

RESEARCH SUMMARY

Evaluating the Impacts of Red Light Camera Deployment on Intersection Traffic Safety

WHAT WAS THE NEED?

Federal and state transportation agencies have devoted considerable resources over the past decades to education, engineering, enforcement, and deployment of safety strategies. Red-light cameras (RLC) are a popular countermeasure to reduce red-light running and improve intersection safety. The reduction in side impact crashes at RLC intersections, however, is sometimes accompanied by no-change or an increase in the number of rear-end collisions. In addition, whether multiple deployments of RLC in a traffic network can change driving habits (e.g., motorists drive less aggressively) remains to be determined.

WHAT WAS THE GOAL?

Previous research concluded that intersection crashes are the consequence of complex interrelations between engineering designs, signal controls, and behavioral discrepancies of local driving populations. Rather than generalize and be overly influenced by other research, it is necessary to collect location-specific data to evaluate the benefits/effectiveness of any deployed counter measure. The following objectives were set for this study:

- To assess the effectiveness of RLC systems in reducing various types of intersection crashes using location-specific data.
- To understand the impact of RLC systems on driver behaviors, including their approaching speeds and responses to the signal yellow phase.

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WHAT DID THE RESEARCH TEAM DO?

This study conducted a two-phase evaluation. Part I evaluated the effectiveness of RLC deployments at 27 local intersections over the past decade, including a comparison with those findings in the literature with respect to reducing rear-end collisions and side-impact crashes. Based on the findings discussed in Part I, Part II investigated the impact that RLCs had on driver behaviors, especially their responses to the yellow phase. This was based on field observations of more than 1,000 drivers at two RLC intersection clusters (each includes an upstream, an RLC, and a downstream intersection) and two individual RLC intersections. Behavioral observations included drivers' approaching speeds, acceleration/deceleration rates, and their responses to a yellow phase.

WHAT WAS THE OUTCOME?

Evaluation results are summarized below:

- The literature review and Part I before-and-after studies confirmed that proper implementation of the RLC program indeed reduced side-impact crashes, but not rear-end collisions.
- Depending on the characteristics of the local driving populations such as prevailing speeds or aggressive driving behaviors, the presence of RLC may either increase or decrease the number of rear-end collisions.

- This program reduced the percentage of aggressive drivers at both the RLC and its downstream intersections.
- A properly implemented RLC program has significant influence on driver behavior.
- RLC deployment was found to decrease the percentage of red-light-running vehicles and drivers' aggressive passing behavior (i.e., entering the intersection one second ahead of the all-red phase).
- RLCs were shown to have a spillover effect at the immediate downstream intersections.

Based on these findings one can comfortably conclude that the positive effects from a properly implemented RLC program generally outweigh any negatives.

HOW WILL THE RESULTS BE USED?

Extensive field observations at both RLC and non-RLC intersections will need to be conducted by MDOT SHA and local jurisdictions to develop deployment guidelines.

LEARN MORE

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