Thin Asphalt Concrete Pavement On Crushed Rock Base

Final Report
For
HR-2075

December 2001

Highway Division

Iowa Department Of Transportation

Final 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

By
Mohammad Mujeeb
Materials Research
515-239-1086
FAX: 515-239-1092
Materials Department
Highway Division
Iowa Department of Transportation
Ames, Iowa 50010

and

Elijah Gansen
Materials Research
515-239-1094
FAX: 515-239-1092
Materials Department
Highway Division
Iowa Department of Transportation
Ames, Iowa 50010

December 2001

TECHNICAL REPORT TITLE PAGE

1. REPORT NO.	2. REPORT DATE
HR-2075	December 2001

3. TITLE AND SUBTITLE	4. TYPE OF REPORT & PERIOD COVERED
Thin Asphalt Concrete Pavement on Crushed Rock Base - Cass County	Final Report 4-96 to 12-2001

5. AUTHOR(S)	6. PERFORMING ORGANIZATION ADDRESS
Mohammad Mujeeb Materials Research	Iowa Department of Transportation Materials Department 800 Lincoln Way Ames, Iowa 50010
Elijah Gansen Materials Research	

7. ACKNOWLEDGEMENT OF COOPERATING ORGANIZATIONS

8. ABSTRACT

The road paving cost continues to increase and the backlog of projects waiting for 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 G35 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 historic Portland cement concrete (PCC) problems in Cass County. The new pavement gives quicker access time to farms and residences.

9. KEY WORDS	10. NO. OF PAGES
Asphalt concrete pavement Low volume road Pavement structure	24

TABLE OF CONTENTS

INTRODUCTION

The cost of paving roads continues to increase and the backlog of projects waiting for funding is growing. Finding a more cost-effective way to use available money to pave these roads will result in more miles of road being paved with the same amount of money. This project is located in Cass County on G35 and was constructed in 1996. It consists of a thin layer of asphalt over a base designed to achieve stability while having some permeability.

Asphalt cement concrete (ACC) pavement was chosen for the project based on cost, convenience, and historic Portland concrete cement (PCC) problems in Cass county. The new pavement also gives quicker access time to farms and residences in the area.

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.

PROJECT LOCATION AND DESCRIPTION

The project is located approximately five miles southeast of Atlantic on Cass County road G35 from US 71 to county road N28 (See 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.

The original gravel surfaced road was built with a subgrade crown slope of 6 to 8 percent. The gravel surface had an approximate depth of 4 to 6 inches as determined using a Falling Weight Deflectometer (FWD). The road was also rocked and graded in 1993 and 1994. Terracon Consultant Inc. performed the road surface evaluation and completed the plans that were later modified by the county engineer.

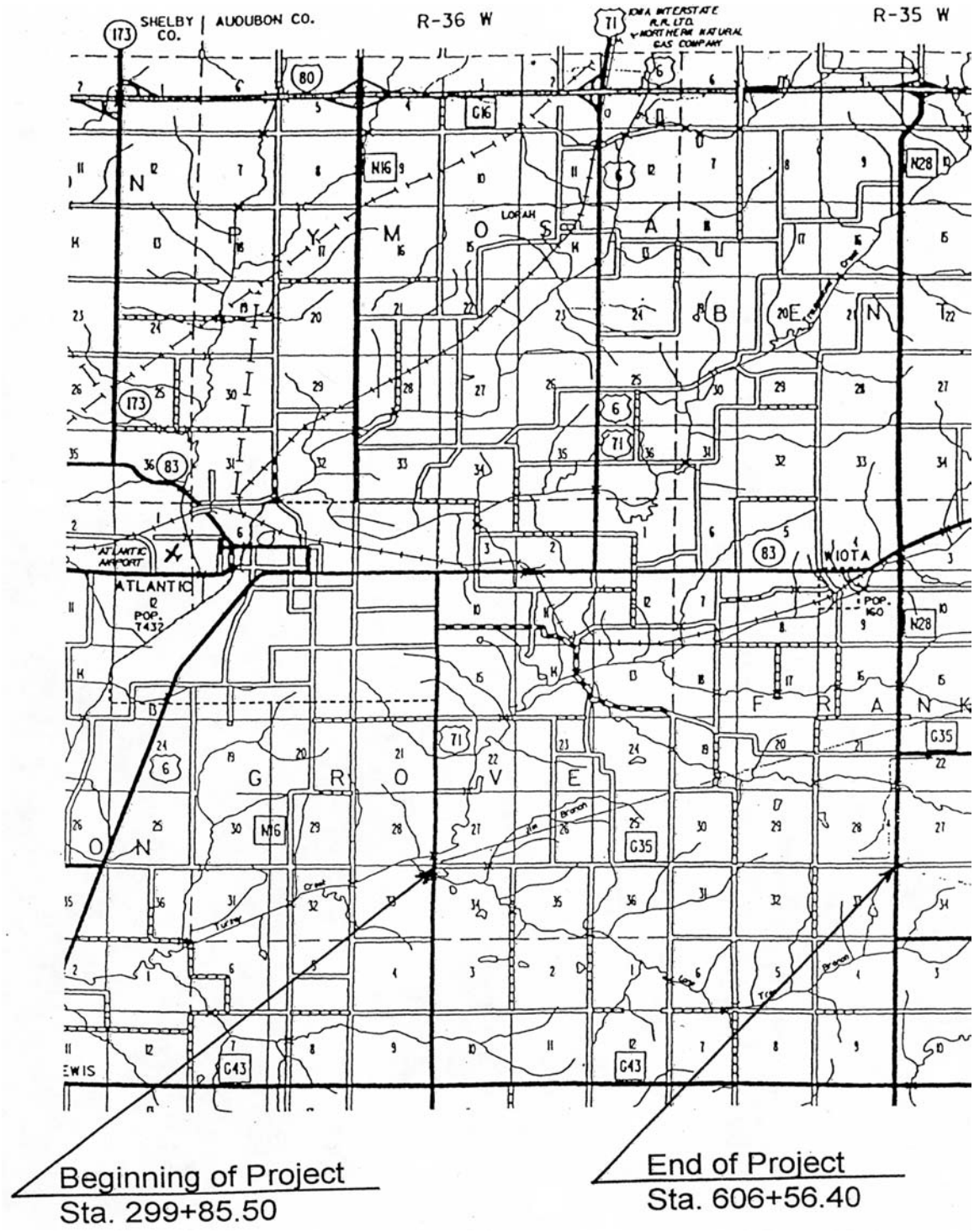

Figure 1: Map of project location.

CONSTRUCTION

Work began on May 15, 1996 with the installation of the longitudinal subdrain. It was installed 12 feet from the centerline at a depth of 33 inches. Subdrain work was completed on May 21, 1996.

After the completion of the subdrains the crushed stone base was placed. It was determined that the base material should meet the requirement of Iowa DOT's Special Provisions SP-1277 (See Appendix B). The only grading necessary was 1½ miles at the west end of the project, and also at the junction with N28. The base material was then placed with an asphalt paving machine and compacted to a minimum thickness of 6 inches, and a width of 22 feet. Compaction was done with a vibratory roller. Compaction on the first day was done with the roller in vibratory mode for all four passes. On the second day the method was changed to three passes in static mode and the final pass in vibratory mode.

It was discovered that in some places the subbase was wet. The road was stabilized in those areas by placing Tensar fabric under the rock in the following locations:

Tensar fabric with 2 inches of rock

Sta. 574+00 to Sta. 581+50

Sta. 365+50 to Sta. 366+50

Sta. 537+00 to Sta. 542+00

Sta. 549+00 to Sta. 554+00

On June 28, 1996 paving started at the west end of the project. The western 1½ miles were paved 4 inches thick (2 inches binder and 2 inches surface) because of the regrading, and the remainder of the project was paved 3 inches thick (1 ½ inches binder and 1 ½ inches surface). Upon inspection it was discovered in several places that the binder was ½ inch thin at the edges. The thinner binder was compensated for by increasing the thickness of the surface lift of asphalt in the following areas:

Areas with extra ½ inch of surface

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

There was also a possible soft spot that was strengthened with an additional $^{3}/_{4}$ inch of asphalt from Sta. 551+00 to Sta. 554+00. On July 3, 1996 it was discovered that trucks had damaged the surface next to the edge of the slab in two locations. The contractor repaired the damage by removing all of the surface, 1 inch of the binder, and replacing it with asphalt. Paving was completed on July 5, 1996. During the paving operation the contractor used side roads as much as possible to minimize the chance of damage to the base material. Once on site the trucks were also kept towards the center of the road to help prevent damage to the edge of the slab.

TESTING

This project was evaluated from completion in July of 1996 to 2001. Rut Depth, Crack Survey, and Road Rater analyses were performed on this project each year to determine the performance of the thin asphalt on a crushed rock base. The results of each year's tests are shown in Table 1.

Year	Average Rut Depth	Average Cracks per 100 ft.	Road Rater
1996	0	0	2.73
1997	0.02	0	2.03
1998	0.02	0	2.11
1999	0.06	0	2.08
2000	0.08	0.03	2.13
2001	0.05	0.04	2.01

Table 1:Results of rut depth, crack survey, and road rater tests.

DISCUSSION

The objective of this research was to determine the feasibility, economics, and performance of a thin asphalt concrete roadway on an open graded stone base.

Feasibility

In terms of feasibility this project turned out very well. The construction of this road was not all that different from normal construction except that the asphalt surface is thinner. The only difficulties during the construction of this project were disturbing the subgrade as the base was placed, and the other soft spots that were encountered in the subgrade.

Economics

The economics of this project was one of the main concerns. Traditional 7 inch thick PCC pavement for this section of road would have cost $1,501,000. To pave this road using traditional ACC paving would have cost $1,684,000. By using this technique for paving on a crushed rock base the county was able to save about $225,000 over traditional ACC and about $400,000 over traditional PCC.

Performance

This project performed quite well. The patches that were installed due to damage by trucks are holding up well and show little sign of deterioration after 5 years of service. There are 3 more patches along the edge of the slab that were installed after completion of the project probably due to damage by heavy loads.

The data for the average rut depth is shown graphically in Appendix A, Chart 1. The graph shows that the average rut depth started to increase as time progressed until 2001 when it decreased. This decrease in rut depth was not expected and can be attributed to the positioning of the rut depth gauge on the pavement during testing or mud that had been tracked onto the pavement from the adjacent fields altering the readings. The gauge was checked for accuracy before and after completion of the rut depth testing so that can ruled out as a possible cause for the decrease.

The data from the crack survey does behave as expected (See Appendix A, Chart 2). There were no cracks reported for the first 3 years of service for this pavement. Then as time progressed more cracks developed. The majority of these cracks are located at the aforementioned patches.

This section of road was also tested yearly using the Road Rater. This machine was used to test the structural rating of the pavement. The results show a decrease in the rating as time progresses, a period of leveling off, and then a decrease to its present state in 2001 (See Appendix A, Chart 3).

CONCLUSION

The results of this project were pleasing, and the pavement is performing quite well. This system of paving had several advantages. It cost less than traditional ACC and PCC paving. It requires less construction time, and causes minimal disturbance to residents and farmers that live along the right of way. This method of paving also has some disadvantages. The design life of the thin asphalt pavement is less than traditional methods. It will require an overlay in 15 to 20 years. There is also the problem of the weaker edges of the pavement. Even though the patches that are in place are performing well it is still a maintenance problem.

ACKNOWLEDGEMENT

The authors wish to thank Henningsen Construction of Atlantic for their help in providing the information.

REFERENCES

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

APPENDIX A
Rut Depth Testing, Crack Survey, and Road Rater Analysis

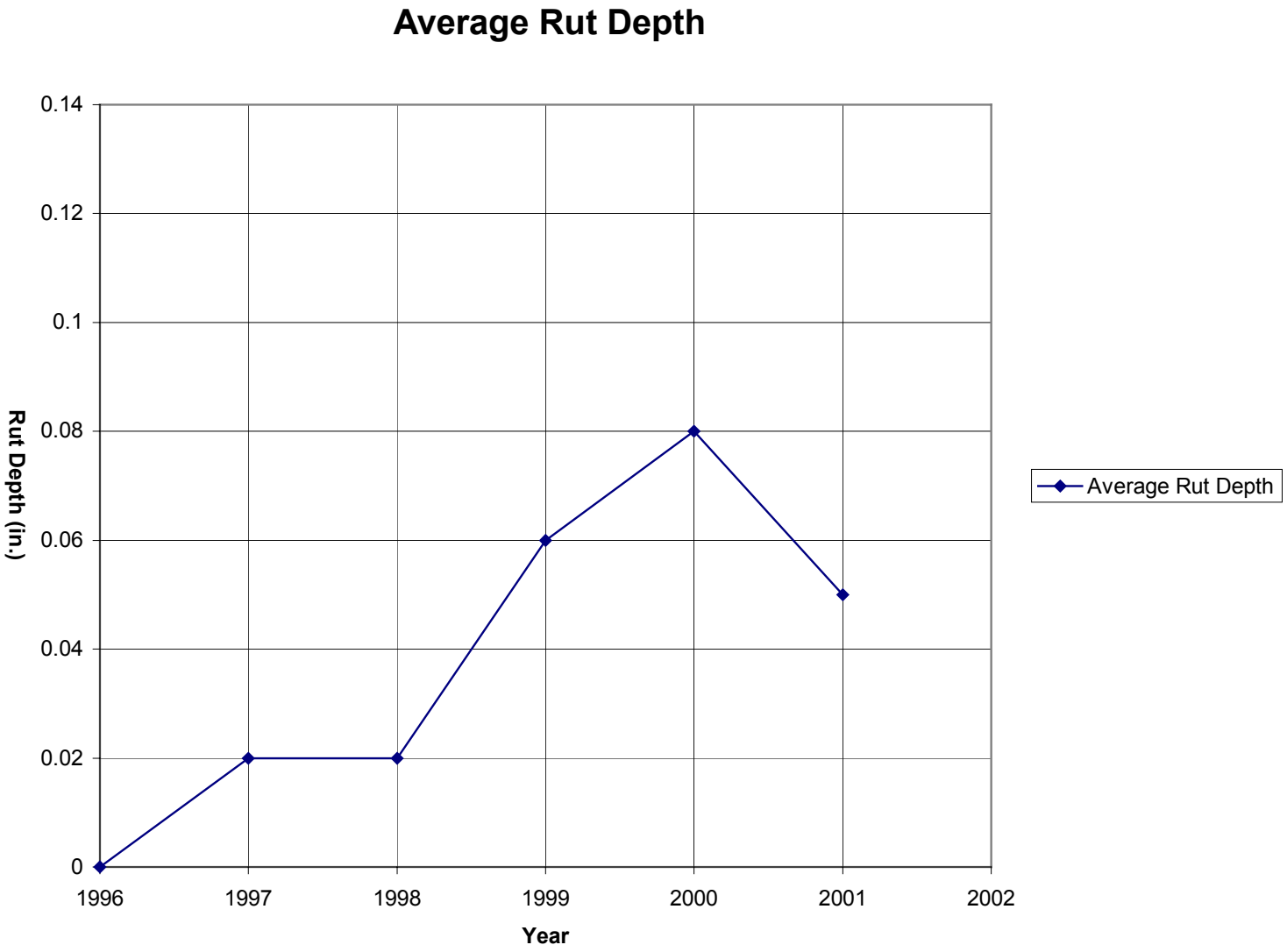

Chart 1: Average Rut Depth.

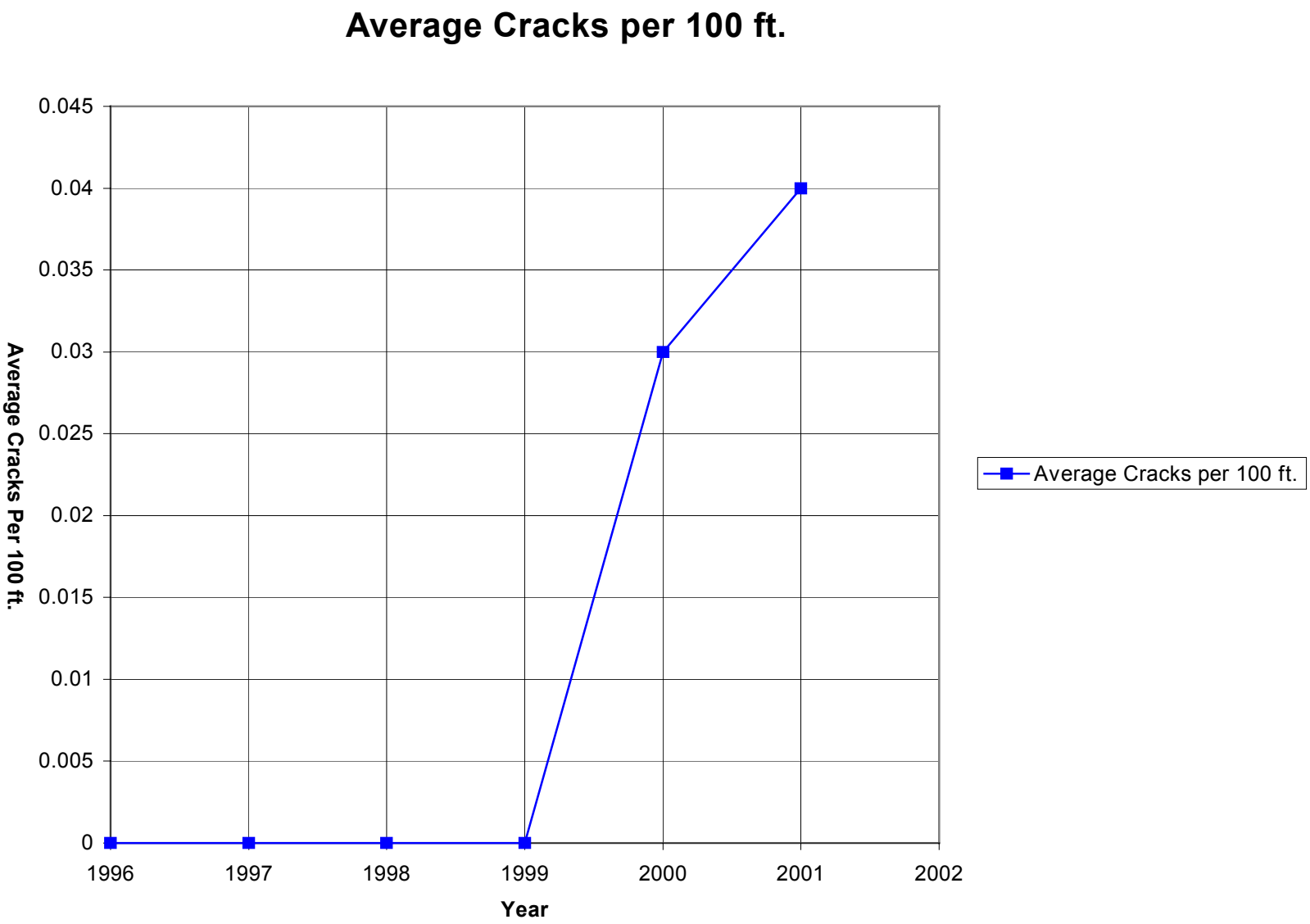

Chart 2: Cracks per 100 ft.

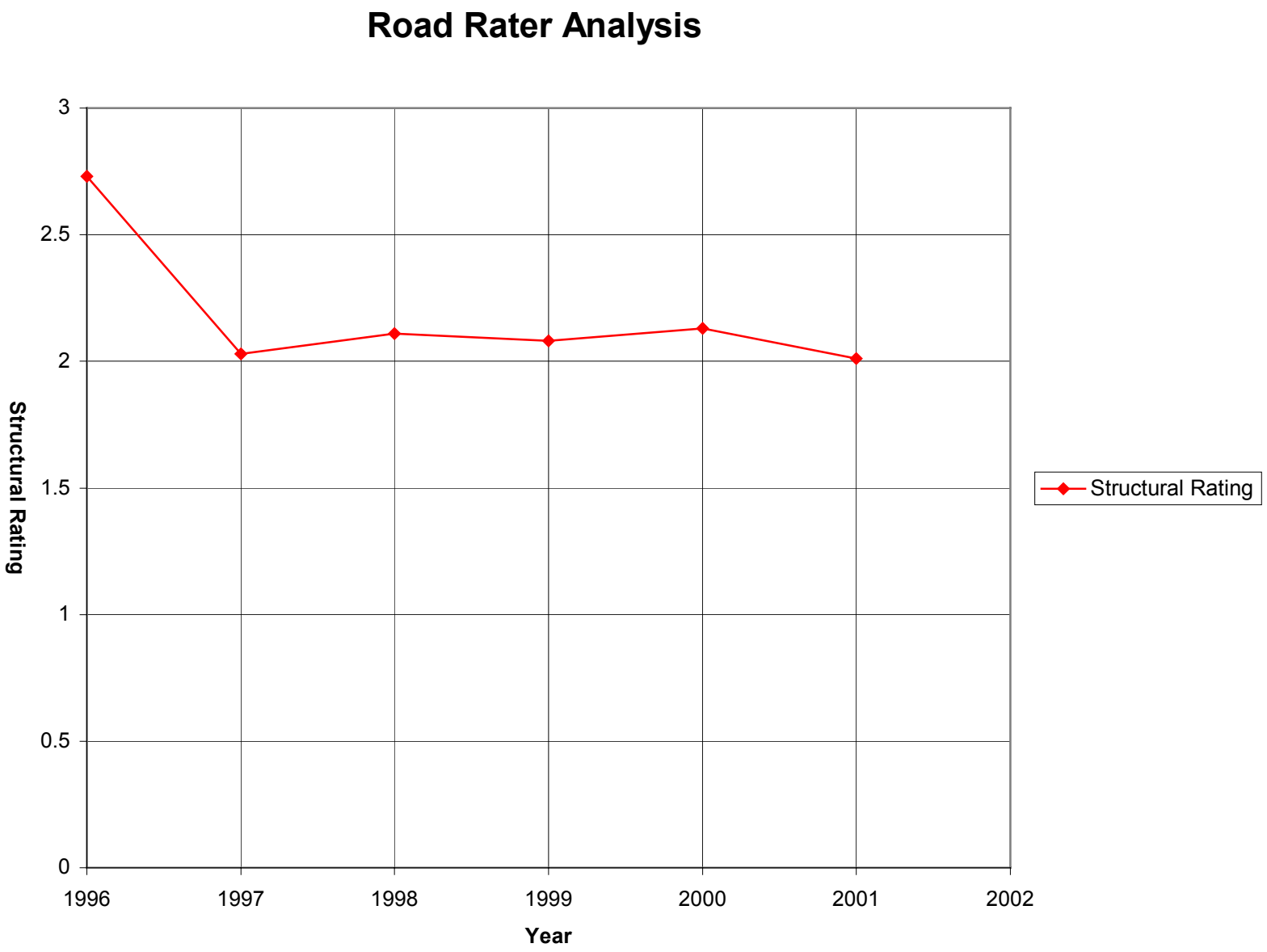

Chart 3: Road Rater Analysis Structural Rating.

APPENDIX B
Special Provisions

SP-1277
(New)

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:

A. The natural subgrade for pavement shall be constructed in accordance with Article 2109.03 and meeting the following requirements:

1. Loose granular material present on the roadbed shall be bladed into a windrow and stored on the shoulder area.

2. Where center of roadbed is removed to achieve the proper elevation and cross section, the windrowed material shall be mixed and recompacted in the center of the roadbed to a uniform composition.

3. Depressions that develop during rolling shall be filled with windrowed material.

4. The subgrade shall be so maintained until the base is placed.

5. Subgrade core outs at intersections with paved roads shall be compacted to at least 100% of AASHTO T 99 maximum dry density.

B. The crushed stone base shall be brought to the job at the specified gradation and optimum moisture content. The determination of the optimum moisture content is incidental to the cost of the base.

The use of the project for a haul road is restricted. Hauling vehicles will not be allowed to use the landfill road from the junction of US 71 to the NE corner of Section 24-76-36 except when empty.

The base may be placed in one or two layers at a uniform loose depth no greater than 8 to 10 inches, and compacted to the target density using a minimum of blading to avoid segregation.

Mechanical spreaders, such as Jersey spreaders, are required. Tailgating or dumping in piles will not be permitted for base construction. Where it is not practical to employ mechanical spreaders, the aggregate may be end dumped on the subgrade at carefully spaced and planned intervals to minimize the distance material must be moved. End dumping must be approved by the Engineer.

C. The base will be compacted immediately after placing with a self propelled vibratory roller. The first several passes shall be in the static mode. The final passes shall be made in the vibratory mode with the vibration impacts being in the range of 7 to 16 impacts per foot of travel.

The contractor shall use the field control strip method for determining target density. The control strip is constructed at the beginning of work using equipment and methods known to be effective, until no appreciable increase in density is attained through repeated coverage by the compactor. The construction process shall be capable of producing an average target density at 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 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.

APPENDIX C

Lab Testing of Materials and Mix Design

AAR6-0230
A

PROJECT INFO

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

LAB NO....:AAR6-0230

MATERIAL.....:3/4 CLASS A +4
INTENDED USE....:SHOULDERS
PRODUCER.....:SCHILDBERG CONST CO INC
PROJECT NO.....:STP-83-1(11)--2C-15
FM-15(18)--55-15
FM-78(86)--55-78
COUNTY.....:CASS QUARRY NO.:A15002
SPEC NO.....:4120.00 CONTRACTOR:HENNINGSEN'S
QUANTITY.....:18,000 T.
SOURCE.....:ATLANTIC NE-06-076N-36W, CASS
UNIT OF MATERIAL:BELT
SAMPLED BY.....:GREG NEWBURY SENDER NO.:4LAB6-18
DATE SAMPLED: 06/14/96 DATE RECEIVED: 06/20/96 DATE REPORTED: 06/26/96

LAB NUMBER	AAR6-0230
TYPE OF AGGREGATE	STONE
COARSE AGGREGATE SIZE	3/4
AFTER 16 CYCLES, F&T METHOD A % LOSS	11
AFTER 25 CYCLES, F&T METHOD C % LOSS	4
LA ABRASION % LOSS, GRADING B	26
SPECIFIC GRAVITY	2.612
ABSORPTION	2.35

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

DISPOSITION: COMPLIES WITH CURRENT SPECS.

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

AAR6-0269 ASSURANCE
A

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 QUARRY NO.:A69002
SPEC NO.....:4120.00 CONTRACTOR:HENNINGSEN
SOURCE.....:STENNETT NE-27-073N-38W, MONTGOMERY
UNIT OF MATERIAL:1 BAG TAKEN FROM S/P AT QRY
SAMPLED BY.....:TUPPER SENDER NO.:SWHT6047
DATE SAMPLED: 06/27/96 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 GEOLOGY CASS CO.
DIST. 4

DISPOSITION: COMPLIES WITH CURRENT SPECS

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

AAT6-0240 ASSURANCE
A

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:HENNINGSEN
SOURCE.....:ATLANTIC NE-06-076N-36W, CASS
UNIT OF MATERIAL:1 BAG TAKEN FROM S/P AT AC PLANT
SAMPLED BY.....:TUPPER SENDER NO.:SWHT6050
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.
POTTAWATATMIE CO. DIST. 4

DISPOSITION: COMPLIES WITH CURRENT SPECS

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

AAT6-0241 ASSURANCE
A

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 QUARRY NO.:A15002
SPEC NO.........:4126.09 CONTRACTOR:HENNINGSEN
SOURCE..........:ATLANTIC NE-06-076N-36W, CASS
UNIT OF MATERIAL:1 BAG TAKEN FROM S/P @ AC PLANT
SAMPLED BY......:TUPPER SENDER NO.:SWHT6055
DATE SAMPLED: 07/02/96 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

ABC6-0120 ASSURANCE
BC

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

LAB NO....:ABC6-0120

MATERIAL........:UNCOMPACTED MIX
INTENDED USE....:3/4 TYPE B BINDER
PROJECT NO......:FM-15(18)--55-15
COUNTY..........:CASS/POTTAW CONTRACTOR:HENNINGSEN
SOURCE..........:ATLANTIC
UNIT OF MATERIAL:1 BOX TAKEN FROM ROAD
SAMPLED BY......:H. TUPPER SENDER NO.:SWHT6-51
DATE SAMPLED: 07/01/96 DATE RECEIVED: 07/11/96 DATE REPORTED: 07/15/96

RICE SP. GR. SWITC	2.404
MARSHALL DENSITY SWITCH	2.336
VOIDS SWITC	2.9
VOIDS AMES LAB	4.1

SIEVE ANALYSIS PERCENT PASSING

SIEVE	GRAM RETAINED	PERCENT RETAINED	PERCENT PASSING	COLD-FEED GRADATION	TARGET GRADATION	SPEC LOW LIMIT	SPEC HIGH LIMIT
3/4			100.00	100.00			
1/2			92.00	96.00			
3/8			83.00	90.00			
4			67.00	72.00			
8			52.00	56.00			
16			41.00	45.00			
30			29.00	31.00			
50			11.30	12.00			
100			5.20	5.10			
200			4.60	4.50			

ASPHALT CONCRETE RESULTS

% AC INTENDED	6.200
% AGGREGATE BY EXTRACTION	94.100
% BITUMEN BY EXTRACTION	5.900
SPECIFIC GRAVITY	2.312
MARSHALL STABILITY/LBS	1687
MARSHALL FLOW 0.01 IN.	6
SPECIFIC GRAVITY RICE METHOD	2.411

OPIES TO:
CENTRAL LAB CASS CO. POTTAWATAMIE CO.
DIST. 4

ISPOSITION:

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

ABC6-0121 ASSURANCE
BC

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.....:FM-15(18)--55-15
COUNTY.....:CASS CONTRACTOR:HENNINGSEN
SOURCE.....:ATLANTIC
UNIT OF MATERIAL:1 BOX TAKEN FROM ROAD
SAMPLED BY.....:H. TUPPER SENDER NO.:SWHT6-56
DATE SAMPLED: 07/02/96 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 ANALYSIS PERCENT PASSING

SIEVE	GRAM RETAINED	PERCENT RETAINED	PERCENT PASSING	COLD-FEED TARGET GRADATION	SPEC LOW GRADATION LIMIT	SPEC HIGH LIMIT
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 ASSURANCE
3

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

LAB NO....:AB 6-0113

ATERIAL.....:AC-10
NTENDED USE....:3/4 TYPE B BINDER
ROJECT NO.....:FM-15(18)--55-15 Cass
FM-78(86)--55-78
CONTRACTOR:HENNINGSEN
OURCE.....:OMAHA
NIT OF MATERIAL:1 QT TAKEN FROM AC TANK AT AC PLANT
AMPLED BY.....:TUPPER SENDER NO.:5WHT6-49
ATE 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

ESTED IN ACCORDANCE WITH AASHTO M-226

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

ISPOSITION: RESULTS COMPLY WITH AASHTO M226 TABLE 2

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

AB 6-0112 ASSURANCE
B

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 CONTRACTOR:HENNINGSEN
UNIT OF MATERIAL:1 QT TAKEN FROM TANK @ AC PLANT
SAMPLED BY......:TUPPER SENDER NO.:SWHT6-54
DATE SAMPLED: 07/02/96 DATE RECEIVED: 07/03/96 DATE REPORTED: 07/09/96
SUPPLIER: KOCH

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

ESTED IN ACCORDANCE WITH AASHTO M-226

OPIES TO:
CENTRAL LAB CASS CO. DIST. 4

ISPOSITION: RESULTS COMPLY WITH AASHTO M226 TABLE 2

SIGNED: ORRIS J. LANE, JR.
TESTING ENGINEER

~~~~
~~~~