

Maintaining Sign Retroreflectivity: Comparison Panel Procedure

The Comparison Panel Procedure uses panels of known reflectivity that are at or above the minimum reflectivity requirement and compares them to signs identified as marginal during the nighttime inspection. This procedure should typically be used to assess the signs identified as marginal. Due to the time and labor associated with the work required to complete the verification of one sign, it would not be in the best interest of efficiency to perform this on all of the signs an agency owns.

In this procedure an appropriate comparison panel, constructed of similar type sheeting and color, is placed directly on the existing sign. The combination of sign and comparison panel is compared by the inspector to visually assess the level of retroreflectivity of the sign in question.



Figure 1: Examples of comparison panels on traffic signs that pass (left) and fail (right)⁽¹⁾

CONDUCTING THE COMPARISON PANEL PROCEDURE:

This procedure requires that the inspections occur during the night and that the inspecting personnel must exit the inspection vehicle. It is extremely important to recognize the safety concerns and comply with all safety requirements during each routine stop. To

CORNELL LOCAL ROADS PROGRAM

416 RILEY-ROBB HALL, ITHACA, NY 14853

PHONE: (607) 255-8033

FAX: (607) 255-4080

E-MAIL: clrp@cornell.edu

INTERNET: www.clrp.cornell.edu

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conduct this procedure the inspector must exit the vehicle and attach the comparison panel to the questionable sign. This may require that additional personnel are present to provide the added safety required, depending on the specific sign location. The method may also require the use of a ladder, depending on the height of the sign.

1. Initially, a visual inspection is conducted at the posted speed limit to identify any signs that may be of questionable retroreflectivity.
2. When a questionable sign is spotted, the inspectors may either identify the sign through documentation and mark its location on a map for further inspection at a later date, or may stop and conduct the comparison panel procedure at that time.
3. Comparison panels are to be cleaned prior to departure. Existing signs are to be tested in their existing condition for an accurate performance reading.
4. When a comparison panel is to be attached to a sign, the level of safety should be evaluated based on the level of traffic, proximity to hazards and in accordance with the MUTCD. It may be necessary to erect proper work zone signage.
5. Once all safety measures are taken, the inspector attaches the similar comparison panel with a simple clip (any other means is also acceptable) to the questionable sign and moves approximately 25 feet from the sign face to evaluate it.
6. Holding the flashlight at ear level and directing it toward the sign, the inspector determines whether the sign is acceptable or should be replaced. The flashlight to be used should be fully charged, or with new batteries, and be provided with a high intensity light bulb for easier inspection.
7. If the sign is found to be acceptable, documentation should be provided in the files to maintain regular inspections of the particular sign.
8. If the sign is found unacceptable it should be identified and the sign crew notified to replace the sign as soon as possible.
9. Once the Comparison Panel Procedure is completed the panels are to be cleaned and stored in protective coverings to maintain their accuracy and prolong their use.
10. It is recommended that the comparison panels be tested with a retroreflectometer annually to maintain their accuracy. It is further recommended that the measured reflectivity (R_A) value obtained from this test be recorded and placed on a removable sticker placed on the back of the panel. When a comparison panel R_A value falls below the minimum acceptable level identified in the MUTCD, it is to be replaced.
11. If the use of a retroreflectometer is not available for verification of the panels, new panels are required when the warranty of each panel passes.

COST & EFFICIENCY

Conducting the Comparison Panel Procedure requires an agency to obtain or purchase a set of comparison panels. Including blue and brown for minimum retroreflectivity, each set of comparison panels must contain eight different panels for each color (blue, brown, green, orange, red, white, yellow, and yellow-green). A quote obtained for a complete set of 6 inch x 3 inch panels ranged from \$50 to \$60 for Hi-Prismatic and Diamond Grade sheeting, respectively. It should be noted that the purchase of new panels will probably far exceed the requirement of “at or above” the minimum retroreflectivity for comparison signs. To lessen the “brightness” or retroreflectivity of a comparison panel, research found that the use of plastic films worked well to decrease the retroreflectivity of new comparison panels. Using plastic films, such as plastic report covers, was found to work well in reducing the R_A value in a logarithmic manner (the more sheets, the smaller the drop in R_A per sheet). Utilizing signs from within an existing inventory, which are at or above the minimum retroreflectivity level, may also be an option for use as comparison panels. The retroreflectivity of these panels must be measured for accuracy and the value written on the panels for future reference. One method for constructing comparison panels is detailed in another tip sheet in this series.

As with other methods of measuring retroreflectivity, the major expense incurred in this method is the cost associated with the purchase of a retroreflectometer. The cost of an ASTM specified retroreflectometer is approximately \$10,000. Considering that the comparison panels only need to be checked once a year, the sharing of a single retroreflectometer among several municipalities is highly recommended.

The efficiency of this procedure, by itself, is fairly low. To test every single sign in an agency’s jurisdiction would take a considerable amount of time compared to the other methods available. However, despite its low efficiency, this method would allow signs to serve a high percentage of their actual service life. Also, due to its low efficiency, it is recommended that this method be used as a secondary test to measure signs considered marginal in the other Visual Assessment methods.

Key Notes:

- Comparison Panels used must be a minimum of 15 R_A value above the ASTM minimum retroreflectivity requirements listed in the MUTCD Section 2A.08, Table 2A-3. This will minimize any questionable judgments on the retroreflectivity of an individual sign and increase the usable life of the comparison panel.
- Hi-intensity material used for the comparison panels may require dampening to reduce the retroreflectivity of the panel to obtain more accurate results for marginal signs.
- The following table represents the minimum retroreflectivity requirements and sheeting type allowed for the comparison panels:^[2]

Color	Minimum R_A Value	Sheeting for Panel
White on Green	$W \geq 120, G \geq 15$	W=II, G=II
Black on Yellow or Orange ¹	$Y \geq 50, O \geq 50$	Y=II, O=II
Black on Yellow or Orange ²	$Y \geq 75, O \geq 75$	Y=II, O=II
White on Red ³	$W \geq 35 R \geq 7$	W=I, R=II
Black on White	$W \geq 50$	W=I

¹Signs with text at least 48 inches (1200 mm) and all sizes of bold symbol signs

²Signs with text less than 48 inches (1200 mm)

³Minimum Sign Contrast Ratio $\geq 3:1$ (White Retroreflectivity / Red Retroreflectivity)

Panel Sheet Key: ASTM Retroreflective Sheeting Type Descriptions:^[2]

TYPE I: Medium Density; enclosed lens

TYPE II: Medium high-intensity; enclosed lens

REFERENCES:

[1] *Methods for Maintaining Traffic Sign Retroreflectivity*. FHWA-HRT-08-026. U.S. Department of Transportation, Federal Highway Administration, Washington D.C., 2007.

[2] *The Manual on Uniform Traffic Control Devices (MUTCD)*, 2009 Edition. U.S. Department of Transportation, Federal Highway Administration, Washington D.C., 2009.



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