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WISCONSIN TRANSPORTATION INFORMATION CENTER – LTAP



*Upgrading signs for better retroreflectivity is, in part, a response to a greater number of older drivers on the road who need more light and more reaction time after dark.*

## Sign retroreflectivity in spotlight

### NIGHTTIME SIGN VISIBILITY

is in the spotlight with the recent release by the Federal Highway Administration (FHWA) of a new minimum retroreflectivity standard. FHWA adopted the second revision to the 2003 Manual on Uniform Traffic Control Devices (MUTCD) on January 22, 2008.

Mandated by Congress in 1993, the revision came after several years of FHWA research that culminated in a 2003 report on safe minimum retroreflectivity levels. Retroreflectivity refers to how a surface, like a highway sign or pavement marking, reflects or bounces light back to a source.

Upgrading signs and materials for better retroreflectivity is, in part, a response to a greater number of older drivers on the road who need more light and more reaction time after dark.

guide signs—not including street name signs—that fail to meet new minimum levels as determined by the agency’s established management or assessment method.

The *final phase* involves replacement by January 2018 of street name signs and overhead guide signs that fall short of the standard for retroreflectivity.

### Working with the standard

Matt Rauch, State Signing Engineer with the Wisconsin Department of Transportation, says WisDOT is reviewing and preparing to implement the new retroreflectivity standard. He and Tom Heydel, Traffic Engineer for WisDOT Southeast Region, say local governments will find the state’s approach a helpful guide. But they encourage them also to review the revision

the retroreflectivity of signs in service—*Expected Sign Life*, monitoring individual signs based on the sign material with the shortest life, and *Blanket Replacement*, doing upgrades at specific intervals. The *Control Sign* management method and the two assessment methods—*Visual Nighttime Inspection* and *Measured Sign Retroreflectivity*—all require a retroreflectometer measurement.

WisDOT already uses the blanket approach now when they do an improvement project, Rauch notes. He anticipates applying the expected sign life method for general sign management going forward as they do now for deciding replacements in a blanket program. Measured sign retroreflectivity and visual nighttime inspections cost too

much time and money, he says, to be feasible.

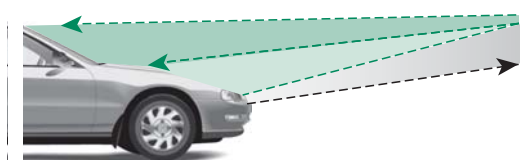
Routine visual inspection of signs remains important in every sign-management program, says

### From management method to action

The MUTCD phases the changes in over 10 years, giving agencies that maintain signs time to respond.

The *initial phase* addresses an important element of the new requirements. Agencies must implement an ongoing management or assessment method by January 2012 to track the condition of signs. The MUTCD describes three acceptable management methods and two assessment methods designed to monitor retroreflectivity and keep it at or above minimum levels.

*Phase two* requires the January 2015 replacement of regulatory, warning and ground-mounted



*Cone of retroreflected light (green tint) returned to driver from car headlight striking road sign.*

in light of their own sign management operation.

Heydel says establishing a workable management or assessment method is a critical first step. He points out local governments and other agencies have four years to implement one of five recommended methods for keeping signs up to the new standard.

Two acceptable management methods do not require measuring

Heydel, and helps to keep inventory records up to date.

### Inventory system improves sign management

Setting up an inventory system to track sign assets helps reduce the risk of liability. It also institutionalizes the sign management process, making it easier to meet all MUTCD sign standards.

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## Sign retroreflectivity in spotlight

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*Agencies must implement an ongoing management or assessment method by January 2012 to track the condition of signs.*

WisDOT and some larger municipalities in the state use versions of the SIGNview sign-management system from Cartêgraph. The software lets users customize screens, libraries and reports, and synchronize data from other sources. It takes training and practice to use, but Heydel says a tool like this is essential for managing a complex inventory of signs.

Simpler, less expensive software on the market offers good options for small- to medium-sized communities. As *Crossroads* reported early last year, one of them is SimpleSigns from Rowekamp Associates. Available in the state since December 2006, the product is in use by 11 Wisconsin counties.

From a main entry screen, SimpleSigns imports existing spreadsheet data or new information. Drop-down menus let users navigate sign location, condition, and repair activities. Cost for the basic program includes tech support. The company also offers data conversion and a GIS mapping tool.

PWS Signs is a sign-inventory tool developed by the Technology Transfer Center at the University of New Hampshire. Due out spring 2008, it is described as low-cost. The software uses GPS and a digital map to locate signs and their attributes. It provides sign inventory, condition assessments, maintenance management and budget planning.

Sign companies also offer inventory options. TAPCO, a Wisconsin-based company that works with many government agencies, has a sign-inventory package in development that combines existing software with GPS and retroreflectometer technology.

### Material improvement

The new standard specifies minimum maintained retroreflectivity levels as measured by the degree of reflected light seen at different angles and distances. Based on these minimums, the MUTCD outlines sheeting types that meet the specified levels for different signs. These include more reflective materials like high-intensity







prismatic sheeting made without glass beads.

Scott Plouff, Sign Division Manager with TAPCO, says manufacturers keep improving the performance and durability of sheeting material. Engineer-grade sheeting in wide use for decades has an expected life of five to seven years, he says, while the new prismatics are warranted for 10 years, and the diamond-

grade sheeting for 12 years. The expected life for fluorescent sheeting is 12 to 15 years.

"The new materials are made to be brighter and last longer," Plouff notes. "And when budgets are tight, sheeting that holds up longer is more cost effective."

Plouff says he knows 3M plans to stop making engineer-grade sheeting. The current product does not meet retroreflectivity

Sign color and type	Sheeting types and expected sign life	Phase-in sign date
<b>WHITE on GREEN</b>  Guide signs	Prismatic high intensity 10-12 yrs Fluorescent 12-15 yrs	<b>Jan 22, 2015</b>
 Overhead guide signs	Prismatic high intensity 10-12 yrs Fluorescent 12-15 yrs	<b>Jan 22, 2018</b>
<b>BLACK on YELLOW</b>  Warning signs	Prismatic high intensity 10-12 yrs Fluorescent 12-15 yrs	<b>Jan 22, 2015</b>
<b>BLACK on ORANGE</b>  Warning in Work zone	Prismatic high intensity 10-12 yrs Fluorescent 12-15 yrs	<b>Jan 22, 2015</b>
<b>WHITE on RED</b>  Stop, Yield, Wrong Way Do Not Enter, etc.	Engineer grade 7 yrs High intensity beaded 10 yrs Prismatic high intensity 10-12 yrs Fluorescent 10-15 yrs	<b>Jan 22, 2015</b>
<b>BLACK on WHITE</b>  Speed Limit, One Way U.S. Highway, etc.	Engineer grade 7 yrs High intensity beaded 10 yrs Prismatic high intensity 10-12 yrs Fluorescent 10-15 yrs	<b>Jan 22, 2015</b>
<b>Signs excluded from retroreflectivity maintenance guidelines:</b> Parking, Standing & Stopping signs (R7 & R8 series) Walking, Hitchhiking & Crossing signs (R9 series, R10-1 through R10-4b) Adopt-a-Highway signs All signs with blue or brown background Bikeway signs for exclusive use of bicycles or pedestrians		

*Simplified version of MUTCD Table 2A-3, shows sign types, materials that meet minimum retroreflectivity levels, and phase-in dates.*

### Contact

Tom Heydel  
WisDOT Traffic Engineer  
[tom.heydel@dot.state.wi.us](mailto:tom.heydel@dot.state.wi.us)

Matt Rauch  
WisDOT State Signing Engineer  
[matt.rauch@dot.state.wi.us](mailto:matt.rauch@dot.state.wi.us)

Scott Plouff  
TAPCO Sign Division Manager  
[Scott@tapconet.com](mailto:Scott@tapconet.com)

### Resources

[www.fhwa.dot.gov/retro](http://www.fhwa.dot.gov/retro)

FHWA web page on night visibility with information about the new retroreflectivity standard and links to the final rule and other useful information.

standards beyond the first year in service, far less than the new standard for sign life.

Material improvement is critical to the new standard, says Heydel. As authorities responsible for sign maintenance anticipate bringing their inventory into line over the next 7 to 10 years, better materials help bring replacement costs down and put signs on the roads that contribute to traffic safety.

### One approach to assessment and upgrade

Portage County replaces about 150 road signs a year in an ongoing sign management program. The county does nighttime visual inspections annually to identify all warning and regulatory signs that need replacement.

Assistant Highway Commissioner Dale Petersen, who supervises the county's sign division, says his crews look for deteriorating retroreflectivity and also record any seasonal or incidental damage to signs or sign posts.

### Quick Take on Methods

*Sign agencies must establish one or more of these management or assessment methods by 2012.*

#### Management methods

##### Expected Sign Life

Note age of sign and replace before retroreflective material is expected to degrade to minimum level.

##### Blanket Replacement

Replace all signs at specific intervals based on expected life of sheeting material.

##### Control Signs

Use assessment method to monitor performance of each type of sign in the field or maintenance yard.

#### Assessment methods

##### Visual Assessment

Conduct nighttime inspections with accepted procedures for calibration and comparison to establish minimum levels.

##### Measured Sign Retroreflectivity

Take exact measurements of all signs using retroreflectometer.

Inspectors rely on visual information, not a mechanical device, to judge the serviceability of signs. While they log how long signs have been in service, the manufacturer's expected sign life does not strictly determine when a sign gets replaced.

"We have many open agricultural fields in this area, lots of airborne sand and grit that speeds the breakdown of signs in close proximity," Petersen says. "Our approach is to err the side of safety. Visual nighttime inspection gives us first-hand data to replace the signs that really need it."

Sign inventory is now kept with spreadsheets and maps. Petersen

plans to computerize the information soon and use laptops in the field to record findings.

The inspection and inventory methods are part of a multi-year program underway in Portage County to replace all warning and regulatory signs with Prismatic High Intensity sheeting, a switch from Engineer Grade sheeting. Upgrades are complete on between one third and one half of existing signs.

Portage County's experience with the new material has been positive, Petersen reports. The signs in place are holding up well and even resist scratching during installation. ■

### Going for the max

While WisDOT plans to follow the Expected Sign Life method for managing its sign inventory, the department wants to learn more about the actual retroreflective durability of the high-intensity prismatic sheeting used on many state highway signs. State Signing Engineer Matt Rauch says they plan to test how signs in the inventory perform against the expected 10-year life.

"From a taxpayer and motorist safety perspective, we want to be sure we maximize the full life out of our signs while providing signs with retroreflective values that are within the FHWA guidelines," he says. There is no existing outside research on sign life, Rauch notes, only the sheeting manufacturers' warranties.

WisDOT Traffic Operations staff will monitor the performance of different types of sheetings and colors on control signs of varying age at the department's Madison maintenance yard. They will work with the University of Wisconsin-Madison to assess measurements.

The next step is to track reflective values of a variety of signs against the controls using a retroreflectometer. Besides sign color, age and type of sheeting material, the study will examine and compare compass direction as a factor in reduced retroreflectivity. Control signs will face south or west for the most ultraviolet exposure.

Rauch says the goal is to determine how long the signs will last and document findings in the state's replacement policy for permanent signs, part of the WisDOT Traffic Guidelines Manual (TGM). He reminds local governments they do not have to follow the TGM recommendations but can adopt any policies that work for them.

Watch *Crossroads* for updates on study findings.

*The new standard specifies minimum maintained retroreflectivity levels as measured by the degree of reflected light seen at different angles and distances.*



#### More about MUTCD

*Crossroads* will explore more about the standards revision in future articles, including a closer look at accepted minimum retroreflectivity levels.