Red Light Camera Systems

Operational Guidelines

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U.S.Department of Transportation
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RED LIGHT CAMERA SYSTEMS OPERATIONAL GUIDELINES

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Foreword

Red light running is one of the major causes of crashes, deaths, and injuries at signalized intersections. Most recent crash statistics show that nearly 1,000 Americans were killed and 176,000 were injured in 2003 due to red light running related crashes. The monetary impact of crashes to our society is approximately $14 billion annually.

The Federal Highway Administration (FHWA) and National Highway Traffic Safety Administration (NHTSA) support a comprehensive approach to intersection safety that incorporates engineering, education, and enforcement countermeasures to prevent red light running and improve intersection safety. Red light cameras can be a very effective countermeasure to prevent red light running. There are a number of studies that indicate reduction in crashes at signalized intersections due to red light cameras. FHWA is promoting red light cameras as one of its identified priority, market-ready safety technologies.

This document is an update to a previous version dated March 2003 (1). The information contained in this document is intended to foster discussions and initiatives that will improve intersection safety by reducing crashes due to red light running. This document is not a regulatory requirement and the decision to use red light cameras is a matter for local decision-makers.

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CHAPTER I. INTRODUCTION

The use of camera systems for the enforcement of red light violations at signalized intersections is increasingly widespread in the United States. State and local agencies have found that the use of red light camera systems can reduce red light running by motorists and, more importantly, reduce the number of crashes attributable to red light violations. A recent synthesis of literature on the safety impacts of red light camera systems found that there was "…a preponderance of evidence, albeit not conclusive, indicating that red light running camera systems improve the overall safety of intersections where they are used… angle crashes are usually reduced, and, in some situations, rear-end crashes increase, but to a lesser extent."(2) Furthermore, a recent study of red light camera systems in seven jurisdictions throughout the US confirmed that these systems are likely to reduce right-angle crashes but can increase rear-end crashes. However, the systems were found to provide an economic benefit of $28,000 to $50,000 at a treated site when considering the economic cost of crashes by crash type (3). The reduction in the number of crashes is especially important as crashes caused by motorists running red lights are, on the average, more deadly and damaging than other types of crashes at signalized intersections (4, 5, 6).

The purpose of these guidelines is to assist jurisdictions who are considering the implementation of red light camera systems and help them avoid inconsistent or incorrect application of such systems. Questions have been raised regarding the contracting, design, implementation, operation of red light camera systems, and the legality and intent of photo enforcement systems. In a broader perspective, for continued use of red light camera systems and other technologies to improve transportation operations and safety, it is vital these technologies are perceived as accurate and reliable and are applied fairly.

Red light cameras are currently in place in more than 95 communities in the United States. As red light camera programs continue to be implemented across the nation, there is much to be learned from previous experiences. Traffic engineers, law enforcement officials, and other State and local agency managers can benefit greatly from guidance and research that provides effective and comprehensive procedures for implementing a successful red light camera program.

The Federal Highway Administration (FHWA) and the National Highway Traffic Safety Administration (NHTSA) have developed this operational guideline for use by State and local agencies for the implementation and operation of red light camera systems. Although not a regulatory requirement, the guideline is intended to provide critical information for State and local agencies on relevant aspects of red light camera systems in order to promote consistency, proper implementation, and operation; and to ensure that this effective tool and other forms of technology remain available to transportation and enforcement agencies around the nation.

This guideline can be used by State and local agency managers, transportation engineers, and law enforcement officials to identify and properly address safety problems resulting from red light running within their jurisdiction. This guideline outlines proven and effective practices implemented in the United States, and provides operational guidance that can be followed to ensure that cost-effective solutions are implemented by State and local agencies. The Institute of Transportation Engineers (ITE) has issued *Making Intersections Safer: A Toolbox of Factors and Countermeasures to Prevent Red Light Running* (7) that discusses in detail many of the issues and practices identified in this document.

CHAPTER II. UNDERSTANDING OF THE PROBLEM

Red light running and the collisions and injuries that result from it has become a national safety problem. Incidences of red light running, along with other aggressive driving behaviors, is on the rise. For 2003, the most recent year for which statistics are available, there were 206,000 red light running crashes, resulting in 934 fatalities and 176,000 injuries (8).

FACTORS CONTRIBUTING TO CRASHES CAUSED BY RED LIGHT RUNNING

A number of factors that contribute to crashes caused by red light running have been identified from research and crash data studies. These factors include namely:

- Driver behavior.
- Intersection design and operation.
- Vehicle characteristics.
- Weather.

Driver Behavior

Driver behavior (including speeding and aggressive driving) is the most significant contributing factor to the occurrence of red light running. Motorists may accelerate when anticipating a change in signal indication, in order to make it through the intersection on the yellow. If a motorist misjudges the time of the signal change, he or she will enter the intersection against the red signal indication.

Motorists driving above the posted speed limit or driving too fast for conditions increase the distance needed to stop before entering intersections and decrease the distance available to react to a change in traffic signal indication. In other words, speeding significantly increases the risk of running a red light and the possibility of being involved in a crash as a result of running the red light.

For many drivers, inattentiveness may also be the contributing cause. Drowsiness, conversing with passengers, eating, and use of a cellular phone or other electronic devices are among the many common distractions that cause drivers to reduce their focus on the task of driving. Inattentive or distracted drivers may perceive a change in signal indication late or in some cases not at all. Motorists, perceiving the signal indication late, may not perceive the change in time and run through the red signal.

Intersection Design and Operation

Deficiencies in the design and configuration of signalized intersections may contribute to red light violations. Certain design and configuration conditions (geometrics) may provide inadequate stopping distance, may cause motorist to be confused, or limit visibility of traffic control devices. Where these design and configuration conditions can be identified and corrected through engineering improvements, the number of red light violations can be reduced. Therefore, it is important when considering the use of a red light camera system, that an engineering study be done to identify potential engineering improvements that could be implemented in the intersection design and configuration. If an engineering study identifies countermeasures that might take considerable time to design and implement, then appropriate

short-term temporary solutions should be considered while long-term improvements are investigated and implemented.

An engineering study can identify the following conditions that may be present at a signalized intersection and contribute to red light running by motorists:

- Grade
  The grade of an intersection approach may significantly effect the time and distance needed for a motorist to stop a vehicle at an intersection. If approaching the intersection on a downhill grade, motorists may not account for vehicle mass and momentum, which will require longer stopping time (9).

- Poor Visibility
  Poor visibility due to darkness, rain, or snow and to a motorist's impaired vision may prevent or reduce a motorist's ability to see and react to signs, signals, and other traffic control devices at intersections and on the approaches to intersections in a timely manner.

- Roadside Obstructions
  Roadside obstructions (i.e., parked vehicles, vegetation growth, pedestrians) may block a motorist's field of view to road signs, traffic signals, and other features at the intersection, thus contributing to driver confusion. Intersections and adjoining approaches should be engineered so that roadside parking does not interfere with sign visibility. Signs should be regularly monitored and cleared of vegetation over-growth.

- Line of Sight
  As motorists approach an intersection, their line of sight to the intersection should be unobstructed. Any obstructions may reduce reaction times and/or negatively impact driver behavior. Line of sight problems often occur at intersections located at the base of a hill, where the traffic signal is partially or completely hidden from the driver's view until reaching the top. Line of sight problems may also occur when following a taller vehicle, whereby the taller vehicle obstructs the line of sight of the driver of the following shorter vehicle.

- Traffic Volumes
  Research studies have indicated that time of day and traffic volume may be associated with increased red light running behavior (5, 10). During peak traffic periods, increased traffic volumes and congestion may contribute to the number of motorists running red lights. Motorists traveling during these periods are often subject to the delays from traffic congestion that may negatively affect their driving behavior. If traffic signals are not properly timed to accommodate the increased traffic volumes and coordinated to enhance traffic flows, motorists may wait for two or more cycles before passing through signalized intersections. Frustrated motorists may choose to enter the intersection on a red light in order to avoid waiting through an additional cycle. Traffic volumes during the late evening and early morning hours are relatively light. During these time periods and especially on non-traffic-actuated approaches at signalized intersections, motorists may have to wait for extended times when there is little or no traffic on the other intersection approaches. Faced with this situation, motorists may engage in unsafe or aggressive

driving behavior by electing to run the red light. A study has also indicated that larger intersections and high volumes seem to be related to red light running (10).

- Signal Timing
  Research studies have determined that inadequate signal timing generally tends to increase red light running by motorists at signalized intersections (9, 11, 12). Methods for development of signal timing plans and discussion of adequate clearance intervals can be found in the *Traffic Control Systems Handbook* (13) and the *Manual of Traffic Signal Design* (14) available from the ITE (www.ite.org).

Vehicle Characteristics

Vehicle characteristics may contribute to red light running and to crashes resulting from red light running. Vehicles that carry heavy loads require additional time to slow and stop when a traffic signal changes to yellow (15). Drivers of vehicles with heavy loads may forget or disregard the effect of the loads on stopping distances, and this may result in red light running.

Weather

One study has found that weather is not a predictor of red light running (10). However, it is reasonable to infer that weather conditions such as heavy rain, snow, hail, or high winds may distract drivers, make roadway surfaces slick, and may cause stopping distance to be increased. Inclement weather conditions will likely exacerbate the effects of steep grades, limited sight distances, and high approach speeds. Reduced visibility resulting from severe weather, sun glare, or dust and debris may also prevent a motorist from observing signs, signals, or other traffic control devices in a timely manner. Location and configuration of signals relative to early morning and afternoon sun glare can reduce visibility of signal colors.

CHAPTER III. PROBLEM IDENTIFICATION

An initial step in determining if red light camera systems, or any other countermeasure, are to be employed, is to establish if a red light running and resulting crash problem exists in the jurisdiction in general or at a specific intersection. Red light running and crashes attributable to red light running may result from a number of contributing factors and, consequently, may be addressed by a variety of countermeasures encompassing engineering improvements, enhanced driver and public education, and increased enforcement. The red light running problem at any intersection needs to be investigated and the feasibility of all countermeasures, including red light camera systems, should be addressed.

Investigating Intersection Safety

A systematic approach to the collection and analysis of various intersection safety-related data is important for the identification of intersections where there is a high incidence of red light running and for the investigation of countermeasures. The elements of the investigation are described below.

Data Collection

An identification of intersections with high crash rates, public complaints, and those identified by law enforcement as having violation problems, is the first step in improving intersection safety. While complaints or other inputs from motorists and the general public about red light running at specific locations are helpful, data on crashes resulting from red light running and the number of red light violations at signalized intersections are required for an objective assessment of the potential safety problems and an understanding of factors that may be contributing to the problems.

Data for investigating intersection safety may be obtained from the following sources:

- Crash statistics and investigation records maintained by law enforcement and traffic engineering agencies.
- Crash statistics maintained by insurance companies, if available.
- Counts of citations issued by law enforcement officers for red light running.
- Camera surveys of driver behavior at intersections, including counts of red light violations.
- Field observations of driver behavior at intersections, including speed surveys, by trained personnel.
- Complaints or other inputs from motorists and the general public.

Intersection Crash Data

State and local agencies typically collect crash data for injury crashes or crashes where property damage exceeds a pre-determined threshold amount. Generally, data regarding minor non-injury crashes are not collected.

Crash data is the most comprehensive basis for the identification and analysis of red light running at signalized intersections. The data should be classified with as much detail as possible, including:

- Intersection location, by identifier or street names.
- Crash type, for example, angle collision, rear-end collision, or striking a pedestrian or bicyclist.
- Crash location and vehicle movement, including movement direction, left turn, through, or u-turn.
- Crash day of week and time of day.
- Weather at the time of the crash.
- Type of vehicle: automobile, SUV, truck, bus, or motorcycle.
- Vehicle speeds.

Red Light Violation Data

An analysis of red light running violation data may serve as an alternative to the crash data when crash data are not available. This data may be available from records maintained by law enforcement or from special studies collected by video cameras or other means. However, this approach is generally not recommended because the data may reflect targeted enforcement at selected intersections only and the criteria applied by individual officers for issuing citations may vary from one officer to another.

Driver Behavior Observations

Video surveys or field observations may also provide important data on driver behavior and operational conditions at intersections. Conditions such as traffic repeatedly backing up into an intersection from adjacent freeway ramps or intersections, traffic backing into the through lane from the left-turn bay, or high speeds on the intersection approaches may be contributing to red light violations and to the incidence of crashes attributable to red light running.

Traffic, Signal, and Intersection-Related Data

Intersection geometry, traffic volumes, and signal timing data are generally available from the State or local agency traffic engineering or public works department. The following data provide necessary information for a rigorous analysis of factors that may be affecting the frequency of crashes attributable to red light running:

- Signal operation: coordinated, fully actuated, semi-actuated, pre-timed, or isolated.
- Signal phasing: protected, permissive, or protected-permissive left turns, split phasing.
- Yellow interval.
- All-Red interval.
- Number of traffic lanes.
- Number and location of signal heads.

- Vehicle detector locations.
- Approach angles, speed limits, and directions.
- Street lighting.
- Approach grades and visual obstructions.
- Average daily and peak period traffic volumes.
- Proportion of tall or wide vehicles.

A sample assessment form that can be used as a guide for field inspections of problem sites can be found in *Intersection Safety Issue Briefs* (16).

Motorist Complaints and Comments

Qualitative means to identify intersections where red light running is a frequent occurrence should also be employed by State and local agencies. Through the solicitation of inputs from motorists and from the general public, intersections where there are unique or changed conditions or where motorists have witnessed "near misses" that might not otherwise be identified from an analysis of crash data can be considered for further analysis and investigations. Written and oral complaints from motorists may be used as an input for determining intersections where there is a problem with red light running.

Engineering Study

The State or local agency considering the use of a red light camera system should conduct an engineering study to determine the factors contributing to red light running and to identify appropriate countermeasures that could be implemented to reduce the number of crashes resulting from red light violations. Once identified, the appropriate effective countermeasures (engineering, education, and enforcement) should be considered in addressing the crash problem.

Section 4C.01 of the *Manual on Uniform Traffic Control Devices (MUTCD)* requires that an engineering study be conducted whenever the installation of a traffic signal is being considered (17). After a traffic signal is installed, traffic conditions may change and a high incidence of red light violations may occur, a changed condition that warrants attention by traffic engineers and traffic safety professionals. Engineering studies should be fully documented in preparation for any questions or concerns about proposed photo enforcement camera installation. The documentation should include a full description of the operation of the intersection, assessed throughout the day. The engineering study must also review pedestrian and bicycle conditions at the intersection. For further discussion on the engineering studies, refer to the MUTCD at http://mutcd.fhwa.dot.gov/. For a complete description of the steps in an engineering study, please refer to ITE's *Manual of Transportation Engineering Studies (18)*.

CHAPTER IV. COUNTERMEASURES AND THEIR APPLICATIONS

Over the last decade, considerable efforts have been made to mitigate red light running behavior by motorists in the United States. Research has shown that engineering improvements (9, 11, 19), safety education and increased enforcement by law enforcement officers (12, 20) can significantly reduce red light violations. In addition, to supplement traditional law enforcement activities, many jurisdictions have implemented automated enforcement red light camera systems.

The solution to the problem of red light running and resulting crashes may require one or a combination of engineering, education, and enforcement measures.

- Intersection Engineering Improvements
  Engineering solutions to be considered include, but are not limited to, modifying traffic signal timing, improving signing and marking, improving sight lines, modifying grades and/or grade separation, adjusting the prevailing speeds, changes in surface treatments, altering lane configuration, and replacing the traffic signal with some other form of traffic control device or intersection type.

- Education
  A well-designed public information and education campaign will assist motorists and the general public in understanding the safety issues inherent to red light running. It will provide information and data that explain what red light running is, why red light running is dangerous, and what actions are currently being undertaken to reduce the incidence of red light running.

- Traditional Enforcement By Law Enforcement Officers
  Traditional enforcement efforts by law enforcement officers specifically targeting red light running violators can be a cost effective deterrent in reducing red light violations at problem intersections.

- Red Light Camera Systems
  Red light camera systems can be a cost effective tool to reduce red light violations. Red light camera systems should be part of a comprehensive intersection safety program, which considers all countermeasures to reduce fatal and injury crashes at intersections.

An engineering study should consider each of these possible solutions in order to identify the most appropriate solution to the documented problem at the intersection.

ENGINEERING COUNTERMEASURES

Intersection design deficiencies may contribute to red light running and crashes at signalized intersections. The deficiencies may be mitigated by engineering improvements of two types: traffic operation (including signal control) improvements, and intersection geometry improvements.

Traffic Operation and Signal Control

At a minimum, retiming of the traffic signal should be analyzed as a red light running countermeasure. Signal timing should be reviewed regularly to determine if it is still appropriate

for the traffic conditions in effect, and changed if the need for a change is indicated. Traffic signal timing, especially the length of the yellow and all-red interval times, should be in accordance with the broad guidelines in the MUTCD (17) and due consideration should be given to the informational report developed by ITE (9), which discusses methods for determining vehicle signal change and clearance intervals. In addition, any applicable State and local agency policies and procedures should also be followed.

The following list identifies possible engineering countermeasures to reduce incidences of red light running:

- Improving Signal Head Visibility
  Signal head visibility can be improved by increasing the size of the traffic signal lamps from 8 to 12 inches. Improving signal visibility can be especially beneficial on streets that run in an east-to-west direction where the sun angle silhouettes the traffic signal head making it difficult to see the signal indication. The addition of backplates can also make signals more visible.

- Additional Signal Heads
  Depending on the intersection and the number and visibility of signals currently deployed, adding signal heads may help decrease the frequency of red light violations. If a single signal head is used for multiple lanes, such as two through lanes, the signal may be blocked from view of a motorist if traveling behind or along side a truck or other high profile vehicle. A similar situation may occur when the traffic signal pole and head are located on the corner of an intersection.

- All-Red Interval
  An all-red clearance interval provides additional time for motorists already in the intersection to proceed through the intersection on the red indication while holding cross traffic on the cross street approaches. The red clearance interval is not intended to reduce the incidence of red light running; rather it is a safety measure.

  The MUTCD indicates that the length of the all-red interval should be a function of traffic speed, cross street width, and length of the yellow interval (17). The MUTCD guidance is that the clearance interval should not exceed six seconds in length. Typically where used, the length of an all-red interval is one second to not more than three seconds.

- Appropriate Yellow Times
  The purpose of the yellow interval is to warn approaching traffic of the imminent change in the assignment of right-of-way. The length of the yellow interval is determined in such a way that it provides enough time for a vehicle to travel at its prevailing speed through the intersection before the traffic signal turns red or to allow a driver to stop at a comfortable average deceleration before entering the intersection. Therefore, the likelihood of a motorist running a red light increases as the yellow interval is shortened. Lengthening the yellow interval, within appropriate guidelines, has been shown to significantly reduce the number of inadvertent red light violations (11).

  The length of the yellow intervals should be in accordance with MUTCD guidelines (17) and applicable State and local agency policies and procedures. The ITE informational report (9) contains more detailed discussion of methods for the calculation of appropriate clearance intervals for specific circumstances.

- Signalized Intersection Warning Signs
  Advance warning signs are posted upstream on an intersection approach to alert motorists that they are nearing a signalized intersection. Advance warning signs are especially beneficial at intersections with curved approaches or those with steep grades.

- Advanced Yellow Flashing Lights
  Consideration should be given to the use of advanced yellow flashing lights as advance warning at intersections with high-speed approaches or limited sight distances. These traffic control devices are posted well in advance of an intersection and only flash at approaching motorists when the signal indication is likely to be red when the motorists reach the intersection. This operation is different than the typical flashing yellow light in advance of an intersection that simply warns of the existence of the signalized intersection. Advanced yellow flashing lights may provide the most benefit in slowing vehicles on steep grade approaches and larger vehicles with more mass and momentum.

  Advanced warning flashers and their effect on red light violations were studied in Bloomington, Minnesota (21). The advanced warning flashers were used for approximately three months, during which red light running violation data was collected. It was determined that the installation of the advanced yellow flashing lights reduced red light violations significantly at the study intersection, with a greater reduction in truck red light violations.

- Adjusting the Approach Speed
  Approach speeds are a critical determinant for the length of the yellow time at a signalized intersection. Speed limits on the approaches to a signalized intersection where there is a problem with red light running should be evaluated based on speed studies and observations. It may be necessary to consider additional speed-affecting measures in order to achieve the necessary result.

- Traffic Signal Coordination
  A coordinated traffic signal operation where motorists are able to move smoothly in platoons from intersection to intersection reduces the risk of red light violations and collisions.

- Advance Vehicle Detection
  Advance vehicle detection may be employed to hold green signal indications for the maximum allowable time, allowing motorists at the back of platoons or under light traffic conditions, to legally enter and traverse a signalized intersection.

- Removal of Unwarranted Traffic Signals
  Low volume, signalized intersections may experience a reduction in red light violations and crashes when traffic signals are removed and alternative intersection designs or other forms of traffic control are implemented. Guidance on the signal removal process can be found in Section 4B.02 of the MUTCD (17).

- Removal of On-Street Parking
  The restriction of on-street parking for a distance of at least 200 feet from each intersection approach may enhance the driver visibility of signage, signals, pedestrians, cross-traffic, and other pertinent features near the intersection.

Other factors may serve to increase vehicle delays at signalized intersections and contribute to an increased frequency of red light running. Malfunctioning vehicle detection and signal actuating equipment, long phases or cycle lengths, or the use of protected left turn phases at times of the day when not required may serve to increase delays and, under certain circumstances, may cause motorists to engage in unsafe driving behavior by running red lights.

Intersection Geometry Changes

Deficiencies in intersection configuration or geometry may increase the number of motorists unintentionally running red lights. Where intersection geometry deficiencies are identified and can be improved, appropriate changes should be designed, deployed, and evaluated. Design guidelines can be found in AASHTO's *A Policy on Geometric Design of Highways and Streets*, 2001 (22) and ITE publications: *The Traffic Safety Toolbox: A Primer on Traffic Safety* (23), *Traffic Engineering Handbook* (24), and *Toolbox on Intersection Safety and Design* (25).

EDUCATION

A well-designed public information and education campaign will assist motorists and the public in understanding the safety issues inherent to red light running. This campaign should provide information and data that defines the red light running problem, explains why red light running is dangerous, and identifies the actions that are currently being undertaken to reduce the incidence of red light running. One of the key messages for the red light running education campaign should be the fatality and injury consequences and resulting emotional and economic toll of red light running. The emotional toll of red light running to crash victims and their families is quite obvious; however, the indirect economic costs associated with red light running related crashes in terms of lost productivity, higher insurance premiums, and medical cost, while significant, are often not understood.

An on-going educational program should be designed to combat red light running, in general, and be delivered in a way so as to communicate the seriousness of the violation and the effectiveness of the countermeasures being employed.

The on-going public information and education program should use various media, such as: posters, mailings, hand-outs, public service announcements on radio and television, warning notices, billboards, warning signs, press releases, slogans, and bumper stickers. The State or local agency should monitor the effectiveness of the educational program and modify it in order to achieve maximum effectiveness. A red light running education campaign supported by targeted enforcement by law enforcement agencies is a very effective tool. Red light running campaigns should be dovetailed with other traffic safety education and enforcement programs, such as speeding and other forms of aggressive driving.

ENFORCEMENT

Law enforcement officers play an important role enforcing traffic laws and rules of the road violations, which includes red light violations. Red light camera systems are but one method of

monitoring and enforcing red light violations, others involve the direct use of law enforcement officers. Alternative officer enforcement strategies include:

- Single Officer: to enforce red light violations, an officer takes an inconspicuous position at an intersection where the officer can clearly see the signal and motorist. After observing a violation, it may be necessary to follow the violator through the intersection in order to stop and cite the driver.

- Dual Officer: a safer alternative, requiring a higher level of staff commitment, involves the use of separate observer and pursuit officers. The observer officer witnesses the violation and then radios the information to the pursuit officer who is typically located downstream of the signal and will stop the driver and issue the citation.

- Multiple Signal Head Enforcement: a traffic signal head or some other lighted device is attached to the reverse side of an existing traffic signal. This allows a single police officer to observe violations from the opposite side of the intersection and to enforce red light violations in greater safety.

- Random Enforcement: refers to the random selection of the locations to be enforced and this may be performed by either single or multiple officers. Random enforcement makes police presence visible and reminds drivers that enforcement is taking place.

- Targeted Enforcement: is when problem locations are identified and officer staff resources are committed to enforcement for a particular period. Such stepped up enforcement can work as a visible reminder to motorists that the traffic laws should not be violated.

CHAPTER V. RED LIGHT CAMERA PROGRAM IMPLEMENTATION

A red light camera system is one of the measures available to traffic engineering, enforcement, and safety professionals, that when properly applied, may be effective in the reduction of certain types of collisions at signalized intersections. Red light camera systems have had the greatest success and highest levels of support in communities where they have been implemented as one element of an overall traffic safety management program. There are several key steps to successfully implementing a red light camera system program, which is the subject of this chapter.

EARLY PLANNING AND STARTUP

The development of a successful red light camera program will be based on the systematic analysis of crash data, together with data on citations issued to motorists for red light running, where available, and inputs from the general public. The objective is to identify locations where red light running by motorists is contributing to crashes.

The key elements recommended for the early planning and startup of a red light camera program are as follows:

- Establish a Steering Committee.
- Establish Program Objectives.
- Identify the Legal Requirements.
- Assess System Procurement Alternatives.
- Establish Public Awareness and Information Campaign.

Steering Committee of Stakeholder Group Representatives

Any community considering the implementation of a red light camera system should first establish a steering committee inclusive of all stakeholders.

The Steering Committee serves to establish broad based program objectives and to monitor program results. The appropriate participants will vary by community and would typically include representatives from the following organizations:

- State Department of Motor Vehicles.
- State and local Police and Sheriff's Department.
- Traffic Engineering Department.
- Public Works Department.
- City, County, or State's Attorney's Office.
- City, County, or State Public Information Office or Community Affairs.
- Judiciary.
- Photo Enforcement Services Contractor, if one is hired.
- Selected Community Representatives.
- Selected outside Agency Representatives, such as a local Automobile Club.

A high level of quality control and on-going coordination of activities is required for the operation and maintenance of photo enforcement systems. The program also has significant visibility with the community at large and with their elected officials that require coordination to effectively communicate the program's objectives and program results.

Red Light Camera Program Objectives

Early on the Steering Committee should define as clearly as possible the red light camera program objectives. While it is clear that the overall objective of any red light camera program is the reduction of collisions at signalized intersections resulting from red light running, program objectives should address specific operational needs.

Legal Requirements

Prior to initiating a red light camera program, legal aspects and requirements should be identified. Red light camera systems pose legal questions and concerns, the answers to which may vary from State to State. In particular, privacy, citation distribution, and types of penalties need to be thoroughly addressed and resolved prior to the startup of a red light camera program.

Presently, there are two approaches that have been adopted by States in the deployment and operation of red light camera systems:

- Driver Responsibility. Where the government entity alleges that a driver has committed a violation and receives a citation, there should be photographic evidence that allows the driver to be identified. This requires that one or more red light camera(s) is/are located so that a frontal view of the vehicle is recorded as it runs the red light. Further, the recorded view should allow the driver and vehicle identities to be clearly determined. If the recorded view of a driver is obstructed or not clear, no citation should be issued. Additionally, a method should be provided through which the registered owner can certify that he or she was not the driver at the time of the violation.

  In States where red light camera systems are applied as described above, red light violations recorded by red light camera systems are considered to be moving violations with citations carrying the same penalties as citations issued by law enforcement officers, including “points” and holds on vehicle registration or driver license renewals for unpaid fines.

- Registered Owner Responsibility. Where the registered owner is responsible for the citation, only photographic evidence that identifies the vehicle, usually from the rear, and its license number is required. Typically, States where red light camera systems have been adopted in this manner have enacted legislation at the State level that authorizes the use of red light camera systems or permits local agencies to enact local ordinances for use of red light camera systems.

The National Committee on Uniform Traffic Laws and Ordinances (NCUTLO) developed the “Automated Traffic Law Enforcement Model Law” (26) to offer clear guidance to States considering automated enforcement technology.

Issues arising from legal challenges to automated photo enforcement are presented in Appendix A.

System Procurement Alternatives

There are a number of alternatives available to State and local agencies for the development and operation of red light camera programs. A State or local agency may take full responsibility for system operations and citation processing functions or elect to outsource these functions to a private contractor. Where a private contractor is responsible for installation and operation of the red light camera equipment, the State or local agency should establish the necessary procedures so that the agency has complete oversight and day-to-day supervision of the program. Table 1 summarizes selected alternatives for the acquisition, installation, operation, and maintenance of red light camera systems that are available to State and local agencies.

Where a private contractor is responsible for the processing of citations, compensation to private vendors based on the number of citations issued should be avoided. In multiple jurisdictions, the courts have determined that it is inappropriate for the private contractor to be responsible for determining installation locations and operation of the system because of an appearance of a conflict of interest. This conflict of interest should be avoided in all phases of the system installation and operation: startup, design, installation, operation, and maintenance. At all times, the State or local agency should verify and exercise complete oversight of all actions of the private contractor.

Some agencies are compensating their camera system vendors based on a flat fee per location per time period. Others have installed and operated their own systems. It may also be appropriate to pay a vendor to operate and maintain an agency-designed and -implemented system. Compensation should be based solely on the value of the equipment or the services provided.

Tables 2 and 3 summarize selected contractor payment options.

Public Awareness and Information Campaign

Education on improving traffic safety is a crucial component for any significant change to occur with traffic control systems. Appropriate educational elements should be applied regardless of the chosen solution. For red light camera programs, often the initial educational program includes issuance of warning citations to likely violators for limited period, and clear public communication of the date on which warning citations will be halted and actual enforcement citations will begin. However, education and media outreach efforts should continue throughout the life of the program to keep the public informed of results and need for safety vigilance. Ongoing awareness of the presence of enforcement measures is key to deterrence and long-term behavior changes.

Table 1. Selected Red Light Camera System Acquisition, Installation, Operation, and Maintenance Alternatives

	Project Planning and Management	Equipment Ownership	Design and Installation	Plan Check and Installation Inspection	Operation and Maintenance	Citation Data Processing	Decision To Issue Citation	Violator Inquires	Public Information Program
OPTION A									
State/Local Agency	☐			☐			☐		
Private Contractor		☐	☐		☐	☐		☐	☐
OPTION B									
State/Local Agency	☐	☐		☐			☐		
Private Contractor			☐		☐	☐		☐	☐
OPTION C									
State/Local Agency	☐	☐	☐	☐			☐	☐	☐
Private Contractor			☐		☐	☐			
OPTION D									
State/Local Agency	☐	☐	☐	☐	☐	☐	☐	☐	☐
Private Contractor									

Table 2. Payment Options for Contractor Owned and Operated Red Light Camera Systems

Payment Option	Equipment	Equipment Installation	Equipment Maintenance	Citation Data Processing
Initial Fixed Price Payment	☐	☐		
Initial Fixed Price Payment and Fixed Monthly Payments	☐	☐	☐	☐
Fixed Monthly Payments	☐	☐	☐	☐
Initial Fixed Price Payment and Per Citation Payments				
Per Citation Payments				
Initial Fixed Price Payment and Fixed Monthly Payment Schedule, Depending On Pre-Determined Low/High Number of Citations Issued	☐	☐	☐	☐
Fixed Monthly Payment Schedule, Depending On Pre-Determined Low/High Number of Citations Issued		☐	☐	☐
Time Worked and Materials Used			☐	☐

Table 3. Payment Options for Agency Owned and Contractor Operated Red Light Camera Systems

Payment Option	Equipment Maintenance	Citation Data Processing
Fixed Monthly Payments	☐	☐
Fixed Monthly/Per Citation Payments	☐	☐
Per Citation Payments		
Fixed Monthly Payment Schedule, Depending On Pre-Determined Low/High Number of Citations Issued	☐	☐
Time Worked and Materials Used	☐	☐

A red light camera program should not be started without a comprehensive public awareness and information campaign. Research has indicated that public information campaigns are a key to the success of the red light camera programs (27).

In 1995, FHWA sponsored a study examining the public's awareness of community-based safety programs. The study concluded that an information campaign needed to accomplish three objectives in connection with the implementation of red light camera programs. First, public awareness and information should make citizens more aware of their driving habits and safety consequences of running red light. This should stimulate a voluntary change in behavior at signalized intersections. Second, communications should be through a variety of media with the public and elected officials to explain program objectives, as well as program results. This is critical to gain public support for program expansion. Lastly, public awareness and information should provide motorists with advance warning that there is increased enforcement. This, by itself, may cause a change in driver behavior, but should describe the effectiveness of the systems. Without an effective educational campaign, motorists may be surprised or confused when they receive a citation. If questions or concerns can be effectively answered through written, telephone, or web-based information, motorists receiving citations will be more supportive of the program and less likely to question the program's overall objectives.

The public awareness and information campaign should encompass the following elements:

- Clear description of the operation of the red light camera equipment in non-technical terms.
- Clear statement of the program objectives.
- Description of the advantages of automated enforcement.
- Explanation of other measures being taken to improve safety at intersections.
- Description of the use of the red light camera program revenues.

The public awareness and information campaign may be developed using the following methods:

- Outreach efforts to employers, schools, driver education, local community groups, and all area media.
- Telephone and web-based information centers that include a hot-line for calls about intersection problems and traffic safety concerns, in addition to handling inquires regarding the operation of the red light camera program.

Public awareness and information campaigns are frequently used prior to and during the development of a red light camera program. The campaigns often employ a variety of methods in an effort to reach as many citizens as possible. The extent of the campaigns, however, varies among the jurisdictions where red light camera systems have been deployed. Table 4 identifies some of the more commonly used methods to increase public awareness and provide information.

Table 4. Public Awareness and Education Campaign Elements Used by Selected Red Light Camera Programs

Jurisdiction	Posters	Mailings	Hand outs	Media	Warning Notices	Billboards	Warning Signs	Press Releases	Slogans	Bumper Stickers
Charlotte, NC	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Fairfax, VA		☐		☐	☐		☐	☐		
Howard County, MD	☐		☐	☐	☐		☐			
Lincoln, NE				☐		☐				
New York City, NY				☐	☐		☐			
Oxnard, CA	☐		☐	☐					☐	☐
Polk County, FL					☐		☐			
Sacramento, CA	☐		☐	☐	☐	☐	☐	☐	☐	☐
San Francisco, CA				☐	☐	☐	☐	☐		☐
San Diego, CA		☐		☐			☐	☐		

An important aspect of the public awareness and information campaign is the direction provided for individuals who received citations on how to review their citation and/or view the photographic evidence.

It is also important for the success of the red light camera program that traffic court officials, including judges, commissioners, and administrative support personnel, be fully informed about the program scope and operation. Officials who often conduct traffic court hearings may not be fully versed in the operation of the red light camera equipment. It is important that the appropriate documentation is prepared and submitted in a timely manner in the event an individual contests the citation in court. The increased use of electronic data transfers and viewing may be appropriate to ensure that the court packages are readily available when needed.

Public awareness and educational outreach efforts for employers, schools, driver education programs, and local community groups, as well as the media, are necessary. Reports of program results, emphasizing the achieved safety benefits, should be available and posted on the program web site and local newspapers. The campaign should employ various communications media designed to reach residents and commuters, including regular surveys to gauge public support and awareness, and should focus on a central message of improving traffic safety. An example of a safety message is to emphasize that red light camera systems can be applied as an effective tool to reduce collisions resulting from red light running.

SYSTEM PLANNING

Proper planning by a State or local agency will establish the foundation for a successful red light camera system for detecting and documenting red light running at signalized intersections. As appropriate, a State or local agency should solicit assistance from other public agencies where red light camera programs have been successfully deployed, as well as from qualified consulting engineers with experience in red light camera systems design and operations.

Violations Processing Procedure

The violation processing procedure should address the following aspects of the installation and operation of the red light camera system, and the processing of the recorded violations and citations issued:

- Establish the enforcement threshold consistent with traditional enforcement methods.
- The number of days allowable from the date of the violation occurrence before citations can be mailed, if different from applicable legal requirements.
- How citations for commercial or rental car vehicles will be addressed.
- Minimum vehicle speed threshold.
- Should citation issuance be restricted to specific time periods or days of week only?
- Maximum number of days before citations are reissued to violators following registered owners disputed responsibility and subsequent violator identification.
- Guidelines for pitch measurement where inductive loops are employed for vehicle detection.
- Clear specification of photographic data requirements for issuing citations, including the red signal indication and the time elapsed since onset of red.

The system design and installation should be consistent with the definition of a violation under the applicable State and/or local laws.

The installation should be consistent with other neighboring intersections under the jurisdiction of the responsible agency, so that vehicle operators are held to a uniform standard throughout the jurisdiction.

Site Selection

Sites selected for the installation of red light camera systems should be based on accurate crash and red light violations data. As discussed earlier, data regarding the total number of crashes may be used, although intersections with high numbers of collisions may not have a high number of crashes related to red light running. Violation data needs to be applied with some caution. Likewise, locations where it is known that there are high numbers of red light violations may not have corresponding high numbers of crashes related to the red light running. Heavily traveled intersections where there are heavy left turn movements operated on protected left turn phases

are often intersections of this type. Traffic volumes, except when used as a factor to determine the incidence of crashes or violations, are not a suitable measure for selecting locations for the installation of red light camera systems.

The installation of a red light camera system at a signalized intersection identified as having a red light running problem should be done when an engineering study of the intersection determines photo enforcement is an appropriate countermeasure to reduce the incidence of red light running.

Other criteria for red light camera system site selection may include recommendations from law enforcement and traffic safety professionals, citizens' complaints, and input from community groups. These criteria should be considered in conjunction with crash data and violations or citations data.

Undesirable characteristics that will also affect decisions regarding the installation of red light camera systems include:

- Driveways that restrict camera pole or auxiliary flash placement.
- Approaches that are more than three lanes wide and double left turn lanes where views are more frequently obstructed.
- Wide crossing streets where second photographs may not be taken at the pre-determined location due to motorists speeding up and slowing down as they traverse the intersection.

When red light camera systems are in operation, law enforcement officials should place an emphasis on routine enforcement of traffic laws and regulations that require visible and unobstructed display of license plates.

Warning Signs

Signs warning motorists that red light cameras are being used are typically required by law or ordinance but, whether required or not, should be posted as part of the driver awareness and education process. These warning signs may be placed in the following locations at photo-enforced intersections:

- In advance of photo-enforced intersections.
- At photo-enforced intersections, typically on the far side traffic signal pole.
- On all approaches into an area where red light camera systems are used for red light running.

Warning signs placed on all approaches into an area, while used to satisfy legal requirements in some jurisdictions, are appropriate as supplemental warning signs but not as the primary warning for motorists. Advance warning signs should be installed at photo-enforced intersections.

All advance warning signs should be clearly visible and compliant with the MUTCD (17).

Traffic Signal Yellow Times

The MUTCD and ITE recommended practice on the length of yellow interval times provides adequate and proper direction to practitioners. Yellow times should be established in accordance with the MUTCD (17) guidelines and the ITE (9) informational report for methods for calculating yellow time intervals.

Changes in the yellow times after red light camera systems are in place and operational will affect the number of photographed violations, increasing the number of violations when yellow times are shortened and reducing the number of violations when yellow times are lengthened. Where changes in the yellow times at intersections with red light camera systems are required as the result of updated speed surveys or other factors, the changes should be clearly described in public information announcements. Providing warning notices for a reasonable amount of time after the change is particularly important for violations recorded at intersections where the yellow interval has been shortened.

System Selection and Technologies

The most widely used red light camera systems employ film-based cameras and inductive loop vehicle detection technologies. However, other red light camera technologies have become available over the past five years, most notably technologies that employ digital camera equipment where photographic data, including streamed video clips, may be immediately downloaded for processing using leased telephone line or microwave communications. Additionally, red light camera systems that use video-based and radar vehicle detection methods, as well as systems that employ overhead camera placements and floodlighting equipment as an alternative to the curb-based placements, are used by many State and local agencies.

A red light camera system consists of the following on-the-street components:

- Camera Units.
- Intersection Lighting.
- Camera Housing and Supporting Structure.
- Vehicle Detection.
- Communications.
- Warning Signs.

Each of these components is reviewed in the following sections.

Camera Unit

There are three general types of cameras units used to automatically record red light violations. The types of camera units used in red light camera systems include:

- 35mm Conventional Film Units.
- Digital Still Picture Units.
- Digital Video Units.

Each type has both pros and cons, as shown in table 5.

Table 5. Camera Units Compared

Camera Unit	Pros	Cons
35 mm	Best resolution	Collection and development of film
Digital Still	Digital format Ease of use No film collection or development.	Needs communication links between cameras and processing center Comparatively poor resolution
Digital Video	Provide video clips of alleged violations Provides circumstances in which violations occur	Impression of surveillance Needs communication links between cameras and processing center

Intersection Lighting

Additional intersection lighting is required in conjunction with the operation of the camera units. The additional lighting will need to be installed in accordance with the equipment manufacturer's specifications, as well as with State or local ordinances that govern the amount of lighting that is permitted in the driver's field of view.

For camera units that record violations with one or two photographs or digital images, flash units synchronized with the camera shutter provide additional lighting at the intersection at time of exposure so vehicle license plate and drivers, if local or State law allow, can be more clearly photographed. Typically, one flash unit is installed as an integral part of the camera housing. Additional flash units may be installed at intersections where there are more than two lanes being monitored or to maximize the amount of backlighting in the vehicle interior as it traverses the intersection.

For camera units that record a video clip for each violation, continuous additional lighting will be considered. This may be provided by curb or overhead mounted lighting equipment, as specified by the equipment manufacturer.

Camera Housing and Supporting Structure

The types of camera housing and supporting structures will depend on the type of red light camera system being installed.

Curb-mounted red light camera systems, the most common type currently being employed by State and local agencies, need a camera housing enclosure that is mounted on a pole. The camera unit housing should be weather and damage resistant, and contain a locking mechanism to protect the system from vandalism. Additional poles may be employed for auxiliary flash lighting units. For digital camera systems, a separate enclosure for the data storage and communications equipment is also required at the intersection.

The poles for curb-mounted red light camera systems should be tall enough to provide the necessary angle of view to clearly record violations at the intersection. There are at least two types of poles currently in use. The first, a hinged pole, lowers the camera housing on a hinge

located in the center of the pole. A second type, a solid pole, utilizes a motorized “elevator” to raise and lower the camera housing.

Overhead-mounted red light camera systems normally require curb-mounted poles with cantilever arms extending over the traffic lanes. Camera and flash units are mounted on the cantilever arms as required for system operation. Red light camera systems of this type provide an increased field of view that is especially advantageous for red light camera systems on wider arterial streets as well as enhanced lighting for enhanced photographic data quality.

Some jurisdictions have found that they can afford only a limited number of red light camera systems. By installing red light camera housings at problem intersections, and periodically moving the actual cameras from housing to housing, gives motorists the impression that cameras are omnipresent and reduces red light violations throughout the community.

Vehicle Detection

Vehicle detectors are used to trigger the camera to record a vehicle running a red light. Different vehicle detection technologies are available for this purpose.

Most red light camera systems employ pairs of inductive loops installed near the intersection at a location suitable for showing that a violation has occurred. It is critical for the system design and operation that the inductive loops be installed in the appropriate locations, consistent with the agency’s definition of a violation. Red light camera systems may also employ piezoelements, video-based equipment, or radar devices for vehicle detection and tracking, as an alternative to, or in conjunction with, inductive loop detectors.

The placement of the vehicle detectors is critical to the integrity of the red light camera system and the citations developed from the photographic data.

For red light camera systems that document violations with two photographs, the first photograph should be taken to show the motor vehicle that will be running the red light, at a location immediately before it enters the intersection against a red traffic signal indication. The vehicle detection equipment should be configured to detect the presence of the vehicle at the desired location and to initiate the first photograph being taken with the vehicle at that location. If the vehicle is detected after it has already entered the intersection, it cannot be determined with certainty from the photographs that the vehicle entered the intersection illegally and consequently, a citation should not be issued. The second photograph is taken after the vehicle has entered the intersection, at a time interval after the first photograph calculated to provide the best view of the vehicle and its license plate, and where required, the driver’s face.

For red light camera systems that document violations with video clips that show the vehicle running the red light continuously starting at a location before the vehicle enters the intersection against the red traffic signal indication, vehicle detection should be configured so that the video clip recording is initiated at an appropriate location.

The placement of inductive loop detectors immediately in advance of the intersection stop line for vehicle detection may require that existing stop line loop detectors used for the traffic signal operations need to be abandoned, relocated, or replaced with another type of vehicle detection system, such as video-based detection. Generally, a solution that accommodates vehicle detection requirements for both traffic signal operations and the red light camera system can be

developed although there may be some additional costs for vehicle detection associated with the installation of the red light camera system equipment under these circumstances.

Communications

For digital camera units, a communications link with adequate bandwidth should be provided from the intersection to a location where the violations data is processed. The required communications may be implemented using State and local agency fiber optics, leased high-capacity telephone lines, or microwave technologies.

No communications outside of the intersection are required for 35mm conventional film camera units.

Communications links are normally required to support certain functions related to citation data processing, including access to vehicle registration and driver's license databases, data transfers to and from traffic court data processing systems, and on-line inquiries or payments from persons receiving citations.

Warning Signs

Refer to page 21 for guidance on warning signs.

ENGINEERING DESIGN OF RED LIGHT CAMERA SYSTEMS

The red light camera system installation plans should be prepared and signed by an appropriately licensed engineer. Installation plans should be prepared in accordance with the system manufacturer's standard plans and technical specifications, and with State and local agency standard plans and specifications for public works and traffic engineering improvements. The plans should address the placement of the red light camera system equipment and related components, including:

- Camera equipment.
- Camera housing and supporting structure.
- Intersection lighting.
- Vehicle detection system.
- Communications.
- Pullboxes, conduit runs, and conductor schedule.
- Electrical service.
- Warning signs.

There are currently no standard plans and specifications for the acquisition and installation of red light camera systems, except for the plans and specifications provided by the manufacturers and standard plans and specifications that have been developed by State and local agencies for their own use and application. The U.S. Department of Transportation (USDOT), through a cooperative agreement with the International Association of Chiefs of Police (IACP), are developing red light camera systems performance specifications and testing laboratories to ensure the accuracy and reliability of these systems.

The installation plans should be processed through the appropriate State or local agency plan review and permitting procedures.

RED LIGHT CAMERA SYSTEM INSTALLATION

Where a contractor does the installation work, the normal construction inspection procedures employed by the State or local agency should be carried out for the installation of the red light camera equipment. Proper installation includes:

- Installation consistent with the equipment manufacturer's guidelines and State or local agency specifications.
- Inspection of all installation work by State and local agency officials and, where necessary, by the project engineer.
- Testing of the red light camera equipment prior to its cutover for unattended operation.
- The preparation of as-built drawings that reflect actual construction conditions.

Installations should be thoroughly inspected before testing begins. A comprehensive testing program should then be conducted using both simulated and actual traffic before the system is placed into unattended operation. No warning letters or citations should be issued until it is determined that the system is working accurately and reliably.

OPERATION AND MAINTENANCE

As with any integrated system, every element of a red light camera system should function properly for the system to produce the desired results. In addition to proper design and installation, procedures to ensure the proper operation and maintenance of the system should be developed and implemented by the State and local agency.

Proper operation should be consistent with the manufacturer's instructions and the documented operational procedures that have been developed, reviewed, and approved by all parties involved. Periodic checks and audits to verify that it continues to operate properly should also be conducted.

Proper maintenance should include both preventive and corrective maintenance. Preventive maintenance should be performed on a regular basis. Tests of operational performance should be conducted regularly, and actual operational results examined constantly in order to identify any variation from specified performance. If any flaw in the system operation or performance is detected, the issuance of citations should be immediately stopped and any citations previously issued with the possibility of flawed operation or performance should be withdrawn.

Red light camera system operations and maintenance should include the following tasks and functions:

- Collect images of recorded violations and related violations data from photo-enforced intersections.
- Inspect camera and vehicle detection system operations.
- Perform preventative maintenance and cleaning.
- Identify defective equipment and make repairs or replace the equipment.
- Store recorded violations data.

- Review recorded violations data to identify violations.
- Identify vehicle registered owner.
- Prepare draft citations for review and approval.
- Prepare and mail citations to vehicle registered owners.
- Answer telephone inquiries.
- Schedule violator appointments.
- Process vehicle registered owner certifications regarding driver identity at the time of the violation.
- Provide court-requested information and support court hearings.
- Prepare monthly progress reports.

Citation Data Processing

The procedures and methods employed for system operations should be designed to ensure the preservation of the chain of custody of evidence for each recorded violation so that backup data and documentation can be easily retrieved when needed. The procedures and methods used for system operations should be comprehensive, clearly documented in writing, and followed without exception.

Citation data processing should be carried out in a secured facility using a data processing system with appropriate security features and firewalls. All personnel, especially those with access to motor vehicle registration and driver's license databases, should be cleared with appropriate background checks.

Internal quality control is essential and should be achieved by the use of two separate internal reviews of each violation, periodic audits by independent law enforcement or engineering staff, and other procedures. Procedures, especially important to ensure quality control, should be developed for each of the following areas:

- Guidelines to be applied for issuing a citation. In other words, a very specific definition is needed to identify what constitutes a red light running violation.

- Citation review and approval requirements, including provisions for the procedure to be used when the time to review is shortened, traffic officers are not available to conduct the reviews, or the number of citations is larger than usual.

- Quality assurance audits, to be conducted by trained traffic officers for randomly selected sample of recorded violations on a periodic basis.

Only a qualified law enforcement officer should be authorized to issue a citation. Citations should not be created prior to review of appropriate evidentiary material by the officer. Under no circumstances should a citation be issued when the officer expresses any lack of confidence that a properly documented and provable violation has occurred.

System Maintenance

Periodic inspections and preventative maintenance should be required to ensure that the equipment is functioning properly. Service and inspection logs should be maintained to document the inspections and preventative maintenance activities. The service and inspection logs may be required at court hearings to confirm that the red light camera equipment was functioning properly at the time that the violations were recorded.

As part of the periodic preventative maintenance, the camera unit and housing should be thoroughly cleaned and the camera unit activated in its "test" mode and confirmed to be operating correctly. The condition of the camera housing and mounting structure, camera unit, vehicle detection system, and warning signs should be inspected and the conditions noted in the service and inspection logs.

On-Going System Assessment

Continual analysis of violation and crash data, with community input, is an important element of a successful red light camera program. Adequate funding should be provided to assure the necessary data analysis, problem identification, and problem diagnostic review work tasks are undertaken.

Red light running camera enforcement efforts should be monitored, with adequate pre- and post-installation study periods, in order to measure the program's effectiveness. Timely collection and reporting of crash data is an important part of the monitoring process, as are control sites with no photo enforcement so the effects of camera enforcement can be distinguished from other external effects.

The steering committee should meet on a regular basis. Regular agenda items should be to review the data of violations and citations issued with a discussion of any changes or trends noted. Input from the State or local agency's traffic engineering department and street maintenance department should include regular updates on planned traffic signal modifications or street improvements construction that could impact the operation of the system. Discussion should be encouraged on whether program objectives are being met through the deployment of red light camera systems or whether alternative measures should be applied. The group should have input to the regular prioritization of intersections targeted for safety-related improvements.

A monitoring program based on the timely collection and reporting of crash data is needed. These crash data should include control sites with no photo enforcement so that the effects of camera enforcement can be distinguished from other external effects. Responsibilities for the collection and reporting of crash data need to be established and clearly defined. Traffic safety professionals need to review intersection safety issues and conduct diagnostic reviews of intersections identified from the crash data tabulations as warranting safety-related improvements.

Regular reports on the public awareness and information campaign should be prepared and reviewed. Public use of the web site and telephone information systems should be monitored.

ON-GOING PUBLIC INFORMATION AND EDUCATION

An on-going public information and education campaign is needed to assure the motoring public that the red light running camera program is being operated in the most effective, efficient, and fair manner possible. Public information and education efforts begin before installation, but do not end when the system is fully operational.

The on-going educational program should be designed to combat red light running, in general, as well as to provide information related to the operation of the red light camera equipment. Where possible, the on-going public information and education program should be developed and delivered in a way so as to address any specific populations or conditions that have been identified as contributing extensively to the red light running problem.

The on-going public information and education program should use various media, including the print and broadcast media, to communicate the problem, the program and the results. The agency should monitor the effectiveness of the educational program in order to achieve maximum effectiveness and public support for the red light camera program.

REFERENCES

1. *Guidance for Using Red Light Cameras*, Publication No. FHWA-SA-03-018, Federal Highway Administration, National Highway Traffic Safety Administration, Washington, DC, March 2003.

2. Hugh W. McGee and Kimberly A. Eccles, "Impact of Red Light Camera Enforcement on Crash Experience", *NCHRP Synthesis 310*, National Cooperative Highway Research Program, Transportation Research Board, Washington, DC, 2003.

3. F. M. Council, B. Persaud, K. Eccles, and C. Lyon, "Safety Evaluation of Red Light Cameras" FHWA Publication No., FHWA-HRT-05-048, November 2004.

4. Federal Highway Administration, "Association of Selected Intersection Factors with Red-light-running Crashes," *ITE Journal*, Vol. 70, No. 7, July 2000, pp. 37-42.

5. R. A. Retting, A.F. Williams, D.F. Preusser and H.B. Weinstein, "Classifying Urban Crashes for Countermeasure Development," *Accident Analysis and Prevention*, Vol. 27, No. 3, 1995, pp. 283-294.

6. J. M. Golob, S. Cho, J.P. Curry and T.F. Golob, *Impacts of the San Diego Photo Red-light Enforcement System on Traffic Safety*, Transportation Research Board Pre-print CD-ROM, Washington, DC, January 2003.

7. *Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red Light Running*, Federal Highway Administration and Institute of Transportation Engineers, Washington, DC, 2003.

8. *As cited by Insurance Institute of Highway Safety at https://www.iihs.org/topics/red-light-running.*

9. *Determining Vehicle Signal Change and Clearance Intervals,* An Informational Report of the Institute of Transportation Engineers, Prepared by ITE Technical Council Task Force 4TF-1ITE, Washington, DC, August 1994.

10. B.E. Porter and K. J. England, "Predicting Red-Light Running Behavior: A Traffic Safety Study in Three Urban Settings," *Journal of Safety Research,* Vol. 31, No. 1, pp 1-8, 2000.

11. R.A. Retting and M.A. Greene, "Influence of Traffic Signal Timing on Red Light Running and Potential Vehicle Conflicts at Urban Intersections," *Transportation Research Record 1595,* Transportation Research Board, Washington, DC, 1997, pp. 1-7.

12. F.R. Hulscher, "The Problem of Stopping Drivers after the Termination of the Green Signal at Traffic Lights," *Traffic Engineering and Control*, Vol. 25, No. 3, March 1984, pp. 110-116.

13. *Traffic Control Systems Handbook*, Publication No. FHWA-SA-95-032, Federal Highway Administration, Washington, DC, 1995.

14. James H. Kell and Iris J. Fullerton Eds., *Manual of Traffic Signal Design*, 2nd *Ed.,* Institute of Transportation Engineers/Prentice Hall, Washington, DC, 1998.

15. L. Evans and R.W. Rothery, "Influence of Vehicle Size and Performance on Intersection Saturation Flow," *Proceedings of the Eighth International Symposium on Transportation and Traffic Theory,* University of Toronto Press, Toronto, Ontario, 1983.

16. Intersection Safety Issue Briefs, Federal Highway Administration and Institute of Transportation Engineers, Washington, DC, April 2004. http://www.ite.org/library/IntersectionSafety/BreifingSheets.pdf

17. Manual on Uniform Traffic Control Devices for Streets and Highways, 2003 Edition, Federal Highway Administration, Washington, DC, 2003.

18. H. Douglas Robertson, Ed., *Manual of Transportation Engineering Studies*, Institute of Transportation Engineers, Washington, DC, 2000.

19. H. S. Stein, "Traffic Signal Change Intervals: Policies, Practices and Safety," *Transportation Quarterly,* Vol. 40, No. 3, 1986, pp.433-445.

20. T.M. Tarawneh, V.A. Singh, and P.T. McCoy, "Investigation of Effectiveness of Media Advertising and Police Enforcement in Reducing Red Light Violations," *Transportation Research Record 1693,* Transportation Research Board, National Research Council, Washington, DC, 1999, pp. 37-45.

21. B.B. Farraher, R. Weinholzer, and M. P. Kowski, *The Effect of Advanced Warning Flashers on Red Light Running: A Study Using Motion Imaging Recording System Technology at Trunk Highway 169 and Pioneer Trail in Bloomington, Minnesota.* In 69th ITE Annual Meeting, Institute of Transportation Engineers, Washington, DC, 1999.

22. A Policy on Geometric Design of Highways and Streets, American Association of State Highway Transportation Officials, Washington, DC, 2001.

23. The Traffic Safety Toolbox: A Primer on Traffic Safety, Institute of Transportation Engineers, Washington, DC, 1999.

24. James L. Pline, Ed., *Traffic Engineering Handbook*, 5th Ed., Institute of Transportation Engineers, Washington, DC, 1999.

25. Toolbox on Intersection Safety and Design, Institute of Transportation Engineers and Federal Highway Administration, Washington, DC, September 2004.

26. National Committee of Uniform Traffic Laws and Ordinances, *Automated Traffic Law Enforcement Model Law.* www.ncutlo.org/autoenforce622.htm.

27. John F. McFadden and Hugh W. McGee, *Synthesis and Evaluation of Red Light Running Automated Enforcement Programs in the United States,* Publication No. FHWA-A-IF-00-004, Federal Highway Administration, Washington, DC, 1999.

BIBLIOGRAPHY

Agent, K.R. and D. Wagner, *Evaluation of Red Light Running Campaign*, Report KTC-96-29, Kentucky Transportation Center, December 1996, pp. 1-39.

Automated Enforcement in Transportation, Institute for Transportation Engineers, Washington, DC, December 1999.

"Beep, Smash, Thud: Traffic Engineering Methods to Reduce Urban Crashes," *Status Report, Insurance Institute for Highway Safety*, Vol. 33, No. 4, May 2, 1998, pp. 1–7.

Blackburn, R.R. and D.T. Gilbert, "Photographic Enforcement of Traffic Laws," *National Cooperative Highway Research Program: Synthesis of Highway Practice 219,* Transportation Research Board, Washington, DC, 1995, pp. 1-68.

Bonneson, J. and Zimmerman, K. "Effect of Yellow Interval Timing On Red-Light Violation Frequency at Urban Intersections," Texas Transportation Institute, The Texas A & M University, *Transportation Research Record*, Washington, D.C., 2004.

Burris, M. and R. Apparaju, *Assessment of Automated Photo Enforcement Systems for Polk County Signalized Intersection Safety Improvement Project*, Center for Urban Transportation Research, University of South Florida, Tampa, Florida, September 25, 1998.

Butler, J.A., "Another View on Vehicle Change Intervals," *ITE Journal*, Vol. 53, No. 3, March 1983, pp. 44-48.

California State Auditor, *Red-light Camera Programs: Although They Have Contributed to a Reduction in Accidents, Operational Weaknesses Exist at the Local Level*, Bureau of State Audits, Sacramento, California, July 2002.

Chin, H. C., "Effect of Automatic Red-light Cameras on Red-Light Running," *Traffic Engineering and Control*, Vol. 30, No. 4, April 1989, pp. 175–179.

City of Charlotte, North Carolina, http://www.charmeck.org/Departments/transportation/special+programs/city+ ordinance.asp.

City of Toledo, Ohio. http://safety.fhwa.dot.gov/fourthlevel/srlr/pdf/Leg_Ohio.pdf

Curry, James, "Enforcement and Technology Innovations", *Proceedings of the 1997 International Highway-Rail Grade Crossing Safety Conference,* Conference, Seattle, Washington, July 1997.

Datta, T. K., K. Schattler, and S. Datta, "Red Light Violations and Crashes at Urban Intersections," *Transportation Research Record 1734,* Paper No. 00-0480, January 2000, pp. 1-26.

Erickson, G., "Digital Traffic Cameras," *Traffic Technology International*, 1996, pp. 332–336.

Fleck, J. L., and B. B. Smith, "Can We Make Red Light Runners Stop? Red Light Photo Enforcement in San Francisco, California," *Transportation Research Record 1693,*

Transportation Research Board, National Research Council, Washington, DC, 1999, pp. 46-49.

Frisch, Al, “LA’s Metro - Innovations In Grade Crossing Safety”, *Transit Policing*, Volume 3, Number 2, Fall 1993.

Gilbert, Daniel T., Nina J. Sines, and Brandon E. Bell, “Photographic Traffic Law Enforcement,” *National Cooperative Highway Research Program Legal Research Digest, Number 36,* Transportation Research Board, Washington, DC, December, 1996.

Hansen, G. A., “Human Factors in Transportation: Use of Automated Traffic Enforcement Technology to Modify Driving Behavior,” In *Transportation Research Board 78th Annual Meeting*. Transportation Research Board, National Research Council, Washington, DC, January 1999, pp. 1–15.

Hasson, P., “Red Lights Mean Stop,” Midwest Resource Center, Federal Highway Administration, 2000, http://mrc.fhwa.dot.gov/articles/redlight.htm.

Hill, S. and Lindly, J. “Speed Red Light Running Prediction And Analysis.” Department of Civil and Environmental Engineering, The University of Alabama, *Transportation Research Record*, Washington, D.C., 2004.

Houston-Galveston Area Council, *Greater Houston Metropolitan Safety Planning Program: 2004 Status Report*, February 17, 2004, pp.1-37.

Hubaud, Lou and Linda Meadow. “Los Angeles Metro Blue Line Enforcement Program”, Final *Report, Safety of Highway-Railroad Grade Crossings, Research Needs Workshop,* Report Number DOT-VNTSC-FRA-95-12.2, January 1996.

Insurance Institute for Public Safety, “Red Light Cameras Yield Big Reductions in Crashes and Injuries”, *Status Report,* Volume 36, No. 4, April 28, 2001.

Kendall, S. “Is Automate Enforcement Constitutional?”, *Insurance Institute for Highway Safety,* 2004.

Kraus, E., and Quiroga, C. “Red Light Running Trends In Texas,” Texas Transportation Institute, The Texas A & M University, *Transportation Research Record*, Washington, D.C., 2004.

Lawson, S.D., “Automatic Surveillance and Red-Light running: Potential for Camera Use and Accident Reduction at High-Risk Light-Controlled Junctions,” *Traffic Engineering and Control,* January 1992, pp. 10-12.

Lawson, S.D., H.T. Morris, R.W. Hardy, and A.C. Howard, *Red Light Running and Surveillance Cameras – Policy Issues Related to Accident Reduction and Enforcement*.

Meadow, Linda, “Los Angeles Metro Blue Line Grade Crossing Safety Improvement Program,” *Proceedings of the 1993 National Conference on Highway-Rail Safety,* St. Louis, Missouri. July 11-14, 1993.

Meadow, Linda, “Los Angeles Metro Blue Line Grade Crossing Safety Improvement Program”, *Paper Presented at 1993 Rapid Transit Conference, American Public Transit Association,*

Washington, DC, June 1993.

Meadow, Linda, “Los Angeles Metro Blue Line Light Rail Safety Issues”, *Transportation Research Record 1433,* Transportation Research Board, National Research Council, Washington, DC, pp. 123-133.

Meadow, Linda and James Curry, “New Technologies for Highway-Railroad Grade Crossing Safety”, *Proceedings of the Seventh National Conference on Light Rail Transit, Volume 2.* Baltimore, Maryland, November, 1995.

Meadow, Linda and James Curry, “Light Rail Transit Safety Issues”, *Compendium of Technical Papers, Institute of Transportation Engineers, 47th District 6 Annual Meeting,* Portland, Oregon, July 1994.

Mitretek Systems, *Automated Enforcement of Traffic Signals; A Literature Review*, Prepared For U.S. Department of Transportation, Federal Highway Administration, Contract Number DTFH61-00-C-00001, Washington, DC, August 13, 2001.

Mohamedshah, Y. M., L. W. Chen, and F. M. Council, *Association of Selected Intersection Factors with Red Light Running Crashes,* Federal Highway Administration, U.S. Department of Transportation, Washington, DC, May 2000, pp. 1–21.

National Campaign to Stop Red Light Running, http://www.stopredlightrunning.com.

“Officials Nationwide Give a Green Light to Automated Traffic Enforcement,” *Status Report,* Insurance Institute for Highway Safety, Vol. 35, No. 3, March 2000.

O’Laughlin, John, “ITS Technology and Law Enforcement”, *ITS Quarterly,* Volume 5, Number 2. Intelligent Transportation Society of America, Washington, DC, Summer 1997, pp. 51-55.

PB Farradyne, *Photo Enforcement System Review*, Prepared for the City of San Diego Police Department, January, 2002, http://www.sandiego.gov/police.

Passetti, K. A., and T. H. Hicks, Use of Automated Enforcement for Red Light Violations, Department of Civil Engineering, Texas A&M University, College Station, Texas, pp. 1–60.

Photocop Home Page. Photocop, Cedar Park, Texas. http://www.photocop.com.

Polk, A., “Electronic Enforcement of Traffic Laws: The Devil is in the Details,” *ITS Quarterly*, Summer 1998, pp. 12–27.

Redelmeier, D. “Traffic-Law Enforcement and Risk of Death from Motor-Vehicle Crashes: Case-Crossover Study*”, The Lancet,* Vol. 361, June 28, 2003, pp. 2177-2182.

Red Light Cameras Q&A: General, Insurance Institute for Highway Safety, Arlington, Virginia, http://www.hwysafety.org/qanda/qarlc.htm.

Red Light Literature, Photocop, Cedar Park, Texas. http://www.photocop.com/red-light.htm. Accessed August 4, 1999.

Retting, R. A., and A. F. Williams, “Characteristics of Red Light Violators: Results of a Field Investigation,” *Journal of Safety Research*, Vol. 27, No. 1, Spring 1996, pp. 9–15.

Retting, R. A., A. F. Williams, C. M. Farmer, and A. F. Feldman, “Evaluation of Red Light Camera Enforcement in Fairfax, Virginia,” *ITE Journal*, October 1998, pp. 30–34.

Retting, R. A., A. F. Williams, C. M. Farmer, A. F. Feldman, *Evaluation of Red Light Camera Enforcement in Oxnard, California,* Insurance Institute for Highway Safety, Arlington, Virginia, March 1998, pp. 2–12.

Retting, R. A., and A. F. Williams, “Public Opinion Regarding Red Light Cameras and the Perceived Risk of Being Ticketed,” In *Transportation Research Board 79th Annual Meeting (Preprint CD-ROM),* Transportation Research Board, National Research Council, Washington, DC, January 2000, pp. 1–5.

Retting, R. A., A. F. Williams, and M. A. Greene, “Red Light Running and Sensible Countermeasures: Summary of Research Findings,” *Transportation Research Record,* No. 1640, Transportation Research Board, Washington, DC, 1998, pp. 23-26.

Retting, R.A., Robert G. Ulmer and Allan F. Williams, “Prevalence and Characteristics of Red Light Running Crashes in the United States,” *Accident Analysis and Prevention,* Vol. 31, No. 6, 1999, pp. 687-694.

Retting R.A., and S. Ferguson, “Effects of Red Light Cameras On Violations and Crashes: A Review of the International Literature,” *Traffic Injury Prevention*, 2003, pp. 17-23.

Ruby, D and A. Hobeika, *Assessment of Red Light Running Cameras in Fairfax County, Virginia*, Department of Civil and Environmental Engineering, Virginia Polytechnic Institute and State University, Presented at 82nd Annual Meeting of the Transportation Research Board, Washington, DC, January 2003.

SafeLight First-Year Report. City of Charlotte, North Carolina, 1997.

Sisiopiku, V. Assessment *of Red Light Running Camera Enforcement Technologies*, Department of Civil and Environmental Engineering, Michigan State University, Presented at 81st Annual Meeting of the Transportation Research Board, Washington, DC, January 2002.

Smith, D. M., J. McFadden, and K. A. Passetti, “Review of Automated Enforcement of Red Light Running Technology and Programs,” In *Transportation Research Board 79th Annual Meeting (Preprint CD-ROM),* Transportation Research Board, National Research Council, Washington, DC, January 2000, pp. 1–20.

State of North Carolina, http://www.charmeck.org/Departments/transportation/special+programs/state+legislation.asp.

State of Maryland, http://safety.fhwa.dot.gov/fourthlevel/srlr/pdf/Leg_Maryland.pdf

Stop Red Light Running Program, Federal Highway Administration, U.S. Department of Transportation, Washington, DC, http://www.fhwa.dot.gov/stoprlr/index.htm, Accessed October 18, 1999.

Stop Red Light Running Literature, Federal Highway Administration, U.S. Department of Transportation, Washington, DC, http://www.fhwa.dot.gov/stoprlr/camr/camrtech.htm. Accessed November 1999.

Supriyasilp, T, D. Turner, J. Lindly, E. Mansfield, and J. Howell, *Speed Sensitivity of a Red Light Camera Enforcement System*, Department of Civil and Environmental Engineering, The University of Alabama, Presented at 84th Annual Meeting of the Transportation Research Board, Washington, DC, January 2004.

Swali, L. N., and P. L. Belcher, "The Use of Cameras to Reduce Casualties in London," In *International Conference on Road Traffic Monitoring and Control,* Institution of Electrical Engineers, London, England, 1992, pp. 28–31.

Turner, S. and A. E. Polk. "Overview of Automated Enforcement in Transportation," *ITE Journal*, June 1998, pp. 20–28.

U.S. Department of Transportation, *Accidents That Shouldn't Happen*, A Report of the Grade Crossing Safety Task Force to Secretary Federico Pena, March 1, 1996, pp. 4.

Wissinger, L. M., J. E. Hummer, and J. S. Milazzo II, "Using Focus Groups to Investigate the Issues Surrounding Red Light Running," *Transportation Research Board 79th Annual Meeting (Preprint CD-ROM),* Transportation Research Board, National Research Council, Washington, DC, January 2000, pp. 1–28.

World Report on Road Traffic Injury Prevention, World Health Organization/The World Bank, Washington, DC, April 2004, pp. 132-133.

Vinzant, J. C., and B. J. Tatro, *Evaluation of the Effects of Photo Radar Speed and Red Light Camera Technologies on Motor Vehicle Crash Rates,* Department of Police, City of Mesa, Arizona, March 1, 1999, pp. 2–7.

Yamada, A., and P. Salzberg, *A Review of Automated Traffic Enforcement Systems: A Report to Washington State Legislature,* Washington Traffic Safety Commission, December 1999.

Yee, B. M., "San Francisco's Red Light Camera Enforcement Program," In *Compendium of Technical Papers: The 67th ITE Annual Meeting*. Institute of Transportation Engineers, Washington, DC, 1997.

Zador, P., H. Stien, S. Shapiro, and P. Tarnoff," Effect of Clearance Interval Timing on Traffic Flow and Crashes at Signalized Intersections," *ITE Journal,* November 1985, pp. 36-39.

APPENDIX A. PHOTO RED LIGHT ENFORCEMENT LEGAL CONSIDERATIONS

NOTICE

The National Highway Traffic Safety Administration (NHTSA) and the Federal Highway Administration (FHWA) has compiled and distributed this information as a legal guide only. This material is not intended to be a complete treatment of every jurisdiction's laws and court decisions related to photo red light enforcement. Instead, this material includes highlights and examples of court decisions, and discusses issues that users engaged in photo red light enforcement should consider.

Due to the dynamic nature of law enforcement and the evolution of technology, it is important that each department review this information to verify that it is consistent with applicable, current State and local law and regulations, and with department policy and procedure. ***This information is NOT intended to substitute for the advice of legal counsel****. You should speak with your legal advisor, and/or local prosecutor, about the sufficiency of your department's manual, policy, curriculum, and training program on this subject. This material should not be used as the sole basis for compliance with any law or regulation, and* ***departments should NOT rely on this material as a legal defense*** *in any civil or criminal action. Remember that new court decisions and amendments to the law could change the material in this appendix.*

Photo red light enforcement is a relatively new law enforcement tool. Thus, case law is not well established. Although the few cases involving photo red light raised constitutional issues, the decisions were based upon procedural grounds, never answering the ultimate question – is it constitutional? The ruling on the Motion to Dismiss citations issued under San Diego, California's photo red light program (under appeal as of the preparation of this report), found the program constitutional. However, this ruling is not binding and only provides insight into the court's reasoning.

Automated speed enforcement, a relatively new enforcement tool as well, shares common legal issues with photo red light enforcement – such as the registered owner presumption, notice, procedural, constitutional issues, etc. Most automated speed cases have also tended to avoid constitutional questions. Some issues (e.g., chain of custody, service of process issues, registered owner presumption) have been addressed, but these decisions tend to be highly fact-dependent and/or are based on State statutes.

Many questions remain. The answer to these questions may be gleaned from cases not specific to automated enforcement. Existing case precedent dealing with evidentiary issues of older enforcement techniques will shape the use of automated enforcement evidence in the future. Law enforcement will use the same criminal procedures as are applicable to the collection (search and seizure), preservation (chain-of-custody), and discovery of other types of evidence.

It is most important to note that although the courts will borrow from established case law to determine case law regarding automated enforcement, the path will most likely be contorted. The law is known for nuances. Thus, subtle distinctions between photo red light programs may affect a court's decision and produce seeming inconsistencies.

Most importantly, the classification of the photo red light violation, as either a civil or criminal violation, will dramatically effect decisions. Similarly, as in the San Diego photo red light program, the enabling statute may impact the admissibility of the evidence (see page 51 for enabling statutes). A State's surrounding body of law and the manner in which the program is conducted will also impact the viability of the photo red light program and the success or failure of challenges to the program. Without assessing merit, the following are some of the procedural and substantive issues that may be generated by photo red light enforcement.

Procedural Issues:

- Authentication of photographs
- Chain of evidence of photographs
- Compliance with enabling statutes
- Foundation: Device reliability (maintenance, checks for accuracy, training of personnel involved in the process)
- Misuse or dissemination of photographs
- Municipal drafting
- Notice – compliance with applicable state rules for service
- Proper notice of use of photo red light enforcement (signs)
- Standing – who can bring an action, when, and where

Substantive Issues:

- Administration of the program violates Fourteenth Amendment Due Process rights
- Confrontation rights (6th Amendment right)
- Equal Protection (disparate treatment for public, police, rental, corporate, out-of-state vehicles, motorists cited by police)
- Fifth Amendment right to remain silent (for statutes requiring affidavit as to who was driving)
- Mailing a citation that requires appearance is a seizure subject to the Fourth Amendment
- Photographing a motorist is a search subject to the Fourth Amendment
- Pre-charging delay (delay between the violation's occurrence and receipt of notice) – Fourteenth Amendment Due Process

- Presumption that the registered owner is the driver impermissibly shifts the burden of proof
- Privacy – violation of State privacy laws
- Revenue generation: selection criteria for photo red light enforcement, light phase timing
- Substantive Due Process - Privacy

The above are all issues that are likely to continue to be the subject of legal review and refinement. Monitoring their long-term clarification through legal proceedings is to be advised for all jurisdictions adopting red light camera enforcement systems. The remainder of Appendix A reviews current relevant case law examples and in doing so illuminates the types of issues that have been raised.

PHOTO RED LIGHT CASE LAW SYNOPSIS

***Dajani v. Governor of Md.*, No. CCB-00-713, 2001 U.S. Dist. LEXIS 982 (D. Md. Jan. 24, 2001) (unreported).**

Facts: The defendant was charged with a photo red light violation and convicted. In this jurisdiction, photo red light violations are civil and not considered moving violations. Insurance companies may not consider the convictions.

Issue: The defendant appealed to the Federal district court, requesting the court declare the statute unconstitutional. The defendant alleged the photo red light statute violated the Sixth Amendment's Confrontation Clause and the Fourteenth Amendment's Due Process Clause.

The court upheld the conviction on procedural matters (lack of Federal jurisdiction and lack of standing) without comment on the constitutional issues. The Fourth Circuit Court of Appeals affirmed the District Court's decision. (Dajani v. Governor of Md., No. 01-1179, 2001 U.S. App. LEXIS 17303 (4th Cir. 2001).

Kovach v. District of Columbia, 805 A.2d 957 (D.C. 2002).

Facts: The defendant paid, without contesting, a photo red light citation. Subsequently, the police department "decided to remove the camera because it was observing an inordinate number of people running the light, which was confusing to motorists." *Id*. at 959. Outstanding fines were dismissed, but those motorists who had paid were not reimbursed.

Issue: The defendant appealed, alleging the District's decision to forgive some, but not all, violations violated the Fifth and Fourteenth Amendments.

The court upheld the conviction because "in failing to contest the infraction, appellant effectively acknowledged liability for running the red light." The court also rejected the defendant's argument that the confusing placement of the stoplight created "manifest injustice." The defendant "has no standing to challenge the decision unless . . . he was confused . . ." *Id.* at 962-63.

Structural Components Int., Inc. v. City of Charlotte, No. C0A102-200 (N.C. Ct. App., Nov. 19, 2002) (unreported – not final until expiration of rehearing period).

Facts: The president of Structural Components received a photo red light citation for one of its vehicles. In this jurisdiction, violations are civil. Structural Components contested the violation at a "review hearing."

Issue: Upon conviction, Structural Components (plaintiff) filed suit in the superior court alleging negligence (by failing to establish reasonable guideline, failure to govern the program in a reasonable manner, and failure to provide a reasonable appeals process) and civil rights violations (State/Federal due process and equal protection).

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Upon defendant's (the City and Lockheed Martin) motion to dismiss, the court determined it lacked jurisdiction and dismissed the action. Structural Components appealed. The appellate court affirmed the trial court's dismissal on procedural grounds (waiver of the negligence action for failure to properly state issue in appeals brief and, because one cannot recover monetary damage for a procedural due process violation involving a civil penalty, failure to state a claim). The court noted the proper avenue to challenge the constitutionality of the statute was by certiorari to the superior court (which Structural Components had not used) and the present statutory scheme provided an adequate method for challenging the legality of the program.

City of Commerce City v. Colorado, 40 P.3d 1273 (Colo. 2002).

Issue: Commerce City challenged whether the Colorado statute (Colo. Rev. Stat. § 42-4-110.5 (2002)), which authorized the photo red light program, infringed upon the City's "home-rule" powers. Noting that the program involved a "mix" of state and local concerns and, where conflicts arose, State concerns prevail, the court affirmed the validity of the program.

People v. John Allen (In re Red Light Camera Cases*)*, No. 57927SD (Cal. Super. Ct. Aug. 2001) (order denying motion to dismiss) (available at http://freedom.gov/auto/ cases/ sdmotion.asp). *This case remains under appeal. This order is presented to illustrate issues that may arise with photo red light enforcement.*

Facts: Defendants in a photo red light case filed a motion to dismiss alleging failure to comply with the authorizing statute (section 21455.5 of the California Vehicle Code). In this jurisdiction, the violation is criminal and a conviction is entered onto the driver's license record.

Issue #1: The defendants contended the photo red light program was not operated by a government agency in cooperation with a law enforcement agency as required by the authorizing statute.

The court noted "once the construction process was begun, there was very little City involvement." The City did not inspect the project when complete and the "entire process of installation and calibration of the camera equipment, putting film into the cameras, unloading the cameras, developing the film, maintaining the camera equipment, and reviewing the photographs to make the initial determination as to whether or not there was a violation and whether the alleged violator can be identified, is done by Lockheed Martin. Further, once Lockheed determines that a citation will not [be] issue[d], that decision is not reviewed by the City.

If Lockheed decides a citation should [be] issue[d], it reviews Department of Motor Vehicles' information . . . prints the citation, including printing the signature of the sergeant in charge of the program on the citation. The first time the City becomes involved is when the police department receives the citation which has already been printed." The police review copies of the photographs and the digital information to determine whether the citation should be issued. If a citation is issued, Lockheed mails it . . ."

The court found the City had "no involvement with, nor supervision over, with the ongoing operation of the system" and "[t]he Legislature did not contemplate such a lack of participation by the City" when it authorized a government agency to "operate an automated enforcement system." Thus, the program violated the statute.

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Issue #2: The defendants contended the signs were inadequate.

The statute required signs "clearly indicating the system's presence, visible to traffic approaching from all directions." The posted signs were 24" by 30." Based upon testimony of police officers as to the signs visibility and the lack of evidence drivers were not able to see the signs, the court found the signs adequate.

Issue #3: A related statute (section 40520 of the California Vehicle Code) required photo red light violations to be accompanied by an affidavit of non-liability, information as to what constitutes non-liability, information as to the effect of executing the affidavit, and instructions for return. The defendants alleged this procedure was "unconstitutional because it requires innocent people to testify against each other."

The court noted the section was a legislative attempt to prevent blanket immunity for corporate and rental agencies vehicles and provides a method for the registered owner who is not driving to avoid liability. Without elaboration, the court determined the statute compliant with due process and "a legitimate exercise of the police power in an attempt to issue citations to the actual driver who violated the red light."

Issue #4: The California Penal Code (section 959.1) requires pleadings (citations) be sworn before an officer entitled to administer oaths. The defendants alleged that "no officer swears to the facts because the signature is affixed electronically before it is sent to the police and the officer who reviews the citation is not the sergeant whose signature appears on the citation." The reviewing officer merely stamps his ID number below the signature.

The court noted that pleading defects (i.e., minor errors in the pleading document) that do not prejudice a substantial right do not justify dismissal.

Issue #5: The defendants argued that because the City did not comply with statutory provisions regarding the "operation' of the program, all citations must be dismissed. In making its determination the court looked at the following issues.

Issue #5A: Was the delegation of authority constitutional?

Although, the City had delegated the tasks of evidence collection and determining who will not be cited to Lockheed Martin, the police retained the "ultimate authority to determine who will be prosecuted." Thus, the delegation was not unconstitutional.

Issue #5B: Is the fee paid to Lockheed Martin a contingency fee and if so, what is the legal effect?

Because Lockeed's payment was contingent upon a conviction, the fee was deemed a contingency fee.

The court indicated that Lockheed was "supposed to be a neutral evaluator of the evidence" and "should not have a financial interest in the outcome." The court reasoned that because the statute mandated a government agency "operate" the program, the purpose was to guarantee, "information obtained from the red light cameras would be trustworthy. The potential conflict created by a contingent method of compensation further undermines the trustworthiness of the evidence which is used to prosecute the red light violations."

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Issue #5C: Does the delegation, without statutory authority, which operates on a contingent fee basis violate due process such that it requires a dismissal of pending actions?

The court noted that the threshold question in a due process challenge to executive action is whether the behavior is "so egregious, so outrageous, that it may fairly be said to shock the contemporary conscience." In this case, the court held the conduct did not rise to that level.

Issue #5D: Is the photo red light evidence admissible?

The court indicated that "where evidence is obtained from sources subject to legislative standards, there should be substantial compliance." The court noted that "there is no authority in the Vehicle Code for unsupervised private operation of a red light camera system. Therefore, there is not substantial compliance with the safeguards required by the statute. Such a lack of authority, combined with the collection based compensation, result in evidence lacking foundation. Without foundation, the evidence is not relevant and is not admissible."

Accordingly, the court did not grant the motion to dismiss, but rather granted a motion to exclude the evidence.

Office of the Attorney General of the State of Texas, Opinion No. JC-0460, 2002 Tex. Op. Atty. Gen. 20 (2002).

Issue: Could a city pass an ordinance authorizing a photo red light program and could violations be civil, rather than criminal?

Based on Texas law (which deemed red light violations criminal), the Attorney General opined a city could authorize a photo red light program to identify violators, but could not make violations civil.

Office of the Attorney General of the State of Tennessee, Opinion No. 01-004, 2001 Tenn. AG LEXIS 6 (2001) (available at http://www.attorneygeneral. state.tn.us/op/ 2001/OP/OP4.pdf).

Issue: The Attorney General's Office was tasked with determining whether, pursuant to inherent police power, a city had authority to enact ordinances allowing photo-enforcement.

Without addressing specific constitutional issues, the Attorney General's opinion concluded that the use of photo-enforcement did not conflict with any State statute. In a footnote, the opinion noted photo-enforcement has "generally been viewed as a permissible exercise of State and local government police power which is not violative of Federal or State constitutional provisions."

Office of the Attorney General of the State of Nebraska, Opinion No. 00001, 2000 Neb. AG LEXIS 1 (2000) (Available at http//:www.ago.state.ne.us/opinion/index.html).

The Attorney General's office was tasked with assessing the constitutionality of proposed legislation involving photo red light enforcement. The Attorney General offered the following opinions:

Issue #1: Procedural Due Process

The proposed legislation permitted a defendant to contest the violation in a county court and assumed that proper notice would be provided. Thus, the Attorney General opined the proposed legislation would comply with the procedural due process requirements of reasonable notice and an opportunity to be heard.

Issue #2: Substantive Due Process

Substantive due process guarantees individuals protection from arbitrary government action. The Attorney General noted that due process is satisfied if the government has the power to act on the subject matter, if they did not act capriciously or in a discriminatory manner, and if there was a reasonable relationship to a proper governmental purpose.

The Attorney General opined that the proposed legislation complied with substantive due process because protecting public safety is a proper subject matter and the legislation was rationally related to that interest.

As to the registered owner presumption, the Attorney General opined this was also a "proper exercise of the State's police power" similar to holding the registered owner of a parked vehicle liable.

Issue #3: Equal Protection

The Attorney General noted the similarities of the Nebraska and U.S. Constitution in that equal protection challenges not involving a suspect class or fundamental right are tested only for rationality. A Nebraska Supreme Court decision (State v. Michalski, 221 Neb. 380, 377 N.W.2d 510 (1985)) had held that driving is not a fundamental right, and that drivers were not a suspect class.

The Attorney General opined that the classification would be between two types of drivers: (1) those individuals cited directly by an officer who receive a criminal penalty, and have the conviction recorded on their driver's license; and (2) those individuals cited by the photo red light program who are subjected only to civil penalties and no recordation on their driver's license.

The Attorney General noted that, although the purpose of the legislation was not set forth, the apparent purpose was to reduce the hazards of running red lights. Thus, the Attorney General concluded that, given the "wide latitude" and deference to the legislative process, the legislation met the rational basis standard and the proposed law would comply with Equal Protection rights.

RELATED AUTOMATED ENFORCEMENT CASE LAW SYNOPSIS

Oregon v. Dahl, 57 P.3d 965 (Or. Ct. App. 2002).

Facts: An officer operating a photo radar unit photographed the defendant's vehicle exceeding the posted speed limit. The defendant was the only registered owner. The officer observed the violation, but did not effect an enforcement stop and could not identify the driver. At trial, a witness commented that the defendant failed to provide a sworn certificate of innocence as permitted by statute.

Issue #1: The defendant contended the Oregon statute which establishes a presumption that the registered owner of a vehicle is the driver impermissibly shifts the burden of persuasion.

An Oregon statute (OR. REV. STAT § 153.030.1) provides that unless excepted, criminal procedure laws apply to traffic violations. However, a different statute (OR. REV. STAT § 153.076.2) provides that traffic violations must be proved by a preponderance of the evidence (a civil standard). Because this statute authorized a civil standard of proof, the court reasoned a civil standard also applied to the presumption. Therefore, the burden shift was permissible.

Issue #2: The defendant contended that, even if the violation is civil, the Oregon presumption statute violated due process standards.

The court noted that both U.S. Supreme Court (Bandini Petroleum Co. v. Superior Ct., 284 U.S. 8 (1931)) and Oregon State court decisions required a "rational connection" between the fact proved and the ultimate fact presumed. The defendant argued that "vehicles usually have more than one key, licensed drivers outnumber registered vehicles, and vehicles commonly are borrowed or stolen, all of which indicate that vehicle are often driven by someone other than their owner." The court, although acknowledging that vehicles are often driven by non-owners, found that "it is not irrational for the legislature to presume that vehicles are often driven by owners" and "we need not decide what facts are more likely to be true; the rational connection test does not require adoption of the best or most persuasive explanation." Thus, the Oregon statute did not violate due process. *Id*. at 968-969.

Issue #3: The defendant contended a witness reference to her failure to submit a sworn certificate of innocence violated her statutory and constitutional right to remain silent.

The Fifth Amendment provides that no person "shall be compelled *in any criminal case* to be a witness against himself." The court indicated that the defendant had failed to identify how she could have been exposed to any criminal responsibility. Thus, "her constitutional right was not implicated." *Id.* at 969.

Section 810.439 provides a defendant in a traffic violation case an opportunity to avoid trial by submitting a certificate of innocence. The defendant may disregard that opportunity. The court "assumed without deciding" that the witness's comment impermissibly infringed on the defendant's statutory right, however, the court also stated "there was no indication that the trial court relied on that testimony in making its decision." Thus, the court found the defendant was not prejudiced by the comment. *Id.*

McNeil v. Town of Paradise Valley, No. 01-17003, 2002 U.S. App. LEXIS 17306 (9th Cir. Aug. 12, 2002). *Not Published – Check with Court Rules. The case is presented to illustrate issues that may arise with photo red light enforcement*.

Issues: McNeil appealed the district court's dismissal of alleged civil rights and Racketeer Influenced and Corrupt Organizations Act (RICO) violations premised on the issuance of an automated speed citation. The facts and basis for these contentions was not clearly set forth. However, it appears that McNeil contended the mailing of a traffic citation to the registered owner was a seizure and the process was in violation of due process.

Without elaboration, the court found municipalities cannot constitute a RICO enterprise. Further the court indicated that, because a seizure requires intentional physical control, the mailing of a citation is not a seizure. As for the due process claim, the court indicated that the challenge to the citation in municipal court was sufficient.

Oregon v. Clay, 29 P.3d 1101 (Or. 2001).

Facts: An officer operating a photo radar unit photographed the defendant's vehicle speeding. The officer did not effect an enforcement stop and did not know the identity of the driver in the radar photo. Subsequently, a citation was issued and mailed to the defendant. The defendant did not appear at trial, but rather was represented by counsel. No evidence was presented on behalf of the defendant. The State presented no direct evidence that the defendant was the registered owner, but rather relied on witness testimony and an "official duty" presumption to establish the defendant as the registered owner. Upon being found guilty, the defendant appealed, contending the State had failed to prove that she was the registered owner of the vehicle. The Oregon Court of Appeals upheld the conviction and the defendant appealed to the state supreme court.

In this jurisdiction, the registered owner is presumed to be the driver – see Oregon Law 1995, Chapter 579, sections 1-3 later codified to Oregon Revised Statutes §§ 810.438-810.439. Oregon statute section 811.123 requires proof that a particular person was speeding.

Issue: The defendant contended there was insufficient evidence to permit the trier of fact to find that she was the registered owner of the vehicle.

The court indicated that it did not "perceive any evidentiary basis . . . that would permit a trier of fact to find that the defendant was the registered owner of the speeding car." *Id.* at 1103. The percipient witness could not identify the driver and there was no evidence to conclude the defendant was the registered owner (which would have invoked the presumption that the registered owner was the driver).

The court indicated that because an officer had the authority, not a duty, to send the citation, the presumption that an "official duty had been performed" was not applicable. Because they could not prove the notice had been mailed to the registered owner, they could not prove the defendant was the registered owner. Because they could not prove that the defendant was the registered owner, the presumption that the registered owner was the driver was not applicable.

Oregon v. Weber, 19 P.3d 378 (Or. Ct. App. 2001).

Facts: An officer operating a photo radar unit observed the defendant's vehicle speed. The unit photographed the vehicle. Subsequently, the defendant was mailed a citation.

Issue #1: The defendant contended the inscription (indicating vehicle speed) on the photograph was impermissible hearsay.

The court indicated that, by statutory definition (Oregon Evidence Code 801), hearsay is a statement by a declarant and a declarant is a person who makes a statement. A machine, not a person, made the inscription on the photograph. Thus, the hearsay rule is inapplicable.

Issue #2: The defendant contended the court should have excluded the photograph on chain-of-custody grounds because the state offered no evidence as to "who picked up the film from the station, what happened to the film, how it was handled, or what was done to it prior to the citation and photograph being returned to the police station six days later."

The court indicated that, "given the totality of circumstances, the trial court was well within its discretion in determining that there was no appreciable likelihood of alteration or tampering and that no further foundation was required." *Id*. at 381-82.

Issue #3: The defendant contended the automated speed enforcement unconstitutionally shifts the burden of proof of the offender identity.

The court ruled the defendant had failed to use the proper judicial procedure to preserve this issue.

Issue #4: The defendant contended the time delay (between the occurrence of the violation and the mailing of the notice) violated her Fourteenth Amendment due process rights.

The court indicated that "for a precharging delay to give rise to a due process violation, a defendant must show both substantial prejudice to his right to a fair trial and that the delay was done intentionally to gain a tactical advantage." The court found the defendant failed to establish the state intentionally delayed the notice to gain a tactical advantage. *Id.* at 385.

Bentley v. West Valley City, 21 P.3d 210 (Utah 2001).

Issue: Plaintiffs, who received automated speed enforcement citations, sought reimbursement of fines alleging the automated enforcement program violated Utah Code section 41-6-52.5. None of the plaintiffs had challenged the program during the criminal proceedings.

The court ruled on procedural grounds finding the plaintiffs failed to assert an "actionable civil theory under which criminal fines are recoverable . . . ."

Anchorage v. Baxley, 946 P.2d 894 (Alaska Ct. App. 1997).

Facts: The defendants received automated speed enforcement citations. At trial, numerous witnesses testified to the reliability of the speed enforcement device. However, the trial court found the witnesses' financial interest in the acceptance of speed enforcement units tainted their credibility. The magistrates found that, absent independent corroboration as to the reliability of the device, results were not admissible.

Issue: The city appealed seeking a ruling that automated speed enforcement evidence was admissible without corroboration.

The court indicated the case was moot because "we would only review the magistrates' decision to determine whether the evidence presented would allow a reasonable fact finder to conclude that the municipality had failed to prove its case." And, given the magistrates' dim view of the witnesses' credibility, no reversible error occurred. *Id.* at 598-99.

West Valley City v. McDonald, **948 P.2d 371 (Utah Ct. App. 1997).**

Facts: The defendant received an automated speed enforcement citation and requested a jury trial. The state amended the complaint to a lesser charge (which did not warrant a jury trial). Subsequently, the defendant was convicted.

Issue: The defendant appealed claiming that reducing the charge deprived her of her statutory right to a jury trial.

The court upheld the conviction.

Tonner v. Paradise Valley Magistrate's Court, 831 P.2d 448 (Ariz. Ct. App. 1992).

Facts: An automated speed enforcement citation was mailed to General Motors Acceptance Corporation (GMAC), the registered owner. GMAC forwarded the notice to Tonner and mailed a copy of its transmittal letter to the court. The court reissued the notice to Tonner. Tonner failed to reply or appear. The court entered an order for a civil sanction (fine).

Issue: Tonner filed an action to vacate the sanction arguing lack of personal jurisdiction based upon improper service of notice.

The court indicated that under Arizona civil procedure rules (Ariz. R. Civ. P. 4.1c), service is not complete unless acknowledged. As Tonner failed to reply, service was not complete. Without service, the court lacked jurisdiction by which to sanction Tonner.

Office of the Attorney General of the State of South Carolina, (**No Opinion No.) 2002 S.C. AG LEXIS 209 (2002).**

The Attorney General re-evaluated[1] the use of automated traffic enforcement and concluded that "general case law and other authority reviewed herein support the conclusion that a properly drafted statute authorizing use of photo-radar or similar forms of automated traffic enforcement would pass constitutional muster. These authorities have reviewed automated traffic enforcement from a variety of constitutional perspective include the Due Process and Equal Protection Clauses, the Fourth Amendment's protection against unreasonable searches and seizures, the Sixth Amendment's right to present an adequate defense, as well as the federal and state constitution's right to privacy. The general consensus is that automated traffic enforcement is constitutional."

"Of course, the constitutionality of any statute authorizing automated traffic enforcement would depend, in part, upon a well drafted statute."

See also:

1. Office of the Attorney General of the State of Mississippi, Opinion No 2000-0068, 2000 Miss. AG LEXIS 113 (2000) indicated that, prior to implementing a photo red light program, a municipality would need statutory authority allowing citation of the registered owner of a violator's vehicle.

2. Office of the Attorney General of the State of South Carolina, 1996 S.C. AG LEXIS 54 (1996) regarding municipalities use of photo-radar in South Carolina. Though the opinion notes that no State statute prohibited photo-radar enforcement, the Attorney General nevertheless expressed concerns about the registered owner presumption, concluding that the Legislature was the appropriate authority to authorize use of the presumption.

3. Office of the Attorney General of the State of Montana, 45 Op. Atty Gen. Mont. 7 (1993) regarding a municipality enacting a photo-radar ordinance. The Attorney General's opinion noted "a presumption exists that legislative acts are constitutional" and "the constitutionality of a proposed legislative act is not an appropriate subject for an Attorney General's Opinion."

4. Office of the Attorney General of the State of Alabama, 239 Op. Atty Gen. Ala. 52 (1995) regarding the use of photo radar devices. The Attorney General indicated that, "while the use of such devices is legal, the use of such devices to mail speeding citation to motorists would not comply with substantive or procedural requirement of Alabama law."

5. Office of the Attorney General of the State of Georgia, No. 82000-7, 2000 Ga. AG LEXIS 13 (2000) concluding the "Home Rule Act" allowed municipalities to enact photo enforcement programs.

6. Office of the Attorney General of the State of Georgia, No. U2000-12, 2000 Ga. AG LEXIS 23 (2000) concluding counties may enact ordinances permitting photo enforcement and whether such devices may be used within the state highway system.

[1] See Office of the Attorney General of the State of South Carolina, 1996 S.C. AG LEXIS 54 (1996).

7. Andrew N. J. Tarr, *Picture It: Red Light Cameras Abide by the Law of the Land*, 80 N.C. L. Rev., 1879 (2002).

8. Mark Lehman, *Are Red Light Cameras Snapping Privacy Rights?*, 33 U. Tol. L. Rev., 815 (2002).

9. Steven Tafoya Naumchi, *Review of Selected 1998 California Legislation, Transportation and Motor Vehicles: Stop Photographic Enforcement of Red Lights*, 30 McGeorge L. Rev., 833 (1999).

10. Thomas M. Stanek, Comment*, Photo Radar in Arizona: Is it Constitutional?*, 30 Ariz St. L.J., 1209 (1998).

AUTOMATED ENFORCEMENT RELATED STATUTES AND ORDINANCES

Model Statute:

National Committee of Uniform Traffic Laws and Ordinances, *Automated Traffic Law Enforcement Model Law* – www.ncutlo.org/autoenforce622.htm.

State Statutes:

1. California Vehicle Code– CAL. VEH. CODE §§ 210, 21455.5, 21455.6, 40518, 40520 (2003).
2. Colorado Revised Statutes – COLO. REV. STAT. § 42-4-110.5 (2002).
3. Delaware Code Annotated - DEL. CODE. ANN. TITL 21 § 4101(d) (2002).
4. Official Code of Georgia Annotated – GA. CODE. ANN. § **40-6-20** (2002).
5. Illinois Compiled Statutes Annotated - 625 ILL. COMP. STAT. ANN. 5/1-105.5, 5/11-306 (2002).
6. Annotated Code of Maryland – MD. CODE ANN. TRANSP. § 21-**202.1** (2002).
7. Nevada Revised Statutes Annotated –NEV. REV. STAT. ANN. § 484.910 (2002).
8. New Jersey Annotated Statutes –*N.J. STAT. ANN. § 39:4-103.1 (2002).*
9. New York Consolidated Laws Service – N.Y VEH. & TRAF. LAW § 1111-a (2002).
10. General Statutes of North Carolina – N.C. GEN. STAT. § 160A-300.1 (2002).
11. Oregon Revised Statutes – OR. REV. STAT. §§ *810.434* - 36, 438 - 439 (2001).
12. Pennsylvania Consolidated Statutes - 75 PA.C.S. §§ 102, 3116 (2002).
13. Utah Code Annotated –UTAH CODE ANN. § 41-6-52.5 (2002).
14. Code of Virginia – VA. CODE. ANN. §§ 46.2-819.1, 833.01 (2002).
15. Wisconsin Statutes - WIS. STAT. § 349.02 (2002).

Ordinances:

1. Toledo, Ohio, Mun. Code § 313.12 (1999) and Ordinance No. 451-00 (2000).
2. Dayton, Ohio, Rev. Code of Gen. Ordinances No. 70.121 (2002).
3. District of Columbia Code Ann. §§ 50-2209.01, 03 (2002).
4. Charlotte, N. C., Ordinance No. 966 (1998)– see www.charmeck.org/Departments/transportation/special+programs/city+ordinance.asp

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