

# Moving Forward

A Winter Workshop for Contractors, Consultants, Designers,  
Municipalities, and Developers  
February 17, 2009



New MUTCD  
Requirements for  
Sign Retroreflectivity



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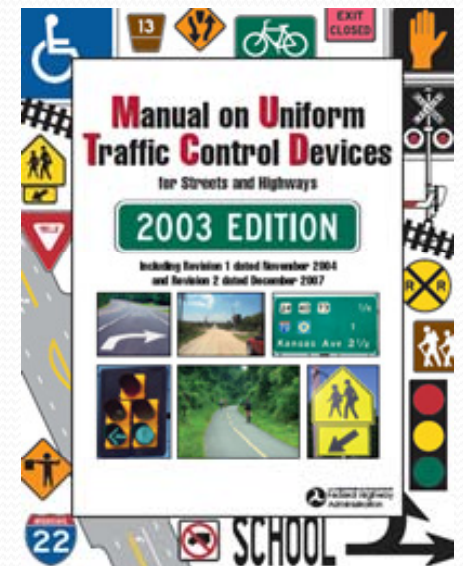
# Final rule



Federal Register

- Published December 21, 2007
  - Vol 72, No. 245
- Revision #2 of the 2003 Edition of the MUTCD
- Effective January 22, 2008

MUTCD - National standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel







# New MUTCD language

- Section 2A.09 – Maintaining Minimum Retroreflectivity
- “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”

## New MUTCD Table 2A.3 Minimum Maintained Retroreflectivity Levels

| Sign Color                         | Sheeting Type (ASTM D4956-04) ① |                 |              |                               | Additional Criteria |
|------------------------------------|---------------------------------|-----------------|--------------|-------------------------------|---------------------|
|                                    | Beaded Sheeting                 |                 |              | Prismatic Sheeting            |                     |
|                                    | I                               | II              | III          | III, IV, VI, VII, VIII, IX, X |                     |
| White on Green                     | W*<br>G ≥ 7                     | W*<br>G ≥ 15    | W*<br>G ≥ 25 | W ≥ 250; G ≥ 25               | Overhead            |
|                                    | W*<br>G ≥ 7                     | W ≥ 120; G ≥ 15 |              |                               | Ground-mounted      |
| Black on Yellow or Black on Orange | Y*; O*                          | Y ≥ 50; O ≥ 50  |              |                               | ②                   |
|                                    | Y*; O*                          | Y ≥ 75; O ≥ 75  |              |                               | ③                   |
| White on Red                       | W ≥ 35; R ≥ 7                   |                 |              |                               | ④                   |
| Black on White                     | W ≥ 50                          |                 |              |                               | —                   |

① The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/m<sup>2</sup> 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 should not be used for this color for this application.



# New MUTCD language



- “Support:  
Compliance... is achieved by having a method in place and using the method to maintain the minimum levels established in Table 2A-3. Provided that... a method is being used, an agency would be in compliance... even if there are some individual signs that do not meet the... levels at a particular point in time.”



“...one or more of the following assessment or management methods should be used...”

- Visual Nighttime Inspection
  - Calibration Signs
  - Comparison Panels
  - Consistent Parameters
- Measured Sign Retro

- Expected Sign Life
- Blanket Replacement
- Control Signs
- Future Method Based On Engineering Study
- Combination Of Any





# Visual nighttime inspection

- Trained inspector
- Visual inspection/assessment at night
- Need to tie to minimum values by using
  - Calibration signs procedure, **or**
  - Comparison panels procedure, **or**
  - Consistent parameter procedure



# Visual nighttime inspection

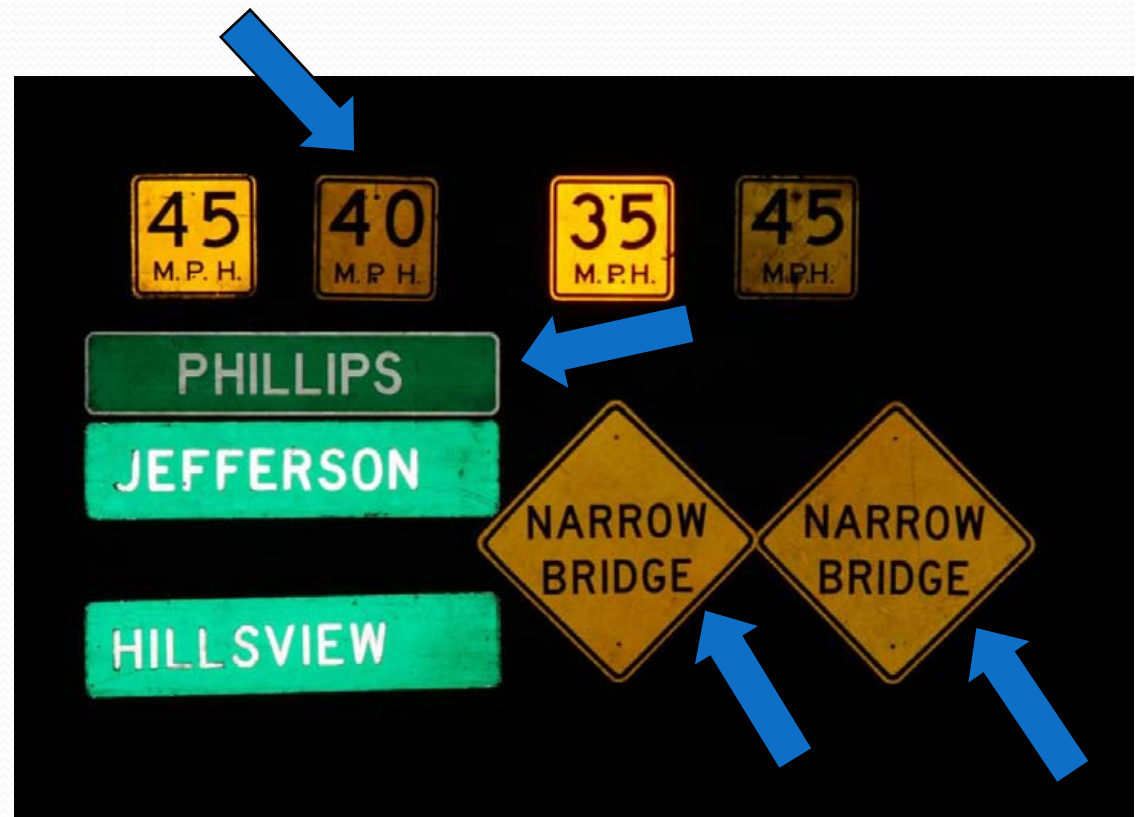
- Common elements of all visual assessment techniques
  - Properly aim inspection vehicle headlamps
    - [http://www.automedia.com/Aiming\\_Headlights/ccr20010801ha/1](http://www.automedia.com/Aiming_Headlights/ccr20010801ha/1)
    - <http://www.coolbulbs.com/HID-VISUAL-HEADLIGHT-AIMING-PROCEDURE.pdf>
  - Two-person crew works best
  - Having an inventory is ideal
  - Have evaluation form and criteria
  - Conduct evaluations at roadway speed
  - Use low-beam headlamps



# Calibration signs

You “calibrate” your eyes with calibration signs

- Calibration signs are near minimum retro
- You then evaluate signs as compared to calibration signs



# Comparison panels

- Tie to minimum values with comparison panels
  - Panels are near desired retro
  - Clipped to sign - viewed from distance
  - Evaluate signs compared to panels





# Consistent parameters

- Uses parameters consistent with those used to develop the minimum levels
  - Inspector – older driver (60+)
  - SUV type vehicle
  - Cutoff headlamps (properly aimed)






# Visual nighttime inspections

- Method advantages:
  - Low administrative and fiscal burden
  - Signs are viewed in their natural surroundings
  - Low level of sign replacement and sign waste
- Method disadvantages:
  - Subjective ... but research has shown that trained observers can reasonably and repeatedly detect signs with marginal retroreflectivity.
  - Exposure/risk of conducting nighttime inspections
  - Paying overtime





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# Measured sign retroreflectivity

- Use a portable instrument
- Receive proper training
- Have a protocol for consistency
- Compare readings to minimum values





# Example Retroreflectometers

Contact  
Devices:



Model 922  
(Gamma Scientific)



Model GR3  
(Delta)

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Non-Contact  
Devices:



SMARTS Van


Experimental concept,  
but NOT yet available.



# Measured sign retroreflectivity

- Advantages:
  - Provides the most direct means of monitoring the maintained retroreflectivity levels
  - Removes subjectivity
- Disadvantages:
  - Cost of instruments (approx \$10,000 to \$12,000)
  - Measuring all signs in a jurisdiction can be time consuming
  - Using retroreflectivity as the only indicator of whether or not a sign should be replaced may end up neglecting other attributes of the sign's overall appearance.





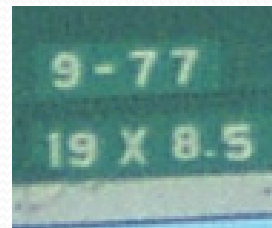
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# Expected sign life

- Find the life of the sheeting type in your area
- Replacement based on expected life for individual signs





# Expected sign life

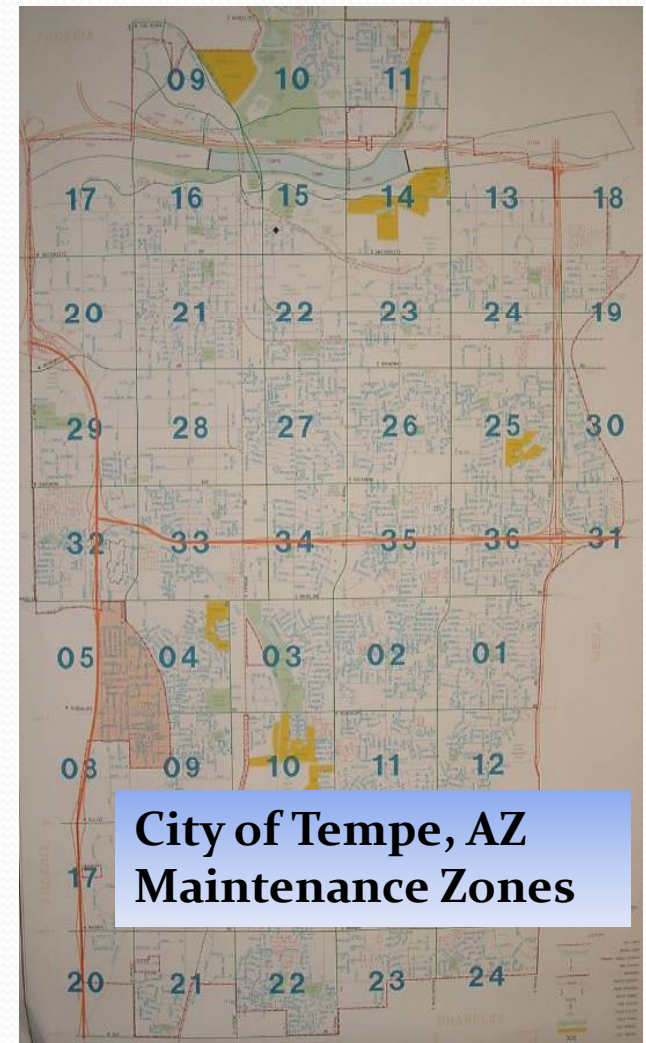
- Build and use a weathering rack like the one shown
- AASHTO-NTPEP data
- Sheeting company warranty information
- Specify sign life
- Measure existing signs with known install date and compare to min level
- Use weathering data or nearby jurisdiction's weathering data





# Blanket replacement

- All signs in an area/corridor are replaced at the same time at specified intervals
- Specified intervals could be set based on expected sign life
- Some existing blanket sign replacement policies exist using 10-12 years for Beaded High-Intensity sheeting signs





# Control signs

- Sign life is estimated using a subset of signs representing an agency's inventory.
  - Subset of signs constitutes the “control signs”
- Control signs can be in-service signs or signs in a maintenance yard.
- Agency monitors control signs to estimate condition of all their signs.
- Periodically measure retroreflectivity of control signs.

**Example of Control Signs**




# Other options

- Flexibility is provided for future advancements in technology and methods that have not been fully developed (must be based on an engineering study)
- Combination of methods, also







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# New rule compliance schedule

- Effective date of Final Rule: January 22, 2008
- Establish and implement method(s): 4 years (January 2012)
- Replace identified regulatory, warning, and ground-mounted guide signs (except street name signs): 7 years (January 2015)
- Replace identified street name and overhead guide signs: 10 years (January 2018)



# Exempt signs


- Parking/Standing/Stopping
- Walking/Hitchhiking
- Adopt-A-Highway
- Blue or Brown Backgrounds
- Exclusive Use of Bikes or Pedestrians


Note: Must still meet other requirements in MUTCD (inspections, retroreflective, etc.)



# More information

- ATSSA [www.retroreflectivity.net](http://www.retroreflectivity.net)
  - Primer on retroreflectivity
  - Common questions
- FHWA [fhwa.dot.gov/retro](http://fhwa.dot.gov/retro)
  - Summary Brochure
  - Final Rule
  - Power Point Presentations
  - Frequently Asked Questions
  - Newsletter Articles



**NEW MUTCD SIGN**  **RETROREFLECTIVITY REQUIREMENTS**

**KNOW YOUR RETRO 2007**

Maintaining Traffic Sign Retroreflectivity FHWA-SA-07-020

**T**raffic signs provide important information to drivers at all times, both day and night. To be effective, their visibility must be maintained. The 2003 Manual on Uniform Traffic Control Devices (MUTCD) addresses sign visibility in several places, including Sections 1A.03, 1A.04, 1A.05, 2A.06, 2A.08, and 2A.22. These sections address factors such as uniformity, design, placement, operation, and maintenance. Previously, the MUTCD did not specify minimum retroreflectivity levels.

The second revision of the 2003 MUTCD introduces new language establishing minimum retroreflectivity levels that must be maintained for traffic signs. **Agencies have until January 2012, to establish and implement a sign assessment or management method to maintain minimum levels of sign retroreflectivity.** The compliance date for regulatory, warning, and ground-mounted guide signs is January 2015. For overhead guide signs and street name signs, the compliance date is January 2018. The new MUTCD language is shown on page 2 and 3 of this document.

The new standard in Section 2A.09 requires that agencies maintain traffic signs to a minimum level of retroreflectivity outlined in Table 2A-3 of the MUTCD. The Federal Highway Administration (FHWA) believes that this proposed change will promote safety while providing sufficient flexibility for agencies to choose a maintenance method that best matches their specific conditions.

Including Table 2A-3 in the MUTCD does not imply that an agency must measure the retroreflectivity of every sign. Rather, the new MUTCD language describes five methods that agencies can use to maintain traffic sign retroreflectivity at or above the minimum levels. Agencies can choose from those methods or combine them. Agencies are allowed to develop other appropriate methods based on engineering studies. However, agencies should adopt a consistent method that produces results that correspond to the values in Table 2A-3.

The new MUTCD language recognizes that there may be some individual signs that do not meet the minimum retroreflectivity levels at a particular point in time. As long as the agency with jurisdiction is maintaining signs in accordance with Section 2A.09 of the MUTCD, the agency will be considered to be in compliance. This document describes methods that can be used to maintain sign retroreflectivity at or above the MUTCD's minimum maintained retroreflectivity levels.

**RETROREFLECTIVITY MAINTENANCE**

The MUTCD describes two basic types of methods that agencies can use to maintain sign retroreflectivity at or above the MUTCD minimum maintained retroreflectivity levels — assessment methods and management methods. The FHWA has identified and listed assessment and management methods for maintaining sign retroreflectivity in accordance with Section 2A.09. These methods are described on page four. A full report on these methods can be found at [www.fhwa.dot.gov/retro](http://www.fhwa.dot.gov/retro).

[www.fhwa.dot.gov/retro](http://www.fhwa.dot.gov/retro) Maintaining Traffic Sign Retroreflectivity (2007) Page 1



# Need more info or training?

- Delaware T<sup>2</sup> Center
  - Matt Carter, T<sup>2</sup> Engineer
    - [matheu@udel.edu](mailto:matheu@udel.edu); (302) 831-7236
- Workshop Training – coming this fall (2009)
  - Overview Workshop
  - Inspector Workshop
  - Keep an eye out: <http://www.ce.udel.edu/dct/t2/t2.htm>

