

Evaluating the Interaction of Fixed Roadway Lighting and Forward Vehicle Lighting

To reduce glare experienced by drivers, advanced forward lighting systems (AFS) may be able to dim vehicle headlamps. However, since a driver's ability to see clearly must not be impaired, these systems would only be acceptable on roadways with sufficient ambient illuminance levels. This study examined the feasibility of dimming vehicle forward lighting in lit areas while maintaining a driver's visual performance.

LRC researchers illuminated an area at an unused airport tarmac with high-pressure sodium lamps on three light poles six meters high. These lamps supplied an average maximum illuminance of 7.4 lux, and filters reduced illuminances to 10% and 30% levels. Headlamps conforming to SAE standards supplied forward illumination at three light levels: 10%, 30%, and 100%. Twelve subjects detected targets from five directions: -15° , -5° , 0° , 5° , and 15° . These tests were repeated for each of the nine combinations of ambient illuminances and headlamp intensities.



Left: The unused airport runway provides an ideal environment for roadway lighting simulations. Right: Results of mean detection distances are plotted for all lighting combinations tested.

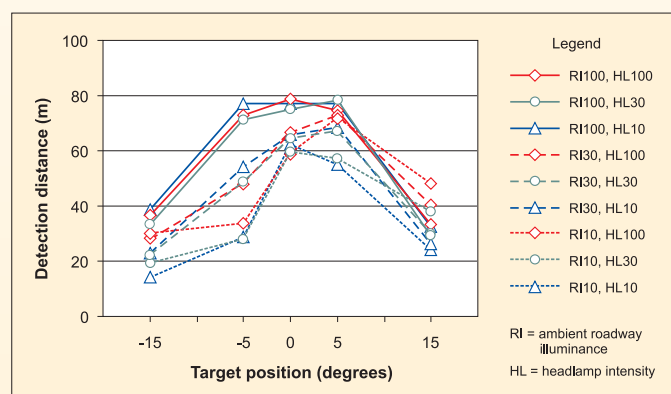


Test vehicle positioned behind adjustable headlamps on a test stand.

Experiment results

- Detection distances increased as ambient illuminance increased.
- Detection distances decreased as the eccentricity angle of the targets increased.
- The impact of headlamp intensity (HL) on the detection distance was significantly less than that of the ambient roadway illuminance.

These results imply that headlight systems can be dimmed to reduce glare without impairing a driver's visual performance if fixed street lighting provides sufficient illumination.



Sponsors

Project: National Highway Traffic Safety Administration
Site: Schenectady County Airport, Scotia, N.Y.

