TRC9902

Different Curing Procedures

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Final Report

2006

DIFFERENT CURING PROCEDURES
TRC-9902

Final report

By

Planning and Research Division
Arkansas State Highway and Transportation Department

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Problem Statement

In recent years, premature bridge deck cracking has caused great concern to the AHTD. Research conducted over the past several years has attempted, with mixed results, to identify the causes of this cracking. While this problem may not be detrimental to the structural integrity, the potential for accelerated deterioration exists. Since a majority of bridge decks are poured during hot weather, curing procedures are of great importance. However, it appears that, at times, the curing process is not begun as soon as it should. Ideally, the curing compound should be applied as soon as the concrete is finished. However, this does not occur in most cases. This is due, in part, to the tining of the deck surface. The tining process delays the application of the curing compound. This delay has the potential for adverse affects, i.e. cracking, scaling, etc. Research project TRC-9902 is concerned with premature bridge deck cracking as a result of inappropriate curing procedures and examines the various methods of curing concrete.

Introduction

Curing is recognized as an important process in the manufacture of durable Portland cement concrete (PCC). Properties of concrete such as resistance to freezing and thawing, strength, water tightness, wear resistance, and volume stability improve with age as long as conditions are favorable for continued hydration of the cement. The improvement is rapid at early ages but continues more slowly for an indefinite period. Two conditions for such improvement in quality are required: (1) the presence of moisture and (2) a favorable temperature.

Rapid evaporation of water from the surface of fresh PCC can significantly retard the cement hydration process at an early age. Loss of water also causes PCC to shrink, thus creating tensile stresses at the drying surface. If these stresses develop before the PCC has attained adequate strength, surface cracking may result.

Hydration proceeds at a much slower rate when the PCC temperature is low; from a practical standpoint there is little chemical action between cement and water when the PCC temperature is near or below freezing. It follows that PCC should be protected so that moisture is not lost during the early hardening period and the PCC temperature is kept favorable for hydration.

Project Locations

Two bridges were monitored in the project. Bridge Number 06704 was constructed under job 060536; it is located on state highway 365 in Morgan. The bridge was constructed in stages in order to allow traffic to continue to cross Interstate 40 during construction. The first half of the bridge deck was placed in August 1999 with the second half of the bridge deck completed in March 2000. The second structure was Bridge Number 06702 constructed under job R80094; it is located on State Highway 10 in Adona.

Curing Procedures

Each bridge deck was assigned a new technique for testing. A fogger (Figure 1) was used on the Adona deck to keep it moist before the curing method was placed. A curing compound was used on the Morgan deck before applying the curing method. Both decks were cured using burlap after setting (Figure 2). The Morgan deck was also used to test a new vibrator for consolidation (Figure 3). Other differences in the construction of the decks included surface treatment. The Adona deck was tined (Figure 4a) while the Morgan deck employed a burlap drag for skid resistance as well as tining (Figure 4b).

Figure 1: Fogger used on Adona Bridge Deck

Figure 2: Burlap Curing on Adona Bridge Deck

Figure 3: Vibrator used on Morgan Bridge Deck

Figure 4a: Tining on Adona Bridge Deck

Figure 4b: Tining on Morgan Bridge Deck

Data Collection and Evaluation

Cores were taken from each bridge deck and evaluated using petrography. There were four cores taken from each deck, and the petrography results are shown in Tables 1a and 1b. The full results from the Petrograph analysis are in Appendix A.

The bridge decks were also evaluated visually with manual distress surveys. These surveys are included in Appendix B. Both decks experienced similar levels of cracking at both approximately 1 year of age and 4 years of age.

Petrographic Analysis Results Adona Bridge		
Core 1A1 (Averages)		
Chord Length	0.0095	in
Air Voids (A)	2.4262	%
Aggregate	47.3079	%
Paste (P)	50.2659	%
A/P Ratio	4.8267	%
Core 2A1 (Averages)		
Chord Length	0.0159	in
Air Voids (A)	2.6341	%
Aggregate	52.2354	%
Paste (P)	45.1305	%
A/P Ratio	5.8366	%
Core 3A1 (Averages)		
Chord Length	0.0155	in
Air Voids (A)	5.0705	%
Aggregate	50.9925	%
Paste (P)	43.9370	%
A/P Ratio	11.5403	%
Core 4A1 (Averages)		
Chord Length	0.0118	in
Air Voids (A)	3.2393	%
Aggregate	56.9545	%
Paste (P)	39.8062	%
A/P Ratio	8.1377	%

Table 1a: Adona Petrograph Results

Petrographic Analysis Results Morgan Bridge		
Core 1M1 (Averages)		
Chord Length	0.0116	in
Air Voids (A)	6.8161	%
Aggregate	52.7374	%
Paste (P)	40.4465	%
A/P Ratio	16.8520	%
Core 2M1 (Averages)		
Chord Length	0.0140	in
Air Voids (A)	4.9692	%
Aggregate	61.3869	%
Paste (P)	33.6439	%
A/P Ratio	14.7699	%
Core 3M1 (Averages)		
Chord Length	0.0132	in
Air Voids (A)	3.7533	%
Aggregate	55.9787	%
Paste (P)	40.2680	%
A/P Ratio	9.3208	%
Core 4M1 (Averages)		
Chord Length	0.0104	in
Air Voids (A)	2.5486	%
Aggregate	53.7239	%
Paste (P)	43.7275	%
A/P Ratio	5.8284	%

Table 1b: Morgan Petrograph Results

Conclusions

This project was never completed as originally planned due to multiple personnel changes. As the data changed hands, the purpose of the project got lost. A new project has begun, TRC 0603 "Curing Practices to Reduce Shrinkage in Concrete," that will provide much of the information this project originally intended. At this point, the data included here, along with the other bits and pieces that have been salvaged, is going to be turned over to the Primary Investigator for TRC 0603.

Appendix A

Petrography Results

Petrographic Analysis Results
Adona Bridge

Core 1A1 (28 passes)

Air Voids

air-void dia. (0.001 in.)	Total no. observed
0-2	0
2-4	25
4-6	0
6-8	50
8-10	26
10-12	23
12-14	24
14-16	15
16-18	2
18-20	2
20-30	5
30-40	5
40-50	1
50+	2

Aggregate

aggregate dia. (0.01 in.)	Total no. observed
0-1	1042
1-2	407
2-3	93
3-4	60
4-5	34
5-10	54
10-20	39
20-40	26
40-60	24
60-80	0
80-10	0
100+	0

Totals

	L	SS	A %	Agg %	P %	A/P %
Average	0.0095	420.5816	2.4262	47.3079	50.2659	4.8267
Std. Dev.	0.0041	0.0041	0.8463	6.252	5.8988	1.5731

L	chord length (in)
SS	specific surface ?
A %	air void percentage
Agg %	aggregate percentage
P %	paste percentage
A/P %	air void/paste ratio percentage

Petrographic Analysis
AHTD

Tester: David Lumbert, PG   Job #: Research   Sample #: 1A1

Date: 3/10/2003

comment: None

Results

Air-void frequencies

air-void dia. .001 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	0	0	0	0	0	0	0	0	0	0	2	1	0	1	2	1	0	7	0	7	0	2	0	2	0	0	0	25
4- 6	3	0	0	1	9	0	0	7	0	3	0	3	2	2	1	1	2	6	4	2	3	7	2	1	2	3	6	0	70
6- 8	0	5	4	2	0	2	2	0	4	1	5	1	1	0	3	1	2	0	1	2	4	0	0	2	4	0	0	4	50
8-10	3	0	0	0	1	2	0	0	0	0	0	1	0	1	1	1	0	0	1	3	2	0	4	0	3	3	0	0	26
10-12	1	0	2	0	2	0	0	1	0	0	0	1	0	4	0	3	0	0	1	0	0	3	1	1	0	0	3	0	23
12-14	1	1	2	2	1	2	0	1	0	1	3	0	3	0	0	0	0	0	0	0	2	1	1	2	0	0	0	1	24
14-16	1	2	1	0	1	0	2	0	3	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	1	0	1	15
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
18-20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
20-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	1	0	0	5
30-40	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	5
40-50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
50+	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2

Aggregate frequencies

aggregate dia. .01 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 1	34	27	28	31	25	28	25	26	27	33	34	38	32	29	39	55	40	48	61	51	63	38	48	38	51	41	28	24	1042
1- 2	19	13	11	15	16	25	6	20	8	13	14	16	16	17	8	10	9	16	16	19	14	13	15	19	10	15	23	11	407
2- 3	3	6	7	2	7	3	2	7	4	3	1	2	5	2	1	0	2	2	4	7	6	0	3	2	2	5	4	1	93
3- 4	4	1	4	2	3	4	1	1	4	3	1	2	0	1	0	0	3	4	1	2	3	1	3	3	2	2	1	4	60
4- 5	3	0	0	2	0	1	3	1	2	1	0	3	0	1	0	0	1	0	1	0	2	1	5	2	0	1	3	1	34
5-10	1	2	2	5	2	1	4	1	1	2	1	1	1	2	3	3	2	0	3	1	3	3	2	1	3	1	1	2	54
10-20	1	3	1	1	4	2	2	3	2	1	2	0	2	0	0	1	2	3	2	0	0	0	0	1	2	2	1	1	39
20-40	1	1	1	1	0	1	0	0	1	1	1	2	2	2	2	1	1	1	0	2	2	1	0	0	0	0	1	1	26
40-60	1	0	0	0	0	0	1	1	1	1	1	1	1	2	2	2	1	1	1	0	0	1	1	1	1	1	1	1	24
60-80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Analysis per pass

Pass #	L	spec surf	A(%)	Agg(%)	past(%)	A/past(%)

1	0.0117	343.2592	3.3294	44.6154	52.0551	6.3960
2	0.0095	421.1912	2.1707	41.6011	56.2281	3.8605
3	0.0099	402.5269	2.5553	35.0619	62.3829	4.0961
4	0.0121	330.8292	2.0727	40.0920	57.8353	3.5838
5	0.0073	547.9988	2.9197	38.5370	58.5433	4.9873
6	0.0163	246.1214	3.2504	44.0734	52.6761	6.1706
7	0.0258	155.1530	3.6830	44.9851	51.3319	7.1749
8	0.0073	545.9922	1.8839	51.0453	47.0709	4.0022
9	0.0132	303.0446	3.0170	51.8364	45.1466	6.6827
10	0.0092	433.4477	1.5820	51.1411	47.2769	3.3462
11	0.0092	436.6514	2.0939	46.5404	51.3657	4.0764
12	0.0074	539.5684	1.9063	48.9299	49.1639	3.8774
13	0.0084	477.8565	1.6741	53.2149	45.1110	3.7112
14	0.0097	414.4464	1.9303	62.6107	35.4590	5.4437
15	0.0082	485.9424	1.6463	57.1239	41.2299	3.9929
16	0.0075	536.6426	1.7037	56.4819	41.8144	4.0745
17	0.0073	546.9462	1.2537	52.1071	46.6391	2.6881
18	0.0055	733.8327	0.9344	51.5441	47.5214	1.9663
19	0.0049	822.1995	1.9460	49.3301	48.7239	3.9939
20	0.0145	276.7740	3.7163	43.6879	52.5959	7.0657
21	0.0070	567.9482	3.8233	48.0320	48.1447	7.9412
22	0.0098	409.5388	3.3487	36.4750	60.1763	5.5648
23	0.0110	364.7203	4.0736	43.8511	52.0753	7.8225
24	0.0089	450.9159	1.5207	42.1466	56.3327	2.6995
25	0.0066	609.8829	2.0613	48.7077	49.2310	4.1870
26	0.0111	359.5304	2.5430	47.8229	49.6341	5.1235
27	0.0090	446.5418	2.8153	47.0819	50.1029	5.6190
28	0.0124	322.8224	2.4781	45.9456	51.5763	4.8048

Overall Analysis

Overall	0.0095	420.5816	2.4262	47.3079	50.2659	4.8267
Stddev	0.0041	0.0041	0.8463	6.2520	5.8988	1.5731

Petrographic Analysis Results
Adona Bridge

Core 2A1 (28 passes)

Air Voids

air-void dia. (0.001 in.)	Total no. observed
0-2	0
2-4	4
4-6	6
6-8	30
8-10	24
10-12	13
12-14	20
14-16	19
16-18	10
18-20	7
20-30	20
30-40	3
40-50	2
50+	4

Aggregate

aggregate dia. (0.01 in.)	Total no. observed
0-1	431
1-2	365
2-3	140
3-4	78
4-5	31
5-10	55
10-20	35
20-40	57
40-60	18
60-80	0
80-10	0
100+	0

Totals

	L	SS	A %	Agg %	P %	A/P %
Average	0.0159	251.0246	2.6341	52.2354	45.1305	5.8366
Std. Dev.	0.0068	0.0068	1.7098	9.4020	8.7090	3.4426

L chord length (in)
SS specific surface ?
A % air void percentage
Agg % aggregate percentage
P % paste percentage
A/P % air void/paste ratio percentage

Petrographic Analysis
AHTD

Tester: David Lumbert   Job #: Research   Sample #: 2A1

Date: 2/20/2003

comment: N/A

Results

Air-void frequencies

air-void dia. .001 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	0	0	4
4- 6	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	0	0	6
6- 8	0	0	0	1	0	3	2	0	1	4	1	2	2	1	0	0	0	0	0	3	3	1	0	1	1	0	0	4	30
8-10	3	2	2	0	1	1	0	2	0	0	0	0	0	1	2	1	1	1	0	1	0	0	1	3	1	0	1	0	24
10-12	0	0	0	0	3	0	0	0	0	0	0	1	0	0	1	0	3	0	1	0	0	0	1	0	0	0	2	1	13
12-14	1	0	0	1	0	0	1	1	0	1	0	2	1	0	0	3	1	1	1	1	2	0	0	0	0	0	1	2	20
14-16	0	0	0	0	0	1	4	0	3	2	3	0	0	2	0	1	0	0	0	0	0	0	3	0	0	0	0	0	19
16-18	1	0	0	1	0	1	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	1	1	1	0	0	0	10
18-20	1	0	0	0	0	0	0	1	0	1	0	0	1	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	7
20-30	1	0	0	1	3	0	0	0	1	0	1	1	0	2	0	1	2	0	2	0	1	1	0	0	0	1	1	1	20
30-40	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	3
40-50	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
50+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	4

Aggregate frequencies

aggregate dia. .01 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 1	10	18	4	4	4	14	13	24	21	26	11	20	13	12	16	9	11	12	6	14	23	19	20	24	18	27	9	29	431
1- 2	10	5	8	8	10	6	11	15	9	14	18	17	21	9	14	11	16	17	12	21	11	10	12	11	9	16	22	22	365
2- 3	4	6	5	4	6	1	4	2	6	4	8	4	5	2	4	6	6	2	5	5	13	4	7	4	9	3	4	7	140
3- 4	1	4	6	1	3	2	2	1	11	4	6	6	2	5	1	0	2	3	1	0	1	4	2	3	2	2	2	1	78
4- 5	2	0	1	2	0	1	2	0	3	2	2	2	0	0	1	1	0	2	0	1	0	1	1	0	1	2	3	1	31
5-10	1	3	0	0	3	2	1	4	3	2	2	2	2	1	5	4	2	1	1	2	1	3	0	2	3	0	1	4	55
10-20	3	0	1	1	1	1	0	0	2	1	3	1	0	1	1	2	1	0	0	2	2	2	1	2	2	1	3	1	35
20-40	3	5	4	3	2	2	2	3	1	1	1	2	4	3	3	0	1	2	2	2	3	1	1	2	1	2	1	0	57
40-60	0	0	1	2	2	1	1	0	0	0	0	0	0	0	0	2	2	2	2	1	0	1	1	0	0	0	0	0	18
60-80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Analysis per pass

Pass #	L	spec surf	A(%)	Agg(%)	past(%)	A/past(%)
1	0.0141	283.2861	2.8240	55.8386	41.3374	6.8316

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
4	0.0151	265.2300	1.7236	73.1539	25.1226	6.8606
5	0.0151	264.1634	3.0284	66.9689	30.0027	10.0938
6	0.0107	373.0183	1.8383	55.4587	42.7030	4.3048
7	0.0109	365.6725	2.5003	48.7399	48.7599	5.1278
8	0.0170	235.3980	2.9130	47.4491	49.6379	5.8685
9	0.0150	266.5956	2.1434	52.2761	45.5804	4.7025
10	0.0112	357.1229	2.5601	37.2684	60.1714	4.2547
11	0.0191	209.4789	3.8190	48.5686	47.6124	8.0210
12	0.0129	309.5576	2.2151	45.7519	52.0330	4.2572
13	0.0113	353.5130	1.2931	52.1544	46.5524	2.7778
14	0.0206	194.6354	4.6974	48.1179	47.1847	9.9554
15	0.0095	419.1115	1.3634	58.3943	40.2423	3.3880
16	0.0158	253.2180	2.7080	52.8207	44.4713	6.0893
17	0.0150	266.7667	3.4273	53.9716	42.6011	8.0451
18	0.0134	298.8792	1.1471	58.9473	39.9056	2.8746
19	0.0191	209.8774	2.1781	53.0546	44.7673	4.8655
20	0.0080	501.2083	1.5961	58.0570	40.3469	3.9561
21	0.0131	305.1494	2.2471	56.2536	41.4993	5.4149
22	0.0172	233.1342	0.9804	52.3317	46.6879	2.1000
23	0.0248	161.1958	7.7989	41.0073	51.1939	15.2340
24	0.0268	149.0764	6.1330	44.9471	48.9199	12.5368
25	0.0408	97.9528	5.8337	43.3074	50.8589	11.4704
26	0.0101	394.9155	1.1576	42.9877	55.8547	2.0725
27	0.0139	287.7077	1.9861	44.2826	53.7313	3.6964
28	0.0114	352.2483	2.5956	34.2881	63.1163	4.1124

Overall Analysis

Overall	0.0159	251.0246	2.6341	52.2354	45.1305	5.8366
Stddev	0.0068	0.0068	1.7098	9.4020	8.7090	3.4426

Petrographic Analysis Results
Adona Bridge

Core 3A1 (26 passes)

Air Voids

air-void dia. (0.001 in.)	Total no. observed
0-2	0
2-4	13
4-6	79
6-8	35
8-10	42
10-12	30
12-14	19
14-16	23
16-18	6
18-20	7
20-30	21
30-40	4
40-50	4
50+	15

Aggregate

aggregate dia. (0.01 in.)	Total no. observed
0-1	825
1-2	414
2-3	142
3-4	51
4-5	47
5-10	75
10-20	47
20-40	38
40-60	11
60-80	0
80-10	0
100+	0

Totals

	L	SS	A %	Agg %	P %	A/P %
Average	0.0155	258.3366	5.0705	50.9925	43.9370	11.5403
Std. Dev.	0.0068	0.0068	2.6529	6.3261	5.4384	6.2002

L	chord length (in)
SS	specific surface ?
A %	air void percentage
Agg %	aggregate percentage
P %	paste percentage
A/P %	air void/paste ratio percentage

Petrographic Analysis
AHTD

Tester: David W Lumbert   Job #: Research   Sample #: 3A1

Date: 3/6/2003

comment: Nome

Results

Air-void frequencies

air-void dia. .001 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	3	0	0	2	0	0	0	0	1	0	0	3	1	0	0	2	0	0	0	0	0	0	0	0	1	0	13
4- 6	0	4	5	2	1	2	3	4	3	2	5	3	1	0	6	1	3	9	4	4	3	2	5	0	0	7	79
6- 8	3	0	0	1	1	1	0	0	2	1	0	3	5	6	0	0	1	0	0	0	0	0	0	7	4	0	35
8-10	0	1	5	2	0	2	2	2	1	2	7	4	0	0	0	1	2	0	0	0	4	2	1	0	0	4	42
10-12	2	0	0	0	0	0	0	0	4	0	1	1	0	0	5	1	1	3	4	4	0	1	1	2	0	0	30
12-14	0	0	1	1	0	2	0	0	0	2	1	0	3	1	0	0	0	0	0	0	0	0	0	4	4	0	19
14-16	0	1	0	0	3	0	1	0	0	0	0	0	1	4	3	2	0	0	0	4	1	0	1	0	0	2	23
16-18	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	2	0	0	1	1	0	0	0	0	6
18-20	0	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0	0	2	0	7
20-30	1	0	1	1	1	1	0	1	0	0	0	0	3	1	1	2	0	1	2	1	1	0	1	0	1	1	21
30-40	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	1	0	0	4
40-50	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4
50+	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	0	0	1	1	3	1	1	1	2	1	15

Aggregate frequencies

aggregate dia. .01 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Total
0- 1	32	39	24	46	26	36	38	31	31	28	39	40	47	22	24	31	30	37	29	24	27	28	22	24	22	48	825
1- 2	7	4	16	20	12	8	10	15	14	11	11	18	21	15	25	25	30	24	26	30	12	7	21	17	9	6	414
2- 3	2	8	8	6	4	9	2	5	7	3	3	6	4	6	8	9	4	5	6	4	2	7	8	4	10	2	142
3- 4	1	0	4	1	3	4	1	2	1	0	3	0	2	2	8	1	3	1	1	4	1	0	1	2	2	3	51
4- 5	1	2	1	3	0	2	2	1	0	1	1	2	1	4	0	2	4	1	4	2	2	3	2	2	2	2	47
5-10	3	3	3	0	1	1	3	4	3	1	3	5	1	3	3	2	1	5	5	2	5	6	6	2	0	4	75
10-20	3	1	2	4	3	2	1	0	1	1	1	0	3	2	1	2	3	3	1	1	3	3	2	1	1	2	47
20-40	2	4	1	0	0	0	1	2	3	3	1	2	1	1	1	1	1	0	1	1	1	2	2	2	3	2	38
40-60	1	0	1	1	2	2	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
60-80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
80-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Analysis per pass

Pass #	L	spec surf	A(%)	Agg(%)	past(%)	A/past(%)

2	0.0092	436.2050	1.8340	58.4877	39.6783	4.6222
3	0.0093	428.3228	3.2019	56.7654	40.0327	7.9981
4	0.0115	347.3428	3.2903	55.7743	40.9354	8.0377
5	0.0129	310.0375	2.2117	55.1204	42.6679	5.1836
6	0.0229	174.3299	6.5557	57.3779	36.0664	18.1768
7	0.0218	183.6608	4.3559	52.4269	43.2173	10.0790
8	0.0105	381.5656	2.3961	62.3481	35.2557	6.7965
9	0.0075	530.7279	2.3687	56.2231	41.4081	5.7204
10	0.0087	459.6946	1.7403	56.8316	41.4281	4.2007
11	0.0080	502.0621	3.1869	51.9340	44.8791	7.1010
12	0.0065	619.0239	2.5847	47.9466	49.4687	5.2249
13	0.0151	264.4573	6.9144	47.4979	45.5877	15.1673
14	0.0154	260.4833	6.1424	44.6937	49.1639	12.4938
15	0.0102	393.7783	4.3534	44.6309	51.0157	8.5335
16	0.0194	206.1236	6.6534	43.6713	49.6753	13.3938
17	0.0102	390.5614	2.6336	47.7296	49.6369	5.3057
18	0.0093	432.4169	3.9644	44.7187	51.3169	7.7254
19	0.0190	210.3049	5.9777	44.6539	49.3684	12.1084
20	0.0165	242.0679	6.6097	39.2251	54.1651	12.2029
21	0.0301	132.9819	12.0317	44.4176	43.5507	27.6269
22	0.0283	141.1495	6.4774	56.9977	36.5249	17.7343
23	0.0246	162.9129	7.0151	57.2039	35.7810	19.6058
24	0.0192	208.0372	8.2403	44.7614	46.9983	17.5332
25	0.0232	172.3819	9.2817	45.4530	45.2653	20.5051
26	0.0193	206.8966	8.2857	49.8933	41.8210	19.8123

Overall Analysis

Overall	0.0155	258.3366	5.0705	50.9925	43.9370	11.5403
Stddev	0.0068	0.0068	2.6529	6.3261	5.4384	6.2002

Petrographic Analysis Results
Adona Bridge

Core 4A1 (29 passes)

Air Voids

air-void dia. (0.001 in.)	Total no. observed
0-2	1
2-4	2
4-6	45
6-8	90
8-10	25
10-12	16
12-14	37
14-16	16
16-18	11
18-20	13
20-30	13
30-40	4
40-50	1
50+	4

Aggregate

aggregate dia. (0.01 in.)	Total no. observed
0-1	643
1-2	353
2-3	92
3-4	37
4-5	26
5-10	73
10-20	71
20-40	61
40-60	24
60-80	0
80-10	0
100+	0

Totals

	L	SS	A %	Agg %	P %	A/P %
Average	0.0118	338.2093	3.2393	56.9545	39.8062	8.1377
Std. Dev.	0.0049	0.0049	1.4814	7.6216	7.2379	3.6231

L chord length (in)
SS specific surface ?
A % air void percentage
Agg % aggregate percentage
P % paste percentage
A/P % air void/paste ratio percentage

Petrographic Analysis
AHTD

Tester: David Lumbert, PG   Job #: Research   Sample #: 4A1

Date: 3/7/2003

comment: None

Results

Air-void frequencies

air-void dia. .001 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Total
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
2- 4	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
4- 6	7	1	5	2	1	1	1	5	4	0	0	2	0	0	0	0	0	0	0	3	0	0	0	0	0	2	3	1	7	45
6- 8	1	3	0	3	3	1	2	5	0	4	2	3	2	4	6	5	2	4	3	0	3	6	9	7	3	5	1	3	0	90
8-10	4	0	1	1	2	1	2	1	0	0	2	0	0	0	1	0	5	0	1	0	3	0	0	0	0	0	1	0	0	25
10-12	3	0	2	2	0	2	0	2	1	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	2	16
12-14	1	1	0	0	1	0	2	3	0	1	1	5	0	0	2	0	2	3	1	0	1	3	1	2	1	1	1	0	4	37
14-16	0	2	1	0	1	0	2	0	1	0	0	0	2	3	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	16
16-18	1	1	1	0	0	1	0	1	0	0	1	0	0	0	1	0	1	0	2	0	0	0	0	0	0	0	1	0	0	11
18-20	0	1	0	0	1	2	2	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	1	1	0	1	0	0	1	13
20-30	1	0	0	0	0	0	0	2	1	0	1	0	0	2	1	0	0	0	0	1	1	1	0	0	0	1	0	1	0	13
30-40	0	1	0	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	4
40-50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	[illegible]	[illegible]	[illegible]
50+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Aggregate frequencies

aggregate dia. .01 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	Total
0- 1	27	26	24	13	25	22	22	21	14	[illegible]	[illegible]	17	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1- 2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0	1	1	1	1	24
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Analysis per pass

Pass #	L	spec surf	A(%)	Agg(%)	past(%)	A/past(%)
[illegible]	[illegible]	[illegible]				

2	0.0137	291.7472	3.9173	58.4266	37.6561	10.4028
3	0.0088	453.1294	2.5221	61.6707	35.8071	7.0437
4	0.0084	478.6836	1.9100	67.0640	31.0260	6.1561
5	0.0100	398.8257	2.5790	59.6617	37.7593	6.8301
6	0.0113	355.0296	2.8971	62.6313	34.4716	8.4044
7	0.0114	351.7046	3.5744	60.1283	36.2973	9.8476
8	0.0111	359.3729	6.3603	54.6683	38.9714	16.3204
9	0.0099	402.7328	1.9864	67.5480	30.4656	6.5202
10	0.0076	523.6288	1.0913	70.7054	28.2033	3.8694
11	0.0149	269.3263	3.3947	69.3829	27.2224	12.4703
12	0.0096	418.2569	2.7324	62.9050	34.3626	7.9518
13	0.0106	378.4743	1.2079	57.5961	41.1960	2.9320
14	0.0144	276.8273	3.7156	50.8847	45.3997	8.1841
15	0.0106	378.6412	3.3201	45.0349	51.6450	6.4288
16	0.0068	586.6823	0.9740	48.1104	50.9156	1.9130
17	0.0175	229.1115	5.9859	46.5614	47.4527	12.6144
18	0.0222	179.9937	6.3494	53.2104	40.4401	15.7008
19	0.0117	341.3879	2.6781	41.8554	55.4664	4.8284
20	0.0106	375.9104	1.8241	46.8327	51.3431	3.5528
21	0.0119	335.2330	3.4091	52.8557	43.7351	7.7950
22	0.0140	285.4934	4.8037	54.4237	40.7726	11.7817
23	0.0121	329.6024	4.1609	48.1046	47.7346	8.7167
24	0.0097	410.9048	3.6157	55.6690	40.7153	8.8805
25	0.0315	126.9720	4.5004	57.8539	37.6457	11.9547
26	0.0105	380.3366	3.0049	59.6236	37.3716	8.0405
27	0.0094	426.2444	1.8769	57.7840	40.3391	4.6527
28	0.0089	447.7779	1.2761	67.7413	30.9826	4.1189
29	0.0093	432.2822	3.7013	59.1117	37.1870	9.9532

Overall Analysis

Overall	0.0118	338.2093	3.2393	56.9545	39.8062	8.1377
Stddev	0.0049	0.0049	1.4814	7.6216	7.2379	3.6231

Petrographic Analysis Results
Morrilton Bridge

Core 1M1 (28 passes)

Air Voids

air-void dia. (0.001 in.)	Total no. observed
0-2	4
2-4	61
4-6	124
6-8	79
8-10	82
10-12	68
12-14	20
14-16	41
16-18	18
18-20	19
20-30	32
30-40	12
40-50	7
50+	11

Aggregate

aggregate dia. (0.01 in.)	Total no. observed
0-1	886
1-2	554
2-3	149
3-4	60
4-5	27
5-10	61
10-20	36
20-40	39
40-60	14
60-80	4
80-10	2
100+	0

Totals

	L	SS	A %	Agg %	P %	A/P %
Average	0.0116	346.1213	6.8161	52.7374	40.4465	16.8520
Std. Dev.	0.0033	0.0033	2.5315	7.3833	6.1048	5.8870

L chord length (in)
SS specific surface ?
A % air void percentage
Agg % aggregate percentage
P % paste percentage
A/P % air void/paste ratio percentage

Petrographic Analysis
AHTD

Tester: David Lumbert   Job #: Research   Sample #: 1M1

Date: 1/28/2003

comment:

Results

Air-void frequencies

air-void dia. .001 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	4
2- 4	5	2	1	0	9	0	3	0	5	7	4	1	2	1	0	0	1	2	2	0	5	4	1	5	0	0	1	0	61
4- 6	2	2	5	5	1	7	0	10	0	1	5	1	5	7	4	10	4	9	5	11	0	5	4	1	5	2	4	9	124
6- 8	6	4	4	0	7	0	7	0	7	12	0	1	2	1	0	1	1	0	4	0	7	0	3	6	0	3	2	1	79
8-10	1	3	1	10	0	10	4	1	0	2	3	2	1	3	3	1	3	2	8	5	0	4	4	0	2	0	7	2	82
10-12	0	0	1	0	5	0	0	13	1	6	0	4	6	1	1	2	2	3	0	0	2	6	0	2	6	1	0	6	68
12-14	1	0	2	0	0	2	3	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	2	0	1	4	1	0	20
14-16	0	0	1	3	4	0	3	1	4	3	2	0	0	3	1	2	5	0	2	0	2	0	0	0	1	1	2	1	41
16-18	0	0	0	0	0	3	0	2	0	0	0	2	0	0	1	1	0	1	0	1	0	0	1	2	2	0	0	2	18
18-20	0	1	1	2	0	0	0	0	0	0	0	0	0	3	0	1	1	0	1	2	1	0	0	1	0	3	2	0	19
20-30	1	1	2	1	0	0	5	0	0	3	2	2	2	0	1	0	1	0	0	0	4	3	1	2	0	1	0	0	32
30-40	0	0	0	1	0	1	1	1	0	0	1	0	0	0	1	0	0	1	1	0	2	0	1	0	1	0	0	0	12
40-50	0	0	0	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	0	1	1	1	0	0	0	0	1	0	7
50+	0	0	0	0	0	2	0	0	1	2	1	0	0	0	0	0	0	0	0	0	1	0	0	0	2	2	0	0	11

Aggregate frequencies

aggregate dia. .01 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 1	37	38	35	47	35	44	55	20	35	32	30	23	16	26	21	27	24	37	48	55	31	26	24	21	24	12	35	28	886
1- 2	12	19	23	19	34	18	20	34	26	30	12	15	14	13	33	17	22	24	15	19	16	19	18	20	19	17	10	16	554
2- 3	14	3	4	5	10	10	9	3	2	7	2	4	2	7	8	3	6	2	8	6	8	6	7	4	1	1	2	5	149
3- 4	2	2	7	1	2	4	1	0	4	3	1	1	2	2	0	2	1	5	3	3	1	1	1	2	1	4	2	2	60
4- 5	0	3	2	0	1	1	1	0	4	0	3	0	0	1	0	2	1	0	0	1	1	0	0	1	1	2	0	2	27
5-10	3	1	1	2	1	3	3	1	4	3	0	2	3	2	1	6	4	1	1	0	2	1	0	3	1	5	4	3	61
10-20	0	0	0	1	0	0	0	2	0	2	1	2	1	1	0	1	1	2	4	3	1	1	1	2	2	2	4	2	36
20-40	1	1	1	0	0	0	0	2	1	1	0	1	3	2	2	1	2	2	1	1	2	4	2	1	2	2	1	3	39
40-60	0	0	0	0	0	1	1	0	0	0	2	2	0	1	1	1	0	0	0	0	0	0	2	2	1	0	0	0	14
60-80	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
80-100	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Analysis per pass

Pass #   L   spec surf   A(%) Agg(%) past(%) A/past(%)

1	0.0063	632.1612	3.2541	63.5909	33.1550	9.8149
2	0.0087	462.3455	3.2134	58.9169	37.8697	8.4855
3	0.0098	409.9411	5.0181	58.2720	36.7099	13.6697
4	0.0119	336.2564	7.4773	50.3139	42.2089	17.7150
5	0.0077	520.9116	5.7043	49.2033	45.0924	12.6502
6	0.0139	287.8982	9.9241	49.1727	40.9031	24.2625
7	0.0126	316.6966	9.3826	45.7959	44.8216	20.9332
8	0.0115	347.9200	9.5260	39.9253	50.5487	18.8452
9	0.0133	301.3183	6.8271	41.6551	51.5177	13.2520
10	0.0123	326.3382	12.6074	44.7319	42.6607	29.5528
11	0.0154	260.3007	8.3420	45.7636	45.8944	18.1765
12	0.0131	305.2539	4.8671	63.9263	31.2066	15.5965
13	0.0095	419.2384	4.9069	66.6727	28.4204	17.2652
14	0.0099	403.1242	5.6700	60.3211	34.0089	16.6721
15	0.0126	318.1231	4.3110	59.8360	35.8530	12.0241
16	0.0087	460.5642	4.4666	56.6901	38.8433	11.4990
17	0.0128	313.1438	6.9343	49.0419	44.0239	15.7512
18	0.0086	463.5560	4.6843	46.8596	48.4562	9.6671
19	0.0093	430.4354	6.3723	50.0880	43.5397	14.6356
20	0.0094	426.9703	5.6210	45.7780	48.6010	11.5656
21	0.0163	245.3025	11.6474	42.6239	45.7287	25.4707
22	0.0114	350.1414	7.8336	55.4967	36.6697	21.3625
23	0.0095	419.3239	4.9059	57.9536	37.1406	13.2089
24	0.0095	420.9010	5.1590	62.1051	32.7359	15.7595
25	0.0171	233.6960	9.7807	52.6933	37.5260	26.0638
26	0.0219	182.6386	10.6377	54.5416	34.8207	30.5500
27	0.0111	361.8191	6.3173	48.3849	45.2979	13.9461
28	0.0091	439.7100	5.4581	56.2937	38.2481	14.2704

Overall Analysis

Overall	0.0116	346.1213	6.8161	52.7374	40.4465	16.8520
Stddev	0.0033	0.0033	2.5315	7.3833	6.1048	5.8870

Petrographic Analysis Results
Morrilton Bridge

Core 2M1 (28 passes)

Air Voids

air-void dia. (0.001 in.)	Total no. observed
0-2	1
2-4	23
4-6	53
6-8	96
8-10	27
10-12	30
12-14	45
14-16	26
16-18	5
18-20	8
20-30	16
30-40	6
40-50	3
50+	9

Aggregate

aggregate dia. (0.01 in.)	Total no. observed
0-1	583
1-2	473
2-3	135
3-4	37
4-5	21
5-10	35
10-20	32
20-40	58
40-60	22
60-80	11
80-10	3
100+	0

Totals

	L	SS	A %	Agg %	P %	A/P %
Average	0.0140	285.8437	4.9692	61.3869	33.6439	14.7699
Std. Dev.	0.0064	0.0064	2.6354	8.9638	8.3782	9.2725

L	chord length (in)
SS	specific surface ?
A %	air void percentage
Agg %	aggregate percentage
P %	paste percentage
A/P %	air void/paste ratio percentage

Petrographic Analysis
AHTD

Tester: David Lumbert, PG   Job #: Research   Sample #: 2M1

Date: 2/6/2003

comment: None

Results

Air-void frequencies

air-void dia. .001 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
2- 4	4	0	0	2	1	0	0	3	0	1	0	0	0	0	0	1	1	0	2	0	0	0	0	0	3	3	2	0	23
4- 6	0	1	2	2	0	1	0	4	2	5	2	4	2	0	1	1	5	1	6	1	3	0	4	1	0	3	0	2	53
6- 8	3	1	2	4	6	7	5	1	2	1	1	0	5	2	3	3	3	5	2	4	6	7	4	3	4	2	6	4	96
8-10	4	1	0	1	0	1	2	0	0	0	0	0	0	0	0	1	3	1	0	1	0	0	0	10	0	0	2	0	27
10-12	1	4	6	3	0	0	0	0	1	0	2	4	0	0	1	3	1	0	2	0	0	0	1	0	0	0	0	1	30
12-14	2	3	0	2	1	3	0	0	0	0	1	0	2	3	1	2	2	7	2	0	0	3	5	0	0	4	2	0	45
14-16	0	0	4	0	0	0	2	0	0	1	0	2	0	0	5	0	1	0	0	6	3	0	0	0	2	0	0	0	26
16-18	0	2	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5
18-20	0	0	0	0	0	2	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	0	1	0	0	1	8
20-30	1	0	0	0	1	2	1	0	0	0	1	1	0	1	1	0	1	0	2	0	0	1	1	0	0	1	1	0	16
30-40	1	0	0	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	6
40-50	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	3
50+	0	1	1	0	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	9

Aggregate frequencies

aggregate dia. .01 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 1	44	37	25	32	15	19	15	17	14	9	11	9	16	18	12	28	41	24	24	23	23	10	25	20	19	14	22	17	583
1- 2	20	17	21	19	19	15	10	13	10	6	12	16	13	14	21	26	19	36	33	17	13	21	13	21	13	13	13	9	473
2- 3	3	4	3	1	5	3	7	3	6	2	1	2	2	2	7	11	7	5	11	7	11	4	6	6	3	6	2	5	135
3- 4	2	3	1	0	0	2	0	1	2	3	1	1	2	1	0	3	5	1	1	1	1	2	0	1	0	0	2	1	37
4- 5	0	1	0	1	0	1	1	3	0	1	0	1	0	0	2	3	1	0	0	0	2	1	0	0	2	1	0	0	21
5-10	4	0	1	1	0	1	1	0	1	0	0	2	0	2	0	2	1	3	4	1	1	2	0	2	2	2	0	2	35
10-20	0	1	0	1	0	0	2	0	0	1	0	0	1	1	3	1	1	1	2	4	3	1	1	0	3	1	1	3	32
20-40	2	1	2	1	1	1	1	1	1	2	3	3	3	5	4	2	2	1	0	0	1	3	3	3	2	4	4	2	58
40-60	0	1	1	2	1	1	2	3	2	2	2	1	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	22
60-80	0	0	0	0	1	1	0	0	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1	11
80-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	3
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Analysis per pass

Pass #	L	spec surf	A(%)	Agg(%)	past(%)	A/past(%)
1	0.0125	319.2563	6.0856	49.7020	44.2124	13.7644
2	0.0242	165.5603	8.9739	47.2319	43.7943	20.4909

4	0.0083	481.7826	3.3210	61.2907	35.3883	9.3845
5	0.0270	147.8880	7.7279	54.9956	37.2766	20.7311
6	0.0249	160.6027	12.0973	61.2647	26.6380	45.4136
7	0.0274	146.2144	9.3796	64.8993	25.7211	36.4664
8	0.0180	222.3952	5.1389	68.5060	26.3551	19.4985
9	0.0113	352.6559	1.9444	71.0660	26.9896	7.2044
10	0.0082	487.2437	2.1110	77.2813	20.6077	10.2437
11	0.0136	294.1717	3.1080	76.0637	20.8283	14.9220
12	0.0132	302.1411	4.9173	70.4607	24.6220	19.9711
13	0.0078	510.6021	2.0144	67.1143	30.8713	6.5252
14	0.0132	303.8029	2.6333	66.1110	31.2557	8.4250
15	0.0145	275.9279	5.3844	57.6003	37.0153	14.5465
16	0.0083	482.6303	2.8416	51.1539	46.0046	6.1767
17	0.0094	426.4125	4.5563	50.5939	44.8499	10.1590
18	0.0093	432.1654	3.7023	44.6091	51.6886	7.1627
19	0.0106	378.4693	5.4354	53.6853	40.8793	13.2963
20	0.0107	375.4253	3.6530	52.2701	44.0769	8.2878
21	0.0081	492.9650	2.7820	63.0590	34.1590	8.1443
22	0.0095	420.9720	2.9863	63.6440	33.3697	8.9491
23	0.0109	368.3771	4.9639	58.4541	36.5820	13.5691
24	0.0105	380.1197	4.5099	65.6830	29.8071	15.1301
25	0.0085	468.8782	2.4374	68.0069	29.5557	8.2469
26	0.0086	464.0578	3.2016	73.3239	23.4746	13.6385
27	0.0167	239.7158	6.6746	65.6840	27.6414	24.1470
28	0.0247	161.8385	7.0617	64.6337	28.3046	24.9490

Overall Analysis

Overall	0.0140	285.8437	4.9692	61.3869	33.6439	14.7699
Stddev	0.0064	0.0064	2.6354	8.9638	8.3782	9.2725

Petrographic Analysis Results
Morrilton Bridge

Core 3M1 (31 passes)

Air Voids

air-void dia. (0.001 in.)	Total no. observed
0-2	0
2-4	11
4-6	66
6-8	66
8-10	13
10-12	26
12-14	25
14-16	14
16-18	8
18-20	10
20-30	9
30-40	4
40-50	2
50+	11

Aggregate

aggregate dia. (0.01 in.)	Total no. observed
0-1	647
1-2	401
2-3	105
3-4	31
4-5	24
5-10	43
10-20	43
20-40	50
40-60	19
60-80	6
80-10	0
100+	0

Totals

	L	SS	A %	Agg %	P %	A/P %
Average	0.0132	303.6753	3.7533	55.9787	40.2680	9.3208
Std. Dev.	0.0062	0.0062	1.5143	9.4318	9.2021	4.7734

L chord length (in)
SS specific surface ?
A % air void percentage
Agg % aggregate percentage
P % paste percentage
A/P % air void/paste ratio percentage

Core 3M1

air-void dia. (0.001 in.)	Pass #																														Totals
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
0-2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2-4	0	3	0	1	0	0	0	0	0	1	0	1	0	0	2	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	11
4-6	0	3	1	1	0	1	2	0	1	3	1	0	7	0	5	5	0	7	8	1	0	3	3	6	2	1	1	2	0	2	0	66
6-8	3	3	2	3	3	0	5	4	3	3	3	4	0	3	1	0	3	0	3	0	4	1	2	0	2	2	2	0	2	3	2	66
8-10	0	1	1	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1	0	13
10-12	0	0	0	0	0	0	1	1	0	1	0	0	1	0	2	3	0	5	2	0	0	1	4	3	0	1	0	0	0	1	0	26
12-14	0	1	0	1	1	1	0	1	1	0	2	3	0	0	0	0	0	0	0	0	6	0	1	0	2	1	1	0	1	1	1	25
14-16	1	1	0	0	1	0	0	1	0	1	0	0	1	0	0	0	3	0	1	0	0	2	0	0	0	0	0	0	1	0	1	14
16-18	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0	8
18-20	1	1	0	0	1	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	10
20-30	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	2	0	9
30-40	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0	4
40-50	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
50+	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	1	11

aggregate dia. (0.01 in.)	Pass #																														Totals
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
0-1	17	36	17	12	12	16	12	13	17	18	20	25	33	24	25	23	23	14	24	47	33	35	24	20	13	21	12	18	13	16	14	647
1-2	6	10	10	16	3	14	6	13	14	12	13	15	16	18	16	25	12	16	20	10	22	10	16	18	15	11	8	8	8	9	11	401
2-3	7	0	6	1	3	0	2	0	5	4	4	3	4	2	1	3	3	5	8	4	1	5	7	5	3	0	3	8	3	3	2	105
3-4	1	0	0	2	2	3	1	1	0	2	2	0	0	2	2	2	2	0	0	0	0	2	1	3	0	0	0	1	1	1	0	31
4-5	0	2	1	0	1	0	0	0	0	1	2	2	4	0	0	2	1	0	0	1	0	2	1	1	0	0	2	0	0	1	0	24
5-10	3	1	0	2	0	1	1	2	2	0	0	1	3	0	1	0	4	2	4	3	3	1	2	2	1	1	0	2	0	0	1	43
10-20	1	0	0	0	1	0	1	1	2	3	3	2	0	2	2	2	2	4	1	2	1	0	2	1	1	0	2	0	2	2	3	43
20-40	2	2	3	3	3	3	3	4	2	2	2	1	1	2	2	2	1	1	2	1	1	1	0	0	1	2	1	1	1	0	0	50
40-60	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	2	2	1	1	19
60-80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	6
80-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Petrographic Analysis
AHTD

Tester: David Lumbert, PG   Job #: Research   Sample #: 3M1

Date: 3/5/2003

comment: N/A

Results

Air-void frequencies

air-void dia. .001 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2- 4	0	3	0	1	0	0	0	0	0	1	0	1	0	0	2	1	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0
4- 6	0	3	1	1	0	1	2	0	1	3	1	0	7	0	5	5	0	7	8	1	0	3	3	6	2	1	1	2	0	2	0
6- 8	3	3	2	3	3	0	5	4	3	3	3	4	0	3	1	0	3	0	3	0	4	1	2	0	2	2	2	0	2	3	2
8-10	0	1	1	0	0	0	1	0	0	0	0	0	4	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1	0
10-12	0	0	0	0	0	0	1	1	0	1	0	0	1	0	2	3	0	5	2	0	0	1	4	3	0	1	0	0	0	1	0
12-14	0	1	0	1	1	1	0	1	1	0	2	3	0	0	0	0	0	0	0	0	6	0	1	0	2	1	1	0	1	1	1
14-16	1	1	0	0	1	0	0	1	0	1	0	0	1	0	0	0	3	0	1	0	0	2	0	0	0	0	0	0	1	0	1
16-18	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	0	0	1	0	0
18-20	1	1	0	0	1	0	0	1	1	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0
20-30	0	0	0	0	0	0	1	0	0	0	0	1	0	2	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	2	0
30-40	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0	0
40-50	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
50+	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	1	0	0	1

Aggregate frequencies

aggregate dia. .01 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
0- 1	17	36	17	12	12	16	12	13	17	18	20	25	33	24	25	23	23	14	24	47	33	35	24	20	13	21	12	18	13	16	14	6
1- 2	6	10	10	16	3	14	6	13	14	12	13	15	16	18	16	25	12	16	20	10	22	10	16	18	15	11	8	8	8	9	11	4
2- 3	7	0	6	1	3	0	2	0	5	4	4	3	4	2	1	3	3	5	8	4	1	5	7	5	3	0	3	8	3	3	2	1
3- 4	1	0	0	2	2	3	1	1	0	2	2	0	0	2	2	2	2	0	0	0	0	2	1	3	0	0	0	1	1	1	0	
4- 5	0	2	1	0	1	0	0	0	0	1	2	2	4	0	0	2	1	0	0	1	0	2	1	1	0	0	2	0	0	1	0	
5-10	3	1	0	2	0	1	1	2	2	0	0	1	3	0	1	0	4	2	4	3	3	1	2	2	1	1	0	2	0	0	1	
10-20	1	0	0	0	1	0	1	1	2	3	3	2	0	2	2	2	2	4	1	2	1	0	2	1	1	0	2	0	2	2	3	
20-40	2	2	3	3	3	3	3	4	2	2	2	1	1	2	2	2	1	1	2	1	1	1	0	0	1	2	1	1	1	0	0	
40-60	1	1	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	2	2	1	1	
60-80	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	1	
80-100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Analysis per pass

Pass #	L	spec surf	A(%)	Agg(%)	past(%)	A/past(%)
1	0.0111	360.8806	1.8473	58.7547	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	3.4250	58.1420	40.4350	8.4654
3	0.0140	285.0830	2.3385	61.8793	35.7822	6.5354
4	0.0154	259.0314	3.6032	67.2055	29.1913	12.3433
5	0.0118	340.1567	2.7438	67.6935	29.5627	9.2814
6	0.0088	456.7513	0.5838	73.4687	25.9475	2.2501
7	0.0151	264.2960	5.5493	64.0855	30.3652	18.2753
8	0.0185	215.9477	6.1743	59.7620	34.0637	18.1259
9	0.0177	225.9613	4.1305	50.9043	44.9652	9.1860
10	0.0153	260.9031	5.6215	53.3628	41.0157	13.7057
11	0.0184	217.6042	6.1273	51.4938	42.3788	14.4585
12	0.0099	402.2122	2.9835	44.4313	52.5852	5.6737
13	0.0074	540.8779	3.2047	46.0887	50.7067	6.3200
14	0.0134	298.9090	2.2303	46.3047	51.4650	4.3337
15	0.0062	640.3074	2.0823	43.6257	54.2920	3.8354
16	0.0083	481.9568	2.7665	52.1008	45.1327	6.1297
17	0.0163	245.6356	3.7997	44.9265	51.2738	7.4105
18	0.0090	445.3961	3.8917	46.1452	49.9632	7.7891
19	0.0084	476.7013	4.1955	50.9748	44.8297	9.3588
20	0.0212	188.8701	4.9417	44.1733	50.8850	9.7114
21	0.0188	212.5912	6.8990	38.6898	54.4112	12.6794
22	0.0126	317.9306	4.6132	49.1942	46.1927	9.9868
23	0.0088	453.4120	2.9407	54.3890	42.6703	6.8916
24	0.0105	380.6080	3.5032	50.7733	45.7235	7.6616
25	0.0098	407.0063	2.2932	64.4718	33.2350	6.8999
26	0.0142	281.1527	3.3197	64.8433	31.8370	10.4271
27	0.0220	181.4059	5.1450	69.7822	25.0728	20.5202
28	0.0228	175.1313	3.0453	66.5930	30.3617	10.0302
29	0.0118	338.7247	1.9682	66.4568	31.5750	6.2333
30	0.0118	339.9915	4.3138	62.1062	33.5800	12.8464
31	0.0364	109.7815	6.0727	64.5155	29.4118	20.6470

Overall Analysis

Overall	0.0132	303.6753	3.7533	55.9787	40.2680	9.3208
Stddev	0.0062	0.0062	1.5143	9.4318	9.2021	4.7734

Petrographic Analysis Results
Morrilton Bridge

Core 4M1 (28 passes)

Air Voids

air-void dia. (0.001 in.)	Total no. observed
0-2	1
2-4	22
4-6	82
6-8	25
8-10	33
10-12	28
12-14	21
14-16	8
16-18	3
18-20	4
20-30	3
30-40	2
40-50	2
50+	7

Aggregate

aggregate dia. (0.01 in.)	Total no. observed
0-1	1073
1-2	553
2-3	147
3-4	64
4-5	22
5-10	63
10-20	39
20-40	27
40-60	11
60-80	11
80-10	1
100+	0

Totals

	L	SS	A %	Agg %	P %	A/P %
Average	0.0104	385.9644	2.5486	53.7239	43.7275	5.8284
Std. Dev.	0.0050	0.0050	1.3626	8.8704	8.5428	3.2858

L	chord length (in)
SS	specific surface ?
A %	air void percentage
Agg %	aggregate percentage
P %	paste percentage
A/P %	air void/paste ratio percentage

Morgan Bridge

Petrographic Analysis
AHTD

Tester: David Lumbert   Job #: Research   Sample #: 4M1

1/22/03
Date: 1/4/1980

comment:

Results

Air-void frequencies

air-void dia. .001 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
2- 4	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	2	0	1	0	1	1	3	0	0	3	8	22
4- 6	1	0	1	2	4	6	0	3	6	2	2	2	0	8	0	1	2	1	0	5	5	5	4	2	2	9	8	1	82
6- 8	0	0	0	0	0	0	1	3	0	1	2	2	2	0	1	6	1	0	2	0	1	0	3	0	0	0	0	0	25
8-10	0	1	3	3	0	3	0	3	0	2	3	1	0	0	0	0	0	2	0	1	0	1	1	0	5	1	3	0	33
10-12	1	0	0	0	4	0	0	1	5	0	0	0	1	1	1	0	1	2	0	1	5	1	0	1	0	3	0	0	28
12-14	1	0	0	3	0	0	1	0	0	1	1	1	0	1	4	0	0	0	2	0	0	2	1	2	0	0	1	0	21
14-16	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	1	8
16-18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0	0	3
18-20	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	4
20-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	3
30-40	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2
40-50	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
50+	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	1	1	7

Aggregate frequencies

aggregate dia. .01 in.	Pass # 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	Total
0- 1	41	59	55	50	30	53	32	40	35	53	48	39	27	28	19	22	23	29	23	24	16	38	23	52	49	52	61	52	1073
1- 2	27	24	15	20	33	24	30	18	40	18	11	16	15	7	19	18	10	10	15	18	13	18	16	21	22	25	19	31	553
2- 3	5	4	3	3	13	5	2	6	6	4	9	3	1	7	5	2	7	4	1	4	10	5	4	8	8	5	7	6	147
3- 4	2	4	2	2	2	3	5	3	2	3	2	2	3	2	0	3	0	1	2	2	3	1	1	1	3	2	6	2	64
4- 5	2	0	2	1	1	0	0	1	0	2	1	0	1	0	0	0	2	0	0	0	1	1	2	1	1	1	1	1	22
5-10	1	1	0	3	2	2	2	7	2	0	3	2	2	2	1	0	3	1	2	2	3	1	5	3	1	7	3	2	63
10-20	2	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	1	3	3	1	1	3	1	0	1	1	0	2	39
20-40	0	0	0	0	0	1	2	1	1	2	1	1	1	2	1	1	1	1	2	2	1	1	1	2	1	0	1	0	27
40-60	0	0	0	1	1	0	0	0	0	0	1	1	0	1	1	1	1	1	0	0	0	1	1	0	0	0	0	0	11
60-80	0	1	1	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	11
80-100	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
100+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Analysis per pass

Pass #   L   spec surf   A(%)   Agg(%)   past(%)   A/past(%)

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	39.9020	2.0608
2	0.0260	153.7722	1.4864	57.5490	40.9646	3.6286
3	0.0083	481.1307	0.9501	48.5054	50.5444	1.8798
4	0.0105	380.7711	2.7013	49.4520	47.8467	5.6457
5	0.0079	503.1842	1.8170	50.2654	47.9176	3.7919
6	0.0076	527.5305	2.1664	43.6167	54.2169	3.9959
7	0.0171	233.5085	1.4683	45.7246	52.8071	2.7805
8	0.0071	566.2514	2.0183	49.5610	48.4207	4.1682
9	0.0082	488.3011	2.8086	42.8637	54.3077	5.1716
10	0.0188	213.2878	5.3583	48.5787	46.0630	11.6325
11	0.0078	511.7635	2.0099	58.4151	39.5750	5.0786
12	0.0080	498.1320	1.6060	55.6047	42.7893	3.7533
13	0.0161	248.9304	1.8364	58.9993	39.1643	4.6890
14	0.0066	607.9490	1.8799	67.3129	30.8073	6.1020
15	0.0114	349.7267	1.9607	65.5433	32.4960	6.0337
16	0.0113	354.4354	2.9020	63.0503	34.0477	8.5233
17	0.0073	546.1683	0.8370	67.7121	31.4509	2.6613
18	0.0073	546.6614	1.4634	69.0804	29.4561	4.9682
19	0.0226	177.2029	3.2247	65.6517	31.1236	10.3610
20	0.0114	350.6209	2.9336	58.9829	38.0836	7.7030
21	0.0146	270.5201	6.3370	56.2841	37.3789	16.9534
22	0.0082	488.7531	2.5721	55.4490	41.9789	6.1272
23	0.0089	451.6797	3.0363	52.6730	44.2907	6.8554
24	0.0080	497.6500	2.0669	46.5829	51.3503	4.0250
25	0.0099	405.2001	2.5384	42.3276	55.1340	4.6041
26	0.0080	502.3232	3.4127	42.9359	53.6514	6.3609
27	0.0110	364.2711	5.6473	42.3424	52.0103	10.8580
28	0.0111	360.0213	3.4919	39.9160	56.5921	6.1702

Overall Analysis

Overall	0.0104	385.9644	2.5486	53.7239	43.7275	5.8284
Stddev	0.0050	0.0050	1.3626	8.8704	8.5428	3.2858

Appendix B

Bridge Distress Surveys

Adona Bridge

1-year Manual Distress Survey

164' LEN

Arkansas State Highway and Transportation Department

Planning and Research Division

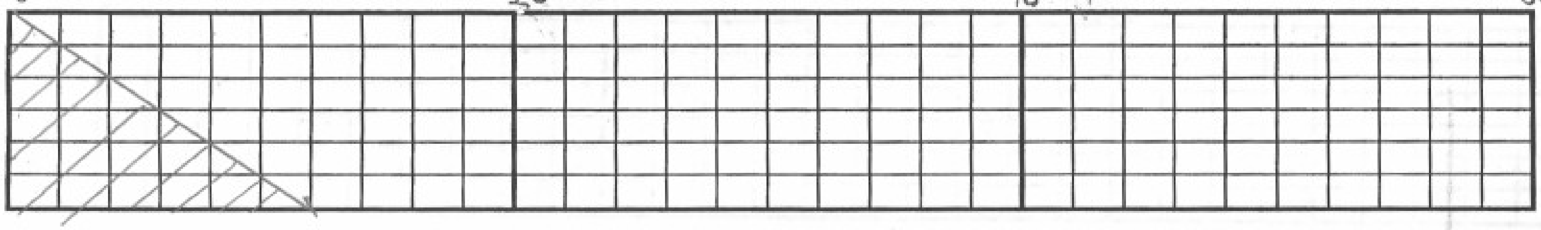
Pavement Distress Survey for Flexible Pavements

Project: TRC-9702
Section Name:
Location: PERRY Co BRIDGE - HWY 10
E B DIR

Date: 5-1-01
Eval: BB

DIRECTION OF TRAVEL →

0' 20' 40' 60'



SHOULDER

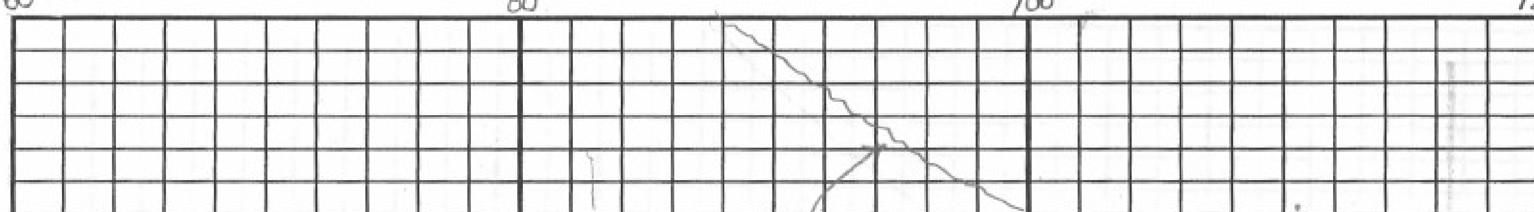
Notes:

Notes:

Notes:

DIRECTION OF TRAVEL →

60' 80' 100' 120'



CRACK IS 1-2" FROM JOINT RUNNING TRANSVERSE

SHOULDER

Notes:
5 HAIRLINE CRACKS RUN FROM PARAPET WALL TO EDGE OF TINING

Notes:

Notes:

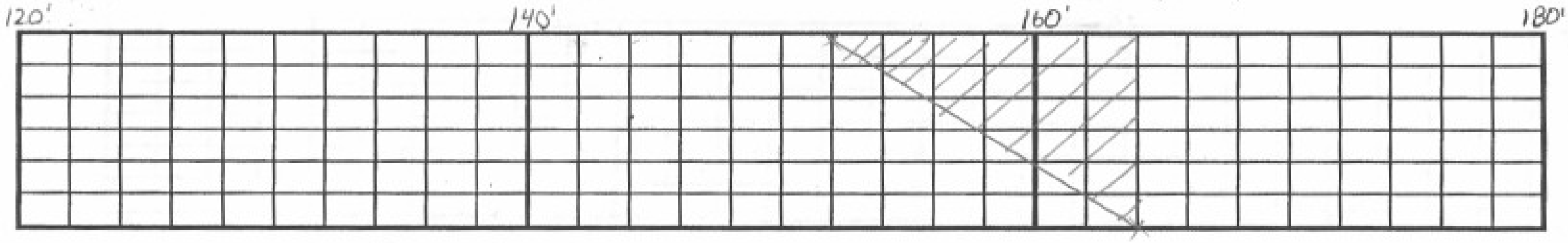
Arkansas State Highway and Transportation Department
Planning and Research Division
Pavement Distress Survey for Flexible Pavements

Project: ______________________ **Date:** 5-1-01

Section Name: ______________________ **Eval:** GB

Location: ______________________

DIRECTION OF TRAVEL →



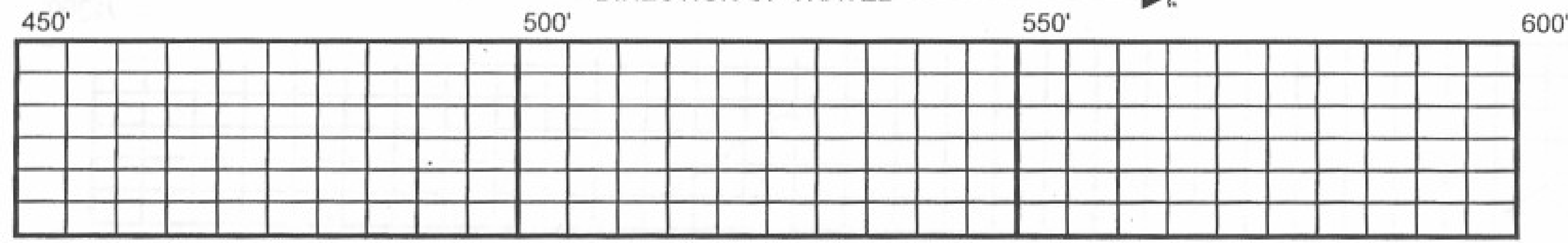
SHOULDER

Notes: ______________________

Notes: ______________________

Notes: ______________________

DIRECTION OF TRAVEL →



SHOULDER

Notes: ______________________

Notes: ______________________

Notes: ______________________

~~Some~~ (1) CRACK ON SHOULDER

Arkansas State Highway and Transportation Department

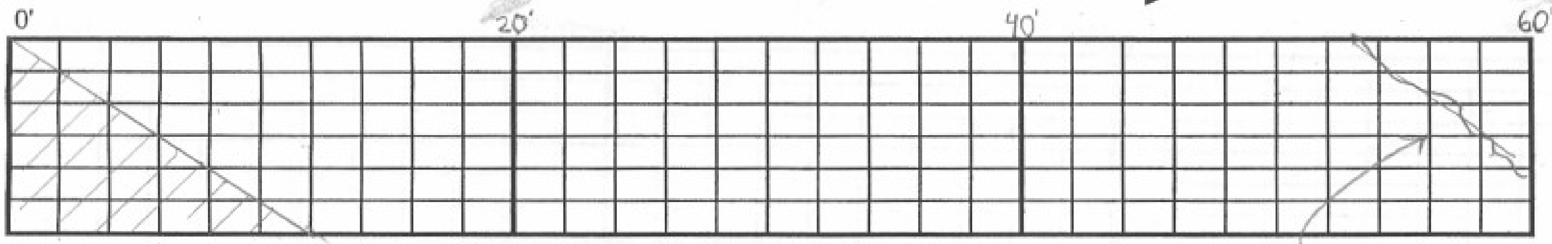
Planning and Research Division

Pavement Distress Survey for Flexible Pavements

Project: TRC 9902
Section Name: R80094 BRIDGE
Location: PERRY CO - HWY 10
WB

Date: 5-1-01
Eval: GB

DIRECTION OF TRAVEL →



CRACK RUNS ALONG JOINT WITHIN 1-2" MATCHES WP W/EB CRAck

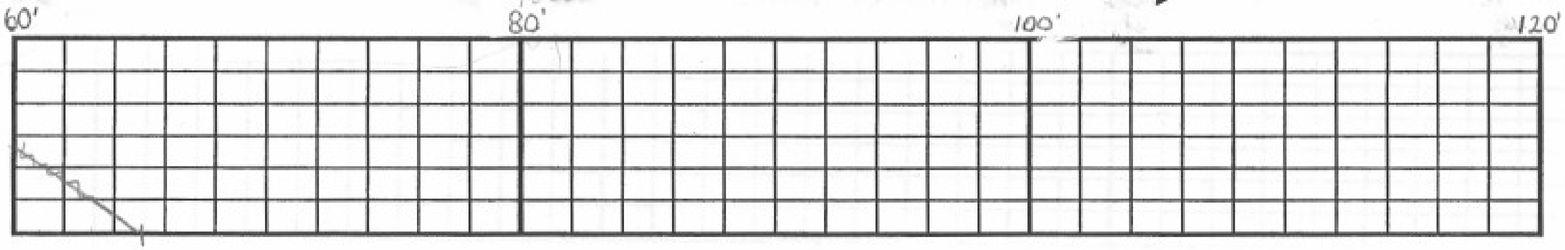
SHOULDER

Notes:

Notes:

Notes:

DIRECTION OF TRAVEL →



SHOULDER

Notes:
3 HAIRLINE CRACKS BET PARAPET WALL & TINED PVMT

Notes:

Notes:

Arkansas State Highway and Transportation Department

Planning and Research Division

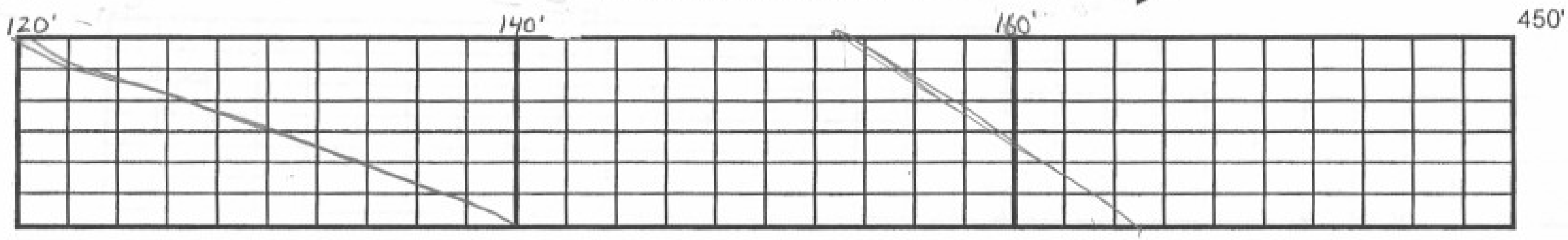
Pavement Distress Survey for Flexible Pavements

Project: ______________________ **Date:** ______________

Section Name: ______________________ **Eval:** ______________

Location: ______________________

DIRECTION OF TRAVEL →



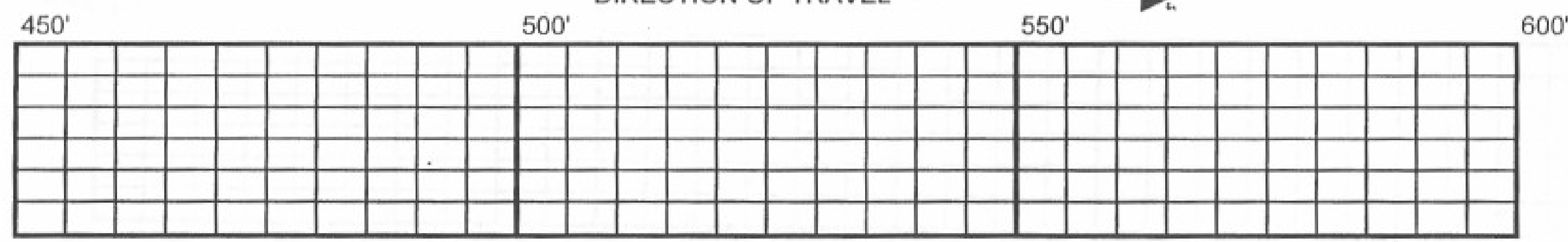
SHOULDER

Notes: ______________________

Notes: ______________________

Notes: ______________________

DIRECTION OF TRAVEL →



SHOULDER

Notes: ______________________

Notes: ______________________

Notes: ______________________

Morgan Bridge

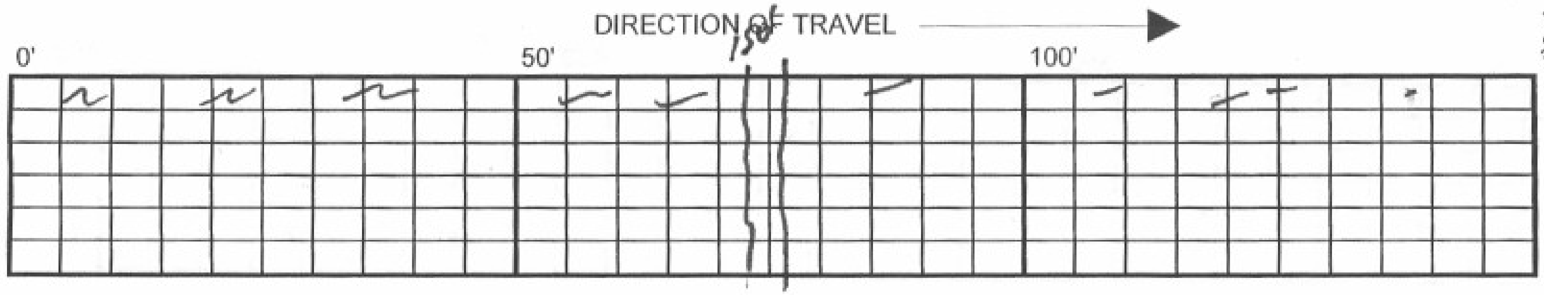
1-year Manual Distress Survey

Arkansas State Highway and Transportation Department
Planning and Research Division
Pavement Distress Survey for Flexible Pavements

Project: MORGAN
Section Name: I-40
Location:

North Bound

Date: 5-18-01
Eval:

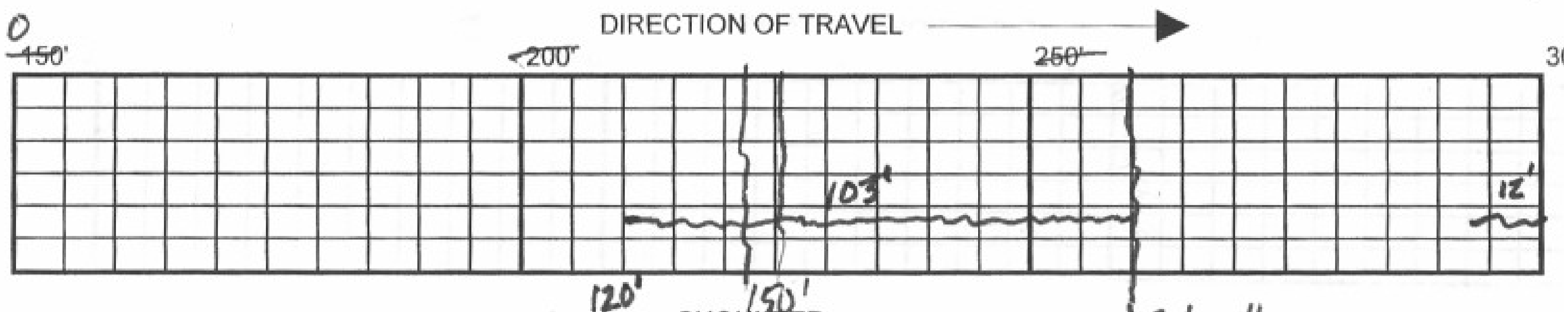


IL

Notes:

Notes:

Notes:



OL

Notes:

Notes:

Notes: sidewall parapet wall

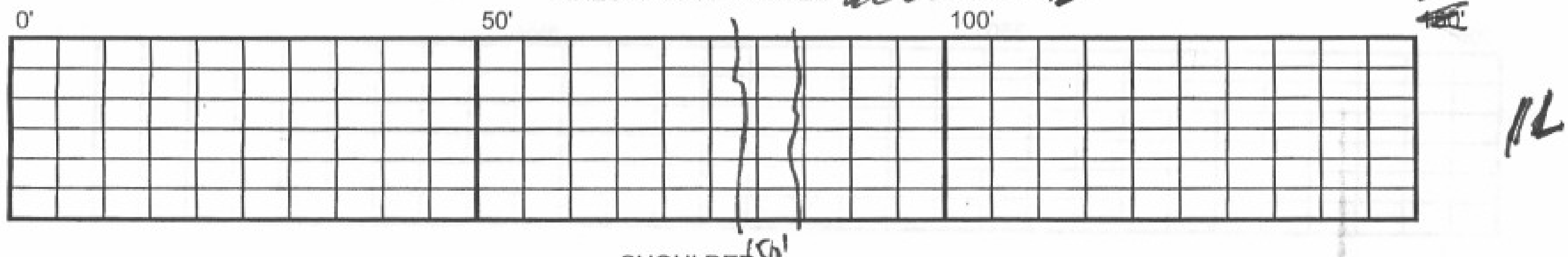
Arkansas State Highway and Transportation Department
Planning and Research Division
Pavement Distress Survey for Flexible Pavements

South Bound

Project: MORGAN
Section Name: I-40
Location:

Date: 5-18-01
Eval:

DIRECTION OF TRAVEL



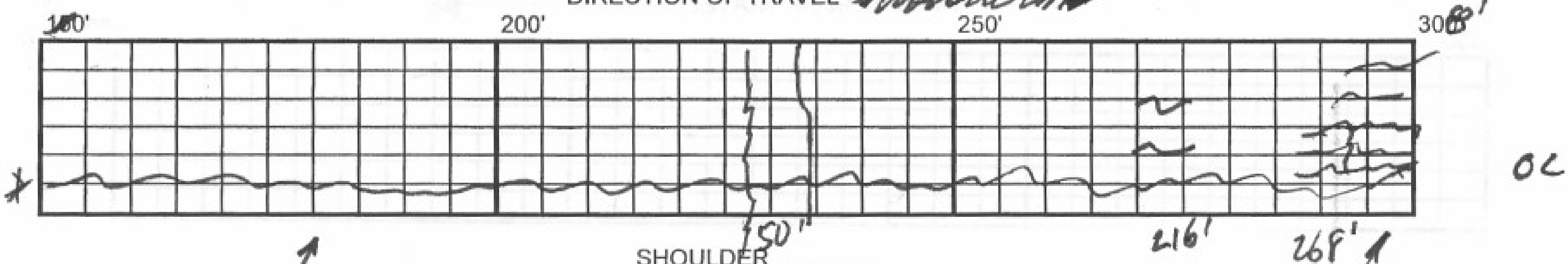
SHOULDER

Notes:

Notes:

Notes:

DIRECTION OF TRAVEL



SHOULDER

Notes: * full length crack SBOL

Notes:

Notes: this end - more cracking

Adona Bridge

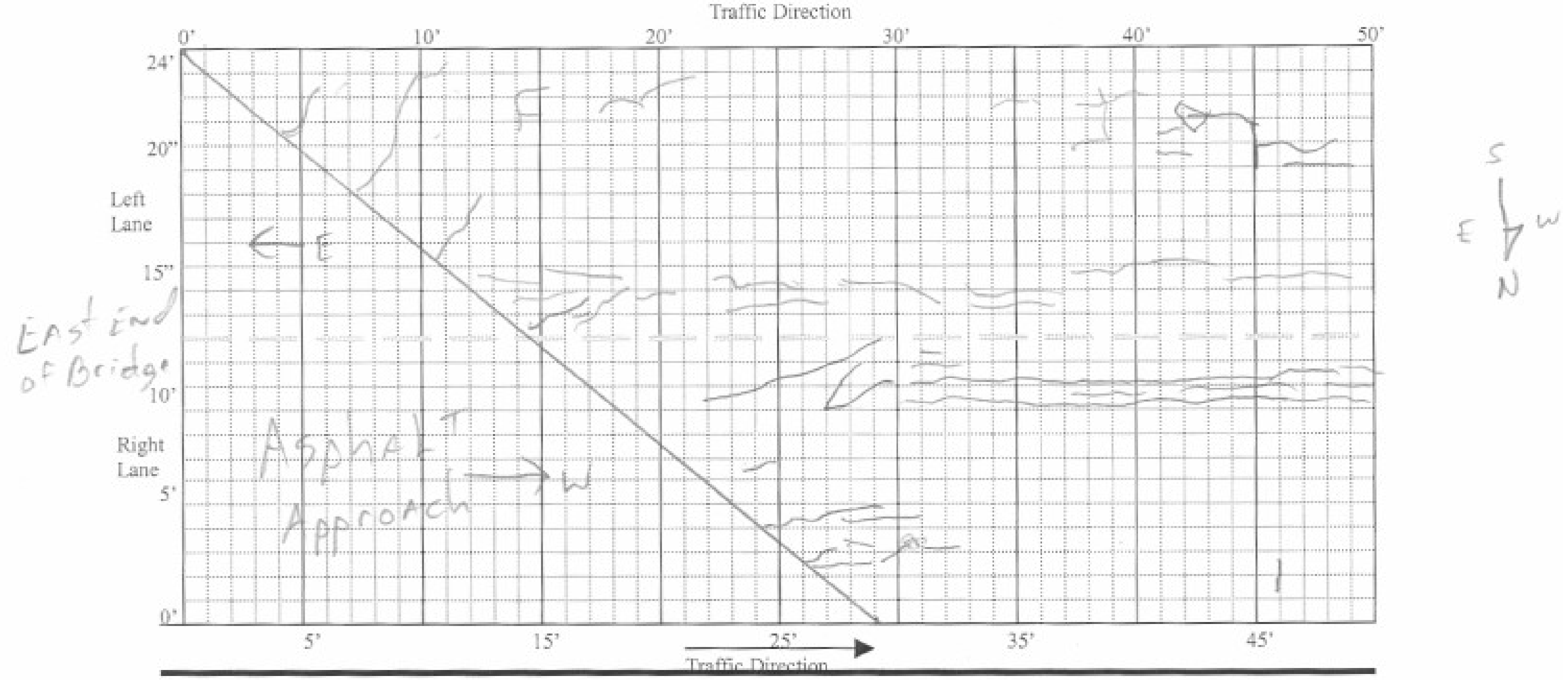
4-year Manual Distress Survey

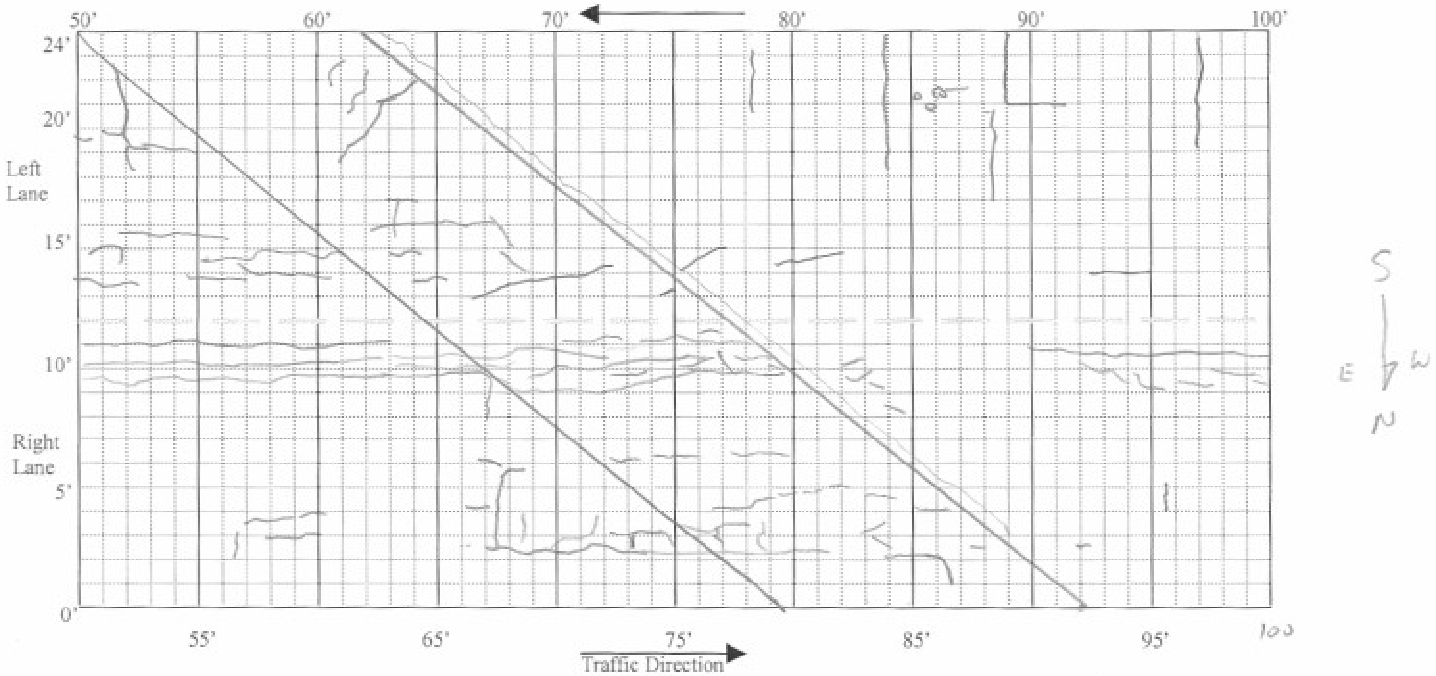
PAGE 1 of 2
T456

Project No. TRC9902 **Project Name:** Curing Procedures of Bridge deck **Surveyor:** M. [signature]

Log Mile: ________ **Route:** 10 **Section:** ____ **Location:** Adona **Date:** 5-26-04

Begin LM________ End LM________



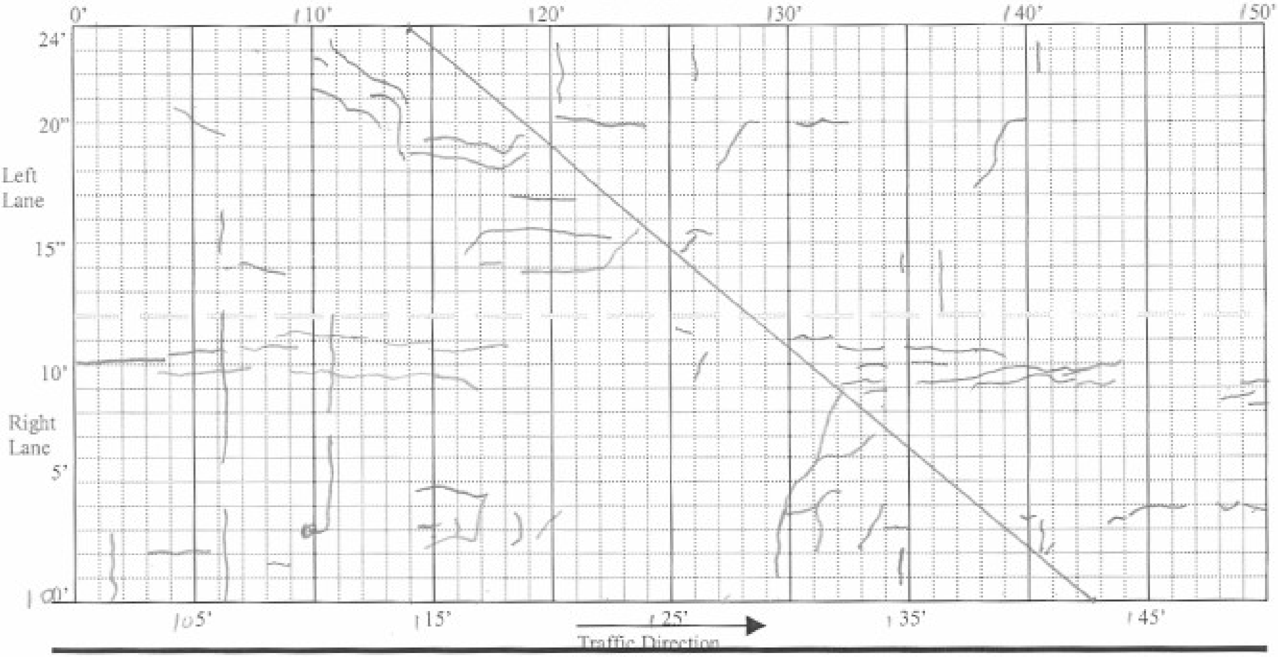


COMMEMTS: All cracks were in the very low severity range and are hairline cracks as indicated on the crack map.

Project No. TRC9902 **Project Name:** Curing Procedures of Bridge Decks **Surveyor:** M. [signature]

Log Mile: ________ **Route:** 10 **Section:** ____ **Location:** Adona **Date:** 5-26-04

Begin LM________ End LM________.



S
E W
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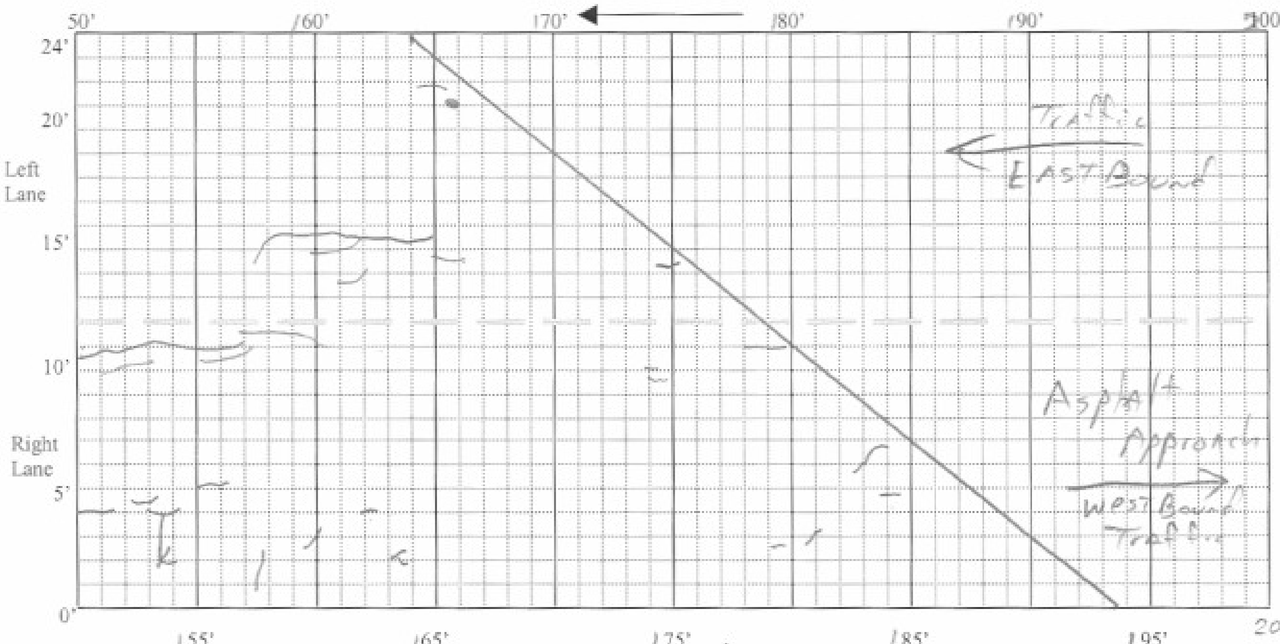


WEST END of Bridge

COMMEMTS: ALL CRAcks were very Low severity, hair line Cracks As indicated on Crack MAP.

Morgan Bridge

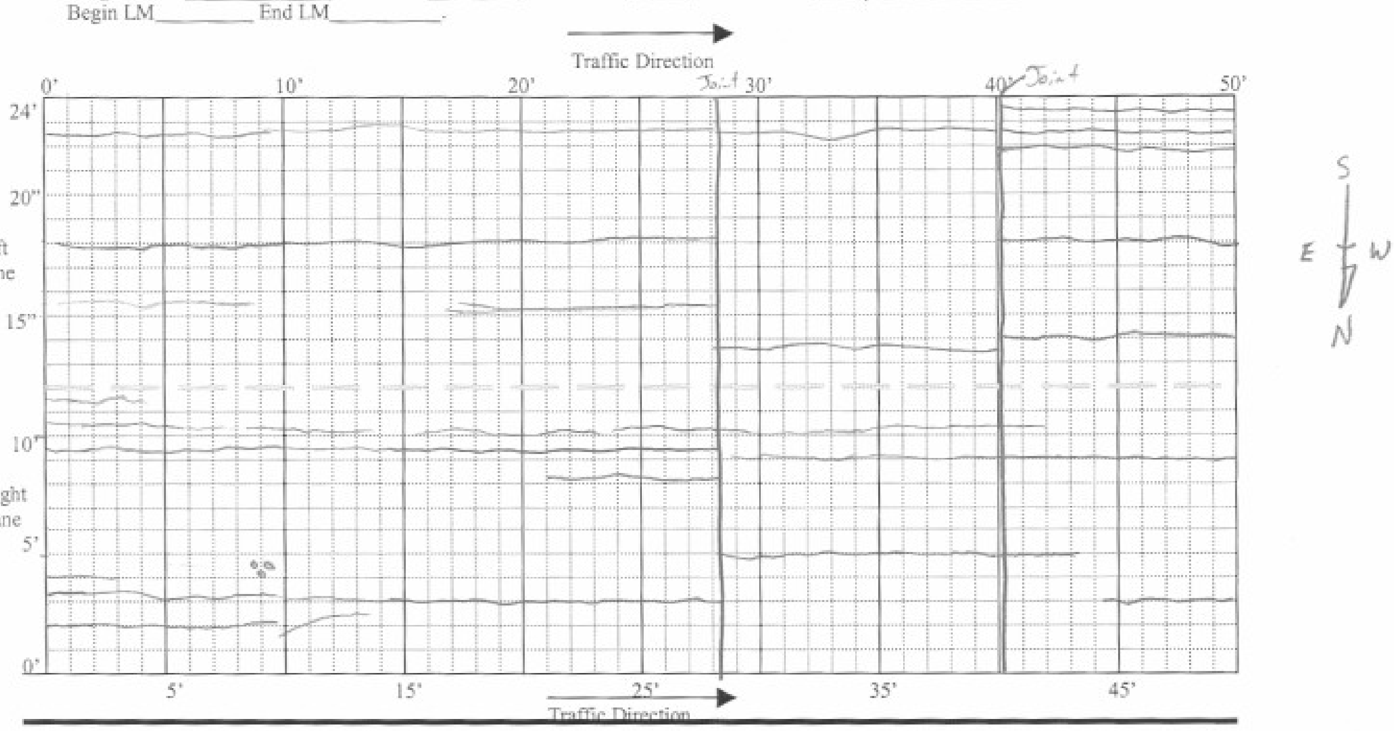
4-year Manual Distress Survey

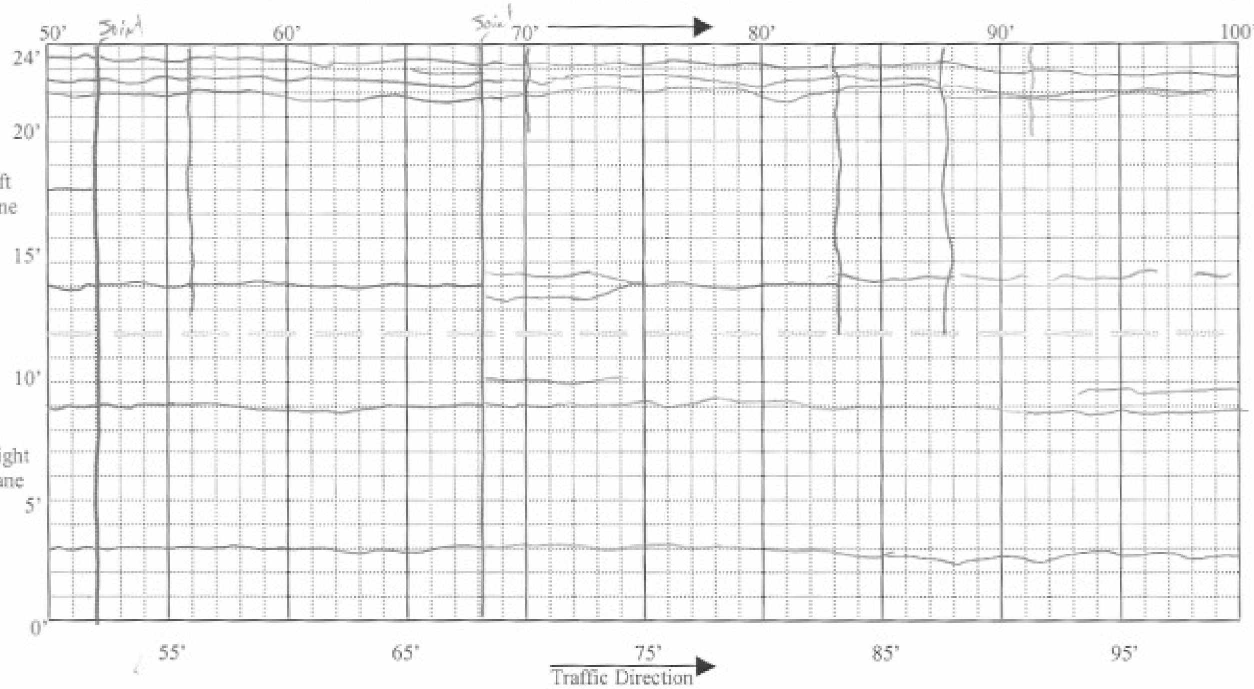
Project No. TRC9902 **Project Name:** Curing Procedures **Surveyor:** M. Sherwood

Log Mile: ______ **Route:** 365 **Section:** ____ **Location:** Morgan **Date:** 5-26-04

Begin LM________ End LM__________.

East End of Bridge



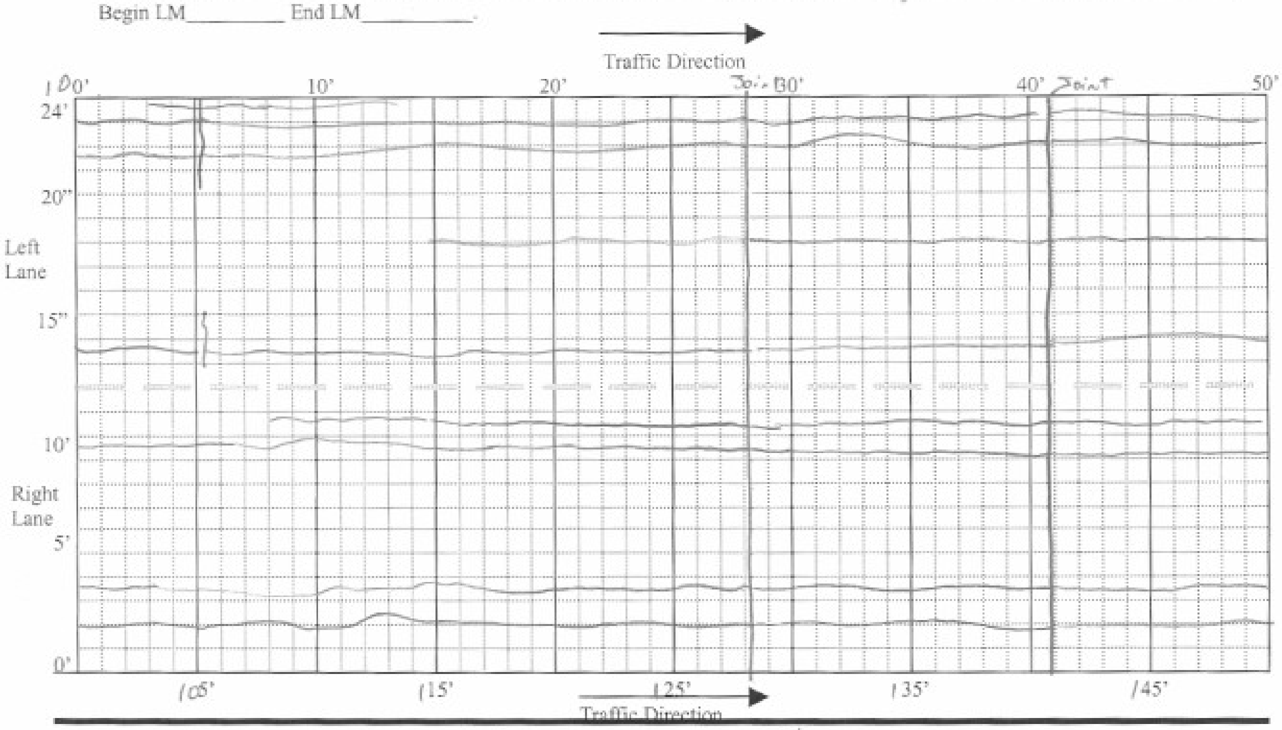


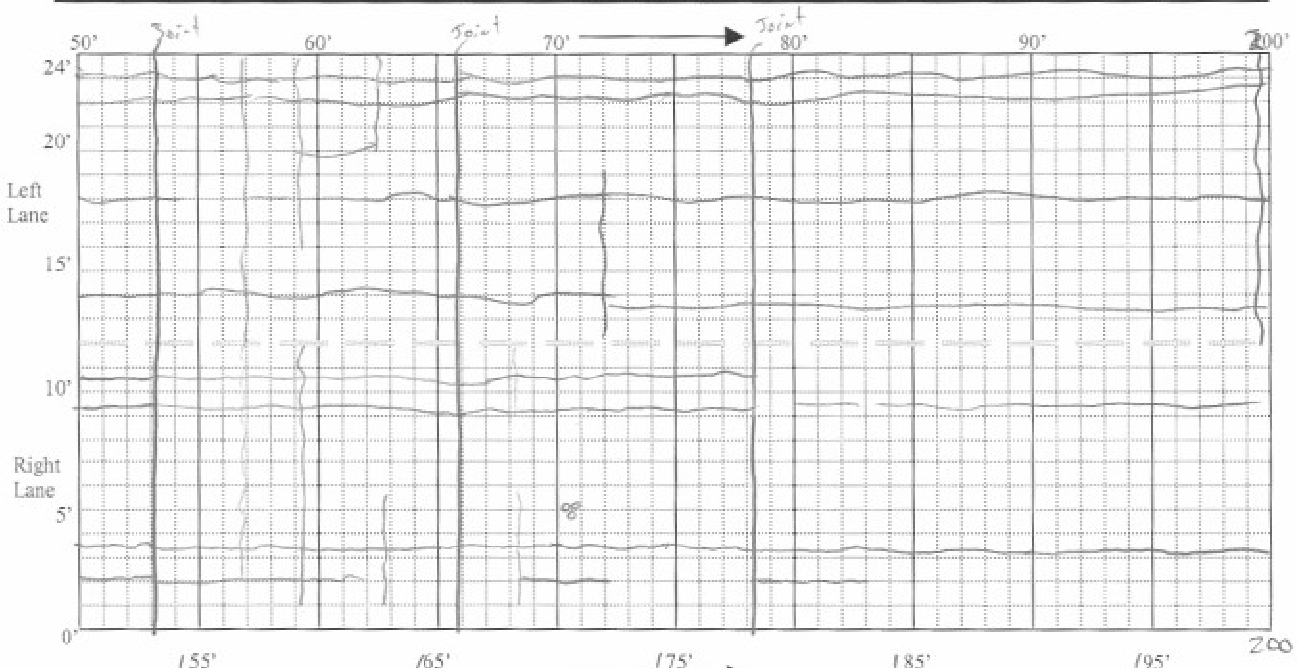
COMMEMTS:____

Project No. TRC9902 **Project Name:** Curing Procedures **Surveyor:** M. [illegible]

Log Mile: ______ **Route:** 365 **Section:** ____ **Location:** Morgan **Date:** 5-26-04

Begin LM________ End LM________



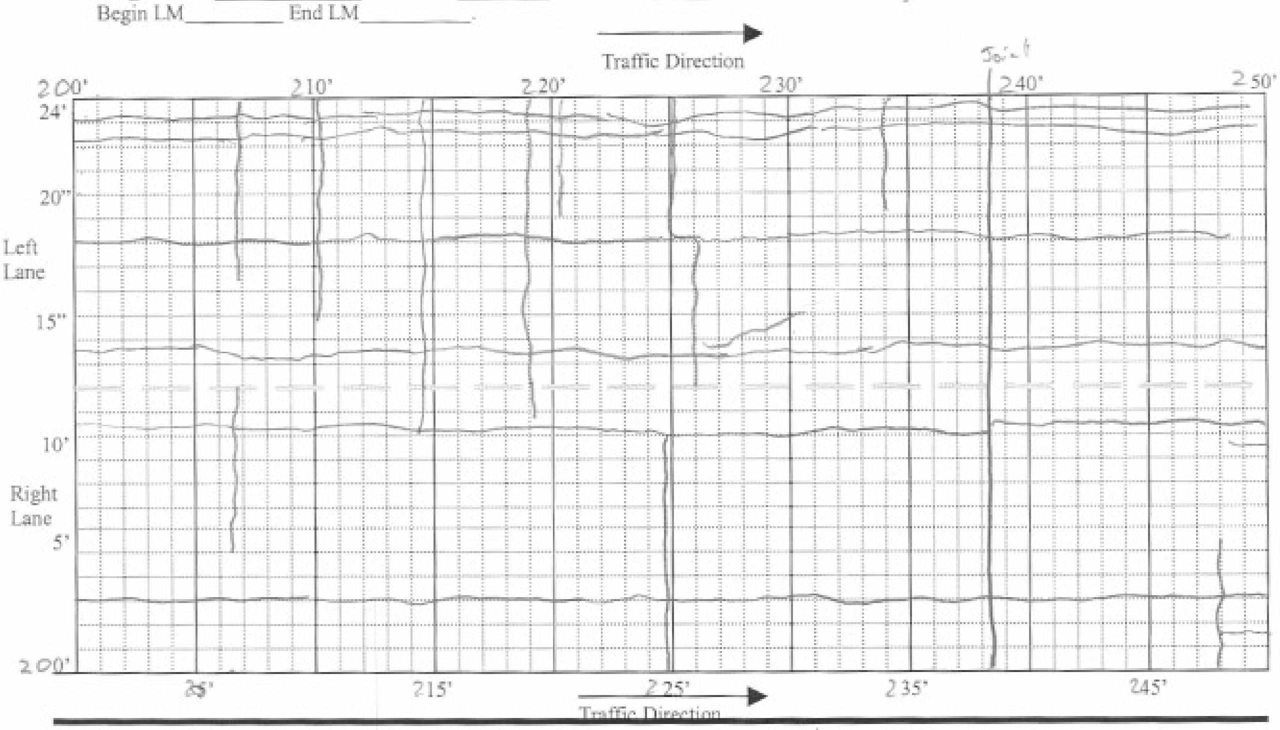


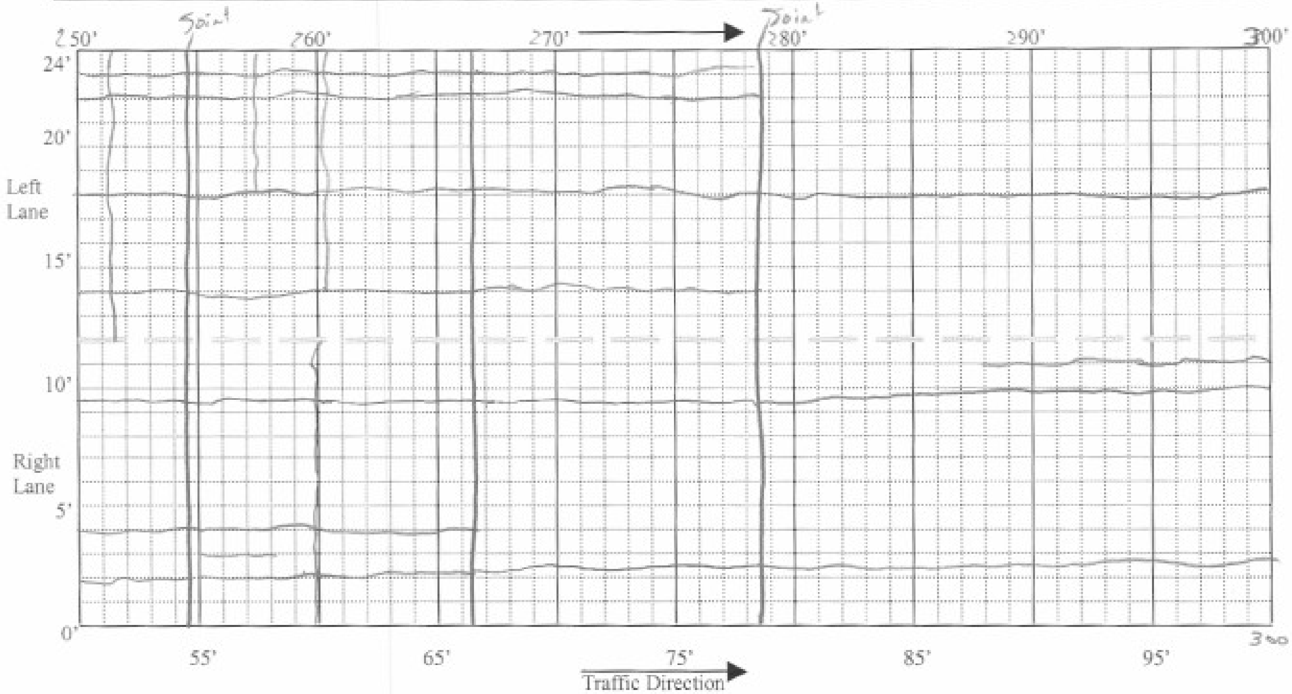
COMMEMTS:

Project No. TRC9902 **Project Name:** Curing Procedures **Surveyor:** M [illegible]

Log Mile: ________ **Route:** 365 **Section:** _____ **Location:** Morgan **Date:** 5-26-04

Begin LM________ End LM__________.



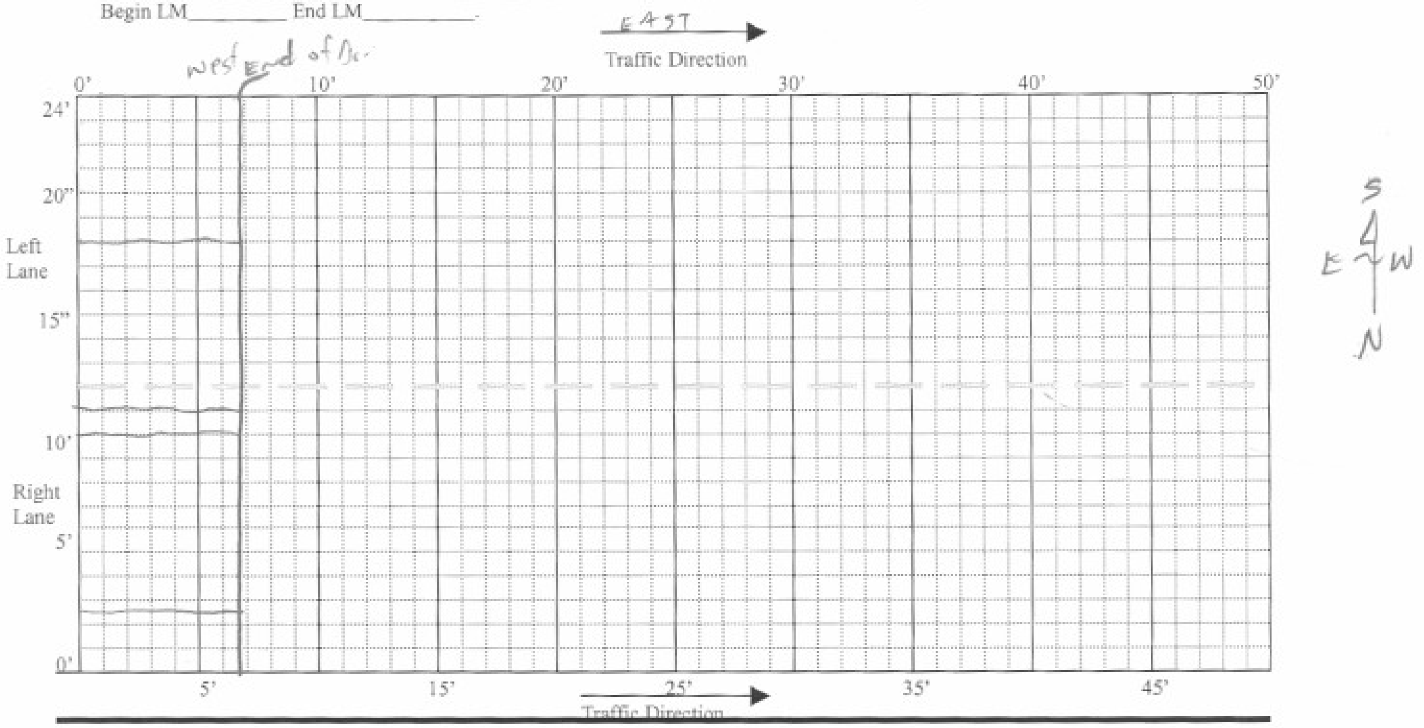


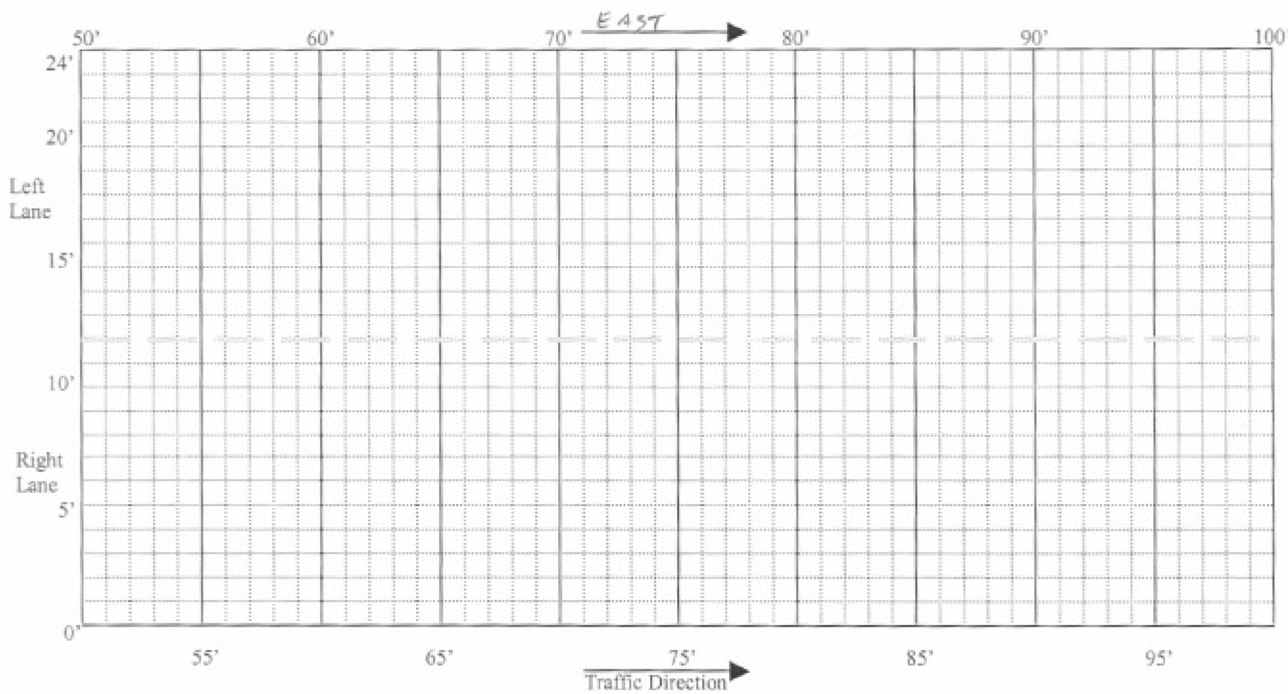
COMMEMTS:____

Project No. JRC4902 **Project Name:** Curing Procedures **Surveyor:** M. [illegible]

Log Mile: ____ **Route:** 365 **Section:** ____ **Location:** Morgan **Date:** 5-26-04

Begin LM________ End LM________



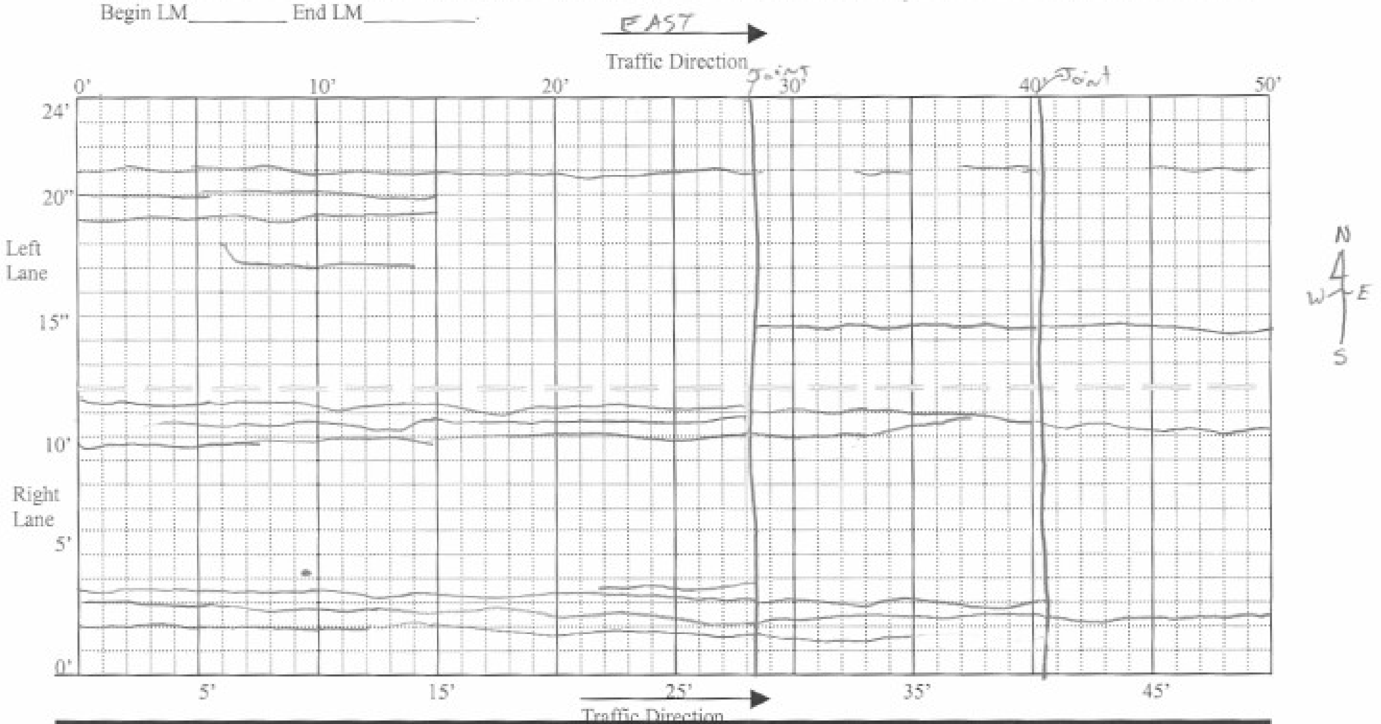


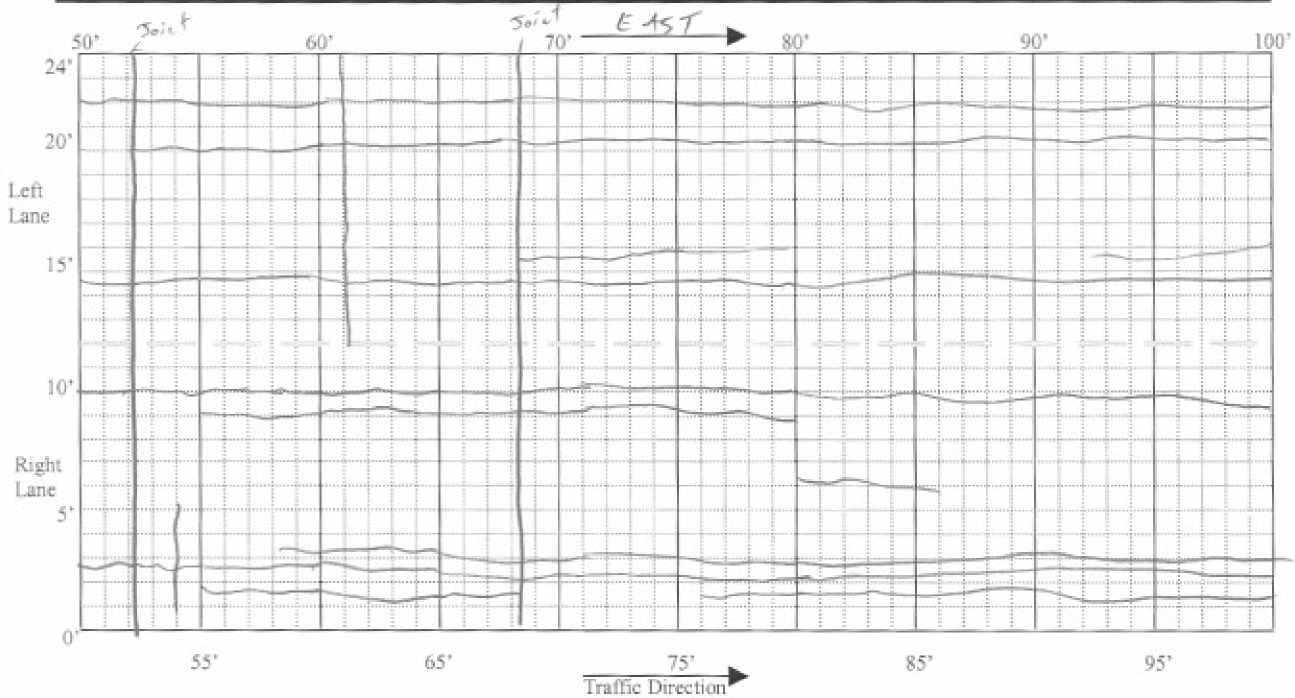
COMMEMTS:____

Project No. TRC9902 **Project Name:** Curing Procedures **Surveyor:** M. Green

Log Mile: ______ **Route:** 365 **Section:** ____ **Location:** Morgan **Date:** 5-26-04

Begin LM________ End LM__________.



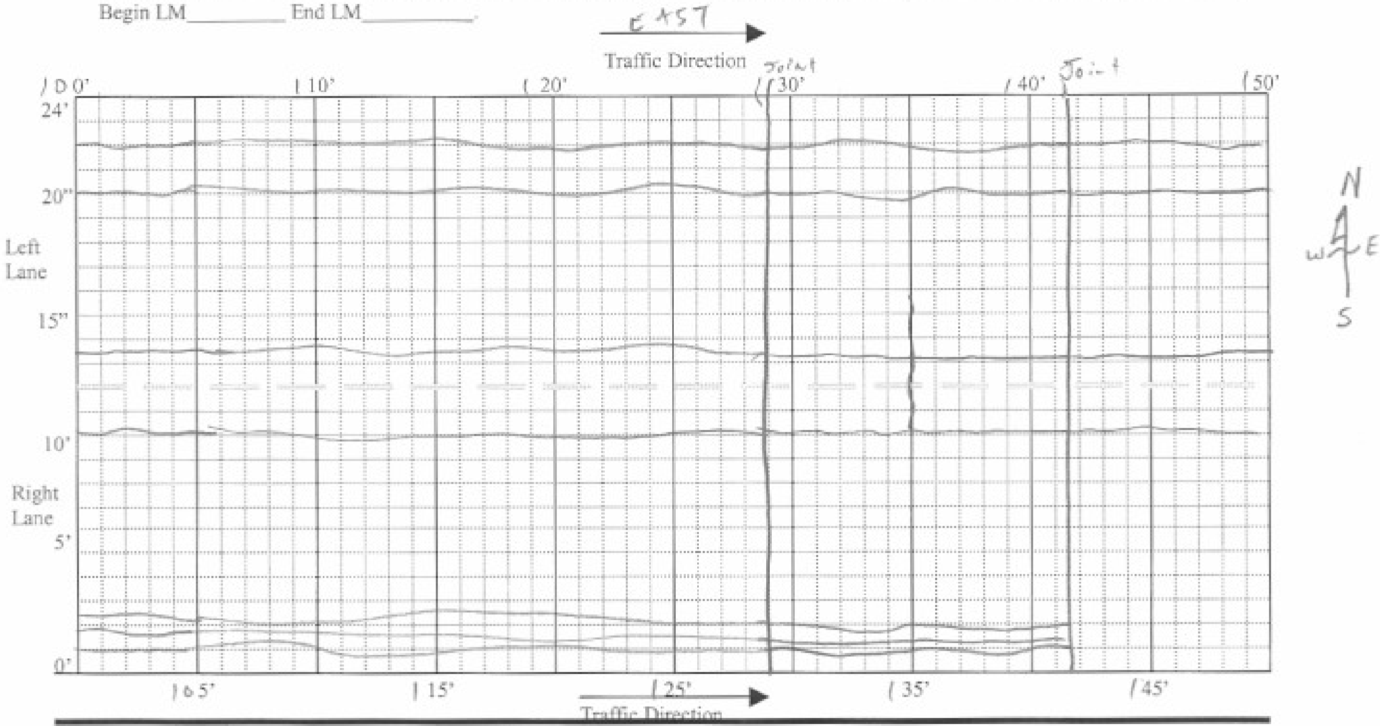


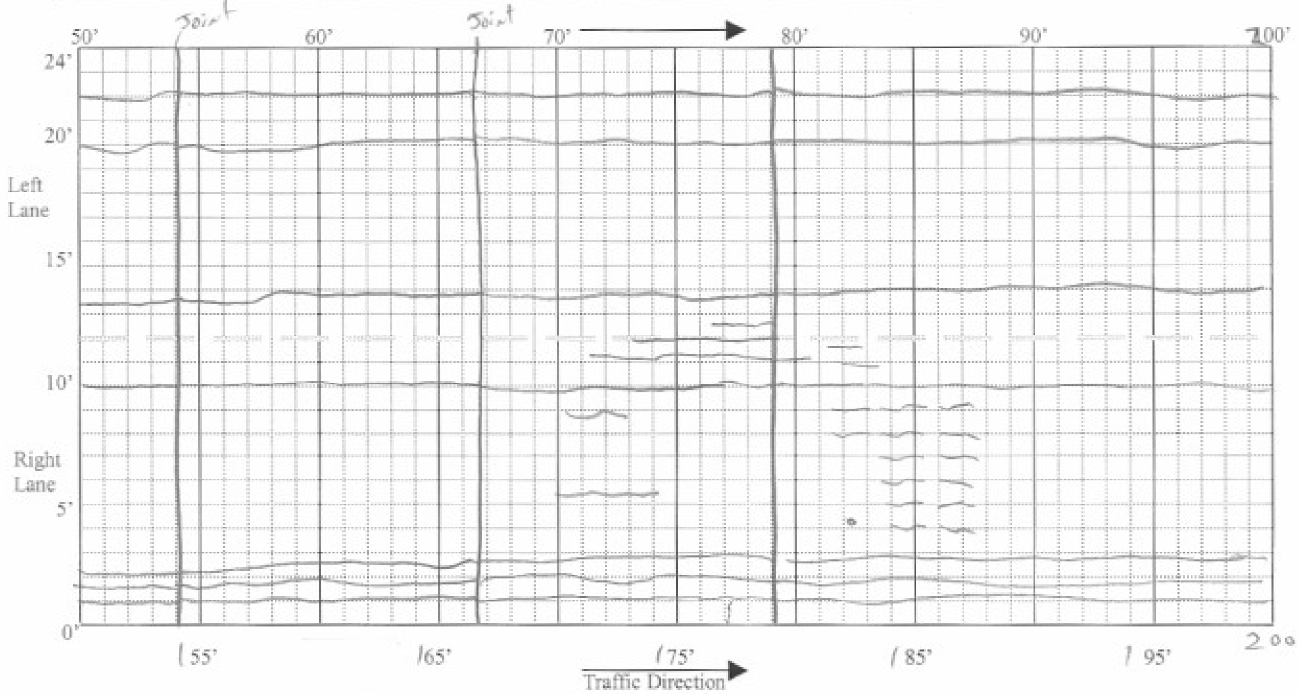
COMMEMTS: ____

Project No. TRC9902 **Project Name:** Bridgedeck Curing Procedures **Surveyor:** M. [illegible]

Log Mile: ____ **Route:** 365 **Section:** ____ **Location:** Morgan **Date:** 5-26-04

Begin LM________ End LM__________.





COMMEMTS:

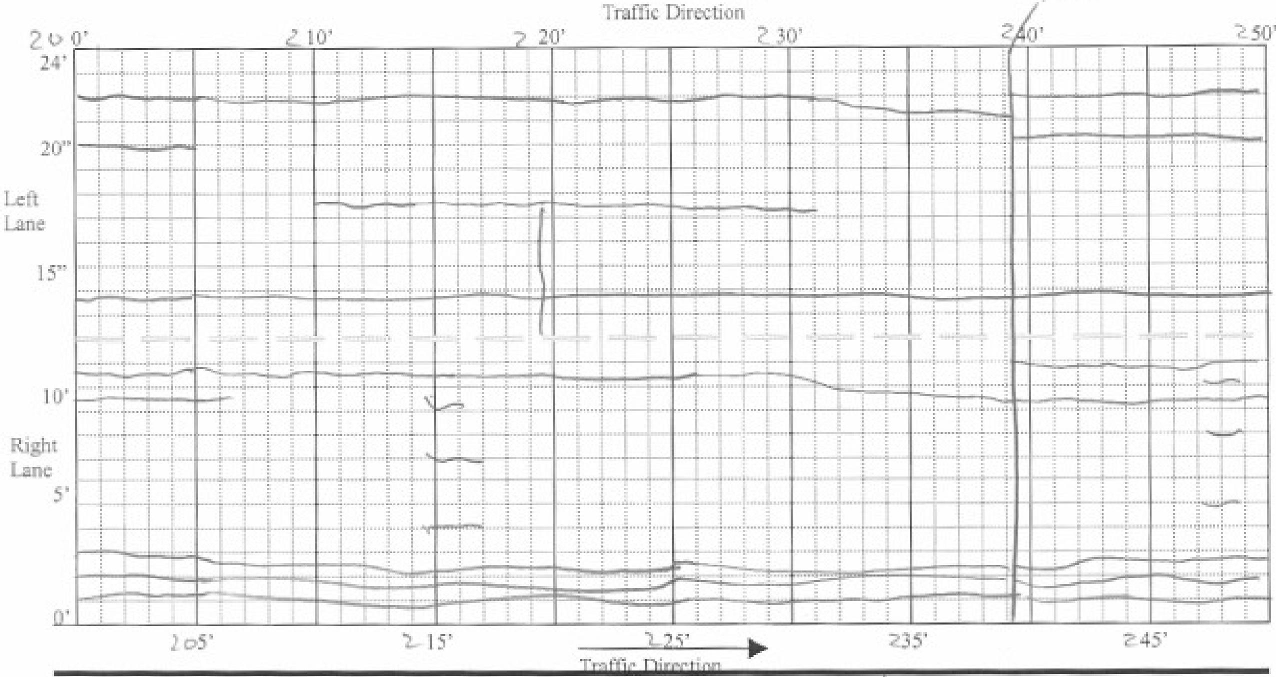
Project No. TRC9902 **Project Name:** Curing Procedures **Surveyor:** M [illegible]

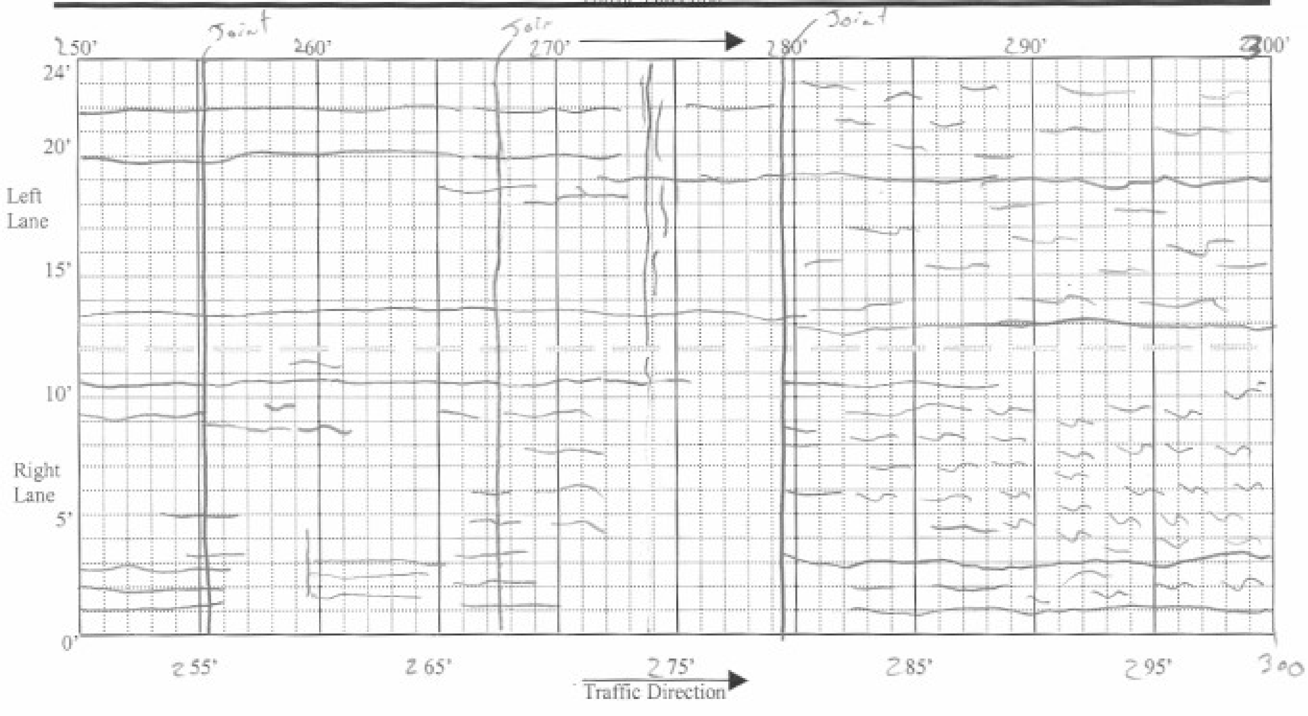
Log Mile: ________ **Route:** 365 **Section:** ____ **Location:** Morgan **Date:** 5-28-04

Begin LM________ End LM__________

EAST

Traffic Direction





COMMEMTS:

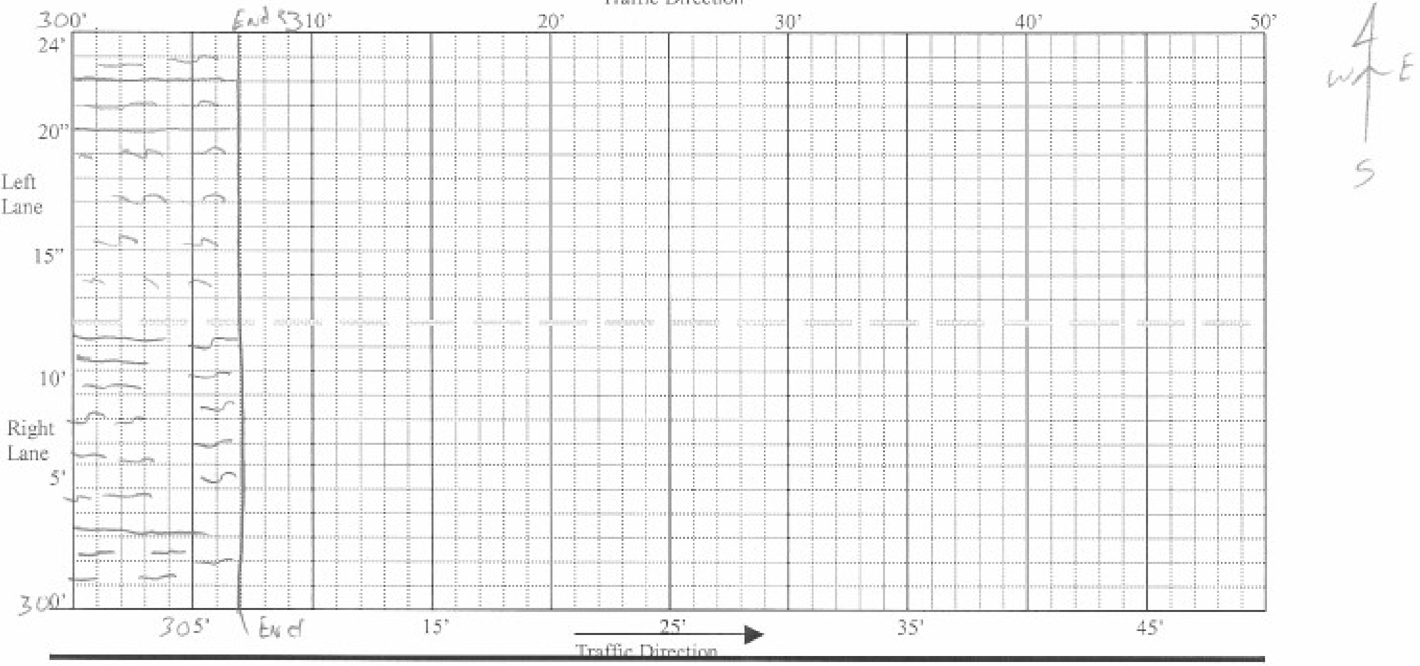
Project No. TRC9902 **Project Name:** Curing Procedures **Surveyor:** M. [illegible]

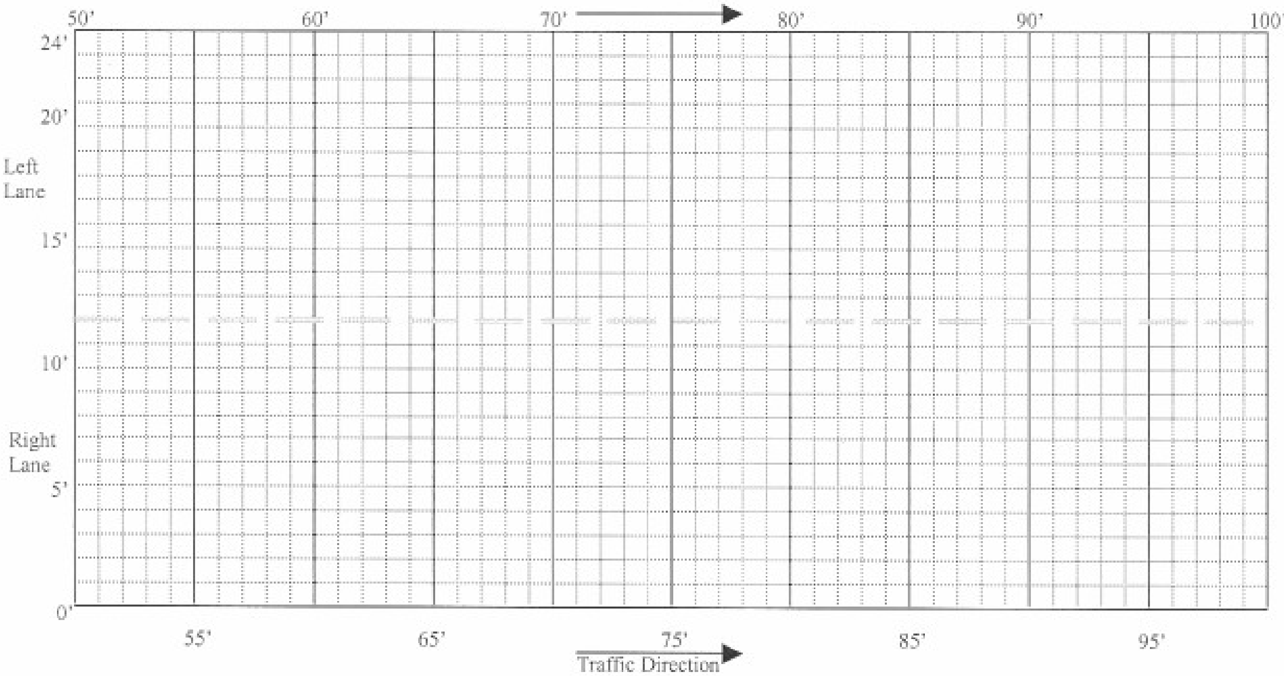
Log Mile: ____ **Route:** ____ **Section:** ____ **Location:** Morgan **Date:** 5-26-04

Begin LM____ End LM____.

EAST

Traffic Direction





COMMEMTS: ______________________________