In 1996, Pennsylvania State University’s transportation department began to study the design characteristics of on-premise signs from the perspective of the motorist and traffic safety.

In the years since, research from Penn State’s Thomas D. Larson Pennsylvania Transportation Institute has provided a "unique, objective scientific basis for understanding the manner in which motorists receive and respond to the informational content of the private, roadside sign system," according to the authors of On-Premise Sign Research Review. “The research and corresponding analyses afford designers and sign regulators with insight into legibility, size, illumination and placement characteristics necessary for effective roadside communication to occur.”

The review was prepared by Philip Garvey, senior researcher for the Thomas D. Larson Pennsylvania Transportation Institute, and Richard B. Crawford, Esq., Mercer Sign Consultants.

At the time of the research review, 10 studies had been completed at the Transportation Institute, plus a white paper and handbook of sign-illumination guidelines and terms:

- SIGN VISIBILITY, Effects of Traffic Characteristics and Mounting Height (2003)
- ON-PREMISE COMMERCIAL SIGNS AND DRIVER INFORMATION LOAD (2003 white paper)
- RELATIVE VISIBILITY OF INTERNALLY AND EXTERNALLY ILLUMINATED ON-PREMISE SIGNS (2004)
- ELECTRONIC MESSAGE CENTER RESEARCH REVIEW (2005)
- INTERNAL vs. EXTERNAL ON-PREMISE SIGN LIGHTING: Visibility and Safety in the Real World (2009)
- ON-PREMISE SIGN LIGHTING, Terms, Definitions, Measurement (2010 handbook guide)

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FIVE STUDIES EXAMINED THE OPTIMUM ILLUMINATION FOR A DRIVER IN TERMS OF VISIBILITY, LEGIBILITY, AND TRAFFIC SAFETY.

- The studies examine the environmental impact of on-premise sign lighting; the best type of sign lighting for driver detection and legibility; whether the real-world environment changes detection and legibility results; and what lighting level/brightness is best at night for driver detection and legibility.

- Six signs with different illumination modes; text and background colors; and contrast ratios (e.g. dark letters on light background) were evaluated.

- Researchers found that internally illuminated signs provided significantly longer visibility distances and longer available reading times than externally illuminated signs.

- Internally illuminated signs should be between recommended industry standard brightness levels (minimum) and 1.75 times over industry standard (maximum). This range is optimal for driver recognition and legibility.

FIVE ADDITIONAL FACTORS MUST BE CONSIDERED FOR PARALLEL SIGN VISIBILITY

- Signs that are parallel to roadways rather than perpendicular present unique challenges. These signs might include, for example, wall signs, building signs, façade signs and other signs affixed to a building structure.

- Even when a driver can see the face of a parallel sign, content may be foreshortened or distorted. Drivers must be close in order to increase the viewing angle enough for the sign to be legible, but the closer the driver, the more peripheral the sign becomes, and the shorter the glances must become.

- Letter heights previously developed for perpendicular signs, where drivers have more time and can take longer straight ahead glances, do not provide adequate parallel sign legibility.

- Researchers identified multiple factors to determine letter heights for parallel signs: glance angle, glance duration, glance frequency, sign reading speed and observation angle. Study results include equations and look-up charts to help determine appropriate letter sizes for motorist visibility and legibility.

RESEARCH HIGHLIGHTS

70% larger to achieve same legibility.

The advantage in legibility of an internally illuminated sign vs. an externally illuminated one.

Internally Illuminated

Externally Illuminated

Illuminated signage legibility at 30 feet of distance in a vehicle traveling 35 mph.

Read the Full Report of "On-Premise Sign Research Review" at www.signresearch.org/on-premise