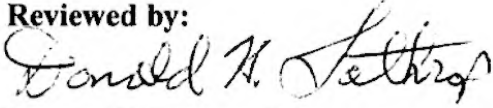


MATERIALS & RESEARCH

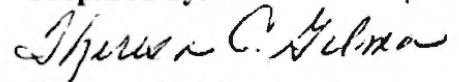
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January 10, 2003

RESEARCH UPDATE

U 2003-1

FIELD EVALUATION OF 3M™ SCOTCH-LANE™ WET REFLECTIVE REMOVABLE TAPE SERIES 750 (Final Report)

REFERENCES

Work Plan 2002-R-3

INTRODUCTION

In response to an increased public concern about the visibility of pavement markings on Vermont's highways, the Vermont Agency of Transportation has begun to actively pursue the evaluation of several new technologies that claim to enhance and improve the visibility of pavement marking lines under various conditions. These evaluations apply to both temporary and permanent pavement marking materials with respect to their adhesion, durability, retroreflectivity, and effectiveness in not only day and night, but under wet and dry conditions as well. The objective of this study is to evaluate one of these materials, 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750, a temporary marking material that is designed to provide improved nighttime visibility in wet weather conditions.

PRODUCT DESCRIPTION

Scotch-Lane™ Wet Reflective Removable Tape Series 750, manufactured by the Traffic Control Division of the 3M™ Company, Inc., of St. Paul, Minnesota, is a reinforced tape that utilizes wet reflective "enclosed lens optics." It is recommended that the pre-coated, pressure sensitive adhesive tape, be applied to a dry surface using a surface preparation adhesive, 3M™ Scotch-Lane™ P-50. Immediately after the placement of the material, the area can be open to traffic.

The product is recommended for the temporary application of longitudinal lines only.

PROJECT DESCRIPTION

The site chosen for the evaluation of the 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750 was located on the Middlesex-Bolton IM 089-2(26) project on Interstate I-89 in the Town of Waterbury. The tape was placed as part of a lane reassignment on a one-year old bituminous concrete pavement. A one-half mile segment of yellow material was placed on the left edge of the lane followed by a one-half mile segment of white material placed on the right edge of the lane. The offset of the marking materials allowed for observation of a wet reflective product along side a standard temporary tape.

COST

The cost of the 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750, on the Middlesex-Bolton IM 089-2(26) project was \$1.70 per linear foot. The original bid price for temporary tape on the project was \$1.25 per linear foot. The increased price for implementing a one-mile segment of the wet reflective tape was \$2,376, an increase of 36%.

INSTALLATION

On April 24, 2002, both the white and yellow Series 750 tape was placed on Interstate I-89 in Waterbury, Vermont. The material was located on the south end of the project, shortly beyond a one-lane shift crossover. The line striping subcontractor, Scott's Line Striping of Williston, Vermont, installed the temporary tape following the manufacturers installation procedures. Scott's applied the P-50 surface preparation adhesive followed by the use of a standard tape handcart applicator and tamping device. The average temperature during the time of application was approximately 48°F, slightly below the manufacturer's recommended minimum temperature requirement of 50°F.

Figure 1. 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750 after installation (butt-splice).

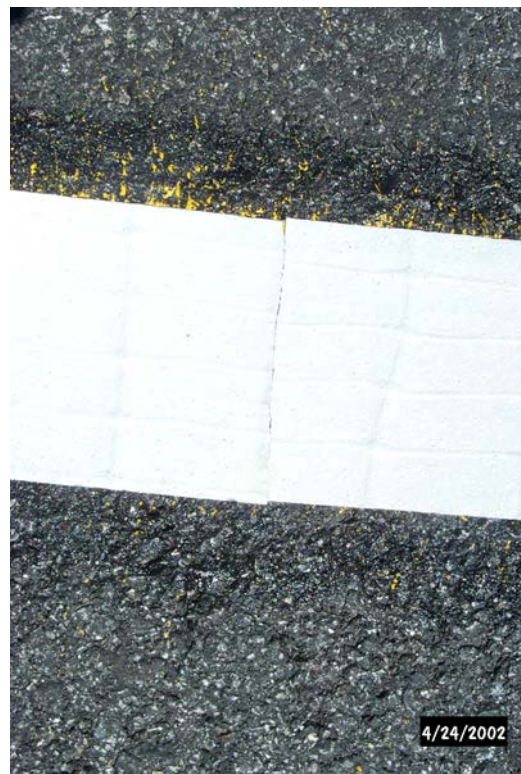




Figure 2. 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750 adjacent to non- wet reflective temporary tape.

PERFORMANCE

The performance of the 3M™ 750 series pavement marking material was evaluated based on its adhesion, durability, reflectivity, and the public's perception on its effectiveness. It was originally planned to have signs erected informing the public of the location of the experimental feature with a toll free number to provide feedback. Due to the short duration of the evaluation this was not done, rather, agency personnel evaluated the performance of the material under various weather conditions and reported the following:

- After six-months of service, the wet-reflective tape was observed during the evening hours under light rainfall. It was reported that the white line was noticeably brighter in the area of the 750, but little difference was detected in the yellow lines.
- On the evening of October 13, 2002, the 3M™ 750 series was observed under rain conditions. The 750 tape shined brightly, being visible for nearly one-tenth of a mile, whereas the standard temporary tape was barely visible.
- In dry conditions, both day and night, there was no discernable difference between the 3M™ 750 series tape and the standard temporary tape.

Retroreflectivity data was collected on the white material just prior to its removal using an LTL 2000 reflectometer. During the readings there was light snowfall and the pavement was wet. No data was collected on the yellow because of its earlier removal. The values on the 6 ½ month old material are presented in Table 1.

| Retroreflectivity – End of Service Life (White Material) 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750 | | | | | | |
|---|-----------------------|----------|----------|----------|----------|------------------------|
| Location | Reading Number | | | | | Average Reading |
| | 1 | 2 | 3 | 4 | 5 | |
| ~ MM 66.55 | 395 | 429 | 406 | 389 | 410 | 406 |
| ~ MM 65.83 | 577 | 554 | 431 | 397 | 489 | 490 |
| ~ MM 65.95 | 366 | 413 | 480 | 448 | 442 | 430 |
| Standard Temporary Tape (Control) | | | | | | |
| ~ MM 68.00 | 9 | 7 | 10 | 6 | 10 | 8 |

Table 1. End of Service Retroreflectivity Values – White Material

After 6 ½ months of service, the one-half mile segment of yellow tape remained well intact and only two small segments of the white material, approximately 60 feet in length each debonded. Both the white and yellow tape sustained the project’s life without maintenance and at the time of the material’s removal on November 1, 2002, each material pulled up easily in long-length segments.



Figure 3. 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750 prior to removal.

SUMMARY

After 6 ½ months of service, the 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750 proved to be an effective temporary marking material. Based on visual observations made by agency personnel, the incorporation of wet reflective “enclosed lens optics” aided in providing better delineation during wet nighttime conditions than the conventional temporary tape. Although there was no detectable visual difference in the material in dry conditions, both day and night, the material retained much higher retroreflectivity than the standard tape (See Table 1). And, in addition to differences measured in retroreflectivity, there was noticeable benefits in wet conditions.

A study done by the New Jersey Department of Transportation on this same product concluded that the product performed well with minimal loss of material during its eight month evaluation. They found the product to remove “with relative ease, typically without tearing, and left a clean surface.” As a result of its performance, NJDOT recommended its approval for use on long line applications and it is anticipated to be incorporated on ten upcoming construction projects.

Based on the performance of this product and comments from other states, 3M™ Scotch-Lane™ Wet Reflective Removable Tape Series 750 should be considered for use by the agency as an acceptable temporary tape with wet reflective characteristics.

DISCLAIMER

“The information contained in this report was compiled for the use of the Vermont Agency of Transportation. Conclusions and recommendations contained herein are based upon the research data obtained and the expertise of the researchers, and are not necessarily to be construed as Agency policy. This report does not constitute a standard, specification, or regulation. The Vermont Agency of Transportation assumes no liability for its contents of the use thereof.”