LTPP Seasonal Monitoring Program

Site Monitoring Suspension Status
Draft Final Report for
GPS Section 204054 (20A)
Enterprise, Kansas

U.S. Department
of Transportation
Federal Highway
Administration

FHWA Contract No. DTFH61-96C-0013 September 1996

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Report No. FHWA-

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Technical Report Documentation Page

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FHWA LTPP Technical Representative - Aramis Lopez, HNR-40

16. Abstract

This report contains information on instrument de-installation and monitoring data collection activities for the Long Term Pavement Performance (LTPP) General Pavement Study (GPS) section 204054 conducted on August 5, 1996. The report presents a description of the following activities: SMP data collection activities, including instrument and equipment problems noted prior to de-installation; instrument de-installation activities and unresolved problems with installed sensors; and instrument reinstallation schedule. Also included in the report are the color copies of site photographs taken during suspension preparation activities. The reinstallation of the instrumentation in this site is scheduled for August 1-7, 1997. All units such as the rain gauge, air temperature sensor, and the associated metal poles will be carefully reinstalled and tested.

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Long Term Pavement Performance, LTPP, Instrument De-installation, Seasonal Monitoring Program, SMP, Time Domain Reflectometry, TDR, Piezometer, Falling Weight Deflectometer	**No restrictions. This document is available to the public from the sponsoring agency.**

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1.0 INTRODUCTION

The seasonal monitoring data collection for the Long Term Pavement Performance (LTPP) General Pavement Study (GPS) section 204054 has been suspended for a period of one year effective August 5, 1996. The test section, which is part of the Seasonal Monitoring Program (SMP) managed by the Federal Highway Administration (FHWA) LTPP Division, is located just east of Enterprise, Kansas on the westbound driving lane of Interstate Highway 70 at milepost 280.9. Additional background information on the test section, including the exact location of the test section, types of instruments installed, and the pavement structure in-place, can be found in the *Site Installation Report for GPS Section 204054 (20A), Enterprise, Kansas* dated February 1996 (1).

This report contains information on instrument de-installation and monitoring data collection activities conducted on August 5, 1996. After the installation of instrumentation in the test section on August 24, 1995, the test section was visited a total of eight times for SMP data collection, four in 1995 and four in 1996, including the de-installation visit. The dates and activities

performed during these visits can be found in the SMP data collection summary table in appendix A. The instrumentation for the site is scheduled for reinstallation August 1997 and will be monitored for another year. This section is planned to be monitored every other year for the remainder of the LTPP study.

The report presents a description of the following activities: SMP data collection activities, including instrument and equipment problems noted prior to de-installation; instrument de-installation activities and unresolved problems with installed sensors; and instrument reinstallation schedule. Also included in the report are the color copies of site photographs taken during suspension preparation activities.

2.0 SMP DATA COLLECTION

2.1 SMP Data Collection

Prior to de-installation of the instrumentation in this test section, the full suite of SMP monitoring measurements in the *LTPP Seasonal Monitoring Program Instrument Installation and Data Collection Guidelines* (2) was performed. These include the following:

- FWD and associated measurements.
- Elevation survey.
- Manual distress survey with transverse profile measurements.
- Manual electrical resistivity measurements (two- and four-point).

- Automated mobile data measurements (Time Domain Reflectometry [TDR] and resistivity).
- Water table measurements.

A summary of all the SMP data collected to date can be found in the SMP data collection summary table in appendix A. The specific type and amount of data collected can be found on the copy of SMP field activity report (data sheet SMP-D10) in appendix B. Ten other SMP data sheets pertaining to the data collection activities are also in appendix B. The locations for FWD, faultmeter, and elevation measurements can be found in the site information sheet (SIS) in appendix C. During the instrument de-installation and data collection activities, the weather was calm and sunny with intermittent drizzling.

As can be seen the SMP data collection summary table in appendix A, no longitudinal profile measurements were recorded. This data will be collected at the first opportunity once the new longitudinal profile equipment is released for use or the old profile equipment is in working condition.

2.3 Instrument and Equipment Problems

The performance of all TDR, rain gauge, and Measurement Research Corporation (MRC) sensors in the test section were evaluated by reviewing the data from the onsite and mobile dataloggers using the SMPCheck program (3).

A review of the onsite data collected during this visit indicated that MRC sensors 15, 16, 17, and 18 did not function as expected on July 19 and 22, 1996.

As can be seen in the plots presented in figure D-1 in appendix D, two spikes were noted in the temperatures recorded by MRC sensors 15, 16, 17, and 18, for July 19 and 22, 1996. The temperatures recorded in these days in summer were below 0 °C, indicating potential equipment problems. For sensor 17 only the temprature recorded on July 19, 1996, was below 0 °C. Similar problems with the MRC temperature recordings attributed to intermittent failure of the relay were reported in the site installation report (1). The temperature recordings from the remaining MRC sensors and air temperature measuring sensor appear reasonable and typical of temperatures at this time of the year.

As shown in photograph number 1 in appendix E, the collector unit (funnel) of the rain guage was detached from the weather station system probably by strong winds. Note the clips expected to hold the collector unit in place in the photograph are intact. The collector unit was found in the ditch along the eastbound lane, approximately 50 to 70 meters from its original location. Photographs 2 through 5 in appendix E show the damage to the collector unit. Note in photograph number 5 that the sieve in the collector unit is missing. Discussions with the local Kansas DOT staff in Abeline indicate that there were strong winds from July 23 through August 5, 1995, which most likely caused the collector unit to be detached from the weather station system. It is therefore recommended that the rainfall data from July 23 through August 5, 1996 not be entered into the IMS database.

A review of the data from the mobile datalogger indicates that the TDR sensors are functioning as expected. All the TDR traces, which can be found in figure D-2 in appendix D, had the maximum and minimum points on the traces that enable analysis. However, in the same figure, plot K indicates potential problems with the mobile unit, possibly the CRREL multiplexer. As can be seen in plot K, a value of -6999 was noted for locations 10 and 11, suggesting potential problems at these locations in the mobile unit. A review of data from previous visits indicates that this problem existed as early as March 11, 1996.

3.0 INSTRUMENT DE-INSTALLATION ACTIVITIES

3.1 Suspension Preparation and Repairs to Instrumentation Hole

As required by the LTPP Seasonal Directive SM-8 (3), on the last day of monitoring, the following site preparation activities were performed:

- Application of an electronics quality, anti-corrosion compound to the TDR and BNC connectors, electrical resistivity connector, and MRC temperature lead wires.
- Disconnection and removal of the panel board containing the onsite CR10, power supply, terminal strip, and relay. A dessicant pouch with all wires and connectors was sealed in a plastic bag. The wires were secured as high as possible in the cabinet.

- After completion of the final water table depth measurement, the end of the piezometer was sealed and marked for easy identification, as shown in photograph number 6 in appendix E.
- The three temprature holes in the pavement were sealed with silicone after the final temprature readings, as shown in photograph number 7 in appendix E.
- Locked cabinet as shown in photograph number 8 in appendix E.

All units such as the rain gauge, air temperature sensor, and the associated metal poles were labeled "20SA" and carefully stored in the North Central Regional Coordination Office (NCRCO) for reinstallation. The union was left onsite in the cabinet.

3.2 Unresolved Problems with the Installed Sensors

The unresolved problem at this site is the CRREL multiplexer in the mobile unit. Previous problem reports (PRs) on this case (namely NA-01, NC-08, and NC-15 submitted February 22, 1995, February 27, 1995, and October 13, 1995 [5], respectively) were reviewed. These problems were resolved and required no immediate action at the time. A new problem report on the problem related to the CRREL multiplexer has been despatched to the other three Regional Coordination Offices, PCS/Law and the LTPP Division, HNR-40 of the FHWA.

3.3 Unique Site Features

This test section is the 12th SMP installation in the LTPP North Central Region.

The MOBILE program used to collect data from the mobile datalogger has been modified to account for the nonstandard TDR cable lengths in this site. The program, which is referred to as "MOB20SA," enables the maximum and minimum points on the TDR traces to be captured.

4.0 INSTRUMENT REINSTALLATION

Reinstallation of the instrumentation in this site is scheduled for August 1-7, 1997. All units such as the rain gauge, air temperature sensor, and the associated metal poles labeled "20SA" are carefully reinstalled and tested.

At the SMPCheck meeting recently held in Champaign, Illinois, it was discussed that solar panels would be installed at the SMP sites on top of the cabinets to prolong the life of the battery onsite. There are ongoing efforts to purchase these units.

5.0 SUMMARY

This report contains information on instrument de-installation and monitoring data collection activities for the Long Term Pavement Performance (LTPP) General Pavement Study (GPS) section 204054, conducted on August 5, 1996. The report presents a description of the SMP data collection activities including instrument and equipment problems noted prior to de-installation, instrument de-installation activities, unresolved problem with the CRREL multiplexer in the mobile unit, and instrument reinstallation schedule. Also included in the report

are the color copies of site photographs taken during suspension preparation activities.

During reinstallation of the instrumentation in this site, scheduled for August 1-7, 1997, all units such as the rain gauge, air temperature sensor, and the associated metal poles will be carefully reinstalled and tested. This includes the installation of solar panels on the cabinets to prolong the life of the battery onsite. There are ongoing efforts to purchase these units.

LIST OF REFERENCES

1. *LTPP Seasonal Monitoring Program Site Installation Report for GPS Section 204054 (20A) Enterprise, Kansas.* Federal Highway Administration, LTPP Division, HNR-40, Turner-Fairbanks Highway Research Center, McLean, Virginia. February 1996.
2. *LTPP Seasonal Monitoring Program: Instrumentation Installation and Data Collection Guideline.* FHWA-RD-94-110, Federal Highway Administration, LTPP Division, HNR-40, Turner-Fairbanks Highway Research Center, McLean, Virginia. April 1994.
3. SMPCheck, computer software version 2.4, prepared for The Federal Highway Administration, Pavement Performance Division, HNR-30, McLean, Virginia. August 1996.
4. Lopez, Aramis Jr. *Long Term Pavement Performance Directive for the Seasonal Monitoring Program: Directive Number SM-8, Suspension of SMP Site Monitoring Activities.* Federal Highway Administration, LTPP Division, Turner-Fairbanks Highway Research Center, McLean, Virginia. March 1995.
5. Padgett, Sherry. *Long Term Pavement Performance (LTPP) Monitoring Problem Report.* A nine page Facsimile Message from Jonathan Groegr, PCS/Law, Beltsville, Maryland to Thomas Wilson, ERES Consultants, Inc., Champaign, Illinois, August 29, 1996.

Appendix A - SMP Data Collection Summary Table

SMP DATA COLLECTION SUMMARY

20SA --204054 , I-70 JUST EAST OF ENTERPRISE, KS (MP 281)

		ONSITE Data			MOBILE Data		Manual Data								FWD Data				Distress		Profile		Comments
Date dd/mmm/yy	Visit ID	Pvmt. Temp.	Air Temp.	Rain	TDR	Frost Volts	Backup TDR	Backup TDR	Frost 2-Pt.	Frost 4-Pt.	Water Table	Pvmt. Elev.	Joint Open.	Joint Fault	Man. Temp.	OWP	ML	PE	M	P	P	D	
??????????																				X			
10-Mar-93																					X		
18-Feb-95																					X		PROFILE DATA NOT REC. BY RCO
18-Apr-95																			X				DISTRESS SURVEY/FWD DATA PRIOR
24-Aug-95	95A														X	1	1	1					INSTALLATION
25-Aug-95	95B	X	X	X	X	X			D	D	D	D		D	X	2	2	2					FINISH INSTALL, NO SNAPRINGS YET
21-Sep-95	95C	X	X	X	X	X			D	D	D	D		D	X	1	1	1					RAIN; ONE FWD CYCLE, NO SNAPRINGS YET
18-Oct-95	95D	X	X	X	X	X			D	D	D	D	D		X	3	3	3					INSTALLED SNAPRINGS
26-Oct-95																					X		
16-Nov-95	95E	X	X	X	X	X			D	D	D	D	D	D	X	3	3	3					RESET TIME TO CST
11-Dec-95	95F	X	X	X	X	X					D		D	D	X	2	2	2					
24-Jan-96	96A	X	X	X	X	X			D	D	D	D	D	D	X	2	2	2	X				REPLACE RELAY FOR ONSITE CR10
8-Mar-96	96B	X	X	X	X	X			X	X	X		X	X	X	2	2	2					
25-Apr-96	96C	X	X	X	X	X			X	X	X	X	X	X	X	2	2	2					SET CLOCK DST, 2 FROST DATA SETS
5-Aug-96	96D	D	D	D	D	D			D	D	D	D	D	D	X	2	2	2	X				DE-INSTALLED SITE

Updated August 29, 1996

N:\LTPP\NCRCO\TASK_A\SMP\SLOOP\SMPTRK\20SA.XLS

Appendix B - SMP Data Sheets

- SMP-D10: SMP Field Activity Report
- SMP-D03: Contact Resistance Measurements
- SMP-D04: Four-Point Resistivity Measurements
- SMP-D05: Ground Water Table Measurement
- SMP-D06: Joint Opening Measurement
- SMP-D07: Joint Faulting Measurement
- SMP-D09: Elevation Measurements - PCC
- SMP-M1: Distress Survey of Instrument Area
- FHWA/SHRP-LTPP Pavement Temperature Profile Measurements
- FASTBACK PLUS - Backup History Report

Ran data needs to be edited in SMPcheck

2 0 5 4 9 6 D

Seasonal Monitoring Program Guidelines: Version 2.1a/March 1995

LTPP Seasonal Monitoring Program Data Sheet SMP-D10 SMP Field Activity Report	Agency Code [2 0] LTPP Section ID [4 0 5 4]

Onsite Datalogger and Instrumentation		
File Name - *.ONS	205496DH	Comments:
Battery Replace	Yes - (No)	Voltages ~~12.6~~ 11.9 v
Repairs/Calib.	Record type 4, [illegible] 201+204, MRC 14-18 temp dif > 10°C	
Other: Found on rain gg missing — check rain data!	MRC 14-18 reading -273° C	

Mobile Datalogger	Datafile = MOBILE.DAT	
File Name - *.MOB	~~205496DH~~	Comments:
TDR/Resistance Voltages	Sets (0 2)	TDR #2 has flat trace
Other:	Voltages read neg. in resist probes	

Manual Data Collection		
Piezometer	(Yes) - No	Comments: 4.293m
Resistance 2 pt.	Sets (0 1)	
Resistivity 4 pt.	Sets (0 1)	
Elevations	Sets (0 1)	Sunny
Distress Survey	(Yes) - No	
Long. ~~Dipstick~~ Profile	~~Yes~~ (No)	~~[illegible]~~
Photos or Video	(Yes) No	
Other:		

FWD and Associated Data		
FWD Testing	Sets (0 2)	Operator: DSP
JCP - Snap Rings	Sets (0 2)	
JCP - Faulting	Sets (0 2)	
Other:		

IF REQUIRED, ATTACH SKETCHES TO THIS DATA SHEET

Comments: Scan program ~~failed~~ failed to catch MRC temps < -50°C - note on problem report. De-installed site @ 1600 hrs

Prepared by: GEE

Employer: ERES

Date (dd/mmm/yy): 25/Aug/96

Daylight Savings Time (Y) or N): Y (winter is STD. Time)

2 0 5 A 9 6

LTPP Seasonal Monitoring Program Data Sheet SMP-D03 Contact Resistance Measurements	Agency Code [2 0] LTPP Section ID [4 0 5 4]

Start Time (military): 0 9 5 5

Test Position	Switch Settings I1 V1	Switch Settings I2 V2	Voltage (ACV) Range Setting	Voltage (ACV) Reading	Current (ACA) Range Setting	Current (ACA) Reading	Comments
1	1	2	[illegible]V	1.180	[illegible]	159.0	current all over
2	2	3	V	1.256	Micro	[illegible] 153.0	
3	3	4	"	1.074	"	164.0	
4	4	5	"	1.067	"	146.0	
5	5	6	"	0.979	"	139.0	
6	6	7	"	1.330	"	144.0	
7	7	8	"	2.324	"	146.2	
8	8	9	"	2.467	"	159.0	
9	9	10	"	2.198	"	198.7	
10	10	11	"	2.134	"	159.4	
11	11	12	"	3.738	"	139.1	
12	12	13	"	3.080	"	167.5	
13	13	14	"	2.375	"	179.7	
14	14	15	"	2.825	"	135.9	
15	15	16	"	3.970	"	125.0	
16	16	17	"	3.275	"	180.2	
17	17	18	"	2.310	"	198.6	
18	18	19	"	2.370	"	205.6	
19	19	20	"	2.412	"	203.0	
20	20	21	"	2.105	"	232.7	
21	21	22	"	1.847	"	252.0	
22	22	23	"	1.950	"	225.2	
23	23	24	"	2.319	"	206.5	
24	24	25	"	2.097	"	278.6	
25	25	26	"	1.971	"	270.7	
26	26	27	"	2.152	"	262.9	
27	27	28	"	2.0816	"	237.3	
28	28	29	"	2.213	"	208.5	
29	29	30	"	2.616	"	202.5	
30	30	31	"	2.206	"	2.489	
31	31	32	"	1.866	"	211.1	
32	32	33	"	1.763	"	307.7	
33	33	34	"	1.869	"	294.1	
34	34	35	"	1.783	"	268.5	
35	35	36	"	1.750	"	246.6	
36	36	37	Milli	2.8	Micro	3050	R1 = 91Ω
37	37	38	"	2.8	"	[illegible] 2666	R2 = 105Ω
38	38	39	"	1.6258	"	[illegible] 1,619	R3 = 1005Ω
39	39	00	V	6.41	"	7.2	R4 = 990277Ω

Note: R = V/I, in ohms; measured resistances should be compared with known values.

Comments: _____

Prepared by: GFE Employer: ERES

Date (dd/mmm/yy): 05/Aug/96

20 S A 96 D

LTPP Seasonal Monitoring Program Data Sheet SMP-D04 Four-Point Resistivity Measurements	Agency Code [20] LTPP Section ID [4054]

Start Time (military): 1020

Test Position	Switch Settings I1	V1	V2	I2	Voltage (ACV) Range Setting	Reading (Volts)	Current (ACA) Range Setting	Reading (Amps)	Comments
1	1	2	3	4	Milli	69.3	Micro	73.6	current all over
2	2	3	4	5		48.1		59.2	
3	3	4	5	6		54.2		57.1	
4	4	5	6	7		45.4		55.3	
5	5	6	7	8		45.5		43.6	
6	6	7	8	9		60.7		48.2	
7	7	8	9	10		78.1		55.9	
8	8	9	10	11		73.1		43.3	
9	9	10	11	12		86.5		51.1	
10	10	11	12	13		95.8		52.9	
11	11	12	13	14		67.7		39.3	
12	12	13	14	15		80.3		38.1	
13	13	14	15	16		91.0		41.8	
14	14	15	16	17		97.6		50.5	
15	15	16	17	18		67.0		44.9	
16	16	17	18	19		81.1		56.1	
17	17	18	19	20		87.1		65.9	
18	18	19	20	21		94.6		72.2	
19	19	20	21	22		86.8		69.5	
20	20	21	22	23		88.6		65.3	
21	21	22	23	24		98.1		66.9	
22	22	23	24	25		108.8		70.7	
23	23	24	25	26		76.2		68.8	
24	24	25	26	27		110.7		78.3	
25	25	26	27	28		109.9		79.3	
26	26	27	28	29		94.5		76.9	
27	27	28	29	30		92.2		69.4	
28	28	29	30	31		99.2		73.1	
29	29	30	31	32		88.2		70.5	
30	30	31	32	33		98.8		76.4	
31	31	32	33	34		108.2		92.1	
32	32	33	34	35		113.8		82.3	
33	33	34	35	36	↓	112.9	↓	79.8	
36	36	36	37	37	Milli	2.08	Micro	3077	R1 = .909 Ω
37	37	37	38	38	↓	274.6		266	R2 = 1020 Ω
38	38	38	39	39	Volts	1.632		1623	R3 = 1005 Ω
39	39	39	00	00	Volts	6.49		7.3 Micro	R4 = 889041 Ω

Note: R = V/I, in ohms; measured resistances should be compared with known values.

Comments: _____

Prepared by: GFE Employer: FRES

Date (dd/mmm/yy): 05/AUG/96

Data Sheet SMP-D04: Four-Point Resistivity Measurements

2 0 5 4 9 6 D

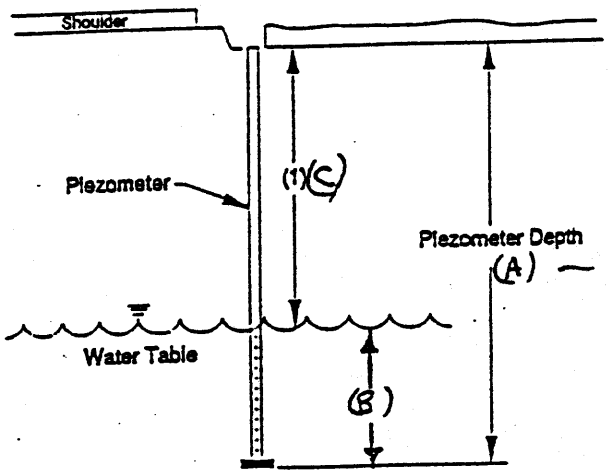
LTPP Seasonal Monitoring Program Data Sheet SMP-D05 Ground Water Table Measurement	Agency Code [2 1] LTPP Section ID [4 0 5 4]

MEASURED
Piezometer Depth (m): (A) 4.292

Measurement Number	Time (military)	(C) Depth to Water[1,2] (m) (A−B)	(B) Depth of Water (m) measure	Comments
1	0937	3.561	0.731	
2	1445	3.549	0.752	

[1] Distance from top of piezometer pipe to top of ground water table; to an accuracy of ±10 mm (0.4 in)

[2] If piezometer pipe is dry or frozen, enter "time" when observation was made, leave "depth to water" field blank, and enter "pipe is dry" or "pipe is frozen" under comments column.



MEASURE. DO NOT ASSUME DEPTH ON INFO SHEET IS CORRECT. RV

Comments: _____

_____

_____

Prepared by: CFE Employer: ERES

Date (dd/mmm/yy): 05/Aug/96

20USA96D

Seasonal Monitoring Program Guidelines: Version 2.1a/March 1995

LTPP Seasonal Monitoring Program Data Sheet SMP-D06 Joint Opening Measurement	Agency Code [20] LTPP Section ID [4054]

Station	Time (military)	Joint Opening (mm) Offset (PE): 0.30 m	Offset (MIL): 1.83 m	Offset (ILE): 3.35 m	Joint Width (mm)	Joint w (in) for fi
4+39	1040	115.39	114.46	112.45		
		115.25	114.52	112.17	2.5	9.
		115.32	114.46	112.13		
	1350	115.07	115.39	114.63	2.5	7.
4+54	1050	113.16	114.37	114.02		
		113.10	114.19	114.07	6.4	.25
		113.14	114.17	114.05		
	1355	113.90	114.43	114.97	6.4	7.
4+69	1055	115.23	116.36	115.99		
		115.39	116.30	115.97	3.6	.145
		115.24	116.31	115.99		
	1358	115.15	116.23	116.07	3.6	7.
4+84	1058	115.11	116.20	115.96		
		115.15	116.12	115.96	8.15	.344
		115.26	116.20	115.96		
	1400	115.15	116.02	115.63	8.48	.304
5+00	1100	115.45	116.50	115.35		
		115.45	116.43	115.33	3.0	.1
		115.45	116.54	115.30		.16
	1405	115.61	116.38	115.31	4.1	
5+15	1105	115.11	115.39	115.09		
		115.43	115.39	115.12	6.50	.25
		115.69	115.39	115.15		
	1410	115.55	115.14	114.98	5.33	.22

Comments: _____

Prepared by: DSP Employer: EKES

Date (dd/mmm/yy): 05/AUG/96

20SA96D

Seasonal Monitoring Program Guidelines: Version 2.1a/March 1995

LTPP Seasonal Monitoring Program Data Sheet SMP-D07 Joint Faulting Measurement	Agency Code [20] LTPP Section ID [4054]

Station	Time (military)	Joint Faulting (mm)		
		Offset (OWP): ___.___ m	Offset (ML): ___.___ m	Offset (IWP): ___.___ m
~~4+45~~ 4+39	1045	1.1	7.1	0.1
	1350	0.1	1.1	0.1
4+50	1050	0.1	0.1	0.1
	1350	0.1	0.1	0.1
4+69	1055	2.1	1.1	2.1
	1355	2.1	1.1	1.1
4+84	1055	0.1	0.1	1.1
	1400	0.1	0.1	2.1
5+00	1100	1.1	2.1	1.1
	1405	2.1	2.1	1.1
5+15	1105	1.1	0.1	0.1
	1410	0.1	0.1	0.1

Comments: Sta. 4+39 mL Spall & fault meter reading

Prepared by: GMS Employer: ERES

Date (dd/mmm/yy): 25/Aug/95

2 0 S A 9 6

Seasonal Monitoring Program Guidelines: Version 2.1a/March 1995

LTPP Seasonal Monitoring Program Data Sheet SMP-D09 Elevation Measurements - PCC	Agency Code [20] LTPP Section ID [4 0 5 4]

Type of Instrument: NA2000

Start Time (military): 1235

check "close" at midpoint of survey.

BM	Station	BS	HI	~~HPS~~	FS	ELEV	CLOSE
Piez.	4+78	1.5615		1.5616			1.5612
B.O.T. BM Other							

Station	Offset (PE): 0.30 m	Offset (ML): 1.83 m	Offset (ILE): 3.35 m	Comments
4+39 AJ	1.2050	1.1766	1.1440	
4+47 MP	1.2168	1.1868	1.1553	
4+54 BJ	1.2250	1.2049	1.1724	
4+54 AJ	1.2351	1.2057	1.1748	
4+62 MP	1.2456	1.2152	1.1852	
4+69 BJ	1.2359	1.2259	1.1923	
4+69 AJ	1.2556	1.2263	1.1947	
4+77 MP	1.2691	1.2394	1.2098	
4+84 BJ	1.2819	1.2538	1.2232	
4+84 AJ	1.2814	1.2539	1.2329	
4+~~93~~ MP	1.2926	1.2641	1.2345	
5+00 BJ	1.3075	1.2784	1.2494	
5+00 AJ	1.3102	1.2808	1.2507	
5+08 MP	1.3234	1.2932	1.2629	
5+15 BJ	1.3284	1.3103	1.2804	

Comments:

Prepared by: GFE Employer: ERES

Date (dd/mmm/yy): 05/Aug/95

20 S 496 D

LTPP Seasonal Monitoring Program Data Sheet SMP-M1 (Page 1) Distress Survey of Instrumentation Area	Agency Code [21] Test Section Number [4054]

Rate the condition of the instrumentation area (check one):

X Good (little or no distress; repairs are not required in the immediate future)

____ Poor (significant distress, repairs required now or in the immediate future)

List any repairs (type and extent) done since instrumentation installation and/or last survey of instrumentation area: None

Additional Comments: None

Prepared by: GFE Employer: ERES

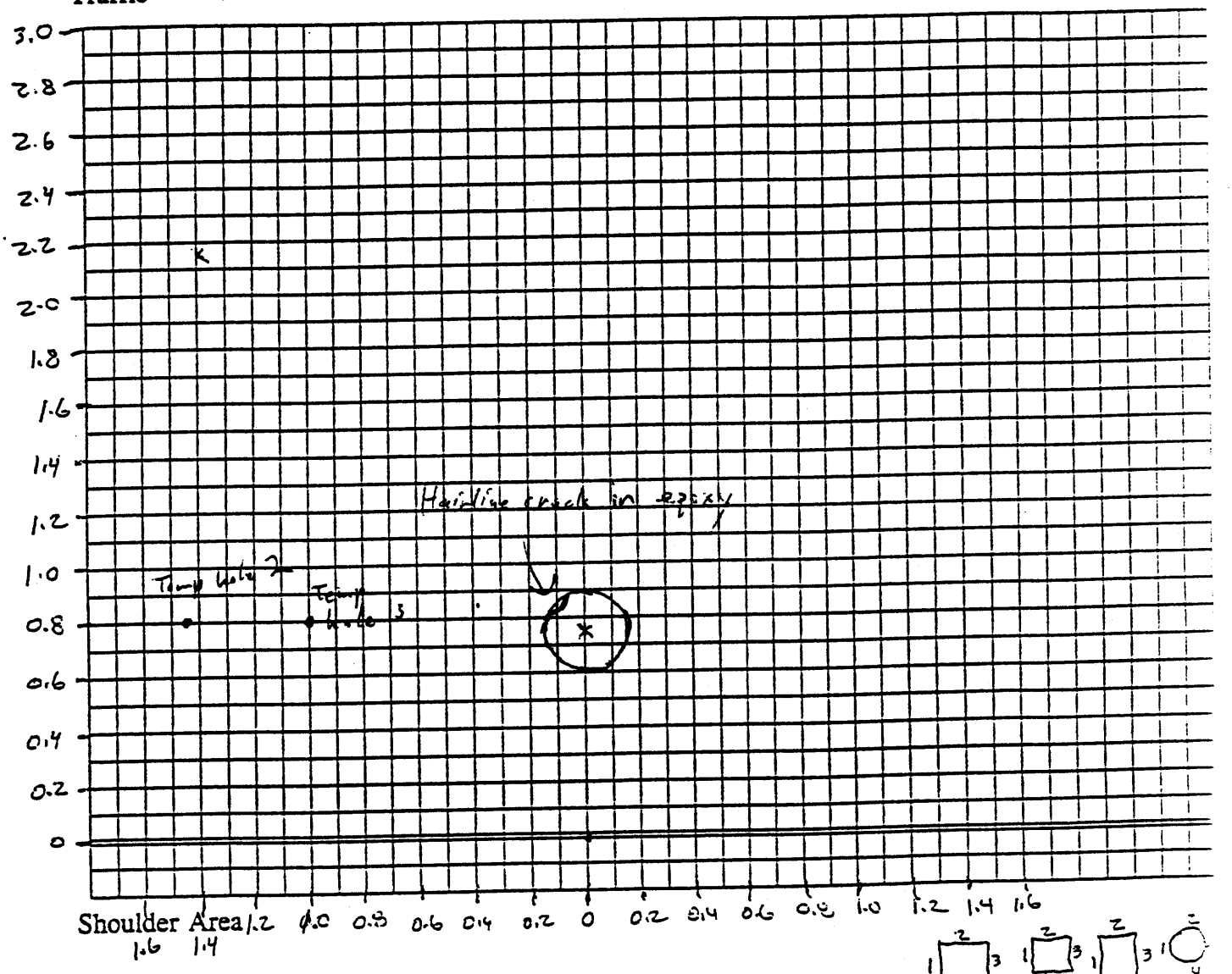
Date: 05/Aug/96
dd-mmm-yy

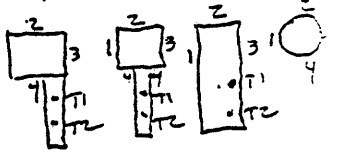
2 0 S 4 9 6 D

LTPP Seasonal Monitoring Program Data Sheet SMP-M1 (Page 2) Distress Survey of Instrumentation Area	Agency Code [2 0] SHRP Section ID [4 0 5 4] Survey Date [0 5 / Aug / 9 6] dd mmm yy

Use grid below to sketch distresses within 1.5 m (5 ft) of instrumentation block/hole and trench. Use LTPP Distress Identification Manual to extent possible. (Note: each square in grid equals 0.1 m by 0.1 m area)

Traffic ⟹





Use table below to record settlement of pavement in instrumentation area.

Measurement Device: DIPSTICK / STRAIGHT EDGE

Location	Settlement, mm			
	Location 1	Location 2	Location 3	Location 4
Instrumentation block/hole	0 2 0 .	0 1 0 .	0 2 0 .	0 2 0 .
Trench	6 .	0 .	n/a	n/a

SHRP LTPP

SHRP REGION NCR STATE CODE 20 SHRP ASSIGNED ID 4054

STATE Kansas TESTING SMP FWD DISTRICT

LTPP EXPERIMENT CODE SMP FWD ROUTE/HIGHWAY NO. I-70

FIELD ACTIVITY REPORT FIELD SET NO. SMP96D

TESTING DATE 05/AUG/96 (dd mmm yr) SHEET NUMBER 1 OF 3 DCG SHEET

FWD AND TOW VEHICLE BEFORE OPERATION CHECKS (Initial)

	TIME	ODOMETER
START TRAVEL	0710	56835
END TRAVEL	0730	56850
READY TO TEST	0800	
TRAFFIC CONTROL READY	0820	
BEGIN TESTING	0825	
END TESTING	0310	
START TRAVEL	0400	56850
END TRAVEL	0410	56858

DOWN TIME HOURS REASON(S)

NUMBER OF TESTS:

	BASIN	JT/CRACK
TP	0	
OWP	0	
PE	cycles 2 * 9 tests	cycles 2 * 12 tests
ML	2 * 2	

ADDITIONAL REMARKS REGARDING TESTING

TRAFFIC CONTROL CREW

AGENCY KS DOT

NAMES:

TEST COMPLETED ERES AFFILIATION (Company name?)

DSP FWD OPERATOR

05 (DAY) (dd) AUG (MONTH) (mmm) 1996 (YEAR)

COPIES: RCO

FHWA/SHRP-LTPP PAVEMENT TEMPERATURE PROFILE MEASUREMENTS

SHRP NORTH CENTRAL REGION

SHRP SECTION I.D. # 20 4054

AGENCY KS DOT

TESTING SMP FWD

ROUTE/HIGHWAY # I-70

FIELD SET # SMP96D

TESTING DATE dd/mmm/yr 05/Aug/96

SHEET # 2 OF 3

LOCATION STATION 5+03

DEPTH	D1 = 1.4	D2 = 6.1	D3 = 10.9	D4 =	D5 =	WEATHER CONDITIONS
MILTIME	T1 (F)	T2 (F)	T3 (F)	T4 (F)	T5 (F)	
0840	73.8	83.1	87.3			C
0949	74.3	82.1	86.3			R
1050	78.5	82.3	85.8			R
11 41	88.3	83.4	86.4			C
13:00	95.6	87.9	87.3			PC
13:47	97.6	89.0	87.5			PC
14:53	99.0	91.8	89.1			PC

All numbers by readable person doing data entry & Don't make someone else have to guess.

NOTE: USE ONLY THESE WEATHER TERMS; (S)SUNNY, (PC)PARTLY CLOUDY, (C)CLOUDY, (R)RAIN

COMMENT

TESTING COMPLETED BY:

DSP
FWD OPERATOR

dd/mmm/yr 05/AUG/1996
DATE

FHWA FWD S/N 8002-060

FASTBACK PLUS BACKUP HISTORY REPORT 08-05-96 15:14:44

```
SU  User name       = HI DISK
SN  Set name        = C96080SA.FUL
SV  Volume          = C:
SY  Volume type     = Fixed Disk
SI  Comment         = ""
SM  Media           = A:MS-DOS 1.44Mb 3 1/2 Floppies
SD  Date gates      = Off :  01-01-80  12-31-99
SR  Size gates      = Off :          0  2146435072
SA  Attributes      = Off :  None
SE  ECC             = On
SC  Compression     = Save Time
    Virus Scanning  = Off
ST  Backup Type     = Full
SP  Protection      = NONE
```

	FILE NAME	SIZE	DATE	TIME	ATTR	SEG	ENGBLK
P	PATH = \						2
P	PATH = \FWD						2
P	PATH = \FWD\DATA						2
F	20SA96D1.FWD	385318	08-05-96	13:13:06	----	1	2
F	20SA96D2.FWD	729390	08-05-96	14:07:44	----	1	10
F	20SA96D3.FWD	920286	08-05-96	14:56:44	----	1	25

	TIME	STA	CHANGE

J1 Pass

Stn 478, DMI should read 477

J2/J3 Pass

Stn. 468, DMI should read 470, ~~2nd test failed, tested~~

Stn 484, DMI should read 485

J4/J5

re first test, used wrong setup; Stn. 453. change lane spec.

J4

JI

1st test at stn 476, DMI should read 440

J4/J5

Stn 469, J/C opening is actually .1

Appendix C- Site Information Sheet (SIS)

Updated 25-Jun-95

204054 - 20SA

LOCATION - IH-70 WB Lanes, Just East of Enterprise, KS (MP281)
CONTACTS -Steve Keim 913-263-1801 (Second contact is Dale Hershberger 913-632-3108)
TEMP HOLES - Sta. 5+03, Depths about 1.3", 6.3", and 9.3" (PCC = 10.0")

TEST LOCATIONS:	J1	J2	J3	J4	J5
	447	440	447	439	440
	462	455	463	454	455
	477	470	477	469	470
	493	485	493	484	485
	508	501	BLK	500	501
	--	--	--	515	516

DISTRESS COMMENTS:

Sta J1 - Midpanel tests.

512 LP ADJACENT TO INSTRUMENTATION HOLE

Sta J2 and J3 - Corner and Mid-edge tests.

Sta J4 and J5 - Load transfer tests in the OWP.

PIEZOMETER - Sta 4+78, 1.0 feet from edge of paved shoulder, Depth = 4.295M.
(Located longitudinally at midpanel of third panel tested.)

ELEVATIONS - No DOT BM

Offsets:	PE	ML	ILE	
(M)		0.30	1.83	3.35
(ft)		1.0	6.0	11.0
		(hole)	(hole)	(hole)

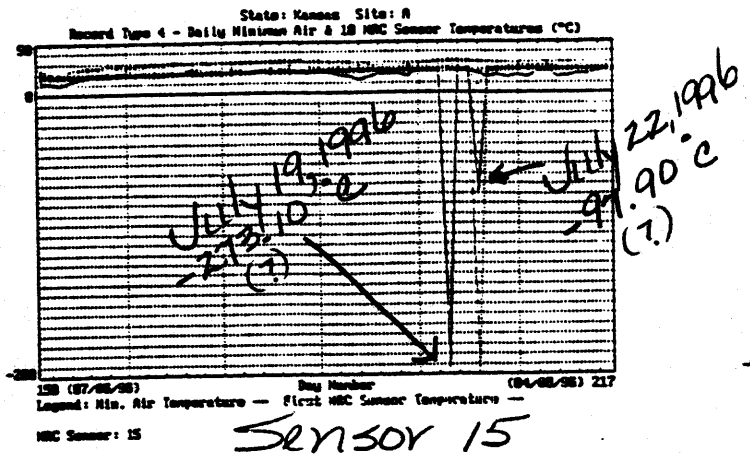
Sta:	--	BJ/AJ	439	459	478	491	503	521
	--	at MP	450	468	484	497	512	
		(only **AJ** at **441** and **BJ** at **521**)						

FAULTMETER	Offsets:	OWP	ML	IWP			
		(M)	0.76	1.83	2.90		
		(ft)	2.5	6.0	9.5		
		Sta:	439	454	469	484	500	515

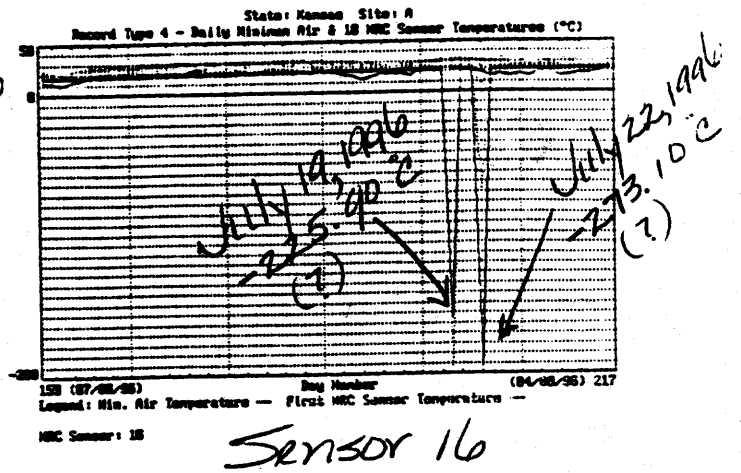
COMMENTS -- use "MOB2OSA" versus "MOBILE" - has modified cable lengths
-- 97/98 loop pack and redrill temperature holes

Appendix D - Instrument and Equipment Evaluation Plots

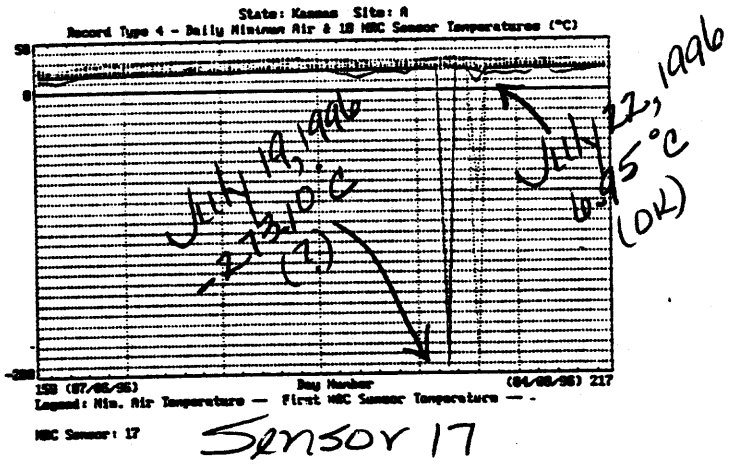
- MRC Sensor Profiles (figure D-1)
- TDR Traces (figures D-2)



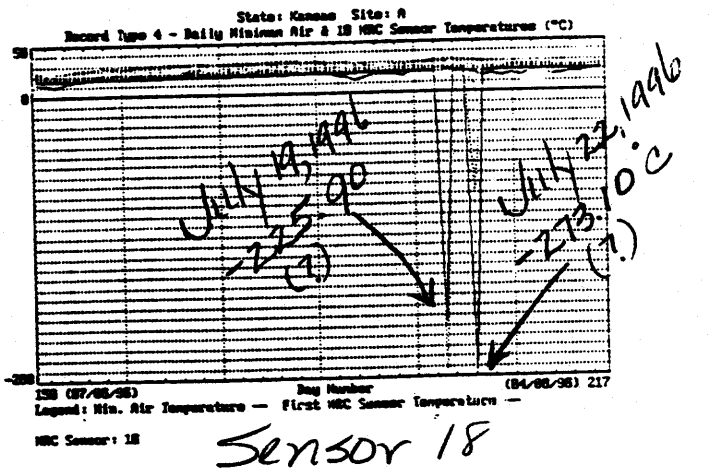
Sensor 15



Sensor 16



Sensor 17



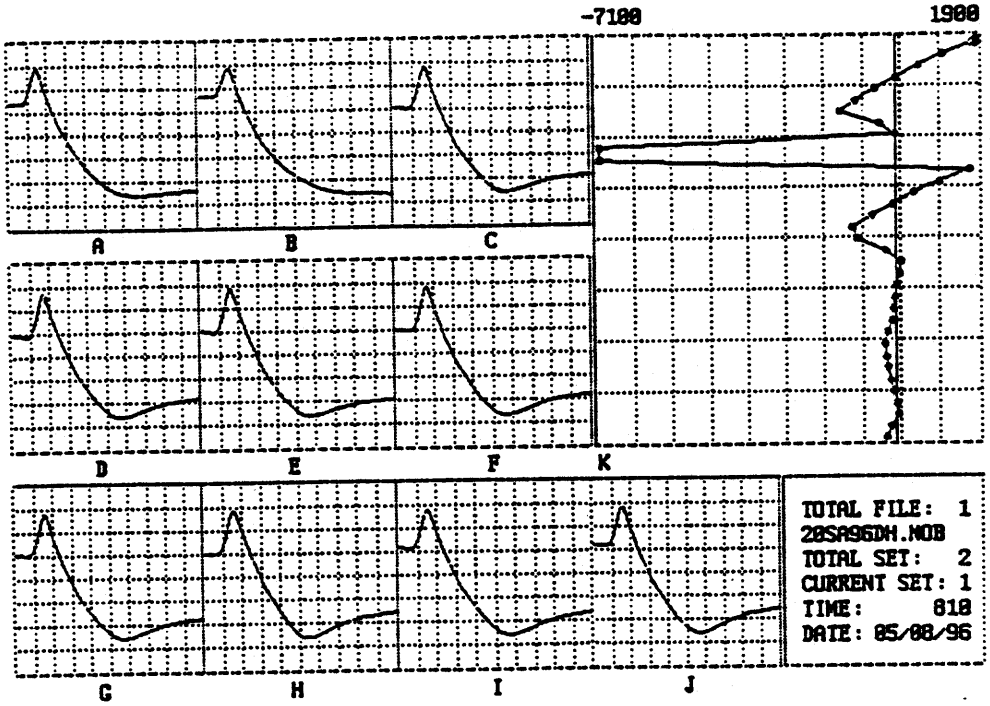
Sensor 18

Notes

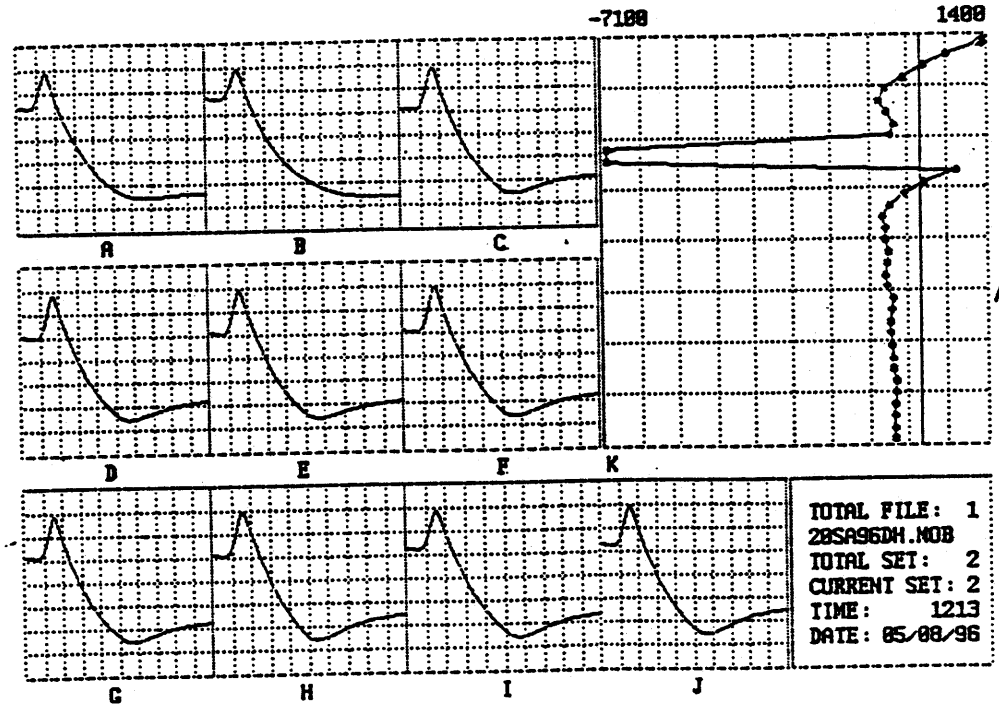
) MRC Nos. 15, 16, 17, and 18 failed on July 19, 1996 - Temperature adings between -225 °C and -273 °C.

) MRC Nos. 15, 16, and 18 failed on July 22, 1996 - Temperature dings between -97 °C and -273 °C. Redding for ensor 17 was 6.95 °C which is considered reasonable.

gure D-1. Profiles for MRC sensors 15, 16, 17 and 18 for st section 204054 (20SA) for the period of June 07, 1996 o August 04, 1996.



Problem with CRREL on positions 10/11



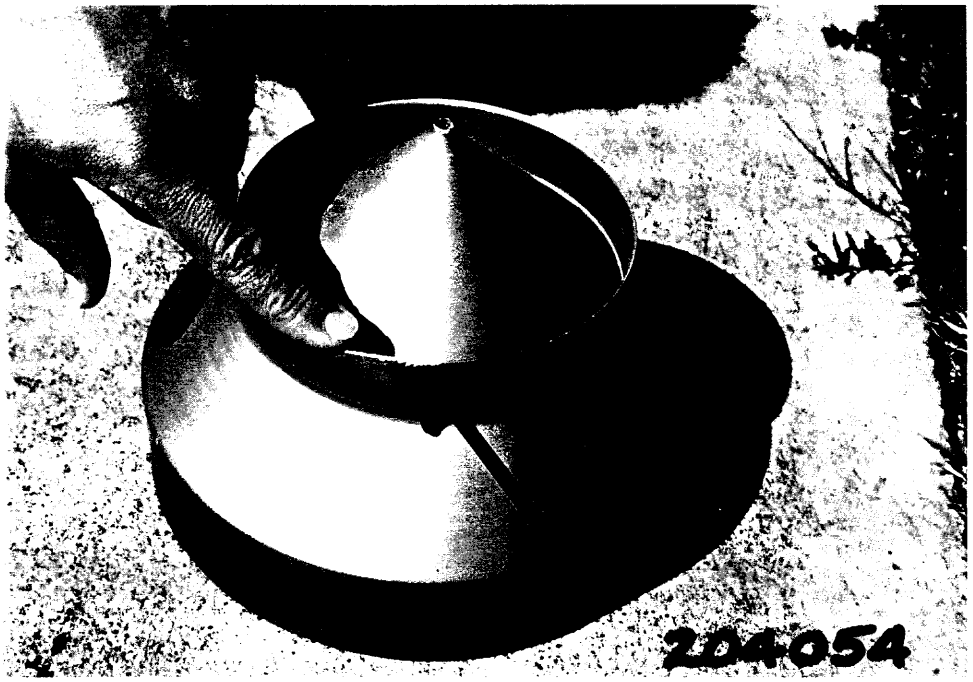
Problem with CRREL on positions 10/11

Figure D-2. TDR traces for test section 20454 recorded on August 05, 1996.

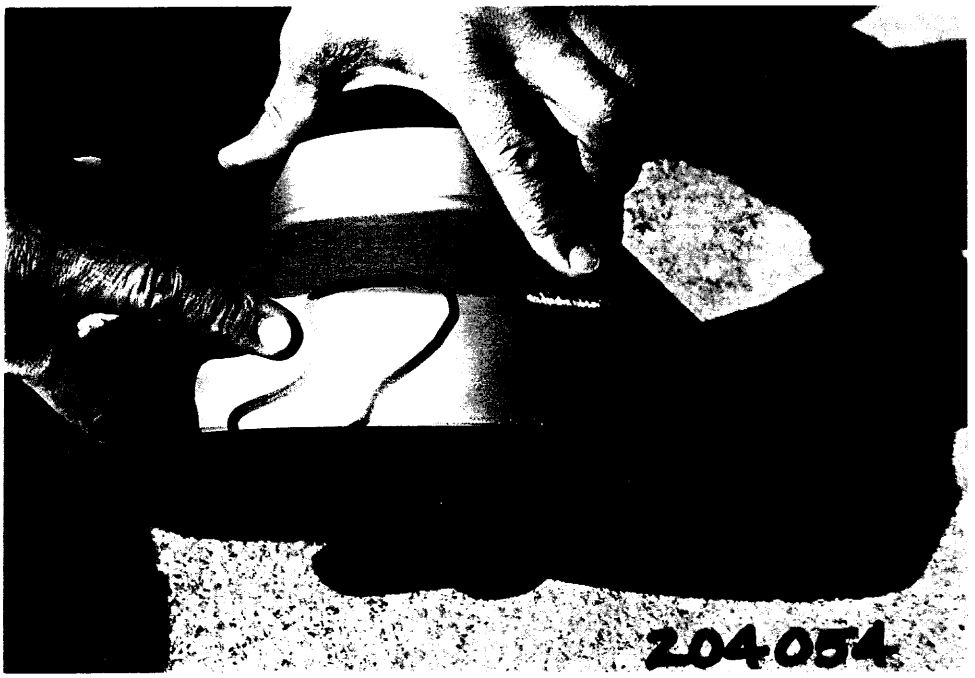
Appendix E - Photographs

Photograph #1

Photograph # 2



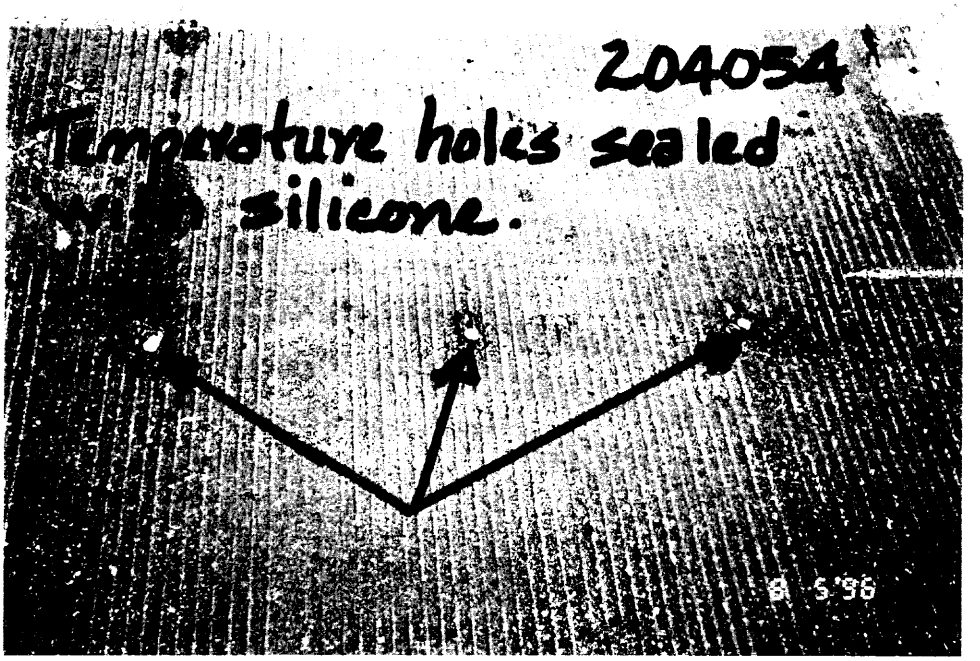
Photograph # 3



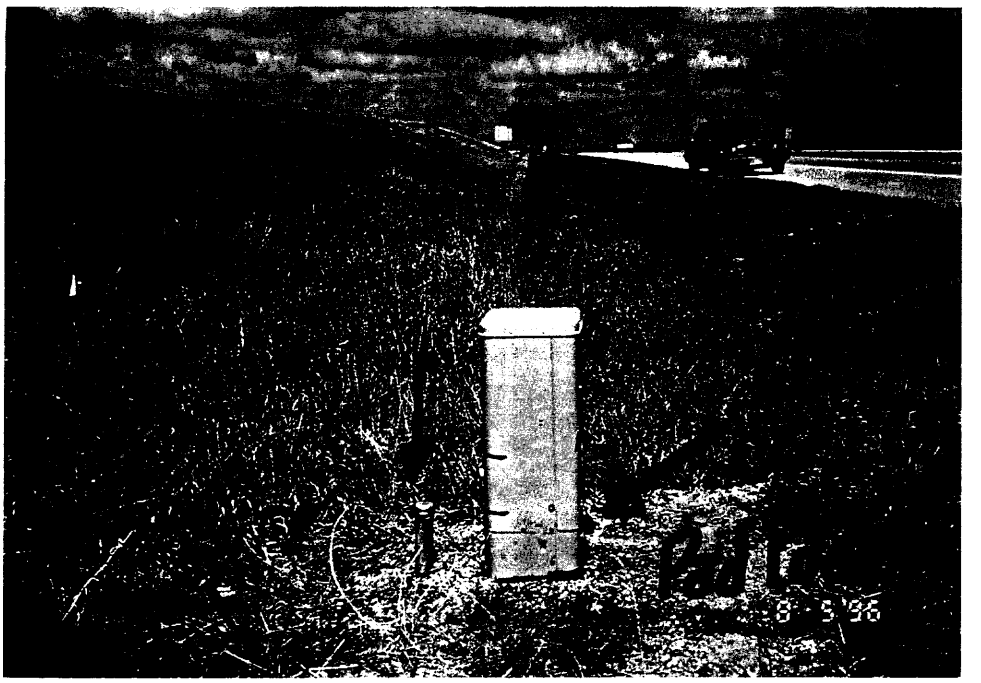
Photograph # 4

Photograph #5

Photograph #6



Photograph #7



Photograph # 8