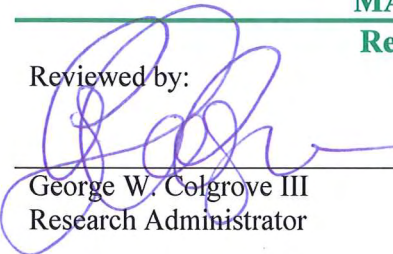

MATERIALS & RESEARCH SECTION

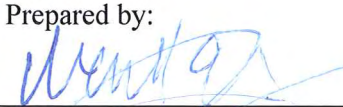
Research & Technology Implementation

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RESEARCH UPDATE

U2013-06

2013 Pavement Marking Data Collection Summary

INTRODUCTION

With increased network rehabilitation needs and ever increasing need to improve the safety of motorists under all weather conditions, it has become common practice by the Vermont Agency of Transportation (VTrans) to use various methods and products to extend the overall value of the roadway network. In recent years this has been accomplished through the use of preventative maintenance pavement treatments and durable pavement markings.

One type of preventative maintenance pavement treatment is paver-placed surface treatment (PPST) which comprises of a warm polymer modified asphalt emulsion coat, overtopped with an immediate placement of a thin hot mix asphalt (HMA) wearing course. PPST commonly used to correct rutting distresses in conventional pavements. Although the treatment does not provide a structural improvement in terms of traffic loading, it does result in a smoother ride and essentially eliminates rutting which can cause major travelling issues for motorists in wet weather events. Pavement markings failures on PPST have posed a significant safety concern.

In the past a double application of waterborne paint was used as permanent pavement markings on PPST however practice has shown that these markings typically do not last more than a few months. With VTrans' experience and familiarity with the use of durable markings in the 2012 construction season, surface applied polyurea was selected for use on two PPST projects in an effort to increase safety by providing motorists with brighter markings. Initial retroreflectivity readings of the line stripes in the projects were not collected at construction. To gage the long term effectiveness of the polyurea stripes, initial readings were collected on a new application of the same PPST and polyurea materials along the southbound lanes of Interstate 91 in Lyndon-Barton in 2013 to use for comparisons.

VTrans, together with its line striping contractors have been collaborating on means and methods to improve safety at intersection locations. Intersections have proven to be an exceptionally difficult area to maintain markings. Due to the stopping, starting and turning movements of vehicles, the markings at intersections receive an increased amount of wear and tear. In an effort to increase marking durability in these locations, the pavement marking manufacturers have developed a new class of enhanced durable permanent pavement marking tape. As part of the a large commercial project construction in St. Albans, there was a paving project where intersection pavement marking tape was used for long lines and standard permanent tape was used for symbols and legends. Research collected readings at three of the intersections which included long lines, stop bars, arrows, gore areas, and legends.

This update summarizes all surveillance and testing methods, data collection results, and associated findings to date.

PRODUCT DESCRIPTION:

Lyndon-Barton – Polyurea Line Stripes

The polyurea paint used in this project was Epoplex LS 90. Epoplex LS 90 is a two-component, 100% solids polyurea coating designed as a fast setting highway marking coating that provides durability and abrasion resistance. It is formulated to provide a simple volumetric mixing ratio of two volumes of “Component A” (amine) to one volume of “Component B” (isocyanate). The product can be applied to both cementitious and asphalt highway surfaces as a long-lasting striping material for both edging and center line markings, as well as all intersection markings. The manufacturer quotes the following advantages:

- 100% solids chemistry
- Low viscosity suitable for spray application
- Long-term abrasion and corrosion resistance
- Excellent bond strength assures good adhesion to a variety of substrates
- Special formulation chemistry for fast set at a wide range of temperatures
- 100% ultraviolet light stability
- High reflective qualities

LS 90 is applied using a specialized mobile truck mounted system capable of spraying both white and yellow polyurea through an airless static tube or impingement mixing guns according to Epoplex’s recommended proportions and be of sufficient size and stability with adequate hydraulic and air power supplies to produce lines of uniform dimensions. The equipment has high-pressure air blast cleaning system capable of cleaning the pavement immediately prior to applying the markings.

St. Albans - Durable Intersection Markings Tape

The intersection tape in this project was Brite-Line Technologies LLC Deltaline® HDX profiled tape for long lines, gore markings, and stop bars and ATM 400 for symbols.

Brite-Line claims that Deltaline® HDX profiled tape is a high performance durable pavement marking that also provides extended reflective performance not achievable from traditional markings. Deltaline® HDX is specially engineered for the more demanding intersection and crosswalk applications. The road may be opened to traffic immediately after application.

Advance Traffic Markings (ATM) claims that ATM 400 pavement marking tape provides exceptional durability in the most demanding traffic conditions. ATM 400 is recommended for longitudinal and transverse application in high traffic areas. The highly retroreflective tape offers superior visibility under all lighting conditions. The tape composite is thick (90 mil or 2.29mm); is resistant to wear and provides extended life over standard highway markings. Superior adhesive system minimizes tape movement in hot and cold climates. The ATM adhesive system

extends the application season typically shortened by marginal weather conditions.

CONSTRUCTION:

Lyndon-Barton – Polyurea Line Stripes

Epoplex LS 90 polyurea pavement markings were installed along Interstate 91 Southbound in Lyndon-Barton in conjunction with the Lyndon-Barton IM SURF (34) PPST preventative maintenance paving project. The markings were surface applied as specified at 25 mils (+/- 2 mils). The subcontractor who applied the markings was Liddell Brothers Inc. of Halifax, Massachusetts. The markings were applied in the section where data collection was completed on October 2, 2013.

St. Albans - Durable Intersection Markings Tape

The pavement marking tape was installed along US Route 7 in St. Albans, Vermont in conjunction with the JLD Properties of the St. Albans commercial project. The subcontractor who applied the markings was Scott's Line Striping of Williston, Vermont. The markings were applied in the section where data collection was completed the week of July 15th, 2013. Minimal information is currently available regarding the application is known due to the type of construction project. All construction information will be collected by the end of the evaluation.

PERFORMANCE:

Lyndon-Barton – Polyurea Line Stripes

Retroreflectivity readings in millicandelas per lux per meter squared (mcdl/lx/m²) from the first two visits on October 4th, 2013 and October 21st, 2013 have been:

- White Edge 467 and 473
- White Skip 443 and 482
- Yellow Edge 328 and 316

The markings are shown in Figures 3 and 4 below.



Figure 3: Yellow Edge Line.



Figure 4: White Edge Line.

St. Albans - Durable Intersection Markings Tape

The site has been visited monthly since installation. Figures 1 and 2 depict the markings below. Table 1 below summarizes these results.



Figure 1: ATM 400 Arrow.



Figure 2: Brite-Line Gore Marking and Long Line Markings.

Table 1 St. Albans Marking Retroreflectivity Summary (in mcdl/lx/m2)

Saint Albans - "The Wal-Mart Project"				
Product	Line Type	Date		
		7/30/2013	8/20/2013	9/30/2013
Briteline HDX	White Long	238	279	292
Briteline HDX	Yellow Long	165	164	203
ATM 400	Arrows	498	536	781
Briteline HDX	Yellow Gore	147	161	172
Briteline HDX	White Stop	312	266	185

FOLLOW-UP

All marking averages are acceptable values for this application type. In the early winter maintenance cycle, another set of readings will be taken following initial plowing and salting activities over the lines to determine the early age reduction in retroreflectivity due to some reflective optics getting sheared off. Periodic visits will also be made during the life of the lines.