

Final Report
for
Experimental Project HR-516
SYNTHETIC FABRIC TO IMPROVE
STRUCTURAL CAPACITY
IN ASPHALT OVERLAYS

Highway Division
Iowa Department of Transportation

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Introduction

Iowa's first field application of synthetic engineering fabrics was on research project HR-158, "Prevention of Reflective Cracking in Asphalt Overlays". This research placed in September 1971 used three different engineering fabrics. A final report concluding generally favorable performance was distributed in May 1977. There have been a number of Iowa engineering fabric installations since that initial project.

Problem Statement

A section of Interstate 35 just north of US 34 in Clarke County was constructed in 1958 and 1959 with 4 1/2 inches of asphalt concrete over a rolled stone base. Under the concept of stage construction an additional 3 3/4 inches of asphalt concrete was placed in 1966. By 1979, this section of Interstate 35 was carrying over 6000 vehicles per day and exhibited substantial wheel rutting. It was in need of some type of surface restoration. An additional overlay would result in loss of vertical bridge clearance at the US 34 bridge overpass.

Objective

The objective of this project was to determine the performance of engineering fabric in providing additional structural capacity.

Project Construction

This experimental fabric construction was incorporated into Clarke County project I-IR-35-2(157)33--14-20 constructed in 1979. The basic concept of this project included the heater scarification of 1 inch of the existing asphaltic concrete with an additional 1 inch of asphalt concrete added during heater scarification. Sprinkle treatment aggregate was placed on top of the mat just prior to compaction to provide a surface with better frictional characteristics.

If this surface restoration practice had been used at the US 34 overpass, it would have required raising of the bridge. A new technique was used beneath the US 34 overpass and adjacent to the overpass. The existing rutted asphalt surface was milled to a depth of 6 inches and 5 1/2 inches of asphalt concrete mix was replaced across the total roadway.

A CMI-4000 rotomill was used to remove the asphalt concrete. It required two passes of the rotomill to remove the 6-inch depth. Compressed air and a power broom were used to clean the surface after the rotomilling operation. The surface was then tacked at 0.22 gallons per sq yd with AC 10 prior to placement of the asphalt concrete. The asphalt concrete was placed in three lifts. There were two 2" binder lifts followed by a 1 1/2-inch thick surface lift. The engineering fabric was placed between the first and second binder lift. The surface lift received an aggregate sprinkle treatment to provide better frictional characteristics.

The contractor elected to use Petromat fabric on this project. The material was applied with very little difficulty when the tractor with the applicator was driven in a straight line. Any major wrinkles which did occur were sliced and overlapped prior to being covered with asphalt concrete.

Post Construction Performance

Performance of the overlay and control sections have been monitored annually using Road Rater testing. The Road Rater deflection summary is as follows:

Roadrater Deflection Summary I-35 Clarke County

Date	<u>Average Deflection, Mils</u>	
	Fabric Section MP 33.09-33.32	Resurfacing Without Fabric MP 33.4-33.8
11-20-80	0.50	---
11-10-81	0.58	0.64
5-12-82	----	1.16
11-12-82	0.75	----
5-16-83	1.05	0.96
5-9-84	1.44	1.22

The Iowa Department of Transportation has recently developed a program to predict the subgrade support values beneath a section of pavement. This subgrade support program yielded a K Value of 217 for the experimental fabric section and a K Value of 194 for the resurfacing without fabric from Road Rater testing conducted in 1984. These values show a better subgrade support value beneath the experimental fabric section than on the comparative heater scarification overlay section.

Visual evaluation of rutting and cracking have been conducted during annual field reviews. By 1983, the experimental fabric section was exhibiting substantial cracking in the wheel path and rutting to a maximum of 1 1/2 inches in the outside wheel path. The rutting appears to be a result of structural failure.

Conclusion

The evaluation of this experimental fabric installation would support the fact that engineering fabric does not provide a significant structural benefit when placed between layers of asphalt concrete pavement.