February 19, 2008
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Revised Jan. 30, 2013
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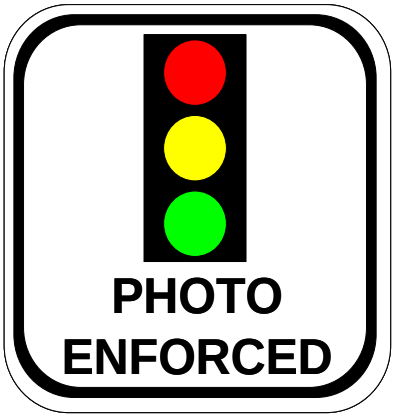
Red Light Running Camera (Photo Enforcement) Engineering Safety Analysis Guidelines



Highway Operations Section
Traffic Engineering Division
Virginia Department of Transportation
1401 East Broad Street
Richmond, Virginia 23219

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Summary of Changes:

- Removed all references to TE306.1 including the memorandum
- Replaced old reference to ITE requirements with current reference - *Guidelines for Determining Traffic Signal Change and Clearance Intervals,* A Recommended Practice of the Institute of Transportation Engineers, Prepared by ITE Technical Advisory Committee, April 2020.
- Changed all references from RTE to DTE and from ROMM to DOMM in flowchart on page C-1
- Added revised date of June 18, 2020 to cover page and headers

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INTRODUCTION

The 2007 Virginia General Assembly enacted legislation (Chapter 903 of the 2007 Virginia Acts of Assembly in Appendix A) allowing the use of cameras in Virginia counties, cities, and towns to enforce compliance with traffic signals. The legislation allows localities by ordinance to install and operate red light running camera systems at no more than one intersection for every 10,000 residents within the locality. In Planning District 8, localities may install and operate red light running cameras at no more than 10 intersections or one intersection for every 10,000 residents within the locality, whichever is greater. Planning District 8 is the geographic area served by the Northern Virginia Regional Commission consisting of 14 member localities including: the counties of Arlington, Fairfax, Loudon and Prince William; the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park; the towns of Dumfries, Herndon, Leesburg, Purcellville and Vienna. Based on the legislation provisions, Appendix B provides a tabulation of the maximum number of intersections at which photo enforcement at any one time could be operated for each locality, based on 2010 population data.

It also contains requirements for analysis, approval, and annual monitoring. This document provides guidance to Virginia localities on what should be submitted to VDOT for those proposed photo enforced intersections maintained and/or operated by VDOT. The Institute of Transportation Engineers and Federal Highway Administration have also published guidance documents regarding red light running countermeasures and photo enforcement, *Making Intersections Safer: A Toolbox of Engineering Countermeasures to reduce Red-Light Running* published in 2003 and *Red Light Camera System Operational Guidelines* published in 2005. References and links to these documents and other related literature and research can be found in Appendix C.

During the 2012 Legislative Session, the General assembly passed HB 1295 and SB 679 which were subsequently signed into law as Chapters 805 and 836 (See Appendix A), respectively, of the 2012 Acts of Assembly. As a result VDOT was removed from the process for approving traffic light signal violation monitoring system (also known as Red Light Camera (RLC) or Photo-red Enforcement) at intersections effective July 1, 2012. As this action was part of a group of changes to remove mandates on localities, it is assumed that the goal was to remove VDOT from the process where localities maintained their own signals; however, the legislation also removed VDOT from the process where signals are owned, operated and maintained by VDOT, as well. In order to fulfill our responsibility regarding these types of signals, VDOT will use authority granted under the Land Use Permit process to manage those requests for installations of RLC systems on VDOT's right of way. All other requirements of the original legislation, Chapter 903 Section 15.2-968.1, remain in effect.

LEGISLATIVE REQUIREMENTS

<u>Intersection Selection Factors and Implementation Criteria</u>
When selecting potential intersections for installation of red light running cameras, the Code of Virginia states localities shall consider the following factors:

i. The accident rate for the intersection,
ii. The rate of red light violations occurring at the intersection,

iii. The difficulty experienced by law-enforcement officers to apprehend violators,
iv. The ability of law-enforcement officers to apprehend violators safely within a reasonable distance from the violation.

The legislation also requires a minimum 0.5 second grace period between the time the signal turns red and the time the first violation is recorded by the camera.

Public Awareness Program

Prior to implementation of red light running cameras or expansion of the monitoring system, a locality shall conduct a public awareness program advising the public that a photo enforcement system is being implemented. Further guidance on public awareness campaigns can be found in national publications such as *Red Light Camera Systems: Operational Guidelines*, published by the Federal Highway Administration and the National Highway Traffic Safety Administration in January 2005. In addition, localities must place conspicuous signs within 500 feet of the intersection approach at which a red light running camera is installed informing motorists of the enforcement effort. A standard warning sign for use across the Commonwealth will be the MUTCD's standard sign.

Evaluation and Certification Efforts

Localities are required to evaluate the photo enforcement 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. Localities shall annually certify compliance with the legislation and make all records available for inspection and audit by the Commonwealth Transportation Commissioner or the Commissioner of the Department of Motor Vehicles.

Engineering Study Guidelines

Before red light running camera(s) can be installed at an intersection, the locality is required to complete an engineering safety analysis for the specific intersection. The engineering study should document the current clearance intervals (yellow and all-red), whether the signal is coordinated with other signals along the corridor, and the current condition of other safety features (i.e., lane markings, median control, speed limits, signing, etc.).

ENGINEERING STUDY GUIDELINES

When considering the use of a red light camera system it is important to perform an engineering study to identify potential issues with the intersection configuration that may be contributing to red light violations or potential improvements/countermeasures that may need to be implemented instead of a photo enforcement system. VDOT has established engineering study guidelines to assist localities in reviewing photo enforcement request submittals. The engineering safety analysis should include a statement explaining why photo enforcement is proposed for a specific intersection. The engineering safety analysis shall be stamped and signed by a professional engineer. An engineering analysis template is provided in Appendix D and includes sections for: Intersection and Signal Data, Signal Timings and Traffic Data, and Crash and Enforcement Data.

Intersection and Signal Data

Signal Visibility

As motorists approach an intersection their line of sight to the intersection and the traffic signal should be unobstructed. The engineering analysis of the intersection should address intersection and traffic signal visibility.

Engineering counter measures such as 'signal ahead' signs (with or without flashers) may be installed to warn drivers approaching a signalized intersection and to prepare them to stop if necessary for proposed intersections.

Adding additional signal heads so that there is one signal head over each lane may be an appropriate countermeasure for intersections with high percentages of heavy vehicles. LED lighting, 12 inch signal lamps and backplates shall be considered to make traffic signals more visible to drivers, especially under adverse weather and lighting conditions and to combat sun glare issues.

Pavement Markings, Conditions and Treatments

Information requested in the study report includes: a diagram of the intersection, sight distance on the approach, grade of the approach, data on signal heads, pavement markings, and warning signs.

The engineering analysis of the intersection should document pavement and marking conditions in the vicinity of the intersection.

Signal Timings and Traffic Data

Clearance Intervals

The Manual on Uniform Traffic Control Devices (MUTCD) and the Institute of Transportation Engineers (Guidelines for Determining Traffic Signal Change and Clearance Interval dated April 2020) provide guidance on calculating clearance intervals – yellow and all red intervals.

The yellow interval is designed to warn motorists of the change in assignment of right-of-way. Yellow intervals should provide motorists with adequate time to make the appropriate decision to either proceed through the intersection before the signal turns red or make a comfortable deceleration and stop before entering the intersection. The likelihood of a motorist entering an intersection on red increases as the amount of yellow time is decreased. An appropriate yellow clearance interval is critical to preventing inadvertent violation of the red signal.

Signal Timing and Phasing

The engineering analysis of the intersection should include an evaluation of the intersection timings, phasing, and coordination with other intersections. The amount of traffic entering the intersection, the time of day, the number of turns, and sequence of the signals are all important factors and vary from intersection to intersection. Traffic engineering judgment and local knowledge of the intersection in conjunction with signal optimization and simulation should result in the most efficient traffic signal timing at the intersection.

Vehicle Detection Data

The engineering analysis of the intersection should include an evaluation of loop detector locations and the existence of a dilemma zone. Location of loop detectors at relatively higher speed intersections (speeds greater than 30 mph) is an important factor in signalized intersection design. At a certain distance from the intersection, depending on speed, drivers seeing the onset of the yellow phase may be indecisive about stopping or proceeding through the intersection. This zone of driver indecision is often referred to as a "dilemma zone". One measure to reduce the likelihood of vehicles being in the "dilemma zone" is to install a vehicle detector in the zone that will extend green time if a vehicle is present and not allow the yellow interval to begin while a vehicle is present in the zone. Dilemma zone detection is not generally used with coordinated signal systems.

Traffic Volume Data

The engineering analysis should include an intersection volume count containing both the number of passenger cars and heavy vehicles. At a minimum, volume counts should include a 48-hour automatic traffic recorder directional and classification count from which to calculate an ADT, and turn movement counts concurrent with the same time period as the red-light violation counts.

Crash and Enforcement Data

Three-year Crash Analysis

The engineering analysis of the intersection should include a crash analysis that focuses on identifying crashes related to red light running violations. The crash analysis should include at least 3-years of the latest historical crash data. Indicators of red light running related crashes can be found in crash reports in sections such as contributing cause, collision type, traffic control, offense charged, and the narrative and/or diagram. This data should be evaluated in detail to determine if a red light running problem is resulting in crashes at an intersection. Crash rates should be reported in crashes per million entering vehicles and by types of crashes, specifically for angle and rear end crash types. The most prominent crash types of red light running violators are angle and turning crashes. Crashes involving single vehicles or pedestrians and bicyclists can also occur as a result of red light running when violators or other drivers take evasive action to avoid crashes or when coming in conflict with pedestrians and bicyclists legally in the intersection.

Violation Rates

The engineering analysis should document the frequency or violation rate of red light running at an intersection. Violations shall be analyzed for a minimum of a 12 hour period, preferably from 7 AM to 7 PM, and be summarized by approach and movement for all legs of the intersection even if a particular leg is not under consideration for photo enforcement. Violation rates shall be collected concurrently with the traffic count and classification study.This documentation will help to determine if a problem exists and will also provide a measure for comparison once photo enforcement is implemented.

Counts of red light violations at an intersection should be done either manually through field observations or by the preferred approach, video camera. This data may also provide important

information on driver behavior and operational conditions at an intersection. The legislation states that violation rates be expressed as number of violations per 1,000 vehicles.

Enforcement Endorsement
The engineering analysis should document law enforcement opinions regarding red light running violations at specific intersections. In addition, as part of the engineering analysis, there should be documentation of law enforcement difficulties and safety issues related to apprehending red light violators by conventional means other than photo enforcement.

APPROVAL PROCESS FOR STATE MAINTAINED INTERSECTIONS

Requests for land use permits to install RLC within VDOT right of way falls under the provisions for Special Request and Installation Permits, Section 660 of the *Land Use Permit Regulations* (24VAC30-151). This section was recently revised to delegate the authority for approval of land use permits for RLC installations from the Commissioner to the appropriate District Administrator.

The process for RLC installation requests occurring within VDOT's right of way is as follows:

- Localities request a scoping meeting with the District Traffic Engineer (DTE) and stakeholders to discuss the objectives of the program, the state requirements and the installation process. This initial meeting will answer many questions on both sides and provide an opportunity to exchange lessons learned.
- Localities submit formal request including the mandated P.E.signed and sealed safety analysis to the appropriate Area Land Use Engineer (ALUE) or appropriate district permit authority in order to apply for the necessary land use permit. The safety analysis shall be conducted in conformance with VDOT's study template
- ALUE will transmit request and documentation to the DTE.
- DTE will coordinate review with Central Office Traffic Engineering Division and the residency administrator and is responsible for all additional communications with the requesting locality as changes and clarifications are made.
- DTE will submit the request, safety analysis and his recommendation to the District Administrator (DA) for action with copies to the ALUE.
- DA will send his decision to the permit authority for appropriate processing and copy the DTE.
- Central Office TED is notified of the decision and posts approved locations to the department's red light running camera website.

A flow chart of this process can be found in Appendix B.

Appeals or Exceptions to the District Administrator's decision are at the discretion of the Commissioner or his designee.

INTERFACING WITH VDOT SIGNAL EQUIPMENT

Safe and efficient signalized intersections are a high priority for the Department. Considerable technical equipment is located throughout a modern signalized intersection. Highly trained technicians maintain and operate these systems. Allowing improperly trained personnel to work on this equipment could jeopardize the safety of the traveling public as well as expose the Department and/or the locality to liability.

VDOT will not allow access to, or any work around, any Department maintained traffic signal component unless a VDOT traffic signal technician is present. Qualifications of those performing work for a locality must be submitted and approved by VDOT. An insurance certificate may be required. Additional requirements related to securing a land use permit for installation of RLC are detailed in the referenced Special Request and Installation Permit section 660 of the *Land Use Permit Regulations*.

APPENDIX A

LEGISLATION

VIRGINIA ACTS OF ASSEMBLY -- 2007 RECONVENED SESSION

CHAPTER 903

An Act to amend the Code of Virginia by adding a section numbered 15.2-968.1, relating to local ordinances establishing certain traffic signal enforcement programs; penalties.

[S 829]

Approved April 4, 2007

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding a section numbered 15.2-968.1 as follows:

§ 15.2-968.1. Use of photo-monitoring systems to enforce traffic light signals.

A. The governing body of any county, city, or town may provide by ordinance for the establishment of a traffic signal enforcement program imposing monetary liability on the operator of a motor vehicle for failure to comply with traffic light signals in such locality in accordance with the provisions of this section. Each such locality may install and operate traffic light signal photo-monitoring systems at no more than one intersection for every 10,000 residents within each county, city, or town at any one time, provided, however, that within planning District 8, each study locality may install and operate traffic light signal photo-monitoring systems at no more than 10 intersections, or at no more than one intersection for every 10,000 residents within each county, city, or town, whichever is greater, at any one time.

B. The operator of a vehicle shall be liable for a monetary penalty imposed pursuant to this section if such vehicle is found, as evidenced by information obtained from a traffic light signal violation monitoring system, to have failed to comply with a traffic light signal within such locality.

C. Proof of a violation of this section shall be evidenced by information obtained from a traffic light signal violation monitoring system authorized pursuant to this section. A certificate, sworn to or affirmed by a law-enforcement officer employed by a locality authorized to impose penalties pursuant to this section, or a facsimile thereof, based upon inspection of photographs, microphotographs, videotape, or other recorded images produced by a traffic light signal violation monitoring system, shall be prima facie evidence of the facts contained therein. Any photographs, microphotographs, videotape, or other recorded images evidencing such a violation shall be available for inspection in any proceeding to adjudicate the liability for such violation pursuant to an ordinance adopted pursuant to this section.

D. In the prosecution for a violation of any local ordinance adopted as provided in this section, prima facie evidence that the vehicle described in the summons issued pursuant to this section was operated in violation of such ordinance, together with proof that the defendant was at the time of such violation the owner, lessee, or renter of the vehicle, shall constitute in evidence a rebuttable presumption that such owner, lessee, or renter of the vehicle was the person who committed the violation. Such presumption shall be rebutted if the owner, lessee, or renter of the vehicle (i) files an affidavit by regular mail with the clerk of the general district court that he was not the operator of the vehicle at the time of the alleged violation or (ii) testifies in open court under oath that he was not the operator of the vehicle at the time of the alleged violation. Such presumption shall also be rebutted if a certified copy of a police report, showing that the vehicle had been reported to the police as stolen prior to the time of the alleged violation of this section, is presented, prior to the return date established on the summons issued pursuant to this section, to the court adjudicating the alleged violation.

E. For purposes of this section, "owner" means the registered owner of such vehicle on record with the Department of Motor Vehicles. For purposes of this section, "traffic light signal violation monitoring system" means a vehicle sensor installed to work in conjunction with a traffic light that automatically produces two or more photographs, two or more microphotographs, video, or other recorded images of each vehicle at the time it is used or operated in violation of § 46.2-833, 46.2-835, or 46.2-836. For each such vehicle, at least one recorded image shall be of the vehicle before it has illegally entered the intersection, and at least one recorded image shall be of the same vehicle after it has illegally entered that intersection.

F. Imposition of a penalty pursuant to this section shall not be deemed a conviction as an operator and shall not be made part of the operating record of the person upon whom such liability is imposed, nor shall it be used for insurance purposes in the provision of motor vehicle insurance coverage. No monetary penalty imposed under this section shall exceed $50, nor shall it include court costs.

G. A summons for a violation of this section may be executed pursuant to § 19.2-76.2. Notwithstanding the provisions of § 19.2-76, a summons for a violation of this section may be executed by mailing by first class mail a copy thereof to the

owner, lessee, or renter of the vehicle. In the case of a vehicle owner, the copy shall be mailed to the address contained in the records of the Department of Motor Vehicles; in the case of a vehicle lessee or rentor, the copy shall be mailed to the address contained in the records of the lessor or rentor. Every such mailing shall include, in addition to the summons, a notice of (i) the summoned person's ability to rebut the presumption that he was the operator of the vehicle at the time of the alleged violation through the filing of an affidavit as provided in subsection D and (ii) instructions for filing such affidavit, including the address to which the affidavit is to be sent. If the summoned person fails to appear on the date of return set out in the summons mailed pursuant to this section, the summons shall be executed in the manner set out in § 19.2-76.3. No proceedings for contempt or arrest of a person summoned by mailing shall be instituted for failure to appear on the return date of the summons. Any summons executed for a violation of this section shall provide to the person summoned at least 60 business days from the mailing of the summons to inspect information collected by a traffic light signal violation monitoring system in connection with the violation.

H. Information collected by a traffic light signal violation monitoring system installed and operated pursuant to subsection A shall be limited exclusively to that information that is necessary for the enforcement of traffic light violations. On behalf of a locality, a private entity may not obtain records regarding the registered owners of vehicles that fail to comply with traffic light signals. Notwithstanding any other provision of law, all photographs, microphotographs, electronic images, or other personal information collected by a traffic light signal violation monitoring system shall be used exclusively for enforcing traffic light violations and shall not (i) be open to the public; (ii) be sold or used for sales, solicitation, or marketing purposes; (iii) be disclosed to any other entity except as may be necessary for the enforcement of a traffic light violation or to a vehicle owner or operator as part of a challenge to the violation; or (iv) be used in a court in a pending action or proceeding unless the action or proceeding relates to a violation of § 46.2-833, 46.2-835, or 46.2-836 or requested upon order from a court of competent jurisdiction. Information collected under this section pertaining to a specific violation shall be purged and not retained later than 60 days after the collection of any civil penalties. If a locality does not execute a summons for a violation of this section within 10 business days, all information collected pertaining to that suspected violation shall be purged within two business days. Any locality operating a traffic light signal violation monitoring system shall annually certify compliance with this section and make all records pertaining to such system available for inspection and audit by the Commonwealth Transportation Commissioner or the Commissioner of the Department of Motor Vehicles or his designee. Any person who discloses personal information in violation of the provisions of this subsection shall be subject to a civil penalty of $1,000.

I. A private entity may enter into an agreement with a locality to be compensated for providing the traffic light signal violation monitoring system or equipment, and all related support services, to include consulting, operations and administration. However, only a law-enforcement officer employed by a locality may swear to or affirm the certificate required by subsection C. No locality shall enter into an agreement for compensation based on the number of violations or monetary penalties imposed.

J. When selecting potential intersections for a traffic light signal violation monitoring system, a locality shall consider factors such as (i) the accident rate for the intersection, (ii) the rate of red light violations occurring at the intersection (number of violations per number of vehicles), (iii) the difficulty experienced by law-enforcement officers in patrol cars or on foot in apprehending violators, and (iv) the ability of law-enforcement officers to apprehend violators safely within a reasonable distance from the violation. Localities may consider the risk to pedestrians as a factor, if applicable. A locality shall submit a list of intersections to the Virginia Department of Transportation for final approval.

K. Before the implementation of a traffic light signal violation monitoring system at an intersection, the locality shall complete an engineering safety analysis that addresses signal timing and other location-specific safety features. The length of the yellow phase shall be established based on the recommended methodology of the Institute of Transportation Engineers. All traffic light signal violation monitoring systems shall provide a minimum 0.5-second grace period between the time the signal turns red and the time the first violation is recorded. If recommended by the engineering safety analysis, the locality shall make reasonable location-specific safety improvements, including signs and pavement markings.

L. Any locality that uses a traffic light signal violation monitoring system shall evaluate the system on a monthly basis to ensure all cameras and traffic signals are functioning properly. Evaluation results shall be made available to the public.

M. Any locality that uses a traffic light signal violation monitoring system to enforce traffic light signals shall place conspicuous signs within 500 feet of the intersection approach at which a traffic light signal violation monitoring system is used. There shall be a rebuttable presumption that such signs were in place at the time of the commission of the traffic light signal violation.

N. Prior to or coincident with the implementation or expansion of a traffic light signal violation monitoring system, a locality shall conduct a public awareness program, advising the public that the locality is implementing or expanding a traffic light signal violation monitoring system.

VIRGINIA ACTS OF ASSEMBLY -- 2012 SESSION

CHAPTER 805

An Act to amend and reenact §§ 2.2-1124, 2.2-4303, 2.2-4343, 5.1-40, 15.2-968.1, 15.2-1643, 15.2-2223.1, 22.1-18.1, 22.1-92, 22.1-129, 22.1-275.1, 37.2-504, 37.2-508, 42.1-36.1, and 51.5-89 of the Code of Virginia and to repeal § 2 of the first enactment of Chapter 814 of the Acts of Assembly of 2010, relating to the elimination of various mandates on local and regional entities relating to procurement procedures, education, and land use.
[H 1295]

Approved April 18, 2012
§ 15.2-968.1. Use of photo-monitoring systems to enforce traffic light signals.

A. The governing body of any county, city, or town may provide by ordinance for the establishment of a traffic signal enforcement program imposing monetary liability on the operator of a motor vehicle for failure to comply with traffic light signals in such locality in accordance with the provisions of this section. Each such locality may install and operate traffic light signal photo-monitoring systems at no more than one intersection for every 10,000 residents within each county, city, or town at any one time, provided, however, that within planning District 8, each such locality may install and operate traffic light signal photo-monitoring systems at no more than 10 intersections, or at no more than one intersection for every 10,000 residents within each county, city, or town, whichever is greater, at any one time.

B. The operator of a vehicle shall be liable for a monetary penalty imposed pursuant to this section if such vehicle is found, as evidenced by information obtained from a traffic light signal violation monitoring system, to have failed to comply with a traffic light signal within such locality.

C. Proof of a violation of this section shall be evidenced by information obtained from a traffic light signal violation monitoring system authorized pursuant to this section. A certificate, sworn to or affirmed by a law-enforcement officer employed by a locality authorized to impose penalties pursuant to this section, or a facsimile thereof, based upon inspection of photographs, microphotographs, videotape, or other recorded images produced by a traffic light signal violation monitoring system, shall be prima facie evidence of the facts contained therein. Any photographs, microphotographs, videotape, or other recorded images evidencing such a violation shall be available for inspection in any proceeding to adjudicate the liability for such violation pursuant to an ordinance adopted pursuant to this section.

D. In the prosecution for a violation of any local ordinance adopted as provided in this section, prima facie evidence that the vehicle described in the summons issued pursuant to this section was operated in violation of such ordinance, together with proof that the defendant was at the time of such violation the owner, lessee, or renter of the vehicle, shall constitute in evidence a rebuttable presumption that such owner, lessee, or renter of the vehicle was the person who committed the violation. Such presumption shall be rebutted if the owner, lessee, or renter of the vehicle (i) files an affidavit by regular mail with the clerk of the general district court that he was not the operator of the vehicle at the time of the alleged violation or (ii) testifies in open court under oath that he was not the operator of the vehicle at the time of the alleged violation. Such presumption shall also be rebutted if a certified copy of a police report, showing that the vehicle had been reported to the police as stolen prior to the time of the alleged violation of this section, is presented, prior to the return date established on the summons issued pursuant to this section, to the court adjudicating the alleged violation.

E. For purposes of this section, "owner" means the registered owner of such vehicle on record with the Department of Motor Vehicles. For purposes of this section, "traffic light signal violation monitoring system" means a vehicle sensor installed to work in conjunction with a traffic light that automatically produces two or more photographs, two or more microphotographs, video, or other recorded images of each vehicle at the time it is used or operated in violation of § 46.2-833, 46.2-835, or 46.2-836. For each such vehicle, at least one recorded image shall be of the vehicle before it has illegally entered the intersection, and at least one recorded image shall be of the same vehicle after it has illegally entered that intersection.

F. Imposition of a penalty pursuant to this section shall not be deemed a conviction as an operator and shall not be made part of the operating record of the person upon whom such liability is imposed, nor shall it be used for insurance purposes in the provision of motor vehicle insurance coverage. No monetary penalty imposed under this section shall exceed $50, nor shall it include court costs.

G. A summons for a violation of this section may be executed pursuant to § 19.2-76.2. Notwithstanding the provisions of § 19.2-76, a summons for a violation of this section may be executed by mailing by first class mail a copy thereof to the owner, lessee, or renter of the vehicle. In the case of a vehicle owner, the copy shall be mailed to the address contained in the records of the Department of Motor Vehicles; in the case of a vehicle lessee or renter, the copy shall be mailed to the address contained in the records of the lessor or renter. Every such mailing shall include, in addition to the summons, a notice of (i) the summoned person's ability to rebut the presumption that he was the operator of the vehicle at the time of the alleged violation through the filing of an affidavit as provided in subsection D and (ii) instructions for filing such affidavit, including the address to which the affidavit is to be sent. If the summoned person fails to appear on the date of return set out in the summons mailed pursuant to this section, the summons shall be executed in the manner set out in § 19.2-76.3. No proceedings for contempt or arrest of a person summoned by mailing shall be instituted for failure to appear on the return date of the summons. Any summons executed for a violation of this section shall provide to the person summoned at least 30 business days from the mailing of the summons to inspect information collected by a traffic light signal violation monitoring system in connection with the violation.

H. Information collected by a traffic light signal violation monitoring system installed and operated pursuant to subsection A shall be limited exclusively to that information that is necessary for the enforcement of traffic light violations. On behalf of a locality, a private entity that operates a traffic light signal violation monitoring system may enter into an agreement with the Department of Motor Vehicles, in accordance with the provisions of subdivision B 21 of § 46.2-208, to obtain vehicle owner information regarding the registered owners of vehicles that fail to comply with a traffic light signal. Information provided to the operator of a traffic light signal violation monitoring system shall be protected in a database with security comparable to that of the Department of Motor Vehicles' system, and used only for enforcement against individuals who violate the provisions of this section. Notwithstanding any other provision of law, all photographs, microphotographs, electronic images, or other personal information collected by a traffic light signal violation monitoring system shall be used exclusively for enforcing traffic light violations and shall not (i) be open to the public; (ii) be sold or used for sales, solicitation, or marketing purposes; (iii) be disclosed to any other entity except as may be necessary for the enforcement of a traffic light violation or to a vehicle owner or operator as part of a challenge to the violation; or (iv) be used in a court in a pending action or proceeding unless the action or proceeding relates to a violation of § 46.2-833, 46.2-835, or 46.2-836 or requested upon order from a court of competent jurisdiction. Information collected under this section pertaining to a specific violation shall be purged and not retained later than 60 days after the collection of any civil penalties. If a locality does not execute a summons for a violation of this section within 10 business days, all information collected pertaining to that suspected violation shall be purged within two business days. Any locality operating a traffic light signal violation monitoring system shall annually certify compliance with this section and make all records pertaining to such system available for inspection and audit by the Commissioner of Highways or the Commissioner of the Department of Motor Vehicles or his designee. Any person who discloses personal information in violation of the provisions of this subsection shall be subject to a civil penalty of $1,000 per disclosure. Any unauthorized use or disclosure of such personal information shall be grounds for termination of the agreement between the Department of Motor Vehicles and the private entity.

I. A private entity may enter into an agreement with a locality to be compensated for providing the traffic light signal violation monitoring system or equipment, and all related support services, to include consulting, operations and administration. However, only a law-enforcement officer employed by a locality may swear to or affirm the certificate required by subsection C. No locality shall enter into an agreement for compensation based on the number of violations or monetary penalties imposed.

J. When selecting potential intersections for a traffic light signal violation monitoring system, a locality shall consider factors such as (i) the accident rate for the intersection, (ii) the rate of red light violations occurring at the intersection (number of violations per number of vehicles), (iii) the difficulty experienced by law-enforcement officers in patrol cars or on foot in apprehending violators, and (iv) the ability of law-enforcement officers to apprehend violators safely within a reasonable distance from the violation. Localities may consider the risk to pedestrians as a factor, if applicable.

K. Before the implementation of a traffic light signal violation monitoring system at an intersection, the locality shall complete an engineering safety analysis that addresses signal timing and other location-specific safety features. The length of the yellow phase shall be established based on the recommended methodology of the Institute of Transportation Engineers. All traffic light signal violation monitoring systems shall provide a minimum 0.5-second grace period between the time the signal turns red and the time the first violation is recorded. If recommended by the engineering safety analysis, the locality shall make reasonable location-specific safety improvements, including signs and pavement markings.

L. Any locality that uses a traffic light signal violation monitoring system shall evaluate the system on a monthly basis to ensure all cameras and traffic signals are functioning properly. Evaluation results shall be made available to the public.

M. Any locality that uses a traffic light signal violation monitoring system to enforce traffic light signals shall place conspicuous signs within 500 feet of the intersection approach at which a traffic light signal violation monitoring system is used. There shall be a rebuttable presumption that such signs were in place at the time of the commission of the traffic light signal violation.

N. Prior to or coincident with the implementation or expansion of a traffic light signal violation monitoring system, a locality shall conduct a public awareness program, advising the public that the locality is implementing or expanding a traffic light signal violation monitoring system.

O. Notwithstanding any other provision of this section, if a vehicle depicted in images recorded by a traffic light signal photo-monitoring system is owned, leased, or rented by a county, city, or town, then the county, city, or town may access and use the recorded images and associated information for employee disciplinary purposes.

APPENDIX B

NUMBER OF ALLOWABLE
PHOTO ENFORCED INTERSECTIONS
PER LOCALITY

NUMBER OF ALLOWABLE PHOTO ENFORCED INTERSECTIONS BY COUNTY

JURISDICTION	POPULATION 2010	POTENTIAL # OF INTERSECTIONS	REGION	DISTRICT
Accomack	33,164	3	Eastern	Hampton Roads
Albemarle	98,970	10	Northwestern	Culpeper
Alleghany	16,250	2	Northwestern	Staunton
Amelia	12,690	1	Central	Richmond
Amherst	32,353	3	Southwestern	Lynchburg
Appomattox	14,973	1	Southwestern	Lynchburg
Arlington	207,627	21	Northern	Nova
Augusta	73,750	7	Northwestern	Staunton
Bath	4,731	0	Northwestern	Staunton
Bedford	68,676	7	Southwestern	Salem
Bland	6,824	0	Southwestern	Bristol
Botetourt	33,148	3	Southwestern	Salem
Brunswick	17,434	2	Central	Richmond
Buchanan	24,098	2	Southwestern	Bristol
Buckingham	17,146	2	Central	Lynchburg
Campbell	54,842	5	Southwestern	Lynchburg
Caroline	28,545	3	Central	Fredericksburg
Carroll	30,042	3	Southwestern	Salem
Charles City	7,256	0	Central	Richmond
Charlotte	12,586	1	Central	Lynchburg
Chesterfield	316,236	32	Central	Richmond
Clarke	14,034	1	Northwestern	Staunton
Craig	5,190	0	Southwestern	Salem
Culpeper	46,689	5	Northern	Culpeper
Cumberland	10,052	1	Central	Lynchburg
Dickenson	15,903	2	Southwestern	Bristol
Dinwiddie	28,001	3	Central	Richmond
Essex	11,151	1	Central	Fredericksburg
Fairfax	1,081,726	108	Northern	Nova
Fauquier	65,203	7	Northern	Culpeper
Floyd	15,279	2	Southwestern	Salem
Fluvanna	25,691	3	Northwestern	Culpeper
Franklin	56,159	6	Southwestern	Salem
Frederick	78,305	8	Northwestern	Staunton
Giles	17,286	2	Southwestern	Salem
Gloucester	36,858	4	Eastern	Fredericksburg
Goochland	21,717	2	Central	Richmond
Grayson	15,533	2	Southwestern	Bristol
Greene	18,403	2	Northwestern	Culpeper
Greensville	12,243	1	Eastern	Hampton Roads

NUMBER OF ALLOWABLE PHOTO ENFORCED INTERSECTIONS BY COUNTY

JURISDICTION	POPULATION 2010	POTENTIAL # OF INTERSECTIONS	REGION	DISTRICT
Halifax	36,241	4	Central	Lynchburg
Hanover	99,863	10	Central	Richmond
Henrico	306,935	31	Central	Richmond
Henry	54,151	5	Southwestern	Salem
Highland	2,321	0	Northwestern	Staunton
Isle of Wight	35,270	4	Eastern	Hampton Roads
James City	67,009	7	Eastern	Hampton Roads
King and Queen	6,945	0	Central	Fredericksburg
King George	23,584	2	Northern	Fredericksburg
King William	15,935	2	Central	Fredericksburg
Lancaster	11,391	1	Central	Fredericksburg
Lee	25,587	3	Southwestern	Bristol
Loudoun	312,311	31	Northern	Nova
Louisa	33,153	3	Northwestern	Culpeper
Lunenburg	12,914	1	Central	Richmond
Madison	13,308	1	Northern	Culpeper
Mathews	8,978	0	Eastern	Fredericksburg
Mecklenburg	32,727	3	Central	Richmond
Middlesex	10,959	1	Eastern	Fredericksburg
Montgomery	94,392	9	Southwestern	Salem
Nelson	15,020	2	Southwestern	Lynchburg
New Kent	18,429	2	Central	Richmond
Northampton	12,389	1	Eastern	Hampton Roads
Northumberland	12,330	1	Central	Fredericksburg
Nottoway	15,853	2	Central	Richmond
Orange	33,481	3	Northern	Culpeper
Page	24,042	2	Northwestern	Staunton
Patrick	18,490	2	Southwestern	Salem
Pittsylvania	63,506	6	Southwestern	Lynchburg
Powhatan	28,046	3	Central	Richmond
Prince Edward	23,368	2	Central	Lynchburg
Prince George	35,725	4	Central	Richmond
Prince William	402,002	40	Northern	Nova
Pulaski	34,872	3	Southwestern	Salem
Rappahannock	7,373	0	Northern	Culpeper
Richmond	9,254	0	Central	Fredericksburg
Roanoke	92,376	9	Southwestern	Salem
Rockbridge	22,307	2	Northwestern	Staunton
Rockingham	76,314	8	Northwestern	Staunton
Russell	28,897	3	Southwestern	Bristol
Scott	23,177	2	Southwestern	Bristol

NUMBER OF ALLOWABLE PHOTO ENFORCED INTERSECTIONS BY COUNTY

JURISDICTION	POPULATION 2010	POTENTIAL # OF INTERSECTIONS	REGION	DISTRICT
Shenandoah	41,993	4	Northwestern	Staunton
Smyth	32,208	3	Southwestern	Bristol
Southampton	18,570	2	Eastern	Hampton Roads
Spotsylvania	122,397	12	Northern	Fredericksburg
Stafford	128,961	13	Northern	Fredericksburg
Surry	7,058	0	Eastern	Hampton Roads
Sussex	12,087	1	Eastern	Hampton Roads
Tazewell	45,078	5	Southwestern	Bristol
Warren	37,575	4	Northwestern	Staunton
Washington	54,876	5	Southwestern	Bristol
Westmoreland	17,454	2	Central	Fredericksburg
Wise	41,452	4	Southwestern	Bristol
Wythe	29,235	3	Southwestern	Bristol
York	65,464	7	Eastern	Hampton Roads

NUMBER OF ALLOWABLE PHOTO ENFORCED INTERSECTIONS BY CITY

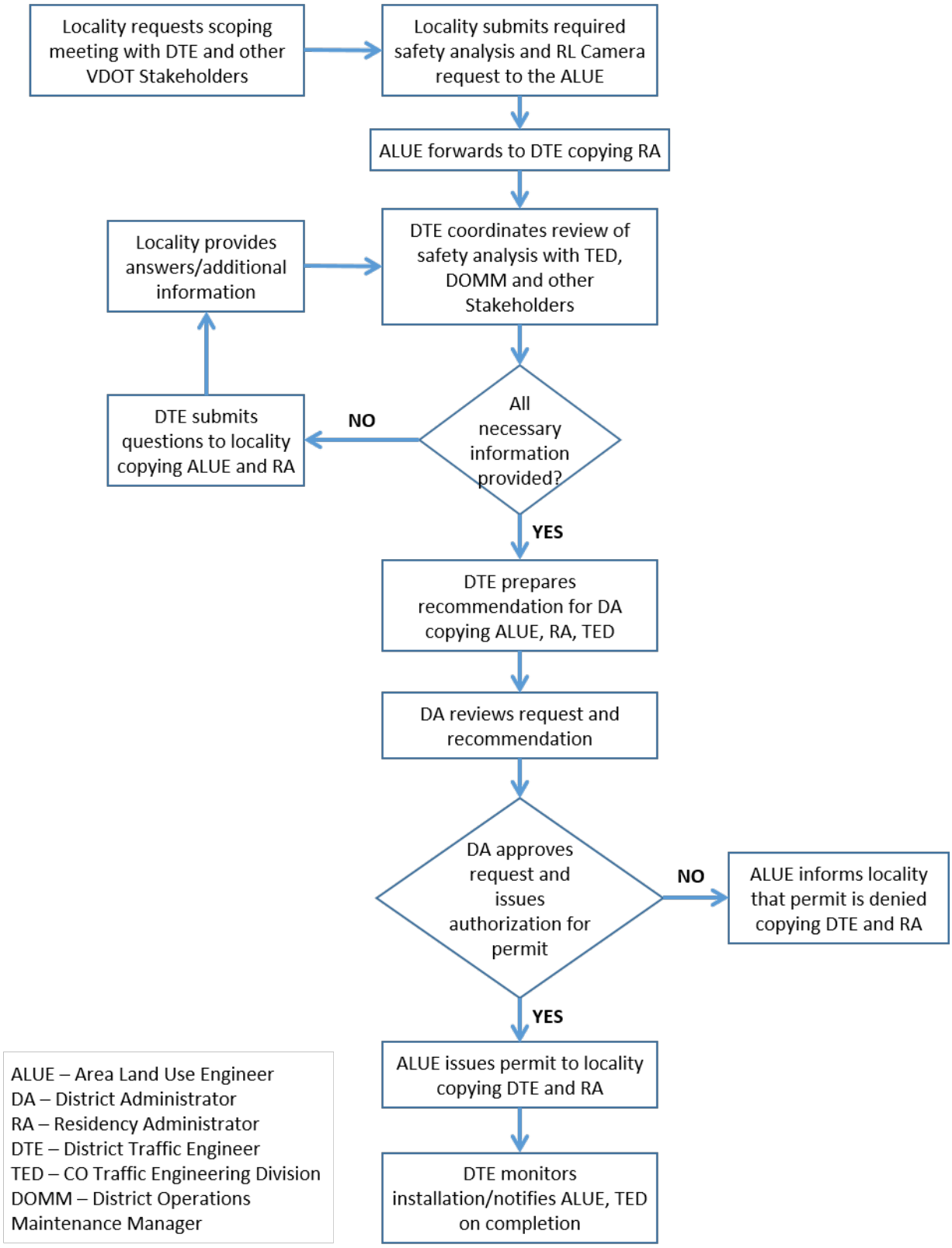
JURISDICTION	POPULATION 2010	POTENTIAL # OF INTERSECTIONS	REGION	DISTRICT
Alexandria	139,966	14	Northern	Nova
Bedford	6,222	0	Southwestern	Salem
Bristol	17,835	2	Southwestern	Bristol
Buena Vista	6,650	0	Northwestern	Staunton
Charlottesville	43,475	4	Northwestern	Culpeper
Chesapeake	222,209	22	Eastern	Hampton Roads
Colonial Heights	17,411	2	Central	Richmond
Covington	5,961	0	Northwestern	Staunton
Danville	43,055	4	Southwestern	Lynchburg
Emporia	5,927	0	Eastern	Hampton Roads
Fairfax	22,565	2	Northern	Nova
Falls Church	12,332	1	Northern	Nova
Franklin	8,582	0	Eastern	Hampton Roads
Fredericksburg	24,286	2	Northern	Fredericksburg
Galax	7,042	0	Southwestern	Salem
Hampton	137,436	14	Eastern	Hampton Roads
Harrisonburg	48,914	5	Northwestern	Staunton
Hopewell	22,591	2	Central	Richmond
Lexington	7,042	0	Northwestern	Staunton
Lynchburg	75,568	8	Southwestern	Lynchburg
Manassas	37,821	4	Northern	Nova
Manassas Park	14,273	1	Northern	Nova
Martinsville	13,821	1	Southwestern	Salem
Newport News	180,719	18	Eastern	Hampton Roads
Norfolk	242,803	24	Eastern	Hampton Roads
Norton	3,958	0	Southwestern	Bristol
Petersburg	32,420	3	Central	Richmond
Poquoson	12,150	1	Eastern	Hampton Roads
Portsmouth	95,535	10	Eastern	Hampton Roads
Radford	16,408	2	Southwestern	Salem
Richmond	204,214	20	Central	Richmond
Roanoke	97,032	10	Southwestern	Salem
Salem	24,802	2	Southwestern	Salem
Staunton	23,746	2	Northwestern	Staunton
Suffolk	84,585	8	Eastern	Hampton Roads
Virginia Beach	437,994	44	Eastern	Hampton Roads
Waynesboro	21,006	2	Northwestern	Staunton
Williamsburg	14,068	1	Eastern	Hampton Roads
Winchester	26,203	3	Northwestern	Staunton

NUMBER OF ALLOWABLE PHOTO ENFORCED INTERSECTIONS BY TOWN					
JURISDICTION	JURISDICTION TYPE	POPULATION 2010	POTENTIAL # OF INTERSECTIONS	REGION	DISTRICT
Abingdon	Town	8,191	0	Southwestern	Bristol
Accomac	Town	519	0	Eastern	Hampton Roads
Alberta	Town	298	0	Central	Richmond
Amherst	Town	2,232	0	Southwestern	Lynchburg
Appalachia	Town	1,754	0	Southwestern	Bristol
Appomattox	Town	1,733	0	Southwestern	Lynchburg
Ashland	Town	7,225	0	Central	Richmond
Belle Haven	Town	532	0	Eastern	Hampton Roads
Berryville	Town	4,185	0	Northwestern	Staunton
Big Stone Gap	Town	5,614	0	Southwestern	Bristol
Blacksburg	Town	42,620	4	Southwestern	Salem
Christiansburg	Town	21,041	2	Southwestern	Salem
Clifton	Town	282	0	Northern	Nova
Hamilton	Town	506	0	Northern	Nova
Haymarket	Town	1,782	0	Northern	Nova
Hillsboro	Town	80	0	Northern	Nova
Leesburg	Town	42,616	4	Northern	Nova
Lovettsville	Town	1,613	0	Northern	Nova
Middleburg	Town	673	0	Northern	Nova
Occoquan	Town	934	0	Northern	Nova
Quantico	Town	480	0	Northern	Nova
Round Hill	Town	539	0	Northern	Nova
Culpeper	Town	16,379	2	Northern	Culpeper
Dumfries	Town	4,961	0	Northern	Nova
Front Royal	Town	14,440	1	Northwestern	Staunton
Herndon	Town	23,292	2	Northern	Nova
Purcellville	Town	7,727	0	Northern	Nova
Vienna	Town	15,687	1	Northern	Nova

APPENDIX C

APPROVAL PROCESS FLOW CHART

Red Light Camera Request and Approval Process



ALUE – Area Land Use Engineer
DA – District Administrator
RA – Residency Administrator
DTE – District Traffic Engineer
TED – CO Traffic Engineering Division
DOMM – District Operations Maintenance Manager

APPENDIX D

REFERENCE DOCUMENTS

REFERENCES

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J.S. Milazzo, J.E. Hummer and L.M. Prothe, *A Recommended Policy of Automated Electronic Traffic Enforcement of Red-Light Running Violations in North Carolina*, North Carolina Governor's Highway Safety Program, North Carolina State University, 2001.

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APPENDIX E

ENGINEERING SAFETY ANALYSIS TEMPLATE

VDOT
Traffic Signal Photo Enforcement
Engineering Analysis Template

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

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

Intersection approaches under consideration for photo enforcement:

This Study performed under the direction of _____
(licensed professional engineer)

A. INTERSECTION & SIGNAL DATA (Include information on all approaches not just those under consideration for photo enforcement)

1. Signal Visibility

a. Minimum Sight Distance to Signal

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

*See attached table of minimum sight distance requirements from the MUTCD.

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. Stop bars in "good" condition? ☐ Yes ☐ No
Explain: _____
_____

b. Lane lines "clearly" visible? ☐ Yes ☐ No
Explain: _____
_____

c. Crosswalks “clearly” marked? ☐ Yes ☐ No
Explain: _____
_____

d. Pavement conditions (ruts, potholes, cracking, etc.)?
☐ Good Explain: _____
☐ Fair Explain: _____
☐ Poor Explain: _____

e. Pavement surface treatments exist? (rumble strips, texturing, pavers, etc.)
☐ Yes Explain: _____
_____
☐ No

3. Provide scaled 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 (Include information on all approaches not just those under consideration for photo enforcement)

1. Clearance Intervals

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

*Reference ITE Guidelines for Determining Traffic Signal Change & Clearance Intervals April 2020.

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 discuss whether signal timings (phasing, cycle length, progression, coordination, etc) are contributing to red-light running problem.

a. Do signal timings or phasing factor in as a possible contributor to RLR at this intersection?

☐ Yes Explain: _____

_____

☐ No Explain: _____

_____

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

_____

_____

_____

3. Vehicle Detection Data

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

4. 48-Hour Traffic Volume & Classification Data (Concurrent with 12- hour violation survey)

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

C. CRASH & ENFORCEMENT DATA (Include information on all approaches not just those under consideration for photo enforcement)

1. Most Recent 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.12-hour observed violation rate (conducted concurrently with traffic count survey)
Date: _____
Time Period: _____

Approach and Movement	Traffic Volume	Number of Violations

*per 1000 vehicles

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: _____
_____

Minimum Sight Distance

85th Percentile Speed (mph)	**Minimum Sight Distance (ft)**
20	175
25	215
30	270
35	325
40	390
45	460
50	540
55	625
60	715

Table 4D-2 *Manual on Uniform Traffic Control Devices,* (2009 Edition) Transportation Research Board (TRB), Washington, DC, 2003