

State of Illinois
DEPARTMENT OF TRANSPORTATION
Division of Highways
Bureau of Materials and Physical Research

AN EVALUATION
OF
GLASGRID PAVEMENT REINFORCEMENT MESH

FINAL REPORT

by

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IMPORTANT

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INTRODUCTION

Glasgrid Pavement Reinforcement Mesh is designed to reduce thermal- and stress-related reflective cracking in bituminous concrete overlays over either bare or previously overlaid portland cement concrete pavements. It is constructed from fiberglass strands aligned in a grid structure and is placed between the binder and surface lifts. Bayex, a division of Bay Mills Limited, of Midland, Ontario, Canada, originally submitted a Preliminary Information for Product Evaluation Form in January of 1986. Since field applications in Illinois in 1989, an improved adhesive technology was internally developed and production was moved from an outside contracted company to a Bayex plant in order to provide stricter quality control.

Several case studies written by Bay Mills purported that Glasgrid had performed successfully on several highway and airport projects in Canada since the late 1980's. The fabric was reported to provide a smooth riding surface requiring little maintenance throughout its service life and was found to be easy to install. Furthermore, a Texas Transportation Institute study claimed that Glasgrid would extend the life of an overlay two to three times (1).

One type of Glasgrid Pavement Reinforcement Mesh, fabric 8501, is designed to be used as an area reflective crack control treatment. The fabric is laid out horizontally over the width of the lane and extended through the entire test section. Fabric 8502 is designed to be used as a strip reflective crack control treatment and is extended transversely across the lane in order to cover an existing transverse crack. Information regarding fabrics 8501 and 8502 is included in Table 1.

EVALUATION

In order to determine whether Glasgrid could be used effectively in Illinois, the following two field trial installation sites were selected based on their compatibility with the product:

1. FA 582 (Illinois 111) at the I-270 interchange
Pontoon Beach
13,400 ADT

The existing pavement consisted of 9 inches of jointed portland cement concrete with a bituminous concrete overlay. Two test sections were constructed on September 30, 1993, using the 8501 fabric, and two control sections were established.

2. FAP 669 (Illinois 29) south of the I-474 interchange
Pekin
30,200 ADT

The existing pavement consisted of 10 inches of jointed portland cement concrete. Two test section were constructed on October 14, 1993, using both the 8501 and 8502 fabrics, and two control sections were established.

Prior to constructing the test sections, the prospective pavements were tested with a falling weight deflectometer (FWD). Standard departmental procedures were used to analyze the data for voids under the pavement. Since the Glasgrid fabrics 8501 and 8502 are not designed to bridge voids under a pavement, only pavement sections that were found to have no voids were considered. In addition, distress surveys were performed on the test and control sections, and existing cracks were mapped.

The application of the Glasgrid fabric went relatively smoothly, with only a few problems. On Illinois 111, the area fabric (8501) was placed in five foot width rolls with a tractor. The grid overlapped the centerline by six inches and extended onto the shoulder by about two feet. After the grid was placed, it was rolled with a pneumatic tired roller with one pass, and the surface mix was placed immediately thereafter. On Illinois 29, the area fabric (8501) was installed in three passes starting at the median edge. The first two passes were laid with a tractor full width and then rolled, and the third strip was cut in half, laid by hand, and not rolled. The overlap was approximately six inches in the transverse direction. In a few areas, the pneumatic tired roller turned on the mat and the Glasgrid was damaged.

Six, twelve and nineteen month post-construction distress surveys were conducted. All transverse cracks were noted on a distress survey form. At the time of the last survey, all of the Glasgrid sections showed at least the same degree of reflective cracking as the control sections. In some instances, the degree of cracking was higher in the test sections than in the control sections. A summary of this data is included with design data in Table 2. The percentage of reflected cracks was calculated by dividing the number of cracks in the portland cement concrete pavement or existing bituminous overlay by the number of cracks which reflected through to the new bituminous overlay. Typical condition photos of the test sections before and after construction are included in Figures 1 through 6.

Approximately one year after placement, all of the test and control sections were tested again with the FWD. The analysis of this data indicated that all of the sections were still free of voids. In addition, the test and control sections were cored to evaluate the condition of the overlay. Cores were collected from locations where cracks existed in the original pavement and not in the overlay and where cracks existed in both the original pavement and the overlay. In virtually all of the test sections and none of the control sections, the binder lift was separated from the surface lift. In many instances, the crack in the overlay was directly over the crack in the existing pavement. In no instances was Glasgrid successful in preventing a reflective crack from forming.

CONCLUSIONS AND RECOMMENDATIONS

Glasgrid Pavement Reinforcement Mesh does not appear to have the ability to retard reflective cracking in bituminous concrete overlays placed over either bare or previously overlaid portland cement concrete pavements. Glasgrid fabric literature lists the following requirements: a stable base; consistent smoothness at the joints; a clean, milled surface; a minimum of 1/2 inch of leveling or binder course; and 1 3/4 to 2 inches of surface course. All of these conditions were met on both of the field trial installation sites. The distress surveys and core samples clearly indicated that the Glasgrid test sections have not performed any better than the control sections. In addition, another state transportation department reported unsatisfactory Glasgrid performance. In an April 1993 report, the Colorado Department of Transportation observed a greater degree of cracking in Glasgrid sections than in untreated sections and recommended against using Glasgrid as a crack reduction treatment (2). Due to the evidence that Glasgrid Pavement Reinforcement Mesh cannot consistently reduce reflective cracking in bituminous concrete overlays, it is recommended that Glasgrid not be allowed for use on state funded highway projects.

REFERENCES

1. Jayawickrama, P., and Robert L. Lytton, "Reinforcing Fiberglass Grids for Asphalt Overlays," Texas Transportation Institute, May, 1986.
2. Harmelink, Donna S., "Crack-Reduction, Pavement-Reinforcement, Glasgrid," Colorado Department of Transportation Report DTD-R-93-6, April 1993.

TABLE 1. GLASGRID FABRIC SPECIFICATIONS

<u>FABRIC</u>	<u>MIN TENSILE STRENGTH</u>	<u>MIN WEIGHT</u>	<u>MAX ELONGATION</u>	<u>MELT POINT</u>	<u>COST</u>
8501	100x100 kN/m (560x560 lb/in)	450 g/sq m (13 oz/sq yd)	0.04	1000C (1800F)	\$5.00 PER LINEAL FT
8502	200x100 kN/m (1120x560 lb/in)	650 g/sq m (19 oz/sq yd)	0.04	1000C (1800F)	\$6.85 PER SQ YD

TABLE 2. GLASGRID DESIGN AND PERFORMANCE DATA

8501

<u>DIST</u>	<u>ROUTE</u>	<u>TRAFFIC</u>	<u>OVERLAY THICKNESS</u>	<u>EXISTING PAVEMENT</u>	<u>DATE PLACED</u>	<u>DATE SURVEYED</u>	<u>GLASGRID % REFLECT CRACKS</u>	<u>CONTROL % REFLECT CRACKS</u>
4	IL 29	30,200 ADT 5.5% TRUCKS	1.0" BINDER 2.0" SURFACE	10" PCC	10/14/93	04/26/94	14.6	9.5
						10/21/94	14.6	9.5
						06/20/95	19.4	13.3
8	IL 111	13,400 ADT 4.8% TRUCKS	1.75" BINDER 1.5" SURFACE	9" PCC w/ AC OVERLAY	09/30/93	03/30/94	31.5	29.3
						10/14/94	31.5	35.1
						06/19/95	32.4	35.1
8	IL 111	13,400 ADT 4.8% TRUCKS	1.75" BINDER 1.5" SURFACE	9" PCC w/ AC OVERLAY	09/30/93	03/30/94	4.1	3.9
						10/14/94	4.5	3.9
						06/19/95	5.5	3.9

8502

<u>DIST</u>	<u>ROUTE</u>	<u>TRAFFIC</u>	<u>OVERLAY THICKNESS</u>	<u>EXISTING PAVEMENT</u>	<u>DATE PLACED</u>	<u>DATE SURVEYED</u>	<u>GLASGRID % REFLECT. CRACKS</u>	<u>CONTROL % REFLECT. CRACKS</u>
4	IL 29	30,200 ADT 5.5% TRUCKS	1.0" BINDER 2.0" SURFACE	10" PCC	10/18/93	05/17/94	44.6	30.0
						10/21/94	54.1	30.5
						06/20/95	55.4	30.9



Figure 1.

September 1993
Pre-Construction Photo
Station 159+00
8501 Test Section

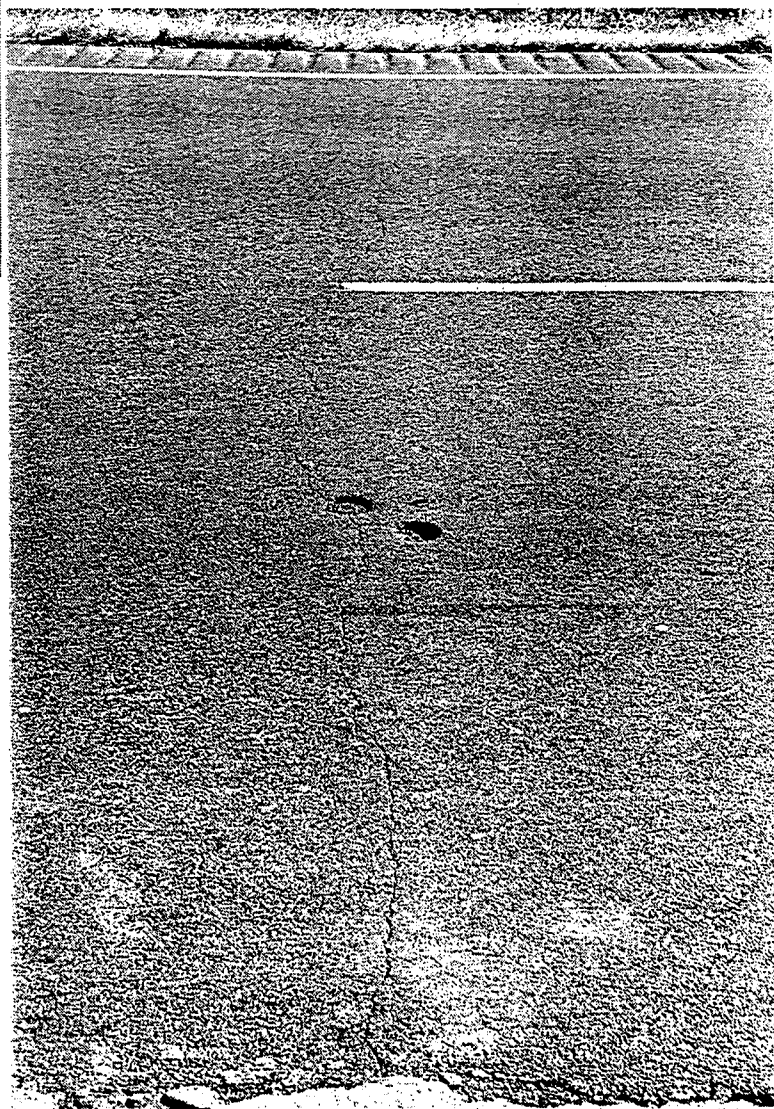


Figure 2.

November 1995
Post-Construction Photo
Station 159+00
8501 Test Section



Figure 3.

October 1993
Pre-Construction Photo
Station 262+89
8501 Test Section

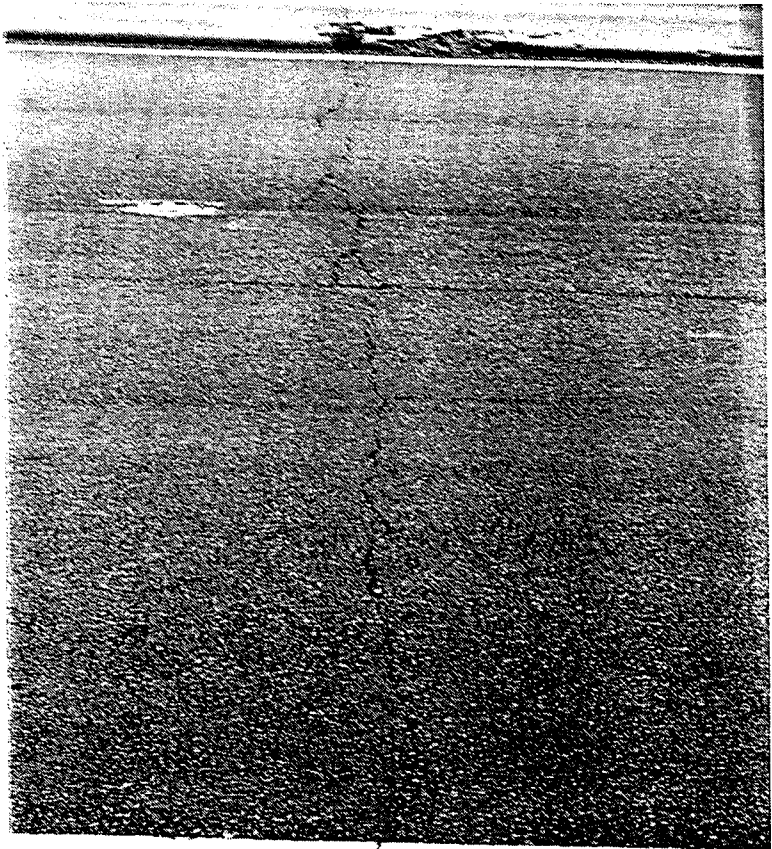
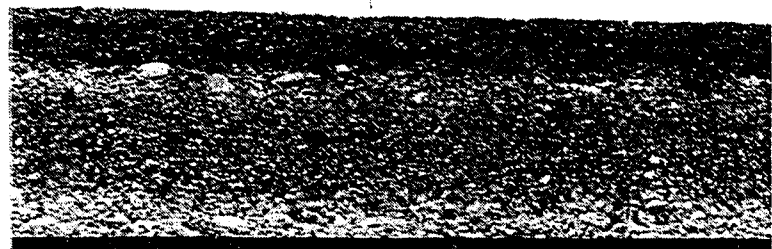


Figure 4.

April 1994
Post-Construction Photo
Station 262+89
8501 Test Section



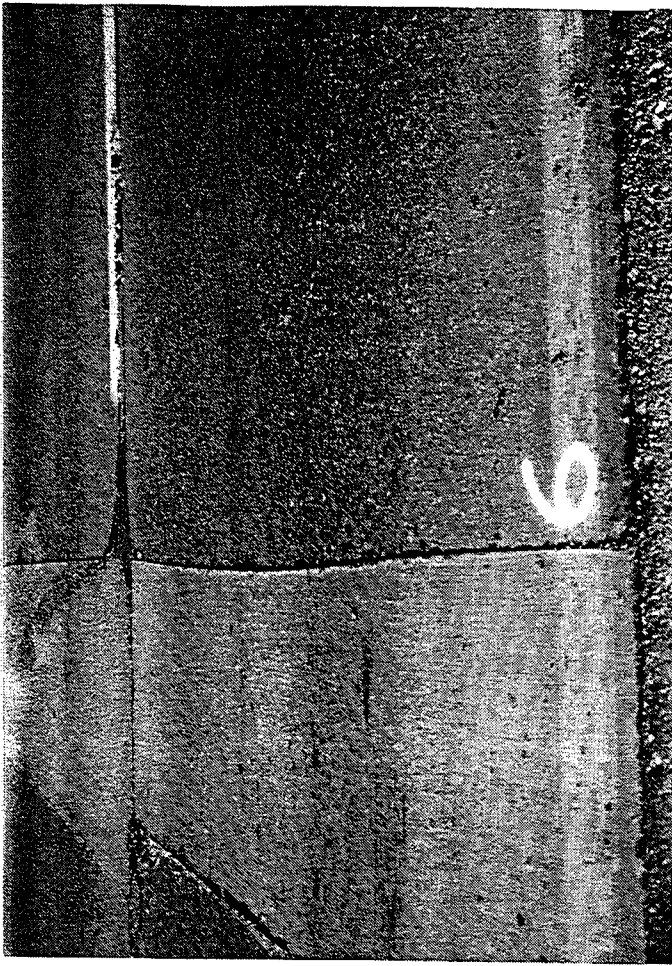


Figure 5.

October 1993
Pre-Construction Photo
Station 277+65
8502 Test Section

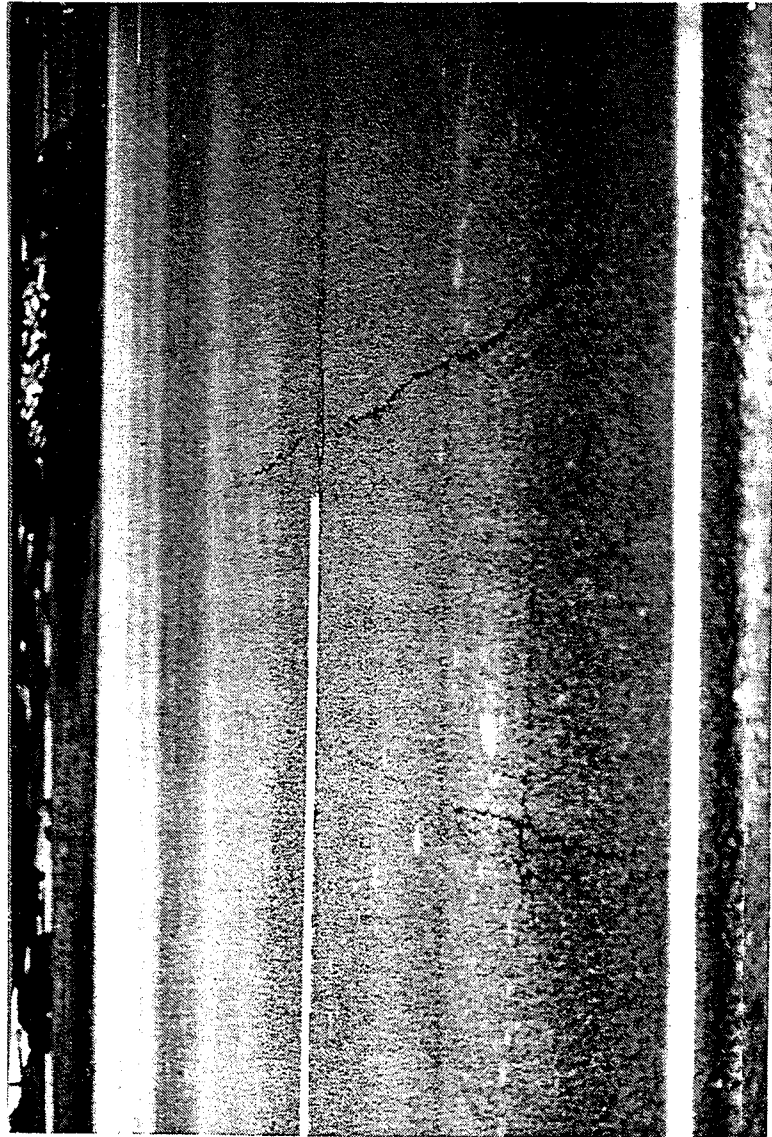


Figure 6.

May 1994
Post-Construction Photo
Station 277+65
8502 Test Section