

RED-LIGHT RUNNING AND LIMITED VISIBILITY DUE TO LTV'S USING THE UCF DRIVING SIMULATOR

PROBLEM STATEMENT

Red light running contributes significantly to the number of motor vehicle crashes and injuries nationally. Researchers have reported that drivers who run red lights are involved in some 260,000 crashes annually, of which approximately 750 are fatal. Between 1992 and 1998, the number of fatal motor vehicle crashes at traffic signals increased 18%, which is significantly higher than the 5% rise in all other fatal crashes. During the past decade, the United States has experienced a profound shift in the composition of the passenger vehicle fleet as a result of the rapid growth in light truck vehicle (LTV) sales, a category that includes minivans, sports utility vehicles (SUVs), and light-duty trucks. The majority of LTVs are used as private passenger vehicles, and the number of miles logged in them increased 26 percent between 1995 and 2000. LTVs usually ride higher and wider than typical passenger cars, factors which likely affect visibility from passenger car drivers.

OBJECTIVES

The main goal of this project was to test the utility of a driving simulator to address select traffic engineering operations and safety issues. Three primary objectives were established:

1. Evaluate the effect of a new pavement marking design on red light running at signalized intersections.
2. Assess how Light Truck Vehicles (LTVs) affect horizontal visibility from the passenger cars that follow them, and estimate the potential for rear-end collisions.
3. Assess how Large Size Vehicles (LSVs) affect vertical visibility from the passenger cars that follow them, and estimate the potential for red-light running.

FINDINGS AND CONCLUSIONS

The results of the red-light marking experiment are promising, indicating that with this approach there is a potential for reducing red-light running at regular intersections by up to almost 75%. According to a post-simulation survey, test subjects positively rated the pavement-marking countermeasure and did not feel uncomfortable or confused by the marking when making a stop-go decision. Driver operation speeds and brake response times did not differ significantly between the treated and the regular intersections, which indicates that the marking treatment does not negatively affect driver behaviors at intersections.

The UCF driving simulator was also used to test vertical and horizontal visibility blockages. To study horizontal visibility blockage, researchers designed two sub-scenarios for simulation. The results confirmed the premise that LTVs contribute to recent increases in rear-end collisions, likely as a result of horizontal visibility blockage. In fact, the results showed that passenger car drivers behind LTVs are more inclined to speed to maintain a small distance from the LTV. According to the survey, 65% of the subjects indicated that they drive close to LTVs under actual driving situations.

To study vertical visibility blockage, researchers designed three sub-scenarios for simulation. The results confirmed that LSVs increase the rate of red light running significantly due to vertical visibility blockage of the traffic signal pole. However, when drivers follow LSVs, their behavior is not different than when they drive behind passenger cars. Thus, the addition of a traffic signal pole on the side of the road resulted in a significant decrease in red light running. Sixty-five percent of the test subjects indicated in the post-simulation survey that they felt that the signal pole placed on the side of the road was effective in improving the visibility of the signal.

BENEFITS

This study provides information that should prove useful to traffic engineers with regard to the design of signalized intersections. The studied pavement marking proved effective at heightening driver awareness of the presence of imminent signalized intersections. Likewise, traffic signals placed at the roadside contributed to improving driver awareness of signalized intersections. These treatments suggest potential countermeasures to signal visibility blockage created by the disparity in the width and height of small and medium-sized passenger vehicles and LTV and LSV classes of vehicles. The simulation studies and post-simulation surveys provided useful insights into driver behaviors. Overall, the research provides information that may be useful for improving the safety of signalized intersections.

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