



REPLY TO  
ATTENTION OF

DEPARTMENT OF THE ARMY  
U.S. ARMY CORPS OF ENGINEERS  
441 G STREET, NW  
WASHINGTON, DC 20314-1000

S: 30 September 2014

CECW-CO

30 December 2011


MEMORANDUM FOR MSC and District Chiefs, Operations Divisions

SUBJECT: Reflectivity Requirements for Traffic Signs

1. The Federal Highway Administration (FHWA), as directed by Congress in the 1993 Department of Transportation Appropriations Act, has mandated federal agencies with responsibility for maintenance of roads open to public travel maintain all traffic signs to a minimum standard of reflectivity. The Corps will comply with this directive to maximize traffic safety. Districts are requested to ensure traffic signs on public roads managed by the Corps on fee-owned property meet minimum standards of reflectivity. Districts and projects must evaluate the retroreflectivity of all traffic signs by 30 September 2014 and at least biannually thereafter.
2. Methods used to ensure traffic signs meet minimum reflectivity requirements are specified by the FHWA. Managers may use the method that best serves their project from among the methods outlined in the enclosed Reflectivity Requirements for Traffic Signs document. Also enclosed is a FHWA table (2A-3) that defines minimum levels of sign retroreflectivity. All yellow, orange and white traffic signs, including the white on STOP signs, located on Corps managed roads on lands owned in fee are covered by this requirement. Traffic signs are included in EP 310-1-6a and 6b, the Corps Sign Standards Manual, Section 9. All traffic signs made since October 2010 by Corps sign shops and Federal Prison Industries (UNICOR) are fabricated with highly reflective prismatic material, Type IV or better, which makes any sign purchased after that date in compliance.
3. After completing your inventories, projects will continue to replace signs as necessary, which will ultimately bring projects into compliance. As previously practiced, budget requests for signs will be included with other routine project needs annually.
4. My POC on this matter is Mr. Rick Magee, National Sign Program Manager, Sign Standards Mandatory Center for Expertise at (651) 290-5578.

FOR THE COMMANDER:

Encls

  
MICHAEL G. ENSICH  
Chief, Operations  
Directorate of Civil Works

## Reflectivity Requirements for Traffic Signs Briefing

### 1. References:

- a. Corps of Engineers Sign Standards Manual (EP 310-1-6a) 2006.
- b. Manual of Uniform Traffic Control Devices (MUTCD) 2009, Federal Highway Administration.
- c. Federal Highway Administration Safety Nighttime Visibility at:  
[http://safety.FHWA.dot.gov/roadway\\_dept/night\\_visib/](http://safety.FHWA.dot.gov/roadway_dept/night_visib/)
- d. Federal Requirements for Sign Reflectivity 2010, Federal Highway Administration Resource Center. Accessible on the NRM Gateway at:  
<http://corpslakes.usace.army.mil/employees/sign/pdfs/FHWAReflectivityReq4-2010.pdf>

2. The Federal Highway Administration (FHWA), as directed by Congress in the 1993 Department of Transportation Appropriations Act, has mandated all federal agencies with responsibility for maintenance of roads open to public travel to maintain all traffic signs to a minimum standard of reflectivity. (MUTCD 2A.09)

“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.”

“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 an assessment or management 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.”

3. More than twice the number of automobile crashes per million miles driven occurs in the dark hours as occur during daylight. Nighttime visibility of traffic control devices is becoming increasingly important as the population ages. Often the only visual cues available for a driver after dark are the signs and pavement markings that reflect back to the eye of the driver. Additionally, the standard for sign sheeting has changed and Type I engineer grade glass-beaded sheeting is no longer used on white, yellow or orange traffic signs, and is being phased out by manufacturers.

4. Applicability: All yellow, orange and white traffic signs, including the white on STOP signs, on Corps managed roads on lands owned in fee are covered by this requirement. Traffic signs are included in the Corps Sign Standards Manual, Section 9. Exemptions include Parking/No Parking signs, signs with blue or brown backgrounds and signs to be viewed exclusively by pedestrians, bicyclists or equestrians.

5. MUTCD Methods for Maintaining Reflectivity: The MUTCD specifies several approved methods for ensuring that traffic signs meet minimum standards of reflectivity:

- a. Visual assessment: Night-time comparison of sign reflectivity to sample panels.
- b. Measured retroreflectivity: Use of portable reflectometer instrument to measure reflectivity.
- c. Expected sign life: Type I and II signs are warranted for seven years, Type III and IV for 10 years.
- d. Blanket replacement: Change all signs in an area at the same time on a specified rotation.
- e. Control signs: Sign life measured using test signs, either in-service or in maintenance yard.
- f. Future methods: Based on engineering study.
- g. Combination of methods: Use of one or more of the above methods together.

6. Recommendations: Districts and projects must evaluate the reflectivity of all traffic signs by 30 September 2014 and biannually thereafter. Any of the MUTCD approved methods or combination may be used as long as the method and the results are documented. The following four methods described are in order of preferred priority for Corps facilities.

a. Visual Assessment: This method requires two people, one to drive an SUV or pick-up and one over the age of 60 to ride and look at signs after dark. The inspector may be a Corps employee or a volunteer. It will help to have sample sign panels or patches of new material to calibrate the inspector's eye. Attach patches meeting the minimum current reflectivity standards to the existing sign face using painters or masking tape. The inspector simply rates each sign while driving by them at posted speeds using low beams of properly adjusted headlights. The inspector notes each sign's reflectivity on a print-out of the sign inventory worksheet (EP 310-1-6a, page 3.3), a sign maintenance field report worksheet (EP 310-1-6b, Section C, page 14) or similar document. If loss of reflectivity is noticeable compared to the new sample material, the sign should be replaced as soon as possible.

b. Sign Age Method: Most traffic signs on Corps projects have met or exceeded their seven year life expectancy for Type I or II engineer grade material. If signs are older than seven years, plans should be made to replace them over the next four years.

c. Blanket Replacement: This method replaces all signs in a specific area or all signs of a specific type. For example, all traffic signs in the area of the dam would be replaced in 2014, all traffic signs in and near a particular recreation area in 2015, and so forth. Or all yellow warning signs on the project would be replaced in 2014 and all white regulatory signs in 2015. Plan to change all signs again on a 10- to 12-year cycle.

d. Measure Retroreflectivity: This is accomplished by using a retroreflectometer. These devices are expensive and projects are not expected to purchase them. Project sign managers may be able to partner with state or local highway departments that have obtained the retroreflectometer to have them inspect traffic signs on Corps property.

Further information on these methods may be found in the FHWA Sign Retroreflectivity Tool Kit: [http://safety.FHWA.dot.gov/roadway\\_dept/night\\_visib/retrotoolkit/](http://safety.FHWA.dot.gov/roadway_dept/night_visib/retrotoolkit/).

7. Procurement of New Signs: The FHWA requires signs not in compliance with reflectivity standards of the MUTCD **must be replaced by January 2015**. Even though a particular type of sheeting might initially meet the minimum retro level when it is new, it might quickly degrade to below the minimum, thus losing its effectiveness at night and requiring replacement during next assessment. Type I and Type II material is good for seven years according to the manufacturers. The expected life of prismatic materials is 10 to 12 years, depending on type and manufacturer. The use of higher performance sheeting, even though it has a higher initial cost, might provide a better life-cycle cost for the project.

Although the Corps Sign Manual currently calls for a minimum of Type I engineering grade material for traffic signs, all traffic signs made since October 2010 by Corps sign shops and Federal Prison Industries (UNICOR) are fabricated with highly reflective prismatic material, Type IV or better so these signs are in compliance.

8. For further information, please contact your district/division sign program manager, the regional member of the Sign Advisory Work Group (all can be found on the Natural Resources Management Gateway at: <http://corpslakes.usace.army.mil/employees/sign/sign.cfm> under "Division & District POCs") or the National Sign Standards Mandatory Center of Expertise at (651) 290-5578.

**New MUTCD Table 2A-3. Minimum Maintained Retroreflectivity Levels ①**

| SIGN COLOR                         | SHEETING TYPE (ASTM D4956-04) |                 |            |                               | ADDITIONAL CRITERIA |
|------------------------------------|-------------------------------|-----------------|------------|-------------------------------|---------------------|
|                                    | Beaded Sheeting               |                 |            | Prismatic Sheeting            |                     |
|                                    | I                             | II              | III        | III, IV, VI, VII, VIII, IX, X |                     |
| White on Green                     | W*; G ≥ 7                     | W*; G ≥ 15      | W*; G ≥ 25 | W ≥ 250; G ≥ 25               | Overhead            |
|                                    | W*; 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.

**BOLD SYMBOL SIGNS**

- W1-1, -2 – Turn and Curve
- W1-3, -4 – Reverse Turn and Curve
- W1-5 – Winding Road
- W1-6, -7 – Large Arrow
- W1-8 – Chevron
- W1-10 – Intersection in Curve
- W1-15 – 270 Degree Loop
- W2-1 – Cross Road
- W2-2, -3 – Side Road
- W2-4, -5 – T and Y Intersection
- W2-6 – Circular Intersection
- W3-1 – Stop Ahead
- W3-2 – Yield Ahead
- W3-3 – Signal Ahead
- W4-1 – Merge
- W4-2 – Lane Ends
- W4-3 – Added Lane
- W4-6 – Entering Roadway Added Lane
- W6-1, -2 – Divided Highway Begins and Ends
- W6-3 – Two-Way Traffic
- W10-1, -2, -3, -4, -11, -12 – Highway-Railroad Advance Warning
- W11-2 – Pedestrian Crossing
- W11-3 – Deer Crossing
- W11-4 – Cattle Crossing
- W11-5 – Farm Equipment
- W11-6 – Snowmobile Crossing
- W11-7 – Equestrian Crossing
- W11-8 – Fire Station
- W11-10 – Truck Crossing
- W12-1 – Double Arrow
- W16-5p, -6p, -7p – Pointing Arrow Plaques
- W20-7a – Flagger
- W21-1a – Worker

**FINE SYMBOL SIGNS – Symbol Signs Not Listed As Bold Symbol Signs**

**SPECIAL CASES**

- W3-1 – Stop Ahead: Red retroreflectivity ≥ 7
- W3-2 – Yield Ahead: Red retroreflectivity ≥ 7; White retroreflectivity ≥ 35
- W3-3 – Signal Ahead: Red retroreflectivity ≥ 7; Green retroreflectivity ≥ 7
- W3-5 – Speed Reduction: White retroreflectivity ≥ 50
- For non-diamond shaped signs such as W14-3 (No Passing Zone), W4-4p (Cross Traffic Does Not Stop), or W13-1, -2, -3, -5 (Speed Advisory Plaques), use largest sign dimension to determine proper minimum retroreflectivity level.