Signing and Pavement Marking Retroreflectivity

Greg Schertz
FHWA Retroreflectivity Team Leader
Overview of Sign Retroreflectivity Requirements
  - What Changed and What Did Not?
  - Allowed “Methods”
Common Questions
Pavement Marking Rulemaking
The Manual on Uniform Traffic Control Devices (MUTCD), which is published by the FHWA, is recognized as the national standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel.


MUTCD Introduction (Compliance Dates):

<table>
<thead>
<tr>
<th>Provision</th>
<th>Compliance Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation and continued use of an assessment or management method that is designed to maintain traffic sign retroreflectivity at or above the established minimum levels</td>
<td>January 22, 2012 – June 13, 2014</td>
</tr>
<tr>
<td>Replace identified regulatory, warning, ground-mounted guide signs (except street-name)</td>
<td>January 22, 2015</td>
</tr>
<tr>
<td>Replace identified street name &amp; overhead guide signs</td>
<td>January 22, 2018</td>
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</table>
MUTCD Requirements

**MUTCD Section 2A.08 Standard:**
Public agencies or officials having jurisdiction shall use an assessment or management method that is designed to maintain sign retroreflectivity at or above the minimum levels in Table 2A-3.

Table 2A-3 Minimum Maintained Retroreflectivity Levels¹

<table>
<thead>
<tr>
<th>Sign Color</th>
<th>Sheet Type (ASTM D4956-04)</th>
<th>Additional Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beaded Sheeting</td>
<td>Prismatic Sheeting</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>White on Green</td>
<td>W⁺⁺; G ≥ 7</td>
<td>W⁺⁺; G ≥ 25</td>
</tr>
<tr>
<td>Black on Yellow or Black on Orange</td>
<td>W⁺⁺; G ≥ 7</td>
<td>W ≥ 120; G ≥ 15</td>
</tr>
<tr>
<td>White on Red</td>
<td>Y⁺⁺; O⁺⁺; Y ≥ 50; O ≥ 50</td>
<td>Y ≥ 75; O ≥ 75</td>
</tr>
<tr>
<td>Black on White</td>
<td>W ≥ 35; R ≥ 7</td>
<td></td>
</tr>
</tbody>
</table>

¹ The minimum maintained retroreflectivity levels shown in this table are in units of cd/lix/m² measured at an observation angle of 0.2° and an entrance angle of -4.0°.
² For text and fine symbol signs measuring at least 1200 mm (48 in) and for all sizes of bold symbol signs
³ For text and fine symbol signs measuring less than 1200 mm (48 in)
⁴ Minimum Sign Contrast Ratio ≥ 3:1 (white retroreflectivity ÷ red retroreflectivity)
* This sheeting type shall not be used for this color for this application.
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</tr>
<tr>
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MUTCD Section 2A.08 Standard:
Public agencies or officials having jurisdiction shall use an assessment or management method that is designed to maintain sign retroreflectivity at or above the minimum levels in Table 2A-3.

MUTCD Section 2A.08 Guidance:
Except for those signs specifically identified in Paragraph 6, one or more of the following assessment or management methods should be used to maintain sign retroreflectivity.
• Visual Nighttime Inspection **Method**, using
  • Comparison Panel **Procedure**, or
  • Calibration Signs **Procedure**, or
  • Consistent Parameters **Procedure**

• Measured Sign Retroreflectivity **Method**

• Expected Sign Life **Method**

• Blanket Replacement **Method**

• Control Signs **Method**
• Visual Nighttime Inspection Method
  • Uses trained personnel to observe traffic signs during the nighttime
  • Key to this method is using an approved procedure to tie the inspection to the minimum values in Table 2A-3
• Comparison Panel Procedure
• Calibration Signs Procedure
• Consistent Parameters Procedure
Methods and Procedures

Sign Retro Requirements

• Visual Nighttime Inspection Method
  • Comparison Panel Procedure
    • Comparison panels are near values in Table 2A-3
    • Trained inspector views roadway signs at night
    • Comparison panels are clipped to marginal signs
    • Trained inspector views panel/sign with flashlight
    • If sign appears less bright than panel, sign is replaced.
  • Calibration Signs Procedure
  • Consistent Parameters Procedure
• **Visual Nighttime Inspection Method**
  - Comparison Panel Procedure

• **Calibration Signs Procedure**
  - Calibration Signs are near values in Table 2A-3
  - Inspection conducted at night
  - Trained inspector views calibration signs just prior to inspection to “calibrate” eyes as to appearance of signs at minimum values
  - Inspector drives roads, noting signs that appear less bright than calibration signs appeared
  - If sign appears less bright than calibration sign, replace sign
  - Consistent Parameters Procedure
• **Visual Nighttime Inspection Method**
  • Comparison Panel Procedure
  • Calibration Signs Procedure

• **Consistent Parameters Procedure**
  • Duplicate “parameters” used in retroreflectivity research
    • Design vehicle (SUV or pickup inspection vehicle)
    • Design driver (60+ years old inspector)
  • Trained inspector views signs at night
  • If sign does not appear to have adequate retroreflectivity to meet their driving needs, replace sign
• Visual Nighttime Inspection

• Measured Sign Retroreflectivity Method
  • Measure each sign with a retroreflectometer
  • Replace signs that don’t meet values in Table 2A-3

• Expected Sign Life

• Blanket Replacement

• Control Signs
Methods and Procedures  

**Sign Retro Requirements**

- Visual Nighttime Inspection
- Measured Sign Retroreflectivity
- Expected Sign Life Method
  - Determine sign life for type of sheeting used
  - Track age and type of sheeting for each sign
  - Replace each sign before expected end of service life
- Blanket Replacement
- Control Signs
• Visual Nighttime Inspection
• Measured Sign Retroreflectivity
• Expected Sign Life
• Blanket Replacement Method
  • Replace all signs in a group (area, corridor, etc) before they are below minimum values in Table 2A-3
  • Replace that same group again prior to expected end of service life
• Control Signs
Methods and Procedures

Sign Retro Requirements

- Visual Nighttime Inspection
- Measured Sign Retroreflectivity
- Expected Sign Life
- Blanket Replacement
- Control Signs **Method**
  - When a group of signs are replaced, designate a subset of those signs to be the “control” signs
  - Track retroreflectivity of the control signs
  - When retroreflectivity of control signs reaches values in Table 2A-3, replace all signs in the group.
Methods Review

Sign Retro Requirements

- Visual Nighttime Inspection Method
  - Comparison Panel Procedure
  - Calibration Signs Procedure
  - Consistent Parameters Procedure
- Measured Sign Retroreflectivity Method
- Expected Sign Life Method
- Blanket Replacement Method
- Control Signs Method
- Or a combination of Methods
### Summary of Sign Retroreflectivity Maintenance Methods

A method must be implemented and in use by January 2012.

<table>
<thead>
<tr>
<th>ASSESSMENT METHODS</th>
<th>EQUIPMENT NEEDS</th>
<th>INSPECTOR REQUIREMENTS</th>
<th>TIME DEMANDS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration Signs</td>
<td>Any</td>
<td>(1)</td>
<td>Any</td>
</tr>
<tr>
<td>Composition Panels</td>
<td>Any</td>
<td>(1)</td>
<td>Any</td>
</tr>
<tr>
<td>Consistent Parameters</td>
<td>PU or SUV</td>
<td>(1)</td>
<td>60+</td>
</tr>
<tr>
<td>Measured Retro</td>
<td>(1)</td>
<td>(2)</td>
<td>Any</td>
</tr>
</tbody>
</table>

- (1) Not required in MUTCD, but might be beneficial
- (2) Need training on operation of retroreflectometer

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<th>MANAGEMENT METHODS</th>
<th>Equipment Needs</th>
<th>Inspector Requirements</th>
<th>Time Demands</th>
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<tr>
<td>Expected Sign Life</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blanket Replacement</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Signs</td>
<td>(1)</td>
<td>(2)</td>
<td>Only Control Signs</td>
</tr>
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</table>

Means “required”
• What About Pavement Marking Retroreflectivity??
Report on DOT Significant Rulemakings

Overview

The Significant Rulemakings Report provides a summary and the status for all significant rulemakings that DOT currently has pending or has issued recently. We update the Report at the beginning of each month. The information in the Report is not intended to commit DOT to specific conclusions or actions. For example, after further analysis, DOT may decide the effects of the rule would be different or it may decide to terminate the rulemaking.
24. **Pavement Markings**

**Popular Title:** Pavement Markings  
**RIN 2125-AF34**  
**Stage:** SNPRM  
**Previous Stage:** NPRM: Publication Date 4/22/2010; End of Comment Period 8/20/2010.  

**Abstract:** This rulemaking would amend the Manual on Uniform Traffic Control Devices, incorporated by reference in 23 CFR part 655, subpart F, to include standards, guidance, options, and supporting information relating to maintaining minimum levels of retroreflectivity for pavement markings on all roads open to public travel. We originally scheduled publication of a final rule for 12/30/2011. A supplemental NPRM had been scheduled for 05/14/2012.

**Effects:**  
None

**Prompting action:** Statute  
**Legal Deadline:** None  
**Rulemaking Project Initiated:** 12/07/2009  
**Docket Number:** FHWA-2009-0139

**Dates for SNPRM:**

<table>
<thead>
<tr>
<th>Milestone</th>
<th>Originally Scheduled Date</th>
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<th>Actual Date</th>
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<tr>
<td>To OST</td>
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<td>07/31/2014</td>
<td>08/04/2014</td>
</tr>
<tr>
<td>To OMB</td>
<td>02/06/2012</td>
<td>09/04/2014</td>
<td></td>
</tr>
<tr>
<td>OMB Clearance</td>
<td>05/07/2012</td>
<td>12/04/2014</td>
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</tr>
<tr>
<td>Publication Date</td>
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<td>12/10/2014</td>
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<td>End of Comment Period</td>
<td>07/14/2012</td>
<td>02/10/2015</td>
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**Explanation for any delay:** Additional coordination necessary

**Federal Register Citation for SNPRM:** None
## Pavement Marking Retroreflectivity Rulemaking

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Common Questions
**Does the MUTCD still require replacing signs based on retroreflectivity?**

**Yes.** Signs identified through an agency’s method as being below the minimum established retroreflectivity levels have exhausted their useful service life and need to be replaced.

Schedules for replacing the signs should be based on resources and relative priorities.
What about guide signs, including street name signs?

*Do they have to meet minimum retro requirements?*

**Yes.** The standards for minimum retroreflectivity requirements still apply to guide signs. There is no compliance date for including guide signs in your method. However, agencies are expected to add these signs to their method as resources allow.
I’ve heard that I am not supposed to use Engineer Grade sheeting. Is that true?

Engineering grade sheeting (ASTM Type I) is no longer to be used for warning signs (yellow or orange backgrounds) or the white legend on guide signs.

It can be used for other sign applications, although it may not be the most cost-effective choice.
Can we inspect signs during the day to avoid overtime costs associated with nighttime inspection?

Not if your agency is using the nighttime visual inspection method listed in the MUTCD. The measurement method can be performed in daylight.

The MUTCD allows development of other methods, as long as they are based on an engineering study that tie the method to the minimum retroreflectivity levels.
If I use the Nighttime Visual Inspection Method, what are the requirements for the inspector?

The MUTCD requires a trained inspector for nighttime visual inspection, but does not specify training requirements.

It is important that your inspector understand how to perform the specific procedure in order to identify signs falling below or near the minimum level.
We’ve been using nighttime visual inspections for a couple decades. Can I continue our system?

There are three very specific procedures that should be followed for your “nighttime visual inspection” method to comply with the MUTCD. You need to follow one or more of those procedures so that the inspection has a “tie” back to the minimum values in the MUTCD table.
I heard a rumor that I have to turn in my retroreflectivity documentation annually to my FHWA Division office for approval. Is that true?

No. FHWA does not require that you submit documentation – annually or under any other timeframe. It is, however, advisable for an agency to document their method and activities in managing sign retroreflectivity, and maintain this documentation.
My agency has a very limited budget to meet these regulations. Do you have any suggestions for cost-effective means of complying?

This will vary significantly from agency to agency. Selecting the most appropriate method for your agency is a key factor in the overall cost.

One cost-saving measure that applies to many agencies is to review their inventory for signs that should be removed from the system.
What happens if?

• Just like other standards in the MUTCD, there is no specific penalty spelled out.
• Just like for not using red STOP signs, you are exposed to potential liability if you don’t follow the MUTCD.
• Possibility of risking your access to federal and state funding.
Summary

• Sign retro standard in place
  – Deadline already passed
  – Must have a “method” in place and be following it
  – Specific procedures for each method

• Pavement Marking Retro Standard
  – Supplemental Notice of Proposed Rulemaking (SNPA) expected in December
Thank you for attending!

- MUTCD Website: [http://mutcd.fhwa.dot.gov](http://mutcd.fhwa.dot.gov)
- Nighttime Visibility Website: [http://www.fhwa.dot.gov/retro](http://www.fhwa.dot.gov/retro)
  - Regulations/Standards
  - Technical Guidance
  - Implementation Tools
  - Frequently Asked Questions
  - Research
- Pavement Marking Schedule

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