# Glasgrid Fabric
# To
# Control Reflective Cracking

## Final Report for
## Iowa DOT Project HR-535

## Federal Highway Administration
## Project IA-86-10

November 1990

Highway Division
Iowa Department of Transportation

Final Report
for
Iowa DOT Project HR-535
Included in
Iowa DOT Construction Project Polk IR-35-2(191)67--12-77
Federal Highway Administration
Experimental Project IA 86-10

# GLASGRID FABRIC TO CONTROL REFLECTIVE CRACKING

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Office of Materials
Ames, Iowa 50010

November 1990

## TABLE OF CONTENTS


| | Page |
|---|---|
| Abstract | 1 |
| Introduction | 2 |
| Project Location | 2 |
| Objective | 3 |
| Materials | 3 |
| Construction | 3 |
| Description of Test Sections | 4 |
| Performance Evaluation | 6 |
| Conclusions | 8 |
| Appendices | |
| Appendix A - Mix Designs for Asphalt Cement Concrete | 9 |
| Appendix B - Joint and Crack Locations of Test Sections | 14 |


## 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 a standard, specification or regulation.

ABSTRACT

The major problem with durability of asphalt cement concrete (ACC) overlays to rehabilitate jointed portland cement concrete (PCC) pavement comes from reflective cracking. The objective of this research was to evaluate the effectiveness of Glasgrid in regard to preventing reflection cracking. Glasgrid is a glass fiber mesh with 1/2 inch by 1 inch openings (Figure 1). Each strand is composed of many small glass fibers. After the grid is formed, it is coated with a polymer modified asphalt cement.

In 1986, four experimental Glasgrid test sections were incorporated into Polk County project IR-35-2(191)67--12-77 on Interstate 35 from IA 5 to the west I-80 interchange on the west edge of Des Moines. Single and double layers of Glasgrid were placed over transverse cracks and joints of the existing PCC pavement. The Glasgrid was placed on the PCC pavement for one section and between lifts of the ACC resurfacing on the other three sections.

The four Glasgrid sections were compared to two sections without Glasgrid for four years. The sections were reviewed annually to determine how many cracks or joints had reflected through the resurfacing. Glasgrid placed on the PCC pavement was more effective at preventing reflection cracking than Glasgrid between lifts of AC resurfacing. In general, Glasgrid yielded a small reduction or retardation in the amount of reflection cracking, but not sufficient to justify additional expense for the use of Glasgrid.

## INTRODUCTION

An ACC overlay is most often the rehabilitative effort used to maintain the serviceability of either an ACC roadway or a PCC roadway. The major problem in durability of this ACC overlay comes from reflective cracking. These cracks usually open allowing water to enter the unsealed crack and strip the ACC in the overlay allowing accelerated deterioration at the crack. The ACC overlay between the cracks remains durable, but the life of the overlay is governed by the weakest link.

There have been many efforts to control reflective cracking through ACC overlays. Stress relieving layers have been used with moderate success. A wide variety of engineering fabrics to prevent reflective cracking have been used. These have exhibited varying degrees of success. The Glasgrid material is a glass fiber mesh designed to reinforce the ACC in the pavement construction.

## PROJECT LOCATION

The evaluation of the Glasgrid was incorporated into construction of Polk County project IR-35-2(191)67--12-77. This was an ACC resurfacing project on I-35 beginning at the interchange of IA 5 and extending northerly to just south of the west I-80 interchange, a total of 4.015 miles. The successful bidder on this project let June 24, 1986, was Manatt's, Inc.

## OBJECTIVE

The objective of the research was to evaluate the effectiveness of Glasgrid in regard to preventing reflection cracking.

## MATERIALS

The mix designs for both the Type A, 3/4" binder course and the 1/2", Type A surface course are included in Appendix A. The crushed limestones for these mixes were obtained from the Martin-Marietta, Ames Mine in Story County. The sand was from West Des Moines in Polk County. The asphalt cement (AC) for the Type A mixes was AC 20 produced by Amoco from Davenport.

The Glasgrid was supplied in rolls 5' wide by Bay Mills Limited of Ontario, Canada. Glasgrid is a glass fiber mesh with 1/2 inch by 1 inch openings (Figure 1). Each strand is composed of many small glass fibers. After the grid is formed, it is coated with a polymer modified AC.

## CONSTRUCTION

Production and laying of the ACC began July 21, 1986, and was completed October 14, 1986. The ACC overlay over the PCC consisted of three courses. The first was a 1 1/2" AC binder course followed by a second 1 1/2" ACC binder course followed by a 1 1/2" ACC surface course. The Glasgrid was placed in the southbound roadway. There were no significant problems encountered in placing the Glasgrid material.

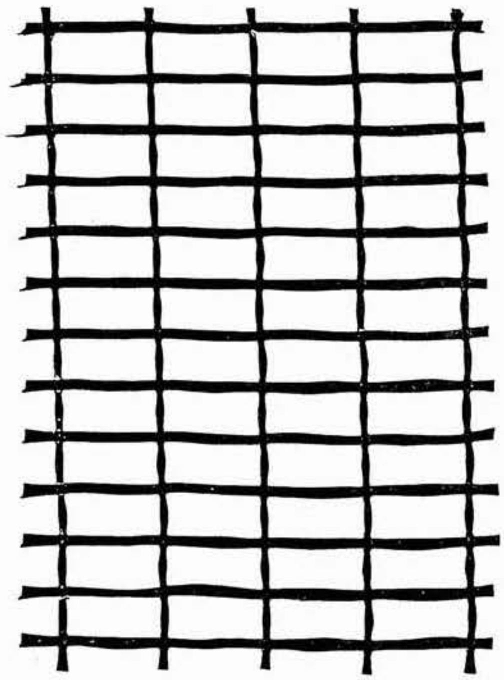

Figure 1  Glasgrid Mesh, 1/2 inch x 1 inch

DESCRIPTION OF TEST SECTIONS

Four different placement systems were used for the Glasgrid in an effort to prevent reflection cracking. The locations of the joints and cracks in the Glasgrid Test Sections are given in Appendix B.

The Glasgrid was placed over 35 joints and cracks in Test Section 1 from Milepost (MP) 71.94 to MP 72.15. The placement technique used in Test Section 1 was to place one roll of Glasgrid in a single width directly over the PCC transverse joint or crack. This was done only in the driving lane.

Test Section 2 from MP 71.60 to MP 71.94 was a comparative section where no Glasgrid was used.

In Test Section 3 (MP 71.24 to MP 71.47), the first 1 1/2" of AC binder course was placed directly on the PCC followed by the placement of the Glasgrid, followed by the placement of an additional 1 1/2" of binder and then 1 1/2" of surface course. This technique was also used for 35 cracks and joints.

Test Section 4 (MP 71.03 to MP 71.22) utilized two 5' wide strips of Glasgrid for each joint or crack. The Glasgrid for Test Section 3 was placed on top of the first 1 1/2" binder course. These two layers of Glasgrid were overlapped by 2' with the double layer of Glasgrid being directly over the crack or joint. An additional 1 1/2" of binder and 1 1/2" of surface was then placed over the Glasgrid.

Test Section 5 (MP 70.82 to 71.01) was similar to Test Section 3 in that two strips of Glasgrid were used over each joint or crack, but in this case, they were overlapped by 4'. This again gave a double layer of Glasgrid placed on the first 1 1/2" ACC overlay course. Again, an additional 1 1/2" of binder and 1 1/2" of AC surface were placed on top of the double layer of Glasgrid.

Another comparative section with no Glasgrid (Test Section 6) extended from MP 70.45 to MP 70.80.

PERFORMANCE EVALUATION

The evaluation consisted of an annual crack survey for the six sections. A brief summary of the sections is:

1. Single layer, single width of Glasgrid on the PCC pavement.
2. Comparative section without Glasgrid.
3. Single layer, single width of Glasgrid between lifts of ACC resurfacing.
4. Double layer of Glasgrid between lifts of ACC resurfacing with a 2-foot overlap.
5. Double layer of Glasgrid between lifts of ACC resurfacing with a 4-foot overlap.
6. Comparative section without Glasgrid.

A summary of the results of the annual crack surveys is given in Table 1.

TABLE 1
Summary of Annual Crack Surveys

| | | | | Number of Cracks | | | | Average Crack Spacing Feet | | | | Initial # | % of Cracks Reflected | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sec. | From MP | To MP | Length Feet | Nov. 87 | Nov. 88 | Oct. 89 | Oct. 90 | Nov. 87 | Nov. 88 | Oct. 89 | Oct. 90 | of Cracks & Joints | Nov. 87 | Nov. 88 | Oct. 88 | Oct. 90 |
| 1 | 71.94 | 72.15 | 937 | 5 | 14 | 13 | 15 | 187 | 67 | 72 | 62 | 35 | 14 | 40 | 37 | 43 |
| 2 | 71.60 | 71.94 | 1848 | 6 | 28 | 32 | 39 | 308 | 66 | 58 | 47 | 62* | 10 | 45 | 52 | 63 |
| 3 | 71.24 | 71.47 | 1211 | 4 | 20 | 22 | 28 | 303 | 61 | 55 | 43 | 35 | 11 | 57 | 63 | 80 |
| 4 | 71.03 | 71.22 | 1050 | 7 | 18 | 20 | 21 | 150 | 58 | 53 | 50 | 36 | 19 | 50 | 56 | 58 |
| 5 | 70.82 | 71.01 | 989 | 1 | 9 | 12 | 17 | 989 | 110 | 82 | 58 | 35 | 3 | 26 | 34 | 49 |
| 6 | 70.45 | 70.80 | 1848 | 9 | 27 | 30 | 38 | 205 | 68 | 62 | 49 | 62* | 15 | 44 | 48 | 61 |

*Estimated by calculation

The best performance of Glasgrid was section 1 with a single layer on the PCC pavement with 43% of the cracks or joints reflecting for an average crack spacing of 62 feet. The poorest performance of Glasgrid (section 3) was a single layer between ACC lifts with 80% of the cracks or joints reflecting for an average crack spacing of 43 feet.

The sections without Glasgrid were very similar in performance with 62% of the cracks and joints reflected for an average crack spacing of 48 feet. One Glasgrid section did not perform as well as the section without Glasgrid and three Glasgrid sections performed better than the conventional sections.

## CONCLUSIONS

This research evaluating the prevention of reflection cracking with Glasgrid supports the following conclusions:

1. Glasgrid placed on the PCC pavement was more effective at preventing reflection cracking than Glasgrid between lifts of ACC resurfacing.

2. In general, the use of Glasgrid would yield a small reduction or retardation in the amount of reflection cracking, but not sufficient to justify additional expense for the use of Glasgrid.

# Appendix A

## Mix Designs for Asphalt Cement Concrete

Dist. ... Matls. P. McGuffin C. Berry Mark Trueblood D.M. Lab
R. Monroe
✓D. Heins

IOWA DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
Office of Materials
PROPORTIONS & PRODUCTION LIMITS FOR AGGREGATES

COUNTY: Polk PROJECT NO.: IR-35-2(191)67--12-77 DATE: 8-12-86

PROJ. LOCATION: On I-235 from just South of the Iowa 5 Interchange, North to just south of the I-80 Interchange.

TYPE AND CLASS OF MIX: Type A COURSE: Surface MIX SIZE: 1/2"

CONTRACTOR: Manatts TRAFFIC: 11,000 VPD ~~XXXXX~~

| MATERIAL | SAMPLE INDENT. | PROP. % IN MIX | PRODUCER & LOCATION |
|---|---|---|---|
| 1/2" Cr. Lmst. | 1MT6-151 | 55% | Martin Marietta (Ames) SW-24-84-24 Story |
| 3/8" Chips | 1MT6-154 | 15% | Martin Marietta (Ames) SW-24-84-24 Story |
| Sand | 1MT6-153 | 30% | West Des Moines Sand (Flint) SE-29-78-25 Polk |
| | | | |
| Asph. Cement | AC-20 | | Amoco - Linwood, Iowa |

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

| MATERIAL | SIEVE ANALYSIS -% PASSING | | | | | | | | | | | SILT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 3/4 | ½ | 3/8 | 4 | 8 | 16 | 30 | 50 | 100 | 200 | |
| 1/2" Cr. Lmst. | | 100 | 99 | 82 | 52 | 33 | 25 | 20 | 14 | 10 | 8.0 | |
| 3/8" Chips | | | | 100 | 54 | 14 | 7.5 | 5.0 | 3.0 | 2.5 | 2.0 | |
| Sand | | | | 100 | 99 | 90 | 66 | 36 | 7.4 | 0.7 | 0.2 | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

## PRELIMINARY JOB MIX FORMULA TARGET GRADATION

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOLERANCE ± | | | 100 | 98/100 | 7 | 7 | 5 | | 4 | | | 2 | |
| COMBINED GRADING | | | 100 | 99 | 90 | 66 | 47 | 35 | 23 | 10 | 6.1 | 4.8 | |
| SURFACE AREA C.- | | | | | | .02 | .04 | .08 | .14 | .30 | .60 | 1.60 | TOTAL |
| S. A. SQ. FT. /LB. | | | | | +2.0 | 1.32 | 1.88 | 2.80 | 3.22 | 3.00 | 3.66 | 7.68 | 25.56 |

## PRODUCTION LIMITS FOR AGGREGATES APPROVED BY THE CONTRACTOR/PRODUCER

| SIEVE SIZE | 1/2" Cr. Lmst. | | 3/8" Chips | | Sand | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. |
| 1 | | | | | | | * Corrected Copy | | | |
| 3/4 | 100 | | | | | | NOTE: | | | |
| ½ | 98 | 100 | 100 | | 100 | | #3/8 Sieve Max. raised to 89 | | | |
| 3/8 | 75 | *89 | 98 | 100 | 98 | 100 | on 1/2" Cr. Lmst. | | | |
| 4 | 45 | 56 | 47 | 58 | 92 | 100 | | | | |
| 8 | 28 | 36 | 8.0 | 17 | 85 | 93 | | | | |
| 30 | 16 | 23 | 1.0 | 8.0 | 32 | 39 | | | | |
| 50 | | | | | | | | | | |
| 2. | 6.0 | 10 | 0 | 3.0 | 0 | 1.5 | | | | |

COMMENTS:
(Spec. No. etc.)

1024 & SP-663

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

Signed S/ Don Ede R.M.
Contractor/Producer

Signed [illegible]

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
ASPHALT CONCRETE MIX DESIGN
LAB LOCATION AMES

MIX, TYPE AND CLASS: TYPE A LAB NO. ABD6-156

INTENDED USE: SURFACE

SIZE 1/2" SPEC. NO. 1024 DATE REPORTED 8/6/86

COUNTY POLK PROJECT IR-35-2(191)67--12-77

CONTRACTOR MANATTS

PROJ. LOCATION FROM JUST S. OF IOWA 5 INTERCHANGE TO JUST S. OF I-80

AGG. SOURCES CR. LST. & CHIPS - MARTIN MARIETTA, AMES MINE, STORY CO.;
SAND - WEST DES MOINES SAND, FLINT, POLK CO.
JOB MIX FORMULA AGGREGATE PROPORTIONS: 55% AAT6-683; 15% AAT6-686; 30% AAT6-685

JOB MIX FORMULA - COMBINED 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 | 99 | 90 | 66 | 47 | 35 | 23 | 10 | 6.1 | 4.8 |
| TOLERANCE: | | | | 98/100 | 7 | 7 | 5 | | 4 | | | 2 |

ASPHALT SOURCE AND APPROXIMATE VISCOSITY AMOCO - 2010 POISES

| | | | |
|---|---|---|---|
| PLASTICITY INDEX | | | |
| % ASPH. IN MIX | 4.5 | 5.5 | 6.5 |
| NUMBER OF MARSHALL BLOWS | 75 | 75 | 75 |
| MARSHALL STABILITY - LBS. | 3243 | 3230 | 3188 |
| FLOW - 0.01 IN. | 8 | 9 | 9 |
| SP.GR. BY DISPLACEMENT(LAB DENS.) | 2.289 | 2.312 | 2.333 |
| BULK SP. GR. COMB. DRY AGG. | 2.633 | 2.633 | 2.633 |
| SP. GR. ASPH. @ 77 F. | 1.034 | 1.034 | 1.034 |
| CALC. SOLID SP.GR. | 2.494 | 2.458 | 2.422 |
| % VOIDS - CALC. | 8.22 | 5.93 | 3.69 |
| RICE SP. GR. | 2.485 | 2.449 | 2.413 |
| % VOIDS - RICE | 7.89 | 5.59 | 3.32 |
| % WATER ABSORPTION - AGGREGATE | 1.14 | 1.14 | 1.14 |
| % VOIDS IN THE MINERAL AGGREGATE | 16.98 | 17.02 | 17.15 |
| % V.M.A. FILLED WITH ASPHALT | 51.58 | 65.18 | 78.49 |
| CALCULATED ASPH.FILM THICKNESS(MICRONS) | 7.84 | 9.94 | 12.08 |
| FILLER/BITUMEN RATIO | | 0.80 | |

A CONTENT OF 6.0% ASPHALT IS RECOMMENDED TO START THE JOB.

COPIES:
ASPH. MIX DESIGN
IR-35-2(191)67--12-77, POLK
K. M. MEEKS
P. MCGUFFIN
R. MONROE
J. SMYTHE
. HEINS
MANATTS
M. TRUEBLOOD
W. OPPEDAL

SIGNED: MAX I. SHEELER
TESTING ENGINEER

IOWA DEPARTMENT OF TRANSPORTATION
OFFICE OF MATERIALS
ASPHALT CONCRETE MIX DESIGN
LAB LOCATION AMES

MIX, TYPE AND CLASS: TYPE A LAB NO. ABD6-155

INTENDED USE: BINDER

SIZE 3/4" SPEC. NO. 1024 DATE REPORTED 8-6-86

COUNTY POLK PROJECT IR-35-2(191)67--12-77

CONTRACTOR MANATTS

PROJ. LOCATION FROM JUST SOUTH OF IOWQ 5 TO JUST SOUTH OF 1-80

AGG. SOURCES 1/2 & 3/4" CR. LST. - MARTIN MARIETTA, AMES MINE, STORY CO.;
SAND - WEST D.M. SAND, FLINT, POLK CO.
JOB MIX FORMULA AGGREGATE PROPORTIONS: 55% AAT6-683; 15% AAT6-684; 30% AAT6-685

JOB MIX FORMULA - COMBINED 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 | 99 | 94 | 80 | 60 | 46 | 34 | 22 | 10 | 6.0 | 4.8 |
| TOLERANCE: | 98/100 | | | 7 | 7 | 5 | | 4 | | | 2 |

| | | |
|---|---|---|
| ASPHALT SOURCE AND APPROXIMATE VISCOSITY | AMOCO - 2010 POISES | |
| PLASTICITY INDEX | | |
| % ASPH. IN MIX | 4.5 | 5.5 |
| NUMBER OF MARSHALL BLOWS | 75 | 75 |
| MARSHALL STABILITY - LBS. | 3550 | 3283 |
| FLOW - 0.01 IN. | 8 | 8 |
| SP.GR. BY DISPLACEMENT(LAB DENS.) | 2.313 | 2.340 |
| BULK SP. GR. COMB. DRY AGG. | 2.605 | 2.605 |
| SP. GR. ASPH. @ 77 F. | 1.034 | 1.034 |
| CALC. SOLID SP.GR. | 2.478 | 2.443 |
| % VOIDS - CALC. | 6.68 | 4.21 |
| RICE SP. GR. | 2.475 | 2.441 |
| % VOIDS - RICE | 6.55 | 4.14 |
| % WATER ABSORPTION - AGGREGATE | 1.44 | 1.44 |
| % VOIDS IN THE MINERAL AGGREGATE | 15.20 | 15.11 |
| % V.M.A. FILLED WITH ASPHALT | 56.09 | 72.17 |
| CALCULATED ASPH.FILM THICKNESS(MICRONS) | 7.67 | 9.81 |
| FILLER/BITUMEN RATIO | 0.89 | |

A CONTENT OF 5.4% ASPHALT IS RECOMMENDED TO START THE JOB.

COPIES:
ASPHALT MIX DESIGN
IR-80-35-2(191)67--12-77, POLK
K. MEEKS
P. MCGUFFIN
R. MONROE
J. SMYTHE
. HEINS
MANATTS
W. OPPEDAL

SIGNED: MAX I. SHEELER
TESTING ENGINEER

cc: [illegible] Dist. 4 Matls. R. Monroe √D. Heins [illegible] W.D.M. Sand M. Trueblood C. Berry Des Moines Lab

IOWA DEPARTMENT OF TRANSPORTATION
HIGHWAY DIVISION
Office of Materials
PROPORTIONS & PRODUCTION LIMITS FOR AGGREGATES

COUNTY: Polk PROJECT NO.: IR-35-2(191)67--12-77 DATE: 8-12-86

LOCATION: On I-35 from just south of the Iowa 5 Interchange, North to just south of the I-80 Interchange.

TYPE AND CLASS OF MIX : Type A COURSE: Binder MIX SIZE: 3/4"

CONTRACTOR: Manatts TRAFFIC: 11,000 VPD

| MATERIAL | SAMPLE INDENT. | PROP. % IN MIX | PRODUCER & LOCATION |
|---|---|---|---|
| 1/2" Cr. Lmst. | 1MT6-151 | 55% | Martin Marietta (Ames) SW-24-84-24 Story |
| 3/4" Conc. Stone | 1MT6-152 | 15% | Martin Marietta (Ames) SW-24-84-24 Story |
| Sand | 1MT6-153 | 30% | West Des Moines Sand (Flint) SE-29-78-25 Polk |
| | | | |
| Asph. Cement | AC-20 | | Amoco - Linwood, Iowa |

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

| MATERIAL | SIEVE ANALYSIS -% PASSING | | | | | | | | | | | SILT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 3/4 | ½ | 3/8 | 4 | 8 | 16 | 30 | 50 | 100 | 200 | |
| 1/2" Cr. Lmst. | | 100 | 99 | 82 | 52 | 33 | 25 | 20 | 14 | 10 | 8.0 | |
| 3/4" Conc. Stone | 100 | 94 | 65 | 36 | 10 | 3.1 | 2.8 | 2.7 | 2.3 | 2.1 | 1.8 | |
| Sand | | | | 100 | 99 | 90 | 66 | 36 | 7.4 | 0.7 | 0.2 | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |

PRELIMINARY JOB MIX FORMULA TARGET GRADATION

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TOLERANCE ± | | 100 | 98/100 | | 7 | 7 | 5 | | 4 | | | 2 | |
| COMBINED GRADING | | 100 | 99 | 94 | 80 | 60 | 46 | 34 | 22 | 10 | 6.0 | 4.8 | |
| SURFACE AREA C. | | | | | | .02 | .04 | .08 | .14 | .30 | .60 | 1.60 | TOTAL |
| S. A. SQ. FT. /LB. | | | | | +2.0 | 1.20 | 1.84 | 2.72 | 3.08 | 3.00 | 3.60 | 7.68 | 25.12 |

PRODUCTION LIMITS FOR AGGREGATES APPROVED BY THE CONTRACTOR/PRODUCER

| SIEVE SIZE | 1/2" Cr. Lmst. | | 3/4" Conc.Stone | | Sand | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | MAX. |
| 1 | | | 100 | | | | * Corrected Copy | | | |
| 3/4 | 100 | | 92 | 100 | | | NOTE: | | | |
| ½ | 98 | 100 | | | 100 | | 3/8" Sieve Max. raised to 89 | | | |
| 3/8 | 75 | *89 | 29 | 40 | 98 | 100 | on 8-11-86 on 1/2" Cr. Lmst. | | | |
| 4 | 45 | 56 | 3.0 | 14 | 92 | 100 | | | | |
| 8 | 28 | 36 | 0 | 6.0 | 85 | 93 | | | | |
| 30 | 16 | 23 | 0 | 5.0 | 32 | 39 | | | | |
| 50 | | | | | | | | | | |
| 200 | 6.0 | 10 | 0 | 3.0 | 0 | 1.5 | | | | |

COMMENTS:
(Spec. No.,etc.)

1024 & SP-663

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

Signed S/ Don Eide
Contractor/Producer

Signed [signature]
Dist. Matls. Engr.

# Appendix B

# Joint and Crack Locations of Test Sections

## Joint and Crack Locations - Test Section 1

| Station | Type* | Station | Type |
|---|---|---|---|
| 295+51.7 (MP72.15) | J | 289+53 | C |
| 294+75 | J | 289+24.5 | C |
| 293+98.6 | J | 289+00.5 | J |
| 293+22.1 | J | 288+84.5 | C |
| 292+83.6 | C | 288+24 | J |
| 292+06.9 | J | 288+05.3 | C |
| 291+86.6 | C | 287+83.6 | C |
| 291+63.1 | C | 287+47.5 | J |
| 291+49.3 | C | 287+26.4 | C |
| 291+30.3 | J | 287+03.4 | C |
| 291+15 | C | 286+88.4 | C |
| 291+00.2 | C | 286+70.8 | J |
| 290+87.2 | C | 286+52.4 | C |
| 290+74.2 | C | 286+41.4 | C |
| 290+53.6 | J | 286+26.9 | C |
| 290+20.6 | C | 286+12.1 | C |
| 290+08.4 | C | 285+94.4 | J |
| 289+77 | J | (field Sta. 286+34.4) | |

## Joint and Crack Locations - Test Section 3

| Station | Type* | Station | Type |
|---|---|---|---|
| 261+09.8 | J | 255+13.2 | C |
| 260+82.5 | C | 254+97.1 | J |
| 260+57 | C | 254+48.9 | C |
| 260+33.2 | J | 254+20.6 | J |
| 260+12 | C | 253+70.9 | C |
| 259+76 | C | 253+44.1 | J |
| 259+56.3 | J | 253+08.4 | C |
| 259+36.3 | C | 252+59.4 | J |
| 258+95.9 | C | 252+26.5 | C |
| 258+79.7 | J | 252+03.2 | J |
| 258+56.7 | C | 251+26.9 | J |
| 258+41.7 | C | 251+01.4 | C |
| 258+03.1 | J | 250+50.4 | J |
| 257+53.1 | C | 249+92.4 | C |
| 257+26.8 | J | 249+73.9 | J |
| 256+50.4 | J | 249+40.9 | C |
| 256+05.4 | C | 248+99 | J |
| 255+73.7 | J | (field Sta. 248+99) | |

*J/Joint
*C/Crack

## Joint and Crack Locations - Test Section 4

| Station | Type* | Station | Type |
|---|---|---|---|
| 248+31.5 | J | 242+28.4 | J |
| 247+64 | J | 241+72.2 | C |
| 246+87.8 | J | 241+51.9 | J |
| 246+67.8 | C | 241+18.2 | C |
| 246+11.1 | J | 240+75.3 | J |
| 245+51.5 | C | 240+54.5 | C |
| 245+34.5 | J | 240+37.3 | C |
| 244+98.5 | C | 240+22.7 | C |
| 244+58 | J | 239+98.7 | J |
| 244+40.9 | C | 239+69.2 | C |
| 244+02.1 | C | 239+46.1 | C |
| 243+81.5 | J | 239+22.2 | J |
| 243+60.8 | C | 238+92.3 | C |
| 243+31.6 | C | 238+69.8 | C |
| 243+21.6 | C | 238+45.7 | J |
| 242+88.6 | C | 238+04.7 | C |
| 242+61.1 | C | 237+69.2 | J |
| 242+45.6 | C | 237+46.9 | C |
| | | (field Sta. 238+15.6) | |

## Joint and Crack Locations - Test Section 5

| Station | Type* | Station | Type |
|---|---|---|---|
| 236+85 | J | 230+92.3 | C |
| 236+39.3 | C | 230+73.4 | J |
| 236+08.5 | J | 230+33.9 | C |
| 235+83.7 | C | 230+06.8 | J |
| 235+51.3 | C | 229+83.8 | C |
| 235+32 | J | 229+30.1 | J |
| 234+89.3 | C | 228+53.7 | J |
| 234+55.6 | J | 228+34.9 | C |
| 234+36.4 | C | 228+19.1 | C |
| 233+79.1 | J | 227+77.5 | J |
| 233+61.5 | C | 227+06 | J |
| 233+43.2 | C | 226+56.9 | C |
| 233+19.5 | C | 226+29.3 | J |
| 232+85.5 | C | 226+09.3 | C |
| 232+62.4 | C | 225+91.6 | C |
| 232+26.4 | J | 225+71 | C |
| 231+80.1 | C | 225+52.7 | J |
| 231+49.8 | J | (field Sta. 228+39.4) | |

*J/Joint
*C/Crack