EPOXY AND THERMOPLASTIC PAVEMENT MARKINGS ON US 30 IN CARROLL COUNTY

Final Report for
Iowa DOT Project HR-545

Federal Highway Administration
Project IA-89-02

November 1995

Project Development Division

Iowa Department of Transportation

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November 1995

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DISCLAIMER

ABSTRACT

A one mile section each of thermoplastic and epoxy pavement marking materials were placed on new ACC pavement near Carroll, IA on Highway 30. The markings were evaluated for four years to see if they were suitable materials for durable pavement markings.

The epoxy markings were inadvertently repainted after two years. They were performing well up to that time with little plow damage and good retroreflectivity.

The thermoplastic dash lines suffered heavy snow plow damage after the first year and were repainted after the third winter. The thermoplastic edge lines performed fairly well for four years.

INTRODUCTION

Pavement markings are used to delineate roadways and make them safer to navigate during the night time and during inclement weather. The most common type of pavement marking is waterborne traffic paint. There are many areas around the state where the waterborne paint is worn off the pavement during the winter time. The paint experiences heavy wear during the winter due to sand that is applied to the road for added traction, and due to frequent snow plowing.

Epoxy and thermoplastic pavement markings are two materials which may have the potential for serving as durable pavement markings that can survive for several winters.

OBJECTIVE

The objective of this study is to determine if epoxy and thermoplastic suitable alternatives for durable pavement markings.

PROJECT LOCATION AND CONTRACTOR

The project number for this work was F-30-2(62)--20-14. The marking materials were placed on U.S. 30 in east of Carroll, IA in Carroll County in July 1989. One mile sections of each material was installed. The thermoplastic material was placed between station 160 and 226. The epoxy material was placed between station 118 and 160. The materials were placed by Swanston Engineering.

MATERIALS

The thermoplastic material was an alkyd type thermoplastic manufactured by Cataphote, Inc. The epoxy material was a fast dry epoxy manufactured by Polycarb, Inc. The product was Mark 55.1.

INSTALLATION

Both materials were place on new asphalt pavement. The epoxy was applied at 15 mils. The thermoplastic was supposed to be applied between 125 and 188 mils, however, the initial application was not thick enough, so a second application was put down on some areas. This resulted in thermoplastic lines which were too thick. Some areas were up to 400 mils.

DURABILITY

The thermoplastic was showing significant snow plow damage after the first winter. Approximately 12 percent of the yellow material was missing. Most dashes had 3 to 10 percent of the material missing, a few dashes were nearly completely gone. After the second winter the percent of missing yellow material had risen to 29 percent, and 10 dashes were completely gone. The yellow dash lines were repainted with waterborne paint after the third winter in the spring of 1992. The extra thickness of the dash lines most likely contributed to the heavy snow plow damage.

There was no reported damage to the thermoplastic edge lines during the first three winters. Some damage was reported to the edge lines after the fifth winter. But at this time, the edge lines had been repainted and it was difficult to get an accurate assessment of the damage. All thermoplastic lines showed transverse cracks across the line at 2 to 3 inch intervals. Although the material was cracked, it still adhered. It did not pop out in small pieces. The cracks were not visible at highway speeds.

The epoxy material had very good durability. There was no significant snow plow damage. There was minor chipping and wear on the edge line at intersections after the first year. The chipping or wear did not noticeably increase by the second year. The epoxy was inadvertently repainted with waterborne traffic paint sometime after June of 1991. The repainting was probably done in the spring of 1992 at the same time the thermoplastic dashes were repainted.

RETROREFLECTIVITY READINGS

All retroreflectivity readings were taken with an Ecolux model N75 retroreflectometer. The entrance/observation angles are 86.5/1.0 degrees. The following retroreflectivity values are in millicandelas x lux^{-1} x $meter^{-2}$. Most white areas include average of 24 individual readings. Most yellow areas include average of 12 individual readings.

Fast Dry Epoxy

	7/89	10/89	2/90	5/90	8/90	6/91	6/92
White	427	342	260	337	370	325	319*
Yellow	388	313	186	252	267	229	repaint

* Two small areas which were not repainted were measured. Includes average of 4 individual reading.

Thermoplastic

	7/89	10/89	2/90	5/90	8/90	6/91	6/92	8/93
White	625	491	320	470	440	255	177	216
Yellow	384	269	120	161	180	130	repaint	repaint

CONCLUSIONS

The thermoplastic dash lines showed significant snowplow damage. This was most likely aggravated by excessive thickness of the material when it was installed.

The thermoplastic material performed well as an edge line.

The epoxy material was performing well through two winters before it was inadvertently repainted. The epoxy definitely had more service life left, but its impossible to determine exactly how much more life.