

ASPHALT RUBBER CEMENT CONCRETE WEBSTER COUNTY

**CONSTRUCTION REPORT
IOWA DEPARTMENT OF TRANSPORTATION
PROJECT HR-555**

FEBRUARY 1993

Highway Division



**Iowa Department
of Transportation**

Construction Report
for
Iowa Department of Transportation
Project HR-555

Asphalt Rubber Cement Concrete
Webster County

by
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February 1993

TECHNICAL REPORT TITLE PAGE

1. REPORT NO.	2. REPORT DATE
HR-555	February 1993

3. TITLE AND SUBTITLE	4. TYPE OF REPORT & PERIOD COVERED
Asphalt Rubber Cement Concrete Webster County	Construction Report, 4-92 to 2-93

5. AUTHOR(S)	6. PERFORMING ORGANIZATION ADDRESS
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7. ACKNOWLEDGEMENT OF COOPERATING ORGANIZATIONS

8. ABSTRACT

Discarded tires have become a major disposal problem in the U.S. Different techniques of recycling these discarded tires have been tried. The state of Iowa is currently evaluating the use of discarded tires ground into crumb rubber and blending it with asphalt to make asphalt rubber cement (ARC). This was the sixth project this process has been used in. This project is located on US 169 from the east junction of IA 175 west and north to US 20.

Only the binder course was placed this year with the surface course to be let at a later date. There are four test sections, two sections with conventional mixtures and two with ARC mixtures.

9. KEY WORDS	10. NO. OF PAGES
Ground crumb rubber, recycled tires, asphalt rubber cement, crumb rubber modifier, asphalt concrete	33

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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

Recycling discarded tires into asphalt rubber cement (ARC) is currently being researched by the Iowa DOT.

The process used in this project involves blending the crumb rubber with AC-5 before mixing it with the aggregates.

The Iowa DOT currently has six projects completed using ARC, which they are evaluating.

This project is located on US 169 from the east junction of IA 175 west and north to US 20. Only the binder course was completed on this project. There will be reconstruction on portions of the roadway, then the entire project will be overlaid at a later date. The project contains two test sections of ARC and two control sections. The control sections were placed on August 13, 1992 and the ARC test sections were placed on August 24, 1992.

OBJECTIVE

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

CONTRACTOR

Mathy Construction Company of Onalaska, Wisconsin was the contractor on this project. Rouse Rubber Products of Vicksburg,

Mississippi furnished the reactor blender and the fine crumb rubber for the project.

PROJECT LOCATION

The project is located on US 169 from the east junction of IA 175 west and north to US 20. The test sections are located in Table I.

Table I

<u>Section</u>	<u>Sta. to Sta.</u>	<u>Direction</u>	
1	221+00 to 247+00	EB & WB	Conventional
2	303+50 to 383+50	EB & WB	ARC Binder
3	430+00 to 510+00	EB & WB	ARC Binder
4	565+00 to 590+00	EB & WB	Conventional

PRECONSTRUCTION SURVEY

The original roadway was a 24 ft. wide 7 in. thick portland cement concrete (PCC) pavement built in 1930 and overlaid with 3 in. of asphalt cement concrete (ACC) in 1960. The 1991 traffic volume was 2550 VPD with 12% trucks.

A crack and patch survey was conducted on the research sections before construction began. The Road Rater was used to test the structural rating of the sections prior to construction.

Portions of the test sections had been milled. The roadway had a large number of reflective cracks and was showing signs of distress.

MATERIALS

The ground tire rubber provided by Rouse Rubber Products of Vicksburg, Mississippi was a GF-50 rubber. The course aggregate was furnished by Martin-Marietta, Fort Dodge Mine, Webster County Iowa. The crushed limestone manufactured sand was produced by Martin-Marietta, Hodges, Humboldt County Iowa and the natural sand was produced by Northwest Limestone, Yates, Webster County Iowa. The AC-5 used in the asphalt rubber cement (ARC) mixture and the AC-10 used in the conventional mixture was supplied by Bituminous Materials of Algona, Iowa.

MIX DESIGN

Low lab voids were a problem with both the conventional mixtures and the ARC mixtures. The conventional mixture was changed twice and a new mix design was implemented for the last two days of production. Even with a new mix design, including an aggregate interchange and a reduced asphalt liquid content, the lab voids still remained below 3%. The ARC mixture had low lab voids at 1.5% the first day so ARC content was reduced from 6.5% to 6.1% to help increase the lab voids. This did increase the lab voids to 3.6%. The asphalt content on the conventional mix started out at 5.1% and was lowered to 4.9%.

In the ARC mixture 15% crumb rubber was used. This amounted to 1% of the asphalt concrete mixture. All mix designs are shown in Appendix B.

PLANT OPERATION

This was the first time a drum plant had been used for producing the ARC mixture. This worked satisfactorily with approximately 250 ton per hour being produced. Normally, this Bituma Drum Plant has a production rate of 350 ton per hour producing conventional mixtures. Past production of the ARC using the Rouse Reactor was normally 150 ton per hour. This was mainly due to the fact that maintaining high enough temperatures for adequate reaction to take place was a problem which caused reaction to take longer. Between 1991 and 1992, Rouse Rubber added an auxiliary heater to the reaction unit which increased production. The heater increased the temperature 50°F from what it was coming out of the tanker up to 390°-400°F. It was pumped out of the reactor-blender at a rate of 75 gal. per minute at a stabilized temperature of 350°F.

PAVING OPERATION

There were no construction problems with the conventional mix and segregation was minimal.

The ARC mix seemed to handle well but the mix appeared rather dry. The appearance seemed to improve after the first 1500 ft. There was a slight problem with tearing of the mat with the ARC mixture when the finish roller ran over it. Mathy backed the finish roller off some which helped reduce the problem. This same problem had also occurred on the ARC project in Muscatine

County Iowa. With the Muscatine project and this project, the tearing was not apparent the next day. The temperature of the mat behind the paver was between 275°F and 300°F with the conventional mixture and about 290°F with the ARC.

Mathy used a Blaw Knox PF-180H Paver and Dynapac vibratory roller with a steel finish roller on this project.

CONSTRUCTION TESTING

A sample of the GF-50 rubber was taken for gradation testing. The rubber and AC-5 were sampled for viscosity testing. Samples were also obtained for creep and resilient modulus testing. All lab results are given in Appendix B.

Road Rater testing was completed prior to project completion. These results are in Appendix C.

COST COMPARISON

A major difference between conventional mixtures and the ARC mixtures is the cost. On this project the asphalt cement was bid at \$84.00 per ton while the asphalt rubber cement was bid at \$190.00 per ton which is 126% higher. The cost of the conventional asphalt cement concrete and the ARC concrete are shown in Table II. The ARC mixture cost 40% more than the conventional mixtures.

Table II

<u>Conventional Binder</u>		<u>ARC Binder</u>	
Mix	\$14.53	Mix	\$14.53
4.9% AC-10	<u>4.12</u>	6.1% ARC	<u>11.59</u>
Total	\$18.65 per ton	Total	\$26.12 per ton

EVALUATION

Standard project testing of the mix was completed. Creep and resilient modulus tests has also been completed.

The evaluation will also consist of Road Rater testing, friction testing, and crack and rut surveys.

The project will be evaluated for five years. After five years, hopefully a conclusion can be made to determine if using asphalt rubber binders will:

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

CONCLUSIONS

From the project the following conclusions can be made:

1. The ARC mixture can be constructed with little or no difference from that of a conventional mixture.
2. The ARC pavement appears to be in as good a condition as the conventional pavement. There is a slight difference in color.

Appendix A
Special Provisions and Proposal



Iowa Department of Transportation

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

NHS-169-6(43)-19-94 Webster County

April 28, 1992

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.

1069.01 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 production of the asphalt rubber cement concrete mixture.

1069.02 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 aggregate requirements shall meet type "A" quality and be in accordance with the plans and the standard specifications except the gradations for the concrete mixtures shall meet the following:

Sieve size	Percent passing 3/4" Type A ARC Concrete Mixture
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

B. Asphalt Rubber Cement.

The asphalt rubber cement shall be a uniform reacted blend of compatible paving grade asphalt cement, ground reclaimed vulcanized rubber and extender oil if required. The asphalt rubber cement shall meet the physical parameters listed below.

Apparent Viscosity, 347°F., Spindle 3, 12 RPM cps (ASTM D2669 Brookfield)	Min Max	1,000 4,000
Penetration, 77°F., 100 g, 5 sec.: 1/10 mm. (ASTM D5)	Min Max	50 100
Penetration, 39.2°F., 200 g, 60 sec.: 1/10 mm. (ASTM D5)	Min	25
Softening Point: °F., (ASTM D36)	Min	120
Resilience, 77° F.,: % (ASTM D3407)	Min	10
Ductility, 39.2° F., 1 cpm: cm. (ASTM D113)	Min	10
TFOT Residue, (ASTM D1754) Penetration Retention, 39.2° F.: %	Min	75
Ductility Retention, 39.2° F.: %	Min	50

C. Asphalt Extender Oil.

An asphalt extender oil may be added, if necessary, to meet the requirements of asphalt rubber cement. 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.

D. Equipment.

All equipment shall conform to the standard specifications unless noted otherwise in this Special Provision.

1069.03 GROUND RECLAIMED VULCANIZED RUBBER.**A. General.**

The ground rubber shall be produced from the processing automobile and/or truck tires. The rubber shall be substantially free from contaminants including fabric, metal, mineral, and the non-rubber substances. The rubber shall be sufficiently dry to be free flowing and not produce a foaming problem when added to hot asphalt cement. Up to 4% by weight of talc or other appropriate blocking agent can be added to reduce agglomeration of the rubber particles.

A.1 Physical Requirements.

Gradation and Particle Length: When tested in accordance with ASTM C-136 using a 50 gram sample, the resulting rubber gradation shall meet the following gradation limits.

Sieve Size	Percent Passing
#10	100
#30	26-100
Max. Particle Length	3/16"

A.2 Fiber Content.

The fiber content of the ground rubber shall be less than 0.3% by weight.

A.3 Moisture Content.

The moisture content of the ground rubber shall be less than 0.75% by weight.

A.4 Mineral Contaminants

The mineral contaminant amount of the ground rubber shall not be greater than 0.25% by weight as determined after water separating a 50 gram rubber sample in a 1 liter glass beaker filled with water.

A.5 Metal Contaminants

The rubber shall contain no visible metal particles as indicated by thorough stirring of a 50 gm. sample with a magnet.

B. Packaging

The ground rubber shall be supplied in moisture resistant packaging such as either disposable bags or other appropriate containers. Bags shall be palletized into units for shipment and glue shall be placed between layers of bags to increase the unit stability during shipment. Palletized units containing bags shall be wrapped with ultra-violet resistant stretch wrap. The maximum allowable tolerance per bag will be ± 2 lbs. for bags weighing 100 lbs or less.

C. Labeling

Each container or bag of ground rubber shall be labeled with the manufacturer designation as to the size and type, the nominal rubber weight designation with tolerance, and the manufacturer lot designation. Palletized units shall contain a label which indicates the manufacturer and production lot number designations, rubber type, and net pallet weight.

D. Certification

The supplier 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.

1069.04 ASPHALT RUBBER CEMENT BLEND DESIGN

The asphalt cement shall be grade AC-5 unless otherwise recommended by the asphalt rubber supplier and approved by the Engineer. The asphalt rubber cement design shall be performed by the asphalt rubber supplier. The proportion of ground rubber shall be between 15 and 20 percent by weight of the total mixture of the asphalt rubber cement.

1069.05 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.
- 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 ARC to the aggregate and an internal mixing unit if necessary for uniformity within the storage 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.

1069.06 ASPHALT RUBBER CEMENT MIXING, REACTION AND TRANSFER PROCEDURE**A. Asphalt Cement Temperature.**

The temperature of the asphalt cement shall be between 300° and 425° F. at the addition of the ground rubber.

B. Blending and Reacting.

The asphalt cement and ground rubber shall be combined and mixed together in a blender unit, pumped into the agitated storage tank, and then reacted for a sufficient time to meet the properties contained in Section 1069.02B of this Special Provision.

C. Transfer.

The reacted asphalt rubber cement shall be metered into the mixing chamber of the hot mix plant at the percentage required by the job mix formula.

D. Delays.

When a delay occurs in asphalt rubber cement use after its full reaction, the asphalt rubber shall be allowed to cool. The asphalt rubber cement shall be reheated slowly just prior to use to a temperature as recommended by the rubber supplier, and shall also be thoroughly mixed before pumping and metering into the hot mix plant for combination with the aggregate. The viscosity of the asphalt rubber cement shall be checked by the asphalt rubber supplier. If the viscosity is out of the range specified in Section 1069.02B of this special provision, the asphalt rubber cement shall be adjusted by the addition of either the asphalt cement or ground rubber as required to produce a material with the appropriate viscosity.

1069.07 COMPACTION REQUIREMENT.

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

1069.08 COMPACTION EQUIPMENT.

A minimum of two rollers meeting Article 2001.05, Paragraph B or Paragraph F, of the Standard Specifications shall be furnished. Compaction with pneumatic tired rollers will not be allowed.

1069.09 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 Asphalt Rubber Cement Concrete Mix will be measured as per the standard specifications and be paid for in tons.

Proposal ID No. 920547

ESTIMATING PROPOSAL

Bid Order No. 95

Item of Work ASPH CEMENT CONC RESURFACING

Project No. NHS-169-6(43)--19-94

Item PRIMARY ROAD

Miles 11.9030

County WEBSTER

Location and Description ON U.S. 169, AT 5 LOCATIONS, FROM THE EAST JCT. OF IOWA 175 WEST AND NORTH TO THE INTERCHANGE OF RELOCATED U.S. 20. (SEE PLANS FOR SPECIFIC LOCATIONS).

ESTIMATING PROPOSAL

TO THE IOWA DEPARTMENT OF TRANSPORTATION HIGHWAY DIVISION

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 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 this 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; 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.

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 defined in the specifications; to execute the formal contract within thirty days of the date of approval for award or to forfeit the proposal amount furnished herewith; to begin work in accordance with the contract documents and to either complete the work within the contract period or 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.

Proposal Item No.	Amount of Proposal Guaranty	Construction Period	Working Days	Liquidated Damages Per Day
	\$50,000.00	SPECIFIED COMPLETION DATE 10/23/92	45	\$600.00

Submitted 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 on 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.

In the event of statutory authority preference will be given to products and provisions grown and coal produced within the state of Iowa where available.

Interest: 5.0%
 Information: NONE APPLICABLE
 Minimum Wages: MINIMUM WAGES IN EFFECT
 Date of Letting: APRIL 28, 1992
 Time: 9:00 A.M.

SCHEDULE OF PRICES

Proposal ID No. 920547

COST CNTR: 611000

OBJ NUM: 892

Bid Order No. 95

Contractor's No. _____

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Project No. NHS-169-6(43)--19-94

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	\$XXX,XXX,XXX	.XX
0010 0400175 442 84	ASPHALT CEMENT CONCRETE, TYPE A BINDER COURSE, MIXT. SIZE 3/4 IN.	29654.000 TONS				
0020 0402175 442 91	ASPH.CEM.CONC.,TYPE A BINDER, 3/4 IN. (ASPHALT RUBBER CEMENT (A.R.C.) CONCRETE)	8371.000 TONS				
0030 0375010 442 84	ASPHALT CEMENT	1780.000 TONS				
0040 0375030 442 91	ASPHALT RUBBER CEMENT (A.R.C.)	586.000 TONS				
0050 6375000 442 84	PRIMER OR TACK-COAT BITUMEN	15357.000 GALLONS				
0060 0475095 442 84	BASE, CLEANING & PREPARATION OF	11.900 MILES				
0070 5070002 441 87	PATCHES, FULL-DEPTH, BY COUNT	67.000 ONLY				
0080 5070001 441 87	PATCHES, FULL-DEPTH, BY AREA	698.000 SQ. YDS.				
0090 5075000 442 88	PATCHES, SURFACE	38.000 TONS				
0100 7425020 444 86	SHOULDERS, GRANULAR, TYPE B	6795.000 TONS				
0110 8450810 442 84	TRENCHING & RESHAPING	328.000 STAS.				
0120 9263010 493 84	PAVEMENT MARKINGS	2606.090 STAS.				
0130 8445110 493 84	TRAFFIC CONTROL	1.000 LUMP SUM				
0140 6911000 442 84	SAMPLES	1.000 LUMP SUM				

SCHEDULE OF PRICES

Proposal ID No. 920547

COST CNTR: 611000

OBJ NUM: 892

Bid Order No. 95

Contractor's No. [REDACTED]

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Project No. NHS-169-6(43)--19-94

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)					
0150 8445112 493 86	FLAGGERS	180.000 DAYS	135.0000		24,300.00	
0160 8445114 493 86	PILOT CARS	40.000 DAYS	200.0000		8,000.00	
0170 3350010 442 84	FIELD LABORATORY	1.000 ONLY				
0180 4980005 42 85	MOBILIZATION	1.000 LUMP SUM				
0190 8447010 442 84	TRAINEE REIMBURSEMENT	520.000 HOURS	0.8000		416.00	
		SUBTOTAL FOR SECTION 001				
				BID TOTAL		

PROPOSAL REQUIREMENTS
SPECIAL PROVISIONS TEXT

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Project No. NHS-169-6(43)--19-94

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
2
3

MARCH 8, 1991
DECEMBER 13, 1991
JANUARY 10, 1992

*** 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-1069

APRIL 28, 1992

SPECIAL PROVISIONS FOR ASPHALT RUBBER CEMENT (ARC) CONCRETE
*** INTENDED FOR WEBSTER COUNTY ASPHALT CEMENT CONCRETE RESURFACING PROJECT NHS-169-6(43)--19-94 ***

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-1057

FEBRUARY 23, 1988

SUPPLEMENTAL SPECIFICATIONS FOR CERTIFIED PLANT INSPECTION.

SS-1062

AUGUST 1, 1988

SUPPLEMENTAL SPECIFICATIONS FOR MOBILIZATION

SS-1089

DECEMBER 5, 1989

SUPPLEMENTAL SPECIFICATIONS FOR PORTLAND CEMENT CONCRETE PROPORTIONS

SS-5003

MAY 1, 1990

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

PROPOSAL REQUIREMENTS
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Project No. NHS-169-6(43)--19-94

Type of Work ASPH CEMENT CONC RESURFACING

SS-5014 DECEMBER 11, 1990

SUPPLEMENTAL SPECIFICATIONS FOR DELIVERY OF SAMPLES

SS-5025 MARCH 26, 1991

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

SS-5035 AUGUST 27, 1991

SUPPLEMENTAL SPECIFICATIONS FOR FULL DEPTH PATCHES

SS-5036 AUGUST 27, 1991

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

SS-5040 JANUARY 7, 1992

GENERAL SUPPLEMENTAL SPECIFICATION FOR CONSTRUCTION PROJECTS

005 02

*** REVISION TO SS-5035 ***

DELETE THE FOURTH SENTENCE OF PARAGRAPH 2.C ON PAGE 17 OF SS-5035, 'SUPPLEMENTAL SPECIFICATION FOR FULL DEPTH PATCHES', AND REPLACE WITH THE FOLLOWING TWO NEW SENTENCES IN LIEU THEREOF.

"HOWEVER, NO CORRECTIVE ACTION IS REQUIRED IF THE NEW PROFILOMETER INDEX IS EQUAL TO OR LESS THAN 12 INCHES PER MILE. ALSO, IF THE NEW PROFILOMETER INDEX IS GREATER THAN 12 INCHES PER MILE BUT NOT GREATER THAN 30 INCHES PER MILE, NO CORRECTIVE ACTION IS REQUIRED IF THE DIFFERENCE BETWEEN THE NEW PROFILOMETER INDEX AND THE ABI IS EQUAL TO OR LESS THAN 2 INCHES PER MILE."

005 22

*** REVISION TO SS-5003 ***

IN SS-5003, 'SUPPLEMENTAL SPECIFICATIONS FOR SPECIFIC AFFRIMATIVE ACTION RESPONSIBILITIES (DISADVANTAGED BUSINESS ENTERPRISE) FEDERAL AID PROJECTS'. UNDER SECTION 5003.06, REPLACE SUBSECTION B.3. ('TRANSPORTATION OR DELIVERY SERVICES') WITH THE FOLLOWING:

3. TRANSPORTATION OR DELIVERY SERVICES

=====
IF A DBE TRUCKING COMPANY PICKS UP A PRODUCT FROM A MANUFACTURER OR REGULAR DEALER AND DELIVERS THE PRODUCT TO THE CONTRACTOR, THE COMMERCIALY USEFUL FUNCTION PERFORMED IS NOT THAT OF A SUPPLIER BUT THAT OF A TRANSPORTER OF GOODS. UNLESS THE DBE COMPANY IS ITSELF THE MANUFACTURER OR A REGULAR DEALER IN THE PRODUCT, CREDIT ONLY WILL BE ALLOWED FOR THE COST OF THE TRANSPORTATION SERVICE. FOR TRANSPORTATION OF MATERIALS BY TRUCK TO BE USED TOWARD MEETING THE DBE GOAL, THE FOLLOWING SHALL APPLY:

A) THE DBE MUST BE RESPONSIBLE FOR MANAGEMENT AND SUPERVISION OF

PROPOSAL REQUIREMENTS

Proposal I.D. No. 920547

SPECIAL PROVISIONS TEXT

Bid Order No. 95

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Project No. NHS-169-6(43)--19-94

Type of Work ASPH CEMENT CONC RESURFACING

THE ENTIRE TRUCKING OPERATION THAT IS TO COUNT TOWARD THE GOAL. THE DBE SHALL MAINTAIN STRICT RECORDS TO VERIFY THE AMOUNT OF HAULING DONE BY EACH TRUCKER. THESE RECORDS SHALL BE AVAILABLE TO THE PROJECT ENGINEER, UPON REQUEST. ALL PAYMENTS FOR TRUCKING THAT IS TO COUNT TOWARDS THE DBE COMMITMENT SHALL BE MADE BY THE PRIME CONTRACTOR TO THE DBE FIRM SHOWN ON FORM 102115.

- B) 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 LEASE. TRUCKS WHICH ARE LEASED SHALL BE FROM A FIRM THAT IS IN THE COMMERCIAL LEASING BUSINESS. THE OWNERS OF THE COMMERCIAL LEASING BUSINESS CAN NOT BE HEAVY-HIGHWAY CONTRACTORS.
- C) TO MEET THE DBE GOAL, THE FOLLOWING TRUCKS MAY BE USED:
 - 1. TRUCKS LISTED ON THE TRUCK ROSTER UNDER THE DBE TRUCKING FIRM THAT IS SHOWN ON FORM 102115. AT LEAST ONE OF THESE TRUCKS SHALL BE HAULING ON THE PROJECT AT ALL TIMES.
 - 2. TRUCKS ON THE DBE TRUCK ROSTER LISTED UNDER ANOTHER DBE. THERE IS NO LIMITATION TO THE NUMBER OF THESE TRUCKS THAT CAN BE USED.
 - 3. NON-DBE TRUCKS OWNED BY AN INDEPENDENT OPERATOR, OR AN OWNER/OPERATOR. THE NUMBER OF THESE TRUCKS IS LIMITED TO THE NUMBER OF TRUCKS LISTED, UNDER 3.C)1. ABOVE, THAT ARE ON THE JOB. TRUCKS OWNED BY CONTRACTORS PREQUALIFIED TO BID AS PRIMES SHALL NOT BE CONSIDERED INDEPENDENT OPERATORS.
- D) THE DBE TRUCKER SHALL NOTIFY THE PROJECT ENGINEER OF THE TRUCKS HAULING ON THE PROJECT AT LEAST 24 HOURS PRIOR TO THEIR USE. FOR AN INDEPENDENT OR OWNER/OPERATOR TRUCK THE FOLLOWING SHALL BE PROVIDED:
 - OWNER'S NAME
 - LICENSE PLATE NUMBER
 - TRUCK IDENTIFICATION NUMBER (VIN NUMBER)

THESE TRUCKS ARE NOT TO BE CONSIDERED LEASED TRUCKS.
- E) WHERE DAVIS/BACON WAGE REQUIREMENTS APPLY, THE DBE TRUCKING COMPANY SHOWN OF FORM 102115 SHALL BE RESPONSIBLE FOR COLLECTING AND SUBMITTING CERTIFIED PAYROLLS FOR ALL DRIVERS. OWNER/OPERATORS SHALL BE LISTED ON THE CERTIFIED PAYROLLS AS OWNER/OPERATORS.

005 23

*** REVISIONS TO GENERAL SUPPLEMENTAL SPECIFICATIONS SS-5040 ***

THE FOLLOWING REVISIONS SHALL APPLY TO SECTIONS 1105, 2214 AND 2303 OF THE IOWA D.O.T. STANDARD SPECIFICATIONS.

SECTION 1105, CONTROL OF WORK.

DELETE THE FIRST SENTENCE OF THE SECOND INDENTED PARAGRAPH IN ARTICLE 1105.14 (AS REVISED IN SS-5040) AND REPLACE IT WITH THE FOLLOWING NEW SENTENCE.

WHEN TEMPORARY PRIMARY HAUL ROADS ARE REQUIRED, THE CONTRACTOR SHALL SUBMIT SUGGESTED HAUL ROUTE OR ROUTES TO THE DEPARTMENT WITHIN 21 CALENDAR DAYS AFTER THE APPROVAL OF AWARD.

SECTION 2214, PAVEMENT SCARIFICATION.

DELETE THE SECOND SENTENCE OF THE FIRST PARAGRAPH OF ARTICLE 2214.07,

PROPOSAL REQUIREMENTS
SPECIAL PROVISIONS TEXT

Bid Order No. 95

Proposal ID No. 920547

Contractor's No. _____

County WEBSTER

Page No. 4

Project No. NHS-169-6(43)--19-94

Type of Work ASPH CEMENT CONC RESURFACING

PARAGRAPH 'A' (AS REVISED IN SS-5040).

DELETE THE SECOND PARAGRAPH OF ARTICLE 2214.07, PARAGRAPH 'A' (AS REVISED IN SS-5040) AND REPLACE IT WITH THE FOLLOWING NEW PARAGRAPH.

WHEN SCARIFICATION INVOLVES REMOVAL OF A SMALL QUANTITY OF ASPHALTIC MATERIAL, THE CONTRACTOR WILL BE PAID THE CONTRACT PRICE PER SQUARE YARD FOR THE AREA OF SCARIFICATION COMPLETED. THIS SALVAGED MATERIAL SHALL BE INCORPORATED IN THE PROJECT OR STOCKPILED, AS DIRECTED BY THE CONTRACT DOCUMENTS.

DELETE PARAGRAPH 'B' OF ARTICLE 2214.07 (AS REVISED IN SS-5040) AND REPLACE IT WITH THE FOLLOWING NEW PARAGRAPH 'B'.

WHEN THE SCARIFIED MATERIAL IS NOT SUITABLE FOR RECYCLING, THE CONTRACTOR WILL BE PAID THE CONTRACT PRICE PER SQUARE YARD FOR THE SCARIFICATION COMPLETED. THIS MATERIAL SHALL BE INCORPORATED INTO THE WORK OR REMOVED FROM THE PROJECT IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

DELETE THE FIRST SENTENCE OF THE LAST PARAGRAPH OF ARTICLE 2214.07, (AS REVISED IN SS-5040) AND REPLACE IT WITH THE FOLLOWING NEW PARAGRAPH.

THIS COMPENSATION SHALL BE FULL PAYMENT FOR FURNISHING ALL MATERIALS, INCLUDING WATER, EQUIPMENT, TOOLS, AND LABOR NECESSARY TO COMPLETE THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, INCLUDING SALVAGING AND STOCKPILING.

SECTION 2303, A.C.C. MIXTURES.

DELETE THE FOURTH, FIFTH AND SIXTH PARAGRAPHS OF ARTICLE 2303.05, PARAGRAPH 'C' (AS REVISED IN SS-5040).

DELETE THE SECOND SENTENCE OF THE FIRST PARAGRAPH OF ARTICLE 2303.15 AND REPLACE IT WITH THE FOLLOWING NEW SENTENCE.

THE OFFSET DISTANCE BETWEEN ALL OTHER LONGITUDINAL JOINTS IN SUCCEEDING COURSES SHALL BE NOT MORE THAN 3 INCHES.

DELETE THE FIFTH PARAGRAPH OF ARTICLE 2303.27, PARAGRAPH 'B' (AS REVISED IN SS-5040) AND REPLACE IT WITH THE FOLLOWING NEW PARAGRAPH.

THE QUANTITY OF ASPHALT CEMENT IN RECLAIMED MATERIAL WHICH IS INCORPORATED INTO THE MIX WILL BE CALCULATED IN TONS OF ASPHALT CEMENT IN THE SALVAGED MATERIAL BASED ON AN ASSUMED ASPHALT CEMENT CONTENT OF 5 PERCENT. THE QUANTITY OF ASPHALT CEMENT IN RECLAIMED MATERIAL, WHICH IS INCORPORATED INTO THE MIX, WILL BE INCLUDED IN THE QUANTITY OF ASPHALT CEMENT USED.

DELETE THE LAST PARAGRAPH OF ARTICLE 2303.27, PARAGRAPH 'B' (AS REVISED IN SS-5040).

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.

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.

PROPOSAL REQUIREMENTS

Proposal ID No. 920547

SPECIAL PROVISIONS TEXT

Bid Order No. 95

Contractor's No. _____

County WEBSTER

Page No. 5

Project No. NHS-169-6(43)--19-94

Type of Work ASPH CEMENT CONC RESURFACING

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.

181 15

THE SURFACE COURSE SHALL BE 3/4 IN. MIX WITH NO SPECIAL AGGREGATE FRICTIONAL REQUIREMENTS.

182 00600

THE PERCENTAGE OF CRUSHED PARTICLES IN THE A.C.C. SHALL BE:
BINDER 60%

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 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.

700 00

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

Appendix B
Lab Testing and Mix Designs

ABD2-0182
BD

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

LAB NO.....:ABD2-0182

MATERIAL.....:TYPE A
INTENDED USE.....:BINDER
PROJECT NO.....:NHS-169-6(43)--19-94
COUNTY.....:WEBSTER
SPEC NO.....:5040.00
SAMPLED BY.....:

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

DATE SAMPLED: DATE RECEIVED: DATE REPORTED: 08/20/92
PROJ. LOCATION: FROM E. JCT. IOWA 175 TO U.S. 20

AGG. SOURCES: CR.LST. & CHIPS - MARTIN MARIETTA, FORT DODGE
MINE, WEBSTER CO.; MAN. SAND - MARTIN MARIETTA, HODGES,
HUMBOLDT CO.; SAND - NORTHWEST LST., YATES, WEBSTER 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	92.0	79.0	56.0	45.0	33.0	22.0	11.0	5.3	4.0	

TOLERANCE /100 :

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

MATERIAL MIX	A94002	A94002	A46006	A94502	
% AGGR. PROP.	52.50	12.50	10.00	25.00	0.00

ASPHALT SOURCE AND APPROXIMATE VISCOSITY POISES	ALGONA			
% ASPHALT IN MIX	4.50	5.50	0.00	0.00
NUMBER OF MARSHALL BLOWS	50	50	0	0
MARSHALL STABILITY - LBS.	2482	2390	0	0
FLOW - 0.01 IN.	6	8	0	0
SP GR BY DISPLACEMENT (LAB DENS)	2.376	2.395	0.000	0.000
BULK SP. GR. COMB. DRY AGG.	2.697	2.697	0.000	0.000
SP. GR. ASPH. @ 77 F.	1.023	1.023	0.000	0.000
CALC. SOLID SP. GR.	2.526	2.488	0.000	0.000
% VOIDS - CALC.	5.94	3.73	0.00	0.00
RICE SP.GR.	2.497	2.462	0.000	0.000
% VOIDS - RICE	4.85	2.72	0.00	0.00
% WATER ABSORPTION - AGGREGATE	0.47	0.47	0.00	0.00
% VOIDS IN MINERAL AGGREGATE	15.87	16.08	0.00	0.00
% V.M.A. FILLED WITH ASPHALT	62.59	76.84	0.00	0.00
CALC. ASPH. FILM THICK. MICRONS	8.85	10.93	0.00	0.00
FILLER/BITUMEN RATIO	0.00	0.78	0.00	0.00

A CONTENT OF 5.1% AC 10 IS RECOMMENDED TO START THE JOB.
TARGET VOIDS 3.5%

COPIES TO:

CENTRAL LAB
D. HEINS
JEFFERSON RES.

R. MONROE
MATHY

J. ADAM
DIST. 1

DISPOSITION:

.....

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

ABD2-0183
BD

23

MIX DESIGN

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

LAB NO.....:ABD2-0183

MATERIAL.....:TYPE A ARC
INTENDED USE.....:BINDER
PROJECT NO.....:NHS-169-6(43)--19-94
COUNTY.....:WEBSTER
SPEC NO.....:5040.00
SAMPLED BY.....:

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

DATE SAMPLED: DATE RECEIVED: DATE REPORTED: 08/21/92
PROJ. LOCATION: FROM E. JCT. IOWA 175 TO U.S. 20

AGG. SOURCES: CR. LST. & CHIPS - MARTIN MARIETTA, FORT
DODGE MINE, WEBSTER CO.; MAN. SAND - MARTIN MARIETTA,
HODGES, HUMBOLDT CO.; SAND - NORTHWEST LST., YATES, WEBSTER
CO./ 15% RUBBER ADDED TO AC.

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	56.0	45.0	33.0	22.0	11.0	5.3	4.0	

TOLERANCE /100 :

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

MATERIAL MIX	A94002	A94002	A46006	A94502	
% AGGR. PROP.	52.50	12.50	10.00	25.00	0.00
% ASPHALT IN MIX		5.25	6.25	7.25	0.00
NUMBER OF MARSHALL BLOWS		50	50	50	0
MARSHALL STABILITY - LBS.		1933	1777	1600	0
FLOW - 0.01 IN.		9	12	13	0
SP GR BY DISPLACEMENT (LAB DENS)		2.332	2.338	2.354	0.000
BULK SP. GR. COMB. DRY AGG.		2.697	2.697	2.697	0.000
SP. GR. ASPH. @ 77 F.		1.022	1.022	1.022	0.000
CALC. SOLID SP. GR.		2.497	2.459	2.423	0.000
% VOIDS - CALC.		6.60	4.94	2.85	0.00
RICE SP.GR.		2.469	2.438	2.405	0.000
% VOIDS - RICE		5.55	4.10	2.12	0.00
% WATER ABSORPTION - AGGREGATE		0.47	0.47	0.47	0.00
% VOIDS IN MINERAL AGGREGATE		18.07	18.73	19.05	0.00
% V.M.A. FILLED WITH ASPHALT		63.47	73.65	85.04	0.00
CALC. ASPH. FILM THICK. MICRONS		10.41	12.48	14.56	0.00
FILLER/BITUMEN RATIO		0.00	0.62	0.00	0.00

A CONTENT OF 6.5% BINDER IS RECOMMENDED TO START THE JOB.

TARGET VOIDS 3.5%

COPIES TO:

~~CENTRAL LAB~~
D. HEINS
DIST. 1

R. MONROE
MATHY
JEFFERSON RES.

J. ADAM
W. OPPELAL

DISPOSITION:

.....

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

AAT2-0449

24

A

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

LAB NO.....:AAT2-0449

MATERIAL.....:GF 50 CRUMB RUBBER

INTENDED USE.....:A.R.C. BINDER

PRODUCER.....:ROUSH

PROJECT NO.....:NHS-169-6 (43) --19-94

COUNTY.....:WEBSTER

CONTRACTOR:MATHY CONST.

UNIT OF MATERIAL:GF - 50 RUBBER GRANULES

SAMPLED BY.....:C. ANDERSON

SENDER NO.:CA2-123

DATE SAMPLED: 08/24/92

DATE RECEIVED: 08/27/92

DATE REPORTED: 08/27/92

SIEVE NO. 10 - 100.0

LAB NUMBER

AAT2-0449

SIEVE ANALYSIS %

#30

98.0

#50

33.0

COPIES TO:

CENTRAL LAB

GEOLOGY

V. MARKS

DISPOSITION:

.....

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

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

Project NHS-169-6(43)-17-74
 Contract No. 34399
 Date 8-24-92
 Report No. 11
 Resident Engineer Ron DeBok

Contractor Mathy Construction Plant Location 5 miles south Fort Dodge on Hwy. 169
 Plant Type Drum Make Bituma Pollution Equipment bag house
 Mix Type A Class AC-05 Size 3/4" Crushed Aggr. Sources Martin Marietta Recycle Source
 Asphalt Source & Grade Bituminous AC-05 Sand Sources Hodges, Yates Plant Operated 7:15 A.M. to 6:30 P.M. Mix No. AB02-0162

SIEVE ANALYSIS OF COMBINED AGGREGATES

SAMPLE	SIEVE NO. - % PASSING												
	19-25	30	42.5	60	75	100	150	200	250	300	375	475	600
JOB MIX FORMULA - LIMITS	98-100	85-99	72-86	49-63	40-50	18-26	7.0-6.0	3.0-2.0	1.5-1.0	0.75-0.5	0.425-0.25	0.25-0.15	0.15-0.075
Spl. ID	Time	Compl.	1 1/2	1	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
E-B11	AM	yes	100	93	84	60	46	35	25	14	7.5	5.2	3.0

SAMPLES SUBMITTED		SAMPLES SUBMITTED	
Materials	Senders No.	Materials	Senders No.
3/4" Type A	8-24-1	AC-5	ACC-02
3/4" Type A	8-24-2	AC-5	ACC-03
3/4" Type A	8-24-3	AC-5	ACV-01
AC-05	AC-5901	AC-5	ACV-02 03
Intended Added	5.5 % A.C.	Tank Meas	5.60 % A.C.
Intended Total	(6.5 with Rubber) % A.C.	Total	% A.C.

LAB. DEN. <u>2.371</u>				DENSITY RECORD				SOLID DEN. <u>2.409</u>				TEMPERATURE RECORD						MATERIALS DELIVERIES		
Course Laid	Station	Refer	Date Laid	(1)	Density	% Density	% Voids	Time	7	9	11	3	5	Type	Ticket No.	Quantity				
Binder	502+28	3' RT.	8-24-92	2 3/4	2.329	98.229	3.3	Air	69	73	75	78	86	84	AC-5	2970	25.50			
	490+27	7' RT.		2 1/4	2.322	97.933	3.6	A.C.	303	320	325	325	330	330	AC-5	2972	25.32			
	478+26	7' RT.		2 1/2	2.366	99.189	1.7	Aggr.	303	305	310	315	305	310	AC-5	2985	25.46			
	454+25	7' RT.		1 1/4	2.291	96.626	4.9	Mix	300	300	305	312	300	305	AC-5	2991	25.25			
	444+64	9' RT.		2 1/2	2.303	97.132	4.4	Mat	290	295	300	325	295	300	AC-5	2997	25.38			
	511+78	7' LT.		1 1/8	2.284	96.331	5.15	RECYCLED MIX ONLY						AC-5	2999	25.94				
	481+98	5' LT.		2 3/8	2.322	97.933	3.6	Total RAP Used Tons												
								Total Aggr. Used Tons												
								RAP Used %												
								Aggr. Used %												

Avg. Field Density Lot #1 <u>2.317</u>		Avg. Field Density Lot #2 <u>2.73</u>		PRODUCTION AND PLACEMENT RECORD											
(2)	Side	Course Laid	From Station to Station	Tons Today	Tons To Date										
2	RT.	Binder	514+30 to 430+24	1421.69											
2	LT.	Binder	514+30 to 479+50	604.61											
				2026.30	30867.86										

Advisory - Fines/Bitumen Ratio = $\frac{5.2}{5.6} = 0.93$
 Ave. % Field Voids = $\frac{3.8}{5.6} = 0.68$
 Lab % Voids = 1.54
 Q.I. (Density) = $\frac{97.110 - 95.0}{1.162} = 2.33$ ✓

COMMENTS: started rubber mix today

Acceptance Fines/Bitumen Ratio = $\frac{4.6}{5.6} = 0.82$

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

Signed Kevin J. Ellis Inspector
 Cert. No. 318

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

County Webster
 Project NHS-169-6(43)-19-94
 Contract No. 34398
 Date 8-25-92
 Report No. 12
 Resident Engineer Ren DeBok

Contractor Mathy Construction Plant Location 5 miles south Fort Dodge on Hwy. 169
 Plant Type Drum Make Bituma Pollution Equipment bag house
 Mix Type A Class AC-5 Size 3/4" Crushed Aggr. Sources Martin Marietta Recycle Source
 Asphalt Source & Grade Bituminous AC-05 Sand Sources Hodges, Yates Plant Operated 7:00 A.M. to 10:30 P.M. Mix No. AB02-0162

SIEVE ANALYSIS OF COMBINED AGGREGATES

SAMPLE			SIEVE NO. - % PASSING											
JOB MIX FORMULA - LIMITS			99-100	95-99	72-86	49-63	40-50	18-26	10-15	7.5-10	4.75-7.5	2.0-60	1.18	0.425
Spl. ID	Time	Compl.	1/2"	3/8"	3/4"	4"	8"	16"	30"	50"	100"	200"	400"	600"
1E-B12	AM	yes	100	92	79	57	44	33	23	12	6.5	4.5		

SAMPLES SUBMITTED

SAMPLES SUBMITTED		SAMPLES SUBMITTED	
Materials	Senders No.	Materials	Senders No.
3/4" Type A	8-25-1	AC-5	ACC-02
3/4" Type A	8-25-2	AC-5	ACC-03
3/4" Type A	8-25-3	AC-5	ACC-04
AC-5	ACC-04	AC-5	ACC-02, 03
Intended Added	5.1	% A.C. Tank Meas.	5.34
Intended Total	6.1	% A.C. Total	

LAB. DEN. 2.362

DENSITY RECORD

SOLID DEN. 2.450

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	474+63	3' LT.	8-25-92	2.14	2.33	98.688	4.9	59	62					AC-5	3003	25.55	
	469+80	7' LT.		1.78	2.334	98.815	4.7	A.C.	310	326							
	463+05	5' LT.		2.49	2.286	96.782	6.7	Aggr.	310	316							
	452+46	9' LT.		2	2.276	96.359	7.1	Mix	305	310							
	449+55	11' LT.		2.44	2.306	97.629	5.9	Mat	310	310	300						
	442+80	5' LT.		2.42	2.333	98.772	4.8	RECYCLED MIX ONLY Total RAP Used Tons _____ Total Aggr. Used Tons _____ RAP Used % _____ Aggr. Used % _____									
	432+21	9' LT.		1.78	2.270	96.105	7.35										

Avg. Field Density Lot #1 2.305

PRODUCTION AND PLACEMENT RECORD

Avg. Field Density Lot #2	* (2) Side	Course Laid	From Station to Station	Tons Today	Tons To Date
	LT.	Binder	478+50 to 431+25	800.99	31668.85

Advisory - Fines/Bitumen Ratio = $\frac{4.5}{5.34} = 0.84$
 Ave. % Field Voids = 5.9
 Lab % Voids = 3.6

O.I. (Density) =
 (Show Calculation)
 $\frac{97.593 - 95.0}{1.189} = 2.18$

Acceptance Fines/Bitumen Ratio = $\frac{4.6}{5.34} = 0.86$

COMMENTS

Rained out at 10:30
 A.C. changed to 5.1% from 5.5%

Rubber
 Mix

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

MT

Signed Ken J. Elmi
 Inspector

318
 Cert. No.

BITUMINOUS TREATED BASE, ASPHALT TREATED BASE, ASPHALT CONCRETE

DAILY PLANT REPORT

Project NHS-169-6(93)-14-11

Contract No. 34398

Date 8-26-92

Report No. 13

Contractor Mathy Construction

Plant Location 5 miles south Fort Dodge on Hwy. 169

Plant Type Drum Make Bituma Pollution Equipment bag house Resident Engineer Ren DeBok

Mix Type A Class 3/4" Size 3/4" Crushed Aggr. Sources Martin Marietta Recycle Source

Asphalt Source & Grade Bituminous AC-05 Sand Sources Hodges, Yates Plant Operated 6:45 A.M. to 6:30 P.M. Mix No. AB02-0162

SIEVE ANALYSIS OF COMBINED AGGREGATES

SAMPLE	SIEVE NO. - % PASSING														
	JOB MIX FORMULA - LIMITS		98-100	85-99	72-86	49-63	40-50	19-26		2.0-6.0					
Spl. ID	Time	Compl.	1 1/2	1	3/4	3/8	3/16	1/8	1/16	1/30	1/50	1/100	1/200		
<u>E-B13</u>	<u>AM</u>	<u>YES</u>	<u>✓</u>	<u>100</u>	<u>92</u>	<u>91</u>	<u>57</u>	<u>45</u>	<u>35</u>	<u>25</u>	<u>14</u>	<u>7.1</u>	<u>5.0</u>		

SAMPLES SUBMITTED		SAMPLES SUBMITTED	
Materials	Senders No.	Materials	Senders No.
<u>3/4" Type A</u>	<u>8-26-1</u>	<u>AC-5</u>	<u>ACC-06-098</u>
<u>3/4" Type A</u>	<u>8-26-2</u>	<u>AC-5</u>	<u>ACC-05-09</u>
<u>3/4" Type A</u>	<u>8-26-3</u>		
<u>AC-5</u>	<u>ACC-05</u>		
Intended Added	<u>5.1</u> % A.C.	Tank Meas.	<u>5.37</u> % A.C.
Intended Total	<u>6.1</u> % A.C.	Total	<u>6.1</u> % A.C.

LAB. DEN. 2.372

DENSITY RECORD

SOLID DEN. 2.445

TEMPERATURE RECORD

MATERIALS DELIVERIES

Course Laid	Station	± Refer	Date Laid	(1) Density	% Density	% Voids
<u>Binder</u>	<u>500r 46</u>	<u>5' RT.</u>	<u>8-26-92</u>	<u>2.29</u>	<u>98.735</u>	<u>4.2</u>
	<u>469+77</u>	<u>1' RT.</u>		<u>1.78</u>	<u>97.723</u>	<u>5.2</u>
	<u>441+24</u>	<u>9' RT.</u>		<u>2.24</u>	<u>99.663</u>	<u>3.3</u>
	<u>505+78</u>	<u>11' LT.</u>		<u>2.318</u>	<u>97.091</u>	<u>5.8</u>
	<u>490+42</u>	<u>3' LT.</u>		<u>2.24</u>	<u>96.585</u>	<u>6.4</u>
	<u>459+71</u>	<u>1' LT.</u>		<u>2.218</u>	<u>100.084</u>	<u>2.90</u>
	<u>447+42</u>	<u>1' LT.</u>		<u>2.28</u>	<u>96.965</u>	<u>5.9</u>

Time	7	9	11	1	3	5
Air	<u>54</u>	<u>58</u>	<u>59</u>	<u>67</u>	<u>76</u>	<u>75</u>
A.C.	<u>328</u>	<u>337</u>	<u>329</u>	<u>323</u>	<u>324</u>	<u>333</u>
Aggr.	<u>315</u>	<u>310</u>	<u>320</u>	<u>320</u>	<u>315</u>	<u>310</u>
Mix	<u>310</u>	<u>305</u>	<u>315</u>	<u>315</u>	<u>310</u>	<u>305</u>
Mat	<u>300</u>	<u>305</u>	<u>320</u>	<u>315</u>	<u>310</u>	<u>305</u>

Type	Ticket No.	Quantity
<u>AC-5</u>	<u>3006</u>	<u>25.39</u>
<u>AC-5</u>	<u>3008</u>	<u>25.62</u>
<u>AC-5</u>	<u>3012</u>	<u>25.68</u>
<u>AC-5</u>	<u>3019</u>	<u>25.38</u>
<u>AC-5</u>	<u>3022</u>	<u>25.64</u>
<u>AC-5</u>	<u>3027</u>	<u>25.40</u>

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

Avg. Field Density Lot #1 2.327

Avg. Field Density Lot #2 _____

Advisory - Fines/Bitumen Ratio = $\frac{5.0}{5.37} = 0.93$
 Ave. % Field Voids = 4.8
 Lab % Voids = 3.0
 Q.I. (Density) = $\frac{98.121 - 95.0}{1.386} = 2.25$
 (Show Calculation)

PRODUCTION AND PLACEMENT RECORD

(2) Side	Course Laid	From Station to Station	Tons Today	Tons To Date
<u>RT.</u>	<u>514+60 to 429+00</u>			
<u>RT.</u>	<u>Binder</u>	<u>514+60 to 429+00</u>	<u>1368.17</u>	
<u>LT.</u>	<u>Binder</u>	<u>515+00 to 429+00</u>	<u>1362.74</u>	
			<u>2730.91</u>	<u>34399.76</u>

Acceptance Cold Feed	1	3/4	3/8	3/16	1/8	1/16	1/30	1/50	1/100	1/200
(Certified Projects Only)	<u>100</u>	<u>91</u>	<u>80</u>	<u>57</u>	<u>45</u>	<u>35</u>	<u>25</u>	<u>13</u>	<u>7.6</u>	<u>4.5</u>

COMMENTS
22 ton road waste

Rubber Mix

Acceptance Fines/Bitumen Ratio = $\frac{4.5}{5.37} = 0.84$

COMMENTS: Delays, Breakdowns, Corrective Action, etc.

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

Signed Kevin J. Ellis
 Inspector

318
 Cert. No.

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

County Webster
 Project NHS-169-6 (43)-19-94
 Contract No. 34398
 Date 8-27-92
 Report No. 14
 Resident Engineer Ron DeBok

Contractor Mathy Construction Plant Location 5 miles south Fort Dodge on Hwy. 169
 Plant Type Drum Make Bituma Pollution Equipment bag house
 Mix Type A Class AC-05 Size 3/4" Crushed Aggr. Sources Martin Marietta Recycle Source _____
 Asphalt Source & Grade Bituminous AC-05 Sand Sources Hodges, Yates Plant Operated 6:45 A.M. to 6:00 P.M. Mix No. ABD2-0162

SIEVE ANALYSIS OF COMBINED AGGREGATES

SAMPLE	SIEVE NO. - % PASSING													
	75	100	150	200	30	45	60	75	100	150	200			
JOB MIX FORMULA - LIMITS	98-100	85-99	72-86	49-63	40-50	18-26			2.0-6.0					
Spl. ID	Time	Compl.	1%	1	%	1/2	%	4	8	16	30	50	100	200
E-B17	AM	yes	100	94	83	61	46	34	23	12	6.5	4.5		

SAMPLES SUBMITTED		SAMPLES SUBMITTED	
Materials	Senders No.	Materials	Senders No.
3/4" Type A	8-27-1	AC-5	ACC-11-13
3/4" Type A	8-27-2	AC-5	ACV-10-13
3/4" Type A	8-27-3		
AC-5	ACC-10		
Intended Added	5.1 % A.C.	Tank Meas.	5.27 % A.C.
Intended Total	6.1 % A.C.	Total	

LAB. DEN. <u>2.371</u>				DENSITY RECORD				SOLID DEN. <u>2.451</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	312+09	1' RT.	8-27-92	2 1/2	2.287	96.457	6.7	Air	54	58	70	74	76	76	AC-5	3040	26.00			
	360+66	5' RT.		1 3/4	2.255	95.108	8.00	A.C.	317	323	333	325	328	330	AC-5	3041	25.43			
	337+80	11' RT.		2 1/2	2.273	95.867	7.3	Aggr.	305	312	317	313	315	320	AC-5	3044	26.14			
	312+09	1' RT.		2 1/4	2.283	96.288	6.9	Mix	300	307	313	309	310	313	AC-5	3048	25.30			
	369+27	11' LT.		2 1/2	2.270	95.740	7.4	Mat	300	320	315	305	320	315	AC-5	3049	20.16			
	337+79	7' LT.		2	2.294	96.752	6.4	RECYCLED MIX ONLY Total RAP Used Tons _____ Total Aggr. Used Tons _____ RAP Used % _____ Aggr. Used % _____												
	322+55	1' LT.		2 3/8	2.302	97.090	6.1													

Avg. Field Density Lot #1 <u>2.281</u>				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 = $\frac{4.5}{5.27} = 0.85$					RT.	Binder	383+50 to 303+50				1330.58							
Ave. % Field Voids = <u>6.9</u>					LT.	Binder	383+50 to 303+50				1370.21							
Lab % Voids = <u>3.3</u>											2700.79				37100.55			
Q.I. (Density) = $\frac{96.186 - 95.0}{0.669} = 1.77$																		
(Show Calculation)							Acceptance Cold Feed	1	%	%	%	4	8	16	30	50	100	200
						COMMENTS	(Certified Projects Only)		100	93	82	60	45	34	23	12	7.1	4.5

Finished job

Rubber Mix

Acceptance Fines/Bitumen Ratio = $\frac{4.5}{5.27} = 0.85$

COMMENTS: Delays, Breakdowns, Corrective Action, etc.

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

MT

Signed Kevin J. Elmer
 Inspector

731
 318
 Cert. No.

TEST SECTION WORKSHEET

①

TEST SECTION WORK SHEET

DATE: 8/26/92 STATE: INDIANA COUNTY: webster

PROJECT NUMBER: _____ HIGHWAY: IA-169

MARKER: _____ % RUBBER: 15%

TYPE RUBBER: GFSDA UNIT RPM: 20

TOTAL RUBBER USED/DAY: 48,375 ASPHALT TEMP: 350°F
 $21.5 \text{ skids} @ 2250 \text{ gal} = 48,375$

BROOKSFIELD DATA

TIME	TEMP	SPINDLE	B/F READING	FACTOR	CPS VISCOSITY
			<u>10 RPM</u>		
8:30	350	3	21.5	200	1000
11:30	350	3	6	200	1200
1:30	350	3	5.5	200	1100
5:00	350	3	7	200	1400
<u>made 2750 TON Asphalt concrete</u>					
<u>8/27/92</u>					
			<u>10 RPM</u>		
8:00	355	3	6	200	1200
10:00	350	3	8	200	1600
12:00	350	3	8.5	200	1700
3:00	347	3	10.0	200	2000
5:00	345	3	8.5	200	1800

Rubber Used = $21.5 \text{ skids} @ 2250 = 48,375$
 Made 2750 TONS Asphalt concrete

30
TEST SECTION WORKSHEET

(2)

TEST SECTION WORK SHEET

DATE: 8/24/92 STATE: IOWA COUNTY: webster

PROJECT NUMBER: _____ HIGHWAY: IA 169

MARKER: _____ % RUBBER: 15%

TYPE RUBBER: GF-50A UNIT RPM: 80

TOTAL RUBBER USED/DAY: 19 pallets ASPHALT TEMP: 340-360°F
@ 2250 # Each = 40,750 #

BROOKSFIELD DATA

TIME	TEMP	SPINDLE	5RPM B/F READING	FACTOR	CPS VISCOSITY
11:00	350	3	5	400	2000
1:00	360	3	8	400	3200
3:00	360	3	6	400	2400
5:30	360	3	8	400	3200
8/25/92					
7:30	start up	3	4.5	400	1800
9:00	345	3	5	400	2000
11:00	375	3	6	400	2400
(1) used 1 pallet @					
2250 #/pallet = 15,750					
(3) made					

10 RPM

340 - 1200
CPS

350 - 1200
CPS

345 1400
CPS

Marshall Stability, Creep & Resilient Modulus Testing

	Conventional	ARC
Marshall Stability 3/4" Binder - 50 Blows	2,436	1,790
Creep 3/4" Binder - 50 Blows	88	77
Resilient Modulus 3/4" Binder - 50 Blows	710,000	580,000

Appendix C
Road Rater Results

Road Rater Results
Preconstruction
May 14, 1992

<u>Section</u>	<u>Northbound</u>	<u>Southbound</u>	<u>Average</u>
1	3.34	3.88	3.61
2	2.93	3.18	3.06
3	4.21	3.33	3.77
4	2.07	2.52	2.29