

OHIO DEPARTMENT OF TRANSPORTATION OFFICE OF TRAFFIC ENGINEERING RESEARCH IMPLEMENTATION PLAN



Title: Field Evaluation of Unlighted Overhead Guide Signs Using Older Drivers

State Job Number: 14812

PID Number: 76199

Research Agency: Ohio University

Researcher(s): Helmut Zwahlen

Technical Liaison(s): Jim Roth

Research Manager: Monique Evans

Sponsor(s): Tony Vogel, Dave Holstein

Study Start Date: 10/28/2002

Study Completion Date: 8/28/2003

Study Duration: 10 Months

Study Cost: \$88,619.64

Study Funding Type: 80 Federal / 20 State from ODOT SPR (2)

STATEMENT OF NEED:

In the preceding Unlighted Overhead Guide Sign Feasibility Study, it was determined that the lighting of overhead guide signs on freeways could be eliminated if white micro-prismatic Type VII or Type IX legends were used on green beaded Type III backgrounds. Because the expert panel in that study was limited to ODOT engineers who were relatively young (average age 38), it was considered necessary to conduct a second study to ensure that these unlighted overhead guide signs would meet the needs of older drivers, who have typically degraded visual capabilities. Additionally, there was interest in evaluating Type VIII and micro-prismatic Type III sheeting materials, which were not included in the first study.

RESEARCH OBJECTIVES:

This study aims to measure the suitability of unlighted overhead guide signs in certain material combinations for older drivers. The material combinations studied were (legend on background, unlighted except where noted) beaded Type III on beaded Type III, lighted beaded Type III on beaded Type III, Type VIII on microprismatic Type III, Type IX on beaded Type III, Type IX on Type IX, and Type VII on beaded Type III. The lighted beaded Type III on beaded Type III sign represented existing sign lighting practice in Ohio.

RESEARCH TASKS:

- C The researcher will conduct a panel field evaluation using a number of unlighted overhead guide signs constructed from a variety of retroreflective sheeting materials to determine their suitability and acceptance by older drivers (age 65-75; 10 female, 10 male) at night.
- C The signs studied will be the same ones used for the previous study on US Route 30 near Mansfield, with one addition. Ohio University will also take advantage of this unique opportunity to compare the microprismatic Type VIII on microprismatic Type III sign material combination with previously tested Type IX or Type VII legend on beaded Type III background, both in the panel evaluation and with some photometric measurements with an ART 920 refectionometer.
- C The researchers will then give ODOT further recommendations regarding the feasibility of eliminating overhead guide sign lighting and what retroreflective legend and background sheeting materials to use in locations where lighting can be eliminated for older drivers as well as for the general population.

RESEARCH DELIVERABLES:

- The final report documenting all research activities, conclusions, and recommendations.

RESEARCH RECOMMENDATIONS:

With older drivers, it appears that the preferred options are Type IX on Type IX or Type VII on beaded Type III. This is a change from our previous recommendation of Type IX on beaded Type III as one of the top two material combination options. It appears that the higher background luminance of the Type IX background material is preferred by older drivers, perhaps because it increases the amount of overall light reflected from the sign at closer distances, even at some cost in contrast. Type IX materials are designed for better performance at closer distances of less than 400 feet (122 m). 80% of evaluators thought Type IX on Type IX signs were adequate for nighttime use from a visibility and readability standpoint on the exit interview form. On the other hand, the Type VII legend may be preferred because it is designed to appear brighter at a longer distance. This may enhance the perceived legibility of the legend, which was highest for this sign group as measured by responses on the Sign Evaluation Form. 65% of the evaluators selected Type VII on beaded Type III as adequate for nighttime use from a visibility and readability standpoint. unlighted overhead signs with white micro-prismatic Type VII legends on green beaded Type III backgrounds, or Type IX legends on Type IX backgrounds, will have a number of benefits including the elimination of the luminaire installation costs, the electricity requirements at overhead signs, the electricity costs, the maintenance and associated traffic control costs, and the wasted illumination towards the night sky (“light pollution”).

Both of these unlighted sign groups, Type IX on Type IX and Type VII on beaded Type III, were rated noticeably higher than the lighted beaded Type III on beaded Type III sign group. In fact, the lighted sign group ranked fourth or fifth in terms of visibility and readability, and only 40% (visibility) or 45% (readability) selected the sign group as adequate in the exit interview. This suggests that implementing unlighted signs with appropriate materials may actually constitute a perceived improvement on Ohio’s highways. The Type VIII on micro-prismatic Type III sign group performed about as well as the lighted sign group. The Type IX on beaded Type III group performed markedly worse than in the previous study, being fairly consistently the second lowest sign, above the unlighted beaded Type III on beaded Type III, which, as expected, was the worst performer.

PROJECT PANEL COMMENTS:

None

IMPLEMENTATION STEPS & TIME FRAME:

ODOT policy was changed in 2003 to eliminate sign lighting for overhead signs. See Attachment A for a copy of Section 212-2 of the current Traffic Engineering Manual dated July 16, 2004.

EXPECTED BENEFITS:

Cost savings for material, maintenance, and electrical energy.

EXPECTED RISKS, OBSTACLES, & STRATEGIES TO OVERCOME THEM:

None

OTHER ODOT OFFICES AFFECTED BY THE CHANGE:

- District Planning, Production, and Construction offices.

PROGRESS REPORTING & TIME FRAME:

N/A, recommendations have been implemented since Year 2003.

TECHNOLOGY TRANSFER METHODS TO BE USED:

- The final report of this research will be available online at ODOT website.
- The Final Report was also distributed to all other state departments of transportation in addition to national libraries and repositories.

IMPLEMENTATION COST & SOURCE OF FUNDING:

None

Approved By: (attached additional sheets if necessary)

Office Administrator(s):

Signature: Dave Holstein Office: OTE Date: 4/25/2006

Division Deputy Director(s):

Signature: Tony Vogel Division: DHO Date: 4/26/2006

Attachment A

200 SIGNS

Traffic Engineering Manual

212 SIGN LIGHTING

212-1 General

OMUTCD Sections 2A.08 and 2E.05 indicate that overhead sign installations should be illuminated unless an engineering study shows that retroreflectorization alone will perform effectively, providing effective and reasonably uniform illumination of the sign face and message. The following sections, as well as Sections 240-7, 241-4, 242-2, 250-8 and 1103-6.7, provide additional information about sign lighting.

212-2 Sign Lighting for Overhead Guide Signs

Research has shown that sign lighting is not necessary for overhead Guide Signs when Type H or J reflective sheeting is used for the reflective legends. Section 220-6 requires that Type H or J sheeting be used for the reflective legends (including shields and symbols) on overhead extrusheet signs on ODOT-maintained highways. Therefore, for new installations on ODOT-maintained highways, sign lighting should not be used.

For existing installations, sign lighting may remain. As existing signs are upgraded with legends of Type H or J reflective sheeting, the existing sign lighting should be removed. Removal shall include, as a minimum, the physical removal of the luminaires and luminaire support assemblies.

212-3 Sign Lighting Fixtures

As noted in Sections 1104-3 and 1130-5, a High Pressure Sodium (HPS) light source is generally used for lighting ODOT-maintained highways. While HPS lighting provides reasonable color delineation, it is not usually considered to be best suited for sign lighting. The most commonly used light source for exclusive sign lighting in Ohio is mercury vapor. Mercury vapor luminaires are the standard on ODOT-maintained highways. When used, they shall be installed in accordance with SCD TC-31.21 and Sections 240-7, 241-4, 242-2 and 250-8 of this Manual.