Research Report
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EVALUATION OF STAMARK BRAND BISYMMETRIC 1.75 GRADE PAVEMENT MARKING TAPE

by

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16. Abstract

The objective of this project was to evaluate the performance of Stamark Brand Bisymmetric 1.75 Grade pavement Marking Tape (Series 320) on a large-scale installation on Interstate 24 in McCracken County. The evaluation consisted of periodic inspection of the tape to determine its durability, appearance, and reflectivity.

The tape has demonstrated good performance after two years in service. No durability problems were noted. While the appearance of the tape was not as bright as a typical traffic paint, it was adequate. The tape has maintained a high level of reflectivity. The performance of the material would potentially warrant additional use as longitudinal marking on moderate volume roadways. However, the cost of the tape must be considered in determining its use.

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INTRODUCTION

Pavement marking materials serve to provide guidance for motorists under all conditions of light and weather. Traditionally, traffic paints have been used as the primary material to delineate highways. However, in recent years many other more durable marking materials have been used. Pavement tape is one type of durable marking material which has been used. Several types of pavement tape are available. There is a continuing need to evaluate the various alternatives available that have the potential of improving roadway delineation.

One of the past disadvantages of pavement tapes in general has been a problem with maintaining reflectivity over an extended period of time. Various types of pavement tapes are available which provide different levels of performance for a range of costs. One such tape is manufactured by the 3M company. This product is marketed as Stamark Brand Pavement Tape, Bisymmetric 1.75 Grade (Series 320). It has been offered as a highway reflective tape designed for use as lane lines, edge lines, channelizing lines, and gore markings in areas of free rolling traffic. The tape contains 1.75 index glass beads for durability and high brightness. This tape is precoated with a pressure sensitive adhesive and is not designed to be easily removed after application. The manufacturer notes that damage will be caused by such factors as heavy trucks, high traffic volume, and excessive encroachment such that this tape has been proposed as medium durable pavement marking material.

The objective of this project was to monitor the performance of a large-scale installation of the bisymmetric type of pavement marking tape.

INSTALLATION

The test installation was placed on Interstate 24 in McCracken County, Kentucky between milepoints 0 and 3.2. This is a section of four-lane, divided interstate having an average daily traffic of approximately 20,000. The installation was placed in July 1989. The tape was placed in conjunction with a repaving contract (asphalt pavement) with the tape rolled in behind the paver. The tape was placed with an application apparatus pulled by a truck so that it was not applied by hand.

The installation consisted of placing four-inch white lane lines and edge lines, four-inch yellow edge lines, and eight-inch white gore markings. The total contract quantities were 55,866 linear feet of four-inch white, 46,726 linear feet of four-inch yellow, and 2,892 linear feet of eight-inch white tape. The cost was $0.65 per linear foot for the four-inch tape and $2.00 per linear foot for the eight-inch tape. The total cost of the tape installation was $72,468.80.

PROCEDURE

The evaluation consisted of periodic inspection of the tape to determine its durability, appearance, and reflectivity. The durability was evaluated by visually inspecting the installation to determine if any tape had been lost due to adhesion problems or if the tape was experiencing wear from the traffic. The appearance was both subjectively rated by visual observations and evaluated using a colormeter. The subjective appearance evaluation was based on a comparison of the color of the tape with the original color, taking into account changes due to such factors as yellowing, bleeding, darkening, fading, dirt collection, and mold growth. A Colorgard II Reflectometer was used for the colormeter data. The colormeter data are dimensionless with higher numbers representing a brighter line. The reflectivity data were collected using the Mirolux 12. The Mirolux 12 measurements were reported in units of millicandelas per square foot per footcandle (or millicandelas).

Six sets of data were collected during the evaluation process. Data were first obtained within a few weeks of completion of the installation. Data were then obtained periodically over a two-year period. The data were collected 3 months, 6 months, 12 months, 18 months, and 24 months after installation. Nighttime observations were also conducted.

RESULTS

Durability

No durability problems were noted during the two-year evaluation period. There were no instances of a failure of a section of the tape which would be related to a problem with adhesion. Also, there was no significant traffic wear of the tape. The installation consisted of lane lines, edge lines, and gore markings on a four-lane divided interstate having 12-foot lane widths so the amount of vehicle encroachment would be minimized. At the end of the two-year evaluation period, a close inspection revealed minor wear of the tape. Over 90 percent of the tape was still in place. This minor wear was not noticeable when driving on the roadway.

Appearance

No unacceptable appearance problems were noted. The only significant problem was tracking of asphalt on portions of stripes (especially the yellow edge line) which caused some discoloration. This occurred at the time of tape installation which was concurrent with the repaving. The white and yellow color of

this tape was not as bright as some tapes. Colormeter data are listed in Table 1. The colormeter data fluctuated somewhat throughout the evaluation period with no substantial reductions in readings.

The colormeter data would be considered acceptable. The only available comparison would be the requirements given in Section 831 of the Standardard Specifications for Road and Bridge Construction for the Kentucky Department of Highways. This section deals with reflective pavement marking tape and requires a minimum colormeter reading of 30 for white material and 20 for yellow material for a transverse line after six months in service. The values listed in Table 1 remain above these minimum values.

The values listed in Table 1 support the subjective opinion concerning the brightness of the tape. Specifically, while this tape is not as bright as some of the alternative marking materials, its color is adequate.

Reflectivity

Reflectivity data are presented in Table 2. The values listed in Table 2 show that reflectivity was maintained at a very high level after two years in service. There were fluctuations in the data over the two-year period but the tape did not show any substantial drop in reflectivity.

In some instances, there were large variations in measurements obtained during a given data collection period. For example, the data obtained two years after installation revealed a large variation as a function of whether the Mirolux was pointed in or opposite the direction of travel. A large amount of data was collected in these instances with the average reported. In each case, the measurements were so high that even the bottom of the range in reflectivity was much higher than what would be considered a minimum acceptable level. The minimum level listed in the Standard Specifications is 70 millicandelas per square foot per foot-candle while a value of 100 has also been used as a minimum. The data in Table 2 show that this tape maintains a very high level of reflectivity.

CONCLUSION

The Stamark Brand Bisymmetric 1.75 Grade Pavement Marking Tape has demonstrated good performance after two years in service. No durability problems were noted. While the appearance of the tape was not as bright as a typical traffic paint, the appearance was adequate. The tape has maintained a high level of reflectivity.

RECOMMENDATION

The Stamark Brand Bisymmetric 1.75 Grade Pavement Marking Tape was observed to perform well as lane delineation on an interstate highway having an average daily traffic of 20,000. The performance of the material would potentially warrant additional use as longitudinal marking on moderate volume roadways. However, the cost of the tape must be considered in determining its use. Other durable materials such as extruded thermoplastics have been observed to perform the same function (on asphalt pavements) for a lower cost. One example of a recommended use for this tape would be on moderate volume highways having a portland cement concrete (PCC) pavement. Pavement tape is the only durable marking material that has shown consistent durability on PCC pavements.

TABLE 1. COLORMETER DATA

	Type of Line		
Time in Service	**White Edge Line**	**White Lane Line**	**Yellow Edge Line**
New	45*	42	25
3 Months	37	36	21
6 Months	39	41	23
12 Months	31	34	21
18 Months	36	49	25
24 Months	33	39	22

* Numbers are dimensionless.

TABLE 2. REFLECTIVITY DATA

	Type of Line		
Time in Service	**White Edge Line**	**White Lane Line**	**Yellow Edge Line**
New	680*	590	430
3 Months	680	590	460
6 Months	700	620	500
12 Months	740	630	520
18 Months	770	570	500
24 Months	670	500	500

* Millicandelas per square foot per footcandle.