

Reflecting on Road Signs

Road signs are an essential part of Oregon's transportation system, providing travelers with information to help ensure safe, orderly and predictable traffic movement. The investment in signs is substantial. The Oregon Department of Transportation (ODOT) estimates that more than \$44 million is invested in signs statewide. To manage these assets, ODOT needs to be able to plan for sign replacement due to normal wear and physical damage or loss.

Retroreflectivity

Signs need to be visible and readable at night as well as during the day. For nighttime visibility, signs are illuminated through "retroreflection." Retroreflection occurs when light rays (e.g. from vehicle headlights) strike the surface and are reflected back toward the source of light.

Signs use various types of retro-reflective sheeting. The sheeting consists of tiny prisms or spheres in a weather-resistant, transparent plastic film. Depending on their color, signs exhibit different levels of retroreflectivity. Signs with a white or yellow background have the highest intensities, while green and red signs have lower intensities. The Federal Highway Administration and ODOT have set standards for minimum retroreflectivity. The standards vary depending on the color of the sheeting material.

In the course of normal wear, sign performance may be affected by environmental conditions such as sunlight, temperature, dust and moisture.

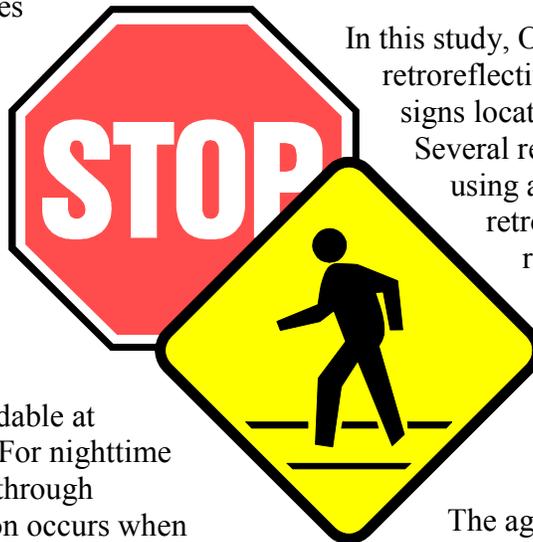
ODOT recently studied sign retroreflectivity and the factors that may affect it, such as the age of the sign and its physical orientation. Having better information on these factors could help ODOT plan for the replacement of signs.

In this study, ODOT personnel measured the retroreflectivity of 137 high-intensity road signs located in the mid-Willamette Valley. Several readings were taken on each sign using a hand-held device called a retroreflectometer. Data were also recorded on the age and physical orientation of each sign (north, south, east or west).

Do Age and Orientation Matter?

The age of the signs in the study covered a 12-year span, with signs installed from 1985 to 1997. Overall, the majority had retroreflectivity levels above minimum ODOT standards. No consistent relationship was found between the age of signs and their retroreflectivity. Also, the physical orientation of road signs appeared to have little or no effect on their levels of retroreflectivity.

How uniform does sign intensity remain with abrasion from windblown dirt and the effects of weather? The study measured the variability of retroreflectivity readings over the surface, but the analysis showed that sign age appeared to have no effect on this variability. However, a relationship was found between the physical orientation and the uniformity of a sign. Variability in retroreflectivity was found to be greater among west-facing signs with white and yellow background sheeting and



among south-facing signs with green and red sheeting.

Thus, the physical orientation of road signs toward prevailing weather patterns may affect their service life. In relatively mild environments like the Willamette Valley, orientation may not be a major concern in planning for sign replacement. Factors such as vandalism or other damage may come into play before weathering becomes an issue.

In harsher environments of central and eastern Oregon, however, sign orientation will probably play a greater role. Windblown dust and precipitation will likely begin to degrade the surface of road signs, reducing the uniformity of their retroreflectivity and their overall intensity in a shorter period of time.

Accumulating dust and dirt on a sign will also decrease its retroreflectivity. The study, however, only collected data from signs that had been washed beforehand. Thus the study cannot speak to the retroreflectivity of signs as they often may appear to motorists. How often signs should be

washed, and the effects of graffiti removal products and anti-graffiti coatings on sign retroreflectivity are issues to address in future studies.

Study Recommendations

This study has provided some useful information for understanding the role that age and physical orientation may play in sign retroreflectivity. Data is needed from other regions of the state to confirm the trends that seem to be evident.

The study recommends that data from all regions of the state be recorded in ODOT's sign database as part of its sign management program. In addition, retroreflectivity readings for both the sign sheeting and the legend should be collected during sign inspections, as much as feasible. This accumulation of data over time will then be available for future analysis of sign wear for more regions of the state. The additional information will help ODOT in planning for sign replacement and managing this important component of the transportation system.

Request a copy of the report "Factors Affecting Sign Retroreflectivity" from the ODOT Research Group by phone, e-mail, or in person. Or view the report on the Research web page listed below.

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For more information on ODOT's Research Program and Projects, check the website at

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