

Work Zone Lighting Demonstration

Lighting systems used in work zones often produce light levels that substantially exceed those typically used for roadway lighting in non-work zone locations. Light levels of 50 lux or more are typically recommended. However, producing these light levels can reduce visibility by creating glare to drivers and workers, especially when trailer-mounted light towers are used, contributing to visual chaos. Taming the diverse components of the work zone visibility system so that they work together to provide unambiguous visual information can be a challenge. To address these challenges, LRC researchers conducted a two-part study assessing the requirements for work zone illumination.

Part 1: Estimating Visibility for Workers

Light levels for workers were evaluated using the relative visual performance model, which estimates the speed and accuracy of visual processing as a function of light level, contrast, size, and observer age. The light levels were evaluated with and without the presence of visibility-reducing glare. Light levels of 10-20 lux resulted in adequate visibility even in the presence of moderate glare. These results suggested that the illuminances typically recommended may not always be necessary for adequate visual performance by nighttime roadway construction workers, especially when glare can be minimized.

Part 2: Outdoor Field Demonstration

Several alternative lighting systems have been suggested for work zone illumination, especially to reduce glare compared to conventional work zone lighting. To compare the effectiveness of these alternatives, a real-world, full-scale demonstration was conducted at a dead-end two-lane roadway in East Greenbush, NY. The demonstration was attended by transportation agency engineers and highway contractors.

Ratings from the observers in the demonstration suggest that 10-20 lux on the ground is sufficient for most visual tasks, especially when glare is controlled. "Balloon" lighting systems were found to achieve adequate visual performance for workers. Light-emitting diode systems with good optical control were found to produce illumination similar in quantity and quality to conventional light towers.

Conclusion

The findings suggest that when lighting systems provide sufficient glare control, light levels do not always need to be especially high to ensure adequate visibility by workers.



Several alternative lighting systems were showcased at the work zone demonstration.

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