
COUNTYWIDE REVIEW OF THE SUFFOLK COUNTY RED LIGHT CAMERA PROGRAM



Suffolk County Department of Public Works

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Executive Summary

Introduction

Since 1993, many states and local jurisdictions have adopted red light cameras as automated enforcement of red light ordinances. The use of cameras for red light violations is the most common example of automated enforcement programs that utilize cameras to enforce traffic safety laws. In red light camera programs, automated cameras take photographs and videos of vehicles entering intersections with traffic signals displaying a red light, and citations are sent to the vehicle's registered owner.

The Suffolk County Red Light Camera (RLC) program was authorized in 2009 under NYS Vehicle and Traffic Law, and is administered by the Suffolk County Traffic and Parking Violations Agency (TPVA). In May of 2009, New York State authorized the installation of red light cameras at fifty (50) locations in Suffolk County, and in June of 2010, the first cameras were activated. In June 2012, and additional fifty (50) cameras were authorized. In January 2013, the RLC program was transferred to TVPA. Between 2013 and 2014, the 50 additional cameras were installed, and 18 of the previously authorized locations were relocated. By October of 2014, 215 cameras were operating at 100 intersections, which is the current configuration of the program.

As with all RLC programs, the Suffolk County RLC program is intended to reduce red light running, and by extension, the occurrence of crashes associated with violations of this kind, widely considered to include right angle and left turn crashes, which are the crashes more likely to result in higher severity, including injury and fatality. Industry-wide research reviewed for the purposes of this study indicates that this pattern is not an uncommon occurrence at intersections where red light programs have been instituted. It also indicates an increase in the overall number of crashes could be expected.

For example, the results of a study conducted by the Federal Highway Administration (FHWA) based on 132 intersections in California concluded that red light camera programs increase total number of crashes, reduce right angle crashes, and provide generally positive safety and economic benefit. However, other studies indicate the contrary, including a study by the National Motorists Association that concluded that crashes increased with no discernable safety benefit due to red light camera enforcement. See Appendix A for additional information regarding these studies.

Therefore, in 2017, the Suffolk County Legislature directed the Suffolk County Department of Public Works (SCDPW) to engage an independent third party contractor to conduct a comprehensive review of the RLC program, to review the intersections in the RLC program, evaluate the efficacy of the program, and to serve as guidance as to the future conduct of the program.

This effort has been completed, and a report has been prepared documenting the procedures, methodologies, results and recommendations of the comprehensive review of the Suffolk County Red

Light Camera (RLC) program. The following sections of this Executive Summary provide a summary overview of the report.

Study Locations and Description

The study examines the entirety of the Suffolk County RLC program. At the time this writing, a total of 215 red light cameras were operating at 100 signalized intersections in Suffolk County. These intersection locations, which are referred to in this report as Active RLC locations, are identified in Table ES-1. Note that at a number of locations, more than one approach to the intersection is monitored, thus there are more cameras than intersections. Fifty-eight (58) of these intersections are under the jurisdiction of the New York State Department of Transportation, and the remaining forty-two (42) are at intersections under the jurisdiction of SCDPW. The crash experience at these 100 intersections for three years prior (2007 through 2009) to RLC enforcement and for three years during RLC enforcement (2015 through 2017) was examined in this study. For the purposes of this report, these periods are referred to as the Pre-Enforcement and Active-Enforcement periods.

In addition to the 100 Active RLC intersections in the program, eighteen (18) intersection locations are included in the study where red light cameras had previously been deployed, but were subsequently relocated to one of the above 100 intersections. Information regarding these intersections is provided in Table ES-2. These intersections are referred to as Deactivated RLC intersections in this report. The crash experience at these 18 Deactivated intersections prior to RLC enforcement (2007 through 2009), during RLC enforcement (variously between 2010 and 2013), and after the red light cameras were removed (2015 through 2017) was examined in this study. In addition to the study periods identified above for Active locations, the crash experience during the three years following removal of the cameras was examined. This study period is referred to as the Post-Enforcement period.

Table ES-1. 100 Active Intersection Locations

Int. No.	Roadway 1		Roadway 2	Enforced Approach	Jurisdiction	Hamlet
1	CR 4 (Commack Rd)	at	I495N	SB, WB	NYSDOT	East Half Hollow Hills
2	CR 112 (Johnson Ave)	at	NY27N	SB, WB	NYSDOT	Sayville
3	NY25	at	Pidgeon Hill Rd	EB, WB	NYSDOT	South Huntington
4	CR 93 (Ocean Ave)	at	I495S	NB, EB	NYSDOT	Ronkonkoma
5	Ronkonkoma Ave	at	I495N	SB, WB	NYSDOT	Ronkonkoma
6	NY25	at	Eastwood Blvd	EB, WB	NYSDOT	Centereach
7	Old Nichols Rd	at	I495N	SB, WB	NYSDOT	Ronkonkoma
8	NY111	at	I495S	NB, EB	NYSDOT	Hauppauge
9	CR 93 (Ocean Ave)	at	I495N	SB, WB	NYSDOT	Ronkonkoma
10	CR 67 (Motor Pkwy)	at	I495S (Exit 57)	NB, WB	NYSDOT	Islandia
11	CR 28 (New Hwy)	at	NY109	NB, EB, WB	NYSDOT	East Farmingdale
12	CR 83	at	NY25	NB, SB, EB, WB	NYSDOT	Selden
13	NY25	at	Holbrook Rd	EB, WB	NYSDOT	Centereach
14	NY110	at	CR 47 (Great Neck Rd)	NB, SB, WB	NYSDOT	Farmingdale
15	NY111	at	I495N	SB, WB	NYSDOT	Hauppauge
16	NY112	at	NY27N	SB, WB	NYSDOT	East Patchogue
17	CR 4 (Commack Rd)	at	NY25	NB, SB, EB, WB	NYSDOT	Commack

Int. No.	Roadway 1		Roadway 2	Enforced Approach	Jurisdiction	Hamlet
18	I495S	at	CR 4 (Commack Rd)	NB, EB	NYSDOT	Dix Hills
19	CR 2 (Straight Path)	at	NY27	NB, EB	NYSDOT	Lindenhurst
20	NY112	at	NY27S	NB, EB	NYSDOT	East Patchogue
21	NY25	at	Larkfield Rd	EB, WB	NYSDOT	Elwood
22	NY110	at	Conklin St	EB, SB	NYSDOT	Farmingdale
23	NY110	at	NY25	NB, EB, WB	NYSDOT	South Huntington
24	NY454	at	CR 100 (Suffolk Ave)	NB, SB	NYSDOT	Islandia
25	NY25	at	NY112	EB, WB	NYSDOT	Coram
26	NY25A	at	CR 21 (Rocky Point -Yaphank Rd)	EB, WB	NYSDOT	Rocky Point
27	NY112	at	CR 99 (Woodside Ave)	NB, SB, EB, WB	NYSDOT	South Medford
28	NY112	at	I495S	NB, EB	NYSDOT	Medford
29	NY112	at	I495N	SB, WB	NYSDOT	Medford
30	NY454	at	Broadway	EB, WB	NYSDOT	South Holbrook
31	NY347	at	Mark Tree Rd	EB, WB	NYSDOT	East Setauket
32	I495S	at	NY231 (Deer Park Ave)	EB	NYSDOT	Dix Hills
33	NY111, Joshua's Path	at	CR 67, Motor Pkwy	NB, SB, EB, WB	NYSDOT	Hauppauge
34	Hawkins Ave/Stony Brook Rd	at	NY25, Middle Country Rd	NB, SB, EB, WB	NYSDOT	Lake Grove
35	Mount Sinai Coram Rd	at	NY25, Middle Country Rd	SB, EB	NYSDOT	Coram
36	CR 47, Great Neck Rd	at	NY 27A	SB, WB	NYSDOT	Copiague
37	NY 112	at	Barton Ave	NB, SB	NYSDOT	East Patchogue
38	NY 25A	at	Mount Sinai Coram Road	EB, WB	NYSDOT	Mount Sinai
39	Miller Place Rd	at	NY 25A	NB, SN	NYSDOT	Miller Place
40	NY 454	at	Lincoln Ave	EB, WB	NYSDOT	Commack
41	CR 47, Great Neck Rd	at	CR 2, Dixon Ave	NB, SB, EB, WB	SCDPW	Copiague
42	CR 28, New Highway	at	Ralph Ave	SB	SCDPW	North Amityville
43	CR 47, Great Neck Rd	at	CR 12, Oak St	NB, SB	SCDPW	Copiague
44	CR 96, Great East Neck Rd	at	Raynor Ave	NB, SB	SCDPW	West Babylon
45	CR 96, Great East Neck Rd	at	Arnold Ave	NB, SB	SCDPW	West Babylon
46	NY 25	at	Redwood Lane	EB, WB	NYSDOT	Smithtown
47	NY 25/25A, E. Main Street	at	Landing Ave	EB, WB	NYSDOT	Smithtown
48	CR 14, Indian Head/Harned Rd	at	NY 25	NB, SB, WB	NYSDOT	Commack
49	CR 3, Pinelawn Road	at	I-495, Express Drive North	SB, WB	NYSDOT	Melville
50	NY 231, Deer Park Ave	at	Nicolls Road	NB, SB	NYSDOT	Deer Park
51	NY 231, Deer Park Ave	at	CR 57, Bayshore Road	SB	NYSDOT	North Babylon
52	CR 10, Elwood Road	at	NY 25, Jericho Turnpike	SB, EB, WB	NYSDOT	Elwood
53	CR 17, Carleton Ave	at	NY 27A	NB, SB, EB	NYSDOT	East Islip
54	CR 13, Fifth Ave	at	CR 50, Union Blvd	NB, EB, WB	SCDPW	Bay Shore
55	CR 100, Suffolk Ave	at	Brentwood Road	EB, WB	SCDPW	Brentwood
56	CR 17, Carleton Ave	at	CR 100, Suffolk Ave	SB, EB, WB	SCDPW	Central Islip
57	CR 13, Fifth Ave	at	CR 57, Bay Shore Rd	NB, EB, WB	SCDPW	Bay Shore
59	CR 100, Suffolk Ave	at	2nd St/ Madison Ave	EB, WB	SCDPW	Bay Shore
60	CR 13, Fifth Ave	at	CR 100, Suffolk Ave	NB, SB, WB	SCDPW	Brentwood
61	CR 46, William Floyd Pkwy	at	Lawrence Rd/ Flintlock Dr	NB, SB	SCDPW	Shirley
62	CR 46, William Floyd Pkwy	at	Surrey Circle	NB, SB	SCDPW	Shirley
63	CR 83, Patchogue-Mt Sinai Rd	at	Old Town Rd	NB, SB	SCDPW	Coram

Int. No.	Roadway 1		Roadway 2	Enforced Approach	Jurisdiction	Hamlet
64	CR 80, Montauk Hwy	at	Garden Pl	EB, WB	SCDPW	Shirley
65	CR 101, Patchogue-Yaphank Rd	at	Station Rd	EB, WB	SCDPW	North Bellport
66	CR 80, Montauk Hwy	at	Phyllis Dr	EB, WB	SCDPW	East Patchogue
67	CR 46, William Floyd Pkwy	at	CR 80, Montauk Hwy	NB, SB, EB, WB	SCDPW	Shirley
68	Hawkins Ave	at	LIE, I-495 Express Dr South	NB, EB	NYSDOT	Lake Ronkonkoma
69	NYS 25	at	South Coleman Rd	EB, WB	NYSDOT	Centereach
70	NYS 110	at	LIE, I-495 Express Dr South	NB, EB	NYSDOT	Melville
71	CR 92, Oakwood Rd	at	NYS 25, Jericho	SB, WB	NYSDOT	Huntington Station
72	NYS 25	at	Dawn Dr	WB	NYSDOT	Centereach
73	CR 2, Straight Path	at	35th Street	NB	SCDPW	Copiague
74	CR 96, Great East Neck Rd	at	Railroad	NB	SCDPW	West Babylon
75	NYS 109	at	CR 96, Great East Neck Rd	SB	NYSDOT	West Babylon
76	CR 13A, N. Clinton Ave	at	CR 50, Union Blvd	SB, EB	SCDPW	Bay Shore
77	CR 13, Fifth Ave	at	Candlewood Rd	SB	SCDPW	North Bay Shore
78	CR 57, Bay Shore Rd	at	Howells Rd	EB	SCDPW	Baywood
79	CR 17, Wheeler Rd	at	CR 67, Motor Parkway	NB	SCDPW	Central Islip
80	CR 19, Waverly Ave	at	Gateway Plaza	NB	SCDPW	Yaphank
81	CR 99, Woodside Ave	at	Station Rd	WB	SCDPW	North Bellport
82	CR 16, Portion Rd	at	Ackerly Ln	EB, WB	SCDPW	Lake Ronkonkoma
83	CR 19, Waverly Ave	at	Furrows Rd	NB, SB	SCDPW	Holtsville
84	CR 4, Commack Rd	at	Dorothea St	NB, SB	SCDPW	Commack
85	CR 4, Commack Rd	at	Hauppauge Rd/ New Highway	SB	SCDPW	Commack
86	CR 16, Terry Rd	at	NYS 347	NB, SB, EB, WB	NYSDOT	Nesconset
87	CR 2, Straight Path	at	CR 3, Wellwood Ave	NB, SB	SCDPW	North Lindenhurst
88	CR 3, Pinelawn Rd	at	Half Hollow Road	NB, SB	SCDPW	Melville
89	CR 4, Commack Rd	at	Marcus Blvd/ Tanger Dwy	NB, SB	SCDPW	Deer Park
90	CR 83, North Ocean Ave	at	CR 16, Horseblock Rd	NB, SB	SCDPW	Farmingville
91	CR 19, Waverly Ave	at	NYS 27, SSR	NB, EB	SCDPW	North Patchogue
92	CR 19, Waverly Ave	at	NYS 27, NSR	WB	SCDPW	North Patchogue
93	CR 46, William Floyd Pkwy	at	Moriches Middle Island Rd	NB, SB	SCDPW	Shirley
94	CR 80, Montauk Hwy	at	Washington Ave/ Herkimer St	EB	SCDPW	Mastic
95	CR 111, Port Jeff-West Hampton	at	I-495, NSR	NB	SCDPW	Manorville
96	NY 109	at	CR 2, Straight Path	EB, WB	NYSDOT	West Babylon
97	NY 27A	at	CR 96, Great East Neck Rd/Bergen Ave	NB, SB	NYSDOT	West Babylon
98	NY 347	at	Arrowhead Ln	NB, EB, WB	NYSDOT	Setauket
99	CR 83, North Ocean Ave	at	I-495, Express Drive South	NB, EB	SCDPW	Holtsville
100	CR 35, Park Avenue	at	CR 11, Pulaski Road	NB, SB, EB, WB	SCDPW	Huntington Station

Table ES-2. 18 Deactivated Intersection Locations

Int. No.	Roadway 1		Roadway 2	Enforced Approach	Jurisdiction	Hamlet
101	CR 67 (Motor Parkway)	at	I495N (Exit 57)	SB, WB	NYSDOT	Islandia
102	CR 97 (Nicholls Rd)	at	NY347	NB, SB, EB, WB	NYSDOT	Lake Grove
103	NY25	at	Boyle Rd	EB, WB	NYSDOT	Selden
104	CR 93 (Lakeland)	at	NY275 NSR	SB	NYSDOT	Bohemia
105	NY25	at	Marshall Dr/Paula Blvd	EB, WB	NYSDOT	North Selden
106	CR 112 (Johnson Ave)	at	NY275	NB, EB	NYSDOT	Sayville
107	NY454	at	CR 67 (Motor Pkwy)	NB, SB, EB, WB	NYSDOT	Islandia
108	NY112	at	CR 16 (Horseblock Rd)	NB, EB	NYSDOT	Medford
109	NY347	at	Old Town Rd	EB, WB	NYSDOT	Port Jefferson Station
110	NY454	at	Old Willets Path	EB	NYSDOT	Hauppauge
111	NY25	at	CR 97 (Nicholls Rd)	WB	NYSDOT	Centereach
112	NY454	at	CR 112 (Johnson Ave)	EB, WB	NYSDOT	Bohemia
113	NY347	at	NY25	SB,	NYSDOT	St. James
114	NY347	at	Stonybrook Rd	EB, WB	NYSDOT	South Stony Brook
115	NY27	at	N. Delaware Ave	EB	NYSDOT	North Lindenhurst
116	NY27	at	N. Monroe Ave	WB	NYSDOT	North Lindenhurst
117	NY231 (Deer Park Ave)	at	I495N	SB	NYSDOT	Dix Hills
118	NY231 (Deer Park Ave)	at	CR2 (Straight Path)	NB	NYSDOT	Dix Hills

Crash Data Reduction Procedure

To examine the crash experience, crash records were obtained from the NYSDOT's Accident Location Information System (ALIS), which is a Geographic Information Systems (GIS) based system. Crash reports were requested via the Freedom of Information Law (FOIL) process through NYSDOT. Crash records consisted of police accident reports, hereinafter referred to as MV-104A forms. These MV-104A reports are prepared by the responding police officer for each reportable crash, and submitted to DMV for recording in the database.

This data was subjected to a thorough and extensive preliminary review to ensure that each crash in fact occurred within the location and time parameters established for the study. It should be noted that, for the purposes of crash analyses, reports for crashes that occurred within 200 feet of the centerpoint of each study location were included, which ensured a comprehensive analysis of all intersection crashes. Each crash was categorized by crash type based on the descriptions in Table ES-3. In addition, the following information was entered into the project database for each crash:

Crash Information:

- Crash Date
- Crash Time
- Number of Vehicles
- Number Injured
- Number of Fatalities
- Cost exceeded \$1,000


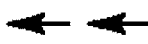







Crash Condition:

- Lighting Condition
- Roadway Surface Condition

Crash Location:

- Road name crash occurred on
- Nearest cross street name (where applicable)
- Distance from nearest cross street (where applicable)
- Cardinal direction from nearest cross street (where applicable)
- Each reviewer assigned the crash an approach code. During the evaluation process, the reviewer used a combination of the description and "Direction of Travel" boxes 23 and 24 from the MV-104A to determine the approach of the crash.

Table ES-3. Crash Code Description

Crash Code	Description	Diagram
Left Turn With	Collision of left turning vehicle into a vehicle in the same travel direction	
Rear End	Front to rear collision on same approach	
Overtaking	Side to side collision on same approach	
Left Turn Opposing	Collision of left turning vehicle into a vehicle in opposing travel directions	
Right Angle	Front to side collision from perpendicular approaches, also known as a T-Bone collision	
Right Turn With	Collision of right turning vehicle into a vehicle in the same travel direction	
Right Turn Opposing	Collision of right turning vehicle into a vehicle in the opposing travel direction	
Head On	Collision of vehicles front to front, usually opposite approaches	
Sideswipe	Collision of vehicles side to side traveling on opposite approaches	
Other	Other description could include multiple vehicles greater than two, pedestrian or bicycle accidents.	Varies by Officer Sketch

The increase of study area from the center of each intersection resulted in a total of 18,125 crash reports consisting of 33,503 pages were obtained, reviewed and entered into the data base developed for the purpose. Only those crashes found to have met the study parameters were then included in further analysis. Table ES-4 provides details of the crash data obtained, processed and included for analysis in the study.

Table ES-4. Total Records Processed

Provided by NYSDOT	Pages	Records	Within Study Area
Active Intersections			
2007-2009 (Pre-Enforcement)	8,625	4,935	3,515
2014-2017 (Active Enforcement)	13,716	8,729	6,808
100 Intersections Subtotal:	22,341	13,664	10,323
Deactivated Intersections			
2007-2009 (Pre-Enforcement)	6,030	1,175	722
2010-2013 (Active Enforcement)	1,879	1,284	821
2014-2017 (Post-Enforcement)	3,253	2,002	1,499
18 Intersections Subtotal:	11,162	4,461	3,042
Grand Total:	33,503	18,125	13,365

Projected Crashes Based On County-Wide Crash Rates

In order to evaluate the impact of the RLCs and to provide a more accurate evaluation, it was necessary to calculate the projected number of crashes that would have occurred at the 100 Active intersections if the intersections where red light cameras were installed followed the Countywide increase in crashes. Toward this end, growth rates were developed to estimate the number of crashes that would be expected during the Active-Enforcement period (2015-2017). The growth rates were determined using information obtained from the NYSDOT ALIS information on the actual number of total crashes in Suffolk County at signalized intersections from 2007-2017. To minimize the impact of the statistical regression to the mean, the three-year average number of crashes for each analysis period was used to form the basis of the projections. The NYSDOT data indicates that the total number of reportable crashes in Suffolk County at signalized intersections of all types rose from an average of 6,757 from 2007 to 2009 to an average of 7,574 from 2015 to 2017, an increase of 12.1%. These projected growth rates formed the basis for comparison between the two study periods. The following sections discuss the results of these comparisons.

Similarly, for the 18 Deactivated intersection locations, growth rates in crashes were developed based on the countywide data for the three study periods examined. For the Active-Enforcement years 2010-2013, the NYSDOT data indicates that the total number of reportable crashes in Suffolk County at signalized intersections of all types rose from an average of 6,757 from 2007 to 2009 to an average of 6,912 from 2010 to 2013, an increase of 2.3%. Thus, this growth rate was used to project crashes for the Active-Enforcement (2010-2013) period. From the Active-Enforcement (2010-2013) to Post-Enforcement (2015-

2017) periods, countywide crashes increased from an average of 6,912 per year to an average of 7,574 per year, an increase of 9.6%. This growth rate is used to project crashes for the Post-Enforcement (2015-2017) period and examine what happened after the cameras were removed.

Note that two analyses were conducted for the period following camera removal at the Deactivated locations. Analysis I compared the actual number of crashes at the 18 Deactivated intersection locations during the Post-Enforcement period (2015-2017) to the projected number of crashes during the Post-Enforcement period (2015-2017). Both crash severity and crash type were examined. The projections used in this analysis were based on the growth rate of 9.6% applied to the actual number of crashes during the Active-Enforcement 24 month period (2010-2013), and the analysis examines what took place after the cameras had been in place and were then removed.

The second analysis (Analysis II) also compares the actual number of crashes during the Post-Enforcement period (2015-2017) to the projected number of crashes during the Post-Enforcement period (2015-2017), but the projections are based on applying the 12.1% growth rate to the actual Pre-Enforcement period (2007-2009) crashes. Both crash severity and crash type were examined. In this manner, the analysis attempts to provide a comparison to the projections had the program not been implemented.

The following tables, Table ES-5 through Table ES-12, provide the results of the crash analyses conducted at all intersections for all study time periods.

Table ES-5. Comparison of Crashes by Crash Severity, Active-Enforcement Period (2015-2017) Projected Crashes* to Active – Enforcement (2015 – 2017) Actual Crashes, 100 Active Intersections

Crash Severity	Projected* Crashes Active Enforcement Period (2015-2017)		Actual Crashes Active Enforcement Period (2015-2017)		Difference - Actual to Projected Crashes		
	Projected No. of Crashes	Projected Annual Avg. No. of Crashes	Actual No. of Crashes	Annual Avg. No. of Crashes	No. of Crashes	Annual Avg. No. of Crashes	Percent Change
Fatal	19	6.4	17	5.7	-2	-0.7	-10.5%
Injury	1,555	518.3	1,386	462.0	-169	-56.3	-10.9%
Combined Fatal + Injury	1,574	524.6	1,403	467.7	-171	-57.0	-10.9%
PDO	2,366	788.7	4,209	1,403.0	1,842	614.0	77.8%
Total Crashes	3,940	1,313.3	5,612	1,870.67	1,671	557.0	42.4%

*Projections are based on 12.1% growth in Countywide crashes at signalized intersections from 2007- 2009 to 2015 - 2017.

Table ES-6. Comparison of Crashes by Crash Type, Active- Enforcement Period (2015 – 2017) Projected Crashes* to Active- Enforcement (2015-2017) Actual Crashes, 100 Active Intersections

Location	Crash Type	Projected* Crashes Active-Enforcement Period (2015-2017)		Actual Crashes Active-Enforcement Period (2015-2017)		Difference - Actual to Projected Crashes		
		Projected No. of Crashes	Projected Average Annual No. of Crashes	No. of Crashes	Annual Avg. No. of Crashes	No. of Crashes	Annual Avg. No. of Crashes	Percent Difference
All Active Intersections	LEFT TURN WITH	89	29.7	95	31.7	6	2.0	6.7%
	REAR END	1453	484.3	2,702	900.7	1249	416.3	46.2%
	OVERTAKING	536	178.7	1,175	391.7	639	213.0	54.4%
	LEFT TURN OPPOSING	809	269.7	691	230.3	-118	-39.3	-17.1%
	RIGHT ANGLE	527	175.7	337	112.3	-190	-63.3	-56.4%
	RIGHT TURN WITH	152	50.7	144	48.0	-8	-2.7	-5.6%
	RIGHT TURN OPPOSING	40	13.3	58	19.3	18	6.0	31.0%
	HEAD ON	17	5.7	20	6.7	3	1.0	15.0%
	SIDESWIPE	36	12.0	45	15.0	9	3.0	20.0%
	OTHER	178	59.3	242	80.7	64	21.3	26.4%
	PEDESTRIAN	55	18.3	50	16.7	-5	-1.7	-10.0%
BICYCLE	48	16.0	53	17.7	5	1.7	9.4%	
All Active Intersections Total		3,940	1,313.3	5,612	1,870.7	1,672	557.3	29.8%

*Projections are based on 12.1% growth in Countywide crashes at signalized intersections from 2007- 2009 to 2015 - 2017

Table ES-7. Comparison of Crashes by Crash Severity, Active-Enforcement Period (2010 – 2013) Projected* Crashes to Active-Enforcement Period (2010-2013) Actual Crashes, 18 Deactivated Intersections

Crash Severity	Projected* Crashes Active Enforcement Period (2010-2013)	Actual Crashes Active Enforcement Period (2010-2013)	Difference Actual to Projected	
	Annual Avg. No. of Crashes	Annual Avg. No. of Crashes	Annual Average No. Crashes	Percent Difference
Fatal	1.3	0.5	-0.8	-61.5%
Injury	99.9	97.5	-2.4	-2.5%
Combined Fatal + Injury	101.3	98.0	-3.3	-3.3%
Property Damage Only	145.0	144.5	-0.5	-0.3%
Total:	246.2	242.5	-3.7	-1.5%

**Projections are based on 2.3% growth in Countywide crashes at signalized intersections between 2007-2009 and 2010-2013.*

Table ES-8. Comparison of Crashes by Crash Type, Active-Enforcement Period (2010 – 2013) Projected* Crashes to Active-Enforcement Period (2010-2013) Actual Crashes, 18 Deactivated Intersections

Int. No.	Crash Type	Projected* Crashes Active-Enforcement Period (2010 – 2013)	(Actual Crashes Active Enforcement Period (2010-2013)	Difference Actual to Projected	
		Annual Average No. of Crashes	Annual Average No. of Crashes	Annual Average No. Crashes	Percent Difference
All 18 Deactivated Intersections	LEFT TURN WITH	4.4	0.5	-3.9	-88.6%
	REAR END	128.9	144.5	15.6	12.1%
	OVERTAKING	26.3	38.5	12.2	46.4%
	LEFT TURN OPPOSING	38.9	32.0	-6.9	-17.7%
	RIGHT ANGLE	21.8	11.0	-10.8	-49.5%
	RIGHT TURN WITH	4.4	1.0	-3.4	-77.3%
	RIGHT TURN OPPOSING	3.1	1.0	-2.1	-67.4%
	HEAD ON	1.0	0.5	-0.5	-51.1%
	SIDESWIPE	2.0	1.0	-1.0	-51.1%
	OTHER	12.0	9.0	-3.0	-24.8%
	PEDESTRIAN	1.7	3.5	1.8	101.3%
BICYCLE	1.7	0.0	-1.7	-100.0%	
All 18 Deactivated Intersections Total:		246.2	242.5	-3.7	-1.5%

**Projections are based on 2.3% growth in Countywide crashes at signalized intersections between 2007-2009 and 2010-2013.*

Table ES-9. Comparison of Crashes by Crash Severity, Post-Enforcement Period (2015 – 2017) Projected* Crashes to Post-Enforcement Period (2015-2017) Actual Crashes, 18 Deactivated Intersections, Analysis I

Crash Severity	Projected* Crashes Post-Enforcement Period (2015-2017)	Actual Crashes Post-Enforcement Period (2015-2017)	Difference Actual to Projected	
	Annual Avg. No. of Crashes	Annual Avg. No. of Crashes	Annual Avg. No. of Crashes	Percent Difference
Fatal	0.5	0.3	-0.2	-40.0%
Injury	106.9	108.7	1.8	1.7%
Combined Fatal + Injury	107.4	109.0	1.6	1.5%
Property Damage Only	158.4	304.0	145.6	91.9%
Total:	265.8	413.0	147.2	35.6%

**Projections are based on 9.6% growth in Countywide crashes at signalized intersections between 2010-2013 and 2015-2017.*

Table ES-10. Comparison of Crashes by Crash Type, Post-Enforcement Period (2015 – 2017) Projected* Crashes to Post-Enforcement Period (2015-2017) Actual Crashes, 18 Deactivated Intersections, Analysis I

Int. No.	Crash Type	Projected* Crashes Post-Enforcement Period (2015-2017)	Actual Crashes Active-Enforcement Period (2015-2017)	Difference Actual to Projected	
		Annual Average No. of Crashes	Annual Average No. of Crashes	Annual Average No. Crashes	Percent Difference
All 18 Deactivated Intersections	LEFT TURN WITH	0.5	2.0	1.5	400.0%
	REAR END	158.4	224.7	66.3	41.9%
	OVERTAKING	42.2	83.3	41.1	97.4%
	LEFT TURN OPPOSING	35.1	39.0	3.9	11.1%
	RIGHT ANGLE	12.1	24.3	12.2	100.8%
	RIGHT TURN WITH	1.1	10.0	8.9	809.1%
	RIGHT TURN OPPOSING	1.1	3.0	1.9	172.7%
	HEAD ON	0.5	0.7	0.2	40.0%
	SIDESWIPE	1.1	1.3	0.2	18.2%
	OTHER	9.9	19.0	9.1	91.9%
	PEDESTRIAN	3.8	2.0	-1.8	-47.4%
BICYCLE	0.0	3.7	3.7	-	
All 18 Deactivated Intersections Total:		265.8	413.0	147.2	55.4%

**Projections are based on 9.6% growth in Countywide crashes at signalized intersections between 2010-2013 and 2015-2017.*

Table ES-11. Comparison of Crashes by Crash Severity, Post-Enforcement Period (2015 – 2017) Projected* Crashes to Post-Enforcement Period (2015-2017) Actual Crashes, 18 Deactivated Intersections, Analysis II

Crash Severity	Projected* Crashes Post-Enforcement Period (2015-2017)	Actual Crashes Post-Enforcement Period (2015-2017)	Difference Actual Crashes to Projected Crashes	
	Annual Avg. No. of Crashes	Annual Avg. No. of Crashes	Annual Avg. No. Crashes	Percent Difference
Fatal	1.7	0.3	-1.3	-82.4%
Injury	109.7	108.7	-1.0	-0.9%
Combined Fatal + Injury	111.0	109.0	-2.0	-1.8%
Property Damage Only	159.0	304.0	145.0	91.2%
Total:	270.0	413.0	143.0	52.9%

**Projections are based on 12.1% growth in Countywide crashes at signalized intersections from 2007- 2009 to 2015 - 2017.*

Table ES-12. Comparison of Crashes by Crash Type, Post-Enforcement Period (2015-2017) Projected* Crashes to Post-Enforcement Period (2015-2017) Actual Crashes, 18 Deactivated Intersections, Analysis II

Int. No.	Crash Type	Projected* Crashes Post-Enforcement Period (2015 – 2017)	Actual Crashes Post-Enforcement Period (2015-2017)	Difference Actual to Projected	
		Annual Average No. of Crashes	Annual Average No. of Crashes	Annual Average No. Crashes	Percent Difference
All 18 Deactivated Intersections	LEFT TURN WITH	5.0	2.0	-3.0	-60.0%
	REAR END	141.3	224.7	83.4	59.0%
	OVERTAKING	28.7	83.3	54.6	190.7%
	LEFT TURN OPPOSING	42.7	39.0	-3.7	-8.6%
	RIGHT ANGLE	24.0	24.3	0.3	1.4%
	RIGHT TURN WITH	5.0	10.0	5.0	100.0%
	RIGHT TURN OPPOSING	3.3	3.0	-0.3	-10.0%
	HEAD ON	1.0	0.7	-0.3	-33.3%
	SIDESWIPE	2.3	1.3	-1.0	-42.9%
	OTHER	13.0	19.0	6.0	46.2%
	PEDESTRIAN	2.0	2.0	0.0	0.0%
BICYCLE	2.0	3.7	1.7	83.3%	
All 18 Deactivated Intersections Total:		270.3	413.0	142.7	52.8%

**Projections are based on 12.1% growth in Countywide crashes at signalized intersections from 2007- 2009 to 2015 - 2017.*

Summary of Findings

The findings based on the results of this comprehensive, in-depth analysis of the crash experience at the signalized intersections included in the Suffolk County Red Light Camera Program are as follows:

1. The number of total crashes at the 100 Active RLC camera locations increased by 59.6%, from 3,515 to 5,612, between the two study periods examined in this study, 2007 – 2009 Pre-Enforcement and 2015 - 2017 Active-Enforcement.
2. The number of signalized intersections crashes Countywide increased by 12.1% between the two study periods examined in this study, Pre-Enforcement (2007 – 2009) and Active Enforcement (2015- 2017). Had the total number of crashes increased by the countywide rate, 3,940 total crashes could have been expected at the 100 RLC Active intersections during the three year period from 2015 to 2017. Therefore, 1,672 more crashes, a 42% increase, occurred at these locations than projected, or 557.3 more per year than projected.
3. The number of crashes that resulted in injury at the 100 Active intersection locations was lower than the number of crashes projected based on signalized intersection countywide crash rates. During the Active-Enforcement period (2015-2017), 1,403 such crashes occurred, while 1,574 were projected. Therefore, 171 fewer such crashes an average of 57.0 fewer crashes per year, occurred than had they increased at the countywide rate.
4. The total number of crashes that involved fatalities was unchanged between the Pre-Enforcement (2007- 2009) and Active-Enforcement (2015 – 2017) periods studied. Since fatal crashes are rare occurrences, statistical relationships and specific projections of increases or decreases in the number of fatal crashes are difficult to forecast. However, no increase in fatal crashes was noted.
5. The number of left turn and right angle crashes, generally considered to include a higher number of more severe crashes, and which are associated with red light running, was lower than the projected number of these crash types during the Active-Enforcement (2015 – 2017) period while the number of rear end and overtaking crashes was higher than projected.
6. The analyses confirm the trend identified in prior studies of RLC locations in other municipalities that concluded overall crashes increase but fatal and injury (F/I) crashes decrease with the implementation of RLC programs.
7. Overall, using standard NYSDOT crash reduction cost benefit methodology, the change in severity between the projected and actual crashes at these locations during the Active-Enforcement period (2015-2017) has resulted in a crash cost benefit of approximately \$5.14M per year due to the reduction in anticipated fatal and injury (F/I) crashes, based on NYSDOT crash cost benefit methodology.

8. At fifteen (15) Active intersection locations, actual fatal and injury (F/I) crashes exceeded projected crashes by a notable amount (more than 2.0 crashes per year). These locations do not follow the program trend. Further investigations at these locations did not result in determination of any common factors that would explain these results.
9. Nineteen (19) Active intersection locations exhibited notably fewer (greater than 2.0 fewer) F/I crashes during the Active Enforcement period, seven (7) of which also experienced decreases in overall crashes. These locations exhibited better crash experience than the 100 Active intersections overall. Further investigations indicated that geometric improvements had been made at three (3) of these locations. As above, these locations did not exhibit any common factors that would explain these results.
10. The crash patterns at Deactivated locations exhibited patterns that were different from those at Active intersection locations. From Pre-Enforcement to Active Enforcement, the annual average number of total crashes was virtually unchanged, as was the number of injury crashes. Thus, both were slightly lower than the projected number of crashes.
11. At the Deactivated intersection locations, during the Active-Enforcement 24 month period (2020-2013), the number of fatal and injury and PDO crashes was lower than would have been expected, but the difference was so low as to be insignificant.
12. At the Deactivated intersection locations, left turn and right angle crashes were lower than projected during 24 Month Active-Enforcement period, and rear end and overtaking crashes were higher.
13. At the Deactivated intersection locations, following removal of the cameras, the following was noted:
 - a. Crashes involving fatalities and injuries remained essentially unchanged, while property damage only crashes were nearly 100% higher than projected.
 - b. Rear end, overtaking, right angle and left turn crashes were all higher than the projected annual average number of crashes based on countywide crash rates.
 - c. Right angle crashes increased significantly more than would have been expected, doubling from approximately 12 to 24 crashes per year.

14. At the Deactivated intersection locations, an additional analysis of the Post-Enforcement period which examined what happened several years after the cameras had been removed, and attempted to compare crash history with that which may have prevailed had the RLC program not have been implemented, the following was observed:
 - a. Combined fatal and injury crashes were essentially equal to the projected number of crashes, while property damage only crashes were 90% higher than projected.
 - b. Total left turn decreased and right angle crashes increased slightly. Rear end and overtaking crashes increased at rates that might have been expected had the cameras remained in place.
15. At the 18 Deactivated intersection locations, contrary to trends at the 100 Active intersection locations and at other RLC programs, during the 24 Month Active-Enforcement period (2010-2013), seven (7) of the 18 Deactivated intersections exhibited an increase in average annual F/I crashes above the projected number, two of which showed a notable average annual increase in F/I crashes (greater than 2.0 crashes per year).
16. At the 18 Deactivated intersection locations, following removal of the cameras, during the Post-Enforcement period (2015-2017), eight (8) of the eighteen intersections showed increases in average annual F/I crashes beyond projected values, four (4) of which were notable and exceeded 2.0 F/I crashes per year. At four other locations, average annual F/I crashes decreased by 2.0 crashes.
17. At the 18 Deactivated intersection locations, seven (7) Deactivated intersections experienced increases of greater than 10.0 crashes per year following camera removal, with only one that had a corresponding decrease in F/I crashes.
18. At the 18 Deactivated intersection locations, it should be noted that due to the small sample size and short duration of active RLC monitoring at these locations, caution must be exercised when attempting to correlate crash patterns to the implementation of the RLC program.

Conclusions

1. There is a correlation between the RLC program and reduction of severity in the crash experience. There is no definitive way to prove causality.
2. At the Active 100 Intersections, the total number of crashes exceeded Countywide projections during Active Enforcement periods, but Fatal and Injury (F/I) crashes went down.
3. The reduced number of higher severity crashes has resulted in a crash cost reduction benefit of approximately \$5.14M per year at the 100 Active Intersections.
4. At the 18 Deactivated locations, during the Active-Enforcements 24-month period (2010-2013) the RLC program had a similar impact on the crash experience as at Active locations.
5. At the 18 Deactivated locations, for all time periods examined, crash types exhibited patterns similar to those at the 100 Active locations, with rear end and overtaking crashes representing nearly the entirety of the total increase in crashes.
6. At the 18 Deactivated locations, termination of RLC monitoring correlated with an increase in crashes, including rear end, overtaking, left turn and right angle crashes without an associated increase in fatal and injury crashes.
7. There is no apparent residual benefit after cameras are removed, since fatal and injury, right angle and left turn crashes were approximately equal to the projected number of crashes at the Deactivated locations had the program not been implemented.
8. Although no studies in the public domain regarding crash experience following the termination of RLC enforcement could be located, and therefore care must be taken regarding the relationship of the RLC program and these crash results, based on the forgoing analysis and investigations.

Recommendations

1. The Suffolk County Red Light Camera program should be continued due to a reduction in crashes resulting in injury or fatality, and a corresponding reduction in left turn and right angle crashes.
2. At the following intersections where the number of Fatal and Injury (F/I) crashes were not reduced, the Red Light Camera program should be considered for either future study, monitoring or relocation to other signalized intersection locations:

Int.No	Description	Int.No	Description
8	NY111 at I495S	73	CR 2, Straight Path at 35th Street
10	CR 67 (Motor Pkwy) at I495S (Exit 57)	75	NYS 109 at CR 96, Great East Neck Rd
27	NY112 at CR 99 (Woodside Ave)	79	CR 17, Wheeler Rd at CR 67, Motor Parkway
35	Mount Sinai Coram Rd at NY25, Middle Country Rd	89	CR 4, Commack Rd at Marcus Blvd/ Tanger Dwy
50	NY 231, Deer Park Ave at Nicolls Road	90	CR 83, North Ocean Ave at CR 16, Horseblock Rd
52	CR 10, Elwood Road at NY 25, Jericho Turnpike	97	NY 27A at CR 96, Great East Neck Rd/Bergen Ave
60	CR 13, Fifth Ave at CR 100, Suffolk Ave	98	NY 347 at Arrowhead Ln
62	CR 46, William Floyd Pkwy at Surrey Circle		

