



Minnesota Department of Transportation

MEMORANDUM

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Date: July 26, 2005

To: District Engineers
District Area Maintenance Engineers
District Traffic Engineers
Striping Coordinators

From: Bernie Arseneau
State Traffic Engineer

Subject: 2005 Strategic Pavement Marking Plan

Technical Memorandum **No: 03-08-T-03**, dated May 2, 2003, Mn/DOT Policy for Pavement Marking Operations, requires the development of a comprehensive strategic pavement marking plan for Mn/DOT.

This plan is attached for your review and use. It is anticipated that this plan will be placed on our website and will be periodically updated to reflect the pavement marking needs of drivers in Minnesota.

I would like to thank each District Traffic Engineer and District Striping Coordinator for their assistance in the development of this plan. A special thanks goes to Brad Lechtenberg for his extraordinary assistance in coordinating the development of this plan with the annual maintenance striping operations.

Any questions related to the plan or any pavement marking activities can be address to either Jon Jackels, 651-634-5428 jon.jackels@dot.state.mn.us or Maggi Chalkline, 651-634-5432 margaret.chakline@dot.state.mn.us.

Attachment

cc: Marthand Nookala
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Mn/DOT STRATEGIC PAVEMENT MARKING PLAN

July 19, 2005

INTRODUCTION

Background

In 1995 Mn/DOT established a goal to provide an appropriate pavement marking on all highways, 365 days per year. To accomplish this goal Mn/DOT has:

- Conducted a customer focus group that determined acceptable minimum retroreflectivity readings for pavement markings
- Developed performance based specifications for pavement markings
- Centralized coordination of striping maintenance activities
- Established material and application policies
- Established a preventative maintenance pavement marking task force

Purpose

This strategic pavement marking plan is the next step in realizing the goal of obtaining uniform pavement markings across the state that meet or exceed Minnesota driver needs and expectations.

This plan takes into account the performance of various pavement marking materials and the need to invest wisely to provide durable pavement markings on high priority, heavy traveled roads.

Scope

This plan addresses all Mn/DOT pavement marking maintenance and construction activities for longitudinal and transverse markings on all Trunk Highways.

Organization

This strategic plan is presented with the following sections:

- Pavement Marking Responsibilities
- Materials
- New Initiatives
- Conclusion

PAVEMENT MARKING RESPONSIBILITIES

Pavement markings are a joint responsibility of Central Office and District operations. This section of the plan details the pavement marking responsibilities of these offices.

Central Office Responsibilities

Office of Traffic Security and Operations

The Pavement Marking Unit of the Office of Traffic Security and Operations (OTSO) is responsible for:

- Establishing and maintaining all pavement marking standards and guidelines for Mn/DOT.
- Evaluating new pavement marking materials including maintaining a Qualified Products List (QPL).
- Developing and maintaining all pavement marking material and installation specifications and requirements.
- Establishing, maintaining and communicating predictive models for pavement marking materials and methods to be used in managing the pavement marking infrastructure.
- Developing and maintaining a statewide strategic pavement marking plan.
- Developing inventory and infrastructure management methods, procedures, and best practices for inclusion in the plan.
- Providing leadership and technical support on the selection, application, maintenance and management of pavement markings.
- Providing information regarding state-of-the-art pavement marking materials, processes and equipment based on current research.
- Managing the operations of the statewide Laserlux crew.
- Insuring that there is at least one annual statewide pavement marking coordinator meeting.

Office of Maintenance – Central Business

The Striping Business Unit of the Office of Maintenance referred to as the business is responsible to maintain existing pavement markings to meet performance standards. The Business is responsible for:

- Maintaining pavement markings as requested by the districts, both annual and unforeseen requests, in the most timely, cost efficient manner possible.
- Tracking production, production rates, and costs (material, labor, equipment, etc.) related to pavement marking operations.
- Administering the financial, strategic, and administrative functions related to the business including:
 - Purchase contracts for materials.

- Staffing including having an updated MOU with the union and providing position requirements and a template for doing seasonal postings to the districts.
- Pricing of pavement marking.
- Generating invoices based on the amount of production completed in each District.
- Managing the stripers and related equipment. The districts will do the actual repairs and maintenance that the crews cannot complete and will be reimbursed by the business for this service in the form of credits to district striping invoices.
- Providing training for both latex and epoxy striping crews.
- Providing proper technical expertise to the striping crews in a timely fashion to assure the highest standards of quality and productivity.

The business will provide general management of the latex operations. This will consist of mainly strategic allocation of resources to assure timely completion of statewide pavement marking. The business will provide both general management and supervision of epoxy operations.

The Business Executive Board will be responsible for oversight of the striping business. They will typically meet to make decisions on mid level business activities. Members of the board will be:

Chair – AME - Gary Niemi

State Traffic Engineer - Bernie Arseneau

State Maintenance Engineer – Mark Wikelius

Maintenance Operations Engineer - Curt Gobeli

State Striping Coordinator - Brad Lechtenberg

Pavement Marking, Work Zone and New Products Engineer - Jon Jackels

Pavement Marking Engineer CO – Maggi Chalkline

Metro District Representative- Dave Schmidt

Outstate District Representatives- James Miles and Roger Hille

District Responsibilities

Districts are responsible for maintaining appropriate pavement markings on all highways and interstates 365 days a year. This includes construction and maintenance activities related to pavement markings.

To accomplish this, each district has identified a striping coordinator that is responsible for district pavement marking decisions, projects and priorities. A pavement marking striping coordinator is crucial to influence projects that effect pavement marking between construction, maintenance and traffic personnel. The coordinators identified by the districts are:

District	Coordinator
1	Jim Miles
2	Roger Hille
3	Gary Niemi
4	Oliver Kendall
6	Mike Schweyen
7	Marc Flygare
8	Allan Rice
Metro	Heather Lott

The district coordinators will be responsible for making requests to the OTSO Pavement Marking Unit for laserlux readings. The coordinators will also report all handheld retroreflectometer reading to the pavement marking unit so these readings can be added to the inventory data base and used for analysis of marking performance.

Support of Central Striping Business

Districts will lease support and traffic control equipment to the striping business for efficient and safe pavement marking operations. The business will reimburse the districts for this service at established MnDOT rental rates in the form of credits to district striping invoices.

Material handling and storage for the central business is a district responsibility for which they will be reimbursed from the business by credits to their striping invoices.

The districts that have strippers based within their boundaries are responsible for doing the seasonal postings required to fill the pavement marking positions. The seasonal striping positions will be filled from the district's workforce.

The districts will provide daily work planning and supervision for latex pavement marking. Those districts that supply a crew will be reimbursed for supervision and administrative expenses by the business in the form of credits to their striping invoices.

Construction

Construction or reconstruction projects should always use technical memorandum pavement marking requirements unless granted a design exception by Mn/DOT's State Traffic Engineer. Construction project engineers will provide striping information to the Pavement Marking Unit by submitting the project striping log. This information will be used to update the pavement marking inventory and for quality assurance measures. Project Engineers are responsible for the quality of all pavement markings installed by private striping contractors.

MATERIALS

Requirements

Material requirements for pavement markings are detailed in Technical Memorandum No. 03-08-T-03, dated May 2, 2003, titled "Mn/DOT Policy for Pavement Marking Operations".

New Products

The evaluation and approval process for new pavement marking materials is included in **Technical Memorandum No: 03-20-T-05, dated** August 11, 2003, titled "Traffic Control and Safety Product Evaluation Process and Qualified Products List". This procedure is detailed further on OTSO's website.

NEW INITIATIVES

Inventory and Maintenance Requests

The inventories provided by each District are being combined into a single pavement marking database and GIS map. This data will be maintained and updated annually by OTSO's Pavement Marking Unit with districts' help and cooperation. This update will be accomplished by including all new construction and maintenance striping. The work plan for the central maintenance striping business will be used to incorporate revisions made by maintenance activities. Performance measures collected by the central office laserlux van and district handheld retroreflectometers will also be used to insure accuracy of this data.

The OTSO Pavement Marking Unit in cooperation with the central business will prepare a proposed pavement marking maintenance striping request prior to each pavement marking season for each district. This annual request will be based on the existing state pavement marking inventory, predictive pavement marking modeling, pavement marking service life expectations, and laser and handheld retroreflectometer performance data. This proposed plan will then be reviewed, revised and approved by each Striping Coordinator by taking into account construction and maintenance activities, remaining service life of the roadway surface and other factors including anticipated costs.

Meeting goals of tech memo

Technical Memorandum No. 03-08-T-03 required each District to develop an implementation schedule to achieve the material goals on all Trunk Highways before December 31, 2007.

Since all roadways will not be resurfaced before the end of 2007 and the tech memo requirements do not require tape to be used on roadways with less than 6 years of

surface life, it is cost prohibitive and impractical to implement the provisions of the tech memo without modification. The following criteria were used to estimate costs to meet these material goals:

- Two Lane Two Way Highways with ADT >1500 (non IRC) that have Latex will be retrofitted with Epoxy markings.
- Interregional Corridors and Multi-Lane Highways that have Epoxy or Latex markings and a concrete surface that has been placed since 1994, will be retrofitted with Tape Centerlines and Epoxy Edgelines.
- Interregional Corridors and Multi-Lane Highways that have Latex markings and a Bituminous Surface, or a Concrete Surface installed before 1994, will be retrofitted with Epoxy markings.

To minimize budget impacts, some removal of existing markings will not be performed. Therefore, all markings shall be placed in the following manner:

- Broken Lines shall be tagged to the existing marking, extending the length of the segment.
- Solid Lines will be placed on the traveled lane side of the existing line, doubling the width of the line.
- No Passing Zone existing markings must be removed and the new markings installed in its place.

The Pavement Marking Unit of OTSO met with each district in September 2004 to identify the sections that needed to be retrofitted. Sections were removed if they met any of the following criteria:

- The section currently has the Tech Memo required pavement marking installed.
- The section is scheduled for resurfacing.
- The roadway surface in a poor condition.

The cost of this retrofit are reflected in the chart below. OTSO and the Districts agree that these are the sections should be retrofitted.

In developing the estimated costs, the following prices were assumed (based on actual bid prices for 2003 and 2004):

- Epoxy = \$0.15 per foot
- Tape – Grooved in = \$2.86 per foot
- Marking Removal = \$0.17 per foot

The total retrofitting costs for 2005 - 2007 by district are as follows:

District	Retrofit to Epoxy		Retrofit to Tape/Epoxy*			Total District Cost
	2L2W Centerline Miles	Marking and Removal Cost	Centerline Miles		Marking and Removal Cost	
			2L2W	Multi-Lane		
1	0	\$0	0	0	\$0	\$0
2	0	\$0	0	5	\$30,202	\$30,202
3	26	\$53,402	1	12	\$77,014	\$130,416
4	156	\$323,594	0	25	\$149,921	\$473,515
6	88	\$197,397	61	165	\$924,936	\$1,122,333
7	0	0	9	15	\$102,000	\$102,000
8	130	\$270,962	53	0	\$134,722	\$405,684
Metro	151	\$314,128	0	177	\$768,352	\$1,082,480
Total	551	\$1,159,483	124	399	\$2,187,147	\$3,346,630

Total Retrofit Cost = \$3,346,630

* The marking and removal cost is for Tape/Epoxy if the surface is Concrete 1994 or newer, or Epoxy if the surface is not Concrete 1994 or newer and does not currently have Epoxy markings in place.

Through the construction program and this proposal Mn/DOT highways will be in substantial compliance with the materials requirement of the tech memo by the end of 2007.

Centralized Message Markings

The central business is investigating combining all message marking maintenance into the business and provide this service to the districts beginning in 2005.

Preventive Maintenance

A task force has been formed to address the relationship between pavement preventive maintenance and pavement markings. The results of these activities will be published as best practices. It is anticipated the task force co-chairs, Jerry Geib and Jon Jackels will continue to monitor and improve these best practices as they evolve.

CONCLUSION

The OTSO Pavement Marking Unit will continue to work with the central business and district operations to improve pavement markings on Trunk Highways. This strategic plan will be updated as necessary to reflect these changes and improvements.