

PROTECTING ROADSIDE WORKERS: FIELD EVALUATION OF FLARES, CONES, AND TOW TRUCK LIGHT PATTERNS

INTRODUCTION

Between 2011 and 2016, motor vehicle towing workers were killed while operating on the roadway at an annual rate of 42.9 deaths per 100,000 full-time equivalent workers—far greater than the rate for all other industries (2.9 per 100,000 full-time workers). While all 50 States have Slow Down and Move Over laws, most do not cover all vehicles at the roadside, and motorist awareness and compliance may be inconsistent. There is a need for additional research on countermeasures to improve the safety of towing and recovery personnel.

This study aimed to do the following:

- Evaluate the extent to which motorists passing a tow truck slowed down and moved over, day and night, in response to the deployment of flares or cones in combination with two different tow truck light systems.
- Survey road service personnel regarding their attitudes, experience with, and willingness to use flares and cones.
- Document available and potential countermeasures that could be deployed for protection when operating along the roadside.

RESULTS

Evaluation of Flares and Cones in Combination with Two Different Light Patterns

Lane Occupancy

- During the day, the presence of the tow truck displaying the Daytime light pattern was associated with a significant shift of vehicles (25%) from Lane 1 into Lanes 2 or 3, in comparison to when the truck and client vehicle were not present.
- At night, both the Daytime and Nighttime light patterns were associated with large and significant lane shifts (increases of 41% and 40%, respectively).
- Neither flares nor cones produced a significant change in the occupancy of Lane 1 during the day.
- When flares were added to the truck displaying the Daytime light pattern at night, the occupancy of Lane 1 decreased significantly beyond the level achieved by the truck and Daytime lights alone. The addition of cones, however, produced only a very small additional reduction that did not reach statistical significance.
- When paired with the Nighttime light pattern at night, both flares and cones yielded a large and statistically reliable shift out of Lane 1 beyond what occurred with truck alone.

Speed and Lateral Position

- During the day, both flares and cones were associated with small increases in Lane 1 vehicle speeds, however only that for cones was statistically reliable. The lateral distance of the passing traffic did improve (increase) but did not reach significance for either the flares or cones.
- When flares and cones were added to the Daytime light pattern at night, both were associated with significant increases in Lane 1 speeds and decreases in lateral

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ABOUT

Founded in 1947, the AAA Foundation for Traffic Safety in Washington, D.C., is a nonprofit, publicly supported charitable research and educational organization dedicated to saving lives by preventing traffic crashes and reducing injuries when crashes occur. Funding for this research was provided by voluntary contributions from AAA/CAA and their affiliated motor clubs, individual members, AAA-affiliated insurance companies, and other organizations or sources.

MORE INFORMATION

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distance. In contrast, when added to the Nighttime light pattern, both cones and flares showed decreases in Lane 1 speed, although only the latter reached statistical reliability. Flares also resulted in a larger lateral distance of passing vehicles while cones yielded a small decrease in that measure, although neither of the changes reached statistical reliability.

Survey of Towing Industry Personnel

- Results of the survey suggest that overall industry personnel attitudes towards flares and cones are largely favorable and the majority use these countermeasures in a variety of situations.
- Making deployment easier and having laws requiring use were indicated by respondents as motivators for regularly using flares and cones. Making cone retrieval easier and reducing the expense of flares were also particularly popular motivators.
- Respondents report being likely to regularly use flares and cones if research evidence suggested that they were effective and even more so if a company policy were combined with such research evidence.

Review of Countermeasures

- A total of 42 available and prospective countermeasures with potential to reduce the risk to roadside service and incident response personnel were identified.
- Some countermeasures were products that could currently be purchased and others were at various levels of technology readiness, ranging from nascent ideas to products under development.
- The most promising countermeasures, both in terms of altering passing motorist behavior and promoting widespread technician use, appear to be expensive, overly complex, and/or otherwise unattractive to the industry.

METHODOLOGY

On-road Study

An on-road experiment assessed the behavior of motorists passing a roadside incident with varying combinations of flares, cones, and two different light patterns: a Daytime light pattern representative of the emergency lighting currently in widespread use and a Nighttime light pattern designed to avoid masking road safety personnel working at the roadside at night. The staged incident consisted of a flatbed tow truck with the Daytime or Nighttime light pattern activated, 6 ft in front of a silver sedan with hazard flashers operating, on the shoulder of a multilane, limited access highway. The Daytime light pattern was evaluated in both day and night conditions; the Nighttime pattern was only evaluated at night. A second test condition consisted of the deployment of three current-generation flares or retroreflective and fluorescent cones in a taper pattern behind the sedan. Video data collected in December 2021 was processed using computer vision techniques to estimate lane occupancies and speed and lateral position of vehicles in Lane 1, the driving lane closest to the shoulder (Lanes 2 and 3 were farther adjacent).

Survey

An internet-based survey was conducted to collect attitudinal data from a sample of industry personnel regarding slow down and move over laws and attitudes and likely use data on cones and flares. A total of 227 respondents completed the survey. The analysis focused on respondents currently working in the towing service industry (N = 208).

Review of Countermeasures

A review was conducted to examine the state-of-the-art of countermeasures with potential to reduce the risk of crashes between roadside service technicians and incident response personnel and passing vehicles. For each countermeasure identified, project staff assessed its availability, its technology readiness, its cost, and its amenability to valid research to determine its effectiveness within the scope of the project.

REFERENCE

Blomberg, R.D., Wright, T.J., Finstad, K., Brunsen, E., Van Houten, R., Radmehr, N., Yopez, J., & Johnson, T. (2023). *Protecting Roadside Workers: Field Evaluation of Flares and Cones in Combination with Tow Truck Light Patterns* (Technical Report). Washington, D.C.: AAA Foundation for Traffic Safety.