

# Local Agency Pavement Marking Plan

tech transfer summary

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## RESEARCH PROJECT TITLE

Local Agency Pavement Marking Plan

## SPONSORS

Iowa Highway Research Board (IHRB  
Project TR-551)  
Iowa Department of Transportation  
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The mission of the Institute for Transportation (InTrans) at Iowa State University is to develop and implement innovative methods, materials, and technologies for improving transportation efficiency, safety, reliability, and sustainability while improving the learning environment of students, faculty, and staff in transportation-related fields.

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Providing good pavement markings is an essential component toward safe and efficient travel on Iowa's public roadways.

## Objective

The goal of this research is to assist local agencies in providing effective and consistent pavement markings on Iowa's public roadways, improving both the safety and the quality of travel for the public.

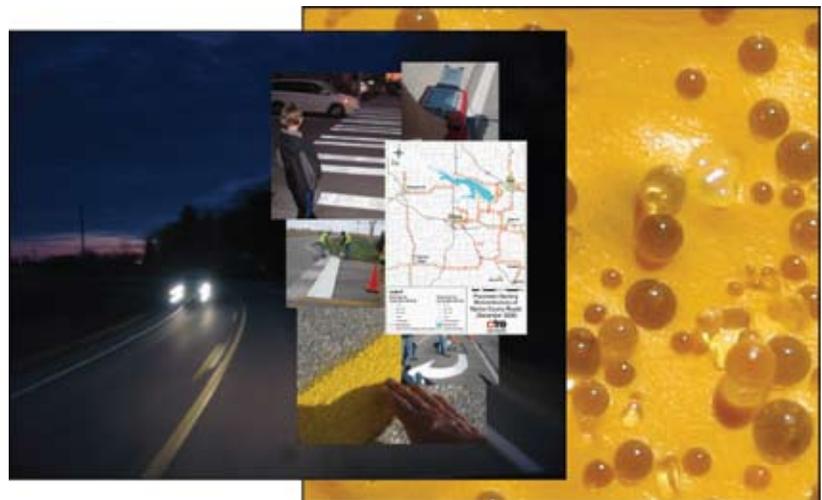
## Problem Statement

On April 22, 2010, the Federal Highway Administration (FHWA) published a notice of proposed amendments (NPA) for the Manual on Uniform Traffic Control Devices (MUTCD) regarding pavement marking retroreflectivity. The proposed revisions would establish a uniform minimum level of nighttime pavement marking performance, based on the visibility needs of nighttime drivers. The proposed revisions will promote safety, enhance traffic operations, and facilitate comfort and convenience for all drivers, including older drivers.

Given the relatively short life that pavement markings have, in terms of an agency asset, and the lack of performance benchmarks, it has been convenient, up to this point, for many agencies to simply refresh all markings on a cyclical basis. However, with the anticipated amendments to the MUTCD, agencies will need to have a maintenance method in place to manage pavement marking performance at a given benchmark.

## Agency Requirements

- Understand the performance of their markings
- Be able to set goals to achieve compliance
- Develop the ability to trigger corrective action when performance fails to meet expectations



*MUTCD revisions will establish a uniform minimum level of pavement marking performance, based on the visibility needs of nighttime drivers*

The FHWA proposes a phase-in compliance period of four years, or the fall of 2014, for implementation and continued use of a maintenance method that is designed to maintain pavement marking retroreflectivity at or above the established minimum levels.

Once the rulemaking process is completed, each local agency will be responsible as follows.

- Implement a maintenance method that will maintain marking retroreflectivity levels
- Take actions to assure that all pavement markings meet the established minimum levels

The proposed FHWA amendments to the MUTCD will change the way local agencies manage their pavement markings and place a focus on pavement marking quality and management methods.

## Research Description

The research demonstrates a reliable and practical process for viewing, understanding, and making decisions about pavement marking needs, durability, and quality.

The research team, in conjunction with the project technical advisory committee, completed these tasks:

- Surveyed current pavement marking practices for local Iowa agencies
- Demonstrated new tools to manage pavement marking retroreflectivity through five demonstration studies
- Demonstrated the performance of different pavement marking products of interest to local agencies

## Key Findings

### Survey of Current Practice

Local agencies will continue to rely on both in-house crews and private contractors for pavement marking maintenance. Decisions regarding pavement marking materials, and the frequency of application, will be more of a challenge following the final FHWA rulemaking on minimum thresholds.

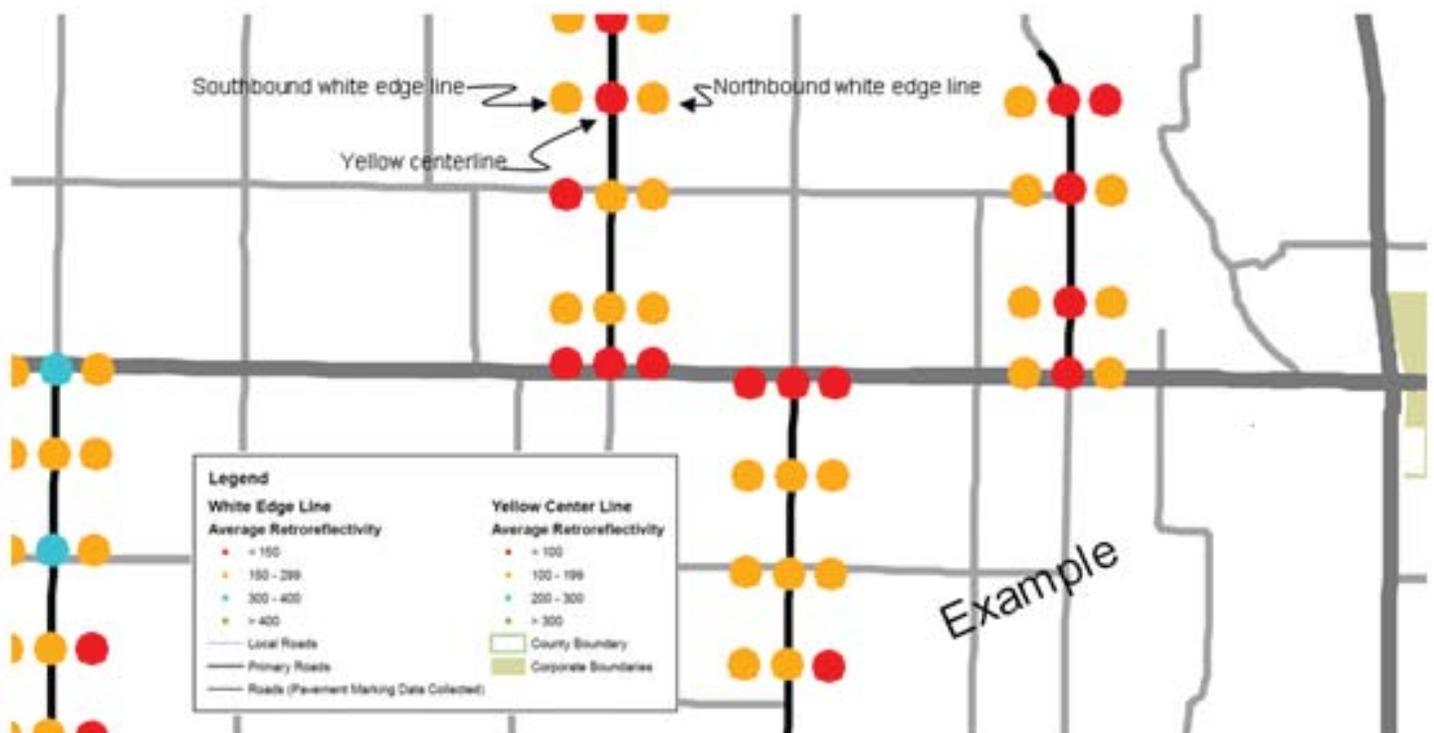
### Pavement Marking Management Tool

Case studies were completed for two cities and three counties, representing different pavement marking installation practices. Maps were produced in a geographical information system (GIS) environment to show the pavement marking retroreflectivity conditions by line type and time period. The report provides a discussion of map formatting, marking performance thresholds, and the overall utility provided.

### Pavement Marking Field Demonstrations

In an effort to support agency decision making, the research team identified reasonable pavement marking alternatives to field demonstrate under local agency conditions. The demonstrations were divided into two categories: longitudinal and transverse markings.

*Longitudinal Marking Demonstrations* - These two demonstrations provide local agencies with high-build waterborne paint performance examples under two very different conditions, urban and rural. Each setting included both grooved and surface-applied marking segments, so performance could be compared.



Sample case study map showing pavement marking retroreflectivity for yellow centerline and northbound and southbound white edge lines

Under urban conditions, the white skip lines performed for 2 years. The left-turn channelizing lines were still acceptable beyond 2.5 years.

In the rural two-lane roadway setting, the grooved edge-line pavement markings performed beyond 2.5 years, in contrast to the surface-applied edge-line and center-line markings, which did not perform beyond 1 year.

The demonstrations highlight the need to monitor pavement marking performance by line type, given the variation in performance. These examples are a beginning point for agencies in considering their material selection options over the wide variety of pavement marking materials and installation techniques that are available.

*Transverse Marking Demonstrations* - The heat-in-place, precut, thermoplastic markings were installed across central Iowa and in a variety of settings, beginning in 2007 and ending in 2009. With a few exceptions, this type of durable marking provided agencies with more than 2 years of effective performance, in contrast to annual painting with waterborne paint.

After 2 winters, some left-turn-arrow markings had retro-reflectivity readings of more than 300 millicandelas (mcd), regardless of surface type. The life of these markings can be further extended through patching the damaged areas.

Concrete surfaces require the use of a primer, which can slow the installation process, and more failures occurred on concrete surfaces than on asphalt. The cooling time for these markings can be accelerated, versus waiting for paint to dry, in humid and cloudy conditions.

## Implementation Benefits

With a national pavement marking minimum performance threshold and tools for local agencies to manage marking thresholds, the goal of promoting safety, enhancing traffic operations, and facilitating the comfort and convenience for all drivers is attainable and will appropriately begin at the local level.



*Transverse marking wear and snow plow damage*



*Transverse marking installation and performance demonstrations*

## Implementation Readiness

As the adage goes, “What gets watched... gets done.”

### Get Organized

- A clear strategy serves as an organizational magnifying glass, from the ground up. Develop a maintenance method that clearly, and as simply as possible, shows pavement marking conditions, compliance to a benchmark, improvement actions selected, and costs. Selecting a champion to see this initiative through is critical.

### Measure and Monitor

- Understand pavement marking performance and annual needs. Begin conducting an annual nighttime survey for pavement marking retroreflectivity and a daytime survey for presence.

If a pavement marking retroreflectometer is available, measure marking performance on a consistent basis. Storing this information within a GIS database allows for easier review and decision making and serves as a tool to communicate striping needs.

### Develop a Strategy

- To support funding, develop an agency guideline for pavement marking performance and material selection, specific to local conditions.

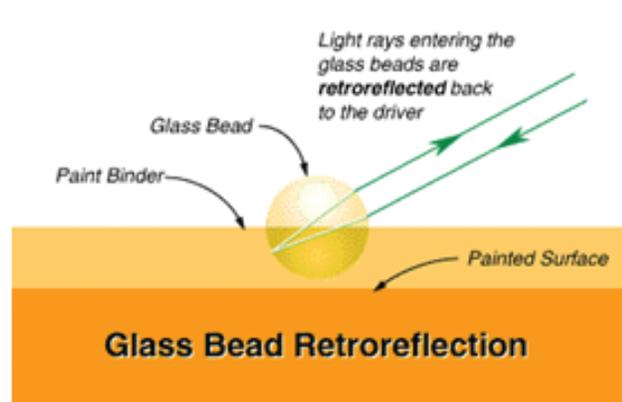
- For roadways having a remaining service life of at least five years, higher traffic volumes, and a history of not keeping a pavement marking line for 12 months, consider more durable pavement marking materials, such as high-build waterborne paint, epoxy, polyurea, or tape, and consider grooving these markings in, to extend their performance.

### Consider your Options

- Multi-agency agreements provide agencies of all sizes the advantages of larger quantity pricing and consistent material and installation specifications, and ease the burden of the contracting and/or dispute-resolution process. These agreements can be with a private contractor or another local agency.

### Communicate Effectively

- As part of an annual pavement marking contract, agencies can rank pavement marking placement by developing installation maps that are given priority throughout the paint season.
- Have agency staff monitor the quality and quantity of contractor-applied markings.
- Track material installation by date, line, and quantity, and record these in a tabular format, so the information can be used to make more effective decisions each year.



*Light rays are retroreflected back to the driver (Federal Highway Administration HIGHWAY TECHNET)*