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

- 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

<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 II III III III, IV, VI, VII, VIII, IX, X</td>
<td></td>
</tr>
<tr>
<td>White on Green</td>
<td>W* G ≥ 7</td>
<td>W* G ≥ 15</td>
</tr>
<tr>
<td></td>
<td>W* G ≥ 15</td>
<td></td>
</tr>
<tr>
<td>Black on Yellow or Black on Orange</td>
<td>Y*; O*</td>
<td>Y ≥ 50; O ≥ 50</td>
</tr>
<tr>
<td></td>
<td>Y*; O*</td>
<td>Y ≥ 75; O ≥ 75</td>
</tr>
<tr>
<td>White on Red</td>
<td>W ≥ 35; R ≥ 7</td>
<td>④</td>
</tr>
<tr>
<td>Black on White</td>
<td>W ≥ 50</td>
<td>—</td>
</tr>
</tbody>
</table>

① The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/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 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
  - 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
“...one or more of the following assessment or management methods should be used...”

<table>
<thead>
<tr>
<th>Visual Nighttime Inspection</th>
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<tr>
<td>Calibration Signs</td>
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<td>Comparison Panels</td>
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<tr>
<th>Expected Sign Life</th>
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</thead>
<tbody>
<tr>
<td>Blanket Replacement</td>
</tr>
<tr>
<td>Control Signs</td>
</tr>
<tr>
<td>Future Method Based On Engineering Study</td>
</tr>
<tr>
<td>Combination Of Any</td>
</tr>
</tbody>
</table>
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)

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.
“...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
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.
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
“...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
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
- Primer on retroreflectivity
- Common questions
- FHWA  fhwa.dot.gov/retro
- Summary Brochure
- Final Rule
- Power Point Presentations
- Frequently Asked Questions
- Newsletter Articles
Need more info or training?

- Delaware T² Center
  - Matt Carter, T² Engineer
    - 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