

THERMOPLASTIC PAVEMENT MARKINGS

FINAL REPORT

Iowa Highway Research Board Project

HR-172

Iowa Department of Transportation
Highway Division
Office of Operations Research

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INTRODUCTION

It is difficult to maintain reflectorized lane markings on high-traffic, multi-lane highways. This is particularly true of sections in urban areas where there are frequent lane changes, such as on the Des Moines Freeway, I-235. In spite of the fact that the lane markings are painted on an average of three times a year, they are frequently absent during a considerable portion of the winter period.

In the summer of 1973, the office of Highway Maintenance suggested a research project using a new thermoplastic paint developed by the Prismo Universal Corporation. Because of difficulties in scheduling the work, a definite proposal was not submitted until 1974. Upon the recommendation of the Iowa Highway Research Board, the project was approved by the Iowa State Highway Commission on August 7, 1974.

APPLICATION

The contract with the Prismo Universal Corporation was for the application of a maximum of 150,000 linear feet of lane marking at \$0.15 per linear foot, to be applied in standard 15 ft. stripes in the bare pavement surface between the existing paint stripes. The thermoplastic stripes were to be applied on interstate and primary highways within Polk County and the Des Moines metropolitan area, especially on interstate route I-235.

The paint stripes were applied during the period from August 19 to August 28, 1974. A total of 145,020 linear feet was painted at a total cost of \$21,753. All equipment and materials were supplied by Prismo, including a large machine equipped for heating and applying the paint and the glass beads.

The thermoplastic was heated to a temperature in excess of 400° before being sprayed onto the pavement. The glass beads were applied immediately after the application of the paint. The thermoplastic hardened almost immediately, and it was not necessary to protect the stripes from traffic. The painting operations were observed by personnel from the Maintenance and Research offices. Highway Maintenance Foreman Edward Thornton accompanied the Prismo crew throughout the entire painting operation. He made frequent checks to ascertain that the thickness of the paint stripe was 0.025 in. thick with a tolerance of + or - 0.005.

PERFORMANCE

Maintenance personnel observed the thermoplastic paint at frequent intervals throughout the winter. They reported that the thermoplastic paint was not performing as had been expected. It was wearing away in areas where there is a large amount of lane changing by traffic, in much the same manner as our regular traffic marking paint.

A complete inspection of the thermoplastic paint stripes was made on May 13, 1975 by John Moody, Edward M. Thornton, Charles R. Pickett, and Stephen E. Roberts. Both Mr. Thornton and Mr. Pickett had observed the performance of the thermoplastic paint throughout the winter. The areas observed on May 13 were as follows:

1. U.S. 69 from the north part of Ankeny south to Jct. Iowa 160
2. U.S. 69 (E. 14th St. - Des Moines) from just north of I-80 south to Army Post Road and north from Army Post Road to I-235.
3. I-235 westbound from E. 15th St. to I-35/80 (west junction)
4. I-235 eastbound from I-35/80 (west junction) to I-35/80 (North Junction)
5. I-80 from I-235 eastbound to Hubbell Ave. (U.S. 65)

The thermoplastic lane lines on U.S. 69 from Ankeny south to the junction of U.S. 69 and Iowa 160 were badly worn with only traces remaining in some sections.

The thermoplastic lane lines on East 14th Street in Des Moines (U.S. 69) from I-80 to Army Post Road were also almost

completely worn away with only slight traces to be observed at intervals.

On the I-235 sections both westbound and eastbound the thermoplastic lines ranged from fair to poor. In the areas where there is a considerable amount of lane changing, such as the area from about Penn Avenue west to 31st Street, there were only traces of the thermoplastic paint remaining. In the areas further west, where I-235 is only two lanes in each direction, the paint was badly chipped and worn and a considerable portion of each line was missing. The best section of thermoplastic paint observed on I-235 was between East University and Euclid Avenue northbound. This is a two-lane section in each direction where there appears to be a minimum of lane changing by traffic.

In the section of I-80 from I-235 eastbound to Hubbell Avenue, the thermoplastic paint appeared worn but was still visible. Most of this section has three lanes. The best paint performance was observed in the lane line between the south (right) and center lanes.

The thermoplastic paint appears to wear in a somewhat different manner from the conventional lane marking paint. The thermoplastic lines appear as though the paint had chipped or flaked off in patches. The result is a broken or dotted line in some cases with the width being about $1/3$ or $1/2$ of the original $4\frac{1}{2}$ in. This suggested the possibility that the thermoplastic paint had been damaged and removed by snow plows. This was discussed in some detail with Thornton and Pickett. They called attention to the fact that if the wear were due to snow plowing, then the wear in the 2-lane sections of I-235 would have been as great as the wear in the 3-lane sections near downtown Des Moines, since the amount of plowing would be essentially the same in both sections. Attention was also directed to the fact that there was less snow plowing on East 14th Street than on I-235, yet the thermoplastic lines had been almost completely worn away on East 14th Street. This leads to the conclusion that the thermoplastic lane lines were lost due to traffic use rather than to snow plow operations. It is possible that the thermoplastic lines may have been particularly sensitive to wear by studded snow tires.

CONCLUSIONS

The thermoplastic paint was described by the manufacturer as being capable of lasting at least three times as long as the conventional traffic marking paint. The experimental installation of the thermoplastic lane lines in the Des Moines area was made in the hope that the greater durability of the thermoplastic paint would provide visible lane lines throughout the winter period. This hope was not realized. The thermoplastic paint, including application, costs about three times as much as the conventional paint applied by maintenance personnel. Although there were a few locations where the thermoplastic lines were still visible in varying degrees, none of the lines appeared to be of such quality that would permit their being used through another season without repainting.