

Red-Light Cameras: Effective Enforcement Measures for Intersection Safety

THE USE OF CAMERAS TO COUNTER RED-LIGHT RUNNING HAS SIGNIFICANTLY REDUCED INTERSECTION VIOLATIONS IN COMMUNITIES THROUGHOUT THE UNITED STATES. RED-LIGHT CAMERA PROGRAMS WITH A WELL DEFINED PROCESS AND GOOD LEGISLATION CAN FACILITATE PUBLIC ACCEPTANCE AND PROMOTE INTERSECTION SAFETY.

This article contains excerpts from Stop on Red = Safe on Green: A Guide to Red Light Camera Programs, published by the National Campaign to Stop Red Light Running. For more information or to obtain a copy, please visit www.stopredlightrunning.com or call 202-828-9100.

THE SCOPE OF THE PROBLEM

According to the Federal Highway Administration, red-light running was to blame for as many as 218,000 crashes, 181,000 injuries and 880 fatalities in 2001.¹ The problem plagues cities—where running traffic controls is the leading cause of urban automobile crashes—as well as rural communities.

From 1992 to 2000, the number of fatal crashes at signalized intersections in the United States increased by 19 percent. Red-light running was the single most frequent cause of these crashes—equivalent to more than three times the rate of increase for all other fatal crashes during the same period.² More than half of those who died were pedestrians or vehicle occupants hit by red-light runners. The financial cost to the public was estimated to exceed \$14 billion per year.³ The California Highway Patrol estimates that each red-light running fatality costs the United States \$2,600,000 and other red-light running crashes cost between \$2,000 and \$183,000, depending on severity.⁴ Despite such catastrophic consequences, only a tiny fraction of red-light runners face any punishment for their actions.

PUBLIC RESPONSE TO RED-LIGHT CAMERAS

Red-light cameras (RLC) are used in more than 70 U.S. communities. Although they are not without detractors (many public safety initiatives meet resis-

tance early on), RLC programs generally have widespread public support. A 2002 Harris Poll found that 83 percent of the U.S. public supported RLC enforcement—an increase of almost 10 percent from a poll conducted one year earlier.⁵ In addition, as shown in Table 1, polls conducted by the Insurance Institute for Highway Safety (IIHS) found that a large majority of the public supported RLC—an average of 80 percent in five cities with cameras and 76 percent in five cities without cameras.

BENEFITS OF RLC: AN EFFECTIVE COUNTERMEASURE TO A DEADLY PROBLEM

RLC has significantly reduced intersection violations and crashes in communities throughout the United States and around the world. Photo enforcement is a proven deterrent that can bring about behavioral changes, resulting in motorists' obeying traffic signals, respecting fellow drivers and avoiding crashes, injuries and loss of life caused by red-light running. (See Table 2 for violation/crash reduction statistics for several U.S. jurisdictions.) Studies have shown that photo enforcement leads to a 25–30 percent reduction in intersection injury crashes. Most encouraging, there seems to be a spillover effect to intersections not equipped with cameras, indicating that photo enforcement leads to more widespread behavioral change.⁶

With the direct and indirect costs associated with crashes, deaths and injuries (such as law enforcement, medical and other emergency personnel and traffic tie-ups), reducing these events provides substantial savings to a community. A study in Fairfax County, VA, USA, found that crashes were reduced by 40 percent after the activation of RLC. Researchers projected that, accounting for the costs of the system, the reduction saved \$12.8 million over the eight-year cycle of the program.⁷

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Table 1. Percentage of U.S. drivers who favor red-light cameras.

In cities with cameras:	
Fairfax, VA, USA	84 percent
Charlotte, NC, USA	82 percent
Oxnard, CA, USA	79 percent
Mesa, AZ, USA	78 percent
San Francisco, CA, USA	77 percent
In cities without cameras:	
Fort Lauderdale, FL, USA	82 percent
Raleigh/Durham, NC, USA	76 percent
Arlington, TX, USA	74 percent
Charlottesville, VA, USA	74 percent
Fresno, CA, USA*	72 percent

*Note: This poll was originally published on April 28, 2001. Since then, the city of Fresno has begun using red-light cameras.

Source: Insurance Institute for Highway Safety, 2001.

IMPLEMENTING A SUCCESSFUL RLC PROGRAM

A well-executed program—including a clear, well-defined process coupled with good legislation—can increase effectiveness, facilitate public acceptance and improve the long-term success of RLC programs. While there is no cookie-cutter formula that addresses the specific needs and characteristics of every jurisdiction, common steps in successful programs include

- identifying the safety problem and determining if RLC is an appropriate solution;
- identifying and enlisting the support of key players;
- establishing program goals;
- evaluating and selecting sites;
- initiating a multifaceted public awareness campaign prior to program start and continuing it through the life of program;
- resolving legislative needs;
- choosing a camera system and vendor(s) based on the jurisdiction's objectives, priorities and resources;
- implementing the program using best management practices;
- predicting, acknowledging and addressing public concerns; and
- evaluating and monitoring the program's success.

Table 2. Violation/crash reduction statistics for selected U.S. jurisdictions.

Jurisdiction	Violation/crash reduction
Oxnard, CA, USA	Injury crashes at intersections with traffic signals dropped 29 percent after camera enforcement began in 1997; the reductions occurred at intersections with and without cameras.
Fairfax, VA, USA	Red-light violations declined 44 percent after one year of camera enforcement.
Washington, DC, USA	Red-light running fatalities decreased from 16 percent to 2 percent in the first two years with red-light cameras.
Charlotte, NC, USA	Red-light running violations dropped by more than 70 percent in the first year.
New York City, NY, USA	Red-light violations at camera intersections declined by 62 percent.
Howard County, MD, USA	In the four years since camera operation, the number of crashes at every camera location dropped, with reductions ranging from 21 percent to 37.5 percent.
San Francisco, CA, USA	Red-light cameras led to a 68-percent reduction in violation rate.
Los Angeles County, CA, USA	There was a 92-percent drop in violations.
Nationwide	<i>Automated Enforcement of Traffic Signals: A Literature Review</i> reported violation reductions ranging from 20 percent to 87 percent, with half of the jurisdictions reporting 40- to 62-percent reductions in red-light violations.*

*Note: Data from Maccubbin, R., B. Staples and A. Salwin. *Automated Enforcement of Traffic Signals: A Literature Review*. Prepared for the Federal Highway Administration, 2001.

Source: National Campaign to Stop Red Light Running. *Stop on Red = Safe on Green: A Guide to Red Light Camera Programs*. Washington, DC, USA, 2002.

Four of these steps merit particular attention: identifying the problem, establishing program goals, selecting intersections as photo enforcement sites and addressing public concerns. Each of these components is best undertaken with the input, support and understanding of the engineering community and each may require special expertise at the local level. RLC programs are a valuable supplement to good engineering, which is a prerequisite for intersection safety.

Problem Identification

It is vital that jurisdictions evaluate the safety problem and determine if RLC is an appropriate solution. What is the particular issue? Pedestrian safety? Intersection crashes? A comprehensive engineering review of the intersection in question should be conducted to determine the extent of the problem and the causes of red-light running. This study helps ensure that red-light running is not due to engineering or other setting shortcomings. Can the problem be addressed with other

countermeasures such as road improvements, improved signal visibility, or better traffic signal timing? One useful resource for those conducting engineering reviews is the Federal Highway Administration (FHWA)/Institute of Transportation Engineers (ITE) *Toolbox of Engineering Countermeasures for Red Light Running*, expected to be published in spring 2003.⁸

Establishing Program Goals

Effective coordination between law enforcement and engineers at local levels is important to setting goals and gathering data and can reduce reliance on state traffic data systems. Jurisdictions with very little or no prior data on intersection crashes and red-light violations need to collect these data before they implement a camera program. They also should plan for measurements of control locations or intersections that will not get cameras right away. Without data, jurisdictions cannot empirically demonstrate a need for cameras—or any other intervention. Research and program evaluation experts should be consulted in this

process before data are collected. Collecting the appropriate data takes time. Jurisdictions should be prepared to study potential intersections for six months to one year (or more, if crash data/trends are required).

Site Selection

Intersections generally are chosen for photo enforcement based on collision, citation and complaint data as well as violation studies and citizen input. Traffic engineers must determine whether an existing intersection's features are engineered appropriately or need to be modified as well as if they are conducive to the construction and installation of a camera system. For example, is there a manhole or a driveway that would interfere with the placement of system components? Typically, intersections are chosen based on one or more of the following factors:

- High violation and crash rate
- High traffic volume
- Community request
- Concern for pedestrian safety
- Difficulty or danger of enforcement

For cameras to be effective, the intersection must be engineered to encourage good driver behavior. As discussed earlier, an engineering review is an important part of this process. Researchers suggest that, at a minimum, an intersection review should include a determination that the sight distance of the signal is adequate and that the yellow phase is sufficient for drivers to stop or pass the stop-bar before the red phase begins. Other practices that should be considered include the use of all-red clearance intervals, conspicuous traffic signal housings, adequate signal brightness, coordinated signal timing and the use of advance warning signs on high-speed roads or at locations with limited sight distances.

Addressing Public Concerns

In addition to a thorough engineering review of the intersection where cameras are to be placed, program managers should predict, acknowledge and address public concerns about camera programs. Opposition to RLC programs has focused on a number of issues; some of these issues are explored briefly below.

Signal timing. The sole purpose of the

yellow phase is to warn drivers that the light is about to change from green to red. It is not intended to accommodate driver behavior including speeding and other forms of risk-taking. Once the yellow warning appears, drivers are obligated to stop or to clear the intersection.

Guidelines for yellow light timing are set by ITE in conformance with the laws put forth in the *Uniform Vehicle Code* and standards set forth in FHWA's *Manual on Uniform Traffic Control Devices*.^{9,10} The duration of the yellow interval normally is 3 to 6 seconds (sec.). A longer duration is reserved for use on approaches with higher speeds.

Studies by IIHS indicate that increasing the length of the yellow change interval decreased the frequency of red-light running in the short period following the timing change. However, IIHS researchers acknowledge that these initial reductions in red-light running are not a long-term solution.¹¹ At intersections where the yellow phase is inappropriately short, lengthening the yellow can bring some drivers who are inadvertent offenders into compliance. However, extending the yellow phase will not reduce incidences of deliberate red-light running.

Some jurisdictions employ a red clearance interval in which the red signal indication is displayed to all traffic. This is not intended to reduce incidences of red-light running; it is a safety measure that separates the last red-light runner from the first green-light runner for 1 to 3 sec., which can prevent a collision.^{12,13} Before RLC is used, jurisdictions should ensure that intersections are properly engineered to give the driver every chance to comply. Signal timing should be checked—not just the yellow and all-red phases—to assure it is in tune with current traffic demand. Hardware also should be checked to ensure traffic signal controllers and their detectors are working properly. Poorly timed and/or poorly maintained equipment contributes to congestion and delays that encourage red-light running.

These engineering options are not sufficient for intersections that have been studied and adjusted as best as possible by local engineers. Red-light running is a complex driving behavior that needs to be addressed through a combination of

engineering, enforcement and education, not just engineering alone.

Privacy. Legal opinions have found that RLC does not violate a citizen's legal right to privacy.¹⁴ The right to drive a vehicle is coupled with the responsibility to abide by certain rules, including the responsibility to obey traffic signals. Driving is a regulated activity on public roads. RLC is triggered only by motorists who break traffic laws.

Presumption of innocence. Some opponents claim that with photo enforcement, owners are presumed guilty until proven innocent. As IIHS notes, photo enforcement does not violate the presumption of innocence because this presumption attaches at trial, not before.¹⁵ Police and prosecutors are not bound by a presumption of innocence. Rather, ethics prevent them from charging a person unless there is sufficient evidence.

Photo enforcement laws provide that photographic evidence of a violation is sufficient to issue a citation to a registered owner. The citation is merely a summons; the alleged offender has the opportunity to present a defense at a hearing. However, offenders often find that photographic evidence is difficult to rebut. This underscores for jurisdictions the importance of keeping careful oversight of equipment maintenance and accuracy.

Notification. Some opponents argue that if traffic offenders are to defend themselves adequately against a charge, they should be entitled to immediate notice of the offense rather than a citation that is delivered later by mail. In response to that argument, IIHS notes that the Fourteenth Amendment of the U.S. Constitution provides that a person be given due process of law and that fundamental fairness requires that a person charged with an offense be given notice of exactly what offense is being charged and when and where it was allegedly committed. Absent a violation of any statute of limitations, there is no guarantee that a person will be charged contemporaneously with an offense:

“Traditional enforcement methods almost always provide relatively immediate notice of an offense during the stop and citation process, but there is nothing in the law providing traffic law offenders with special rights to notice. Furthermore, in some circumstances traditional enforce-

ment methods do not provide immediate notice. An officer who observes a violation can cite the violator at a later time. In crash situations, citations often are issued after the investigation is completed, days or weeks after the crash.”¹⁶

Revenue. Some opponents of photo enforcement view RLC as a revenue source rather than a safety tool. Many jurisdictions are combating that concern by moving to flexible fixed-fee payments to contractors. That way, there are no misconceptions that vendors have an incentive to increase citations, thereby increasing revenues. When revenues exceed costs, many jurisdictions reinvest that money into the RLC program or into other traffic safety initiatives. Jurisdictions should be attentive to revenue generation and distribution. They should:

- Determine the amount of fines for a citation and the distribution among all parties.
- Determine the involvement of vendors and operators. Is a vendor reimbursed on a per-ticket or a flat-fee basis? Overcome any perception that the program is simply a revenue generator for the jurisdiction. One way to do that is to dedicate income to traffic safety (rather than the general fund), as recommended by the National Committee on Uniform Traffic Laws and Ordinances.
- Prevent appearances of conflict of interest for government authority and contractor.

Ticketing procedures. Some opponents complain that receiving tickets in the mail takes away the constitutional right to confront an accuser. However, as with parking tickets, each ticketed individual is given the opportunity to testify in court and provide a defense against the ticket. According to Charles Ramsey, chief of the Washington, DC, USA, Metropolitan Police Department, “All individuals receiving tickets from red light cameras have the same rights to contest their citation as those who receive tickets from police officers, including the option of an in-person hearing to present their defense.”¹⁷

Some localities have addressed the issue of how to contest a violation by allowing a mail-in format. To contest a ticket by mail

in Washington, DC, the owner must return a sworn affidavit, including evidence and testimony, to the Automated Traffic Enforcement Office. This waives the right to an in-person hearing.

Increase in rear-end crashes. A few studies report an increase in rear-end crashes following the implementation of RLC enforcement. This is not surprising. When more drivers stop on red, more rear-end collisions will occur if motorists behind them are following too closely or not paying attention. This appears to be a temporary effect that decreases or disappears once drivers become accustomed to cameras and change their driving behavior. When considering all crash types—particularly those involving injury—RLC leads to significant reductions in crashes, especially costly injury-related crashes.

THE ROLE OF THE TRAFFIC ENGINEER IN RLC PROGRAMS

Traffic engineers play a pivotal role in each stage of an RLC program. Before a program even begins, engineers assist in selecting camera sites and conducting intersection engineering reviews. Traffic engineers must ensure that the cameras coordinate with existing traffic systems and may assist in installing cameras and monitoring the results of camera enforcement. With cooperation among the many key players in photo enforcement programs, RLC programs throughout the United States can continue to reap enormous safety benefits for the public. ■

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is executive director of the National Campaign to Stop Red Light Running, located in Washington, DC, USA. The campaign is an independent advocacy initiative

guided by a voluntary national advisory board comprised of leaders from the fields of traffic safety, law enforcement, transportation, engineering, healthcare and emergency medicine. It provides the public and elected officials with a better understanding of the seriousness of red-light running as well as law enforcement practices and tools that can make roadways safer.