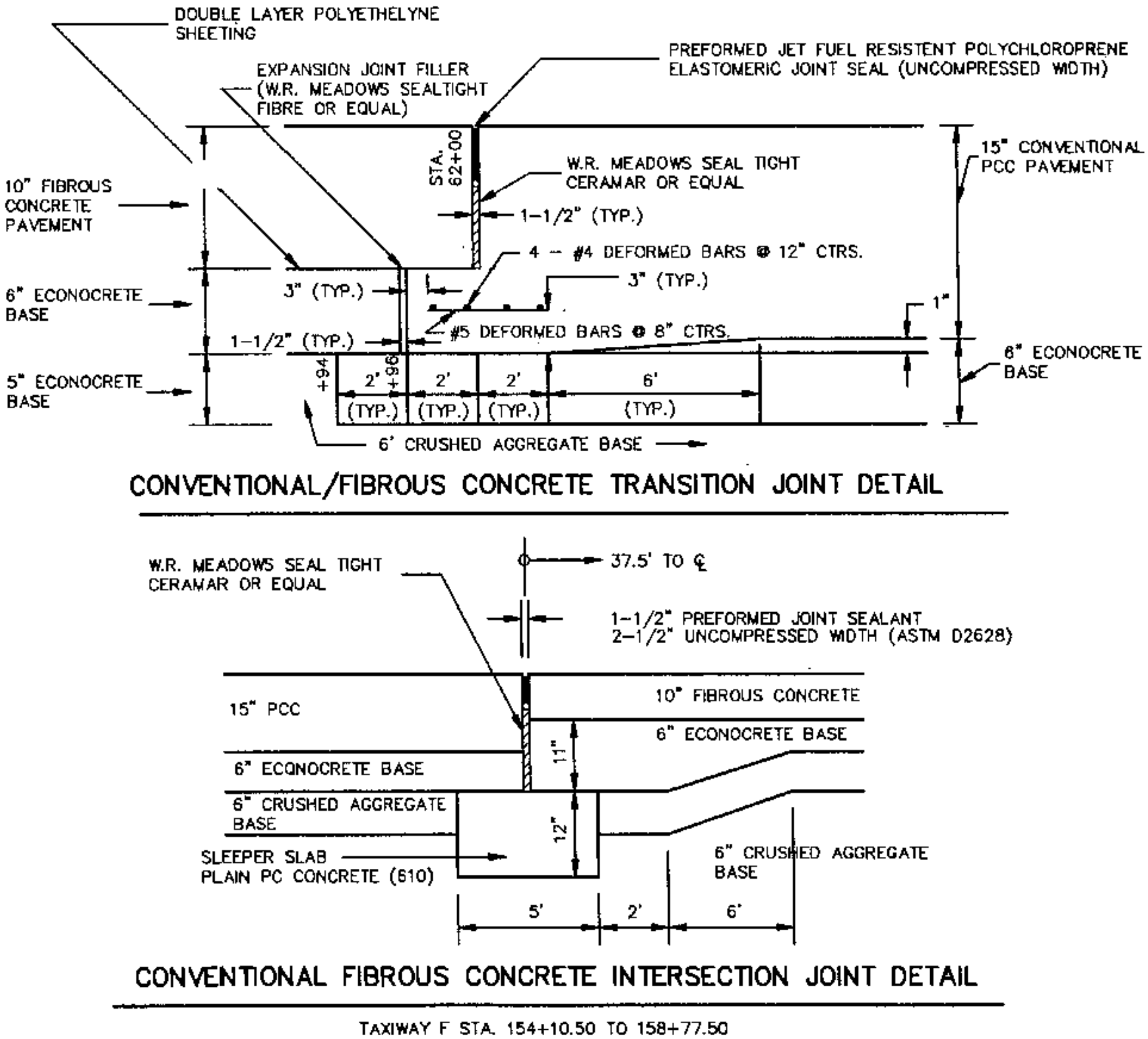


FIGURE 8. DETAIL OF JOINT BETWEEN THE FIBROUS JOINTED PCC PAVEMENT WITH TYPE K CEMENT AND CONVENTIONAL PCC PAVEMENT

3. MONITORING PROGRAM.

3.1 PROGRAM.

The quarterly readings were taken during the fall, winter, spring, and summer seasons. Originally, the readings were to be obtained during October, January, April, and July but due to schedules, construction, and other activities, some readings were obtained during the following months. For this report, the reading periods are described as the "First Period, Fall," "Second Period, Winter," "Third Period, Spring," and "Fourth Period, Winter."

The data was collected over a 3-day period. The exact sequence is presented in table 1. In summary, during the first 24 hours of reading, the horizontal movement devices and thermocouples were read every hour. During the second 24 hours of reading, the thermocouples and stress/strain gauges were read seven times at various intervals during the day and night.

The data collection period began at 6:00 p.m. on Sunday, when UPS was not operating. This allowed continuous closing of the taxiway to collect data. After about 10:30 p.m. each evening, the taxiway was heavily used by UPS aircraft, making data collection difficult. Therefore, after the 10:00 p.m. reading, the taxiway was opened to aircraft traffic and readings were suspended until 6:00 a.m. the following day.

In between readings, a visual survey of the pavements was conducted.

The NDT survey was conducted within a week or two of the field surveys.

3.2 INSTRUMENTATION LAYOUT.

The instruments were only installed in the prestressed fibrous PCC pavement. The location of the stress/strain gauges, thermocouples, and horizontal movement devices area shown in figure 9.

Three stress/strain gauges were installed on both sides of the runway at five stations. These gauges are at a depth of 1, 3.5, and 6 inches, as shown in figure 10.

Four thermocouples to measure pavement temperatures were installed on both sides of the runway at the same five stations as the stress/strain gauges. These gauges are at a depth of 1 inch, 2.7 inches, 4.3 inches, and 6 inches, as shown in figure 10.

One horizontal movement device was installed on both sides of the runway at seven stations. Five of the horizontal movement devices are installed at the same location as the strain gauges and thermocouples. The horizontal movement device consists of a reference rod buried 3 feet into the ground and a stainless steel ruler fastened to the handhole, as shown in figure 11. The exact layout of the instruments is shown in figure 12.

TABLE 1. DATA COLLECTION PROGRAM AND SCHEDULE

Dates of Data Collection			
Period	Quarter	Reading Dates	NDT date
First	Fall 97	November 23-25, 1997	November 20, 1997
Second	Winter 98	February 8-10, 1998	February 18, 1998
Third	Spring 98	April 20-22, 1998	May 26, 1998
Fourth	Summer 98	August 30 - September 1, 1998	August 26, 1998

READING PROGRAM

Sunday

1. Verify taxiway closure with Airport Operations.
2. Open all manholes and handholes.
3. Begin hourly readout for 24 hours.
   a. Readings begin at 6:00 p.m. and continue until midnight.
   b. Each hourly Reading begins on the hour.
   c. First, ambient air temperature is obtained from the airport's ASOS.
   d. Second, all in-pavement horizontal movement measuring devices are read.
   e. Third, all thermocouples are read.
   f. Movement at the pavement ends is measured.
   g. Reading begins at the east end. Horizontal movement devices are read from east to west, followed by gauge readings from west to east.

Monday

1. Continue hourly readout from 12:00 midnight until 6:00 p.m.
2. Begin reading stress/strain gauges.
   a. Reading Time
      1. 6:00 p.m.
      2. 10:00 p.m.
   b. Each hourly Reading begins on the hour.
   c. First, ambient air temperature is obtained from the airport's ASOS.
   d. Second, all in-pavement horizontal movement measuring devices are read.
   e. Third, all thermocouples are read.
   f. Fourth, all stress/strain gauges are read.
   g. Movement at the pavement ends is measured.
   h. Reading begins at the east end. Horizontal movement devices are read from east to west, followed by gauge readings from west to east.

3. Pavement condition survey—as time allows.
   a. Prestressed PCC & Fibrous PCC pavement.
      1. Record station, offset, length and width of all cracks, and take pictures.
      2. Plot cracks on master drawings.
   b. Plain PCC pavement.
      1. Record distress by type, amount and severity, and take pictures.
      2. Plot distress on master drawings.
4. Repair thermocouples and stress strain gauges, as necessary.
5. Mark out NDT test locations.

Tuesday

1. Continue reading stress/strain gauges.
   a. Reading Time
      1. 6:00 a.m.
      2. 8:30 a.m.
      3. 11:00 a.m.
      4. 2:00 p.m.
      5. 6:00 p.m.
2. Finish pavement condition survey.

NDT TESTING PROGRAM

Fall Only Testing Program

a. Test Plain PCC, Fibrous PCC, and Prestressed PCC pavement sections.
b. Four passes on all pavement, 10 ft and 20 ft, left and right.
c. 60 ft test spacing.
d. In prestressed pavement test.
   1. Crack (epoxied)
   2. Both construction joints
e. In Fibrous pavement test:
   1. Transverse construction joint
   2. Transverse working joint
   3. Transverse non-working joint
f. In a plain PCC pavement test:
   1. Center
   2. Transverse joint
   3. Longitudinal joint
   4. Center slab

Winter, Spring, and Summer Testing Program

a. Test all three pavement sections—same as fall program.
b. Four passes on all pavements—same as fall program.
c. Test spacing 120′—greater than fall program.
d. Crack and construction joints in prestressed PCC—same as fall program.
e. Joints in fibrous concrete—same as fall program.
f. Four test locations in plain PCC—same as fall program.

Note: All test locations are marked so NDT equipment can test the same location each time.

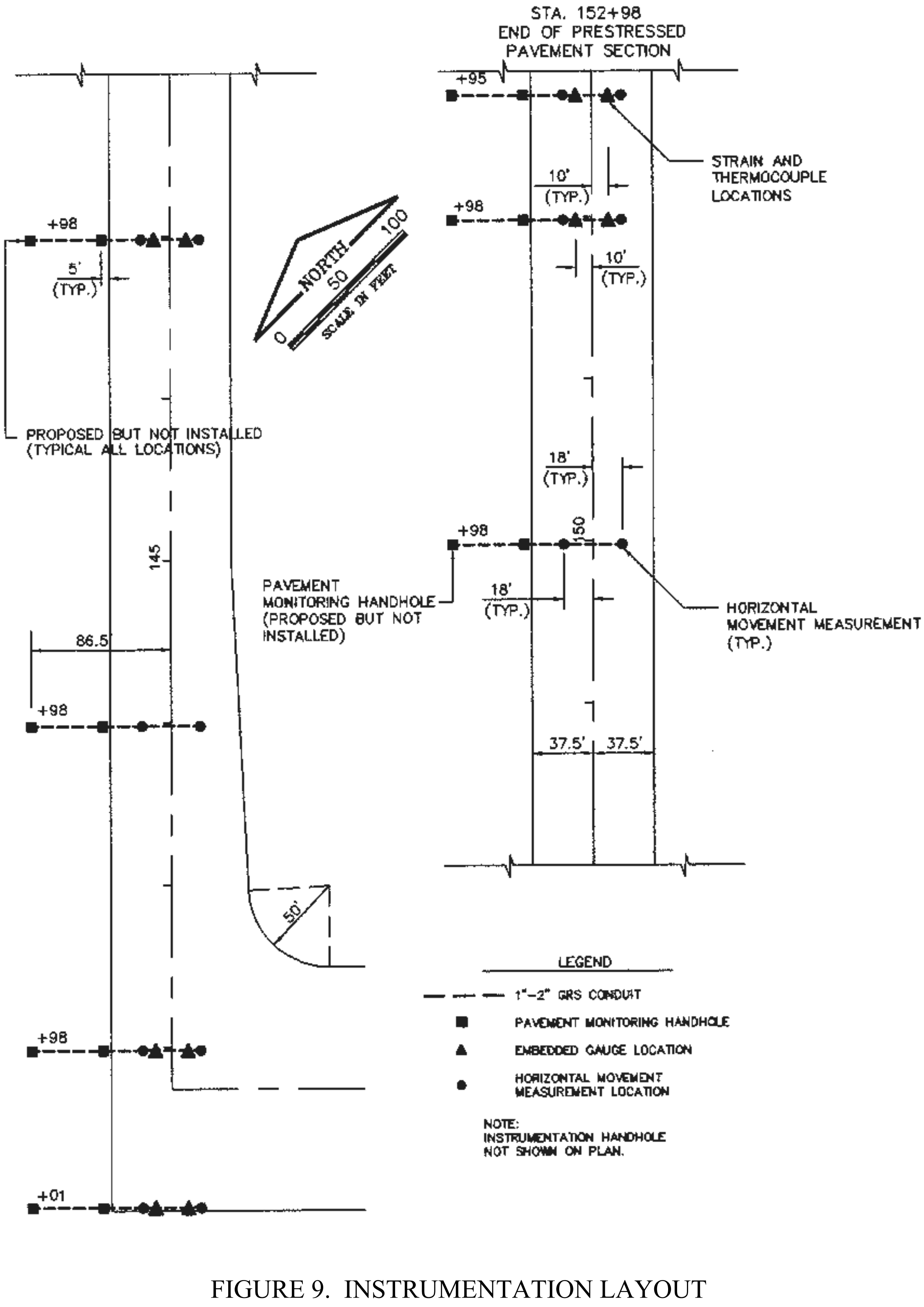


FIGURE 9. INSTRUMENTATION LAYOUT

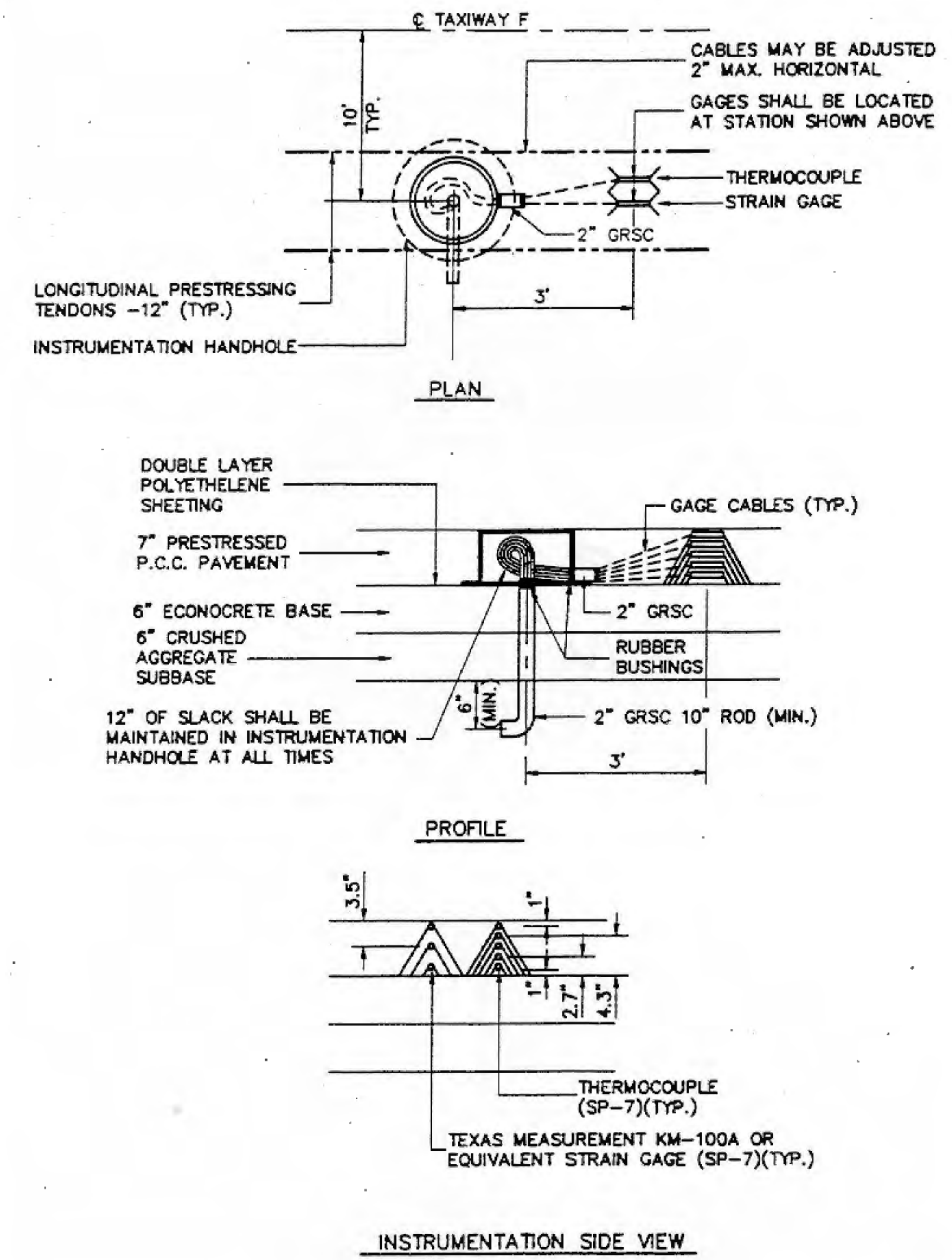


FIGURE 10. THERMOCOUPLES AND STRESS/STRAIN GAUGE INSTALLATION DETAILS

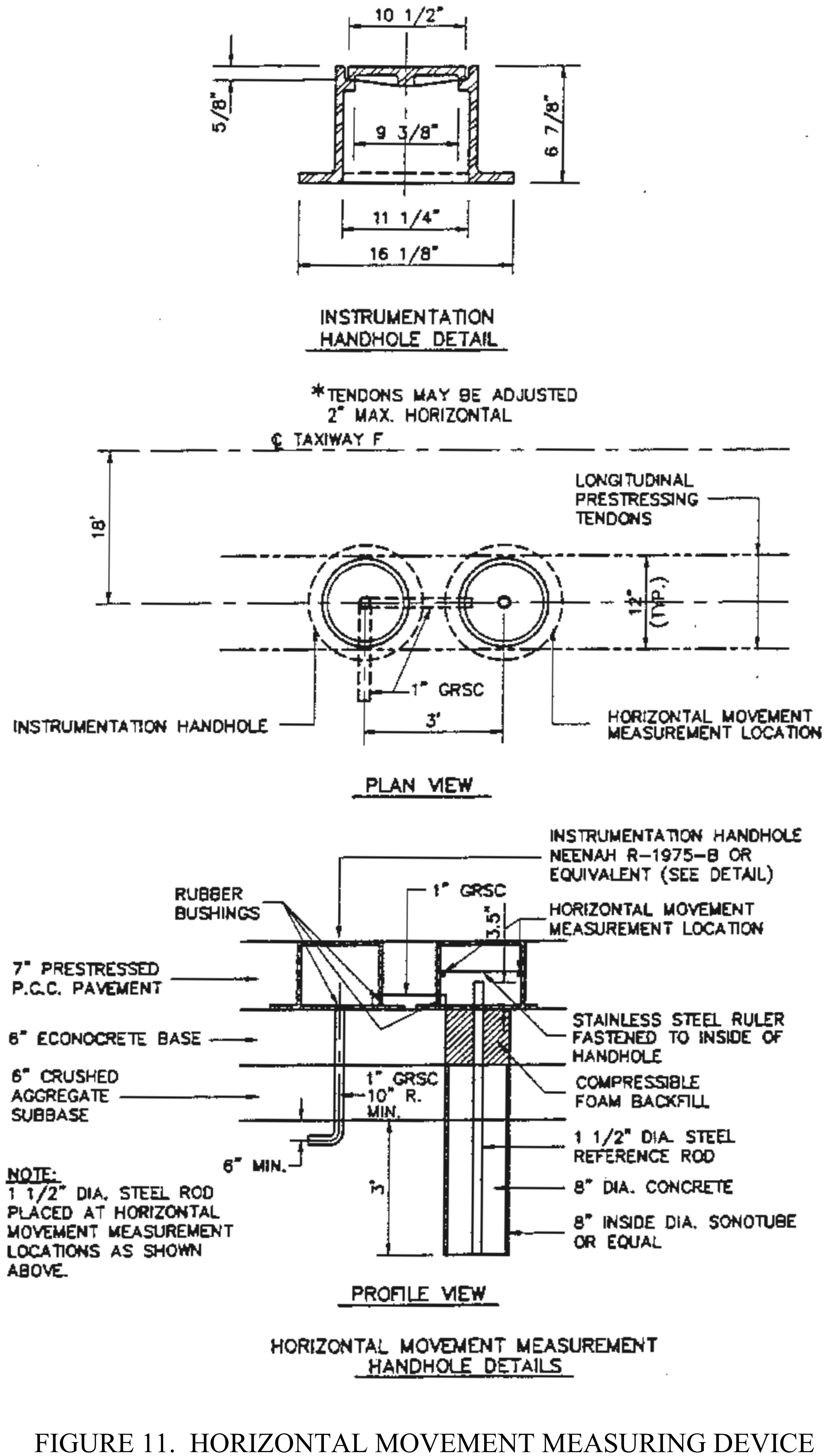


FIGURE 11. HORIZONTAL MOVEMENT MEASURING DEVICE INSTALLATION DETAILS

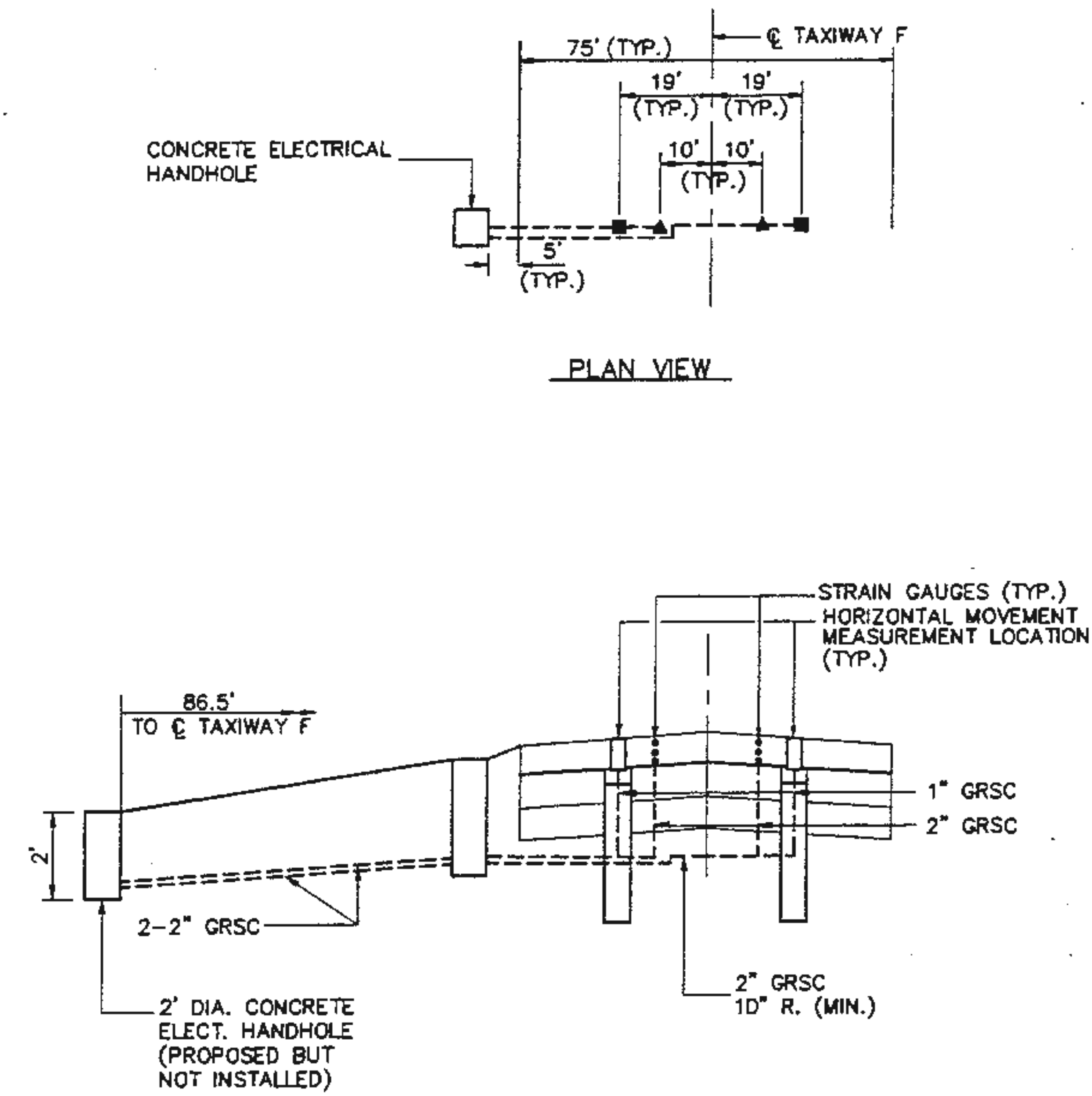


FIGURE 12. INSTRUMENTATION GAUGES AND HANDHOLE LOCATIONS

4. PAVEMENT CONDITION SURVEYS.

4.1 VISUAL SURVEY NOTES.

During each reading period, the condition of the prestressed fibrous pavement, gap slab, fibrous PCC pavement, and conventional PCC pavement was assessed using a series of questions, as shown in table 2. Many of these questions are subjective and dependent on the visual surveyor. As such, the same surveyor was used for each visual survey.

TABLE 2. VISUAL SURVEY NOTES FOR THE FIFTH YEAR OF MONITORING

Item	Location	Comment	November 1998	February 1998	April 1998	August 1998
1. PRESTRESSED PCC PAVEMENT						
1.1.	General	a. Surface feels rough when driven over. Rust streaks from snow plows are visible. b. Fibers apparent below surface.	NC NC	NC NC	NC NC	NC NC
1.2.	West End (Sta. 140+98)	a. Movement has occurred, the dirt has been pushed away from the edge of the pavement.	NC	NC	NC	NC
1.3.	General	Snow Plow damage along the edge of the pavement.	NC	NC	NC	NC
1.4.	General	a. Rust spots/pock marks more visible but not getting worse. b. Fibers have popped out of the surface, but not getting worse. c. Blow holes visible, but not getting worse. d. Fibers most visible by rain caused construction joint.	NC/NA NC/NA avg = 20 fib/ 3750 sq ft NC/NA NC/NA	NC/NA NC/NA avg = 15 fib/ 3750 sq ft NC/NA NC/NA	NC/NA NC/NA avg = 19 fib/ 3750 sq ft NC/NA NC/NA	NC/NA NC/NA avg = 29 fib/ 3750 sq ft NC/NA NC/NA
1.5.	General	Crazing is visible along length of the taxiway.	NC/NA	NC/NA	NC/NA	NC/NA
1.6.	General	Fiber balls are visible on the pavement surface, but the pavement surface is not deteriorating.	NC/NA	NC/NA	NC/NA	NC/NA
1.7.	General	Rain damaged surface has a pocked surface but surface is not deteriorating.	NC/NA	NC/NA	NC/NA	NC/NA
1.8.	General Instrumentation Handholes	Hairline cracks are found between all instrumentation handholes except that at sta. 152+95. Cracks are tight and not spalled.	NC/NA	NC/NA	NC/NA	NC/NA
1.9.	Construction Crack (Sta. 145 + 50)	Crack is tight and shows no sign of deterioration.	NC	NC	NC	NC
1.10	Construction Joints	147+62 end of first day; tight, without spalls	NC	NC	NC	NC
		150+37 rain delay; tight, without spalls	NC	NC	NC	NC
1.11	Crack/anomaly	See table 3	See table 3			
2. GAP SLAB						
2.1.	Finger Joint	a. Full of dirt b. Slightly raised c. Paint worn off of steel	NC NC Raised 1/4"	NC NC	NC NC	NC NC
2.2.	Slab	• Crazing apparent but not an active problem. • Hairline cracks are found at a 2 foot spacing.	NC	NC	NC	NC
2.3.	East Side of Gap Slab	Slightly raised above adjacent pavement	1/4"	1/4"	1/4"	1/4"

NC = No change since last monitoring session
NA = Not an active problem
NE = Crack did not exist during monitoring session.

TABLE 2. VISUAL SURVEY NOTES FOR THE FIFTH YEAR OF MONITORING (Continued)

Item	Location	Comment	November 1997	February 1998	April 1998	August 1998
3. FIBROUS PCC PAVEMENT						
3.1.	General	a. Surface feels rough when driven over. b. Fibers apparent below surface.	NC NC	NC NC	NC NC	NC NC
3.2.	General	a. Rust spots/pock marks visible but not getting worse. b. Fibers have popped out of the surface, but not getting worse. c. Blow holes visible but not getting worse.	NC/NA See above NC/NA	NC/NA See above NC/NA	NC/NA See above NC/NA	NC/NA See above NC/NA
3.3.	General, Joint Spalling	a. Spalling primarily due to saw cutting during construction. b. Some spalling due to winter weather observed.	NC Change	NC NC	NC NC	NC NC
			Slightly worse due to snow plow			
3.4.	General, Sealant Condition	Joint sealant condition	See table 5			
3.5.	Expansion Joint	Expansion joint condition	See table 5			
3.6.	Joints	Construction joint opening and condition	See table 5			
3.7.	Cracks	See table 3	See table 4			
4. CONVENTIONAL PCC PAVEMENT						
4.1.	General	Pavement in excellent condition without surface deterioration.	NC	NC	NC	NC
4.2.	General	Spalling of Transverse Joints, percent of all joint with joint spalls (Also see PCI survey sheet)	87%	100%	NC	NC
4.3.	Cracks	No. 1 in sample unit 4	No Spalls, Hairline	No Spalls, Hairline	No Spalls, Hairline	No Spalls, Hairline
		No. 2 in sample unit 5	NC	NC	NC	NC

NC = No change since last monitoring session
NA = Not an active problem
NE = Crack did not exist during monitoring session.

Cracks and spalls are not included in the visual survey notes but are addressed as part of the distress survey as noted below.

For the prestressed fibrous pavement, there appears to be no change in the surface condition during the fifth year. Crazing is visible, but is not an active problem. Fiber balls are visible on the pavement surface, but are not causing the pavement to crack. The rain damage which occurred during construction is not deteriorating. In summary, the surface is not showing any signs of deteriorations.

Fibers are visible in the surface of the pavement, but the number of fibers have not increased. At three randomly selected sites, the number of fibers visible in a 3,750-square foot area average 21 visible fibers.

The surface of the gap slab concrete is also not showing any sign of deterioration. However, the gap slap has tilted. The east side of the slab is higher than the west side. The gap slab has faulted approximately 1/4 in. above the fibrous pavement. This faulting may be due to growth in the fibrous pavement. The joints in the fibrous pavement have opened a significant amount, causing the pavement to grow.

The fingers of the finger joint are slightly raised, in part due to the rotating of the gap slab and in part due to debris in the finger joint. Portions of the finger joint has lost its shine due to rusting of the steel used to make the fingers.

For the fibrous pavement, there appears to be no change in the surface condition during the fifth year. Crazing is visible but is not an active problem. Fiber balls are visible on the pavement surface but are not causing the pavement to crack. The fiber spall at the joint, which occurred during construction, have not changed in condition. In summary, the surface is not showing any signs of deteriorations.

For the conventional pavement, there appears to be no change in the condition of the mortar during the fifth year. As discussed in the pavement condition index (PCI) survey, all of the joints have spalled.

4.2 CRACK SURVEY PRESTRESSED FIBROUS PCC PAVEMENT.

The location and condition of cracks in the prestressed fibrous survey are shown in table 3 and the location observed during each reading period is shown in figures 13, 14, 15, and 16.

Crazing can be seen throughout the pavement, but is not a problem.

Most transverse cracks have appeared in the prestressed fibrous PCC pavement during the spring than during any other season. Since the cracking is found in the spring, the cracking is more likely caused by the environment than by loading.

A longitudinal crack has appeared along the north edge of the prestressed fibrous pavement, as shown in figure 15 and 16. This crack is centered on the taxiway stripe into the UPS apron. The crack appears to be due to the insufficient support along the north edge of the apron. The UPS aircraft, traveling over either the edge has cracked the pavement. Curling of this edge may have contributed to the crack formation.

Most of the cracks found in the prestressed fibrous PCC pavement are longitudinal cracks. These cracks range in length from 2 to 32 feet. The cracks are fairly straight. Based on the offset of the cracks, these longitudinal cracks may be overtop the tendons. Most of the cracks are tight with little spalling, indicating that the cracks are not working. As discussed later in design assumptions, (section 10), if a load (curl) related cracking should occur in the prestressed pavement, they should occur in the longitudinal direction.

Since the cracks are relatively short, and randomly located, the longitudinal cracks are assumed to be environmentally related and not caused by loading.

TABLE 3. LOCATION OF CRACKS IN PRESTRESSED PCC PAVEMENT

Crack No.	Description	First Observed	Length	Transverse Crack			Longitudinal Crack			Remarks
				Sta. Offset	From	To	Center-line Offset	From Sta.	To Sta.	
	Construction joint at end of first day pour			147+56						
	Construction joint at rain delay on first day			150+25						Tight No spalling
1	Transverse crack	Aug. 93	75'	145+50	37.5' lt.	37.5' rt.				Tight No spalling
2	Transverse crack	Jan. 94	40.5'	147+37	3' lt.	37.5' rt.				Width < 1/16" Tight, spalling caused by fibers
3	Longitudinal crack	Apr. 95	9'				9' lt.	152+66	150+75	Width < 1/16" Spalls caused by fibers
4	Longitudinal crack	Apr. 95	6'				17' rt.	142+49	142+55	Hairline
5	Longitudinal crack	Apr. 95	3'				22' rt.	146+96	146+99	Visible, tight
6	Transverse crack	Apr. 95	24'	147+07	17.5' lt.	6.5' Rrt.				Hairline, tight Fibers popping out No spalling
7	Transverse crack	Apr. 95	28'	147+29	10' lt.	18' rt.				Visible Spalls caused by fibers
8	Transverse crack	Apr. 95	24'	147+91	20' lt.	4' rt.				Hairline. tight, w/ some spalling
9	Longitudinal crack	Apr. 95	1'				10' lt.	149+99	150+00	Hairline, tight, w/ some spalling
10	Longitudinal crack	Apr. 95	3'				11' lt.	149+97	150+00	Hairline, tight
11	Longitudinal crack	Apr. 95	6'				17' lt.	152+67	152+73	Visible, tight Spalls caused by fibers
12	Longitudinal crack	Apr. 95	2'				4' rt.	152+74	152+76	Visible, tight Spalls caused by fibers
13	Longitudinal crack	July 95	2'				16' lt.	147+50	147+52	Hairline, tight
14	Longitudinal crack	July 95	1'				2' lt.	150+27	151+28	Hairline, tight
15	Longitudinal crack	July 95	5'				5' lt.	150+27	150+32	Hairline, tight
16	Longitudinal crack	July 95	4'				32' lt.	151+31	151+35	Hairline, tight
17	Longitudinal crack	Apr. 96	48'	147+02	37.5' lt.	37.5 rt.				Hairline, tight
18	Longitudinal crack	Apr. 96	10'				11' rt.	150+29	150+39	Hairline, tight
19	Longitudinal crack	Apr. 96	6'				13' lt.	150+29	150+35	Hairline, tight
20	Longitudinal crack	Apr. 96	6'				23' lt.	150+67	150+73	Hairline, tight hard to find

TABLE 3. LOCATION OF CRACKS IN PRESTRESSED PCC PAVEMENT (CONTINUED)

Crack No.	Description	First Observed	Length	Transverse Crack			Longitudinal Crack			Remarks
				Sta. Offset	From	To	Center-line Offset	From Sta.	To Sta.	
21	Longitudinal crack	Apr. 96	3'				10' rt.	152+72	152+75	Hairline, tight
22	Longitudinal crack	Apr. 96	4'				17' rt.	152+72	152+76	Hairline, tight
23	Longitudinal crack	Apr. 96	3'				21' rt.	152+76	152+79	Hairline, tight
24	Longitudinal crack	Apr. 96	2'				22' rt.	152+72	152+74	Hairline, tight
25	Longitudinal crack	Apr. 96	4'				2'rt.	152+72	152+76	Hairline, tight
26	Longitudinal Crack	Apr. 97	3'				22' rt.	143+91	143+94	Hairline
27	Longitudinal Crack	Apr. 97	5'				25' rt.	147+51	147+56	Hairline
28	Longitudinal Crack	Oct. 97	3'				17' lt.	145+47	145+50	Hairline
29	Longitudinal Crack	Oct. 97	4'				6' rt.	145+53	145+57	Hairline
30	Longitudinal Crack	Oct. 97	6'				6' rt.	150+19	150+25	Hairline
31	Longitudinal Crack	Oct. 97	2'				17' rt.	150+25	150+27	Hairline
32	Longitudinal Crack	Oct. 97	4'				20' rt.	150+25	150+29	Hairline
33	Longitudinal Crack	Oct. 97	1'				23' rt.	150+25	150+26	Hairline
34	Longitudinal Crack	Apr. 98	80'				32.5' lt.	147+46	148+26	Hairline
35	Longitudinal Crack	Apr. 98	24'				34.5' lt.	147+44	147+68	Hairline
36	Longitudinal Crack	July 98	3'				22' lt.	143+65	143+68	Tight, caused by Fiber Ball
37	Longitudinal Crack	July 98	15'				22'rt.	144+68	144+83	Hairline
38	Longitudinal Crack	July 98	7'				12'rt.	149+18	149+25	Hairline

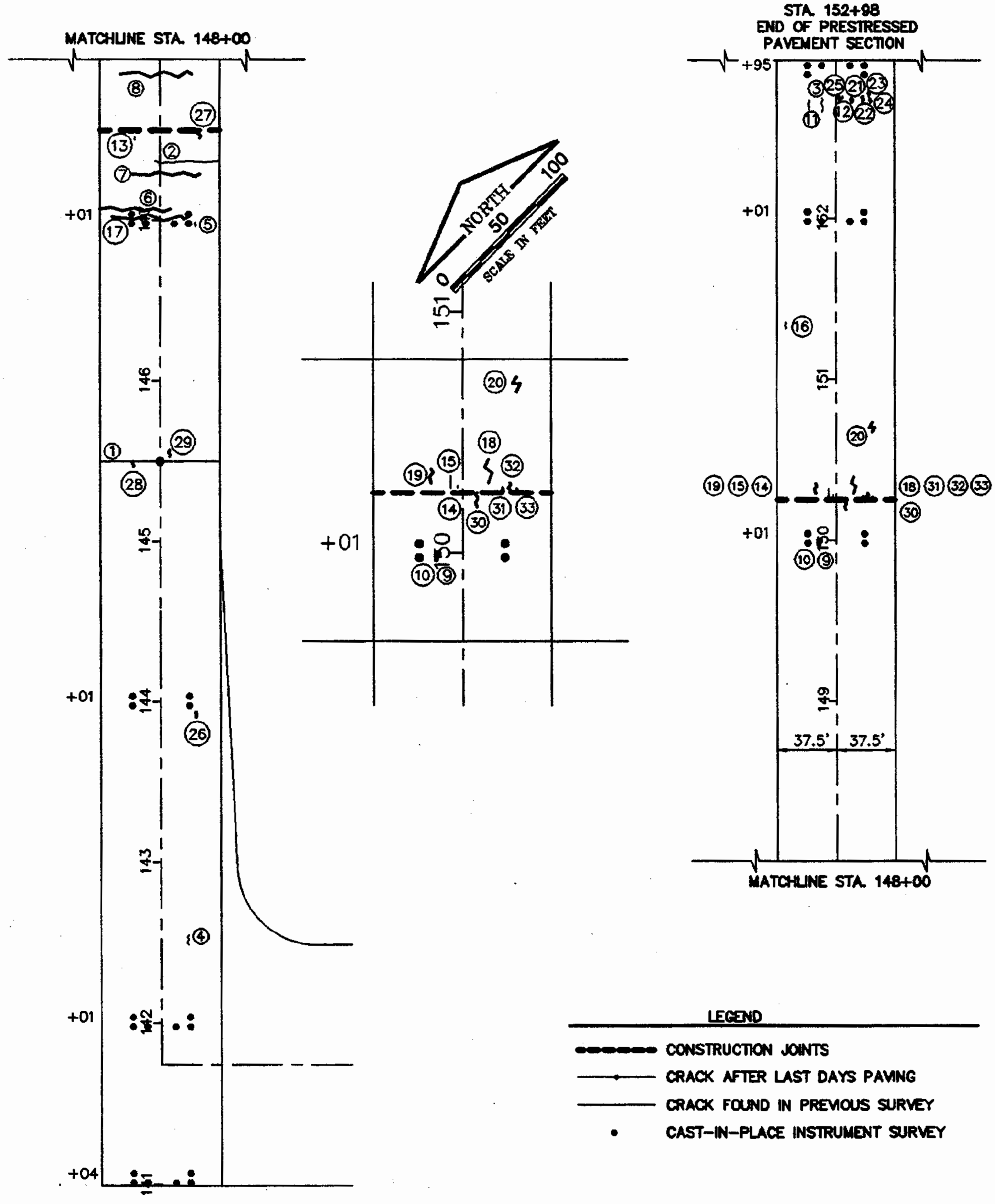


FIGURE 13. CRACKS IN PRESTRESSED CONCRETE PAVEMENT, FALL 1997

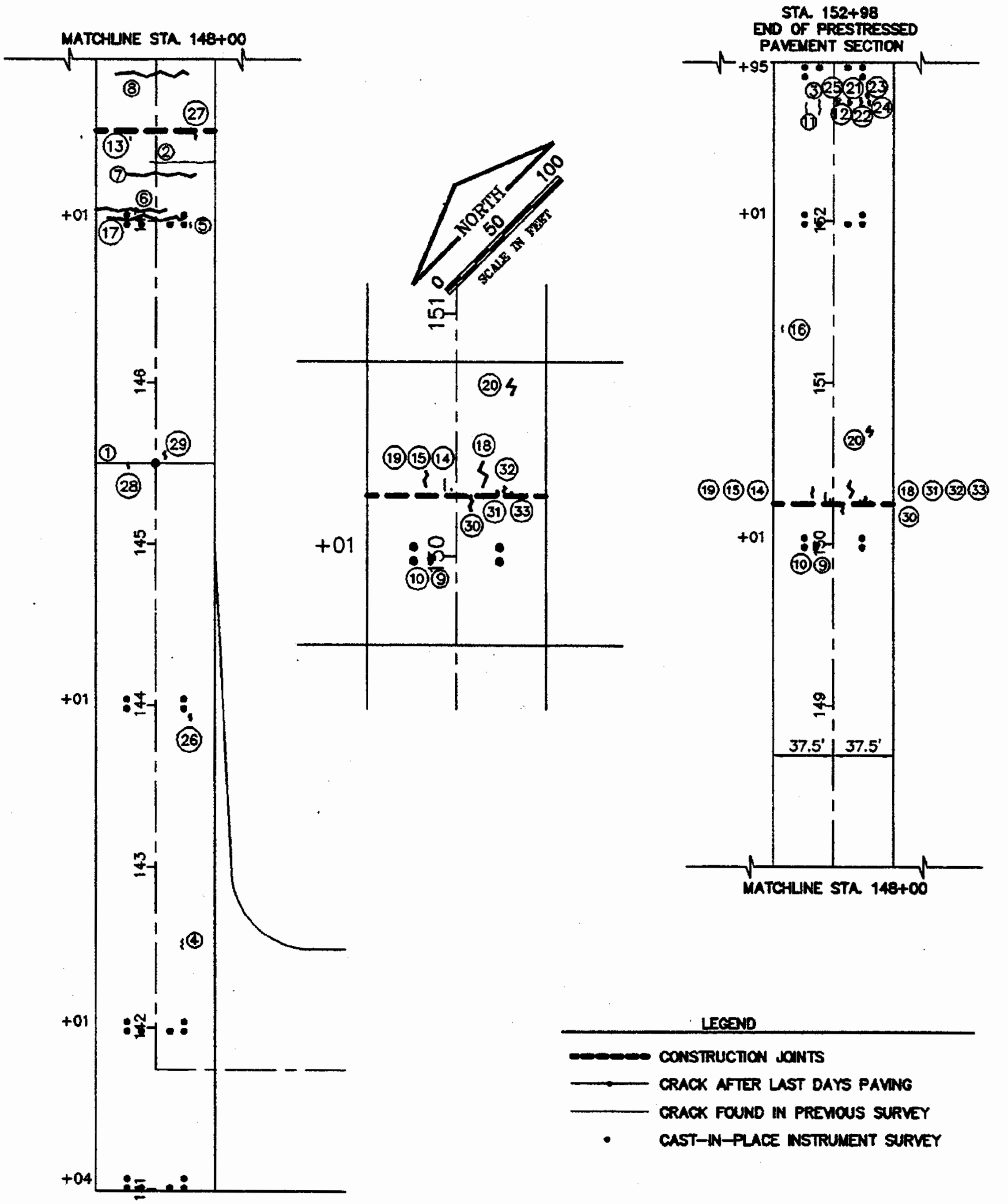


FIGURE 14. CRACKS IN PRESTRESSED CONCRETE PAVEMENT, WINTER 1998

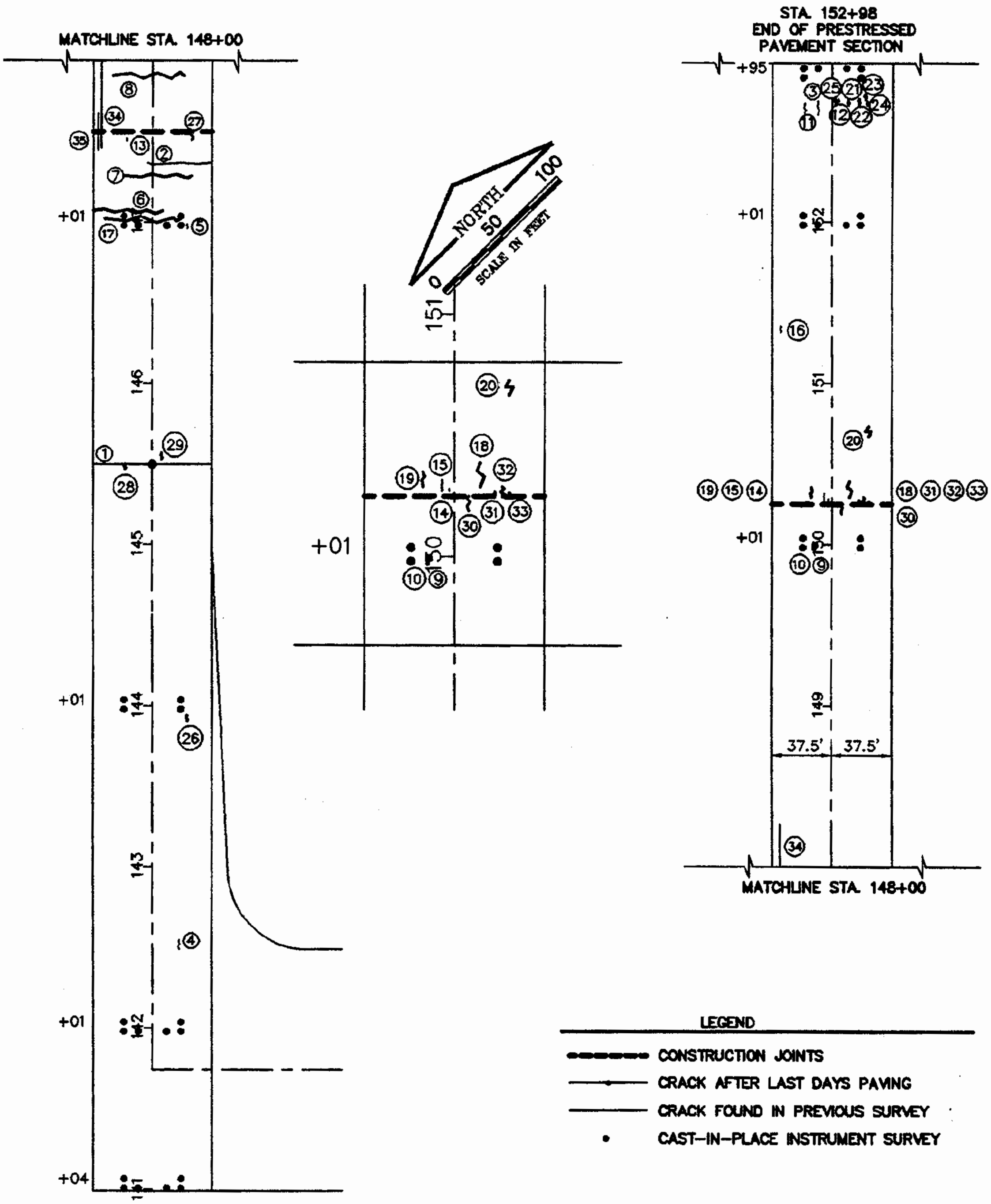


FIGURE 15. CRACKS IN PRESTRESSED CONCRETE PAVEMENT, SPRING 1998

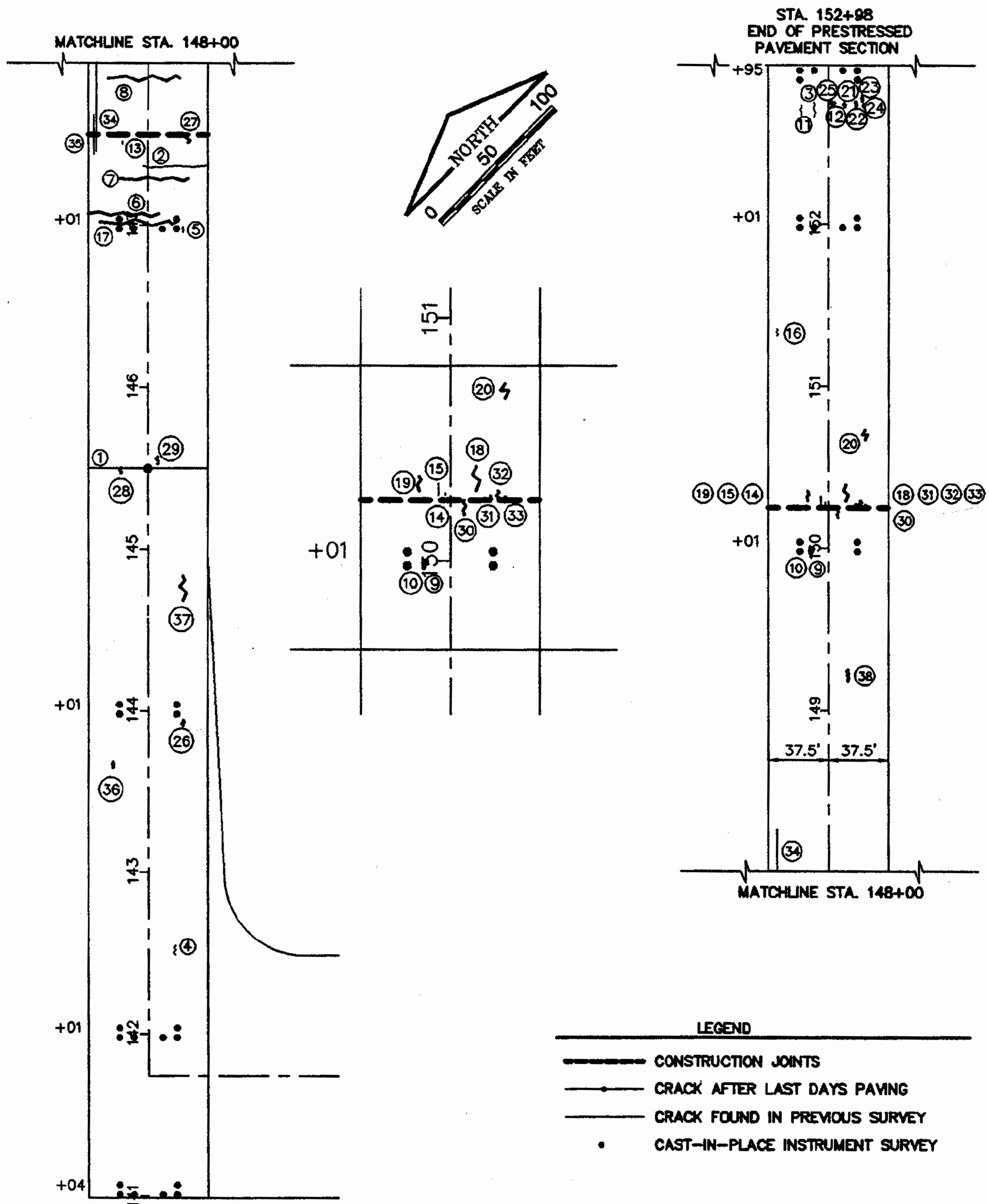


FIGURE 16. CRACKS IN PRESTRESSED CONCRETE PAVEMENT, SUMMER 1998

The transverse cracks found in the prestressed fibrous PCC pavement vary in condition from tight, hairline, hard-to-find cracks to tight cracks with slight spalling due to fibers. Many cracks are difficult to find. Figure 16 from the fourth period survey, shows all of the cracks found in the prestressed fibrous pavement after 5 years. Figure 17 shows the most predominant cracks; the hairline, hard-to-find cracks have been removed. Most of the predominant cracks are in the center of the pavement section, near the start of the second day's placement.

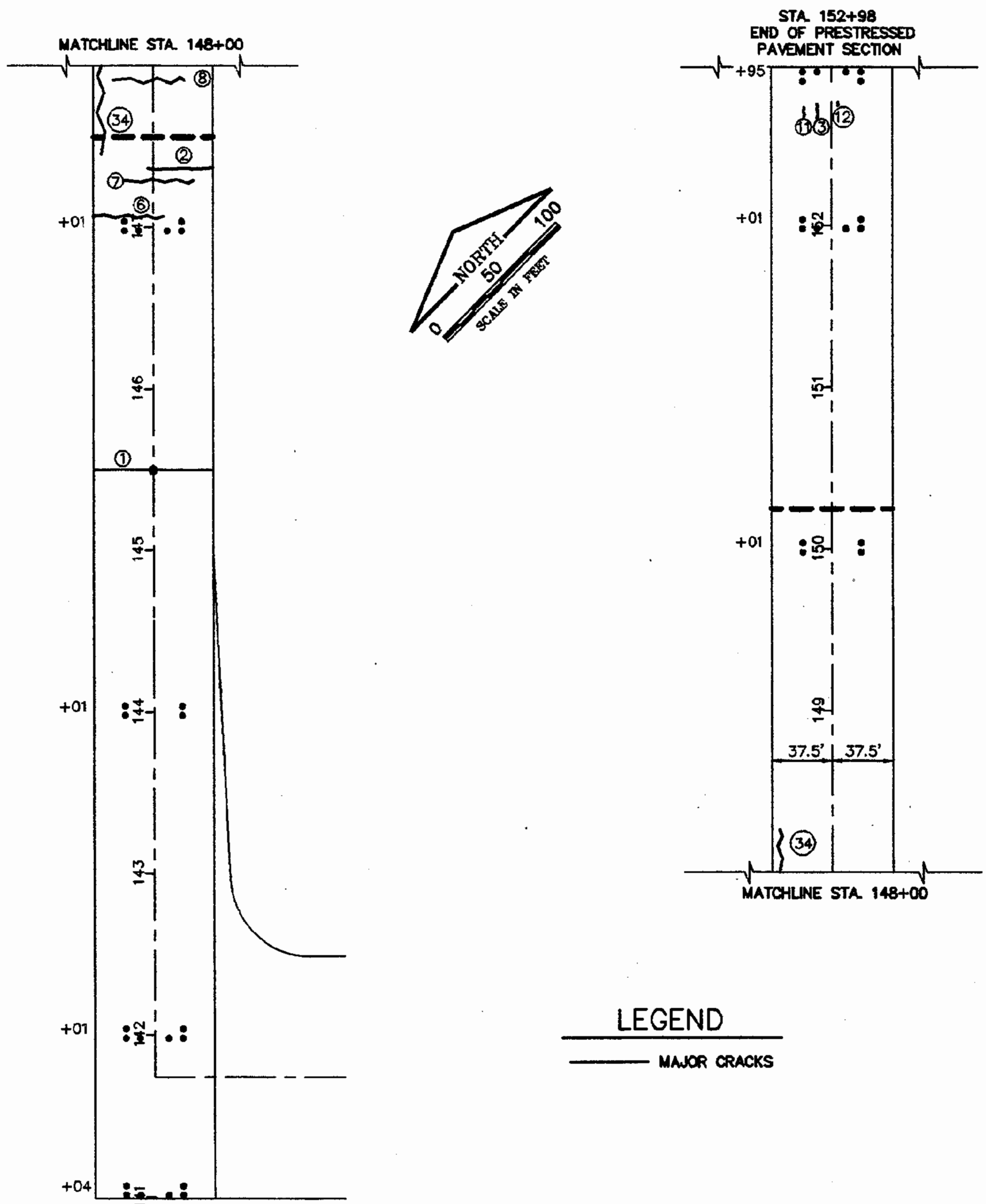


FIGURE 17. MAJOR CRACKS IN THE PRESTRESSED CONCRETE PAVEMENT, SUMMER 1998

The transverse cracks may be due to either a late application of curing compound, cold joints in the PCC paving, the stress in the tendons may be less than at the ends of the pavement, or the friction in the center of the slab is greater than expected. If the curing compound was applied late, the surface of the pavement could have lost moisture, causing an uneven expansion of the type K cement. If the bottom grows more than the top, a crack could occur.

At the start of a paving day, some hand finishing of the concrete is required. Often the paver stops during this operation, so the finishers can keep pace with the paver. If the paver stopped too long, the face of the concrete could have begun to setup, causing a cold joint to form.

The tension in the prestressing cables, at the center of the slab, could be less than the design tension. The internal stress caused by prestressing cables is least in the center and greatest at the ends. During construction, the stress in the cables was measured at the ends but not in the center of the slab. The loss in tension between the ends and center was predicted by calculations. If the actual loss is more than calculated, the stress in the center of the slab could be less than design, causing a crack. If the cracking is due to the stress, cracking will continue to occur with time at this location.

As discussed in section 7, the center of the pavement has moved. If during this movement the friction in the center of the slab combined with the weight of the pavement, and other stresses is greater than expected, stresses in the pavement could become great enough to crack the pavement when the pavement changes length.

The cause for the transverse cracking is unknown. However, the cause may be determined with time, regardless of the cause for the cracking. The cracks are of low severity and primarily in one location along the pavement. In summary, the lack of a full width working crack verifies that the design assumptions were met.

4.3 CRACK SURVEY FIBROUS PCC PAVEMENT.

The location and condition of cracks in the fibrous survey are shown in table 4, and the location observed during each reading period is shown in figures 18, 19, 20, and 21.

Most of the transverse cracks in the fibrous PCC pavement appeared during the spring survey period. Since the cracking is found in the spring, these cracks may be caused by the environment than by loading.

Transverse cracks are found throughout the pavement. However, only one crack is full width of the pavement. This crack is located approximately 20 feet from a nonworking joint, as noted in table 4, and occurred during the first 3 months following construction. The remaining transverse cracks are partial width of the pavement.

There is a large concentration of transverse cracking found in the vicinity of the entrance to the UPS apron. These cracks may be due to aircraft loading.

TABLE 4. LOCATION OF CRACKS AND JOINTS IN FIBROUS PCC PAVEMENT

Crack No.	Description	Joint Sta.	First Observed	Length	Transverse Crack Sta. Offset	Transverse Crack From	Transverse Crack To	Longitudinal Crack Center-line Offset	Longitudinal Crack From Sta.	Longitudinal Crack To Sta.	Remarks
	Joint at Gap Slab	153+13									
	Joint	153+98									Tight, no change Not working
	Joint	155+48									Working Joint, L to M Severity Sealant 1" below surface Little spalling
	Construction joint	157+48									No Sealant Working joint Little spalling
	Joint	158+48									Low Severity, may not be working
	Joint	159+98									Low Severity, some spalling
	Expansion joint	161+98									Resealed in 1994 High Severity
1	Longitudinal crack		Aug. 93	12'				0.5' rt.	161+86	161+98	Low Severity <1/32" width L Spalling
2	Transverse Crack		Oct. 93	70'	154+16	32.5' lt.	37.5' rt.				Right side > 1/8" & spalled Left side hairline M spalling
3	Transverse crack		July 94	44'	158+25	7' lt.	37' rt.				M Severity 1/16" width L Spalling
4	Transverse crack		July 94	75'	158+93	37.5' lt.	37.5' rt.				L to M Severity <1/16" width Low Severity Spalling
5	Transverse crack		Oct. 94	30'	161+20	10' lt.	20' rt.				Visible, <1/16" width Fiber Spalls Low Severity Spalling
6	Longitudinal crack		Oct. 94	28'				18'rt.	161+44	161+72	Low Severity <1/8" width Fiber Spalls
7	Transverse crack		Apr. 95	24'	161+82	1' rt.	25' rt.				Low Severity < 1/32" width Spalling
8	Longitudinal crack		Apr. 95	5'				6' lt.	161+85	161+90	Low Severity < 1/32" width Spalling
9	Longitudinal crack		Apr. 95	10'				18' lt.	161+88	161+98	Medium Severity < 1/32" width Spalling
10	Transverse crack		July 95	20'	153+76	10' rt.	30' rt.				Visible < 1/32" width Slight spalling
11	Transverse crack		July 95	42'	154+81	12' lt.	30' rt.				Visible No Spalling
12	Transverse crack		July 95	12'	158+37	17' lt.	5' lt.				Low Severity Light spalling
13	Longitudinal crack		July 95	4'				1' lt.	159+64	159+68	Hairline
14	Transverse crack		July 95	15'	160+27	10' lt.	5' rt.				Hairline Low severity < 1/32" wide Growing
15	Transverse crack		July 95	24'	160+87	9' lt.	15' rt.				Visible Low Spalling
16	Longitudinal crack		July 95	10'				10' lt.	161+86	161+96	Hairline
17	Longitudinal crack		July 95	4'				20' rt.	161+77	161+81	Hairline
18	Longitudinal crack		July 95	10'				25' rt.	161+85	161+95	Hairline to visible
19	Longitudinal crack		Oct. 95	11'				12.5' lt.	161+59	161+70	Hairline

TABLE 4. LOCATION OF CRACKS AND JOINTS IN FIBROUS PCC PAVEMENT (Continued)

Crack No.	Description	Joint Sta.	First Observed	Length	Transverse Crack Sta. Offset	Transverse Crack From	Transverse Crack To	Longitudinal Crack Center-line Offset	Longitudinal Crack From Sta.	Longitudinal Crack To Sta.	Remarks
20	Longitudinal crack		Oct. 95	5'				17.5' lt.	161+58	161+64	Hairline
21	Longitudinal crack		Jan. 96	20'				10' rt.	157+28	157+48	Hairline
22	Transverse crack		Apr. 96	8'	156+57	Centerline	8' rt.				Hairline
23	Transverse crack		Apr. 96	8'	156+99	Centerline	8' rt.				Hairline
24	Transverse crack		Apr. 96	5'	158+11	5' rt.	10' rt.				Hairline
25	Transverse crack		Apr. 96	5'	158+73	5' rt.	10' rt.				Hairline
26	Transverse crack		Apr. 96	5'	158+73	7' lt.	12' lt.				Hairline
27	Longitudinal crack		Apr. 96	22'				13' lt.	159+65	159+87	Hairline
28	Longitudinal crack		Apr. 96	5'				7' rt.	159+65	159+70	Low Severity
29	Transverse crack		Apr. 96	7'	159+55	5' rt.	12' rt.				Hairline
30	Transverse crack		Apr. 96	7'	160+73	10' lt.	17' lt.				Hairline
31	Transverse crack		Apr. 96	8'	161+49	7' lt.	15' lt.				Hairline
32	Transverse crack		Apr. 96	12'	161+71	Centerline	12' rt.				Hairline, visible
33	Longitudinal Crack		Apr. 97	17'				12' lt.	158+76	158+93	Hairline
34	Longitudinal Crack		Apr. 97	20'				12' rt.	159+18	159+38	Hairline
35	Longitudinal Crack		Oct. 97	5'				15' rt.	157+48	157+53	Low Severity
36	Longitudinal Crack		Oct. 97	30'				15' lt.	159+53	159+83	Hairline
37	Longitudinal Crack		Oct. 97	10'				15' lt.	160+35	160+45	Hairline
38	Longitudinal Crack		Oct. 97	5'				22' rt.	161+93	161+98	Hairline
39	Longitudinal Crack		July 98	3'				18' lt	155+48	155+51	Hairline
40	Longitudinal Crack		July 98	5'				18' lt	157+23	157+28	Hairline
41	Longitudinal Crack		July 98	41				18' lt.	157+43	157+84	Hairline

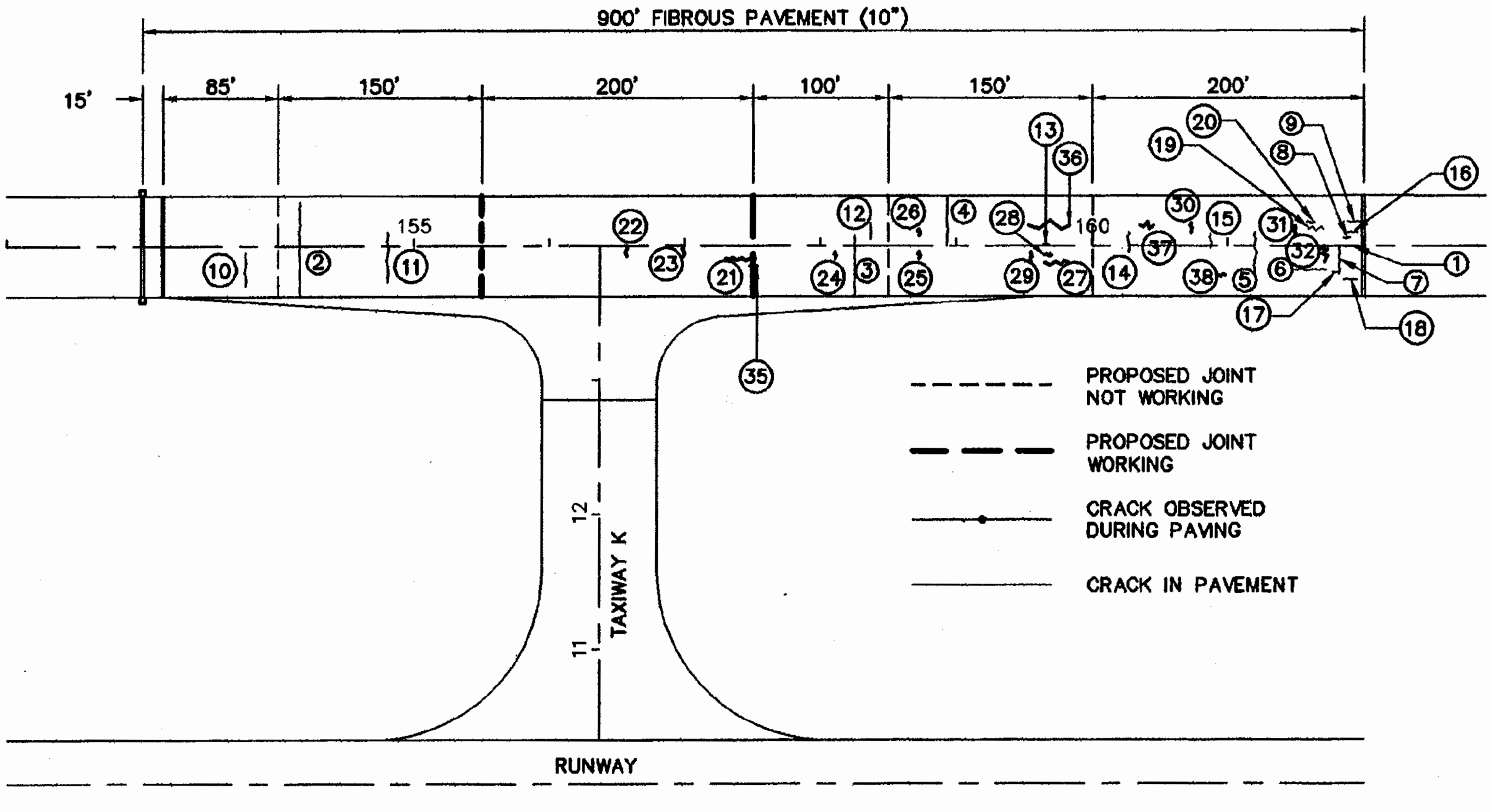


FIGURE 18. CRACKS IN FIBROUS PCC PAVEMENT, FALL 1997

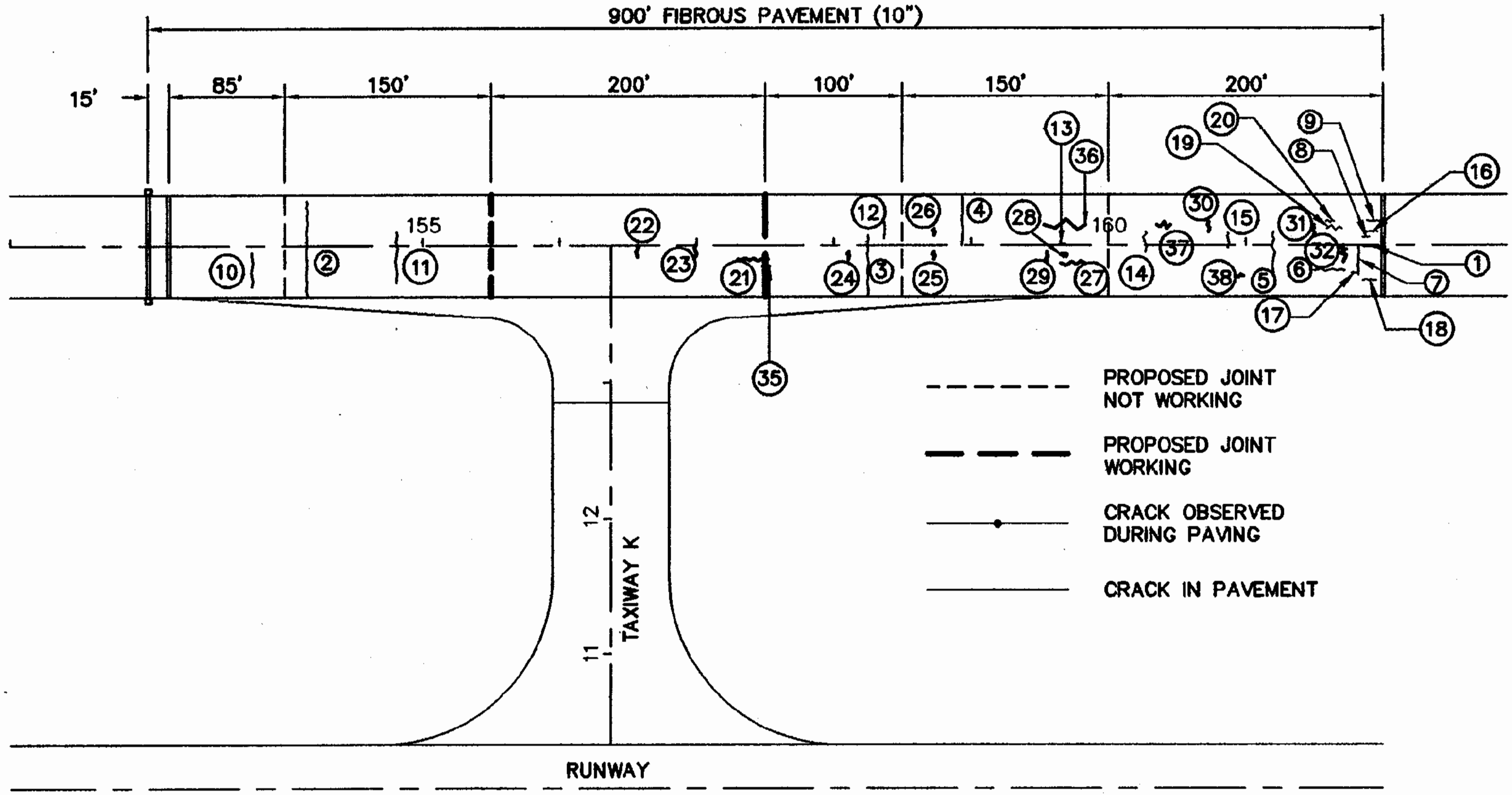


FIGURE 19. CRACKS IN FIBROUS PCC PAVEMENT, WINTER 1998

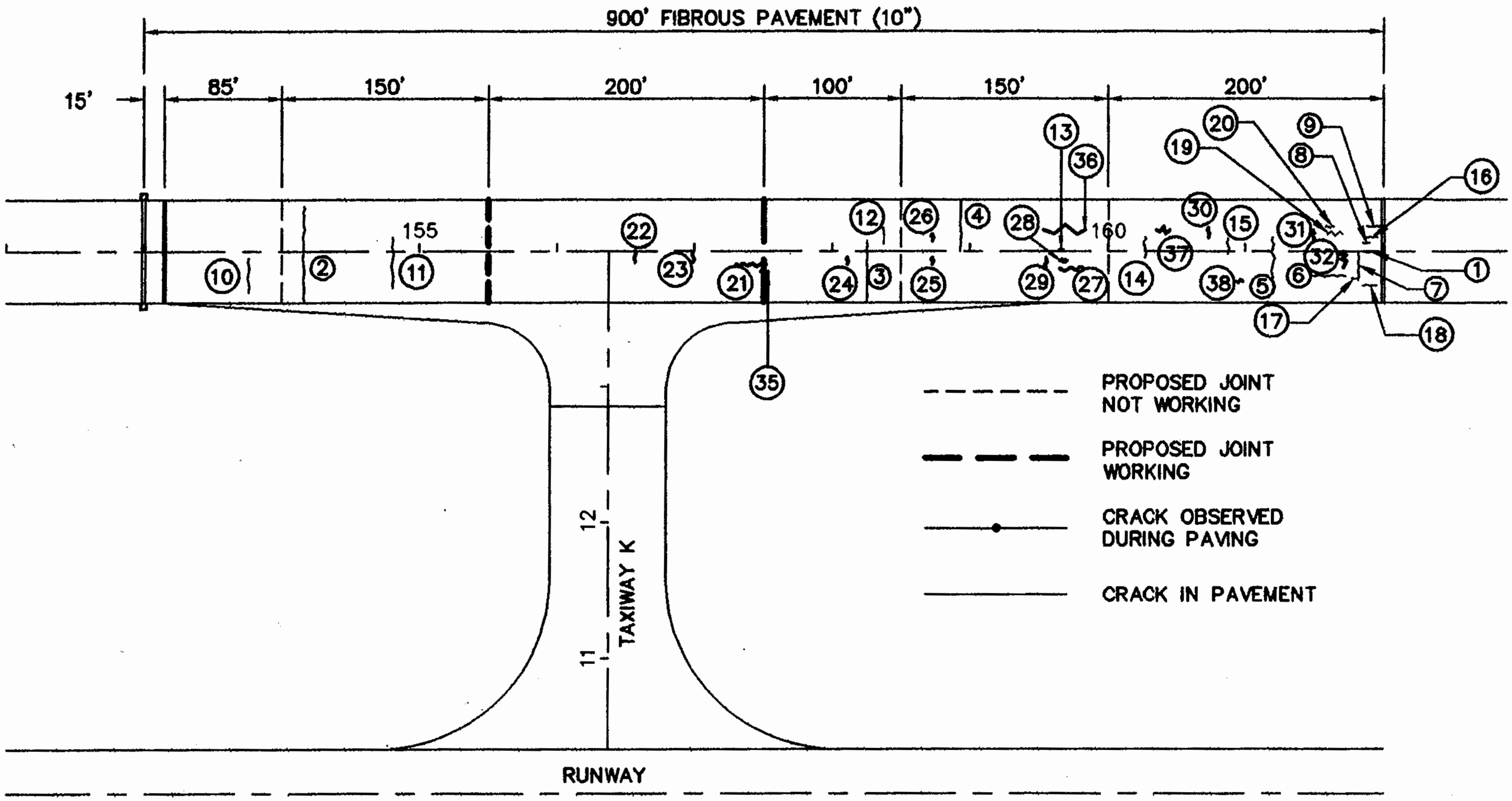


FIGURE 20. CRACKS IN FIBROUS PCC PAVEMENT, SPRING 1998

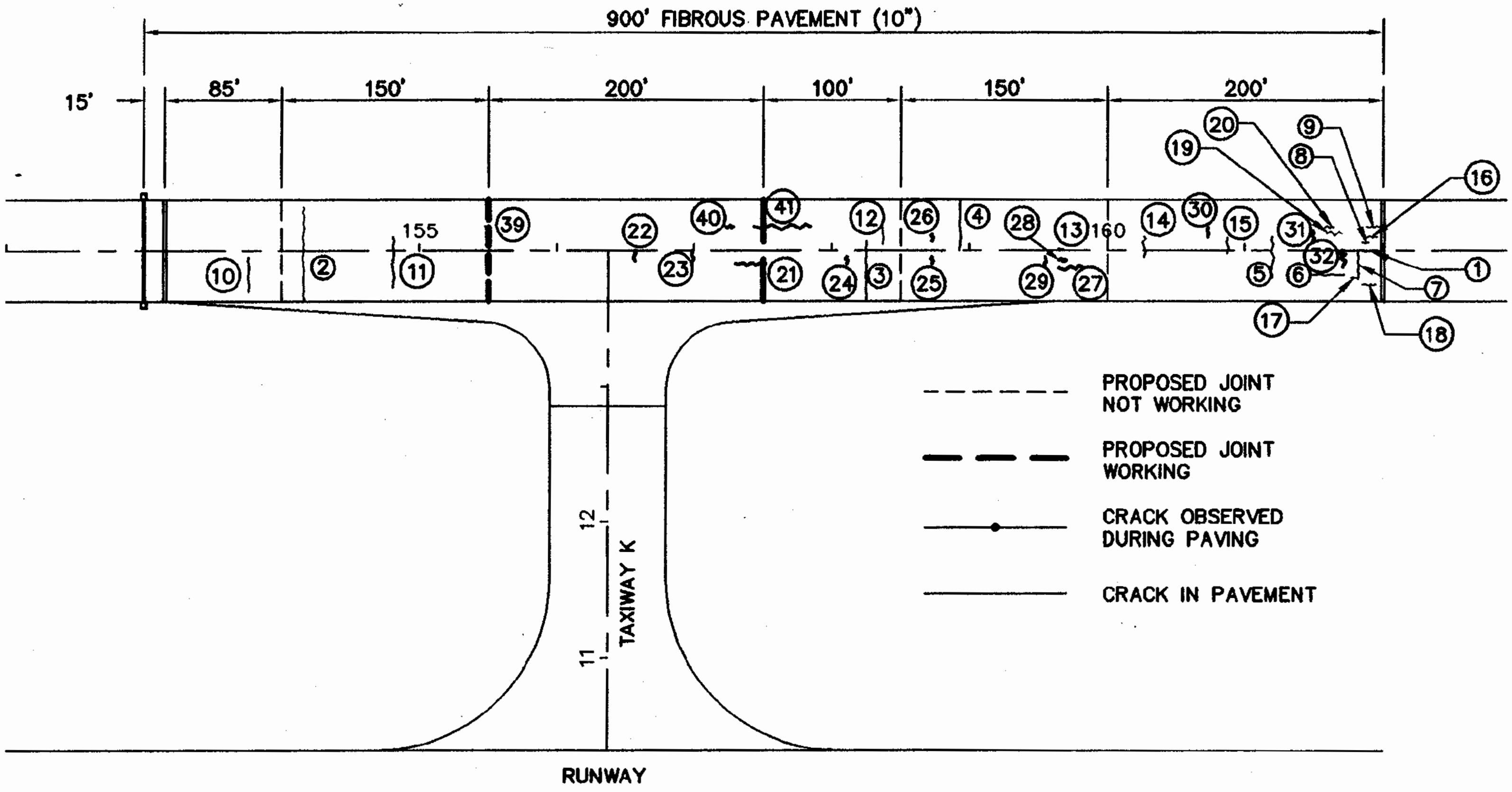


FIGURE 21. CRACKS IN FIBROUS PCC PAVEMENT, SUMMER 1998

The longitudinal cracks in the fibrous pavement range in length from 1 to 25 feet. The longer cracks are fairly straight with some meandering. These cracks continue to appear. Figure 22 shows the longitudinal cracks along the pavement section without any transverse cracking. The longitudinal cracks are primarily on the east end of the project. The cracks end at the entrance into the UPS apron. These cracks may be due to aircraft traffic. Based on the assumption that these may be load related, it appears that a longitudinal joint spacing of 25 to 50 feet may be appropriate for pavement consisting of steel fibers with shrinkage compensating cement. More investigation in the longitudinal joint spacing is required.

The longitudinal and transverse cracking in the eastern 100 feet of the fibrous pavement, may be due to improperly applied curing compound. In this location is the greatest concentration of short, randomly spaced transverse cracks, and short sections of longitudinal cracking.

Some of the transverse cracks in the fibrous concrete pavement appear to be the natural crack spacing at which the concrete wants to crack. The cracks which appear to be working is shown in figure 23. The distance between working joints and transverse cracks, shown in table 4, averages 125 feet along the entire length of pavement. The working crack and joint spacing ranged from 68 to 200 feet. Based on the assumption that these are the only working cracks, it appears that a transverse joint spacing of 50 to 75 feet may be obtainable with PCC pavement consisting of steel fibers with shrinkage compensating cement.

It should be remembered that the purpose of the fibrous project was to determine if the use of steel fibers with shrinkage compensating cement will allow an increase in joint spacing.

In the summer of 1998, there were a total of three joints which appear to be working and 19 cracks greater than 5 feet long. The average cracks spacing is 40 feet. The transverse crack spacing is shorter on the east end than on the west end.

The transverse cracks begin to spall after two winters, and the cracks open with time. However, the cracks do no grow across the pavement.

4.4 PAVEMENT CONDITION INDEX SURVEY CONVENTIONAL PCC PAVEMENT.

A PCI survey was conducted quarterly in the conventional PCC pavement. The distress found during the survey, along with their location and resulting PCI value, are presented in figures 24, 25, 26, and 27.

The PCI drops about 10 PCI points each year, up to the third spring reading. The PCI value then levels off. The fifth year PCI is of the same magnitude as the fourth year PCI. This trend is due to joint spalling. By the fall of the fourth year, almost all of the slabs were spalled.

During the fifth monitoring year, the PCI of the conventional PCC pavement deteriorated from an average of 69 to 67. This deterioration is due to an increase in the severity of joint spalling. In November 1997, 79 slabs contained joint spalling, of which 31 slabs were of medium severity. In August 1998, 82 slabs contained joint spalling, of which 35 were of medium severity. Joint spalling was found in 89% of the slabs.

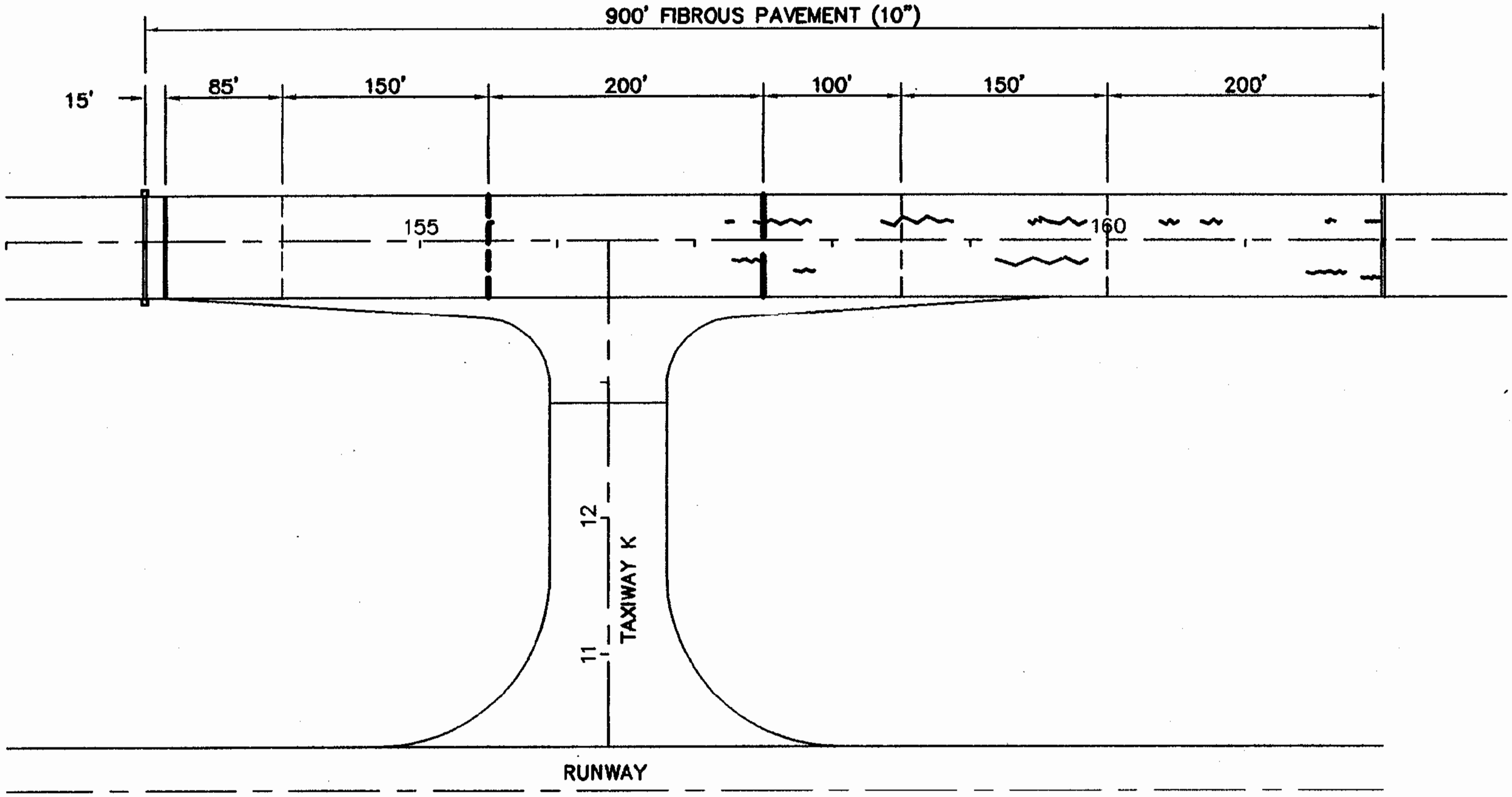


FIGURE 22. MAJOR LONGITUDINAL CRACKS IN FIBROUS PCC PAVEMENT, SUMMER 1998

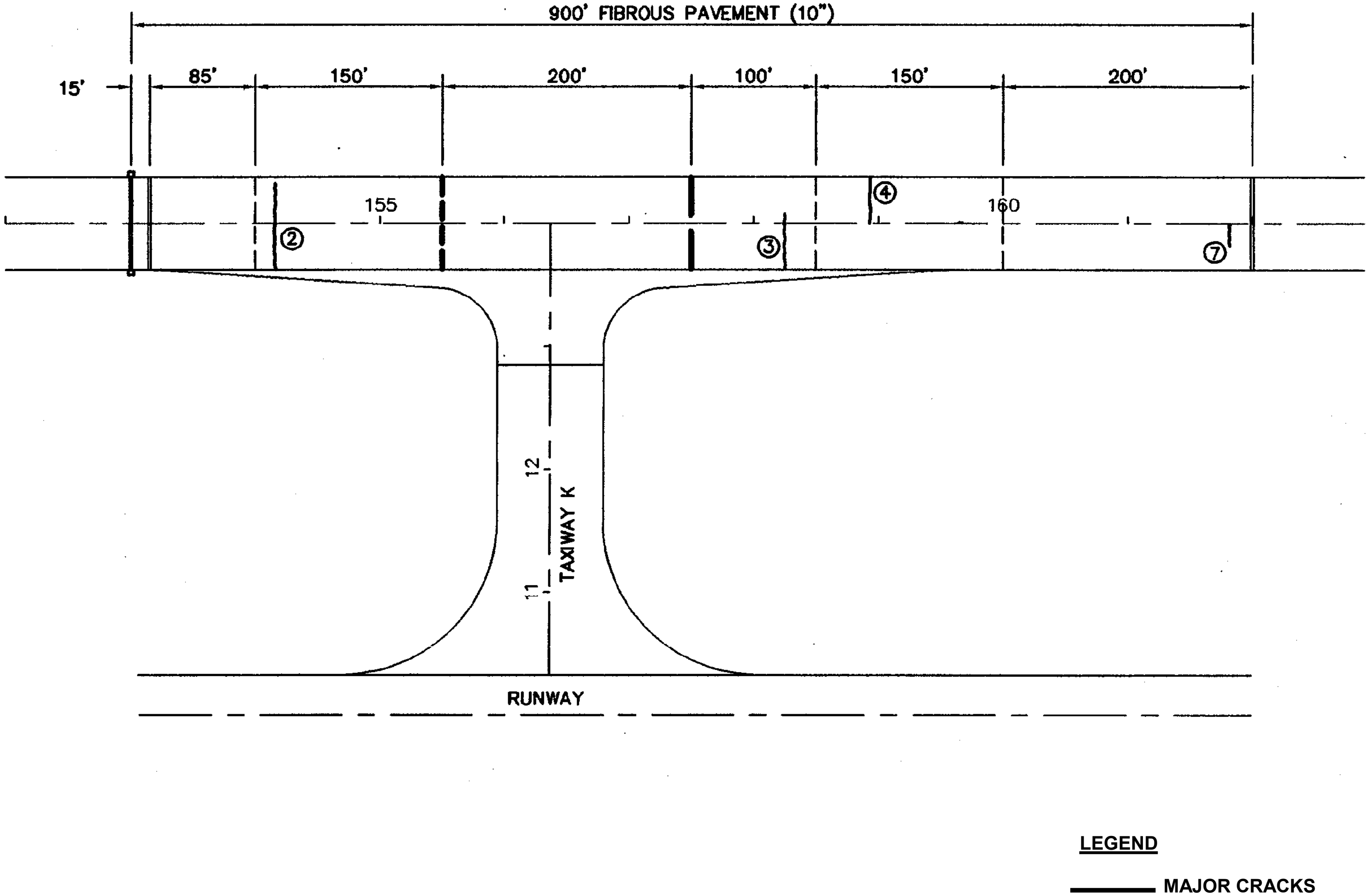


FIGURE 23. MAJOR TRANSVERSE CRACKS IN FIBROUS PCC PAVEMENT, SUMMER 1998

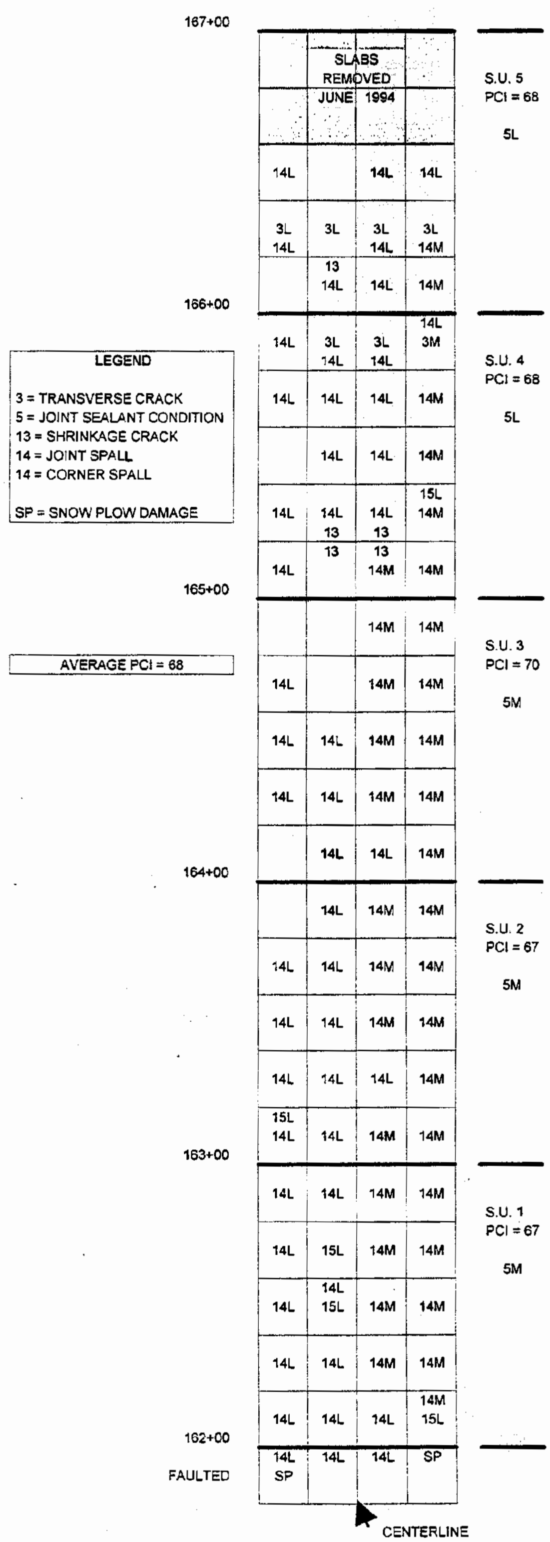


FIGURE 24. PAVEMENT CONDITION INDEX SURVEY—CONVENTIONAL PCC PAVEMENT, FALL 1997

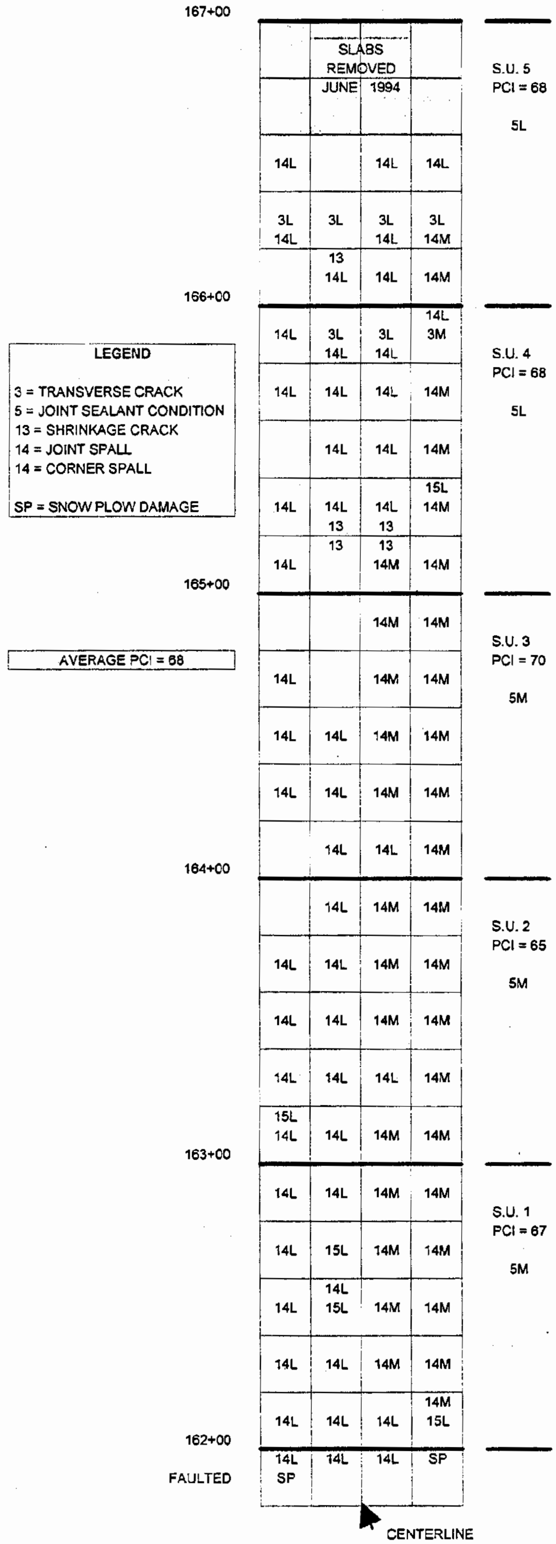


FIGURE 25. PAVEMENT CONDITION INDEX SURVEY—CONVENTIONAL PCC PAVEMENT, WINTER 1998

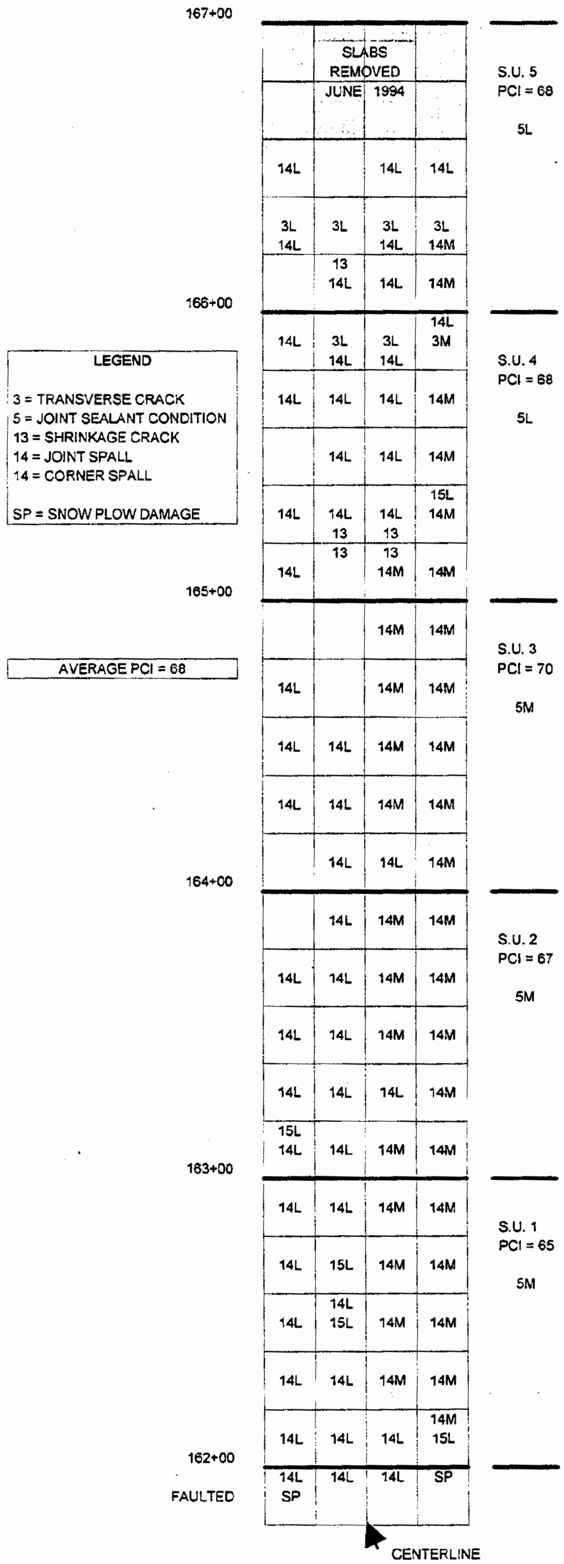


FIGURE 26. PAVEMENT CONDITION INDEX SURVEY—CONVENTIONAL PCC PAVEMENT, SPRING 1998

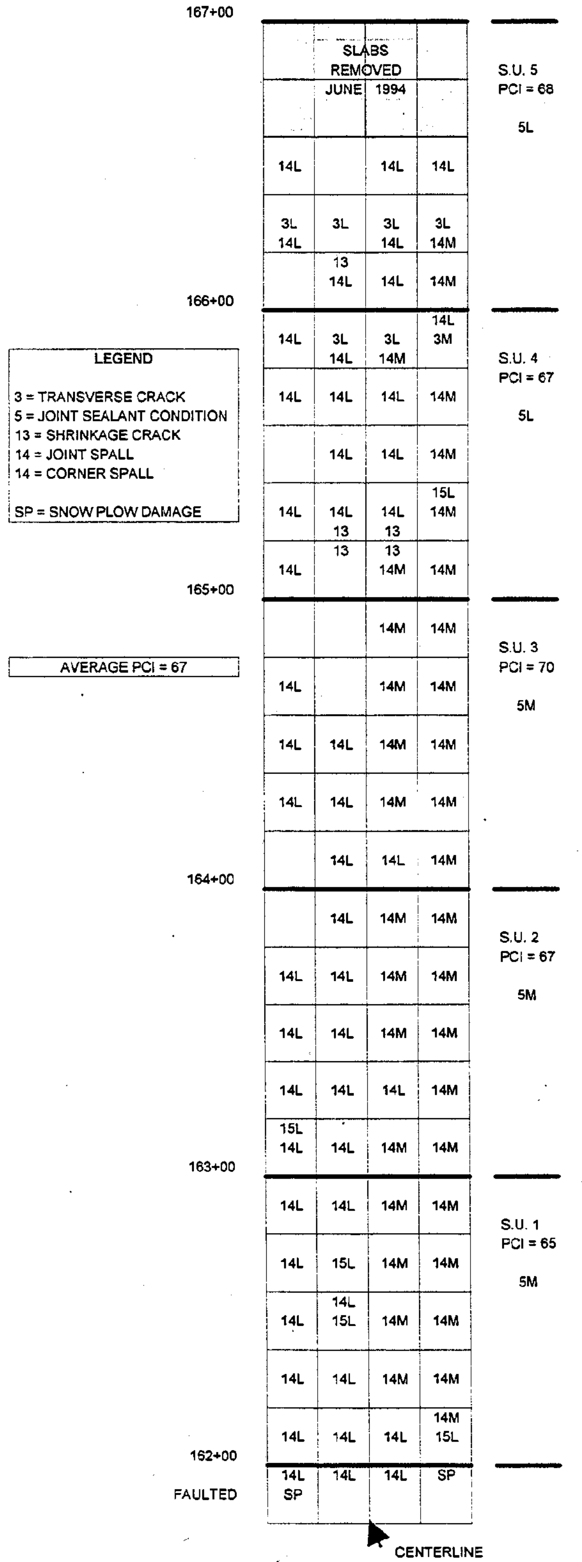


FIGURE 27. PAVEMENT CONDITION INDEX SURVEY—CONVENTIONAL PCC PAVEMENT, SUMMER 1998

It is interesting to note that the spalling first appeared on the south side of the pavement, and most of the slabs which are of medium severity are also on the south side of the pavement. The cause for this difference is not known. During construction, the concrete finisher along the south side of the pavement tended to spend more time finishing the pavement than the finisher on the north side of the pavement. It has been hypothesized that the south edge of the pavement may have more freeze-thaw cycles than the north edge.

In addition to joint spalling, seven slabs contain low severity transverse cracks, five slabs contain shrinkage cracks, and five slabs contained low severity corner spalls.

The average PCI value for each survey quarter over the 5 years, is shown in figure 28.

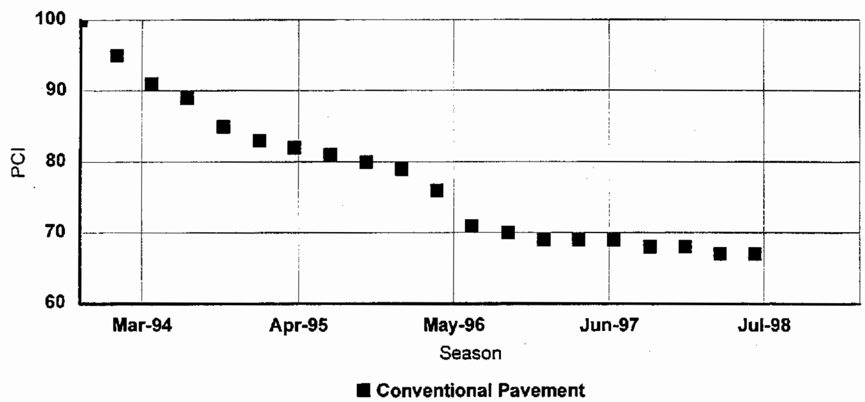


FIGURE 28. CONVENTIONAL PAVEMENT DETERIORATION
(PCI WITH TIME)

5. JOINT MOVEMENT.

5.1 JOINT MOVEMENT.

The joint opening in the prestressed fibrous and fibrous PCC pavements were measured quarterly. This included the west edge of the prestressed fibrous PCC pavement, the finger joint between the prestressed fibrous PCC pavement, and the fibrous PCC pavement and the joints in the fibrous PCC pavements. The results of the joint movement are presented in table 5.

The west end of the prestressed pavement was measured between the edge of the connecting taxiway and the end of the prestressed pavement. The west end had a maximum difference in length of 2.25 inches. The east end of the prestressed pavement was measured between fingers in the finger joint. The east end had a maximum difference in length of 2.25 inches. The maximum movement for the entire prestressed pavement was 4.5 inches during the fifth monitoring year.

The joint opening at each quarterly reading period was fairly consistent. Three joints in the fibrous PCC pavement do not appear to be working. The joints at station 153+98, 158+48, and 159+98 remain relatively unchanged in width opening throughout the years. The working joints in the fibrous pavement moved between 0.75 and 1 inch between the summer and the winter.

TABLE 5. JOINT OPENING MEASUREMENTS

Joint No.	Location	Pavement Type		October 1997	January 1998	April 1998	July 1998	Original Width	Comments
1.	WEST END	Prestressed	min. value*	5 14/16	5 15/16	5 2/16	4 0/16	___	Difference between ends of taxiways
1.	WEST END	Prestressed	max. value*	6 4/16	6 3/16	5 9/16	4 11/16	___	Difference between ends of taxiways
2.	STA. 152+98	Between prestressed and gap slab	min. value*	3 1/16	3 1/16	1 15/16	1 8/16	___	Difference between fingers of joint
2.	STA. 152+98	Between prestressed and gap slab	max. value*	3 12/16	3 5/16	2 10/16	2 8/16	___	Difference between fingers of joints
3.	STA. 153+13	Between gap slab and fibrous		1 3/16″	1 10/1″	1″	12/16″	1 1/2″	Faulted, Sealant coming out. Spalling due to snow plow. Full of debris.
4.	STA. 153+98	Fibrous pavement		7/16″	6/16"	6/16"	7/16"	3/8"	Only spalling due to fibers. Sealant good; not faulted.
5.	STA. 155+48	Fibrous pavement		10/16″	1 9/16″	14/16″	11/16″	1/2″	Little Spalling. Sealant failed - 11/3″ below pavement. Dirt, chips and other debris in joint.
6.	STA. 157+48	Fibrous pavement		13/16″	1 11/6″	14/16″	13/16″	1/2″	Sealant failed. Low severity spalling. Little Spalling. Dirt & other debris in joint.
7.	STA. 158+48	Fibrous pavement		7/16″	7/16″	7/16″	6/16″	3/8″	Snow plow damage. South side worse. Sealant starting to fail. Lots of spall chips.
8.	STA. 159+98	Fibrous pavement		15/16″	1 12/16″	13/16″	14/16″	3/8″	Sealant has been replaced. Snow plow damage. South side worse. Low severity spalling.
9.	STA. 161+98	Between fibrous and conventional		1 8/16″	2 6/16″	2″	1 12/16″	1 1/2″	Resealed in Sept. ′94 due to sealant failure. Snow plow damage visible. 1/4″ Faulting. A moderate amount of spalling due to snow plow.

5.2 FINGER JOINT OBSERVATION.

During July 1996, the finger joint was completely closed. It was reported by the airport, that during the previous week when the air temperature was over 100°F, the finger joint was slightly raised. It appears that when the finger joint was installed, the calculated location of the fingers with respect to each other was slightly off. The joint opening was designed for 3 1/2 inches of movement. During the fifth monitoring year, the actual movement is less than the design movement. Only during the third year, when the annual movement was over 6.67 inches, did the actual movement exceed the design movement.

5.3 FIBROUS JOINT OBSERVATION.

During the design, the cracking of the joints in fibrous pavement was a concern. It was decided to include angle iron below the joints and to saw the joint to within 1/2 inch of the dowel bars to promote cracking. The center of the 1-inch-diameter dowel bar was located in the center of the 10-inch pavement, 5 inches below the surface of the pavement. The initial saw cut was 4 inches. Based on the fact that three joints do not move, it appears that three joints have not cracked.

The movement at the joints which are working is very high and exceeds the anticipated movement. The condition of the joints is noted in table 5. The joints sealants allow for about 3/8-inch annual movement. As noted in table 5, approximately 1 inch of annual movement was recorded. Most of the joints are spalled with failed sealant. The sealant has been replaced in two joints.

6. TEMPERATURE CHANGES.

6.1 MAXIMUM TEMPERATURE DIFFERENTIAL.

Yoder[4] States:

- "Tests have shown that maximum temperature differentials occur during the day in the spring and summer months."
- "Maximum temperature differentials for slabs 6 and 9 inches thick approach 2 1/2 to 3 degrees per inch of slab."

Table 6 shows the temperature distribution at one location, at 3:00 p.m. for all 5 monitoring years.

Table 7 shows the maximum temperature distribution during the monitoring period for all 5 monitoring years. The temperature differential were greatest during the spring and summer readings period. The maximum temperature differential between the top and bottom of the pavement was 2.9°F/in at 1 p.m. during July 1996, the third year. The maximum temperature differential was between 2 1/2° and 3°F/in, as predicted by Yoder.

[4]Yoder, E.J., and Witczak, M.W. *Principals of Pavement Design*, John Wiley & Sons, 1975, p 87.

TABLE 6. TEMPERATURE DIFFERENTIAL THROUGH DEPTH OF PAVEMENT
(Based on quarterly readings at 3:00 p.m. at station 153+00, south side)

FIRST YEAR

October 1993

Depth (in)	Temp. (F)	F/in.	Comments
1.0	58.7		
		0.4	From 1" to 2.7"
2.7	58.1		
		0.4	From 2.7" to 4.3"
4.3	57.4		
		0.2	From 4.3" to 6"
6.0	57.0		
Avg.		0.3	From 1" to 6"

January 1994

Depth (in)	Temp. (F)	F/in.	Comments
1.0	17.6		
		-0.1	From 1" to 2.7"
2.7	17.8		
		0.0	From 2.7" to 4.3"
4.3	17.8		
		0.1	From 4.3" to 6"
6.0	17.6		
Avg.		0.0	From 1" to 6"

April 1994

Depth (in)	Temp. (F)	F/in.	Comments
1.0	67.2		
		0.3	From 1" to 2.7"
2.7	66.7		
		1.1	From 2.7" to 4.3"
4.3	64.8		
		1.2	From 4.3" to 6"
6.0	62.8		
Avg.		0.9	From 1" to 6"

July 1994

Depth (in)	Temp. (F)	F/in.	Comments
1.0	92.7		
		1.5	From 1" to 2.7"
2.7	90.3		
		1.2	From 2.7" to 4.3"
4.3	88.2		
		1.1	From 4.3" to 6"
6.0	86.3		
Avg.		1.3	From 1" to 6"

SECOND YEAR

October 1994

Depth (in)	Temp. (F)	F/in.	Comments
1.0	50.4		
		-0.2	From 1" to 2.7"
2.7	50.7		
		0.0	From 2.7" to 4.3"
4.3	50.7		
		-0.2	From 4.3" to 6"
6.0	51.1		
Avg.		-0.1	From 1" to 6"

January 1995

Depth (in)	Temp. (F)	F/in.	Comments
1.0	26.2		
		0.0	From 1" to 2.7"
2.7	26.2		
		0.5	From 2.7" to 4.3"
4.3	25.3		
		-0.2	From 4.3" to 6"
6.0	25.6		
Avg.		0.1	From 1" to 6"

April 1995

Depth (in)	Temp. (F)	F/in.	Comments
1.0	63.6		
		0.7	From 1" to 2.7"
2.7	62.5		
		1.1	From 2.7" to 4.3"
4.3	60.7		
		1.1	From 4.3" to 6"
6.0	58.9		
Avg.		0.9	From 1" to 6"

July 1995

Depth (in)	Temp. (F)	F/in.	Comments
1.0	102.0		
		3.0	From 1" to 2.7"
2.7	97.2		
		2.1	From 2.7" to 4.3"
4.3	93.6		
		1.2	From 4.3" to 6"
6.0	91.5		
Avg.		2.1	From 1" to 6"

THIRD YEAR

October 1995

Depth (in)	Temp. (F)	F/in.	Comments
1.0	74.2		
		2.8	From 1" to 2.7"
2.7	69.8		
		1.5	From 2.7" to 4.3"
4.3	67.3		
		1.2	From 4.3" to 6"
6.0	65.2		
Avg.		1.8	From 1" to 6"

January 1996

Depth (in)	Temp. (F)	F/in.	Comments
1.0	15.9		
		-0.4	From 1" to 2.7"
2.7	16.6		
		0.5	From 2.7" to 4.3"
4.3	15.8		
		--	From 4.3" to 6"
6.0	--		
Avg.		0.0	From 1" to 4.3"

April 1996

Depth (in)	Temp. (F)	F/in.	Comments
1.0	61.3		
		2.7	From 1" to 2.7"
2.7	57.0		
		1.6	From 2.7" to 4.3"
4.3	54.3		
		0.9	From 4.3" to 6"
6.0	52.7		
Avg.		1.7	From 1" to 6"

July 1996

Depth (in)	Temp. (F)	F/in.	Comments
1.0	108.0		
		2.7	From 1" to 2.7"
2.7	103.7		
		3.6	From 2.7" to 4.3"
4.3	97.5		
		2.1	From 4.3" to 6"
6.0	94.0		
Avg.		2.8	From 1" to 6"

Note: Sta 153+00, North Side

FOURTH YEAR

November 96

Depth (in)	Temp. (F)	F/in.	Comments
1.0	35.2		
		-0.2	From 1" to 2.7"
2.7	35.5		
		0.2	From 2.7" to 4.3"
4.3	35.2		
		0.2	From 4.3" to 6"
6.0	34.9		
Avg.		0.1	From 1" to 6"

February 97

Depth (in)	Temp. (F)	F/in.	Comments
1.0	36.9		
		1.3	From 1" to 2.7"
2.7	34.8		
		0.1	From 2.7" to 4.3"
4.3	34.6		
		0.4	From 4.3" to 6"
6.0	34.0		
Avg.		0.6	From 1" to 4.3"

May 97

Depth (in)	Temp. (F)	F/in.	Comments
1.0	80.2		
		2.3	From 1" to 2.7"
2.7	76.5		
		1.7	From 2.7" to 4.3"
4.3	73.6		
		1.4	From 4.3" to 6"
6.0	71.3		
Avg.		1.8	From 1" to 6"

July 97

Depth (in)	Temp. (F)	F/in.	Comments
1.0	81.5		
		-0.4	From 1" to 2.7"
2.7	82.2		
		-0.1	From 2.7" to 4.3"
4.3	82.4		
		0.1	From 4.3" to 6"
6.0	82.3		
Avg.		-0.2	From 1" to 6"

FIFTH YEAR

November 97

Depth (in)	Temp. (F)	F/in.	Comments
1.0	36.3		
		-0.1	From 1" to 2.7"
2.7	36.4		
		0.1	From 2.7" to 4.3"
4.3	36.2		
		0.6	From 4.3" to 6"
6.0	35.1		
Avg.		0.2	From 1" to 6"

February 98

Depth (in)	Temp. (F)	F/in.	Comments
1.0	38.9		
		0.6	From 1" to 2.7"
2.7	37.9		
		-0.4	From 2.7" to 4.3"
4.3	38.6		
		1.0	From 4.3" to 6"
6.0	36.9		
Avg.		0.4	From 1" to 4.3"

April 98

Depth (in)	Temp. (F)	F/in.	Comments
1.0	57.2		
		-0.7	From 1" to 2.7"
2.7	58.4		
		-0.4	From 2.7" to 4.3"
4.3	59.1		
		0.1	From 4.3" to 6"
6.0	58.9		
Avg.		-0.3	From 1" to 6"

August 98

Depth (in)	Temp. (F)	F/in.	Comments
1.0	90.4		
		-2.9	From 1" to 2.7"
2.7	95.0		
		-1.8	From 2.7" to 4.3"
4.3	98.0		
		-2.2	From 4.3" to 6"
6.0	101.7		
Avg.		-2.3	From 1" to 6"

Note: Sta 153+00, North Side

TABLE 7. MAXIMUM TEMPERATURE DIFFERENTIAL THROUGH THE PAVEMENT DEPTH

(Greatest temperature differential during observation period)

October 1993
7 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	46.4		
		-1.2	From 1" to 2.7"
2.7	48.3		
		-0.7	From 2.7" to 4.3"
4.3	49.5		
		-0.5	From 4.3" to 6"
6.0	50.4		
Avg.		-0.8	From 1" to 6"

January 1994
7 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	12.7		
		-1.0	From 1" to 2.7"
2.7	14.3		
		-1.5	From 2.7" to 4.3"
4.3	16.8		
		-0.6	From 4.3" to 6"
6.0	17.9		
Avg.		-1.0	From 1" to 6"

April 1994
11 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	64.7		
		3.4	From 1" to 2.7"
2.7	59.3		
		1.9	From 2.7" to 4.3"
4.3	56.0		
		0.9	From 4.3" to 6"
6.0	54.5		
Avg.		2.0	From 1" to 6"

July 1994
2 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	94.2		
		3.1	From 1" to 2.7"
2.7	89.2		
		2.4	From 2.7" to 4.3"
4.3	85.2		
		1.4	From 4.3" to 6"
6.0	82.8		
Avg.		2.3	From 1" to 6"

SECOND YEAR

October 1994
6 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	45.5		
		-0.8	From 1" to 2.7"
2.7	46.7		
		-0.8	From 2.7" to 4.3"
4.3	48.1		
		-0.8	From 4.3" to 6"
6.0	49.4		
Avg.		-0.8	From 1" to 6"

January 1995
10 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	18.6		
		-1.6	From 1" to 2.7"
2.7	21.1		
		-0.9	From 2.7" to 4.3"
4.3	22.7		
		-0.7	From 4.3" to 6"
6.0	23.9		
Avg.		-1.1	From 1" to 6"

April 1995
12 noon

Depth (in)	Temp. (F)	F/in.	Comments
1.0	64.7		
		3.9	From 1" to 2.7"
2.7	58.5		
		2.4	From 2.7" to 4.3"
4.3	54.4		
		1.6	From 4.3" to 6"
6.0	51.7		
Avg.		2.6	From 1" to 6"

July 1995
3 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	102.0		
		3.0	From 1" to 2.7"
2.7	97.2		
		2.1	From 2.7" to 4.3"
4.3	93.6		
		1.2	From 4.3" to 6"
6.0	91.5		
Avg.		2.1	From 1" to 6"

THIRD YEAR

October 1995
2 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	72.3		
		2.7	From 1" to 2.7"
2.7	67.9		
		1.7	From 2.7" to 4.3"
4.3	65.0		
		1.3	From 4.3" to 6"
6.0	62.8		
Avg.		1.9	From 1" to 6"

January 1996
11 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	4.0		
		-0.9	From 1" to 2.7"
2.7	5.4		
		-2.4	From 2.7" to 4.3"
4.3	9.5		
		--	From 4.3" to 6"
6.0	--		
Avg.		-1.7	From 1" to 4.3"

April 1996
2 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	62.4		
		1.4	From 1" to 2.7"
2.7	60.2		
		4.4	From 2.7" to 4.3"
4.3	52.7		
		1.2	From 4.3" to 6"
6.0	50.6		
Avg.		2.4	From 1" to 6"

July 1996
1 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	99.6		
		4.1	From 1" to 2.7"
2.7	93.0		
		2.8	From 2.7" to 4.3"
4.3	88.2		
		1.8	From 4.3" to 6"
6.0	85.2		
Avg.		2.9	From 1" to 6"

Note: Sta 153+00, North Side

FOURTH YEAR

November 96
1 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	26.6		
		-0.8	From 1" to 2.7"
2.7	27.9		
		-1.0	From 2.7" to 4.3"
4.3	29.6		
		-0.2	From 4.3" to 6"
6.0	30.0		
Avg.		-0.7	From 1" to 6"

February 97
11 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	35.3		
		1.1	From 1" to 2.7"
2.7	33.6		
		0.7	From 2.7" to 4.3"
4.3	32.4		
		0.4	From 4.3" to 6"
6.0	31.7		
Avg.		0.7	From 1" to 4.3"

May 97
11 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	72.6		
		3.4	From 1" to 2.7"
2.7	67.2		
		1.5	From 2.7" to 4.3"
4.3	64.6		
		1.2	From 4.3" to 6"
6.0	62.6		
Avg.		2.0	From 1" to 6"

July 97
6 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	90.8		
		-2.0	From 1" to 2.7"
2.7	94.0		
		-0.2	From 2.7" to 4.3"
4.3	94.3		
		-0.8	From 4.3" to 6"
6.0	95.7		
Avg.		-1.0	From 1" to 6"

FIFTH YEAR

November 97
11 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	46.5		
		2.5	From 1" to 2.7"
2.7	42.5		
		1.6	From 2.7" to 4.3"
4.3	39.8		
		0.8	From 4.3" to 6"
6.0	38.4		
Avg.		1.6	From 1" to 6"

February 98
11 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	42.6		
		2.4	From 1" to 2.7"
2.7	38.7		
		1.2	From 2.7" to 4.3"
4.3	36.6		
		2.1	From 4.3" to 6"
6.0	33.1		
Avg.		1.9	From 1" to 4.3"

April 98
11 am

Depth (in)	Temp. (F)	F/in.	Comments
1.0	42.6		
		2.4	From 1" to 2.7"
2.7	38.7		
		1.2	From 2.7" to 4.3"
4.3	36.6		
		0.5	From 4.3" to 6"
6.0	35.8		
Avg.		1.4	From 1" to 6"

August 98
2 pm

Depth (in)	Temp. (F)	F/in.	Comments
1.0	74.0		
		--	From 1" to 2.7"
2.7	--		
		--	From 2.7" to 4.3"
4.3	84.4		
		-1.8	From 4.3" to 6"
6.0	67.5		
Avg.		-2.7	From 1" to 6"

During the fall, the maximum temperature distribution occurs during the morning. Three of the five maximum temperature distributions are between 6:00 a.m. and 11:00 a.m.

During the winter, the maximum temperature distribution occurs throughout the day. Two of the five maximum distributions were at 11 a.m. and three of the maximum distribution were between 7 and 11 p.m.

During spring, the maximum temperature distribution occurs at midday. All five maximum distributions were between 11 a.m. and 2 p.m.

During summer, the maximum temperature distribution occurs during the afternoon. Four of the five maximum distributions occur between 1 and 3 in the afternoon, and the fifth occurs at 6:00 p.m.

The average maximum temperature differential for depth of slab only exceed 2.5 degrees per inch during three time periods—April 1995, July 1996, and August 1998. The maximum temperature differential exceeded 2.0 degrees per inch during each monitoring year, but only during April and July.

There were several instances where the temperature differential between two adjacent thermocouples in the slab were over 4 degrees per inch. Typically, the temperature differential between two adjacent thermocouples in the slab ranged between 0.5 to 2.5 degrees per inch.

Table 8 and figure 29 show the temperature differential at one location during the August reading period. From 11:00 to sometime after noon the temperature differential for depth of slab was greater than 2.5 degrees per inch. For 5 hours during the day, the maximum temperature differential was greater than 2 degrees per inch.

Based on these readings, Yoder's statement on temperature differential appears to be correct. However, it should be noted that the maximum temperature differential may occur for only a short time period during the day.

TABLE 8. HOURLY TEMPERATURE DIFFERENTIAL, SUMMER 1996
(Station 153+00, south side)

Time	Temperature at 1.0″ Depth	Temperature Differential Between 1.0″ to 2.7″ Depth (deg/in)	Temperature at 2.7″ Depth	Temperature Differential Between 2.7″ to 4.3″ Depth (deg/in)	Temperature at 4.3″ Depth	Temperature Differential Between 4.3″ to 6.0″ Depth (deg/in)	Temperature at 6.0″ Depth	Temperature Differential Between 1.0″ to 6.0″ Depth (deg/in)
6:00 PM	74.0	-0.6	75.1	0.8	73.8	-1.1	75.6	-0.32
7:00 PM	72.1	1.3	69.9	-0.7	71.1	-0.2	71.5	0.12
8:00 PM	64.6	1.1	62.8	1.2	60.9	-0.2	61.3	0.66
9:00 PM	65.9	1.8	62.8	0.9	61.3	-0.3	61.8	0.82
10:00 PM	60.3	3.5	54.3	0.4	53.7	-2.2	57.4	0.58
11:00 PM	58.8	1.8	55.8	-1.6	58.3	0.5	57.5	0.26
12:00 AM	67.8	2.4	63.7	-0.6	64.7	0.6	63.6	0.84
1:00 AM	64.7	-0.2	65.1	2.5	61.1	-0.6	62.1	0.52
2:00 AM	61.3	0.7	60.1	2.4	56.2	-1.4	58.6	0.54
3:00 AM	57.7	1.0	56.0	1.1	54.3	1.3	52.1	1.12
4:00 AM	63.9	-3.2	69.3	3.0	64.5	0.1	64.4	-0.10
5:00 AM	64.8	1.2	62.7	0.3	62.3	1.5	59.7	1.02
6:00 AM	66.1	1.4	63.7	-0.4	64.4	1.5	61.9	0.84
7:00 AM	68.6	-0.4	69.3	0.5	68.5	0.5	67.7	0.18
8:00 AM	82.1	-1.1.	83.9	2.0	80.7	0.7	79.5	0.52
9:00 AM	96.4	-2.5	100.6	1.1	98.9	1.0	97.2	-0.16
10:00 AM	100.9	-2.4	105.0	-0.2	105.3	0.7	104.1	-0.64
11:00 AM	93.1	-3.6	99.2	-2.4	103.1	-1.9	106.4	-2.66
12:00 PM	91.5	-3.9	98.2	-1.3	100.2	-2.3	104.1	-2.52
1:00 PM	92.8	-3.2	98.3	1.7	95.5	-0.7	96.7	-0.78
2:00 PM	86.2	-5.3	95.2	-0.9	96.7	-0.9	98.2	-2.40
3:00 PM	90.4	-2.7	95.0	-1.9	98.0	-2.2	101.7	-2.26
4:00 PM	87.1	-2.9	92.1	4.4	85.1	0.0	85.1	0.40
5:00 PM	81.4	1.8	78.3	0.4	77.6	-2.2	81.3	0.02
6:00 PM	72.5	0.5	71.7	-0.4	72.3	-0.8	73.6	-0.22
10:00 PM	60.9	0.7	59.7	0.8	58.5	0.5	57.6	0.66
6:00 AM	68.1	0.2	67.7	1.5	65.3	-1.6	68.1	0.00
8:30 AM	78.6	3.9	72.0	-2.9	76.6	-0.2	76.9	0.34
11:00 AM	100.0	-0.9	101.6	1.3	99.5	-2.4	103.5	-0.70
2:00 AM	77.5	-2.0	80.9	-1.1	82.6	-1.3	84.8	-1.46
6:00 PM	96.3	-0.2	96.7	0.5	95.9	0.8	94.6	0.34

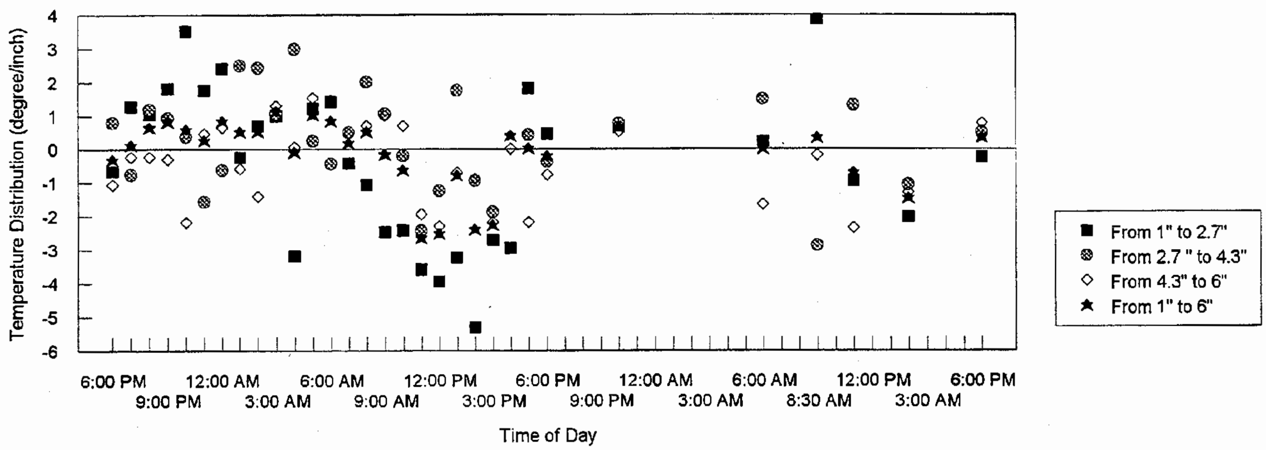


FIGURE 29. TEMPERATURE DIFFERENTIAL VARIABILITY, SUMMER 1998
(Station 153+00, south side)

6.2 DAILY TEMPERATURE CYCLE.

The daily temperature cycle for four locations are shown by recorded temperature and change in temperature. The four locations are station 141+00, north side; station 142+00, north side; station 153+00, north side; and station 153+00, south side. These stations represents two readings on the same side of the pavement and two readings on the opposite side of the pavement. All of these readings were analyzed, but these four stations represent the entire readings.

The plugs connecting the thermocouples cables to the readout device broke easily. When it had been determined that the plug connection had broken, the plug was repaired as soon as practical. Blank lines on the data sheets indicate the plug connection was broken.

A tabulation of the hourly temperatures are found in tables 9a, 10a, 11a, and 12a. The daily temperature cycles are graphically presented in figures 30, 31, 32, and 33. The changes in temperature are found in tables 9b, 10b, 11b, and 12b and are graphically presented in figures 34, 35, 36, and 37.

The temperature of the surface of the PCC pavement is typically lower than the air temperature during the day and higher than the air temperature during the night. This is expected since the sunlight will heat the pavement. The exception is during the winter when the pavement is extremely cold.

The temperature of the surface of the PCC pavement is typically higher than the temperature at the bottom of the pavement during the day and lower during the night. The temperature of the surface begins to increase shortly after sunrise and begins to decrease about an hour before sunset when the sun is lower in the sky.

The temperature on the surface of the PCC pavement peaks about 2 to 4 hours before the temperature on the bottom of the slab peaks.

TABLE 9a. DAILY TEMPERATURE CYCLE, IN-PAVEMENT THERMOCOUPLES, FALL 1997

TABULATION OF READINGS

Date	STATION > LOCATION > TIME / DEPTH >		Air Temp	141+00 N 1"	141+00 N 2.7"	141+00 N 4.3"	141+00 N 6"	142+00 N 1"	142+00 N 2.7"	142+00 N 4.3"	142+00 N 6"	153+00 N 1"	153+00 N 2.7"	153+00 N 4.3"	153+00 N 6"	153+00 S 1"	153+00 S 2.7"	153+00 S 4.3"	153+00 S 6"
Nov. 23	18:00	pm	29	28.7	30.0	30.7	31.9	29.8	30.9	31.5	31.8	29.8	31.6	31.9	32.9	29.5	31.2	31.9	32.1
Nov. 23	19:00	pm	28	28.2	29.6	30.4	31.6	29.1	30.8	31.5	32.0	28.6	30.9	31.8	32.7	28.9	30.4	31.3	31.8
Nov. 23	20:00	pm	26	28.1	30.0	30.4	32.4	30.4	31.7	32.0	32.6	30.2	31.6	32.1	32.3	30.9	30.9	31.5	31.8
Nov. 23	21:00	pm	23	27.6	29.7	30.4	31.3	29.1	31.3	32.0	33.2	28.6	31.1	31.4	32.6	28.9	30.3	31.3	31.5
Nov. 23	22:00	pm	23	26.7	28.5	29.7	31.5	27.9	29.5	30.7	32.3	27.0	28.8	30.3	31.0	26.4	28.6	29.5	30.3
Nov. 23	23:00	pm	23	25.8	27.6	29.7	31.1	27.2	29.1	30.2	31.8	26.1	28.7	30.2	31.2	26.6	29.2	29.7	30.4
Nov. 24	0:00	mid	20	24.9	27.0	29.2	31.3	25.8	28.0	29.1	30.7	24.9	27.3	28.8	29.8	25.0	26.8	28.0	29.0
Nov. 24	1:00	am	19	24.1	26.5	28.1	31.0	25.5	27.9	29.0	31.0	25.0	27.4	28.9	29.8	25.2	27.3	28.1	29.4
Nov. 24	2:00	am	16	23.6	25.0	27.7	30.4	24.3	26.8	28.7	30.7	22.4	26.1	27.7	28.5	23.6	25.5	26.9	27.9
Nov. 24	3:00	am	14	19.9	24.2	27.5	30.0	23.9	26.1	27.7	29.9	23.7	25.0	27.7	28.2	23.3	25.5	27.0	27.3
Nov. 24	4:00	am	14	22.0	25.1	27.2	29.0	23.5	26.9	27.6	29.9	23.0	24.2	25.8	27.0	21.7	23.8	26.1	26.3
Nov. 24	5:00	am	12	20.6	23.7	25.4	28.6	22.7	25.5	27.5	28.8	22.1	23.6	25.3	26.8	22.2	23.7	25.0	26.6
Nov. 24	6:00	am	13	21.3	26.3	24.3	27.3	22.2	25.5	25.3	27.6	20.9	22.5	24.7	25.6	22.7	23.2	24.6	26.2
Nov. 24	7:00	am	15	21.1	23.0	24.9	28.0	22.3	24.1	25.9	28.1	20.5	22.6	24.3	25.8	21.2	22.8	24.2	25.3
Nov. 24	8:00	am	18	23.2	23.1	24.1	26.3	21.0	22.3	23.9	25.9	22.1	22.3	23.7	25.0	22.0	22.7	23.1	23.6
Nov. 24	9:00	am	20	24.2	24.5	25.3	27.2	24.8	27.4	25.2	26.7	29.6	25.3	25.2	25.5	25.6	24.9	24.7	28.5
Nov. 24	10:00	am	22	27.5	27.3	26.9	27.6	28.7	28.0	27.5	28.3	30.1	28.1	27.3	26.7	30.1	28.0	27.0	26.9
Nov. 24	11:00	am	25	31.4	29.6	29.1	29.2	33.1	30.5	29.6	29.5	34.0	31.2	29.7	28.7	33.0	31.1	29.2	28.3
Nov. 24	12:00	noon	27	33.1	31.7	30.8	30.7	34.9	32.4	31.9	31.0	36.1	33.8	31.9	31.7	34.5	33.2	31.9	30.6
Nov. 24	13:00	pm	29	35.9	34.7	32.7	31.8	37.5	35.7	34.3	33.9	38.8	36.6	34.8	33.4	37.8	35.8	34.3	33.7
Nov. 24	14:00	pm	30	35.2	34.1	33.2	31.9	37.9	35.5	34.1	34.8	38.1	36.8	37.7	34.6	37.1	35.9	35.6	34.4
Nov. 24	15:00	pm	32	34.0	34.4	33.1	32.9	36.3	36.1	35.5	34.8	36.9	36.5	36.8	35.6	36.3	36.4	36.2	35.1
Nov. 24	16:00	pm	30	32.8	33.5	32.7	31.7	33.7	36.0	34.3	34.4	33.7	35.1	36.6	35.5	32.9	33.3	33.9	33.9
Nov. 24	17:00	pm	28	30.5	32.4	32.6	33.2	33.3	33.8	33.9	33.9	32.5	33.9	34.5	35.0	32.6	32.9	33.6	33.3
Nov. 24	18:00	pm	28	29.6	31.3	31.7	32.3	31.8	33.7	33.6	33.7	31.0	32.9	33.5	33.8	31.3	32.3	33.1	33.2
Nov. 24	22:00	pm	30	32.4	31.5	31.3	31.3	31.4	31.3	31.3	31.5	31.0	32.1	32.1	31.9	32.5	31.6	31.9	32.1
Nov. 25	6:00	am		--	31.7	--	31.1	33.6	32.7	31.8	31.8	34.6	33.5	32.9	32.6	35.0	34.0	32.9	32.5
Nov. 25	8:30	am	37	--	31.8	--	31.1	34.1	32.8	32.0	32.2	36.8	34.5	33.2	33.2	36.6	34.2	33.1	32.7
Nov. 25	11:00	am	49	43.3	40.5	--	36.9	44.4	40.9	38.9	37.9	47.9	43.6	40.4	39.0	46.5	42.5	39.8	38.4
Nov. 25	14:00	pm	54	46.6	45.5	--	42.4	46.1	45.3	44.0	42.7	42.4	47.1	46.3	45.5	46.7	46.5	45.6	44.8
Nov. 25	18:00	pm	48	42.4	42.3	--	41.6	42.1	42.0	42.2	41.9	42.7	43.8	44.1	43.8	42.3	43.1	43.6	43.4

TABLE 9b. CHANGE IN TEMPERATURE, IN-PAVEMENT THERMOCOUPLES, FALL 1997

COMPARED TO INITIAL READING

Date	STATION > LOCATION > TIME / DEPTH >		Air Temp	141+00 N 1"	141+00 N 2.7"	141+00 N 4.3"	141+00 N 6"	142+00 N 1"	142+00 N 2.7"	142+00 N 4.3"	142+00 N 6"	153+00 N 1"	153+00 N 2.7"	153+00 N 4.3"	153+00 N 6"	153+00 S 1"	153+00 S 2.7"	153+00 S 4.3"	153+00 S 6"
Nov. 23	18:00	pm																	
Nov. 23	19:00	pm	-1	-0.5	-0.4	-0.3	-0.3	-0.7	-0.1	0.0	0.2	-1.2	-0.7	-0.1	-0.2	-0.6	-0.8	-0.6	-0.3
Nov. 23	20:00	pm	-3	-0.6	0.0	-0.3	0.5	0.6	0.8	0.5	0.8	0.4	0.0	0.2	-0.6	1.4	-0.3	-0.4	-0.3
Nov. 23	21:00	pm	-6	-1.1	-0.3	-0.3	-0.6	-0.7	0.4	0.5	1.4	-1.2	-0.5	-0.5	-0.3	-0.6	-0.9	-0.6	-0.6
Nov. 23	22:00	pm	-6	-2.0	-1.5	-1.0	-0.4	-1.9	-1.4	-0.8	0.5	-2.8	-2.8	-1.6	-1.9	-3.1	-2.6	-2.4	-1.8
Nov. 23	23:00	pm	-6	-2.9	-2.4	-1.0	-0.8	-2.6	-1.8	-1.3	0.0	-3.7	-2.9	-1.7	-1.7	-2.9	-2.0	-2.2	-1.7
Nov. 24	0:00	mid	-9	-3.8	-3.0	-1.5	-0.6	-4.0	-2.9	-2.4	-1.1	-4.9	-4.3	-3.1	-3.1	-4.5	-4.4	-3.9	-3.1
Nov. 24	1:00	am	-10	-4.6	-3.5	-2.6	-0.9	-4.3	-3.0	-2.5	-0.8	-4.8	-4.2	-3.0	-3.1	-4.3	-3.9	-3.8	-2.7
Nov. 24	2:00	am	-13	-5.1	-5.0	-3.0	-1.5	-5.5	-4.1	-2.8	-1.1	-7.4	-5.5	-4.2	-4.4	-5.9	-5.7	-5.0	-4.2
Nov. 24	3:00	am	-15	-8.8	-5.8	-3.2	-1.9	-5.9	-4.8	-3.8	-1.9	-6.1	-6.6	-4.2	-4.7	-6.2	-5.7	-4.9	-4.8
Nov. 24	4:00	am	-15	-6.7	-4.9	-3.5	-2.9	-6.3	-4.0	-3.9	-1.9	-6.8	-7.4	-6.1	-5.9	-7.8	-7.4	-5.8	-5.8
Nov. 24	5:00	am	-17	-8.1	-6.3	-5.3	-3.3	-7.1	-5.4	-4.0	-3.0	-7.7	-8.0	-6.6	-6.1	-7.3	-7.5	-6.9	-5.5
Nov. 24	6:00	am	-16	-7.4	-3.7	-6.4	-4.6	-7.6	-5.4	-6.2	-4.2	-8.9	-9.1	-7.2	-7.3	-6.8	-8.0	-7.3	-5.9
Nov. 24	7:00	am	-14	-7.6	-7.0	-5.8	-3.9	-7.5	-6.8	-5.6	-3.7	-9.3	-9.0	-7.6	-7.1	-8.3	-8.4	-7.7	-6.8
Nov. 24	8:00	am	-11	-5.5	-6.9	-6.6	-5.6	-8.8	-8.6	-7.6	-5.9	-7.7	-9.3	-8.2	-7.9	-7.5	-8.5	-8.8	-8.5
Nov. 24	9:00	am	-9	-4.5	-5.5	-5.4	-4.7	-5.0	-3.5	-6.3	-5.1	-0.2	-6.3	-6.7	-7.4	-3.9	-6.3	-7.2	-3.6
Nov. 24	10:00	am	-7	-1.2	-2.7	-3.8	-4.3	-1.1	-2.9	-4.0	-3.5	0.3	-3.5	-4.6	-6.2	0.6	-3.2	-4.9	-5.2
Nov. 24	11:00	am	-4	2.7	-0.4	-1.6	-2.7	3.3	-0.4	-1.9	-2.3	4.2	-0.4	-2.2	-4.2	3.5	-0.1	-2.7	-3.8
Nov. 24	12:00	noon	-2	4.4	1.7	0.1	-1.2	5.1	1.5	0.4	-0.8	6.3	2.2	0.0	-1.2	5.0	2.0	0.0	-1.5
Nov. 24	13:00	pm	0	7.2	4.7	2.0	-0.1	7.7	4.8	2.8	2.1	9.0	5.0	2.9	0.5	8.3	4.6	2.4	1.6
Nov. 24	14:00	pm	1	6.5	4.1	2.5	0.0	8.1	4.6	2.6	3.0	8.3	5.2	5.8	1.7	7.6	4.7	3.7	2.3
Nov. 24	15:00	pm	3	5.3	4.4	2.4	1.0	6.5	5.2	4.0	3.0	7.1	4.9	4.9	2.7	6.8	5.2	4.3	3.0
Nov. 24	16:00	pm	1	4.1	3.5	2.0	-0.2	3.9	5.1	2.8	2.6	3.9	3.5	4.7	2.6	3.4	2.1	2.0	1.8
Nov. 24	17:00	pm	-1	1.8	2.4	1.9	1.3	3.5	2.9	2.4	2.1	2.7	2.3	2.6	2.1	3.1	1.7	1.7	1.2
Nov. 24	18:00	pm	-1	0.9	1.3	1.0	0.4	2.0	2.8	2.1	1.9	1.2	1.3	1.6	0.9	1.8	1.1	1.2	1.1
Nov. 24	22:00	pm	1	3.7	1.5	0.6	-0.6	1.6	0.4	-0.2	-0.3	1.2	0.5	0.2	-1.0	3.0	0.4	0.0	0.0
Nov. 25	6:00	am	-29	--	1.7	--	-0.8	3.8	1.8	0.3	0.0	4.8	1.9	1.0	-0.3	5.5	2.8	1.0	0.4
Nov. 25	8:30	am	8	--	1.8	--	-0.8	4.3	1.9	0.5	0.4	7.0	2.9	1.3	0.3	7.1	3.0	1.2	0.6
Nov. 25	11:00	am	20	14.6	10.5	--	5.0	14.6	10.0	7.4	6.1	18.1	12.0	8.5	6.1	17.0	11.3	7.9	6.3
Nov. 25	14:00	pm	25	17.9	15.5	--	10.5	16.3	14.4	12.5	10.9	12.6	15.5	14.4	12.6	17.2	15.3	13.7	12.7
Nov. 25	18:00	pm	19	13.7	12.3	--	9.7	12.3	11.1	10.7	10.1	12.9	12.2	12.2	10.9	12.8	11.9	11.7	11.3

TABLE 10a. DAILY TEMPERATURE CYCLE, IN-PAVEMENT THERMOCOUPLES, WINTER 1998

TABULATION OF READINGS

Date	STATION > LOCATION > TIME / DEPTH >		Air Temp	141+00				142+00				153+00				153+00			
				N 1"	N 2.7"	N 4.3"	N 6"	N 1"	N 2.7"	N 4.3"	N 6"	N 1"	N 2.7"	N 4.3"	N 6"	S 1"	S 2.7"	S 4.3"	S 6"
Feb. 8	18:00	pm	32	-	37.6	-	38.2	37.7	39.0	39.6	39.9	39.0	41.6	43.2	42.0	39.3	40.3	41.5	43.5
Feb. 8	19:00	pm	30	-	36.6	-	38.4	34.2	36.1	36.8	38.0	35.4	38.2	39.4	37.4	36.1	37.1	39.0	41.4
Feb. 8	20:00	pm	29	-	34.4	-	36.7	34.2	35.9	37.1	38.0	34.5	37.2	38.2	38.8	35.1	36.4	38.1	38.9
Feb. 8	21:00	pm	28	-	33.5	-	35.4	33.4	34.6	36.2	37.1	33.7	35.7	37.0	37.5	34.4	35.0	36.9	38.9
Feb. 8	22:00	pm	27	-	33.0	-	34.7	32.1	33.3	35.1	36.2	33.1	35.3	36.2	36.9	32.0	34.2	36.1	37.1
Feb. 8	23:00	pm	27	-	32.0	-	34.2	30.9	32.4	33.9	34.8	32.3	34.2	35.5	36.2	32.0	33.3	35.0	36.2
Feb. 9	00:00	mid	24	-	29.6	-	27.8	31.1	32.5	33.9	35.3	31.6	33.1	34.3	35.1	31.3	32.6	33.8	34.6
Feb. 9	01:00	am	23	-	32.8	-	32.7	29.5	31.3	32.5	33.4	30.5	31.8	33.2	33.9	30.6	31.5	33.2	33.9
Feb. 9	02:00	am	22	-	32.0	-	31.9	29.5	30.9	32.0	32.4	30.5	31.4	32.3	33.0	30.5	31.1	32.3	32.7
Feb. 9	03:00	am	22	-	31.0	-	31.7	29.5	30.4	31.1	31.5	30.7	31.4	32.0	32.5	30.5	30.9	31.5	31.8
Feb. 9	04:00	am	23	-	30.7	-	31.6	29.4	30.2	30.8	31.3	30.9	31.5	32.4	32.7	30.7	31.1	31.7	31.9
Feb. 9	05:00	am	24	-	30.5	-	32.3	29.7	30.7	31.4	31.9	31.6	32.2	33.1	33.3	31.8	32.4	32.7	32.7
Feb. 9	06:00	am	25	-	30.4	-	33.5	30.9	31.5	32.8	33.4	32.8	33.6	34.0	34.7	33.0	33.3	34.4	34.9
Feb. 9	07:00	am	24	-	30.3	-	33.1	31.4	32.0	33.0	33.1	33.0	33.7	34.1	34.9	33.1	33.4	34.4	34.5
Feb. 9	08:00	am	24	-	30.4	-	32.8	32.1	32.3	33.2	34.3	33.6	34.1	34.5	35.1	34.2	33.7	33.9	34.5
Feb. 9	09:00	am	25	-	32.0	-	31.9	33.0	32.3	33.0	33.0	34.3	33.7	33.9	33.9	33.9	33.6	33.7	33.7
Feb. 9	10:00	am	26	-	32.0	-	31.9	33.2	32.3	32.5	32.1	--	34.1	33.3	33.3	33.0	33.7	33.8	33.3
Feb. 9	11:00	am	27	-	32.5	-	33.7	35.5	34.4	33.4	33.3	37.2	35.8	34.9	34.9	36.7	35.2	35.1	34.4
Feb. 9	12:00	noon	28	-	34.2	-	36.4	37.1	35.9	35.0	34.8	38.2	37.1	35.7	35.3	37.7	36.1	35.6	34.9
Feb. 9	13:00	pm	29	-	35.0	-	36.0	38.0	36.5	35.9	35.2	39.3	38.1	36.9	36.2	38.9	38.0	37.1	36.0
Feb. 9	14:00	pm	30	-	36.3	-	36.5	38.8	37.7	36.5	36.6	40.6	39.9	38.1	37.7	39.8	39.9	38.6	37.7
Feb. 9	15:00	pm	33	-	36.6	-	41.4	38.8	38.2	36.8	36.0	39.7	39.2	38.8	37.9	38.9	37.9	38.6	36.9
Feb. 9	16:00	pm	34	-	36.2	-	38.7	37.8	37.5	36.8	36.5	38.8	39.1	38.7	38.7	38.5	38.0	37.9	37.2
Feb. 9	17:00	pm	33	-	34.4	-	38.1	36.9	37.3	37.1	36.8	38.1	38.7	38.7	39.4	37.8	39.6	37.8	37.7
Feb. 9	18:00	pm	30	-	37.1	-	34.8	35.8	35.6	35.6	36.1	--	--	37.0	--	--	35.8	--	36.1
Feb. 9	22:00	pm	29	-	33.9	-	34.1	33.4	34.5	34.9	35.4	35.0	--	36.3	36.5	35.5	36.0	36.3	36.4
Feb. 10	06:00	am	28	-	32.5	-	33.2	33.2	32.9	32.7	33.0	34.1	33.5	33.9	33.8	33.5	33.1	32.9	33.0
Feb. 10	08:30	am	32	-	32.7	-	33.3	33.5	33.1	33.0	33.2	34.4	33.7	33.4	33.3	33.7	33.4	33.0	33.1
Feb. 10	11:00	am	38	-	34.8	-	33.6	39.1	36.4	34.8	34.5	43.1	39.2	36.7	36.1	42.6	38.7	36.6	35.8
Feb. 10	14:00	pm	42	-	39.0	-	36.7	43.9	42.3	40.2	39.7	44.2	43.7	42.7	42.0	43.9	43.2	42.1	41.6
Feb. 10	18:00	pm	42	-	40.0	-	37.6	40.9	40.6	40.2	40.5	41.7	41.6	41.5	40.9	41.3	41.0	40.9	40.3

TABLE 10b. CHANGE IN TEMPERATURE, IN-PAVEMENT THERMOCOUPLES, WINTER 1998

COMPARED TO INITIAL READING

Date	STATION > LOCATION > TIME / DEPTH >		Air Temp	141+00				142+00				153+00				153+00			
				N 1"	N 2.7"	N 4.3"	N 6"	N 1"	N 2.7"	N 4.3"	N 6"	N 1"	N 2.7"	N 4.3"	N 6"	S 1"	S 2.7"	S 4.3"	S 6"
Feb. 8	18:00	pm																	
Feb. 8	19:00	pm	-2	--	-1.0	--	0.2	-3.5	-2.9	-2.8	-1.9	-3.6	-3.4	-3.8	-4.6	-3.2	-3.2	-2.5	-2.1
Feb. 8	20:00	pm	-3	--	-3.2	--	-1.5	-3.5	-3.1	-2.5	-1.9	-4.5	-4.4	-5.0	-3.2	-4.2	-3.9	-3.4	-4.6
Feb. 8	21:00	pm	-4	--	-4.1	--	-2.8	-4.3	-4.4	-3.4	-2.8	-5.3	-5.9	-6.2	-4.5	-4.9	-5.3	-4.6	-4.6
Feb. 8	22:00	pm	-5	--	-4.6	--	-3.5	-5.6	-5.7	-4.5	-3.7	-5.9	-6.3	-7.0	-5.1	-7.3	-6.1	-5.4	-6.4
Feb. 8	23:00	pm	-5	--	-5.6	--	-4.0	-6.8	-6.6	-5.7	-5.1	-6.7	-7.4	-7.7	-5.8	-7.3	-7.0	-6.5	-7.3
Feb. 9	00:00	mid	-8	--	-8.0	--	-10.4	-6.6	-6.5	-5.7	-4.6	-7.4	-8.5	-8.9	-6.9	-8.0	-7.7	-7.7	-8.9
Feb. 9	01:00	am	-9	--	-4.8	--	-5.5	-8.2	-7.7	-7.1	-6.5	-8.5	-9.8	-10.0	-8.1	-8.7	-8.8	-8.3	-9.6
Feb. 9	02:00	am	-10	--	-5.6	--	-6.3	-8.2	-8.1	-7.6	-7.5	-8.5	-10.2	-10.9	-9.0	-8.8	-9.2	-9.2	-10.8
Feb. 9	03:00	am	-10	--	-6.6	--	-6.5	-8.2	-8.6	-8.5	-8.4	-8.3	-10.2	-11.2	-9.5	-8.8	-9.4	-10.0	-11.7
Feb. 9	04:00	am	-9	--	-6.9	--	-6.6	-8.3	-8.8	-8.8	-8.6	-8.1	-10.1	-10.8	-9.3	-8.6	-9.2	-9.8	-11.6
Feb. 9	05:00	am	-8	--	-7.1	--	-5.9	-8.0	-8.3	-8.2	-8.0	-7.4	-9.4	-10.1	-8.7	-7.5	-7.9	-8.8	-10.8
Feb. 9	06:00	am	-7	--	-7.2	--	-4.7	-6.8	-7.5	-6.8	-6.5	-6.2	-8.0	-9.2	-7.3	-6.3	-7.0	-7.1	-8.6
Feb. 9	07:00	am	-8	--	-7.3	--	-5.1	-6.3	-7.0	-6.6	-6.8	-6.0	-7.9	-9.1	-7.1	-6.2	-6.9	-7.1	-9.0
Feb. 9	08:00	am	-8	--	-7.2	--	-5.4	-5.6	-6.7	-6.4	-5.6	-5.4	-7.5	-8.7	-6.9	-5.1	-6.6	-7.6	-9.0
Feb. 9	09:00	am	-7	--	-5.6	--	-6.3	-4.7	-6.7	-6.6	-6.9	-4.7	-7.9	-9.3	-8.1	-5.4	-6.7	-7.8	-9.8
Feb. 9	10:00	am	-6	--	-5.6	--	-6.3	-4.5	-6.7	-7.1	-7.8	--	-7.5	-9.9	-8.7	-6.3	-6.6	-7.7	-10.2
Feb. 9	11:00	am	-5	--	-5.1	--	-4.5	-2.2	-4.6	-6.2	-6.6	-1.8	-5.8	-8.3	-7.1	-2.6	-5.1	-6.4	-9.1
Feb. 9	12:00	noon	-4	--	-3.4	--	-1.8	-0.6	-3.1	-4.6	-5.1	-0.8	-4.5	-7.5	-6.7	-1.6	-4.2	-5.9	-8.6
Feb. 9	13:00	pm	-3	--	-2.6	--	-2.2	0.3	-2.5	-3.7	-4.7	0.3	-3.5	-6.3	-5.8	-0.4	-2.3	-4.4	-7.5
Feb. 9	14:00	pm	-2	--	-1.3	--	-1.7	1.1	-1.3	-3.1	-3.3	1.6	-1.7	-5.1	-4.3	0.5	-0.4	-2.9	-5.8
Feb. 9	15:00	pm	1	--	-1.0	--	3.2	1.1	-0.8	-2.8	-3.9	0.7	-2.4	-4.4	-4.1	-0.4	-2.4	-2.9	-6.6
Feb. 9	16:00	pm	2	--	-1.4	--	0.5	0.1	-1.5	-2.8	-3.4	-0.2	-2.5	-4.5	-3.3	-0.8	-2.3	-3.6	-6.3
Feb. 9	17:00	pm	1	--	-3.2	--	-0.1	-0.8	-1.7	-2.5	-3.1	-0.9	-2.9	-4.5	-2.6	-1.5	-0.7	-3.7	-5.8
Feb. 9	18:00	pm	-2	--	-0.5	--	-3.4	-1.9	-3.4	-4.0	-3.8	--	--	-6.2	--	--	-4.5	--	-7.4
Feb. 9	22:00	pm	-3	--	-3.7	--	-4.1	-4.3	-4.5	-4.7	-4.5	-4.0	--	-6.9	-5.5	-3.8	-4.3	-5.2	-7.1
Feb. 10	06:00	am	-4	--	-5.1	--	-5.0	-4.5	-6.1	-6.9	-6.9	-4.9	-8.1	-9.3	-8.2	-5.8	-7.2	-8.6	-10.5
Feb. 10	08:30	am	0	--	-4.9	--	-4.9	-4.2	-5.9	-6.6	-6.7	-4.6	-7.9	-9.8	-8.7	-5.6	-6.9	-8.5	-10.4
Feb. 10	11:00	am	6	--	-2.8	--	-4.6	1.4	-2.6	-4.8	-5.4	4.1	-2.4	-6.5	-5.9	3.3	-1.6	-4.9	-7.7
Feb. 10	14:00	pm	10	--	1.4	--	-1.5	6.2	3.3	0.6	-0.2	5.2	2.1	-0.5	0.0	4.6	2.9	0.6	-1.9
Feb. 10	18:00	pm	10	--	2.4	--	-0.6	3.2	1.6	0.6	0.6	2.7	0.0	-1.7	-1.1	2.0	0.7	-0.6	-3.2

TABLE 11a. DAILY TEMPERATURE CYCLE, IN-PAVEMENT THERMOCOUPLES, SPRING 1998

TABULATION OF READINGS

	STATION >			141+00				142+00				153+00				153+00			
	LOCATION >		Air	N	N	N	N	N	N	N	N	N	N	N	N	S	S	S	S
Date	TIME / DEPTH >		Temp	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"
Apr. 19	18:00	pm	60	67.9	69.3	67.8	--	72.3	70.6	68.8	66.7	75.8	75.7	73.3	71.8	73.7	73.0	71.3	70.0
Apr. 19	19:00	pm	61	67.6	66.9	67.4	--	69.3	69.5	68.6	67.8	69.7	71.0	71.1	69.9	70.1	72.0	70.7	69.9
Apr. 19	20:00	pm	60	64.2	64.9	65.0	--	64.7	66.1	66.3	65.7	67.0	69.3	70.3	69.4	65.5	67.3	67.9	67.5
Apr. 19	21:00	pm	52	61.8	62.1	63.3	--	61.9	63.8	65.4	64.2	64.1	66.3	67.7	67.8	63.7	64.7	65.6	66.4
Apr. 19	22:00	pm	49	59.7	60.9	61.4	--	60.0	61.8	62.7	62.9	62.0	64.3	65.5	65.6	60.7	62.7	63.7	64.1
Apr. 19	23:00	pm	45	56.4	58.2	60.1	--	57.6	59.5	60.7	61.2	59.7	61.9	62.4	63.6	58.6	60.6	61.7	62.0
Apr. 20	00:00	mid	46	54.5	56.8	57.6	--	57.2	57.8	58.8	59.5	58.1	60.2	61.6	61.7	56.8	58.6	60.0	60.3
Apr. 20	01:00	am	49	52.6	54.8	56.2	--	53.6	56.2	57.6	57.6	57.4	58.9	59.7	60.2	54.9	57.2	58.6	59.0
Apr. 20	02:00	am	47	53.0	54.3	55.6	--	53.2	55.2	56.5	57.6	56.2	58.1	59.1	59.8	54.3	56.3	57.6	58.3
Apr. 20	03:00	am	46	50.9	53.6	54.4	55.8	51.7	55.0	55.1	56.2	53.0	57.1	57.4	58.1	52.3	53.5	56.7	57.3
Apr. 20	04:00	am	45	49.2	51.4	52.7	54.3	50.1	52.0	53.6	55.3	51.7	54.1	55.9	57.0	51.2	53.5	55.0	56.5
Apr. 20	05:00	am	44	48.6	50.4	51.5	53.1	51.2	51.8	52.4	53.8	51.9	53.2	54.9	56.3	50.3	52.9	53.2	55.0
Apr. 20	06:00	am	43	48.1	49.5	50.7	52.5	49.2	48.8	50.9	52.0	49.9	51.8	53.0	54.2	49.1	51.2	52.4	53.7
Apr. 20	07:00	am	41	50.0	49.3	50.1	51.7	47.3	48.9	50.3	51.1	49.2	50.4	51.7	52.7	48.4	49.4	50.7	51.5
Apr. 20	08:00	am	46	50.8	50.3	50.0	51.0	50.4	49.9	50.0	51.1	53.4	52.1	51.8	52.8	52.6	50.8	50.8	51.2
Apr. 20	09:00	am	53	55.2	53.6	52.8	52.3	55.6	53.6	52.6	52.7	58.8	57.0	54.8	54.3	56.9	54.4	53.3	52.8
Apr. 20	10:00	am	58	59.6	56.3	54.2	53.4	59.1	55.8	53.8	53.2	62.4	58.7	56.6	55.5	60.3	57.1	55.0	54.0
Apr. 20	11:00	am	60	61.9	59.1	56.8	55.1	61.9	58.7	56.3	55.3	64.8	61.8	59.5	57.8	62.7	59.8	57.5	56.1
Apr. 20	12:00	noon	60	62.0	59.8	57.4	56.2	62.0	58.9	56.9	56.0	64.4	63.8	60.2	60.0	62.6	59.9	58.8	57.9
Apr. 20	13:00	pm	60	62.5	60.0	58.6	57.1	62.6	59.9	58.5	57.3	63.8	64.4	61.2	60.3	62.1	60.8	59.5	58.6
Apr. 20	14:00	pm	49	57.1	57.0	57.2	57.8	56.6	57.4	57.9	57.8	59.1	60.0	60.9	61.0	58.1	59.2	59.7	59.9
Apr. 20	15:00	pm	49	56.0	56.9	56.5	56.3	56.0	57.0	57.2	57.3	58.4	59.2	59.8	59.9	57.2	58.4	59.1	58.9
Apr. 20	16:00	pm	49	55.6	55.0	55.9	56.4	55.2	55.6	56.3	56.2	56.7	57.4	57.5	58.2	56.1	56.9	57.4	57.8
Apr. 20	17:00	pm	48	54.4	55.4	54.8	56.5	55.3	55.9	56.2	56.5	58.9	57.6	58.4	58.8	56.4	57.0	57.6	57.6
Apr. 20	18:00	pm	49	55.9	55.0	55.4	55.1	53.7	54.8	55.5	55.3	53.6	55.5	56.6	56.9	53.6	55.1	55.6	56.2
Apr. 20	22:00	pm	48	--	53.7	54.0	55.2	51.8	53.1	54.1	55.3	53.1	54.8	56.3	55.7	53.1	54.1	55.3	55.6
Apr. 21	06:00	am	48	--	49.3	50.6	--	47.9	48.6	50.1	51.8	50.5	50.9	51.3	51.9	50.3	57.3	49.9	50.5
Apr. 21	08:30	am	48	--	47.1	47.3	--	48.3	48.2	48.5	48.6	50.9	50.9	50.1	50.0	50.8	49.0	49.1	49.3
Apr. 21	11:00	am	52	--	57.7	55.0	58.9	60.7	57.8	55.1	53.4	63.3	60.2	57.8	55.8	61.8	58.5	55.9	54.3
Apr. 21	14:00	pm	54	--	64.2	61.3	--	66.8	64.4	61.6	59.4	67.7	66.4	63.9	61.8	66.3	64.5	62.5	61.5
Apr. 21	18:00	pm	51	--	58.0	57.9	57.6	56.2	57.4	57.8	57.8	57.0	58.6	59.4	59.3	56.6	58.1	58.7	58.5

TABLE 11B. CHANGE IN TEMPERATURE, IN-PAVEMENT THERMOCOUPLES, SPRING 1998

COMPARED TO INITIAL READING

	STATION >			141+00				142+00				153+00				153+00			
	LOCATION >		Air	N	N	N	N	N	N	N	N	N	N	N	N	S	S	S	S
Date	TIME / DEPTH >		Temp	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"
Apr. 19	18:00	pm																	
Apr. 19	19:00	pm	1	-0.3	-2.4	-0.4	--	-3.0	-1.1	-0.2	1.1	-6.1	-4.7	-2.2	-1.9	-3.6	-1.0	-0.6	-0.1
Apr. 19	20:00	pm	0	-3.7	-4.4	-2.8	--	-7.6	-4.5	-2.5	-1.0	-8.8	-6.4	-3.0	-2.4	-8.2	-5.7	-3.4	-2.5
Apr. 19	21:00	pm	-8	-6.1	-7.2	-4.5	--	-10.4	-6.8	-3.4	-2.5	-11.7	-9.4	-5.6	-4.0	-10.0	-8.3	-5.7	-3.6
Apr. 19	22:00	pm	-11	-8.2	-8.4	-6.4	--	-12.3	-8.8	-6.1	-3.8	-13.8	-11.4	-7.8	-6.2	-13.0	-10.3	-7.6	-5.9
Apr. 19	23:00	pm	-15	-11.5	-11.1	-7.7	--	-14.7	-11.1	-8.1	-5.5	-16.1	-13.8	-10.9	-8.2	-15.1	-12.4	-9.6	-8.0
Apr. 20	00:00	mid	-14	-13.4	-12.5	-10.2	--	-15.1	-12.8	-10.0	-7.2	-17.7	-15.5	-11.7	-10.1	-16.9	-14.4	-11.3	-9.7
Apr. 20	01:00	am	-11	-15.3	-14.5	-11.6	--	-18.7	-14.4	-11.2	-9.1	-18.4	-16.8	-13.6	-11.6	-18.8	-15.8	-12.7	-11.0
Apr. 20	02:00	am	-13	-14.9	-15.0	-12.2	--	-19.1	-15.4	-12.3	-9.1	-19.6	-17.6	-14.2	-12.0	-19.4	-16.7	-13.7	-11.7
Apr. 20	03:00	am	-14	-17.0	-15.7	-13.4	--	-20.6	-15.6	-13.7	-10.5	-22.8	-18.6	-15.9	-13.7	-21.4	-19.5	-14.6	-12.7
Apr. 20	04:00	am	-15	-18.7	-17.9	-15.1	-1.5	-22.2	-18.6	-15.2	-11.4	-24.1	-21.6	-17.4	-14.8	-22.5	-19.5	-16.3	-13.5
Apr. 20	05:00	am	-16	-19.3	-18.9	-16.3	-2.7	-21.1	-18.8	-16.4	-12.9	-23.9	-22.5	-18.4	-15.5	-23.4	-20.1	-18.1	-15.0
Apr. 20	06:00	am	-17	-19.8	-19.8	-17.1	-3.3	-23.1	-21.8	-17.9	-14.7	-25.9	-23.9	-20.3	-17.6	-24.6	-21.8	-18.9	-16.3
Apr. 20	07:00	am	-19	-17.9	-20.0	-17.7	-4.1	-25.0	-21.7	-18.5	-15.6	-26.6	-25.3	-21.6	-19.1	-25.3	-23.6	-20.6	-18.5
Apr. 20	08:00	am	-14	-17.1	-19.0	-17.8	-4.8	-21.9	-20.7	-18.8	-15.6	-22.4	-23.6	-21.5	-19.0	-21.1	-22.2	-20.5	-18.8
Apr. 20	09:00	am	-7	-12.7	-15.7	-15.0	-3.5	-16.7	-17.0	-16.2	-14.0	-17.0	-18.7	-18.5	-17.5	-16.8	-18.6	-18.0	-17.2
Apr. 20	10:00	am	-2	-8.3	-13.0	-13.6	-2.4	-13.2	-14.8	-15.0	-13.5	-13.4	-17.0	-16.7	-16.3	-13.4	-15.9	-16.3	-16.0
Apr. 20	11:00	am	0	-6.0	-10.2	-11.0	-0.7	-10.4	-11.9	-12.5	-11.4	-11.0	-13.9	-13.8	-14.0	-11.0	-13.2	-13.8	-13.9
Apr. 20	12:00	noon	0	-5.9	-9.5	-10.4	0.4	-10.3	-11.7	-11.9	-10.7	-11.4	-11.9	-13.1	-11.8	-11.1	-13.1	-12.5	-12.1
Apr. 20	13:00	pm	0	-5.4	-9.3	-9.2	1.3	-9.7	-10.7	-10.3	-9.4	-12.0	-11.3	-12.1	-11.5	-11.6	-12.2	-11.8	-11.4
Apr. 20	14:00	pm	-11	-10.8	-12.3	-10.6	2.0	-15.7	-13.2	-10.9	-8.9	-16.7	-15.7	-12.4	-10.8	-15.6	-13.8	-11.6	-10.1
Apr. 20	15:00	pm	-11	-11.9	-12.4	-11.3	0.5	-16.3	-13.6	-11.6	-9.4	-17.4	-16.5	-13.5	-11.9	-16.5	-14.6	-12.2	-11.1
Apr. 20	16:00	pm	-11	-12.3	-14.3	-11.9	0.6	-17.1	-15.0	-12.5	-10.5	-19.1	-18.3	-15.8	-13.6	-17.6	-16.1	-13.9	-12.2
Apr. 20	17:00	pm	-12	-13.5	-13.9	-13.0	0.7	-17.0	-14.7	-12.6	-10.2	-16.9	-18.1	-14.9	-13.0	-17.3	-16.0	-13.7	-12.4
Apr. 20	18:00	pm	-11	-12.0	-14.3	-12.4	-0.7	-18.6	-15.8	-13.3	-11.4	-22.2	-20.2	-16.7	-14.9	-20.1	-17.9	-15.7	-13.8
Apr. 20	22:00	pm	-12	--	-15.6	-13.8	-0.6	-20.5	-17.5	-14.7	-11.4	-22.7	-20.9	-17.0	-16.1	-20.6	-18.9	-16.0	-14.4
Apr. 21	06:00	am	-12	--	-20.0	-17.2	--	-24.4	-22.0	-18.7	-14.9	-25.3	-24.8	-22.0	-19.9	-23.4	-15.7	-21.4	-19.5
Apr. 21	08:30	am	-12	--	-22.2	-20.5	--	-24.0	-22.4	-20.3	-18.1	-24.9	-24.8	-23.2	-21.8	-22.9	-24.0	-22.2	-20.7
Apr. 21	11:00	am	-8	--	-11.6	-12.8	3.1	-11.6	-12.8	-13.7	-13.3	-12.5	-15.5	-15.5	-16.0	-11.9	-14.5	-15.4	-15.7
Apr. 21	14:00	pm	-6	--	-5.1	-6.5	--	-5.5	-6.2	-7.2	-7.3	-8.1	-9.3	-9.4	-10.0	-7.4	-8.5	-8.8	-8.5
Apr. 21	18:00	pm	-9	--	-11.3	-9.9	1.8	-16.1	-13.2	-11.0	-6.9	-18.8	-17.1	-13.9	-12.5	-17.1	-14.9	-12.6	-11.5

TABLE 12a. DAILY TEMPERATURE CYCLE, IN-PAVEMENT THERMOCOUPLES, SUMMER 1998

TABULATION OF READINGS

	STATION >			141+00				142+00				153+00				153+00			
	LOCATION >		Air	N	N	N	N	N	N	N	N	N	N	N	N	S	S	S	S
Date	TIME / DEPTH >		Temp	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"
Aug. 30	18:00	pm	78	76.0	76.0	76.6	80.7	73.3	71.8	73.9	74.3	74.0	75.1	73.8	75.6	76.2	75.8	75.1	76.8
Aug. 30	19:00	pm	74	74.6	72.4	72.8	71.6	67.2	66.4	67.5	70.8	72.1	69.9	71.1	71.5	75.9	72.7	73.1	74.8
Aug. 30	20:00	pm	70	64.3	58.0	56.0	55.9	57.2	55.4	55.2	55.3	64.6	62.8	60.9	61.3	68.8	66.0	63.5	68.1
Aug. 30	21:00	pm	67	64.3	60.3	60.7	63.1	61.2	59.1	58.6	57.5	65.9	62.8	61.3	61.8	67.0	66.6	62.1	64.5
Aug. 30	22:00	pm	63	66.2	59.2	56.0	56.2	56.8	54.0	54.0	52.6	60.3	54.3	53.7	57.4	62.5	59.2	57.1	56.2
Aug. 30	23:00	pm	62	70.3	64.6	61.7	61.4	64.3	58.2	56.5	53.7	58.8	55.8	58.3	57.5	62.5	61.6	60.6	58.2
Aug. 31	00:00	mid	61	67.2	64.4	64.1	63.1	61.4	58.2	56.0	54.6	67.8	63.7	64.7	63.6	71.6	68.6	67.7	70.6
Aug. 31	01:00	am	60	69.1	64.8	65.4	62.7	64.3	60.7	61.4	58.0	64.7	65.1	61.1	62.1	70.7	67.4	68.1	64.8
Aug. 31	02:00	am	59	66.5	61.3	60.5	56.4	61.2	58.3	56.5	55.1	61.3	60.1	56.2	59.6	66.0	62.5	63.2	63.3
Aug. 31	03:00	am	57	60.1	52.6	53.1	51.7	57.4	55.7	54.6	52.3	57.7	56.0	54.3	52.1	62.5	60.9	58.6	59.9
Aug. 31	04:00	am	56	66.1	65.1	64.4	60.5	61.9	61.1	58.5	68.9	63.9	69.3	64.5	64.4	71.0	69.2	67.8	69.2
Aug. 31	05:00	am	56	68.9	61.7	63.7	60.7	62.6	62.1	58.9	59.2	64.8	62.7	62.3	59.7	69.6	67.6	65.6	65.2
Aug. 31	06:00	am	56	65.3	61.0	61.6	56.8	63.1	56.0	58.2	56.4	66.1	63.7	64.4	61.9	69.2	67.4	67.2	67.4
Aug. 31	07:00	am	57	69.6	65.5	65.9	63.3	70.7	63.2	65.9	62.3	68.6	69.3	68.5	67.7	75.8	73.2	71.6	72.7
Aug. 31	08:00	am	59	78.2	77.2	76.4	74.5	75.1	72.3	73.4	72.1	82.1	83.9	80.7	79.5	82.1	84.2	83.9	85.1
Aug. 31	09:00	am	67	92.0	93.8	93.3	93.5	85.5	85.9	90.1	86.3	96.4	100.6	98.9	97.2	95.5	96.7	94.5	95.8
Aug. 31	10:00	am	67	96.8	100.1	99.3	99.5	101.4	102.1	103.4	100.2	100.9	105.0	105.3	104.1	107.3	104.4	111.2	109.7
Aug. 31	11:00	am	72	93.3	98.2	99.2	-	99.8	101.6	98.7	102.3	93.1	99.2	103.1	106.4	98.9	104.7	109.8	111.0
Aug. 31	12:00	noon	73	90.1	90.7	98.2	98.3	96.7	97.2	99.1	100.2	91.5	98.2	100.2	104.1	92.5	97.5	100.9	--
Aug. 31	13:00	pm	74	89.9	85.2	97.7	100.1	--	96.6	101.3	103.7	82.8	98.3	95.5	96.7	83.6	88.5	95.0	--
Aug. 31	14:00	pm	78	92.1	95.2	97.5	102.0	93.3	94.2	100.6	97.7	86.2	95.2	96.7	98.2	88.1	92.3	98.2	--
Aug. 31	15:00	pm	80	87.3	93.1	93.8	97.6	87.9	92.5	95.6	95.1	90.4	95.0	98.0	101.7	91.1	95.6	100.5	--
Aug. 31	16:00	pm	78	85.2	88.2	92.6	93.8	82.0	86.2	87.6	90.8	87.1	82.1	85.1	85.1	80.9	86.1	88.5	--
Aug. 31	17:00	pm	77	82.1	86.3	87.1	87.9	78.3	81.3	85.7	85.4	81.4	78.3	77.6	81.3	76.8	81.4	81.8	--
Aug. 31	18:00	pm	77	80.4	79.9	82.2	84.3	76.4	77.2	79.3	81.3	72.5	71.7	72.3	73.6	74.9	74.8	76.2	--
Aug. 31	22:00	pm	65	63.1	60.4	58.7	56.9	57.1	55.2	55.0	53.7	60.9	59.7	58.5	57.6	59.2	59.0	57.6	--
Sept. 1	06:00	am	60	65.2	62.3	61.2	60.9	63.1	62.7	61.5	60.1	68.1	67.7	65.3	68.1	69.0	67.8	68.1	--
Sept. 1	08:30	am	63	78.0	83.0	81.6	--	72.7	72.6	73.5	73.9	78.6	72.0	76.6	76.9	78.7	75.7	75.1	75.6
Sept. 1	11:00	am	--	100.3	104.2	105.3	--	98.6	97.2	99.8	112.8	100.0	101.6	99.5	103.5	92.1	--	99.6	99.3
Sept. 1	14:00	pm	76	98.0	97.5	105.6	--	96.7	102.7	105.0	92.1	77.5	80.9	82.6	84.8	74.0	--	84.4	87.5
Sept. 1	18:00	pm	70	95.9	93.6	92.3	--	96.0	94.8	93.6	--	96.3	96.7	95.9	94.6	94.6	--	94.4	93.3

TABLE 12b. CHANGE IN TEMPERATURE, IN-PAVEMENT THERMOCOUPLES, SUMMER 1998

COMPARED TO INITIAL READING

	STATION >			141+00				142+00				153+00				153+00			
	LOCATION >		Air	N	N	N	N	N	N	N	N	N	N	N	N	S	S	S	S
Date	TIME / DEPTH >		Temp	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"	1"	2.7"	4.3"	6"
Aug. 30	18:00	pm																	
Aug. 30	19:00	pm	-4	-1.4	-3.6	-3.8	-9.1	-6.1	-5.4	-6.4	-3.5	-1.9	-5.2	-2.7	-4.1	-0.3	-3.1	-2.0	-2.0
Aug. 30	20:00	pm	-8	-11.7	-18.0	-20.6	-24.8	-16.1	-16.4	-18.7	-19.0	-9.4	-12.3	-12.9	-14.3	-7.4	-9.8	-11.6	-8.7
Aug. 30	21:00	pm	-11	-11.7	-15.7	-15.9	-17.6	-12.1	-12.7	-15.3	-16.8	-8.1	-12.3	-12.5	-13.8	-9.2	-9.2	-13.0	-12.3
Aug. 30	22:00	pm	-15	-9.8	-16.8	-20.6	-24.5	-16.5	-17.8	-19.9	-21.7	-13.7	-20.8	-20.1	-18.2	-13.7	-16.6	-18.0	-20.6
Aug. 30	23:00	pm	-16	-5.7	-11.4	-14.9	-19.3	-9.0	-13.6	-17.4	-20.6	-15.2	-19.3	-15.5	-18.1	-13.7	-14.2	-14.5	-18.6
Aug. 31	00:00	mid	-17	-8.8	-11.6	-12.5	-17.6	-11.9	-13.6	-17.9	-19.7	-6.2	-11.4	-9.1	-12.0	-4.6	-7.2	-7.4	-6.2
Aug. 31	01:00	am	-18	-6.9	-11.2	-11.2	-18.0	-9.0	-11.1	-12.5	-16.3	-9.3	-10.0	-12.7	-13.5	-5.5	-8.4	-7.0	-12.0
Aug. 31	02:00	am	-19	-9.5	-14.7	-16.1	-24.3	-12.1	-13.5	-17.4	-19.2	-12.7	-15.0	-17.6	-16.0	-10.2	-13.3	-11.9	-13.5
Aug. 31	03:00	am	-21	-15.9	-23.4	-23.5	-29.0	-15.9	-16.1	-19.3	-22.0	-16.3	-19.1	-19.5	-23.5	-13.7	-14.9	-16.5	-16.9
Aug. 31	04:00	am	-22	-9.9	-10.9	-12.2	-20.2	-11.4	-10.7	-15.4	-5.4	-10.1	-5.8	-9.3	-11.2	-5.2	-6.6	-7.3	-7.6
Aug. 31	05:00	am	-22	-7.1	-14.3	-12.9	-20.0	-10.7	-9.7	-15.0	-15.1	-9.2	-12.4	-11.5	-15.9	-6.6	-8.2	-9.5	-11.6
Aug. 31	06:00	am	-22	-10.7	-15.0	-15.0	-23.9	-10.2	-15.8	-15.7	-17.9	-7.9	-11.4	-9.4	-13.7	-7.0	-8.4	-7.9	-9.4
Aug. 31	07:00	am	-21	-6.4	-10.5	-10.7	-17.4	-2.6	-8.6	-8.0	-12.0	-5.4	-5.8	-5.3	-7.9	-0.4	-2.6	-3.5	-4.1
Aug. 31	08:00	am	-19	2.2	1.2	-0.2	-6.2	1.8	0.5	-0.5	-2.2	8.1	8.8	6.9	3.9	5.9	8.4	8.8	8.3
Aug. 31	09:00	am	-11	16.0	17.8	16.7	12.8	12.2	14.1	16.2	12.0	22.4	25.5	25.1	21.6	19.3	20.9	19.4	19.0
Aug. 31	10:00	am	-11	20.8	24.1	22.7	18.8	28.1	30.3	29.5	25.9	26.9	29.9	31.5	28.5	31.1	26.6	36.1	32.9
Aug. 31	11:00	am	-6	17.3	22.2	22.6	-80.7	26.5	29.8	24.8	28.0	19.1	24.1	29.3	30.8	22.7	28.9	34.7	34.2
Aug. 31	12:00	noon	-5	14.1	14.7	21.6	17.6	23.4	25.4	25.2	25.9	17.5	23.1	26.4	28.5	16.3	21.7	25.8	--
Aug. 31	13:00	pm	-4	13.9	9.2	21.1	19.4	--	24.8	27.4	29.4	8.8	23.2	21.7	21.1	7.4	12.7	19.9	--
Aug. 31	14:00	pm	0	16.1	19.2	20.9	21.3	20.0	22.4	26.7	23.4	12.2	20.1	22.9	22.6	11.9	16.5	23.1	--
Aug. 31	15:00	pm	2	11.3	17.1	17.2	16.9	14.6	20.7	21.7	20.8	16.4	19.9	24.2	26.1	14.9	19.8	25.4	--
Aug. 31	16:00	pm	0	9.2	12.2	16.0	13.1	8.7	14.4	13.7	16.5	13.1	7.0	11.3	9.5	4.7	10.3	13.4	--
Aug. 31	17:00	pm	-1	6.1	10.3	10.5	7.2	5.0	9.5	11.8	11.1	7.4	3.2	3.8	5.7	0.6	5.6	6.7	--
Aug. 31	18:00	pm	-1	4.4	3.9	5.6	3.6	3.1	5.4	5.4	7.0	-1.5	-3.4	-1.5	-2.0	-1.3	-1.0	1.1	--
Aug. 31	22:00	pm	-13	-12.9	-15.6	-17.9	-23.8	-16.2	-16.6	-18.9	-20.6	-13.1	-15.4	-15.3	-18.0	-17.0	-16.8	-17.5	--
Sept. 1	06:00	am	-18	-10.8	-13.7	-15.4	-19.8	-10.2	-9.1	-12.4	-14.2	-5.9	-7.4	-8.5	-7.5	-7.2	-8.0	-7.0	--
Sept. 1	08:30	am	-15	2.0	7.0	5.0	--	-0.6	0.8	-0.4	-0.4	4.6	-3.1	2.8	1.3	2.5	-0.1	0.0	-1.2
Sept. 1	11:00	am	--	24.3	28.2	28.7	--	25.3	25.4	25.9	38.5	26.0	26.5	25.7	27.9	15.9	--	24.5	22.5
Sept. 1	14:00	pm	-2	22.0	21.5	29.0	--	23.4	30.9	31.1	17.8	3.5	5.8	8.8	9.2	-2.2	--	9.3	10.7
Sept. 1	18:00	pm	-8	19.9	17.6	15.7	--	22.7	23.0	19.7	--	22.3	21.6	22.1	19.0	18.4	--	19.3	16.5

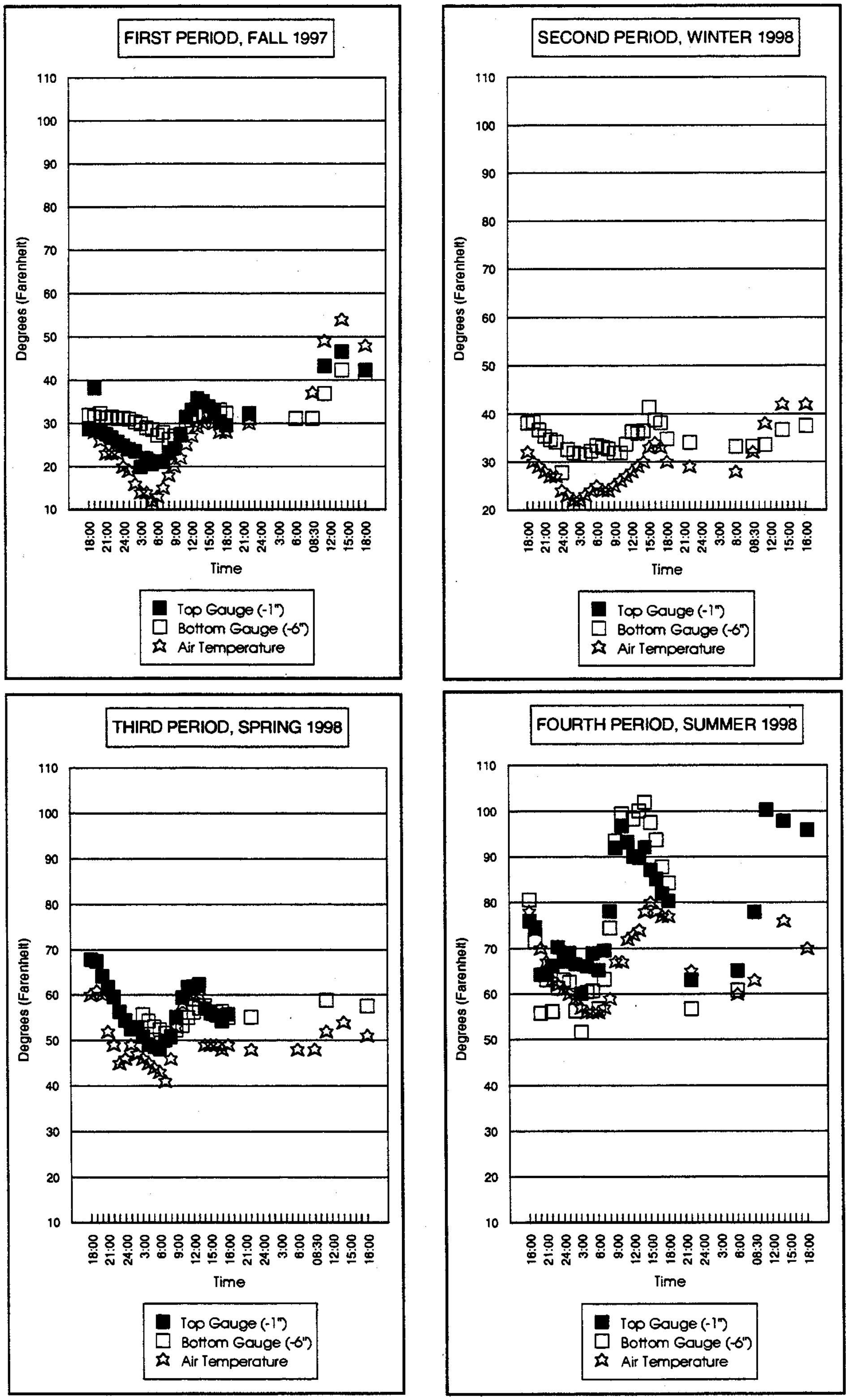


FIGURE 30. DAILY TEMPERATURE CYCLE, STATION 141+00, NORTH SIDE

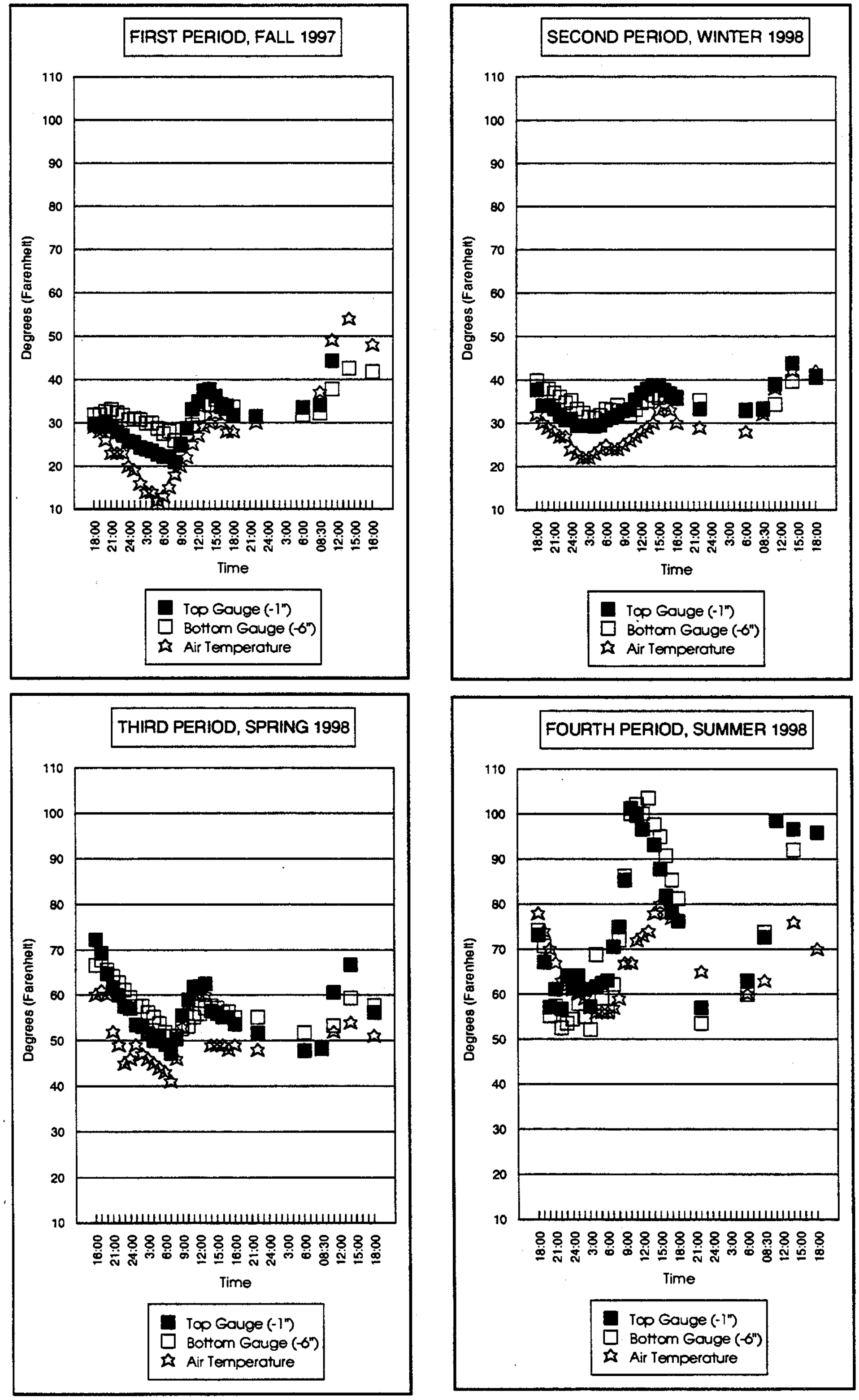


FIGURE 31. DAILY TEMPERATURE CYCLE, STATION 142+00, NORTH SIDE

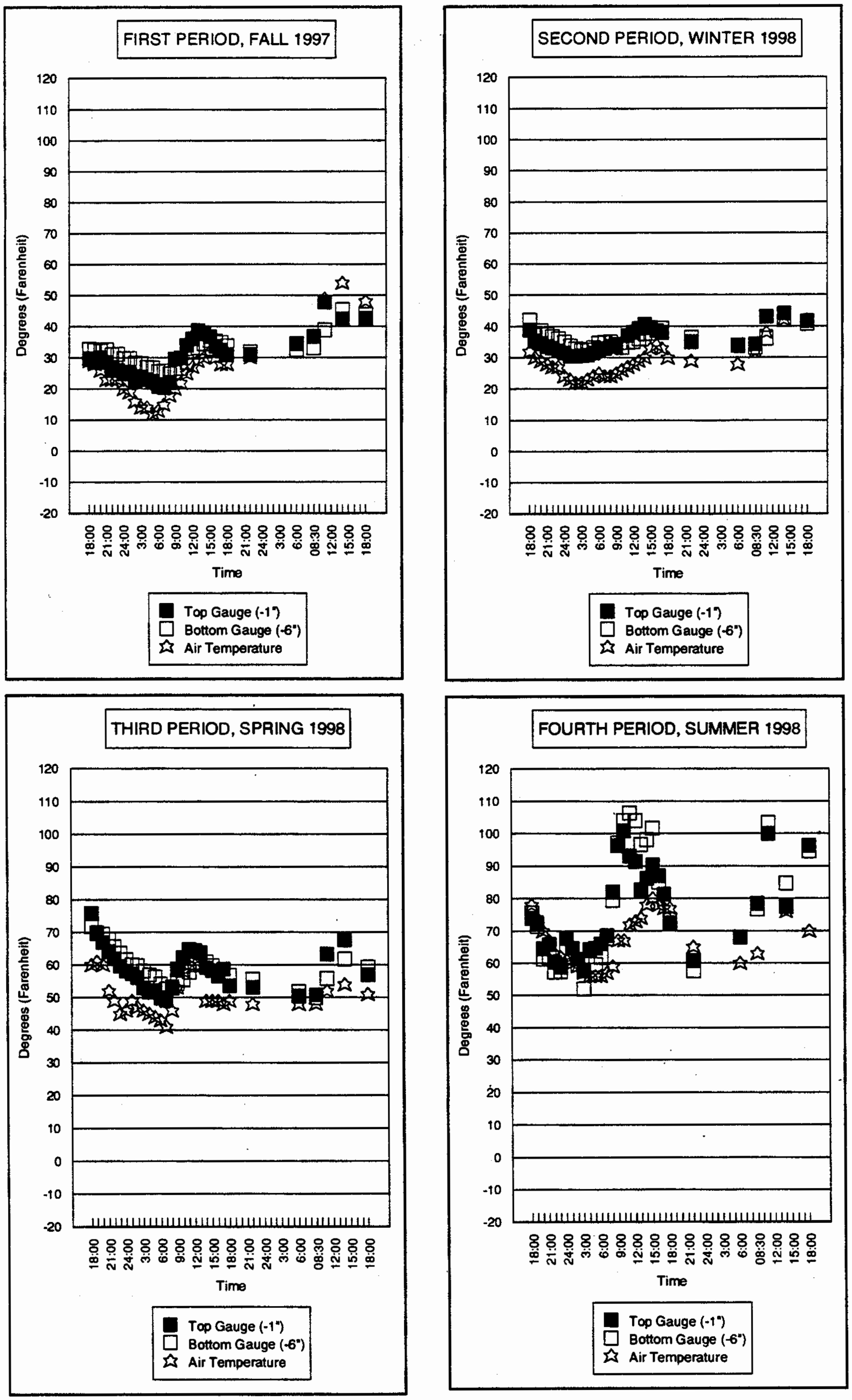


FIGURE 32. DAILY TEMPERATURE CYCLE, STATION 153+00, NORTH SIDE

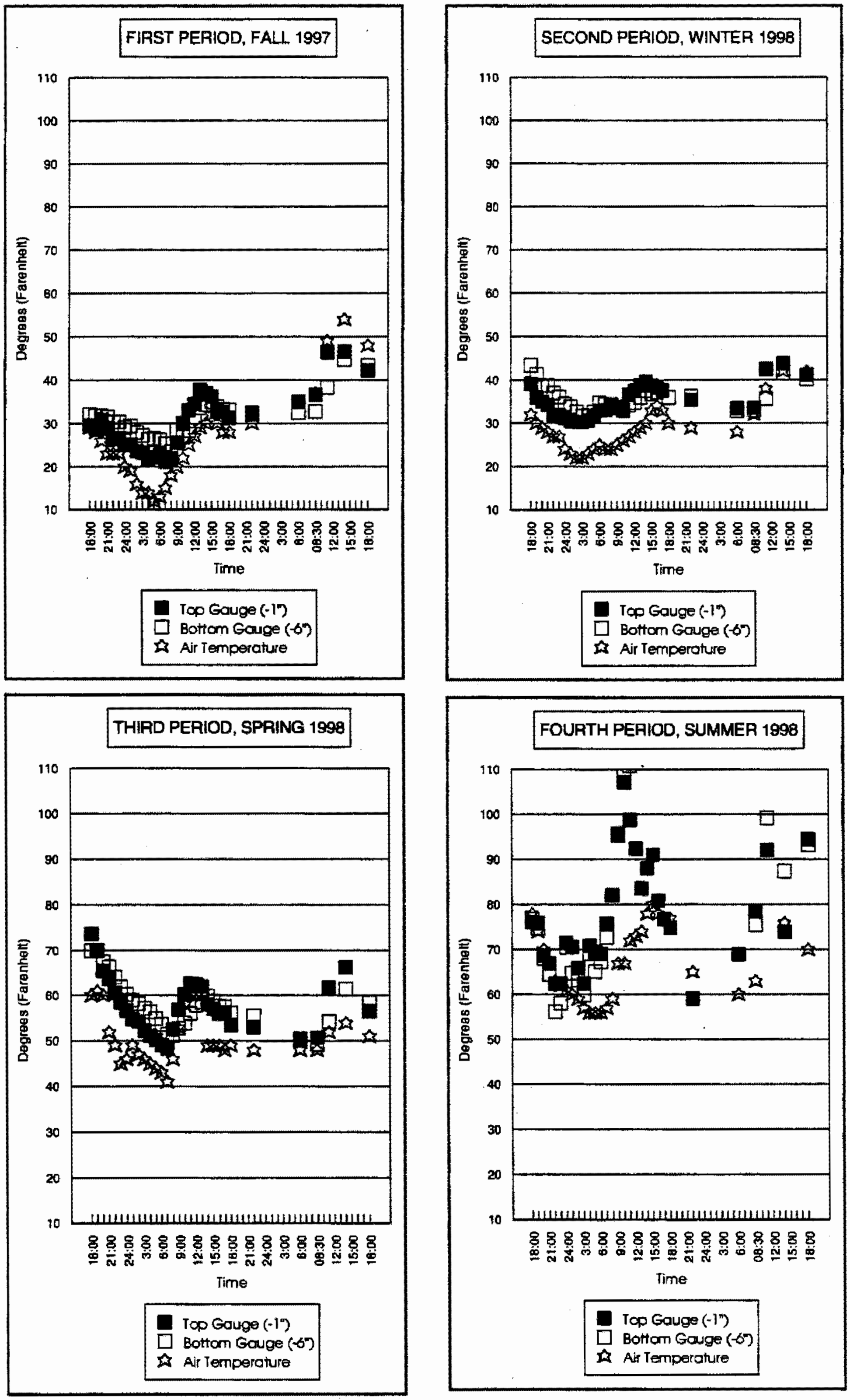


FIGURE 33. DAILY TEMPERATURE CYCLE, STATION 153+00, SOUTH SIDE

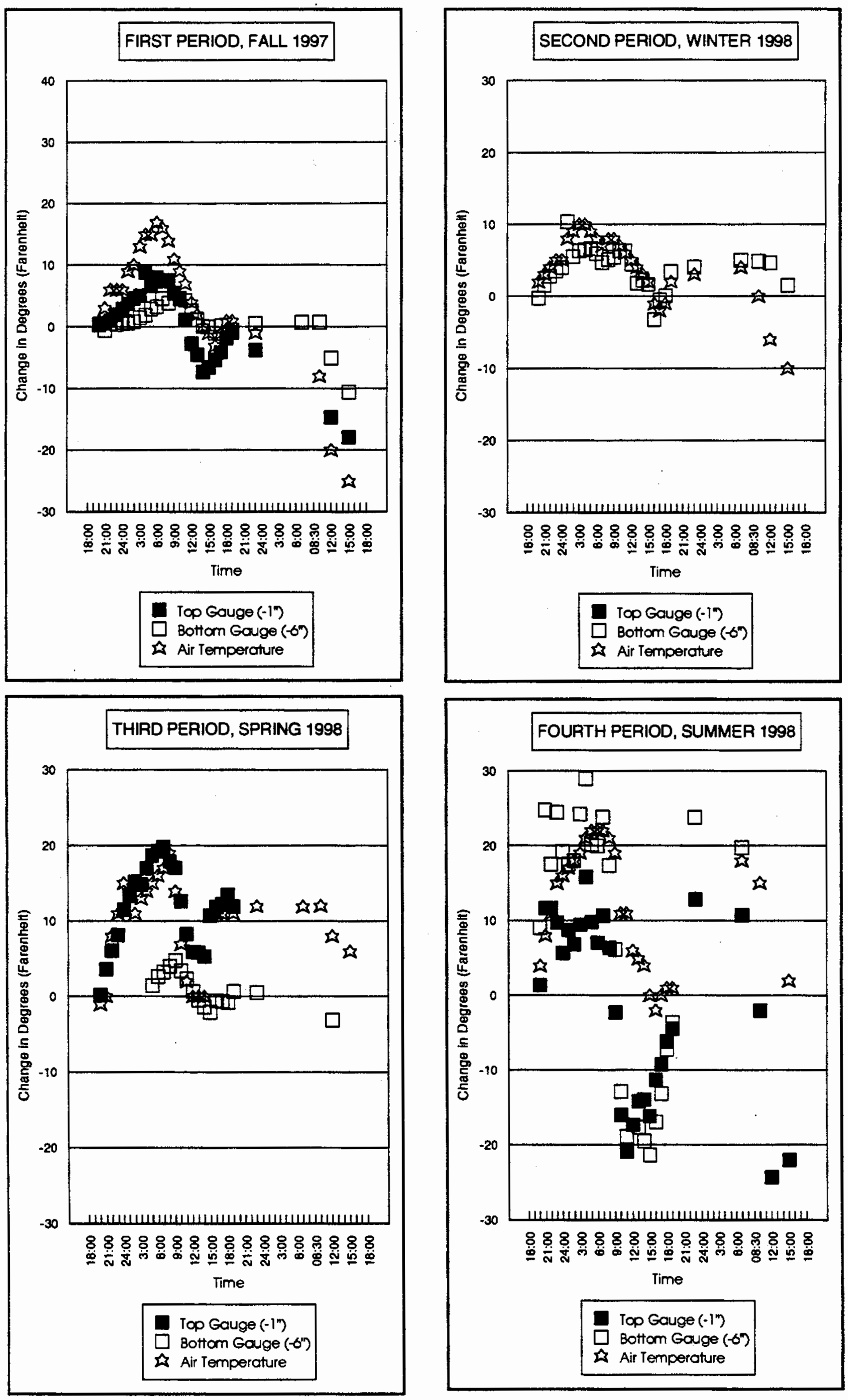


FIGURE 34. CHANGE IN TEMPERATURE, COMPARED TO INITIAL READING, STATION 141+00, NORTH SIDE

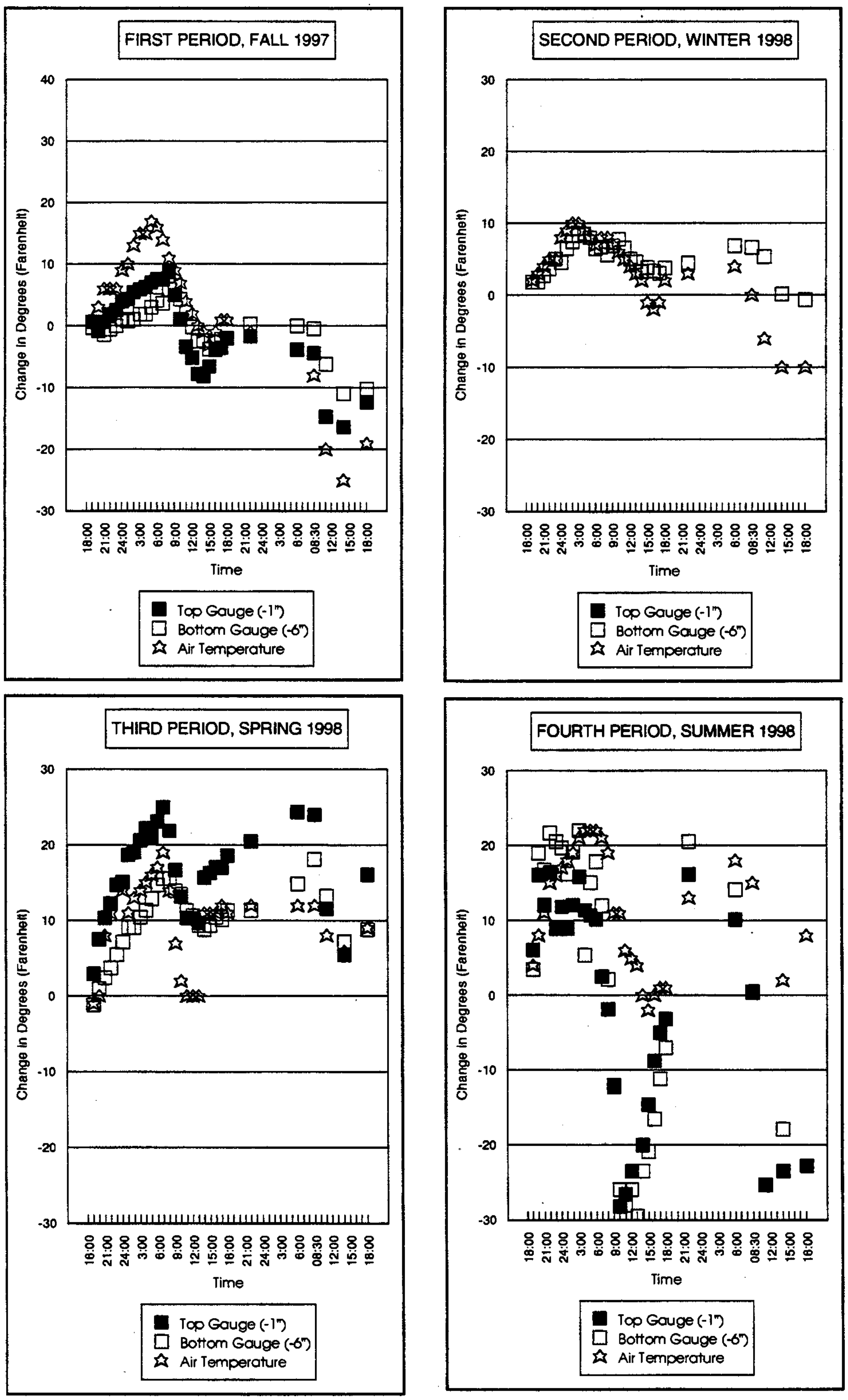


FIGURE 35. CHANGE IN TEMPERATURE, COMPARED TO INITIAL READING, STATION 142+00, NORTH SIDE

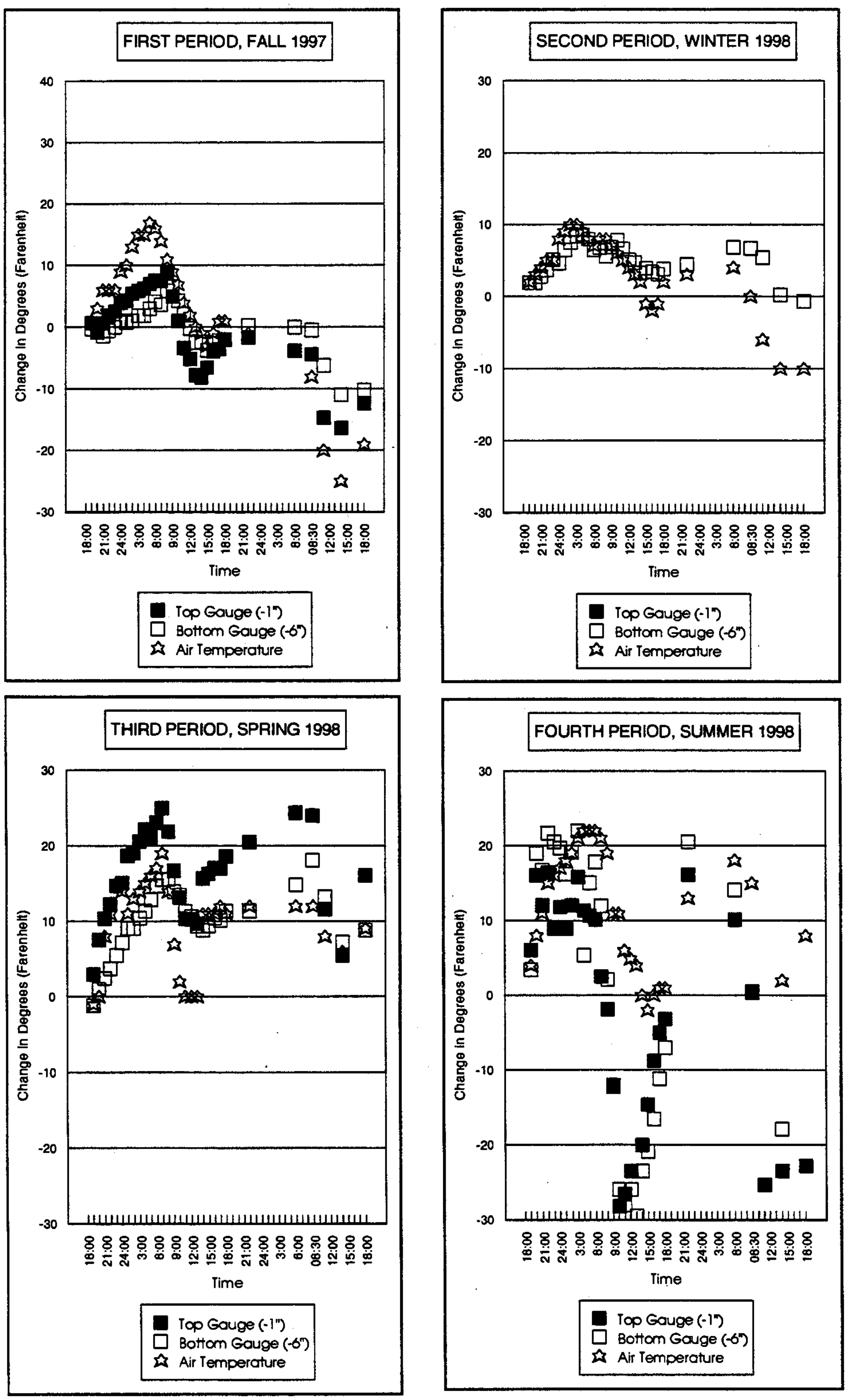


FIGURE 36. CHANGE IN TEMPERATURE, COMPARED TO INITIAL READING, STATION 153+00, NORTH SIDE

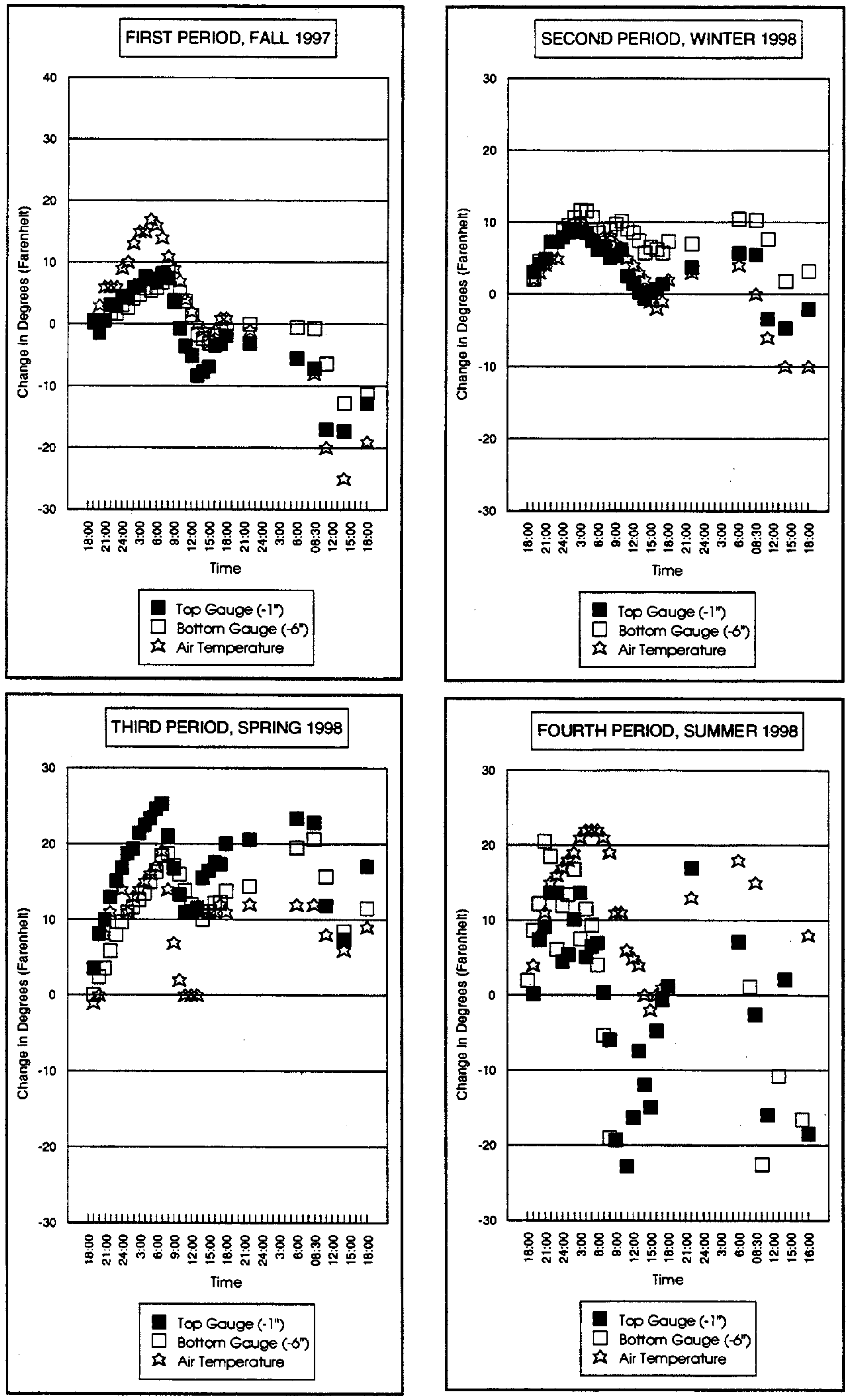


FIGURE 37. CHANGE IN TEMPERATURE, COMPARED TO INITIAL READING, STATION 153+00, SOUTH SIDE

6.3 DAILY TEMPERATURE FLUCTUATION.

The daily fluctuation of the pavement temperature at one depth (4.3 inches) was tabulated in table 13 and shown in figures 38 and 39.

At all four locations, the same temperature trends are observed. As the air temperature changes, the pavement temperature changes.

The temperature readings vary by as much as 6 degrees at the same hour. Typically, the thermocouple at station 141+00 is the lowest reading. These thermocouple were the first thermocouple to be read. Often, the thermocouples at station 153+00 have the highest readings. These thermocouples were the last ones to be read. It appears that during the 15-minute interval between the first and last thermocouple reading, the pavement temperature often changed. It was decided that as long as the gauges are read in the same sequence each time, the interval between readings would be the same at each thermocouple location. However, observations on variability of the pavement temperature along the length of the pavement could not be made.

7. HORIZONTAL LENGTH CHANGES.

7.1 CONDITION OF HORIZONTAL MOVEMENT GAUGES.

Two horizontal movement gauges have been damaged, and are difficult to read. These gauges are located at stations 141+00 and 152+00.

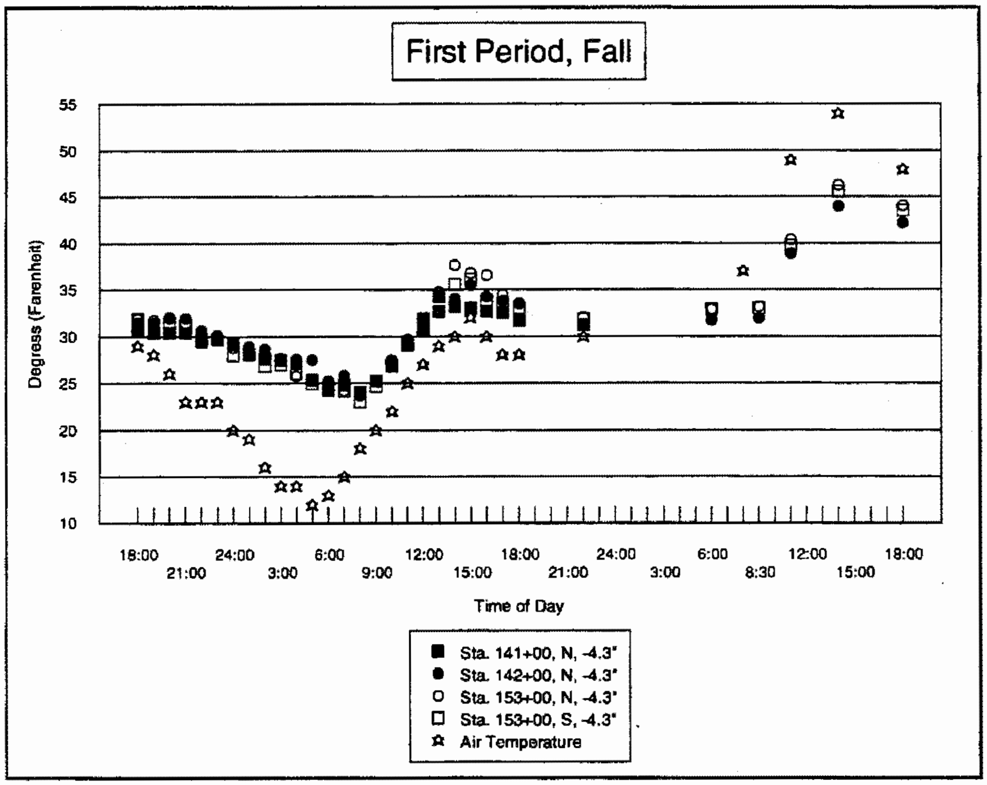
During construction, the reference rod and cap were placed in the middle of the handhole. When the initial stressing was applied, the edges of the prestressed pavement compressed 2 to 3 inches at both ends. This movement caused the handholes to move. As a result, the reference rods, which are stationary, became offset in the handhole. During the winter months when the pavement shrinks due to the temperature, the gauges reach their limits and the cap on the reference rods are firmly against the walls of the handhole. When this occurs, readings are no longer accurate. The gauges which “maxed out” during the winter reading are noted on the survey sheets.

In addition, the caps are loose during the remainder of the reading periods. The caps are periodically tightened, but the caps remain loose and move slightly when touched.

TABLE 13. DAILY TEMPERATURE FLUCTUATION

STATION >	FIRST PERIOD (FALL) READINGS					SECOND PERIOD (WINTER) READINGS				
STATION >		141+00	142+00	153+00	153+00		141+00	142+00	153+00	153+00
LOCATION >	Air	N	N	N	S	Air	N	N	N	S
TIME / DEPTH >	Temp	4.3"	4.3"	4.3"	4.3"	Temp	4.3"	4.3"	4.3"	4.3"
06:00 PM	29	30.7	31.5	31.9	31.9	32	-	39.6	43.2	41.5
07:00 PM	28	30.4	31.5	31.8	31.8	30	-	36.8	39.4	39.0
08:00 PM	26	30.4	32.0	32.1	32.1	29	-	37.1	38.2	38.1
09:00 PM	23	30.4	32.0	31.4	31.4	28	-	36.2	37.0	36.9
10:00 PM	23	29.7	30.7	30.3	30.3	27	-	35.1	36.2	36.1
11:00 PM	23	29.7	30.2	30.2	30.2	27	-	33.9	35.5	35.0
12:00 AM	20	29.2	29.1	28.8	28.8	24	-	33.9	34.3	33.8
01:00 AM	19	28.1	29.0	28.9	28.9	23	-	32.5	33.2	33.2
02:00 AM	16	27.7	28.7	27.7	27.7	22	-	32.0	32.3	32.3
03:00 AM	14	27.5	27.7	27.7	27.7	22	-	31.1	32.0	31.5
04:00 AM	14	27.2	27.6	25.8	25.8	23	-	30.8	32.4	31.7
05:00 AM	12	25.4	27.5	25.3	25.3	24	-	31.4	33.1	32.7
06:00 AM	13	24.3	25.3	24.7	24.7	25	-	32.8	34.0	34.4
07:00 AM	15	24.9	25.9	24.3	24.3	24	-	33.0	34.1	34.4
08:00 AM	18	24.1	23.9	23.7	23.7	24	-	33.2	34.5	33.9
09:00 AM	20	25.3	25.2	25.2	25.2	25	-	33.0	33.9	33.7
10:00 AM	22	26.9	27.5	27.3	27.3	26	-	32.5	33.3	33.8
11:00 AM	25	29.1	29.6	29.7	29.7	27	-	33.4	34.9	35.1
12:00 PM	27	30.8	31.9	31.9	31.9	28	-	35.0	35.7	35.6
01:00 PM	29	32.7	34.3	34.8	34.8	29	-	35.9	36.9	37.1
02:00 PM	30	33.2	34.1	37.7	37.7	30	-	36.5	38.1	38.6
03:00 PM	32	33.1	35.5	36.8	36.8	33	-	36.8	38.8	38.6
04:00 PM	30	32.7	34.3	36.6	36.6	34	-	36.8	38.7	37.9
05:00 PM	28	32.6	33.9	34.5	34.5	33	-	37.1	38.7	37.8
06:00 PM	28	31.7	33.6	33.5	33.5	30	-	35.6	37.0	–
10:00 PM	30	31.3	31.3	32.1	32.1	29	-	34.9	36.3	36.3
06:00 AM	--	--	31.8	32.9	32.9	28	-	32.7	33.9	32.9
08:00 AM	37	--	32.0	33.2	33.2	32	-	33.0	33.4	33.0
11:00 AM	49	--	38.9	40.4	40.4	38	-	34.8	36.7	36.6
02:00 PM	54	--	44.0	46.3	46.3	42	-	40.2	42.7	42.1
06:00 PM	48	--	42.2	44.1	44.1	42	-	40.2	41.5	40.9

STATION >	THIRD PERIOD (SPRING) READINGS					FOURTH PERIOD (SUMMER) READINGS				
STATION >		141+00	142+00	153+00	153+00		141+00	142+00	153+00	153+00
LOCATION >	Air	N	N	N	S	Air	N	N	N	S
TIME / DEPTH >	Temp	4.3"	4.3"	4.3"	4.3"	Temp	4.3"	4.3"	4.3"	4.3"
06:00 PM	60	67.8	68.8	73.3	71.3	78	76.6	73.9	73.8	75.1
07:00 PM	61	67.4	68.6	71.1	70.7	74	72.8	67.5	71.1	73.1
08:00 PM	60	65.0	66.3	70.3	67.9	70	56.0	55.2	60.9	63.5
09:00 PM	52	63.3	65.4	67.7	65.6	67	60.7	58.6	61.3	62.1
10:00 PM	49	61.4	62.7	65.5	63.7	63	56.0	54.0	53.7	57.1
11:00 PM	45	60.1	60.7	62.4	61.7	62	61.7	56.5	58.3	60.6
12:00 AM	46	57.6	58.8	61.6	60.0	61	64.1	56.0	64.7	67.7
01:00 AM	49	56.2	57.6	59.7	58.6	60	65.4	61.4	61.1	68.1
02:00 AM	47	55.6	56.5	59.1	57.6	59	60.5	56.5	56.2	63.2
03:00 AM	46	54.4	55.1	57.4	56.7	57	53.1	54.6	54.3	58.6
04:00 AM	45	52.7	53.6	55.9	55.0	56	64.4	58.5	64.5	67.8
05:00 AM	44	51.5	52.4	54.9	53.2	56	63.7	58.9	62.3	65.6
06:00 AM	43	50.7	50.9	53.0	52.4	56	61.6	58.2	64.4	67.2
07:00 AM	41	50.1	50.3	51.7	50.7	57	65.9	65.9	68.5	71.6
08:00 AM	46	50.0	50.0	51.8	50.8	59	76.4	73.4	80.7	83.9
09:00 AM	53	52.8	52.6	54.8	53.3	67	93.3	90.1	98.9	94.5
10:00 AM	58	54.2	53.8	56.6	55.0	67	99.3	103.4	105.3	111.2
11:00 AM	60	56.8	56.3	59.5	57.5	72	99.2	98.7	103.1	109.8
12:00 PM	60	57.4	56.9	60.2	58.8	73	98.2	99.1	100.2	100.9
01:00 PM	60	58.6	58.5	61.2	59.5	74	97.7	101.3	95.5	95.0
02:00 PM	49	57.2	57.9	60.9	59.7	78	97.5	100.6	96.7	98.2
03:00 PM	49	56.5	57.2	59.8	59.1	80	93.8	95.6	98.0	100.5
04:00 PM	49	55.9	56.3	57.5	57.4	78	92.6	87.6	85.1	88.5
05:00 PM	48	54.8	56.2	58.4	57.6	77	87.1	85.7	77.6	81.8
06:00 PM	49	55.4	55.5	56.6	55.6	77	82.2	79.3	72.3	76.2
10:00 PM	48	54.0	54.1	56.3	55.3	65	58.7	55.0	58.5	57.6
06:00 AM	48	50.6	50.1	51.3	49.9	60	61.2	61.5	65.3	68.1
08:00 AM	48	47.3	48.5	50.1	49.1	63	81.6	73.5	76.6	75.1
11:00 AM	52	55.0	55.1	57.8	55.9	--	105.3	99.8	99.5	99.6
02:00 PM	54	61.3	61.6	63.9	62.5	76	105.6	105.0	82.6	84.4
06:00 PM	51	57.9	57.8	59.4	58.7	70	92.3	93.6	95.9	94.4



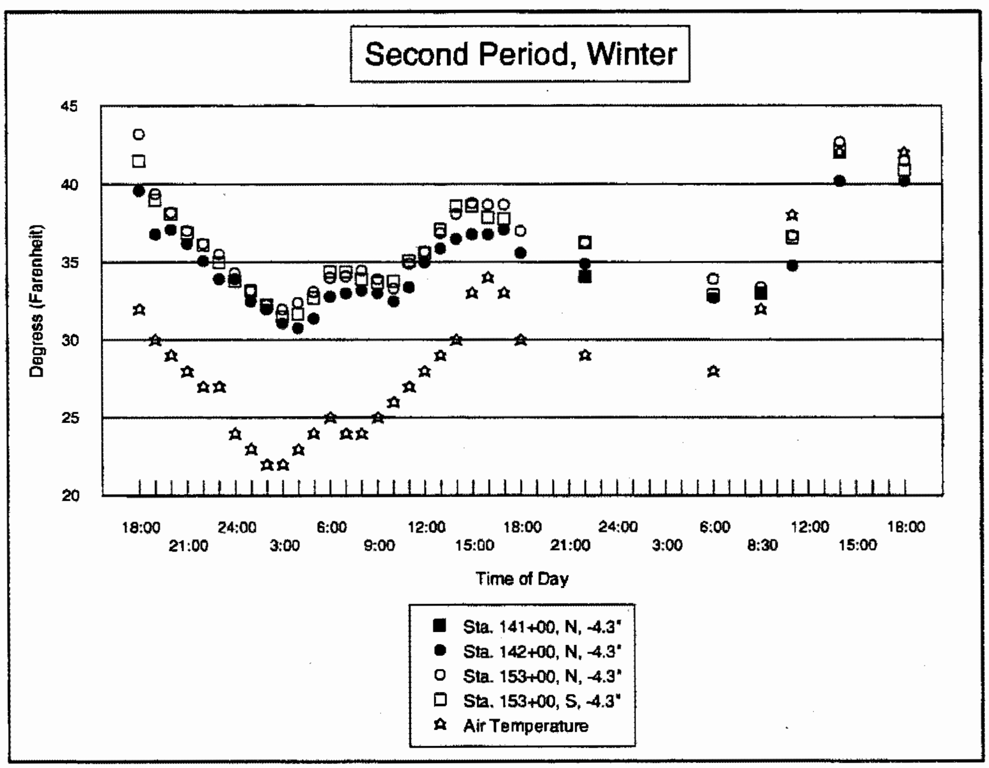
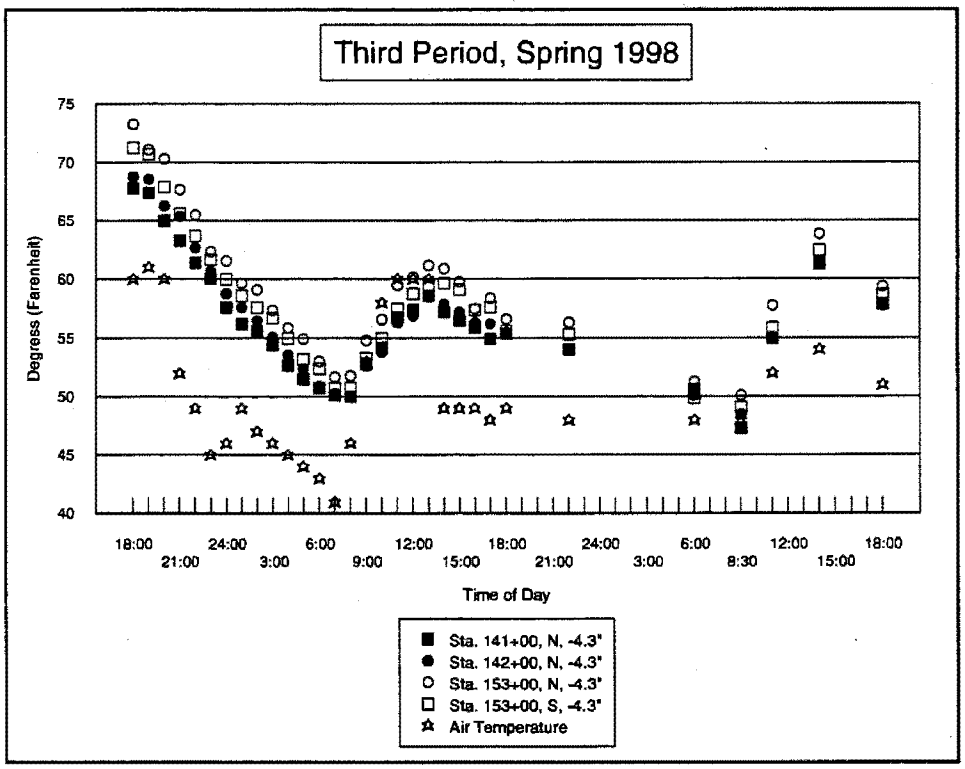


FIGURE 38. DAILY TEMPERATURE FLUCTUATION, FALL AND WINTER



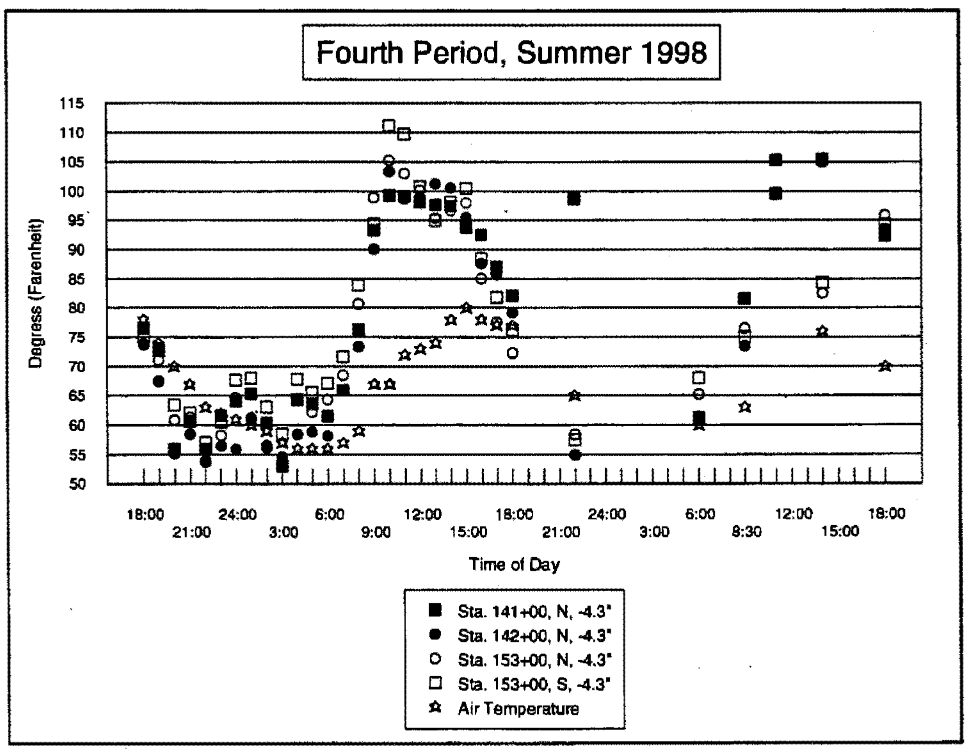


FIGURE 39. DAILY TEMPERATURE FLUCTUATION, SPRING AND SUMMER

7.2 CENTER OF THE PAVEMENT.

The horizontal movement gauge located at station 147+00 is located in the center of the prestressed fibrous pavement. These gauges move 4/32 (0.125) to 8/32 (0.25) inch daily. Between Fall and Spring, the center of the prestressed fibrous pavement moved 0.169 inch to the east. During the five years of monitoring, the center of the prestressed fibrous pavement has moved approximately 0.5 inch to the west. During the fifth year of monitoring, the average location of the center of the prestressed fibrous pavement, as measured by the horizontal movement gauges at station 147+00 were:

- Fall 4.341 inches
- Winter 4.494 inches
- Spring 4.510 inches
- Summer 4.306 inches

During the week before the third summer observation period, the finger joint, located at the east end of the fibrous concrete pavement, completely closed. Once closed, any additional pavement movement would be to the west, towards the free edge. Thus, movement of the center of the pavement to the west is anticipated and was found to occur.

7.3 SEASONAL CHANGE IN LENGTH.

The prestressed fibrous pavement is typically its shortest length around 6 in the morning. Occasionally, a drop in temperature on a cloudy day will shorten the length of the pavement.

The seasonal influence on the pavement length is shown in figure 40. The 6 a.m. readings from the horizontal movement gauges located 1,000 feet apart at stations 142+00 and 152+00 were averaged. Using the shortest reading as a base of 0.00, the seasonal movement of the gauges is shown for all five years of monitoring. During the first three monitoring years, the shortest pavement length occurred during the winter. During the fourth and fifth monitoring years, the shortest pavement length occurred during the fall.

During 4 out of the 5 observation years, the west end of the pavement moved more than the east end of the pavement. This is likely due to the west edge being a free edge. Seasonally, the prestressed fibrous pavement changes in length between 2.469 and 4.235 inches per 1,000 feet.

7.4 DAILY CHANGE IN LENGTH.

The daily influence on the pavement length is shown in table 14. Movement is not uniform on the pavement. The north half of pavement moves at a different rate than the south half of the pavement. During the fifth monitoring year, pavement movement over the 24-hour monitoring period at station 142+00 was 0.125 inch in February 1998 and 0.718 during August 1998. At station 152+00, movement during the same time period was 0.188 inch in February 1998 and 0.656 during August 1998.

The pavement movement is not uniform. The east end of the project, which abuts the expansion joint/gap slab, moves less during a 24-hour period than the free west end.

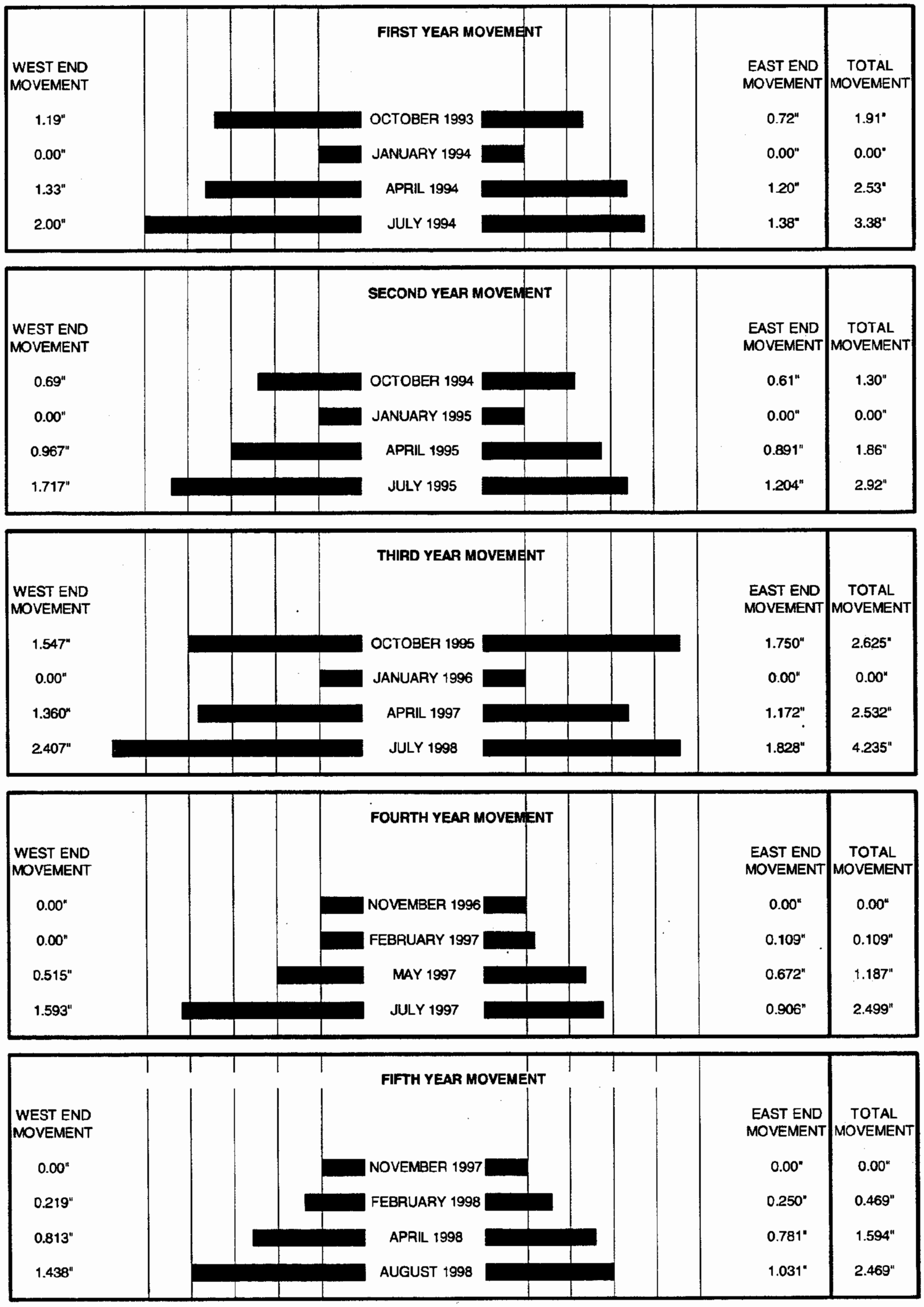


FIGURE 40. SEASONAL LENGTH OF PAVEMENT
(Based on quarterly readings at 6 a.m., Wednesday, station 142+00 to station 152+00)

TABLE 14. MAXIMUM MOVEMENT DURING SURVEY PERIOD

Survey Period		Change in Air Temperature (deg F)	Maximum Movement (Average of Both Gauges)						
			Station 141+00	Station 142+00	Station 144+00	Station 147+00	Station 150+00	Station 152+00	Station 153+00
Fall	October 93	26	0.359	0.313	0.156	0.109	0.125	0.250	0.375
Winter	January 94	42	0.470	0.375	0.135	0.125	0.220	0.435	0.595
Spring	April 94	30	0.609	0.516	0.328	0.141	0.328	0.531	0.688
Summer	July 94	14	0.438	0.375	0.188	0.109	0.188	0.406	0.500
Fall	October 94	14	0.297	0.234	0.188	0.125	0.109	0.188	0.313
Winter	January 95	17	0.359	0.219	0.141	0.109	0.094	0.125	0.203
Spring	April 95	24	0.500	0.625	0.219	0.063	0.234	0.438	0.594
Summer	July 95	14	0.500	0.453	0.281	0.188	0.188	0.469	0.438
Fall	October 95	32	0.563	0.375	0.250	0.094	0.219	0.375	0.594
Winter	January 96	19	0.656	0.594	0.375	0.125	0.250	0.344	0.313
Spring	May 96	25	0.688	0.563	0.281	0.094	0.375	0.594	0.781
Summer	July 96	25	0.875	0.688	0.469	0.188	0.250	0.625	0.719
Fall	November 96	9	0.281	0.156	0.125	0.156	0.156	0.188	0.156
Winter	February 97	6	--	0.125	0.125	0.156	0.094	0.219	0.156
Spring	May 97	26	0.688	0.531	0.344	0.313	0.344	0.563	0.688
Summer	July 97	27	0.625	0.531	0.313	0.094	0.282	0.532	0.688
Fall	November 97	32	0.563	0.391	0.250	0.188	0.188	0.469	0.406
Winter	February 98	20	0.250	0.125	0.094	0.125	0.094	0.188	0.313
Spring	April 98	20	0.594	0.656	0.156	0.156	0.250	0.625	0.718
Summer	August 98	24	1.344	0.718	0.282	0.250	0.375	0.656	0.750

The amount of movement during the 48-hour observation period does not appear to be solely related to the change in air temperature. The difference in air temperature and pavement movement is shown in table 14. At station 144+00, the pavement moved 0.094 inch when the air temperature changed 20°F during February, 0.313 inch when the air temperature changed 20°F in April, and 0.282 inch when the air temperature changed 24°F during August. Besides a change in air temperature, the amount of pavement movement appears to be related to the amount of sunlight during the reading period.

7.5 TOTAL LENGTH MOVEMENT.

The total movement in the fibrous prestressed pavement can be determined by taking the maximum and minimum readings at stations 142 and 152. As previously discussed, the minimum readings at station 141+00 are not accurate. The minimum reading at station 152 right is not shown since it is also not accurate during the winter months.

Gauge	Maximum Reading	Minimum Reading	Movement
Sta. 142 LT	5.4063	7.3750	1.9687
Sta. 142 RT	6.3750	8.3750	2.0000
Sta. 152 LT	2.5938	1.1250	1.4688

The maximum movement for 1000 feet of prestressed fibrous pavement is 3.4532 inches. This would project to 4.1438 inches of movement for 1200 feet of pavement. This is less than measured (5.0 inches) at the pavement ends, as discussed in section 5.

7.6 UNIFORMITY OF MOVEMENT.

The maximum daily movement during the 48-hour observation period was plotted by station and is shown in figure 41.

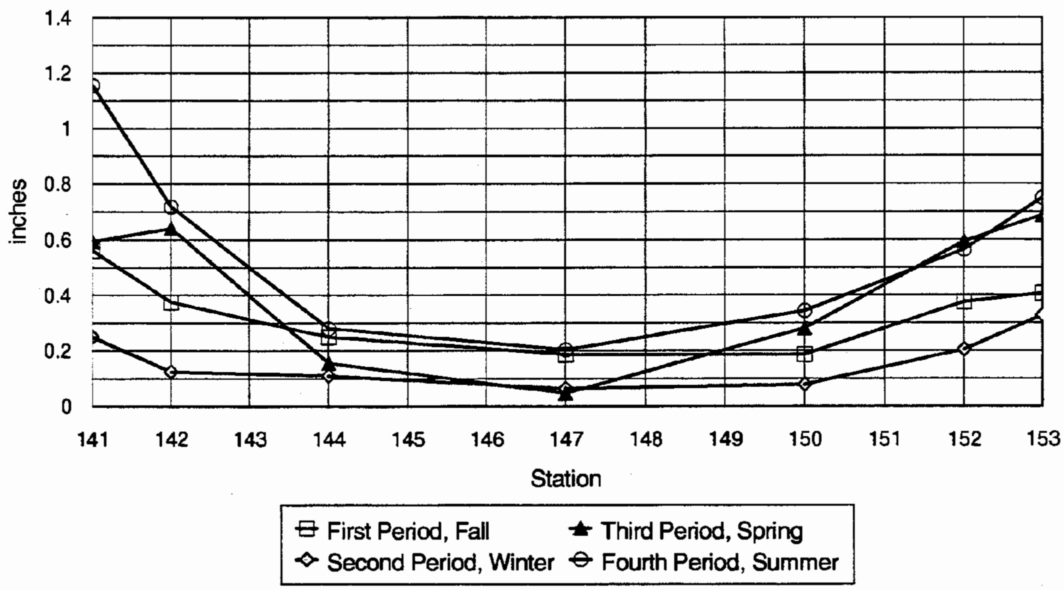


FIGURE 41. MOVEMENT OVER 48 HOURS
(Fall 1997 to Summer 1998)

The west portion of the prestressed fibrous pavement (stations 141+00 to 147+00) shows fairly uniform movement, except for the spring reading at station 141+00. The movement may have been read in error. The gauges in the last 100 feet of the pavement appear to move proportionally more than the rest of the pavement.

The east portion of the prestressed fibrous pavement (stations 147+00 to 153+00) show similar trends; the daily movements are fairly uniform with the last 100 feet moving proportionally more than the rest of the pavement.

Unlike the movement during the third monitoring year, the movement during the summer of the fifth monitoring year is uniform.

The proportionally greater movement in the last 100 feet may account for the difference between the measured pavement movement and projected pavement movement, discussed above.

7.7 LOCATION OF NO MOVEMENT.

In section 7.2 it was noted that the center of the pavement moves seasonally. Figures 42 and 43 show the movement during the first 24-hour reading period, based on the initial reading. Positive values are movement to the east. Although it is difficult to be precise, it appears as if the center of the movement is located east of the center of the pavement, between station 148+00 and 149+00.

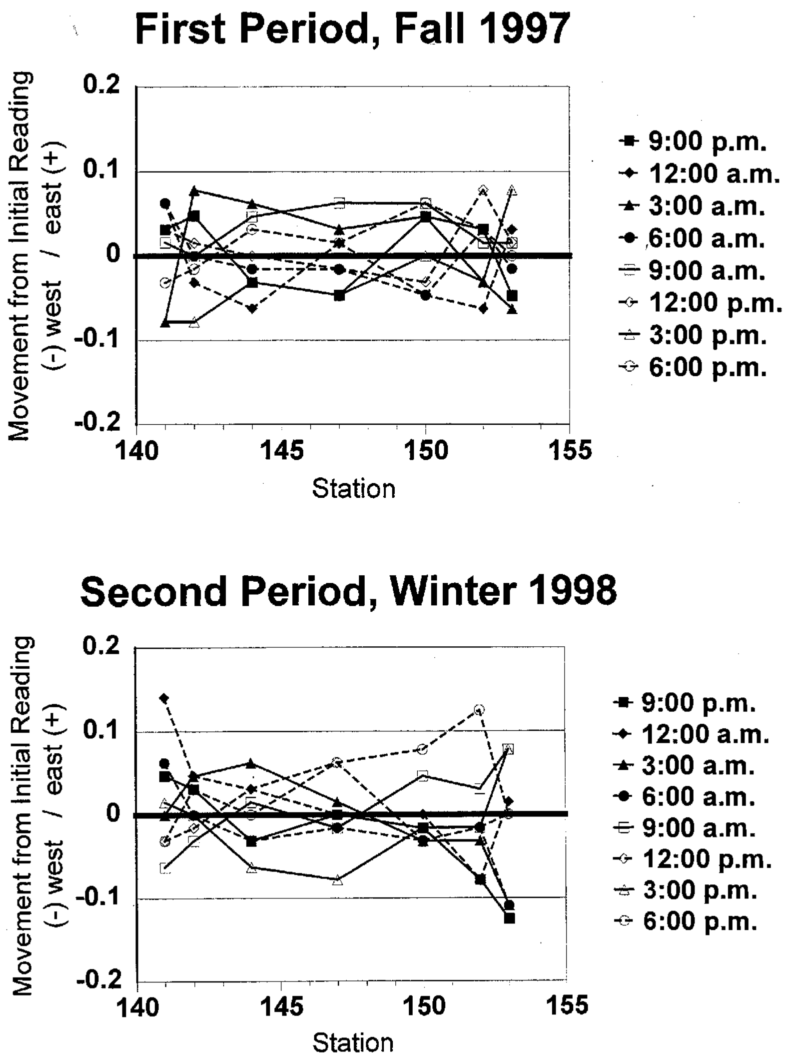


FIGURE 42. MOVEMENT FROM INITIAL READING, FALL AND WINTER

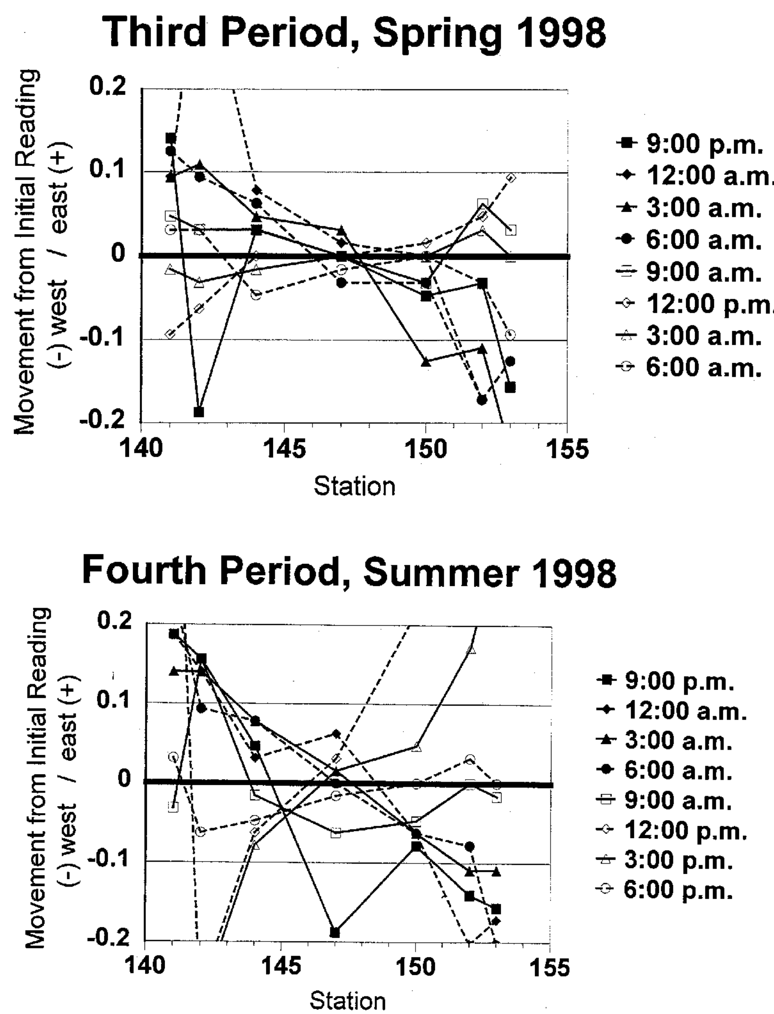


FIGURE 43. MOVEMENT FROM INITIAL READING, SPRING AND SUMMER

7.8 PAVEMENT MOVEMENT.

When the prestressed fibrous pavement moves, it moves fairly uniformly. However, this movement is not exactly the same at similar points on the pavement. As shown in tables 15, 18, 21, and 24, movement at the edges of the pavement will often occur at different time periods and amount. A good example of this is found in the summer readings. The pavement at station 141+00 begins to grow at 10:00 am, and grows 0.438 inch in 1 hour. The pavement at station 153+00 grows only 0.063 inch during the same time period. The following hour, the west end grows 0.063 inch while the east end grows 0.234 inch. It appears that the free edge will move quicker that at the fixed edge.

Additional information on changes in horizontal length, and a comparison of length to initial readings are shown in tables 15 through 26 and figures 44 through 51.

TABLE 15. DAILY MOVEMENT CYCLE, HORIZONTAL LENGTH, FALL 1997

TABULATIONS OF READINGS

DATE	STATION LOCATION TIME/DEPTH	141+00 N (IN)	141+00 S (IN)	142+00 N (IN)	142+00 S (IN)	144+00 N (IN)	144+00 S (IN)	147+00 N (IN)	147+00 S (IN)	150+00 N (IN)	150+00 S (IN)	152+00 N (IN)	152+00 S (IN)	153+00 N (IN)	153+00 S (IN)
Nov. 23	06:00 PM	8.500	7.813	7.250	8.281	6.781	6.781	4.375	4.594	2.063	2.094	1.156	0.781	1.594	1.313
Nov. 23	07:00 PM	8.469	7.875	7.250	8.250	6.750	6.750	4.375	4.500	2.094	2.125	1.250	0.813	1.563	1.250
Nov. 23	08:00 PM	8.500	7.875	7.250	8.281	6.813	6.813	4.469	4.563	2.094	2.125	1.250	0.875	1.563	1.250
Nov. 23	09:00 PM	8.500	7.875	7.313	8.313	6.750	6.750	4.438	4.438	2.125	2.125	1.250	0.750	1.563	1.250
Nov. 23	10:00 PM	8.563	7.906	7.281	8.313	6.719	6.813	4.438	4.531	2.094	2.063	1.156	0.781	1.594	1.281
Nov. 23	11:00 PM	8.438	7.813	7.344	8.375	6.750	6.750	4.469	4.531	2.094	2.188	1.188	0.813	1.594	1.250
Nov. 24	12:00 AM	8.594	7.906	7.250	8.313	6.688	6.688	4.406	4.500	2.063	2.094	1.125	0.750	1.625	1.250
Nov. 24	01:00 AM	8.500	7.844	7.313	8.281	6.688	6.750	4.375	4.500	2.125	2.094	1.188	0.750	1.625	1.281
Nov. 24	02:00 AM	8.563	7.938	7.313	8.344	6.719	6.781	4.438	4.469	2.031	2.094	1.125	0.750	1.500	1.219
Nov. 24	03:00 AM	8.500	7.844	7.375	8.344	6.750	6.750	4.406	4.563	2.125	2.125	1.125	0.688	1.500	1.250
Nov. 24	04:00 AM	8.563	7.875	7.313	8.313	6.750	6.813	4.500	4.625	2.063	2.094	1.188	0.719	1.500	1.188
Nov. 24	05:00 AM	8.563	7.906	7.250	8.344	6.813	6.844	4.438	4.563	2.094	2.156	1.219	0.750	1.500	1.250
Nov. 24	06:00 AM	8.563	7.906	7.344	8.375	6.719	6.750	4.406	4.531	2.063	2.094	1.125	0.750	1.500	1.219
Nov. 24	07:00 AM	8.594	7.969	7.375	8.375	6.750	6.813	4.438	4.531	2.094	2.188	1.156	0.750	1.500	1.250
Nov. 24	08:00 AM	8.563	7.938	7.344	8.313	6.781	6.844	4.438	4.500	2.063	2.125	1.156	0.750	1.500	1.188
Nov. 24	09:00 AM	8.563	7.938	7.344	8.375	6.781	6.781	4.531	4.531	2.125	2.156	1.156	0.750	1.500	1.250
Nov. 24	10:00 AM	8.563	7.969	7.250	8.375	6.719	6.844	4.438	4.563	2.063	2.188	1.250	0.781	1.531	1.219
Nov. 24	11:00 AM	8.625	7.938	7.375	8.375	6.781	6.781	4.500	4.531	2.094	2.156	1.250	0.750	1.531	1.188
Nov. 24	12:00 PM	8.625	7.938	7.375	8.375	6.781	6.781	4.500	4.531	2.063	2.156	1.281	0.781	1.563	1.219
Nov. 24	01:00 PM	8.531	7.875	7.313	8.281	6.750	6.781	4.438	4.563	2.063	2.156	1.281	0.781	1.563	1.219
Nov. 24	02:00 PM	8.500	7.844	7.250	8.313	6.719	6.688	4.438	4.563	2.094	2.188	1.188	0.813	1.625	1.344
Nov. 24	03:00 PM	8.594	7.813	7.313	8.281	6.781	6.719	4.438	4.500	2.063	2.156	1.188	0.813	1.625	1.313
Nov. 24	04:00 PM	8.656	7.750	7.375	8.313	6.750	6.813	4.563	4.563	2.094	2.063	1.156	0.750	1.656	1.438
Nov. 24	05:00 PM	8.438	7.750	7.313	8.313	6.719	6.813	4.438	4.500	2.031	2.094	1.219	0.844	1.563	1.438
Nov. 24	06:00 PM	8.438	7.906	7.313	8.250	6.750	6.813	4.438	4.531	2.125	2.219	1.250	0.813	1.563	1.375
Nov. 24	10:00 PM	8.563	8.000	7.281	8.313	6.719	6.813	4.438	4.531	2.063	2.125	1.219	0.781	1.563	1.313
Nov. 25	06:00 AM	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Nov. 25	08:00 AM	8.469	7.750	7.250	8.281	6.750	6.656	4.406	4.531	2.094	2.125	1.219	0.781	1.625	1.313
Nov. 25	11:00 AM	8.375	7.656	7.125	8.156	6.625	6.688	4.438	4.500	2.125	2.250	1.313	0.938	1.656	1.438
Nov. 25	02:00 PM	8.094	7.438	6.969	8.000	6.594	6.719	4.438	4.500	2.188	2.250	1.500	1.063	1.938	1.625
Nov. 25	06:00 PM	8.188	7.469	6.969	8.000	6.563	6.594	4.438	4.500	2.219	2.250	1.469	1.094	1.813	1.594

TABLE 16. CHANGE IN HORIZONTAL LENGTH, FALL 1997

COMPARED TO INITIAL READINGS

DATE	STATION LOCATION / TIME/DEPTH	141+00 N (IN)	141+00 S (IN)	142+00 N (IN)	142+00 S (IN)	144+00 N (IN)	144+00 S (IN)	147+00 N (IN)	147+00 S (IN)	150+00 N (IN)	150+00 S (IN)	152+00 N (IN)	152+00 S (IN)	153+00 N (IN)	153+00 S (IN)
Nov. 23	06:00 PM														
Nov. 23	07:00 PM	0.031	-0.062	0.000	0.031	0.031	0.031	0.000	0.094	-0.031	-0.031	-0.094	-0.032	0.031	0.063
Nov. 23	08:00 PM	0.000	-0.062	0.000	0.000	-0.032	-0.032	-0.094	0.031	-0.031	-0.031	-0.094	-0.094	0.031	0.063
Nov. 23	09:00 PM	0.000	-0.062	-0.063	-0.032	0.031	0.031	-0.063	0.156	-0.062	-0.031	-0.094	0.031	0.031	0.063
Nov. 23	10:00 PM	-0.063	-0.093	-0.031	-0.032	0.062	-0.032	-0.063	0.063	-0.031	0.031	0.000	0.000	0.000	0.032
Nov. 23	11:00 PM	0.062	0.000	-0.094	-0.094	0.031	0.031	-0.094	0.063	-0.031	-0.094	-0.032	-0.032	0.000	0.063
Nov. 24	12:00 AM	-0.094	-0.093	0.000	-0.032	0.093	0.093	-0.031	0.094	0.000	0.000	0.031	0.031	-0.031	0.063
Nov. 24	01:00 AM	0.000	-0.031	-0.063	0.000	0.093	0.031	0.000	0.094	-0.062	0.000	-0.032	0.031	-0.031	-0.032
Nov. 24	02:00 AM	-0.063	-0.125	-0.063	-0.063	0.062	0.000	-0.063	0.125	0.032	0.000	0.031	0.031	0.094	0.094
Nov. 24	03:00 AM	0.000	-0.031	-0.125	-0.063	0.031	0.031	-0.031	0.031	-0.062	-0.031	0.031	0.093	0.094	0.063
Nov. 24	04:00 AM	-0.063	-0.062	-0.063	-0.032	0.031	-0.032	-0.125	-0.031	0.000	0.000	-0.032	0.062	0.094	0.125
Nov. 24	05:00 AM	-0.063	-0.093	0.000	-0.063	-0.032	-0.063	-0.063	0.031	-0.031	-0.062	-0.063	0.031	0.094	0.063
Nov. 24	06:00 AM	-0.063	-0.093	-0.094	-0.094	0.062	0.031	-0.031	0.063	0.000	0.000	0.031	0.031	0.094	0.094
Nov. 24	07:00 AM	-0.094	-0.156	-0.125	-0.094	0.031	-0.032	-0.063	0.063	-0.031	-0.094	0.000	0.031	0.094	0.063
Nov. 24	08:00 AM	-0.063	-0.125	-0.094	-0.032	0.000	-0.063	-0.063	0.094	0.000	-0.031	0.000	0.031	0.094	0.125
Nov. 24	09:00 AM	-0.063	-0.125	-0.094	-0.094	0.000	0.000	-0.156	0.063	-0.062	-0.062	0.000	0.031	0.094	0.063
Nov. 24	10:00 AM	-0.063	-0.156	0.000	-0.094	0.062	-0.063	-0.063	0.031	0.000	-0.094	-0.094	0.000	0.063	0.094
Nov. 24	11:00 AM	-0.125	-0.125	-0.125	-0.094	0.000	0.000	-0.125	0.063	-0.031	-0.062	-0.094	0.031	0.063	0.125
Nov. 24	12:00 PM	-0.125	-0.125	-0.125	-0.094	0.000	0.000	-0.125	0.063	0.000	-0.062	-0.125	0.000	0.031	0.094
Nov. 24	01:00 PM	-0.031	-0.062	-0.063	0.000	0.031	0.000	-0.063	0.031	0.000	-0.062	-0.125	0.000	0.031	0.094
Nov. 24	02:00 PM	0.000	-0.031	0.000	-0.032	0.062	0.093	-0.063	0.031	-0.031	-0.094	-0.032	-0.032	-0.031	-0.031
Nov. 24	03:00 PM	-0.094	0.000	-0.063	0.000	0.000	0.062	-0.063	0.094	0.000	-0.062	-0.032	-0.032	-0.031	0.000
Nov. 24	04:00 PM	-0.156	0.063	-0.125	-0.032	0.031	-0.032	-0.188	0.031	-0.031	0.031	0.000	0.031	-0.062	-0.125
Nov. 24	05:00 PM	0.062	0.063	-0.063	-0.032	0.062	-0.032	-0.063	0.094	0.032	0.000	-0.063	-0.063	0.031	-0.125
Nov. 24	06:00 PM	0.062	-0.093	-0.063	0.031	0.031	-0.032	-0.063	0.063	-0.062	-0.125	-0.094	-0.032	0.031	-0.062
Nov. 24	10:00 PM	-0.063	-0.187	-0.031	-0.032	0.062	-0.032	-0.063	0.063	0.000	-0.031	-0.063	0.000	0.031	0.000
Nov. 25	06:00 AM	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov. 25	08:00 AM	0.031	0.063	0.000	0.000	0.031	0.125	-0.031	0.063	-0.031	-0.031	-0.063	0.000	-0.031	0.000
Nov. 25	11:00 AM	0.125	0.157	0.125	0.125	0.156	0.093	-0.063	0.094	-0.062	-0.156	-0.157	-0.157	-0.062	-0.125
Nov. 25	02:00 PM	0.406	0.375	0.281	0.281	0.187	0.062	-0.063	0.094	-0.125	-0.156	-0.344	-0.282	-0.344	-0.312
Nov. 25	06:00 PM	0.312	0.344	0.281	0.281	0.218	0.187	-0.063	0.094	-0.156	-0.156	-0.313	-0.313	-0.219	-0.281

TABLE 17. TOTAL MOVEMENT CALCULATION, HORIZONTAL LENGTH, FALL 1997

AT SIMILAIR LOCATIONS

DATE	STATION LOCATION / TIME/DEPTH	141+00 AVERAGE MOVEMENT	153+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 141 AND 153	142+00 AVERAGE MOVEMENT	152+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 142 AND 152	144+00 AVERAGE MOVEMENT	150+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 144 AND 150	147+00 AVERAGE MOVEMENT
Nov. 23	06:00 PM										
Nov. 23	07:00 PM	-0.015	0.047	-0.062	0.016	-0.063	0.079	0.031	-0.031	0.062	0.047
Nov. 23	08:00 PM	-0.031	0.047	-0.078	0.000	-0.094	0.094	-0.032	-0.031	-0.001	-0.031
Nov. 23	09:00 PM	-0.031	0.047	-0.078	-0.047	-0.032	-0.015	0.031	-0.047	0.078	0.047
Nov. 23	10:00 PM	-0.078	0.016	-0.094	-0.031	0.000	-0.031	0.015	0.000	0.015	0.000
Nov. 23	11:00 PM	0.031	0.031	0.000	-0.094	-0.032	-0.062	0.031	-0.063	0.094	-0.015
Nov. 24	12:00 AM	-0.093	0.016	-0.109	-0.016	0.031	-0.047	0.093	0.000	0.093	0.032
Nov. 24	01:00 AM	-0.016	0.001	-0.017	-0.031	-0.001	-0.030	0.062	-0.031	0.093	0.047
Nov. 24	02:00 AM	-0.094	0.094	-0.188	-0.063	0.031	-0.094	0.031	0.016	0.015	0.031
Nov. 24	03:00 AM	-0.016	0.079	-0.095	-0.094	0.062	-0.156	0.031	-0.047	0.078	0.000
Nov. 24	04:00 AM	-0.063	0.110	-0.173	-0.047	0.015	-0.062	-0.001	0.000	-0.001	-0.078
Nov. 24	05:00 AM	-0.078	0.079	-0.157	-0.031	-0.016	-0.015	-0.048	-0.047	-0.001	-0.016
Nov. 24	06:00 AM	-0.078	0.094	-0.172	-0.094	0.031	-0.125	0.046	0.000	0.046	0.016
Nov. 24	07:00 AM	-0.125	0.079	-0.204	-0.109	0.016	-0.125	-0.001	-0.063	0.062	0.000
Nov. 24	08:00 AM	-0.094	0.110	-0.204	-0.063	0.016	-0.079	-0.032	-0.016	-0.016	0.016
Nov. 24	09:00 AM	-0.094	0.079	-0.173	-0.094	0.016	-0.110	0.000	-0.062	0.062	-0.046
Nov. 24	10:00 AM	-0.110	0.079	-0.189	-0.047	-0.047	0.000	-0.001	-0.047	0.046	-0.016
Nov. 24	11:00 AM	-0.125	0.094	-0.219	-0.109	-0.032	-0.077	0.000	-0.047	0.047	-0.031
Nov. 24	12:00 PM	-0.125	0.063	-0.188	-0.109	-0.063	-0.046	0.000	-0.031	0.031	-0.031
Nov. 24	01:00 PM	-0.047	0.063	-0.110	-0.031	-0.063	0.032	0.015	-0.031	0.046	-0.016
Nov. 24	02:00 PM	-0.016	-0.031	0.015	-0.016	-0.032	0.016	0.077	-0.063	0.140	-0.016
Nov. 24	03:00 PM	-0.047	-0.015	-0.032	-0.031	-0.032	0.001	0.031	-0.031	0.062	0.016
Nov. 24	04:00 PM	-0.047	-0.093	0.046	-0.079	0.016	-0.095	-0.001	0.000	-0.001	-0.078
Nov. 24	05:00 PM	0.062	-0.047	0.109	-0.047	-0.063	0.016	0.015	0.016	-0.001	0.016
Nov. 24	06:00 PM	-0.016	-0.015	-0.001	-0.016	-0.063	0.047	-0.001	-0.093	0.092	0.000
Nov. 24	10:00 PM	-0.125	0.016	-0.141	-0.031	-0.032	0.001	0.015	-0.016	0.031	0.000
Nov. 25	06:00 AM	--	--	--	--	--	--	--	--	--	--
Nov. 25	08:00 AM	0.047	-0.015	0.062	0.000	-0.032	0.032	0.078	-0.031	0.109	0.016
Nov. 25	11:00 AM	0.141	-0.093	0.234	0.125	-0.157	0.282	0.124	-0.109	0.233	0.016
Nov. 25	02:00 PM	0.391	-0.328	0.719	0.281	-0.313	0.594	0.124	-0.141	0.265	0.016
Nov. 25	06:00 PM	0.328	-0.250	0.578	0.281	-0.313	0.594	0.202	-0.156	0.358	0.016

TABLE 18. DAILY MOVEMENT CYCLE, HORIZONTAL LENGTH, WINTER 1998

TABULATIONS OF READINGS

DATE	STATION LOCATION TIME/DEPTH	141+00 N (IN)	141+00 S (IN)	142+00 N (IN)	142+00 S (IN)	144+00 N (IN)	144+00 S (IN)	147+00 N (IN)	147+00 S (IN)	150+00 N (IN)	150+00 S (IN)	152+00 N (IN)	152+00 S (IN)	153+00 N (IN)	153+00 S (IN)
Feb. 8	06:00 PM	8.156	7.438	7.000	8.031	6.594	6.656	4.469	4.531	2.250	2.313	1.594	1.188	1.938	1.656
Feb. 8	07:00 PM	8.156	7.438	7.000	8.031	6.594	6.656	4.469	4.531	2.250	2.313	1.594	1.188	1.938	1.656
Feb. 8	08:00 PM	8.250	7.500	7.031	8.063	6.563	6.688	4.438	4.531	2.250	2.281	1.406	1.125	1.844	1.563
Feb. 8	09:00 PM	8.219	7.469	7.031	8.063	6.563	6.625	4.469	4.531	2.250	2.281	1.438	1.188	1.781	1.563
Feb. 8	10:00 PM	8.250	7.500	7.063	8.094	6.594	6.625	4.438	4.531	2.250	2.250	1.438	1.156	1.781	1.500
Feb. 8	11:00 PM	8.281	7.563	7.063	8.125	6.594	6.625	4.406	4.563	2.250	2.250	1.438	1.125	1.750	1.406
Feb. 9	12:00 AM	8.344	7.625	7.063	8.125	6.594	6.656	4.438	4.563	2.219	2.313	1.375	1.094	1.844	1.531
Feb. 9	01:00 AM	8.375	7.656	7.125	8.156	6.625	6.719	4.469	4.500	2.188	2.250	1.375	1.094	1.750	1.500
Feb. 9	02:00 AM	8.375	7.625	7.125	8.156	6.656	6.719	4.469	4.500	2.188	2.250	1.344	1.094	1.719	1.469
Feb. 9	03:00 AM	8.344	7.625	7.125	8.156	6.656	6.719	4.438	4.594	2.188	2.281	1.313	1.094	1.719	1.438
Feb. 9	04:00 AM	8.375	7.625	7.125	8.156	6.656	6.719	4.469	4.563	2.188	2.250	1.344	1.094	1.688	1.406
Feb. 9	05:00 AM	8.406	7.625	7.125	8.156	6.625	6.688	4.438	4.563	2.188	2.250	1.313	1.063	1.625	1.375
Feb. 9	06:00 AM	8.469	7.625	7.125	8.156	6.625	6.688	4.438	4.563	2.188	2.219	1.313	1.063	1.594	1.344
Feb. 9	07:00 AM	8.344	7.656	7.094	8.125	6.625	6.719	4.406	4.594	2.219	2.313	1.313	1.094	1.719	1.438
Feb. 9	08:00 AM	8.344	7.656	7.094	8.125	6.625	6.719	4.406	4.594	2.219	2.313	1.313	1.094	1.719	1.438
Feb. 9	09:00 AM	8.344	7.625	7.094	8.125	6.625	6.719	4.406	4.563	2.219	2.281	1.344	1.094	1.688	1.406
Feb. 9	10:00 AM	8.313	7.594	7.094	8.125	6.625	6.719	4.406	4.500	2.219	2.219	1.406	1.063	1.656	1.344
Feb. 9	11:00 AM	8.344	7.625	7.094	8.125	6.656	6.750	4.438	4.531	2.219	2.281	1.313	1.063	1.719	1.469
Feb. 9	12:00 PM	8.313	7.594	7.063	8.125	6.688	6.719	4.469	4.625	2.188	2.250	1.344	1.063	1.656	1.438
Feb. 9	01:00 PM	8.313	7.594	7.063	8.125	6.688	6.719	4.469	4.625	2.188	2.250	1.344	1.063	1.719	1.469
Feb. 9	02:00 PM	8.313	7.625	7.063	8.125	6.656	6.719	4.438	4.531	2.219	2.281	1.406	1.125	1.813	1.500
Feb. 9	03:00 PM	8.344	7.594	7.063	8.125	6.594	6.688	4.438	4.500	2.188	2.219	1.313	1.063	1.750	1.500
Feb. 9	04:00 PM	8.313	7.594	7.094	8.125	6.656	6.750	4.438	4.531	2.156	2.250	1.344	1.094	1.781	1.500
Feb. 9	05:00 PM	8.313	7.563	7.094	8.125	6.594	6.625	4.563	4.563	2.219	2.281	1.375	1.125	1.719	1.438
Feb. 9	06:00 PM	8.313	7.563	7.125	8.125	6.594	6.688	4.563	4.500	2.250	2.313	1.438	1.188	1.688	1.563
Feb. 9	10:00 PM	8.313	7.594	7.094	8.156	6.656	6.719	4.500	4.594	2.188	2.281	1.375	1.094	1.656	1.500
Feb. 10	06:00 AM	8.313	7.594	7.094	8.125	6.625	6.719	4.438	4.563	2.188	2.281	1.375	1.094	1.656	1.438
Feb. 10	08:00 AM	8.313	7.625	7.063	8.125	6.625	6.719	4.406	4.563	2.188	2.281	1.406	1.094	1.688	1.438
Feb. 10	11:00 AM	8.250	7.594	7.063	8.125	6.625	6.688	4.406	4.531	2.219	2.250	1.313	1.094	1.688	1.469
Feb. 10	02:00 PM	8.188	7.469	7.000	8.031	6.625	6.688	4.469	4.563	2.250	2.250	1.438	1.188	1.750	1.625
Feb. 10	06:00 PM	8.188	7.469	7.000	8.000	6.563	6.656	4.438	4.594	2.219	2.313	1.500	1.188	1.781	1.563

TABLE 19. CHANGE IN HORIZONTAL LENGTH, WINTER 1998

COMPARED TO INITIAL READINGS

DATE	STATION LOCATION TIME/DEPTH	141+00 N (IN)	141+00 S (IN)	142+00 N (IN)	142+00 S (IN)	144+00 N (IN)	144+00 S (IN)	147+00 N (IN)	147+00 S (IN)	150+00 N (IN)	150+00 S (IN)	152+00 N (IN)	152+00 S (IN)	153+00 N (IN)	153+00 S (IN)
Feb. 8	06:00 PM														
Feb. 8	07:00 PM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Feb. 8	08:00 PM	-0.094	-0.062	-0.031	-0.032	0.031	-0.032	0.031	0.000	0.000	0.032	0.188	0.063	0.094	0.093
Feb. 8	09:00 PM	-0.063	-0.031	-0.031	-0.032	0.031	0.031	0.000	0.000	0.000	0.032	0.156	0.000	0.157	0.093
Feb. 8	10:00 PM	-0.094	-0.062	-0.063	-0.063	0.000	0.031	0.031	0.000	0.000	0.063	0.156	0.032	0.157	0.156
Feb. 8	11:00 PM	-0.125	-0.125	-0.063	-0.094	0.000	0.031	0.063	-0.032	0.000	0.063	0.156	0.063	0.188	0.250
Feb. 9	12:00 AM	-0.188	-0.187	-0.063	-0.094	0.000	0.000	0.031	-0.032	0.031	0.000	0.219	0.094	0.094	0.125
Feb. 9	01:00 AM	-0.219	-0.218	-0.125	-0.125	-0.031	-0.063	0.000	0.031	0.062	0.063	0.219	0.094	0.188	0.156
Feb. 9	02:00 AM	-0.219	-0.187	-0.125	-0.125	-0.062	-0.063	0.000	0.031	0.062	0.063	0.250	0.094	0.219	0.187
Feb. 9	03:00 AM	-0.188	-0.187	-0.125	-0.125	-0.062	-0.063	0.031	-0.063	0.062	0.032	0.281	0.094	0.219	0.218
Feb. 9	04:00 AM	-0.219	-0.187	-0.125	-0.125	-0.062	-0.063	0.000	-0.032	0.062	0.063	0.250	0.094	0.250	0.250
Feb. 9	05:00 AM	-0.250	-0.187	-0.125	-0.125	-0.031	-0.032	0.031	-0.032	0.062	0.063	0.281	0.125	0.313	0.281
Feb. 9	06:00 AM	-0.313	-0.187	-0.125	-0.125	-0.031	-0.032	0.031	-0.032	0.062	0.094	0.281	0.125	0.344	0.312
Feb. 9	07:00 AM	-0.188	-0.218	-0.094	-0.094	-0.031	-0.063	0.063	-0.063	0.031	0.000	0.281	0.094	0.219	0.218
Feb. 9	08:00 AM	-0.188	-0.218	-0.094	-0.094	-0.031	-0.063	0.063	-0.063	0.031	0.000	0.281	0.094	0.219	0.218
Feb. 9	09:00 AM	-0.188	-0.187	-0.094	-0.094	-0.031	-0.063	0.063	-0.032	0.031	0.032	0.250	0.094	0.250	0.250
Feb. 9	10:00 AM	-0.157	-0.156	-0.094	-0.094	-0.031	-0.063	0.063	0.031	0.031	0.094	0.188	0.125	0.282	0.312
Feb. 9	11:00 AM	-0.188	-0.187	-0.094	-0.094	-0.062	-0.094	0.031	0.000	0.031	0.032	0.281	0.125	0.219	0.187
Feb. 9	12:00 PM	-0.157	-0.156	-0.063	-0.094	-0.094	-0.063	0.000	-0.094	0.062	0.063	0.250	0.125	0.282	0.218
Feb. 9	01:00 PM	-0.157	-0.156	-0.063	-0.094	-0.094	-0.063	0.000	-0.094	0.062	0.063	0.250	0.125	0.219	0.187
Feb. 9	02:00 PM	-0.157	-0.187	-0.063	-0.094	-0.062	-0.063	0.031	0.000	0.031	0.032	0.188	0.063	0.125	0.156
Feb. 9	03:00 PM	-0.188	-0.156	-0.063	-0.094	0.000	-0.032	0.031	0.031	0.062	0.094	0.281	0.125	0.188	0.156
Feb. 9	04:00 PM	-0.157	-0.156	-0.094	-0.094	-0.062	-0.094	0.031	0.000	0.094	0.063	0.250	0.094	0.157	0.156
Feb. 9	05:00 PM	-0.157	-0.125	-0.094	-0.094	0.000	0.031	-0.094	-0.032	0.031	0.032	0.219	0.063	0.219	0.218
Feb. 9	06:00 PM	-0.157	-0.125	-0.125	-0.094	0.000	-0.032	-0.094	0.031	0.000	0.000	0.156	0.000	0.250	0.093
Feb. 9	10:00 PM	-0.157	-0.156	-0.094	-0.125	-0.062	-0.063	-0.031	-0.063	0.062	0.032	0.219	0.094	0.282	0.156
Feb. 9	06:00 AM	-0.157	-0.156	-0.094	-0.094	-0.031	-0.063	0.031	-0.032	0.062	0.032	0.219	0.094	0.282	0.218
Feb. 10	08:00 AM	-0.157	-0.187	-0.063	-0.094	-0.031	-0.063	0.063	-0.032	0.062	0.032	0.188	0.094	0.250	0.218
Feb. 10	11:00 AM	-0.094	-0.156	-0.063	-0.094	-0.031	-0.032	0.063	0.000	0.031	0.063	0.281	0.094	0.250	0.187
Feb. 10	02:00 PM	-0.032	-0.031	0.000	0.000	-0.031	-0.032	0.000	-0.032	0.000	0.063	0.156	0.000	0.188	0.031
Feb. 10	06:00 PM	-0.032	-0.031	0.000	0.031	0.031	0.000	0.031	-0.063	0.031	0.000	0.094	0.000	0.157	0.093

TABLE 20. TOTAL MOVEMENT CALCULATION, HORIZONTAL LENGTH, WINTER 1998

AT SIMILAIR LOCATIONS

DATE	STATION LOCATION / TIME/DEPTH	141+00 AVERAGE OVEMENT	153+00 AVERAGE OVEMENT	TOTAL MOVEMENT BETWEEN 141 AND 153	142+00 AVERAGE OVEMENT	152+00 AVERAGE OVEMENT	TOTAL MOVEMENT BETWEEN 142 AND 152	144+00 AVERAGE OVEMENT	150+00 AVERAGE OVEMENT	TOTAL MOVEMENT BETWEEN 144 AND 150	147+00 AVERAGE OVEMENT
Feb. 8	06:00 PM										
Feb. 8	07:00 PM	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Feb. 8	08:00 PM	-0.078	0.093	-0.171	-0.031	0.126	-0.157	-0.000	0.016	-0.016	0.016
Feb. 8	09:00 PM	-0.047	0.125	-0.172	-0.031	0.078	-0.109	0.031	0.016	0.015	0.000
Feb. 8	10:00 PM	-0.078	0.157	-0.235	-0.063	0.094	-0.157	0.015	0.032	-0.017	0.016
Feb. 8	11:00 PM	-0.125	0.219	-0.344	-0.078	0.110	-0.188	0.015	0.032	-0.017	0.016
Feb. 9	12:00 AM	-0.187	0.109	-0.296	-0.078	0.157	-0.235	0.000	0.016	-0.016	-0.000
Feb. 9	01:00 AM	-0.218	0.172	-0.390	-0.125	0.157	-0.282	-0.047	0.063	-0.110	0.015
Feb. 9	02:00 AM	-0.203	0.203	-0.406	-0.125	0.172	-0.297	-0.063	0.063	-0.126	0.015
Feb. 9	03:00 AM	-0.187	0.219	-0.406	-0.125	0.188	-0.313	-0.063	0.047	-0.110	-0.016
Feb. 9	04:00 AM	-0.203	0.250	-0.453	-0.125	0.172	-0.297	-0.063	0.063	-0.126	-0.016
Feb. 9	05:00 AM	-0.219	0.297	-0.516	-0.125	0.203	-0.328	-0.031	0.063	-0.094	-0.000
Feb. 9	06:00 AM	-0.250	0.328	-0.578	-0.125	0.203	-0.328	-0.031	0.078	-0.109	-0.000
Feb. 9	07:00 AM	-0.203	0.219	-0.422	-0.094	0.188	-0.282	-0.047	0.016	-0.063	0.000
Feb. 9	08:00 AM	-0.203	0.219	-0.422	-0.094	0.188	-0.282	-0.047	0.016	-0.063	0.000
Feb. 9	09:00 AM	-0.187	0.250	-0.437	-0.094	0.172	-0.266	-0.047	0.032	-0.079	0.016
Feb. 9	10:00 AM	-0.157	0.297	-0.454	-0.094	0.157	-0.251	-0.047	0.063	-0.110	0.047
Feb. 9	11:00 AM	-0.187	0.203	-0.390	-0.094	0.203	-0.297	-0.078	0.032	-0.110	0.016
Feb. 9	12:00 PM	-0.157	0.250	-0.407	-0.078	0.188	-0.266	-0.079	0.063	-0.142	-0.047
Feb. 9	01:00 PM	-0.157	0.203	-0.360	-0.078	0.188	-0.266	-0.079	0.063	-0.142	-0.047
Feb. 9	02:00 PM	-0.172	0.141	-0.313	-0.078	0.126	-0.204	-0.063	0.032	-0.095	0.016
Feb. 9	03:00 PM	-0.172	0.172	-0.344	-0.078	0.203	-0.281	-0.016	0.078	-0.094	0.031
Feb. 9	04:00 PM	-0.157	0.157	-0.314	-0.094	0.172	-0.266	-0.078	0.079	-0.157	0.016
Feb. 9	05:00 PM	-0.141	0.219	-0.360	-0.094	0.141	-0.235	0.015	0.032	-0.017	-0.063
Feb. 9	06:00 PM	-0.141	0.172	-0.313	-0.109	0.078	-0.187	-0.016	0.000	-0.016	-0.031
Feb. 9	10:00 PM	-0.157	0.219	-0.376	-0.110	0.157	-0.267	-0.063	0.047	-0.110	-0.047
Feb. 10	06:00 AM	-0.157	0.250	-0.407	-0.094	0.157	-0.251	-0.047	0.047	-0.094	-0.000
Feb. 10	08:00 AM	-0.172	0.234	-0.406	-0.078	0.141	-0.219	-0.047	0.047	-0.094	0.016
Feb. 10	11:00 AM	-0.125	0.219	-0.344	-0.078	0.188	-0.266	-0.031	0.047	-0.078	0.032
Feb. 10	02:00 PM	-0.032	0.109	-0.141	0.000	0.078	-0.078	-0.031	0.032	-0.063	-0.016
Feb. 10	06:00 PM	-0.032	0.125	-0.157	0.016	0.047	-0.031	0.016	0.016	0.000	-0.016

TABLE 21. DAILY MOVEMENT CYCLE, HORIZONTAL LENGTH, SPRING 1998

TABULATIONS OF READINGS

DATE	STATION LOCATION / TIME/DEPTH	141+00 N (IN)	141+00 S (IN)	142+00 N (IN)	142+00 S (IN)	144+00 N (IN)	144+00 S (IN)	147+00 N (IN)	147+00 S (IN)	150+00 N (IN)	150+00 S (IN)	152+00 N (IN)	152+00 S (IN)	153+00 N (IN)	153+00 S (IN)
April 19	06:00 PM	7.156	6.469	6.156	7.156	6.094	6.094	4.438	4.531	2.781	2.813	2.344	2.063	3.063	2.750
April 19	07:00 PM	7.125	6.500	6.125	7.125	6.063	6.188	4.500	4.563	2.781	2.844	2.406	2.156	3.063	2.750
April 19	08:00 PM	7.219	6.531	6.156	7.000	6.603	6.156	4.469	4.719	2.750	2.813	2.313	2.125	3.063	2.688
April 19	09:00 PM	7.281	6.625	6.125	6.813	6.094	6.156	4.406	4.563	2.750	2.750	2.281	2.063	2.875	2.625
April 19	10:00 PM	7.344	6.563	6.250	7.000	6.063	6.156	4.469	4.594	2.781	2.781	2.188	2.031	2.813	2.500
April 19	11:00 PM	7.344	6.656	6.313	7.313	6.125	6.156	4.469	4.563	2.719	2.750	2.219	1.969	2.781	2.531
April 20	12:00 AM	7.406	6.688	6.344	7.344	6.156	6.250	4.438	4.563	2.688	2.813	2.094	1.906	2.875	2.375
April 20	01:00 AM	7.500	6.750	6.375	7.406	6.188	6.250	4.438	4.594	2.625	2.750	2.031	1.813	2.625	2.344
April 20	02:00 AM	7.531	6.750	6.406	7.406	6.219	6.250	4.438	4.531	2.625	2.688	2.000	1.813	2.563	2.313
April 20	03:00 AM	7.531	6.750	6.406	7.500	6.219	6.281	4.469	4.594	2.594	2.656	2.000	1.781	2.563	2.219
April 20	04:00 AM	7.625	6.844	6.438	7.500	6.219	6.281	4.469	4.594	2.594	2.688	1.906	1.781	2.531	2.219
April 20	05:00 AM	7.625	6.875	6.531	7.563	6.250	6.375	4.438	4.563	2.563	2.656	1.688	1.688	2.375	2.125
April 20	06:00 AM	7.656	6.875	6.531	7.563	6.250	6.375	4.438	4.563	2.563	2.625	1.781	1.656	2.406	2.125
April 20	07:00 AM	7.656	6.875	6.563	7.563	6.281	6.375	4.406	4.531	2.563	2.625	1.844	1.656	2.438	2.125
April 20	08:00 AM	7.656	6.875	6.531	7.594	6.281	6.438	4.438	4.563	2.531	2.625	1.875	1.688	2.375	2.125
April 20	09:00 AM	7.688	6.938	6.563	7.594	6.313	6.375	4.438	4.563	2.531	2.594	1.906	1.656	2.438	2.156
April 20	10:00 AM	7.656	6.906	6.531	7.563	6.281	6.438	4.438	4.563	2.531	2.594	1.875	1.688	2.406	2.156
April 20	11:00 AM	7.594	6.875	6.500	7.531	6.313	6.375	4.438	4.594	2.563	2.625	1.938	1.719	2.531	2.250
April 20	12:00 PM	7.594	6.844	6.500	7.531	6.313	6.375	4.438	4.563	2.563	2.594	1.938	1.719	2.531	2.250
April 20	01:00 PM	7.563	6.813	6.469	7.500	6.281	6.375	4.438	4.531	2.563	2.563	1.938	1.719	2.563	2.281
April 20	02:00 PM	7.594	6.813	6.500	7.500	6.281	6.375	4.438	4.625	2.563	2.625	1.969	1.781	2.531	2.313
April 20	03:00 PM	7.563	6.844	6.469	7.500	6.281	6.375	4.438	4.563	2.563	2.594	1.969	1.750	2.500	2.281
April 20	04:00 PM	7.563	6.813	6.438	7.469	6.250	6.344	4.406	4.563	2.500	2.594	1.969	1.719	2.438	2.219
April 20	05:00 PM	7.625	6.875	6.500	7.500	6.313	6.375	4.438	4.594	2.594	2.625	1.969	1.750	2.313	2.219
April 20	06:00 PM	7.594	6.875	6.500	7.531	6.250	6.313	4.469	4.500	2.563	2.594	1.938	1.719	2.406	2.188
April 20	10:00 PM	7.625	6.875	6.500	7.500	6.250	6.375	4.469	4.594	2.563	2.625	1.906	1.750	2.500	2.219
April 21	06:00 AM	7.750	7.031	6.563	7.594	6.313	6.438	4.469	4.594	2.500	2.563	1.813	1.625	2.406	2.125
April 21	08:00 AM	7.750	7.063	6.594	7.625	6.313	6.438	4.469	4.594	2.500	2.563	1.813	1.594	2.375	2.063
April 21	11:00 AM	7.625	6.844	6.531	7.563	6.313	6.375	4.438	4.594	2.500	2.563	1.906	1.625	2.406	2.156
April 21	02:00 PM	7.438	6.688	6.406	7.375	6.250	6.313	4.438	4.563	2.625	2.625	2.063	1.813	2.688	2.406
April 21	06:00 PM	7.500	6.750	6.375	7.438	6.250	6.313	4.469	4.563	2.625	2.688	1.938	1.813	2.688	2.375

TABLE 22. CHANGE IN HORIZONTAL LENGTH, SPRING 1998

COMPARED TO INITIAL READINGS

DATE	STATION LOCATION TIME/DEPTH	141+00 N (IN)	141+00 S (IN)	142+00 N (IN)	142+00 S (IN)	144+00 N (IN)	144+00 S (IN)	147+00 N (IN)	147+00 S (IN)	150+00 N (IN)	150+00 S (IN)	152+00 N (IN)	152+00 S (IN)	153+00 N (IN)	153+00 S (IN)
April 19	06:00 PM														
April 19	07:00 PM	0.031	-0.031	0.031	0.031	0.031	-0.094	-0.062	-0.032	0.000	-0.031	-0.062	-0.093	0.000	0.000
April 19	08:00 PM	-0.063	-0.062	0.000	0.156	-0.509	-0.062	-0.031	-0.188	0.031	0.000	0.031	-0.062	0.000	0.062
April 19	09:00 PM	-0.125	-0.156	0.031	0.343	0.000	-0.062	0.032	-0.032	0.031	0.063	0.063	0.000	0.188	0.125
April 19	10:00 PM	-0.188	-0.094	-0.094	0.156	0.031	-0.062	-0.031	-0.063	0.000	0.032	0.156	0.032	0.250	0.250
April 19	11:00 PM	-0.188	-0.187	-0.157	-0.157	-0.031	-0.062	-0.031	-0.032	0.062	0.063	0.125	0.094	0.282	0.219
April 20	12:00 AM	-0.250	-0.219	-0.188	-0.188	-0.062	-0.156	0.000	-0.032	0.093	0.000	0.250	0.157	0.188	0.375
April 20	01:00 AM	-0.344	-0.281	-0.219	-0.250	-0.094	-0.156	0.000	-0.063	0.156	0.063	0.313	0.250	0.438	0.406
April 20	02:00 AM	-0.375	-0.281	-0.250	-0.250	-0.125	-0.156	0.000	0.000	0.156	0.125	0.344	0.250	0.500	0.437
April 20	03:00 AM	-0.375	-0.281	-0.250	-0.344	-0.125	-0.187	-0.031	-0.063	0.187	0.157	0.344	0.282	0.500	0.531
April 20	04:00 AM	-0.469	-0.375	-0.282	-0.344	-0.125	-0.187	-0.031	-0.063	0.187	0.125	0.438	0.282	0.532	0.531
April 20	05:00 AM	-0.469	-0.406	-0.375	-0.407	-0.156	-0.281	0.000	-0.032	0.218	0.157	0.656	0.375	0.688	0.625
April 20	06:00 AM	-0.500	-0.406	-0.375	-0.407	-0.156	-0.281	0.000	-0.032	0.218	0.188	0.563	0.407	0.657	0.625
April 20	07:00 AM	-0.500	-0.406	-0.407	-0.407	-0.187	-0.281	0.032	0.000	0.218	0.188	0.500	0.407	0.625	0.625
April 20	08:00 AM	-0.500	-0.406	-0.375	-0.438	-0.187	-0.344	0.000	-0.032	0.250	0.188	0.469	0.375	0.688	0.625
April 20	09:00 AM	-0.532	-0.469	-0.407	-0.438	-0.219	-0.281	0.000	-0.032	0.250	0.219	0.438	0.407	0.625	0.594
April 20	10:00 AM	-0.500	-0.437	-0.375	-0.407	-0.187	-0.344	0.000	-0.032	0.250	0.219	0.469	0.375	0.657	0.594
April 20	11:00 AM	-0.438	-0.406	-0.344	-0.375	-0.219	-0.281	0.000	-0.063	0.218	0.188	0.406	0.344	0.532	0.500
April 20	12:00 PM	-0.438	-0.375	-0.344	-0.375	-0.219	-0.281	0.000	-0.032	0.218	0.219	0.406	0.344	0.532	0.500
April 20	01:00 PM	-0.407	-0.344	-0.313	-0.344	-0.187	-0.281	0.000	0.000	0.218	0.250	0.406	0.344	0.500	0.469
April 20	02:00 PM	-0.438	-0.344	-0.344	-0.344	-0.187	-0.281	0.000	-0.094	0.218	0.188	0.375	0.282	0.532	0.437
April 20	03:00 PM	-0.407	-0.375	-0.313	-0.344	-0.187	-0.281	0.000	-0.032	0.218	0.219	0.375	0.313	0.563	0.469
April 20	04:00 PM	-0.407	-0.344	-0.282	-0.313	-0.156	-0.250	0.032	-0.032	0.281	0.219	0.375	0.344	0.625	0.531
April 20	05:00 PM	-0.469	-0.406	-0.344	-0.344	-0.219	-0.281	0.000	-0.063	0.187	0.188	0.375	0.313	0.750	0.531
April 20	06:00 PM	-0.438	-0.406	-0.344	-0.375	-0.156	-0.219	-0.031	0.031	0.218	0.219	0.406	0.344	0.657	0.562
April 20	10:00 PM	-0.469	-0.406	-0.344	-0.344	-0.156	-0.281	-0.031	-0.063	0.218	0.188	0.438	0.313	0.563	0.531
April 20	06:00 AM	-0.594	-0.562	-0.407	-0.438	-0.219	-0.344	-0.031	-0.063	0.281	0.250	0.531	0.438	0.657	0.625
April 21	08:00 AM	-0.594	-0.594	-0.438	-0.469	-0.219	-0.344	-0.031	-0.063	0.281	0.250	0.531	0.469	0.688	0.687
April 21	11:00 AM	-0.469	-0.375	-0.375	-0.407	-0.219	-0.281	0.000	-0.063	0.281	0.250	0.438	0.438	0.657	0.594
April 21	02:00 PM	-0.282	-0.219	-0.250	-0.219	-0.156	-0.219	0.000	-0.032	0.156	0.188	0.281	0.250	0.375	0.344
April 21	06:00 PM	-0.344	-0.281	-0.219	-0.282	-0.156	-0.219	-0.031	-0.032	0.156	0.125	0.406	0.250	0.375	0.375

TABLE 23. TOTAL MOVEMENT CALCULATION, HORIZONTAL LENGTH, SPRING 1998

AT SIMILAIR LOCATIONS

DATE	STATION LOCATION TIME/DEPTH	141+00 AVERAGE MOVEMENT	153+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 141 AND 153	142+00 AVERAGE MOVEMENT	152+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 142 AND 152	144+00 AVERAGE MOVEMENT	150+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 144 AND 150	147+00 AVERAGE MOVEMENT
April 19	06:00 PM										
April 19	07:00 PM	0.000	0.000	0.000	0.031	-0.078	0.109	-0.031	-0.015	-0.016	-0.047
April 19	08:00 PM	-0.063	0.031	-0.094	0.078	-0.016	0.094	-0.285	0.016	-0.301	-0.110
April 19	09:00 PM	-0.140	0.157	-0.297	0.187	0.031	0.156	-0.031	0.047	-0.078	0.000
April 19	10:00 PM	-0.141	0.250	-0.391	0.031	0.094	-0.063	-0.015	0.016	-0.031	-0.047
April 19	11:00 PM	-0.188	0.251	-0.439	-0.157	0.110	-0.267	-0.046	0.063	-0.109	-0.032
April 20	12:00 AM	-0.234	0.282	-0.516	-0.188	0.204	-0.392	-0.109	0.047	-0.156	-0.016
April 20	01:00 AM	-0.313	0.422	-0.735	-0.235	0.282	-0.517	-0.125	0.110	-0.235	-0.032
April 20	02:00 AM	-0.328	0.469	-0.797	-0.250	0.297	-0.547	-0.140	0.141	-0.281	0.000
April 20	03:00 AM	-0.328	0.516	-0.844	-0.297	0.313	-0.610	-0.156	0.172	-0.328	-0.047
April 20	04:00 AM	-0.422	0.532	-0.954	-0.313	0.360	-0.673	-0.156	0.156	-0.312	-0.047
April 20	05:00 AM	-0.438	0.657	-1.095	-0.391	0.516	-0.907	-0.218	0.188	-0.406	-0.016
April 20	06:00 AM	-0.453	0.641	-1.094	-0.391	0.485	-0.876	-0.218	0.203	-0.421	-0.016
April 20	07:00 AM	-0.453	0.625	-1.078	-0.407	0.454	-0.861	-0.234	0.203	-0.437	0.016
April 20	08:00 AM	-0.453	0.657	-1.110	-0.407	0.422	-0.829	-0.265	0.219	-0.484	-0.016
April 20	09:00 AM	-0.500	0.610	-1.110	-0.423	0.423	-0.846	-0.250	0.235	-0.485	-0.016
April 20	10:00 AM	-0.468	0.626	-1.094	-0.391	0.422	-0.813	-0.265	0.235	-0.500	-0.016
April 20	11:00 AM	-0.422	0.516	-0.938	-0.360	0.375	-0.735	-0.250	0.203	-0.453	-0.032
April 20	12:00 PM	-0.407	0.516	-0.923	-0.360	0.375	-0.735	-0.250	0.219	-0.469	-0.016
April 20	01:00 PM	-0.375	0.485	-0.860	-0.329	0.375	-0.704	-0.234	0.234	-0.468	0.000
April 20	02:00 PM	-0.391	0.485	-0.876	-0.344	0.329	-0.673	-0.234	0.203	-0.437	-0.047
April 20	03:00 PM	-0.391	0.516	-0.907	-0.329	0.344	-0.673	-0.234	0.219	-0.453	-0.016
April 20	04:00 PM	-0.375	0.578	-0.953	-0.298	0.360	-0.658	-0.203	0.250	-0.453	0.000
April 20	05:00 PM	-0.438	0.641	-1.079	-0.344	0.344	-0.688	-0.250	0.188	-0.438	-0.032
April 20	06:00 PM	-0.422	0.610	-1.032	-0.360	0.375	-0.735	-0.187	0.219	-0.406	-0.000
April 20	10:00 PM	-0.438	0.547	-0.985	-0.344	0.376	-0.720	-0.218	0.203	-0.421	-0.047
April 21	06:00 AM	-0.578	0.641	-1.219	-0.423	0.485	-0.908	-0.281	0.266	-0.547	-0.047
April 21	08:00 AM	-0.594	0.688	-1.282	-0.454	0.500	-0.954	-0.281	0.266	-0.547	-0.047
April 21	11:00 AM	-0.422	0.626	-1.048	-0.391	0.438	-0.829	-0.250	0.266	-0.516	-0.032
April 21	02:00 PM	-0.250	0.360	-0.610	-0.235	0.266	-0.501	-0.187	0.172	-0.359	-0.016
April 21	06:00 PM	-0.313	0.375	-0.688	-0.251	0.328	-0.579	-0.187	0.141	-0.328	-0.032

TABLE 24. DAILY MOVEMENT CYCLE, HORIZONTAL LENGTH, SUMMER 1998

TABULATIONS OF READINGS

DATE	STATION LOCATION TIME/DEPTH	141+00 N (IN)	141+00 S (IN)	142+00 N (IN)	142+00 S (IN)	144+00 N (IN)	144+00 S (IN)	147+00 N (IN)	147+00 S (IN)	150+00 N (IN)	150+00 S (IN)	152+00 N (IN)	152+00 S (IN)	153+00 N (IN)	153+00 S (IN)
Aug. 30	06:00 PM	6.375	5.750	5.375	5.375	5.563	5.688	4.313	4.563	2.813	2.938	2.625	2.375	3.313	3.094
Aug. 30	07:00 PM	6.469	5.813	5.438	5.500	5.594	5.625	4.219	4.375	2.844	2.938	2.594	2.344	3.313	3.063
Aug. 30	08:00 PM	6.438	5.875	5.500	5.438	5.563	5.625	4.250	4.375	2.813	2.813	2.500	2.500	3.250	3.063
Aug. 30	09:00 PM	6.531	5.969	5.500	5.563	5.625	5.719	4.125	4.375	2.813	2.781	2.469	2.250	3.156	2.938
Aug. 30	10:00 PM	6.563	5.938	5.563	5.563	5.656	5.688	4.313	4.344	2.719	2.750	2.375	2.188	3.125	2.875
Aug. 30	11:00 PM	6.688	6.125	5.688	5.719	5.688	5.688	4.281	4.375	2.719	2.750	2.375	2.125	3.000	2.750
Aug. 31	12:00 AM	6.719	6.156	5.688	5.656	5.688	5.719	4.250	4.375	2.719	2.750	2.250	2.063	3.000	2.750
Aug. 31	01:00 AM	6.844	6.219	5.750	5.750	5.750	5.750	4.313	4.344	2.656	2.688	2.250	2.000	2.969	2.656
Aug. 31	02:00 AM	6.844	6.250	5.781	5.750	5.750	5.813	4.250	4.406	2.625	2.688	2.219	1.969	2.906	2.656
Aug. 31	03:00 AM	6.875	6.281	5.844	5.781	5.750	5.813	4.250	4.406	2.625	2.719	2.188	1.906	2.844	2.688
Aug. 31	04:00 AM	6.906	6.344	5.813	5.938	5.813	5.813	4.281	4.375	2.625	2.625	2.125	1.875	2.688	2.438
Aug. 31	05:00 AM	6.969	6.469	5.906	5.875	5.813	5.844	4.250	4.406	2.594	2.719	2.094	1.906	2.813	2.563
Aug. 31	06:00 AM	7.063	6.563	5.906	5.906	5.844	5.875	4.281	4.375	2.594	2.625	2.125	1.813	2.688	2.438
Aug. 31	07:00 AM	7.000	6.531	5.875	5.969	5.813	5.875	4.219	4.250	2.563	2.656	2.031	1.844	2.688	2.438
Aug. 31	08:00 AM	7.000	6.563	5.938	6.250	5.750	5.875	4.188	4.313	2.531	2.563	2.063	1.844	2.625	2.375
Aug. 31	09:00 AM	7.000	6.563	5.875	6.250	5.750	5.938	4.219	4.313	2.500	2.625	2.094	1.844	2.688	2.406
Aug. 31	10:00 AM	7.000	6.531	5.875	5.906	5.813	5.938	4.250	4.375	2.500	2.750	2.156	1.813	2.750	2.438
Aug. 31	11:00 AM	7.844	6.563	5.781	5.813	5.750	5.781	4.219	4.313	2.594	2.813	2.188	1.938	2.750	2.563
Aug. 31	12:00 PM	7.938	6.594	5.875	5.719	5.750	5.813	4.250	4.344	2.688	2.875	2.313	2.125	3.063	2.719
Aug. 31	01:00 PM	6.375	6.656	5.625	5.500	5.656	5.750	4.250	4.375	2.750	3.000	2.375	2.188	3.250	3.000
Aug. 31	02:00 PM	6.375	6.719	5.625	5.469	5.656	5.688	4.250	4.375	2.781	2.938	2.438	2.250	3.281	3.063
Aug. 31	03:00 PM	6.406	6.781	5.563	5.469	5.688	5.719	4.250	4.375	2.813	2.844	2.500	2.281	3.313	3.094
Aug. 31	04:00 PM	6.438	6.813	5.500	5.438	5.688	5.719	4.250	4.375	2.813	2.781	2.563	2.313	3.375	3.125
Aug. 31	05:00 PM	6.438	6.813	5.500	5.469	5.688	5.688	4.250	4.344	2.813	2.813	2.531	2.313	3.344	3.125
Aug. 31	06:00 PM	6.469	6.781	5.438	5.469	5.688	5.625	4.250	4.344	2.813	2.844	2.531	2.313	3.313	3.094
Aug. 31	10:00 PM	6.563	6.625	5.563	5.563	5.688	5.688	4.250	4.375	2.750	2.781	2.469	2.063	3.188	2.844
Sept. 1	06:00 AM	6.781	6.563	5.688	5.781	5.688	5.719	4.219	4.375	2.688	2.719	2.188	1.781	2.688	2.625
Sept. 1	08:00 AM	6.938	6.188	5.875	5.844	5.781	5.750	4.219	4.375	2.625	2.656	2.125	1.875	2.750	2.500
Sept. 1	11:00 AM	6.813	6.031	5.844	5.781	5.750	5.813	4.250	4.313	2.625	2.688	2.188	2.000	2.875	2.688
Sept. 1	02:00 PM	6.500	5.750	5.500	5.500	5.719	5.688	4.281	4.344	2.781	2.813	2.500	2.313	3.250	3.063
Sept. 1	06:00 PM	6.406	5.688	5.406	5.438	5.625	5.656	4.250	4.313	2.813	2.781	2.594	2.375	3.313	3.125

TABLE 25. CHANGE IN HORIZONTAL LENGTH, SUMMER 1998

COMPARED TO INITIAL READINGS

DATE	STATION LOCATION TIME/DEPTH	141+00 N (IN)	141+00 S (IN)	142+00 N (IN)	142+00 S (IN)	144+00 N (IN)	144+00 S (IN)	147+00 N (IN)	147+00 S (IN)	150+00 N (IN)	150+00 S (IN)	152+00 N (IN)	152+00 S (IN)	153+00 N (IN)	153+00 S (IN)
Aug. 30	06:00 PM														
Aug. 30	07:00 PM	-0.094	-0.063	-0.063	-0.125	-0.031	0.063	0.094	0.188	-0.031	0.000	0.031	0.031	0.000	0.031
Aug. 30	08:00 PM	-0.063	-0.125	-0.125	-0.063	0.000	0.063	0.063	0.188	0.000	0.125	0.125	-0.125	0.063	0.031
Aug. 30	09:00 PM	-0.156	-0.219	-0.125	-0.188	-0.062	-0.031	0.188	0.188	0.000	0.157	0.156	0.125	0.157	0.156
Aug. 30	10:00 PM	-0.188	-0.188	-0.188	-0.188	-0.093	0.000	0.000	0.219	0.094	0.188	0.250	0.187	0.188	0.219
Aug. 30	11:00 PM	-0.313	-0.375	-0.313	-0.344	-0.125	0.000	0.032	0.188	0.094	0.188	0.250	0.250	0.313	0.344
Aug. 31	12:00 AM	-0.344	-0.406	-0.313	-0.281	-0.125	-0.031	0.063	0.188	0.094	0.188	0.375	0.312	0.313	0.344
Aug. 31	01:00 AM	-0.469	-0.469	-0.375	-0.375	-0.187	-0.062	0.000	0.219	0.157	0.250	0.375	0.375	0.344	0.438
Aug. 31	02:00 AM	-0.469	-0.500	-0.406	-0.375	-0.187	-0.125	0.063	0.157	0.188	0.250	0.406	0.406	0.407	0.438
Aug. 31	03:00 AM	-0.500	-0.531	-0.469	-0.406	-0.187	-0.125	0.063	0.157	0.188	0.219	0.437	0.469	0.469	0.406
Aug. 31	04:00 AM	-0.531	-0.594	-0.438	-0.563	-0.250	-0.125	0.032	0.188	0.188	0.313	0.500	0.500	0.625	0.656
Aug. 31	05:00 AM	-0.594	-0.719	-0.531	-0.500	-0.250	-0.156	0.063	0.157	0.219	0.219	0.531	0.469	0.500	0.531
Aug. 31	06:00 AM	-0.688	-0.813	-0.531	-0.531	-0.281	-0.187	0.032	0.188	0.219	0.313	0.500	0.562	0.625	0.656
Aug. 31	07:00 AM	-0.625	-0.781	-0.500	-0.594	-0.250	-0.187	0.094	0.313	0.250	0.282	0.594	0.531	0.625	0.656
Aug. 31	08:00 AM	-0.625	-0.813	-0.563	-0.875	-0.187	-0.187	0.125	0.250	0.282	0.375	0.562	0.531	0.688	0.719
Aug. 31	09:00 AM	-0.625	-0.813	-0.500	-0.875	-0.187	-0.250	0.094	0.250	0.313	0.313	0.531	0.531	0.625	0.688
Aug. 31	10:00 AM	-0.625	-0.781	-0.500	-0.531	-0.250	-0.250	0.063	0.188	0.313	0.188	0.469	0.562	0.563	0.656
Aug. 31	11:00 AM	-1.469	-0.813	-0.406	-0.438	-0.187	-0.093	0.094	0.250	0.219	0.125	0.437	0.437	0.563	0.531
Aug. 31	12:00 PM	-1.563	-0.844	-0.500	-0.344	-0.187	-0.125	0.063	0.219	0.125	0.063	0.312	0.250	0.250	0.375
Aug. 31	01:00 PM	0.000	-0.906	-0.250	-0.125	-0.093	-0.062	0.063	0.188	0.063	-0.062	0.250	0.187	0.063	0.094
Aug. 31	02:00 PM	0.000	-0.969	-0.250	-0.094	-0.093	0.000	0.063	0.188	0.032	0.000	0.187	0.125	0.032	0.031
Aug. 31	03:00 PM	-0.031	-1.031	-0.188	-0.094	-0.125	-0.031	0.063	0.188	0.000	0.094	0.125	0.094	0.000	0.000
Aug. 31	04:00 PM	-0.063	-1.063	-0.125	-0.063	-0.125	-0.031	0.063	0.188	0.000	0.157	0.062	0.062	-0.062	-0.031
Aug. 31	05:00 PM	-0.063	-1.063	-0.125	-0.094	-0.125	0.000	0.063	0.219	0.000	0.125	0.094	0.062	-0.031	-0.031
Aug. 31	06:00 PM	-0.094	-1.031	-0.063	-0.094	-0.125	0.063	0.063	0.219	0.000	0.094	0.094	0.062	0.000	0.000
Aug. 31	10:00 PM	-0.188	-0.875	-0.188	-0.188	-0.125	0.000	0.063	0.188	0.063	0.157	0.156	0.312	0.125	0.250
Sept. 1	06:00 AM	-0.406	-0.813	-0.313	-0.406	-0.125	-0.031	0.094	0.188	0.125	0.219	0.437	0.594	0.625	0.469
Sept. 1	08:00 AM	-0.563	-0.438	-0.500	-0.469	-0.218	-0.062	0.094	0.188	0.188	0.282	0.500	0.500	0.563	0.594
Sept. 1	11:00 AM	-0.438	-0.281	-0.469	-0.406	-0.187	-0.125	0.063	0.250	0.188	0.250	0.437	0.375	0.438	0.406
Sept. 1	02:00 PM	-0.125	0.000	-0.125	-0.125	-0.156	0.000	0.032	0.219	0.032	0.125	0.125	0.062	0.063	0.031
Sept. 1	06:00 PM	-0.031	0.062	-0.031	-0.063	-0.062	0.032	0.063	0.250	0.000	0.157	0.031	0.000	0.000	-0.031

TABLE 26. TOTAL MOVEMENT CALCULATION, HORIZONTAL LENGTH, SUMMER 1998

AT SIMILAIR LOCATIONS

DATE	STATION LOCATION TIME/DEPTH	141+00 AVERAGE MOVEMENT	153+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 141 AND 153	142+00 AVERAGE MOVEMENT	152+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 142 AND 152	144+00 AVERAGE MOVEMENT	150+00 AVERAGE MOVEMENT	TOTAL MOVEMENT BETWEEN 144 AND 150	147+00 AVERAGE MOVEMENT
Aug. 30	06:00 PM										
Aug. 30	07:00 PM	-0.079	0.015	-0.094	-0.094	0.031	-0.125	0.016	-0.015	0.031	0.141
Aug. 30	08:00 PM	-0.094	0.047	-0.141	-0.094	0.000	-0.094	0.031	0.063	-0.032	0.125
Aug. 30	09:00 PM	-0.188	0.156	-0.344	-0.156	0.141	-0.297	-0.047	0.079	-0.126	0.188
Aug. 30	10:00 PM	-0.188	0.204	-0.392	-0.188	0.219	-0.407	-0.047	0.141	-0.188	0.109
Aug. 30	11:00 PM	-0.344	0.329	-0.673	-0.329	0.250	-0.579	-0.063	0.141	-0.204	0.110
Aug. 31	12:00 AM	-0.375	0.329	-0.704	-0.297	0.344	-0.641	-0.078	0.141	-0.219	0.125
Aug. 31	01:00 AM	-0.469	0.391	-0.860	-0.375	0.375	-0.750	-0.125	0.204	-0.329	0.109
Aug. 31	02:00 AM	-0.485	0.423	-0.908	-0.391	0.406	-0.797	-0.156	0.219	-0.375	0.110
Aug. 31	03:00 AM	-0.516	0.438	-0.954	-0.438	0.453	-0.891	-0.156	0.204	-0.360	0.110
Aug. 31	04:00 AM	-0.563	0.641	-1.204	-0.500	0.500	-1.000	-0.188	0.251	-0.439	0.110
Aug. 31	05:00 AM	-0.657	0.516	-1.173	-0.516	0.500	-1.016	-0.203	0.219	-0.422	0.110
Aug. 31	06:00 AM	-0.751	0.641	-1.392	-0.531	0.531	-1.062	-0.234	0.266	-0.500	0.110
Aug. 31	07:00 AM	-0.703	0.641	-1.344	-0.547	0.563	-1.110	-0.219	0.266	-0.485	0.203
Aug. 31	08:00 AM	-0.719	0.704	-1.423	-0.719	0.547	-1.266	-0.187	0.329	-0.516	0.188
Aug. 31	09:00 AM	-0.719	0.657	-1.376	-0.688	0.531	-1.219	-0.219	0.313	-0.532	0.172
Aug. 31	10:00 AM	-0.703	0.610	-1.313	-0.516	0.516	-1.032	-0.250	0.251	-0.501	0.125
Aug. 31	11:00 AM	-1.141	0.547	-1.688	-0.422	0.437	-0.859	-0.140	0.172	-0.312	0.172
Aug. 31	12:00 PM	-1.204	0.313	-1.517	-0.422	0.281	-0.703	-0.156	0.094	-0.250	0.141
Aug. 31	01:00 PM	-0.453	0.079	-0.532	-0.188	0.219	-0.407	-0.078	0.001	-0.079	0.125
Aug. 31	02:00 PM	-0.485	0.031	-0.516	-0.172	0.156	-0.328	-0.047	0.016	-0.063	0.125
Aug. 31	03:00 PM	-0.531	0.000	-0.531	-0.141	0.109	-0.250	-0.078	0.047	-0.125	0.125
Aug. 31	04:00 PM	-0.563	-0.047	-0.516	-0.094	0.062	-0.156	-0.078	0.079	-0.157	0.125
Aug. 31	05:00 PM	-0.563	-0.031	-0.532	-0.110	0.078	-0.188	-0.063	0.063	-0.126	0.141
Aug. 31	06:00 PM	-0.563	0.000	-0.563	-0.079	0.078	-0.157	-0.031	0.047	-0.078	0.141
Aug. 31	10:00 PM	-0.532	0.188	-0.720	-0.188	0.234	-0.422	-0.063	0.110	-0.173	0.125
Sept. 1	06:00 AM	-0.610	0.547	-1.157	-0.359	0.516	-0.875	-0.078	0.172	-0.250	0.141
Sept. 1	08:00 AM	-0.500	0.579	-1.079	-0.485	0.500	-0.985	-0.140	0.235	-0.375	0.141
Sept. 1	11:00 AM	-0.359	0.422	-0.781	-0.438	0.406	-0.844	-0.156	0.219	-0.375	0.156
Sept. 1	02:00 PM	-0.063	0.047	-0.110	-0.125	0.093	-0.218	-0.078	0.079	-0.157	0.125
Sept. 1	06:00 PM	0.016	-0.016	0.032	-0.047	0.016	-0.063	-0.015	0.079	-0.094	0.156

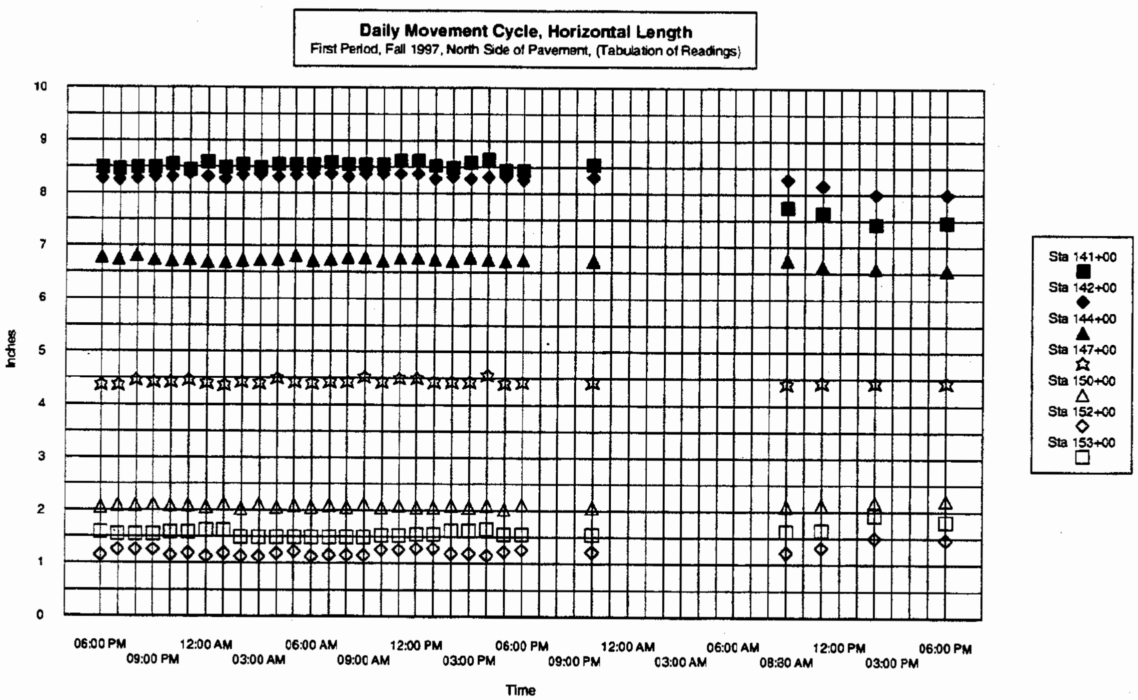


FIGURE 44. DAILY MOVEMENT CYCLE, HORIZONTAL LENGTH, FALL 1997

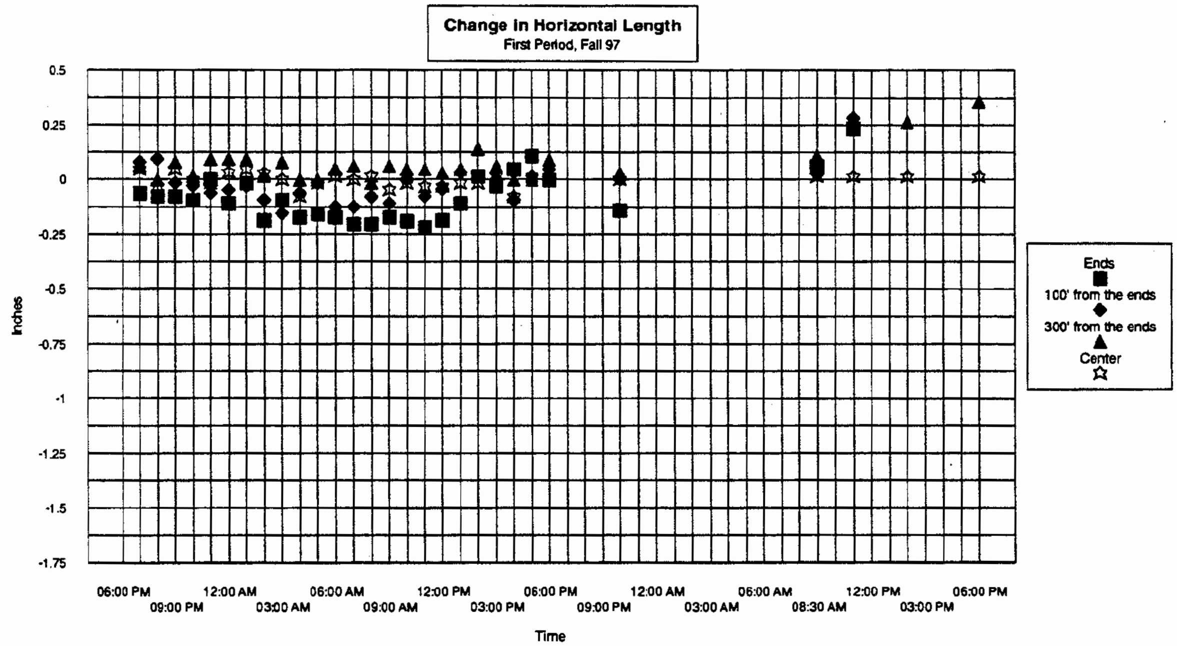


FIGURE 45. CHANGE IN HORIZONTAL LENGTH, FALL 1997

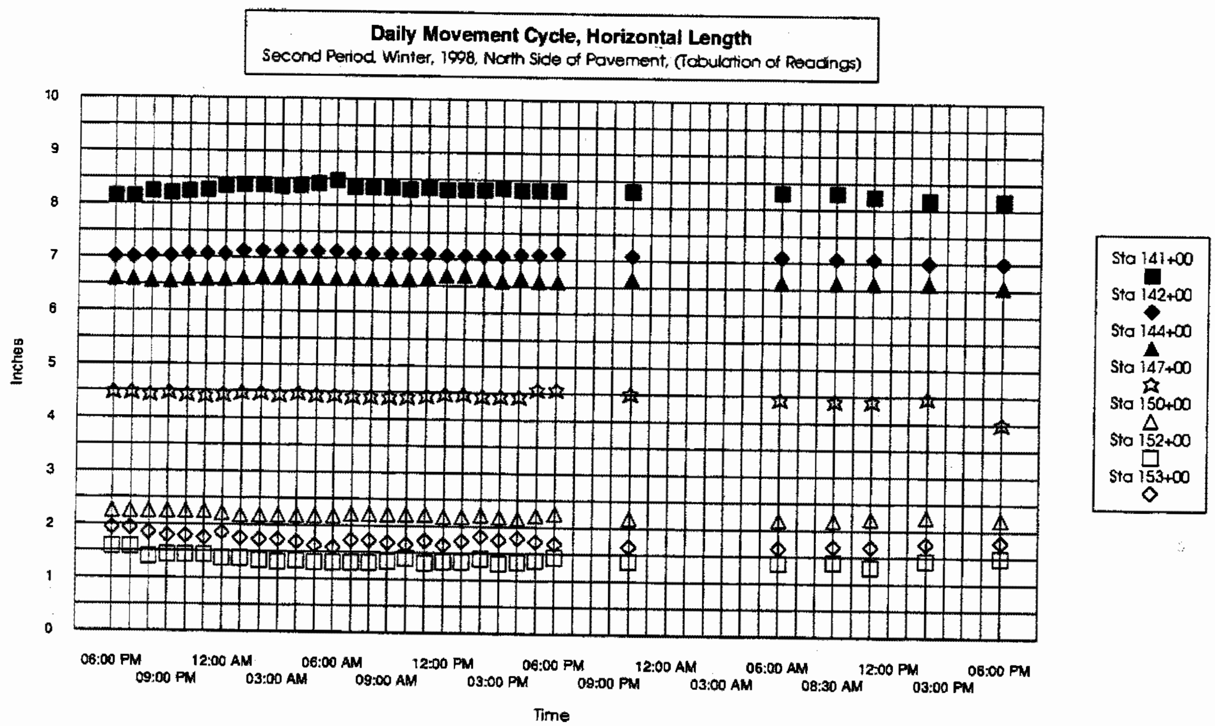


FIGURE 46. DAILY MOVEMENT CYCLE, HORIZONTAL LENGTH, WINTER 1998

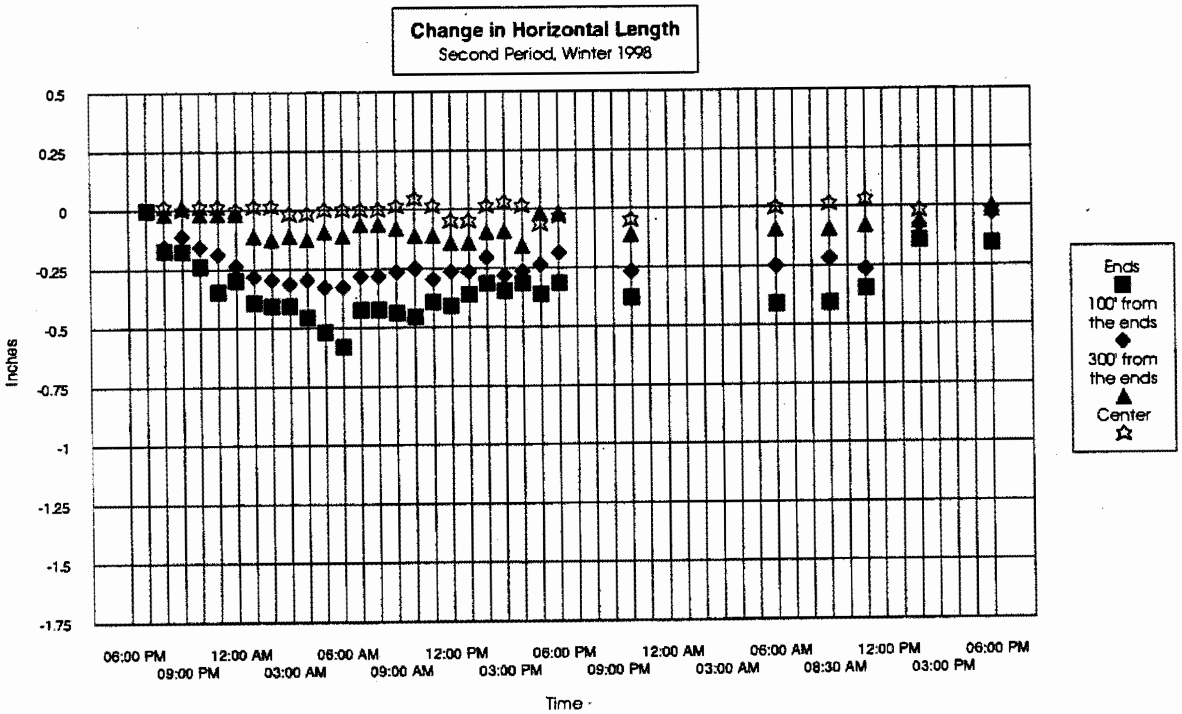


FIGURE 47. CHANGE IN HORIZONTAL LENGTH, WINTER 1998

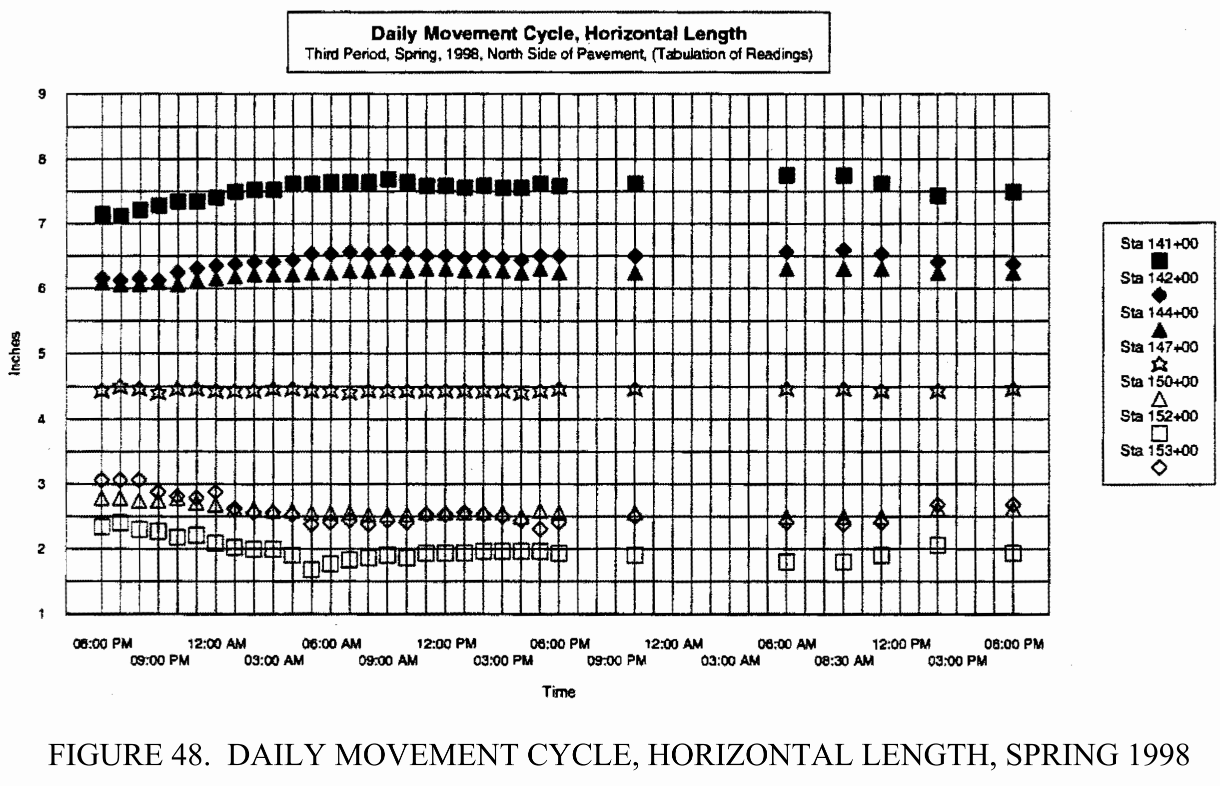


FIGURE 48. DAILY MOVEMENT CYCLE, HORIZONTAL LENGTH, SPRING 1998

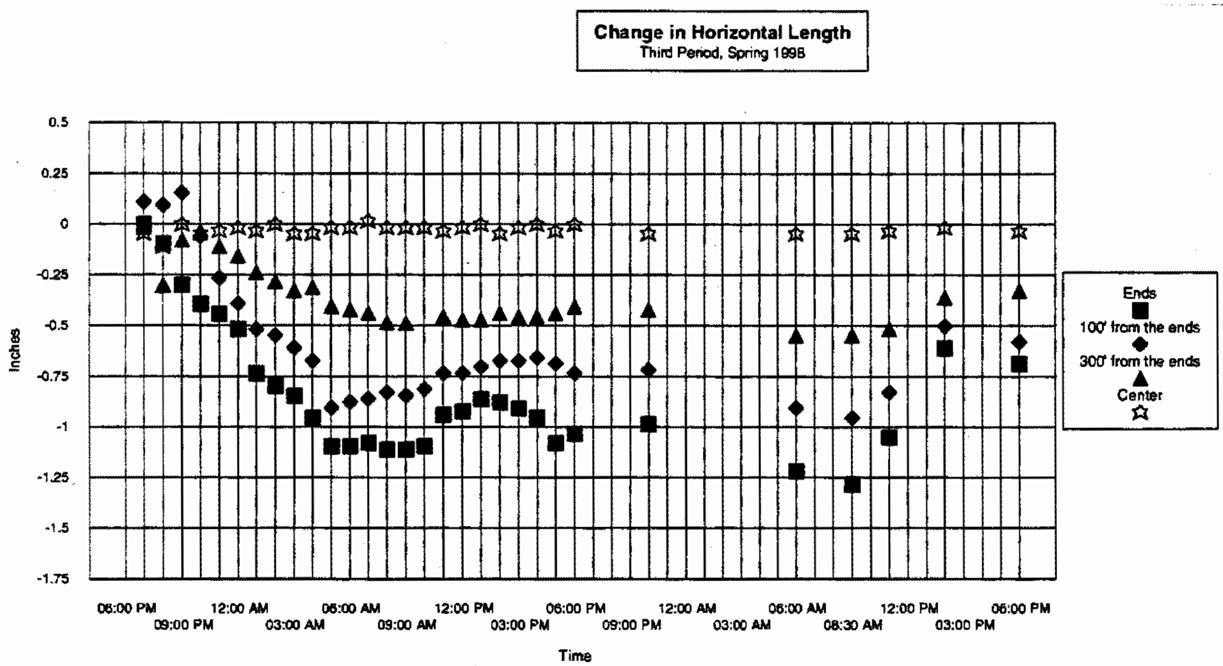


FIGURE 49. CHANGE IN HORIZONTAL LENGTH, SPRING 1998

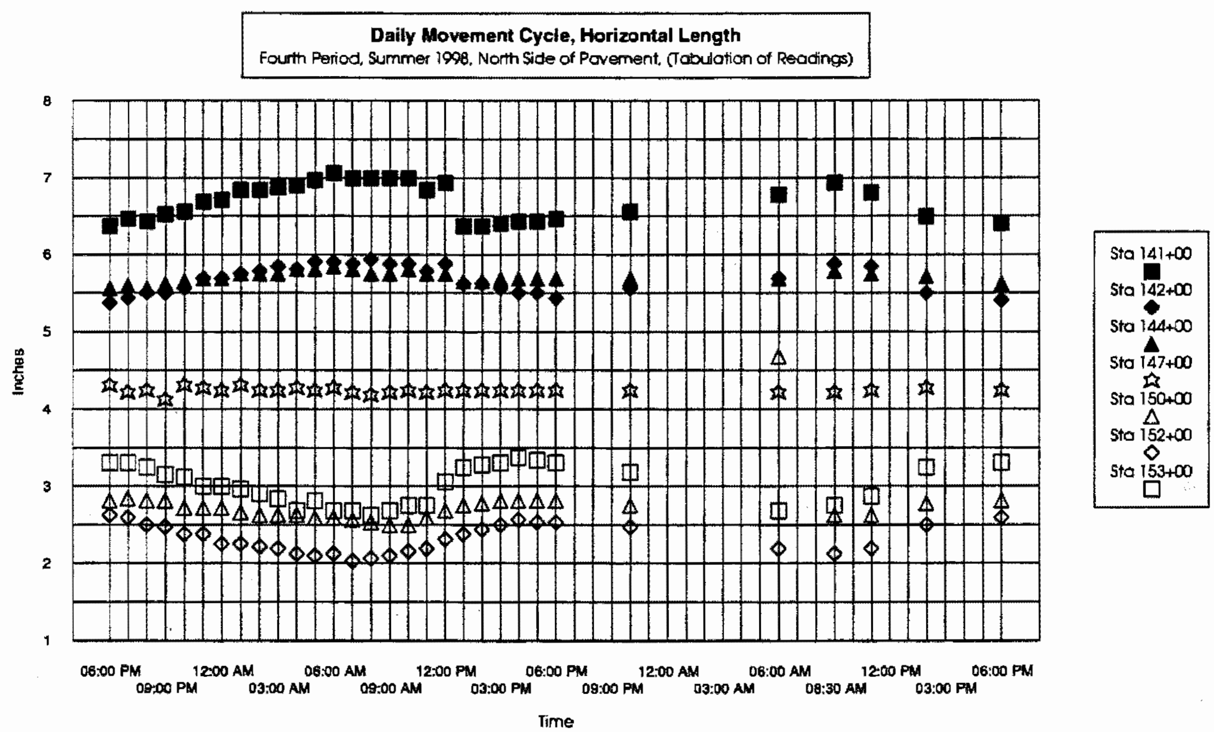


FIGURE 50. DAILY MOVEMENT CYCLE, HORIZONTAL LENGTH, SUMMER 1998

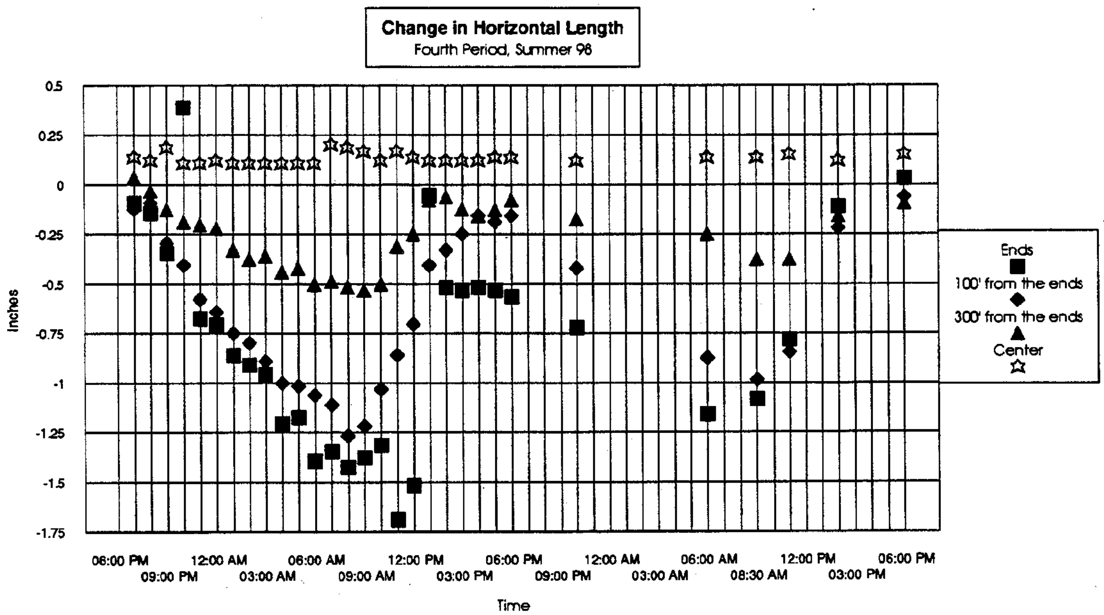


FIGURE 51. CHANGE IN HORIZONTAL LENGTH, SUMMER 1998

8. STRAIN READINGS.

8.1 CONDITION OF STRAIN GAUGES.

Many of the strain gauges are not readable.

Several strain gauges have had their control cables cut, repaired in the fall of 1995, only to have been cut again in the winter of 1995/1996. The cuts have not been repaired. As discussed in the previous section, the handholes moved during the initial stressing cycle. This movement placed the conduit near the wall of the handhole. During the winter months, pavement movement causes the handhole to move more, often cutting the control cables.

Some of the gauges have stopped reading for no apparent reason. For example, at station 147+00, the center of the prestressed fibrous pavement, only two of the six gauges are readable. The handholes did not move during construction at this location.

Some of the gauges are readable, but the reading wanders quite a bit, and the reading is questionable. These gauges where the readings drift, are noted on the reading sheet.

Of the 30 gauges installed, only 15 supply consistent readings.

8.2 WEATHER AFFECTS ON STRAIN READINGS.

The daily strain gauge readings and change in daily strain gauge readings are shown in tables 27 through 30 and figures 52 through 55. The strain gauge measures internal stress. For discussion in this report, the strain gauge readings will be discussed and not strain values. The reading does not imply stress or strain in the pavement.

TABLE 27. DAILY STRAIN CYCLE, STRAIN GAUGES, FALL 1997
(Tabulation of Readings)

			141+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM	28	-330	--	-420	31.7	-520	--	--	32.5
24-Nov	10:00 PM	30	--	--	-443	31.3	-353	--	-420	31.3
25-Nov	06:00 AM	--	-240	-110	-440	--	--	--	--	31.2
25-Nov	08:30 AM	37	-250	-107	-430	--	980	--	-310	31.2
25-Nov	11:00 AM	49	-324	-175	-503	--	-323	--	--	38.6
25-Nov	02:00 PM	54	-301	-216	-570	--	--	--	--	44.6
25-Nov	06:00 PM	48	-292	-214	-510	--	-365	--	--	42.4

			142+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM	28	-2959	-4682	-402	33.6	--	--	--	--
24-Nov	10:00 PM	30	-2970	--	-394	31.3	--	--	--	--
25-Nov	06:00 AM	--	-2990	-3600	-395	31.8	-1806	--	-2287	--
25-Nov	08:30 AM	37	-2994	-3764	-395	32.0	-1840	--	-2306	--
25-Nov	11:00 AM	49	-3015	-3756	-377	38.9	-1936	--	-2379	--
25-Nov	02:00 PM	54	-2995	-3750	-382	44.0	-1966	--	-2346	--
25-Nov	06:00 PM	48	-2973	-3744	-385	42.2	-1935	--	-2293	--

			147+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM	28	--	--	-1952	--	--	--	--	32.4
24-Nov	10:00 PM	30	--	--	-1928	--	--	--	4296	33.5
25-Nov	06:00 AM	--	--	--	-1940	--	--	--	--	33.0
25-Nov	08:30 AM	37	-2679	--	-1947	--	--	--	--	32.9
25-Nov	11:00 AM	49	-2826	--	-1952	--	--	--	--	39.1
25-Nov	02:00 PM	54	-2776	--	-1960	--	--	--	--	45.5
25-Nov	06:00 PM	48	-2743	--	-1962	--	--	--	--	--

			152+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM	28	--	-2142	-1918	32.8	-4101	-12760	-1127	33.1
24-Nov	10:00 PM	30	--	-2142	-1926	31.8	-4124	10200	-1091	31.8
25-Nov	06:00 AM	--	--	-2140	-1925	32.6	-4133	14620	-1070	32.1
25-Nov	08:30 AM	37	--	-2145	-1924	33.1	-4153	18300	-1058	32.9
25-Nov	11:00 AM	49	--	-2145	-1909	40.3	-4184	7110	-1066	39.9
25-Nov	02:00 PM	54	--	-2160	-1933	45.4	-4156	4900	-1087	45.2
25-Nov	06:00 PM	48	--	-2150	-1930	42.9	-4133	5450	-1084	42.7

			153+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM	28	--	--	--	33.5	-2964	-1047	-1528	33.2
24-Nov	10:00 PM	30	--	-2750	--	32.1	-3002	-1063	-1534	32.1
25-Nov	06:00 AM		--	-2600	--	32.9	-2990	-1040	-1521	32.5
25-Nov	08:30 AM	37	--	-2620	--	33.2	-2989	-1050	-1504	32.7
25-Nov	11:00 AM	49	--	-2550	--	40.4	-3024	-1061	-1492	38.4
25-Nov	02:00 PM	54	6810	-2640	--	46.3	-2999	-1065	-1530	44.8
25-Nov	06:00 PM	48	--	-2580	--	44.1	-2989	-1071	-1535	43.4

TABLE 28. DAILY STRAIN CYCLE, STRAIN GAUGES, WINTER 1998
(Tabulation of Readings)

			141+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM	30	-	-1760	-2017	-	-4095	--	-1050	34.6
09-Feb	10:00 PM	29	-	-2031	-2052	-	-4097	-	-1071	34.0
10-Feb	06:00 AM	28	-	-1700	-2330	-	-4080	-	-1038	32.2
10-Feb	08:30 AM	32	-	-1672	-2339	-	-4085	-	-1040	32.6
10-Feb	11:00 AM	38	-	-1811	-2189	-	-4135	-	-1089	34.8
10-Feb	02:00 PM	42	-	-2106	-2188	-	-4141	-	-1080	39.6
10-Feb	06:00 PM	42	-	-2078	-2108	-	-4123	-	-1095	39.1

			142+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM	30	-2948	-3738	-358	35.6	-1860	-	-2298	35.9
09-Feb	10:00 PM	29	-2948	-3727	-357	34.9	-1856	-	-2294	34.0
10-Feb	06:00 AM	28	-2959	-3460	-341	32.7	-1861	-	-2302	36.7
10-Feb	08:30 AM	32	-2967	-3464	-348	33.0	-1879	-	-2311	37.2
10-Feb	11:00 AM	38	-2991	-3561	-350	34.8	-1868	-	-2313	35.5
10-Feb	02:00 PM	42	-2975	-3717	-356	40.2	-1952	-	-2343	40.8
10-Feb	06:00 PM	42	-2956	-3723	-354	40.2	-1910	-	-2319	40.4

			147+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM	30	-2769	-	-1805	35.8	-	-	-	35.8
09-Feb	10:00 PM	29	-2704	-	-1893	35.7	-	-	-	35.5
10-Feb	06:00 AM	28	-2729	-	-1848	33.2	-	-	-	33.3
10-Feb	08:30 AM	32	-2789	-	-1850	33.3	-	-	-	33.5
10-Feb	11:00 AM	38	-2737	-	-1793	35.3	-	-	-	35.5
10-Feb	02:00 PM	42	-2750	-	-1887	41.4	-	-	-	39.7
10-Feb	06:00 PM	42	-2736	-	-1929	40.4	-	-	-	40.3

			152+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM	30	-	-1760	-2017	36.3	-4095	-	-1050	37.3
09-Feb	10:00 PM	29	-	-2031	-2052	35.5	-4097	-	-1071	35.8
10-Feb	06:00 AM	28	-	-1700	-2330	34.1	-4080	-	-1038	33.7
10-Feb	08:30 AM	32	-	-1672	-2339	33.5	-4085	-	-1040	33.7
10-Feb	11:00 AM	38	-	-1811	-2189	36.8	-4135	-	-1089	36.6
10-Feb	02:00 PM	42	-	-2106	-2188	42.3	-4141	-	-1080	42.5
10-Feb	06:00 PM	42	-	-2078	-2108	40.7	-4123	-	-1095	40.4

			153+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM	30	-	-	-	37.0	-	-	-	-
09-Feb	10:00 PM	29	-	-	-	36.3	-	-	-	36.3
10-Feb	06:00 AM	28	-	-	-	33.9	-	-	-	32.9
10-Feb	08:30 AM	32	-	-2130	-	33.4	2400	1860	1400	33.0
10-Feb	11:00 AM	38	-	-2175	-	36.7	2025	760	870	36.6
10-Feb	02:00 PM	42	-	-2345	-	42.7	-220	-785	-355	42.1
10-Feb	06:00 PM	42	-	-2444	-	41.5	-1433	-914	-984	40.9

TABLE 29. DAILY STRAIN CYCLE, STRAIN GAUGES, SPRING 1998
(Tabulation of Readings)

			141+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM	49	-342	-126	-389	55.4	-	-	-	56.4
20-Apr	10:00 PM	48	-320	-77	-281	54.0	-	-	-	54.8
21-Apr	06:00 AM	48	-303	-85	-275	50.6	-	-	-	53.4
21-Apr	08:30 AM	48	-275	-97	-243	47.3	-210	-	-	48.2
21-Apr	11:00 AM	52	-307	-224	-245	55.0	-220	-	-	55.1
21-Apr	02:00 PM	54	-332	-218	-219	61.3	-209	-	-	61.6
21-Apr	06:00 PM	51	-322	-29	-353	57.9	-216	-	-	58.1

			142+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM	49	-2963	-3528	-391	55.5	-	-	-2427	-
20-Apr	10:00 PM	48	-2977	-3616	-391	54.1	-	-	-2416	-
21-Apr	06:00 AM	48	-2980	-3550	-407	50.1	-	-	-2430	-
21-Apr	08:30 AM	48	-2990	-3520	-430	48.5	-	-	-2450	-
21-Apr	11:00 AM	52	-3002	-3675	-349	55.1	-	-	-2424	-
21-Apr	02:00 PM	54	-3005	-3708	-347	61.6	-1790	-	-2363	-
21-Apr	06:00 PM	51	-3034	-3700	-365	57.8	-1476	-	-2388	-

			147+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM	49	-2706	-	-1938	56.4	-	-	-	-
20-Apr	10:00 PM	48	-284	-	-	-	-	-	-	-
21-Apr	06:00 AM	48	-230	-	-	51.7	-	-	-	-
21-Apr	08:30 AM	48	-185	-	-	48.5	-	-	-	-
21-Apr	11:00 AM	52	-286	-	-	55.7	-	-	-	-
21-Apr	02:00 PM	54	-290	-	-	61.3	-	-	-	-
21-Apr	06:00 PM	51	-284	-	-1919	57.6	-	-	-	-

			152+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM	49	-	-2085	-1933	56.4	-3925	-1087		57.2
20-Apr	10:00 PM	48	-	-2085	-1958	55.1	-4015	-1206	-	55.6
21-Apr	06:00 AM	48	-	-2042	-1930	48.9	-4030	-1157	-	50.3
21-Apr	08:30 AM	48	-	-2056	-1880	49.7	-4068	-1090	-	50.7
21-Apr	11:00 AM	52	-	-	-	-	-	-	-	-
21-Apr	02:00 PM	54	-	-2160	-1914	63.6	-4175	-1076	-	63.7
21-Apr	06:00 PM	51	-	-2143	-1933	58.6	-4133	-1100	-	58.9

			153+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM	49	-	-	-	56.6	-2949	-995	-1482	55.6
20-Apr	10:00 PM	48	-	-	-	56.3	-2938	-980	-1475	55.3
21-Apr	06:00 AM	48	-	-	-	51.3	-2964	-917	-1403	49.9
21-Apr	08:30 AM	48	-	-	-	50.1	-2972	-920	-1417	49.1
21-Apr	11:00 AM	52	-	-	-	57.8	-3004	-1025	-1499	55.9
21-Apr	02:00 PM	54	-	-	-	63.9	-3018	-1020	-1522	62.5
21-Apr	06:00 PM	51	-	-	-	59.4	-2986	-1028	-1537	58.7

TABLE 30. DAILY STRAIN CYCLE, STRAIN GAUGES, SUMMER 1998
(Tabulation of Readings)

			141+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM	77	*	-267	-	82.2	-	-	-	82.9
31-Aug	10:00 PM	65	-	-255	-	98.7	-	-	-	60.1
01-Sep	06:00 AM	60	-	-232	-	61.2	-	-	-	62.9
01-Sep	08:30 AM	63	-256	-220	-225	81.6	-	-	-	72.9
01-Sep	11:00 AM		107	-288	-	105.3	-	-	-	97.7
01-Sep	02:00 PM	76	289	-292	-	105.6	-	-	-	101.3
01-Sep	06:00 PM	70	-236	-225		92.3				93.5

			142+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM	77	-2312	-2575	-479	79.3	-1670	-	-1597	83.0
31-Aug	10:00 PM	65	-2514	-2734	-461	55.0	-1876	-	-1716	55.2
01-Sep	06:00 AM	60	-2815	-3115	-427	61.5	-2025	-	-1862	62.6
01-Sep	08:30 AM	63	-3032	-3731	-415	73.5	-2398	-	-1925	74.6
01-Sep	11:00 AM		-2327	-2565	-475	99.8	-1887	-	-1609	92.1
01-Sep	02:00 PM	76	-2319	-2544	-460	105.0	-1663	-	-1581	96.6
01-Sep	06:00 PM	70	-3039	-3690	-404	93.6	-1979	-	-2380	93.7

			147+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM	77	-	0	0	75.4	-	-	-	-
31-Aug	10:00 PM	65	-	0	0	59.2	-	-	-	-
01-Sep	06:00 AM	60	-	0	0	65.2	-	-	-	-
01-Sep	08:30 AM	63	-290	0	0	74.1	-	-	-	-
01-Sep	11:00 AM		-	-	-	104.5	-	-	-	-
01-Sep	02:00 PM	76	-	-	-	91.3	-	-	-	-
01-Sep	06:00 PM	70	-	-	-	93.2	-	-	-	-

			152+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM	77	0	-1685	-1430	73.6	-3290	0	-1140	-
31-Aug	10:00 PM	65	0	-1881	-1716	57.1	-3326	0	-1257	57.1
01-Sep	06:00 AM	60	0	-2225	-1875	65.8	-3742	0	-1236	65.5
01-Sep	08:30 AM	63	0	-2203	-1971	76.3	-4236	4500	-1212	76.6
01-Sep	11:00 AM		0	-1653	-1414	95.4	-3305	0	-1100	93.3
01-Sep	02:00 PM	76	0	-1665	-1377	89.7	-3301	0	-1085	83.0
01-Sep	06:00 PM	70	0	-2224	-2027	94.9	-4244	0	-1134	96.2

			153+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM	77	*	-2113	0	72.3	-2252	0	-1416	-
31-Aug	10:00 PM	65	0	-2167	0	58.5	-2257	0	-1452	-
01-Sep	06:00 AM	60	0	-2570	0	65.3	-2862	-1011	-1486	-
01-Sep	08:30 AM	63	0	-2769	0	76.6	-3074	-989	-1471	75.6
01-Sep	11:00 AM		0	-2070	0	99.5	-2271	-868	-1225	99.3
01-Sep	02:00 PM	76	0	-2078	0	82.6	-2260	-914	-1122	87.5
01-Sep	06:00 PM	70	0	-2930	0	95.9	-3078	-1150	-1411	93.3

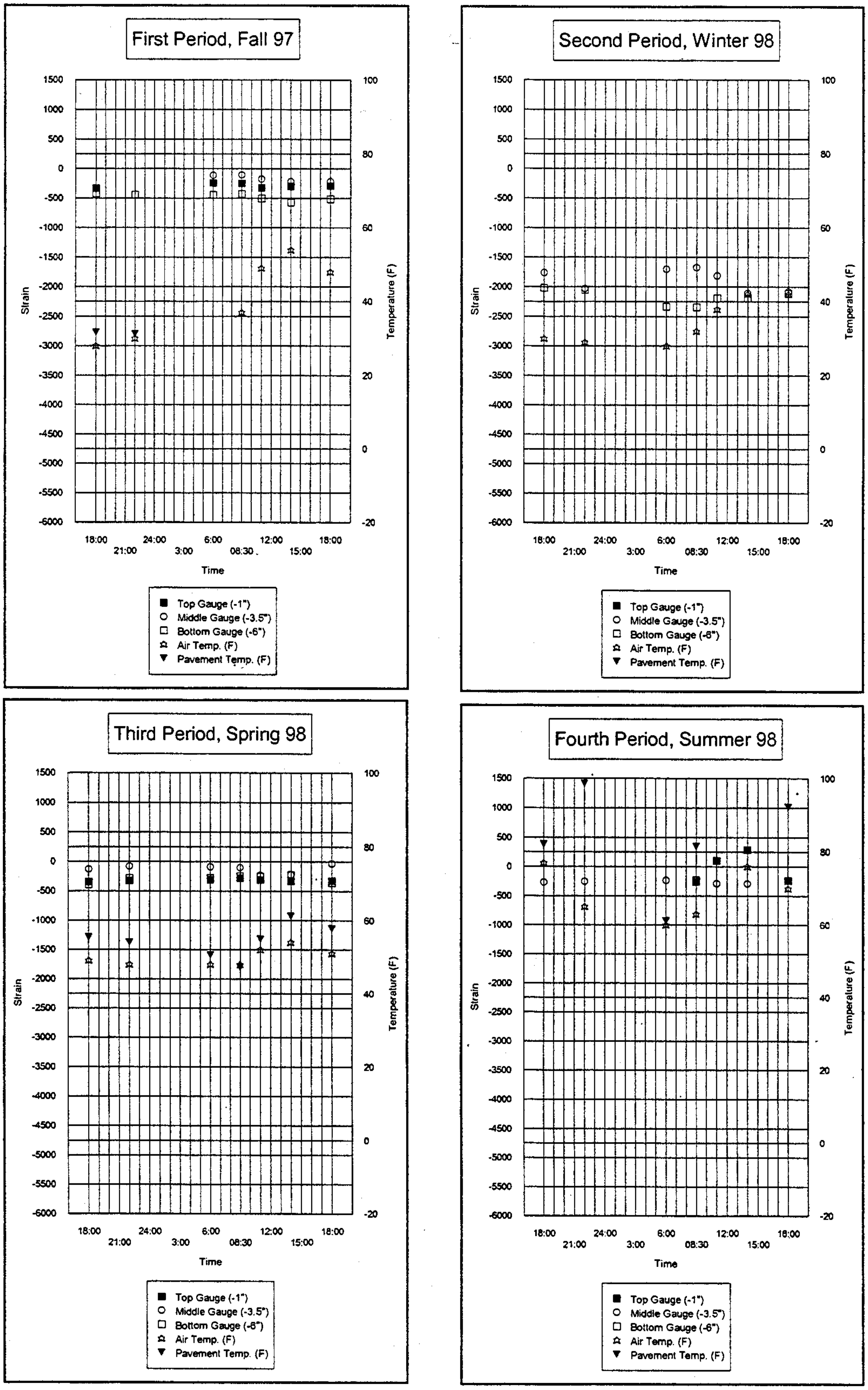


FIGURE 52. DAILY STRAIN CYCLE, STATION 141+00, NORTH SIDE

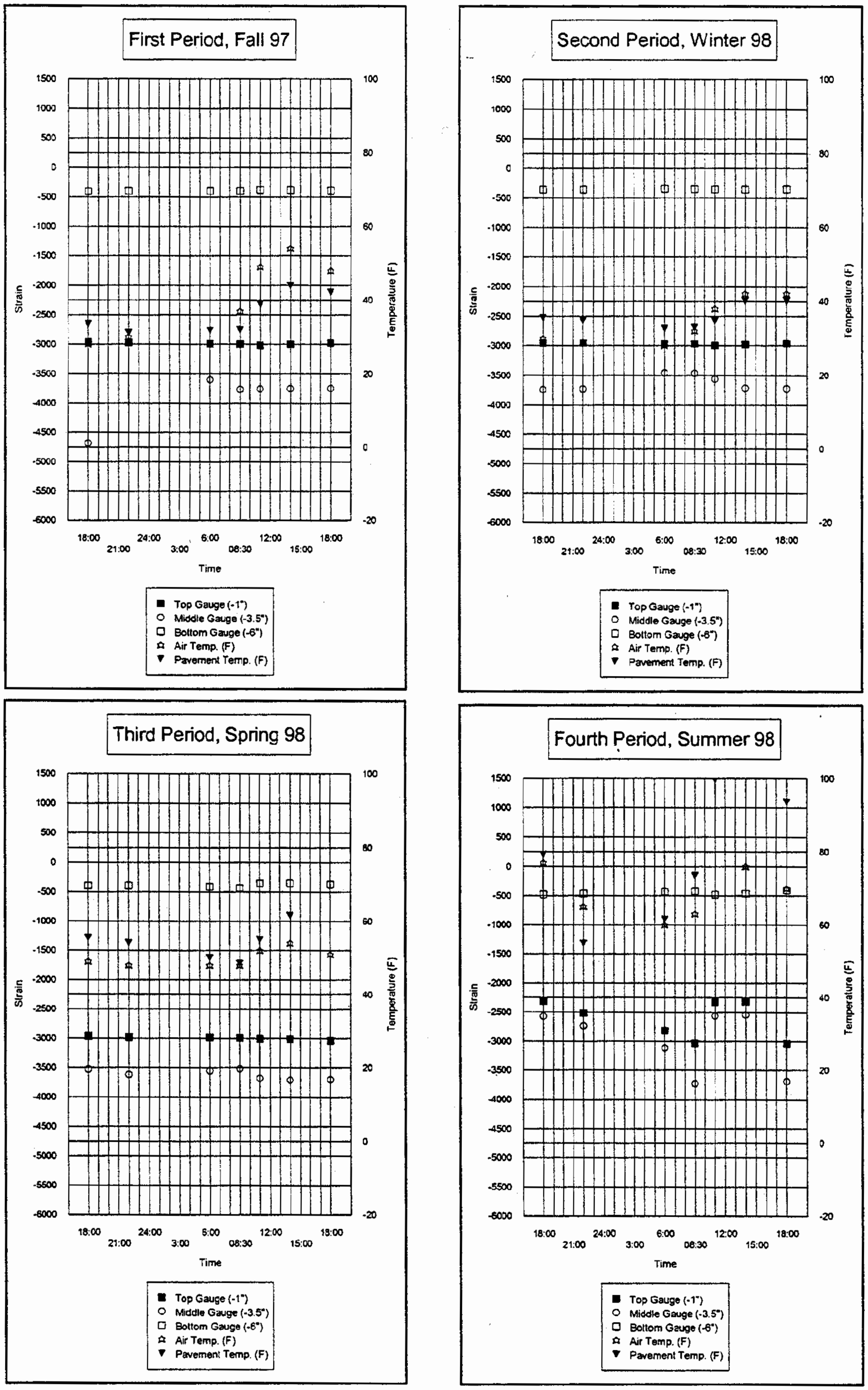


FIGURE 53. DAILY STRAIN CYCLE, STATION 142+00, NORTH SIDE

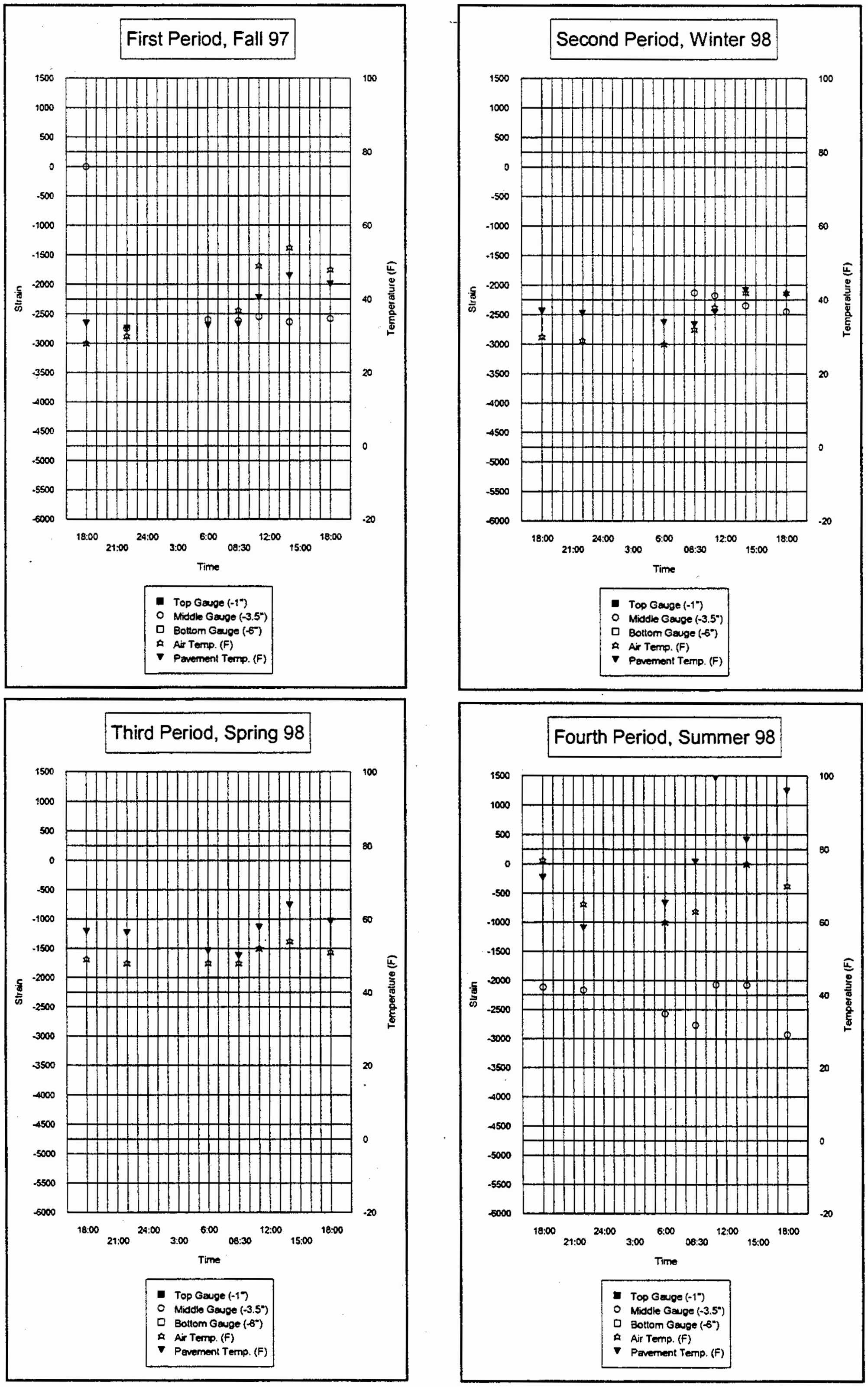


FIGURE 54. DAILY STRAIN CYCLE, STATION 153+00, NORTH SIDE

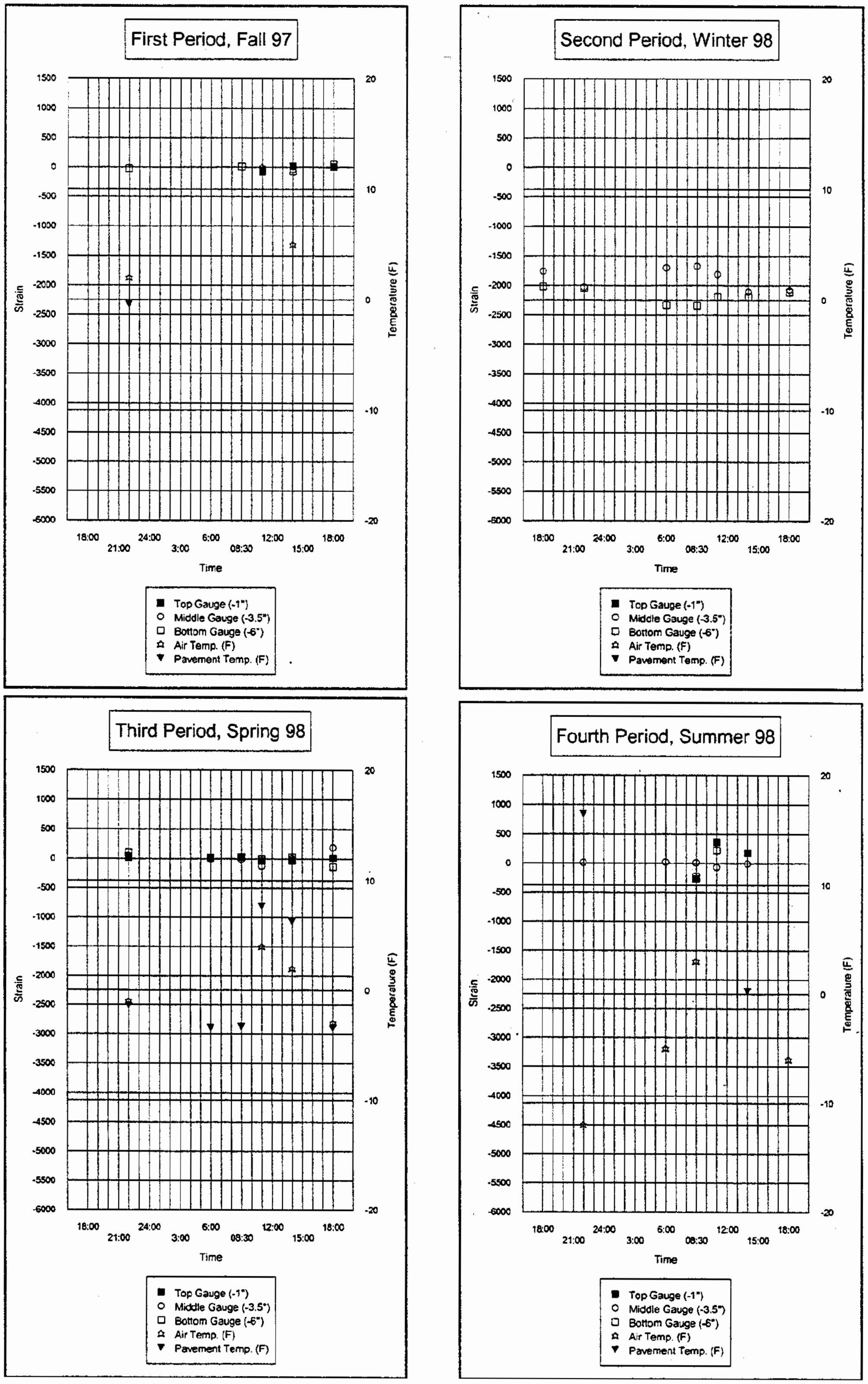


FIGURE 55. DAILY STRAIN CYCLE, STATION 153+00, SOUTH SIDE

There appears to be a relationship between the pavement temperature and the value read from the strain gauge. As the pavement temperature increases, the value read from the strain gauge decreased slightly. This is best shown in figure 53. Note that as the air temperature rises, the strain gauge value decreased. This trend appears in all four reading periods.

There appears to be a better correlation between change in strain gauge value and change in pavement temperature then the relationship between the change in strain gauge value and change in air temperature.

8.3 DAILY STRAIN CYCLE.

Tables 31 through 34 and figures 56 through 59 present the change in strain based on the time and change in pavement temperature. It appears that as the pavement temperature increases, the strain value decreases.

8.4 CHANGE IN STRAIN DUE TO CHANGE IN AIR TEMPERATURE.

The strain readings were analyzed based on change in air temperature. The results are shown in figure 60.

There does not appear to be a relationship between change in air temperature and change in strain gauge value. This is not surprising based on the pavement temperature analysis which showed that the pavement temperature follows the air temperature by several hours.

8.5 CHANGE IN STRAIN DUE TO CHANGE IN PAVEMENT LENGTH.

The strain gauge readings were analyzed based on change in pavement length for each season. The results are shown in figure 61.

There does not appear to be a relationship between change in strain gauge value and change in pavement length. During the fall period, the data points in figure 61 show a level trend. During the winter period, the data points show a scattered trend. During the third period, the data points again show level trend. During the fourth period, the data points again show a scattered trend. The relationship shown in figure 61 for the first and third periods appears that of constant stress/strain readings for changes in length or a lock or correlation.

The strain readings were analyzed based on change in pavement length at each gauge's depth. The results are shown in figure 62.

Although there is a scatter in the points, a unique relationship for each gauge depth appears. This relationship for the gauges at 1 inch and 3.5 inches below the pavement surface are similar. The relationship at 6 inches below the pavement surface is flatter than the other two depths.

TABLE 31. CHANGE IN STRAIN, STRAIN GAUGES, FALL 1997
(Compared to previous readings)

			141+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM									
24-Nov	10:00 PM	2	--	--	-23	-0.4	167	--	--	-1.2
25-Nov	06:00 AM	--	--	--	3	--	--	--	--	-0.1
25-Nov	08:30 AM	--	-10	3	10	--	--	--	--	0.0
25-Nov	11:00 AM	12	-74	-68	-73	--	-1303	--	--	7.4
25-Nov	02:00 PM	5	23	-41	-67	--	--	--	--	6.0
25-Nov	06:00 PM	-6	9	2	60	--	--	--	--	-2.2

			142+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM									
24-Nov	10:00 PM	2	-11	--	8	-2.3	--	--	--	--
25-Nov	06:00 AM	--	-20	--	-1	0.5	--	--	--	--
25-Nov	08:30 AM	--	-4	-164	0	0.2	-34	--	-19	--
25-Nov	11:00 AM	12	-21	8	18	6.9	-96	--	-73	--
25-Nov	02:00 PM	5	20	6	-5	5.1	-30	--	33	--
25-Nov	06:00 PM	-6	22	6	-3	-1.8	31	--	53	--

			147+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM									
24-Nov	10:00 PM	2	--	--	24	--	--	--	--	1.1
25-Nov	06:00 AM	--	--	--	-12	--	--	--	--	-0.5
25-Nov	08:30 AM	--	--	--	-7	--	--	--	--	-0.1
25-Nov	11:00 AM	12	-147	--	-5	--	--	--	--	6.2
25-Nov	02:00 PM	5	50	--	-8	--	--	--	--	6.4
25-Nov	06:00 PM	-6	33	--	-2	--	--	--	--	--

			152+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM									
24-Nov	10:00 PM	2	--	0	-8	-1.0	-23	22960	36	-1.3
25-Nov	06:00 AM	--	--	2	1	0.8	-9	4420	21	0.3
25-Nov	08:30 AM	--	--	-5	1	0.5	-20	3680	12	0.8
25-Nov	11:00 AM	12	--	0	15	7.2	-31	-11190	-8	7.0
25-Nov	02:00 PM	5	--	-15	-24	5.1	28	-2210	-21	5.3
25-Nov	06:00 PM	-6	--	10	3	-2.5	23	550	3	-2.5

			153+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
24-Nov	06:00 PM									
24-Nov	10:00 PM	2	--	-2750	--	-1.4	-38	-16	-6	-1.1
25-Nov	06:00 AM	--	--	150	--	0.8	12	23	13	0.4
25-Nov	08:30 AM	--	--	-20	--	0.3	1	-10	17	0.2
25-Nov	11:00 AM	12	--	70	--	7.2	-35	-11	12	5.7
25-Nov	02:00 PM	5	--	-90	--	5.9	25	-4	-38	6.4
25-Nov	06:00 PM	-6	--	60	--	-2.2	10	-6	-5	-1.4

TABLE 32. CHANGE IN STRAIN, STRAIN GAUGES, WINTER 1998
(Compared to previous reading)

			141+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM									
09-Feb	10:00 PM	-1.0	-	-271	-35	-	-2	-	-21	-0.6
10-Feb	06:00 AM	-1.0	-	331	-278	-	17	-	33	-1.8
10-Feb	08:30 AM	4.0	-	28	-9	-	-5	-	-2	0.4
10-Feb	11:00 AM	6.0	-	-139	150	-	-50	-	-49	2.2
10-Feb	02:00 PM	4.0	-	-295	1	-	-6	-	9	4.8
10-Feb	06:00 PM	0.0	-	28	80	-	18	-	-15	-0.5

			142+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM									
09-Feb	10:00 PM	-1.0	0	11	1	-0.7	4	-	4	-1.9
10-Feb	06:00 AM	-1.0	-11	267	16	267.0	-5	-	-8	2.7
10-Feb	08:30 AM	4.0	-8	-4	-7	-4.0	-18	-	-9	0.5
10-Feb	11:00 AM	6.0	-24	-97	-2	-97.0	11	-	-2	-1.7
10-Feb	02:00 PM	4.0	16	-156	-6	-156.0	-84	-	-30	5.3
10-Feb	06:00 PM	0.0	19	-6	2	-6.0	42	-	24	-0.4

			147+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM									
09-Feb	10:00 PM	-1.0	65	-	-88	-0.1	-	-	-	-0.3
10-Feb	06:00 AM	-1.0	-25	-	45	0.0	-	-	-	-2.2
10-Feb	08:30 AM	4.0	-60	-	-2	0.0	-	-	-	0.2
10-Feb	11:00 AM	6.0	52	-	57	0.0	-	-	-	2.0
10-Feb	02:00 PM	4.0	-13	-	-94	0.0	-	-	-	4.2
10-Feb	06:00 PM	0.0	14	-	-42	0.0	-	-	-	0.6

			152+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM									
09-Feb	10:00 PM	-1.0	-	-271	-35	-0.8	-2	-	-21	-1.5
10-Feb	06:00 AM	-1.0	-	331	-278	331.0	17	-	33	-2.1
10-Feb	08:30 AM	4.0	-	28	-9	28.0	-5	-	-2	0.0
10-Feb	11:00 AM	6.0	-	-139	150	-139.0	-50	-	-49	2.9
10-Feb	02:00 PM	4.0	-	-295	1	-295.0	-6	-	9	5.9
10-Feb	06:00 PM	0.0	-	28	80	28.0	18	-	-15	-2.1

			153+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
09-Feb	06:00 PM									
09-Feb	10:00 PM	-1.0	-	-	-	-0.7	-	-	-	-
10-Feb	06:00 AM	-1.0	-	-	-	0.0	-	-	-	-3.4
10-Feb	08:30 AM	4.0	-	-	-	-2130.0	-	-	-	0.1
10-Feb	11:00 AM	6.0	-	-45	-	-45.0	-375	-1100	-530	3.6
10-Feb	02:00 PM	4.0	-	-170	-	-170.0	-2245	-1545	-1225	5.5
10-Feb	06:00 PM	0.0	-	-99	-	-99.0	-1213	-129	-629	-1.2

TABLE 33. CHANGE IN STRAIN, STRAIN GAUGES, SPRING 1998
(Compared to previous reading)

			141+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM									
20-Apr	10:00 PM	-1.0	22	49	108	-1.4	-	-	-	-1.6
21-Apr	06:00 AM	0.0	17	-8	6	-3.4	-	-	-	-1.4
21-Apr	08:30 AM	0.0	28	-12	32	-3.3	-210	-	-	-5.2
21-Apr	11:00 AM	4.0	-32	-127	-2	7.7	-10	-	-	6.9
21-Apr	02:00 PM	2.0	-25	6	26	6.3	11	-	-	6.5
21-Apr	06:00 PM	-3.0	10	189	-134	-3.4	-7	-	-	-3.5

			142+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM									
20-Apr	10:00 PM	-1.0	-14	-88	0	-1.4	-	-	11	-
21-Apr	06:00 AM	0.0	-3	66	-16	-4.0	-	-	-14	-
21-Apr	08:30 AM	0.0	-10	30	-23	-1.6	-	-	-20	-
21-Apr	11:00 AM	4.0	-12	-155	81	6.6	-	-	26	-
21-Apr	02:00 PM	2.0	-3	-33	2	6.5	-1790	-	61	-
21-Apr	06:00 PM	-3.0	-29	8	-18	-3.8	314	-	-25	-

			147+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM									
20-Apr	10:00 PM	-1.0	2422	-	-	-56.4	-	-	-	-
21-Apr	06:00 AM	0.0	54	-	-	51.7	-	-	-	-
21-Apr	08:30 AM	0.0	45	-	-	-3.2	-	-	-	-
21-Apr	11:00 AM	4.0	-101	-	-	7.2	-	-	-	-
21-Apr	02:00 PM	2.0	-4	-	-	5.6	-	-	-	-
21-Apr	06:00 PM	-3.0	6	-	-	-3.7	-	-	-	-

			152+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM									
20-Apr	10:00 PM	-1.0	-	0	-25	-1.3	-90	-119	-	-1.6
21-Apr	06:00 AM	0.0	-	43	28	-6.2	-15	49	-	-5.3
21-Apr	08:30 AM	0.0	-	-14	50	0.8	-38	67	-	0.4
21-Apr	11:00 AM	4.0	-	-	-	-49.7	-	-	-	-
21-Apr	02:00 PM	2.0	-	-	-	63.6	-	-	-	-
21-Apr	06:00 PM	-3.0	-	17	-19	-5.0	42	-24	-	-4.8

			153+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
20-Apr	06:00 PM									
20-Apr	10:00 PM	-1.0	-	-	-	-0.3	11	15	7	-0.3
21-Apr	06:00 AM	0.0	-	-	-	-5.0	-26	63	72	-5.4
21-Apr	08:30 AM	0.0	-	-	-	-1.2	-8	-3	-14	-0.8
21-Apr	11:00 AM	4.0	-	-	-	7.7	-32	-108	-82	6.8
21-Apr	02:00 PM	2.0	-	-	-	6.1	-14	5	-23	6.6
21-Apr	06:00 PM	-3.0	-	-	-	-4.5	32	-8	-15	-3.8

TABLE 34. CHANGE IN STRAIN, STRAIN GAUGES, SUMMER 1998
(Compared to previous reading)

			141+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM									
31-Aug	10:00 PM	-12.0	0	12	0	16.5	0	0		-22.8
01-Sep	06:00 AM	-5.0	0	23	0	-37.5	0	0		2.8
01-Sep	08:30 AM	3.0	-256	12	-225	20.4	0	0		10.0
01-Sep	11:00 AM	-63.0	363	-68	225	23.7	0	0		24.8
01-Sep	02:00 PM	76.0	182	-4	0	0.3	0	0		3.6
01-Sep	06:00 PM	-6.0								

			142+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM									
31-Aug	10:00 PM	-12.0	-202	-159	18	-24.3	-206		-119	-27.8
01-Sep	06:00 AM	-5.0	-301	-381	34	6.5	-149		-146	7.4
01-Sep	08:30 AM	3.0	-217	-616	12	12.0	-373		-63	12.0
01-Sep	11:00 AM	-63.0	705	1166	-60	26.3	511		316	17.5
01-Sep	02:00 PM	76.0	8	21	15	5.2	224		28	4.5
01-Sep	06:00 PM	-6.0								

			147+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM									
31-Aug	10:00 PM	-12.0	0		0	-16.2				
01-Sep	06:00 AM	-5.0	0		0	6.0				
01-Sep	08:30 AM	3.0	-290		0	8.9				
01-Sep	11:00 AM	-63.0	290		0	30.4				
01-Sep	02:00 PM	76.0	0		0	-13.2				
01-Sep	06:00 PM	-6.0								

			152+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM									
31-Aug	10:00 PM	-12.0	0	-196	-286	-16.5	-36		-117	57.1
01-Sep	06:00 AM	-5.0	0	-344	-159	8.7	-416		21	8.4
01-Sep	08:30 AM	3.0		22	-96	10.5	-494		24	11.1
01-Sep	11:00 AM	-63.0	0	550	557	19.1	931		112	16.7
01-Sep	02:00 PM	76.0	0	-12	37	-5.7	4		15	-10.3
01-Sep	06:00 PM	-6.0	0	-559		5.2				

			153+00							
			NORTH SIDE				SOUTH SIDE			
DATE	TIME	AIR TEMP (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)	1" DEPTH (in/in)	3.5" DEPTH (in/in)	6" DEPTH (in/in)	PVT TEMP 4.3" (deg F)
31-Aug	06:00 PM									
31-Aug	10:00 PM	-12.0	0		0	-13.8	-5	0	-36	0.0
01-Sep	06:00 AM	-5.0	0		0	6.8	-605	-1011	-34	0.0
01-Sep	08:30 AM	3.0	0		0	11.3	-212	22	15	75.6
01-Sep	11:00 AM	-63.0	0		0	22.9	803	121	246	23.7
01-Sep	02:00 PM	76.0	0		0	-16.9	11	-46	103	-11.8
01-Sep	06:00 PM	-6.0								

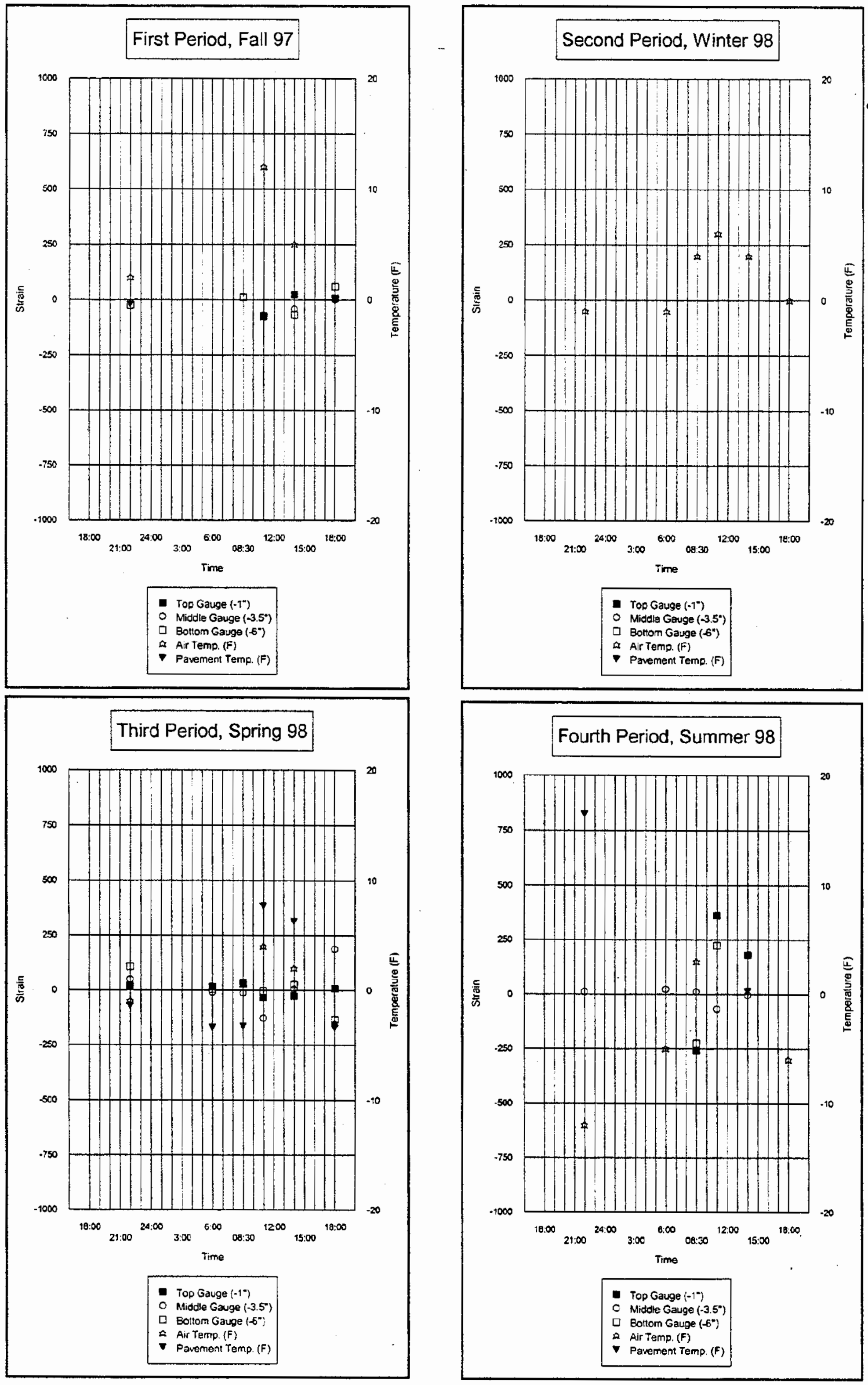


FIGURE 56. CHANGE IN STRAIN, COMPARED TO PREVIOUS READING, STATION 141+00, NORTH SIDE

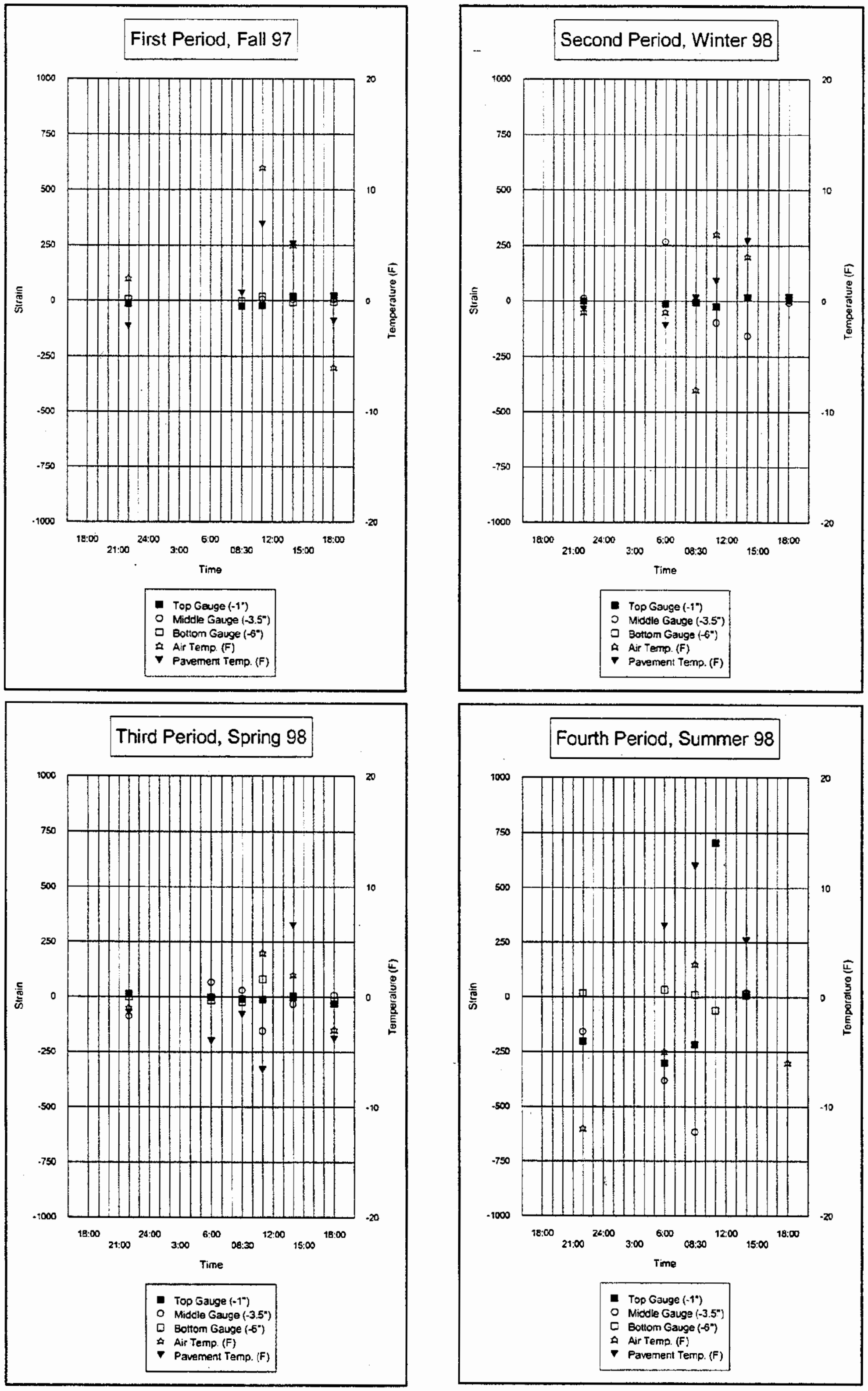


FIGURE 57. CHANGE IN STRAIN, COMPARED TO PREVIOUS READING, STATION 142+00, NORTH SIDE

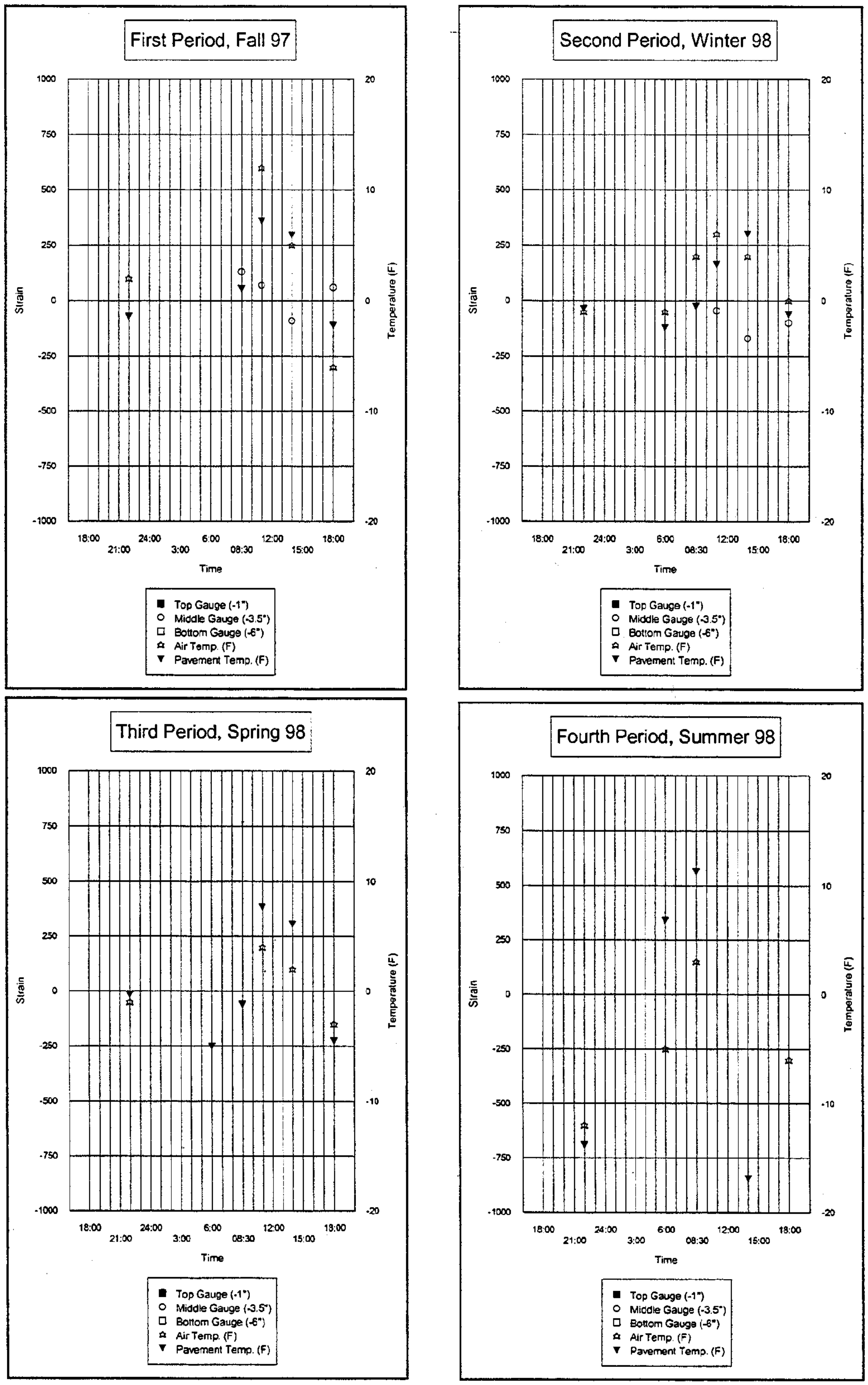


FIGURE 58. CHANGE IN STRAIN, COMPARED TO PREVIOUS READING, STATION 153+00, NORTH SIDE

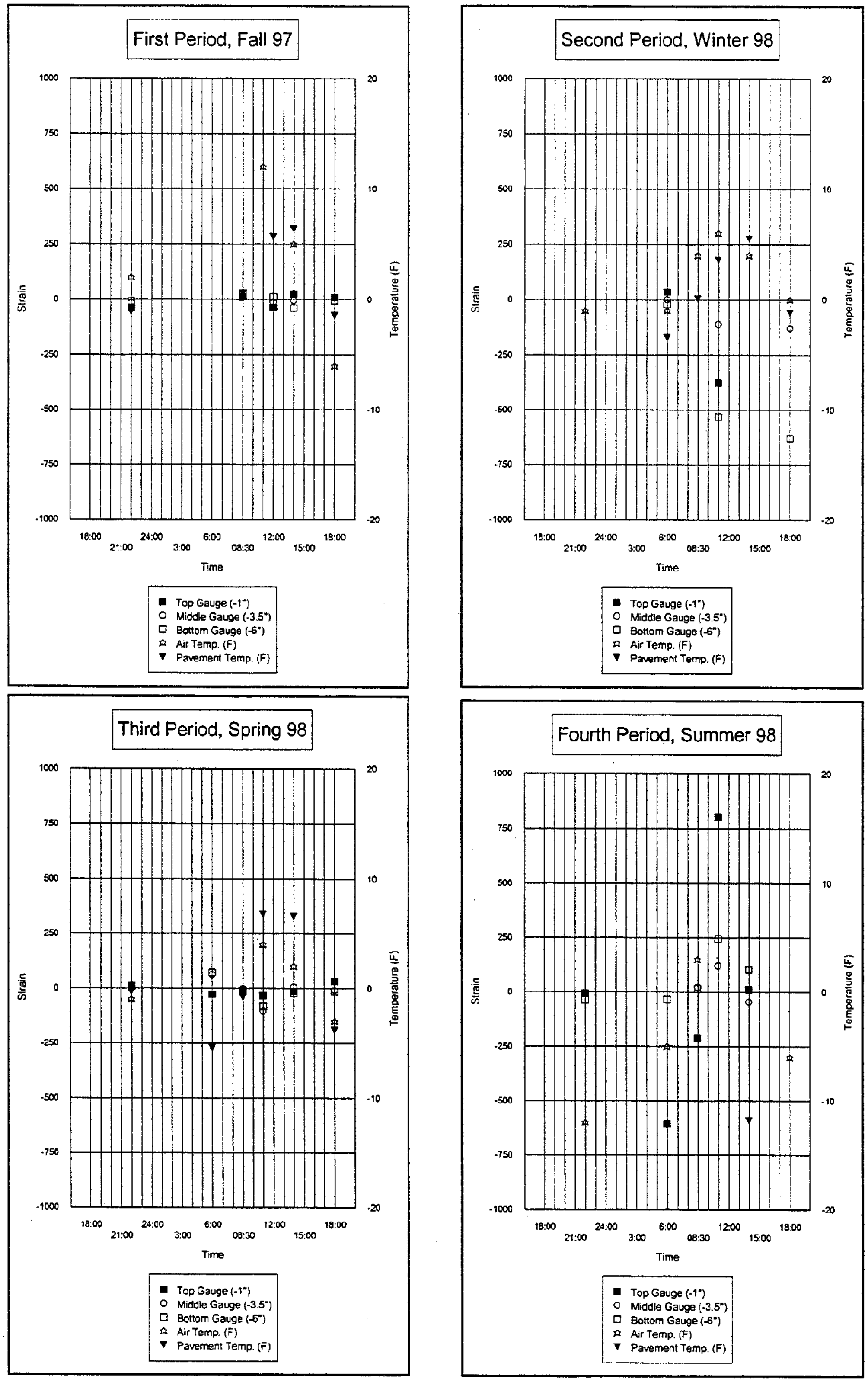


FIGURE 59. CHANGE IN STRAIN, COMPARED TO PREVIOUS READING, STATION 153+00, SOUTH SIDE

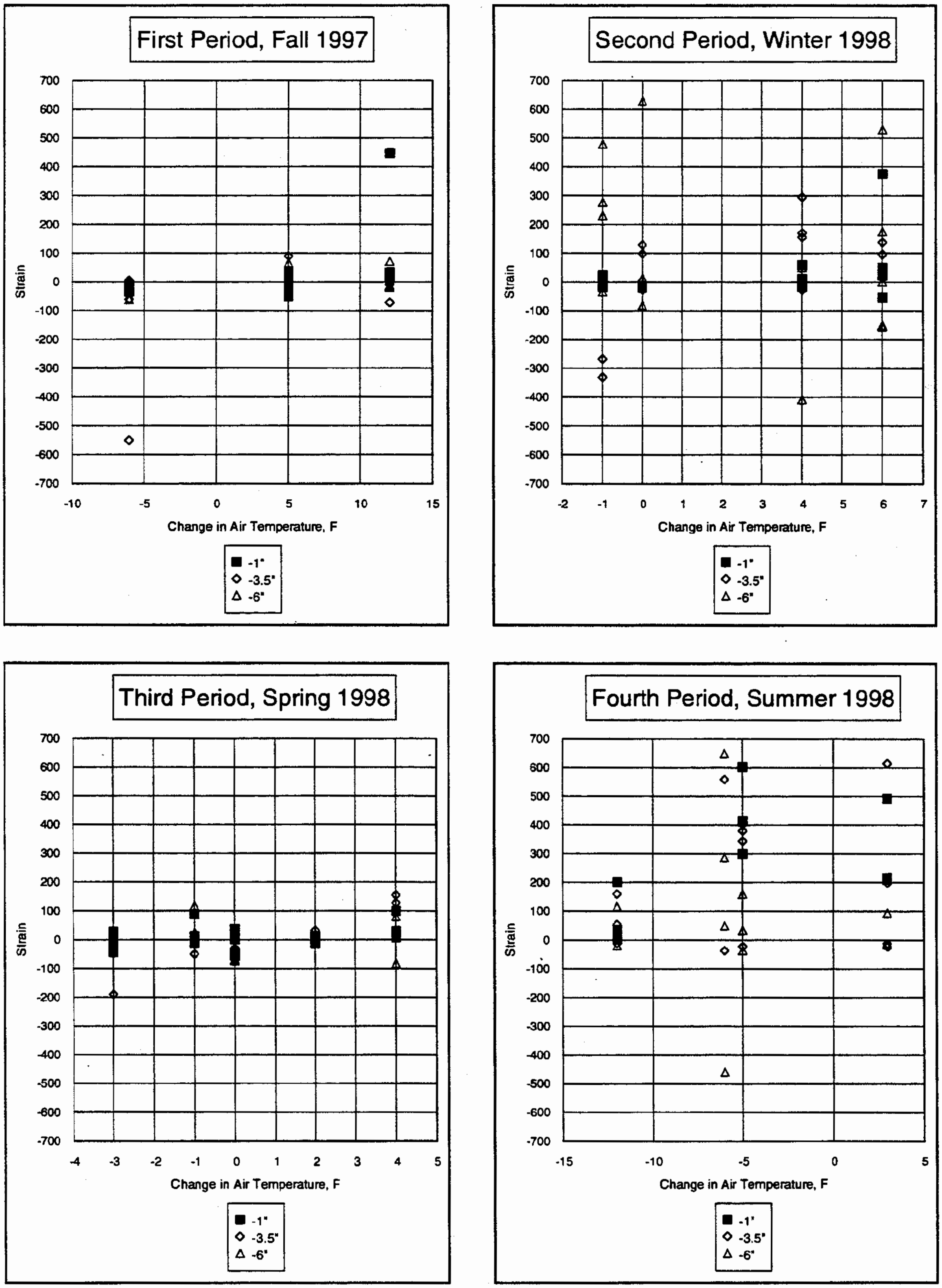


FIGURE 60. CHANGE IN STRAIN DUE TO CHANGE IN AIR TEMPERATURE

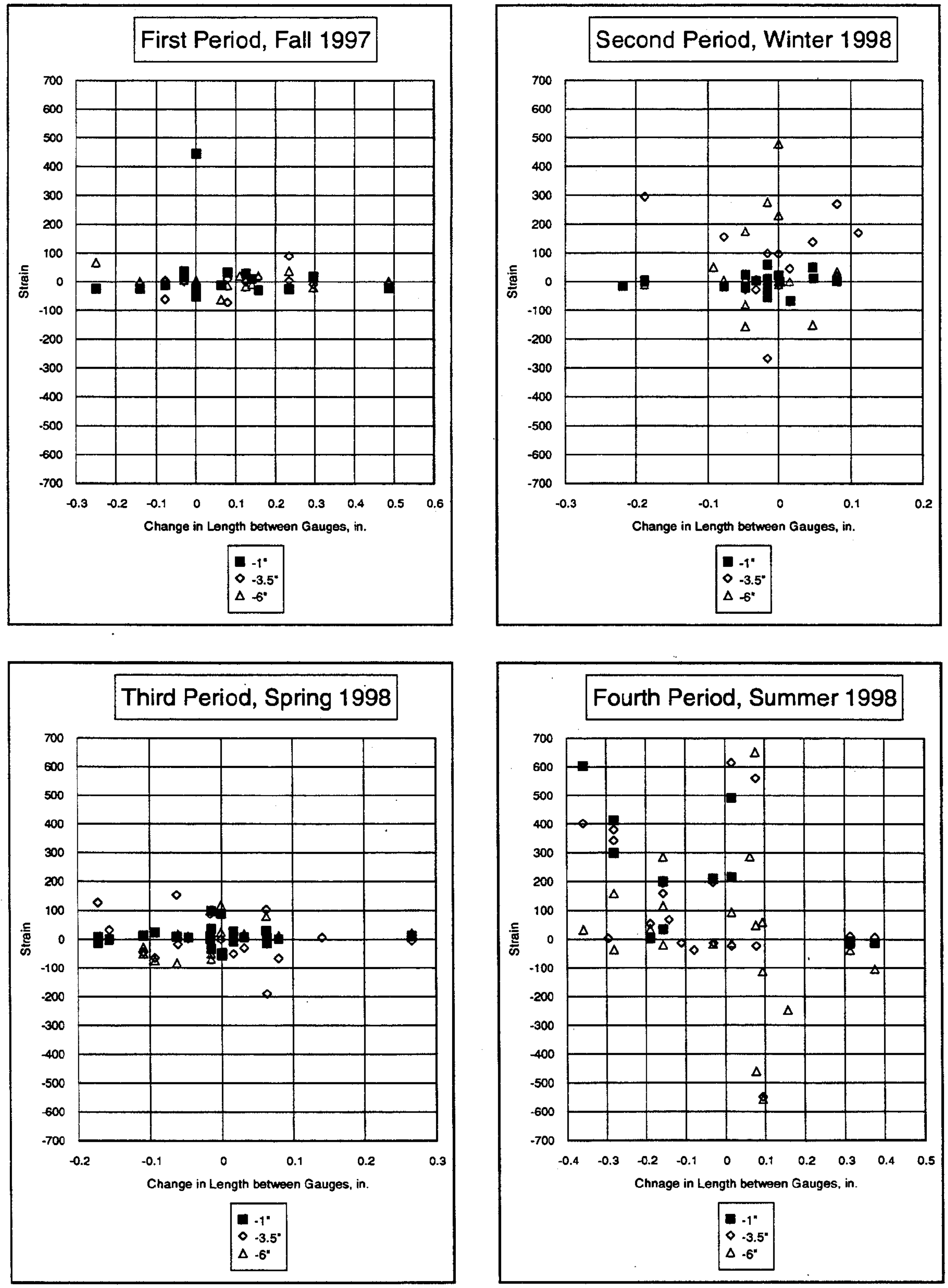


FIGURE 61. CHANGE IN STRAIN DUE TO CHANGE IN PAVEMENT LENGTH, FOR EACH SEASON

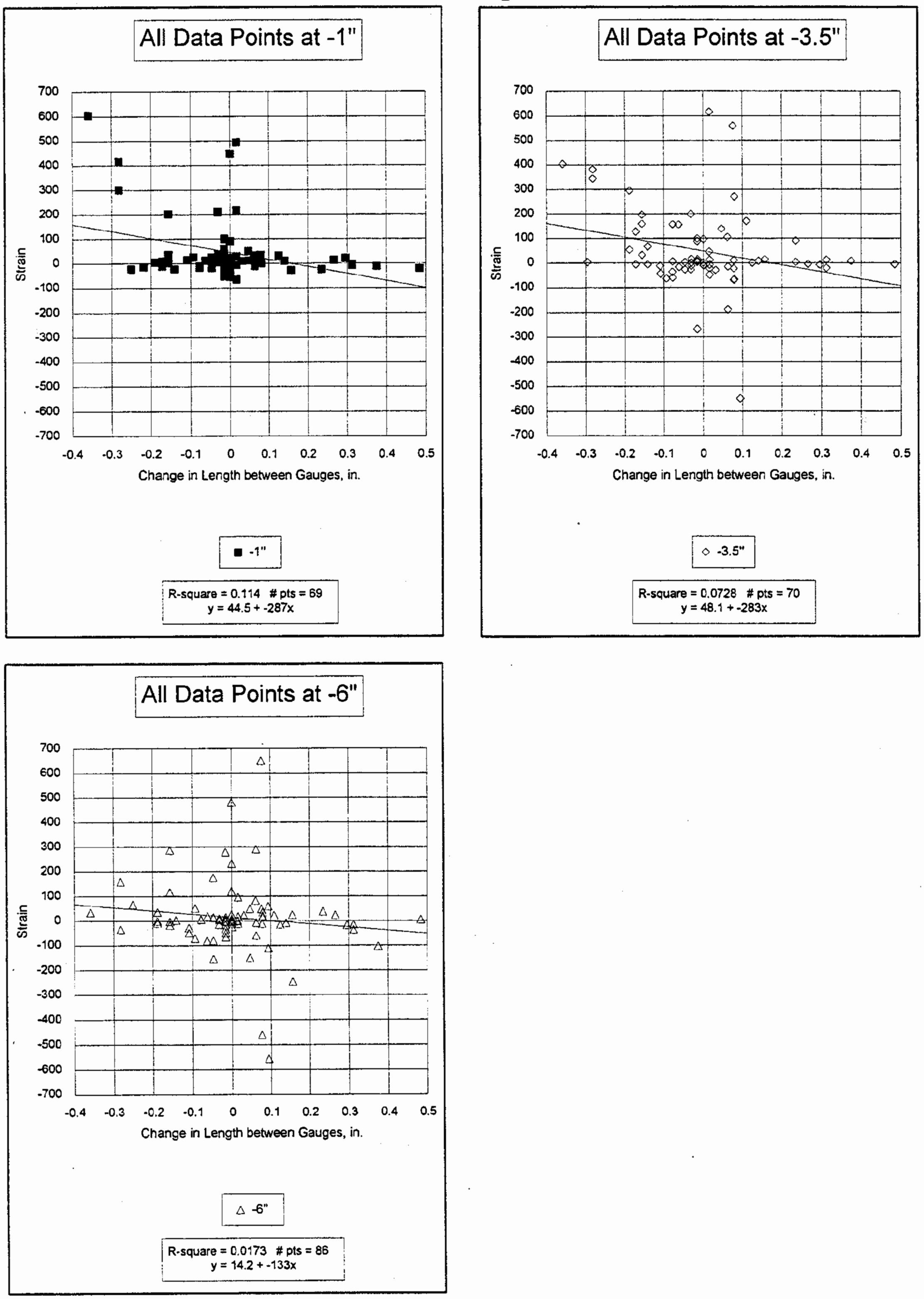


FIGURE 62. CHANGE IN STRAIN DUE TO CHANGE IN PAVEMENT LENGTH, FOR EACH GAUGE DEPTH

When all of the data points are combined, there appears to be a relationship between all of the data points, as shown in figure 63.

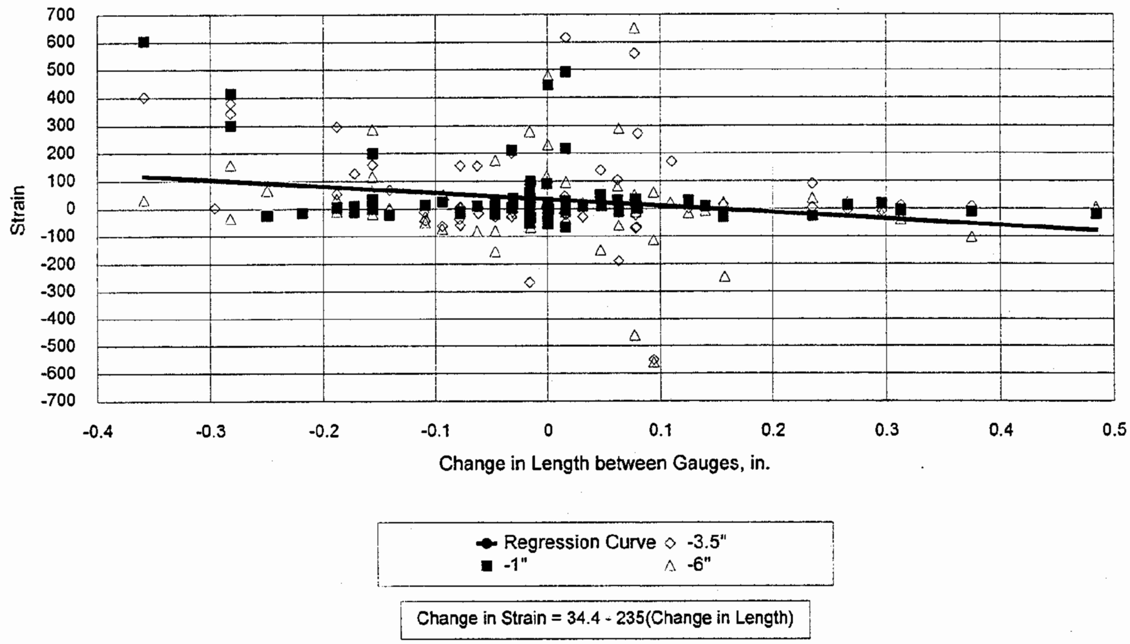


FIGURE 63. CHANGE IN STRAIN DUE TO CHANGE IN PAVEMENT LENGTH, ALL DATA POINTS

8.6 CHANGE IN STRAIN DUE TO CHANGE IN PAVEMENT TEMPERATURE.

The strain readings were analyzed based on a change in pavement temperature at a depth of 4.3 inches. The results are shown in figure 64.

There does not appear to be a relationship between change in strain and change in pavement temperature at a depth of 4.3 inches. During the fall period, the data points in figure 64 show a level trend. During the winter period, the data points show an scattered trend. During the third period, the data points again show level trend. During the fourth period, the data points again show a scattered trend.

8.7 CHANGE IN STRAIN DUE TO PAVEMENT TEMPERATURE.

The strain readings were analyzed based on a change in temperature at the same depth as the strain gauge. The pavement temperature had to be interpreted from the thermocouples gauges.

The results, shown in figure 65 show a very good relationship between change in strain and change in temperature for each season. The slope of the regression line for the data points in the first, third, and fourth periods varies between -3.0164 and -5.3333. The slope of the regression line for the second period (winter) data point is -10.6950.

The reason for the increase in the slope of the second period (winter) is a scatter in the temperature readings at a depth of 6 inches. The cause for this is unknown.

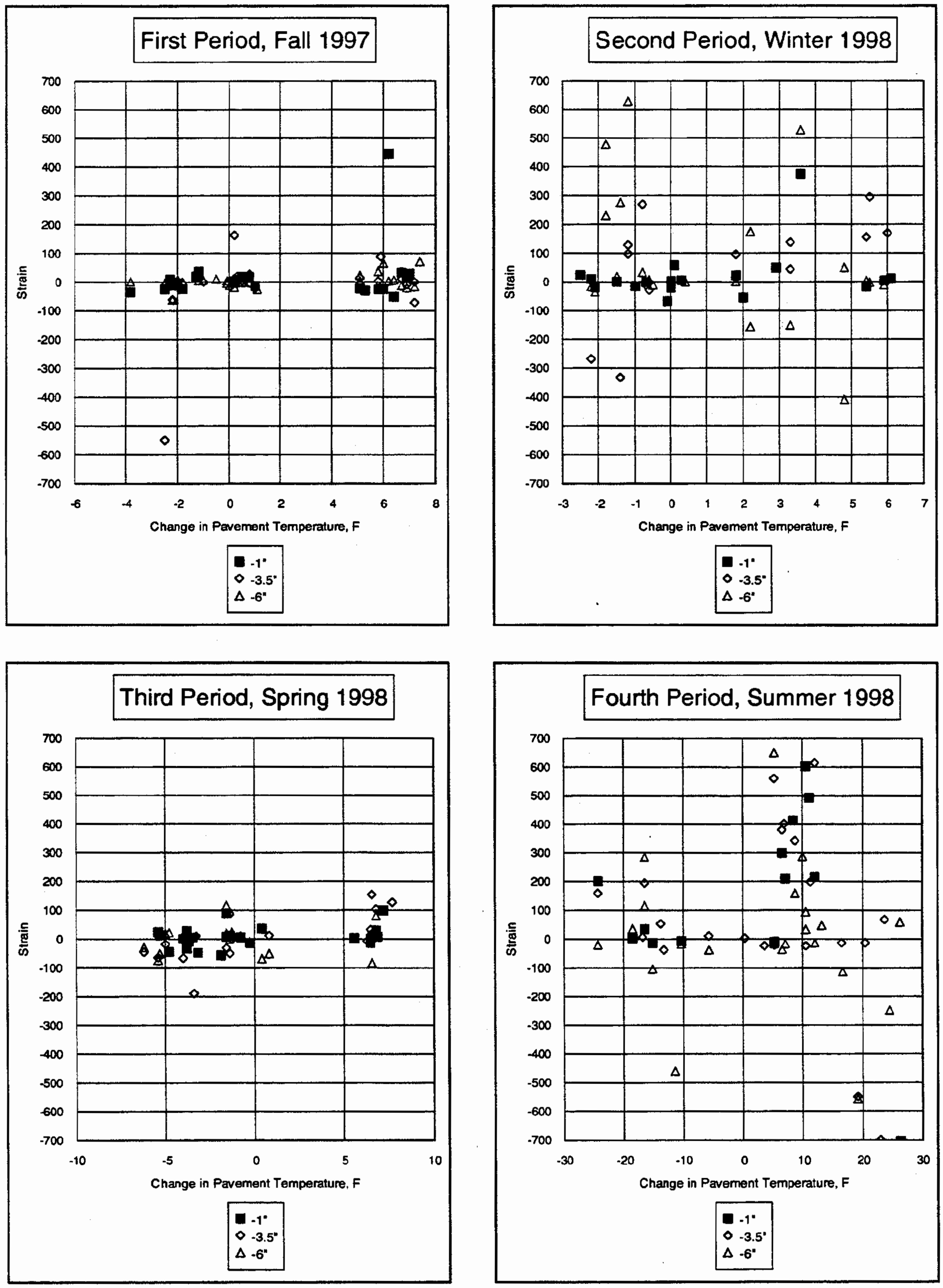


FIGURE 64. CHANGE IN STRAIN DUE TO CHANGE IN PAVEMENT TEMPERATURE AT A DEPTH OF 4.3 inches

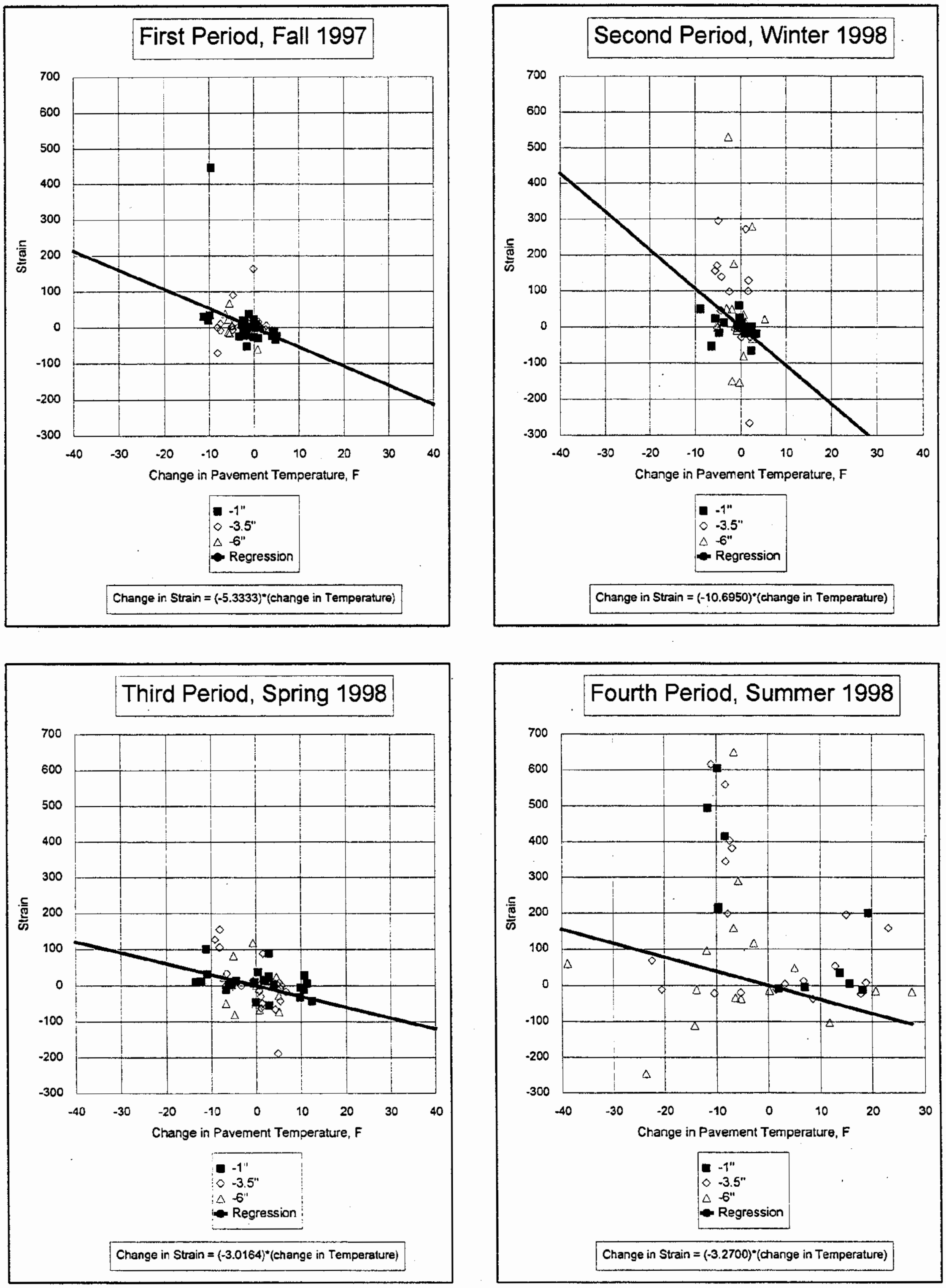


FIGURE 65. CHANGE IN TEMPERATURE, CHANGE IN STRAIN

8.8 CHANGE IN STRAIN DUE TO CHANGE IN PAVEMENT TEMPERATURE—ALL POINTS.

The change in strain was plotted against the change in pavement temperature at comparable depths for the first three readings (fall, winter, and spring) and is shown in figure 66. Figure 67 shows the strain reading for all four reading periods. Although there appears to be more scatter in the data points, the slope of the regression lines increases slightly from -4.2424 to -4.1241.

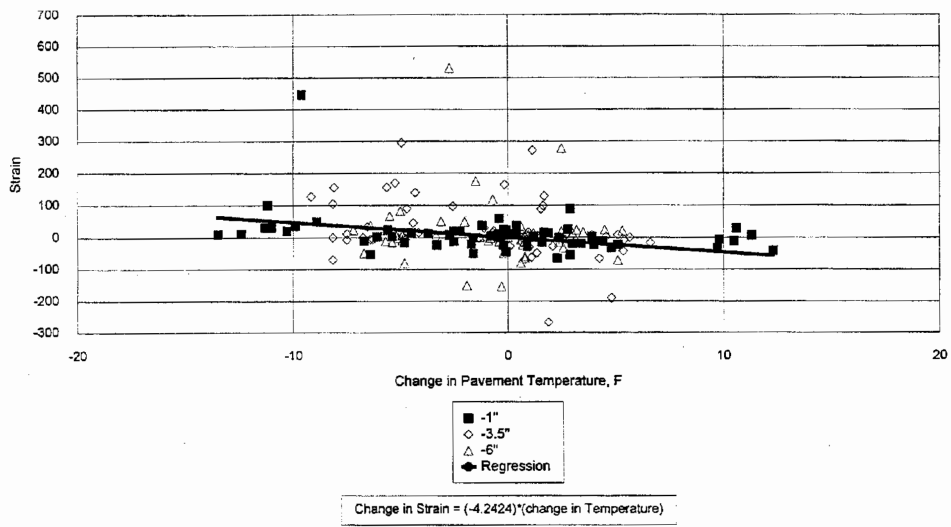


FIGURE 66. CHANGE IN TEMPERATURE, CHANGE IN STRAIN—FIRST THREE READINGS
(Fall 1997, Winter 1998, and Spring 1998)
(Based on a change from previous reading, reasonable data points, as shown)

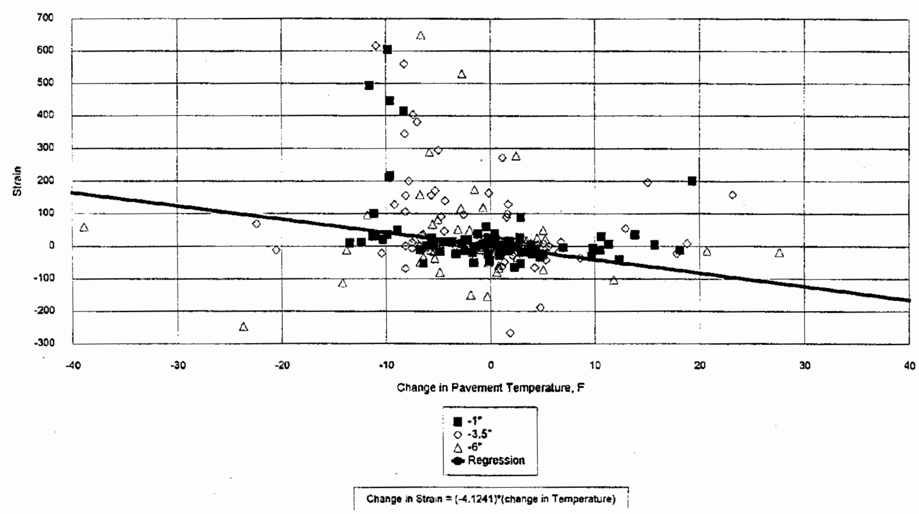


FIGURE 67. CHANGE IN TEMPERATURE, CHANGE IN STRAIN—ALL FIFTH YEAR READINGS
(Fall 1997, Winter 1998, Spring 1998, and Summer 1998)
(Based on a change from previous reading, reasonable data points, as shown)

In summary, it appears that for the fifth year, there is a relationship between change in strain and change in pavement temperature. This relationship is

Change in strain = (-4.1241) × (change in temperature)

The relationship for the third year was

Change in strain = (-2.0925) × (change in temperature)

The relationship for the fourth year was

Change in strain = (-3.3141) × (change in temperature)

The average relationship for the third, fourth, and fifth year is

Change in strain = (-3.1769) × (change in temperature)

8.9 ERRONEOUS DATA.

During the analysis of the third year data, it was observed that the readings during October 1994, April 1995, and July 1995, were erroneous and should not be included in any further analysis. The equipment used to the strain gauges was not working properly.

8.10 LONG-TERM CHANGE IN STRAIN—FUNCTIONAL GAUGES.

A comparison of gauge readings at stations 141+00 north, 142+00 south, 153+00 north and 153+00 south are shown in table 35. Some of the gauges show fairly consistent readings during the past five years while others are inconsistent.

Ten gauges have consistently provided reliable data. The average strain reading for each reading period was calculated and is shown in tables 36. Some obviously erroneous data, such as when the gauges did not work, and wandering data, has been removed from the table and the corrected data is shown in table 37.

The data points in table 37 were analyzed using regression analysis. The results are shown in table 38. All but one of the slopes of the regression analysis are negative. This indicates that there is a long-term change in strain.

TABLE 35. TABULATION OF QUARTERLY STRAIN READINGS AT SELECTED LOCATIONS

	141+00 North Side			142+00 North Side			153+00 North Side			153+00 South Side		
	-1"	-3.5"	-6"	-1"	-3.5"	-6"	-1"	-3.5"	-6"	-1"	-3.5"	-6"
27-Oct-93		30	-2	-2644	-3413	-50	-5386	-1871	988	-2685	-767	-1151
		33	-4	-2643	-3414	-50	-5387	-1869	992	-2685	-764	-1150
		30	-19	-2655	-3415	-48	-5398	-1860	993	-2695	-765	-1146
		32	-41	-2660	-3415	-53	-5400	-1871	994	-2696	-763	-1148
		31	-67	2646	-3415	-54	-5389	-1871	989	-2686	-767	-1154
		49	-80	-2636	-3415	-53	-5389	-1863	986	-2678	-763	-1153
		49	190	-2641	-3422	-54	-5383	-1866	992	-2684	-762	-1148
20-Apr-94				-2597	-3358		-5564	-1863	978	-2648	-762	-1172
				-2617	-3364		-5386	-1853	994	-2667	-749	-1141
				-2640	-3337		-3040	-1863	-1660	-3869	-7739	-829
				-2653	-3364		-5388	-1866	989	-2677	-761	-1140
				-2584	-3344		-5343	-1859	974	-2641	-756	-1158
				-2575	-3359		-5330	-1847	971	-2644	-754	-1152
				-2574	-3355		-5343	-1839	986	-2629	-744	-1142
21-Jul-94			-1830	-2521	-3217	142	-4889	-1566	1424	-2139	-451	-1062
			-700	-2108	-2857	471	-4994	-1530	1423	-1223	-305	-873
			-434	-2178	-2822	582	-5355	-1920	990	-2553	-1215	-780
			444	-2640	-3252	90	-5377	-1882	988	-2684	-743	-1147
			430	-2629	-3268	50	5363	-1889	954	-2680	-779	-1185
			144	-2625	-3323	1	-5358	-1889	952	-2676	-781	-1210
			271	-2610	-3325	21	-5368	-1880	919	-2688	-787	-1208
26-Oct-94			-686			-675	-673	-670	-682	-682	-671	-679
			-744	-733	-720	-728	-727	-719	-723	-727	-728	-723
		11685	-739	-726	-730	-776	-724	-725	-726	-727	-727	-725
		14745	-737	-730	-729	-743	-725	-720	-725	-733	-730	-725
	-9462	16710	-732	-726	-726	-716	-721	-722	-729	-730	-728	-728
	-7800		-752	-778	-721	-725	-740	-738	-744	-745	-742	-742
			-776	-745	-744	-744	-742	-738	-744	-744	-741	-743
07-Feb-95			-770	-763	-761	-766	-744	-731	-740	-745	-741	-738
			-746	-732	-735	-746	-740	-743	-739	-739	-737	-732
			-744	-747	-745	-733	-742	-721	-740	-741	-751	-744
			-749	-749	-748	-707	-749	-740	-745	-743	-748	-753
			-745	-742	-742	-742	-753	-733	-740	-741	-744	-748
			-743	-742	-748	-755	-754	-738	-748	-749	-744	-746
			-758	-753	-749	-763	-758	-745	-751	-758	-754	-755
26-Apr-95			-1030	-185	-128	-137	-6012	-2650	330	-2749	-460	-1575
			-721	-2636	-201	4	-5030	-1966	790	-2471	-881	-1320
			-780	-2882	-288	470	-5050	-2177	920	-2783	-563	-1294
			-1760	-2998	-478	-37	-691	-2181	383	-2748	-1176	-1447
			-1600	-2792	-379	225	-454	-2462	-1000	-2828	-1136	-1660
			-1781	-3085	-428	-203	-456	-2246	684	-2836	-958	-1692
			-1170	-2977	-3830	-294	-5907	-2140	569	-2945	-1169	-1981
01-Aug-95			-1951	-695	-696	-686	-6183	-3017	150	-3435	-1531	-2009
			-1663	-694	-692	-688	-688	-684	-681	-3469	-1533	-665
			-1963	-692	-695	-691	-697	-44	-683	-3472	-1530	-1999
			-1565	-629	-691	-800	-5640	250	-560	-632	-660	-656
			-1925	-3436	-673	-722	-672	-602	-683	-681	-644	-734
			-685	-390	-695	-688	-677	-149	217	-690	-702	-705
			-935	-2470	169	-650	-1930	-350	700	-680	198	650
17-Oct-95			-282	-1433	-296	-399	-5728	-2312	581	-2333	-283	-1542
			-306	-3000	-285	-385	-5732	-2373	571	-3032	-1103	-1528
	-795	-235	-1295	-3053	-3727	-358	-5786	-2456	587	-3073	-1103	-1536
	-805	-249	-971	-3022	-3736	-395	-5753	-2462	562	-3042	-1120	-1558
	-657	-191	-685	-3011	-3761	-408	-5754	-2420	554	-3034	-1120	-1562
	-714	-189	-741	-3005	-3762	-405	-5733	-2402	547	-3040	-1116	-1524
30-Jan-96				-2992	-308		-5729		500	-2968	-1188	-1609
				-3012	-3860		-5738	-329	508	-3007	-1110	-1700
				-3045	-280		-5771	-371	508	-3062	-1125	-1600
				-3037	3835		-5729	-2300	537	-3025	-1090	-1588
				-2989	-3835		-5706	-2298	529	-2988	-1089	-1608
				-2998	-3841		-5718	-2308	508	-2988	-1118	-1610
				-3000	-3850		-5709	-2284	512	-2991	-1109	-1610
30-Apr-96	450	-186	-460	-2968	-3743	-380	-5687	-2613	608	-2964	-1057	-1484
	808	-190	-384	-2995	-3747	-376	-5723	-2642	615	-3010	-1066	-1483
	810	-205	-438	-3019	-3726	-340	-5783	-2579	611	-3041	-1070	-1461
	548	-229	-420	-3031	-3718	-336	-5807	-2742	614	-3059	-1084	-1474
	266	-203	-566	-3001	-3718	-363	-5769	-2640	585	-3032	-1102	-1530
	132	-202	-525	-2966	-3731	-385	-5734	-2453	570	-3007	-1102	-1520
	12	-195	-551	-2962	-3749	-396	-5706	-2460	567	-3000	-1096	-1533
17-Jul-96	-560	-228	-500	-3036	-3733	-425	-5785		553	-3066	-1171	-1633
	-4422	-234	-470	-2925	-3650	-378	-5817		560	-3080	-1210	-1450
	-291	-250	-2940	-2916	-3485	-235	-5583		865	-3019	-1057	-1295
	1645	85	-573	-3630	-3305	-208	-2765		1301	-2434	-321	-163
	-10	153	-145	-2723	-3475	-91	-5570		925	-2525	-754	-1188
	-251	-877	-78	-2788	-3489	-104	-5505			-2888	-1289	-799

TABLE 35. TABULATION OF QUARTERLY STRAIN READINGS AT SELECTED LOCATIONS (Continued)

	141+00 North Side			142+00 North Side			153+00 North Side			153+00 South Side		
	-1"	-3.5"	-6"	-1"	-3.5"	-6"	-1"	-3.5"	-6"	-1"	-3.5"	-6"
21-Nov-96	-366	-172	-369	-2990	-3795	-425		-2595		-2990	-1072	-1535
	-332	-152	-232	-2991	-3782	-411		-2618		-3006	-1068	-1537
	-345	-117	-301	-2997	-3777	-403		-2634		-3007	-1075	-1497
	-339	-166	-363	-2992	-3778	-299		-2540		-2984	-1075	-1514
	-326	-139	-242	-2975	-3770	-401		-2500		-2961	-1027	-1480
	-218	-195	-252	-2962	-3760	-382		-2560		-2961	-1052	-1469
	-352	-175	-175	-3051	-3725	-318		-2530		-2750	-1000	-1110
Feb-97												
6-May-97	-232			2406	3120	-223		1502		2419	479	1028
	-214			2395	3146	-304		1822		2428	498	1042
	-210			2443	3116	-237		1740		2459	489	969
	-295			2454	3116	-232		1870		2475	500	1020
	-306			2424	3122	-216		1825		2446	514	1039
22-Jul-97	-380	-113	-333	-3120	-3363	-435				-3018	-1586	-1070
	-395	-279	-374	-3058.	-3541	-371				-3026	-1150	-1602
	-390	-300	-630	-3064	-3580	-360				-2250	-570	-1160
	-387	-292	-548	-3012	-3620	-382				-2647	-929	-1413
	-402	-342	-495	-3160	-3230	-395				-2825	-1118	-1490
	-399	-315	-590	-3021	-3570	-397				-3028	-1132	-1592
	-413	-396	-347	-3040	-3720	-403				-3054	-1170	-1578
24-Nov-97	-330		-420	-2959	-4682	-402				-2964	-1047	-1528
			-443	-2970		-394		-2750		-3002	-1063	-1534
	-240	-110	-440	-2990	-3600	-395		-2600		-2990	-1040	-1521
	-250	-107	-430	-2994	-3764	-395		-2620		-2989	-1050	-1504
	-324	-175	-503	-3015	-3756	-377		-2550		-3024	-1061	-1492
	-301	-216	-570	-2995	-3750	-382	6810	-2640		-2999	-1065	-1530
	-292	-214	-510	-2973	-3744	-385		-2580		-2989	-1071	-1535
09-Feb-98	-267	-177		-2948	-3738	-358						
	-285	-180		-2948	-3727	-357						
	-272	-190	-480	-2959	-3460	-341						
	-272	-191	-480	-2967	-3464	-348		-2130		2400	1860	1400
	-237	-191	-326	-2991	-3561	-350		-2175		2025	760	870
	-226	-190	-377	-2975	-3717	-356		-2345		-220	-785	-355
	-233	-196	-367	-2956	-3723	-354		-2444		-1433	-914	-984
20-Apr-98	-342	-126	-389	-2963	-3528	-391				-2949	-995	-1482
	-320	-77	-281	-2977	-3616	-391				-2938	-980	-1475
	-303	-85	-275	-2980	-3550	-407				-2964	-917	-1403
	-275	-97	-243	-2990	-3520	-430				-2972	-920	-1417
	-307	-224	-245	-3002	-3675	-349				-3004	-1025	-1499
	-332	-218	-219	-3005	-3708	-347				-3018	-1020	-1522
	-322	-29	-353	-3034	-3700	-365				-2986	-1028	-1537
31-Aug-98		-267		-2312	-2575	-479		-2113		-2252		-1416
		-255		-2514	-2734	-461		-2167		-2257		-1452
		-232		-2815	-3115	-427		-2570		-2862	-1011	-1486
	-256	-220	-225	-3032	-3731	-415		-2769		-3074	-989	-1471
	107	-288		-2327	-2565	-475		-2070		-2271	-868	-1225
	289	-292		-2319	-2544	-460		-2078		-2260	-914	-1122
	-236	-225		-3039	-3690	-404		-2930		-3078	-1150	-1411

TABLE 36. AVERAGE STRAIN READINGS FOR READING PERIODS
(For gauges which have functioned during most reading periods)

Reading Period	141+00 North Side -6"	141+00 South Side -1"	142+00 North Side -1"	142+00 North Side -3.5"	142+00 North Side -6"
	141, N, -6"	141, S, -1"	142, N, -1"	142, N, -3.5"	142, N, -6"
Oct-93	-36	-4039	-1890	-3416	-52
Apr-94		-4145	-2606	-3354	
Jul-94	-239	-4036	-2605	-3277	194
Oct-94	-738	-704	-740	-728	-730
Feb-95	-751	-743	-747	-747	-745
Apr-95	-1468	-4251	-2895	-317	4
Aug-95	-1527	-525	-2953	-568	-704
Oct-95	-713	-4352	-3018	-3747	-392
Jan-96			-3010	-2310	
Apr-96	-478	-4260	-2992	-3733	-368
Jul-96	-768	-4288	-2897	-3553	-258
Nov-96	-276	-4510	-2994	-3770	-332
Jan-97					
Apr-97		-5034	2424	-3124	-242
Jul-97	-474		-3068	-3517	-392
Nov-97	-474	-508	-2985	-3883	-390
Feb-98	-406	-3280	-2963	-3627	-352
Apr-98	-286		-2993	-3614	-383
Aug-98			-2623	-2993	-446

Reading Period	147+00 North Side -1"	147+00 North Side -3.5"	147+00 North Side -6"	147+00 South Side -6"	152+00 North Side -1"	152+00 North Side -3.5"	152+00 North Side -6"	152+00 South Side -1"	152+00 South Side -3.5"	152+00 South Side -6"
	147, N, -1"	147, N, -3.5"	147, N, -6"	147, S, -6"	152, N, -1"	152, N, -3.5"	152, N, -6"	152, S, -1"	152, S, -3.5"	152, S, -6"
Oct-93	-2406	-2022	-1667	-112	-3034	-1893	-1717	-3866	-7804	-883
Apr-94	-2389	-1964	-1619		-2907	-1880	-1654	-2530	-7699	-844
Jul-94	-2275	-1931	-1638	6	-2972	-1700	-1506	-3561	-7369	-708
Oct-94	-725	-726	-724	-724	-728	-724	-725	-724	-730	-518
Feb-95	-745	-747	-746	-747	-749	-747	-747	-741	-740	-743
Apr-95	-2567	-2268	-2021	-409	-3227	-2164	-1925	-3931	-8115	-994
Aug-95		-448	-592	-694	-3792	-811	-688	-4596	-8483	-1573
Oct-95	-2772	-2323	-1989	-301	-3909	-2207	-1999	-4198	-8070	-1130
Jan-96				-386	-3424	-2196	-2012	-4152	-317	-1178
Apr-96	-2740		-1892		-3327	-2161	-1772	-4167		-1312
Jul-96	-2481		-1887		-3256	-1908	-1596	-4030		-713
Nov-96	-2678		-1912			-2086	-1880	-4082		-1042
Jan-97										
Apr-97	2263		1389			1583	1352	3607		619
Jul-97	-2763		-1996			-2151	-1981	-4207		-1149
Nov-97	-2756		-1949			-2146	-1924	-4141		-1083
Feb-98	-2745		-1858			-1880	-2175	-4108		-1066
Apr-98	-260		-1929			-2095	-1925	-4058	-1119	
Aug-98	-290					-1934	-1687	-3635		-1166

Reading Period	153+00 North Side -1"	153+00 North Side -3.5"	153+00 North Side -6"	153+00 South Side -1"	153+00 South Side -3.5"	153+00 South Side -6"
	153, N, -1"	153, N, -3.5"	153, N, -6"	153, S, -1"	153, S, -3.5"	153, S, -6"
Oct-93	-5390	-1867	991	-2687	-764	-1150
Apr-94	-5392	-1856	982	-2651	-754	-1151
Jul-94	-3711	-1794	961	-2570	-723	-1066
Oct-94	-722	-719	-725	-727	-724	-724
Feb-95	-749	-736	-743	-745	-746	-745
Apr-95	-5500	-2195	613	-2766	-906	-1567
Aug-95	-5912	-263	356	-3459	-1531	-2004
Oct-95	-5748	-2404	567	-3044	-1112	-1542
Jan-96	-5729	-2298	515	-3004	-1118	-1618
Apr-96	-5744	-2590	596	-3016	-1082	-1498
Jul-96	-5667	-2590	800	-2861	-1094	-1310
Nov-96		-2568		-2951	-1052	-1449
Jan-97				2445		
Apr-97		1752		-2835	496	1020
Jul-97					-1094	-1415
Nov-97		-2593		-2994	-1057	-1521
Feb-98		-2274		693	230	233
Apr-98				-2976	-984	-1476
Aug-98		-2385		-2579	-986	-1369

TABLE 37. AVERAGE STRAIN READINGS FOR READING PERIOD—CORRECTED FOR ERRONEOUS READINGS
(For gauges which have functioned during most reading periods)

Reading Period	141+00 North Side -6" 141, N, -6"	141+00 South Side -1" 141, S, -1"	142+00 North Side -1" 142, N, -1"	142+00 North Side -3.5" 42, N, -3.5	142+00 North Side -6" 142, N, -6"	147+00 North Side -1" 147, N, -1"	147+00 North Side -3.5" 47, N, -3.5	147+00 North Side -6" 147, N, -6"	147+00 South Side -6" 147, S, -6"
Oct-93	-36	-4039	-1890	-3416		-2406		-1667	
Apr-94		-4145	-2606	-3354		-2389		-1619	
Jul-94	-239	-4036	-2605	-3277		-2275		-1638	
Apr-95	-1468	-4251	-2895			-2567		-2021	
Aug-95	-1527		-2953						
Oct-95	-713	-4352	-3018	-3747	-392	-2772		-1989	
Jan-96			-3010						
Apr-96	-478	-4260	-2992	-3733	-368	-2740		-1892	
Jul-96	-768	-4288	-2897	-3553	-258	-2481		-1887	
Nov-96	-276	-4510	-2994	-3770	-332	-2678		-1912	
Apr-97		-5034			-242	2263			
Jul-97	-474		-3068	-3517	-392	-2763		-1996	
Nov-97	-474		-2985	-3883	-390	-2756		-1949	
Feb-98	-406	-3280	-2963	-3627	-352	-2745		-1858	
Apr-98	-286		-2993	-3614	-383			-1929	
Aug-98			-2623		-446				

Reading Period	152+00 North Side -1" 152, N, -1"	152+00 North Side -3.5" 52, N, -3.5	152+00 North Side -6" 152, N, -6"	152+00 South Side -1" 152, S, -1"	152+00 South Side -3.5" 52, S, -3.5	152+00 South Side -6" 152, S, -6"
Oct-93		-1893	-1717	-3866	-7804	-883
Apr-94		-1880	-1654		-7699	-844
Jul-94		-1700	-1506	-3561	-7369	-708
Apr-95		-2164	-1925	-3931	-8115	-994
Aug-95				-4596	-8483	-1573
Oct-95		-2207	-1999	-4198	-8070	-1130
Jan-96		-2196	-2012	-4152	-317	-1178
Apr-96		-2161	-1772	-4167		-1312
Jul-96		-1908	-1596	-4030		-713
Nov-96		-2086	-1880	-4082		-1042
Apr-97						
Jul-97		-2151	-1981	-4207		-1149
Nov-97		-2146	-1924	-4141		-1083
Feb-98		-1880	-2175	-4108		-1066
Apr-98		-2095	-1925	-4058		
Aug-98		-1934	-1687	-3635		-1166

Reading Period	153+00 North Side -1" 153, N, -1"	153+00 North Side -3.5" 53, N, -3.5	153+00 North Side -6" 153, N, -6"	153+00 South Side -1" 153, S, -1"	153+00 South Side -3.5" 53, S, -3.5	153+00 South Side -6" 153, S, -6"
Oct-93	-5390	-1867	991	-2687	-764	-1150
Apr-94	-5392	-1856	982	-2651	-754	-1151
Jul-94	-3711	-1794	961	-2570	-723	-1066
Apr-95	-5500	-2195	613	-2766	-906	-1567
Aug-95	-5912		356		-1531	-2004
Oct-95	-5748	-2404	567	-3044	-1112	-1542
Jan-96	-5729	-2298	515	-3004	-1118	-1618
Apr-96	-5744	-2590	596	-3016	-1082	-1498
Jul-96	-5667	-2590	800	-2861	-1094	-1310
Nov-96		-2568		-2951	-1052	-1449
Apr-97				-2835		
Jul-97					-1094	-1415
Nov-97		-2593		-2994	-1057	-1521
Feb-98		-2274				
Apr-98				-2976	-984	-1476
Aug-98		-2385		-2579	-986	-1369

TABLE 38. REGRESSION ANALYSIS FOR STRAIN READINGS
(For gauges which have functioned during most reading periods
corrected for erroneous readings)

Station	Offset	Depth	Intercept	Slope
141+00	North Side	-6"	-4927.71	0.12306
141+00	South Side	-1"	-3828.79	-0.11155
142+00	North Side	-1"	7980.62	-0.30719
142+00	North Side	-3.5"	3954.35	-0.21435
142+00	North Side	-6"	2095.55	-0.06895
147+00	North Side	-1"	6919.94	-0.27117
147+00	North Side	-6"	4052.65	-0.16823
152+00	North Side	-3.5"	820.69	-0.08089
152+00	North Side	-6"	3485.78	-0.15119
152+00	South Side	-1"	-2579.23	-0.04178
152+00	South Side	-6"	3867.56	-0.14019
153+00	North Side	-3.5"	11450.03	-0.39093
153+00	South Side	-1"	1063.09	-0.11102
153+00	South Side	-3.5"	3622.43	-0.13201
153+00	South Side	-6"	2921.56	-0.12401
Average			2726.568	-0.146027

Between the third and fifth monitoring years, the average slope changed as follows:

Year	Slope	Intercept
Third	-0.489684	14626.907
Fourth	-0.3526	8980.19
Fifth	-0.146027	2726.568

This trend may be due to relaxation in the posttensioning cables or due to shrinkage of the type K cement (shrinkage compensating cement). Since there is no noticeable decrease in the pavement length, the relaxation of the posttensioning cables is suspect. This could be verified by testing the tension in the cables. At this time, money for this work is not available. However, during the summer of 1999, Taxiway F will be extended and the tensioning will tested at that time.

The flattening of the slope between the third and fifth year may indicate that most of the relaxation occurred during the first two to three years after construction, and the relaxation has leveled off.

8.11 CHANGE IN STRAIN DUE TO CHANGE IN MOISTURE.

The moisture content of the pavement has not been monitored so a relationship between pavement moisture content and strain cannot be developed.

9. NONDESTRUCTIVE TESTING PROGRAM AND ANALYSIS.

9.1 INTRODUCTION.

As a subconsultant to Crawford, Murphy & Tilly, Inc. (CMT), ERES Consultants, Inc. (ERES) collected seasonal NDT data for the three innovative pavement sections.

For each test period, ERES has evaluated the NDT data by conducting the following analysis:

- Normalized 60-kip deflections.
- Backcalculation of layer modulus and subgrade modulus of reaction, k.
- Deflection load transfer efficiency across cracks and joints.
- Void detection.

The evaluation portion of this report has been divided into two primary sections that discuss the NDT and visual pavement condition survey results. The first section provides an overall summary of the 5-year NDT evaluation results, such as normalized deflections, backcalculated material properties, deflection load transfer at the joints, and detection of the potential presence of voids at the slab corners. This is followed by a second, more detailed analysis of the annual and seasonal performance trends of each innovative pavement section.

9.2 NONDESTRUCTIVE TESTING MONITORING.

ERES used nondestructive testing to evaluate the structural characteristics of each pavement section. This included monitoring the normalized deflections, backcalculated material properties, deflection load transfer at the joints, and detection of the potential presence of voids at the slab corners.

9.2.1 Five-Year NDT Summary.

The seasonal results from each year of NDT have been averaged together to calculate the 5-year seasonal averages for each particular pavement. In addition, the annual averages for each pavement section were calculated. These 5-year seasonal and annual averages were used to identify preliminary findings for each of the innovative pavement sections. The 5-year averages were determined for the normalized deflections, backcalculated modulus values of each layer, and deflection load transfer efficiency. These 5-year averages are a simple summary of each innovative pavement sections response to traffic loading. These results are as shown in tables 39 and 40.

From the 5-year seasonal averages, it can easily be observed that the fall, spring, and summer test results had much lower standard deviations and coefficients of variation than the winter testing. Due to the high amount of variability during the winter testing, the 5-year annual averages for each pavement section also have a considerable amount of variability when the winter NDT results are included. When the winter NDT results are excluded, the 5-year annual averages have similar responses. This reduces the standard deviations and coefficients of variation as shown in tables 39 and 40.

TABLE 39. FIVE-YEAR SEASONAL AND ANNUAL AVERAGES FOR NORMALIZED DEFLECTIONS AND LTE

Pavement Type	5-year Average	Normalized Deflections			Load Transfer Efficiency		
		Mean, mils	SD, mils	CV, %	Mean, %	SD, %	CV, %
PFRC	Fall	26.3	0.9	3%	88%	0%	1%
	Winter	17.9	8.3	46%	81%	9%	12%
	Spring	27.7	1.1	4%	88%	0%	0%
	Summer	26.5	0.5	2%	87%	1%	1%
	Annual	24.6	5.6	23%	86%	5%	6%
	Annual w/o winter	26.8	1.0	4%	88%	1%	1%
FRC	Fall	17.3	0.4	2%	73%	9%	13%
	Winter	12.2	5.5	45%	71%	10%	14%
	Spring	17.8	0.8	4%	78%	10%	13%
	Summer	18.0	1.2	7%	84%	10%	12%
	Annual	16.3	3.6	22%	76%	10%	13%
	Annual w/o winter	17.7	0.8	5%	78%	10%	13%
JPCP	Fall	8.8	1.2	13%	52%	14%	28%
	Winter	7.1	2.5	36%	57%	17%	30%
	Spring	9.8	0.9	9%	67%	9%	14%
	Summer	9.6	1.8	19%	78%	14%	18%
	Annual	8.8	1.9	22%	63%	16%	26%
	Annual w/o winter	9.4	1.3	14%	65%	16%	24%

TABLE 40. FIVE-YEAR SEASONAL AND ANNUAL AVERAGES FOR BACKCALCULATION RESULTS

Pavement Type	5-year Average	Epcc			Ebase			K		
		Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %	Mean, pci	SD, pci	CV, %
PFRC	Fall	9,054	321	4%	2,264	80	4%	299	22	7%
	Winter	12,430	2,489	20%	3,108	622	20%	778	807	104%
	Spring	9,055	422	5%	2,264	106	5%	274	5	2%
	Summer	8,957	190	2%	2,239	47	2%	306	16	5%
	Annual	9,874	1,914	19%	2,469	479	19%	414	429	104%
	Annual w/o winter	9,022	305	3%	2,251	76	3%	293	20	7%
FRC	Fall	10,053	705	7%	2,513	176	7%	238	29	12%
	Winter	15,213	5,375	35%	3,803	1,344	35%	593	620	105%
	Spring	10,318	817	8%	2,581	202	8%	211	5	2%
	Summer	10,224	836	8%	2,554	208	8%	222	20	9%
	Annual	11,452	3,383	30%	2,863	846	30%	316	329	104%
	Annual w/o winter	10,198	738	7%	2,550	183	7%	224	22	10%
JPCP	Fall	8,732	1,754	20%	2,183	439	20%	209	19	9%
	Winter	10,758	1,631	15%	2,690	408	15%	417	373	90%
	Spring	8,181	1,867	23%	2,045	467	23%	191	28	15%
	Summer	7,649	1,329	17%	1,912	332	17%	191	22	12%
	Annual	8,830	1,942	22%	2,207	486	22%	252	198	79%
	Annual w/o winter	8,187	1,609	20%	2,047	402	20%	197	23	12%

The high amount of variability in the winter season of testing is because the subgrade was partially frozen during some of the winter testing. This is most likely due to the frost penetration of the subgrade. These seasonal effects will be discussed in more detail later in this section.

9.2.2 Normalized Deflections.

The 5-year seasonal average normalized deflections are shown in figure 68. Based on deflections, this figure indicates that the conventional section has higher load-carrying capacity than the prestressed and fibrous sections. The normalized deflections for the fall, spring, and summer testing were similar in magnitude. The spring deflections may be slightly higher than the fall and summer testing. The winter deflections were notably less than the other seasons, most likely due to freezing of the subgrade.

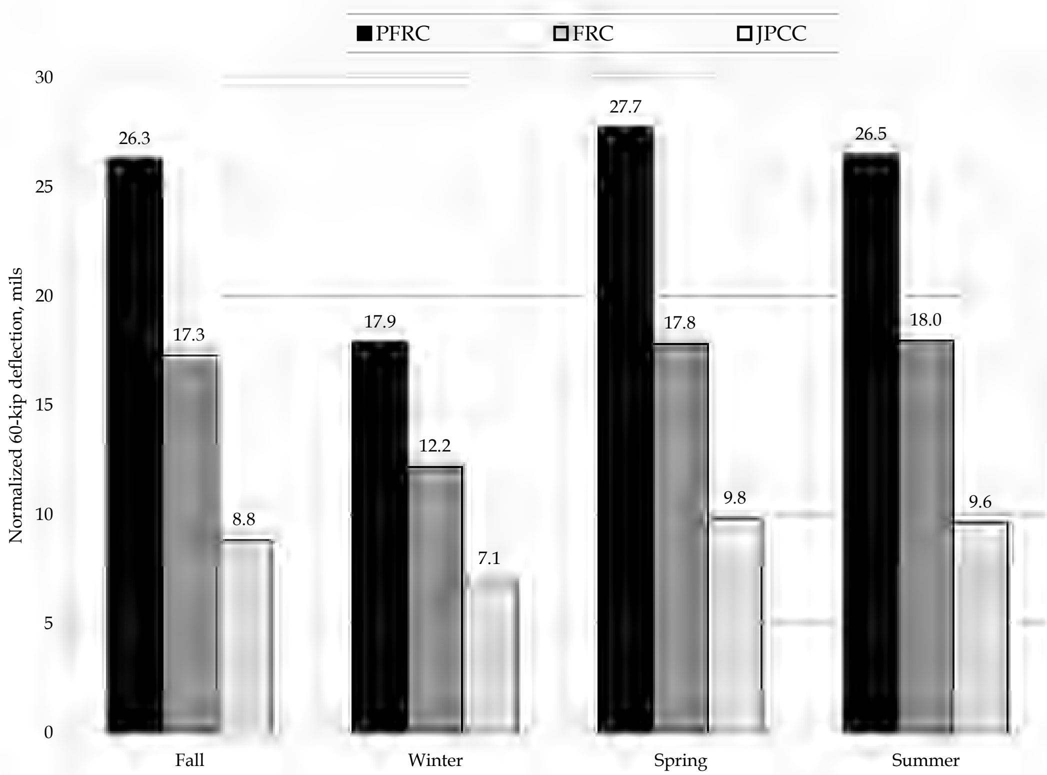


FIGURE 68. FIVE-YEAR SEASONAL AVERAGE FOR NORMALIZED DEFLECTIONS

9.2.3 Backcalculation.

Figures 69 through 71 show the 5-year seasonal average backcalculated PCC and econocrete modulus values and the modulus of subgrade reaction, k. The backcalculation results confirm the normalized deflection findings. In general, the fall, spring, and summer testing were similar in magnitude, while the winter values were notably different. The prestressed and fibrous backcalculated modulus values for the PCC and econocrete remained practically unchanged for the fall, spring, and summer testing. The conventional pavement modulus had higher strengths in the fall that slightly decreased in the spring, and the summer value was the lowest of the unfrozen testing seasons.

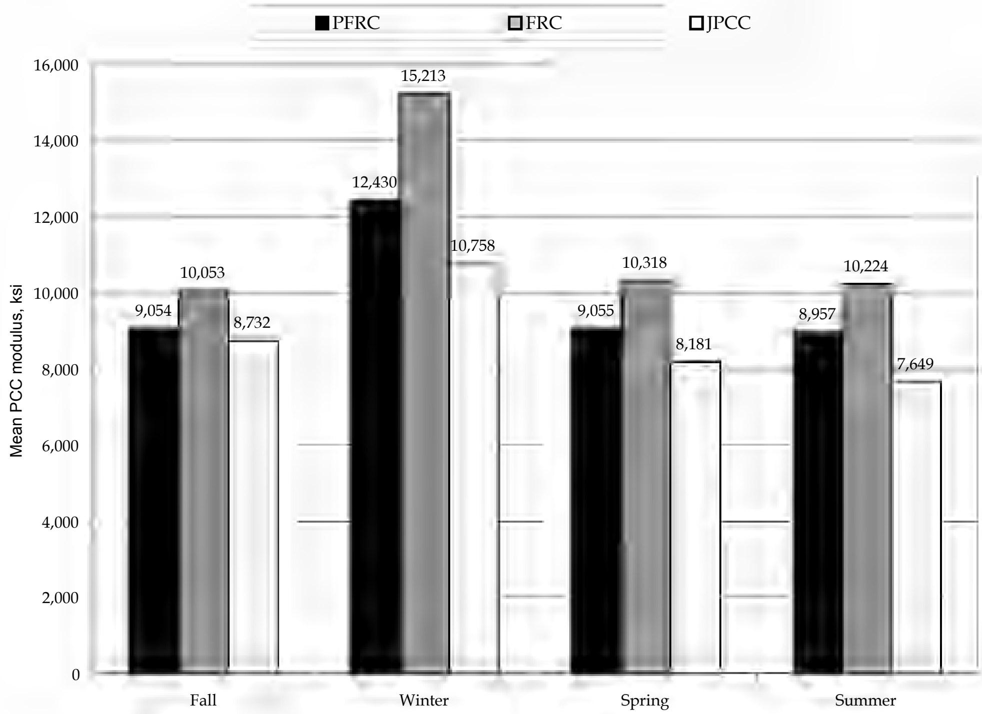


FIGURE 69. FIVE-YEAR SEASONAL AVERAGE FOR BACKCALCULATED PCC MODULUS

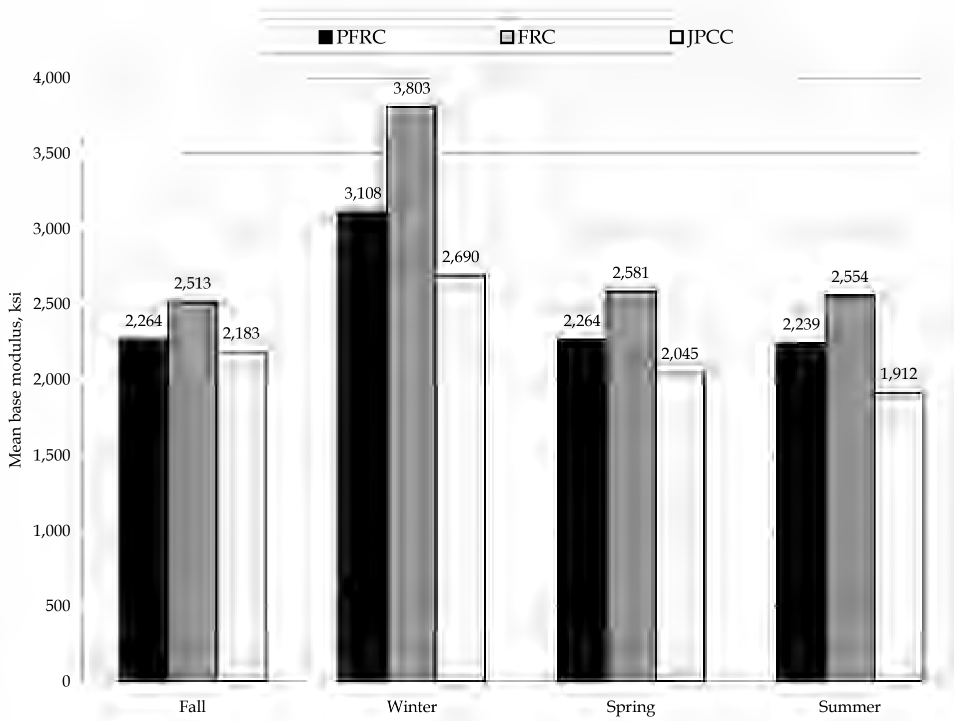


FIGURE 70. FIVE-YEAR SEASONAL AVERAGE FOR BACKCALCULATED ECONOCRETE MODULUS

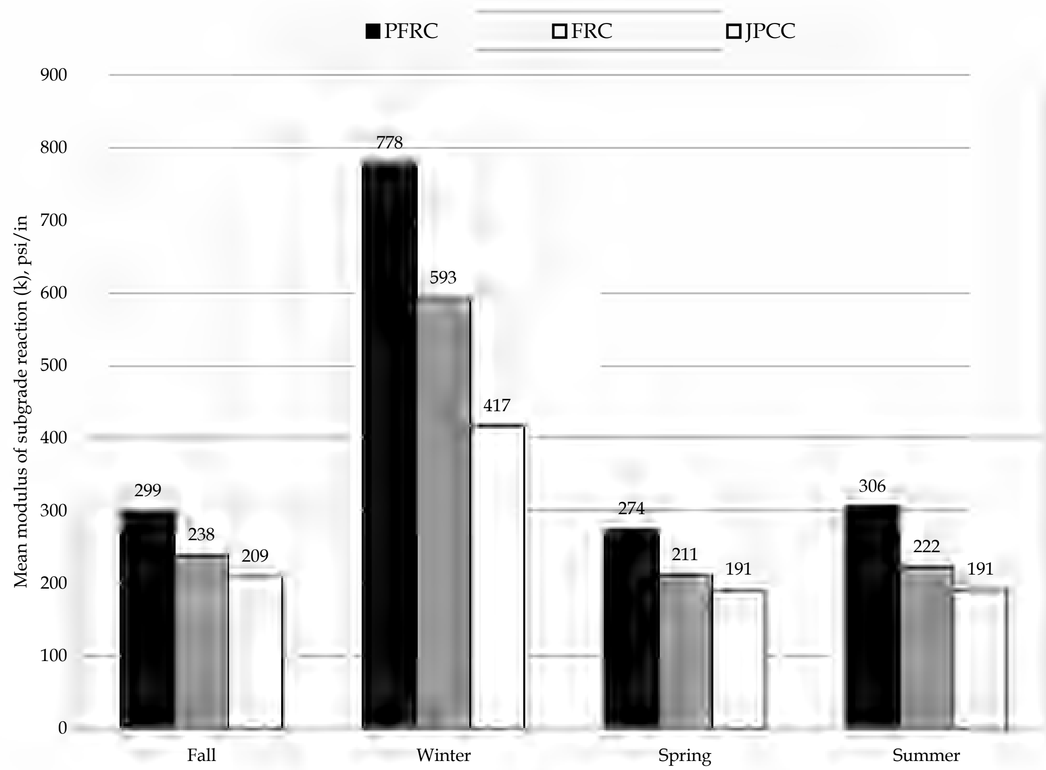


FIGURE 71. FIVE-YEAR SEASONAL AVERAGE FOR SUBGRADE STIFFNESS

It is interesting to note that the subgrade modulus, k, had a slight seasonal variation. For the prestressed section, the fall and summer k values were slightly higher than the spring values. The prestressed and fibrous sections provide less subgrade protection than the conventional section due to the relatively thin pavement structures. Therefore, it is likely that the subgrade of these sections is more sensitive to increased moisture and possibly spring thaw of the subgrade than the thicker conventional section. Due to the increased PCC thickness of the conventional section, it does not appear to be as sensitive to seasonal changes. Therefore, the fall, spring, and summer testing were relatively unchanged.

Backcalculation of the winter testing resulted in higher backcalculated PCC and econocrete modulus values and modulus of subgrade reaction, k. These higher values are a good indication that the pavement sections were affected by the colder winter temperatures. This seasonal response is due to the frost susceptibility of the subgrade, resulting in partial freezing of the subgrade layer. The frost susceptibility of the pavement sections will be further discussed during the analysis of the NDT seasonal trend results, later in this report.

9.2.4 Deflection Load Transfer Efficiency.

The 5-year seasonal averages for deflection load transfer efficiency are shown in figure 72. These averages show that the load transfer efficiency (LTE) for the prestressed section remains relatively constant during the fall, spring, and summer testing. In contrast, the fibrous and conventional sections appear to be more temperature (or seasonal) sensitive. For these two sections, the fall LTE is the lowest. The LTE continues to increase for the fibrous and conventional sections in the spring and summer seasons.

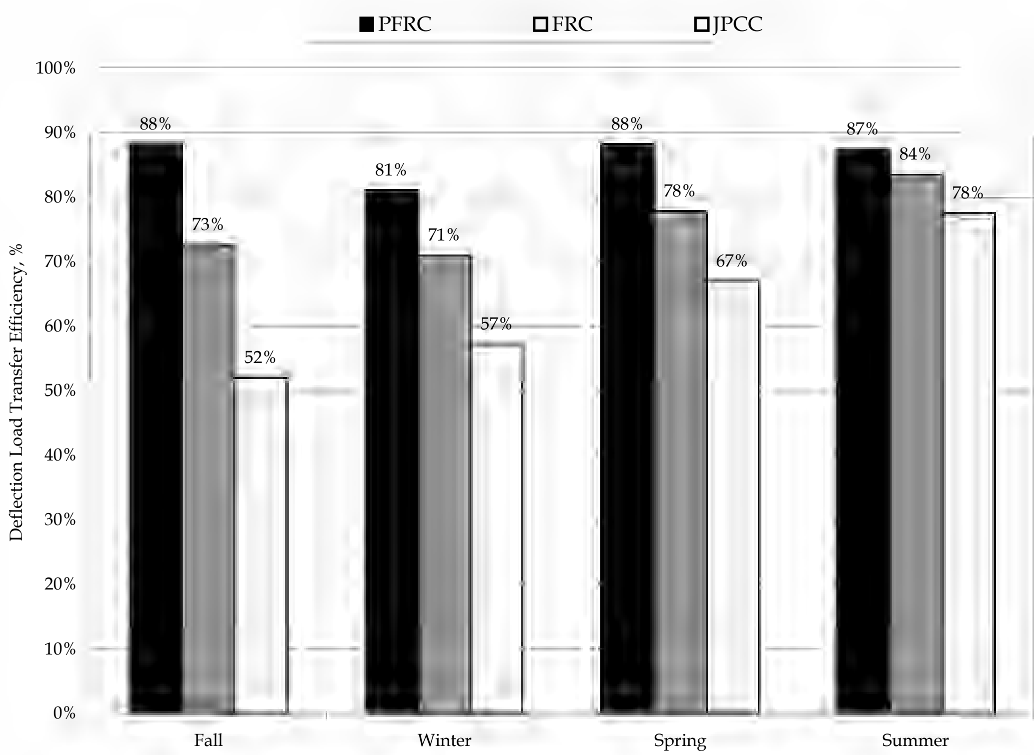


FIGURE 72. FIVE-YEAR SEASONAL AVERAGE FOR DEFLECTION LOAD TRANSFER EFFICIENCY

It is important to note that the 5-year seasonal average winter LTE testing appears to respond similarly to the other testing seasons. However, there is a large amount of deviation in the winter 5-year seasonal average value, which could misrepresent the true seasonal performance of the winter LTE. The large amount of deviation is partially due to the variations in extent of subgrade frost penetration and air temperatures during the annual winter testing. The frost penetration of these pavement sections will be further discussed during the analysis of the NDT seasonal trend results, later in this report.

9.3 NONDESTRUCTIVE TESTING ANNUAL TRENDS.

The normalized deflection, backcalculated modulus values, LTE, and void potential results for each season are summarized below.

9.3.1 Normalized Deflections.

NDT was conducted at three load levels for each pavement type. Because the conventional cross section has a high load-carrying capacity, the deflections were normalized for the highest load level, which was approximately 60,000 lb. The typical range of deflections for a normalized 60-kip load for each pavement section is shown in figure 73. Mean deflection ranges for each type of pavement were measured as follows:

Pavement	Lowest Deflection, mils	Highest Deflection, mils
Prestressed	7.4 (winter 1994)	28.8 (spring 1996)
Fibrous	4.0 (winter 1994)	20.0 (summer 1994)
Conventional	3.6 (winter 1994)	11.8 (summer 1998)

Although the mean deflections are the highest for the prestressed, there is less variability in this section when compared to the fibrous and the conventional sections. As shown in figure 74, the coefficient of variation (CV) during the quarterly testing for the spring, summer, and fall seasons varies from 12 to 18 percent for the prestressed, from 9 to 46 percent for the fibrous, and from 8 to 41 percent for the conventional sections.

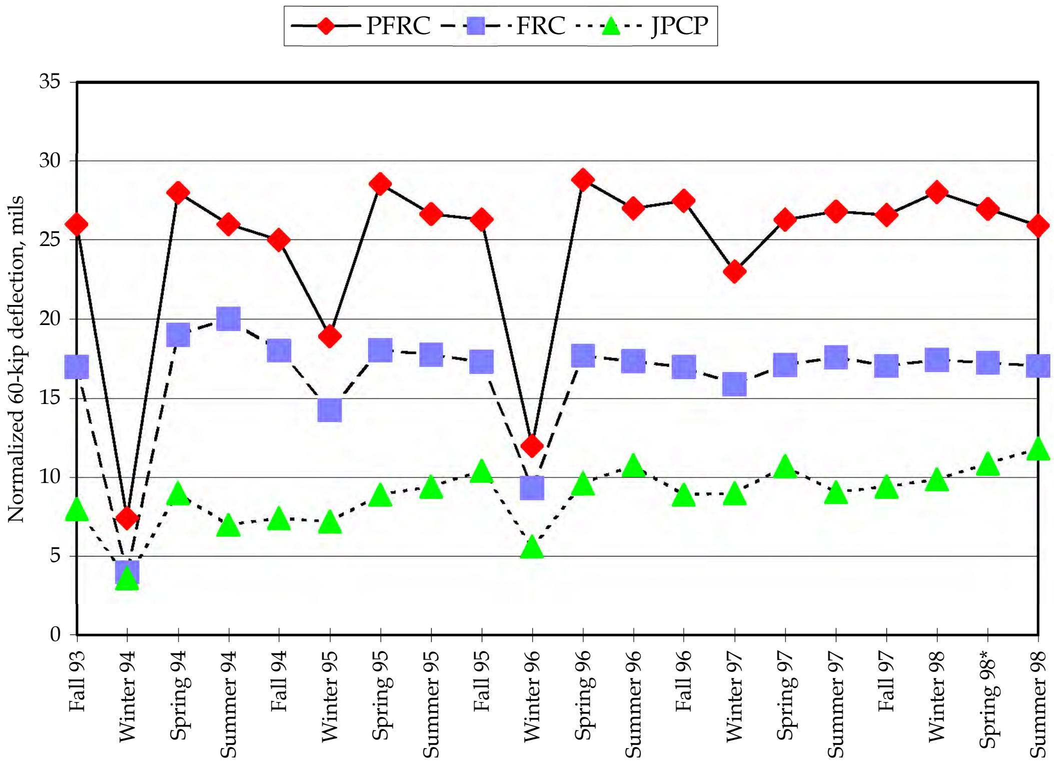
The normalized deflection results show that the load-carrying capacity of the conventional is higher than either the prestressed or fibrous pavement section. The variation in the mean normalized deflections for all seasons, except winter, within each section, is less than 3 mils. The increase in the CV during the winter season can be explained by freezing of the pavement sections. In addition, figure 71 shows that the spring deflections are frequently higher than summer and fall deflections for each pavement section, due to spring thaw of the subgrade.

9.3.2 Backcalculation.

The backcalculated values for the PCC, econocrete, and subgrade are shown in figures 74 through 76. A summary of these results is as follows:

Pavement	Lowest Mean PCC Modulus, ksi	Highest Mean PCC Modulus, ksi
Prestressed	8,677 (fall 1993 and spring 1995)	15,543 (winter 1996)
Fibrous	8,855 (summer 1994)	24,003 (winter 1994)
Conventional	6,103 (summer 1998)	12,699 (winter 1994)

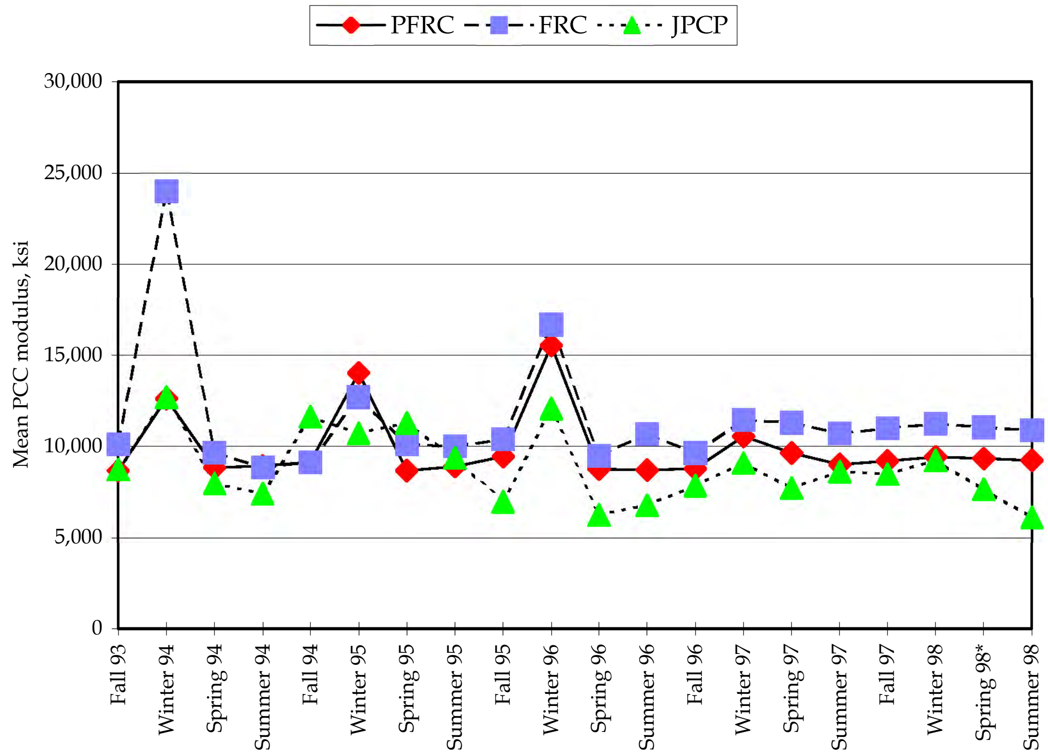
Figure 74 shows that ERESBACK II has been a robust tool that has provided good results in the backcalculated modulus values for the three pavement sections. Both the prestressed and fibrous sections were modeled using an unbonded interface between the PCC and econocrete base, unlike the conventional section where the PCC was bonded to the base. In addition, the PCC modulus values for the sections show that the stiffness of the PCC layer in each section is similar. The key difference in the PCC response for each of these sections is how it responds to seasonal changes, as shown by the normalized deflections in figure 73. During the first 5 years, the PCC response is most similar in the prestressed and fibrous sections.



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, mils	SD, mils	CV, %	Mean, mils	SD, mils	CV, %	Mean, mils	SD, mils	CV, %
Fall 93	26.0	4.0	14%	17.0	2.0	10%	8.0	1.0	8%
Winter 94	7.4	2.5	33%	4.0	0.9	22%	3.6	3.5	97%
Spring 94	28.0	5.0	17%	19.0	4.0	23%	9.0	2.0	21%
Summer 94	26.0	4.0	14%	20.0	7.0	35%	7.0	3.0	41%
Fall 94	25.0	4.6	18%	18.0	8.7	46%	7.4	0.8	11%
Winter 95	18.9	2.7	15%	14.3	1.1	8%	7.2	0.5	6%
Spring 95	28.6	4.1	14%	18.1	2.2	12%	8.9	1.7	19%
Summer 95	26.7	3.3	12%	17.8	1.7	10%	9.4	1.5	15%
Fall 95	26.3	3.5	13%	17.3	1.5	9%	10.4	1.2	12%
Winter 96	12.0	2.6	22%	9.3	2.1	22%	5.6	1.2	21%
Spring 96	28.8	4.6	16%	17.7	2.1	12%	9.6	1.3	14%
Summer 96	27.0	4.2	16%	17.4	1.9	11%	10.8	2.3	21%
Fall 96	27.5	4.5	16%	17.0	1.6	10%	8.9	1.1	12%
Winter 97	23.0	3.8	16%	15.9	2.4	15%	9.0	1.2	13%
Spring 97	26.3	4.3	16%	17.1	2.0	12%	10.7	2.2	21%
Summer 97	26.8	4.1	15%	17.6	2.4	13%	9.1	1.4	16%
Fall 97	26.6	4.3	16%	17.0	1.7	10%	9.4	1.3	13%
Winter 98	28.0	5.0	18%	17.4	1.9	11%	9.9	1.1	11%
Spring 98*	27.0	4.5	17%	17.3	2.1	12%	10.8	2.1	19%
Summer 98	25.9	4.0	15%	17.1	2.3	14%	11.8	3.2	27%

* Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.

FIGURE 73. FIVE-YEAR COMPARISON OF AVERAGE NORMALIZED 60-kip DEFLECTIONS



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %
Fall 93	8,678	1,890	22%	10,120	1,597	16%	8,726	1,422	16%
Winter 94	12,618	3,280	26%	24,003	11,700	49%	12,699	5,208	41%
Spring 94	8,850	1,678	19%	9,673	1,640	17%	7,966	1,624	20%
Summer 94	8,918	1,400	16%	8,855	3,551	40%	7,403	2,075	28%
Fall 94	9,152	1,672	18%	9,134	3,500	38%	11,622	2,063	18%
Winter 95	14,013	3,169	23%	12,703	1,500	12%	10,711	408	4%
Spring 95	8,677	1,694	20%	10,110	1,631	16%	11,299	980	9%
Summer 95	8,902	1,530	17%	9,999	1,398	14%	9,356	2,572	28%
Fall 95	9,459	1,960	21%	10,383	1,176	11%	6,965	1,133	16%
Winter 96	15,543	7,317	47%	16,662	5,846	35%	12,071	4,727	39%
Spring 96	8,757	1,620	19%	9,464	1,502	16%	6,260	861	14%
Summer 96	8,716	1,506	17%	10,675	1,679	16%	6,769	1,672	25%
Fall 96	8,779	1,595	18%	9,647	1,027	11%	7,851	1,069	14%
Winter 97	10,547	2,155	20%	11,470	2,120	18%	9,080	908	23%
Spring 97	9,655	2,559	27%	11,290	2,016	18%	7,712	2,451	32%
Summer 97	9,014	2,442	27%	10,716	1,920	18%	8,614	1,944	23%
Fall 97	9,201	2,126	23%	10,982	1,456	13%	8,494	2,558	30%
Winter 98	9,431	2,082	22%	11,228	2,143	19%	9,229	1,958	21%
Spring 98*	9,334	2,027	22%	11,052	2,021	18%	7,666	2,081	29%
Summer 98	9,236	1,972	21%	10,875	1,898	17%	6,103	2,203	36%

* Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.

FIGURE 74. FIVE-YEAR COMPARISON OF AVERAGE BACKCALCULATED PCC MODULI

The backcalculation results for the econocrete base are very consistent for each of the three pavement sections, excluding the winter results. As is the case for the PCC modulus values, the strength of the econocrete for the prestressed and fibrous pavement sections is approximately the same as in fall 1993. The conventional sections had a larger amount of seasonal variation, which varied over a range of 3,000 ksi, when the winter results were excluded. From figure 75, it appears that the econocrete base layer modulus for the conventional may be gradually decreasing with time. For all three pavement sections, the winter modulus values are generally higher than the other seasonal values, which indicates that these pavement materials were partially to fully frozen. Although the results show that a winter freeze can have a significant effect on the backcalculated modulus, the first 5 years of monitoring show that the modulus values in the spring are similar to those obtained before the freeze (i.e., fall values). The information included in figure 75 is summarized as follows:

Pavement	Lowest Mean Base Modulus, ksi	Highest Mean Base Modulus, ksi
Prestressed	2,169 (fall 1993 and spring 1995)	3,886 (winter 1996)
Fibrous	2,214 (summer 1994)	4,165 (winter 1996)
Conventional	1,526 (summer 1998)	3,018 (winter 1996)

The dynamic subgrade k values obtained from backcalculation analysis are shown in figure 76. It appears that the subgrade strength generally increases from the conventional to the prestressed. This increase could be due to varying in-place subgrade conditions that existed at the time of construction, or it could be construction-related. Also, the seasonal k value for the prestressed typically decreased slightly from year to year, whereas the fibrous and conventional values had no noticeable trend.

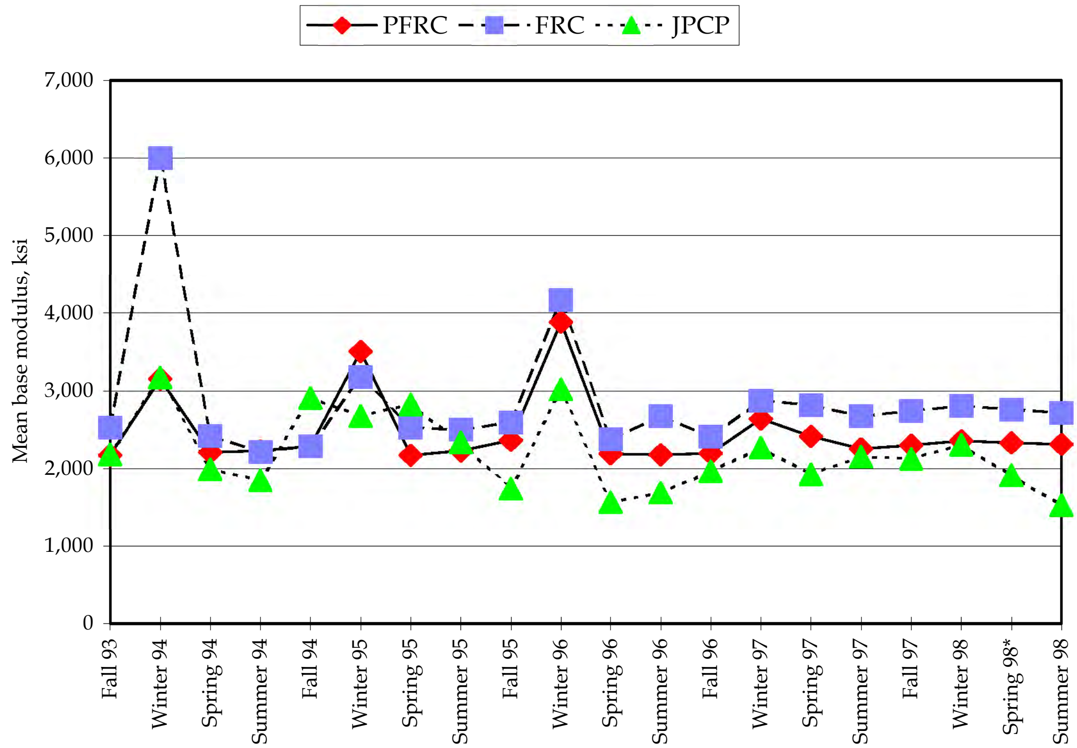
Pavement	Lowest Mean k value, ksi	Highest Mean k value, ksi
Prestressed	256 (winter 1998)	2,188 (winter 1994)
Fibrous	206 (winter 1998)	1,669 (winter 1994)
Conventional	161 (winter 1998)	1,060 (winter 1994)

The backcalculation of the subgrade material properties shows that winter 1994 k values were unreasonably high, which is another indication that the subgrade was frozen during testing.

9.3.3 Deflection Load Transfer Efficiency.

Deflection LTE is defined as the deflection on the unloaded side of a joint divided by the deflection on the loaded side of a joint. To obtain a stress LTE that is greater than 25 percent, the deflection LTE should be greater than 70 percent. Once the deflection LTE falls below 50 percent, there is little reduction in the edge stress in a conventional due to load transfer. The results of LTE analysis for the first 5 years are shown in figure 77.

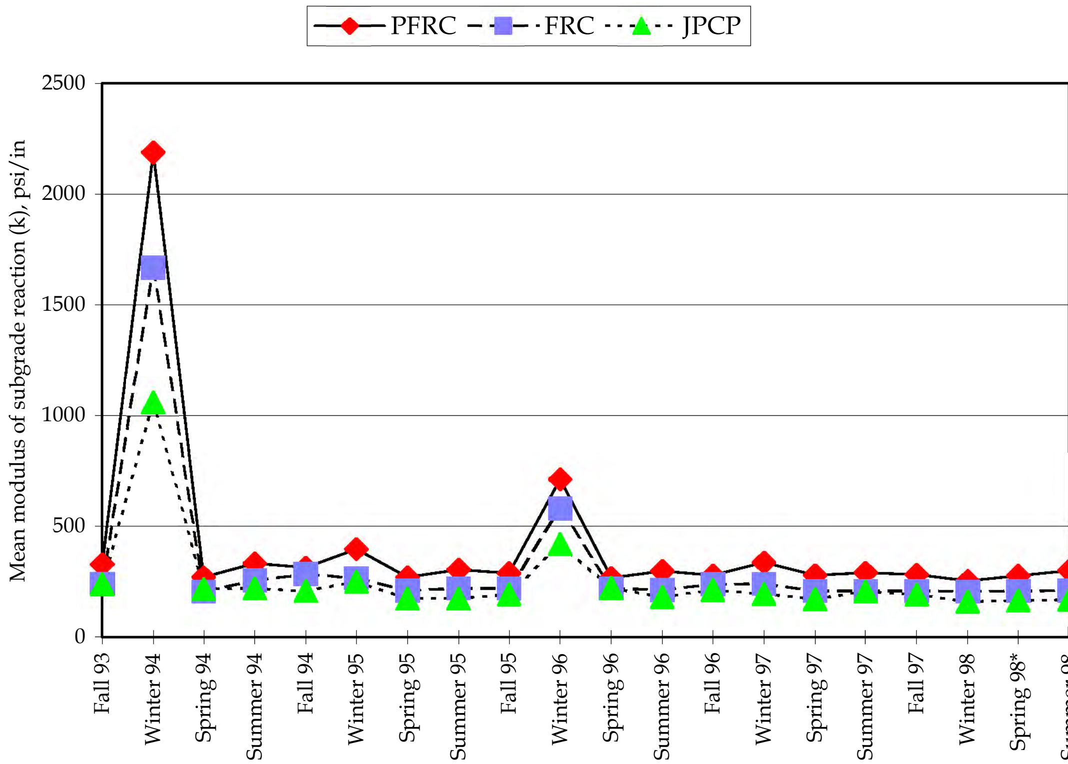
The results show that the LTE for the prestressed has remained consistently high, with the mean LTE ranging from 86 to 89 percent during the spring, summer, and fall seasons. During the winter season, the LTE varied from 66 to 88 percent. This indicates that the LTE for the prestressed section is more sensitive to the temperature changes that occur in the winter.



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %
Fall 93	2,170	472	22%	2,530	399	16%	2,181	356	16%
Winter 94	3,155	820	26%	6,001	2,925	49%	3,175	1,302	41%
Spring 94	2,212	420	19%	2,418	410	17%	1,991	406	20%
Summer 94	2,230	350	16%	2,214	888	40%	1,851	519	28%
Fall 94	2,288	418	18%	2,284	875	38%	2,906	516	18%
Winter 95	3,503	792	23%	3,176	375	12%	2,678	408	15%
Spring 95	2,169	424	20%	2,528	408	16%	2,825	980	35%
Summer 95	2,226	383	17%	2,500	349	14%	2,339	643	28%
Fall 95	2,365	490	21%	2,596	294	11%	1,741	283	16%
Winter 96	3,886	1,829	47%	4,165	1,462	35%	3,018	1,182	39%
Spring 96	2,189	405	19%	2,374	376	16%	1,565	215	14%
Summer 96	2,179	377	17%	2,669	420	16%	1,692	418	25%
Fall 96	2,195	399	18%	2,412	257	11%	1,963	267	14%
Winter 97	2,637	539	20%	2,868	530	18%	2,270	526	23%
Spring 97	2,414	640	27%	2,822	504	18%	1,928	613	32%
Summer 97	2,253	611	27%	2,670	483	18%	2,154	486	23%
Fall 97	2,300	531	23%	2,745	364	13%	2,123	640	30%
Winter 98	2,358	520	22%	2,807	536	19%	2,307	490	21%
Spring 98*	2,334	507	22%	2,763	505	18%	1,917	521	29%
Summer 98	2,309	493	21%	2,719	474	17%	1,526	551	36%

* Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.

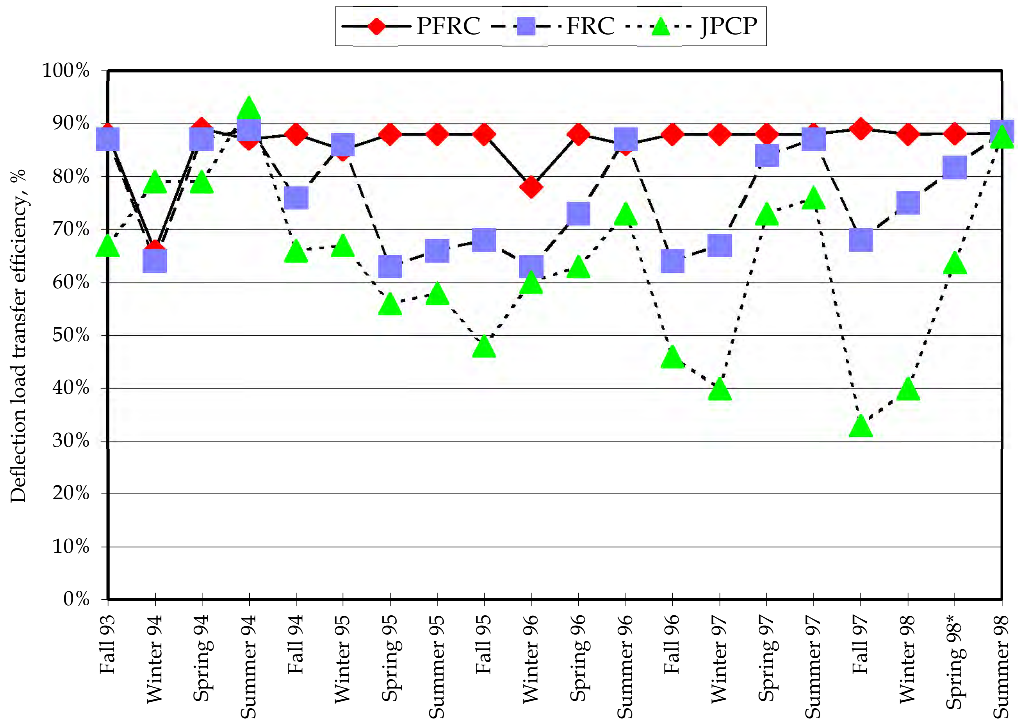
FIGURE 75. FIVE-YEAR COMPARISON OF AVERAGE BACKCALCULATED BASE MODULI



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, pci	SD, pci	CV, %	Mean, pci	SD, pci	CV, %	Mean, pci	SD, pci	CV, %
Fall 93	329	73	22%	240	27	11%	238	39	16%
Winter 94	2,188	671	31%	1,669	329	20%	1,060	548	52%
Spring 94	272	70	26%	207	50	24%	219	44	20%
Summer 94	333	84	25%	257	90	35%	221	54	24%
Fall 94	315	84	27%	284	114	40%	209	25	12%
Winter 95	398	65	16%	265	29	11%	249	23	9%
Spring 95	272	58	21%	212	28	13%	175	39	22%
Summer 95	305	70	23%	221	29	13%	175	37	21%
Fall 95	290	58	20%	220	30	14%	192	16	8%
Winter 96	712	186	26%	580	133	23%	419	45	11%
Spring 96	268	66	25%	220	26	12%	223	31	14%
Summer 96	298	71	24%	213	24	11%	182	53	29%
Fall 96	280	61	22%	238	21	9%	214	42	20%
Winter 97	338	76	23%	242	36	15%	195	29	15%
Spring 97	280	58	21%	209	27	13%	172	30	17%
Summer 97	292	73	25%	210	30	14%	207	31	15%
Fall 97	282	58	21%	208	27	13%	192	35	18%
Winter 98	256	58	23%	206	21	10%	161	11	7%
Spring 98*	278	63	23%	209	25	12%	165	24	14%
Summer 98	300	69	23%	211	29	14%	169	36	21%

* Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.

FIGURE 76. FIVE-YEAR COMPARISON OF AVERAGE BACKCALCULATED MODULUS OF SUBGRADE REACTION



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, %	SD, %	CV, %	Mean, %	SD, %	CV, %	Mean, %	SD, %	CV, %
Fall 93	88%	3%	3%	87%	12%	14%	67%	13%	19%
Winter 94	66%	3%	5%	64%	14%	22%	79%	8%	10%
Spring 94	89%	3%	4%	87%	14%	16%	79%	9%	11%
Summer 94	87%	3%	4%	89%	6%	6%	93%	3%	3%
Fall 94	88%	3%	4%	76%	18%	24%	66%	26%	39%
Winter 95	85%	7%	9%	86%	7%	8%	67%	16%	24%
Spring 95	88%	5%	6%	63%	24%	32%	56%	28%	49%
Summer 95	88%	3%	4%	66%	23%	34%	58%	28%	48%
Fall 95	88% **	3%	4%	68%	23%	33%	48%	18%	38%
Winter 96	78%	5%	7%	63%	25%	40%	60%	11%	18%
Spring 96	88%	4%	4%	73%	23%	31%	63%	14%	23%
Summer 96	86%	5%	6%	87%	9%	11%	73%	19%	26%
Fall 96	88%	2%	3%	64%	22%	35%	46%	11%	24%
Winter 97	88%	3%	3%	67%	23%	34%	40%	9%	23%
Spring 97	88%	4%	4%	84%	5%	7%	73%	17%	24%
Summer 97	88%	3%	4%	87%	8%	10%	76%	16%	21%
Fall 97	89%	3%	3%	68%	26%	39%	33%	9%	28%
Winter 98	88%	3%	3%	75%	27%	35%	40%	10%	24%
Spring 98*	88%	3%	4%	82%	17%	22%	64%	8%	16%
Summer 98	88%	3%	4%	89%	7%	8%	88%	7%	8%

* Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.
** Average of Fall LTE values due to uniform seasonal pavement response.

FIGURE 77. FIVE-YEAR COMPARISON OF AVERAGE TRANSVERSE JOINT LOAD TRANSFER EFFICIENCY

The LTE on the fibrous section has varied from 63 to 89 percent over the past 5 years. The fluctuation in LTE may be influenced by the seasonal temperature variation and the depth of the frozen subgrade. The increase in LTE during the summer may be explained by the increase in temperature, which causes the pavement to expand, reducing the joint opening and increasing the LTE.

The mean LTE for the conventional section has typically been marginal, with the exception of summer 1994. The LTE for the conventional section varies significantly within each evaluation season. It appears that the seasonal variability is becoming greater over time as the pavement ages.

The fibrous and conventional sections had a higher amount of variability than the prestressed. This may be partially explained by the tension applied to the prestressed, which reduces the amount of movement that occurs at the joints, resulting in more consistent LTE. Some of the variability may be caused by the fluctuation of seasonal temperature and moisture conditions, as well as the depth of frozen subgrade. The combination of these factors may have caused the variability of the LTE within each pavement section.

9.3.4 Void Detection.

Voids were periodically detected at some of the conventional slab corners, as shown in table 41. During some phases of testing there appeared to be a significant number of slabs with voids. Throughout the various phases of testing, potential voids have been noted in 0 to 75 percent of the tested slabs. This observation raised a serious question into the cause of voids within this pavement section. However, continued observation of the conventional section noted that the number of voids present from year to year and season to season of the NDT varied significantly. It appears that the number of slabs with voids is not increasing over time. This is a good indication that the subgrade beneath the conventional slabs has not been disturbed by pumping, localized base and subgrade settlement, or unbonding of the PCC and econocrete base. Therefore, it appears that currently the occurrence of voids is not a permanent trend and may be further explained by the climatic factors later in this report.

9.3.5 Seasonal Trends.

Daily climatic data were obtained from the Midwestern Climate Center for the duration of this study. This information, based on the weather station located at Rockford Airport, consisted of the daily high and low temperature and the daily precipitation totals. In addition, the 30-year normals for each of these climatic variables were used. The climatic data are needed to gain a better understanding of the pavement performance. These seasonal effects were then used to determine their impact on the performance of the three monitored pavement sections.

TABLE 41. PERCENTAGE OF TESTED SLABS WITH POTENTIAL VOIDS

Season	Percentage of Slabs Tested With Voids
Fall 93	19
Fall 94	25
Fall 95	30
Fall 96	75
Fall 97	61
Winter 94	0
Winter 95	0
Winter 96	0
Winter 97	50
Winter 98	20
Spring 94	0
Spring 95	30
Spring 96	0
Spring 97	0
Spring 98	N/A
Summer 94	0
Summer 95	40
Summer 96	25
Summer 97	0
Summer 98	0

N/A – Not Available

9.3.6 Average Monthly Climatic Data.

The daily climatic data were used to determine monthly averages at the airport. Figure 78 shows the monthly averages of the minimum and maximum air temperatures. Figure 79 shows the total monthly precipitation. These figures show the cyclic effects of temperature and moisture variability experienced annually. Table 42 shows the minimum and maximum temperatures and precipitation totals on the day of NDT for each season and year of testing.

To fully understand the NDT results and the seasonal impact on these results, it was important that all abnormal climatic conditions be identified. This was easily determined by plotting the average monthly temperatures and total precipitation values along with the 30-year average normal values. Figures 80 through 82 show the results of this comparison. Each year was plotted using the same x axis beginning with January through December. With all 5 years of seasonal data and the 30-year average normal values plotted on the same scale, it is easy to identify any temperature or moisture abnormalities that occurred.

In general, all of the monthly maximum and minimum temperature values appear to be similar to the 30-year average. The only significant exception is the maximum and minimum monthly temperatures for February of 1998. There was more variability in the total monthly amounts of precipitation during the monitoring period. The largest deviations from the 30-year average were in May and July in 1995 and June in 1996.

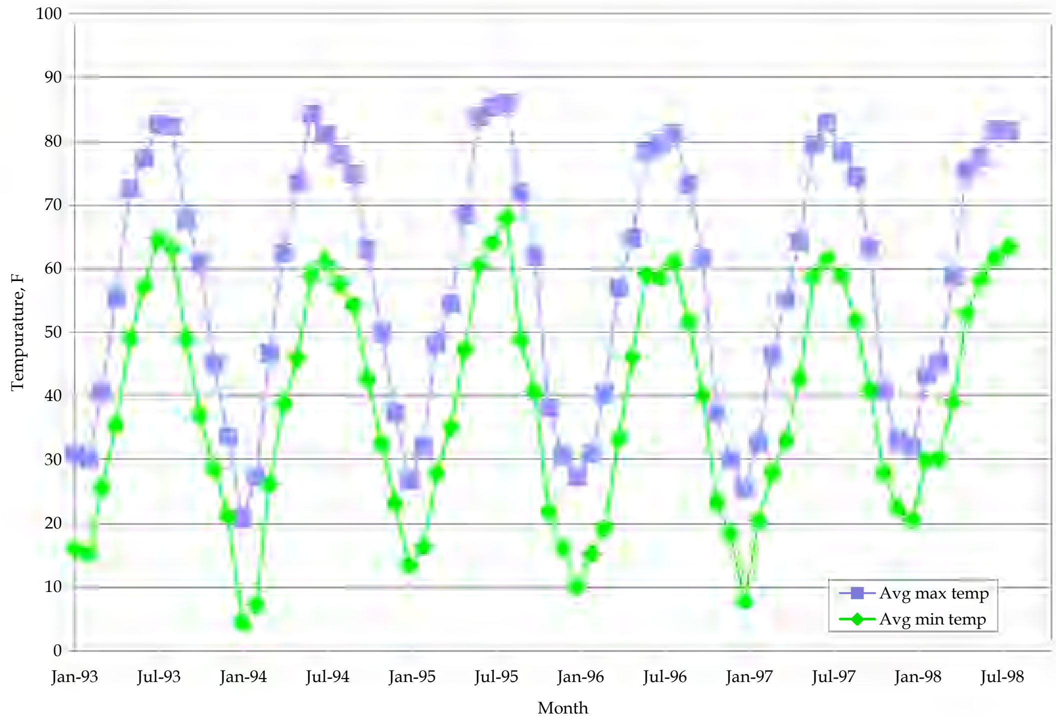


FIGURE 78. MAXIMUM AND MINIMUM AIR TEMPERATURES

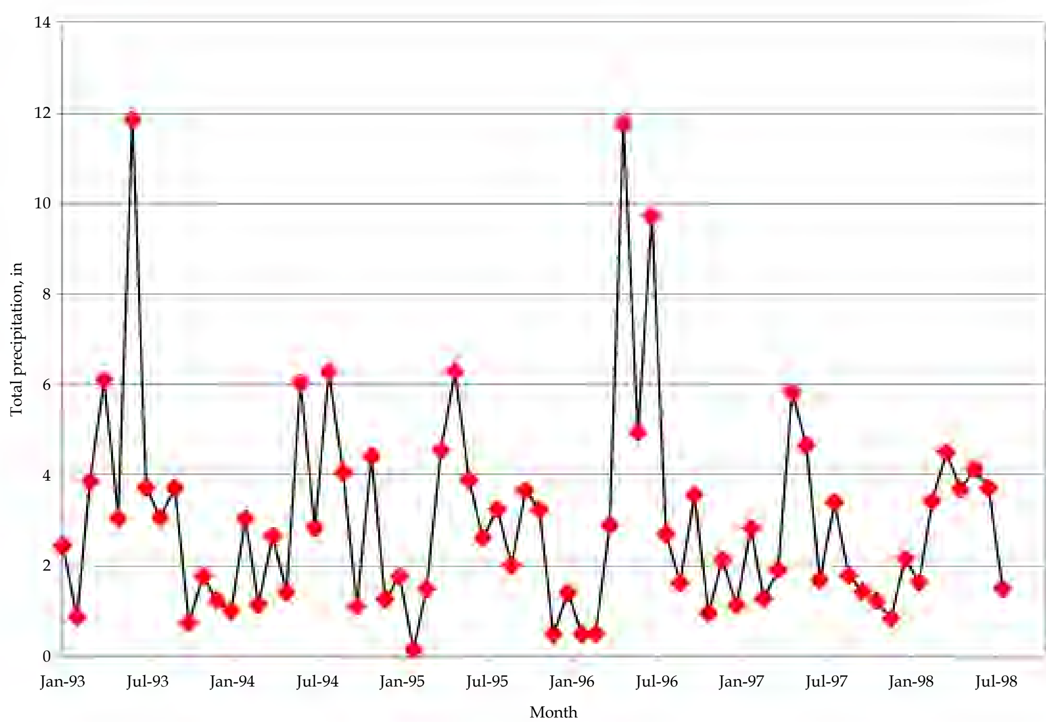


FIGURE 79. MONTHLY PRECIPITATION

TABLE 42. TEST TEMPERATURES AND PRECIPITATION TOTALS DURING NDT DATA COLLECTION

Season	Precipitation (in)	Minimum Temp. (°F)	Maximum Temp. (°F)
Fall 93	T	34	58
Fall 94	0	40	50
Fall 95	0.41	47	54
Fall 96	0	16	27
Fall 97	0.05	23	41
Winter 94	0	12	37
Winter 95	0	23	35
Winter 96	0	27	36
Winter 97	T	24	35
Winter 98	T	36	38
Spring 94	0	40	62
Spring 95	0.35	41	53
Spring 96	0.87	53	70
Spring 97	0	42	63
Spring 98	0.05	49	61
Summer 94	0.01	63	83
Summer 95	0.07	67	86
Summer 96	0	54	72
Summer 97	0.38	63	76
Summer 98	0	N/A	N/A

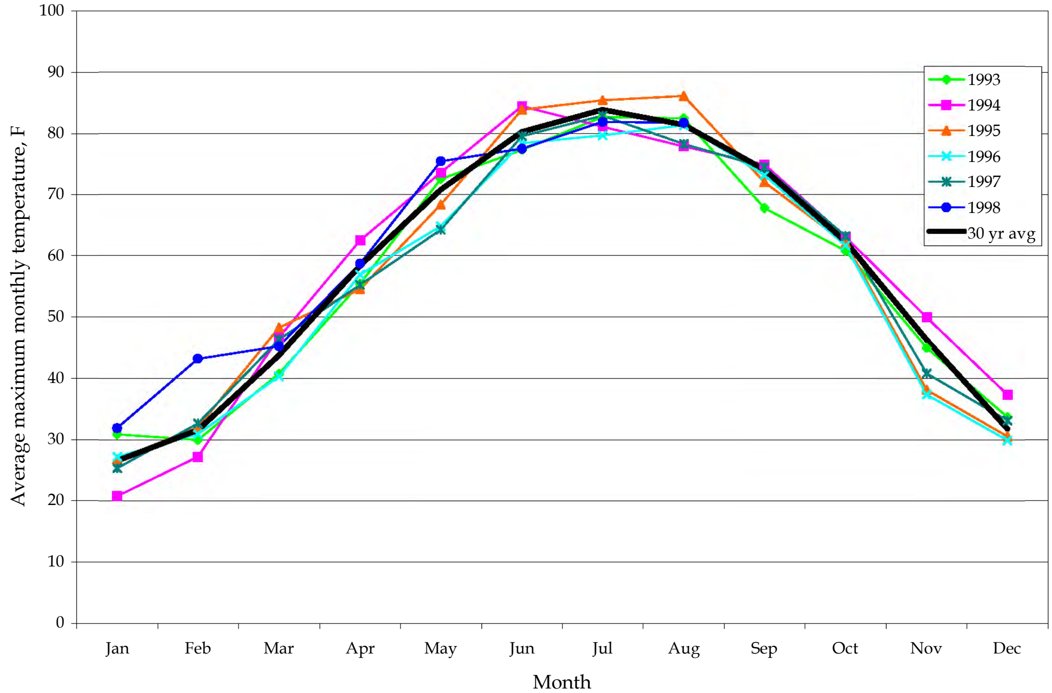


FIGURE 80. AVERAGE MAXIMUM MONTHLY AIR TEMPERATURE

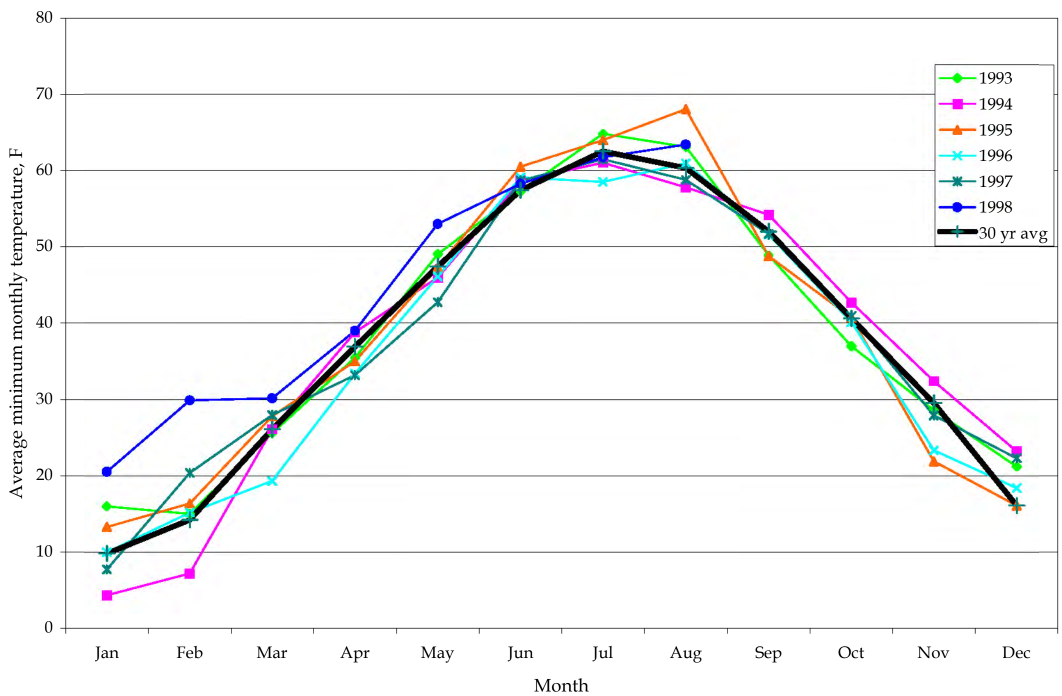


FIGURE 81. AVERAGE MINIMUM MONTHLY AIR TEMPERATURE

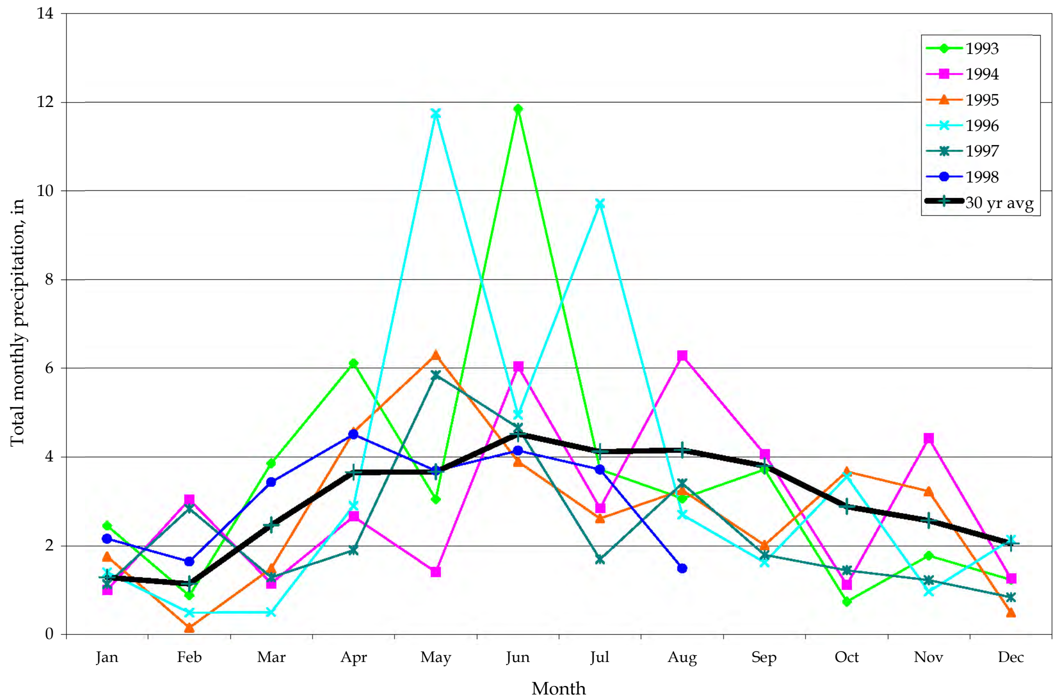


FIGURE 82. TOTAL MONTHLY PRECIPITATION

9.3.7 Seasonal Frost Depth.

It is important to determine if the subgrade materials at Rockford Airport are frost susceptible and the depth of freezing that has occurred during the winter testing. Freezing of the subgrade can only occur if the following three factors occur simultaneously:

- The soil is frost susceptible.
- The freezing temperatures penetrate into the frost susceptible soil.
- Sufficient quantities of moisture are present in the frost susceptible soil.

Based on the geographic location and subgrade soils of the Rockford Airport, it is anticipated that some freezing of the subgrade soil occurs during the winter season. According to the FAA Advisory Circular for Airport Pavement Design and Evaluation, (AC 150/5320-6D), the Rockford area typically has an air-freezing index between 1,000° and 1,500°F per year.

The FAA procedure was used to determine the annual-freezing index of the winter season prior to the winter NDT. Based on the daily climatic data available at Rockford, the seasonal air-freezing index was estimated. The seasonal air-freezing index is the accumulation of all degree days before the falling weight deflectometer (FWD) testing was performed.

These results are included in table 43. The seasonal air-freezing index shows that the winters of 1994, 1996, and 1997 had more days with freezing temperatures than the winters of 1995 and 1998.

TABLE 43. AIR-FREEZING INDEX DURING WINTER TESTING

NDT Testing Year	Seasonal Air-Freezing Index, Degree Days°F	31-Day Air-Freezing Index, Degree Days°F
Winter 1994	1,177	668
Winter 1995	357	230
Winter 1996	1,159	486
Winter 1997	1,078	179
Winter 1998	467	74

It is not likely that the subgrade remained frozen continuously until the spring thaw. It is more realistic for the subgrade to undergo a series of freeze-thaw cycles throughout the winter based on climatic variability. For this reason, the air-freezing index for the period of 30 days prior to and including the date of FWD testing (31 days total) was used to estimate a more realistic air-freezing index. These values are included in table 43.

The air-freezing index and the Berggren equation were used to estimate the depth of frost penetration into the subgrade of each innovative pavement section. The estimated depth of frozen subgrade varied for all three pavement sections due to the differences in pavement thickness above the subgrade. As the pavement structure increases in thickness, the subgrade becomes less frost susceptible due to the insulating effect of the thicker pavement section. Therefore, because the prestressed is the thinnest section and the conventional section is the thickest section, the quantity of frozen subgrade will be greatest for the prestressed section and the least for the conventional section. This observation will be further supported by the FWD testing results, as described below.

The estimated subgrade frost susceptibility of each innovative section is shown in table 44 and is graphically illustrated in figure 83. Based on these numbers, it can be concluded that the pavement subgrade was more frozen during the winter 1994 testing and decreased in extent of frozen subgrade during the winters of 1996 and 1995, respectively. It is expected that none of the pavement sections had frozen subgrade during the winter 1997 and 1998 NDT.

TABLE 44. ESTIMATED DEPTH OF FROZEN SUBGRADE

Year	31-Day Air-Freezing Index Degree Days°F	Estimated Depth of Frozen Subgrade, in.		
		Prestressed	Fibrous	Conventional
Winter 1994	668	16	15	13
Winter 1995	230	2	1	0
Winter 1996	486	11	10	8
Winter 1997	179	0	0	0
Winter 1998	74	0	0	0

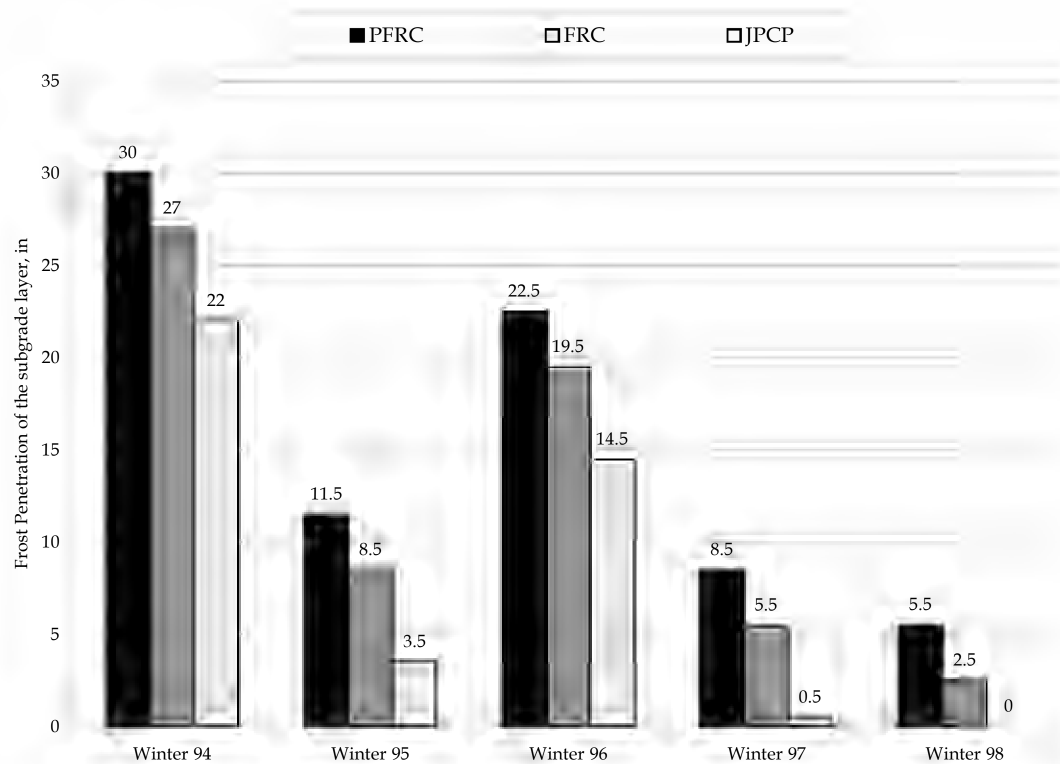


FIGURE 83. SEASONAL SUBGRADE FROST PENETRATION

9.3.8 Climatic Effects on the NDT Results.

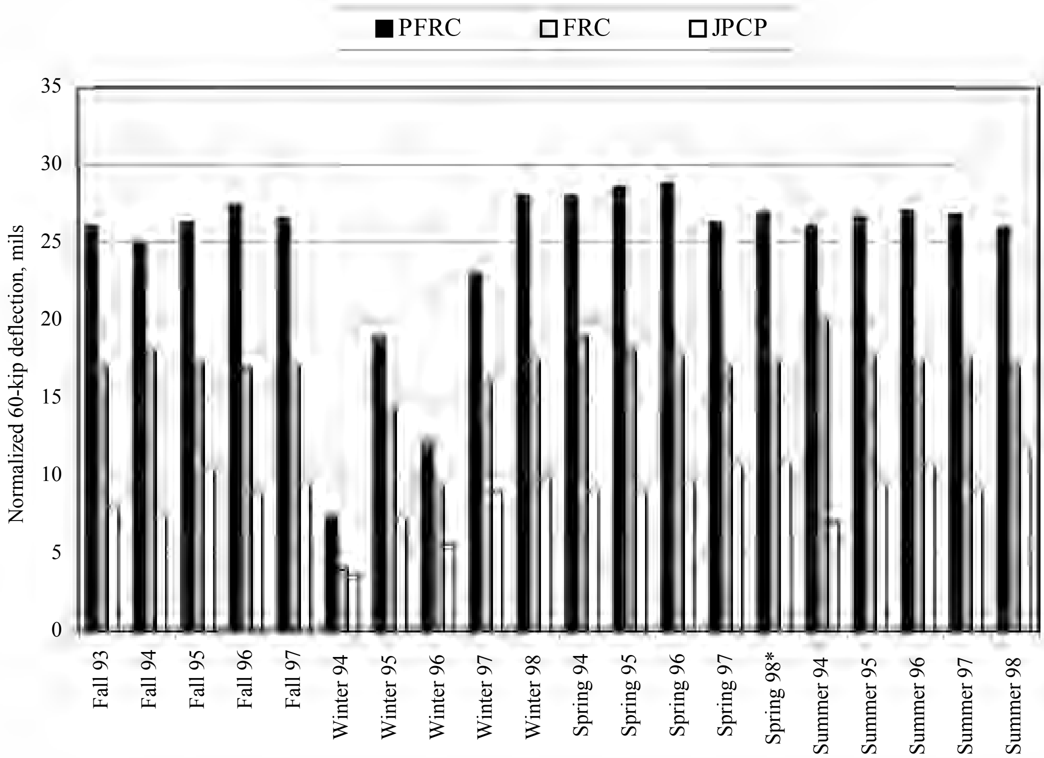
Using the first 5 years of testing during each seasonal period, the performance of each pavement section was monitored to determine its seasonal performance. Some seasonal trends are beginning to develop for each of these pavement sections. The seasonal effects of the NDT results on each pavement section are discussed below.

9.3.8.1 Normalized Deflections.

The normalized deflections of each pavement section are used to understand some of the variability in the seasonal monitoring for each pavement section (see figure 84). Based on the normalized deflections, the following pavement characteristics were identified for the conventional, fibrous, and prestressed pavements.

9.3.8.1.1 Conventional.

The conventional section has similar normalized deflections for all spring, all summer, all fall, and winter 1995, 1997, and 1998 values. Only the normalized deflections for winter 1994 and 1996 were notably reduced. The reduction in normalized deflections during these testing phases is a clear indication that the conventional section was partially frozen during the seasonal testing. This is further supported by looking at the monthly pavement temperatures during each of the testing phases.



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, mils	SD, mils	CV, %	Mean, mils	SD, mils	CV, %	Mean, mils	SD, mils	CV, %
Fall 93	26.0	4.0	14%	17.0	2.0	10%	8.0	1.0	8%
Fall 94	25.0	4.6	18%	18.0	8.7	46%	7.4	0.8	11%
Fall 95	26.3	3.5	13%	17.3	1.5	9%	10.4	1.2	12%
Fall 96	27.5	4.5	16%	17.0	1.6	10%	8.9	1.1	12%
Fall 97	26.6	4.3	16%	17.0	1.7	10%	9.4	1.3	13%
Winter 94	7.4	2.5	33%	4.0	0.9	22%	3.6	3.5	97%
Winter 95	18.9	2.7	15%	14.3	1.1	8%	7.2	0.5	6%
Winter 96	12.0	2.6	22%	9.3	2.1	22%	5.6	1.2	21%
Winter 97	23.0	3.8	16%	15.9	2.4	15%	9.0	1.2	13%
Winter 98	28.0	5.0	18%	17.4	1.9	11%	9.9	1.1	11%
Spring 94	28.0	5.0	17%	19.0	4.0	23%	9.0	2.0	21%
Spring 95	28.6	4.1	14%	18.1	2.2	12%	8.9	1.7	19%
Spring 96	28.8	4.6	16%	17.7	2.1	12%	9.6	1.3	14%
Spring 97	26.3	4.3	16%	17.1	2.0	12%	10.7	2.2	21%
Spring 98*	27.0	4.5	17%	17.3	2.1	12%	10.8	2.1	19%
Summer 94	26.0	4.0	14%	20.0	7.0	35%	7.0	3.0	41%
Summer 95	26.7	3.3	12%	17.8	1.7	10%	9.4	1.5	15%
Summer 96	27.0	4.2	16%	17.4	1.9	11%	10.8	2.3	21%
Summer 97	26.8	4.1	15%	17.6	2.4	13%	9.1	1.4	16%
Summer 98	25.9	4.0	15%	17.1	2.3	14%	11.8	3.2	27%

*Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.

FIGURE 84. FIVE-YEAR SEASONAL COMPARISON OF AVERAGE NORMALIZED 60-kip DEFLECTIONS

The average minimum and maximum monthly temperatures during the winter 1994 and 1996 testing were lower than the winter 1995, 1997, and 1998, as well as the spring, summer, and fall test phases. As the magnitude of the normalized deflections reduces, it is likely that the magnitude of the frozen structure increases. This is further supported by the depth of frost penetration described above. Therefore, the conventional pavement structure was frozen the most in the winter of 1994 and decreased in the amount of frozen pavement structure in 1996. The conventional section was most likely not frozen in the winters of 1995, 1997, and 1998.

9.3.8.1.2 Fibrous.

The fibrous section has seasonal effects similar to the conventional section. The normalized deflections for all spring, all summer, all fall, and winter 1997 and 1998 values were similar. Only the normalized deflections for winter 1994 through 1996 were notably reduced. The reduction in normalized deflections during these testing phases is a clear indication that the fibrous section was partially frozen during the seasonal testing.

This is further supported by looking at the monthly pavement temperatures during each of the testing phases. The average minimum and maximum monthly temperatures during the winter 1994 through 1996 testing were lower than the winter 1997 and 1998, as well as the spring, summer, and fall test phases. As the magnitude of the normalized deflections decreases, it is likely that the magnitude of the frozen structure increases. This is further supported by the depth of subgrade frost penetration described above.

Therefore, the fibrous pavement structure was frozen more in the winter of 1994 and decreased in the amount of frozen pavement structure in 1996 and 1995, respectively. The winter 1995 normalized deflections are slightly less than the spring, summer, and fall normalized deflection results, indicating that freezing of the subgrade was minimal during this testing. It appears that no frost penetration of the subgrade occurred during the winters of 1997 and 1998. The NDT findings agree with the estimated subgrade frost penetration presented above.

9.3.8.1.3 Prestressed.

The prestressed section has seasonal effects similar to the conventional and fibrous pavement sections. The normalized deflections for all spring, all summer, all fall, and winter 1998 values were similar. Only the normalized deflections for winter 1994 through 1997 were notably reduced. The reduction in normalized deflections during these testing phases is a clear indication that the prestressed section was partially frozen during the seasonal testing. This is further supported by looking at the monthly pavement temperatures during each of the testing phases. The average minimum and maximum monthly temperatures during the winter 1994 through 1997 testing were lower than the winter 1998, as well as the spring, summer, and fall test phases.

As the magnitude of the normalized deflections decreases, it is likely that the magnitude of frozen pavement structure increases. This is further supported by the depth of frost penetration described previously. Therefore, the prestressed pavement structure was frozen more in the winter of 1994 and decreased in the amount of frozen pavement structure in 1996 and 1995. It was probably not frozen in the winter 1998. The winter 1997 normalized deflections are slightly less than the spring, summer, and fall normalized deflection results and notably higher than the other normalized winter testing phases. Due to the slightly reduced pavement deflections of the prestressed section, it may be possible that the winter of 1997 testing had minimal or isolated amounts of frozen subgrade during testing.

It is interesting to note that the prestressed section appears to be more susceptible to freezing than the fibrous and conventional sections. This is most likely due to the increase in pavement thickness above the subgrade that serves as an insulating layer, protecting the subgrade from frost penetration. There findings are further supported by the backcalculation results.

9.3.8.2 Backcalculation.

The seasonal effects are further identified by looking at the backcalculated PCC and econocrete modulus values, as well as the subgrade stiffness. These results are shown in figures 85 through 87. To better understand the seasonal effects on the entire pavement structure, it is easiest to identify seasonal effects on the subgrade first. These subgrade characteristics help identify some of the variability of the pavement layers above the subgrade. The modulus values of the PCC and econocrete layers will also identify the seasonal impact on the pavement structure.

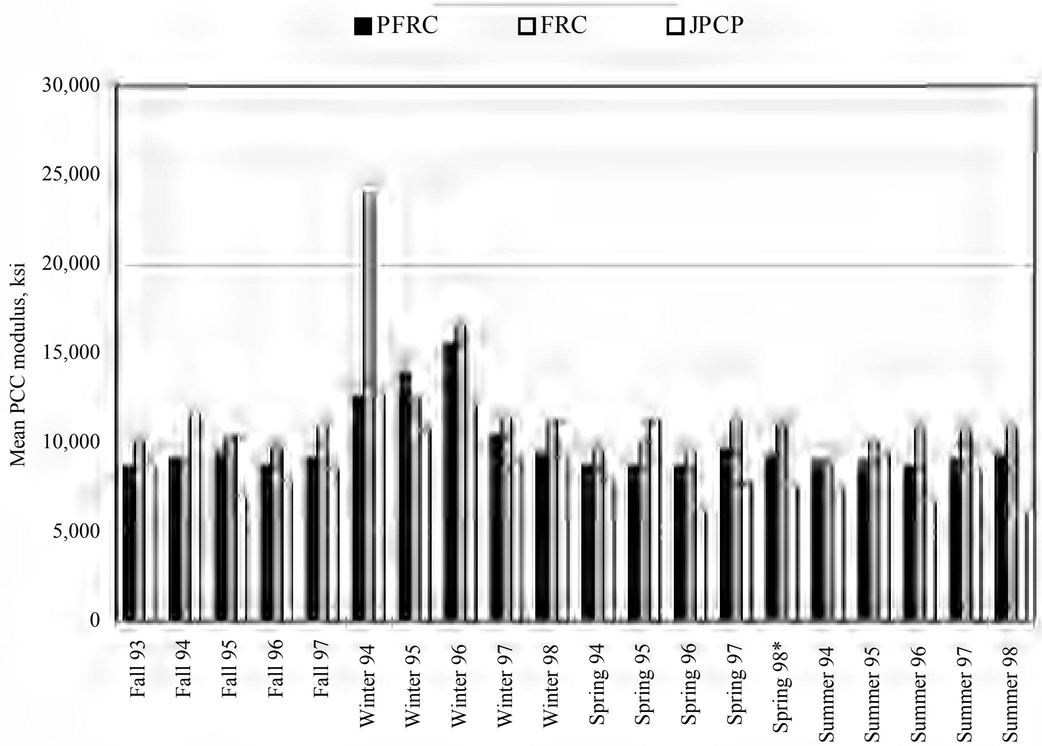
9.3.8.2.1 Conventional.

The k value for the conventional section indicates that the subgrade was partially frozen during the winters of 1996 and 1994. An unreasonably high backcalculated k value suggests that the winter 1994 testing was performed on the most frozen subgrade. The winter 1996 testing was slightly higher than all of the remaining testing phases but considerably less than the 1994 k value, indicating that the subgrade was also slightly frozen. It is interesting to note that the conventional section had the lowest unreasonably high backcalculated values out of the three experimental sections. This may be partially explained by the increase in PCC thickness of the conventional section, which requires a greater frost penetration to reach frozen subgrade. The winter 1995, 1997, and 1998 k values are typical of the nonfrozen k values of the spring, summer, and fall. Therefore, it is not likely that the subgrade was frozen during these testing phases.

Similar trends exist in the PCC and econocrete modulus values. The winter 1995 and 1996 modulus were slightly higher than the spring, summer, and fall testing values. The increased values during the winter testing are an indication that the pavement structure was partially frozen. These findings are similar to the findings from the normalized deflections and coincide with the frost penetration estimates.

9.3.8.2.2 Fibrous.

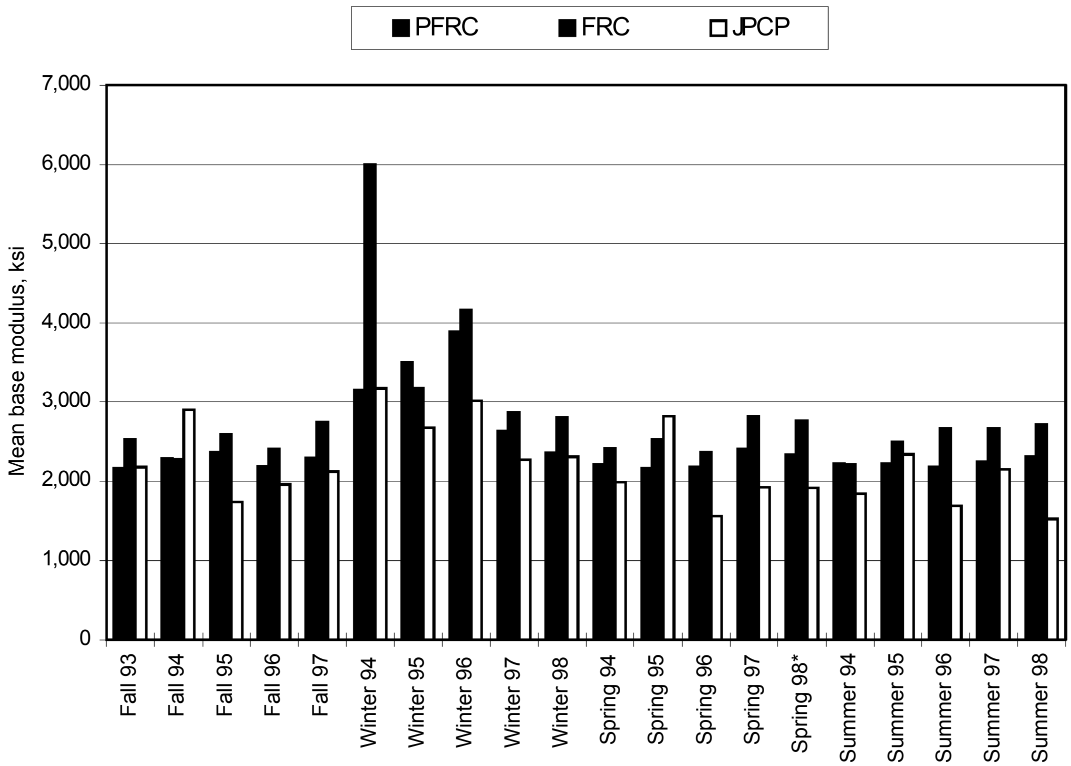
The k value for the fibrous section indicates that the subgrade was partially frozen during the winters of 1996 and 1994. An unreasonably high backcalculated k value suggests that the winter 1994 testing was performed on the most frozen subgrade. Winter 1996 was not frozen as much as the winter of 1994, but it appears to be partially frozen due to the higher k value. The fibrous section subgrade appears to be more frost susceptible than the conventional section and less frost susceptible than the prestressed sections. The winter 1995, 1997, and 1998 k values are typical of the nonfrozen k values of the spring, summer, and fall. Therefore, it is not likely that the subgrade was frozen during these testing phases.



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %
Fall 93	8,678	1,890	22%	10,120	1,597	16%	8,726	1,422	16%
Fall 94	9,152	1,672	18%	9,134	3,500	38%	11,622	2,063	18%
Fall 95	9,459	1,960	21%	10,383	1,176	11%	6,965	1,133	16%
Fall 96	8,779	1,595	18%	9,647	1,027	11%	7,851	1,069	14%
Fall 97	9,201	2,126	23%	10,982	1,456	13%	8,494	2,558	30%
Winter 94	12,618	3,280	26%	24,003	11,700	49%	12,699	5,208	41%
Winter 95	14,013	3,169	23%	12,703	1,500	12%	10,711	408	4%
Winter 96	15,543	7,317	47%	16,662	5,846	35%	12,071	4,727	39%
Winter 97	10,547	2,155	20%	11,470	2,120	18%	9,080	908	23%
Winter 98	9,431	2,082	22%	11,228	2,143	19%	9,229	1,958	21%
Spring 94	8,850	1,678	19%	9,673	1,640	17%	7,966	1,624	20%
Spring 95	8,677	1,694	20%	10,110	1,631	16%	11,299	980	9%
Spring 96	8,757	1,620	19%	9,464	1,502	16%	6,260	861	14%
Spring 97	9,655	2,559	26%	11,290	2,016	18%	7,712	2,451	32%
Spring 98*	9,334	2,027	22%	11,052	2,021	18%	7,666	2,081	29%
Summer 94	8,918	1,400	16%	8,855	3,551	40%	7,403	2,075	28%
Summer 95	8,902	1,530	17%	9,999	1,398	14%	9,356	2,572	28%
Summer 96	8,716	1,506	17%	10,675	1,679	16%	6,769	1,672	25%
Summer 97	9,014	2,442	27%	10,716	1,920	18%	8,614	1,944	23%
Summer 98	9,236	1,972	21%	10,875	1,898	17%	6,103	2,203	36%

*Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.

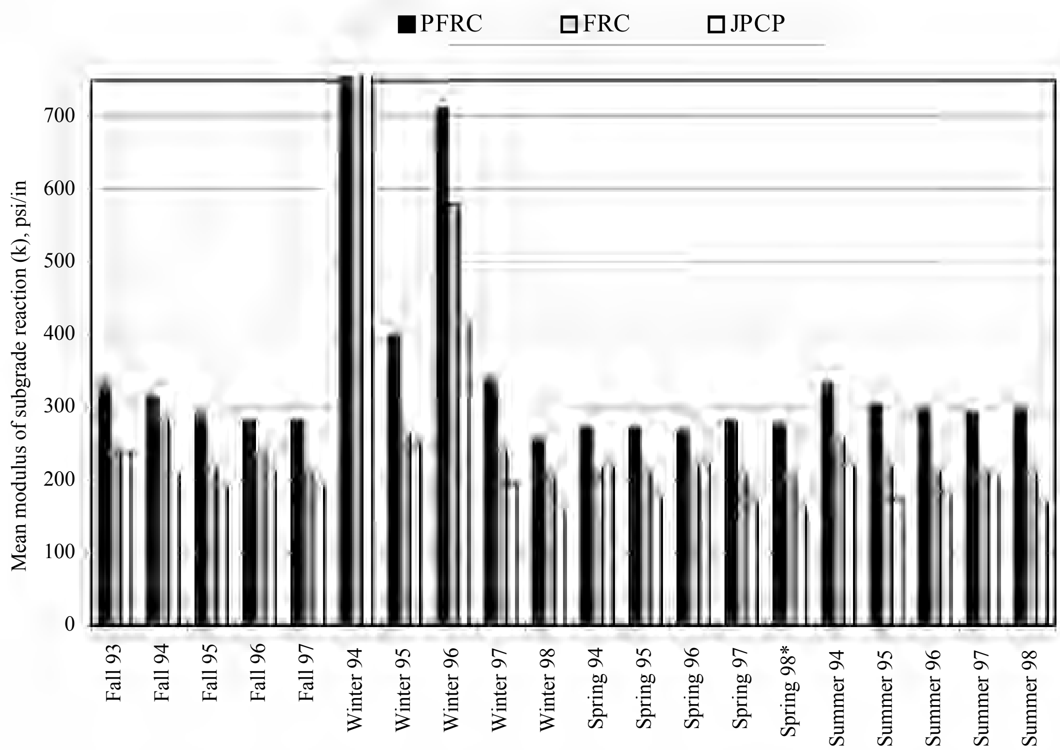
FIGURE 85. FIVE-YEAR SEASONAL COMPARISON OF AVERAGE BACKCALCULATED PCC MODULI



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %	Mean, ksi	SD, ksi	CV, %
Fall 93	2,170	472	22%	2,530	399	16%	2,181	356	16%
Fall 94	2,288	418	18%	2,284	875	38%	2,906	516	18%
Fall 95	2,365	490	21%	2,596	294	11%	1,741	283	16%
Fall 96	2,195	399	18%	2,412	257	11%	1,963	267	14%
Fall 97	2,300	531	23%	2,745	364	13%	2,123	640	30%
Winter 94	3,155	820	26%	6,001	2,925	49%	3,175	1,302	41%
Winter 95	3,503	792	23%	3,176	375	12%	2,678	408	15%
Winter 96	3,886	1,829	47%	4,165	1,462	35%	3,018	1,182	39%
Winter 97	2,637	539	20%	2,868	530	18%	2,270	526	23%
Winter 98	2,358	520	22%	2,807	536	19%	2,307	490	21%
Spring 94	2,212	420	19%	2,418	410	17%	1,991	406	20%
Spring 95	2,169	424	20%	2,528	408	16%	2,825	980	35%
Spring 96	2,189	405	19%	2,374	376	16%	1,565	215	14%
Spring 97	2,414	640	26%	2,822	504	18%	1,928	613	32%
Spring 98*	2,334	507	22%	2,763	505	18%	1,917	521	29%
Summer 94	2,230	350	16%	2,214	888	40%	1,851	519	28%
Summer 95	2,226	383	17%	2,500	349	14%	2,339	643	28%
Summer 96	2,179	377	17%	2,669	420	16%	1,692	418	25%
Summer 97	2,253	611	27%	2,670	483	18%	2,154	486	23%
Summer 98	2,309	493	21%	2,719	474	17%	1,526	551	36%

* Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.

FIGURE 86. FIVE-YEAR SEASONAL COMPARISON OF AVERAGE BACKCALCULATED BASE MODULI



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, pci	SD, pci	CV, %	Mean, pci	SD, pci	CV, %	Mean, pci	SD, pci	CV, %
Fall 93	329	73	22%	240	27	11%	238	39	16%
Fall 94	315	84	27%	284	114	40%	209	25	12%
Fall 95	290	58	20%	220	30	14%	192	16	8%
Fall 96	280	61	22%	238	21	9%	214	42	20%
Fall 97	282	58	21%	208	27	13%	192	35	18%
Winter 94	2,188	671	31%	1,669	329	20%	1,060	548	52%
Winter 95	398	65	16%	265	29	11%	249	23	9%
Winter 96	712	186	26%	580	133	23%	419	45	11%
Winter 97	338	76	23%	242	36	15%	195	29	15%
Winter 98	256	58	23%	206	21	10%	161	11	7%
Spring 94	272	70	26%	207	50	24%	219	44	20%
Spring 95	272	58	21%	212	28	13%	175	39	22%
Spring 96	268	66	25%	220	26	12%	223	31	14%
Spring 97	280	58	21%	209	27	13%	172	30	17%
Spring 98*	278	63	23%	209	25	12%	165	24	14%
Summer 94	333	84	25%	257	90	35%	221	54	24%
Summer 95	305	70	23%	221	29	13%	175	37	21%
Summer 96	298	71	24%	213	24	11%	182	53	29%
Summer 97	292	73	25%	210	30	14%	207	31	15%
Summer 98	300	69	23%	211	29	14%	169	36	21%

*Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.

FIGURE 87. FIVE-YEAR SEASONAL COMPARISON OF AVERAGE BACKCALCULATED MODULUS OF SUBGRADE REACTION

Similar trends exist in the PCC and econocrete modulus values. The winter 1995 and 1996 modulus were higher than the spring, summer, and fall testing values. In addition, the PCC modulus for the winter 1997 was slightly higher than typical spring, summer, and fall testing. The increased values during the winter testing are an indication that the pavement structure was partially frozen. These findings are similar to the findings from the normalized deflections and coincide with the frost penetration estimates.

9.3.8.2.3 Prestressed.

The k value for the prestressed section indicates that the subgrade was partially frozen during the winters of 1995, 1996, and 1994. An unreasonably high backcalculated k value suggests that the winter 1994 testing was performed on the most frozen subgrade. Winter 1996 was not frozen as much as the winter of 1994, but it appears to be partially frozen. In addition, the winter 1995 testing was slightly higher than all of the remaining testing phases, indicating that the subgrade was probably only partially frozen. The winter 1997 and 1998 k values are typical of the nonfrozen k values of the spring, summer, and fall. Therefore, it is not likely that the subgrade was frozen during these testing phases. The prestressed section appears to be the most freeze sensitive, most likely due to the limited depth to freeze susceptible subgrade beneath the very thin prestressed pavement section (7 in) compared to the fibrous (10 in) and conventional (15 in).

Similar trends exist in the PCC and econocrete modulus values. The winter 1995, 1996, and 1997 modulus were higher than the spring, summer, and fall testing values. The increased modulus values during the winter testing are an indication that the pavement structure was partially frozen. These findings are similar to the findings from the normalized deflections and coincide with the frost penetration estimates.

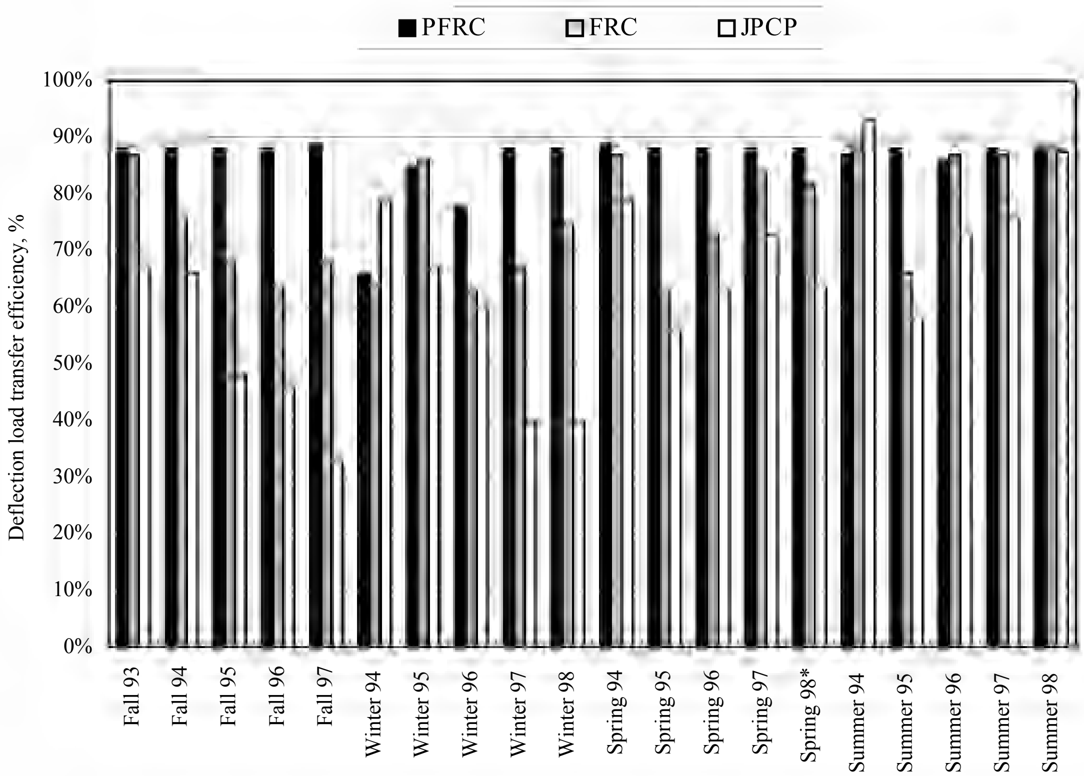
9.3.8.3 Deflection Load Transfer Efficiency.

The deflection LTE results obtained from the NDT are shown in figure 88. From this figure, the following can be observed

- The conventional section generally had significantly lower load transfer values than the prestressed and the fibrous pavement sections. In addition, the range of LTE variability was considerable greater. The conventional section has the greatest reaction to seasonal variations, such as temperature change and precipitation.

- The fibrous section has more variability than the prestressed section but less than the conventional section. It appears that this section is also sensitive to temperature change and precipitation.

- The prestressed section has very little variability due to temperature and precipitation. The posttension applied to this pavement section has helped minimize the seasonal effects of temperature and moisture. In addition, the LTE for this section is notably higher than for the other two sections and is not decreasing over time.



Season	Prestressed			Fiber-reinforced			JPCP		
	Mean, %	SD, %	CV, %	Mean, %	SD, %	CV, %	Mean, %	SD, %	CV, %
Fall 93	88%	3%	3%	87%	12%	14%	67%	13%	19%
Fall 94	88%	3%	4%	76%	18%	24%	66%	26%	39%
Fall 95	88% **	3%	4%	68%	23%	33%	48%	18%	38%
Fall 96	88%	2%	3%	64%	22%	35%	46%	11%	24%
Fall 97	89%	3%	3%	68%	26%	39%	33%	9%	28%
Winter 94	66%	3%	5%	64%	14%	22%	79%	8%	10%
Winter 95	85%	7%	9%	86%	7%	8%	67%	16%	24%
Winter 96	78%	5%	7%	63%	25%	40%	60%	11%	18%
Winter 97	88%	3%	3%	67%	23%	34%	40%	9%	23%
Winter 98	88%	3%	3%	75%	27%	35%	40%	10%	24%
Spring 94	89%	3%	4%	87%	14%	16%	79%	9%	11%
Spring 95	88%	5%	6%	63%	24%	32%	56%	28%	49%
Spring 96	88%	4%	4%	73%	23%	31%	63%	14%	23%
Spring 97	88%	4%	4%	84%	5%	7%	73%	17%	24%
Spring 98*	88%	3%	4%	82%	17%	22%	64%	8%	16%
Summer 94	87%	3%	4%	89%	6%	6%	93%	3%	3%
Summer 95	88%	3%	4%	66%	23%	34%	58%	28%	48%
Summer 96	86%	5%	6%	87%	9%	11%	73%	19%	26%
Summer 97	88%	3%	4%	87%	8%	10%	76%	16%	21%
Summer 98	88%	3%	4%	89%	7%	8%	88%	7%	8%

* Projected Spring 98 values obtained from the average of Winter 98 and Summer 98 values.
** Average of Fall LTE values due to uniform seasonal pavement response.

FIGURE 88. FIVE-YEAR SEASONAL COMPARISON OF AVERAGE TRANSVERSE JOINT LOAD TRANSFER EFFICIENCY

9.3.8.4 Void Detection.

Table 45 shows the percentage of conventional slabs that have potential voids during each testing phase. The percentage of slabs with voids is not increasing over time; therefore, the climatic conditions are partially affecting the seasonal change in potential voids. It appears that cooler temperatures are affecting the potential for voids. The change in temperatures in combination with the changing LTE and slab curling all affect the potential for voids in the conventional slabs.

TABLE 45. PERCENTAGE OF CONVENTIONAL SLABS TESTED WITH POTENTIAL VOIDS AND CLIMATIC DATA

Season	% of Slabs Tested With Voids	Precipitation (in)	Minimum Temperature (°F)	Maximum Temperature (°F)
Fall 93	19	T	34	58
Fall 94	25	0	40	50
Fall 95	30	0.41	47	54
Fall 96	75	0	16	27
Fall 97	61	0.05	23	41
Winter 94 *	0	0	12	37
Winter 95 *	0	0	23	35
Winter 96 *	0	0	27	36
Winter 97	50	T	24	35
Winter 98	20	T	36	38
Spring 94	0	0	40	62
Spring 95	30	0.35	41	53
Spring 96	0	0.87	53	70
Spring 97	0	0	42	63
Spring 98	--	--	--	--
Summer 94	0	0.01	63	83
Summer 95	40	0.07	67	86
Summer 96	25	0	54	72
Summer 97	0	0.38	63	76
Summer 98	0	0	N/A	N/A

N/A – Not Available

* – The pavement structure was partially frozen during the seasonal testing.

9.4 SUMMARY.

9.4.1 Nondestructive Testing Results.

From the NDT analysis, it was observed that the fall, spring, and summer test results had much lower standard deviations and coefficients of variation than the winter testing. Due to the high amount of variability in the winter season of testing, it is believed that the subgrade was partially frozen during some of the winter testing. This is most likely due to the frost penetration of the subgrade. When the winter NDT results, with partial subgrade freezing, are excluded, the seasonal NDT results show similar responses. This significantly reduces the standard deviations and coefficients of variation of the testing results.

It is also important to note that the conventional section has much higher coefficients of variation and standard deviations than the fibrous and prestressed pavement sections. This indicates that the conventional performance is much more variable than the other two innovative test sections. It is expected that this variability will continue to increase as the pavement sections age.

9.4.2 Normalized Deflections and Backcalculation.

The normalized maximum deflections were used to monitor pavement response to a typical aircraft gear load. Generally, the pavement responses were similar for all spring, summer, and fall seasons. During the winter, these deflections decreased in magnitude as the pavement structure froze. For those winter seasons when the pavement structure was not frozen, the normalized maximum deflections were similar to the spring, summer, and fall seasons. The prestressed section was most susceptible to freezing. The fibrous was not as sensitive to freezing as the prestressed, but it was more sensitive than the conventional section. The conventional section showed the most resistance to freezing of the pavement structure. These observations are further supported by the backcalculation results.

The susceptibility of the pavement section to freezing is directly related to the thickness of the pavement surface. As the thickness of each pavement type decreases, it becomes more susceptible to freezing. The PCC thickness of the prestressed pavement section is 7 in., compared to the 10-in fibrous and the 15-in conventional. Reducing the pavement thickness reduces the insulating ability of the PCC and minimizes the depth to the top of the subgrade, allowing more subgrade frost penetration and freezing of the subgrade.

Currently, the most significant seasonal variation occurs from freezing of the pavement structure. None of these pavement sections had a significant reduction in normalized deflections or backcalculated values due to changes in precipitation.

9.4.3 Load Transfer Efficiency.

The conventional section generally had significantly lower load transfer values than the prestressed and the fibrous pavement sections. The conventional section has the greatest amount of annual variability, as well as the greatest reaction to seasonal variations, such as temperature change and precipitation.

The fibrous section has more variability than the prestressed section but less than the conventional section. It appears that this section is also sensitive to temperature change and precipitation.

The prestressed section has very little variability due to temperature and precipitation. The posttension applied to this pavement section helped minimize the seasonal effects of temperature and moisture. In addition, the LTE for this section is notably higher than the other two sections and is not decreasing over time.

9.4.4 Voids.

The percentage of conventional slabs with voids is not increasing over time. There is variability in the percentage of voids within this section during each NDT phase, indicating that climatic conditions are partially affecting the seasonal change in potential voids. It appears that cooler temperatures are affecting the potential for voids. The change in temperatures in combination with the change in load transfer efficiency and slab curling all affect the potential for voids in the conventional slabs.

9.5 TRENDS.

During the first 5 years of seasonal monitoring, preliminary annual and seasonal trends were identified. The trends were based on NDT and a visual pavement inspection survey. It is expected that as the innovative pavement sections continue to age, these trends will become more defined. Currently, the most significant trend identified is that these pavement sections appear to be deteriorating at different rates. The conventional and fibrous pavement are deteriorating at twice the rate of the prestressed pavement. This will become a significant factor in foreign object damage (FOD) potential and increased maintenance efforts.

Structurally, these pavement sections currently do not appear to be significantly deteriorating. As these pavement sections continue to age, their rate of structural deterioration will become more apparent. It is expected that joint deterioration and a decrease in LTE will become critical to the pavements' performance. In addition, it is likely that each pavement section will deteriorate at a different rate due to the variations in thickness and other design variables. It is recommended that monitoring of these pavement sections be continued on an annual basis.

These pavement sections were more sensitive to seasonal variability during the NDT monitoring period. It is important that the monitoring for potential voids be performed periodically to identify any structural support problems. In addition, it is important that the subgrade frost sensitivity be monitored periodically to identify any significant structural effects on these pavement sections. Because these pavement sections are already season sensitive, it is likely that they will exhibit increased sensitivity as they continue to age.

10. COMPARISON OF DESIGN ASSUMPTIONS AND PERFORMANCE.

10.1 k OF SUBGRADE.

During design, the assumed k value, based on a soil investigation, was 190 psi/in. As discussed in section 9, NDT, the measured k value was

Season	Prestressed	Fibrous	Conventional
Average Annual	414	316	252
Average Annual (without winter)	293	224	197

The measured k of the subgrade, without the winter results, is slightly greater than the design value.

10.2 ELASTIC MODULUS OF THE FIBROUS CONCRETE.

During design, the assumed modulus of elasticity of the concrete was 5,000,000 psi. As discussed in section 9, NDT, the measured modulus of elasticity for the fifth year was:

Season	Prestressed	Fibrous	Conventional
Average Annual	9,874,000	11,452,000	8,830,000
>80% (Average less 1 SD)	7,960,000	8,069,000	6,888,000
Average Annual (without winter)	9,022,000	10,198,000	8,187,000
>80% (Average less 1 SD)	8,717,000	9,460,000	6,578,000

The measured value of the modulus of elasticity is significantly greater than the design value of the modulus of elasticity.

10.3 ANNUAL MOVEMENT OF THE PRESTRESSED PAVEMENT.

During design, the finger joint between the prestressed and fibrous pavement was designed with a 3 1/2-inch joint opening.

During the summer of the third reading period, July 1996, the finger joint was completely closed up. During the third year, as discussed in section 5, the maximum difference measured in the opening width during the third monitoring year, was 3 6/16 inches.

Typically, the annual joint opening was less than 3.5 inches.

The length of the prestressed pavement changes annually, the amount is at or slightly less than the designed annual movement. However, during construction the finger joint may not have been properly placed to provide sufficient movement during the hot months.

Part of the closing of the finger joint may be due to movement to the west by the fibrous concrete pavement section. As noted in the report, the joint in the fibrous section are wider in the summer than anticipated.

10.4 TEMPERATURE DIFFERENTIAL.

During the design, the temperature differential was assumed to be an average of 3°F/in of slab depth.

As discussed in section 6, the maximum measured temperature differential was 2.9°F/in of slab depth. A temperature differential in excess of 2.5°F/in is only reached during a short period of time each day.

10.5 CURLING STRESS.

Using an elastic modulus for concrete of 5,000,000, the calculated maximum curl stress in both the longitudinal and transverse directions was estimated to be 243 psi. [((1 + 0.15)*4 × 10^{-6}*5 × 10^{6}*18)/(2(1-0.15)].

Assuming a temperature differential of 2.9°F/in and an average elastic modulus of concrete of 9,000,000, the calculated maximum curl stress in the prestressed pavement in both the longitudinal and transverse directions is estimated to be 494 psi. [((1 + 0.15)*4 × 10^{-6}*9 × 10^{6}*20.3)/(2(1-0.15)]. If a temperature differential of 1.5EF/in is used, the calculated maximum curl stress would be 255 psi.

Assuming a temperature differential of 2.9°F/in and an average elastic modulus of concrete of 10,000,000, the calculated maximum curl stress in the fibrous pavement in both the longitudinal and transverse directions is estimated to be 549 psi.[((1 + 0.15)*4 × 10^{-6}*10 × 10^{6}*20.3)/(2(1-0.15)]. If a temperature differential of 1.5EF/in is used, the calculated maximum curl stress would be 284 psi.

The maximum curling stress in the fibrous, prestressed and conventional pavements are significantly greater than the value assumed in design. As noted above, the maximum temperature differential occurs during a short period of time during the day.

10.6 MAXIMUM STRESS.

During design, the maximum stress in the prestressed pavement slab was estimated to be to be 640 psi in the transverse directions and approximately 800 psi in the longitudinal directions.

Based on the curling stress calculation for the prestressed pavement, the maximum stress in the longitudinal direction is estimated to be 891 and 1051 psi in the transverse direction.

Based on the curling stress calculation, for the fibrous pavement, the maximum stress in the longitudinal direction is estimated to be 946 and 1106 psi in the transverse direction.

Based on the stress calculations, the prestressed pavement will most likely crack under loading conditions in the longitudinal direction.

With the exception of one crack next to the UPS apron, the longitudinal cracks which have occurred are very short, approximately 2 to 4 feet in length. The transverse cracks which have occurred in the prestressed pavement are not propagating. The transverse cracks in the fibrous pavement are most likely due to joint spacing.

The number of short longitudinal cracks is increasing, which could indicate that the maximum curl stress, as discussed above, does occur.

During the fifth year, a longitudinal crack was observed about 5 feet from the edge of the pavement, and is centered on the taxiway centerline stripe. This crack is most likely due to departing UPS aircraft, crossing over the edge of the pavement. When the aircraft cross over the edge, the edge could be in a curled condition, or the edge may have insufficient support. This taxiway entrance was not originally anticipated in the design of the prestressed taxiway, and a sleeper slab was not placed under the edge of the prestressed pavement. Further investigation into the cause of the cracking is required.

It should be noted that during the design of Taxiway F, the UPS ramp was not anticipated. After construction of the prestressed fibrous pavement, sleeper slabs were not constructed at the exit taxiway to the UPS ramp, to control edge stress. Had the exit ramps to the UPS ramp been anticipated, edge stresses would have been considered in the design of the prestressed fibrous pavement, and methods to prevent the longitudinal crack would have been incorporated into the design.

The fibrous PCC pavement is beginning to develop longitudinal cracking, approximately 10 feet from the centerline of the taxiway, on both sides. The cracking is predominantly in the first day of paving, which ends near an entrance to the UPS ramp. This cracking could be due to loading. Further investigation is required.

10.7 TIME OF MAXIMUM CURL.

As discussed in section 6, the maximum temperature differential occurs during daylight hours. Since most of the aircraft traffic at the Greater Rockford Airport is the nighttime UPS hub operations, it is very likely that the combination of maximum curl and aircraft loading does not occur.

10.8 UNIFORM STRESSING AND SUBGRADE FRICTION.

The prestressed pavement was designed for uniform stressing throughout the length of the pavement.

Transverse cracks in the prestressed pavement occur at the approximate center of the pavement. These cracks may indicate that the prestressing is not uniform along the length of the 1200-foot-long section of pavement.

The maximum friction effect occurs at the center of the prestressed slab. The cracking at the approximate center of the pavement may be due to a friction effect higher than anticipated.

10.9 FIBROUS CONCRETE JOINT SPACING.

The joint spacing for the fibrous concrete pavement with type K cement was varied from 85 to 200 feet to determine the appropriate joint spacing for this type of pavement.

Based on the working joint and crack locations, as discussed in section 4, the pavement appears to want to crack transversely at about a 50-foot spacing. The pavement appears to want to crack longitudinally at a 25- to 50-foot spacing. More investigation into the longitudinal joint spading is required.

10.10 ADDITIONAL DESIGN CONSIDERATIONS.

The following consideration was not part of the original design, but is relevant to any new design.

The modulus of elasticity for the econocrete appears to be 2,250,000 psi.

10.11 COEFFICIENT OF THERMAL VOLUME CHANGE.

The in-place coefficient of friction cannot be verified except by removing a section of pavement and applying a force to the tendons with a jack. Arrangements for this measurement are being made.

Using the equation for joint movement calculation in Yoder,

$$z = L(12)[\in \Delta t + \delta]$$

where L = slab length (ft)
z = Joint opening (amount a joint will open) (in.)
$\in$ = Coefficient of thermal volume change (in./in./°F)
δ = Coefficient of Shrinkage (assume = 0 for type K cement)
$\Delta\tau$ = Thermal temperature drop

Using the maximum observed movement at the ends of the taxiway (section 5), the coefficient of thermal volume change for the prestressed pavement is calculated to be

$$6.67 = 1200(12)[\in \times (88-(-18)) + 0]$$

$$\in = 0.0000044 \text{ in/in/°F}$$

Using the maximum movement between sta. 142+00 and 152+00 (section 7.3), the coefficient of thermal volume change for the prestressed pavement is calculated to be

$$4.235 = 1000(12)[\in \times (88-(-18)) + 0]$$

$$\in = 0.0000033 \text{ in/in/°F}$$

Yoder states that the coefficient of thermal volume change is 0.000005 in/in/°F. The coefficient determined from data from this project is within the same magnitude as the commonly accepted value for the coefficient of thermal expansion.

10.12 PAVEMENT CONDITION.

The PCI of the prestressed fibrous concrete pavement is estimated to be in excellent condition. The prestressed fibrous concrete pavement was designed to prevent spalling associated problems. Since spalling problems were not observed, it can be concluded that the pavement condition for the prestressed fibrous concrete pavement met design assumptions.

The PCI of the fibrous concrete pavement is estimated to be very good. The pavement condition is due to joint spalling, crack spalling, and pavement cracking. It should be remembered that the purpose of the fibrous project was to determine if the use of steel fibers with shrinkage compensating cement will allow an increase in joint spacing.

The PCI of the conventional pavement is approximately 67 after 5 years. This condition is primarily due to joint spalling. The FAA pavement design provides for a 20-year structural life. Failure criteria is for 50 percent slab cracking after 20 years. The spalls in the conventional pavement are not structural cracks. Therefore, the conventional pavement has met design assumption. It should be noted that this performance, which is typical of a convention pavement, creates the desire for these innovative pavements.

11. CONCLUSIONS.

- The prestressed pavement is performing excellently. Although some transverse hairline cracks have formed at various locations throughout the pavement, these cracks are not full width of the pavement. Some short longitudinal cracks have formed.

- Most of the transverse cracks are in the center of the prestressed pavement. This may indicate a relaxation of the stressing tendons or the effect of friction in the center of the slab is greater than anticipated.

- The fibrous pavement is performing very well. Three of the joints do not appear to be working. Cracks have formed between the joints. The fibrous pavement is cracked transversely at approximately 50-foot intervals. Longitudinal joint spacing appears to be 25 to 50 feet, but more investigation into the joint spacing is required.

- The surface of the prestressed and fibrous pavements have not deteriorated with time. The surface is not spalled or pitted. The steel fibers are still embedded below the pavement surface.

- The conventional pavement has begun to deteriorate. The average PCI is 67. Most of the joints have become spalled. Five cracked panels which were observed during the first year have not deteriorated.

- It is interesting to note that the cracks in the conventional pavement have occurred in the section of pavement with a fibrous PCC pavement base.

- Most of the cracks in the prestressed and fibrous pavements are first observed during the spring observation period.

- Based on the PCI survey by ERES, the prestressed pavement is in “excellent” condition, and the fibrous pavement is in “very good” condition. The drop in PCI per year for the prestressed pavement is 2.0 PCI points per year, while the drop in PCI per year for the fibrous pavement is 5.2 PCI points per year. The fibrous pavement has a lower PCI value due to the amount of joint spalling, crack spalling, and joint sealant damage.

- Based on the visual pavement survey, it can be concluded that:

    - Currently, the prestressed pavement has the best overall pavement surface condition.

    - The prestressed pavement is performing the best, followed by the fibrous pavement and then the conventional pavement.

    - The fibrous pavement and conventional pavement sections will require more maintenance (joint sealing, crack sealing, and spall repair) than the prestressed pavement.

- The conventional pavement has the most FOD potential. At present, this potential is minimal; however, with time, these joints will have an increased amount of FOD.

- The maximum movement of the pavement, based on movement at the ends of the pavement, is 6.67 inches. The typical movement is less than 6 inches. The finger joint in the gap slab was designed for 3 1/2 inches of movement. The joint has sufficient space to provide the necessary room for the joint to move.

- The finger joint has been observed to be completely closed during the summer months. This closure may be the result of miscalculating the joint opening placement during construction or due to opening of joints in the fibrous pavement.

- The working joints, which are in the fibrous pavement move more than anticipated. The joint seal has failed in these joints.

- The maximum temperature differential (°F/in) is greater than 2.5°F/in for only a short period of time during the day. The greatest temperature distribution occurs during daylight hours when sunlight warms the pavement surface. Typically, the temperature distribution is less than 2.0°/in.

- Based on the maximum temperature differential, high stresses due to curling appear to only occur during a small window (2 to 3 hours) during the day. The maximum temperature differential occurs during the spring and summer.

- A large temperature differential between the top and the bottom of the slab was not observed during the fall nights, as expected.

- The temperature of the surface of the pavement is typically higher than air temperature during the day and lower than the air temperature during the night.

- Variation in temperature along the length of the project, at similar depth, appears to be due to the 15-minute interval required to read the first and last gauge.

- The center of the pavement moves seasonally.

- As shown in figures 42 and 43, the point of zero movement in the slab is to the east of the center of the slab. The location of zero movement is effected by condition of the expansion joint at the east end of the pavement section. The more inoperative the joint, the more the point of zero movement will move toward the east.

- Seasonally, the west end of the pavement moves more than the east end of the pavement. This is likely due to the west edge being a free edge.

- The pavement movement along the length of pavement section is not uniform.

- Daily movement of the pavement is not uniform. Daily, the west end moves more than the east end. During the pavement's maximum growth, occurring during the summer, the east end of the prestressed pavement does not move uniformly during the day. This may be due to a lack of expansion at the expansion joint.

- The end 100 feet of the pavement moves proportionally more than the rest of the pavement. The movement per unit length of pavement (thermal strain) is greater at the ends of the pavement section than at the center of the pavement section. It is expected that the movement per unit length of pavement at the ends of the section would be greater at the ends of the section due to the effect of friction at the bottom of the pavement slab. It would be only in the case of a frictionless interface would the thermal strain be constant along the length of the slab. Thus, it is concluded that friction does exist at the bottom of the pavement slab.

- Considering that there is friction at the bottom of the pavement slab, the measured pavement movement agrees remarkable well with the computed pavement movement using the coefficient of thermal expansion and change in pavement temperature. It could be that over the long term such as from season to season, the back and forth movement of the slab, and the movement of aircraft over the pavement reduce the effect of the friction.

- There is a high level of variability in the response of the strain gauges. This variability may be due to moisture in the gauges. Regardless, the variability makes conclusions on the pavement response from this data difficult.

- There does not appear to be a relationship between time of day and strain reading.

- There does not appear to be a relationship between change in air temperature and change in strain.

- There appears to be a relationship between change in pavement length and change in strain. The relationship is different for each depth of gauge. This may indicate bending of the slabs.

- There appears to be a relationship between change in pavement temperature and change in strain. As the pavement temperature decreases, the strain value increases. However, the relationship should be taken cautiously due to the variability in the response of the gauges.

- There appears to be a long-term decrease in the strain readings. This may indicate a relaxation of the stressing tendons or a creep in the pavement length.

- Because the strain values are decreasing and the overall pavement length is staying the same or increasing, it is possible that the gauges have a reverse polarity.

- The deflections for summer and fall are similar in magnitude. The winter are lower due to frozen subgrade. The spring deflections are higher due to thawing of the subgrade.

- The prestressed pavement section, which was the thinnest pavement, was the most susceptible pavement to freezing.

- The modulus of elasticity for all three pavement sections is similar.

- Load transfer for the prestressed pavement has remained consistently high.

- Load transfer for the fibrous pavement varies between 60 and 90 percent. The load transfer for the conventional pavement has deteriorated with time.

- The NDT values from the prestressed pavement indicate that the posttensioning has helped minimize the seasonal variability due to temperature and precipitation.

- Structurally, the pavement sections do not appear to be significantly deteriorating.

- The conventional pavement has a much higher coefficient of variation and standard deviation then the prestressed and fibrous pavements.

- The percentage of conventional slabs with voids is not increasing over time.

- The full affect of curling plus loading stresses does not appear to be an issue at the Greater Rockford Airport since most of the aircraft traffic is generated by a nighttime air cargo operation. Large temperature differentials between the top and bottom of the pavements was not observed at night.

12. RECOMMENDATIONS.

- The visual survey portion of the pavement monitoring program should be continued. Because these innovative pavement sections were recently constructed, most of the pavement performance trends have not been significant enough to monitor. As these sections continue to age, these trends will become much more noticeable and significant. Continued monitoring will result in many important findings. Therefore, it is recommended that additional visual monitoring of these pavement sections be considered.

- Consideration should be given to additional NDT testing and additional analysis of the existing and new NDT data. Samples of the PCC pavement and base, as well as subgrade testing (with the dynamic cone penetrometer (DCP)) should be included in order to "calibrate" the NDT data.

- Cores should be taken from the pavement to determine the modulus of elasticity and modulus of rupture of the fibrous PCC.

- If an additional monitoring program is funded, prior to the start of the program the movement gauges should be replaced and reset, the thermocouples and strain gauges should be repaired and the strain gauges should be recalibrated.

- The data from the strain gauges should be reviewed in detail to determine if they are working properly. Continued use of the strain gauges for monitoring long term thermal strains is not recommended.

- In future construction projects, the stress in the tendons should be measured

- The intent of the 5-year monitoring program, described in this report, was to record the performance of the innovative pavements. As part of this monitoring program, a substantial amount of data has been collected which has not been analyzed, since analysis of this data would not document performance of the innovative pavements. It is recommended that a separate contract be exercised for analysis of this collected but not analyzed data. The most logical institute for this work is the Center of Excellence at the University of Illinois.

Table A-1
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
First Period, November 1997

INITIAL DAY = November 23, 1997
DAY 1 = November 23, 1997
DAY 2 = November 24, 1997
DAY 3 = November 253, 1997

COMMENTS:

Gap Width	TIME	STA 141		STA 142		STA 144		STA 147		STA 150		STA 152		STA 153		TIME	Temp	Joint Width
		LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT			
6 - 1 / 16	18:00	8 - 16 / 32	7 - 26 / 32	7 - 8 / 32	8 - 9 / 32	6 - 25 / 32	6 - 25 / 32	4 - 12 / 32	4 - 19 / 32	2 - 2 / 32	2 - 3 / 32	1 - 5 / 32	0 - 25 / 32	1 - 19 / 32	1 - 10 / 32	18:00	29	3 - 8 / 16
6 - 1 / 16	19:00	8 - 15 / 32	7 - 28 / 32	7 - 8 / 32	8 - 8 / 32	6 - 24 / 32	6 - 24 / 32	4 - 12 / 32	4 - 16 / 32	2 - 3 / 32	2 - 4 / 32	1 - 8 / 32	0 - 26 / 32	1 - 18 / 32	1 - 8 / 32	19:00	28	3 - 8 / 16
6 - 1 / 16	20:00	8 - 16 / 32	7 - 28 / 32	7 - 8 / 32	8 - 9 / 32	6 - 26 / 32	6 - 26 / 32	4 - 15 / 32	4 - 18 / 32	2 - 3 / 32	2 - 4 / 32	1 - 8 / 32	0 - 28 / 32	1 - 18 / 32	1 - 8 / 32	20:00	26	3 - 8 / 16
6 - 1 / 16	21:00	8 - 16 / 32	7 - 28 / 32	7 - 10 / 32	8 - 10 / 32	6 - 24 / 32	6 - 24 / 32	4 - 14 / 32	4 - 14 / 32	2 - 4 / 32	2 - 4 / 32	1 - 8 / 32	0 - 24 / 32	1 - 18 / 32	1 - 8 / 32	21:00	23	3 - 10 / 16
6 - 2 / 16	22:00	8 - 18 / 32	7 - 29 / 32	7 - 9 / 32	8 - 10 / 32	6 - 23 / 32	6 - 26 / 32	4 - 14 / 32	4 - 17 / 32	2 - 3 / 32	2 - 2 / 32	1 - 5 / 32	0 - 25 / 32	1 - 19 / 32	1 - 9 / 32	22:00	23	3 - 7 / 16
6 - 1 / 16	23:00	8 - 14 / 32	7 - 26 / 32	7 - 11 / 32	8 - 12 / 32	6 - 24 / 32	6 - 24 / 32	4 - 15 / 32	4 - 17 / 32	2 - 3 / 32	2 - 6 / 32	1 - 6 / 32	0 - 26 / 32	1 - 19 / 32	1 - 8 / 32	23:00	23	3 - 9 / 16
6 - 2 / 16	00:00	8 - 19 / 32	7 - 29 / 32	7 - 8 / 32	8 - 10 / 32	6 - 22 / 32	6 - 22 / 32	4 - 13 / 32	4 - 16 / 32	2 - 2 / 32	2 - 3 / 32	1 - 4 / 32	0 - 24 / 32	1 - 20 / 32	1 - 8 / 32	00:00	20	3 - 8 / 16
6 - 2 / 16	01:00	8 - 16 / 32	7 - 27 / 32	7 - 10 / 32	8 - 9 / 32	6 - 22 / 32	6 - 24 / 32	4 - 12 / 32	4 - 16 / 32	2 - 4 / 32	2 - 3 / 32	1 - 6 / 32	0 - 24 / 32	1 - 20 / 32	1 - 9 / 32	01:00	19	3 - 8 / 16
6 - 3 / 16	02:00	8 - 18 / 32	7 - 30 / 32	7 - 10 / 32	8 - 11 / 32	6 - 23 / 32	6 - 25 / 32	4 - 14 / 32	4 - 15 / 32	2 - 1 / 32	2 - 3 / 32	1 - 4 / 32	0 - 24 / 32	1 - 16 / 32	1 - 7 / 32	02:00	16	3 - 8 / 16
6 - 2 / 16	03:00	8 - 16 / 32	7 - 27 / 32	7 - 12 / 32	8 - 11 / 32	6 - 24 / 32	6 - 24 / 32	4 - 13 / 32	4 - 18 / 32	2 - 4 / 32	2 - 4 / 32	1 - 4 / 32	0 - 22 / 32	1 - 16 / 32	1 - 8 / 32	03:00	14	3 - 9 / 16
6 - 2 / 16	04:00	8 - 18 / 32	7 - 28 / 32	7 - 10 / 32	8 - 10 / 32	6 - 24 / 32	6 - 26 / 32	4 - 16 / 32	4 - 20 / 32	2 - 2 / 32	2 - 3 / 32	1 - 6 / 32	0 - 23 / 32	1 - 16 / 32	1 - 6 / 32	04:00	14	3 - 9 / 16
6 - 2 / 16	05:00	8 - 18 / 32	7 - 29 / 32	7 - 8 / 32	8 - 11 / 32	6 - 26 / 32	6 - 27 / 32	4 - 14 / 32	4 - 18 / 32	2 - 3 / 32	2 - 5 / 32	1 - 7 / 32	0 - 24 / 32	1 - 16 / 32	1 - 8 / 32	05:00	12	3 - 9 / 16
6 - 2 / 16	06:00	8 - 18 / 32	7 - 29 / 32	7 - 11 / 32	8 - 12 / 32	6 - 23 / 32	6 - 24 / 32	4 - 13 / 32	4 - 17 / 32	2 - 2 / 32	2 - 3 / 32	1 - 4 / 32	0 - 24 / 32	1 - 16 / 32	1 - 7 / 32	06:00	13	3 - 9 / 16
6 - 3 / 16	07:00	8 - 19 / 32	7 - 31 / 32	7 - 12 / 32	8 - 12 / 32	6 - 24 / 32	6 - 26 / 32	4 - 14 / 32	4 - 17 / 32	2 - 3 / 32	2 - 6 / 32	1 - 5 / 32	0 - 24 / 32	1 - 16 / 32	1 - 8 / 32	07:00	15	3 - 12 / 16
6 - 3 / 16	08:00	8 - 18 / 32	7 - 30 / 32	7 - 11 / 32	8 - 10 / 32	6 - 25 / 32	6 - 27 / 32	4 - 14 / 32	4 - 16 / 32	2 - 2 / 32	2 - 4 / 32	1 - 5 / 32	0 - 24 / 32	1 - 16 / 32	1 - 6 / 32	08:00	18	3 - 12 / 16
6 - 3 / 16	09:00	8 - 18 / 32	7 - 30 / 32	7 - 11 / 32	8 - 12 / 32	6 - 25 / 32	6 - 25 / 32	4 - 17 / 32	4 - 17 / 32	2 - 4 / 32	2 - 5 / 32	1 - 5 / 32	0 - 24 / 32	1 - 16 / 32	1 - 8 / 32	09:00	20	3 - 12 / 16
6 - 3 / 16	10:00	8 - 18 / 32	7 - 31 / 32	7 - 8 / 32	8 - 12 / 32	6 - 23 / 32	6 - 27 / 32	4 - 14 / 32	4 - 18 / 32	2 - 2 / 32	2 - 6 / 32	1 - 8 / 32	0 - 25 / 32	1 - 17 / 32	1 - 7 / 32	10:00	22	3 - 11 / 16
6 - 4 / 16	11:00	8 - 20 / 32	7 - 30 / 32	7 - 12 / 32	8 - 12 / 32	6 - 25 / 32	6 - 25 / 32	4 - 16 / 32	4 - 17 / 32	2 - 3 / 32	2 - 5 / 32	1 - 8 / 32	0 - 24 / 32	1 - 17 / 32	1 - 6 / 32	11:00	25	3 - 10 / 16
6 - 4 / 16	12:00	8 - 20 / 32	7 - 30 / 32	7 - 12 / 32	8 - 12 / 32	6 - 25 / 32	6 - 25 / 32	4 - 16 / 32	4 - 17 / 32	2 - 2 / 32	2 - 5 / 32	1 - 9 / 32	0 - 25 / 32	1 - 18 / 32	1 - 7 / 32	12:00	27	3 - 8 / 16
6 - 4 / 16	13:00	8 - 17 / 32	7 - 28 / 32	7 - 10 / 32	8 - .9 / 32	6 - 24 / 32	6 - 25 / 32	4 - 14 / 32	4 - 18 / 32	2 - 2 / 32	2 - 5 / 32	1 - 9 / 32	0 - 25 / 32	1 - 18 / 32	1 - 7 / 32	13:00	29	3 - 7 / 16
6 - 4 / 16	14:00	8 - 16 / 32	7 - 27 / 32	7 - 8 / 32	8 - 10 / 32	6 - 23 / 32	6 - 22 / 32	4 - 14 / 32	4 - 18 / 32	2 - 3 / 32	2 - 6 / 32	1 - 6 / 32	0 - 26 / 32	1 - 20 / 32	1 - 11 / 32	14:00	30	3 - 9 / 16
6 - 4 / 16	15:00	8 - 19 / 32	7 - 26 / 32	7 - 10 / 32	8 - 9 / 32	6 - 25 / 32	6 - 23 / 32	4 - 14 / 32	4 - 16 / 32	2 - 2 / 32	2 - 5 / 32	1 - 6 / 32	0 - 26 / 32	1 - 20 / 32	1 - 10 / 32	15:00	32	3 - 8 / 16
6 - 4 / 16	16:00	8 - 21 / 32	7 - 24 / 32	7 - 12 / 32	8 - 10 / 32	6 - 24 / 32	6 - 26 / 32	4 - 18 / 32	4 - 18 / 32	2 - 3 / 32	2 - 2 / 32	1 - 5 / 32	0 - 24 / 32	1 - 21 / 32	1 - 14 / 32	16:00	30	3 - 10 / 16
6 - 4 / 16	17:00	8 - 14 / 32	7 - 24 / 32	7 - 10 / 32	8 - 10 / 32	6 - 23 / 32	6 - 26 / 32	4 - 13 / 32	4 - 16 / 32	2 - 1 / 32	2 - 3 / 32	1 - 7 / 32	0 - 27 / 32	1 - 18 / 32	1 - 14 / 32	17:00	28	3 - 7 / 16
6 - 4 / 16	18:00	8 - 14 / 32	7 - 29 / 32	7 - 10 / 32	8 - 8 / 32	6 - 24 / 32	6 - 26 / 32	4 - 14 / 32	4 - 17 / 32	2 - 4 / 32	2 - 7 / 32	1 - 8 / 32	0 - 26 / 32	1 - 18 / 32	1 - 12 / 32	18:00	28	3 - 7 / 16
6 - 3 / 16	22:00	8 - 18 / 32	8 - 0 / 32	7 - 9 / 32	8 - 10 / 32	6 - 23 / 32	6 - 26 / 32	4 - 14 / 32	4 - 17 / 32	2 - 2 / 32	2 - 4 / 32	1 - 7 / 32	0 - 25 / 32	1 - 18 / 32	1 - 10 / 32	22:00	30	3 - 8 / 16
	06:00															06:00		
6 - 3 / 16	08:30	8 - 15 / 32	7 - 24 / 32	7 - 8 / 32	8 - 9 / 32	6 - 24 / 32	6 - 21 / 32	4 - 13 / 32	4 - 17 / 32	2 - 3 / 32	2 - 4 / 32	1 - 7 / 32	0 - 25 / 32	1 - 20 / 32	1 - 10 / 32	08:30	37	3 - 7 / 16
6 - 0 / 16	11:00	8 - 12 / 32	7 - 21 / 32	7 - 4 / 32	8 - 5 / 32	6 - 20 / 32	6 - 22 / 32	4 - 14 / 32	4 - 16 / 32	2 - 4 / 32	2 - 8 / 32	1 - 10 / 32	0 - 30 / 32	1 - 21 / 32	1 - 14 / 32	11:00	49	3 - 4 / 16
6 - 14 / 16	14:00	8 - 3 / 32	7 - 14 / 32	6 - 31 / 32	8 - 0 / 32	6 - 19 / 32	6 - 23 / 32	4 - 14 / 32	4 - 16 / 32	2 - 6 / 32	2 - 8 / 32	1 - 16 / 32	1 - 2 / 32	1 - 30 / 32	1 - 20 / 32	14:00	54	3 - 1 / 16
6 - 14 / 16	18:00	8 - 6 / 32	7 - 15 / 32	6 - 31 / 32	8 - 0 / 32	6 - 18 / 32	6 - 19 / 32	4 - 14 / 32	4 - 16 / 32	2 - 7 / 32	2 - 8 / 32	1 - 15 / 32	1 - 3 / 32	1 - 26 / 32	1 - 19 / 32	18:00	48	3 - 2 / 16
6 - 4 / 16	MAX	8 - 21 / 32	8 - 0 / 32	7 - 12 / 32	8 - 12 / 32	6 - 26 / 32	6 - 27 / 32	4 - 18 / 32	4 - 20 / 32	2 - 7 / 32	2 - 8 / 32	1 - 16 / 32	1 - 3 / 32	1 - 30 / 32	1 - 20 / 32	18:00	54	3 - 11 / 16
6 - 0 / 16	MIN	8 - 3 / 32	7 - 14 / 32	6 - 31 / 32	8 - 0 / 32	6 - 18 / 32	6 - 19 / 32	4 - 12 / 32	4 - 14 / 32	2 - 1 / 32	2 - 2 / 32	1 - 4 / 32	0 - 22 / 32	1 - 16 / 32	1 - 7 / 32	23:00	12	3 - 1 / 16
0 - 4 / 16	DIFF	0 - 18 / 32	0 - 18 / 32	0 - 13 / 32	0 - 12 / 32	0 - 8 / 32	0 - 8 / 32	0 - 6 / 32	0 - 6 / 32	0 - 6 / 32	0 - 6 / 32	0 - 12 / 32	0 - 13 / 32	0 - 14 / 32	0 - 13 / 32	06:00	42	0 - 10 / 16
0-4/16	MVMT	0-18/32		0-12/32		0-8/32		0-6/32		0-6/32		0-12/32		0-13/32				

Table A-2
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
November 1997

141+00

		DATE		Nov. 23						Nov.24									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		28.7	28.2	28.1	27.6	26.7	25.8	24.9	24.1	23.6	19.9	22.0	20.6	21.3	21.1	23.2	
O	- 2.7"	W		30.0	29.6	30.0	29.7	28.5	27.6	27.0	26.5	25.0	24.2	25.1	23.7	26.3	23.0	23.1	
	- 4.3"	B		30.7	30.4	30.4	30.4	29.7	29.7	29.2	28.1	27.7	27.5	27.2	25.4	24.3	24.9	24.1	
	- 6.0"	Y		31.9	31.6	32.4	31.3	31.5	31.1	31.3	31.0	30.4	30.0	29.0	28.6	27.3	28.0	26.3	
S	-1.0"	RR		30.1	28.2	29.0	28.6	26.8	26.1	25.4	24.6	24.6	23.5	24.0	25.1	25.2	25.1	-	
O	- 2.7"	WW		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	- 4.3"	BB		31.4	31.3	31.2	31.5	30.6	30.4	29.8	29.2	28.6	28.2	28.4	26.8	25.8	26.6	24.0	
	- 6.0"	YY		31.5	31.0	31.7	32.5	31.4	31.8	31.6	30.9	30.4	30.6	29.8	28.9	27.4	28.7	26.0	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

		DATE	Nov. 24											Nov. 25					
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	24.2	27.5	31.4	33.1	35.9	35.2	34.0	32.8	30.5	29.6	32.4	-	-	43.3	46.6	42.4	
O	- 2.7"	W	24.5	27.3	29.6	31.7	34.7	34.1	34.4	33.5	32.4	31.3	31.5	31.7	31.8	40.5	45.5	42.3	
	- 4.3"	B	25.3	26.9	29.1	30.8	32.7	33.2	33.1	32.7	32.6	31.7	31.3	-	-	-	-	-	
	- 6.0"	Y	27.2	27.6	29.2	30.7	31.8	31.9	32.9	31.7	33.2	32.3	31.3	31.1	31.1	36.9	42.4	41.6	
S	-1.0"	RR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	- 2.7"	WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	- 4.3"	BB	25.4	27.3	29.0	31.2	33.6	33.7	34.2	33.5	33.1	32.5	31.3	31.2	31.2	38.6	44.6	42.4	
	- 6.0"	YY	26.8	28.3	29.7	30.6	32.9	32.8	34.5	33.8	33.0	32.4	31.8	31.4	31.2	37.3	43.4	42.2	
STRAIN																	
N	-1.0"	R										-330	-	-240	-250	-324	-301	-292	
O	-3.5"	W										-	-	-110	-107	-175	-216	-214	
	-6.0"	B										-420	-443	-440	-430	-503	-570	-510	
S	-1.0"	RR										-520	-353	-	980	-323	-	-365	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-	-420	-	-310	-	-	-	

Table A-3
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
November 1997

142+00

		DATE		Nov. 23	Nov. 24														
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		29.8	29.1	30.4	29.1	27.9	27.2	25.8	25.5	24.3	23.9	23.5	22.7	22.2	22.3	21.0	
O	-2.7"	W		30.9	30.8	31.7	31.3	29.5	29.1	28.0	27.9	26.8	26.1	26.9	25.5	25.5	24.1	22.3	
	-4.3"	B		31.5	31.5	32.0	32.0	30.7	30.2	29.1	29.0	28.7	27.7	27.6	27.5	25.3	25.9	23.9	
	-6.0"	Y		31.8	32.0	32.6	33.2	32.3	31.8	30.7	31.0	30.7	29.9	29.9	28.8	27.6	28.1	25.9	
S	-1.0"	RR		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	-2.7"	WW		31.0	30.6	31.3	30.9	29.6	28.9	28.7	27.5	26.6	26.2	26.2	26.0	24.0	24.7	22.2	
	-4.3"	BB		32.8	32.0	-	-	32.9	31.5	28.5	-	31.9	25.3	24.1	30.2	-	31.3	24.1	
	-6.0"	YY		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

		DATE	Nov. 24										Nov. 25					
INSTRUMENT			TIME															
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	24.8	28.7	33.1	34.9	37.5	37.9	36.3	33.7	33.3	31.8	31.4	33.6	34.1	44.4	46.1	42.1	
O	-2.7"	W	27.4	28.0	30.5	32.4	35.7	35.5	36.1	36.0	33.8	33.7	31.3	32.7	32.8	40.9	45.3	42.0	
	-4.3"	B	25.2	27.5	29.6	31.9	34.3	34.1	35.5	34.3	33.9	33.6	31.3	31.8	32.0	38.9	44.0	42.2	
	-6.0"	Y	26.7	28.3	29.5	31.0	33.9	34.8	34.8	34.4	33.9	33.7	31.5	31.8	32.2	37.9	42.7	41.9	
S	-1.0"	RR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	-2.7"	WW	25.0	29.0	30.7	32.4	35.9	36.1	30.8	34.2	33.3	31.9	31.2	32.4	33.0	41.5	45.3	42.3	
	-4.3"	BB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-6.0"	YY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R										-2959	-2970	-2990	-2994	-3015	-2995	-2973	
O	-3.5"	W										-4682	-	-3600	-3764	-3756	-3750	-3744	
	-6.0"	B										-402	-394	-395	-395	-377	-382	-385	
S	-1.0"	RR										-	-	-1806	-1840	-1936	-1966	-1935	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-	-	-2287	-2306	-2379	-2346	-2292	

Table A-4
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
November 1997

147+00

SIDE	DEPTH	COLOR	INITIAL	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
DATE				Nov. 23						Nov. 24									
INSTRUMENT / THERMOCOUPLE			INITIAL	TIME															
N	-1.0"	R		29.5	28.8	29.8	29.2	27.7	27.2	25.5	25.0	24.6	23.9	23.8	22.9	21.6	23.8	22.4	
O	-2.7"	W		30.7	30.4	30.9	30.8	29.8	29.0	27.6	27.2	26.8	26.7	25.6	25.8	24.0	24.8	23.0	
	-4.3"	B		-	32.0	32.5	32.2	32.1	31.3	29.8	31.6	29.5	29.2	30.0	28.0	-	-	-	
	-6.0"	Y		32.2	32.3	32.7	32.7	32.2	31.9	30.9	31.2	30.5	30.3	29.7	29.7	27.6	28.7	26.7	
S	-1.0"	RR		29.9	29.2	30.5	29.5	28.4	27.6	25.8	25.9	25.6	24.6	23.8	24.6	21.2	23.3	22.7	
O	-2.7"	WW		31.2	30.9	31.6	31.7	30.4	30.2	28.2	28.2	27.1	27.1	27.3	26.5	23.9	25.8	24.3	
	-4.3"	BB		32.0	31.7	32.5	32.3	31.7	31.1	29.9	30.6	29.1	28.8	28.5	28.5	26.8	28.4	25.6	
	-6.0"	YY		32.7	32.6	33.2	33.2	33.0	32.4	31.5	31.7	30.8	30.9	31.2	30.8	28.6	30.2	28.4	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

SIDE	DEPTH	COLOR	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
DATE			Nov. 24											Nov. 25					
INSTRUMENT / THERMOCOUPLE			TIME																
N	-1.0"	R	24.8	28.8	31.8	33.5	36.4	36.1	36.2	32.7	31.5	30.3	31.2	32.7	34.8	44.4	46.0	41.2	
O	-2.7"	W	25.8	28.1	30.2	32.1	34.9	39.4	36.1	33.6	32.5	31.7	31.2	32.6	33.2	40.9	45.1	41.7	
	-4.3"	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-6.0"	Y	27.7	28.4	30.3	31.4	32.6	33.1	35.0	33.6	33.8	33.2	31.9	32.0	32.6	37.4	42.7	41.6	
S	-1.0"	RR	-	30.2	33.9	34.7	38.4	37.1	35.3	32.9	34.5	30.7	31.6	32.9	35.8	45.9	46.1	41.5	
O	-2.7"	WW	26.1	28.9	31.4	33.6	36.2	35.7	35.2	34.4	32.9	32.0	31.7	32.8	37.6	41.4	45.3	41.8	
	-4.3"	BB	26.9	28.6	31.6	32.5	34.8	34.8	35.6	34.0	32.1	32.4	33.5	33.0	32.9	39.1	45.5	-	
	-6.0"	YY	28.4	29.4	30.9	31.8	33.7	33.7	34.0	33.8	33.2	33.1	32.4	32.5	32.9	37.8	42.7	41.7	
STRAIN																			
N	-1.0"	R										-	-	-	-2679	-2826	-2776	-2743	
O	-3.5"	W										-	-	-	-	-			
	-6.0"	B										-1952	-1928	-1940	-1947	-1952	-1960	-1962	
S	-1.0"	RR										-	-	-	-	-	-	-	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-	4296	-	-	-	-	-	

Table A-5
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
November 1997

152+00

SIDE	DEPTH	COLOR	INITIAL	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
DATE				Nov. 23						Nov. 24									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE																			
N	-1.0"	R		30.7	28.9	30.4	28.7	27.6	26.7	24.5	24.2	24.0	23.3	22.5	22.3	21.3	21.7	22.1	
O	- 2.7"	W		31.1	30.7	31.3	30.5	30.7	28.5	27.5	26.5	26.1	25.3	24.3	24.3	23.2	23.5	22.9	
	- 4.3"	B		32.0	31.9	31.9	31.8	30.9	31.5	28.6	29.2	27.7	28.3	27.2	26.6	25.8	26.2	24.2	
	- 6.0"	Y		33.3	32.8	33.0	33.0	32.7	31.3	30.5	30.3	29.9	29.9	29.7	28.7	28.6	28.1	26.3	
S	-1.0"	RR		31.3	28.0	29.8	28.3	28.1	26.3	24.1	24.3	23.7	23.2	22.3	22.0	21.3	22.0	22.5	
O	- 2.7"	WW		31.3	30.1	31.4	31.4	29.4	29.5	27.6	31.6	26.7	28.6	25.4	25.5	24.2	24.0	28.2	
	- 4.3"	BB		32.2	31.5	32.7	32.3	31.3	31.0	29.5	29.4	28.4	28.2	27.5	27.4	26.7	27.2	25.2	
	- 6.0"	YY		39.9	31.2	33.1	32.3	34.8	31.3	30.5	30.1	29.9	29.4	28.8	30.2	28.3	28.5	29.3	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

SIDE	DEPTH	COLOR	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
DATE			Nov. 24												11-25-97				
INSTRUMENT			TIME																
THERMOCOUPLE																			
N	-1.0"	R	26.8	31.6	35.5	37.8	40.2	38.9	37.4	34.5	33.2	32.3	31.9	34.1	36.7	47.8	47.2	42.1	
O	- 2.7"	W	31.2	28.7	32.1	34.4	37.3	38.1	36.7	35.0	34.2	31.7	31.4	33.3	34.0	43.1	46.3	42.5	
	- 4.3"	B	26.7	28.4	33.0	34.6	36.1	36.1	36.7	34.7	34.0	32.8	31.8	32.6	33.1	40.3	45.4	42.9	
	- 6.0"	Y	27.5	28.8	30.9	32.9	34.8	35.0	35.7	33.8	34.2	33.3	32.2	32.4	33.1	38.5	44.2	42.6	
S	-1.0"	RR	27.4	31.7	35.7	37.6	40.4	38.8	37.2	35.1	32.1	31.2	31.3	34.0	36.5	47.8	46.9	41.8	
O	- 2.7"	WW	28.5	31.0	33.7	35.8	38.4	37.8	37.3	35.9	33.9	32.7	31.5	33.0	34.2	43.5	46.3	42.5	
	- 4.3"	BB	27.1	29.5	31.4	33.1	36.8	37.1	37.4	35.4	34.7	33.1	31.8	32.1	32.9	39.9	45.2	42.7	
	- 6.0"	YY	38.2	-	-	-	35.5	35.8	36.0	-	-	-	-	-	34.9	39.1	-	43.9	
STRAIN																	
N	-1.0"	R										-	-	-	-	-	-	-	
O	-3.5"	W										-2142	-2142	-2140	-2145	-2145	-2160	-2150	
	-6.0"	B										-1918	-1926	-1925	-1924	-1909	-1933	-1930	
S	-1.0"	RR										-4101	-4124	-4133	-4153	-4184	-4156	-4133	
O	-3.5"	WW										-12760	10200	14620	18300	7110	4900	5450	
	-6.0"	BB										-1127	-1091	-1070	-1058	-1066	-1087	-1084	

Table A-6
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
November 1997

153+00

DATE				Nov. 23						Nov. 24									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		29.8	28.6	30.2	28.6	27.0	26.1	24.9	25.0	22.4	23.7	23.0	22.1	20.9	20.5	22.1	
O	- 2.7"	W		31.6	30.9	31.6	31.1	28.8	28.7	27.3	27.4	26.1	25.0	24.2	23.6	22.5	22.6	22.3	
	- 4.3"	B		31.9	31.8	32.1	31.4	30.3	30.2	28.8	28.9	27.7	27.7	25.8	25.3	24.7	24.3	23.7	
	- 6.0"	Y		32.9	32.7	32.3	32.6	31.0	31.2	29.8	29.8	28.5	28.2	27.0	26.8	25.6	25.8	25.0	
S	-1.0"	RR		29.5	28.9	30.9	28.9	26.4	26.6	25.0	25.2	23.6	23.3	21.7	22.2	22.7	21.2	22.0	
O	- 2.7"	WW		31.2	30.4	30.9	30.3	28.6	29.2	26.8	27.3	25.5	25.5	23.8	23.7	23.2	22.8	22.7	
	- 4.3"	BB		31.9	31.3	31.5	31.3	29.5	29.7	28.0	28.1	26.9	27.0	26.1	25.0	24.6	24.2	23.1	
	- 6.0"	YY		32.1	31.8	31.8	31.5	30.3	30.4	29.0	29.4	27.9	27.3	26.3	26.6	26.2	25.3	23.6	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

DATE			Nov. 24												Nov. 25				
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	29.6	30.1	34.0	36.1	38.8	38.1	36.9	33.7	32.5	31.0	31.0	34.6	36.8	47.9	42.4	42.7	
O	- 2.7"	W	25.3	28.1	31.2	33.8	36.6	36.8	36.5	35.1	33.9	32.9	32.1	33.5	34.5	43.6	47.1	43.8	
	- 4.3"	B	25.2	27.3	29.7	31.9	34.8	37.7	36.8	36.6	34.5	33.5	32.1	32.9	33.2	40.4	46.3	44.1	
	- 6.0"	Y	25.5	26.7	28.7	31.7	33.4	34.6	35.6	35.5	35.0	33.8	31.9	32.6	33.2	39.0	45.5	43.8	
S	-1.0"	RR	25.6	30.1	33.0	34.5	37.8	37.1	36.3	32.9	32.6	31.3	32.5	35.0	36.6	46.5	46.7	42.3	
O	- 2.7"	WW	24.9	28.0	31.1	33.2	35.8	35.9	36.4	33.3	32.9	32.3	31.6	34.0	34.2	42.5	46.5	43.1	
	- 4.3"	BB	24.7	27.0	29.2	31.9	34.3	35.6	36.2	33.9	33.6	33.1	31.9	32.9	33.1	39.8	45.6	43.6	
	- 6.0"	YY	28.5	26.9	28.3	30.6	33.7	34.4	35.1	33.9	33.3	33.2	32.1	32.5	32.7	38.4	44.8	43.4	
STRAIN																			
N	-1.0"	R										-	-	-	-	-	6810	-	
O	-3.5"	W										-	-2570	-2600	-2620	-2550	-2640	-2580	
	-6.0"	B										-	-	-	-	-	-	-	
S	-1.0"	RR										-2964	-3002	-2990	-2989	-3024	-2999	-2989	
O	-3.5"	WW										-1047	-1063	-1040	-1050	-1061	-1065	-1071	
	-6.0"	BB										-1528	-1534	-1521	-1504	-1492	-1530	-1535	

Table A-7
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
February, 1998

INITIAL DAY = February 8, 1998
DAY 1 = February 8, 1998
DAY 2 = February 9, 1998
DAY 3 = February 10, 1998

COMMENTS:

Gap Width	TIME	STA 141		STA 142		STA 144		STA 147		STA 150		STA 152		STA 153		TIME	Temp	Joint Width
		LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT			
6 - 1 / 16	18:00	8 - 5 / 32	7 - 14 / 32	7 - 0 / 32	8 - 1 / 32	6 - 19 / 32	6 - 21 / 32	4 - 15 / 32	4 - 17 / 32	2 - 8 / 32	2 - 10 / 32	1 - 19 / 32	1 - 6 / 32	1 - 30 / 32	1 - 21 / 32	18:00	32	3 - 1 / 16
6 - 1 / 16	19:00	8 - 5 / 32	7 - 14 / 32	7 - 0 / 32	8 - 1 / 32	6 - 19 / 32	6 - 21 / 32	4 - 15 / 32	4 - 17 / 32	2 - 8 / 32	2 - 10 / 32	1 - 19 / 32	1 - 6 / 32	1 - 30 / 32	1 - 21 / 32	19:00	30	3 - 1 / 16
6 - 1 / 16	20:00	8 - 8 / 32	7 - 16 / 32	7 - 1 / 32	8 - 2 / 32	6 - 18 / 32	6 - 22 / 32	4 - 14 / 32	4 - 17 / 32	2 - 8 / 32	2 - 9 / 32	1 - 13 / 32	1 - 4 / 32	1 - 27 / 32	1 - 18 / 32	20:00	29	3 - 2 / 16
6 - 2 / 16	21:00	8 - 7 / 32	7 - 15 / 32	7 - 1 / 32	8 - 2 / 32	6 - 18 / 32	6 - 20 / 32	4 - 15 / 32	4 - 17 / 32	2 - 8 / 32	2 - 9 / 32	1 - 14 / 32	1 - 6 / 32	1 - 25 / 32	1 - 18 / 32	21:00	28	3 - 2 / 16
6 - 2 / 16	22:00	8 - 8 / 32	7 - 16 / 32	7 - 2 / 32	8 - 3 / 32	6 - 19 / 32	6 - 20 / 32	4 - 14 / 32	4 - 17 / 32	2 - 8 / 32	2 - 8 / 32	1 - 14 / 32	1 - 5 / 32	1 - 25 / 32	1 - 16 / 32	22:00	27	3 - 2 / 16
6 - 2 / 16	23:00	8 - 9 / 32	7 - 18 / 32	7 - 2 / 32	8 - 4 / 32	6 - 19 / 32	6 - 20 / 32	4 - 13 / 32	4 - 18 / 32	2 - 8 / 32	2 - 8 / 32	1 - 14 / 32	1 - 4 / 32	1 - 24 / 32	1 - 13 / 32	23:00	27	3 - 3 / 16
6 - 2 / 16	00:00	8 - 11 / 32	7 - 20 / 32	7 - 2 / 32	8 - 4 / 32	6 - 19 / 32	6 - 21 / 32	4 - 14 / 32	4 - 18 / 32	2 - 7 / 32	2 - 10 / 32	1 - 12 / 32	1 - 3 / 32	1 - 27 / 32	1 - 17 / 32	00:00	24	3 - 3 / 16
6 - 3 / 16	01:00	8 - 12 / 32	7 - 21 / 32	7 - 4 / 32	8 - 5 / 32	6 - 20 / 32	6 - 23 / 32	4 - 15 / 32	4 - 16 / 32	2 - 6 / 32	2 - 8 / 32	1 - 12 / 32	1 - 3 / 32	1 - 24 / 32	1 - 16 / 32	01:00	23	3 - 3 / 16
6 - 2 / 16	02:00	8 - 12 / 32	7 - 20 / 32	7 - 4 / 32	8 - 5 / 32	6 - 21 / 32	6 - 23 / 32	4 - 15 / 32	4 - 16 / 32	2 - 6 / 32	2 - 8 / 32	1 - 11 / 32	1 - 3 / 32	1 - 23 / 32	1 - 15 / 32	02:00	22	3 - 3 / 16
6 - 0 / 16	03:00	8 - 11 / 32	7 - 20 / 32	7 - 4 / 32	8 - 5 / 32	6 - 21 / 32	6 - 23 / 32	4 - 14 / 32	4 - 19 / 32	2 - 6 / 32	2 - 9 / 32	1 - 10 / 32	1 - 3 / 32	1 - 23 / 32	1 - 14 / 32	03:00	22	3 - 3 / 16
6 - 0 / 16	04:00	8 - 12 / 32	7 - 20 / 32	7 - 4 / 32	8 - 5 / 32	6 - 21 / 32	6 - 23 / 32	4 - 15 / 32	4 - 18 / 32	2 - 6 / 32	2 - 8 / 32	1 - 11 / 32	1 - 3 / 32	1 - 22 / 32	1 - 13 / 32	04:00	23	3 - 3 / 16
6 - 1 / 16	05:00	8 - 13 / 32	7 - 20 / 32	7 - 4 / 32	8 - 5 / 32	6 - 20 / 32	6 - 22 / 32	4 - 14 / 32	4 - 18 / 32	2 - 6 / 32	2 - 8 / 32	1 - 10 / 32	1 - 2 / 32	1 - 20 / 32	1 - 12 / 32	05:00	24	3 - 4 / 16
6 - 1 / 16	06:00	8 - 15 / 32	7 - 20 / 32	7 - 4 / 32	8 - 5 / 32	6 - 20 / 32	6 - 22 / 32	4 - 14 / 32	4 - 18 / 32	2 - 6 / 32	2 - 7 / 32	1 - 10 / 32	1 - 2 / 32	1 - 19 / 32	1 - 11 / 32	06:00	25	3 - 4 / 16
6 - 1 / 16	07:00	8 - 11 / 32	7 - 21 / 32	7 - 3 / 32	8 - 4 / 32	6 - 20 / 32	6 - 23 / 32	4 - 13 / 32	4 - 19 / 32	2 - 7 / 32	2 - 10 / 32	1 - 10 / 32	1 - 3 / 32	1 - 23 / 32	1 - 14 / 32	07:00	24	3 - 5 / 16
6 - 1 / 16	08:00	8 - 11 / 32	7 - 21 / 32	7 - 3 / 32	8 - 4 / 32	6 - 20 / 32	6 - 23 / 32	4 - 13 / 32	4 - 19 / 32	2 - 7 / 32	2 - 10 / 32	1 - 10 / 32	1 - 3 / 32	1 - 23 / 32	1 - 14 / 32	08:00	24	3 - 5 / 16
6 - 2 / 16	09:00	8 - 11 / 32	7 - 20 / 32	7 - 3 / 32	8 - 4 / 32	6 - 20 / 32	6 - 23 / 32	4 - 13 / 32	4 - 18 / 32	2 - 7 / 32	2 - 9 / 32	1 - 11 / 32	1 - 3 / 32	1 - 22 / 32	1 - 13 / 32	09:00	25	3 - 4 / 16
6 - 3 / 16	10:00	8 - 10 / 32	7 - 19 / 32	7 - 3 / 32	8 - 4 / 32	6 - 20 / 32	6 - 23 / 32	4 - 13 / 32	4 - 16 / 32	2 - 7 / 32	2 - 7 / 32	1 - 13 / 32	1 - 2 / 32	1 - 21 / 32	1 - 11 / 32	10:00	26	3 - 4 / 16
6 - 1 / 16	11:00	8 - 11 / 32	7 - 20 / 32	7 - 3 / 32	8 - 4 / 32	6 - 21 / 32	6 - 24 / 32	4 - 14 / 32	4 - 17 / 32	2 - 7 / 32	2 - 9 / 32	1 - 10 / 32	1 - 2 / 32	1 - 23 / 32	1 - 15 / 32	11:00	27	3 - 4 / 16
6 - 3 / 16	12:00	8 - 10 / 32	7 - 19 / 32	7 - 2 / 32	8 - 4 / 32	6 - 22 / 32	6 - 23 / 32	4 - 15 / 32	4 - 20 / 32	2 - 6 / 32	2 - 8 / 32	1 - 11 / 32	1 - 2 / 32	1 - 21 / 32	1 - 14 / 32	12:00	28	3 - 3 / 16
6 - 3 / 16	13:00	8 - 10 / 32	7 - 19 / 32	7 - 2 / 32	8 - 4 / 32	6 - 22 / 32	6 - 23 / 32	4 - 15 / 32	4 - 20 / 32	2 - 6 / 32	2 - 8 / 32	1 - 11 / 32	1 - 2 / 32	1 - 23 / 32	1 - 15 / 32	13:00	29	3 - 3 / 16
6 - 1 / 16	14:00	8 - 10 / 32	7 - 20 / 32	7 - 2 / 32	8 - 4 / 32	6 - 21 / 32	6 - 23 / 32	4 - 14 / 32	4 - 17 / 32	2 - 7 / 32	2 - 9 / 32	1 - 13 / 32	1 - 4 / 32	1 - 26 / 32	1 - 16 / 32	14:00	30	3 - 3 / 16
6 - 2 / 16	15:00	8 - 11 / 32	7 - 19 / 32	7 - 2 / 32	8 - 4 / 32	6 - 19 / 32	6 - 22 / 32	4 - 14 / 32	4 - 16 / 32	2 - 6 / 32	2 - 7 / 32	1 - 10 / 32	1 - 2 / 32	1 - 24 / 32	1 - 16 / 32	15:00	33	3 - 3 / 16
6 - - / 16	16:00	8 - 10 / 32	7 - 19 / 32	7 - 3 / 32	8 - 4 / 32	6 - 21 / 32	6 - 24 / 32	4 - 14 / 32	4 - 17 / 32	2 - 5 / 32	2 - 8 / 32	1 - 11 / 32	1 - 3 / 32	1 - 25 / 32	1 - 16 / 32	16:00	34	3 - 3 / 16
6 - 2 / 16	17:00	8 - 10 / 32	7 - 18 / 32	7 - 3 / 32	8 - 4 / 32	6 - 19 / 32	6 - 20 / 32	4 - 18 / 32	4 - 18 / 32	2 - 7 / 32	2 - 9 / 32	1 - 12 / 32	1 - 4 / 32	1 - 23 / 32	1 - 14 / 32	17:00	33	3 - 3 / 16
6 - 2 / 16	18:00	8 - 10 / 32	7 - 18 / 32	7 - 4 / 32	8 - 4 / 32	6 - 19 / 32	6 - 22 / 32	4 - 18 / 32	4 - 16 / 32	2 - 8 / 32	2 - 10 / 32	1 - 14 / 32	1 - 6 / 32	1 - 22 / 32	1 - 18 / 32	18:00	30	3 - 3 / 16
6 - 0 / 16	22:00	8 - 10 / 32	7 - 19 / 32	7 - 3 / 32	8 - 5 / 32	6 - 21 / 32	6 - 23 / 32	4 - 16 / 32	4 - 19 / 32	2 - 6 / 32	2 - 9 / 32	1 - 12 / 32	1 - 3 / 32	1 - 21 / 32	1 - 16 / 32	22:00	29	3 - 3 / 16
6 - 2 / 16	06:00	8 - 10 / 32	7 - 19 / 32	7 - 3 / 32	8 - 4 / 32	6 - 20 / 32	6 - 23 / 32	4 - 14 / 32	4 - 18 / 32	2 - 6 / 32	2 - 9 / 32	1 - 12 / 32	1 - 3 / 32	1 - 21 / 32	1 - 14 / 32	06:00	28	3 - 3 / 16
6 - 2 / 16	08:30	8 - 10 / 32	7 - 20 / 32	7 - 2 / 32	8 - 4 / 32	6 - 20 / 32	6 - 23 / 32	4 - 13 / 32	4 - 18 / 32	2 - 6 / 32	2 - 9 / 32	1 - 13 / 32	1 - 3 / 32	1 - 22 / 32	1 - 14 / 32	08:30	32	3 - 4 / 16
6 - 1 / 16	11:00	8 - 8 / 32	7 - 19 / 32	7 - 2 / 32	8 - 4 / 32	6 - 20 / 32	6 - 22 / 32	4 - 13 / 32	4 - 17 / 32	2 - 7 / 32	2 - 8 / 32	1 - 10 / 32	1 - 3 / 32	1 - 22 / 32	1 - 15 / 32	11:00	38	3 - 3 / 16
6 - 0 / 16	14:00	8 - 6 / 32	7 - 15 / 32	7 - 0 / 32	8 - 1 / 32	6 - 20 / 32	6 - 22 / 32	4 - 15 / 32	4 - 18 / 32	2 - 8 / 32	2 - 8 / 32	1 - 14 / 32	1 - 6 / 32	1 - 24 / 32	1 - 20 / 32	14:00	42	3 - 1 / 16
5 - 15 / 16	18:00	8 - 6 / 32	7 - 15 / 32	7 - 0 / 32	8 - 0 / 32	6 - 18 / 32	6 - 21 / 32	4 - / 32	4 - 19 / 32	2 - 7 / 32	2 - 10 / 32	1 - 16 / 32	1 - 6 / 32	1 - 25 / 32	1 - 18 / 32	18:00	42	3 - 1 / 16
6 - 3 / 16	MAX	8 - 15 / 32	7 - 20 / 32	7 - 4 / 32	8 - 8 / 32	6 - 21 / 32	6 - 24 / 32	4 - 18 / 32	4 - 20 / 32	2 - 8 / 32	2 - 10 / 32	1 - 19 / 32	1 - 6 / 32	1 - 19 / 32	- 6 / 32	18:00	42	3 - 5 / 16
5 - 15 / 16	MIN	8 - 5 / 32	7 - 14 / 32	7 - 0 / 32	8 - 0 / 32	6 - 18 / 32	6 - 20 / 32	4 - 13 / 32	4 - 16 / 32	2 - 5 / 32	2 - 7 / 32	1 - 10 / 32	1 - 2 / 32	1 - 10 / 32	- 2 / 32	23:00	22	3 - 1 / 16
0 - 4 / 16	DIFF	0 - 10 / 32	0 - 6 / 32	0 - 4 / 32	0 - 5 / 32	0 - 3 / 32	0 - 4 / 32	0 - 5 / 32	0 - 4 / 32	0 - 3 / 32	0 - 3 / 32	0 - 9 / 32	0 - 4 / 32	0 - 9 / 32	- 4 / 32	06:00	10	0 - 4 / 16
	MVMT	0-8/32		0-4/32		0-3/32		0-4/32		0-3/32		0-6/32		0-10/32				

Table A-8
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
February, 1998

141+00

SIDE	DEPTH	COLOR	INITIAL	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
DATE				Feb. 8						Feb.9									
INSTRUMENT				TIME															
THERMOCOUPLE																			
N	-1.0"	R		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	-2.7"	W		37.6	36.6	34.4	33.5	33.0	32.0	29.6	32.8	32.0	31.0	30.7	30.5	30.4	30.3	30.4	
	-4.3"	B		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-6.0"	Y		38.2	38.4	36.7	35.4	34.7	34.2	27.8	32.7	31.9	31.7	31.6	32.3	33.5	33.1	32.8	
S	-1.0"	RR		33.2	32.9	33.4	32.2	31.7	-	39.4	30.1	29.6	29.3	29.2	29.3	29.5	31.1	33.1	
O	-2.7"	WW		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-4.3"	BB		38.1	39.1	36.2	34.7	33.4	32.7	32.4	31.4	30.8	30.2	30.0	31.0	31.3	32.0	32.6	
	-6.0"	YY		38.7	39.6	36.8	35.4	34.6	33.4	34.4	32.5	32.0	31.0	31.2	31.7	32.9	33.1	33.7	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

SIDE	DEPTH	COLOR	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
DATE			Feb. 9											Feb. 10					
INSTRUMENT			TIME																
THERMOCOUPLE																			
N	-1.0"	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	-2.7"	W	32.0	32.0	32.5	34.2	35.0	36.3	36.6	36.2	34.4	37.1	33.9	32.5	32.7	34.8	39.0	40.0	
	-4.3"	B	-	-	-	-	-	-	-	-	-	-	34.1	-	-	-	-	-	
	-6.0"	Y	31.9	31.9	33.7	36.4	36.0	36.5	41.4	38.7	38.1	34.8	34.1	33.2	33.3	33.6	36.7	37.6	
S	-1.0"	RR	32.5	32.2	34.2	36.2	36.5	37.0	37.1	36.3	35.7	35.3	33.5	33.0	33.1	38.9	43.2	39.7	
O	-2.7"	WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-4.3"	BB	32.0	31.5	32.8	34.2	34.7	35.1	35.7	35.6	36.0	34.6	34.0	32.2	32.6	34.8	39.6	39.1	
	-6.0"	YY	32.7	31.9	33.4	34.5	34.0	34.1	35.0	35.3	35.6	34.6	34.4	32.7	32.7	34.2	38.3	38.8	
STRAIN																			
N	-1.0"	R										-267	-285	-272	-272	-237	-226	-233	
O	-3.5"	W										-177	-180	-190	-191	-191	-190	-196	
	-6.0"	B										-	-	-480	-480	-326	-377	-367	
S	-1.0"	RR										-	-	-	-	-	-	-3280	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-	-	-232	-233	-408	-	-	

Table A-9
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
February, 1998

142+00

SIDE	DEPTH	COLOR	INITIAL	Feb. 8 18:00	19:00	20:00	21:00	22:00	23:00	Feb.9 00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
THERMOCOUPLE																			
N	-1.0"	R		37.7	34.2	34.2	33.4	32.1	30.9	31.1	29.5	29.5	29.5	29.4	29.7	30.9	31.4	32.1	
O	- 2.7"	W		39.0	36.1	35.9	34.6	33.3	32.4	32.5	31.3	30.9	30.4	30.2	30.7	31.5	32.0	32.3	
	- 4.3"	B		39.6	36.8	37.1	36.2	35.1	33.9	33.9	32.5	32.0	31.1	30.8	31.4	32.8	33.0	33.2	
	- 6.0"	Y		39.9	38.0	38.0	37.1	36.2	34.8	35.3	33.4	32.4	31.5	31.3	31.9	33.4	33.1	34.3	
S	-1.0"	RR		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	- 2.7"	WW		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	- 4.3"	BB		39.3	38.7	34.3	35.3	34.4	33.8	33.9	34.4	32.4	31.6	31.4	31.9	33.7	33.6	33.4	
	- 6.0"	YY		33.5	33.5	37.8	34.1	33.8	33.1	33.5	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

SIDE	DEPTH	COLOR	Feb. 9 9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	Feb.10 06:00	08:30	11:00	14:00	18:00	
THERMOCOUPLE																			
N	-1.0"	R	33.0	33.2	35.5	37.1	38.0	38.8	38.8	37.8	36.9	35.8	33.4	33.2	33.5	39.1	43.9	40.9	
O	- 2.7"	W	32.3	32.3	34.4	35.9	36.5	37.7	38.2	37.5	37.3	35.6	34.5	32.9	33.1	36.4	42.3	40.6	
	- 4.3"	B	33.0	32.5	33.4	35.0	35.9	36.5	36.8	36.8	37.1	35.6	34.9	32.7	33.0	34.8	40.2	40.2	
	- 6.0"	Y	33.0	32.1	33.3	34.8	35.2	36.6	36.0	36.5	36.8	36.1	35.4	33.0	33.2	34.5	39.7	40.5	
S	-1.0"	RR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	- 2.7"	WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	- 4.3"	BB	33.0	32.4	34.5	35.3	36.1	37.3	37.0	38.5	37.1	35.9	34.0	36.7	37.2	35.5	40.8	40.4	
	- 6.0"	YY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R										-2948	-2948	-2959	-2967	-2991	-2975	-2956	
O	-3.5"	W										-3738	-3727	-3460	-3464	-3561	-3717	-3723	
	-6.0"	B										-358	-357	-341	-348	-350	-356	-354	
S	-1.0"	RR										-1860	-1856	-1861	-1879	-1868	-1952	-1910	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-2298	-2294	-2302	-2311	-2313	-2343	-2319	

Table A-10
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
February, 1998

147+00

DATE				Feb. 8						Feb. 9									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		37.8	34.5	34.1	33.1	31.4	31.2	30.9	-	-	28.7	28.9	30.0	31.9	32.0	32.3	
O	- 2.7"	W		40.5	36.1	36.3	34.6	33.2	33.2	31.9	30.9	30.8	30.8	31.1	32.5	33.1	33.4	34.7	
	- 4.3"	B		-	-	34.1	35.3	33.9	33.7	33.3	32.1	31.7	31.2	31.3	32.3	34.3	33.9	33.9	
	- 6.0"	Y		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
S	-1.0"	RR		-	-	31.6	32.5	33.0	33.2	-	-	-	29.0	30.0	31.2	32.5	33.0	33.3	
O	- 2.7"	WW		39.4	36.2	36.5	34.3	33.9	33.5	32.9	31.4	31.3	31.0	32.1	32.5	33.7	33.7	33.9	
	- 4.3"	BB		40.9	38.3	37.7	-	-	-	-	-	-	29.8	30.9	31.9	34.0	34.0	34.5	
	- 6.0"	YY		-	-	35.4	36.1	35.9	35.8	35.2	34.3	33.4	32.9	-	-	-	-	-	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

DATE			Feb. 9											Feb. 10					
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	33.3	33.4	34.6	37.0	38.1	38.9	38.6	38.2	36.9	35.1	32.8	33.0	33.4	39.8	43.5	41.9	
O	- 2.7"	W	33.9	34.0	34.7	36.5	37.0	37.9	38.4	38.2	37.9	-	-	-	-	-	42.6	41.5	
	- 4.3"	B	34.7	34.7	34.5	36.1	36.4	37.0	37.0	37.3	37.1	35.8	35.7	33.2	33.3	35.3	41.4	40.4	
	- 6.0"	Y	-	-	-	-	-	-	-	-	-	-	-	-	-	-	38.3	40.1	
S	-1.0"	RR	33.5	33.7	35.8	37.3	38.3	39.2	38.5	37.5	36.6	34.8	34.2	33.3	33.5	40.3	41.2	40.8	
O	- 2.7"	WW	33.9	34.0	35.6	36.4	37.2	38.6	38.2	38.2	37.7	36.8	35.0	33.4	33.7	37.0	41.6	40.7	
	- 4.3"	BB	34.7	34.7	35.0	35.5	36.0	37.5	37.1	37.9	37.7	35.8	35.5	33.3	33.5	35.5	39.7	40.3	
	- 6.0"	YY	-	-	-	-	-	-	-	-	-	-	-	-	-	36.7	38.4	39.6	
STRAIN																			
N	-1.0"	R										-2769	-2704	-2729	-2789	-2737	-2750	-2736	
O	-3.5"	W										-	-	-	-	-	-	-	
	-6.0"	B										-1805	-1893	-1848	-1850	-1793	-1887	-1929	
S	-1.0"	RR										-	-	-	-	-	-	-	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-	-	-	-	-	-	-	

Table A-11
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
February, 1998

152+00

		DATE		Feb. 8	Feb. 9														
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		38.6	38.2	37.9	33.3	32.3	31.4	31.0	29.9	30.2	30.7	30.9	31.6	32.5	33.1	33.9	
O	- 2.7"	W		39.6	37.7	36.1	34.2	34.2	34.4	31.9	32.3	31.5	30.8	30.9	31.7	32.9	33.1	33.1	
	- 4.3"	B		-	37.1	37.5	35.5	34.7	34.5	33.5	32.6	32.0	31.8	31.9	32.7	34.5	34.1	34.0	
	- 6.0"	Y		-	38.3	-	36.6	36.4	36.1	35.0	34.6	33.7	32.5	32.7	33.5	34.4	34.4	34.7	
S	-1.0"	RR		37.6	34.7	33.9	33.0	32.5	31.5	31.0	29.7	30.0	30.4	30.7	32.1	34.2	33.8	33.6	
O	- 2.7"	WW		40.0	36.8	36.1	35.4	34.3	33.7	33.0	31.5	31.5	31.3	31.5	32.2	33.5	34.0	34.2	
	- 4.3"	BB		41.1	38.3	37.7	36.5	36.2	35.1	34.7	33.2	32.4	32.1	32.3	33.1	34.5	34.5	35.0	
	- 6.0"	YY		42.6	39.2	38.2	37.1	36.7	36.1	35.5	34.4	34.0	35.8	35.7	36.0	36.7	36.9	37.9	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

		DATE	Feb. 9									Feb. 10							
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	-	-	37.6	38.9	39.4	40.9	40.1	38.9	42.1	36.3	-	33.8	34.9	43.6	43.6	41.1	
O	- 2.7"	W	-	-	35.6	37.0	37.7	38.9	39.4	38.8	39.9	36.2	34.7	33.3	33.7	39.0	43.4	40.8	
	- 4.3"	B	33.4	33.2	35.2	36.3	37.1	38.1	38.8	38.8	38.3	36.3	35.5	34.1	33.5	36.8	42.3	40.7	
	- 6.0"	Y	33.7	33.5	35.1	36.2	36.8	37.7	37.9	38.1	38.8	37.0	36.4	33.9	33.8	35.7	40.8	40.2	
S	-1.0"	RR	33.7	34.9	37.5	38.6	39.1	40.6	39.8	38.8	37.7	36.0	34.8	33.9	34.7	43.6	44.3	40.9	
O	- 2.7"	WW	34.2	33.9	36.1	37.5	38.0	39.2	39.3	38.6	38.0	36.3	-	33.5	33.8	39.1	43.7	40.4	
	- 4.3"	BB	35.0	34.7	35.9	36.2	37.1	38.1	38.1	38.3	38.6	37.3	35.8	33.7	33.7	36.6	42.5	40.4	
	- 6.0"	YY	37.0	36.9	35.6	-	-	-	37.4	37.6	38.6	41.4	36.1	33.5	33.9	35.9	40.8	39.8	
STRAIN																			
N	-1.0"	R										-	-	-	-	-	-	-	
O	-3.5"	W										-1760	-2031	-1700	-1672	-1811	-2106	-2078	
	-6.0"	B										-2017	-2052	-2330	-2339	-2189	-2188	-2108	
S	-1.0"	RR										-4095	-4097	-4080	-4085	-4135	-4141	-4123	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-1050	-1071	-1038	-1040	-1089	-1080	-1095	

Table A-12
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
February, 1998

153+00

		DATE		Nov. 8						Nov. 9									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		39.0	35.4	34.5	33.7	33.1	32.3	31.6	30.5	30.5	30.7	30.9	31.6	32.8	33.0	33.6	
O	- 2.7"	W		41.6	38.2	37.2	35.7	35.3	34.2	33.1	31.8	31.4	31.4	31.5	32.2	33.6	33.7	34.1	
	- 4.3"	B		43.2	39.4	38.2	37.0	36.2	35.5	34.3	33.2	32.3	32.0	32.4	33.1	34.0	34.1	34.5	
	- 6.0"	Y		42.0	37.4	38.8	37.5	36.9	36.2	35.1	33.9	33.0	32.5	32.7	33.3	34.7	34.9	35.1	
S	-1.0"	RR		39.3	36.1	35.1	34.4	32.0	32.0	31.3	30.6	30.5	30.5	30.7	31.8	33.0	33.1	34.2	
O	- 2.7"	WW		40.3	37.1	36.4	35.0	34.2	33.3	32.6	31.5	31.1	30.9	31.1	32.4	33.3	33.4	33.7	
	- 4.3"	BB		41.5	39.0	38.1	36.9	36.1	35.0	33.8	33.2	32.3	31.5	31.7	32.7	34.4	34.4	33.9	
	- 6.0"	YY		43.5	41.4	38.9	38.9	37.1	36.2	34.6	33.9	32.7	31.8	31.9	32.7	34.9	34.5	34.5	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

		DATE	2-9-98										Feb. 10					
INSTRUMENT			TIME															
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	34.3	-	37.2	38.2	39.3	40.6	39.7	38.8	38.1	-	35.0	34.1	34.4	43.1	44.2	41.7	
O	- 2.7"	W	33.7	34.1	35.8	37.1	38.1	39.9	39.2	39.1	38.7	-	-	33.5	33.7	39.2	43.7	41.6	
	- 4.3"	B	33.9	33.3	34.9	35.7	36.9	38.1	38.8	38.7	38.7	37.0	36.3	33.9	33.4	36.7	42.7	41.5	
	- 6.0"	Y	33.9	33.3	34.9	35.3	36.2	37.7	37.9	38.7	39.4	-	36.5	33.8	33.3	36.1	42.0	40.9	
S	-1.0"	RR	33.9	33.0	36.7	37.7	38.9	39.8	38.9	38.5	37.8	-	35.5	33.5	33.7	42.6	43.9	41.3	
O	- 2.7"	WW	33.6	33.7	35.2	36.1	38.0	39.9	37.9	38.0	39.6	35.8	36.0	33.1	33.4	38.7	43.2	41.0	
	- 4.3"	BB	33.7	33.8	35.1	35.6	37.1	38.6	38.6	37.9	37.8	-	36.3	32.9	33.0	36.6	42.1	40.9	
	- 6.0"	YY	33.7	33.3	34.4	34.9	36.0	37.7	36.9	37.2	37.7	36.1	36.4	33.0	33.1	35.8	41.6	40.3	
STRAIN																			
N	-1.0"	R										-	-	-	-	-	-	-	
O	-3.5"	W										-	-	-	-2130	-2175	-2345	-2444	
	-6.0"	B										-	-	-	-	-	-	-	
S	-1.0"	RR										-	-	-	2400	2025	-220	-1433	
O	-3.5"	WW										-	-	-	1860	760	-785	-914	
	-6.0"	BB										-	-	-	1400	870	-355	-984	

Table A-13
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
April, 1998

INITIAL DAY =
DAY 1 = April 19, 1998
DAY 2 = April 20, 1998
DAY 3 = April 21, 1998

COMMENTS:

Gap Width	TIME	STA 141		STA 142		STA 144		STA 147		STA 150		STA 152		STA 153		TIME	Temp	Joint Width
		LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT			
5 - 0 / 16	18:00	7 - 5 / 32	6 - 15 / 32	6 - 5 / 32	7 - 5 / 32	6 - 3 / 32	6 - 3 / 32	4 - 14 / 32	4 - 17 / 32	2 - 25 / 32	2 - 26 / 32	2 - 11 / 32	2 - 2 / 32	3 - 2 / 32	2 - 24 / 32	18:00	60	1 - 15 / 16
5 - 0 / 16	19:00	7 - 4 / 32	6 - 16 / 32	6 - 4 / 32	7 - 4 / 32	6 - 2 / 32	6 - 6 / 32	4 - 16 / 32	4 - 18 / 32	2 - 25 / 32	2 - 27 / 32	2 - 13 / 32	2 - 5 / 32	3 - 2 / 32	2 - 24 / 32	19:00	61	1 - 15 / 16
5 - 0 / 16	20:00	7 - 7 / 32	6 - 17 / 32	6 - 5 / 32	7 - 0 / 32	6 - 2 / 32	6 - 2 / 32	4 - 15 / 32	4 - 23 / 32	2 - 24 / 32	2 - 26 / 32	2 - 10 / 32	2 - 4 / 32	3 - 2 / 32	2 - 22 / 32	20:00	60	2 - 0 / 16
5 - 2 / 16	21:00	7 - 9 / 32	6 - 20 / 32	6 - 4 / 32	6 - 26 / 32	6 - 3 / 32	6 - 5 / 32	4 - 13 / 32	4 - 18 / 32	2 - 24 / 32	2 - 24 / 32	2 - 9 / 32	2 - 2 / 32	2 - 28 / 32	2 - 20 / 32	21:00	52	2 - 1 / 16
5 - 2 / 16	22:00	7 - 11 / 32	6 - 18 / 32	6 - 8 / 32	7 - 0 / 32	6 - 2 / 32	6 - 5 / 32	4 - 15 / 32	4 - 19 / 32	2 - 25 / 32	2 - 25 / 32	2 - 6 / 32	2 - 1 / 32	2 - 26 / 32	2 - 16 / 32	22:00	49	2 - 2 / 16
5 - 4 / 16	23:00	7 - 11 / 32	6 - 21 / 32	6 - 10 / 32	7 - 10 / 32	6 - 4 / 32	6 - 5 / 32	4 - 15 / 32	4 - 18 / 32	2 - 23 / 32	2 - 24 / 32	2 - 7 / 32	1 - 31 / 32	2 - 25 / 32	2 - 17 / 32	23:00	45	2 - 3 / 16
5 - 4 / 16	00:00	7 - 13 / 32	6 - 22 / 32	6 - 11 / 32	7 - 11 / 32	6 - 5 / 32	6 - 8 / 32	4 - 14 / 32	4 - 18 / 32	2 - 22 / 32	2 - 26 / 32	2 - 3 / 32	1 - 29 / 32	2 - 28 / 32	2 - 12 / 32	00:00	46	2 - 4 / 16
5 - 6 / 16	01:00	7 - 16 / 32	6 - 24 / 32	6 - 12 / 32	7 - 13 / 32	6 - 6 / 32	6 - 8 / 32	4 - 14 / 32	4 - 19 / 32	2 - 20 / 32	2 - 24 / 32	2 - 1 / 32	1 - 26 / 32	2 - 20 / 32	2 - 11 / 32	01:00	49	2 - 5 / 16
5 - 5 / 16	02:00	7 - 17 / 32	6 - 24 / 32	6 - 13 / 32	7 - 13 / 32	6 - 7 / 32	6 - 8 / 32	4 - 14 / 32	4 - 17 / 32	2 - 20 / 32	2 - 22 / 32	2 - 0 / 32	1 - 26 / 32	2 - 18 / 32	2 - 10 / 32	02:00	47	2 - 6 / 16
5 - 7 / 16	03:00	7 - 17 / 32	6 - 24 / 32	6 - 13 / 32	7 - 16 / 32	6 - 7 / 32	6 - 9 / 32	4 - 15 / 32	4 - 19 / 32	2 - 19 / 32	2 - 21 / 32	2 - 0 / 32	1 - 25 / 32	2 - 18 / 32	2 - 7 / 32	03:00	46	2 - 6 / 16
5 - 8 / 16	04:00	7 - 20 / 32	6 - 27 / 32	6 - 14 / 32	7 - 16 / 32	6 - 7 / 32	6 - 9 / 32	4 - 15 / 32	4 - 19 / 32	2 - 19 / 32	2 - 22 / 32	1 - 29 / 32	1 - 25 / 32	2 - 17 / 32	2 - 7 / 32	04:00	45	2 - 8 / 16
5 - 8 / 16	05:00	7 - 20 / 32	6 - 28 / 32	6 - 17 / 32	7 - 18 / 32	6 - 8 / 32	6 - 12 / 32	4 - 14 / 32	4 - 18 / 32	2 - 18 / 32	2 - 21 / 32	1 - 22 / 32	1 - 22 / 32	2 - 12 / 32	2 - 4 / 32	05:00	44	2 - 6 / 16
5 - 8 / 16	06:00	7 - 21 / 32	6 - 28 / 32	6 - 17 / 32	7 - 18 / 32	6 - 8 / 32	6 - 12 / 32	4 - 14 / 32	4 - 18 / 32	2 - 18 / 32	2 - 20 / 32	1 - 25 / 32	1 - 21 / 32	2 - 13 / 32	2 - 4 / 32	06:00	43	2 - 7 / 16
5 - 8 / 16	07:00	7 - 21 / 32	6 - 28 / 32	6 - 18 / 32	7 - 18 / 32	6 - 9 / 32	6 - 12 / 32	4 - 13 / 32	4 - 17 / 32	2 - 18 / 32	2 - 20 / 32	1 - 27 / 32	1 - 21 / 32	2 - 14 / 32	2 - 4 / 32	07:00	41	2 - 9 / 16
5 - 9 / 16	08:00	7 - 21 / 32	6 - 28 / 32	6 - 17 / 32	7 - 19 / 32	6 - 9 / 32	6 - 14 / 32	4 - 14 / 32	4 - 18 / 32	2 - 17 / 32	2 - 20 / 32	1 - 28 / 32	1 - 22 / 32	2 - 12 / 32	2 - 4 / 32	08:00	46	2 - 7 / 16
5 - 7 / 16	09:00	7 - 22 / 32	6 - 30 / 32	6 - 18 / 32	7 - 19 / 32	6 - 10 / 32	6 - 12 / 32	4 - 14 / 32	4 - 18 / 32	2 - 17 / 32	2 - 19 / 32	1 - 29 / 32	1 - 21 / 32	2 - 14 / 32	2 - 5 / 32	09:00	53	2 - 9 / 16
5 - 8 / 16	10:00	7 - 21 / 32	6 - 29 / 32	6 - 17 / 32	7 - 18 / 32	6 - 9 / 32	6 - 14 / 32	4 - 14 / 32	4 - 18 / 32	2 - 17 / 32	2 - 19 / 32	1 - 28 / 32	1 - 22 / 32	2 - 13 / 32	2 - 5 / 32	10:00	58	2 - 8 / 16
5 - 5 / 16	11:00	7 - 19 / 32	6 - 28 / 32	6 - 16 / 32	7 - 17 / 32	6 - 10 / 32	6 - 12 / 32	4 - 14 / 32	4 - 19 / 32	2 - 18 / 32	2 - 20 / 32	1 - 30 / 32	1 - 23 / 32	2 - 17 / 32	2 - 8 / 32	11:00	60	2 - 7 / 16
5 - 6 / 16	12:00	7 - 19 / 32	6 - 27 / 32	6 - 16 / 32	7 - 17 / 32	6 - 10 / 32	6 - 12 / 32	4 - 14 / 32	4 - 18 / 32	2 - 18 / 32	2 - 19 / 32	1 - 30 / 32	1 - 23 / 32	2 - 17 / 32	2 - 8 / 32	12:00	60	2 - 6 / 16
5 - 6 / 16	13:00	7 - 18 / 32	6 - 26 / 32	6 - 15 / 32	7 - 16 / 32	6 - 9 / 32	6 - 12 / 32	4 - 14 / 32	4 - 17 / 32	2 - 18 / 32	2 - 18 / 32	1 - 30 / 32	1 - 23 / 32	2 - 18 / 32	2 - 9 / 32	13:00	60	2 - 6 / 16
5 - 4 / 16	14:00	7 - 19 / 32	6 - 26 / 32	6 - 16 / 32	7 - 16 / 32	6 - 9 / 32	6 - 12 / 32	4 - 14 / 32	4 - 20 / 32	2 - 18 / 32	2 - 20 / 32	1 - 31 / 32	1 - 25 / 32	2 - 17 / 32	2 - 10 / 32	14:00	49	2 - 7 / 16
5 - 5 / 16	15:00	7 - 18 / 32	6 - 27 / 32	6 - 15 / 32	7 - 16 / 32	6 - 9 / 32	6 - 12 / 32	4 - 14 / 32	4 - 18 / 32	2 - 18 / 32	2 - 19 / 32	1 - 31 / 32	1 - 24 / 32	2 - 16 / 32	2 - 9 / 32	15:00	49	2 - 7 / 16
5 - 6 / 16	16:00	7 - 18 / 32	6 - 26 / 32	6 - 14 / 32	7 - 15 / 32	6 - 8 / 32	6 - 11 / 32	4 - 13 / 32	4 - 18 / 32	2 - 16 / 32	2 - 19 / 32	1 - 31 / 32	1 - 23 / 32	2 - 14 / 32	2 - 7 / 32	16:00	49	2 - 7 / 16
5 - 3 / 16	17:00	7 - 20 / 32	6 - 28 / 32	6 - 16 / 32	7 - 16 / 32	6 - 10 / 32	6 - 12 / 32	4 - 14 / 32	4 - 19 / 32	2 - 19 / 32	2 - 20 / 32	1 - 31 / 32	1 - 24 / 32	2 - 10 / 32	2 - 7 / 32	17:00	48	2 - 7 / 16
5 - 6 / 16	18:00	7 - 19 / 32	6 - 28 / 32	6 - 16 / 32	7 - 17 / 32	6 - 8 / 32	6 - 10 / 32	4 - 15 / 32	4 - 16 / 32	2 - 18 / 32	2 - 19 / 32	1 - 30 / 32	1 - 23 / 32	2 - 13 / 32	2 - 6 / 32	18:00	49	2 - 7 / 16
5 - 5 / 16	22:00	7 - 20 / 32	6 - 28 / 32	6 - 16 / 32	7 - 16 / 32	6 - 8 / 32	6 - 12 / 32	4 - 15 / 32	4 - 19 / 32	2 - 18 / 32	2 - 20 / 32	1 - 29 / 32	1 - 24 / 32	2 - 16 / 32	2 - 7 / 32	22:00	48	2 - 8 / 16
5 - 6 / 16	06:00	7 - 24 / 32	7 - 1 / 32	6 - 18 / 32	7 - 19 / 32	6 - 10 / 32	6 - 14 / 32	4 - 15 / 32	4 - 19 / 32	2 - 16 / 32	2 - 18 / 32	1 - 26 / 32	1 - 20 / 32	2 - 13 / 32	2 - 4 / 32	06:00	48	2 - 10 / 16
5 - 6 / 16	08:30	7 - 24 / 32	7 - 2 / 32	6 - 19 / 32	7 - 20 / 32	6 - 10 / 32	6 - 14 / 32	4 - 15 / 32	4 - 19 / 32	2 - 16 / 32	2 - 18 / 32	1 - 26 / 32	1 - 19 / 32	2 - 12 / 32	2 - 2 / 32	08:30	48	2 - 10 / 16
5 - 8 / 16	11:00	7 - 20 / 32	6 - 27 / 32	6 - 17 / 32	7 - 18 / 32	6 - 10 / 32	6 - 12 / 32	4 - 14 / 32	4 - 19 / 32	2 - 16 / 32	2 - 18 / 32	1 - 29 / 32	1 - 20 / 32	2 - 13 / 32	2 - 5 / 32	11:00	52	2 - 8 / 16
5 - 2 / 16	14:00	7 - 14 / 32	6 - 22 / 32	6 - 13 / 32	7 - 12 / 32	6 - 8 / 32	6 - 10 / 32	4 - 14 / 32	4 - 18 / 32	2 - 20 / 32	2 - 20 / 32	2 - 2 / 32	1 - 26 / 32	2 - 22 / 32	2 - 13 / 32	14:00	54	2 - 4 / 16
5 - 2 / 16	18:00	7 - 16 / 32	6 - 24 / 32	6 - 12 / 32	7 - 14 / 32	6 - 8 / 32	6 - 10 / 32	4 - 15 / 32	4 - 18 / 32	2 - 20 / 32	2 - 22 / 32	1 - 30 / 32	1 - 26 / 32	2 - 22 / 32	2 - 12 / 32	18:00	51	2 - 5 / 16
5 - 8 / 16	MAX	7 - 24 / 32	7 - 2 / 32	6 - 19 / 32	7 - 20 / 32	6 - 10 / 32	6 - 14 / 32	4 - 16 / 32	4 - 23 / 32	2 - 25 / 32	2 - 26 / 32	2 - 13 / 32	2 - 5 / 32	3 - 2 / 32	2 - 24 / 32	18:00	61	2 - 10 / 16
5 - 0 / 16	MIN	7 - 4 / 32	6 - 15 / 32	6 - 4 / 32	6 - 26 / 32	6 - 2 / 32	6 - 2 / 32	4 - 13 / 32	4 - 16 / 32	2 - 16 / 32	2 - 18 / 32	1 - 22 / 32	1 - 19 / 32	2 - 10 / 32	2 - 2 / 32	23:00	41	1 - 15 / 16
0 - 8 / 16	DIFF	0 - 20 / 32	0 - 19 / 32	0 - 15 / 32	0 - 28 / 32	0 - 8 / 32	0 - 12 / 32	0 - 3 / 32	0 - 7 / 32	0 - 9 / 32	0 - 8 / 32	0 - 23 / 32	0 - 18 / 32	0 - 24 / 32	0 - 22 / 32	06:00	20	0 - 11 / 16
0-8/16	MVMT	0-19/32		0-21/32		0-10/32		0-5/32		0-8/32		0-20/32		0-23/32				

Table A-14
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
April, 1998

141+00

SIDE	DEPTH	COLOR	INITIAL	April 19 18:00	April 20 19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
THERMOCOUPLE																			
N	-1.0"	R		67.9	67.6	64.2	61.8	59.7	56.4	54.5	52.6	53.0	50.9	49.2	48.6	48.1	50.0	50.8	
O	-2.7"	W		69.3	66.9	64.9	62.1	60.9	58.2	56.8	54.8	54.3	53.6	51.4	50.4	49.5	49.3	50.3	
	-4.3"	B		67.8	67.4	65.0	63.3	61.4	60.1	57.6	56.2	55.6	54.4	52.7	51.5	50.7	50.1	50.0	
	-6.0"	Y		-	-	-	-	-	-	-	-	-	55.8	54.3	53.1	52.5	51.7	51.0	
S	-1.0"	RR		72.4	68.6	65.0	64.7	60.7	58.3	55.3	53.5	54.6	51.4	49.9	48.7	47.9	47.8	50.7	
O	-2.7"	WW		61.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-4.3"	BB		68.6	68.3	66.2	64.5	62.4	60.5	58.6	56.2	56.3	55.1	53.6	51.8	50.9	50.5	50.9	
	-6.0"	YY		66.5	66.6	65.5	63.7	62.5	60.8	59.2	57.2	57.3	56.4	54.8	53.2	52.8	51.7	50.6	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

SIDE	DEPTH	COLOR	April 20 9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	April 21 06:00	08:30	11:00	14:00	18:00	
THERMOCOUPLE																			
N	-1.0"	R	55.2	59.6	61.9	62.0	62.5	57.1	56.0	55.6	54.4	55.9	-	-	-	-	-	-	
O	-2.7"	W	53.6	56.3	59.1	59.8	60.0	57.0	56.9	55.0	55.4	55.0	53.7	49.3	47.1	57.7	64.2	58.0	
	-4.3"	B	52.8	54.2	56.8	57.4	58.6	57.2	56.5	55.9	54.8	55.4	54.0	50.6	47.3	55.0	61.3	57.9	
	-6.0"	Y	52.3	53.4	55.1	56.2	57.1	57.8	56.3	56.4	56.5	55.1	55.2	-	-	58.9	-	57.6	
S	-1.0"	RR	56.5	59.9	62.4	62.1	61.9	56.7	55.5	54.3	55.3	55.3	52.2	47.3	47.5	61.0	67.7	56.4	
O	-2.7"	WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-4.3"	BB	52.9	54.4	56.9	57.4	58.8	57.9	56.9	56.4	56.6	56.4	54.8	53.4	48.2	55.1	61.6	58.1	
	-6.0"	YY	52.7	53.6	55.4	56.3	57.6	58.0	57.1	56.5	56.8	57.6	55.4	52.7	48.5	53.4	-	58.0	
STRAIN																			
N	-1.0"	R										-342	-320	-303	-275	-307	-332	-322	
O	-3.5"	W										-126	-77	-85	-97	-224	-218	-29	
	-6.0"	B										-389	-281	-275	-243	-245	-219	-353	
S	-1.0"	RR										-	-	-	-210	-220	-209	-216	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-	-	-	-	-	-	-	

Table A-15
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
April, 1998

142+00

SIDE	DEPTH	COLOR	INITIAL	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
DATE				April 19			April 20												
THERMOCOUPLE																			
N	-1.0"	R		72.3	69.3	64.7	61.9	60.0	57.6	57.2	53.6	53.2	51.7	50.1	51.2	49.2	47.3	50.4	
O	- 2.7"	W		70.6	69.5	66.1	63.8	61.8	59.5	57.8	56.2	55.2	55.0	52.0	51.8	48.8	48.9	49.9	
	- 4.3"	B		68.8	68.6	66.3	65.4	62.7	60.7	58.8	57.6	56.5	55.1	53.6	52.4	50.9	50.3	50.0	
	- 6.0"	Y		66.7	67.8	65.7	64.2	62.9	61.2	59.5	57.6	57.6	56.2	55.3	53.8	52.0	51.1	51.1	
S	-1.0"	RR		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	- 2.7"	WW		70.2	69.6	66.5	64.5	61.3	59.4	57.9	55.9	55.2	54.4	53.8	50.1	49.0	49.0	49.9	
	- 4.3"	BB		71.3	69.3	61.1	64.0	62.4	55.9	58.6	56.8	55.9	55.1	49.8	56.0	55.5	55.1	58.9	
	- 6.0"	YY		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

SIDE	DEPTH	COLOR	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
DATE			April 20										April 21						
THERMOCOUPLE																			
N	-1.0"	R	55.6	59.1	61.9	62.0	62.6	56.6	56.0	55.2	55.3	53.7	51.8	47.9	48.3	60.7	66.8	56.2	
O	- 2.7"	W	53.6	55.8	58.7	58.9	59.9	57.4	57.0	55.6	55.9	54.8	53.1	48.6	48.2	57.8	64.4	57.4	
	- 4.3"	B	52.6	53.8	56.3	56.9	58.5	57.9	57.2	56.3	56.2	55.5	54.1	50.1	48.5	55.1	61.6	57.8	
	- 6.0"	Y	52.7	53.2	55.3	56.0	57.3	57.8	57.3	56.2	56.5	55.3	55.3	51.8	48.6	53.4	59.4	57.8	
S	-1.0"	RR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	- 2.7"	WW	53.9	56.3	59.3	59.8	60.1	57.5	56.6	55.7	55.9	55.4	53.3	48.1	48.0	57.8	64.6	52.5	
	- 4.3"	BB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	- 6.0"	YY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R										-2963	-2977	-2980	-2990	-3002	-3005	-3034	
O	-3.5"	W										-3528	-3616	-3550	-3520	-3675	-3708	-3700	
	-6.0"	B										-391	-391	-407	-430	-349	-347	-365	
S	-1.0"	RR										-	-	-	-	-	-1790	-1476	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-2427	-2416	-2430	-2450	-2424	-2363	-2388	

Table A-16
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
April 1997

147+00

DATE				April 4						APRIL 5									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		87.3	78.0	68.0	63.7	60.9	58.2	63.1	64.5	76.3	68.1	75.4	72.4	72.7	67.0	55.3	
O	-2.7"	W		85.9	76.9	67.2	62.1	58.5	54.0	59.1	61.8	72.4	65.8	76.4	70.9	73.9	67.9	55.5	
	-4.3"	B		88.1	80.3	68.6	64.0	57.0	52.9	60.7	60.4	72.3	65.5	76.9	70.8	75.7	70.3	55.6	
	-6.0"	Y		91.5	79.5	68.4	63.5	57.8	52.2	60.2	60.1	77.3	64.9	77.7	71.1	74.0	68.0	55.8	
S	-1.0"	RR		96.2	77.5	67.1	64.8	60.1	56.1	64.1	64.8	75.6	66.8	81.1	74.3	76.0	68.6	55.9	
O	-2.7"	WW		88.2	77.2	64.7	63.9	59.0	55.8	63.2	63.7	76.3	66.1	79.5	72.7	76.6	68.9	55.8	
	-4.3"	BB		86.5	77.8	67.2	62.5	58.0	54.9	63.3	63.5	74.5	64.5	79.8	73.5	78.5	68.6	56.1	
	-6.0"	YY		89.0	68.3	68.0	63.3	58.2	55.7	61.6	63.5	74.5	65.2	80.7	73.3	77.4	67.3	55.9	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

DATE												APRIL 6					
INSTRUMENT			TIME														
THERMOCOUPLE			09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00
SIDE	DEPTH	COLOR																
N	-1.0"	R	74.0	62.7	68.3	73.4	75.7	77.8	79.5	82.0	79.6	73.3	-	53.9	-	71.2	79.1	78.3
O	-2.7"	W	76.5	60.2	64.7	69.1	72.3	73.4	75.5	78.9	77.7	72.9	-	53.5	-	67.0	75.1	77.2
	-4.3"	B	76.1	58.9	62.1	66.4	69.0	70.0	71.9	72.8	75.7	71.7	-	53.8	-	64.2	71.6	75.5
	-6.0"	Y	76.9	58.0	60.4	63.3	66.0	67.0	68.8	72.9	73.0	69.9	-	54.5	-	61.8	68.5	73.9
S	-1.0"	RR	76.5	62.8	69.0	74.2	76.3	78.4	80.0	72.4	79.5	73.3	-	54.4	-	72.5	80.0	78.4
O	-2.7"	WW	76.4	60.1	64.5	68.9	72.1	73.2	75.2	79.1	77.8	72.6	-	53.8	-	67.0	75.1	77.1
	-4.3"	BB	77.1	58.9	62.1	65.8	69.0	70.0	71.8	76.1	75.2	76.7	-	54.1	-	64.2	71.8	75.6
	-6.0"	YY	76.0	58.4	60.7	63.3	65.9	66.9	68.7	72.9	72.8	69.6	-	54.8	-	62.1	68.6	73.4
STRAIN																
N	-1.0"	R										2202	-	2119	-	2298	2270	2226
O	-3.5"	W										-	-	-	-	-	-	-
	-6.0"	B										1396	-	1342	-	1395	1401	1410
S	-1.0"	RR										-	-	-	-	-	-	-
O	-3.5"	WW										-	-	-	-	-	-	-
	-6.0"	BB										-	-	-	-	-	-	-

Table A-17
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
April, 1998

152+00

		DATE		April 19						Apirl 20									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		73.9	69.9	65.2	62.1	64.2	61.2	56.5	55.7	54.4	52.1	51.1	50.1		48.9	51.9	
O	- 2.7"	W		72.4	71.7	66.9	64.1	62.2	60.7	58.4	58.0	56.5	54.3	53.2	52.1		49.8	51.4	
	- 4.3"	B		70.7	71.5	67.6	65.0	63.6	61.4	59.7	58.4	57.9	56.8	55.0	55.4		51.2	51.6	
	- 6.0"	Y		68.9	69.6	67.3	65.3	64.4	62.4	60.7	59.2	59.2	58.7	56.5	53.8		55.0	52.3	
S	-1.0"	RR		74.3	70.9	64.9	65.6	60.2	58.2	56.7	55.6	54.7	53.0	51.6	50.1		48.8	53.6	
O	- 2.7"	WW		73.1	71.9	67.1	64.6	62.5	60.9	58.8	58.0	56.7	54.8	53.7	52.2		50.2	52.1	
	- 4.3"	BB		71.1	70.4	67.8	65.4	63.9	61.6	60.2	54.8	58.5	56.7	55.8	53.8		51.7	52.2	
	- 6.0"	YY		72.4	67.4	63.9	63.8	60.0	58.8	62.4	59.6	59.5	59.2	53.1	53.0		56.1	-	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

		DATE	April 20										April 21						
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	58.6	62.3	64.6	64.7	63.9	58.5	57.3	56.2	56.3	54.7	52.1	50.1	50.2	-	68.1	56.3	
O	- 2.7"	W	55.8	58.6	61.5	62.2	62.0	58.8	57.5	56.7	56.7	55.4	53.8	49.3	49.9	-	65.9	57.7	
	- 4.3"	B	54.9	57.0	59.5	61.4	61.3	59.8	58.3	57.5	57.9	56.4	55.1	48.9	49.7	-	63.6	58.6	
	- 6.0"	Y	54.3	55.4	57.7	59.3	59.4	60.2	59.8	58.5	58.1	53.8	55.9	50.9	51.1	-	61.1	58.6	
S	-1.0"	RR	59.1	62.9	65.0	64.4	64.1	58.6	58.0	56.4	57.0	55.6	52.7	51.0	50.6	-	68.3	56.0	
O	- 2.7"	WW	56.6	59.1	62.0	62.4	62.2	59.6	58.9	57.1	57.0	55.8	53.9	49.9	50.2	-	66.8	58.0	
	- 4.3"	BB	55.1	56.7	59.7	61.1	60.8	60.5	59.4	58.1	58.3	57.2	55.6	50.3	50.7	-	63.7	58.9	
	- 6.0"	YY	-	-	-	-	-	-	-	-	56.8	55.7	56.4	53.1	62.3	-	63.5	59.0	
STRAIN																			
N	-1.0"	R										-	-	-	-	-	-	-	
O	-3.5"	W										-2085	-2085	-2042	-2056	-	-2160	-2143	
	-6.0"	B										-1933	-1958	-1930	-1880	-	-1914	-1933	
S	-1.0"	RR										-3925	-4015	-4030	-4068	-	-4175	-4133	
O	-3.5"	WW										-1087	-1206	-1157	-1090	-	-1076	-1100	
	-6.0"	BB										-	-	-	-	-	-	-	

Table A-18
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
April, 1998

153+00

		DATE		April 19						April 20									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		75.8	69.7	67.0	64.1	62.0	59.7	58.1	57.4	56.2	53.0	51.7	51.9	49.9	49.2	53.4	
O	-2.7"	W		75.7	71.0	69.3	66.3	64.3	61.9	60.2	58.9	58.1	57.1	54.1	53.2	51.8	50.4	52.1	
	-4.3"	B		73.3	71.1	70.3	67.7	65.5	62.4	61.6	59.7	59.1	57.4	55.9	54.9	53.0	51.7	51.8	
	-6.0"	Y		71.8	69.9	69.4	67.8	65.6	63.6	61.7	60.2	59.8	58.1	57.0	56.3	54.2	52.7	52.8	
S	-1.0"	RR		73.7	70.1	65.5	63.7	60.7	58.6	56.8	54.9	54.3	52.3	51.2	50.3	49.1	48.4	52.6	
O	-2.7"	WW		73.0	72.0	67.3	64.7	62.7	60.6	58.6	57.2	56.3	53.5	53.5	52.9	51.2	49.4	50.8	
	-4.3"	BB		71.3	70.7	67.9	65.6	63.7	61.7	60.0	58.6	57.6	56.7	55.0	53.2	52.4	50.7	50.8	
	-6.0"	YY		70.0	69.9	67.5	66.4	64.1	62.0	60.3	59.0	58.3	57.3	56.5	55.0	53.7	51.5	51.2	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

		DATE	April 20											April 21					
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	58.8	62.4	64.8	64.4	63.8	59.1	58.4	56.7	58.9	53.6	53.1	50.5	50.9	63.3	67.7	57.0	
O	-2.7"	W	57.0	58.7	61.8	63.8	64.4	60.0	59.2	57.4	57.6	55.5	54.8	50.9	50.9	60.2	66.4	58.6	
	-4.3"	B	54.8	56.6	59.5	60.2	61.2	60.9	59.8	57.5	58.4	56.6	56.3	51.3	50.1	57.8	63.9	59.4	
	-6.0"	Y	54.3	55.5	57.8	60.0	60.3	61.0	59.9	58.2	58.8	56.9	55.7	51.9	50.0	55.8	61.8	59.3	
S	-1.0"	RR	56.9	60.3	62.7	62.6	62.1	58.1	57.2	56.1	56.4	53.6	53.1	50.3	50.8	61.8	66.3	56.6	
O	-2.7"	WW	54.4	57.1	59.8	59.9	60.8	59.2	58.4	56.9	57.0	55.1	54.1	57.3	49.0	58.5	64.5	58.1	
	-4.3"	BB	53.3	55.0	57.5	58.8	59.5	59.7	59.1	57.4	57.6	55.6	55.3	49.9	49.1	55.9	62.5	58.7	
	-6.0"	YY	52.8	54.0	56.1	57.9	58.6	59.9	58.9	57.8	57.6	56.2	55.6	50.5	49.3	54.3	61.5	58.5	
STRAIN																	
N	-1.0"	R										-	-	-	-	-	-	-	
O	-3.5"	W										-	-	-	-	-	-	-	
	-6.0"	B										-	-	-	-	-	-	-	
S	-1.0"	RR										-2949	-2938	-2964	-2972	-3004	-3018	-2986	
O	-3.5"	WW										-995	-980	-917	-920	-1025	-1020	-1028	
	-6.0"	BB										-1482	-1475	-1403	-1417	-1499	-1522	-1537	

Table A-19
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
August 30 - September 1, 1998

INITIAL DAY =
DAY 1 = August 30, 1998
DAY 2 = August 31, 1998
DAY 3 = September 1998

COMMENTS:

Gap Width	TIME	STA 141		STA 142		STA 144		STA 147		STA 150		STA 152		STA 153		TIME	Temp	Joint Width
		LT	RT*	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT	LT	RT			
4 - 1 / 16	18:00	6 - 12 / 32	5 - 24 / 32	5 - 12 / 32	6 - 12 / 32	5 - 18 / 32	5 - 22 / 32	4 - 10 / 32	4 - 18 / 32	2 - 26 / 32	2 - 30 / 32	2 - 20 / 32	2 - 12 / 32	3 - 10 / 32	3 - 3 / 32	18:00	78	1 - 8 / 16
4 - 1 / 16	19:00	6 - 15 / 32	5 - 26 / 32	5 - 14 / 32	6 - 16 / 32	5 - 19 / 32	5 - 20 / 32	4 - 7 / 32	4 - 12 / 32	2 - 27 / 32	2 - 30 / 32	2 - 19 / 32	2 - 11 / 32	3 - 10 / 32	3 - 2 / 32	19:00	74	1 - 8 / 16
4 - 1 / 16	20:00	6 - 14 / 32	5 - 28 / 32	5 - 16 / 32	6 - 14 / 32	5 - 18 / 32	5 - 20 / 32	4 - 8 / 32	4 - 12 / 32	2 - 26 / 32	2 - 26 / 32	2 - 16 / 32	2 - 16 / 32	3 - 8 / 32	3 - 2 / 32	20:00	70	1 - 7 / 16
4 - 4 / 16	21:00	6 - 17 / 32	5 - 31 / 32	5 - 16 / 32	6 - 18 / 32	5 - 20 / 32	5 - 23 / 32	4 - 4 / 32	4 - 12 / 32	2 - 26 / 32	2 - 25 / 32	2 - 15 / 32	2 - 8 / 32	3 - 5 / 32	2 - 30 / 32	21:00	67	1 - 11 / 16
4 - 5 / 16	22:00	6 - 18 / 32	5 - 30 / 32	5 - 18 / 32	6 - 18 / 32	5 - 21 / 32	5 - 22 / 32	4 - 10 / 32	4 - 11 / 32	2 - 23 / 32	2 - 24 / 32	2 - 12 / 32	2 - 6 / 32	3 - 4 / 32	2 - 28 / 32	22:00	63	1 - 12 / 16
4 - 5 / 16	23:00	6 - 22 / 32	6 - 4 / 32	5 - 22 / 32	6 - 23 / 32	5 - 22 / 32	5 - 22 / 32	4 - 9 / 32	4 - 12 / 32	2 - 23 / 32	2 - 24 / 32	2 - 12 / 32	2 - 4 / 32	3 - 0 / 32	2 - 24 / 32	23:00	62	1 - 14 / 16
4 - 7 / 16	00:00	6 - 23 / 32	6 - 5 / 32	5 - 22 / 32	6 - 21 / 32	5 - 22 / 32	5 - 23 / 32	4 - 8 / 32	4 - 12 / 32	2 - 23 / 32	2 - 24 / 32	2 - 8 / 32	2 - 2 / 32	3 - 0 / 32	2 - 24 / 32	00:00	61	1 - 15 / 16
4 - 8 / 16	01:00	6 - 27 / 32	6 - 7 / 32	5 - 24 / 32	6 - 24 / 32	5 - 24 / 32	5 - 24 / 32	4 - 10 / 32	4 - 11 / 32	2 - 21 / 32	2 - 22 / 32	2 - 8 / 32	2 - 0 / 32	2 - 31 / 32	2 - 21 / 32	01:00	60	1 - 15 / 16
4 - 6 / 16	02:00	6 - 27 / 32	6 - 8 / 32	5 - 25 / 32	6 - 24 / 32	5 - 24 / 32	5 - 26 / 32	4 - 8 / 32	4 - 13 / 32	2 - 20 / 32	2 - 22 / 32	2 - 7 / 32	1 - 31 / 32	2 - 29 / 32	2 - 21 / 32	02:00	59	2 - 0 / 16
4 - 6 / 16	03:00	6 - 28 / 32	6 - 9 / 32	5 - 27 / 32	6 - 25 / 32	5 - 24 / 32	5 - 26 / 32	4 - 8 / 32	4 - 13 / 32	2 - 20 / 32	2 - 23 / 32	2 - 6 / 32	1 - 29 / 32	2 - 27 / 32	2 - 22 / 32	03:00	57	2 - 1 / 16
4 - 9 / 16	04:00	6 - 29 / 32	6 - 11 / 32	5 - 26 / 32	6 - 30 / 32	5 - 26 / 32	5 - 26 / 32	4 - 9 / 32	4 - 12 / 32	2 - 20 / 32	2 - 20 / 32	2 - 4 / 32	1 - 28 / 32	2 - 22 / 32	2 - 14 / 32	04:00	56	2 - 2 / 16
4 - 8 / 16	05:00	6 - 31 / 32	6 - 15 / 32	5 - 29 / 32	6 - 28 / 32	5 - 26 / 32	5 - 27 / 32	4 - 8 / 32	4 - 13 / 32	2 - 19 / 32	2 - 23 / 32	2 - 3 / 32	1 - 29 / 32	2 - 26 / 32	2 - 18 / 32	05:00	56	2 - 3 / 16
4 - 11 / 16	06:00	7 - 2 / 32	6 - 18 / 32	5 - 29 / 32	6 - 29 / 32	5 - 27 / 32	5 - 28 / 32	4 - 9 / 32	4 - 12 / 32	2 - 19 / 32	2 - 20 / 32	2 - 4 / 32	1 - 26 / 32	2 - 22 / 32	2 - 14 / 32	06:00	56	2 - 3 / 16
4 - 9 / 16	07:00	7 - 0 / 32	6 - 17 / 32	5 - 28 / 32	6 - 31 / 32	5 - 26 / 32	5 - 28 / 32	4 - 7 / 32	4 - 8 / 32	2 - 18 / 32	2 - 21 / 32	2 - 1 / 32	1 - 27 / 32	2 - 22 / 32	2 - 14 / 32	07:00	57	2 - 4 / 16
4 - 10 / 16	08:00	7 - 0 / 32	6 - 18 / 32	5 - 30 / 32	7 - 0 / 32	5 - 24 / 32	5 - 28 / 32	4 - 6 / 32	4 - 10 / 32	2 - 17 / 32	2 - 18 / 32	2 - 2 / 32	1 - 27 / 32	2 - 20 / 32	2 - 12 / 32	08:00	59	2 - 5 / 16
4 - 10 / 16	09:00	7 - 0 / 32	6 - 18 / 32	5 - 28 / 32	7 - 0 / 32	5 - 24 / 32	5 - 30 / 32	4 - 7 / 32	4 - 10 / 32	2 - 16 / 32	2 - 20 / 32	2 - 3 / 32	1 - 27 / 32	2 - 22 / 32	2 - 13 / 32	09:00	67	2 - 4 / 16
4 - 10 / 16	10:00	7 - 0 / 32	6 - 17 / 32	5 - 28 / 32	6 - 29 / 32	5 - 26 / 32	5 - 30 / 32	4 - 8 / 32	4 - 12 / 32	2 - 16 / 32	2 - 24 / 32	2 - 5 / 32	1 - 26 / 32	2 - 24 / 32	2 - 14 / 32	10:00	67	2 - 4 / 16
4 - 8 / 16	11:00	6 - 27 / 32	6 - 18 / 32	5 - 25 / 32	6 - 26 / 32	5 - 24 / 32	5 - 25 / 32	4 - 7 / 32	4 - 10 / 32	2 - 19 / 32	2 - 26 / 32	2 - 6 / 32	1 - 30 / 32	2 - 24 / 32	2 - 18 / 32	11:00	72	2 - 2 / 16
4 - 3 / 16	12:00	6 - 30 / 32	6 - 19 / 32	5 - 28 / 32	6 - 23 / 32	5 - 24 / 32	5 - 26 / 32	4 - 8 / 32	4 - 11 / 32	2 - 22 / 32	2 - 28 / 32	2 - 10 / 32	2 - 4 / 32	3 - 2 / 32	2 - 23 / 32	12:00	73	1 - 14 / 16
4 - 2 / 16	13:00	6 - 12 / 32	6 - 21 / 32	5 - 20 / 32	6 - 16 / 32	5 - 21 / 32	5 - 24 / 32	4 - 8 / 32	4 - 12 / 32	2 - 24 / 32	3 - 0 / 32	2 - 12 / 32	2 - 6 / 32	3 - 8 / 32	3 - 0 / 32	13:00	74	1 - 14 / 16
4 - 2 / 16	14:00	6 - 12 / 32	6 - 23 / 32	5 - 20 / 32	6 - 15 / 32	5 - 21 / 32	5 - 22 / 32	4 - 8 / 32	4 - 12 / 32	2 - 25 / 32	2 - 30 / 32	2 - 14 / 32	2 - 8 / 32	3 - 9 / 32	3 - 2 / 32	14:00	78	1 - 9 / 16
4 - 2 / 16	15:00	6 - 13 / 32	6 - 25 / 32	5 - 18 / 32	6 - 15 / 32	5 - 22 / 32	5 - 23 / 32	4 - 8 / 32	4 - 12 / 32	2 - 26 / 32	2 - 27 / 32	2 - 16 / 32	2 - 9 / 32	3 - 10 / 32	3 - 3 / 32	15:00	80	1 - 8 / 16
4 - 2 / 16	16:00	6 - 14 / 32	6 - 26 / 32	5 - 16 / 32	6 - 14 / 32	5 - 22 / 32	5 - 23 / 32	4 - 8 / 32	4 - 12 / 32	2 - 26 / 32	2 - 25 / 32	2 - 18 / 32	2 - 10 / 32	3 - 12 / 32	3 - 4 / 32	16:00	78	1 - 8 / 16
4 - 2 / 16	17:00	6 - 14 / 32	6 - 26 / 32	5 - 16 / 32	6 - 15 / 32	5 - 22 / 32	5 - 22 / 32	4 - 8 / 32	4 - 11 / 32	2 - 26 / 32	2 - 26 / 32	2 - 17 / 32	2 - 10 / 32	3 - 11 / 32	3 - 4 / 32	17:00	77	1 - 8 / 16
4 - 2 / 16	18:00	6 - 15 / 32	6 - 25 / 32	5 - 14 / 32	6 - 15 / 32	5 - 22 / 32	5 - 20 / 32	4 - 8 / 32	4 - 11 / 32	2 - 26 / 32	2 - 27 / 32	2 - 17 / 32	2 - 10 / 32	3 - 10 / 32	3 - 3 / 32	18:00	77	1 - 8 / 16
4 - 4 / 16	22:00	6 - 18 / 32	6 - 20 / 32	5 - 18 / 32	6 - 18 / 32	5 - 22 / 32	5 - 22 / 32	4 - 8 / 32	4 - 12 / 32	2 - 24 / 32	2 - 25 / 32	2 - 15 / 32	2 - 2 / 32	3 - 6 / 32	2 - 27 / 32	22:00	65	1 - 12 / 16
4 - 7 / 16	06:00	6 - 25 / 32	6 - 18 / 32	5 - 22 / 32	6 - 25 / 32	5 - 22 / 32	5 - 23 / 32	4 - 7 / 32	4 - 12 / 32	2 - 22 / 32	2 - 23 / 32	2 - 6 / 32	1 - 25 / 32	2 - 22 / 32	2 - 20 / 32	06:00	60	1 - 15 / 16
4 - 8 / 16	08:30	6 - 30 / 32	6 - 6 / 32	5 - 28 / 32	6 - 27 / 32	5 - 25 / 32	5 - 24 / 32	4 - 7 / 32	4 - 12 / 32	2 - 20 / 32	2 - 21 / 32	2 - 4 / 32	1 - 28 / 32	2 - 24 / 32	2 - 16 / 32	08:30	63	2 - 3 / 16
4 - 7 / 16	11:00	6 - 26 / 32	6 - 1 / 32	5 - 27 / 32	6 - 25 / 32	5 - 24 / 32	5 - 26 / 32	4 - 8 / 32	4 - 10 / 32	2 - 20 / 32	2 - 22 / 32	2 - 6 / 32	2 - 0 / 32	2 - 28 / 32	2 - 22 / 32	11:00		2 - 1 / 16
4 - 1 / 16	14:00	6 - 16 / 32	5 - 24 / 32	5 - 16 / 32	6 - 16 / 32	5 - 23 / 32	5 - 22 / 32	4 - 9 / 32	4 - 11 / 32	2 - 25 / 32	2 - 26 / 32	2 - 16 / 32	2 - 10 / 32	3 - 8 / 32	3 - 2 / 32	14:00	76	1 - 10 / 16
4 - 0 / 16	18:00	6 - 13 / 32	5 - 22 / 32	5 - 13 / 32	6 - 14 / 32	5 - 20 / 32	5 - 21 / 32	4 - 8 / 32	4 - 10 / 32	2 - 26 / 32	2 - 25 / 32	2 - 19 / 32	2 - 12 / 32	3 - 10 / 32	3 - 4 / 32	18:00	70	1 - 8 / 16
		* damaged probe																
4 - 11 / 16	MAX	7 - 0 / 32	6 - 26 / 32	5 - 30 / 32	7 - 0 / 32	5 - 27 / 32	5 - 30 / 32	4 - 10 / 32	4 - 18 / 32	2 - 27 / 32	3 - 0 / 32	2 - 20 / 32	2 - 16 / 32	3 - 12 / 32	3 - 4 / 32	18:00	80	2 - 5 / 16
4 - 0 / 16	MIN	6 - 12 / 32	5 - 22 / 32	5 - 12 / 32	6 - 12 / 32	5 - 18 / 32	5 - 20 / 32	4 - 4 / 32	4 - 8 / 32	2 - 16 / 32	2 - 18 / 32	2 - 1 / 32	1 - 25 / 32	2 - 20 / 32	2 - 12 / 32	23:00	56	1 - 7 / 16
0 - 11 / 16	DIFF	0 - 20 / 32	1 - 4 / 32	0 - 18 / 32	0 - 20 / 32	0 - 9 / 32	0 - 10 / 32	0 - 6 / 32	0 - 10 / 32	0 - 11 / 32	0 - 14 / 32	0 - 19 / 32	0 - 23 / 32	0 - 24 / 32	- 24 / 32	06:00	24	0 - 14 / 16
0-11/16	MVMT	0-28/32		0-19/32		0-9/32		0-8/32		0-12/32		0-21/32		0-24/32				0-14/16

Table A-20
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
Aug. 30 - Sept. 1, 1998

141+00

DATE				Aug. 30	Aug. 31														
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		76.0	74.6	64.3	64.3	66.2	70.3	67.2	69.1	66.5	60.1	66.1	68.9	65.3	69.6	78.2	
O	- 2.7"	W		76.0	72.4	58.0	60.3	59.2	64.6	64.4	64.8	61.3	52.6	65.1	61.7	61.0	65.5	77.2	
	- 4.3"	B		76.6	72.8	56.0	60.7	56.0	61.7	64.1	65.4	60.5	53.1	64.4	63.7	61.6	65.9	76.4	
	- 6.0"	Y		80.7	71.6	55.9	63.1	56.2	61.4	63.1	62.7	56.4	51.7	60.5	60.7	56.8	63.3	74.5	
S	-1.0"	RR		77.5	71.2	59.7	63.7	62.9	67.0	61.9	71.2	65.1	60.7	66.7	73.3	64.7	68.6	76.1	
O	- 2.7"	WW		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	- 4.3"	BB		77.6	69.2	55.8	60.7	55.9	63.9	61.3	66.1	60.8	55.3	62.5	61.8	59.4	67.0	82.1	
	- 6.0"	YY		-	73.0	54.3	63.6	51.1	58.3	63.2	64.8	60.9	52.7	52.3	58.5	54.2	60.6	83.5	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

DATE			Aug. 31										Sept. 1						
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	92.0	96.8	93.3	90.1	89.9	92.1	87.3	85.2	82.1	80.4	63.1	65.2	78.0	100.3	98.0	95.9	
O	- 2.7"	W	93.8	100.1	98.2	90.7	85.2	95.2	93.1	88.2	86.3	79.9	60.4	62.3	83.0	104.2	97.5	93.6	
	- 4.3"	B	93.3	99.3	99.2	98.2	97.7	97.5	93.8	92.6	87.1	82.2	98.7	61.2	81.6	105.3	105.6	92.3	
	- 6.0"	Y	93.5	99.5	-	98.3	100.1	102.0	97.6	93.8	87.9	84.3	56.9	60.9	-	-	-	-	
S	-1.0"	RR	91.4	101.4	98.8	-	102.1	90.5	88.7	86.6	83.5	80.4	62.0	65.2	73.2	88.5	89.9	95.7	
O	- 2.7"	WW	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	- 4.3"	BB	93.3	102.2	102.1	103.2	104.2	102.1	97.3	93.9	87.1	82.9	60.1	62.9	72.9	97.7	101.3	93.5	
	- 6.0"	YY	94.0	76.0	79.5	79.0	78.6	96.2	93.3	89.8	87.8	84.5	57.3	61.2	68.0	93.5	103.9	77.5	
STRAIN																			
N	-1.0"	R										-*	-	-	-256	107	289	-236	*Drifts
O	-3.5"	W										-267	-255	-232	-220	-288	-292	-225	
	-6.0"	B										-	-	-	-225	-	-	-	
S	-1.0"	RR										-	-	-	-	-	-	-	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-	-	-	-	-	-	-	

Table A-21
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
Aug. 30 - Sept. 1, 1998

142+00

		DATE		Aug. 30						Aug. 31									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		73.3	67.2	57.2	61.2	56.8	64.3	61.4	64.3	61.2	57.4	61.9	62.6	63.1	70.7	75.1	
O	- 2.7"	W		71.8	66.4	55.4	59.1	54.0	58.2	58.2	60.7	58.3	55.7	61.1	62.1	56.0	63.2	72.3	
	- 4.3"	B		73.9	67.5	55.2	58.6	54.0	56.5	56.0	61.4	56.5	54.6	58.5	58.9	58.2	65.9	73.4	
	- 6.0"	Y		74.3	70.8	55.3	57.5	52.6	53.7	54.6	58.0	55.1	52.3	68.9	59.2	56.4	62.3	72.1	
S	-1.0"	RR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	- 2.7"	WW		71.4	66.2	61.2	61.3	57.5	58.1	58.0	61.5	60.1	57.0	61.6	58.0	63.4	69.8	74.3	
	- 4.3"	BB		81.9	82.1	67.9	76.6	55.3	74.7	59.3	72.7	59.1	59.0	71.5	70.9	59.4	67.5	75.1	
	- 6.0"	YY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

		DATE	Aug. 31									Sept. 1							
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	85.5	101.4	99.8	96.7	-	93.3	87.9	82.0	78.3	76.4	57.1	63.1	72.7	98.6	96.7	96.0	
O	- 2.7"	W	85.9	102.1	101.6	97.2	96.6	94.2	92.5	86.2	81.3	77.2	55.2	62.7	72.6	97.2	102.7	94.8	
	- 4.3"	B	90.1	103.4	98.7	99.1	101.3	100.6	95.6	87.6	85.7	79.3	55.0	61.5	73.5	99.8	105.0	93.6	
	- 6.0"	Y	86.3	100.2	102.3	100.2	103.7	97.7	95.1	90.8	85.4	81.3	53.7	60.1	73.9	112.8	92.1		
S	-1.0"	RR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O	- 2.7"	WW	88.3	96.8	99.1	98.1	90.2	93.8	92.7	85.7	79.1	75.2	56.7	63.5	73.8	91.7	88.4	94.8	
	- 4.3"	BB	91.1	88.4	94.6	93.2	90.2	104.8	94.3	89.9	86.7	83.0	55.2	62.6	74.6	92.1	96.6	93.7	
	- 6.0"	YY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R										-2312	-2514	-2815	-3032	-2327	-2319	-3039	
O	-3.5"	W										-2575	-2734	-3115	-3731	-2565	-2544	-3690	
	-6.0"	B										-479	-461	-427	-415	-475	-460	-404	
S	-1.0"	RR										-1670	-1876	-2025	-2398	-1887	-1663	-1979	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-1597	-1716	-1862	-1925	-1609	-1581	-2380	

Table A-22
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
Aug. 30 - Sept. 1, 1998

147+00

SIDE	DEPTH	COLOR	INITIAL	Aug. 30 18:00	19:00	20:00	21:00	22:00	23:00	Aug. 31 00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
				INSTRUMENT THERMOCOUPLE — TIME															
N	-1.0"	R		74.5	74.7	64.6	68.1	59.3	62.4	63.9	68.7	59.3	58.0	61.6	62.5	65.2	70.4	80.1	
O	-2.7"	W		74.2	74.9	62.9	63.7	56.8	58.2	58.0	62.0	60.4	54.0	57.9	60.8	66.6	72.5	81.4	
	-4.3"	B		77.4	74.4	64.1	63.9	55.9	57.9	56.9	60.0	56.5	52.4	57.0	61.0	60.9	68.0	82.7	
	-6.0"	Y		79.5	76.9	62.8	63.6	54.6	53.8	54.1	60.4	55.3	51.8	57.1	58.4	58.1	68.0	82.5	
S	-1.0"	RR		75.7	76.3	67.0	63.9	60.0	58.6	61.8	67.6	64.2	60.7	65.9	65.9	68.6	75.8	83.5	
O	-2.7"	WW		75.5	76.3	66.6	62.0	57.6	61.0	58.6	65.0	60.1	57.3	-	64.2	68.8	73.5	84.2	
	-4.3"	BB		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-6.0"	YY		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

SIDE	DEPTH	COLOR	Aug. 31 9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	Sept. 1 06:00	08:30	11:00	14:00	18:00	
			INSTRUMENT THERMOCOUPLE — TIME																
N	-1.0"	R	92.2	100.1	103.7	104.5	80.3	92.7	94.6	86.0	81.3	74.0	61.7	64.2	72.9	89.3	-	-	
O	-2.7"	W	93.1	101.5	104.6	104.3	88.0	89.5	-	91.8	85.6	75.9	60.2	64.7	73.9	85.1	81.6	94.5	
	-4.3"	B	93.4	107.1	108.3	-	-	-	-	94.2	84.3	75.4	59.2	65.2	74.1	104.5	91.3	93.2	
	-6.0"	Y	95.5	108.1	110.4	108.3	100.3	103.1	103.1	94.4	83.8	79.5	58.9	67.5	75.1	92.4	96.2	91.2	
S	-1.0"	RR	95.4	102.7	98.5	96.3	91.8	92.7	-	84.5	80.1	75.9	61.2	68.1	75.2	93.8	76.7	95.0	
O	-2.7"	WW	96.5	105.0	103.9	100.5	90.8	90.2	-	91.7	83.4	76.9	60.3	69.6	74.9	97.6	85.0	94.4	
	-4.3"	BB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	-6.0"	YY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
STRAIN																			
N	-1.0"	R										-	-	-	-290	-	-	-	
O	-3.5"	W										-	-	-	-	-	-	-	
	-6.0"	B										-	-	-	-	-	-	-	
S	-1.0"	RR										-	-	-	-	-	-	-	
O	-3.5"	WW										-	-	-	-	-	-	-	
	-6.0"	BB										-	-	-	-	-	-	-	

Table A-23
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
Aug. 30 - Sept. 1, 1998

152+00

		DATE		Aug. 30						Aug. 31									
INSTRUMENT			INITIAL	TIME															
THERMOCOUPLE				18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
SIDE	DEPTH	COLOR																	
N	-1.0"	R		78.0	72.5	67.3	65.9	58.4	58.6	60.7	61.6	58.3	56.0	57.7	63.8	67.1	71.5	80.9	
O	-2.7"	W		72.8	74.4	66.4	63.5	57.4	56.1	60.2	65.0	62.4	53.0	65.5	62.1	66.2	70.5	79.2	
	-4.3"	B		75.3	72.4	65.9	63.8	56.0	57.7	56.7	59.6	55.1	52.5	68.5	59.1	64.3	69.3	82.3	
	-6.0"	Y		76.4	72.5	64.6	61.4	52.1	51.7	61.4	59.9	56.3	51.2	64.2	61.6	66.5	65.8	80.1	
S	-1.0"	RR		75.2	74.0	69.6	68.5	59.8	61.0	62.3	70.8	60.7	59.5	70.9	58.2	73.0	69.8	80.4	
O	-2.7"	WW		75.2	71.9	65.4	64.8	54.6	56.6	60.7	65.7	63.5	57.5	67.2	64.4	62.1	67.4	78.1	
	-4.3"	BB		74.4	71.3	64.4	64.4	56.7	55.8	59.5	63.3	60.3	55.2	65.2	65.0	65.9	67.1	79.5	
	-6.0"	YY		84.6	82.8	76.6	77.0	72.2	72.0	71.1	73.3	70.0	66.7	73.5	71.0	69.7	71.6	76.2	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

		DATE	Aug. 31										Sept. 1						
INSTRUMENT			TIME																
THERMOCOUPLE			9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	
SIDE	DEPTH	COLOR																	
N	-1.0"	R	91.6	93.1	90.8	89.5	86.2	88.3	80.1	79.7	75.3	72.6	59.4	67.1	77.8	84.4	82.1	96.4	
O	-2.7"	W	92.5	102.1	98.2	95.3	85.6	91.4	87.8	83.1	78.9	72.3	58.7	66.4	76.7	92.7	84.8	96.1	
	-4.3"	B	95.1	101.8	101.4	99.5	88.0	92.4	87.4	83.2	78.3	73.6	57.1	65.8	76.3	95.4	89.7	94.9	
	-6.0"	Y	90.9	99.5	103.0	96.7	93.1	95.5	91.3	86.3	85.1	84.9	58.6	65.3	77.1	83.3	88.6	95.2	
S	-1.0"	RR	93.0	97.9	90.8	85.2	78.4	83.4	81.5	80.0	75.8	72.3	58.5	66.8	78.4	80.7	73.7	96.2	
O	-2.7"	WW	92.2	94.3	95.4	90.5	84.2	88.0	89.0	82.4	78.1	73.1	57.3	65.2	76.9	91.2	78.0	96.3	
	-4.3"	BB	93.7	97.9	98.2	91.1	90.3	-	-	-	-	-	57.1	65.5	76.6	93.3	83.0	96.2	
	-6.0"	YY	83.9	91.9	92.4	-	-	-		89.2	86.1	84.1	56.9	64.9	76.1	90.3	90.1	85.0	
STRAIN																			
N	-1.0"	R										-	-	-	-	-	-	-	
O	-3.5"	W										-1685	-1881	-2225	-2203	-1653	-1665	-2224	
	-6.0"	B										-1430	-1716	-1875	-1971	-1414	-1377	-2027	
S	-1.0"	RR										-3290	-3326	-3742	-4236	-3305	-3301	-4244	
O	-3.5"	WW										-	-	-	4500	-	-	-	
	-6.0"	BB										-1140	-1257	-1236	-1212	-1100	-1085	-1134	

Table -24
GREATER ROCKFORD AIRPORT
TAXIWAY F INSTRUMENTATION
HORIZONTAL MOVEMENT DATA
Aug. 30 - Sept. 1, 1998

153+00

SIDE	DEPTH	COLOR	INITIAL	18:00	19:00	20:00	21:00	22:00	23:00	00:00	01:00	02:00	03:00	04:00	05:00	06:00	07:00	08:00	Comments
DATE				Aug. 30						Aug. 31									
INSTRUMENT THERMOCOUPLE				TIME															
N	-1.0"	R		74.0	72.1	64.6	65.9	60.3	58.8	67.8	64.7	61.3	57.7	63.9	64.8	66.1	68.6	82.1	
O	- 2.7"	W		75.1	69.9	62.8	62.8	54.3	55.8	63.7	65.1	60.1	56.0	69.3	62.7	63.7	69.3	83.9	
	- 4.3"	B		73.8	71.1	60.9	61.3	53.7	58.3	64.7	61.1	56.2	54.3	64.5	62.3	64.4	68.5	80.7	
	- 6.0"	Y		75.6	71.5	61.3	61.8	57.4	57.5	63.6	62.1	59.6	52.1	64.4	59.7	61.9	67.7	79.5	
S	-1.0"	RR		76.2	75.9	68.8	67.0	62.5	62.5	71.6	70.7	66.0	62.5	71.0	69.6	69.2	75.8	82.1	
O	- 2.7"	WW		75.8	72.7	66.0	66.6	59.2	61.6	68.6	67.4	62.5	60.9	69.2	67.6	67.4	73.2	84.2	
	- 4.3"	BB		75.1	73.1	63.5	62.1	57.1	60.6	67.7	68.1	63.2	58.6	67.8	65.6	67.2	71.6	83.9	
	- 6.0"	YY		76.8	74.8	68.1	64.5	56.2	58.2	70.6	64.8	63.3	59.9	69.2	65.2	67.4	72.7	85.1	
STRAIN																			
N	-1.0"	R																	
O	-3.5"	W																	
	-6.0"	B																	
S	-1.0"	RR																	
O	-3.5"	WW																	
	-6.0"	BB																	

SIDE	DEPTH	COLOR	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00	22:00	06:00	08:30	11:00	14:00	18:00	Comments
DATE			Aug. 31											9-1-98					
INSTRUMENT THERMOCOUPLE			TIME																
N	-1.0"	R	96.4	100.9	93.1	91.5	82.8	86.2	90.4	87.1	81.4	72.5	60.9	68.1	78.6	100.0	77.5	96.3	
O	- 2.7"	W	100.6	105.0	99.2	98.2	98.3	95.2	95.0	82.1	78.3	71.7	59.7	67.7	72.0	101.6	80.9	96.7	
	- 4.3"	B	98.9	105.3	103.1	100.2	95.5	96.7	98.0	85.1	77.6	72.3	58.5	65.3	76.6	99.5	82.6	95.9	
	- 6.0"	Y	97.2	104.1	106.4	104.1	96.7	98.2	101.7	85.1	81.3	73.6	57.6	68.1	76.9	103.5	84.8	94.6	
S	-1.0"	RR	95.5	107.3	98.9	92.5	83.6	88.1	91.1	80.9	76.8	74.9	59.2	69.0	78.7	92.1	74.0	94.6	
O	- 2.7"	WW	96.7	104.4	104.7	97.5	88.5	92.3	95.6	86.1	81.4	74.8	59.0	67.8	75.7	-	-	-	
	- 4.3"	BB	94.5	111.2	109.8	100.9	95.0	98.2	100.5	88.5	81.8	76.2	57.6	68.1	75.1	99.6	84.4	94.4	
	- 6.0"	YY	95.8	109.7	111.0	-	-	-	-	-	-	-	-	-	75.6	99.3	87.5	93.3	
STRAIN																			
N	-1.0"	R										-*	-	-	-	-	-	-	* Drifts
O	-3.5"	W										-2113	-2167	-2570	-2769	-2070	-2078	-2930	
	-6.0"	B										-	-	-	-	-	-	-	
S	-1.0"	RR										-2252	-2257	-2862	-3074	-2271	-2260	-3078	
O	-3.5"	WW										-	-	-1011	-989	-868	-914	-1150	
	-6.0"	BB										-1416	-1452	-1486	-1471	-1225	-1122	-1411	

APPENDIX B—SITE PHOTOGRAPHS

FIGURE B-1. OVERALL VIEW OF PROJECT SITE (SEPT. 1998)

FIGURE B-2. CLOSE-UP OF SURFACE TEXTURE (SEPT. 1998)

FIGURE B-3. LOSS OF MORTAR DUE TO CONSTRUCTION TRAFFIC
(SEPT. 1998)

FIGURE B-4. SURFACE DAMAGED BY RAIN DURING CONSTRUCTION
(SEPT. 1998)

FIGURE B-5. FIBER BALL NO. 1 VISIBLE ON THE SURFACE (SEPT. 1998)

FIGURE B-6. FIBER BALL NO. 2 VISIBLE ON THE SURFACE (SEPT. 1998)

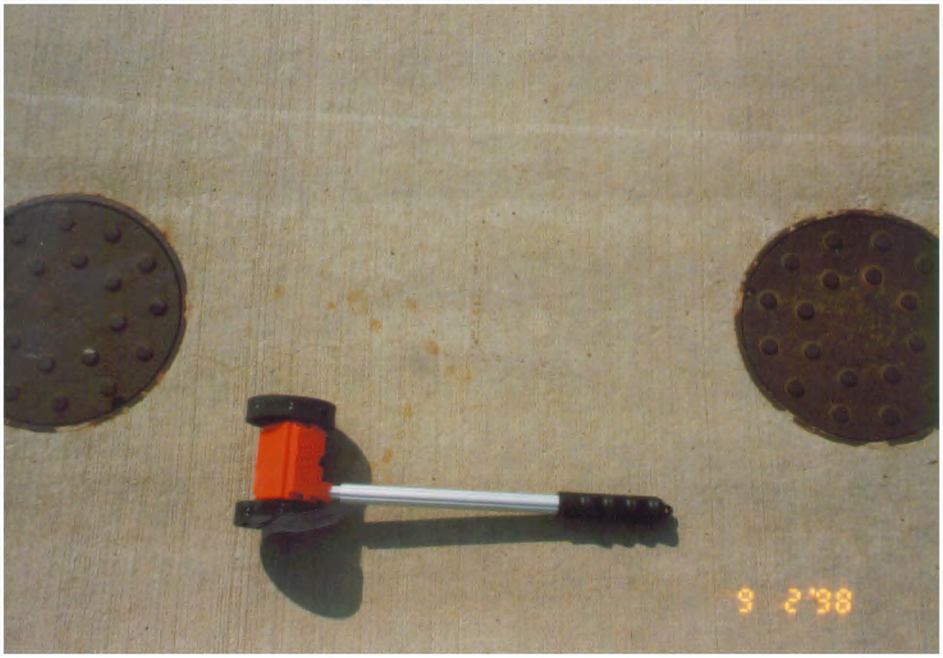


FIGURE B-7. CRACK BETWEEN INSPECTION HANDHOLES (SEPT. 1998)

FIGURE B-8. CLOSE-UP OF THE FINGER JOINT, NOTE ELEVATION DIFFERENCE (SEPT. 1998)

FIGURE B-9. PAVING CRACK NO. 1 IN PRESTRESSED PAVEMENT (SEPT. 1998)

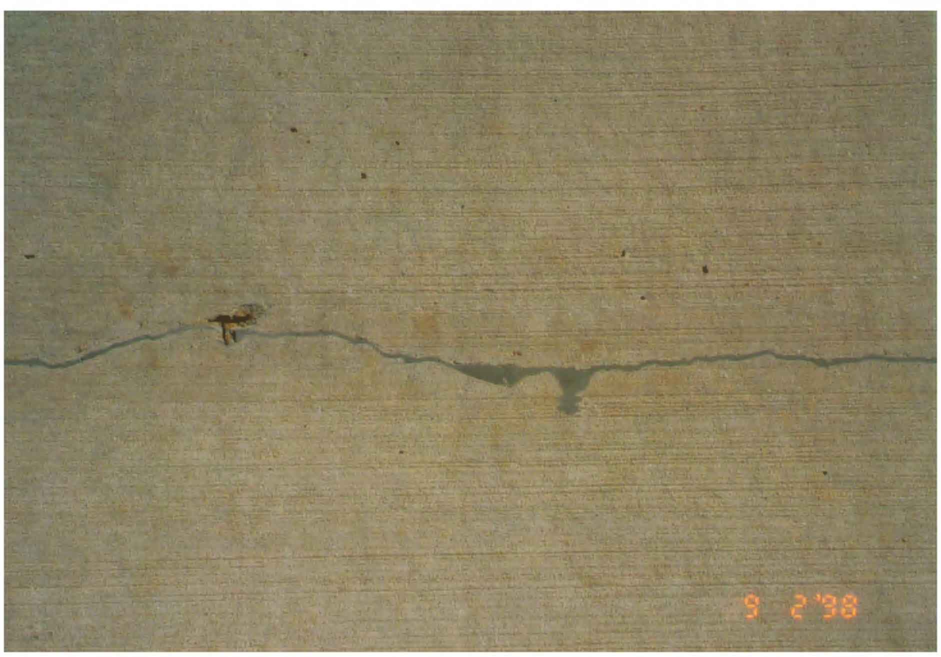


FIGURE B-10. PAVING CRACK NO. 2 IN PRESTRESSED PAVEMENT (SEPT. 1998)

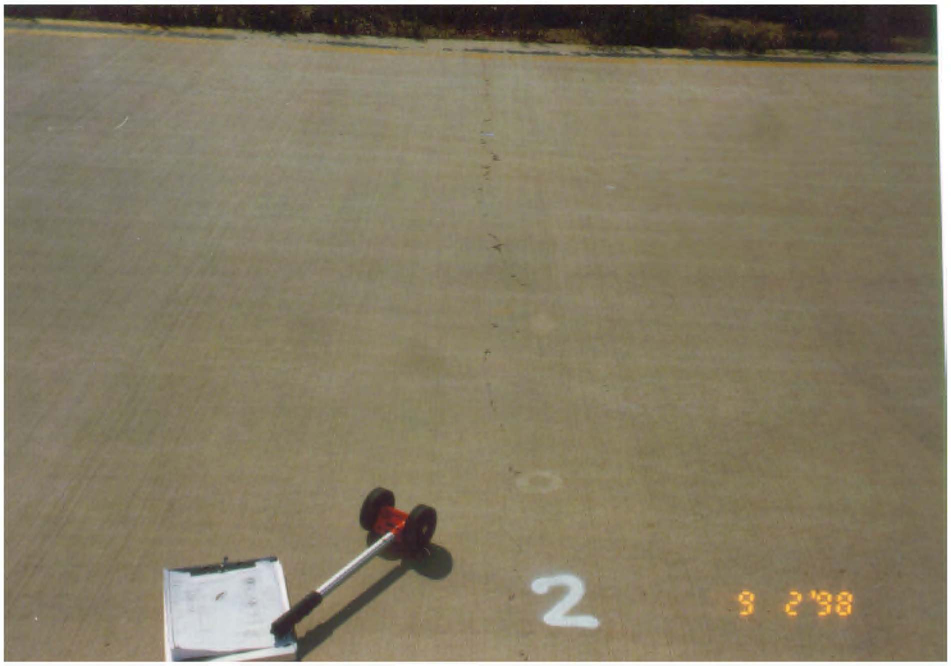


FIGURE B-11. CRACK NO. 2 IN THE PRESTRESSED PAVEMENT, A TRANSVERSE CRACK LOCATED NEAR THE CENTER OF THE PAVEMENT SECTION (SEPT. 1998)

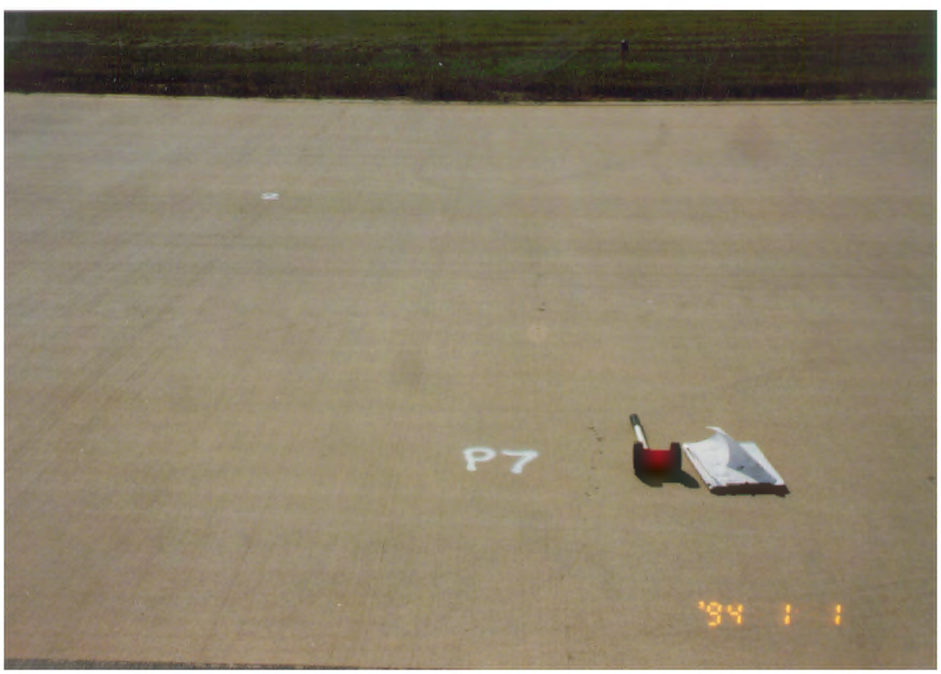


FIGURE B-12. CRACK NO. 7 IN PRESTRESSED PAVEMENT, A TRANSVERSE CRACK (SEPT. 1998)

FIGURE B-13. CRACK NO. 12 IN THE PRESTRESSED PAVEMENT, A LONGITUDINAL CRACK (SEPT. 1998)

FIGURE B-14. CONSTRUCTION JOINT IN THE PRESTRESSED PAVEMENT (SEPT. 1998)

FIGURE B-15. LONGITUDINAL CRACK NO. 1 ALONG PAVEMENT EDGE (SEPT. 1998)

FIGURE B-16. LONGITUDINAL CRACK NO. 2 ALONG PAVEMENT EDGE (SEPT. 1998)

FIGURE B-17. CRACK NO. 2 IN THE FIBROUS PAVEMENT, A TRANSVERSE CRACK WHICH OCCURRED IN OCTOBER 1993 (SEPT. 1998)

FIGURE B-18. CRACK NO. 5 IN THE FIBROUS PAVEMENT, A TRANSVERSE CRACK (SEPT. 1998)

FIGURE B-19. CRACK NO. 4 IN THE FIBROUS PAVEMENT, A TRANSVERSE CRACK (SEPT. 1998)

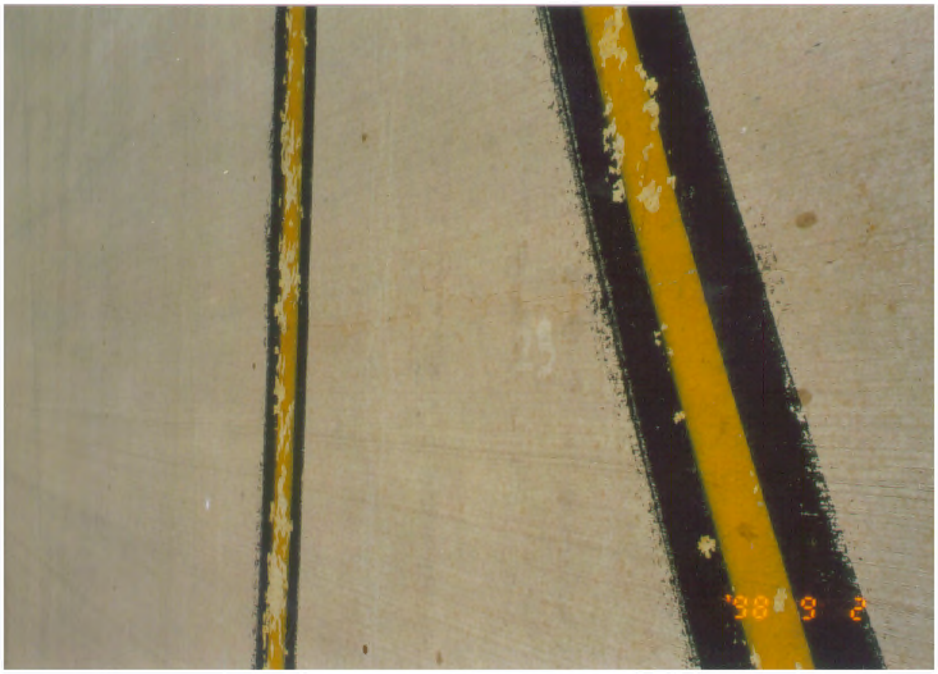


FIGURE B-20. CRACK NO. 23 IN THE FIBROUS PAVEMENT, A TRANSVERSE CRACK (SEPT. 1998)

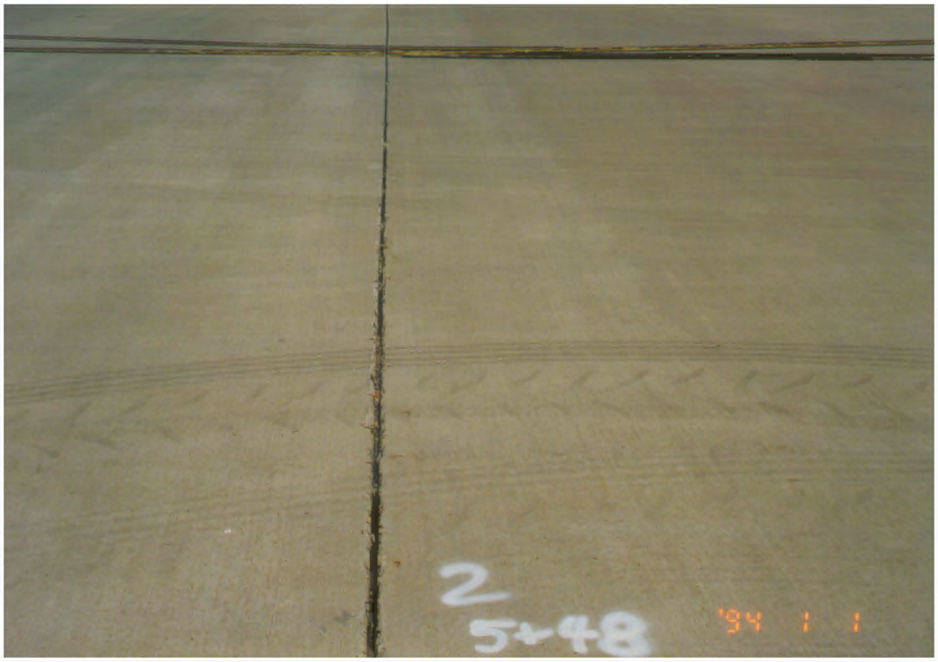


FIGURE B-21. JOINT, STA. 5+48 IN FIBROUS PAVEMENT, A WORKING JOINT (SEPT. 1998)

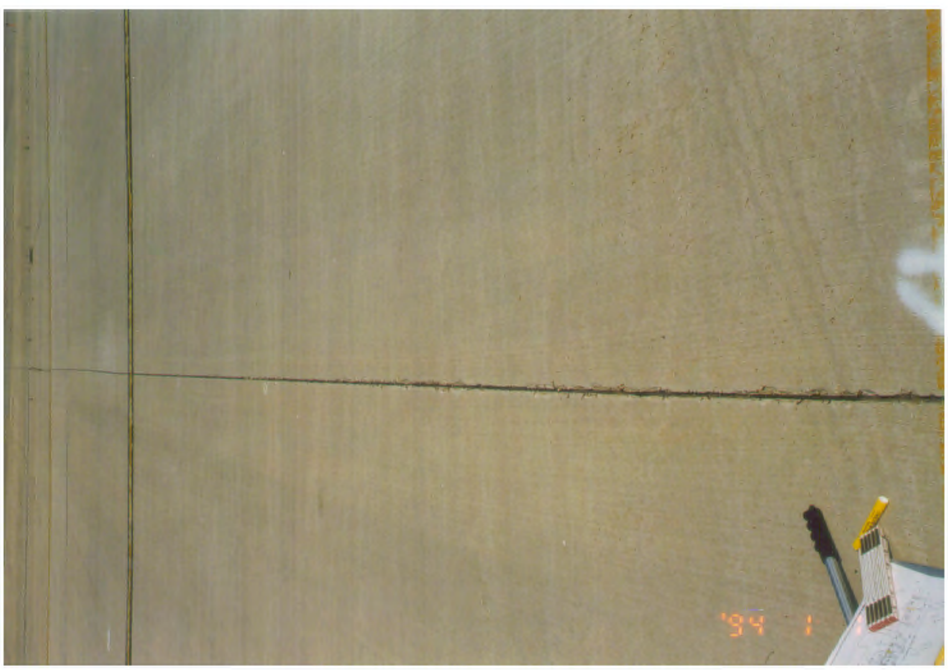


FIGURE B-22. JOINT, STA. 7+48 IN FIBROUS PAVEMENT, A WORKING JOINT (SEPT. 1998)

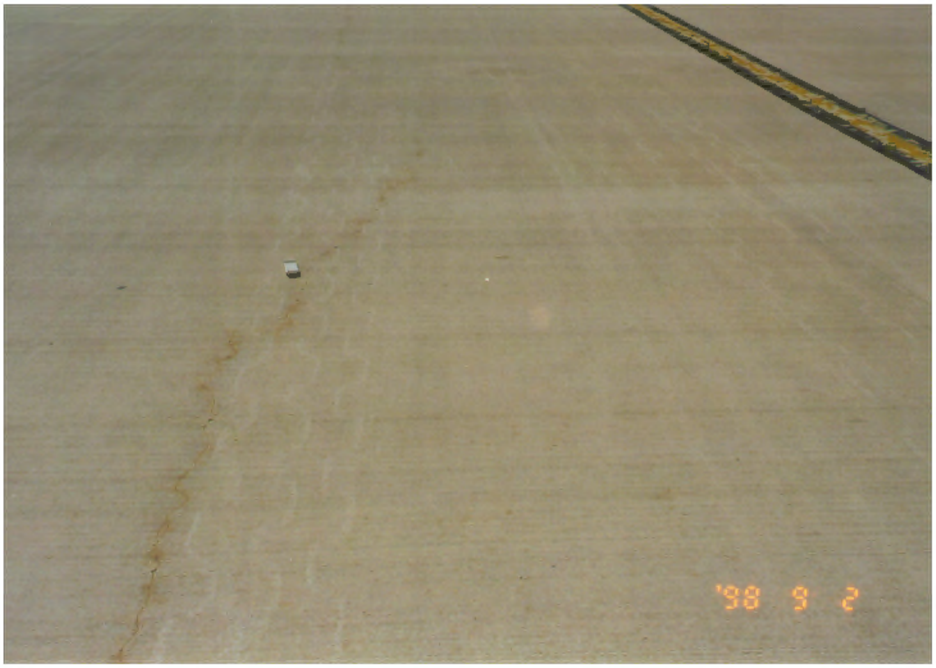


FIGURE B-23. LONGITUDINAL CRACK IN FIBROUS PAVEMENT, IN AIRCRAFT WHEEL PATH (SEPT. 1998)

FIGURE B-24. LONGITUDINAL CRACK IN FIBROUS PAVEMENT, IN AIRCRAFT WHEEL PATH (SEPT. 1998)

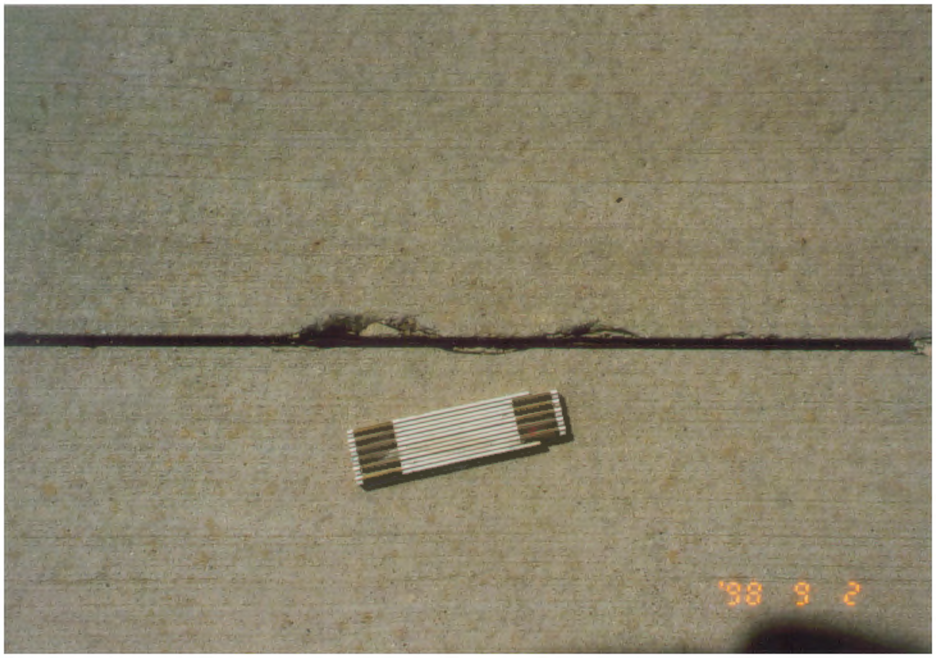


FIGURE B-25. JOINT SPALLING IN CONVENTIONAL PAVEMENT (SEPT. 1998)

FIGURE B-26. TRANSVERSE CRACK IN CONVENTIONAL PAVEMENT (SEPT. 1998)