

EVALUATION OF RECYCLED RUBBER IN ASPHALT CONCRETE DUBUQUE COUNTY

**CONSTRUCTION REPORT
IOWA HIGHWAY RESEARCH BOARD
PROJECT HR-330C**

AUGUST 1992

Highway Division



**Iowa Department
of Transportation**

Construction Report
for
Iowa Highway Research Board
Project HR-330C

Evaluation of Recycled Rubber
in Asphalt Concrete
Dubuque County

By

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TECHNICAL REPORT TITLE PAGE

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8. ABSTRACT

The Iowa Department of Transportation is evaluating the use of discarded tires in asphalt rubber cement. There have been five projects completed in Iowa.

This project is located on US 151 north of Cascade to US 61 in Dubuque. One section consists of an asphalt rubber cement surface and a conventional binder and two sections contain both asphalt rubber cement surface and binder. The control section of conventional asphalt was completed this spring.

Information included in this report consists of test results, construction reports, and cost comparison.

9. KEY WORDS	10. NO. OF PAGES
Asphalt rubber cement Asphalt pavement Recycled tires Crumb rubber	50

TABLE OF CONTENTS

	Page
Introduction.....	1
Objective.....	1
Contractor.....	1
Project Location.....	1
Preconstruction Survey.....	2
Materials.....	2
Viscosity.....	3
Mix Design.....	3
Plant Operation.....	3
Paving Operation.....	4
Construction Testing.....	5
Cost Comparison.....	5
Evaluation.....	6
Conclusion.....	7
Appendices	
Appendix A - Contract and Special Provisions.....	8
Appendix B - Lab Testing.....	25
Appendix C - Field Testing.....	43

DISCLAIMER

The contents of this report reflect the views of the author and do not necessarily reflect the official views of the Iowa Department of Transportation. This report does not constitute any standard, specification or regulation.

INTRODUCTION

Disposal of discarded tires has been a problem nationwide. Recycling these tires into asphalt rubber cement (ARC) is currently being researched in Iowa.

The Iowa DOT currently has five projects using reacted ARC which they are studying.

The project this report refers to is located in Dubuque County on US 151 between Cascade and US 61. It consists of ARC in the surface course and a conventional asphalt cement binder in one section. Another two sections were constructed with ARC in both the binder and surface courses. The control section of this project was completed in May 1992.

OBJECTIVE

The objective of this project was to compare the cost and performance of ARC to conventional asphalt concrete.

CONTRACTOR

Mathy Construction Company of Onalaska, Wisconsin was the contractor on this project. The mix was hauled from their subsidiary plant, River City Asphalt in Dubuque.

PROJECT LOCATION

The project is located on US 151 from Cascade to US 61 in Dubuque County. The test sections are located in Table I.

TABLE I

<u>Section</u>	<u>Station</u>	<u>Lane</u>	<u>Type of Mix</u>
1	391+00 to 500+00	SB	ARC Surface & Conventional Binder
2	391+00 to 500+00	NB	ARC Binder & Surface
3	500+00 to 655+91	NB & SB	ARC Binder & Surface
4	365+00 to 391+50 665+00 to 691+50		Conventional

PRECONSTRUCTION SURVEY

The existing surface was a PC concrete pavement constructed in 1972. It was 24 ft. wide and 9 in. deep. The daily traffic volume is 3525 vehicles per day (V.P.D.) with 15% trucks. The surface had been milled prior to construction. They ranged from .1 to 1.2. The roadway had problems with faulting which the milling corrected somewhat. Fault measurements were taken prior to construction. Otherwise the pavement showed very little distress. Rut depth measurements were made on the roadway prior to construction and shortly after construction. The results are in Appendix C.

MATERIALS

The ground tire rubber was provided by Rouse Rubber of Vicksburg, Mississippi. A GF-60 crumb rubber was used on this project. The coarse aggregate was from River City Stone, Brown Quarry in Dubuque and the sand from Aggregate Materials, Nine Mile Pit near Cascade. The AC was purchased from Koch in Dubuque.

Gradation requirements on the rubber and aggregates are shown in the Special Provisions in Appendix A. Gradation test results at the time of construction are shown in Appendix B.

VISCOSITY

Viscosity testing of the ARC was done prior to construction and checked again on material obtained during production. This was done at the Iowa DOT Laboratory. These results are in Appendix B. The viscosity requirements were 1500-4000 cp. The viscosity was also checked with a Brookfield viscometer at the job site by Rouse.

Mix Design

Samples of all materials were obtained for preliminary testing by the Iowa DOT Laboratory. The job mix proportions are located in Appendix B. The same mix was used for both the ARC binder and surface. An AC content of 5.9% was used in the mixes. This consisted of 5.1% AC-5 and .8% rubber binder. The rubber content was running lower than the 15% needed according to specifications. On September 19, Rouse recalibrated their reactor so they could auger 15%. The mix consisted of 75% 3/4 in. crushed limestone and 25% natural sand.

PLANT OPERATION

The ARC was produced at the River City Plant located in Brown Quarry in Dubuque. It was a Simplicity Plant.

The conventional asphalt cement was produced from a Bituma Plant set up at Baid-Cascade East.

The Simplicity plant ran at normal speed when it was producing the ARC mix. It averaged 150 T./hr. with no slowdown because of the ARC.

PAVING OPERATION

Mathy used a Barber-Greene Paver SB-170. The placing of the ARC and the conventional mix were similar.

There was no shoving or cracking of the mat as was experienced on a previous project located in Muscatine. The original surface had been milled which may be a factor.

Segregation was a problem on this job. The contractor first tried changing from the Barber-Greene paver to a Blaw Knox PF-180 modified with a mixing device in the front of the hopper tunnel. This did improve the consistency, but segregation still occurred at times. The contractor switched from dump trucks to flowboy trucks and this seemed to help the segregation problem.

The ambient temperature was cool, averaging around 50°F, and the mat was cooling rapidly. For that reason, the contractor was concerned he might experience difficulty achieving density. Because of his concern he requested to be able to use a rubber-tired roller. The specifications prohibit the use of a rubber-

tired roller for asphalt rubber mixes but Mathy was given permission to try it. As expected, the rubber tires picked up fines and the use was discontinued.

The ARC was placed in September 1991 and the conventional mix was placed in April 1992. The two mixes were constructed similarly. The same segregation problems were experienced with the conventional mix when construction resumed this spring. Once again the switch was made from dump trucks to flowboys and the segregation problems significantly diminished.

CONSTRUCTION TESTING

Samples were taken during construction for viscosity testing and also for creep and resilient modulus testing.

Shortly after construction the Road Rater was run on the test sections and control sections. Friction testing was completed at this time also.

The results of all field testing are located in Appendix C and all lab test results in Appendix B.

COST COMPARISON

The higher cost is definitely a disadvantage of using the ARC. The asphalt cement was bid at \$101.00/ton and the reacted rubber asphalt cement was bid at \$215.00/ton. The contract prices of the different asphalt mixes are summarized in Table II.

TABLE II

<u>Conventional Binder</u>		<u>Conventional Surface</u>	
	14.14		14.14
AC-10	<u>4.55</u>	AC-10	<u>5.45</u>
(4.5%)	18.69	(5.4%)	19.59
<u>ARC Binder</u>		<u>ARC Surface</u>	
	14.50		14.50
AC-5	<u>12.69</u>	AC-5	<u>12.69</u>
(5.9%)	27.19	(5.9%)	27.19

EVALUATION

Friction testing, Road Rater testing and crack surveys were conducted right after construction and will be conducted annually.

A crack survey was made in the spring of 1992 on the ARC sections. At that time, holes in the roadway surface were discovered. Chunks of tire rubber had somehow gotten between the binder and the surface course of the roadway. It was not noticed at the time of construction. The surface had popped out during the winter, exposing the tire pieces and leaving holes in the surface. There were eleven holes ranging in size from approximately 2 in. in diameter to a rectangle shaped hole approximately 4 in. x 8 in. It is still a mystery how the rubber got in the mat. The holes were repaired by the contractor when he placed the conventional mix.

In addition to the standard project testing of the mix, creep and resilient modulus testing was performed for evaluation.

Hopefully a conclusion can be made to determine if using ARC will:

1. Improve performance.
2. Extend the life of the roadway.
3. Be of enough value from an environmental standpoint to compensate for its higher cost.

CONCLUSION

From the project the following conclusions can be made:

1. ARC mix can be constructed with little or no difference from that of a conventional mix.
2. ARC pavement appears to be in as good a condition as the conventional.

Appendix A
Contract and Special Provisions

Proposal I.D. No. 910958

ESTIMATING PROPOSAL ONLY

A
Bid Order No. 81

Type of Work ASPH CEMENT CONC RESURFACING

Project No. F-151-5(34)--20-31

System PRIMARY ROAD

Miles 19.2290

County DUBUQUE

Location and Description ON U.S. 151, FROM JUST EAST OF THE W.C.L. OF THE CITY OF CASCADE NORTHEASTERLY TO THE JCT. OF U.S. 61.

TO THE IOWA DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION

The bidder hereby certifies that no other principal is involved in or has an interest in this proposal; that the bidder has thoroughly examined the plans and specifications and this contract form and is aware of the special provisions contained herein; that the bidder has examined the site of the work and understands that the quantities of work required by the plans and specifications are approximate only and are subject to increases and decreases; that the bidder understands that all quantities of work actually required must be performed and that payment therefore shall be at the unit prices stipulated herein; that the bidder proposes to timely furnish the specified materials in the quantities required and to furnish the machinery, equipment, labor and expertise necessary to competently complete the project by the time specified; that no state or county official or employee has a direct or indirect interest in the contract which would cause violation of section 314.2 Code of Iowa, 1985; that the bidder has made no agreement with any supplier of motor fuel or special fuel which will result in a violation of section 324.17(8) Code of Iowa, 1985.

If this bid is accepted, Bidder agrees: to perform all "extra work" required to complete the project at unit prices or lump sums to be agreed upon in writing prior to commencement of such "extra work" or, if prior agreement cannot be reached, to perform the work on a "force-account basis" as provided in the specifications; to execute the formal contract within thirty days of the date of approval for award or to forfeit the proposal guaranty furnished herewith; to begin work in accordance with the contract documents and to either complete the work within the contract period or pay liquidated damages, which shall accrue at the daily rate specified below, for each additional working day the work remains uncompleted; and to furnish a performance bond in an amount equal to the contract award as security for the full and complete performance of the contract in accordance with the plans and specifications.

Group or Division No.	Amount of Proposal Guaranty	Working Days	Specified Starting Date	Approximate Starting Date	Specified Completion Date	Liquidated Damages Per Day
	\$120,000.00	70			11/01/91	\$900.00

Enclosed herewith is a certified check, credit union share draft, Cashier's check, bank draft on a solvent bank or a bid bond in the penal sum shown in the contract document as a proposal guaranty. It is understood by bidder that the said guaranty document shall be retained by the Iowa Department of Transportation as a forfeiture in the event the formal contract is not executed or performance bond is not furnished if the award is made to the undersigned.

By virtue of statutory authority preference will be given to products and provisions grown and coal produced within the state of Iowa where applicable.

MINIMUM WAGES IN EFFECT.

DBE GOAL: 10.0%

JUNE 4, 1991

SCHEDULE OF PRICES

Proposal I.D. No. 910958

611000 891

Bid Order No. ^B81

Contractor's No. _____

County DUBUQUE

Page No. 1

Project No. F-151-5(34)-20-31

Type of Work ASPH CEMENT CONC RESURFACING

Unit bids must be typed or shown in ink or the bid will be rejected.

Line No. Item No.	Item on which bid is based. Bidder shall show unit price and extension for each item and total for each group	Item Quantity and Units	Unit Price		Amount	
			Dollars X,XXX,XXX	Cents XXXX	Dollars XX,XXX,XXX	Cents XX
SECTION 001						
BID ALL ITEMS IN THIS SECTION.			X,XXX,XXX	.XXXX	XX,XXX,XXX	.XX
0010 5145160 441 84	PAVEMENT SCARIFICATION	1551.000 TONS				
0020 0400450 442 84	ASPHALT CEMENT CONCRETE, TYPE A SURFACE COURSE, MIXT. SIZE 1/2 IN.	2836.000 TONS				
0030 0400475 442 84	ASPHALT CEMENT CONCRETE, TYPE A SURFACE COURSE, MIXT. SIZE 3/4 IN.	23927.000 TONS				
0040 0400175 442 84	ASPHALT CEMENT CONCRETE, TYPE A BINDER COURSE, MIXT. SIZE 3/4 IN.	25082.000 TONS				
0050 0400380 442 84	ASPHALT CEMENT CONCRETE, TYPE A WEDGE, LEVEL OR STRENGTH. COURSE	2584.000 TONS				
0060 6375000 442 84	PRIMER OR TACK-COAT BITUMEN	36362.000 GALLONS				
0070 0525600 442 84	BASE, TYPE B CLASS 1 ASPHALT CEMENT CONCRETE	231.000 TONS				
0080 0505100 441 84	BASE, STANDARD OR SLIPFORM P.C. CONCRETE, 10 IN.	374.000 SQ. YDS.				
0090 0375010 442 84	ASPHALT CEMENT	2993.000 TONS				
0100 0475095 442 84	BASE, CLEANING & PREPARATION OF	22.630 MILES				
0110 7425010 446 86	SHOULDERS, GRANULAR, TYPE A	84817.000 TONS				
0120 5070002 441 87	PATCHES, FULL-DEPTH, BY COUNT	179.000 ONLY				

SCHEDULE OF PRICES

Proposal I.D. No. **910958**

611000 891

Bid Order No. **81**

Contractor's No. _____

County **DUBUQUE**

Page No. **2**

Project No. **F-151-5(34)--20-31**

Type of Work **ASPH CEMENT CONC RESURFACING**

Unit bids must be typed or shown in ink or the bid will be rejected.

Line No. Item No.	Item on which bid is based. Bidder shall show unit price and extension for each item and total for each group	Item Quantity and Units	Unit Price		Amount	
			Dollars X,XXX,XXX	Cents XXXX	Dollars XX,XXX,XXX	Cents XX
SECTION 001 (CONTINUED)						
0130 5070001 441 87	PATCHES, FULL-DEPTH, BY AREA	4138.000 SQ. YDS.				
0140 0400056 442 87	ASPHALT CEMENT CONCRETE (COMPOSITE SECTIONS)	179.060 TONS				
0150 5075000 442 88	PATCHES, SURFACE	35.000 TONS				
0160 8212034 418 84	SUBDRAIN, LONGITUDINAL, (SHOULDER) 4 IN. DIA.	11390.000 LINEAR FT.				
0170 2301000 418 89	DRAIN, FIN, AS PER PLAN	5050.000 LINEAR FT.				
0180 8220206 418 84	SUBDRAIN OUTLET, CORRUGATED METAL PIPE, 6 IN. DIA.	68.000 ONLY				
0190 4479056 442 88	JOINT ASSEMBLY, EF	12.000 ONLY				
0200 4480507 442 84	JOINT, REPAIR LONGITUDINAL	14520.000 LINEAR FT.				
0210 2625000 410 84	EMBANKMENT-IN-PLACE	445.000 CUBIC YDS.				
0220 4625290 418 84	MANHOLE, RA-29, STORM SEWER	1.000 ONLY				
0230 4450030 418 84	INTAKE, RA-3	1.000 ONLY				
0240 7325030 418 84	SEWER, 20000 STORM, 30 IN. DIA.	280.000 LINEAR FT.				
0250 7325024 418 84	SEWER, 20000 STORM, 24 IN. DIA.	30.000 LINEAR FT.				

SCHEDULE OF PRICES

Proposal I.D. No. 910958

611000 891

Bid Order No. 81

Contractor's No. _____

County DUBUQUE

Page No. 3

Project No. F-151-5(34)--20-31

Type of Work ASPH CEMENT CONC RESURFACING

Unit bids must be typed or shown in ink or the bid will be rejected.

Line No. Item No.	Item on which bid is based. Bidder shall show unit price and extension for each item and total for each group	Item Quantity and Units	Unit Price		Amount	
			Dollars X,XXX,XXX	Cents XXXX	Dollars XX,XXX,XXX	Cents XX
SECTION 001 (CONTINUED)						
0260 3400000 418 84	FIXTURES, ADJUSTMENT OF	18.000 ONLY				
0270 9263010 493 84	PAVEMENT MARKINGS	3195.010 STAS.				
0280 8445110 493 84	TRAFFIC CONTROL	1.000 LUMP SUM				
0290 6911000 442 84	SAMPLES	1.000 LUMP SUM				
0300 2636041 448 84	SEEDING & FERTILIZING	2.000 ACRES				
0310 2634100 448 84	MULCHING	2.000 ACRES				
0320 0402475 442 91	ASPH.CEM.CONC., TYPE A SURFACE, 3/4 IN. (ASPHALT RUBBER CEMENT (A.R.C.) CONCRETE)	6088.000 TONS				
0330 0402175 442 91	ASPH.CEM.CONC., TYPE A BINDER, 3/4 IN. (ASPHALT RUBBER CEMENT (A.R.C.) CONCRETE)	4849.000 TONS				
0340 0375030 442 91	ASPHALT RUBBER CEMENT (A.R.C.)	711.000 TONS				
0350 3350010 442 84	FIELD LABORATORY	1.000 ONLY				
0360 8445112 493 86	FLAGGERS	270.000 DAYS	105.0000		28350.00	
0370 8445114 493 86	PILOT CARS	60.000 DAYS	160.0000		9600.00	
0380 4980005 442 85	MOBILIZATION	1.000 LUMP SUM				

SCHEDULE OF PRICES

Proposal I.D. No. **910958**

611000 891

Bid Order No. **81**

Contractor's No. _____

County **DUBUQUE**

Page No. **4**

Project No. **F-151-5(34)--20-31**

Type of Work **ASPH CEMENT CONC RESURFACING**

Unit bids must be typed or shown in ink or the bid will be rejected.

Line No. Item No.	Item on which bid is based. Bidder shall show unit price and extension for each item and total for each group	Item Quantity and Units	Unit Price		Amount	
			Dollars X,XXX,XXX	Cents XXXX	Dollars XX,XXX,XXX	Cents XX
SECTION 001 (CONTINUED)						
0390	TRAINEE REIMBURSEMENT					
8447010 442 84		520.000 HOURS		0.8000		416.00
		SUBTOTAL FOR SECTION 001				
			BID TOTAL			

PROPOSAL REQUIREMENTS

Proposal I.D. No. 910958

SPECIAL PROVISIONS TEXT

Bid Order No. 81^C

Contractor's No. _____

County DUBUQUE

Page No. 1

Project No. F-151-5(34)--20-31

Type of Work ASPH CEMENT CONC RESURFACING

FHWA-1273

AUGUST 1, 1989

FEDERAL AID CONSTRUCTION CONTRACTS WAGE DECISION NO. IA91-1 DATED
FEBRUARY 22, 1991 AND THE FOLLOWING MODIFICATIONS APPLY TO THIS PROJECT.

MODIFICATION RECORD NO.

PUBLICATION DATE

=====

=====

1

MARCH 8, 1991

*** ADDITIONAL REQUIREMENT ***

THE PRIME CONTRACTOR SHALL SUBMIT CERTIFIED PAYROLLS FOR ITSELF AND EACH APPROVED SUBCONTRACTOR WEEKLY TO THE PROJECT ENGINEER. THE CONTRACTOR MAY USE THE IOWA D.O.T. CERTIFIED PAYROLL FORM OR OTHER APPROVED FORM. THE CONTRACTOR SHALL LIST THE CRAFT FOR EACH EMPLOYEE COVERED BY THE DAVIS-BACON ACT. THE PRIME CONTRACTOR SHALL SIGN EACH OF THE SUBCONTRACTOR'S PAYROLLS TO ACKNOWLEDGE THE SUBMITTAL OF THE CERTIFIED PAYROLL.

SP-1017

JUNE 4, 1991

SPECIAL PROVISIONS FOR ASPHALT RUBBER CEMENT (ARC) CONCRETE
*** INTENDED FOR DUBUQUE COUNTY A.C.C. RESURFACING PROJECT
F-151-5(34)--20-31 ***

SS- 962

JULY 31, 1984

SUPPLEMENTAL SPECIFICATIONS FOR ON THE JOB TRAINING
(EQUAL EMPLOYMENT OPPORTUNITY RESPONSIBILITIES)

SS- 964

JULY 31, 1984

SUPPLEMENTAL SPECIFICATIONS FOR SPECIFIC EQUAL EMPLOYMENT OPPORTUNITY
RESPONSIBILITIES (THIS INCLUDES EMPLOYMENT GOALS FOR MINORITIES AND
WOMEN IN CONSTRUCTION.)

SS-1022

APRIL 1, 1986

SUPPLEMENTAL SPECIFICATIONS FOR LONGITUDINAL JOINT REPAIR

SS-1057

FEBRUARY 23, 1988

SUPPLEMENTAL SPECIFICATIONS FOR CERTIFIED PLANT INSPECTION.

SS-1062

AUGUST 1, 1988

SUPPLEMENTAL SPECIFICATIONS FOR MOBILIZATION

SS-1083

JUNE 27, 1989

SUPPLEMENTAL SPECIFICATIONS FOR STANDARDIZED CONTRACT CLAUSES

PROPOSAL REQUIREMENTS

Proposal I.D. No. 910958

SPECIAL PROVISIONS TEXT

Bid Order No. 81^C

Contractor's No. _____

County DUBUQUE

Page No. 2

Project No. F-151-5(34)--20-31

Type of Work ASPH CEMENT CONC RESURFACING

SS-1089

DECEMBER 5, 1989

SUPPLEMENTAL SPECIFICATIONS FOR PORTLAND CEMENT CONCRETE PROPORTIONS

SS-1091

DECEMBER 5, 1989

SUPPLEMENTAL SPECIFICATIONS FOR FULL-DEPTH PATCHES

SS-1094

DECEMBER 5, 1989

SUPPLEMENTAL SPECIFICATIONS FOR PARTIAL-DEPTH PATCHES AND SURFACE PATCHES (INCLUDING CLEANING AND PREPARATION OF BASE)

SS-5003

MAY 1, 1990

SUPPLEMENTAL SPECIFICATIONS FOR SPECIFIC AFFIRMATIVE ACTION RESPONSIBILITIES (DISADVANTAGED BUSINESS ENTERPRISE) FEDERAL AID PROJECTS

SS-5014

DECEMBER 11, 1990

SUPPLEMENTAL SPECIFICATIONS FOR DELIVERY OF SAMPLES

SS-5015

DECEMBER 11, 1990

GENERAL SUPPLEMENTAL SPECIFICATION FOR CONSTRUCTION PROJECTS

SS-5018

FEBRUARY 12, 1991

ERRATA TO GENERAL SUPPLEMENTAL SPECIFICATIONS FOR CONSTRUCTION PROJECTS (ERRATA TO SS-5015)

SS-5025

MARCH 26, 1991

SUPPLEMENTAL SPECIFICATIONS FOR TRAFFIC CONTROLS FOR STREET AND HIGHWAY CONSTRUCTION, MAINTENANCE, UTILITY AND EMERGENCY OPERATIONS.

005 20

THE FOLLOWING PROPOSAL NOTE SUPERSEDES ANY PLAN NOTE IN REGARD TO SS-1083 AND/OR ARTICLE 1109.03 OF THE STANDARD SPECIFICATIONS.

ANY AND ALL REFERENCES TO ARTICLE 1109.03 OF THE STANDARD SPECIFICATIONS SHALL BE NULL AND VOID ON ALL STANDARDS, PLANS, SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS, AND SPECIAL PROVISIONS. IN LIEU THEREOF, THE PROVISIONS OF SS-1083, DATED JUNE 27, 1989 SHALL APPLY.

005 21

*** REVISE ARTICLE 1101.03 OF THE STANDARD SPECIFICATIONS ***

PROPOSAL REQUIREMENTS

Proposal I.D. No. 910958

SPECIAL PROVISIONS TEXT

Bid Order No. 81

Contractor's No. _____

County DUBUQUE

Page No. 3

Project No. F-151-5(34)--20-31

Type of Work ASPH CEMENT CONC RESURFACING

DELETE THE THIRD AND FOURTH SENTENCES IN THE SECOND PARAGRAPH FOR THE DEFINITION OF A WORKING DAY IN ARTICLE 1101.03 AND REPLACE WITH THE FOLLOWING THREE NEW SENTENCES IN LIEU THEREOF.

"WORKING DAYS WILL NOT BE COUNTED FOR SATURDAYS, SUNDAYS, AND RECOGNIZED LEGAL HOLIDAYS THE CONTRACTOR DOES NOT WORK. WORKING DAYS WILL BE COUNTED FOR SUNDAYS AND RECOGNIZED LEGAL HOLIDAYS THE CONTRACTOR DOES WORK. WORKING DAYS WILL NOT BE COUNTED FOR SATURDAYS THE CONTRACTOR DOES WORK, UNLESS OTHERWISE SPECIFIED IN THE CONTRACT DOCUMENTS."

005 22

*** REVISION TO SS-5003 ***

IN SS-5003, 'SUPPLEMENTAL SPECIFICATIONS FOR SPECIFIC AFFIRMATIVE ACTION RESPONSIBILITIES (DISADVANTAGED BUSINESS ENTERPRISE) FEDERAL AID PROJECTS', UNDER SECTION 5003.06B, REPLACE SUBSECTION 3. B) OF 'TRANSPORTATION OR DELIVERY SERVICES' WITH THE FOLLOWING:
 "THE OFFICE OF CONTRACTS OF THE IOWA DEPARTMENT OF TRANSPORTATION WILL MAINTAIN A TRUCK ROSTER FOR EACH DBE THAT PERFORMS TRUCKING. EACH TRUCK ON THE TRUCK ROSTER SHALL BE EITHER OWNED BY THE DBE OR CONTROLLED BY THE DBE UNDER A LONG-TERM LEASE. TRUCKS WHICH ARE LEASED SHALL BE FROM A FIRM THAT IS IN THE COMMERCIAL LEASING BUSINESS."

ONLY TRUCKS ON THE TRUCK ROSTER MAY BE USED TO MEET THE DBE COMMITMENT. ALL DRIVERS SHALL BE EMPLOYEES OF THE DBE."

005 30

*** REQUIREMENT FOR DISCLOSURE OF ALL SUBCONTRACTORS ***

IOWA CODE 307.49 AS ADDED BY HOUSE FILE 2201 REQUIRES THAT:
 "A BIDDER AWARDED A CONTRACT WITH THE DEPARTMENT SHALL DISCLOSE THE NAMES OF ALL SUBCONTRACTORS, WHO WILL WORK ON THE PROJECT OR WHO THE BIDDER ANTICIPATES WILL WORK ON THE PROJECT.... IF A SUBCONTRACTOR NAMED BY A BIDDER AWARDED A CONTRACT IS REPLACED, OR IF THE COST OF WORK TO BE DONE BY A SUBCONTRACTOR IS REDUCED, THE BIDDER SHALL DISCLOSE THE NAME OF THE NEW SUBCONTRACTOR OR THE AMOUNT OF THE REDUCED COST. IF A SUBCONTRACTOR IS ADDED BY A BIDDER AWARDED A CONTRACT, THE BIDDER SHALL DISCLOSE THE NAME OF THE NEW SUBCONTRACTOR...."

THE LIST OF PROPOSED SUBCONTRACTORS SHALL BE SUBMITTED TO THE OFFICE OF CONTRACTS WITH THE PERFORMANCE BOND AND SIGNED CONTRACT.

FAILURE TO PRESENT THE SUBCONTRACTOR LIST SHALL CAUSE THE CONTRACTOR TO BE RE-EVALUATED FOR FUTURE BIDDER QUALIFICATION AS PER ARTICLE 1102.03.

THESE REQUIREMENTS ARE IN ADDITION OF ARTICLE 1108.01.

080 00

*** DBE GOAL INFORMATION ***

THE ESTABLISHED DBE GOAL FOR THIS CONTRACT CONCERNING PARTICIPATION BY DISADVANTAGED BUSINESS ENTERPRISES (E.G., SUPPLIERS, AND SUBCONTRACTORS) IS SHOWN ON THE FRONT OF THIS PROPOSAL FORM.

REFER TO THE CURRENT 'SUPPLEMENTAL SPECIFICATION FOR SPECIFIC AFFIRMATIVE ACTION RESPONSIBILITIES (DISADVANTAGED BUSINESS ENTERPRISES) FEDERAL AID PROJECTS' FOR ADDITIONAL INFORMATION AND INSTRUCTIONS.

PROPOSAL REQUIREMENTS

SPECIAL PROVISIONS TEXT

Bld Order No. 81^C

Proposal I.D. No. 910958

Contractor's No. _____

County DUBUQUE

Page No. 4

Project No. F-151-5(34)--20-31

Type of Work ASPH CEMENT CONC RESURFACING

IN ADDITION, IF THE WINNING BIDDER ELECTS TO USE DBE SUBCONTRACTORS AND/OR SUPPLIERS, FORM 830231 (SUBCONTRACT REQUEST AND APPROVAL) SHALL BE SUBMITTED TO THE PROJECT ENGINEER PRIOR TO THE PRECONSTRUCTION CONFERENCE TO DOCUMENT DBE SUBCONTRACTORS AND/OR SUPPLIERS TO BE USED. THE CONTRACTOR SHALL ATTACH A COMPLETED FORM 102117 FOR EACH DBE SUBCONTRACTOR AND/OR SUPPLIER.

120 01

THE FIELD LABORATORY OR LABORATORIES IF APPLICABLE SHALL BE ON THE PROJECT AT ALL TIMES TESTING IS REQUIRED.

300 01

*** ON THE JOB TRAINING ***

THE UNIT PRICES FOR 'TRAINEE REIMBURSEMENT' HAS BEEN PREDETERMINED BY THE CONTRACTING AUTHORITY. THE BIDDER SHALL NOT ALTER THE QUANTITY, THE UNIT PRICE, OR THE EXTENSION PROVIDED, BUT SHALL INCLUDE THE AMOUNT IN THE TOTAL BID.

310 10

*** FLAGGERS AND/OR PILOT CARS ***

THE UNIT PRICES FOR 'FLAGGERS' AND/OR 'PILOT CARS' HAS BEEN PREDETERMINED BY THE CONTRACTING AUTHORITY. THE BIDDER SHALL NOT ALTER THE QUANTITY, THE UNIT PRICE, OR THE EXTENSION PROVIDED, BUT SHALL INCLUDE THE AMOUNT IN THE TOTAL BID.

410 00

TEMPORARY PRIMARY ROAD HAUL ROADS ARE REQUIRED FOR THIS PROJECT. THE LOW BIDDER MAY SUBMIT SUGGESTED HAUL ROUTES TO THE CONTRACTS ENGINEER, AS DEFINED BY ARTICLE 1105.14, USING THE FORM INCLUDED WITH THIS PROPOSAL.

500 01

THE FREE TIME ALLOWED BETWEEN NOVEMBER 15 AND APRIL 1 WILL NOT BE PERMITTED ON THIS PROJECT. THE CONTRACTOR SHALL WORK DURING THE WINTER ON ALL WORKING DAYS AS DEFINED IN 1101.03 WORKING DAYS.

649 68

*** FOR PROPOSAL ITEM NO. 0020 ***

THE SURFACE COURSE SHALL BE 1/2 IN. MIX WITH NO SPECIAL AGGREGATE FRICTIONAL REQUIREMENTS.

*** FOR PROPOSAL ITEM NOS. 0030, 0040 AND 0070 ***

THE SURFACE COURSE SHALL BE A 3/4 IN. MIX. AT LEAST 50% OF THE AGGREGATE RETAINED ON THE NO. 4 SIEVE SHALL BE TYPE 4 OR BETTER FRICTIONAL CLASSIFICATION AGGREGATE. FRICTIONAL CLASSIFICATION SHALL BE IN ACCORD WITH MATERIAL INSTRUCTIONAL MEMORANDUM T-203.

*** CRUSHED PARTICLE INFORMATION FOR ALL A.C.C. MIXES ***

PROPOSAL REQUIREMENTS

SPECIAL PROVISIONS TEXT

Bid Order No. **C**
81

Proposal I.D. No. **910958**

Contractor's No. _____

County **DUBUQUE**

Page No. **5**

Project No. **F-151-5(34)-20-31**

Type of Work **ASPH CEMENT CONC RESURFACING**

THE PERCENTAGE OF CRUSHED PARTICLES IN THE A.C.C. SHALL BE:

SURFACE	75%	
BINDER	75%	
* BASE	45%	* (INCLUDING WIDENING)

700 00

ALL GROUPS OR DIVISIONS (IF APPLICABLE) ON THIS PROPOSAL FORM ARE TIED. NO OTHER TIES BETWEEN GROUPS OR PROJECTS WILL BE ALLOWED.

720 00

SEE ADDITIONAL ATTACHED REQUIREMENTS.

(Additional Attached Requirements)

Dubuque County, F-151-5(34)--20-31

ACC Resurfacing

**SPECIAL PROVISIONS
for
SALVAGING AND RECYCLING OF ASPHALT CEMENT CONCRETE**

Salvaged Asphalt Cement Concrete Material

Salvaged asphalt cement concrete material is that which is to be removed from the existing surface to depths shown on the plans as work of the bid item Pavement Scarification.

Existing Asphalt Cement Concrete Material

The existing asphalt cement concrete materials were placed in 1972. The existing asphalt cement concrete is 3/4" Type "B" Binder-Surface, placed in two 1 1/2 inch thick courses.

The gradation of the existing mixture according to the original mix design is as follows:

<u>Sieve Size</u>	<u>% Passing</u>
3/4"	100
1/2"	92
3/8"	76
#4	58
#8	46
#30	30
#200	7.0

The existing mixture is made up of 75% crushed limestone and 25% sand. The asphalt cement content of the existing mixture is approximately 5.0%.

Recycling of Salvaged Asphalt Cement Concrete Materials

Existing asphalt cement concrete material salvaged from this project as work of bid item Pavement Scarification is suitable for recycling into the regular asphalt cement concrete Type "A" binder and surface mixtures on this project. Salvaged material shall not be recycled into the 3/4" type "A" asphalt rubber cement (ARC) concrete binder or surface courses.



Iowa Department of Transportation

**SPECIAL PROVISIONS
for
ASPHALT RUBBER CEMENT (ARC) CONCRETE**

F-151-5(34)-20-31, Dubuque County

June 4, 1991

THE STANDARD SPECIFICATIONS, SERIES OF 1984, ARE AMENDED BY THE FOLLOWING MODIFICATIONS. THESE ARE SPECIAL PROVISIONS, WHICH SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

1017.01 DESCRIPTION.

The asphalt rubber cement (ARC) concrete mix composition will include the incorporation of ARC in the mixture, using the aggregates selected by the Contractor.

The Contractor shall have a representative of the rubber supplier available on the project site during the initial production of the ARC materials. The Contractor shall have a representative of the rubber supplier on call for technical assistance during production operations.

1017.02 GENERAL REQUIREMENTS.

The ARC concrete mixes shall conform to the requirements of the standard specifications for the standard asphalt cement concrete mixes as specified in the plans. The Standard Specifications are modified as follows:

A. Mineral Aggregate for the ARC Concrete Mixes.

Mineral aggregates shall meet Type "A" quality as specified in the plans and specifications except the gradation shall meet the following:

Sieve size	Percent passing
1"	100
3/4"	98-100
1/2"	76-92
3/8"	60-83
#4	40-62
#8	26-45
#30	11-24
#200	3-7

SP-1017, Page 2

B. Asphalt Rubber Cement (ARC)

The ARC shall be a uniform mixture of compatible paving grade asphalt cement, ground reclaimed vulcanized rubber, and if required by the mixture design, a liquid anti-strip agent. The ARC shall meet the following physical parameters when reacted at 350 ±10 degrees Fahrenheit for 60 minutes.

Test	Requirements
Viscosity Brookfield, 350°F	1500 - 4000 CP
Resilience 77°F ASTM D3407	10% min.

C. Asphalt Extender Oil

An asphalt extender oil may be added, if necessary, to meet the requirements of Section 1017.02B of these special provisions. Extender oil shall be a resinous, high flash point, aromatic hydrocarbon meeting the following test requirements.

Viscosity, SSU, at 100 degrees F (ASTM D88)	2500 min.
Flash Point, COC, degrees F (ASTM D92)	390 min.
Molecular Analysis (ASTM D 2007):	
Asphaltenes, Wt. %	0.1 min.
Aromatics, Wt. %	55.0 min.

1017.03 GROUND RECLAIMED VULCANIZED RUBBER.

The rubber used shall be produced from the recycling of automobile and truck tires. Final grinding of the rubber shall be accomplished with processes performed at the ambient temperature. The use of ground rubber from multiple sources is acceptable provided the over-all blend of rubber meets the gradation requirements. The gradation of the rubber when tested in accordance with ASTM C136 using approximately 50 grams shall be in accordance with the following table.

Sieve Size	Percent passing
#10	100
#30	25-100
#50	10-100

Gradation of the rubber may be adjusted due to compatibility and reaction characteristics with the asphalt cement as required in the job mix formula.

Specific gravity of the rubber shall be 1.15 ± 0.05 and it shall be free from fabric, wire, or other contaminating materials. However, up to four percent calcium carbonate may be included to prevent the particles of rubber from sticking together.

The rubber shall be dry so as to be free flowing and not produce foaming when blended with hot asphalt cement. Not more than 1% of the particles shall exceed six times their minimum dimension.

1017.04 PACKAGING.

The ground rubber shall be supplied in moisture resistant disposable bags which weigh 50 ± 2 lbs. The bags shall be palletized into units each containing 50 bags to provide net pallet weights of 2500 ± 100 lbs. Glue shall be placed between layers of bags to increase the unit stability during shipment. Palletized units shall be double wrapped with ultra-violet resistant stretch wrap.

1017.05 CERTIFICATION.

The manufacturer shall ship with the rubber, certificates of compliance which certify that all requirements of these specifications are complied with for each production lot number of shipment.

1017.06 ASPHALT RUBBER CEMENT (ARC) MIXTURE DESIGN

The asphalt cement to be reacted with rubber shall be grade AC-5. The proportion of ground rubber shall be between 15 and 25 percent by weight of the asphalt cement.

The Contractor shall supply to the Engineer, for approval, a mix formulation at least 10 days before pavement construction is scheduled to begin. Mix design criteria for the ARC concrete mixes shall be the same for the non-rubber asphalt cement concrete (ACC) mixtures used on this project.

1017.07 ASPHALT RUBBER CEMENT (ARC) MIXING AND PRODUCTION EQUIPMENT

Unless otherwise authorized by the Engineer, all equipment utilized in production and proportioning of the ARC shall be described as follows:

- A. An asphalt heating tank with a hot oil heat transfer system or retort heating system capable of heating asphalt cement to the necessary temperature for blending with the ground rubber. If required, this unit shall be capable of heating a minimum of 3,000 gallons of asphalt cement to 375^o F.
- B. An ARC mechanical blender with a two stage continuous mixing process capable of producing a homogeneous mixture of asphalt cement and ground rubber, at the mix design specified ratios, as recommended by the supplier of the ground rubber. This unit shall be equipped with a ground rubber feed system capable of supplying the asphalt cement feed system as not to interrupt the continuity of the blending process. A separate asphalt cement feed pump and finished product pump are required. This unit shall have both an asphalt cement totalizing meter in gallons and a flow rate meter in gallons per minute.
- C. An ARC storage tank equipped with a heating system to maintain the proper temperature for pumping and adding of the binder to the aggregate and an internal mixing unit within the ground vessel capable of maintaining a proper mixture of asphalt cement and ground rubber.
- D. An ARC supply system equipped with a pump and metering device capable of adding the ARC by volume to the aggregate at the percentage required by the job-mix formula.

An interlock of the ARC and aggregate feed systems will not be required. The Contractor shall accurately proportion the ARC into the mixture.

952A.08 ASPHALT RUBBER CEMENT MIXING AND REACTING PROCEDURE.**A. Asphalt Cement Temperature.**

The temperature of the asphalt cement shall be between 290^o and 400 degrees F. at the addition of the ground rubber, as directed by the supplier.

SP-1017, Page 4

B. Blending and Reacting.

The asphalt and ground rubber shall be combined and mixed together in a blender unit, pumped into the agitated storage tank, and then reacted for a minimum of 45 minutes from the time the ground rubber is added to the asphalt cement, or as directed by the supplier. Temperature of the ARC mixture shall be maintained between 290^o and 375 degrees F. during the reaction period, or at a temperature specified by the supplier.

C. Transfer.

After the material has been reacted, the ARC shall be metered into the mixing chamber of the ARC concrete production plant at the percentage required by the job-mix formula.

D. Delays.

When a delay occurs in ARC use after its full reaction, the ARC shall be reheated slowly just prior to use to a temperature between 290^o and 375 degrees F., and shall also be thoroughly mixed before pumping and metering into the hot mix plant for mixing with the aggregate. The viscosity of the ARC shall be checked by the supplier to assure specification compliance.

1017.09 COMPACTION REQUIREMENT.

The Asphalt Rubber Cement (ARC) concrete shall be compacted to 95% of laboratory density.

1017.10 COMPACTION EQUIPMENT.

A minimum of two rollers meeting Article 2001.05B shall be furnished. Pneumatic tired rollers will not be allowed.

1017.11 METHOD OF MEASUREMENT AND BASIS OF PAYMENT OF ASPHALT RUBBER CEMENT (ARC) CONCRETE.

The Asphalt Rubber Cement Concrete Mix will be measured as per the standard specification, and be paid for in tons. Asphalt Rubber Cement for use in the ARC Concrete Mix will be measured as per the standard specifications and be paid for in tons.

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: Contracts

DATE: May 20, 1991

ATTENTION: Harvey Olson

REF. NO.: 436/HR-330C

FROM: Vernon J. Marks

OFFICE: Materials - Research

SUBJECT: Request for Addendum on Dubuque FN-151-5(34)--21-~~07~~³¹

By this memo we are requesting an addendum to modify the second sentence of Section 1017.06 of Special Provision SP-1017 to read "The proportion of ground rubber shall be between 10 and 25 percent by weight of the asphalt cement."

VJM:kmd

cc: B. Brown

R. Monroe

T. Cackler

Appendix B
Lab Testing

IOWA DEPARTMENT OF TRANSPORTATION

OFFICE OF MATERIALS

TEST REPORT - ASPHALT MIX DESIGN

LAB LOCATION - AMES

LAB NO. ABD1-0210

MATERIAL TYPE A ARC

INTENDED USE BINDER/SURFACE

PROJECT NO. FN-151-5 (34)--21-31

COUNTY DUBUQUE

CONTRACTOR: MATHY

SPEC NO. 1017.00

SIZE: 3/4

SAMPLED BY:

SENDER NO.:

DATE SAMPLED:

DATE RECEIVED:

DATE REPORTED: 09/18/91

PROJ. LOCATION: FROM CASCADE TO U.S. 61

AGG. SOURCES: 3/4" & 1/2" CR. LST. & MAN. SAND - RIVER CITY
STONE, BROWN QRY., DUBUQUE CO.; SAND - AGGREGATE MATLS.,
NINE MILE, DUBUQUE CO.
BINDER IS 15% REACTED RUBBER

JOB MIX FORMULA-COMB. GRADATION

1-1/2"	1"	3/4"	1/2"	3/8"	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
100.0	92.0	79.0	62.0	44.0	33.0	23.0	12.0	6.9	4.3		

TOLERANCE %/100 :

98	7	7	7	5	4	2
----	---	---	---	---	---	---

MATERIAL MIX	A31010	A31010	A31010	A31502	
% AGGR. PROP.	40.00	15.00	20.00	25.00	0.00

ASPHALT SOURCE AND APPROXIMATE VISCOSITY PDISES	KOCH			
% ASPHALT IN MIX	6.00	7.00	8.00	0.00
NUMBER OF MARSHALL BLOWS	50	50	50	0
MARSHALL STABILITY - LBS.	987	930	972	0
FLOW - 0.01 IN.	10	9	8	0
SP GR BY DISPLACEMENT (LAB DENS)	2.296	2.341	2.351	0.000
BULK SP. GR. COMB. DRY AGG.	2.783	2.783	2.783	0.000
SP. GR. ASPH. @ 77 F.	1.024	1.024	1.024	0.000
CALC. SOLID SP. GR.	2.564	2.524	2.485	0.000
% VOIDS - CALC.	0.00	7.25	5.38	0.00
RICE SP. GR.	2.494	2.468	2.426	0.000
% VOIDS - RICE	7.94	5.15	3.09	0.00
% WATER ABSORPTION - AGGREGATE	1.39	1.39	1.39	0.00
% VOIDS IN MINERAL AGGREGATE	22.45	21.77	22.28	0.00
% V.M.A. FILLED WITH ASPHALT	53.40	66.72	75.85	0.00
CALC. ASPH. FILM THICK. MICRONS	10.22	12.14	14.07	0.00
FILLER/BITUMEN RATIO	0.00	0.57	0.00	0.00
TEMP=	220			
WT=	7300			
SLOPE=	3.98			

A CONTENT OF 7.5% BINDER IS RECOMMENDED TO START THE JOB.
THIS IS 896 AC TO 158 RUBBER.

COPIES TO:

- CENTRAL LAB R. MONROE
- ADAM
- D. HEINS RIVER CITY ASPHALT W. OPPEL
- ED-ST. 6 MANCHESTER RES.

DISPOSITION:

SIGNED: MORRIS J. LANE, JR.
TESTING ENGINEER

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

LAB NO.....:ABD1-0193

MATERIAL.....:TYPE A
INTENDED USE....:BINDER/SURFACE
PROJECT NO.....:FN-151-5(34)--21-31
COUNTY.....:DUBUQUE
SUPP SPEC NO.....:1017.00
SAMPLED BY.....:

CONTRACTOR:MATHY
SIZE.....:3/4
SENDER NO.:

DATE SAMPLED: DATE RECEIVED: DATE REPORTED: 08/22/91
PROJ. LOCATION: FROM CASCADE TO U.S. 61

AGG SOURCES: CR. LST & CHIPS- BARD CONC., CASCADE EAST,
DUBUQUE CO; SAND- TSCHIGGFRIE, MCCABE PIT, DUBUQUE CO.

JOB MIX FORMULA-COMB. GRADATION

	1 1/2"	1"	3/4"	1/2"	3/8"	NO.4	NO.8	NO.16	NO.30	NO.50	NO.100	NO.200
	100.0	89.0	74.0	51.0	36.0	28.0	21.0	11.0	7.0	4.7		

TOLERANCE /100 :	98	7	7	7	5		4				2
------------------	----	---	---	---	---	--	---	--	--	--	---

MATERIAL MIX	A31006	A31006	A31510		
% AGGR. PROP.	37.50	37.50	25.00	0.00	0.00

ASPHALT SOURCE AND	KOCH			
APPROXIMATE VISCOSITY POISES	0945			
ASPHALT IN MIX	5.00	6.00	0.00	0.00
NUMBER OF MARSHALL BLOWS	50	50	0	0
MARSHALL STABILITY - LBS.	2702	2653	0	0
FLOW - 0.01 IN.	7	10	0	0
SP. GR BY DISPLACEMENT (LAB DENS)	2.369	2.399	0.000	0.000
BULK SP. GR. COMB. DRY AGG.	2.763	2.763	0.000	0.000
SP. GR. ASPH. @ 77 F.	1.026	1.026	0.000	0.000
CALC. SOLID SP. GR.	2.597	2.555	0.000	0.000
% VOIDS - CALC.	8.77	6.12	0.00	0.00
RICE SP. GR.	2.506	2.461	0.000	0.000
% VOIDS - RICE	5.47	2.52	0.00	0.00
% WATER ABSORPTION - AGGREGATE	1.61	1.61	0.00	0.00
% VOIDS IN MINERAL AGGREGATE	18.55	18.38	0.00	0.00
% V.M.A. FILLED WITH ASPHALT	52.73	66.69	0.00	0.00
CALC. ASPH. FILM THICK. MICRONS	8.36	10.35	0.00	0.00
FILLER/BITUMEN RATIO	0.00	0.87	0.00	0.00
TEMP=	220			
WT=	7400			
SLOPE=	4.14			
INTER=	-4.62			

A CONTENT OF 5.4% ASPHALT IS RECOMMENDED TO START THE JOB.
TOLERANCE ON #200 ALSO CONTROLLED BY FINES/BITUMEN RATIO.
COPIES TO:

CENTRAL LAB
D. HEINS
DIST. 6

W. OPPEDAL
J. ADAM
MANCHESTER RES.

MATHY
R. MONROE
mark
Dennis

DISPOSITION:

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

00

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - BITUMINOUS AGGREGATES
LAB LOCATION - AMES

LAB NO.: AAT1-1520

MATERIAL: ASPHALT RUBBER

INTENDED USE: ASPHALT BINDER

PRODUCER: RIVER CITY

PROJECT NO.: FN-151-5(34)--21-07

COUNTY: DUBUQUE

CONTRACTOR: MATHY CONST.

SOURCE: BROWNS QRY

UNIT OF MATERIAL: POWDER RUBBER GF-60

SAMPLED BY: ANDERSON

SENDER NO.: CP1-24

DATE SAMPLED: 09/17/91

DATE RECEIVED: 10/31/91

DATE REPORTED: 10/31/91

% PSG.

#10 100

#30 99

#50 50

COPIES TO:

CENTRAL LAB

GEOLOGY

V. MARKS

R. MONROE

DISPOSITION:

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

AB 1-0309
00

29

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - ASPHALT
LAB LOCATION - AMES

LAB NO. AB 1-0309

MATERIAL: ASPHALT RUBBER BINDER

INTENDED USE: ASPHALT BINDER

PRODUCER: RIVER CITY

PROJECT NO.: FN-151-5(34)--21-07

COUNTY: DUBUQUE

CONTRACTOR: MATHY CONST.

SOURCE: BROWNE QUARRY

UNIT OF MATERIAL: RUBBER POWDER GF-60 AC-5

SAMPLED BY: C. ANDERSON

SENDER NO.: CP1-23

DATE SAMPLED: 09/17/91

DATE RECEIVED: 09/23/91

DATE REPORTED: 09/25/91

15% RUBBER BY WEIGHT OF THE TOTAL MIXTURE OF THE ASPHALT RUBBER CEMENT.

RESULTS: 1550 CPS. @ 1 HOUR

SP-1028: APPARENT VISCOSITY, 347 F.,

SPINDLE 3 (BROOKFIELD) 12 RPM, CPS.

MIN. 1000

MAX. 4000

COPIES TO:

CENTRAL LAB

C. ANDERSON

V. MARKS

R. MONROE

DISPOSITION:

SIGNED: ORRIS J. LANE, JR.

TESTING ENGINEER

BC

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
TEST REPORT - ASPHALT CONCRETE
LAB LOCATION - AMES

LAB NO. ABC1-0373

MATERIAL: 3/4" A @ 5.9% TOTAL ARC

INTENDED USE: BINDER/SURFACE

PRODUCER: RIVER CITY

PROJECT NO.: FN-151-5(34)-21-31

COUNTY: DUBUQUE

SOURCE: BROWN'S QRY.

CONTRACTOR: RIVER CITY/MATHY

SAMPLED BY: D. LOHRER

SENDER NO.: CRIAS-448

DATE SAMPLED: 09/17/91

DATE RECEIVED: 09/23/91

DATE REPORTED: 10/01/91

PERCENT ASPHALT DISTRICT 6 NUCLEAR: NOT RUN

SPECIFIC GRAVITY DISTRICT 6 RICE: 2.486

SIEVE	GRAM RETAINED	PERCENT RETAINED	PERCENT PASSING	COLD-FEED TARGET GRADATION	SPEC LOW LIMIT	SPEC HIGH LIMIT
3/4			100.00	100.00		
1/2	205.3	12.20	87.80	87.00		
3/8	320.2	19.10	68.70	69.00		
4	347.5	20.80	47.90	50.00		
8	181.2	10.80	37.10	39.00		
16	110.1	6.50	30.60	32.00		
30	109.4	6.50	24.10	25.00		
50	174.3	10.40	13.70	13.00		
100	58.7	3.50	10.20	8.60		
200	68.0		6.20	5.40		
WASH	90.0					
PAN	14.6					

DRY WT. 1682.400

ASPHALT CONCRETE RESULTS

- % AC INTENDED 5.900
- % AGGREGATE BY EXTRACTION 94.470
- % BITUMEN BY EXTRACTION 5.530
- SPECIFIC GRAVITY 2.431
- MARSHALL STABILITY/LBS 3410
- MARSHALL FLOW 0.01 IN. 7
- SPECIFIC GRAVITY RICE METHOD 2.507

COPIES TO: CENTRAL LAB DIST. 6 MANCHESTER RES.

DISPOSITION: SIGNED: MORRIS J. LANE, JR. TESTING ENGINEER

LABORATORY DENSITY CORRELATION RESULTS

Ames ✓
Boulet
Lab
Manch. Res.

DISTRICT #6 - Cedar Rapids

Project FN-151-5(34)-21-31 County Dubuque
 Contract No. 33442 Contractor Mathy Const. Co.
 Work Type 3/4" Type A ARC Surface Contractor River City Paving
 Date Laid 9-23-91 Field Technician Rick Linderwell
 Remarks Q.I. 1.60 Lab. Density 2.406
 Lab. Sp. G. 2.523

Submitted Field Test Results

Core No.	1	2	3	4	5	6	7
W-1 Air							
W-3 Air							
W-2 Water							
Difference							
Density	2.364	2.268	2.378	2.371	2.370	2.351	2.329
% Lab Density	98.254	94.264	98.836	98.545	98.504	97.714	96.800
Thickness	2 1/4	1 1/2	1 1/2	1 5/8	1 5/8	1 5/8	1 3/4
Voids	6.3	10.1	5.7	6.0	6.1	6.8	7.7

District Lab Test Results

Core No.	1	2	3	4	5	6	7
W-1 Air							
W-3 Air							
W-2 Water							
Difference							
Density	2.361	2.256	2.378	2.368	2.367	2.341	2.320
% Lab Density	98.130	93.766	98.836	98.421	98.379	97.298	96.426
Thickness	2 1/4	1 1/2	1 1/2	1 5/8	1 5/8	1 5/8	1 3/4
Voids	6.4	10.6	5.7	6.1	6.2	7.2	8.0
Correlation Difference	-.003	-.012	.000	-.003	-.003	-.010	-.009

Problems encountered with correlation of field sample, if any:

Roger H. Boulet
District Laboratory

LABORATORY DENSITY CORRELATION RESULTS

Ames
Lab
Lewis
RHB

DISTRICT #6 - Cedar Rapids

Project: FN-151-5(34)-21-31 County: Dubuque
 Contract No.: 33442 Contractor: Mathy Const Co.
 Work Type: 3/4 A Binder ARC Contractor: River City Paving
 Date Laid: 9-17-91 Field Technician: Rick Linderwell
 Remarks: Q.I. = 3.01 Lab. Density: 2.427
 Lab. Sp. G.: 2.486
 Voids: 2.4

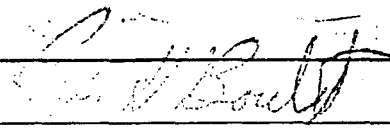
Submitted Field Test Results

Core No.	1	2	3	4	5	6	7
W-1 Air							
W-3 Air							
W-2 Water							
Difference							
Density	2.346	2.355	2.368	2.362	2.336	2.340	2.383
% Lab Density	96.663	97.033	97.569	97.322	96.251	96.415	98.187
Thickness	2	2	1 3/4	1 5/8	2	1 1/2	2
Voids	5.6	5.3	4.7	5.0	6.0	5.9	4.1

District Lab Test Results

Core No.	1	2	3	4	5	6	7
W-1 Air							
W-3 Air							
W-2 Water							
Difference							
Density	2.350	2.355	2.373	2.361	2.333	2.335	2.376
% Lab Density	96.827	97.033	97.775	97.281	96.127	96.209	97.899
Thickness	2	2	1 3/4	1 1/2	2	1 1/2	2
Voids	5.5	5.3	4.5	5.0	6.1	6.1	4.4
Correlation Difference	-0.004	0	-0.005	+0.001	+0.003	+0.005	+0.007

Problems encountered with correlation of field sample, if any:





Iowa Department Transportation

DAILY PLANT REPORT

BITUMINOUS TREATED BASE, ASPHALT TREATED BASE, ASPHALT CONCRETE

County DEWBERRY
 Project FN-151-050001-1
 Contract No. 33042
 Date 7-17-91 TUES
 Report No. 3

Contractor MATHY CONST. CO. (P.O. Box 41, Dubuque, IA) Plant Location State Hwy - Project 101
 Plant Type Batch 5000# Make FAIRCHILD Pollution Equipment 11/20/87 Resident Engineer C.T. Lewis
 Mix Type D Class Binder Size 3/4 ARC Crushed Aggr. Sources River Co. Dubuque Recycle Source _____
 Asphalt Source & Grade ACS 504 Premium Mix Sand Sources 100% 100% - 100% 100% Plant Operated 0630 A.M. to 1700 P.M. Mix No. 14601-003 ARC

SIEVE ANALYSIS OF COMBINED AGGREGATES

75/25 SAMPLE

JOB MIX FORMULA - LIMITS		100	75/100	75/42	63/27	43/57	32/42	31	20/28	14	8.5	3/4.4		
Spl. ID	Time	Compl.	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
5-3A	0910	YES		100	98	81	65	43	38	31	24	12	7.7	4.3
S														

SAMPLES SUBMITTED		SAMPLES SUBMITTED	
Materials	Senders No.	Materials	Senders No.
1111	RES-3A,B,C	RES-3A,B,C	2-2
1105	AC-5		
AC-5 1100	ACM-2		
110102	5-3A-S		
Intended Added <u>5.12</u> % A.C. Tank Meas. <u>5.16</u> % A.C.			
Intended Total <u>5.70</u> % A.C. Total <u>5.76</u> % A.C.			

LAB. DEN. <u>2.427</u>				DENSITY RECORD				SOLID DEN. <u>2.486</u>						
Course Laid	Station	± Refer	Date Laid	* (1)	Density	% Density	% Voids	Time	7	9	11	1	3	5
Binder	402+53	42' Rt	9-17-91	2	2.346	96.663	5.6	Air	43	53	69	73	74	
	416+18	7.7' Rt		2	2.355	97.033	5.3	A.C.	320	330	330	320	315	
	438+33	5.0' Rt		134	2.368	97.569	4.7	Aggr.	320	285	280	290	285	
	450+07	41' Rt		158	2.362	97.322	5.0	Mix	270	285	280	285	290	
	466+50	37' Rt		2	2.336	96.251	6.0	Mat	270	265	270	275	270	
	485+43	32' Rt		112	2.340	96.415	5.9	RECYCLED MIX ONLY						
	502+00	41' Rt		2	2.383	98.187	4.1	Total RAP Used Tons _____						
								Total Aggr. Used Tons _____						
								RAP Used % _____						
								Aggr. Used % _____						

MATERIALS DELIVERIES		
Type	Ticket No.	Quantity
AC-5	418777	25.41 T
"	418790	25.43 T
"	418811	25.39 T
"	418811	25.39 T

Avg. Field Density Lot #1				2.356 97.063 5.2				PRODUCTION AND PLACEMENT RECORD						
Avg. Field Density Lot #2				* (2)	Side	Course Laid	From Station to Station	Tons Today	Tons To Date					
Advisory - Fines/Bitumen Ratio = <u>0.81</u>				VAR	Rt	3/4 B I Base	429+25 - 455+15 DIV2	29.19	88.73					
Ave. % Field Voids = <u>5.2</u>				112	Rt	3/4 A ARC Binder	388+50 - 502+50 DIV2	1308.11	1308.11					
Lab % Voids = <u>3.4%</u> ±DNC														
Q.I. (Density) = _____														
(Show Calculation)														

COMMENTS	Acceptance Cold Feed										
	1	%	1/2	%	4	8	16	30	50	100	200
(Certified Projects Only) <u>RAL- CAS-5</u>	100	99	84	70	51	40	33	26	14	8.7	5.5

$$\frac{97.063 - 95}{0.626} = 3.01 \text{ Q.I.}$$

1.00 T Road Waste

Acceptance Fines/Bitumen Ratio = 0.92

COMMENTS: Delays, Breakdowns, Corrective Action, etc.
 *Thickness: (1) Actual, (2) Intended
 Bituminous Treated Base: Enter % Moisture in % Voids Column

Signed Richard A. [Signature] Inspector
 Cert. No. 55



Iowa Department of Transportation

DAILY PLANT REPORT

BITUMINOUS TREATED BASE, ASPHALT TREATED BASE, ASPHALT CONCRETE

County Dubuque
 Project EN-151-5(34)21-31
 Contract No. 33442
 Date 7/19/91 TRIPS
 Report No. 4

Contractor MATHE CONST. CO. Plant Location RIVER CITY PAVING - Brown Co
 Plant Type Batch 5000# Make SIMPLICITY Pollution Equipment Wash Resident Engineer C.T. Lewis
 Mix Type A ARC Class Binder Size 3/4 Crushed Aggr. Sources River City Stone - Brown Co Recycle Source -
 Asphalt Source & Grade Koch, Dubuque AC 5 Sand Sources Agg Matls - nine mile Plant Operated 0850 A.M. to 1455 P.M. Mix No. ABD1-073 ARC

SIEVE ANALYSIS OF COMBINED AGGREGATES

75/25 SAMPLE

JOB MIX FORMULA - LIMITS			SIEVE NO. - % PASSING												
Spl. ID	Time	Compl.	1 1/2	1	3/4	1/2	3/8	20/30	14	9.5	4.75	20/30	14	9.5	4.75
65-4A	1050	YES	100	99	85	66	45	35	29	22	12	7.7	4.9		

SAMPLES SUBMITTED		SAMPLES SUBMITTED	
Materials	Senders No.	Materials	Senders No.
MIX	RCW-4A,B,C		
AC 5	AC-7,8,9,10		
CORES (1/1)	C-2		
Intended Added	5.50 5.02 % A.C.	Tank Meas.	5.11 % A.C.
Intended Total	5.90 % A.C.	Total	5.90 % A.C.

LAB. DEN. <u>2.428</u>				DENSITY RECORD				SOLID DEN. <u>2.483</u>				TEMPERATURE RECORD						MATERIALS DELIVERIES		
Course Laid	Station	± Refer	Date Laid	* (1)	Density	% Density	% Voids	Time	7	9	11	1	3	5	Type	Ticket No.	Quantity			
Binder	505+34	8.2' LT	9-19-91	17/8	2.381	98.064	4.1	Air	42	42	50	50	52		AC 5	4118318	25.40 T			
	509+34	6.1' LT		17/8	2.393	98.558	3.6	A.C.	315	315	315	320	320		"	4118910	25.34 T			
	516+46	5.2' LT		13/4	2.375	97.817	4.3	Aggr.	305	305	325	320	-		CSS-H	4118341	974 G			
	532+51	4.1' LT		17/8	2.368	97.529	4.6	Mix	305	305	295	310	-							
	540+45	10.6' LT		17/8	2.381	98.064	4.1	Mat	-	-	300	280	285							
	545+27	1.4' LT		17/8	2.363	97.323	4.8	RECYCLED MIX ONLY						CSS-H	4118781	981 G				
	552+05	6.4' LT		17/8	2.399	98.806	3.4	Total RAP Used Tons	X						PALCO 10749	10749	21.232 T			
								Total Aggr. Used Tons	X						"	10751	21.305 T			
								RAP Used %	X						"	10752	21.606 T			
								Aggr. Used %	X						"	10753	21.203 T			

Avg. Field Density Lot #1		2.380 98.023 4.1			PRODUCTION AND PLACEMENT RECORD											
Avg. Field Density Lot #2		* (2)	Side	Course Laid	From Station to Station				Tons Today				Tons To Date			
Advisory - Fines/Bitumen Ratio = 0.83		17/8	LT	3/4" A Binder ARC	499+75 - 558+00 Div 2				810.19				2118.30			
Ave. % Field Voids = 4.1																
Lab % Voids = 2.2 * *DNC																
Q.I. (Density) =		Acceptance Cold Feed														
(Show Calculation)		(Certified Projects Only)														

$\frac{98.023 - 95}{0.529} = 5.71 \text{ Q.I.}$

COMMENTS

Plant down @ 1455, Dryer shaft!
 USED SIDO UNTIL 1245; USED PUGMILL TIL STOP!
 2.00T Road Waste

Acceptance Fines/Bitumen Ratio =

COMMENTS: Delays, Breakdowns, Corrective Action, etc.
 *Thickness: (1) Actual, (2) Intended
 Bituminous Treated Base: Enter % Moisture in % Voids Column

Signed Shayne Seward, 65
 Inspector

Cert. No.



DAILY PLACEMENT REPORT

BITUMINOUS TREATED BASE, ASPHALT TREATED BASE, ASPHALT CONCRETE

County DUBUQUE
 Project FN-151-21-31
 Contract No. 3344
 Date 9-20-91 FRIDAY
 Report No. 5

Contractor Mathy Const Co. Plant Location River City Paving - Brown Jwy
 Plant Type Batch 5000 # Make SIMPLICITY Pollution Equipment Wash Resident Engineer C.T. Lewis
 Mix Type A ARC Class Binder Size 3/4 Crushed Aggr. Sources River City, Stone - Elmwood Recycle Source -
 Asphalt Source & Grade Koch, DUBUQUE, AC 5 Sand Sources Agg Mats., Nine mile Plant Operated 0700 A.M. to 1745 P.M. Mix No. ABD1-0198 ARC

SIEVE ANALYSIS OF COMBINED AGGREGATES

SAMPLE			SIEVE NO. - % PASSING											
JOB MIX FORMULA - LIMITS			100	75/100	75/42	63/77	43/57	37/42	31	29/28	14	8.5	3.4/4	
Spl. ID	Time	Compl.	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
65-SH	0800	YES	100	99	85	66	46	35	28	21	11	6.8	4.4	

SAMPLES SUBMITTED		SAMPLES SUBMITTED	
Materials	Senders No.	Materials	Senders No.
MIX	PSW-5A,B,C		
AC5	AC-11,12		
CORES (9/A)	C-3		
Intended Added	5.02 % A.C.	Tank Meas.	5.07 % A.C.
Intended Total	5.90 % A.C.	Total	5.93 % A.C.

LAB. DEN. 2.418

DENSITY RECORD

SOLID DEN. 2.509

TEMPERATURE RECORD

MATERIALS DELIVERIES

Course Laid	Station	± Refer	Date Laid	* (1)	Density	% Density	% Voids
Binder	572+08	2.0' LT	9-20-91	218	2.332	96.443	7.1
	585+98	9.2' LT		158	2.343	96.898	6.6
	609+83	4.4' LT		112	2.355	97.395	6.1
	620+00	7.8' LT		112	2.347	97.064	6.5
	630+68	3.4' LT		198	2.333	96.485	7.0
	636+55	5.2' RT		114	2.346	97.022	6.5
	654+83	9.8' RT		2	2.307	95.409	8.1

Time	7	9	11	1	3	5
Air	31	42	49	57	60	60
A.C.	310	315	315	320	325	320
Aggr.	350	350	350	335	395	
Mix	300	310	210	310	305	
Mat		300	310	300	310	295

Type	Ticket No.	Quantity
SSS-14	4118932	677 G
AC-5	4118948	25.37 T
"	4118955	25.44 T
3/4 LMS	821278	8,000 T
1/2 LAST	"	9,000 T
Man Sand	"	2,500 T
Sand	4596-4739	319.53 T

RECYCLED MIX ONLY
 Total RAP Used Tons _____
 Total Aggr. Used Tons _____
 RAP Used % _____
 Aggr. Used % _____

Avg. Field Density Lot #1 2.338
 Avg. Field Density Lot #2 _____
 Advisory - Fines/Bitumen Ratio = 0.74
 Ave. % Field Voids = 6.8
 Lab % Voids = 3.6
 Q.I. (Density) = _____
 (Show Calculation)

* (2)		Side	Course Laid	From Station to Station	Tons Today	Tons To Date
1 1/2	LT	3/4 A	ARC Binder	558+00 - 656+65	1524.59	01VZ 3642.89
1 1/2	RT	"	"	630+25 - 656+65		

COMMENTS

Acceptance Cold Feed	1	%	%	%	4	8	16	30	50	100	200
(Certified Projects Only)											

$$\frac{96.674 - 95}{0.650} = 2.58 \text{ Q.I.}$$

No Waste

Acceptance Fines/Bitumen Ratio = _____

COMMENTS: Delays, Breakdowns, Corrective Action, etc.

*Thickness: (1) Actual, (2) Intended
 Bituminous Treated Base: Enter % Moisture in % Voids Column

Signed Richard J. Jensen
George D. Seward, 65
 Inspector _____ Cert. No. _____



DAILY PLANT REPORT

BITUMINOUS TREATED BASE, ASPHALT TREATED BASE, ASPHALT CONCRETE

County DUBUQUE
 Project FN-151-5341 21-31
 Contract No. 33442
 Date 9-21-91 SAT.
 Report No. 6

Contractor MATHY CONST. Co. Plant Location RIVER CITY LAVINS - Brown Qva
 Plant Type Batch 5000* Make SIMPLICITY Pollution Equipment WASH Resident Engineer C.T. Lewis
 Mix Type A ARC Class Binder Size 3/4 Crushed Aggr. Sources River City Stone - Brown Qva Recycle Source -
 Asphalt Source & Grade KOCH - MIBIDUE: AC 5 Sand Sources Agg Mats. Nine mile Plant Operated 0630 A.M. to 1700 P.M. Mix No ADD-113 ARC

SIEVE ANALYSIS OF COMBINED AGGREGATES

SIEVE ANALYSIS OF COMBINED AGGREGATES																SAMPLES SUBMITTED		SAMPLES SUBMITTED		
SAMPLE																Materials	Senders No.	Materials	Senders No.	
JOB MIX FORMULA - LIMITS																MIX	RGN-6A,B,C			
SIEVE NO. - % PASSING																AC-5	AC-13, 14			
Spl. ID	Time	Compl.	1 1/2	1	%	3/8	3/4	4	8	16	30	50	100	200						
656A	0800	YES		100	100	90	74	53	40	32	24	12	7.7	4.9						
																Intended Added	5.02	% A.C. Tank Meas.	4.83	% A.C.
																Intended Total	5.90	% A.C. Total	5.71	% A.C.

LAB. DEN. 2.402

DENSITY RECORD

SOLID DEN. 2.494

TEMPERATURE RECORD

MATERIALS DELIVERIES

Course Laid	Station	Refer	Date Laid	* (1)	Density	% Density	% Voids	Time	7	9	11	1	3	5	Type	Ticket No.	Quantity			
Binder	515+66	2.4' Rt	9-21-91	13/4	2.330	97.002	6.6	Air	35	50	57	64	66	66	AC-5	418958	25.47 T			
	537+43	6.7' Rt		2	2.337	97.294	6.3	A.C.	350	340	325	310	325	330	"	418964	25.41 T			
	550+21	5.9' Rt		2	2.337	97.294	6.3	Aggr.	305	310	305	295	295		"	418965	25.38 T			
	569+39	7.7' Rt		13/8	2.315	96.378	7.2	Mix	300	305	300	295	290		MS-14	418959	1084 G			
	581+54	7.1' Rt		13/8	2.322	96.669	6.9	Mat							Rubber	10750	21.415 T			
	597+05	5.0' Rt		13/8	2.321	96.628	6.9	RECYCLED MIX ONLY										6F60		
	614+87	2.5' Rt		11/2	2.278	94.838	8.7	Total RAP Used Tons												
								Total Aggr. Used Tons												
								RAP Used %												
								Aggr. Used %												

Avg. Field Density Lot #1

2.320 96.586 7.0

PRODUCTION AND PLACEMENT RECORD

Avg. Field Density Lot #2

Advisory - Fines/Bitumen Ratio = 0.86

Ave. % Field Voids = 7.0

Lab % Voids = 3.7

Q.I. (Density) =

(Show Calculation)

$$\frac{96.586 - 95}{0.845} = 1.88$$

COMMENTS

8.00 TON ROAD WASTE

Acceptance Fines/Bitumen Ratio =

COMMENTS: Delays, Breakdowns, Corrective Action, etc.

*Thickness: (1) Actual, (2) Intended

Bituminous Treated Base: Enter % Moisture in % Voids Column

Signed Richard A. Lindquist Inspector Cert. No. _____



DAILY PLAN REPORT
BITUMINOUS TREATED BASE, ASPHALT TREATED BASE, ASPHALT CONCRETE

County DUBUQUE
Project EN-151-51 1-31
Contract No. 3344
Date 9/23/91 Mon.
Report No. 7

Contractor MATHY CONST. Co. Plant Location River City Stone - Brown Q14
Plant Type Batch 500T Make SIMPKITY Pollution Equipment WREN Resident Engineer C.T. LEWIS
Mix Type A ARC Class SURFACE Size 3/4 Crushed Aggr. Sources River City Stone - Brown Q14 Recycle Source -
Asphalt Source & Grade Koch - Dubuque AC 5 Sand Sources Agg. Mart's - Nine Mile Plant Operated 6:30 A.M. to 17:15 P.M. Mix No. ARD-0173 ARC

SIEVE ANALYSIS OF COMBINED AGGREGATES

SAMPLE	SIEVE NO. - % PASSING													
	100	20/100	75/92	37/77	35/57	1/2	3/1	20/28	14	7.5	3.75	2.0	1.0	0.6
JOB MIX FORMULA - LIMITS	100	98/100	78/92	37/77	35/57	1/2	3/1	20/28	14	7.5	3.75	2.0	1.0	0.6
Spl. ID	Time	Compl.	1 1/2	1	%	1/2	%	4	8	16	30	50	100	200
15-7A	0730	YES		100	100	92	76	55	42	33	25	14	8.6	5.1
(5)														

SAMPLES SUBMITTED

Materials	Senders No.	Materials	Senders No.
MIX	RSW-7A,B,C	CORES (9)	C-5
AC-5	AC 15,16,17		
AC-5 Material	ACM-3		
Cold Feed	65-7A S		
Intended Added	5.02	% A.C. Tank Meas.	5.06
Intended Total	5.90	% A.C. Total	5.97

LAB. DEN. 2.406

DENSITY RECORD

Course Laid	Station	Refer	Date Laid	(1)	Density	% Density	% Voids
Surface	555+66	2.5' LT	9-23-91	2 1/4	2.364	98.254	6.3
	577+78	1.3' LT		1 1/2	2.268	94.264	10.1
	587+73	5.0' LT		1 1/2	2.378	99.836	5.7
	607+99	2.4' LT		1 5/8	2.371	98.545	6.0
	624+92	5.7' LT		1 5/8	2.370	98.504	6.1
	635+02	7.3' LT		1 5/8	2.351	97.714	6.8
	645+40	2.6' LT		1 3/4	2.329	96.800	7.7

SOLID DEN. 2.523

TEMPERATURE RECORD

Time	7	9	11	1	3	5
Air	40	48	57	60	62	60
A.C.	355	325	335	325	320	310
Aggr.	285	300	335	330	325	355
Mix	285	310	305	305	300	300
Mat	280	305	305	290	295	

MATERIALS DELIVERIES

Type	Ticket No.	Quantity
255-14	4118971	1063 G
Sand	97499	395 T
"	97507	368 T
"	97509	850 T
"	45206,08	41.56 T
AC-5	4118976	25.34 T
"	4118988	25.38 T
"	4118996	25.32 T

Avg. Field Density Lot #1 2.347

Avg. Field Density Lot #2 97.560

Advisory - Fines/Bitumen Ratio = 0.85

Ave. % Field Voids = 7.0

Lab % Voids = 4.6

Q.I. (Density) = 1.60

(Show Calculation)

PRODUCTION AND PLACEMENT RECORD

(2)	Side	Course Laid	From Station to Station	Tons Today	Tons To Date
VAR	LT	3/4 B I Base	553+00 - +85' 657+02 - +44	Div2: 15.53	104.26
1 1/2	LT	3/4 A ARC Surface	549+00 - 257+41	1435.91	1435.91

Acceptance Cold Feed (Certified Projects Only) RAL-100

1	%	1/2	%	4	8	16	30	50	100	200
100	100	91	76	56	42	33	24	14	9.1	5.8

$$\frac{97.560 - 95}{1.604} = 1.60 \text{ Q.I.}$$

COMMENTS: No WASTE No work 9/22, Sunday

Acceptance Fines/Bitumen Ratio = 0.97

COMMENTS: Delays, Breakdowns, Corrective Action, etc.
*Thickness: (1) Actual, (2) Intended
Bituminous Treated Base: Enter % Moisture in % Voids Column

Signed Robert H. Finkbeiner
George D. Lewis 135
Inspector Cert. No.

IOWA DEPARTMENT OF TRANSPORTATION
 REPORT NO: 07 DAILY REPORT OF ASPHALT PAVING PLANT 05-05-1992

PROJECT NUMBER: FN-151-5(34)-21-31 CONTRACT NUMBER: 33442
 CONTRACTOR: RIVER CITY\MATHY CONSTRUCTION COUNTY: DUBUQUE
 MIX TYPE: A CLASS: SIZE: 3/4 COURSE: BINDER
 MIX DESIGN NUMBER: ABD2-0010 RESIDENT ENGINEER: CAREY LEWIS
 PLANT TYPE: DRUM PLANT MAKE: BITUMA
 POLLUTION CONTROL EQUIPMENT TYPE: BAG HOUS
 ASPHALT SOURCE: KOCH--DUBUQUE GRADE: AC-10
 AGGR. SOURCES: A31510 A31060 A31060 PROJECT
 RECYCLE SOURCE: MILLED FROM PROJECT PERCENT OF RAP IN MIX: 5.0

SIEVE	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200
MIN.	100	100	98	82	67	44	32		17			3.8
MAX.	100	100	100	96	81	58	42		25			7.8
LOT 1	100	100	100	91	77	55	40	32	23	13	7.3	5.4

DENSITY RECORD	LAB DENSITY: 2.403	SOLID DENSITY: 2.484	SPEC. % DENS.: 95				
	LAB VOIDS: 3.3	INTENDED LIFT THICKNESS: 1.5 inches					
	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER	BINDER
STATION	663+95	724+82	753+14	788+32	829+88	849+55	878+68
CL REFERENCE	2.2'LT	3.1'LT	3.0'LT	7.7'LT	2.1'LT	2.9'LT	7.5'LT
THICKNESS	2	2	2	2.375	2.375	1.875	2
CORE DENSITY	2.340	2.329	2.336	2.338	2.312	2.359	2.344
% OF DENSITY	97.378	96.921	97.212	97.295	96.213	98.169	97.545
PERCENT VOIDS	5.8	6.2	6.0	5.9	6.9	5.0	5.6

LOT 1 AVG. DENSITY: 2.337 AVG. % DENSITY: 97.248 AVG. % VOIDS: 5.9
 DENSITY Q.I.: 3.77 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: 5.18 INTENDED TOTAL PERCENT A.C.: 5.40
 PERCENT A.C. BY TANK STICK: 5.13 TOTAL PERCENT A.C.: 5.42
 FILLER/BITUMEN RATIO: 1 NUCLEAR PERCENT A.C.: 5.53

COMMENTS: 659+84LT SIDE - 719+70LT SIDE 1.5"THICKNESS
 719+70LT SIDE - 907+60LT SIDE 2.0"THICKNESS

PLANT INSPECTOR _____
 CERTIFICATION NO _____

PLANT MONITOR _____
 CERTIFICATION NO _____

PAGE 2

REPORT NO: 07

FN-151-5(34)-21-31

05-05-1992

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR	40	46	48	50	52	53
A.C.	311	306	307	307	309	307
AGGR.	295	292	298	299	295	297
MIX	290	289	296	297	292	295
MAT	290	285	280	290	285	295

RECYCLED MIX ONLY

TOTAL RAP USED TONS: 180
 TOTAL AGGR. USED TONS: 3151.54
 RAP USED PERCENT: 5.4
 AGGR. USED PERCENT: 94.6

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
CSS-1H	4220793	23.92
AC-10	4220791	27.00
AC-10	4220796	27.10
AC-10	4220801	27.03
AC-10	4220805	27.08
AC-10	4220808	26.95
AC-10	4220815	27.01

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
3/4" TYPE A	4-7
AC-10	KE5-5-1
AC-10	KE5-5-3
AC-10	KE5-5-5

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
COLD FEED	
AC-10	KE5-5-2
AC-10	KE5-5-4
AC-10	ACM-2L

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
BINDER	659+84LT-907+60LT DIV2	3511.79	10456.52

TIME PLANT OPERATED: 6:00AM-6:30PM

SPECIFICATIONS APPLICABLE TO THIS PROJECT

SP1017 SS5015

OTHER PROJECT DATA

24% CONCRETE SAND
 35% 3/8" CR. LMST
 36% 3/4" CLEAN
 05% RAP

PLANT INSPECTOR _____
 CERTIFICATION NO _____

PLANT MONITOR _____
 CERTIFICATION NO _____

IOWA DEPARTMENT OF TRANSPORTATION
 REPORT NO: 06 DAILY REPORT OF ASPHALT PAVING PLANT 05-04-1992

PROJECT NUMBER: FN-151-5(34)-21-31 CONTRACT NUMBER: 33442
 CONTRACTOR: RIVER CITY\MATHY CONSTRUCTION COUNTY: DUBUQUE
 MIX TYPE: A CLASS: SIZE: 3/4 COURSE: SURFACE
 MIX DESIGN NUMBER: RESIDENT ENGINEER: CAREY LEWIS
 PLANT TYPE: BATCH PLANT MAKE: BIT-STORE
 POLLUTION CONTROL EQUIPMENT TYPE: BAG HOUSE
 ASPHALT SOURCE: KOCH--DUBUQUE GRADE: AC-10
 AGGR. SOURCES: A31510 A31060 A31060
 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	82	67	44	31		17			2.7
MAX.	100	100	100	96	81	58	41		25			6.7
LOT 1	100	100	100	88	74	52	38	30	22	12	6.5	4.7
LOT 2	100	100	100	92	77	54	39	31	23	12	6.8	5.0
AVG.	100	100	100	90	76	53	38	30	22	12	6.7	4.9

DENSITY RECORD	LAB DENSITY: 2.406	SOLID DENSITY: 2.474	SPEC. % DENS.: 95				
	LAB VOIDS: 2.7	INTENDED LIFT THICKNESS: 1.5 inches					
	#1	#2	#3	#4	#5	#6	#7
COURSE LAID	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE	SURFACE
STATION	200+33	209+74	256+32	281+59	324+29	356+88	364+51
CL REFERENCE	9.8 LT	8.6 LT	1.1 LT	7.5 LT	9.4 LT	1.6 LT	5.5 LT
THICKNESS	1.75	1.5	1.375	1.625	1.5	1.5	1.625
CORE DENSITY	2.328	2.281	2.311	2.329	2.291	2.290	2.388
% OF DENSITY	96.758	94.805	96.052	96.800	95.220	95.179	99.252
PERCENT VOIDS	5.9	7.8	6.6	5.9	7.4	7.4	3.5

LOT 1 AVG. DENSITY: 2.317 AVG. % DENSITY: 96.295 AVG. % VOIDS: 6.4
 DENSITY Q.I.: 0.85 LOW OUTLIER: N/A HIGH OUTLIER: N/A NEW Q.I.: N/A

INTENDED ADDED PERCENT A.C.: INTENDED TOTAL PERCENT A.C.: 5.40
 PERCENT A.C. BY TANK STICK: 5.50 TOTAL PERCENT A.C.: 5.50
 FILLER/BITUMEN RATIO: .87 NUCLEAR PERCENT A.C.:

COMMENTS:

PLANT INSPECTOR _____
 CERTIFICATION NO _____

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PAGE 2

REPORT NO: 06

FN-151-5(34)-21-31

05-04-1992

TEMPERATURE RECORD

TIME	7	9	11	1	3	5
AIR	46	54	59	59	63	64
A.C.	311	308	300	299	296	296
AGGR.	295	296	299	296	302	305
MIX	290	295	297	295	298	302
MAT	285	290	285	290	295	290

RECYCLED MIX ONLY

TOTAL RAP USED TONS: 0
 TOTAL AGGR. USED TONS: 0
 RAP USED PERCENT: 0
 AGGR. USED PERCENT: 0

MATERIALS DELIVERIES

TYPE	TICKET NO.	QUANTITY
AC-10	4220763	26.67
AC-10	4220768	27.08
AC-10	4220771	27.01
AC-10	4220777	27.29
AC-10	4220778	27.08
AC-10	4220780	27.14

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
3/4TYPE A	3-8
AC-10	KE-5-4-1
AC-10	KE-5-4-3

SAMPLES SUBMITTED

MATERIALS	SENDERS NO.
HOT MIX	
COLD FEED	
AC-10	KE-5-4-2
AC-10	KE-5-4-4

COURSE LAID	FROM STATION TO STATION	TONS TODAY	TONS TO DATE
SURFACE	175+80RT-205+80RT DIV1	446.93	909.94
SURFACE	205+80RT-391+00RT DIV2	2359.87	4582.30
	TOTAL	2806.80	5492.24

TIME PLANT OPERATED: 6:00AM-5:30PM

SPECIFICATIONS APPLICABLE TO THIS PROJECT

SP1017 SS5015

OTHER PROJECT DATA

BINDER/SURFACE MIX

LOT 1 IS THE MONITORS
 LOT 2 IS PLANT INSP.

PLANT INSPECTOR _____
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HR-330C
Dubuque County

	<u>RM</u>	<u>Creep</u>
ARC Binder & Surface 50 Lab Mixed	310,000	31
ARC Binder & Surface 75 Lab Mixed	450,000	45
ARC Binder & Surface 50 Plant Mixed	890,000	51
ARC Binder & Surface 75 Plant Mixed	1,030,000	80
ARC Binder & Surface 50 Plant Mixed	1,190,000	79
ARC Binder & Surface 75 Plant Mixed	1,000,000	83
ARC Cores	1,590,000	11

Appendix C
Field Testing

Road Rater Results

	<u>Preconstruction</u>	<u>Post Construction</u>	<u>Spring 92</u>
Section 1	4.46	6.14	4.04
Section 2	4.07	5.37	4.76
Section 3	4.32	5.41	4.63
Section 4	4.34	5.26	

HR-330C - Dubuque County
Rut Depths - Conventional Control Section
June 3, 1992
Post Construction

<u>Station</u>	<u>Northbound</u>		<u>Southbound</u>	
	OWT	IWT	OWT	IWT
365+00	.01	.09	.02	.05
367+00	.04	.07	.04	.05
369+00	.07	.06	.05	.09
371+00	.07	.06	.08	.05
373+00	.05	.05	.05	.08
375+00	.06	.05	.04	.07
377+00	.05	.07	.04	.05
379+00	.02	.05	.05	.04
381+00	.03	.06	.03	.07
383+00	.08	.05	.04	.05
385+00	.06	.05	.04	.05
387+00	.05	.05	.07	.07
389+00	.05	.03	.03	.05
391+00	.08	.05	.03	.04
665+00	.07	.06	.04	.06
667+00	.08	.05	.04	.02
669+00	.04	.02	.04	.07
671+00	.04	.07	.04	.06
673+00	.03	.03	.04	.06
675+00	.05	.07	.02	.03
677+00	.07	.05	.03	.05
679+00	.08	.09	.04	.06
681+00	.04	.03	.04	.06
683+00	.03	.05	.04	.06
685+00	.03	.05	.04	.05
687+00	.04	.05	.04	.06
689+00	.04	.07	.05	.03
691+00	.04	.07	.05	.04

HR-330C - Dubuque County
 Rut Depths - ARC Sections
 October 1991
 Post Construction

<u>Station</u>	<u>Northbound</u>		<u>Southbound</u>	
	<u>OWT</u>	<u>IWT</u>	<u>OWT</u>	<u>IWT</u>
395+00	.02	.03	.00	.00
400+00	.04	.05	.01	.01
405+00	.00	.03	.01	.01
410+00	.02	.02	.00	.01
415+00	.01	.02	.01	.02
420+00	.00	.02	.01	.01
425+00	.00	.01	.00	.00
430+00	.09	.02	.02	.01
435+00	.01	.01	.00	.01
440+00	.02	.02	.00	.01
445+00	.01	.01	.01	.02
450+00	.00	.05	.01	.01
455+00	.03	.01	.02	.00
460+00	.01	.01	.00	.00
465+00	.01	.02	.01	.01
470+00	.00	.02	.00	.01
475+00	.01	.03	.01	.01
480+00	.00	.01	.01	.02
485+00	.01	.02	.03	.01
490+00	.02	.01	.01	.01
495+00	.01	.03	.07	.05
500+00	.01	.08	.01	.02
505+00	.01	.07	.01	.01
510+00	.01	.05	.01	.01
515+00	.01	.09	.02	.02
520+00	.03	.10	.01	.01
525+00	.00	.08	.01	.03
530+00	.02	.08	.02	.01
535+00	.00	.04	.01	.01
540+00	.01	.06	.01	.03
545+00	.01	.01	.03	.05
550+00	.03	.01	.00	.01
555+00	.01	.05	.00	.02
560+00	.02	.06	.02	.02
565+00	.01	.04	.01	.02
570+00	.01	.09	.01	.03
575+00	.01	.05	.03	.01
580+00	.00	.04	.01	.01
585+00	.01	.08	.00	.00
590+00	.05	.08	.02	.02
595+00	.02	.09	.04	.02
600+00	.02	.04	.00	.01
605+00	.00	.04	.02	.00
610+00	.01	.08	.01	.01
615+00	.01	.04	.05	.02
620+00	.01	.02	.00	.02

HR-330C - Dubuque County (cont'd)
Rut Depths - ARC Sections
October 1991
Post Construction

<u>Station</u>	<u>Northbound</u>		<u>Southbound</u>	
	<u>OWT</u>	<u>IWT</u>	<u>OWT</u>	<u>IWT</u>
625+00	.05	.04	.01	.02
630+00	.01	.02	.04	.01
635+00	.01	.04	.01	.01
640+00	.02	.06	.02	.01
645+00	.03	.06	.03	.01
650+00	.03	.02	.05	.02
655+00	.02	.07	.08	.02

HR-330C - Dubuque County
Rut Depths
March 30, 1992

<u>Station</u>	<u>Northbound</u>		<u>Southbound</u>	
	<u>OWT</u>	<u>IWT</u>	<u>OWT</u>	<u>IWT</u>
395+00	.03	.05	.05	.07
400+00	.05	.06	.02	.02
405+00	.02	.09	.02	.02
410+00	.07	.05	.09	.05
415+00	.03	.05	.03	.05
420+00	.02	.04	.05	.03
425+00	.02	.03	.03	.04
430+00	.09	.05	.02	.05
435+00	.05	.07	.05	.04
440+00	.03	.06	.03	.03
445+00	---	---	---	---
450+00	.02	.05	.04	.03
455+00	.03	.02	.03	.01
460+00	.04	.01	.02	.02
465+00	.03	.05	.05	.02
470+00	.02	.05	.05	.03
475+00	.04	.05	.02	.02
480+00	.03	.03	.03	.03
485+00	.05	.02	.03	.05
490+00	.02	.03	.07	.05
495+00	.05	.07	.10	.08
500+00	.05	.09	.03	.03
505+00	.02	.07	.05	.04
510+00	.03	.05	.05	.05
515+00	---	---	---	---
520+00	.05	.10	.03	.04
525+00	.03	.09	.03	.09
530+00	---	---	---	---
535+00	.04	.04	.07	.05
540+00	.03	.06	.05	.04
545+00	.02	.05	.04	.09
550+00	.07	.03	.05	.04
555+00	.02	.05	.04	.02
560+00	.02	.09	.03	.03
565+00	.01	.09	.02	.05
570+00	.04	.09	.05	.05
575+00	.05	.08	.04	.06
580+00	.03	.09	.08	.03
585+00	.06	.09	.06	.02
590+00	.05	.08	.05	.03
595+00	.02	.09	.07	.04
600+00	---	---	---	---
605+00	.08	.10	.04	.03
610+00	.02	.08	.03	.02
615+00	.05	.06	.05	.02
620+00	.07	.07	.04	.04

HR-330C - Dubuque County (cont'd)
Rut Depths
March 30, 1992

<u>Station</u>	<u>Northbound</u>		<u>Southbound</u>	
	<u>OWT</u>	<u>IWT</u>	<u>OWT</u>	<u>IWT</u>
625+00	.07	.04	.04	.03
630+00	.09	.09	.04	.05
635+00	.03	.04	.05	.06
640+00	.04	.08	.05	.03
645+00	.03	.02	.05	.05
650+00	.04	.05	.05	.02
655+00	.06	.09	.05	.05