

EXPERIMENTAL FEATURES CONSTRUCTION REPORT

**HOT LAID, PREFORMED,
PATTERNED STRIPING MATERIALS
OR 89-02 A & B**

Douglas Ave. - Parrott Crk. Road (Roseburg)
Hwy # 234 (SB)
Contract No. 10740

Clackamas/Boring Hwy. - 362nd Dr.
Hwy # 26
Contract No. 10726

By

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DISCLAIMER

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1.0 INTRODUCTION

This construction report covers two experimental feature installations of a Permanent, Hot Laid, Preformed, Patterned, Striping Material. The permanent striping material used on these experimental feature projects is a 3M product called, "Stamark Pliant Polymer Marking Tape, series A 350". The preformed, patterned, marking tape consists of white or yellow films with glass beads incorporated to provide immediate and continuing retroreflection. This helps improve marking visibility for drivers during night time and rainy driving conditions.

This study will evaluate the applications, reflectivity, durability and cost of the preformed striping material.

The first installation, (OR 89-02A) is on Highway #234 within the City of Roseburg from Douglas Avenue to Parrot Creek Road on the south-bound side of the couplet. This project was funded by the FHWA and Oregon DOT. There is significant cross traffic from commercial approaches and the maximum AADT is 10,000. The Maximum annual accident rate is 27.31 per million VMT.

The second installation, (OR 89-02B), also funded by the FHWA and Oregon DOT, is on Highway #26. The project limits are from the Clackamas/Boring Highway to 362nd Drive between MP 19.96 and MP 22.40. This is a rural 4-lane facility with an at-grade paved median. The AADT is 17,900 and the maximum annual accident rate is 0.72 per million VMT. This is a major access corridor from Portland to the Mt Hood Ski area with significant studded tire usage. The winter maintenance activities are greater here than is typical of the Western Oregon Valleys.

2.0 MATERIAL COMPOSITION AND REFLECTANCE

The retroreflective, pliant, polymer pavement markings consist of a mixture of high quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area with a reflective layer of beads embedded into the patterned surface.

Oregon Department Of Transportation specifications state that any tape used as longitudinal marking must meet the following reflectance standard specifications for initial and retained (after 4 Years) reflectance.

INITIAL REFLECTANCE *

White		
Entrance Angle	86.5 deg.	86.0 deg.
Observation Angle	1.0 deg.	0.2 deg.
Specific Luminance (MCD. FT. -2) 1FS-1)	400	700

Yellow		
Entrance Angle	86.5 deg.	86.0 deg.
Observation Angle	1.0 deg.	0.2 deg.
Specific Luminance (MCD. FT. -2)1FS-1)	300	500

* These reflectance values are based on dark room photometric readings per ASTM 4061.

MINIMUM RETAINED REFLECTANCE
(after 4 years)

	White	Yellow
Entrance Angle	86.5 deg.	86.5 deg.
Observation Angle	1.0 deg.	1.0 deg.
Specific Luminance ((MCD. FT. -2)1FS-1)	100	100

These reflectance specifications are for marking tape only. Oregon DOT does not require reflectance test on traffic line paint or for the glass beads mixed in with it. Instead they each have there own applicable specification.

3.0 INSTALLATION

On both of these projects the striping material was placed on new pavements between the intermediate compaction and final compaction of the top lift. A hand push-cart type striping material dispenser was used to place the striping material (see photo #1 in Appendix C). Once placed, the finish roller then made one pass over the tape in the direction of lay down to seat the tape (see photo #2 in Appendix C).

Douglas Avenue - Parrott Creek

The 3M striping material at this location was placed over a dense graded Class "B" Mix. A description of this class can be found in Appendix D. Here only the skip line was striped with the 3M white striping material. Paint was used to stripe the fog line and cross walk.

During the striping application there were some problems with the material dispenser. The tape would not feed properly through the dispenser, making start offs difficult.

The completion date of this project was September, 1989. Presently the 3M striping material is reported to be working fine. The project is two blocks from the Project Manager's office and his crew has had a chance to observe the striping material during a rainy night. They reported that the material works well and have not had problems with it. More information on this installation has been provided by John Read, Project Manager, in Appendix A.

The Clackamas/Boring Hwy. - 362nd Drive

The 3M striping material at this location was placed over an open-graded Class "F" Mix. A description of this class can be found in Appendix D. Both the yellow and white 3M striping material were used here. There were no problems encountered during placement of the striping material, and the finished striping looked very neat in appearance. The project was completed in August, 1989.

Since the installation sections of the yellow striping material have come up. It is not yet clear why this has happened. Initially it was reported to have happened after the first snow plow pass. Representatives from the 3M Corporation along with ODOT Research Personnel have visited the sight. Samples of the yellow material were taken from the pavement and sent back to the 3M labs for evaluation. The results will be covered in a future report. There has been no reported problems with the white striping material.

A more in depth discussion on the application procedure and cost are provided by Earl Mershon, Project Manager in Appendix B.

COST

Cost data for the striping materials have been supplied by both Project Managers and is presented in Appendix A and B. The initial cost difference between the conventional 4" paint stripe and the hot laid, preformed striping material are substantial. However, when you take into consideration the material's 4 year replacement warranty and the elimination of temporary striping, used during new paving, the cost becomes more comparable.

APPENDIX A

DOUGLAS AVENUE - PARROTT CREEK

CONTRACT NO. C10740

JOHN READ, PROJECT MANAGER, CREW 8030

HOT LAID PREFORMED PATTERNED STRIPING MATERIALS

Placing this stripping material requires close coordination between the paving and striping contractor and OSHD. Since the striping material is placed during the intermediate and final roll on the top lift, the striping layout must be determined prior to the paving so it can be laid out in a timely manner. This can take some time, especially in an urban setting where there are turn-out lanes and varying curb widths.

On this project, the time of application was discussed between the inspector and the contractor. The contractor said that, in his experience, if you applied the striping materials before you could touch the pavement with your bare hand, the striping would twist and warp under the force of the roller because the mat was too soft. This method of application lays on the inspector the responsibility of how the alignment looks; there are no second chances. There were no problems encountered on this project with the striping adhering to the pavement.

The striping contract utilized a string line to keep their layout of the striping material straight. It was then placed and rolled with a small hand roller. The striping material dispenser was a push-cart type device which held one roll of striping. There were quite a few problems with the dispenser. When they would start off, the tape would not feed so the tape would not start. After placement, it was rolled by the finish roller. This made the striping material flush with the pavement.

APPENDIX B

Report on Experimental Striping Material Experimental Feature Work Plan #89-02B

I. COSTS

Bid item cost for permanent striping = \$1.75/lin. ft. with 88,312.3 linear feet installed.

Unit cost of conventional 4" stripe (per Region 1 striping crew) is 0.17¢/lin. ft.

First year conventional stripe requires two applications @ 0.17¢ per lin. ft. = 0.34¢/lin. ft.

Assuming the conventional striping is repainted annually and assuming a 5% inflation rate, the time required to equal the initial expenditure on the experimental material is seven years.

II. CONSTRUCTION REPORT

3M's Stamark pliant polymer marking tape, series A350, was the material supplied to the job site.

Application procedure was as follows:

1. A guide line was painted by following a string line laid during finish rolling operations.
2. A hand operated cart capable of placing two rolls of striping tape simultaneously then applied the striping tape, after finish rolling was complete, and while the mat was still warm 100°-150°F.
3. The finish roller then made one pass over the tape in the direction of lay down to seat the tape.

Weather conditions during application ranged from 50° to 85°F, with one day shortened due to rain.

Because of the slow nature of the operation the finished striping tends to be very neat in appearance. No unusual problems were encountered with this product during construction.

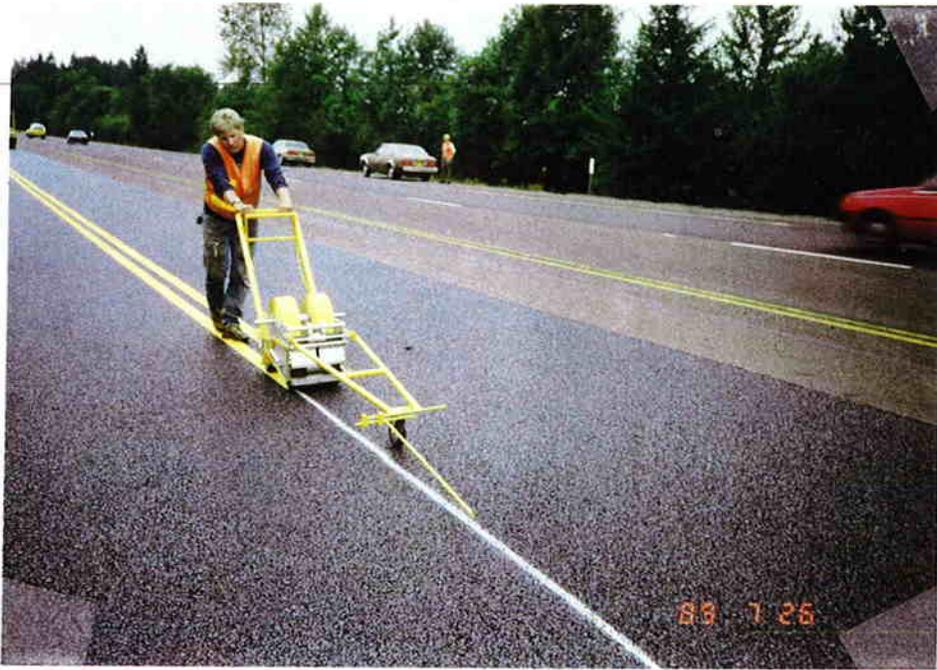
Enclosed are the Project Manager's Narrative and the Project Photography.



Project Manager



Project Inspector



(Photo #1 material dispenser)



(Photo #2 Roller makes one pass)

APPENDIX D

Mix Class Specifications For Large Projects

BROADBAND LIMITS

Sieve Size Passing	Class "B" Percentages of Total Aggregate (by weight)	Class "F" Percentages of Total Aggregate (by weight)
1"	99-100	99-100
3/4"	90-98	85-96
1/2"	75-91	60-71
1/4"	50-70	17-31
NO. 10	21-41	7-19
NO. 40	8-24	-
NO. 200	2-7	1-6
Asphalt Cement*	4-8	4-8
Mineral Filler		0.5-1.5

*Percent of total mix (by weight)