PRODUCTION OF ASPHALT RUBBER CONCRETE BY THE DRY PROCESS

CONSTRUCTION REPORT
IOWA DEPARTMENT OF TRANSPORTATION
PROJECT HR-1062

APRIL 1994

Highway Division

Iowa Department of Transportation

Construction Report
for
Iowa Department of Transportation
Project HR-1062

Production of Asphalt Rubber Concrete by the Dry Process

by

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TECHNICAL REPORT TITLE PAGE

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Production of Asphalt Rubber Concrete by the Dry Process Shelby County	Construction Report 5-93 to 4-94
5. AUTHOR(S)	**6. PERFORMING ORGANIZATION ADDRESS**
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7. ACKNOWLEDGEMENT OF COOPERATING ORGANIZATIONS

8. ABSTRACT

Disposal of used tires has been a problem throughout the United States.

The 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) requires the use of recycled rubber in asphalt concrete starting in FY94. A moratorium has delayed this requirement until FY95.

The Iowa DOT has researched six projects using crumb rubber modifier in asphalt concrete using the wet process. This process involves using a blender-reactor to blend the asphalt cement and crumb rubber. Using the wet process the asphalt cement has to reach a hotter temperature, than is normally required, for reaction to occur. The wet process is also much more expensive than conventional asphalt.

This research deals with using a dry process to incorporate crumb rubber into the asphalt concrete mix.

The project was constructed by Western Engineering of Harlan, Iowa on IA 37 between Earling, Iowa and US 59. It was completed in September 1993. Western Engineering used a double drum mixer to produce the crumb rubber modified asphalt concrete by the dry process.

The production and construction went well with minor difficulty and the dry process is a less expensive procedure for producing crumb rubber modified asphalt concrete.

9. KEY WORDS	10. NO. OF PAGES
Asphalt rubber concrete Crumb rubber modifier Dry process, Tire recycling	50

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DISCLAIMER

INTRODUCTION

Disposal of used tires has been a problem throughout the United States. Various ways to recycle these tires have been researched. Many states, including Iowa, have experimented with using crumb rubber modifier (CRM) in asphalt concrete.

In 1991 the Intermodal Surface Transportation Efficiency Act (ISTEA) went into effect. It requires the use of recycled rubber in asphalt cement. It was to start in fiscal year 1994 with 5% of all federally funded projects to contain CRM but a moratorium was given for that year, so it will now start in FY95 with 10%. It then goes to 15% in 1996 and 20% in 1997. These percentages are based on using 20 lb. (9 kg) of CRM per ton (0.9 megagram) of mix.

The Iowa DOT has completed six projects using CRM in the wet process. This process involves blending and reacting the CRM with the asphalt cement at approximately 350°F (177 C) before adding it to the aggregate. This project researches the use of CRM by a dry process. Using this process, the fine CRM is added to the aggregate and then mixed with the asphalt cement. No special blender-reactor is needed with this process. It appears to be a simpler and less expensive method of adding CRM.

OBJECTIVE

The objective of this research is to evaluate the cost, production process and performance of crumb rubber modified concrete produced by adding finely ground CRM by the dry process.

LOCATION

This project is located in Shelby County on IA 37 between the town of Earling and US 59. The location of the research sections are listed in Table I.

Table I

Section 1	CRM in 3 lifts	1153+95 to 1186+11 EB 1170+50 to 1183+50 WB
Section 2	CRM Surface Only Conventional in 1st & 2nd lifts	1183+75 to 1194+40 WB
Section 3	Conventional Control	1125+00 to 1145+00 EB 1125+00 to 1160+00 WB

MATERIALS

The 3/4" (19 mm) and 1/2" nominal (13.2 mm) stone was produced at Schildberg in Atlantic with part of the 1/2" nominal (13.2 mm) coming from Schildberg in Jefferson. The sand was produced at the Hallett Pit in Harlan. Recycled Asphalt Product (RAP) was used in the 1st lift of asphalt concrete. The RAP was from the Iowa DOT maintenance garage in Harlan. The asphalt cement was purchased from Coastal in El Dorado, Kansas. An AC-10 was used in the first lift with AC-5 used in the 2nd lift and the surface course. The CRM on this project was a GF-80 purchased from Rouse Rubber Industries in Vicksburg, Mississippi.

MIX DESIGN & LAB RESULTS

The binder courses were 3/4" nominal (19 mm) mixes and the surface course was a 1/2" nominal (13.2 mm) mix. The first lift placed had 15% RAP in the mix. AC-10 was used in this lift also. The second lift and the surface contained no RAP and AC-5 was used in the mix. In all three lifts when CRM was used, it was added at a rate of 20 lb (9 kg) per ton (0.9 megagram).

The intended total percent of asphalt cement in the binder courses was 5.7%. At one point due to low voids, it was lowered to 5.4% but was raised back to 5.7% because the voids went too high. The surface had an intended AC content of 5.3%. The same percentages of asphalt cement were used on the CRM and conventional mixes.

The average densities and the percentage of voids were very similar between the CRM and conventional mixes throughout the project. These results can be found on the daily reports in Appendix B.

PRODUCTION

Western Engineering of Harlan, Iowa, the contractor, completed the project in September 1994. Western has an Astec double barrel drum mixer that was used on the project.

The CRM asphalt concrete was produced by adding the crumb rubber into the mix with the baghouse fine return. It then entered the outside compartment of the drum and mixed with the aggregate and was then combined with the asphalt cement.

The CRM was transported in a tanker and blown into a silo at Western's plant.

Everything about the dry process was much simpler than the wet process. With the wet process there was a delay while the reactor-blender had to heat back up after a shutdown. With the dry process the crumb rubber could be turned off and on as needed with no delay.

Production amounts were the same with the CRM and the conventional mixes running approximately 300 ton (270 megagram) per hour.

CONSTRUCTION

Construction went well on this project. The odor of the rubber was strong as it has been on all the CRM projects to date.

A steel drum roller had to be used on the CRM sections. This is true on all crumb rubber projects due to the fact the CRM mix clings to rubber tired rollers.

The asphalt concrete was placed in 3 lifts, each being 1½" (38 mm) thick, amounting to a 4½" (114 mm) overlay.

COST

This project was not originally bid as a CRM project. Western Engineering proposed to try the dry process so the Iowa Highway Research Board granted a staff action to do this.

Western was given a lump sum of $20,000 to complete approximately one mile using CRM asphalt concrete. For this reason, the cost of the CRM asphalt concrete in this project is approximate.

The conventional mix was bid at $19.30 per ton, i.e., $21.27 per megagram, of surface mix and $17.30 per ton, i.e., $19.07 per megagram, of binder mix.

The mobilization for the crumb rubber using the dry process would be very minimal. The only substantial increase in price of the mix would be the cost of the crumb rubber, which was $.35 per pound, i.e., $.0.77 per kilogram. Adding it at a rate of 20 lbs. (9 kg) per ton (0.9 megagram) made an addition of $7.00 per ton ($7.72 per megagram) to the price of the mix. It appears as though adding CRM would increase the mix price 36% to 40%.

EVALUATION

A visual inspection and crack survey of the project will be conducted annually. Also Road Rater testing and friction testing will be done on an annual basis for four years.

Road Rater and friction testing were performed shortly after construction. These results are in Appendix C. So far all sections seem to be performing equally.

CONCLUSIONS

From this project the following conclusions can be made:

1. Using a double drum or batch plant, the contractor does not need the special blender or reaction equipment required to produce CRM asphalt concrete in the wet process.
2. With the dry process, the asphalt cement does not need to be heated to a higher temperature.
3. The dry process can produce CRM asphalt concrete with minor difficulty and is less expensive than the wet process.
4. The contractor can easily change from a conventional mix to a CRM mix using the dry process.

ACKNOWLEDGEMENTS

Appreciation is extended to the efforts put forth by Western Engineering of Harlan, Iowa for their cooperation in this research study. Also to the Iowa DOT Council Bluffs Residency Construction Office for their help in obtaining data on this project.

Appendix A
Contract & Preliminary Work

FO67 (Form 650019)
7-92

CONTRACT NUMBER 35152

County: SHELBY Project Number: STP-37-4(14)--2C-83
Letting Date: NOVEMBER 10, 1992 Engineer: COUNCIL BLUFFS RCE 524200
Cost Center: 611000 Object Code: 893 Milepost: 36.12 TO 40.22
Type of Work: ASPH CEMENT CONC RESURFACING Miles: 4.0760

ON IOWA 37 FROM THE JUNCTION OF IOWA 191 IN THE TOWN OF EARLING, EASTERLY TO THE JUNCTION OF U.S. 59.

This agreement made and entered by and between the IOWA DEPARTMENT OF TRANSPORTATION, AUSTIN TURNER, DOUGLAS SHULL, ROBERT H. MEIER, CATHERINE DUNN, MARLIN VOLZ JR., JANICE JOHNSON, AND BONNIE VETTER, CONTRACTING AUTHORITY, AND WESTERN ENGINEERING CO., INC. OF HARLAN, IOWA, (00048600), CONTRACTOR.

It is agreed that the notice and instructions to bidders, the proposal filed by the Contractor, the specifications, the plan, if any, for project STP-37-4(14)--2C-83, together with Contractor's performance bond, are made a part hereof and together with this instrument constitute the contract. This contract contains all of the terms and conditions agreed upon by the parties hereto. A true copy of said plan is now on file in the office of the Contracting Authority under date of NOVEMBER 5, 1992.

The specifications consist of the 1992 general specifications of the Iowa Department of Transportation plus the following supplemental specifications and special provisions:

FHWA-1273 08/01/89, SS- 964 07/31/84, SS-5003 05/01/90, SS-5045 07/14/92, SS-5050 07/14/92, SS-5055 07/14/92, SS-5060 07/14/92

Contractor, for and in considerations of $****559,220.18, payable as set forth in the specifications consitituting a part of this contract, agrees to construct various items of work and/or provide various materials or supplies in accordance with the plans and specifications therefore, and in the locations designated in the Notice to Bidders.

Contractor certifies by signature on this contract, under pain of penalties for false certification, that the contractor has complied with Iowa Code Section 324.17(8) as amended, if applicable, and Iowa Code Section 91C.5 (Public Registration Number), if applicable.

In consideration of the foregoing, Contracting authority hereby agrees to pay the Contractor promptly and according to the requirements of the specifications the amounts set forth, subject to the conditions as set forth in the specifications.

It is further understood and agreed that the above work shall be commenced or completed in accordance with the following schedule:

Group or Division No.	Construction Period		Working Days	Liquidated Damages Per Day
	LATE START DATE	08/30/93	40	$400.00

Time is the essence of this contract. To accomplish the purpose herein expressed, Contracting authority and Contractor have signed this and one other identical instrument as of the _____ day of _____.

IOWA DEPARTMENT OF TRANSPORTATION

By _____
Contracting Authority

WESTERN ENGINEERING CO., INC.

By _____ _____
Contractor

FCEE Form 65013 ... 2-82

CONTRACT PRICES

Proposal ID Number: 921330 CONTRACT NUMBER 35152 Bid Order Number: 40

Contractor's Number: 00048600 County: SHELBY Page Number: 1

Project Number: STP-37-4(14)--2C-83 Type of Work: ASPH CEMENT CONC RESURFACING

Line Number	ITEM	Item Quantity and Units	Unit Price Dollars X,XXX.XXX Cents XXXX	Amount Dollars XX,XXX,XXX Cents XX
0010	ASPHALT CEMENT CONCRETE, TYPE A SURFACE COURSE, MIXT. SIZE 1/2 IN.	5288.000 TONS	19.3000	102,058.40
0020	ASPHALT CEMENT CONCRETE, TYPE B BINDER COURSE, MIXT. SIZE 3/4 IN.	6252.000 TONS	17.3000	108,159.60
0030	CURB & GUTTER, P.C. CONCRETE 2.5 FT.	727.000 LINEAR FT.	25.5000	18,538.50
0040	PAVED SHOULDERS, AS PER PLAN	190.000 SQ. YDS.	21.5000	4,085.00
0050	ASPHALT CEMENT	677.000 TONS	113.0000	76,501.00
0060	PRIMER OR TACK-COAT BITUMEN	6196.000 GALLONS	0.7500	4,647.00
0070	PATCHES, FULL-DEPTH FINISH, BY AREA	4.000 SQ. YDS.	1400.0000	5,600.00
0080	PATCHES, FULL-DEPTH FINISH, BY COUNT	36.800 ONLY	25.2500	929.20
0090	JOINT ASSEMBLY, EF	4.000 ONLY	205.0000	820.00
0100	PATCHES, SURFACE	8.000 TONS	110.0000	880.00
0110	BASE, CLEANING & PREPARATION OF	4.076 MILES	1180.0000	4,809.68
0120	PAVEMENT SCARIFICATION	3508.000 SQ. YDS.	2.5500	8,945.40
0130	SHOULDERS, GRANULAR, TYPE B	8805.000 TONS	14.3500	126,351.75
0140	RAIL, CONCRETE BARRIER (CAST-IN-PLACE)	268.500 LINEAR FT.	48.5000	13,022.25
0150	REMOVALS, AS PER PLAN	1.000 LUMP SUM	2525.0000	2,525.00
0160	REMOVAL OF GUARDRAIL	500.000 LINEAR FT.	2.0500	1,025.00
0170	REMOVAL OF POSTS	82.000 ONLY	2.0500	168.10
0180	REMOVAL OF GUARDRAIL END ANCHORAGE	4.000 ONLY	101.0000	404.00
0190	GUARDRAIL, POSTS, BEAM	56.000 ONLY	46.2500	2,590.00
0200	GUARDRAIL, FORMED STEEL THRIE BEAM	125.000 LINEAR FT.	14.1500	1,768.75
0210	GUARDRAIL, END ANCHORAGES, BEAM, RE-52	4.000 ONLY	405.0000	1,620.00

CONTRACT PRICES

Proposal ID Number: 921330 CONTRACT NUMBER 35152 Bid Order Number: 40

Contractor's Number: 00048600 County: SHELBY Page Number: 2

Project Number: STP-37-4(14)--2C-83 Type of Work: ASPH CEMENT CONC RESURFACING

Line Number	ITEM	Item Quantity and Units	Unit Price Dollars X,XXX,XXX	Unit Price Cents XXXX	Amount Dollars XX,XXX,XXX	Amount Cents XX
	(CONTINUED)					
0220	GUARDRAIL, FORMED STEEL BEAM	200.000 LINEAR FT.	10.1500		2,030.00	
0230	GUARDRAIL, END ANCHORAGES, BEAM, RE-69	4.000 ONLY	305.0000		1,220.00	
0240	OBJECT MARKER, TYPE 3	4.000 ONLY	81.0000		324.00	
0250	OBJECT MARKER, TYPE 2	8.000 ONLY	20.0000		160.00	
0260	DELINEATORS, SINGLE WHITE	14.000 ONLY	20.0000		280.00	
0270	EMBANKMENT-IN-PLACE	227.000 CUBIC YDS.	11.2500		2,553.75	
0280	EXCAVATION, CLASS 13, FOR WIDENING	253.000 CUBIC YDS.	10.8500		2,745.05	
0290	SEWER, 2000D STORM, 24 IN. DIA.	16.000 LINEAR FT.	56.5000		904.00	
0300	APRONS, CONCRETE, 24 IN. DIA.	1.000 ONLY	354.0000		354.00	
0310	INTAKE, RA-3	1.000 ONLY	2420.0000		2,420.00	
0320	FABRIC REINFORCEMENT	497.000 SQ. YDS.	4.8000		2,385.60	
0330	TEMPORARY TRAFFIC SIGNALS	1.000 ONLY	4100.0000		4,100.00	
0340	PAINTED PAVEMENT MARKING	919.000 STAS.	9.0000		8,271.00	
0350	PAVEMENT MARKING REMOVED	11.500 STAS.	63.0000		724.50	
0360	SAMPLES	1.000 LUMP SUM	1500.0000		1,500.00	
0370	TRAFFIC CONTROL	1.000 LUMP SUM	16500.0000		16,500.00	
0380	PAINTED SYMBOLS AND LEGEND	4.000 ONLY	100.0000		400.00	
0390	PATCHES, FULL-DEPTH REPAIR	6.130 SQ. YDS.	205.0000		1,256.65	
0400	PATCHES BY COUNT (REPAIR)	1.000 ONLY	353.0000		353.00	
0410	FIELD LABORATORY	1.000 ONLY	1090.0000		1,090.00	
0420	FLAGGERS	120.000 DAYS	135.0000		16,200.00	
0430	PILOT CARS	20.000 DAYS	200.0000		4,000.00	

FDEE Form 850031 2-93

CONTRACT PRICES

Proposal ID Number: 921330 CONTRACT NUMBER 35152 Bid Order Number: 40

Contractor's Number: 00048600 County: SHELBY Page Number: 3

Project Number: STP-37-4(14)--2C-83 Type of Work: ASPH CEMENT CONC RESURFACING

Line Number	ITEM	Item Quantity and Units	Unit Price Dollars X,XXX.XXX	Unit Price Cents XXXX	Amount Dollars XX,XXX.XXX	Amount Cents XX
	(CONTINUED)					
0440	MOBILIZATION	1.000 LUMP SUM	4000.0000		4,000.00	
	****** TOTAL FOR CONTRACT				$559,220.18	
					(LAST PAGE)	

DPM 955

IOWA DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
OFFICE OF MATERIALS
PROPORTIONS & PRODUCTION LIMITS FOR AGGREGATES

COUNTY: SHELBY PROJECT NO.: STP-37-4(14)--2C-83 DATE: 08/16/93

PROJECT LOCATION: ON 37 FROM EARLING EAST TO 59

TYPE OF MIX: A CLASS OF MIX: COURSE: SURFACE MIX SIZE: 1/2"

CONTRACTOR: WESTERN ENGR. TRAFFIC: 1050 A.D.T.

MATERIAL	IDENT #	% IN MIX	PRODUCER & LOCATION
1/2" STONE CL	SWI3-26-1	10	SCHILDBERG CRESCENT A78002
1/2" STONE DST	SWI3-26-2	50	SCHILDBERG CRESCENT A78002
SAND	SWI3-26-3	40	HALLETT HARLAN A83504

TYPE AND SOURCE OF ASPHALT CEMENT: AC-10 COASTAL

GRADATION OF INDIVIDUAL AGGREGATE SAMPLES (Typical, Target, or Average)

MATERIAL	SIEVE ANALYSIS -% PASSING 1-1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
1/2" STONE CL	100	100	100	99	84	28	14	8.5	6.7	6.0	5.5	5.0
1/2" STONE DST	100	100	100	99	80	44	28	18	13	11	8.9	7.6
SAND	100	100	100	100	100	97	88	75	50	15	1.7	0.8

PRELIMINARY JOB MIX FORMULA TARGET GRADATION

LERANCE COMB GRADING	100	100	100	92/100 99	7 88	7 64	5 51	40	4 27	12	5.7	2 4.6
SURFACE AREA C. S.A. SQ. FT./LB.		TOTAL 26.72			+2.0	0.02 1.3	0.04 2.0	0.08 3.2	0.14 3.8	0.30 3.6	0.60 3.4	1.60 7.4

PRODUCTION LIMITS FOR AGGREGATES APPROVED BY THE CONTRACTOR/PRODUCER

SIEVE SIZE	10.00% 1/2" STONE CL MIN	MAX	50.00% 1/2" STONE DST MIN	MAX	40.00% SAND MIN	MAX	MIN	MAX	MIN	MAX
1	100.0	100.0	100.0	100.0	100.0	100.0				
3/4	100.0	100.0	100.0	100.0	100.0	100.0				
1/2	98.0	100.0	97.0	100.0	100.0	100.0				
3/8	76.0	90.0	73.0	85.0	100.0	100.0				
#4	21.0	35.0	37.0	51.0	90.0	100.0				
#8	9.0	19.0	23.0	33.0	83.0	93.0				
#30	3.0	11.0	9.0	17.0	42.0	52.0				
#200	2.0	5.0	4.0	8.0	0.0	1.5				

COMMENTS: COPIES: AMES, SAMSON, COOK, WESTERN, SCHILDBERG, HALLETT, SWI, WARM, REYNA, JOHNSON, ATL.LAB., FILE

The above data is furnished for informational purposes only. The Contracting Authority makes no representations as to accuracy, either express or implied, which are to be construed to relieve the Contractor from the responsibility to comply with the specifications.

Signed _____ Contractor/Producer

Signed _____ Dist. Matls. Engr.

FORM 955

IOWA DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
OFFICE OF MATERIALS
PROPORTIONS & PRODUCTION LIMITS FOR AGGREGATES

COUNTY: SHELBY PROJECT NO.: STP-37-4(14)--2C-83 DATE: 08/14/93

PROJECT LOCATION: ON IA. 37 FROM EARLING EAST TO US-59

TYPE OF MIX: B CLASS OF MIX: 1 COURSE: BINDER MIX SIZE: 3/4"

CONTRACTOR: WESTERN ENGR. TRAFFIC: 1050 A.D.T.

MATERIAL	IDENT #	% IN MIX	PRODUCER & LOCATION
RAP	ABC3-0009	15	STOCKPILE AT HARLAN MAINT 5.22% AC I-80
3/4" STONE	SWI3-25-1	16	SCHILDBERG ATLANTIC A15002 FULL BETHANY
1/2" STONE	SWI3-25-2	15	SCHILDBERG ATLANTIC A15002 FULL BETHANY
1/2" STONE	SWI3-25-3	14	SCHILDBERG JEFFERSON A01004 BOT BETHANY
SAND	SWI3-25-4	40	HALLETT MATLS. HARLAN A83504

TYPE AND SOURCE OF ASPHALT CEMENT: AC-10 COASTAL OIL

GRADATION OF INDIVIDUAL AGGREGATE SAMPLES (Typical, Target, or Average)

MATERIAL	SIEVE ANALYSIS -% PASSING 1-1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
RAP	100	100	100	97	85	65	51	38	28	18	13	10
3/4" STONE	100	100	98	54	21	5.0	2.8	2.5	2.4	2.3	2.2	2.1
1/2" STONE	100	100	100	100	97	54	21	13	10	9.0	8.0	7.0
1/2" STONE	100	100	100	100	97	52	20	11	8.2	7.2	6.5	5.9
SAND	100	100	100	100	100	97	88	75	50	15	1.7	0.8

PRELIMINARY JOB MIX FORMULA TARGET GRADATION

TOLERANCE / COMB GRADING			98/100	7	7	7	6		5			3
	100	100	100	92	84	65	49	40	27	11	5.0	4.0
SURFACE AREA C.		TOTAL				0.02	0.04	0.08	0.14	0.30	0.60	1.60
S.A. SQ. FT./LB.		25.05			+2.0	1.3	2.0	3.2	3.8	3.4	3.0	6.4

PRODUCTION LIMITS FOR AGGREGATES APPROVED BY THE CONTRACTOR/PRODUCER

SIEVE SIZE	15.00% RAP MIN	15.00% RAP MAX	16.00% 3/4" STONE MIN	16.00% 3/4" STONE MAX	15.00% 1/2" STONE MIN	15.00% 1/2" STONE MAX	14.00% 1/2" STONE MIN	14.00% 1/2" STONE MAX	40.00% SAND MIN	40.00% SAND MAX
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
3/4	100.0	100.0	97.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1/2	90.0	100.0	47.0	61.0	100.0	100.0	100.0	100.0	100.0	100.0
3/8	78.0	92.0	14.0	28.0	90.0	100.0	90.0	100.0	100.0	100.0
#4	58.0	72.0	0.0	12.0	47.0	61.0	45.0	59.0	90.0	100.0
#8	45.0	57.0	0.0	8.0	15.0	27.0	14.0	26.0	82.0	94.0
#30	23.0	33.0	0.0	7.0	5.0	15.0	3.0	13.0	42.0	52.0
#200	7.0	13.0	0.0	3.0	3.0	7.0	3.0	7.0	0.0	1.5

COMMENTS: COPIES: AMES, SAMSON, COOK, WESTERN, SCHILDBERG, HALLETT,W SWI, REYNA, JOHNSON, ATL. LAB., FILE

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Signed _____ Contractor/Producer

Signed _____ Dist. Matls. Engr.

FORM 955

IOWA DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
OFFICE OF MATERIALS
PROPORTIONS & PRODUCTION LIMITS FOR AGGREGATES

COUNTY: SHELBY PROJECT NO.: STP-37-4(14)--2C-83 DATE: 09/07/93

PROJECT LOCATION: ON 37 FROM EARLING EAST TO 59

TYPE OF MIX: B CLASS OF MIX: 1 COURSE: BINDER MIX SIZE: 3/4"

CONTRACTOR: WESTERN ENGR. TRAFFIC: 1050 A.D.T.

MATERIAL	IDENT #	% IN MIX	PRODUCER & LOCATION
3/4" STONE	SWI3-25-1	18	SCHILDBERG ATLANTIC A15002 FULL BETHANY
1/2" STONE	SWI3-25-2	20	SCHILDBERG ATLANTIC A15002 FULL BETHANY
1/2" STONE	SWI3-25-3	16	SCHILDBERG JEFFERSON A01002 BOT BETHANY
SAND	SWI3-25-4	46	HALLETT MATLS. HARLAN A83504

TYPE AND SOURCE OF ASPHALT CEMENT: AC-5 COASTAL OIL

GRADATION OF INDIVIDUAL AGGREGATE SAMPLES (Typical, Target, or Average)

MATERIAL	SIEVE ANALYSIS -% PASSING 1-1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
3/4" STONE	100	100	98	54	21	5.0	2.8	2.5	2.4	2.3	2.2	2.1
1/2" STONE	100	100	100	100	97	54	21	13	10	9.0	8.0	7.0
1/2" STONE	100	100	100	100	97	52	20	11	8.2	7.2	6.5	5.9
SAND	100	100	100	100	100	97	88	75	50	15	1.7	0.8

PRELIMINARY JOB MIX FORMULA TARGET GRADATION

TOLERANCE			98/100	7	7	7	6		5			3
COMB GRADING	100	100	100	92	85	65	48	39	27	10	3.8	3.1
SURFACE AREA C.		TOTAL				0.02	0.04	0.08	0.14	0.30	0.60	1.60
S.A. SQ. FT./LB.		22.43			+2.0	1.3	1.9	3.1	3.7	3.1	2.3	4.9

PRODUCTION LIMITS FOR AGGREGATES APPROVED BY THE CONTRACTOR/PRODUCER

SIEVE SIZE	18.00% 3/4" STONE		20.00% 1/2" STONE		16.00% 1/2" STONE		46.00% SAND			
	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		
3/4	97.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		
1/2	47.0	61.0	100.0	100.0	100.0	100.0	100.0	100.0		
3/8	14.0	28.0	90.0	100.0	90.0	100.0	100.0	100.0		
#4	0.0	12.0	47.0	61.0	45.0	59.0	90.0	100.0		
#8	0.0	8.0	15.0	27.0	14.0	26.0	82.0	94.0		
#30	0.0	7.0	5.0	15.0	3.0	13.0	42.0	52.0		
#200	0.0	3.0	3.0	7.0	3.0	7.0	0.0	1.5		

COMMENTS: COPIES: AMES, SAMSON, COOK, WESTERN, SCHILDBERG, HALLETT, SWI, REYNA, JOHNSON, ATL. LAB., FILE

The above data is furnished for informational purposes only. The Contracting Authority makes no representations as to accuracy, either express or implied, which are to be construed to relieve the Contractor from the responsibility to comply with the specifications.

Signed _____ Contractor/Producer

Signed _____ Dist. Matls. Engr.

SOUTH WEST INSPECTION, Inc
ASPHALT CONCRETE MIX DESIGN

4B03-18

MATERIAL....:Type B
INTENDED USE:Binder
PROJECT NO..:STP-37-4(14)--2C-83
COUNTY.....:Shelby
SPEC NO.....:
TESTED BY...:Gary Schoenrock
LOCATION....:From Barling To 59

LAB NO.....: SWI3-30
CONTRACTOR.: Western Engineering
SIZE.....: 3/4"
DATE.....: 08/31/93
CONTRACT NO:

AGG. SOURCES:3/4 & 1/2 Stone Schildberg Atlantic
1/2 Stone Schildberg Jefferson
Sand Hallett Harlan

JOB MIX FORMULA-COMBINED GRADATION

Sieve	1	3/4	1/2	3/8	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
% Pass	100	100	92.0	85.0	65.0	48.0	39.0	27.0	10.0	3.8	3.1
+OR-		98-100	+3-7	+6-7	+5-7	+-6		+-5			+3-2
AGGREGATE....3/4 Stone						1/2 St Atl		1/2 St Jef	Sand		RAP
AGG SOURCE #.A15002						A15002		A15508			
% AGGREGATE.. 18.0						20.0		16.0	46.0		

ASPHALT VISCOSITY	1000
% ASPHALT IN MIX	6.00
NO OF MARSHALL BLOWS	50
MARSHAL STABILITY	2151
FLOW-0.01 IN.	9
LAB DENS (AVG OF 3)	2.309
BULK SP GR COMB AGG	2.615
SP GR ASPH @ 77 F	1.024
MAX SP GR (RICE)	2.401
% VOIDS	3.8
% AGGR ABSORPTION	1.15
% VMA	17.0
VMA FILLED WITH AC	77.65
CALC FILM THICKNESS	11.89

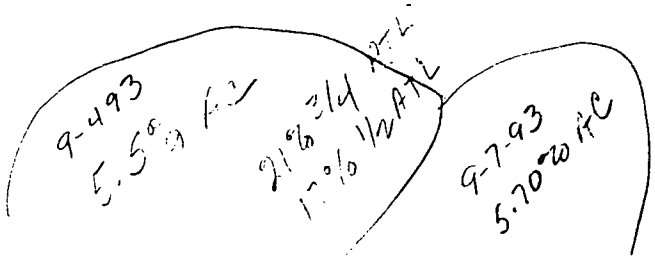
PERCENT ASPHALT TO START.....:	6.00
MININUM PERCENT ASPHALT.....:	4.95
FILLER BITUMEN RATIO.....:	0.50
TARGET VOIDS.....:	3.5
PERCENT AC TO ADD.....:	6.00
GRADE AC TO ADD.....:	AC-10

COPIES:Dist 4 Materials
Res Const Engr
Western Engineering
SWI

SIGNED: Gary Schoenrock
SOUTH WEST INSPECTION, Inc

3/4 1/2 3/8 4 8 16 30 50 100 200

98/100 95/85 78/91 58/70 42/54 39 22/32 10 3.8 11/6.1



IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - ASPHALT MIX DESIGN
LAB LOCATION - ATLANTIC

MATERIAL.....: TYPE B CLASS 1
INTENDED USE.: BINDER-RECYCLED
PROJECT NO...: STP-37-4(14)--2C-83

CONTRACTOR...: WESTERN ENGINEERING
COUNTY.....: SHELBY
PROJ.LOCATION: FROM EARLING EAST TO 59
VOID

LAB NO.....:4BD3-15
SIZE.....:3/4"
SPEC.NO.....:5060
DATE REPORT.:08/23/93

AGG. SOURCES ...3/4 & 1/2 ST-SCHILDBERG-ATLANTIC
1/2 ST-SCHILDBERG-JEFFERSON
SAND-HALLETT-HARLAN
RAP-HARLAN IDOT MAINT.(5.22%AC)

JOB MIX FORMULA-COMBINED GRADATION

1 1/2"	1 "	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
100.0	100.0	100.0	92.0	84.0	65.0	49.0	40.0	27.0	11.0	5.0	4.0
TOLERANCE :		98-100	+3 -7	+4 -7	+5 -7	+-6		+-5			+-3

MATERIAL MIX.:	3/4-ATL	1/2-ATL	1/2-JEF	SAND	RAP
% AGGR.PROP..:	16.00	15.00	14.00	40.00	15.00

'HALT CEMENT SOURCE	COASTAL MATERIALS---AC10			
ROX. VISCOSITY	N/A			
% ASPHALT IN MIX	4.50	5.00	5.50	6.00
NO. OF MARSHALL BLOWS	50	50	50	50
MARSHALL STABILITY-LBS.	1924	2080	2016	2110
FLOW - 0.01 IN.	7	8	9	10
SP.G. BY DISPLACEM'T(DENS.)	2.283	2.298	2.313	2.326
BULK SP.G. OF COMB. DRY AGG	2.613	2.613	2.613	2.613
SP.G. OF A.C. @ 77 F.	1.024	1.024	1.024	1.024
RICE SP.G.	2.450	2.432	2.415	2.398
% VOIDS-RICE.	6.82	5.51	4.22	3.00
% WATER ABSORPTION OF AGG.	1.18	1.18	1.18	1.18
%VOIDS IN MINERAL AGG.	16.56	16.45	16.35	16.32
%VMA FILLED WITH ASPHALT	53.00	60.56	68.28	75.77
CALC. ASPH. FILM THICKNESS	7.69	8.67	9.65	10.63
FILLER/BIT. AT REC. %A.C.	0.89	0.80	0.73	0.67

PERCENT ASPHALT TO START:	5.70	TEMP.	.0
MINIMUM PERCENT ASPHALT:	4.93	WEIGHT	0
PERCENT ASPHALT TO ADD:	4.96	SLOPE	0.00
		INTERCEPT	0.00

A CONTENT OF 5.70 % ASPHALT IS RECOMMENDED TO START THE JOB.
TRAFFIC.: 1050 A.D.T.

COPIES: AMES, J HEGGEN, J ADAM, WESTERN ENGR.
DISTRICT 4, W OPPEDAL, SWI, COUNCIL BLUFFS RES.

SIGNATURE 

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - ASPHALT MIX DESIGN
LAB LOCATION - ATLANTIC

MATERIAL.....: TYPE A
INTENDED USE.: SURFACE
PROJECT NO...: STP-37-4(14)--2C-83

CONTRACTOR...: WESTERN ENGINEERING
COUNTY.....: SHELBY
PROJ.LOCATION: FROM EARLING EAST TO 59
VOID

LAB NO.....:48D3-14
SIZE.....:1/2"
SPEC.NO.....:5060
DATE REPORT.:08/24/93

AGG. SOURCES ...1/2 CL ST-SCHILDBERG-CRESCENT
1/2 D ST-SCHILDBERG-CRESCENT
SAND-HALLETT-HARLAN
VOID

JOB MIX FORMULA-COMBINED GRADATION

1 1/2"	1 "	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
100.0	100.0	100.0	99.0	88.0	64.0	51.0	40.0	27.0	12.0	5.7	4.6
TOLERANCE :			92-100	+6 -7	+-7	+-5		+-4			+-2

MATERIAL MIX.:	1/2 CL	1/2 D ST	SAND	VOID	VOID
% AGGR.PROP..:	10.00	50.00	40.00	0.00	0.00
ASPHALT CEMENT SOURCE		COASTAL MATERIALS---AC10			
APROX. VISCOSITY		N/A			
% ASPHALT IN MIX		4.50	5.00	5.50	6.00
NO. OF MARSHALL BLOWS		50	50	50	50
MARSHALL STABILITY-LBS.		1924	1882	2016	1992
FLOW - 0.01 IN.		7	8	9	10
SP.G. BY DISPLACEM'T(DENS.)		2.308	2.313	2.324	2.334
BULK SP.G. OF COMB. DRY AGG		2.616	2.616	2.616	2.616
SP.G. OF A.C. @ 77 F.		1.024	1.024	1.024	1.024
RICE SP.G.		2.462	2.444	2.426	2.409
% VOIDS-RICE.		6.26	5.36	4.20	3.11
% WATER ABSORPTION OF AGG.		1.11	1.11	1.11	1.11
%VOIDS IN MINERAL AGG.		15.74	16.00	16.05	16.13
%VMA FILLED WITH ASPHALT		56.83	63.13	70.36	77.40
CALC. ASPH. FILM THICKNESS		7.25	8.16	9.08	10.00
FILLER/BIT. AT REC. %A.C.		1.02	0.92	0.84	0.77

PERCENT ASPHALT TO START: 5.60
MINIMUM PERCENT ASPHALT: 5.30
PERCENT ASPHALT TO ADD: n/a

TEMP. 0
WEIGHT 0
SLOPE 0.00
INTERCEPT 0.00

A CONTENT OF 5.60 % ASPHALT IS RECOMMENDED TO START THE JOB.
TRAFFIC.: 1050 A.D.T.

COPIES: AMES, J HEGGEN, J ADAM, WESTERN ENGR.
DISTRICT 4, W OPPEDAL, SWI, COUNCIL BLUFFS RES.

SIGNATURE William Cook

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - ASPHALT MIX DESIGN
LAB LOCATION - ATLANTIC

MATERIAL.....: TYPE B
INTENDED USE.: BINDER
PROJECT NO...: STP-37-4(14)--2C-83

CONTRACTOR...: WESTERN ENGINEERING
COUNTY.....: SHELBY
PROJ.LOCATION: FROM EARLING EAST TO HWY 59

LAB NO.....:4BD3-18
SIZE.....:3/4"
SPEC.NO.....:5060
DATE REPORT.:09/03/93

AGG. SOURCES ..3/4 & 1/2 STONE-SCHILDBERG-ATLANTIC
1/2 STONE-SCHILDBERG-JEFFERSON
SAND-HALLETT-HARLAN
VOID

JOB MIX FORMULA-COMBINED GRADATION

1 1/2"	1 "	3/4"	1/2"	3/8"	#4	#8	#16	#30	#50	#100	#200
100.0	100.0	100.0	92.0	85.0	65.0	48.0	39.0	27.0	10.0	3.8	3.1
TOLERANCE :		98-100	+3 -7	+6 -7	+5 -7	+-6		+-5			+3 -2

MATERIAL MIX.:	3/4 ST	1/2 ST-ATL	1/2 ST-JEF	SAND	VOID
% AGGR.PROP..:	18.00	20.00	16.00	46.00	0.00

ASPHALT CEMENT SOURCE	AC10
APPROX. VISCOSITY	N/A
% ASPHALT IN MIX	6.00
NO. OF MARSHALL BLOWS	50
MARSHALL STABILITY-LBS.	2151
FLOW - 0.01 IN.	9
SP.G. BY DISPLACEM'T(DENS.)	2.309
BULK SP.G. OF COMB. DRY AGG	2.615
SP.G. OF A.C. @ 77 F.	1.024
RICE SP.G.	2.401
% VOIDS-RICE.	3.83
% WATER ABSORPTION OF AGG.	1.15
%VOIDS IN MINERAL AGG.	17.00
%VMA FILLED WITH ASPHALT	72.42
CALC. ASPH. FILM THICKNESS	11.89
FILLER/BIT. AT REC. %A.C.	0.60

MINIMUM PERCENT ASPHALT: 4.95
PERCENT ASPHALT TO ADD: N/A

TEMP.	0
WEIGHT	0
SLOPE	0.00
INTERCEPT	0.00

A CONTENT OF 6.00 % ASPHALT IS RECOMMENDED TO START THE JOB.
TRAFFIC.: 1050 A.D.T.

THIS MIX DESIGN IS A 6.00% REMIX OF 4BD3-15 USING VIRGIN AGGREGATE ONLY
THE REMIX WAS DONE BY GARY SCHOENROCK OF SWI.

COPIES:AMES, J HEGGEN. J ADAM, SWI
DISTRICT 4, W OPPEDAL

SIGNED 

STRAIGHT OF BILL LADING - SHORT FORM - Original - Not Negotiable

SHIPPER'S NO. 11890

CARRIER CARRIER'S NO.

DATE 6/27/93
AT CEDARS, MISSISSIPPI

FROM
ROUSE RUBBER INDUSTRIES, INC.

the property described below, in apparent good order, except as noted (contents and condition of contents of packages unknown), marked, consigned, and destined as indicated below, which said carrier (the word carrier being understood throughout this contract as meaning any person or corporation in possession of the property under the contract) agrees to carry to its usual place of delivery at said destination, if on its route, otherwise to deliver to another carrier on the route to said destination. It is mutually agreed, as to each carrier of all or any of said property over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service to be performed hereunder shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western and Illinois Freight Classifications in effect on the date hereof, if this is a rail or a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment.

Shipper hereby certifies that he is familiar with all the terms and conditions of the said bill of lading, including those on the back thereof, set forth in the classification or tariff which governs the transportation of this shipment, and the said terms and conditions are hereby agreed to by the shipper and accepted for himself and his assigns.

GEORGE LUTHERN (712) 744-3240 DAVE RAU (712) 755-5191

SHIP TO	INVOICE TO	OUR ORDER NO.
LOCATION: BALLETT GRAVEL PIT C/O WESTERN ENGINEERING Go 2 miles South of Harlan, Ia. on Hwy 59-1/4 mile east and then South into the BALLETT GRAVEL PIT COLLECT	WESTERN ENGINEERING ATTN: BILL LEMONS P.O. BOX 350 HARLAN, IA. 51537	#5206
ROUTE: BEST WAY (C.T.S.-CENTRAL TRANSPORTATION)		YOUR ORDER NO. #B51140
TRAILER NO. / SEALS		

No. Packages	Kind of Package, Description of Articles Special Marks, and Exceptions		*WEIGHT (Subject to Correction)	Class or Rate	Check Column
	NMFC # 171800 CLASS 60	GROSS	———		
1	BULK [illegible] TRUCK LOAD OF #GF-80 (A)	TARE	———		
		NET	40150		

Western Engineering Co. / Ballett Pit

Subject to Section 7 of Conditions of applicable bill of lading, if this shipment is to be delivered to the consignee without recourse on the consignor, the consignor shall sign the following statement:
The carrier shall not make delivery of this shipment without payment of freight and all other lawful charges.

M. W. ROUSE
(Signature of Consignor)

If charges are to be prepaid, write or stamp here "To be Prepaid." TO BE COLLECT

Received $______ to apply in prepayment of the charges on the property described hereon.

Agent or Cashier

Per______
(The signature here acknowledges only the amount prepaid.)

Charges Advanced
$______

*If the shipment moves between two ports by a carrier by water the law requires that the bill of lading shall state whether it is "carrier's or shipper's weight."
NOTE - Where the rate is dependent on value, shipper's are required to state specifically in writing the agreed or declared value of the property.
The agreed or declared value of the property is hereby specifically stated by the shipper to be not exceeding

per

†"The fibre boxes used for this shipment conform to the specifications set forth in the box maker's certificate thereon, and all other requirements of Consolidated Freight Classification."
†Shipper's imprint in lieu of stamp; not a part of bill of lading approved by the Interstate Commerce Commission.

This shipment is correctly described
Correct weight is ______ lbs
Subject to verification by the EASTERN WEIGHING AND INSPECTION BUREAU, or SOUTHERN WEIGHING AND INSPECTION BUREAU
According to agreement
ROUSE RUBBER INDUSTRIES, INC. - Shipper
Per

†Shipper's imprint in lieu of stamp, not a part of Bill of Lading approved by the Interstate Commerce Commission

ROUSE RUBBER INDUSTRIES, INC. Shipper Per ______ Agent, Per ______

Permanent Post Office Address of Shipper, P. O. Box 831, Hwy 61 South, Vicksburg, MS 39181-0831

DRIVER COPY 2

ROUSE RUBBER INDUSTRIES, INC.

P.O. BOX 820369 VICKSBURG, MS 39182-0369
TELEPHONE: 601/636-7141 FAX: 601/636-1181

PRODUCT CERTIFICATION

CUSTOMER:	WESTERN ENGINEERING/IA.	
ORDER NUMBER:	#5206 (CUSTOMER P.O.#E51140)	
DATE SHIPPED:	8/27/93	
WEIGHT SHEET NO:	#11890	
WEIGHT SHIPPED:	40,150	
STOCK:	#GF-80(A)	
LOT#:	#238	
ACETONE EXTRACT:	11.0%	
ASH:	5.6%	
CARBON BLACK:	28.8%	
RHC:	54.6%	Natural Rubber = 30.6%
MOISTURE:	0.56%	
SPECIFIC GRAVITY:	1.140	
SIEVE ANALYSIS SCREEN	% PASSING	
14m		
16m		
20m	100%	
30m	100%	
35m		
40m	100%	
60m	100%	
80m	92%	
100m	76%	
Pan		

Morgan White
Quality Control Chemist

Appendix B
Lab Testing

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 1R DAILY REPORT OF ASPHALT PAVING PLANT 09-01-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO., INC. COUNTY: SHELBY
MIX TYPE: B CLASS: 1 SIZE: 3/4" COURSE: BINDER
MIX DESIGN NUMBER: 4BD3-15 RESIDENT ENGINEER: BILL COOK
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL EL DORADO, KS. GRADE: AC10
AGGR. SOURCES: 3/4ATL 1/2ATL 1/2JEF HARLAN
RECYCLE SOURCE: HARLAN IDOT MAINT. PERCENT OF RAP IN MIX: 15.0

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	85	77	58	43		22			1.0
MAX.	100	100	100	95	88	70	55		32			7.0

DENSITY RECORD LAB DENSITY: 2.337 SOLID DENSITY: 2.410 SPEC. % DENS.: 95
LAB VOIDS: 3.0 INTENDED LIFT THICKNESS: 1.50 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	1182+55	1180+85	1175+73	1172+50	1169+48	1167+83	1166+25
CL REFERENCE	9.6LT	7.2LT	7.2LT	7.2LT	2.4LT	11.0LT	3.6LT
THICKNESS	1.50	1.0625	1.375	1.0625	1.875	2.00	1.250
CORE DENSITY	2.249	2.270	2.250	2.249	2.263	2.254	2.226
% OF DENSITY	96.235	97.133	96.277	96.235	96.834	96.448	95.250
PERCENT VOIDS	6.7	5.8	6.6	6.7	6.1	6.5	7.6

LOT 1 AVG. DENSITY: 2.252 AVG. % DENSITY: 96.345 AVG. % VOIDS: 6.6
DENSITY Q.I.: 2.27 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: 4.96 INTENDED TOTAL PERCENT A.C.: 5.70
PERCENT A.C. BY TANK STICK: 4.75 TOTAL PERCENT A.C.: 5.50
FILLER/BITUMEN RATIO: ~~NOT AVAILABLE~~ 0.87 NUCLEAR PERCENT A.C.:

COMMENTS: FOR ADDITIONAL INFORMATION SEE REPORT #1

PLANT INSPECTOR Claudia Cowles
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1436

PAGE 2
REPORT NO: 1R STP-37-4(14)--2C-83 09-01-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR						72
A.C.						295
AGGR.						
MIX						300
MAT						305

RECYCLED MIX ONLY
TOTAL RAP USED TONS: 101.23
TOTAL AGGR. USED TONS: 569.32
RAP USED PERCENT: 15.1
AGGR. USED PERCENT: 84.9

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
CR. RUB	11890	20.08

SAMPLES SUBMITTED MATERIALS	SENDERS NO.	SAMPLES SUBMITTED MATERIALS	SENDERS NO.
HOT MIX	RBI9-1A	HOT MIX	
HOT MIX		COLD FEED	
AC-			

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	1183+75 TO 1163+55 WB	228.70	228.70

TIME PLANT OPERATED: LBS. MIX WASTED: 5000

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
RUBBER BEING INTRODUCED INTO THE OUTER DRUM FOR EXPERIMENTAL RESEARCH AS PER AMES

PLANT INSPECTOR Claudia Cortez
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO A436

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 1 DAILY REPORT OF ASPHALT PAVING PLANT 09-01-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO., INC. COUNTY: SHELBY
MIX TYPE: B CLASS: 1 SIZE: 3/4" COURSE: BINDER
MIX DESIGN NUMBER: 4BD3-15 RESIDENT ENGINEER: BILL COOK
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL EL DORADO, KS. GRADE: AC10
AGGR. SOURCES: 3/4ATL 1/2ATL 1/2JEF HARLAN
RECYCLE SOURCE: HARLAN IDOT MAINT. PERCENT OF RAP IN MIX: 15.0

SIEVE	1 1/2	#1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	85	77	58	43		22			1.0
MAX.	100	100	100	95	88	70	55		32			7.0
		100	99	93	84	65	49	39	25	11	5.8	4.8

DENSITY RECORD LAB DENSITY: 2.349 SOLID DENSITY: 2.440 SPEC. % DENS.: 95
LAB VOIDS: 3.7 INTENDED LIFT THICKNESS: 1.50 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	1196+11	1189+88	1162+83	1159+54	1150+94	1140+69	1133+94
CL REFERENCE	3.6LT	10.8LT	7.2LT	11.0LT	3.6LT	9.6LT	11.0LT
THICKNESS	1.25	1.50	1.875	1.0625	1.750	1.625	1.500
CORE DENSITY	2.227	2.291	2.281	2.272	2.260	2.282	2.263
% OF DENSITY	94.806	97.531	97.105	96.722	96.211	97.148	96.339
PERCENT VOIDS	8.7	6.1	6.5	6.9	7.4	6.5	7.3

LOT 1 AVG. DENSITY: 2.268 AVG. % DENSITY: 96.552 AVG. % VOIDS: 7.0
DENSITY Q.I.: 1.72 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: 4.96 INTENDED TOTAL PERCENT A.C.: 5.70
PERCENT A.C. BY TANK STICK: 4.75 TOTAL PERCENT A.C.: 5.50
FILLER/BITUMEN RATIO: ~~NOT AVAILABLE~~ .87 NUCLEAR PERCENT A.C.:

COMMENTS:

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dutton
CERTIFICATION NO 1436

PAGE 2
REPORT NO: 1 STP-37-4(14)--2C-83 09-01-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR					74	
A.C.					295	
AGGR.						
MIX					290	
MAT					275	

RECYCLED MIX ONLY
TOTAL RAP USED TONS: 101.23
TOTAL AGGR. USED TONS: 569.32
RAP USED PERCENT: 15.1
AGGR. USED PERCENT: 84.9

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
AC-10	155181	24.64
AC-10	155182	23.81
AC-10	155183	23.49
AC-10	155184	23.83
SAND	1742-1808	1397.20
1/2 ATL	3470-3573	669.89
1/2 JEFF	2220-2373	997.08
3/4 ATL	3471-3575	1302.69

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	BI9-1A
HOT MIX	
AC-10	AC1

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
COLD FEED	CF9-9A

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	1201.22 TO 1183+75 WB		
BINDER	1163+55 TO 1132+70 WB	521.15	521.15
S. PATCH	VARIOUS LOCATIONS	7.05	27.93

TIME PLANT OPERATED: 1445 TO 1830 LBS. MIX WASTED: 5000

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SR

PLANT INSPECTOR Claudia Cortez
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1436

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 2 DAILY REPORT OF ASPHALT PAVING PLANT 09-02-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO., INC. COUNTY: SHELBY
MIX TYPE: B CLASS: 1 SIZE: 3/4" COURSE: BINDER
MIX DESIGN NUMBER: 4BD3-15 RESIDENT ENGINEER: BILL COOK
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL EL DORADO, KS. GRADE: AC10
AGGR. SOURCES: 3/4ATL 1/2ATL 1/2JEF HARLAN
RECYCLE SOURCE: HARLAN IDOT MAINT. PERCENT OF RAP IN MIX: 15.0

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	85	77	58	43		22			1.0
MAX.	100	100	100	95	88	70	55		32			7.0
			99	93	83	63	49	38	25	11	6.1	5.0

DENSITY RECORD LAB DENSITY: 2.349 SOLID DENSITY: 2.433 SPEC. % DENS.: 95
LAB VOIDS: 3.5 INTENDED LIFT THICKNESS: 1.50 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	1198+24	1146+63	1131+93	1111+25	1106+82	1086+00	1080+98
CL REFERENCE	9.6RT	7.2RT	1.2RT	6.0RT	9.6RT	2.4RT	1.2RT
THICKNESS	1.125	1.375	1.750	1.750	1.500	1.875	1.750
CORE DENSITY	2.236	2.213	2.251	2.287	2.282	2.267	2.268
% OF DENSITY	95.189	94.210	95.828	97.361	97.148	96.509	96.552
PERCENT VOIDS	8.1	9.0	7.5	6.0	6.2	6.8	6.8

LOT 1 AVG. DENSITY: 2.258 AVG. % DENSITY: 96.114 AVG. % VOIDS: 7.2
DENSITY Q.I.: 0.99 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: 4.65 INTENDED TOTAL PERCENT A.C.: 5.40
PERCENT A.C. BY TANK STICK: 4.53 TOTAL PERCENT A.C.: 5.28
FILLER/BITUMEN RATIO: ~~NOT AVAILABLE~~ 0.95 NUCLEAR PERCENT A.C.:

COMMENTS: SEE REPORT #2R FOR INFORMATION ON RUBBER MIX

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1936

PAGE 2
REPORT NO: 2 STP-37-4(14)--2C-83 09-02-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR			74		74	74
A.C.			300		300	300
AGGR.						
MIX			295		300	290
MAT			250		275	280

RECYCLED MIX ONLY
TOTAL RAP USED TONS: 194.50
TOTAL AGGR. USED TONS: 1121.76
RAP USED PERCENT: 14.8
AGGR. USED PERCENT: 85.2

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
AC-10	155185	24.10
AC-10	155186	23.41
1/2 ATL	3579-3656	840.35
3/4 ATL	3576-3657	852.69

SAMPLES SUBMITTED MATERIALS	SENDERS NO.	SAMPLES SUBMITTED MATERIALS	SENDERS NO.
HOT MIX	BI9-2A	HOT MIX	
HOT MIX		COLD FEED	CF9-2A
AC-10	AC2	AC-10	AC3
AC-10	PD-1		

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	1201+22 TO 1186+18 EB		
BINDER	1147+60 TO 1067+82 EB	999.55	1520.70
S. PATCH	VARIOUS LOCATIONS	6.00	33.93

TIME PLANT OPERATED: 1000 TO 1830 LBS. MIX WASTED: 64800

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
LOWERED TOTAL PERCENT AC TO 5.40 FROM 5.70 AS SUGGESTED BY
GARY LEMONS WESTERN OKAYED BY BUD JOHNSON DISTRICT MATERIALS
WITH A 4.65 ADDED AC.

Claudia Combs

Paula V. Dalton

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 2R DAILY REPORT OF ASPHALT PAVING PLANT 09-02-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO., INC. COUNTY: SHELBY
MIX TYPE: B CLASS: 1 SIZE: 3/4" COURSE: BINDER
MIX DESIGN NUMBER: 4303-15 RESIDENT ENGINEER: BILL COOK
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL EL DORADO, KS. GRADE: AC10
AGGR. SOURCES: 3/4ATL 1/2ATL 1/2JEF HARLAN
RECYCLE SOURCE: HARLAN IDOT MAINT. PERCENT OF RAP IN MIX: 15.0

SIEVE	1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	85	77	58	43		22			1.0
MAX.	100	100	100	95	88	70	55		32			7.0

DENSITY RECORD LAB DENSITY: 2.331 SOLID DENSITY: 2.434 SPEC. % DENS.: 95
LAB VOIDS: 4.2 INTENDED LIFT THICKNESS: 1.500 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	1181+49	1179+50	1170+01	1166+30	1163+50	1158+59	1148+82
CL REFERENCE	1.2RT	10.8RT	9.6RT	4.8RT	7.2RT	6.0RT	11.0RT
THICKNESS	1.875	1.750	2.00	1.750	1.875	1.750	1.625
CORE DENSITY	2.278	2.280	2.260	2.222	2.238	2.261	2.232
% OF DENSITY	97.726	97.812	96.954	95.324	96.010	96.997	95.753
PERCENT VOIDS	6.4	6.3	7.1	8.7	8.1	7.1	8.3

LOT 1 AVG. DENSITY: 2.253 AVG. % DENSITY: 96.654 AVG. % VOIDS: 7.4
DENSITY Q.I.: 1.70 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: 4.65 INTENDED TOTAL PERCENT A.C.: 5.40
PERCENT A.C. BY TANK STICK: 4.53 TOTAL PERCENT A.C.: 5.28
FILLER/BITUMEN RATIO: ~~NOT AVAILABLE~~ 0.95 NUCLEAR PERCENT A.C.:

COMMENTS: FOR ADDITIONAL INFORMATION SEE REPORT #2

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V. Dalton
CERTIFICATION NO 1436

PAGE 2
REPORT NO: 2R STP-37-4(14)--2C-83 09-02-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR				70	72	
A.C.				300	300	
AGGR.						
MIX				300	300	
MAT				285	290	

RECYCLED MIX ONLY
TOTAL RAP USED TONS: 194.50
TOTAL AGGR. USED TONS: 1121.76
RAP USED PERCENT: 14.8
AGGR. USED PERCENT: 85.2

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY

SAMPLES SUBMITTED MATERIALS	SENDERS NO.	SAMPLES SUBMITTED MATERIALS	SENDERS NO.
HOT MIX	RBI9-2A	HOT MIX	
HOT MIX		COLD FEED	
AC-			

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	1186+18 TO 1147+60 EB	455.95	684.65

TIME PLANT OPERATED: 1000 TO 1830 LBS. MIX WASTED: 64800

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
RUBBER BEING INTRODUCED INTO THE OUTER DRUM FOR EXPERIMENTAL RESEARCH AS PER AMES.
PERCENT AC LOWER 3 TENTHS FROM 5.70 TO 5.40

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1936

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 5R DAILY REPORT OF ASPHALT PAVING PLANT 09-07-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO., INC. COUNTY: SHELBY
MIX TYPE: B CLASS: 1 SIZE: 3/4" COURSE: BINDER
MIX DESIGN NUMBER: 4BD3-18 RESIDENT ENGINEER: BILL COOK
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL EL DORADO, KS. GRADE: AC5
AGGR. SOURCES: 3/4ATL 1/2ATL 1/2JEF HARLAN
RECYCLE SOURCE: PERCENT OF RAP IN MIX:

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	85	78	58	42		22			1.1
MAX.	100	100	100	95	91	70	54		32			6.1
			100	91	81	63	49	39	26	10	5.2	4.5

DENSITY RECORD LAB DENSITY: 2.298 SOLID DENSITY: 2.401 SPEC. % DENS.: 95
LAB VOIDS: 4.3 INTENDED LIFT THICKNESS: 1.50 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	1182+17	1179+33	1177+68	1176+29	1173+28	1170+71	1168+25
CL REFERENCE	1.2LT	11.0LT	6.0LT	10.8LT	3.6LT	3.6LT	6.0LT
THICKNESS	1.75	1.75	2.0	2.125	2.0	1.875	2.0
CORE DENSITY	2.216	2.221	2.237	2.248	2.243	2.249	2.252
% OF DENSITY	96.432	96.649	97.346	97.824	97.607	97.868	97.998
PERCENT VOIDS	7.7	7.5	6.8	6.4	6.6	6.3	6.2

LOT 1 AVG. DENSITY: 2.238 AVG. % DENSITY: 97.389 AVG. % VOIDS: 6.8
DENSITY Q.I.: 3.86 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.T.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.70
PERCENT A.C. BY TANK STICK: 5.66 TOTAL PERCENT A.C.: 5.66
FILLER/BITUMEN RATIO: ~~NOT AVAILABLE~~ 0.80 NUCLEAR PERCENT A.C.:

COMMENTS: FOR ADDITIONAL INFORMATION SEE REPORT #5
RUBBER BEING INTRODUCED INTO THE OUTER DRUM FOR EXPERIMENTAL RESEARCH AS PER AMES

PLANT INSPECTOR Claudia Combs
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1936

PAGE 2
REPORT NO: 5R STP-37-4(14)--2C-83 09-07-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR		66				
A.C.		300				
AGGR.						
MIX		305				
MAT		290				

RECYCLED MIX ONLY
TOTAL RAP USED TONS:
TOTAL AGGR. USED TONS:
RAP USED PERCENT:
AGGR. USED PERCENT:

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY

SAMPLES SUBMITTED MATERIALS	SENDERS NO.	SAMPLES SUBMITTED MATERIALS	SENDERS NO.
HOT MIX		HOT MIX	
HOT MIX		COLD FEED	
AC-			

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	1183+75 TO 1167+40 WB	230.60	915.25

TIME PLANT OPERATED: 715 TO 1860 LBS. MIX WASTED: 186880

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
BECAUSE OF HIGH VOIDS PERCENT AC WAS RAISED TO 5.70% FROM 5.50%

PLANT INSPECTOR Claudia Combs
CERTIFICATION NO 2839

PLANT MONITOR Paula V. Dalton
CERTIFICATION NO 1436

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 5 DAILY REPORT OF ASPHALT PAVING PLANT 09-07-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO., INC. COUNTY: SHELBY
MIX TYPE: B CLASS: 1 SIZE: 3/4" COURSE: BINDER
MIX DESIGN NUMBER: 4BD3-18 RESIDENT ENGINEER: BILL COOK
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL EL DORADO, KS. GRADE: AC5
AGGR. SOURCES: 3/4ATL 1/2ATL 1/2JEF HARLAN
RECYCLE SOURCE: PERCENT OF RAP IN MIX:

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	85	78	58	42		22			1.1
MAX.	100	100	100	95	91	70	54		32			6.1
			100	91	81	63	49	39	26	10	5.2	4.5

DENSITY RECORD LAB DENSITY: 2.338 SOLID DENSITY: 2.426 SPEC. % DENS.: 95
LAB VOIDS: 3.6 INTENDED LIFT THICKNESS: 1.50 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	1193+05	1162+39	1136+19	1118+61	1106+17	1099+19	1085+28
CL REFERENCE	7.2LT	6.0LT	6.0LT	8.4LT	1.2LT	8.4LT	2.4LT
THICKNESS	1.875	1.75	2.125	1.75	1.75	2.375	2.25
CORE DENSITY	2.286	2.282	2.284	2.286	2.280	2.251	2.255
% OF DENSITY	97.776	97.605	97.690	97.776	97.519	96.279	96.450
PERCENT VOIDS	5.8	5.9	5.9	5.8	6.0	7.2	7.0

LOT 1 AVG. DENSITY: 2.275 AVG. % DENSITY: 97.299 AVG. % VOIDS: 6.2
DENSITY Q.I.: 3.55 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.70
PERCENT A.C. BY TANK STICK: 5.66 TOTAL PERCENT A.C.: 5.66
FILLER/BITUMEN RATIO: ~~NOT AVAILABLE~~ 0.80 NUCLEAR PERCENT A.C.:

COMMENTS: PLAN THICKNESS FOR CORES OF 150% MAY DEVIATE BY 5% FOR IRREGULARITIES OF 5.23 TONS PER STATION FOR CROWN CORRECTION

PLANT INSPECTOR Claudia Conlee
CERTIFICATION NO 2834

PLANT MONITOR Paula V. Dalton
CERTIFICATION NO 1936

PAGE 2
REPORT NO: 5 STP-37-4(14)--2C-83 09-07-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR	62	65	66	68	72	68
A.C.	300	300	300	300	300	300
AGGR.						
MIX	310	300	300	300	305	300
MAT		270		280	270	275

RECYCLED MIX ONLY
TOTAL RAP USED TONS:
TOTAL AGGR. USED TONS:
RAP USED PERCENT:
AGGR. USED PERCENT:

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
AC-5	155194	23.83
AC-5	155195	22.60
AC-5	155196	24.66
AC-5	155197	24.10
1/2 ATL	3660-3700	634.69
SAND	1826-1932	2580.60

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	BI9-7D
HOT MIX	
AC-5	AC10
AC-5	AC12

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
COLD FEED	CF9-7A
AC-5	AC11

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	1201+50 TO 1183+75 WB		
BINDER	1167+40 TO 1068+95 WB	1894.50	6712.72

TIME PLANT OPERATED: 715 TO 1830 LBS. MIX WASTED: 186880

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
BECAUSE OF HIGH AIR VOIDS PERCENT AC WAS RAISED FROM 5.50%
TO 5.70%

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V. Dalton
CERTIFICATION NO 1436

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 6 DAILY REPORT OF ASPHALT PAVING PLANT 09-08-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO., INC. COUNTY: SHELBY
MIX TYPE: B CLASS: 1 SIZE: 3/4" COURSE: BINDER
MIX DESIGN NUMBER: 4BD3-18 RESIDENT ENGINEER: BILL COOK
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL EL DORADO, KS. GRADE: AC5
AGGR. SOURCES: 3/4ATL 1/2ATL 1/2JEF HARLAN
RECYCLE SOURCE: PERCENT OF RAP IN MIX:

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	85	78	58	42		22			1.1
MAX.	100	100	100	95	91	70	54		32			6.1
			100	92	84	66	52	41	29	12	5.2	4.4

DENSITY RECORD LAB DENSITY: 2.337 SOLID DENSITY: 2.429 SPEC. % DENS.: 95
LAB VOIDS: 3.8 INTENDED LIFT THICKNESS: 1.50 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	1200+27	1196+67	1196+27	1190+59	1150+00	1147+39	1145+08
CL REFERENCE	7.2RT	4.8RT	10.8RT	7.2RT	4.8RT	8.4RT	3.6RT
THICKNESS	1.500	1.625	1.750	2.00	1.875	1.500	1.625
CORE DENSITY	2.243	2.276	2.275	2.262	2.286	2.249	2.257
% OF DENSITY	95.978	97.390	97.347	96.791	97.818	96.235	96.577
PERCENT VOIDS	7.7	6.3	6.3	6.9	5.9	7.4	7.1

LOT 1 AVG. DENSITY: 2.264 AVG. % DENSITY: 96.877 AVG. % VOIDS: 6.8
DENSITY Q.I.: 2.80 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.70
PERCENT A.C. BY TANK STICK: 5.80 TOTAL PERCENT A.C.: 5.80
FILLER/BITUMEN RATIO: ~~NOT AVAILABLE~~ 0.76 NUCLEAR PERCENT A.C.:

COMMENTS:

PLANT INSPECTOR Claudia Cowles
CERTIFICATION NO 2837

PLANT MONITOR Paula V. Dalton
CERTIFICATION NO 1436

PAGE 2
REPORT NO: 6 STP-37-4(14)--2C-83 09-08-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR			66		72	70
A.C.			295		300	300
AGGR.						
MIX			310		300	295
MAT			280	280		280

RECYCLED MIX ONLY
TOTAL RAP USED TONS:
TOTAL AGGR. USED TONS:
RAP USED PERCENT:
AGGR. USED PERCENT:

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
AC-5	155198	26.17
AC-5	155201	24.04
AC-5	155200	23.22
AC-5	304237	24.59
AC-5	155199	24.52
SAND	1933-1993	1315.76
1/2 ATL	2307-3718	329.52
1/2 JEFF	9684-9686	65.91

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.	MATERIALS	SENDERS NO.
HOT MIX	BI9-8A	HOT MIX	
HOT MIX		COLD FEED	CF9-8A
AC-5	AC13	AC-5	AC14

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	1201+97 TO 1200+50 WB		
BINDER	1201+97 TO 1186+11 EB		
BINDER	1151+00 TO 1143+70 EB	512.31	7225.03

TIME PLANT OPERATED: 1000 TO 1830 LBS. MIX WASTED: 165820

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC

PLANT INSPECTOR Claudia Combs
CERTIFICATION NO 2839

PLANT MONITOR Paula V. Dalton
CERTIFICATION NO 1436

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 6R DAILY REPORT OF ASPHALT PAVING PLANT 09-08-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO., INC. COUNTY: SHELBY
MIX TYPE: B CLASS: 1 SIZE: 3/4" COURSE: BINDER
MIX DESIGN NUMBER: 4BD3-18 RESIDENT ENGINEER: BILL COOK
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL EL DORADO, KS. GRADE: AC5
AGGR. SOURCES: 3/4ATL 1/2ATL 1/2JEF HARLAN
RECYCLE SOURCE: PERCENT OF RAP IN MIX:

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	85	78	58	42		22			1.1
MAX.	100	100	100	95	91	70	54		32			6.1
			100	92	84	66	52	41	29	12	5.2	4.4

DENSITY RECORD LAB DENSITY: 2.305 SOLID DENSITY: 2.391 SPEC. % DENS.: 95
LAB VOIDS: 3.6 INTENDED LIFT THICKNESS: 1.500 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	1185+11	1179+12	1175+14	1171+04	1162+78	1160+24	1155+79
CL REFERENCE	4.8RT	1.2RT	9.6RT	1.2RT	8.4RT	1.2RT	6.0RT
THICKNESS	1.875	1.625	1.250	1.875	2.125	1.750	1.875
CORE DENSITY	2.277	2.232	2.233	2.222	2.192	2.229	2.211
% OF DENSITY	98.785	96.833	96.876	96.399	95.098	96.703	95.922
PERCENT VOIDS	4.8	6.6	6.6	7.1	8.3	6.8	7.5

LOT 1 AVG. DENSITY: 2.228 AVG. % DENSITY: 96.659 AVG. % VOIDS: 6.8
DENSITY Q.I.: 1.47 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.70
PERCENT A.C. BY TANK STICK: 5.80 TOTAL PERCENT A.C.: 5.80
FILLER/BITUMEN RATIO: ~~NOT AVAILABLE~~ 0.7% NUCLEAR PERCENT A.C.:

COMMENTS: FOR ADDITIONAL INFORMATION SEE REPORT #6

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 1039

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1171

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR					72	
A.C.					300	
AGGR.						
MIX					295	
MAT'					280	

RECYCLED MIX ONLY
TOTAL RAP USED TONS:
TOTAL AGGR. USED TONS:
RAP USED PERCENT:
AGGR. USED PERCENT:

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
HOT MIX	
AC-	

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
COLD FEED	

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	1186+11 TO 1151+00	473.09	1388.34

TIME PLANT OPERATED: 1000 TO 1800 LBS. MIX WASTED: 165820

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
RUBBER BEING INTRODUCED INTO THE OUTER DRUM FOR EXPERIMENTAL RESEARCH AS PER AMES.

PLANT INSPECTOR Claudia Conlin
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1436

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 10 DAILY REPORT OF ASPHALT PAVING PLANT 09-15-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO. INC. COUNTY: SHELBY
MIX TYPE: A CLASS: SIZE: 1/2 COURSE: SURFACE
MIX DESIGN NUMBER: 4BD3-14 RESIDENT ENGINEER: FEREDOON BEHENAMI
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL ELDORADO, KS. GRADE: AC-5
AGGR. SOURCES: A78002 A78002 A83504
RECYCLE SOURCE: PERCENT OF RAP IN MIX:

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	100	92	81	57	46		23			2.6
MAX.	100	100	100	100	94	71	56		31			6.6
LOT 1	100	100	100	98	88	64	48	37	25	12	6.0	5.2

DENSITY RECORD LAB DENSITY: 2.358 SOLID DENSITY: 2.450 SPEC. % DENS.: 95
LAB VOIDS: 3.8 INTENDED LIFT THICKNESS: 1.50 inches

COURSE LAID	#1 SURFACE	#2 SURFACE	#3 SURFACE	#4 SURFACE	#5 SURFACE	#6 SURFACE	#7 SURFACE
STATION	1159+90	1148+35	1114+55	1098+72	1082+15	1055+82	1038+79
CL REFERENCE	7.2LT	8.4LT	2.4LT	2.4LT	7.2LT	10.8LT	11.0LT
THICKNESS	1.625	1.500	1.625	1.500	1.250	1.875	1.750
CORE DENSITY	2.339	2.336	2.302	2.321	2.236	2.291	2.269
% OF DENSITY	99.194	99.067	97.625	98.431	94.826	97.159	96.226
PERCENT VOIDS	4.5	4.7	6.0	5.3	8.7	6.5	7.4

LOT 1 AVG. DENSITY: 2.299 AVG. % DENSITY: 97.504 AVG. % VOIDS: 6.2
DENSITY Q.I.: 1.58 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.30
PERCENT A.C. BY TANK STICK: 5.29 TOTAL PERCENT A.C.: 5.29
FILLER/BITUMEN RATIO: .98 NUCLEAR PERCENT A.C.:

COMMENTS: 240.80 TONS PRODUCED ON 9-14-93 ADDED TO TOTALS FOR TODAY
ACCEPTANCE GRADATION 100 90 63 47 36 24 10 5.5 4.7
ACCEPTANCE F/B RATIO 0.89

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1436

PAGE 2
REPORT NO: 10 STP-37-4(14)--2C-83 09-15-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR	54	57	60	62	68	66
A.C.	300	300	300	305	305	300
AGGR.						
MIX	320		310	305	300	300
MAT		305	305	280	285	275

RECYCLED MIX ONLY
TOTAL RAP USED TONS:
TOTAL AGGR. USED TONS:
RAP USED PERCENT:
AGGR. USED PERCENT:

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
SAND	1987-1995	191.36
1/2CLEAN	3696-3884	109.48
1/2TYPEA	3700-3898	560.31
CSS-IH	SC002539	12.58
AC-5	161017	24.11
AC-5	161018	26.00
AC-5	161016	23.37
AC-5	161015	24.57

SAMPLES SUBMITTED MATERIALS	SENDERS NO.	SAMPLES SUBMITTED MATERIALS	SENDERS NO.
HOT MIX	SU9-15B	HOT MIX	
HOT MIX		COLD FEED	CF9-14A
AC-5	AC21	COLD FEED	CF9-15A
AC-5	AC22	AC-5	AC23
AC-5	PD-3		

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
SURFACE	1201+97-1193+35 EB&WB		
SURFACE	1198+50 TO 1194+40 WB		
SURFACE	1170+50 TO 1032+50 WB	1928.13	3018.14

TIME PLANT OPERATED: 715 TO 1800 LBS. MIX WASTED: 6000

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
LOWERED PERCENT AC TODAY FROM 5.6% TO 5.3% BECAUSE OF THE VOIDS RUNNING A LITTLE LOW. TALKED TO BUD JOHNSON, DISTRICT MATERIALS, ABOUT THIS CHANGE.

PLANT INSPECTOR Claudia Combs
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1936

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 10R DAILY REPORT OF ASPHALT PAVING PLANT 09-15-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO. INC. COUNTY: SHELBY
MIX TYPE: A CLASS: SIZE: 1/2 COURSE: SURFACE
MIX DESIGN NUMBER: BD3-14 RESIDENT ENGINEER: FEREDOON BEHENAMI
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL ELDORADO, KS. GRADE: AC-5
AGGR. SOURCES: A78002 A78002 A83504
RECYCLE SOURCE: PERCENT OF RAP IN MIX:

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	100	92	81	57	46		23			2.6
MAX.	100	100	100	100	94	71	56		31			6.6
LOT 1	100	100	100	98	88	64	48	37	25	12	6.0	5.2

DENSITY RECORD LAB DENSITY: 2.343 SOLID DENSITY: 2.417 SPEC. % DENS.: 95
LAB VOIDS: 3.1 INTENDED LIFT THICKNESS: 1.50 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE
STATION	1159+90	1148+35	1114+55	1098+72	1082+15	1055+82	1038+79
CL REFERENCE	7.2LT	8.4LT	2.4LT	2.4LT	7.2LT	10.8LT	11.0LT
THICKNESS	1.75	1.75	1.75	1.50	1.75	1.50	1.25
CORE DENSITY	2.286	2.286	2.307	2.265	2.316	2.299	2.312
% OF DENSITY	97.567	97.567	98.464	96.671	98.848	98.122	98.677
PERCENT VOIDS	5.4	5.4	4.6	6.3	4.2	4.9	4.3

LOT 1 AVG. DENSITY: 2.296 AVG. % DENSITY: 97.988 AVG. % VOIDS: 5.0
DENSITY Q.I.: 3.89 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.30
PERCENT A.C. BY TANK STICK: 5.29 TOTAL PERCENT A.C.: 5.29
FILLER/BITUMEN RATIO: .98 NUCLEAR PERCENT A.C.:

COMMENTS: FOR ADDITIONAL INFORMATION SEE REPORT #10

PLANT INSPECTOR Claudia Combs
CERTIFICATION NO 2859

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1436

PAGE 2
REPORT NO: 10R STP-37-4(14)--2C-83 09-15-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR	54	57				
A.C.	300	300				
AGGR.						
MIX	315	315				
MAT		295				

RECYCLED MIX ONLY
TOTAL RAP USED TONS:
TOTAL AGGR. USED TONS:
RAP USED PERCENT:
AGGR. USED PERCENT:

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
HOT MIX	
AC-	

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
COLD FEED	

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
SURFACE	1194+40 TO 1170+50 WB	300.42	300.42

TIME PLANT OPERATED: 715 TO 1800 LBS. MIX WASTED: 6000

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
RUBBER BEING INTRODUCED INTO THE OUTER DRUM FOR EXPERIMENTAL RESEARCH AS PER AMES. PERCENT AC LOWERED FROM 5.6% TO 5.3% TO BRING LAB VOIDS UP.

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1436

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 11 DAILY REPORT OF ASPHALT PAVING PLANT 09-16-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO. INC. COUNTY: SHELBY
MIX TYPE: A CLASS: SIZE: 1/2 COURSE: SURFACE
MIX DESIGN NUMBER: 4BD3-14 RESIDENT ENGINEER: FEREDOON BEHENAMI
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL ELDORADO, KS. GRADE: AC-5
AGGR. SOURCES: A78002 A78002 A83504
RECYCLE SOURCE: PERCENT RAP IN MIX:

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	100	92	81	57	46		23			2.6
MAX.	100	100	100	100	94	71	56		31			6.6
LOT 1	100	100	100	99	90	65	48	37	25	12	6.7	5.8

DENSITY RECORD LAB DENSITY: 2.359 SOLID DENSITY: 2.444 SPEC. % DENS.: 95.
LAB VOIDS: 3.5 INTENDED LIFT THICKNESS: 1.500 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE
STATION	1145+68	1128+45	1119+86	1096+81	1085+63	1059+31	1039+39
CL REFERENCE	2.4RT	6.0RT	9.6RT	8.4RT	7.2RT	4.8RT	8.4RT
THICKNESS	1.50	1.50	1.375	1.50	1.50	1.50	1.50
CORE DENSITY	2.307	2.305	2.289	2.282	2.254	2.249	2.259
% OF DENSITY	97.796	97.711	97.033	96.736	95.549	95.337	95.761
PERCENT VOIDS	5.6	5.7	6.3	6.6	7.8	8.0	7.6

LOT 1 AVG. DENSITY: 2.278 AVG. % DENSITY: 96.560 AVG. % VOIDS: 6.8
DENSITY Q.I.: 1.53 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.30
PERCENT A.C. BY TANK STICK: 5.31 TOTAL PERCENT A.C.: 5.31
FILLER/BITUMEN RATIO: 1.11 NUCLEAR PERCENT A.C.:

COMMENTS:

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2539

PLANT MONITOR Paula V. Dalton
CERTIFICATION NO 1436

PAGE 2
REPORT NO: 11 STP-37-4(14)--2C-83 09-16-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR	56		62	68	68	66
A.C.	300		310	305	300	300
AGGR.						
MIX	315		305	305	305	300
MAT			290	290	275	275

RECYCLED MIX ONLY
TOTAL RAP USED TONS:
TOTAL AGGR. USED TONS:
RAP USED PERCENT:
AGGR. USED PERCENT:

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
AC-10	304366	25.57
AC-10	304374	24.51
AC-10	304378	24.91
1/2CLEAN	4367-4394	112.76
1/2TYPEA	4194-4452	568.26

SAMPLES SUBMITTED MATERIALS	SENDERS NO.	SAMPLES SUBMITTED MATERIALS	SENDERS NO.
HOT MIX	SU9-16C	HOT MIX	
HOT MIX		COMPOSITED	CF9-16A
AC-5	AC24	AC-5	AC25
AC-10	AC26		

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
SURFACE	1193+35 TO 1186+88 EB		
SURFACE	1153+95 TO 1034+40 EB	1439.12	4457.26

TIME PLANT OPERATED: 735 TO 1800 LBS. MIX WASTED: 391840

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
AFTER RUNNING RUBBER TODAY RAN AC TANK DOWN AND THEN SWITCH OVER FROM AC5 TO AC10. AC10 IS COMING FROM KOCH OUT OF COUNCIL BLUFFS. APPROVED BY BUD JOHNSON, DISTRICT MATERIALS

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V. Dalton
CERTIFICATION NO 1436

IOWA DEPARTMENT OF TRANSPORTATION

REPORT NO: 11R DAILY REPORT OF ASPHALT PAVING PLANT 09-16-1993

PROJECT NUMBER: STP-37-4(14)--2C-83 CONTRACT NUMBER: 35152
CONTRACTOR: WESTERN ENGINEERING CO. INC. COUNTY: SHELBY
MIX TYPE: A CLASS: SIZE: 1/2 COURSE: SURFACE
MIX DESIGN NUMBER: 4BD3-14 RESIDENT ENGINEER: FEREDOON BEHENAMI
PLANT TYPE: DOUBLE DRUM PLANT MAKE: ASTEC SUPER SIX PACK
POLLUTION CONTROL EQUIPMENT TYPE: BAGHOUSE
ASPHALT SOURCE: COASTAL ELDORADO, KS. GRADE: AC-5
AGGR. SOURCES: A78002 A78002 A83504
RECYCLE SOURCE: PERCENT OF RAP IN MIX:

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	100	92	81	57	46		23			2.6
MAX.	100	100	100	100	94	71	56		31			6.6
LOT 1	100	100	100	99	90	65	48	37	25	12	6.8	5.9

DENSITY RECORD LAB DENSITY: 2.359 SOLID DENSITY: 2.441 SPEC. % DENS.: 95
LAB VOIDS: 3.4 INTENDED LIFT THICKNESS: 1.500 inches

	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE
STATION	1183+19	1178+52	1175+45	1170+41	1166+93	1159+62	1156+03
CL REFERENCE	2.4RT	8.4RT	6.0RT	3.6RT	1.2RT	8.4RT	3.6RT
THICKNESS	2.00	1.875	1.875	1.75	2.00	1.25	1.75
CORE DENSITY	2.285	2.281	2.266	2.256	2.294	2.256	2.268
% OF DENSITY	96.863	96.694	96.058	95.634	97.245	95.634	96.142
PERCENT VOIDS	6.4	6.6	7.2	7.6	6.0	7.6	7.1

LOT 1 AVG. DENSITY: 2.272 AVG. % DENSITY: 96.324 AVG. % VOIDS: 6.9
DENSITY Q.I.: 2.12 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.30
PERCENT A.C. BY TANK STICK: 5.31 TOTAL PERCENT A.C.: 5.31
FILLER/BITUMEN RATIO: 1.11 NUCLEAR PERCENT A.C.:

COMMENTS: FOR ADDITION INFORMATION SEE REPORT #11
TOTAL TONS OF BINDER AND SURFACE WITH RUBBER IS 2126.39

PLANT INSPECTOR Claudia Cortes
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1436

PAGE 2
REPORT NO: 11R STP-37-4(14)--2C-83 09-16-1993

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR		59				
A.C.		300				
AGGR.						
MIX		320				
MAT		310				

RECYCLED MIX ONLY
TOTAL RAP USED TONS:
TOTAL AGGR. USED TONS:
RAP USED PERCENT:
AGGR. USED PERCENT:

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY

SAMPLES SUBMITTED MATERIALS	SENDERS NO.	SAMPLES SUBMITTED MATERIALS	SENDERS NO.
HOT MIX		HOT MIX	
HOT MIX		COLD FEED	
AC-			

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
SURFACE	1186+88 TO 1153+95 EB	437.63	738.05

TIME PLANT OPERATED: 735 TO 1800 LBS. MIX WASTED: 0

SPECIFICATIONS APPLICABLE TO THIS PROJECT
SS-964 SS-5003 SS-5045 SS-5050 SS-5055 SS-5060

OTHER PROJECT DATA HYDRATED LIME SRC
RUBBER BEING INTRODUCED INTO THE OUTER DRUM FOR EXPERIMENTAL RESEARCH AS PER AMES.

PLANT INSPECTOR Claudia Comeau
CERTIFICATION NO 2839

PLANT MONITOR Paula V Dalton
CERTIFICATION NO 1436

CREEP AND RESILIENT MODULUS TESTING COMPLETED ON HR-1062 SHELBY COUNTY

	Mix	C.R.M. Creep	C.R.M. R.M.	Conventional Creep	Conventional R.M.
Cold Feed 75 Blows	Surface-AC-5	13	139,000	25	201,000
	Binder-AC-5	12	148,000	14	155,000
	Binder-AC-10 w/rap	22	539,000	25	419,000
Hot Box 75 Blows	Surface-AC-5	30	301,000	39	408,000
	Binder-AC-5	21	295,000	21	285,000
	Binder-AC-10 w/rap			35	82,000
Cores		1.2	103,000	.8	114,000

On this project the surface is a 1/2" mix and the binder is a 3/4" mix.

Appendix C
Field Testing

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: Materials

DATE: November 2, 1993

ATTENTION: Vernon Marks

REF. NO.: 435.204

FROM: Chris Anderson CA

OFFICE: Materials - Research

SUBJECT: Friction Testing on IA 37 in Shelby County From Milepost 37.00 to Milepost 40.00

Friction testing was conducted on IA 37 on October 29, 1993. All testing was performed at 40 mph with standard tread (ASTM E-501) test tire. The results are as follows:

Milepost	Eastbound	Westbound
Section 1 - Dry Crumb Rubber 39.3 to 40.0		
39.38	41.7	
39.44	45.9	
39.51	44.2	
39.57	45.8	
39.63	44.3	
39.69	43.5	
39.76	43.7	
39.85	44.8	
39.91	37.9	
Avg.	43.5	
Section 2 - Dry Crumb Rubber 39.5 to 40.0		
39.56		38.0
39.59		42.9
39.63		35.1
39.64		38.6
39.69		38.8
39.71		39.2
39.76		39.1
39.78		33.2
39.82		30.6
39.88		37.0
39.95		38.8
Avg.		37.4

Vernon Marks
Page 2
November 2, 1993

Milepost	Eastbound	Westbound
Section 3 - Conventional 38.8 to 39.1		
38.78	46.2	
38.83	43.8	
38.89	40.7	
38.95	45.5	
39.02	43.5	
39.09	43.6	
39.14	43.5	
Avg.	43.8	
Section 4 - Conventional 38.7 to 39.4		
38.73		44.8
38.79		42.2
38.86		39.9
38.96		42.3
39.02		47.3
39.10		43.0
39.18		42.2
39.25		43.1
39.32		43.4
Avg.		43.1

CA:kmd
cc: B. Brown
O. J. Lane
K. Jones

Road Rater Results

	Prior to Construction 8-7-93	Post-Construction 10-5-93
Section #1	3.01	3.56
Section #2	3.26	3.89
Section #3	3.01	4.26