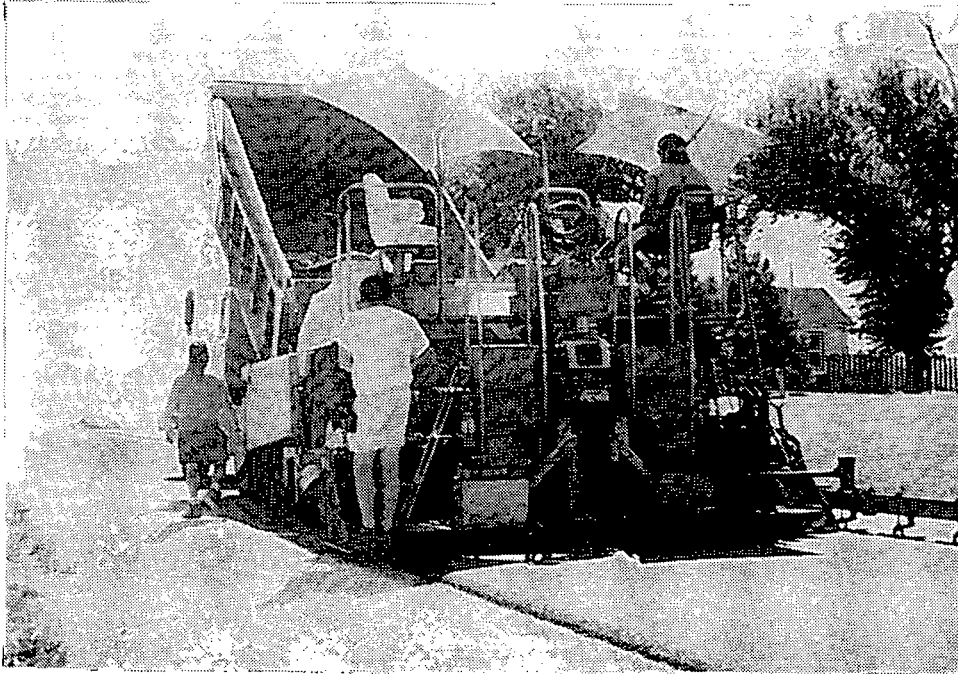


# THIN ASPHALT CONCRETE PAVEMENT ON CRUSHED ROCK BASE



**Construction Report  
Iowa Department of Transportation  
Project HR-2075**

**April 1997**

Project Development Division



**Iowa Department  
of Transportation**

Construction Report  
For  
Iowa Department of Transportation  
Project HR-2075

**THIN ASPHALT CONCRETE PAVEMENT  
ON CRUSHED ROCK BASE**

CASS COUNTY  
PROJECT NO. FM-15-(18)--55-15

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Atlantic, Iowa 50022

April 1997

TECHNICAL REPORT TITLE PAGE

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1. REPORT NO.

HR-2075

2. REPORT DATE

April 1997

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3. TITLE AND SUBTITLE

Thin Asphalt Concrete Pavement  
on Crushed Rock Base  
- Cass County

4. TYPE OF REPORT & PERIOD COVERED

Construction Report 4-96 to 4-97

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5. AUTHOR(S)

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Cass County  
Atlantic, Iowa 50022

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7. ACKNOWLEDGEMENT OF COOPERATING ORGANIZATIONS

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8. ABSTRACT

The road paving cost continues to increase and the backlog of projects awaiting funding is growing. Finding a more cost effective way to use the available money to pave roads will result in more miles of road being paved with the same amount of money. This project is in Cass County on G-35 between US 71 and Norway-Center. It consists of a thin layer of asphalt over a base designed to achieve stability while having some permeability. This project was paved in 1996.

An asphalt cement concrete (ACC) pavement was chosen for the project based on cost, convenience, and historical portland cement concrete (PCC) problems in Cass County. The new pavement gives quicker access time to farms and residences.

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9. KEY WORDS

Asphalt concrete pavement  
Low volume road  
Pavement structure

10. NO. OF PAGES

27

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### DISCLAIMER

The contents of this report reflect the views of the authors 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

As rural areas of the counties become more developed, the need to provide dust free, hard surfaced roads is greater. The ability to provide a hard surface road is difficult because of the high initial cost for ACC or PCC pavements and budget constraints.

A road surface evaluation for this project was done by Terracon Consultant Inc. on June 12, 1995. This report describes that the roadway surface appeared well compacted with little rutting or pumping. The thickness of crushed rock surfacing varied from approximately 4 to 6 inches. Terracon Consultant Inc. used a Dynatest Model 8081 Falling Weight Deflectometer (FWD) to measure the deflection of the rock road due to an applied load as shown in Table 1.

The effective structural number of the existing rock surface was determined to be 0.65. The structural number required was determined to be 2.4 for a 20 year design proposed by the County Engineer. A hot mix asphalt concrete (HMAC) surface of 3 inches and 5 inches of crushed limestone (local source) base, for 20 years - 22,000 ESAL, was determined to be needed as shown in Table 2.

This Terracon Consultant Inc. design was modified by the County Engineer to 3 inches HMAC over 6 inches of crushed limestone. A better quality limestone was selected to provide additional life for the base due to the freeze/thaw environment. The increased depth was used to compensate for partial trimming of the existing rock subgrade.

County Road G-35  
 Cass County, Iowa  
 Job No. 05956501

TABLE - 1

Analysis Unit Station	Gravel Surface			Embankment/Subgrade			Surface Structural Coefficient, a1	Effective Structural Number, S <sub>Neff</sub>
	Average Modulus, E1 (ksi)	Standard Deviation	Coefficient of Variation	Average Modulus MR (ksi)	Standard Deviation	Coefficient of Variation		
302 + 20	27.6	6.3	23%	11	1.7	15%	0.14	0.68
320 + 20	26.0	8.4	32%	5	0.2	4%	0.13	0.67
336 + 20	30.4	10.1	33%	12	2.6	22%	0.14	0.70
350 + 20	43.4	10.7	25%	7	0.8	12%	0.16	0.79
371 + 20	28.0	7.4	26%	6	0.8	13%	0.14	0.68
382 + 20	41.8	16.6	40%	6	0.4	6%	0.16	0.78
406 + 20	16.2	5.4	33%	4	0.6	17%	0.11	0.57
422 + 20	18.4	13.9	75%	8	0.9	11%	0.12	0.59
445 + 20	21.0	5.7	27%	14	1.1	8%	0.12	0.62
463 + 20	56.4	4.4	8%	6	0.6	9%	0.17	0.86
487 + 20	29.4	16.3	55%	5	0.2	4%	0.14	0.69
502 + 20	26.8	9.0	34%	12	1.1	10%	0.13	0.67
525 + 20	29.4	3.4	12%	10	0.8	8%	0.14	0.69
550 + 20	12.0	2.7	23%	2	0.2	9%	0.10	0.41
570 + 20	18.0	2.9	16%	5	0.7	13%	0.12	0.59
585 + 20	16.4	4.0	24%	6	0.3	6%	0.11	0.57
593 + 20	11.8	1.8	15%	5	2.6	54%	0.10	0.51
<b>OVERALL</b>								
Average:	26.0			7.2			0.13	0.65
St. Dev.:	14.0			3.7			0.02	0.11
C.V.:	54%			52%			15%	17%

TERRACON

2

TABLE - 2

		15 years	20 years
Design Period:		15,000	22,000
Design 18-kip ESALs:		2.3	2.4
SN Required:		0.65	0.65
SN Effective:		1.65	1.75
SN Deficit:			
Option	Lift/Material	Thickness (In.)	Thickness (In.)
1	HMAC Surface	3	3
	Crushed Limestone (Local Source)	4	5
2	HMAC Surface	3	3
	Asphalt Concrete Millings	2.5	3.5
3	HMAC Surface	1.5	1.5
	HMAC Binder (30 - 40% recycled ACC)	3.5	4

All of the above thickness designs are based on minor grading and reshaping of the existing crushed rock surface only. No major grade changes are anticipated for this project.

## **OBJECTIVE**

The objective of this project was to determine the feasibility, economics and performance of a thin asphalt concrete roadway on an open-graded stone base and to develop design criteria by varying the thickness of the wearing surface.

## **CONTRACTOR**

Henningsen Construction of Atlantic, Iowa was the contractor on this project. Schildberg Construction of Greenfield, Iowa supplied the base rock from their Menlo Quarry (1 mile south of I-80 and IA 25) and shoulder rock out of the Atlantic Quarry.

## **PROJECT LOCATION**

The project is located approximately five miles southeast of Atlantic on Cass County road G-35 from US 71 east to county road N-28 (Figure 1).

The average daily traffic was 140 vehicles per day, and truck traffic was estimated at seven percent. Future growth in traffic volume was estimated at 300 vehicles per day from the information provided.

## **PROJECT FUNDING**

The project was funded with Cass County Farm-to-Market funds at the cost of \$1,286,485.69 for all work. The contractor's bid was \$1,314,197.84 and the Engineer's estimate was \$1,684,000 for ACC and \$1,501,000 for a seven inch thick PCC pavement.





## **SUBGRADE**

The roadway had been rocked and graded in 1993-1994 under a separate contract. The subgrade crown was built to a 6 to 8 percent slope.

## **SUBDRAINS**

The subdrain work was done by Manatt's Construction Inc. from May 15 through May 21, 1996. The 39,985 feet of subdrain were placed 12 feet from the centerline of the road and 33 inches deep, without any problem except for short rain delays.

## **CRUSHED STONE BASE**

It was decided that the crushed stone base material should meet the requirement of Iowa DOT Special Provisions SP-1277 (Appendix A).

Gradation: A well grade material consisting of 100% passing the 2 inch sieve to 3 to 6 percent passing the #200 sieve, capable of being compacted to specification. Gradation was subject to the approval of the County Engineer.

The crushed stone base material was produced by the Schildberg Construction Company Inc. The contractor elected to place the base materials themselves. Trimming was done on 1½ miles of roadway at the west end to adjust the grade. No other significant trimming was needed on the rest of the project, except at county road N-28.

The stone base was laid to a minimum of 6 inches deep (compacted) using a Cedarapids paver, as shown on the front cover. A vibratory roller was used (Figure 2).

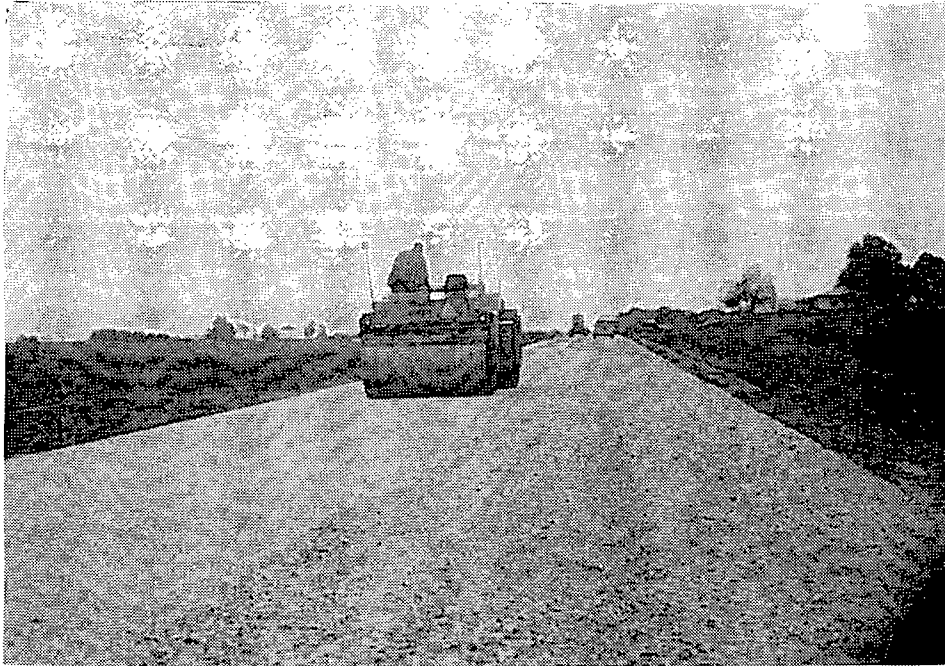


Figure 2

The first day the roller pattern was 4 vibratory passes, but it was changed the next day to 3 passes in a static mode and 1 pass of a vibratory mode. It was noticed that in some areas if the trucks would get too close to the subdrain trench when unloading stone base into the paver, it would cause some pumping of the subbase. In these areas, a roller was used ahead to recompact the subbase before the stone base laid down.

Due to a wet subbase in the following areas, Tensar fabric material was used under the rock to stabilize the road.

Tensor fabric with 2 inches of rock

Sta. 365+50	To	366+50
Sta 537+00	To	542+00
Sta 549+00	To	554+00
Sta 574+00	To	581+50

The stone base was placed 22 feet wide. There was no problem and the operation went very smoothly.

**ASPHALT PAVING**

The graded stone base was primed with MC-70 to keep the graded stone base from being displaced. The contractor tight-bladed the base to remove the loose rock prior to the MC-70 primer application.

On June 28, 1996, the paving began at the west end using a Cedarapids paver.

The asphalt concrete was hauled from a stationary plant in Atlantic, Iowa, about 10 miles from the job site. The lab testing of materials and mix designs are given in Appendix B.

The first 1½ miles were paved 4 inches thick (2 inches binder and 2 inches surface) because of the trimming depth; and the rest of the project was paved 3 inches thick (1½ inches binder and 1½ inches surface). It was noticed that in some places the asphalt

concrete base was about ½ inch thin at the edges. At these locations an extra ½ inch of asphalt surface course was added at the locations noted below:

Sta 334+50 to Sta 339+00

Sta 383+00 to Sta 386+50

Sta 451+00 to Sta 456+00

Sta 601+50 to Sta 606+50

Also at Sta 551+00 to Sta 554+00 an additional ¾ inch thickness of HMAC was added to give extra strength to a possible soft area.

On July 3, 1996, it was noticed that at two locations, Sta 385+00 (5'x42') next to the edge of the slab and at Sta 422+00 (4'x6'), trucks damaged the top surface. The contractor removed the asphalt surface and 1 inch of base material and placed 4½ inches of asphalt concrete at both locations.

The trucks backed on the grade to the Cedarapids paver and kept their speed lower than normal on the rock base. The base remained in very good shape during the paving operation.

The paving was finished on July 5, 1996. The contractor used side roads as much as possible for hauling materials to minimize problems or damage. When trucks were hauling materials on the base or asphalt concrete lifts, they were kept to the middle of the road to minimize damage of the edges.

## **TESTING**

Road Rater testing will be conducted annually to determine the structural integrity of the pavement. The riding quality will be determined annually using the South Dakota profilometer. Crack and patch and rut depth testing will be conducted for a period of at least 5 years.

## **CONCLUSION**

The main goal for this project was to build a thin asphalt surface at a low cost on a crushed stone base suitable for a low volume rural road. This goal was met because this construction saved \$400,000 over conventional asphalt concrete pavement and about \$225,000 over conventional PCC pavement. The road, as designed, was not built to last as long as either alternative. It is expected an overlay will be required in 15 to 20 years.

ACC pavement was considered to be more convenient for the public because of quicker access time to farms and residences. ACC pavement caused the least disruption to the public.

## **ACKNOWLEDGEMENT**

The author wishes to thank Henningsen Construction of Atlantic for their help in providing the information.

## **REFERENCES**

1. Terracon Consultant, Inc., Omaha, Nebraska. "Pavement Evaluation Report," County Road G-35 Cass County, Iowa. Project No. 05956501.001, June 12, 1995.

**Appendix A**  
**Proposal and Special Provision**





Iowa Department of Transportation

**SPECIAL PROVISIONS  
for  
CRUSHED STONE BASE CONSTRUCTION**

**Cass County, FM-15(18)-55-15**

**April 30, 1996**

**THE STANDARD SPECIFICATIONS, SERIES OF 1992, ARE AMENDED BY THE FOLLOWING ADDITIONS. THESE ARE SPECIAL PROVISIONS AND SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.**

**1277.01 DESCRIPTION**

This work will consist of constructing a crushed stone base in accordance with these special provisions and to the width and depth as shown on the plans.

**1277.02 MATERIAL**

A. The crushed stone base material shall be as specified in Section 4122 of the Iowa DOT Standard Specifications and meeting the following requirements:

1. Gradation - A well graded material consisting of 100% passing the 2 inch sieve to 3 to 6% passing the # 200 sieve, capable of being compacted to specification. Gradation is subject to the approval of the engineer.

**1277.03 EQUIPMENT**

Division 20 of the Iowa DOT Standard Specifications shall apply.

Spreading equipment shall be of the size and capabilities to spread material uniformly without segregation. All equipment used to spread and compact the base shall be subject to the approval of the Engineer.

**1277.04 CONSTRUCTION**

The crushed stone base shall be constructed on the existing granular subgrade of crushed limestone and earth in accordance with the following requirements:

least equal to 100% of AASHTO T 180 maximum dry density, based on 10 nuclear density tests taken at random locations in the test strip. Sections of base subsequently constructed shall be compacted to an average of at least 98% of the target density (achieved on tests taken at random locations in the test strip). In addition, the density at any one location shall be required to reach at least 95% of the target density. The contractor shall employ qualified personnel or consultants to determine the target density and optimum moisture content.

Base density will be determined by sampling at random locations by the same procedure indicated in Materials I.M. 346 for determining core locations from portland cement concrete pavement and at any other locations directed by the Engineer prior to trimming. Sampling shall be done by qualified individuals with the same methods and equipment used in the test strip.

D. The base shall be constructed to an elevation at least  $\frac{1}{2}$  inch greater than shown on plans. The base shall be trimmed to final grade and the excess material shall be placed and spread at intersecting roads and driveways and on the shoulders as determined by the Engineer.

E. Asphalt shall be placed immediately behind the trimming operations. Areas not in compliance with the compaction specifications shall be repaired prior to laying of asphalt over that area. Any deformations of the base by trucks shall be repaired before asphalt is placed.

#### **1277.05 METHOD OF MEASUREMENT**

A. Natural Subgrade for Pavement will be measured in miles of project length measured along the centerline of the roadbed.

B. Graded Stone Base will be measured in tons of base placed and compacted and includes material for fillets at intersecting roads, drives, entrances, and includes moisture in the material at the time of delivery.

#### **1277.06 BASIS OF PAYMENT**

A. Natural Subgrade for Pavement will be paid for at the contract unit price per mile, which shall be full payment for excavating, manipulating, replacing, and compacting the material and for furnishing all water required for the work.

B. Graded Stone Base will be paid for the number of tons placed and compacted, which shall be full payment for determining target density and base density sampled at random locations. Base density at other locations directed by the Engineer will be paid in accordance with Article 1109.03, Paragraph B.

ESTIMATING PROPOSAL DESCRIPTION  
- NOT TO BE USED FOR BIDDING -

PAGE: 1

\*\*\*\*\*  
\*  
\* Bid Order No.: 154 \*  
\* Proposal ID No.: 15-0015-018 Letting Date: April 30, 1996 \*  
\* Type of Work: ACC PAVEMENT - NEW 9:00 A.M. \*  
\* Primary County: CASS \*  
\* DBE Goal: None Design: ENGLISH \*  
\* Pre-Qual Group: ACC PAVEMENT/RESURFACING \*  
\*  
\* Contracting Authority: BOARD OF SUPERVISORS OF CASS COUNTY \*  
\* Proposal Guaranty: \$ 40,000.00 \*  
\* Optional Tied Proposal Allowed: NO \*  
\* Bidding Proposal Attachments: NON-FEDERAL AID FORM 650165 \*  
\*\*\*\*\*

This Proposal Includes The Following Project(s):

-----  
Project: FM-15(18)--55-15 County: CASS  
Work Type: ACC PAVEMENT - NEW Plans: Yes  
Route: G35 Design: ENGLISH  
Location: FROM U.S. 71 EAST TO N28.  
Road System: FARM TO MARKET ROAD  
Length: 5.81 Miles  
Non-Federal Aid - Predetermined Wages Are Not In Effect  
-----

PROPOSAL SCHEDULE OF PRICES

\*\*\*\*\*

Vendor No.: | | | | |  
 Proposal ID No.: 15-0015-018  
 Primary Work Type: ACC PAVEMENT - NEW  
 Primary County: CASS

Bid Order No.: 154  
 Letting Date: April 30, 1996  
 9:00 A.M.

UNIT BIDS MUST BE TYPED OR SHOWN IN INK OR THE BID WILL BE REJECTED.

Line No	Item Number Item Description	Item Quantity and Unit	Unit Price		Bid Amount	
			Dollars	Cts	Dollars	Cts
Section 0001 ROADWAY ITEMS						
0010	2102-2710070 EXCAVATION, CLASS 10, ROADWAY AND BORROW	620.000 CY	.	.	.	.
0020	2121-7425020 GRANULAR SHOULDERS, TYPE B	15,000.000 TON	.	.	.	.
0030	2210-0475115 GRADED STONE BASE	40,000.000 TON	.	.	.	.
0040	2214-5145150 PAVEMENT SCARIFICATION	142.000 SY	.	.	.	.
0050	2303-0375010 ASPHALT CEMENT	727.000 TON	.	.	.	.
0060	2303-0400650 ASPHALT CEMENT CONCRETE, TYPE B BINDER COURSE, 1/2 IN. MIX	6,156.000 TON	.	.	.	.
0070	2303-0400675 ASPHALT CEMENT CONCRETE, TYPE B BINDER COURSE, 3/4 IN. MIX	6,228.000 TON	.	.	.	.
0080	2303-6911222 ASPHALT CEMENT CONCRETE PAVEMENT SAMPLES	LUMP	LUMP	.	.	.
0090	2502-8212034 SUBDRAIN, LONGITUDINAL, (SHOULDER) 4 IN. DIA.	38,619.000 LF	.	.	.	.
0100	2502-8220196 SUBDRAIN OUTLET, RF-19E	51.000 EACH	.	.	.	.

PROPOSAL SCHEDULE OF PRICES

\*\*\*\*\*

Vendor No.: |\_\_|\_\_|\_\_|\_\_|\_\_|  
 Proposal ID No.: 15-0015-018  
 Primary Work Type: ACC PAVEMENT - NEW  
 Primary County: CASS

Bid Order No.: 154  
 Letting Date: April 30, 1996  
 9:00 A.M.

UNIT BIDS MUST BE TYPED OR SHOWN IN INK OR THE BID WILL BE REJECTED.

Line No	Item Number Item Description	Item Quantity and Unit	Unit Price		Bid Amount	
			Dollars	Cts	Dollars	Cts
0220	2599-9999013 ('MILES' ITEM) NATURAL SUBGRADE FOR PAVEMENT	5.810 MILE	.		.	
0230	2601-2636041 SEEDING AND FERTILIZING	28.000 ACRE	.		.	
	SECTION 0001 TOTAL				.	
	TOTAL BID				.	

\*\*\*\*\*

Proposal ID No.: 15-0015-018  
Primary Work Type: ACC PAVEMENT - NEW  
Primary County: CASS

Bid Order No.: 154  
Letting Date: April 30, 1996  
9:00 A.M.

-----  
Note Description  
-----

SPECIFICATIONS, SPECIAL PROVISIONS, AND/OR PROPOSAL FORM) SHALL BE CHANGED TO THE 'STANDARD SPECIFICATIONS, SERIES OF 1992'.

090.00

\*\*\* DBE/TSB GOAL INFORMATION \*\*\*

THE DISADVANTAGED BUSINESS ENTERPRISE (DBE) OR TARGETED SMALL BUSINESS (TSB) GOAL ESTABLISHED FOR THIS CONTRACT (E.G., SUPPLIERS, AND SUBCONTRACTORS) IS SHOWN ON THE FRONT OF THIS PROPOSAL FORM.

THE CONTRACTOR IS ENCOURAGED TO SEEK PARTICIPATION OF DISADVANTAGED INDIVIDUALS IN BUSINESS ENTERPRISES. THESE BUSINESS ENTERPRISES MAY BE EITHER DBE CERTIFIED OR TSB CERTIFIED IN ACCORDANCE WITH THE CURRENT 'SUPPLEMENTAL SPECIFICATIONS FOR SPECIFIC AFFIRMATIVE ACTION RESPONSIBILITIES ON NON-FEDERAL AID PROJECTS (ASSIGNED DBE PARTICIPATION GOALS) '.

IF THE WINNING BIDDER ELECTS TO USE DBE OR TSB 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 OR TSB SUBCONTRACTORS AND/OR SUPPLIERS TO BE USED. THE CONTRACTOR SHALL ATTACH A COMPLETED FORM 102117 FOR EACH DBE OR TSB SUBCONTRACTOR AND/OR SUPPLIER LISTED ON THE CONTACTOR'S FORM 102115 THAT WAS SUBMITTED AT THE LETTING.

500.02

EXCEPT FOR THE EROSION CONTROL WORK REQUIRED FOR THIS PROJECT, THE FREE TIME ALLOWED BETWEEN NOVEMBER 15 AND APRIL 1 WILL NOT BE PERMITTED. THE CONTRACTOR SHALL WORK DURING THE WINTER ON ALL WORKING DAYS AS DEFINED IN 1101.03 'WORKING DAY'.

700.00

ALL SECTIONS ON THIS PROPOSAL FORM ARE TIED, AND ALL ITEMS MUST BE BID (WITH THE EXCEPTION OF ALTERNATE ITEMS OR ALTERNATE SETS OF ITEMS). NO OTHER TIES BETWEEN PROPOSALS WILL BE ALLOWED.

**Appendix B**  
**Lab Testing of Mix and Mix Design**





AAR6-0269  
A

ASSURANCE

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

LAB NO.....:AAR6-0269

MATERIAL.....:+4 TYPE B GRAN SHLDRS  
INTENDED USE.....:SHOULDERS  
PRODUCER.....:CONSUMER LS PROD CO  
PROJECT NO.....:FM-15(18)--55-15  
COUNTY.....:CASS  
SPEC NO.....:4120.00  
SOURCE.....:STENNETT NE-27-073N-38W, MONTGOMERY  
UNIT OF MATERIAL:1 BAG TAKEN FROM S/P AT QRY  
SAMPLED BY.....:TUPPER  
DATE SAMPLED: 06/27/96

QUARRY NO.:A69002  
CONTRACTOR:HENNINGSSEN

SENDER NO.:SWHT6047

DATE RECEIVED: 07/05/96

DATE REPORTED: 07/16/96

LAB NUMBER	AAR6-0269
TYPE OF AGGREGATE	STONE
AFTER 16 CYCLES, F&T METHOD A % LOSS	37
AFTER 25 CYCLES, F&T METHOD C % LOSS	14
LA ABRASION % LOSS, GRADING B	39

COPIES TO:  
CENTRAL LAB  
DIST. 4

GEOLOGY

CASS

CO.

DISPOSITION: COMPLIES WITH CURRENT SPECS

SIGNED: ORRIS J. LANE, JR.  
TESTING ENGINEER

AAT6-0240  
A

ASSURANCE

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

LAB NO....:AAT6-0240

MATERIAL.....:+4 STONE  
INTENDED USE....:BINDER  
PRODUCER.....:SCHILDBERG CONST CO INC  
PROJECT NO.....:FM-15(18)--55-15  
                  FM-78(86)--15-78  
SPEC NO.....:4126.09

QUARRY NO.:A15002  
CONTRACTOR:HENNINGSSEN

SOURCE.....:ATLANTIC NE-06-076N-36W, CASS  
UNIT OF MATERIAL:1 BAG TAKEN FROM S/P AT AC PLANT  
SAMPLED BY.....:TUPPER  
DATE SAMPLED: 07/01/96      DATE RECEIVED: 07/05/96      DATE REPORTED: 07/16/96  
COUNTY: CASS, POTTAWATTAMIE

LAB NUMBER	AAT6-0240
TYPE OF AGGREGATE	STONE
AFTER 16 CYCLES, F&T METHOD A % LOSS	12
AFTER 25 CYCLES, F&T METHOD C % LOSS	2
LA ABRASION % LOSS, GRADING B	28

COPIES TO:  
CENTRAL LAB                      GEOLOGY                      CASS                      CO.  
POTTAWATTAMIE CO.              DIST. 4

DISPOSITION: COMPLIES WITH CURRENT SPECS

SIGNED: ORRIS J. LANE, JR.  
TESTING ENGINEER

AAT6-0241  
A

ASSURANCE

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

LAB NO.....:AAT6-0241

MATERIAL.....:+4 STONE  
INTENDED USE.....:SURFACE  
PRODUCER.....:SCHILDBERG CONST CO INC  
PROJECT NO.....:FM-15(18)--55-15  
COUNTY.....:CASS  
SPEC NO.....:4126.09  
SOURCE.....:ATLANTIC NE-06-076N-36W, CASS  
UNIT OF MATERIAL:I BAG TAKEN FROM S/P @ AC PLANT  
SAMPLED BY.....:TUPPER  
DATE SAMPLED: 07/02/96  
QUARRY NO.:A15002  
CONTRACTOR:HENNINGSSEN  
SENDER NO.:SWHT6055  
DATE RECEIVED: 07/05/96  
DATE REPORTED: 07/16/96

LAB NUMBER	AAT6-0241
TYPE OF AGGREGATE	STONE
AFTER 16 CYCLES, F&T METHOD A % LOSS	10
AFTER 25 CYCLES, F&T METHOD C % LOSS	3
LA ABRASION % LOSS, GRADING B	26

COPIES TO:  
CENTRAL LAB                      GEOLOGY                      CASS                      CO.  
DIST. 4

DISPOSITION: COMPLIES WITH CURRENT SPECS.

SIGNED: ORRIS J. LANE, JR.  
TESTING ENGINEER



ABC6-0121  
BC

ASSURANCE

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

LAB NO.....:ABC6-0121

MATERIAL.....:UNCOMPACTED MIX  
INTENDED USE.....:1/2 TYPE B SURFACE  
PROJECT NO.....:EM-15(18)--55-15  
COUNTY.....:CASS  
SOURCE.....:ATLANTIC  
UNIT OF MATERIAL:I BOX TAKEN FROM ROAD  
SAMPLED BY.....:H. TUPPER  
DATE SAMPLED: 07/02/96

CONTRACTOR:HENNINGSSEN

SENDER NO.:SWHT6-56

DATE RECEIVED: 07/11/96 DATE REPORTED: 08/18/96

MARSHALL DENSITY SWITC 2.343  
RICE - SP. GR. SWITCH 2.411  
VOIDS SWITCH 2.8  
VOIDS AMES LAB 3.1

SIEVE	SIEVE ANALYSIS		PERCENT PASSING		COLD-FEED TARGET GRADATION	SPEC LOW LIMIT	SPEC HIGH LIMIT
	GRAM RETAINED	PERCENT RETAINED	PERCENT PASSING	PERCENT PASSING			
3/4			100.00	100.00			
1/2			96.00	96.00			
3/8			87.00	86.00			
4			71.00	70.00			
8			54.00	54.00			
16			42.00	43.00			
30			30.00	31.00			
50			14.00	14.00			
100			6.10	6.00			
200			5.30	5.30			

ASPHALT CONCRETE RESULTS  
% AC INTENDED 6.200  
% AGGREGATE BY EXTRACTION 94.020  
% BITUMEN BY EXTRACTION 5.980  
SPECIFIC GRAVITY 2.338  
MARSHALL STABILITY/LBS 1982  
MARSHALL FLOW 0.01 IN. 8  
SPECIFIC GRAVITY RICE METHOD 2.412

COPIES TO:  
CENTRAL LAB CASS CO. DIST. 4

DISPOSITION:

SIGNED: ORRIS J. LANE, JR.  
TESTING ENGINEER

AB 6-0113  
B

ASSURANCE

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

LAB NO....:AB 6-0113

MATERIAL.....:AC-10  
INTENDED USE.....:3/4 TYPE B BINDER  
PROJECT NO.....:FM-15(18)--55-15 *Cass*  
                  FM-78(86)--55-78

CONTRACTOR:HENNINGSEN

SOURCE.....:OMAHA

UNIT OF MATERIAL:1 QT TAKEN FROM AC TANK AT AC PLANT

SAMPLED BY.....:TUPPER

SENDER NO.:5WHT6-49

DATE SAMPLED: 07/01/96

DATE RECEIVED: 07/03/96

DATE REPORTED: 07/09/96

LAB NUMBER	AB 6-0113	
PENETRATION @ 77 F. 100 GMS. 5 SEC		100
ABS. VIS. OF ORIGINAL ASPH. @ 140 DEGREE F. & 300 MM HG		1086
THIN FILM LOSS ON HEATING 5 HRS. @325 DEGREES C.		0.15
% ORIGINAL PENETRATION (THIN FILM RES.)		62
PENETRATION OF RES. 77 DEGREE F. 100 GMS. 5 SEC.		62
DUCTILITY @ 77 DEGREE F. (THIN FILM RES.)		75
ABS. VIS. OF THIN FILM RESIDUE @ 140 DEGREE F. & 300 MM HG		2419

TESTED IN ACCORDANCE WITH AASHTO M-226

COPIES TO:  
CENTRAL LAB                   CASS                   CO.                   POTTAWATTAMIE CO.  
DIST. 4

DISPOSITION: RESULTS COMPLY WITH AASHTO M226 TABLE 2

SIGNED: ORRIS J. LANE, JR.  
TESTING ENGINEER

AB 6-0112  
B

ASSURANCE

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

LAB NO.....:AB 6-0112

MATERIAL.....:AC10  
INTENDED USE.....:1/2 TYPE B SURFACE  
PROJECT NO.....:FM-15(18)--55-15  
COUNTY.....:CASS  
UNIT OF MATERIAL:1 QT TAKEN FROM TANK @ AC PLANT  
SAMPLED BY.....:TUPPER  
DATE SAMPLED: 07/02/96  
SUPPLIER: KOCH

CONTRACTOR:HENNINGSEN  
SENDER NO.:SWHT6-54  
DATE RECEIVED: 07/03/96  
DATE REPORTED: 07/09/96

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LAB NUMBER	AB 6-0112	
PENETRATION @ 77 F. 100 GMS. 5 SEC		98
ABS. VIS. OF ORIGINAL ASPH. @ 140 DEGREE F. & 300 MM HG		1103
THIN FILM LOSS ON HEATING 5 HRS. @325 DEGREES C.		0.16
% ORIGINAL PENETRATION (THIN FILM RES.)		62
PENETRATION OF RES. 77 DEGREE F. 100 GMS. 5 SEC.		61
DUCTILITY @ 77 DEGREE F. (THIN FILM RES.)		75
ABS. VIS. OF THIN FILM RESIDUE @ 140 DEGREE F. & 300 MM HG		2415

TESTED IN ACCORDANCE WITH AASHTO M-226

COPIES TO:  
CENTRAL LAB                      CASS                      CO.                      DIST. 4

DISPOSITION: RESULTS COMPLY WITH AASHTO M226 TABLE 2

SIGNED: ORRIS J. LANE, JR.  
TESTING ENGINEER