Red Light Running Camera Implementation Guide

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Alabama Department of Transportation

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RED LIGHT RUNNING CAMERA IMPLEMENTATION GUIDE

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DISCLAIMER

This manual provides guidelines and recommended practices on how to identify and document red light running issues at signalized intersections, potential alternative engineering countermeasures, red light running camera system justification process, and the proper implementation of red light running camera enforcement program in the State of Alabama. This manual cannot address or anticipate all possible field conditions that will affect red light running camera applications. It remains the ultimate responsibility of the design engineer and/or the camera applicant to ensure that a red light running camera or an alternative countermeasure is appropriate for prevailing traffic and field conditions.

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Chapter 1

Introduction

This document is to serve as the official Alabama Department of Transportation (ALDOT) guidance document for the implementation of red light running (RLR) cameras on State-owned and non-State-owned roadways in Alabama. The purpose of this document is to provide consistent guidance for ALDOT Region Offices as well as local agencies for the implementation of RLR cameras at signalized intersections. It provides information on RLR camera installation permit application procedure and required documentation.

1.1 Alabama Code

Section 32-5A-32(3), The Code of Alabama 1975, defines what is indicated by a signal showing a red light and thereby defines a red light violation:

> "(*3) Steady red indication:*
>
> *a. Vehicular traffic facing a steady circular red signal alone shall stop at a clearly marked stop line, but if none, before entering the crosswalk on the near side of the intersection, or if none, then before entering the intersection and shall remain standing until an indication to proceed is shown except as provided in subdivision (3)b.*
>
> *b. Except when a sign is in place prohibiting a turn, vehicular traffic facing any steady red signal may cautiously enter the intersection to turn right, or to turn left from a one-way street into a one-way street, after stopping as required by subdivision (3)a. Such vehicular traffic shall yield the right of way to pedestrians lawfully within an adjacent crosswalk and to other traffic lawfully using the intersection*." (The Code of Alabama 1975)

1.2 Supporting Legislation

To date, Alabama has no statewide legislation supporting or outlawing the use of RLR camera enforcement. A previous UTCA (University Transportation Center for Alabama) study conducted for ALDOT recommended that an Alabama oversight committee should be formed to encourage adoption of RLR camera programs and that legislation should be pursued in Alabama to enable automated enforcement of red light running (Supriyasilp et al. 2003).

Supporting legislation at a state, county, or municipal level will generally establish the entire legal framework for the automated program such as responsibility, types of penalties, violation data processing and notice requirements, violation contest and due process, use of revenue derived from automated enforcement, and other legal issues related to the enforcement.

Nearly half of U.S. states have enacted laws permitting the use of RLR camera enforcement (IIHS 2012). A list of current state laws is presented in Appendix A. Some state laws limit the use of the cameras to certain cities, while other state laws allow or prohibit their use statewide. Not all states where RLR cameras are in use have such statewide laws, and Alabama falls into this category. In Alabama, the cities of Auburn, Center Point, Midfield, Montgomery, Opelika, and Selma have deployed RLR cameras, and each has developed a local supporting law.

1.3 Background

Red light running is one of the major causes of crashes, injuries, and fatalities at signalized intersections. According to the Federal Highway Administration (FHWA), between the years 2000 - 2009, red light running resulted in 8,845 fatalities in the U.S., accounting for 10 percent of all intersection fatalities (FHWA 2012). An estimated 165,000 people are injured annually in red light running crashes (IIHS 2007). Nearly two-thirds of the fatalities were people other than the red light running drivers (i.e. occupants of other vehicles, passengers in the red light runners' vehicles, bicyclists, or pedestrians) (IIHS 2011).

Red light running is an aggressive behavior that can be greatly affected by enforcement. However, enforcing red light violations, especially in dense urban areas, by traditional means poses special difficulties for police officers. In most cases, police must follow the red light running vehicle through a red light, endangering themselves as well as other motorists and pedestrians. In addition, most communities do not have the resources to allow police to patrol roadways and intersections as often as would be necessary to ticket all red light runners (IIHS 2011, Teigen and Shinkle 2012). Therefore, communities and local governments have turned to automated enforcement to reduce red light violations without diverting law enforcement resources from other areas of enforcement.

Research indicates that RLR cameras can be an effective countermeasure in reducing red light running (Bochner and Walden 2010, Mohamedshah, Chen, and Council 2000). However, the implementation of RLR cameras as a surrogate to traditional enforcement is not simply a "plug and play" activity. Due to their complexity and controversial nature, cameras require a considerable amount of effort, coordination, and collaboration to be operationally successful. More importantly, they should only be installed where a safety issue associated with red light running has been documented and other alternative countermeasures have failed to address the issue.

The most common crash associated with red light running is an angle crash, which is generally more severe than other typical signal-related crashes, including rear-end. Various studies have reported that RLR cameras reduce angle and turning crashes, but they can also increase rear-end crashes. Several crash modification factors (CMF) are listed on the Crash Modification Factors Clearinghouse website for the implementation of RLR cameras. These CMF values indicate the expected crash effects. Table 1.1 shows selected CMFs cited from previous studies.

TABLE 1.1 Crash Modification Factors Resulting from Adding Red Light Running Cameras

CMF ID	CMF	Crash Type	Crash Severity	Publication Year	Star Quality Rating	Adjusted Standard Error of CMF
2426	0.80	All	All	2010	4	-
3860	0.76	All	Fatal	2011	4	-
3861	0.83	All	Fatal	2011	4	-
420	0.75	Angle	All	2005	5	0.03
424	0.67	Angle	All	2007	4	0.08
421	0.84	Angle, Left turn	Serious Injury, Minor Injury	2005	4	0.07
422	1.15	Rear-end	All	2005	5	0.04
425	1.45	Rear-end	All	2007	4	0.11
2981	1.43	Rear-end	All	2009	4	-
423	1.24	Rear-end	Serious Injury, Minor Injury	2005	4	0.14

Source: CMF Clearinghouse, http://www.cmfclearinghouse.org/, Accessed November 2012

The first six values on the CMF column indicate the potential for RLR cameras to reduce all crashes or only angle crashes, but the last four indicate that RLR cameras increase rear-end crashes as much as 45 percent. The increase in rear-end crashes might lead to questions concerning the overall effectiveness of RLR cameras, but the fact that rear-end crashes are much less severe than angle crashes substantiates the effectiveness of RLR cameras to reduce red light running related crashes and improve overall intersection safety. RLR cameras have the potential to deter red light running violators who receive citations and monetary penalties.

1.4 Report Organization

This document includes guidance on how to identify and document red light running issues at signalized intersections, alternative engineering countermeasures, and red light running camera system justification. It also includes technical guidance for implementation of a RLR camera enforcement program, the RLR camera permit application and approval process, public information campaign, annual reporting requirements, and removal process. In addition, relevant forms and supporting documents are provided in the appendix section of the report.

Chapter 2
Red Light Running Problem Identification

The initial step in determining whether a RLR camera system, or any candidate countermeasure, needs to be deployed is to identify whether red light running and resulting crash problems exist at the intersection. Red light running and associated crashes may result from a number of contributing factors and may be addressed by a variety of countermeasures encompassing engineering improvements, enhanced driver and public education, and increased enforcement. A red light running issue at any intersection should be investigated, and the feasibility of all alternative countermeasures, including RLR camera systems, should be evaluated. The following sections detail the processes for determining whether a red light running problem exists, contributing factors, and engineering countermeasures that could be implemented in a logical manner before considering a RLR camera system. Appendix B shows a decision tree to guide when a RLR camera system may or may not be considered.

2.1 Engineering Process to Identify Red Light Running Problems

A publication by the FHWA/ITE suggests the following process to address red light running safety problems at intersections:

- Identify and confirm that there is a red light running safety problem;
- Conduct an engineering analysis to identify the factors that might be causing the problem;
- Identify alternative countermeasures that could solve the problem;
- Select the most appropriate single or combined set of countermeasures; and
- Implement the countermeasures and monitor the solution to determine the extent of the continuance of the problem. (FHWA/ITE 2003)

2.1.1 Red Light Running Problem Identification

The initial identification of a red light running issue at any intersection or area can come from several sources: citizen complaints, police input, highway monitoring programs, or other sources. To determine if there is indeed a red light running problem and if the intersection is experiencing a level that is greater than the average threshold, a comparison to an established threshold value criteria should be performed to quantify that there is a red light running problem. This threshold value can be in terms of

red light running violation and/or crash rates. The caveat here is that there is no national or statewide standard as to what is considered the maximum threshold; neither is there a standard measure. Local agencies must establish a reasonable threshold or guide using engineering judgment backed by engineering study and analysis.

For violations, the threshold value can be based on field collected data or a local police citation database. It can be measured in terms of number of violations per day, per hour, or the violation rate per 1,000 vehicles passing through the signal, the rate per 10,000 vehicle cycles, or the rate per 100,000 population (Supriyasilp et al. 2003).

Literature shows violation rates vary widely from state to state and from one intersection to another. A study conducted at Iowa State University found red light violation rates ranging from 0.45 - 6.08 violations per 1,000 entering vehicles, and 0.11 - 9.78 violation rates per hour. A two-hour traditional enforcement effort at a high volume intersection in Raleigh, North Carolina resulted in 36 tickets, which is equivalent to 18 violations per hour (FHWA/ITE 2003). Another study conducted at 10 intersections in five Texas cities found 4.1 violations per 1,000 vehicles (Bonneson et al. 2002). A UTCA study using video cameras to collect violation data at three sites in Tuscaloosa, Alabama found violation rates ranging from 0.47 to 29.0 per 1,000 vehicles (Supriyasilp et al 2003). Violation rates vary significantly; therefore it is important to thoroughly evaluate existing data before agencies set any threshold and select sites for RLR camera enforcement.

For crashes, local agencies should isolate crashes related to red light running violations. While this information can be highly dependent on the accuracy and availability of information recorded on the police report, agencies should make every effort to acquire the necessary crash data to help confirm a red light running problem.

Crash rates can be reported in crashes per million entering vehicles or by types of crashes, specifically for angle and rear-end crash types (Eccles et al. 2012). The most prominent crash types of red light running violations are angle and turning crashes. To be a problem, red light running related crashes could be either high in rate based on intersection entering volume, or high in comparison to other types of crashes related to the intersection (FHWA/ITE 2003).

Although no studies identifying reference thresholds are currently present, ALDOT intends to establish expected threshold values in the future based on research. Until such reference threshold is made available, proper documentation of red light running violation and red light running related crashes at intersections is recommended to help determine whether a red light running problem exists. This documentation will also provide a measure for future comparison once RLR camera enforcement is implemented.

2.1.2 Red Light Running Site Evaluation to Identify Contributing Factors

If there is a confirmed red light running issue, then the agency should identify the factors that are contributing to the problem and evaluate possible countermeasures in a systematic process. The initial step for this evaluation is to conduct a field review and collect the necessary crash data that would isolate any contributing factors. Sufficient time should be allocated to conduct a thorough review of the intersection. This means that the review may have to occur during different times of the day to observe operations and conditions under different levels of traffic and lighting conditions. As a minimum, the field data and assessments need to include:

- Traffic volumes as turning movement counts (cars and trucks);
- Signal timing parameters (to include yellow and all-red intervals);

- Sight distance to the signal;
- Geometric configuration and pavement condition;
- Traffic signs and markings and their condition; and
- Traffic speed. (FHWA/ITE 2003)

The following checklist serves as a guide during a field assessment of red light running problems at signalized intersections. The first item to check is the signal visibility available to drivers as they approach the signal. The next item checks the appropriateness of signal control parameters. Of particular concern is the length of yellow and all-red intervals. Research shows that the duration of yellow interval is a significant factor affecting the frequency of red light running and that increasing yellow time to meet the needs of traffic can dramatically reduce red light running (FHWA 2013a). Therefore, the yellow interval must be appropriate for the intersection characteristics and should comply with current ALDOT Traffic Signal Design Guide and Timing Manual. Furthermore, the geometric and traffic operational features should be examined to determine whether they contribute to running a red light signal.

Traffic signal field investigation checklist:

- Visibility and Conspicuity Features
    - Sight distance to signals
    - Number of signals
    - Positioning of signals – overhead, post-mounted, near-side, far-side
    - Line of sight for visibility restricted signals (programmable)
    - Brightness of signals
    - Conspicuity of signals (type, size, and number of signal heads, backplates)
    - Intersection lighting
- Signal Control Parameters
    - Coordination with adjacent signals
    - Timing and cycle length
    - Yellow change interval
    - All-red clearance interval
    - Dilemma zone detection
- Geometric Features
    - Grade of approach lanes
    - Pavement condition
- Traffic Operations Features
    - Vehicle approach speed
    - Right turn on red (RTOR)
    - Pedestrian usage
    - Truck usage. (FHWA/ITE 2003)

A detailed explanation of the characteristics and how to conduct the field inspection is available from the FHWA/ITE's publications "Field Guide for Inspecting Signalized Intersections to Reduce Red-Light Running" (FHWA/ITE 2005) and "Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red-Light Running" (FHWA/ITE 2003).

Intersection diagrams are used to collect pertinent information to help engineers identify the potential problem areas. The diagram should include information about the intersection such as street width, pavement markings, lane configurations, turning bay lengths, signal control types, speed limits, driveways near the intersection, pedestrian walkways, and fixed objects that may block the driver's view. A sample FHWA/ITE Intersection Field Inspection Form (Appendix C) is provided to assist in the

inspection process. Some of the major contributing factors to look for and record during field inspection are listed below:

With respect to signal visibility:

- Problems exist when the sight distance is less than the minimum sight distance required for the approach and there is no advance signal warning sign in advance of approaching the signal;
- Problems exist when a continuous view to all or a portion of the signal face is blocked by utility lines, tree branches, or other objects;
- Problems exist when signal displays on other approaches can be seen from the approach being investigated, thereby confusing the driver.

With respect to signal conspicuity:

- Could visual clutter detract from signal detection? Can signal heads be seen easily among other highway and non-highway features that compete for motorists' attention, especially in dense urban areas?
- Are backplates present? If glare from the sun makes it difficult to see one or more signals as the driver approaches the intersection, backplates might be necessary.
- Are size and number of signal lens adequate?

With respect to signal control parameters:

- Is the yellow change interval inappropriately short or long?
- Is there an all-red clearance interval?

Other factors:

- If the pavement surface near the stop line appears to be slippery or if it is severely rutted, motorists may be reluctant to decelerate to a stop when the yellow appears.
- Is it possible that traffic signal control is no longer warranted?

In addition to field investigation data, it is necessary to collect intersection crash data before identifying countermeasures to address the red light running problem. It is important to access the most recent five (5) years crash history for the intersection. The crash type and causes should be studied for each lane approach. Collision diagrams and crash reports are useful in identifying the types and causes of crashes. It is expected that different jurisdictions or local agencies have different levels of access to crash data, especially red light running related crash data and red light violations data. The maximum effort should be done to acquire all available crash data in support of the red light running problem identification process.

2.2 Identify Alternative Engineering Countermeasures

After completion of field investigation and crash data analysis, if one or more contributing factors are observed, then potential countermeasures to address the issues should be considered. Although the selection of the final countermeasure(s) should be made by the responsible local or Region Traffic Engineer, some potential countermeasures are listed below. Detailed description of these countermeasures and when they are appropriate is available from the FHWA/ITE publication, "Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red-Light Running" (FHWA/ITE 2003).

Alternative engineering countermeasures checklist:

- For Signal Visibility Issues
  - Install additional signals on the near side of the intersection
  - Change signal mounting (to center over each marked lane)
  - Remove/relocate sight obstructing object
  - Install shields and visors
  - Install programmable lenses
  - Install SIGNAL AHEAD sign
  - Install advance warning flashers
  - Increase intersection lighting
  - Install near side indications
- For Signal Conspicuity Issues
  - Add additional signal head to achieve one signal per lane (centered over each marked lane)
  - Install LED signal head
  - Install 12-inch signal head
  - Install double red signal
  - Install backplates; larger or enhanced backplates
  - Install transverse rumble strips
- For Signal Timing Operation Issues
  - Adjust yellow change interval (to correspond to ALDOT Traffic Signal Design Guide and Timing Manual)
  - Add/change all-red clearance interval (to correspond to ALDOT Traffic Signal Design Guide and Timing Manual)
  - Coordinate signal operation with adjacent signals
- Other Measures to Consider
  - Provide dilemma zone protection
  - Determine if signal is still warranted
  - Consider roundabout or other innovative design
  - Improve pavement condition. (FHWA/ITE 2003, FHWA/ITE 2005)

2.3 Red Light Running Camera System Justification

As discussed in Chapter 2.1 and 2.2, before RLR cameras can be installed at an intersection, the jurisdiction or local agency considering the use of a RLR camera is required to conduct an engineering study for the specific intersection. It is important to perform the study to identify potential factors that may be contributing to red light violations and potential improvements/ countermeasures that may be implemented. If one or more countermeasures are deemed feasible, the jurisdiction should work with the local or Region Traffic Engineer to implement them and evaluate their progress. The countermeasures should be used for 6-18 months before any evaluation is made to quantify their effect on red light running. Then the change in the number of red light running violations and the red light running related crashes from the “before” and “after” periods should be compared to measure the effectiveness of the countermeasures. If the countermeasures have succeeded in reducing or resolving the red light running problem, then there is no need to consider RLR cameras. However, if all countermeasures have failed to solve the red light running problem or if no countermeasures are found feasible based on engineering study and analysis, then RLR cameras may be considered and the necessary application and approval guidelines should be followed.

2.3.1 Engineering Study Guidelines

ALDOT has established the following guidelines for an engineering study to assist localities in preparing RLR camera installation request submittals. An engineering study is required to determine whether there are other countermeasures likely to reduce the red light running violations that could be considered at that intersection. At a minimum, this study should include:

- A statement explaining why RLR cameras are proposed for a specific intersection.
- A completed field inspection form.
- A list of countermeasures attempted at the intersection and documentation of how these previously implemented countermeasures affected red light running violations.
- If countermeasures have not yet been attempted, the study should document why countermeasures have not been considered.
- Documentation of the current clearance intervals (yellow and all-red), whether the signal is coordinated with other signals along the corridor, the current condition of other safety features (i.e., lane markings, median control, speed limits, signing, etc.), crash data, red light running related crash data/rate (if available), and red light running violation data/rate.
- A calculation of proposed clearance times, a crash analysis related to red light running violations, a description of the lanes to be RLR camera enforced.

A completed engineering analysis sheet should be included with the final engineering study document. A sample engineering analysis sheet is provided in Appendix D.

ALDOT requires the final engineering study to be stamped and signed by a licensed professional engineer in Alabama. Refer to Chapter 4 for additional RLR camera system permit application and approval requirements.

Chapter 3
Red Light Running Camera Implementation

A properly applied red light running camera system is one of the countermeasures that can be effective to mitigate red light safety problems at signalized intersections. When considering RLR cameras, it is critical to ensure there are no other contributing factors, such as improperly timed traffic signals or limited sight distance, that are increasing the occurrence of violations, since these factors may suggest countermeasures other than RLR camera enforcement. Therefore, RLR cameras should not be installed until the problem location has been studied and other countermeasures have been implemented that did not correct the problem as described in the preceding sections of this document.

RLR camera systems implemented through a careful sequence of planning and actions have seen the greatest success and highest levels of support from communities. In this chapter, several key implementation steps are presented mostly from two publications: Automated Enforcement for Speeding and Red Light Running (Eccles et al. 2012) and Red-Light Camera Systems Operational Guidelines (FHWA/NHTSA 2005).

3.1 Early Planning and Startup

Any local agency considering the use of RLR cameras on State-owned roadways should first obtain authorization from ALDOT to begin the program. Early in the process, a partnership with the lead agency and other important players should be established by considering how to involve them as partners to get maximum benefit from the RLR camera program. The key elements recommended during the early planning and startup of a RLR camera program are as follows:

- Establish steering committee
- Establish program objectives
- Identify legal requirements
- Assess system procurement alternatives
- Establish public awareness and information campaign. (FHWA/NHTSA 2005)

3.1.1 Steering Committee

A steering committee inclusive of all stakeholder groups should be established to help plan the automated enforcement program – the lead agency would benefit from not planning this program alone. For Alabama this might include agencies like the Department of Public Safety, Department of Transportation, Department of Economic and Community Affairs, Administrative Office of Courts, selected city and county representatives, the judiciary, legislators, the media, safety groups, and concerned citizens. The steering committee serves to establish broad based program objectives and to monitor program results.

> **Lead Agency:** RLR camera enforcement programs can be operated by various groups within an agency or the implementing jurisdiction. However, it is recommended that the local police department serve as the lead agency since RLR camera programs are an enforcement function (Eccles et al. 2012).

3.1.2 Program Objectives

Program objectives should be established as clearly as possible early in the program development. RLR camera enforcement often triggers a debate from opponents. While their effectiveness is documented in several studies, their use is sometimes interpreted as a means for agencies to generate revenue and as a violation of privacy rather than to address safety. Therefore, it is essential to indicate the RLR camera program's objective is safety, not revenue.

3.1.3 Legal Requirements

Legal requirements should be identified prior to camera implementation. In particular, privacy issues, citation distribution, and types of penalties need to be thoroughly addressed and resolved prior to the startup of a red light camera program. Another issue is responsibility. Should the driver of the vehicle or the registered owner of the vehicle be held responsible for the violation? Although there is no recommended practice or guideline nationally, to date in Alabama the registered owner is held responsible.

- Driver Responsibility – Holding the driver of a vehicle accountable for an automated traffic law violation typically requires a frontal photograph into the passenger compartment so the driver can be identified for a trial. The frontal photograph increases privacy concerns that often are raised in opposition to automated traffic law enforcement legislation. 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 (Eccles et al. 2012).
- Registered Owner Responsibility – Holding the owner accountable for an automated traffic law enforcement violation requires only a rear photograph of the vehicle registration plate. It is much easier to positively identify a vehicle registration plate and greatly reduces privacy concerns. The owner of the vehicle is responsible for paying the ticket even if another person was driving the vehicle. To prove his/her innocence, the owner must identify the person who was driving the vehicle at the time the picture was taken (Eccles et al. 2012).

Other legal issues to be considered:

- Violation exceptions, e.g., vehicle sliding through the intersection due to adverse weather, sight restrictions due to a lead vehicle, funeral processions, vehicle yield the right-of-way to emergency vehicle,
- Violation notice requirements, photographic data requirements, etc.

3.1.4 Assess System Procurement Alternatives

There are a number of procurement alternatives available to state or 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. In either case, the agencies should maintain complete oversight and day-to-day supervision of the program and should decide based on cost effectiveness, legislation, and in-house capabilities (FHWA/NHTSA 2005).

Where a private contractor is responsible for the processing of citations, compensation based on the number of citations issued should be avoided. A flat fee structure is suggested for vendor services. This flat fee can be for the entire program or for each camera. This payment method is the most acceptable arrangement from the public's perspective because the fee paid to the vendor is not dependent on citations. Tables 3.1 thru 3.3 show procurement alternatives from the FHWA/NHTSA publication. Option A in Table 3.1 leaves the private contractor with many of the design and operation duties, while Option D indicates almost total control of the system rests with the agency. Table 3.2 and Table 3.3 show how payments from the agency to the contractor can be structured based on which group owns the camera system. Table 3.2 assumes the contractor owns the camera system, while Table 3.3 assumes the agency owns the camera system.

TABLE 3.1 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 Inquiries	Public Information Program
Option A									
State/Local Agency	X			X			X		
Private Contractor		X	X		X	X		X	X
Option B									
State/Local Agency	X	X		X			X		
Private Contractor			X		X	X		X	X
Option C									
State/Local Agency	X	X	X	X			X	X	X
Private Contractor			X		X	X			
Option D									
State/Local Agency	X	X	X	X	X	X	X	X	X
Private Contractor									

Source: Red-Light Camera Systems Operational Guidelines, FHWA/NHTSA 2005, Accessed January 2013

TABLE 3.2 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	X	X		
Initial Fixed Price Payment and Fixed Monthly Payments	X	X	X	X
Fixed Monthly Payments	X	X	X	X
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	X	X	X	X
Fixed Monthly Payment Schedule, Depending On Pre-Determined Low/High Number of Citations Issued		X	X	X
Time Worked and Materials Used			X	X

Source: Red-Light Camera Systems Operational Guidelines, FHWA/NHTSA 2005, Accessed January 2013

TABLE 3.3 Payment Options for Agency Owned and Contractor Operated Red Light Camera Systems

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

Source: Red-Light Camera Systems Operational Guidelines, FHWA/NHTSA 2005, Accessed January 2013

3.1.5 Establish Public Awareness and Information Campaign

One of the most important aspects of a successful RLR camera program is an effective public awareness and information campaign. Prior to implementation of red light running cameras, cities or local agencies should conduct a comprehensive public awareness program advising the public that RLR camera enforcement is being implemented before any citation can be issued. The public should be made aware of the exact date of when citations will start, and an active campaign should be held for at least 30 days prior to the first day of citation.

The public awareness and education program should be simple, clear, and encompass the following elements:

- Clear statement of the program objectives (safety not revenue)
- Description of how RLR camera works in non-technical terms
- The advantages of RLR camera enforcement as a supplement to traditional enforcement
- Explanation of other measures being taken to improve safety
- Description of how the RLR camera revenues will be used. (FHWA/NHTSA 2005)

There are many methods available to inform the public including: Newspaper articles, Website, Press releases, media coverage, Public meetings, Brochures, Public service announcements, Print ads, Mailings, Billboards, etc. It is recommended that cities hold well-publicized kickoff events and issue periodic press releases about the effectiveness of RLR camera enforcement, including the estimated number of citations to be issued and the estimated number of crashes to be prevented within their jurisdictions.

3.2 Red Light Running Camera System Planning

Once the local agency has the authority to launch a RLR camera system and has performed the early planning steps, it is important for the agency to establish the next phases of developing the camera system and to work through the implementation steps with the stakeholder group. When appropriate, the agency should solicit assistance from qualified consulting engineers with experience in red light camera systems design and operations or from other public agencies where red light camera programs have been successfully deployed.

3.2.1 Establishing Violation Processing Procedures

It is important to address the following aspects of the installation and operation of the red light camera system and determine the steps that will be used to process violations:

- 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 vehicle detections in RLR camera enforced intersection approaches.
- Clear specification of photographic data requirements for issuing citations, including the red signal indication and the time elapsed since onset of red. (FHWA/NHTSA 2005)

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.

3.2.2 Site Selection

The installation of a RLR camera system at a signalized intersection should be done only when a comprehensive engineering study of the intersection determines RLR camera enforcement is an appropriate countermeasure to mitigate the incidence of red light running. As discussed in Chapter 2, the engineering study should be supported with accurate crash data and red light violations and should ensure that red light violations are not the result of other contributing factors at the intersection.

For the most part, RLR cameras can be used at most intersection approaches as long as sufficient sight distance is available for drivers to see advance warning signs. Below are some conditions where RLR cameras may not be appropriate:

- Intersections with recent geometric or traffic signal design changes. The five (5) years supporting crash records may not be applicable in the new configuration.
- Intersections where new traffic signals have been installed in recent years. Violation or crash history may be too short to support the use of RLR camera.
- Intersections where significant geometric or traffic signal design changes are scheduled for the subsequent years. Such changes may substantially alter the need for RLR camera enforcement.
- Road or utility work is anticipated during the first year of RLR camera operation.
- Locations where major traffic pattern changes resulting from development, construction detours or similar events are anticipated during the first year of RLR camera operation.
- Design, operation or maintenance is inconsistent with state or local standards and practices. (ODOT 2010)

3.2.3 Adopting a Warning Sign Policy

Signs warning motorists that red light cameras are being used are required. The signs should be clearly visible to drivers and should conform to the requirements of the most current edition of the MUTCD adopted by ALDOT. The signs may be placed:

- In advance of RLR camera enforced intersections, so far as practicable
- At the RLR camera enforced intersections, typically on the far side traffic signal pole
- On all major routes entering the jurisdiction indicating that compliance with traffic control devices is enforced

3.2.4 System Selection and Technologies

Technical decisions regarding system selection and technologies include: type of camera unit, intersection lighting, types of camera housing and supporting structures, vehicle detection, and communications. These are vendor-specific and should be handled during negotiations with vendors.

3.3 Engineering Design of Red Light Running Camera Systems

Red light camera system installation plans should be prepared in accordance with the manufacturer's standard plans and technical specifications, and with the standards and specifications of ALDOT and the local agency. The plans should be prepared and signed by an Alabama licensed engineer. All plans showing RLR camera and traffic signal related installations must conform to ALDOT Traffic Signal Design Guide and Timing Manual. The plans shall 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.
- Pull boxes, conduit runs, and conductor schedule.
- Electrical service.
- Warning signs. (FHWA/NHTSA 2005)

The installation plans should be processed through the appropriate ALDOT plan review and permitting procedures.

3.4 Red Light Running Camera System Installation

The proper construction inspection procedures employed by ALDOT or the 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 ALDOT or local agency specifications, and inspection of the installation work by ALDOT or local agency officials and, where necessary, by the project engineer. All work performed within State right-of-way must conform to requirements and procedures of the ALDOT Utility Manual. In addition,

- All material such as poles, pull boxes, conduit, etc. shall conform to ALDOT standards as well as national standards.
- The Region Traffic Engineer or their designee must approve all connections to ALDOT equipment. A wiring detail must appear on the plan sheet.
- All poles installed within the clear zone or right-of-way shall be frangible or breakaway.
- All detection devices shall be non-intrusive. Unless already existing, in-pavement detection may not be permitted on state-owned roadways.
- The detection used for RLR camera equipment shall not interfere with the operation of detector loops or other detectors used for traffic signal operation.
- RLR camera signs should conform to the specifications of the most current edition of the MUTCD adopted by ALDOT. Signs should be placed on each RLR camera covered approach and should be shown on or as an attachment to the signal plans.
- Additional signs should be placed at the jurisdictional boundaries, informing the public that compliance with traffic control devices is enforced through the use of cameras.
- The red light camera system must be tested before it 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.

3.4.1 Access to ALDOT Signal Equipment

ALDOT requires the presence of an authorized ALDOT traffic signal technician to allow access to, or work around, any DOT maintained traffic signal. ALDOT will require a detailed work plan as to what work is scheduled and five (5) days advance notice to schedule a certified ALDOT traffic signal technician to be present during camera installation.

3.5 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. To ensure the proper operation and maintenance of the system, there should be a properly documented operation and maintenance agreement between the agency and the camera vendor.

A permit agreement shall be required for all RLR camera equipment installed within State right-of-way. This permit agreement should address all areas of concern: installation, removal, operation, and maintenance. Any design, operations, or maintenance issues that could affect the potential effectiveness of a RLR camera system should be identified and documented.

3.5.1 Monitoring Program Operation

Regular reviews of the RLR camera program operation can help to identify any issues or concerns before they are raised by the public, media, or others. ALDOT requires agencies to evaluate the RLR

camera system on a monthly basis to ensure all cameras and traffic signals are operating properly. The results of the evaluation are to be made available to the public and to be included in the annual report to be submitted to ALDOT.

3.5.2 Citation Data Processing

The agency in charge of operating the RLR camera system should be certain to store citation data and evidence for each recorded violation so that backup data and documentation can be easily retrieved when needed. It is important that citation data processing is carried out in a secured facility and by those individuals authorized to access motor vehicle registration and driver's license databases.
Agencies should use a standard internal quality control process before issuing a citation. For each violation, a qualified law enforcement officer should review the photographs and/or video collected through the automated process. Although most of the quality control is done by the officer, a periodic audit by independent law enforcement or engineering staff is important to ensure continuous quality control.

In addition, the agencies should establish a clear guideline for the following areas:

- A guideline to delineate when a violation has occurred and when a ticket should be issued.
- A guideline for citation review and approval requirement, including a procedure to be used when the time to review is shortened or traffic officers are not available to conduct the reviews, or the number of citations is larger than usual.
- Periodic quality assurance audits, to be conducted by trained traffic officers for randomly selected sample of recorded violations. (FHWA/NHTSA 2005)

Chapter 4

Permit Application and Approval Process

The local government considering the use of RLR camera systems should comply with the application procedure and guidelines specified in this document. It is the sole responsibility of the local government to submit a complete application package and all required documents while submitting a RLR camera system application to ALDOT. The application package should include the following:

- Signed RLR permit agreement form (Appendix E)
- Data confirming that there is a safety need at the intersection:
    - Number, frequency, and severity of crashes attributed to red light running (include a collision diagram).
    - Number of citations issued (indicating potential for crashes) or electronically generated counts of the number of violations at the intersection.
- An Engineering Study to determine whether there are other countermeasures likely to reduce the red light running crashes that could be considered at that intersection. Sample engineering study report for a new RLR camera permit application is attached in Appendix F. Such a study should include:
    - A statement explaining why a RLR camera system is proposed for a specific intersection.
    - A list of countermeasures attempted at the intersection and documentation of how these previously implemented countermeasures affected red light running violations.
    - If countermeasures have not yet been attempted, it should be documented why countermeasures have not been considered.
    - A description of the lanes to be RLR camera enforced (i.e., the SB left turn lane, the NB thru lane, etc).
    - A general location map of the intersection where the camera will be installed.
    - The proposed clearance times calculation and the current clearance intervals.
- A completed engineering analysis sheet (Appendix D).
- A design showing the existing traffic signal configuration including locations of all field equipment, and proposed location of RLR camera devices and signs. A description of how the RLR camera system will be operated and maintained should be provided. Any design, operations, or maintenance issues that could affect the potential effectiveness of a RLR camera system should be identified.

- Documentation of the following:
    - The local ordinance or resolution approving the use of RLR camera systems.
    - A copy of any Public Hearing and/or meeting minutes where the RLR camera systems will be installed.
- A completed permit request requirements checklist of the required items (Appendix G).

The appropriate staff will review the engineering study and consult with the local agency's staff regarding recommendations and comments. Approval or denial will be sent to the primary contact person on the application package. ALDOT will make every effort to review an application and issue permits or denials within a reasonable time frame of receiving a completed permit package from a local government. An application for amendment to an existing permit and an application for a renewal permit following a suspension or revocation of a permit shall also be processed within similar effort, provided that the application is complete. A permit agreement shall authorize use of a RLR camera system for only those designated intersections approved as having demonstrable evidence of a genuine safety need by ALDOT.

Chapter 5

On-going Public Education

It is recommended that at the initial stages of program planning, agencies plan for a continuous education and media outreach for the life of the program to keep the public informed of results and the need for safety awareness. Ongoing awareness of the presence of RLR cameras is key to a long term and effective enforcement program. The outreach tools and resources used in the initial public education campaign can continue to be utilized. A website is a recommended way of providing updated information about the program, including camera locations, how the cameras operate, frequently asked questions, signal timing information, city and state ordinances and codes, and links to related information.

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 continue to employ various communications media designed to reach residents and commuters to survey the level of 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 RLR cameras can be applied as an effective tool to reduce fatalities and crashes resulting from red light running. Further guidance on a public awareness campaign is available from NCHRP Report 729 and from the FHWA website outreach support (FHWA 2013b).

Chapter 6

Annual Reporting Requirements

Conducting evaluation of RLR cameras after their implementation is important to help the local agency determine whether it is achieving the desired goal of reducing signal violations and crashes and to provide support for their use. NCHRP 310 suggests three general measures of effectiveness to quantify the effect that RLR cameras have on safety of an intersection: (1) a reduction in red light violations, since it is assumed that overall intersection safety will improve if there is a reduction in red light violations, (2) a reduction in traffic conflicts or near misses, since safety is improved as conflicts decrease at intersections and (3) a reduction in crashes as the ultimate measure of the safety effect (NCHRP 310). It is stated that an effective evaluation "*uses many years of good quality crash and roadway data, accounts for other factors that may affect the crash experience, and employs defensible statistical procedures in the analysis of results"* (NCHRP 310). Those desiring to have a better understanding of how an evaluation of RLR cameras could be conducted should refer to Chapter four of NCHRP Synthesis 310, Impact of Red Light Camera Enforcement on Crash Experience, as the topic is beyond the scope of this document. The chapter includes information on the elements of an evaluation, study designs, statistical analysis procedures, and other considerations in RLR camera evaluations.

ALDOT requires that local governments should provide annual reports for the preceding calendar years on the RLR camera systems to the ALDOT Office of Safety Operations by October 1st each year. The report should include:

- A description of the locations where RLR cameras were used;
- The number of violations recorded at each location and in the aggregate on a monthly basis;
- The number of citations issued at each location for three (3) years before and after RLR implementation, as applicable;
- The crash frequency or rate at each location for three (3) years before and after RLR camera implementation, as applicable;
- The number of civil monetary penalties and total amount of such penalties paid after citation without contest;

- The number of violations adjudicated and results of such adjudications, including a breakdown of dispositions made;
- The total amount of civil monetary penalties paid.

The annual report may include a brief narrative on the effectiveness of the RLR camera with respect to red light running violations, red light running related crashes, and overall traffic safety at the intersection. A sample annual report is provided in Appendix F.

The initial permit is applicable for a period of three (3) years. After that period, local governments should submit a renewal application including an evaluation report based on a three (3) years before and after data to provide support for the use of RLR camera. A sample engineering study report to be submitted with the RLR camera renewal application is provided in Appendix F.

6.1 Permit Revocation

A permit will not be revoked without working closely with the local government to resolve issues. Some of the conditions that may result in permit revocation include:

- When local agencies fail to submit an annual report.
- When a review of a three (3) years report indicates that the location had experienced an increase in angle crashes indicating that the RLR camera may not be the appropriate countermeasure.
- Field determination of improper clearance intervals.
- When a field determination indicates the installation of equipment not included on the approved permit.
- Violation of any section of the requirements mentioned in this Guidance.

If it is determined that the RLR camera should be removed, the local government will be responsible for the removal of all RLR camera equipment within 60 days of the revocation of the permit, during which time the local government can appeal the revocation of the permit.

REFERENCES

ALDOT Traffic Signal Design Guide and Timing Manual
http://www.dot.state.al.us/maweb/frm/ALDOT%20Traffic%20signal%20Design%20&%20Timing%20Manual.pdf

ALDOT Utility Manual
http://www.dot.state.al.us/rwweb/doc/proceduralmanuals/ALDOT_Design_utman.pdf

Bochner, B. and Walden, T. (2010). "Effectiveness of Red-Light Cameras." Institute of Transportation Engineers Journal, May 2010:18-24.
http://ncsrsafety.org/wp-content/uploads/2012/11/Effectiveness-of-Red-Light-Cameras.pdf

Bonneson, J., Zimmerman, K., and Brewer, M. (2002). "Engineering Countermeasures to Reduce Red-Light-Running." Texas Transportation Institute Report 0-4027. Texas. August 2002.
http://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/4027-2.pdf

Crash Modification Factors Clearinghouse Website, http://www.cmfclearinghouse.org/, Accessed November 2012

Eccles, K. A., Fiedler, R., Persaud, B., Lyon, C., and Hansen, G. (2012). "*Automated Enforcement for Speeding and Red Light Running.*" NCHRP Report 729, National Cooperative Highway Research Program, Transportation Research Board, Washington, D.C.
http://www.trb.org/Publications/Blurbs/167757.aspx

FHWA/ITE (2003). *Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red-Light Running*. Publication No. IR-115, Washington, D.C.
http://safety.fhwa.dot.gov/intersection/redlight/cameras/rlr_report/

FHWA/ITE (2005). *Field Guide for Inspecting Signalized Intersections to Reduce Red-Light Running*. Publication No. IR-121; FHWA-SA-05-008.
http://safety.fhwa.dot.gov/intersection/redlight/tech/fguide_isirlr/

FHWA/ITE. Intersection Field Inspection Form
http://safety.fhwa.dot.gov/intersection/redlight/tech/fieldinspfrm.cfm

FHWA/NHTSA (2005). *Red-Light Camera Systems Operational Guidelines*. Publication No. FHWA-SA-05-002.
http://safety.fhwa.dot.gov/intersection/redlight/cameras/fhwasa05002/fhwasa05002.pdf

FHWA Website (2013a). *Red-Light Camera Enforcement: Implementation Guidance*, http://safety.fhwa.dot.gov/intersection/redlight/cameras/ipl_guide.cfm, Accessed January 2013

FHWA Website (2013b). *Outreach Support: Implementing a Stop Red-Light Running Program*, http://safety.fhwa.dot.gov/intersection/redlight/outreach/, Accessed August 2013

FHWA Website (2012). *Red-Light Running Fatalities (2000-2009),* http://safety.fhwa.dot.gov/intersection/redlight/data/rlr_fatal/, Accessed November 2012

IIHS (2007). Status Report. Vol 42. No. 1, Jan 2007
http://www.iihs.org/externaldata/srdata/docs/sr4201.pdf, Accessed July 2013

IIHS (2011). Status Report. Vol 46. No. 1, Feb 2011
http://www.iihs.org/externaldata/srdata/docs/sr4601.pdf, Accessed July 2013

IIHS Website (2013). *Automated Enforcement Laws*
http://www.iihs.org/laws/automated_enforcement.aspx, Accessed December 2013

McGee, H. W. and Eccles, K. A. (2003). "*Impact of Red Light Camera Enforcement on Crash Experience."* NCHRP Synthesis 310, National Cooperative Highway Research Program, Transportation Research Board, Washington, D.C., 2003.
http://www.motorists.org/red-light-cameras/nchrp_syn_310.pdf

Mohamedshah, Y. M., Chen, L. W. and Council, F. M. (2000). *"Association of Selected Intersection Factors with Red-Light-Running Crashes."* Highway Safety Information System Summary Report, FHWA-RD-00-112, May 2000.
http://safety.fhwa.dot.gov/intersection/resources/fhwasa09027/resources/Association%20of%20Selected%20Factors%20with%20Red%20Light%20Running.pdf

Oregon DOT (2010). *Red Light Running (RLR) Camera Guidelines*.
http://library.state.or.us/repository/2010/201006141532191/index.pdf

Supriyasilp, T., Turner, D. S. and Lindly, J. K. (2003). *"Pilot Study of Automated Red Light Enforcement."* University Transportation Center for Alabama. Final Report 00470. Tuscaloosa, AL.
http://utca.eng.ua.edu/research/projects/?id=00470

Teigen, A. and Shinkle, D. (2012). *"Traffic Safety and Public Health: State Legislative Action 2011."* National Conference of State Legislature. Transportation Series No. 36, February 2012.
http://www.ncsl.org/issues-research/transport/traffic-safety-and-public-health.aspx

The Code of Alabama 1975 http://alisondb.legislature.state.al.us/acas/codeofalabama/1975/coatoc.htm

APPENDIX A

RED LIGHT CAMERA ENFORCEMENT LAWS IN EACH STATE (IIHS, 2013)

State	Statewide or only specified locations?	Citation issued to whom?	Who is liable?	What image is taken?	Traditional enforcement penalties	Auto enforcement penalties record
Alabama	Montgomery	owner	owner	2 images; tag included	$100 fine/3 points	$110; no points
Alaska	No state law					
Arizona	A city or a town may not place a photo enforcement system on a state highway without providing proof to the DOT that the system is necessary for public safety and obtains a DOT permit or contract.					
	Statewide	not addressed	not addressed	not addressed	$250 fine/2 points	$165 fine/2 points
Arkansas	Use of photo radar by county or state government prohibited except at school zones and railroad crossings; officer must be present and citation must be issued at time of offense					
California	Statewide	registered owner	driver	tag and driver	$100 base fine/1 point	same as for traditional citation
Colorado	Colorado law grants the authority to use automated enforcement to capture any traffic violation					
	Statewide	registered owner	driver	tag and driver	$110 fine (including surcharge)/4 points	$75; no points or record
Connecticut	No state law					
Delaware	Statewide	registered owner	owner	2 or more images of the vehicle	$75-$230 fine	$110 maximum fine; not a record or conviction offense; not to be used by insurers
District of Columbia	DC grants jurisdiction-wide authority to use automated enforcement to capture all moving infractions					
	District of Columbia	registered owner	owner	not addressed	$150 fine/2 points	$150; no points
Florida	Statewide	registered owner	owner	tag and traffic control device	$125 fine/3 points	$158; no points
Georgia	Statewide	registered owner	owner	license tag, intersection, and light	$1,000 maximum fine/3 points	$70 maximum fine; not a conviction or record offense; no points; not a moving violation; not to be used by insurers
Hawaii	No state law					
Idaho	No state law					
Illinois	Illinois has several different automated enforcement laws					
	Cook, DuPage, Kane, Lake, Madison, McHenry, St. Clair, and Will counties; requires local ordinance	registered owner	owner	2 or more images of vehicle and tag	$500 maximum fine/20 points	$100 or the completion of a traffic education program, or both; not a moving violation or record offense
Indiana	No state law					
Iowa	No state law					
Kansas	No state law					
Kentucky	No state law					
Louisiana	State law provides that convictions resulting from camera enforcement shall not be reported for inclusion in driver record; law is silent on other issues					
Maine	All photo enforcement prohibited					

APPENDIX A

RED LIGHT CAMERA ENFORCEMENT LAWS IN EACH STATE (IIHS, 2013)

State	Statewide or only specified locations?	Citation issued to whom?	Who is liable?	What image is taken?	Traditional enforcement penalties	Auto enforcement penalties record
Maryland	Statewide	registered owner	owner	2 or more images of rear of vehicle and tag in any medium	$500 maximum fine/2 points	$100 maximum civil penalty; no points or record; not a moving violation; may not be used by insurers
Massachusetts	No state law					
Michigan	No state law					
Minnesota	No state law					
Mississippi	All localities prohibited from using automated enforcement; all current programs prohibited effective 3/20/09					
Missouri	No state law					
Montana	All localities prohibited from using red light cameras; rail crossings excepted					
Nebraska	No state law					
Nevada	Prohibits use of imaging equipment unless it is hand held by an officer, installed in a vehicle or facility of a law enforcement agency; traditional enforcement penalties: $1,000 maximum fine and 4 points					
New Hampshire	Prohibited unless there is specific statutory authorization					
New Jersey	Local jurisdictions must pass an ordinance and apply to Transportation Commissioner to participate in a pilot program	registered owner	registered owner and driver are jointly liable	two or more images of vehicle and tag	$85	penalty same as for traditional citation; no points
New Mexico	No state law specifically authorizing automated enforcement; NMDOT has banned red light cameras and mobile enforcement vans on state and federal roadways; state law requires counties and municipalities using camera enforcement to post a warning sign and a warning beacon					
New York	Cities of at least 1 million people, up to 150 intersections in each city; Effective 5/28/09: counties of Nassau and Suffolk, the cities of Buffalo, Rochester and Syracuse, by local ordinance, up to 50 intersections; Yonkers, by local ordinance, up to 25 intersections	owner	owner	2 or more images of rear of vehicle and tag in any medium	$100 maximum fine/3 points	$50 fine; not a record or conviction offense; may not be used by insurers
North Carolina	Where specified by statute (Albemarle, Charlotte, Chapel Hill, Cornelius, Durham, Fayetteville, Greensboro, Greenville, High Point, Huntersville, Lumberton, Matthews, Nags Head, Newton, Pineville, Rocky Mount, Spring Lake, and Wilmington)	owner	owner	photo, video, electronic image	$100 maximum fine/3 points	$75 civil penalty; no points
North Dakota	No state law					
Ohio	No state law					
Oklahoma	No state law					
Oregon	Cities statewide	registered owner or driver, if identifiable	registered owner	photographs; digital images	$300 maximum fine	penalty same as for traditional citation

APPENDIX A

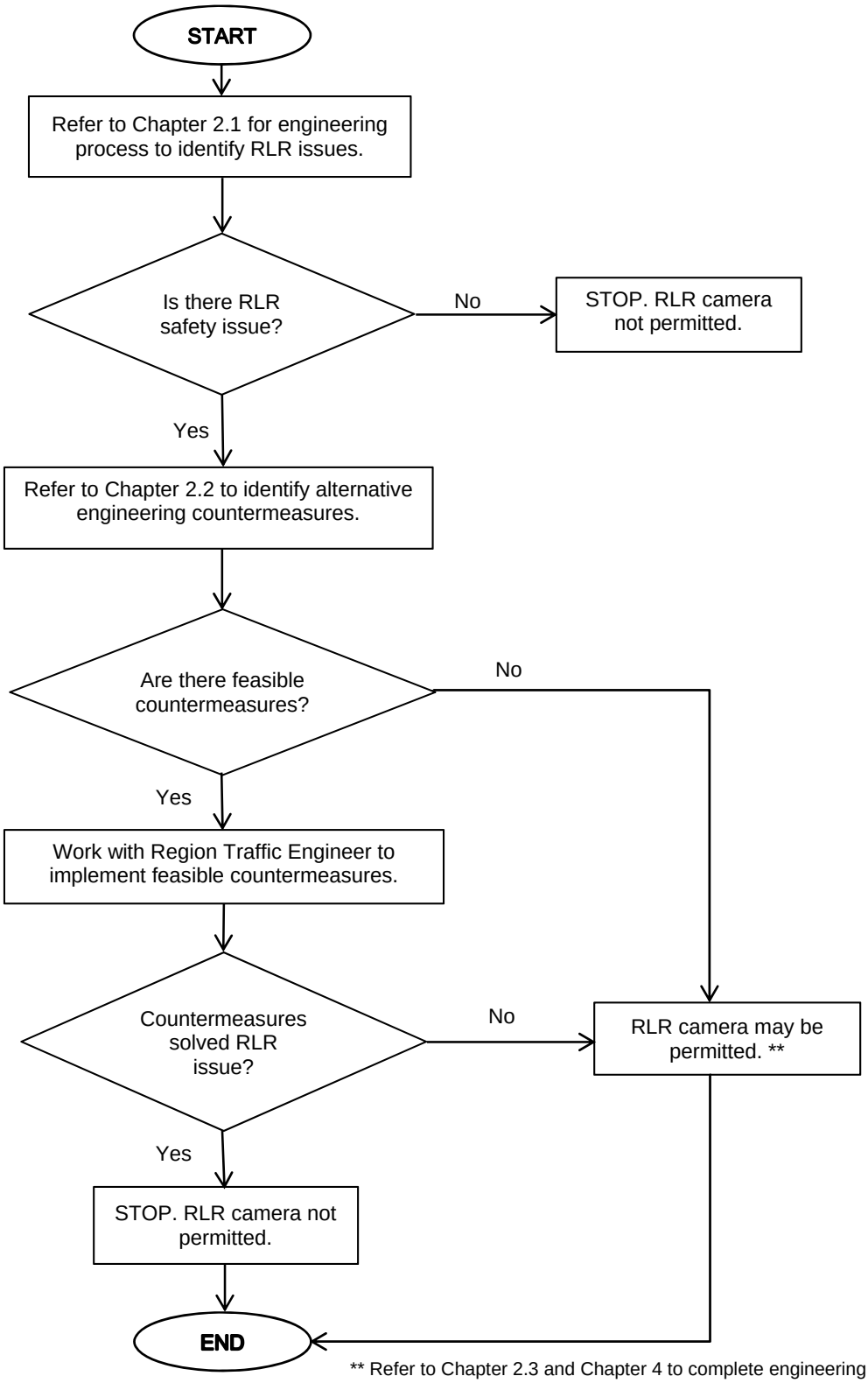
RED LIGHT CAMERA ENFORCEMENT LAWS IN EACH STATE (IIHS, 2013)

State	Statewide or only specified locations?	Citation issued to whom?	Who is liable?	What image is taken?	Traditional enforcement penalties	Auto enforcement penalties record
Pennsylvania	Philadelphia, Pittsburgh, and municipalities with a population exceeding 20,000 with a police department accredited by the Pennsylvania Chiefs of Police Association in Bucks, Chester, Delaware, and Montgomery Counties; requires local ordinance	registered owner	owner	photographs	$25 fine/3 points	$100 maximum; not on operating record
Rhode Island	Statewide	registered owner	driver	2 or more images of vehicle and tag in any medium	$75 fine	$75 fine; not a criminal or record offense; not a moving violation; not to be used by insurers until there is a final adjudication of the violation
South Carolina	Photo enforcement prohibited with narrow exception; citations for violating traffic laws relating to speed or disregarding traffic control devices may only be used when the State declares an emergency and citations must be served in person within one hour of the violation					
South Dakota	No state law					
Tennessee	Statewide except for interstate highways that are not work zones	registered owner	registered owner	red light violations, front tires before the stop line and rear tires past stop line both while signal is red	$50 fine/points	$50; no points
Texas	A Texas municipality may not use an automated traffic control system to enforce speed Statewide; requires local ordinance	registered owner	owner	2 or more photographic or digital images of tag	$200 maximum fine	$75; not a criminal or record offense
Utah	No state law					
Vermont	No state law					
Virginia	Counties, cities, and towns may operate cameras at no more than 1 intersection for every 10,000 residents; requires local ordinance; the exception is the Washington, DC metropolitan area, it permits up to 10 camera sites or 1 site per 10,000 residents, whichever is greater	registered owner	driver	2 photographs or other recorded images	$200 maximum fine/4 points	$50 maximum fine; no court costs; not a criminal offense; no points; may not be used by insurers
Washington	Cities and counties statewide at arterial road intersections with stoplights meeting MUTCD standards for yellow change intervals; local ordinance required	registered owner	registered owner	vehicle, license tag	$250 maximum fine	$250 maximum fine; no record; no points
West Virginia	All photo enforcement prohibited					
Wisconsin	No info about red light camera but speed cameras are prohibited					
Wyoming	No state law					

Note: All different phrases - photo enforcement, photo radar, automated enforcement, and camera enforcement have similar meaning as red light running camera enforcement. Source table from Automated enforcement laws (December 2013), Insurance Institute for Highway Safety at http://www.iihs.org/iihs/topics/laws/automated_enforcement/enforcementtable?topicName=red-light-running#tableData

APPENDIX B

DECISION TREE FOR APPLYING RED LIGHT RUNNING CAMERA SYSTEM



APPENDIX C

INTERSECTION FIELD INSPECTION FORM (FROM ITE)

LOCATION INFORMATION

Intersection Identification:_____with_____

Approach Name:_____ Direction Heading:_____

PART 1. CHECK SIGNAL VISIBILITY

Type of Signal Mounting: **Span Wire** **Mast Arm** **Pole** **Structure** Sight Distance to the Signal: _____*feet*

Requires Advance Warning Sign? **Y** **N** Advance Signal Warning Sign Present: **Y** **N**

Is anything blocking the view of the signals? **Y** **N** If yes, describe_____

Can signal faces on other approaches be seen? **Y** **N** If yes, do these signals have visors, shields, or programmable lenses? **Y** **N**

PART 2. CHECK SIGNAL CONSPICUITY

Could visual clutter detract from the signal? **Y** **N**

Are the signal indications confusing? **Y** **N**

If yes, explain:_____

_____

Are backplates present? **Y** **N**

Are backplates necessary? **Y** **N**

Are other glare-reducing steps needed? **Y** **N**

Signal lens type: **Incandescent** **LEDs**

Signal Lens Size Adequate?:

Red signal lens size: 8 inch 12 inch

Distance from stop line to signal: _____*feet*

Near side signal? **Y** **N**

Is existing size adequate? **Y** **N**

Number of Signal Heads Adequate?

Total number of signal heads for major movement: _____

Total number of lanes for major movement: _____

Is existing number adequate? **Y** **N**

Signal Heads Placement Adequate? **Y** **N**

PART 3. CHECK SIGNAL CONTROL PARAMETERS

Grade (as decimal) g =_____(uphill is positive)

Approach speed *V* =_____*mph*

Cross street width *W* =_____*feet*

Calculate the needed change period *(CP)* for this approach using agency practice or the following equation:

$$CP = 1.0 + \overbrace{\frac{1.47 * V}{(20 + 64.4g)}}^{\text{Yellow}} + \overbrace{\frac{W + 20}{1.47 * V}}^{\text{All-red}}$$

	Actual Value	Calculated Value	Is Existing Adequate?
Yellow Interval	_____	_____	**Y** **N**
All Red Interval	_____	_____	**Y** **N**

PART 4. CHECK OTHER FACTORS

Is horizontal location adequate? **Y** **N** Pavement condition on approach: **Adequate** **Polished** **Severely Rutted**

Should signal warranting study be conducted? **Y** **N** Other concerns:_____

PART 5. IDENTIFY PROMISING COUNTERMEASURES

Visibility Deficiency

____ Install additional signals on near side
____ Change signal mounting
____ Install SIGNAL AHEAD sign
____ Install Advance Warning Flashers
____ Remove/relocate sight obstruction
____ Install programmable lenses
____ Install shields and visors
Other_____

Conspicuity Deficiency

____ Add signals to achieve one per lane
____ Replace with LED lens type
____ Replace with 12” signal head
____ Install double red signal
____ Install/enhance backplates
____ Install rumble strips on approach
____ Install near side signal

Signal Timing Operation Deficiency

____ Change yellow interval
____ Add/change all-red interval

Other Measures

____ Determine if signal is warranted
____ Consider roundabout or innovative design
____ Improve pavement condition

Inspection By: _____ Date:_____

APPENDIX D

ALABAMA DEPARTMENT OF TRANSPORTATION
RED LIGHT RUNNING CAMERA SYSTEM
ENGINEERING ANALYSIS SHEET

Local Jurisdiction: _____ ALDOT District: _____
(County/City/Town)

Intersection: _____
Street Name (Route #) at Street Name (Route #)

This study performed under the direction of: _____
(AL Licensed Professional Engineer)

A. INTERSECTION & SIGNAL DATA

1. Signal Visibility
   a. Minimum Sight Distance to Signal

Approach	Grade	Speed Limit (mph)	Measure (ft)	Required (ft)*

**Refer MUTCD for minimum sight distance requirements*

   b. Are "SIGNAL AHEAD" signs present? ___Yes ___ No
   Are "SIGNAL AHEAD" signs needed? ___Yes ___ No
   Are other warning signs present in the vicinity of the intersection? ___Yes ___ No
   Explain: _____
   _____

   c. Information on Signal Heads

Approach	Lens Size	Lens Type (LED or Bulb)	Back Plates (Yes or No)

2. Pavement and Markings Data
   a. Are stop lines in "good" condition? ___Yes ___ No
   Explain: _____
   _____

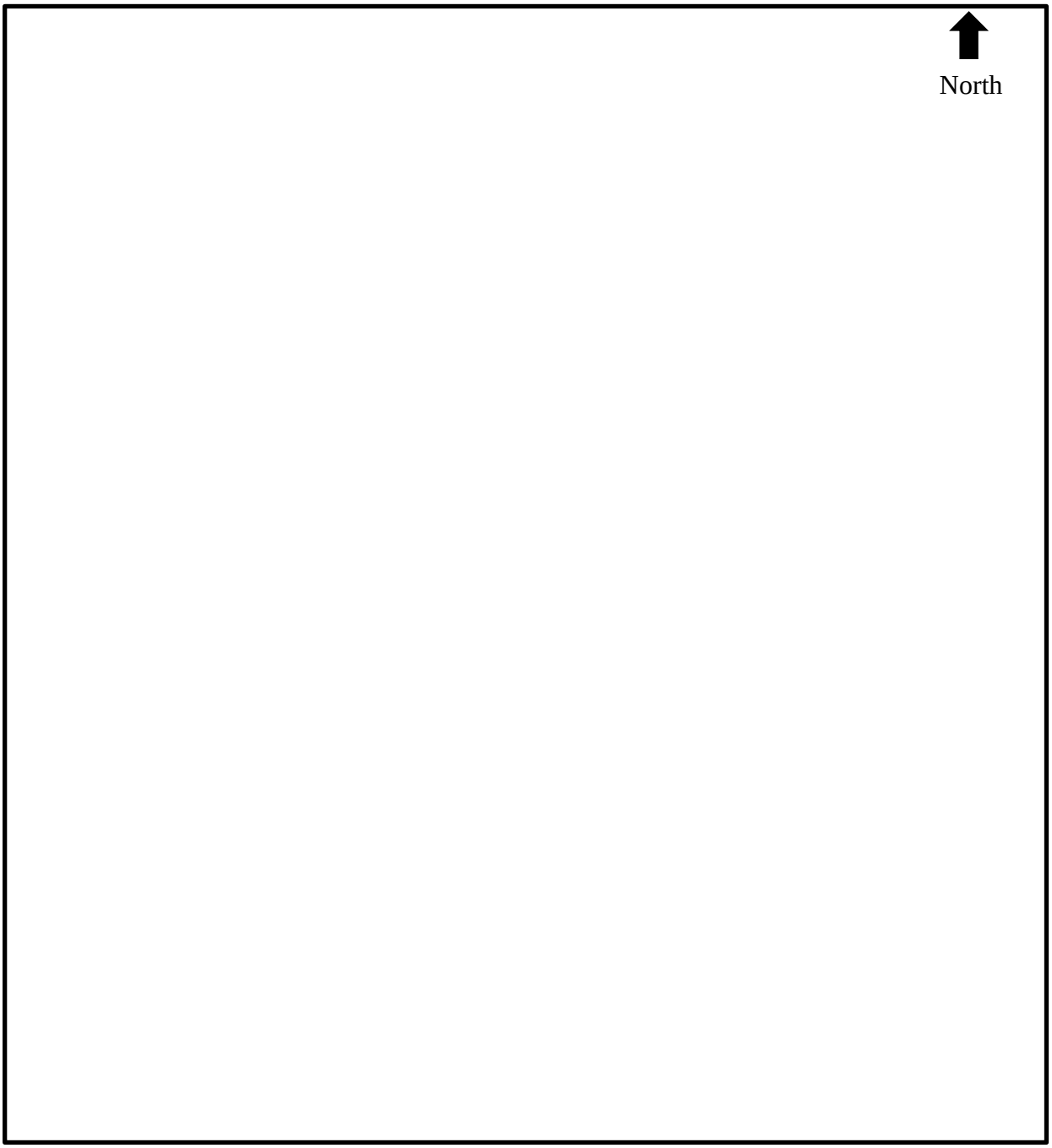
   b. Are lane lines "clearly" visible? ___Yes ___ No
   Explain: _____
   _____

   c. Are crosswalks "clearly" marked? ___Yes ___ No
   Explain: _____

d. What is the pavement condition (ruts, potholes, cracking, etc.)?
___ Good. Explain: _____
___ Fair. Explain: _____
___ Poor. Explain: _____

e. Do pavement surface treatments exist (rumble strips, texturing, pavers, etc.)?
___ Yes. Explain: _____
___ No

3. Provide diagram of intersection including: pavement markings, width of lanes and medians, location of signal heads and signs, locations of loops/detectors, and grades.



B. SIGNAL TIMING & TRAFFIC DATA

1. Clearance Intervals

Approach	Posted Speed Limit	Grade	Width of Intersection	Yellow Interval		All Red Interval	
				Existing	Calculated*	Existing	Calculated*

**Refer to ALDOT Traffic Signal Design Guide and Timing Manual for calculation of clearance intervals*

2. Include existing controller settings for each phase and each time-of-day. Information should include applicable settings such as minimum green, max 1 & 2, passage, minimum gap/ext, protected-permissive, lead-lag, yellow and all red, walk and ped clearance time, recall settings, offsets, cycle length, etc. Include analysis of peak hour conditions and a determination of whether signal timings are contributing to red-light running problem.

   a. Does signal timing or phasing factor in as a possible contributor to RLR at this intersection?
   ___ Yes Explain: _____
   ___ No

   b. List comments or recommendations on potential signal timing or phasing changes:
   _____
   _____
   _____

3. Vehicle Detection Data

Approach	Detection Type (loop, video, etc)	Detector Location (measured from stop bar)

4. Traffic Volume Data

Approach	Daily Volumes		Peak Hour Volumes	
	Total	Heavy Vehicles	Total	Heavy Vehicles

C. CRASH & ENFORCEMENT DATA

1. Three-Year Crash Data

Collision Type	3-year total	Number of Injury Crashes	Number of Fatal Crashes	Crashes Associated with Red Light Running
Angle				
Rear End				
Head On				
Sideswipe				
Pedestrian				
Bicyclist				
Total				

2. Crash Rate
   a. Number of crashes per million entering vehicles: _____
   b. Locality rate for comparison (if available): _____

3. Violation Rate
   a. Number of red light running citations per year issued by law enforcement at the evaluated intersection, if available.
      Number: _____ Year: _____
   b. Observed violations
      Date: _____ Time Period: _____

Approach	Traffic Volume	Number of Violations

4. Enforcement and Operational Issues
   a. Describe the difficulty experienced by law enforcement officers in patrol cars or on foot in apprehending violators.
      _____
      _____
   b. Describe the ability of law enforcement officers to apprehend violators safely within a reasonable distance from the violation.
      _____
      _____
   c. Are pedestrians at risk due to violations? ___Yes ___No
      Explain: _____
      _____
      Number of pedestrians per hour? ____
      Pedestrian crosswalk provided? ___Yes ___ No
   d. Have there been any changes to the operations of the intersection (signal timing, restriping, or increased enforcement) within the past three years? ___Yes ___No
      Explain: _____
      _____

APPENDIX E

ALABAMA DEPARTMENT OF TRANSPORTATION

PERMIT AGREEMENT FOR RED LIGHT RUNNING CAMERA SYSTEM

INSTALLATION ON RIGHT-OF-WAY

Permit No. _____ Maint. Sec. No. _____

THIS AGREEMENT is entered into this the _____ day of _____, 20 ____, by and between the Alabama Department of Transportation acting by and through its Transportation Director hereinafter referred to as the STATE and _____, hereinafter referred to as the APPLICANT.

WITNESSETH

Whereas, the APPLICANT proposes to install red light running camera system on STATE right-of-way located and described as follows:

County: _____ City: _____ Mile Point: _____:_____

Local Highway/Street Names: _____ At _____

Route Numbers: _____ At _____

Whereas, the STATE hereby grants to the APPLICANT approval to install red light running camera system on the STATE right-of-way at the above location and in the manner hereinafter set forth:

Now, therefore, it is agreed by and between the parties hereto as follows:

1. The APPLICANT will install the red light running camera system on STATE right-of-way in accordance with plans and specifications of the APPLICANT as approved by the STATE, which plans and specifications are hereby made a part hereof by reference.

2. In the installation of the red light running camera system and performing work under this Permit Agreement, the APPLICANT will conform to the provisions of the latest edition of the Alabama Department of Transportation Utility Manual, which manual is of record in the Department of Transportation and is hereby a part hereof by reference.

3. The national Manual on Uniform Traffic Control Devices, latest edition adopted by the Alabama Department of Transportation, is hereby made a part hereof by reference and will be conformed to as the provisions thereof are applicable to such work.

4. The installation, maintenance and operation of said red light running camera system shall be subject at all times to inspection and approval by a duly authorized engineer of the Alabama Department of Transportation.

5. The APPLICANT will protect, defend, indemnify and hold harmless the State of Alabama, The Alabama Department of Transportation, the officials, officers, and employees, in both their official and individual capacities, and their agents and/or assigns, from and against any and all actions, damages, claims, loss, liabilities, attorney's fees or expense whatsoever or any amount paid in compromise thereof arising out of or connected with the work performed under this Permit Agreement, and/or the APPLICANT's failure to comply with all applicable laws or regulations.

6. The APPLICANT will be obligated for the payment of damages occasioned to private property, public utilities or the general public, caused by the legal liability (in accordance with Alabama and/or Federal law) of the APPLICANT, its agents, servants, employees or facilities.

7. The STATE in executing this Permit Agreement does not in any way assume the responsibility for the maintenance of the red light running camera system of the APPLICANT, nor the responsibility for any damage to the red light running camera system caused by third parties.

8. The cost of any required changes to the red light running camera system as a result of changes or modifications to the intersection, regardless of who implements the changes, shall be the responsibility of the APPLICANT.

9. When problems affecting the safety of the public arise whether part of the signal system or the red light running camera system, the STATE has the discretion to modify geometry, or change the operating characteristics of the intersections to protect the safety of the public, up to and including the ordering of the removal of the red light running camera system.

10. When the STATE desires to modify an intersection with a red light running camera system to improve operations or safety, it may do so without consideration to the cost of changes to the red light running camera system or impact to revenue generation on red light running camera system or agreements between the APPLICANT and any commercial firm operating the camera system. The STATE shall not be subject to any costs for changes, modifications, or removals of the red light running camera system.

11. Nothing contained in this Permit Agreement, nor the issuance or receipt thereof, shall be construed to alter or affect the title of the STATE to the public right-of-way nor to increase, decrease or modify in any way the rights of the APPLICANT provided by law with respect to the installation, operation or maintenance of its red light running camera system on the STATE right-of-way.

12. The installation of the red light running camera system and related work covered by this Permit Agreement shall be completed within one year from the date shown on this Agreement; otherwise this Agreement becomes null and void.

13. The APPLICANT will have a copy of this Permit Agreement on the project site at all times while said work is being performed.

14. The APPLICANT will perform or cause to be performed the work applied for in this permit contract and will restore the highway and all right-of-way in the work area in as good condition as the same was prior to the work and will maintain the accomplished work and highway work area in a condition satisfactory to the Alabama Department of Transportation.

15. This Permit Agreement when executed will not be valid or binding until the APPLICANT has complied with all existing ordinances, laws, and zoning boards that have jurisdiction in the county, city, or municipality in which the red light running camera system is located.

16. APPLICANT shall make available to the STATE all reasonable requests for records concerning the operations of the red light running camera system and the intersection, including but not limited to, number of violations by particular cameras or movements, total violations, distribution of violations, percentages of violations within specific time periods, crash records and/or operating parameters of the red light running camera system.

17. If it is determined by the STATE that the red light running camera system should be removed, the APPLICANT will be responsible for the removal of all red light running camera system equipment within sixty (60) days of the revocation notice.

18. Failure to comply with any of the conditions of approval listed herein or stipulated by the STATE shall be sufficient reason for the STATE to order removal of the red light running camera system.

IN WITNESS WHEREOF, the parties hereto have caused this Permit Agreement to be executed by their respective officers, officials and persons thereunto duly authorized, to be effective on the day and year first above stated.

Legal Name of Applicant

WITNESS:

By: Signature and Title

Typed or Printed Name

Address

Telephone Number

RECOMMENDED FOR APPROVAL:

District Manager & Date

Region Engineer & Date

ALABAMA DEPARTMENT OF TRANSPORTATION
ACTING BY AND THROUGH ITS TRANSPORTATION DIRECTOR

By:

Date:

State Maintenance Engineer

APPENDIX F
SAMPLE REPORTS

ALABAMA DEPARTMENT OF TRANSPORTATION
ENGINEERING STUDY (NEW RLR PERMIT)

February 25, 2010

Intersection: Peachtree Boulevard at Shadow Road

Reason for Report: The above referenced intersection was studied for possible red light running camera enforcement. This report is in support of the red light running camera permit application submitted for the subject intersection.

Topography: Peachtree Boulevard is an east/west arterial beginning at McFarland Highway (SR 125) and ending at Bessemer Highway (SR 119) located in Bofurd County, Alabama. Peachtree Boulevard has three through lanes, one right lane, and dual left turn lanes on eastbound and westbound approaches to the subject intersection. Shadow Road has two through lanes, one shared through/right lane, and one left lane on eastbound and westbound approaches.

Vehicle Volumes: Peachtree Boulevard ADT = 55,080
Shadow Road ADT = 34,940

Speed limits: Peachtree Boulevard and Shadow Road have posted speed limit of 45 mph.

Pedestrian Movements: No pedestrian movements were observed during this study.

Existing Traffic Control: The subject intersection is controlled by a traffic signal.

Adjacent Traffic Signals: On Peachtree Boulevard, Park Lane is signalized 1900 feet west of the subject location. Nolian Street is signalized 3100 feet east of the subject location.
On Shadow Road, Delian Avenue is signalized 950 feet north of the subject intersection and Robert Drive is signalized 3900 feet south of the intersection.

Crash Analysis: Bofurd County reviewed the past five years (2005-2009) of crashes at the intersection to determine the number of angle crashes. The crash history available (01/01/05-12/31/09) was reviewed to determine that this intersection had on average over 9 crashes per year caused by red light running. A total of 47 right-angle and left-angle crashes were reported for the five years period with 24 resulting injuries and 6 fatalities. All of the reported angle crashes were caused by red light violations.

Red Light Running Crash History

Year	Crash	Injury	Fatal	Right-angle	Left-angle
2005	9	4	1	6	3
2006	11	6	2	9	2
2007	8	3	1	5	3
2008	9	5	0	7	2
2009	10	6	2	6	4
Total	47	24	6	33	14

A crash report that was prepared by Bofurd County Police Department dated Jan 6, 2010 is attached with this report. The Bofurd County Police Department will be the operating agency for the RLR camera program. The Police report shows the number of red light running related crashes for intersections in the county from Jan 01, 2005 to Dec 31, 2009. The subject intersection is the fourth highest among the top 20 intersections with red light running related crashes in Bofurd County.

Signal Warrants: N/A, Existing Signal

Signal Clearance Intervals:

Signal Phase	Existing Clearance Intervals		Required Clearance Intervals	
	Yellow, sec	All-Red, sec	Yellow, sec	All-Red, sec
Phase 1	4.3	1.5	4.3	1.3
Phase 2	5.4	2.5	4.4	1.5
Phase 3	4.2	1.5	4.2	1.3
Phase 4	5.3	2.5	4.3	1.5
Phase 5	4.3	1.5	4.3	1.3
Phase 6	5.4	2.5	4.3	1.5
Phase 7	4.2	1.5	4.2	1.3
Phase 8	5.3	2.5	4.3	1.5

See attached clearance interval calculation spreadsheet. All existing clearance times are equal to, or greater than the minimum required for all phases.

Red Light Running Countermeasures: The following list of countermeasures is primarily from the FHWA/ITE report titled "Making Intersections Safer: A Toolbox of Engineering Countermeasures to Reduce Red Light Running: An Informational Report (2003). All countermeasures in the report are shown below as 'tried' or 'not tried'.

<u>Improve Signal Visibility/ Conspicuity</u>

Tried:

- There are two signal heads for each approach to the intersection
- All traffic signal heads are 12" in size
- All traffic signal heads are mounted overhead
- All approaches to the intersection meet the MUTCD sight distance requirements
- Signal head design is in accordance to current ALDOT Traffic Signal Design and Timing Manual
- All signal heads have LED signal lenses
- Intersection has enough street light

Not Tried:

- Programmable signal heads or louvered lens - intersection doesn't have a sight distance issue
- Backplates - no sun glare problems at intersection
- Rumble strips - too noisy for businesses in area and require too much maintenance on high volume roads
- Installing near side signal heads - current overhead signal heads are visible from a minimum distance and no need for near side signal heads
- Install double red signal heads - no issue with sight distance and signal head visibility

Increase Likelihood of Stopping

Tried:

- There are SIGNAL AHEAD signs for the intersection
- There are stop bars on each approach
- All approaches have operating loop detectors
- Pavement surface is in good condition

Not Tried:

- No advance warning flasher - no sight distance problem at intersection

Address Intentional Violations

Tried:

- Signal timing was last optimized in 2008
- Signal cycle length varies from 120-180 seconds depending on time of day
- Yellow change interval is per current ALDOT Traffic Signal Design and Timing Manual and the ITE proposed recommended practice
- All red clearance intervals is per current ALDOT Traffic Signal Design and Timing Manual and ITE proposed recommended practice
- Signal is designed with dilemma zone loops on Peachtree Boulevard

Not Tried:

- None

Eliminating the Need to Stop

Tried:

- Signal is warranted

Not Tried:

- This intersection is not a good candidate for a roundabout because right-of-way and utility restrictions prevent the use of a roundabout at this location

Citations Issued: From 01/01/2005 -12/31/2009, there were more than 2,100 citations written by the enforcement police officer at the intersection. The number of motorists running the red lights at the intersection is significantly high for east/west approaches.

Conclusions: The results of this study indicate red light running camera enforcement may reduce the number of right angle crashes at this intersection. There are many motorists running the red light on the approaches that are being monitored.

Recommendations: Bofurd County requests approval to implement red light running camera system at the subject location for the eastbound and westbound approaches.

Attachments: Completed permit request requirements checklist
General location map
Five year crash history
Completed field inspection form
Completed engineering analysis sheet
Clearance interval calculation spreadsheet
Intersection diagram showing phasing
RLR camera design
Signed RLR permit agreement form

Prepared by: _____ Date: _____
Traffic Engineer

Recommended by: _____ Date: _____
Region Traffic Engineer

ALABAMA DEPARTMENT OF TRANSPORTATION
ENGINEERING STUDY (ANNUALREPORT)

January 15, 2013

ALDOT Office of Safety Operations
1409 Coliseum Boulevard
Montgomery, Alabama 36130-3050

State Safety Operations Engineer,

The following is the ALDOT required annual report on the red light running enforced intersections in Bofurd County for FY2011/2012.

1) Description of locations where Red Light Running Cameras are used:

    1) Greensboro Road at Northern Boulevard – Northbound and Southbound
    2) Warner Parkway at Academy Street – Northbound and Westbound
    3) West Valley Road at University Road – Eastbound and Westbound
    4) SR 110 at High Point Avenue – Eastbound, Westbound, and Southbound
    5) Nolian Road at 15th Street – Eastbound and Southbound
    6) SR122 at Skyline Parkway – Northbound and Southbound

2) The number of violations recorded at each location aggregated monthly:

Month	1	2	3	4	5	6	Total
Sep 2011	166	133	100	95	133	119	**746**
Oct 2011	134	112	111	92	159	106	**714**
Nov 2011	164	122	120	94	130	96	**726**
Dec 2011	130	101	105	83	120	95	**634**
Jan 2012	140	128	134	86	115	92	**695**
Feb 2012	95	113	113	90	130	113	**654**
Mar 2012	110	101	130	86	99	108	**634**
Apr 2012	121	110	141	91	126	103	**692**
May 2012	97	119	125	86	121	97	**645**
Jun 2012	134	106	139	87	111	101	**678**
Jul 2012	99	141	108	79	123	106	**656**
Aug 2012	151	100	121	81	112	102	**667**
Total	**1541**	**1386**	**1447**	**1050**	**1479**	**1238**	**8141**

3) Total number of citations issued - 8141
   - Greensboro Road at Northern Boulevard – 1541
   - Warner Parkway at Academy Street – 1386
   - West Valley Road at University Road – 1447
   - SR 110 at High Point Avenue – 1050
   - Nolian Road at 15st Street – 1479
   - SR122 at Skyline Parkway – 1238

4) The number of civil monetary penalties and total amount of such penalties paid after citation without contest.

   Number of civil penalties – 6590
   Amount of penalties paid – $637,500

5) The number of violations adjudicated and results of such adjudications, including a breakdown of dispositions made.

   Court hearings requested - 372
   - 95 - Paid fine prior to court hearing
   - 150 - Violations adjudicated
   - 35 - Dismissed
   - 20 - Found guilty – 1 paid reduced fines
   - 42 - Paid fine during pre-trial
   - 30 - Court dates pending or no disposition listed

6) The total amount of civil monetary penalties paid – $640,230

7) Total number of crashes at the six intersections for years 2010-2012

   FY 2010 (before RLR camera): 800 injury crashes and 8 fatalities
   FY 2011 (1st year after RLR camera): 550 injury crashes and 4 fatalities
   FY 2012 (2nd year after RLR camera): 500 injury crashes and 3 fatalities

Conclusions

Narrative assessment for each site

Sincerely,

Melsa Drew
Traffic Division Manager
Bofurd County Police Department
1212 Camp Street
Bufala, AL 31005

ALABAMA DEPARTMENT OF TRANSPORTATION
ENGINEERING STUDY (RENEWAL PERMIT)

September 25, 2010

RLR Camera Location: Greensboro Road at Western Boulevard, *City, County*

Reason for Report: The above referenced intersection has a red light running camera system in place on the southbound and northbound approaches. This report is in support of the red light running camera renewal permit application submitted for the subject location.

Topography: Greensboro Road is a north/south urban principal arterial. It runs from Valley Road on the northern end to Peachtree Boulevard on the southern end. Greensboro Road has two through lanes, a shared through/right turn lane, and a protected left turn on both northbound and southbound approaches to the study intersection. Western Boulevard has one through lane, one shared through/right lane, and one left lane on eastbound and westbound approaches.

Vehicle Volumes: Greensboro Road ADT = 43,000
Western Boulevard ADT = 25,850

Posted Speed limits: Greensboro Road = 50 miles per hour
Western Boulevard = 40 miles per hour

Pedestrian Movements: Light pedestrian movements were observed during this study.

Existing Traffic Control: The subject intersection is controlled by a traffic signal.

Adjacent Traffic Signals: On Greensboro Road, there is a traffic signal 1,300 feet north of the subject intersection at 15th Street and 2,000 feet south at a Wal-Mart entrance.

Western Boulevard has a traffic signal 800 feet east of the subject location at Drew Avenue , and 1,100 feet west at Lance Avenue. The study intersection is not coordinated with any of the adjacent signalized intersections.

Crash Analysis: Red light running camera system was installed at the study intersection in August of 2005. Crash records at the intersection indicate that there were 14 red light running related crashes in the 36 months leading up to the red light running camera installation. In the 36 months following the installation of the cameras, there were 8 red light running related crashes. These records indicate that red light running cameras may have helped contribute to a 43% reduction in red light running crashes at the study intersection. Monthly breakdown of crash records, and number of citations issued and violations record during the 36 months before and after red light running camera installation is attached with this report.

Red Light Running Countermeasures: There are several measures in place at the intersection of Greensboro Road and Western Boulevard to help prevent red light running. The following is a summary of red light running countermeasures at the intersection:

To help improve signal visibility:

- The placement and number of signal heads has been determined based on ALDOT Traffic Signal Design Guide and Timing Manual.
- The signal display uses 12-inch signal lenses.
- The line of sight from any approach is over the minimum requirement.
- The signal heads are placed at appropriate distance from the stop line.

To help increase the likelihood of stopping:

- SIGNAL AHEAD signs have been installed on all approaches.
- Crosswalk and stop bar pavement markings are in fair condition.
- Set-back loops have been placed 400 feet from the stop bars on Greensboro Road, corresponding to 6 seconds away at 50 miles-per-hour, to provide dilemma-zone protection.
- No advance warning flashers are in use as the signal heads are clearly visible from a sufficient distance.
- There are visible left turn signal signs where required.
- There is some pavement rutting which would not prevent vehicles from stopping.

To help improve signal conspicuity:

- There are redundant signal heads on all signalized phases.
- All signal heads employ LED signal lenses.
- Backplates are not in use.

Signal Warrants: N/A

Signal Clearance Intervals: The existing and calculated required minimum clearance intervals of the red light camera enforced traffic signal phases are shown in the following table.

Signal Phase	Existing Clearance Intervals		Required Clearance Intervals	
	Yellow, sec	All-Red, sec	Yellow, sec	All-Red, sec
Phase 1	4.3	2.5	4.3	2.3
Phase 2	4.5	2.5	4.4	2.3
Phase 3	4.2	2.5	4.2	2.1
Phase 4	4.3	2.5	4.3	2.4
Phase 5	4.3	2.5	4.3	2.3
Phase 6	4.5	2.5	4.3	2.5
Phase 7	4.2	2.5	4.2	2.2
Phase 8	4.3	2.5	4.3	2.4

As can be seen from the table, the yellow clearance intervals at the intersection are at least equal to the minimum calculated yellow clearance intervals for all phases that employ Red Light Running camera enforcement.

Conclusions: The results of this study indicate red light running camera enforcement is reducing the number of right angle crashes at this intersection.

Recommendations: The City of Dolly requests a renewed permit to continue operating red light running camera enforcement at current location.

Attachments: Location map
Crash data and summary for three years before/after red light camera installation
Violations record for three years before/after red light camera installation
Intersection diagram showing phasing
Clearance interval calculation spreadsheet

Prepared by: _____ Date: _____
Traffic Engineer

Recommended by: _____ Date: _____
Region Traffic Engineer

Approved by: _____ Date: _____
State Maintenance Engineer

APPENDIX G

RED LIGHT RUNNING CAMERA SYSTEM PERMIT REQUEST
REQUIREMENTS CHECKLIST

County	City	Intersection

Name of Project and Applicant	Date	Phone#

Required Items:	**Provided by District**
Letter of request	___Yes ___ No
Engineering Study -To include completed engineering analysis sheet	___Yes ___ No
Confirmation of safety needs	___Yes ___ No
Collision diagram/history	___Yes ___ No
List of countermeasures attempted	___Yes ___ No
Documentation of RLR crashes improved -If excluded, other countermeasures implemented	___Yes ___ No
Proposed clearance times calculation	___Yes ___ No
Current clearance intervals	___Yes ___ No
Completed RLR permit agreement form	___Yes ___ No
Location map	___Yes ___ No
(3) Sets of blue line or black line plans -(11” X 17” preferred; 24” X 36” max)	___Yes ___ No
Documentation of public hearing or meeting minutes	___Yes ___ No
Documentation of local ordinance/resolution	___Yes ___ No

Region Reviewer: _____ Date Sent to Traffic Operations: _____

---------- DO NOT WRITE BELOW THIS LINE (ALDOT USE ONLY) ----------

Date Submitted to State Traffic Engineer: _____ Date Recommended: _____

Date Completed (Sent back to Region): _____ Date Approved: _____