

Electronic Red Light Safety Program

Program Report for CY 2016

Delaware Department of Transportation

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Introduction

In accordance with Section 107 of House Bill 450 of the 148th General Assembly of the State of Delaware, the Department of Transportation (DelDOT) hereby acknowledges the directive to continue operations of the Red Light Safety Camera Program on an open-ended basis under specified conditions. For Calendar Year 2016, the conditions are as follows:

- a.) The program shall continue to use recognized safety and crash criteria in determining whether and where to add any new enforcement locations to this program. Prior to any new locations, the incumbent state senator and representative for the districts in which such locations are proposed, shall be notified prior to installation.
- b.) To assure integrity and propriety, no person involved in the administration or enforcement of this program shall own any interest or equity in the vendor used by the Department to support the administrative elements of the program. Any such person with an ownership or equity interest in such vendor must divest from the ownership or investment no later than ninety days after the effective date of this act. This restriction applies to anyone with either direct involvement in administering or enforcing this program and those in any supervisory capacity above such persons.

DelDOT's number one priority is the safety of all users, motorists, bicyclists and pedestrians on our roads. Our research shows the Electronic Red Light Safety Program (ERLSP) has greatly reduced the combined total number of red light running and angle crashes at red light monitored intersections since its inception. Red light running continues to be a serious traffic safety issue nationwide. According to the Insurance Institute for Highway Safety (IIHS):

- Red light runners cause hundreds of deaths and tens of thousands of injuries each year. In 2014, 709 people were killed and an estimated 126,000 were injured in crashes that involved red light running.
- A 2016 IIHS study comparing large cities with red light cameras to those without found the devices reduced the fatal red light running crash rate by 21 percent and the rate of all types of fatal crashes at signalized intersections by 14 percent
- An IIHS study of urban crashes found that those involving drivers who ran red lights, stop signs and other traffic controls were the most common type of crash (22 percent). Injuries occurred in 39 percent of the crashes in which motorists ran traffic controls.

Executive Summary

The Electronic Red Light Safety Program (ERLSP) is an electronic monitoring system located at 46 qualifying intersections across the State of Delaware. The current camera locations met eligibility having historically high incidences of red light running related crashes.

The technology for electronic enforcement utilizes a specialized camera, coupled with a traffic signal. The device detects the movement of vehicles into intersections after a signal turns red. The technology takes a picture of the violator's license plate to identify the vehicle. Using this information, a violation notice is generated and sent to the registered owner of the vehicle.

Title 21 §4101(d) allows the Department of Transportation and/or the governing body of any city or county to install and operate traffic light signal violation monitoring systems and assess fines accordingly. In 2016, this section was amended to state that in the event cameras were installed by jurisdictions other than the Department of Transportation, that DelDOT must first approve such installation using the same recognized safety and accident criteria used to determine DelDOT's new locations.

All existing locations erected without the Department of Transportation prior approvals shall be reviewed by DelDOT using same recognized safety and accident criteria used to authorize new locations. Any location that fails to meet the criteria shall be removed upon end of the contract with the camera operator vendor.

In addition, jurisdictions operating an Electronic Red Light Safety Program can only issue right turn on red violations if there is safety and crash data to support it as determined by the Department of Transportation.

All intersections using a traffic control photographic system or other traffic light signal violation monitoring system must adhere to the exact duration of the yellow light change interval. This time-period must be no less than the yellow light change interval duration specified in the design manual developed by the Department of Transportation.

Title 21 exclusively directs DelDOT to identify intersections with high crash incidents as potential candidates for the placement of electronic red light camera systems. In addition, DelDOT must qualify the engineering of any new cameras installed. The Department also manages the contractual obligations of the private company(s) through which the camera systems are installed and maintained, and through which violations are captured, processed, and collected.

Title 2 Transportation, Delaware Administrative Code; Section 1200 Office of Highway Safety, Section 1205, Electronic Red Light Safety Program regulations became effective in 2005, in accordance with Title 21.

Crash Data Analysis

DelDOT's statewide Electronic Red Light Safety Program (ERLSP) has resulted in significant reductions in crashes, specifically angle crashes, which are typically the most severe types of crashes. Analysis was performed to compare crash data before and after the installation of cameras at the initial 30 intersections equipped with enforcement technology. Crash data was reviewed for a three-year "before" period and an "after" period beginning following the installation of the cameras. The average "after" period was approximately 10 years. The following types of crashes were reviewed for the "before" and "after" periods:

- **Total crashes** include all crashes occurring within the vicinity of the intersection.
- **Angle crashes** include right angle crashes, as well as left-turn crashes caused by motorists proceeding through a red light. Crashes caused by motorists turning left on a "permissive" signal indication (i.e., a circular green or flashing red arrow) are not included in this analysis.
- **Red light running crashes** include crashes where a law enforcement officer cited at least one driver for disregarding a traffic signal.
- **Rear end crashes** include crashes when the rear vehicle fails to stop and strikes the front vehicle. This includes rear end crashes that occur at the onset of the yellow and red intervals as well as rear end crashes that occur at the back of a queue of standing vehicles that frequently occur several seconds following the change to a red signal indication.

Crash data was reviewed to determine the overall reduction in crashes for the four crash types. The following is a summary of the results:

- **Total crashes** increased by 6% in the "after" period
- **Angle crashes** reduced by 47% in the "after" period
- **Red light running crashes** reduced by 24% in the "after" period
- **Rear end crashes** increased by 9% in the "after" period

As demonstrated by the significant reduction in angle and red light running crashes, the safety benefits of the ERLSP continue to be realized by the traveling public. As the duration of the "after" evaluation period continues to expand, the results of the "before" and "after" studies will become more statistically reliable. As such, DelDOT will continue to monitor crash data at the locations equipped with enforcement technology.

- **SEE APPENDIX** for charts detailing the average number of crashes for the four crash types at each of the initial 30 intersections with enforcement technology

Data Method Technology

In 2010, the Delaware Criminal Justice Information System (DelJIS) implemented a new crash reporting system called E-Crash. In response to E-Crash, DelDOT implemented Crash Analysis Reporting System (CARS). E-Crash generates latitude and longitude coordinates when law enforcement officers identify the location of crashes in the field. These coordinates in addition to other elements and attributes of the crash report are then communicated to DelDOT for inclusion in CARS. This process results in a more accurate method of establishing the location of crashes, and provides more complete crash data. Data for the CY 2010 through CY 2016 Program Reports was acquired using CARS to document the crash benefits of the ERLSP. As such, data included during that time period is determined through a more accurate and complete reporting methodology.

As noted above, the new CARS system has resulted in a more complete and accurate crash reporting system. This new system has been in use since 2010 (approximately six years) and contains crash data from 2005 through present. Crash data from 2005 through 2009 was migrated from the former crash system into the new CARS system. However, the “before” periods for the first camera installations begin as early as 2001. Therefore, it is not feasible to obtain complete “before” and “after” crash data entirely from the new CARS system. Combining data between the former crash reporting system and the new CARS system may show an increasing trend in overall crashes as a result of the more complete data system. This may instead be the result of a more accurate and complete reporting system. This trend is likely to be more significantly observed in the review of “total” and “rear end” crashes, which are typically less severe compared to “angle” crashes. DelDOT will continue to monitor the impact that the new crash reporting system has on the “before” and “after” crash results.

Supporting Contractor

DelDOT operates the Electronic Red Light Safety Program with the vendor, Conduent (formerly Xerox). Conduent has managed the State’s program since 2014.

Camera Locations

Throughout the State, 102 DeIDOT ERLSP cameras are positioned at 46 signalized intersections. The ERLSP has operating agreements with four local jurisdictions – the City of Dover, City of Newark, City of Seaford, and the Town of Elsmere. These agreements allow the Department to place cameras at locations within municipal areas. Base fine revenue collected from municipal violations is passed to the appropriate jurisdiction. Local police personnel review recorded red light running events, which occur within municipal areas.

The Department in conjunction with the Delaware State Police (DSP) administers areas not included within the four incorporated locations. DSP is responsible for reviewing all non-municipal violations. The entire list of the Department's red light enforcement camera locations follows:

New Castle County:

- Old Baltimore Pike at Salem Church Road/Salem Woods Drive
- Route 2 at Harmony Road
- Route 2 at Red Mill Road/Polly Drummond Hill Road
- Route 2 at Route 41
- Route 2 at Route 7
- Route 4 at Marrows Road
- Route 58/Churchman's Road at Route 1 NB Ramps
- Route 92/Naamans Road at Shipley Road/Brandywine Parkway
- Route 273 at Harmony Road/Gerald Drive
- Route 273 at Route 7
- U.S. 13 at Roosevelt Avenue
- U.S. 40 at Route 72
- U.S. 40 at Route 896
- U.S. 40 at Scotland Drive
- U.S. 202 at Route 92
- Route 4 at Route 72
- Route 4 at Salem Church Road
- Route 58 at I-95 Ramps
- Route 58 at I-95 SB Off-ramp
- Route 72 at Kenmar Drive
- Route 141 at Route 34
- Route 141 at West Park Drive
- Route 273 at Route 1
- U.S. 13 at Boulden Boulevard
- U.S. 13 at Memorial Drive
- U.S. 40 at Eden Square
- U.S. 40 at Glasgow Drive
- U.S. 40 at Governors Square
- U.S. 202 at Silverside Road
- U.S. 301 at Summit Village

Sussex County:

- Route 1 at Munchy Branch Road/Miller Road
- Route 1 at Old Landing Road
- U.S. 13 at Road 40/Redden Road
- U.S. 113 at Route 20
- Route 1 at U.S. 9

City of Newark (Enforced by Newark Police):

- Elkton Road at Route 4
- Route 896 at Route 4

Town of Elsmere (Enforced by Elsmere Police):

- Route 2 at Dupont Road

City of Dover (Enforced by Dover Police):

- Governor's Avenue at North Street
- U.S. 13 at Division Street/Route 8
- U.S. 13 at Kings Highway/White Oak Road
- U.S. 13 at Loockerman Street
- U.S. 13 at Roosevelt Avenue
- U.S. 13 at Scarborough Road
- U.S. 13 at Webbs Lane

City of Seaford (Enforced by Seaford Police):

- U.S. 13 at Tharp Road

The Department commenced the installation of red light photo enforcement equipment at the highlighted intersections above in 2016, with “go-live” activations continuing into early 2017.

Violations

The violation fine for the ERLSP is \$137.50. This amount is calculated using three components: a base fine of \$75.00, a surcharge of \$37.50, a \$10.00 assessment for the Volunteer Ambulance Company Fund, and a \$15.00 assessment for the Fund to Combat Violent Crimes.

The \$75.00 fee is authorized under Title 21 §4101 (d) (2).

The \$37.50 surcharge originates from Title 11. Title 11 Delaware Code §4101 requires any fines or fees levied for violations of Title 21 (such as red light camera enforcement violations) include an additional 50% surcharge. In the case of the ERLSP, the additional 50% charge equals \$37.50.

In accordance with 11 Del.C. Section 4101(j), a \$10.00 assessment is placed on all Title 21 violations for the Volunteer Ambulance Company Fund. This assessment became effective in December 2014. All funds collected from this assessment are transferred to this fund.

In accordance with 11 Del.C. Section 4101(h), a \$15.00 assessment is placed on all Title 21 violations for the Fund to Combat Violent Crimes. This assessment became effective in July 2015. All funds collected from this assessment are transferred to this fund.

The 2011 General Assembly passed legislation allowing both the state and municipalities to increase their red light violation base fines to \$110.00. The Department of Transportation has elected not to increase the fine from its \$75.00 base.

Under the State of Delaware's ERLSP, violation notices are sent directly to the registered owner of the vehicle. Unlike traditional violations cited by a police officer, the camera violations are considered a civil offense and not a criminal offense. Because of this, the violation and fine do not affect the motorist's insurance rate or accumulate points on their driving record. Unpaid violations are subject to restrictions on renewal at time of vehicle registration. If delinquent, the Department increases the fine by \$10.00 for each 30-day period past the event, up to \$30.00 for 90 days.

In calendar year 2016, 50,218 Notices of Civil Violations were issued for red light running. This is an increase of 21.48% from calendar year 2015, when 39,430 violations were distributed.

Table I: Comparison of Violations from 2012 to 2016

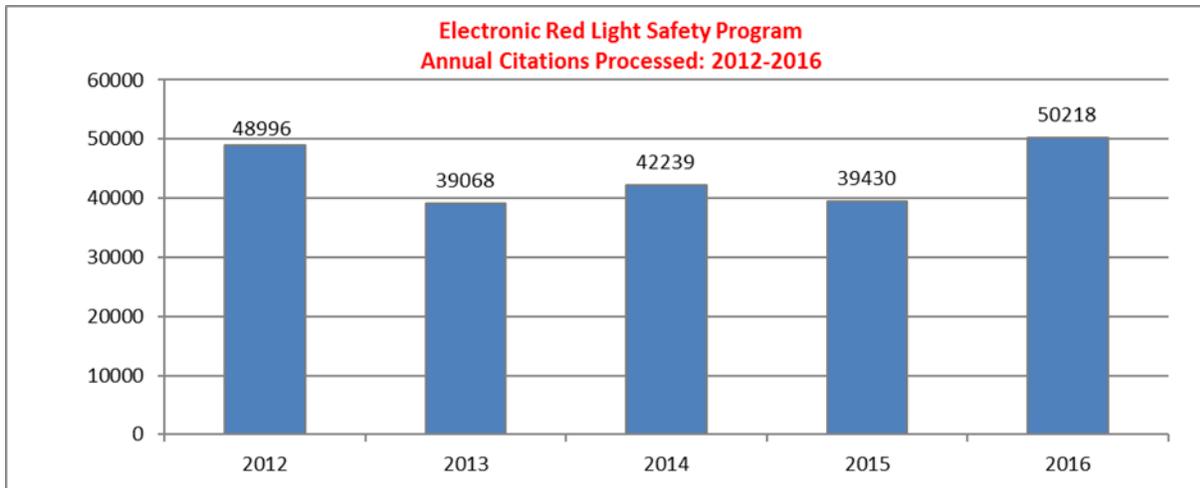
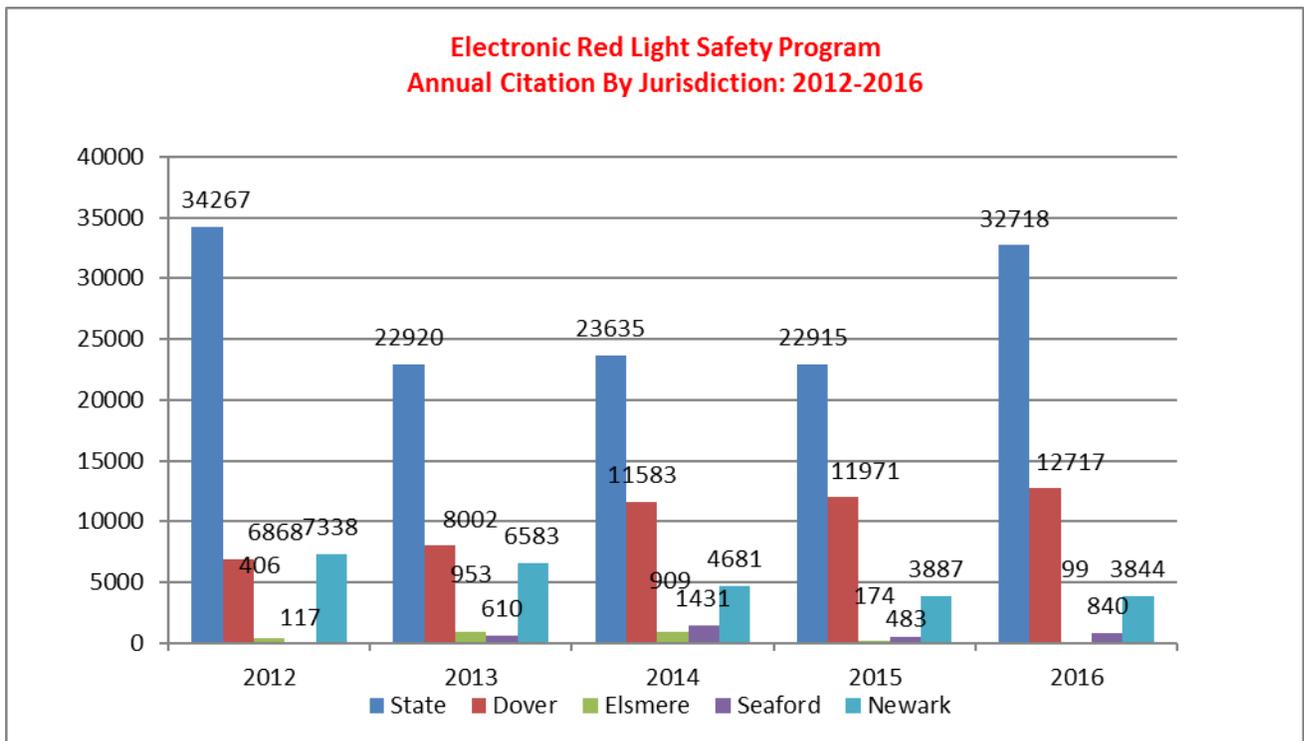


Table II: Comparison of Violations from 2012 to 2016 by Jurisdiction



Revenue / Expenses

Although the ERLSP's priority is safety and not revenue generation, the program does produce more money than it costs to operate. The total receipts collected through the program in calendar year 2016 were \$5,171,364.70.

Table III: Comparison of Revenue/Expenses from 2012 to 2016

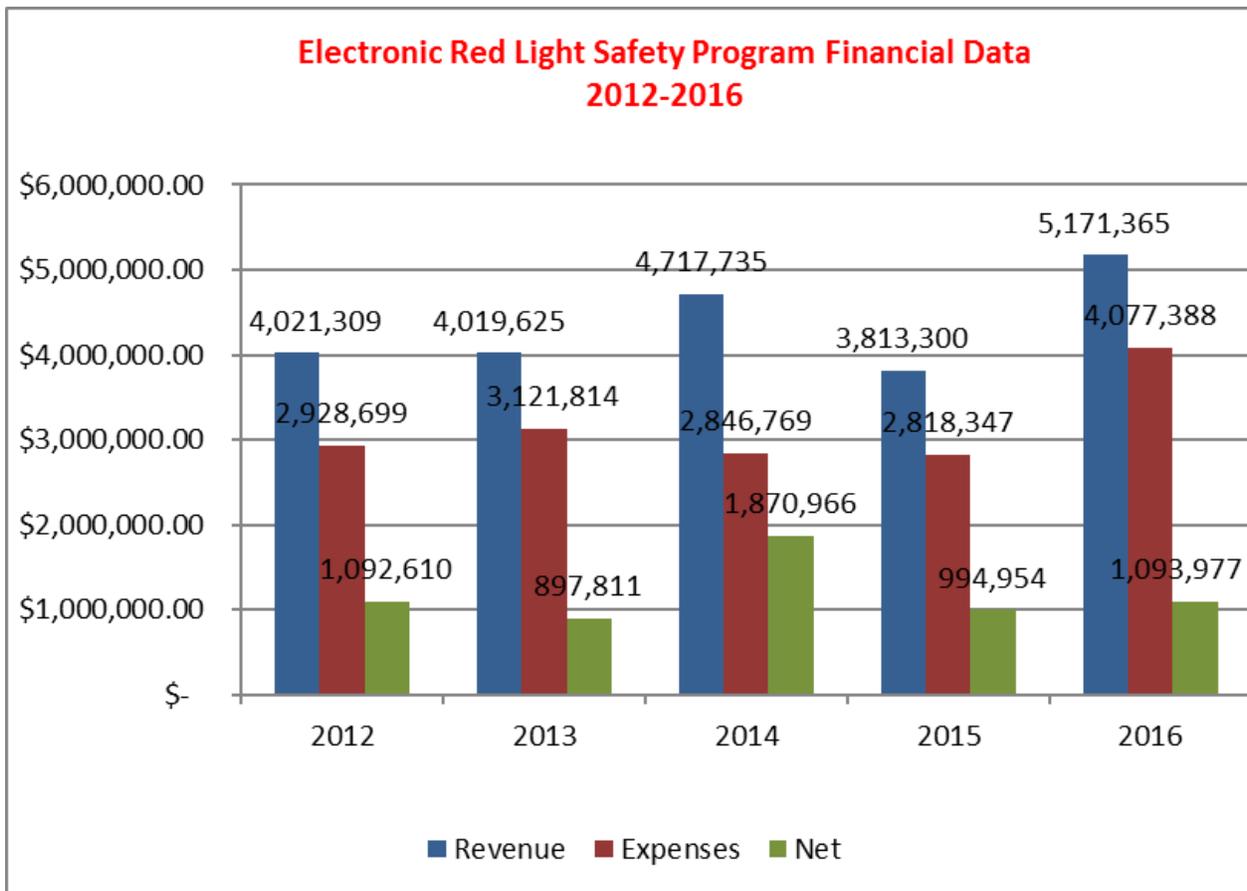


Table IV: Comparison of Revenue/Expenses from 2012 to 2016 Combined and by Jurisdiction

CY 2016 Eletronic Red Light Safety Program Report
Comparison of Revenue/Expenses from 2012 to 2016 Combined and by Jurisdiction

Year	Total Income Collected	ATS/Xerox Expenses	Additional Expenses	Total Program Net Income	Year	Total Citations	Expected Income
2012	\$ 4,021,309.35	\$ 2,829,508.57	\$ 99,190.72	\$ 1,092,610.06	2012	37855	\$ 4,258,687.50
2013	\$ 4,019,624.80	\$ 2,830,238.46	\$ 291,575.61	\$ 897,810.73	2013	39068	\$ 4,395,150.00
2014	\$ 4,717,734.98	\$ 2,701,326.55	\$ 145,442.00	\$ 1,870,966.43	2014	42239	\$ 4,751,887.50
2015	\$ 3,813,300.20	\$ 2,664,149.46	\$ 154,197.54	\$ 994,953.20	2015	39430	\$ 4,830,175.00
2016	\$ 5,171,364.70	\$ 2,944,628.45	\$ 1,132,759.51	\$ 1,093,976.74	2016	50218	\$ 6,151,705.00

Year	State Income	Expense	Net	Year	Elsmere Income	Expense	Net
2012	\$ 2,502,886.50	\$ 1,957,855.20	\$ 545,031.30	2012	\$ 20,524.85	\$ 59,892.27	\$ (39,367.42)
2013	\$ 2,366,944.48	\$ 1,968,236.87	\$ 398,757.61	2013	\$ 53,276.00	\$ 60,613.00	\$ (7,337.00)
2014	\$ 2,484,439.99	\$ 2,066,722.41	\$ 417,717.58	2014	\$ 84,253.52	\$ 50,250.86	\$ 34,002.66
2015	\$ 2,362,743.10	\$ 1,782,013.19	\$ 580,729.91	2015	\$ 25,009.50	\$ 45,392.00	\$ (20,382.50)
2016	\$ 3,078,424.19	\$ 2,540,968.46	\$ 537,455.73	2016	\$ 16,821.50	\$ 47,916.00	\$ (31,094.50)

Year	Dover Income	Expense	Net	Year	Newark Income	Expense	Net
2012	\$ 732,254.89	\$ 452,574.54	\$ 279,680.35	2012	\$ 699,548.11	\$ 249,399.62	\$ 450,148.49
2013	\$ 804,382.83	\$ 488,586.71	\$ 315,796.12	2013	\$ 678,330.59	\$ 189,210.64	\$ 489,149.95
2014	\$ 1,448,603.81	\$ 529,744.36	\$ 918,859.45	2014	\$ 560,165.66	\$ 156,365.16	\$ 403,800.50
2015	\$ 1,044,177.40	\$ 699,252.26	\$ 344,925.14	2015	\$ 337,475.70	\$ 187,032.18	\$ 150,443.52
2016	\$ 1,513,994.76	\$ 1,066,681.50	\$ 447,313.26	2016	\$ 483,533.00	\$ 300,397.00	\$ 183,136.00

Year	Seaford Income	Expense	Net
2012	\$ 66,095.00	\$ 109,786.94	\$ (43,691.94)
2013	\$ 116,640.90	\$ 123,591.24	\$ (6,950.34)
2014	\$ 140,272.00	\$ 99,184.78	\$ 41,087.22
2015	\$ 43,894.50	\$ 104,656.92	\$ (60,762.42)
2016	\$ 78,591.25	\$ 121,425.00	\$ (42,833.75)

The expenses of the program for Conduent (formerly Xerox) are deducted from the gross receipts prior to the distribution of revenue to our jurisdictions. Additional expenses include, DSP, Whitman, Requardt & Associates, LLP (WRA) for engineering support, and refunds – not passed on to the jurisdictions.

For intersections in which revenue does not cover the cost of the cameras and other operational costs, expenses are paid from the state’s revenue.

Court Data

In calendar year 2016, of the 50,218 violations, 229 cases were scheduled for trial. Of these, 224 were upheld by the court and 5 were dismissed. When appeals do occur, most are settled prior to a court hearing. This is largely due to the quality of evidence collected.

Affidavits

Under 21 Del. Code §4101 (d) (9), Delaware law permits a registered vehicle owner to divert responsibility for a video offense if another driver was operating their vehicle at the time the violation occurred. If a registered owner identifies another driver as the violator on the affidavit, the identified driver has the same legal options the registered owner had originally – to accept responsibility and pay the fine or to challenge the allegation in Court.

Should the identified driver opt to challenge the allegation, the prosecution must subpoena the registered owner to Court. This allows a judge to hear from both the registered owner and the identified driver as to who may be responsible for the violation.

Delinquent Fine Payments

For every 30 days that an ERLSP violation remains unpaid after the due date, the fine increases by \$10. After 90 days of non-payment, the fine is capped at \$142.50. The fine becomes delinquent after it is 120 days overdue.

The number of delinquencies in calendar year 2016 was 8,741 out of 50,218 violations processed, totaling \$1,402,178.00. Currently, there are 69,175 outstanding violations from a ten-year period. Approximately 52.23% of the violations are from in-state registered vehicles. Maryland tags accounted for 7,482 (10.82%) of outstanding violations, New Jersey tags equaled 2,807 (4.06%) of outstanding violations and Pennsylvania tags accounted for 8,188 (11.84%) of outstanding violations.

If the in-state owner of a vehicle ignores the court-ordered fine, the Division of Motor Vehicle (DMV) puts a hold on vehicle registration renewals.

The Department contracts with Conduent (formerly Xerox) for delinquent fee collections. As of December 2016, Conduent collected funds for 6,847 violations, totaling \$924,237.01. A total of \$233,449.34 was retained by the organization for collection activities.

New Intersections

As part of its ongoing priority to reduce the frequency of crashes at all intersections, the Department continuously evaluates the need for the placement of cameras throughout the state. Intersections selected into the ERLSP are determined eligible through engineering-based criteria and the use of the most recent crash data. The Delaware Strategic Highway Safety Plan (SHSP) established the reduction of intersection-related fatalities and serious injuries as the SHSP's number one emphasis area. Consistent with the engineering and enforcement goals of the SHSP, the ERLSP reduces the frequency of angle and red-light-running crashes at signalized intersections, as supported in the corresponding annual reports.

The most important criterion in selecting an intersection is the frequency of angle crashes due to red light running. Another factor is the intersection's geometry; specifically, whether the physical configuration of the intersection allows for the installation of ERLSP equipment. Once candidate locations are identified, additional analyses, such as the use of countermeasures in lieu of cameras, the efficacy of capturing images at approaches, and the impacts on other aspects of the intersection's performance, are researched. Each of these steps are considered prior to any final recommendations, as indicated in the ERLSP intersection selection process guidelines included in the Appendix.

The Department completed its most recent site selection process during CY 2015 and into early 2016 and is currently expanding the ERLSP beyond the existing 30 locations to implement red light enforcement monitoring at the following 16 signalized intersections (with CY 2016 installation dates noted):

New Castle County

- Route 4 (E. Chestnut Hill Road) at Route 72 (S. Chapel Street) – **operational 12/26/16**
- Route 4 (E. Chestnut Hill Road) at Salem Church Road / Route 273 Connector – **operational 10/18/16**
- Route 58 (Churchmans Road) at I-95 southbound off-ramp
- Route 58 (Churchmans Road) at Route 7 southbound / Route 1 southbound / I-95 ramps
- Route 72 (S. Chapel Street) at Kenmar Drive / Pencader Plaza – **operational 11/19/16**
- Route 141 (Centre Road) at Route 34 (Faulkland Road)
- Route 141 (Powder Mill Road) at W. Park Drive / U.S. 202 southbound off-ramp
- Route 273 (Christiana Road) at Route 1 southbound ramps – **operational 09/08/16**
- U.S. 13 at Boulden Boulevard / Bacon Avenue – **operational 09/08/16**
- U.S. 13 at Memorial Drive / Hazeldell Avenue – **operational 08/24/16**
- U.S. 40 at Eden Square – **operational 09/15/16**
- U.S. 40 at Glasgow Drive – **operational 11/21/16**
- U.S. 40 at Governors Square – **operational 10/10/16**
- U.S. 202 at Silverside Road
- U.S. 301 / Route 896 (Summit Bridge Road) at Summit Village Shopping Centre / Shoppes of Mt. Pleasant

Sussex County

- Route 1 at U.S. 9 / Savannah Rd – **operational 11/08/16**

Further, monitoring at the following 5 existing intersections (of the 30 presently monitored intersections) has been expanded to include additional approaches with relatively high frequencies of red-light-running crashes:

New Castle County

- Route 58 (Churchmans Road) at Route 7 northbound ramps / Geoffrey Drive – **operational 07/22/16**
- U.S. 13 at Roosevelt Avenue – **operational 07/29/16**
- U.S. 40 at Route 896 (S. College Avenue) – **operational 07/16/16**
- U.S. 40 at Scotland Drive – **operational 07/22/16**

Sussex County

- U.S. 113 at Route 20 (Hardscrabble Road) / Betts Pond Road – **operational 11/05/16**

The 16 new sites and the expansion of 5 of the 30 existing locations were assessed in accordance with the intersection selection process guidelines provided in the APPENDIX. A threshold of 7 at-fault-approach, red-light-running crashes within the 5-year crash analysis period was used in both the selection of new sites and the expansion of existing sites. Locations with crash histories above this threshold were deemed eligible for evaluating the feasibility and effectiveness of automated red-light-running monitoring.

In accordance with the authorizing legislation, prior to the installation of the cameras at the 16 new intersections, notifications were provided to the incumbent state senator and representative for the districts in which such locations were proposed. The Department's camera vendor, Conduent (formerly Xerox), initiated preliminary engineering for the new ERLSP camera installations, which are presently being activated under a phased construction schedule throughout CY 2016 and CY 2017, as noted above.

For “before” and “after” crash rate comparisons at red light camera sites, the Department has typically provided a 6-month “buffer period” between the “before” crash data and “after” crash data to account for irregularities due to construction and installation of the camera (i.e., 3 months before monitoring becomes operational) and due to motorists altering their behaviors (i.e., 3 months after monitoring becomes operational). The CY 2016 “after” crash data period for the 16 newly constructed sites is limited to only a handful of months or less; therefore, the comprehensive ERLSP crash data analysis for these intersections will not be provided until the Program Report for CY 2017.

DelDOT Program Recommendations based on CY 2016 Data

For the past eleven years, the Electronic Red Light Safety Program has demonstrated successful reductions in overall red light running and angle crashes at intersections with red light camera installations. Our primary focus remains on safety, and not the monetary aspects of the program.

The Department recommends the following operating strategy for CY 2017:

- Continue to work with our partnering municipalities to make sure their needs are met.
- Continue to analyze crash data to better understand why crashes are occurring and identify ways to improve safety.
- Review the collections process to determine if changes need to be made to obtain greater efficiency and recoupment. Included in the review will be the pursuit of reciprocity with other states as part of an effort through the Division of Motor Vehicles for general reciprocity among neighboring states.
- Continue to work with jurisdictions outside of the State's program to ensure compliance with Title 21.

APPENDIX

** Figures 1 through 4 following this section depict the average number of crashes per year for the four crash types at each of the initial 30 intersections with enforcement technology.

Figure 1: Total Crashes by Year

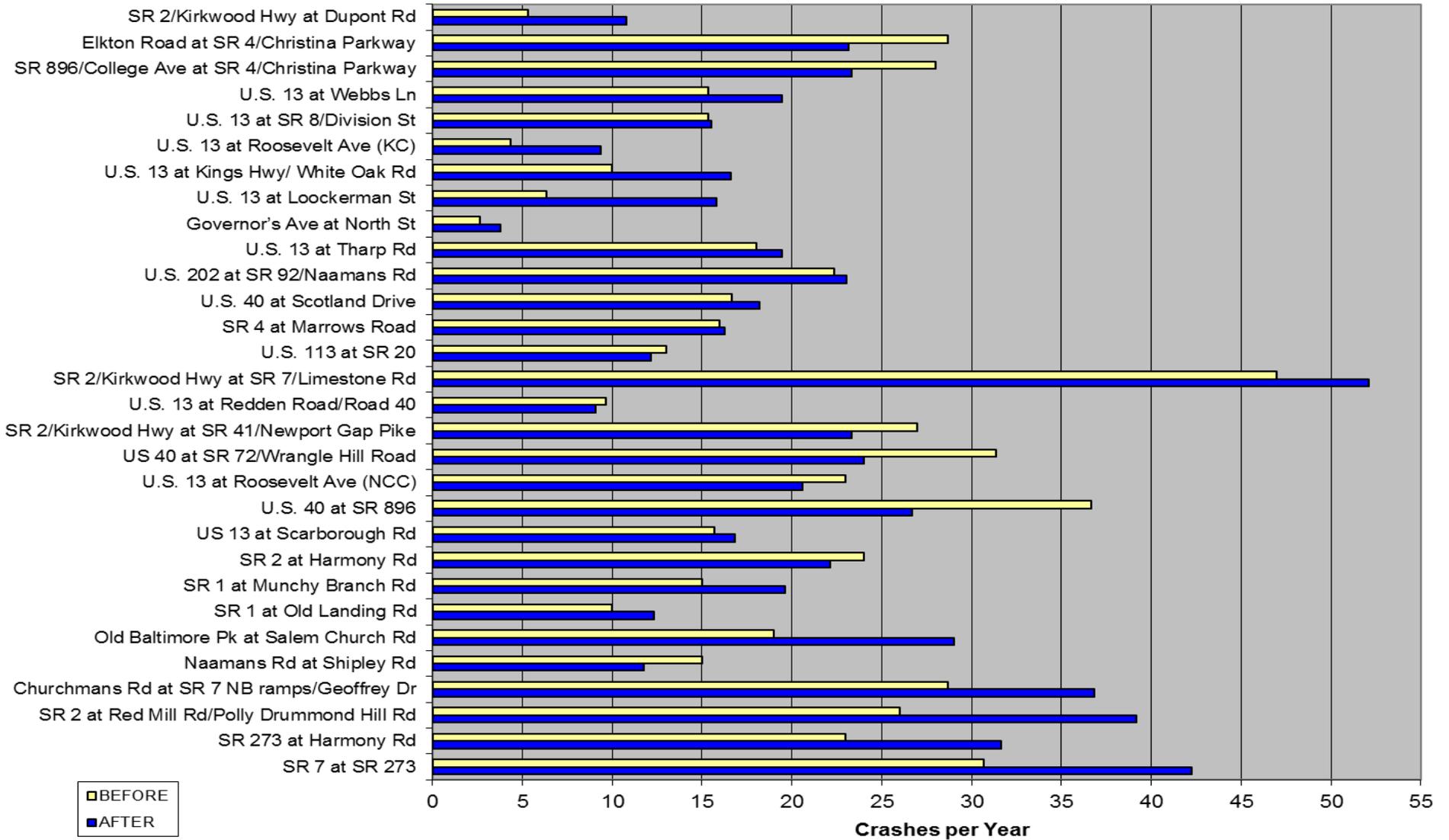


Figure 2: Angle Crashes by Year

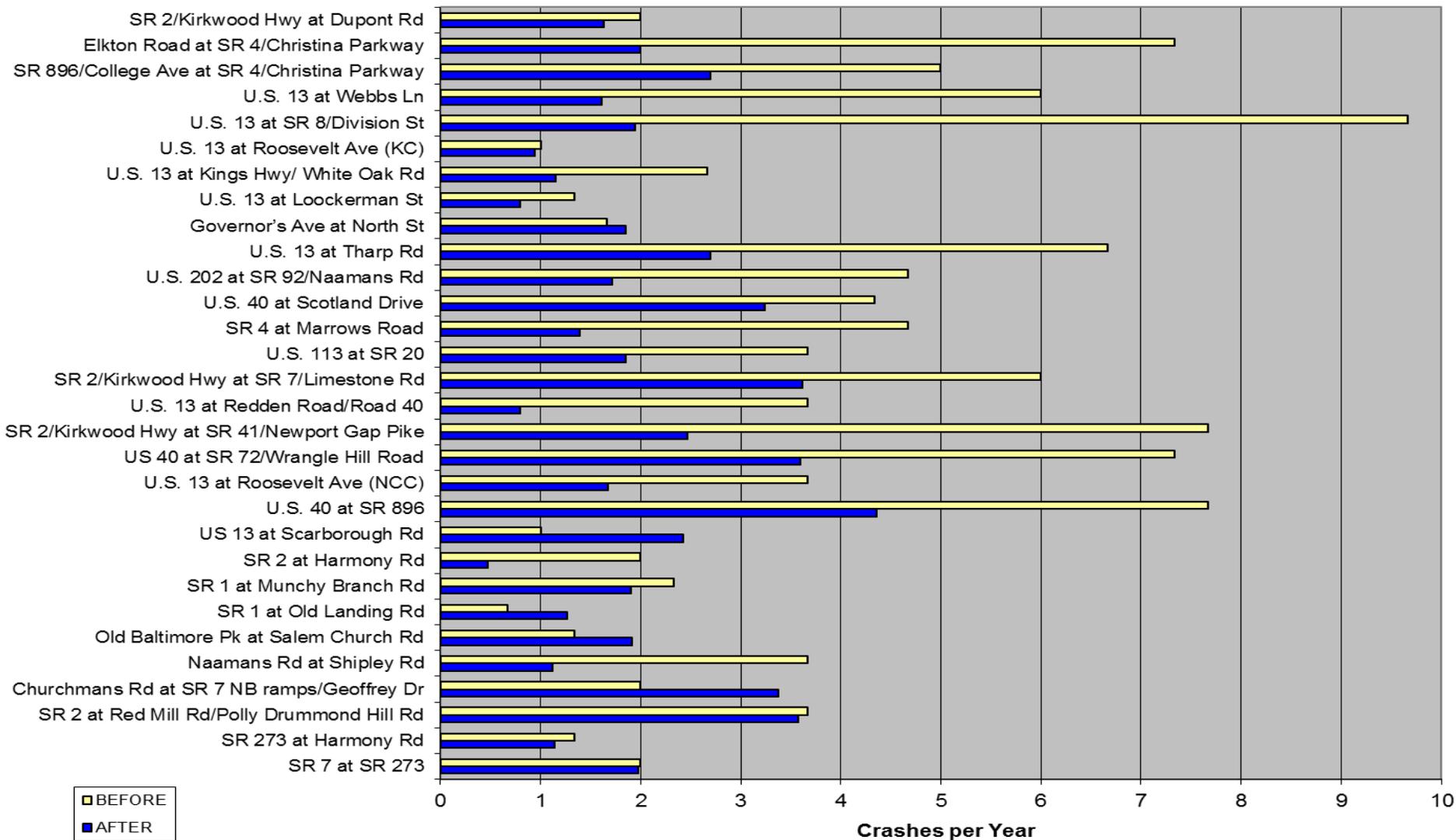


Figure 3: Red Light Running Crashes by Year

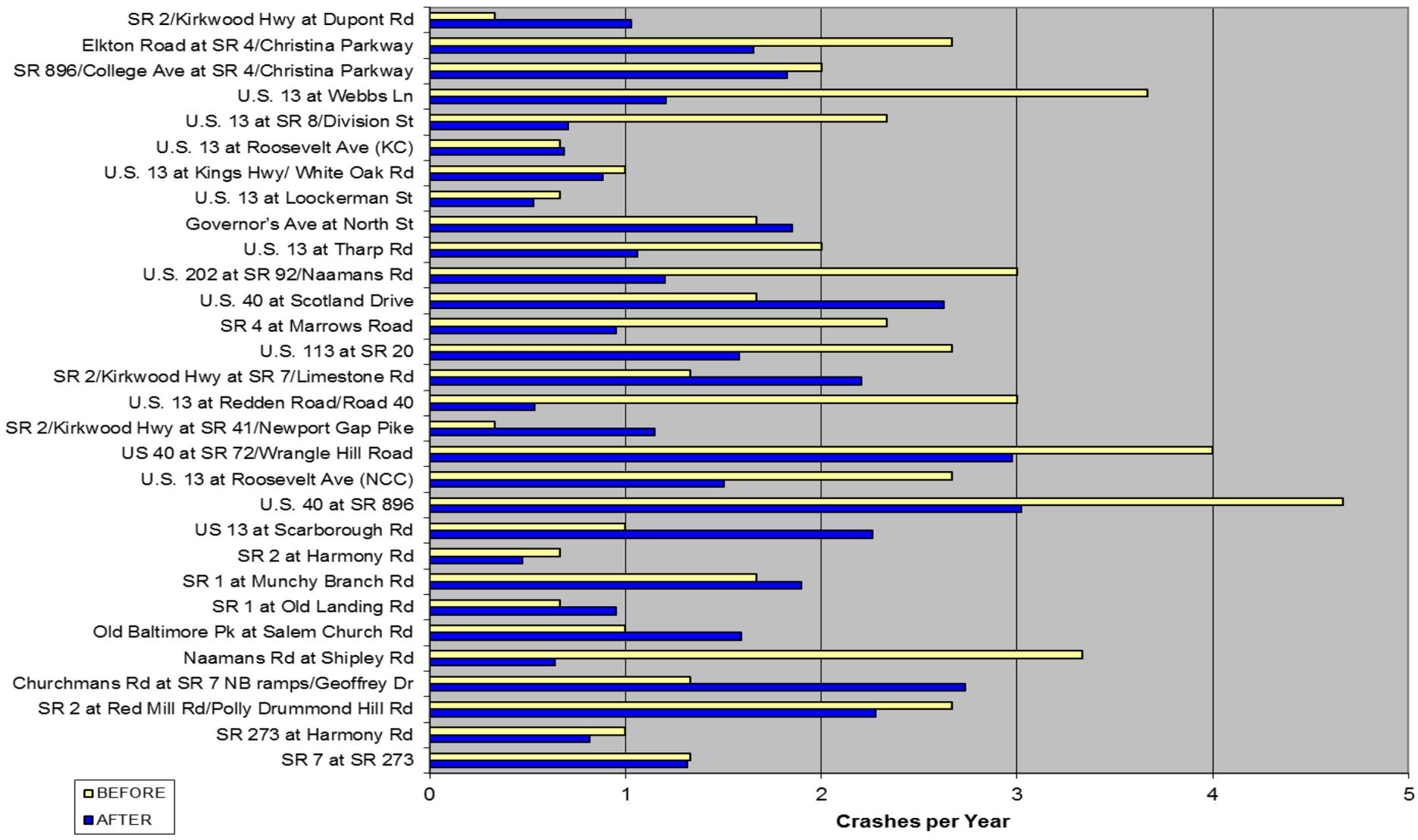
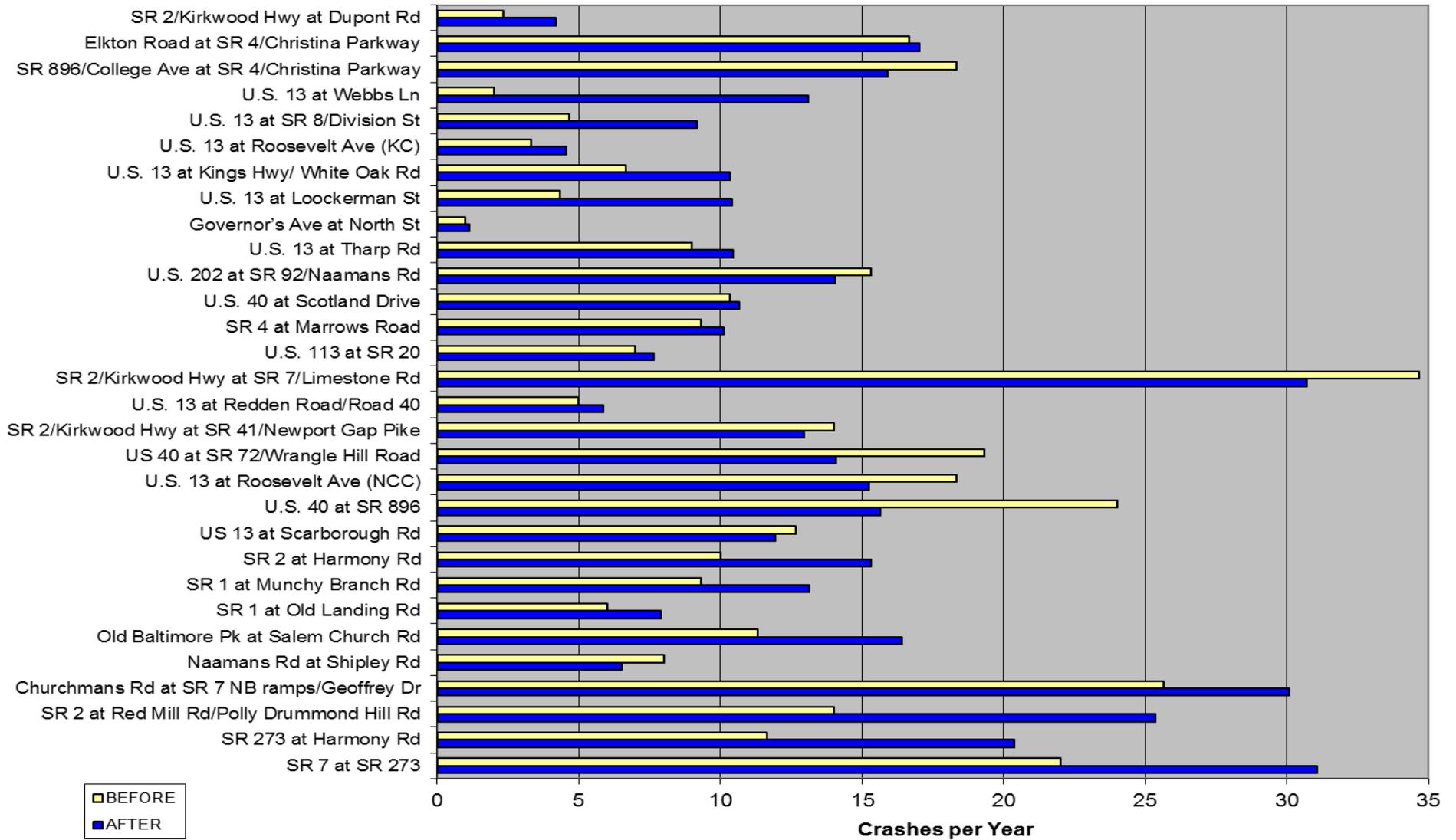


Figure 4: Rear End Crashes by Year



Electronic Red Light Safety Program

Intersection Selection Process

January 26, 2016

Initial Screening

- 1) Intersections are first ranked (highest to lowest) by the total number of red-light running crashes by approach using the most recent five years of available crash data. Summary crash data is used (i.e., individual police reports are not reviewed during this step). This includes existing ERLSP intersections with approaches that are not currently monitored.
- 2) The following intersections are eliminated from further consideration during the current selection process:
 - a) Locations that were eliminated from consideration in prior years due to site constraints (see Step 5 below)
 - b) Locations where remedial improvements were installed during or after the crash study period that would reduce the potential for red-light running crashes (e.g., signal reconstruction or intersection improvements project)
- 3) Cameras are installed on an intersection approach; therefore, the top-ranked intersections (typically intersections with 5 or more red-light running crashes during the study period) identified in Steps 1 and 2 are then re-ranked (highest to lowest) by the highest number of "at-fault" crashes by approach based on a review of police reports.
- 4) The top-ranked intersections are evaluated to determine whether other types of engineering solutions could address the red-light running crashes.
 - a) If the engineering solutions can be implemented in a relatively short time period, they are implemented based on availability of funding and the intersection is eliminated from consideration during the current selection process.
 - b) If DeIDOT Traffic determines that the solutions cannot be implemented in a timely manner or may require a capital project, the intersection in question may still be considered for red light camera installation.
 - c) For all intersections under consideration, required yellow change and red clearance interval times are calculated and updated based on DeIDOT's revised engineering practices which went into effect as of February 25, 2015 (*Traffic Design Manual - 2015 Edition* http://www.deldot.gov/information/pubs_forms/manuals/traffic_design/index.shtml).
- 5) Site visits are performed to determine whether it is feasible to install and operate ERLSP equipment at the remaining candidate intersections. Factors considered include:
 - a) Compatibility with site conditions/infrastructure

- b) Availability of right-of-way for ERLSP equipment
- c) Availability of clear lines of sight for camera perspectives
- d) Confirmation that no road construction or intersection upgrades that would disrupt the camera system are planned at the intersection in the near future

Final Screening

- 6) Actual violation data is collected (by the vendor) for the top intersections identified in the initial screening (Steps 1 – 5).
- 7) The violation data is reviewed by DeIDOT and compared to each intersection's red-light running crash data and a determination is made as to which approaches should be monitored based on the following:
 - a) The approach with the highest number of crashes by at-fault approach shall be monitored
 - b) Other approaches with a high frequency of red-light running crashes
 - c) High frequency of violations
 - d) Complementary movements (i.e., for approaches where the left-turn movement and the through movement share a stop line, both movements may be monitored)
- 8) In accordance with the authorizing legislation, prior to the installation of cameras at new intersections, the incumbent state senator and representative for the districts in which such locations are proposed shall be notified.