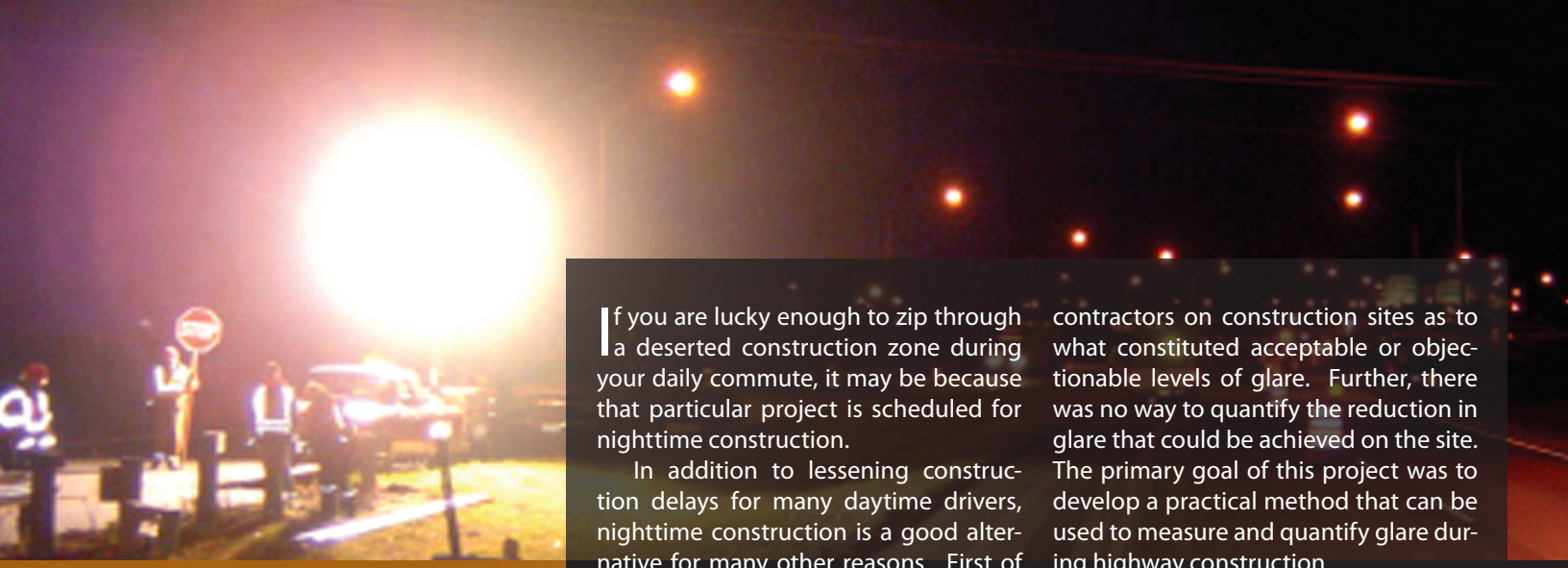

Safe after dark

CEE researchers make nighttime road work safer

By Leslie Sweet Myrick

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Information for this article was compiled from the project's final research report which can be viewed at www.ict.uiuc.edu/publications.asp. Please view this report for more details and illustrations on this study.

The results of this research reflect the view of the investigators and do not necessarily reflect the official views or policies of the Illinois Center for Transportation, nor will the results constitute a standard, specification, or regulation.

If you are lucky enough to zip through a deserted construction zone during your daily commute, it may be because that particular project is scheduled for nighttime construction.

In addition to lessening construction delays for many daytime drivers, nighttime construction is a good alternative for many other reasons. First of all, having fewer travelers on the road can reduce the potential for work zone accidents. Other benefits of nighttime construction can include decreased pollution from stopped vehicles and lower temperatures for construction workers.

However, nighttime construction comes with its own set of risks and problems. Poor utilization and placement of the lighting equipment that illuminates the work zone can cause glare that is dangerous to both drivers and workers. When drivers travel into a brightly-lit construction zone at night, their eyes may have trouble adjusting. Additionally, the bright lights can also impair the construction workers' vision.

With the goal of making construction zones safer, CEE researchers have analyzed and compared the levels of glare and lighting performance generated by typical as well as innovative lighting arrangements and have identified the factors that affect glare measurement in nighttime work zones.

After conducting an extensive review of the existing research on this subject matter, the research team, led by principal investigators professors Khaled El-Rayes and Liang Liu, visited and studied multiple highway construction zones, conducted field studies to evaluate the performance of selected lighting arrangements, and finally developed practical models to measure and control the levels of glare experienced by drive-by motorists as they pass work zones.

In the past, the major challenge in minimizing glare was that no practical and objective model existed to measure and quantify glare on construction sites. The lack of such a model often led to disputes among engineers and contractors on construction sites as to what constituted acceptable or objectionable levels of glare. Further, there was no way to quantify the reduction in glare that could be achieved on the site. The primary goal of this project was to develop a practical method that can be used to measure and quantify glare during highway construction.

The research team observed several construction sites where a variety of lighting equipment was used, including light towers, balloon lights, marine lights, and existing headlights of construction equipment such as roller and milling equipment. Then the team conducted its own lighting experiments in a simulated construction zone at the Advanced Transportation Research Engineering Laboratory (ATREL) in Rantoul. The team tested a total of 25 different lighting arrangements that were similar to the ones set up in the actual work zones they had visited.

Based on its field observations and the experiments at ATREL, the research team made several practical recommendations to reduce and control glare in construction zones which included guidelines for the height of the light sources and the aiming and rotation angles for light towers. Most importantly, as a result of their observations and experiments, the researchers developed a model for quantifying glare, which they named Glare Measurement Model (G2M). This model will be used by engineers and contractors when they set up work zones.

With nighttime construction zones becoming increasingly common, the problem of glare is a growing concern. Thanks to El-Rayes and his team, drivers and workers alike can look forward to all the benefits of nighttime construction, plus safer work zones for everyone.