



***City of Seattle  
Traffic Safety Camera Program***

***Year II Evaluation Report***

***December 2008***

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## Executive Summary

In late July 2006, the City of Seattle initiated a 12-month pilot project designed to test the effectiveness of traffic safety cameras – also known as red light cameras – at selected arterial intersections. The purpose of the project was to gauge the extent to which these cameras might reduce the frequency of red light running and associated accidents, events which have become all too frequent in recent years, not only in Seattle but throughout the country.

A final Evaluation Report for the pilot project was issued in December 2007. Since that time, the City has decided to make the program permanent and to expand it to a total of 30 cameras. As of early December 2008, 18 cameras were operational and the rest are expected to come on line by the end of January or early February 2009.

This report is intended to provide an update on the performance of the six original cameras deployed during the pilot after two years of operation, together with a brief summary of progress on program expansion that got underway in 2008.

For the six original cameras, after 24 months, 27,460 infraction notices had been issued, with a pay rate exceeding 75%, and more than \$2,075,000 in monetary penalties collected. The main findings of this year II evaluation are as follows:

- **RED LIGHT RUNNING.** Operation of red light cameras has reduced red light running by 59.3%, comparing the first 12 weeks of operation during July-October 2006 with the same period two years later. This compares with a decline of 44.4% for the same period after the first year of operation. During the most recent 12-week period, July-October 2008, the six original cameras were capturing approximately 33 violations per camera per week.
- **TRAFFIC CRASHES.** With only four intersections in the test, and just two years of experience, it is not possible to reach definitive conclusions regarding the effects on traffic accidents. There is little evidence that cameras have decreased the frequency of all auto crashes or of the more dangerous angle collisions after two years of operation; however, it does appear that cameras may have mitigated the severity of crashes. There were fewer injury crashes and fewer persons injured in crashes at test intersections than before cameras were installed. Moreover, severity of crashes at a small number of “control” intersections not equipped with cameras showed an increase in the number of persons injured (but not of injury crashes).
- **PUBLIC SUPPORT.** A random telephone survey conducted in August 2008 showed public support for traffic safety cameras at arterial intersections had increased 3 points, to 85%, over an initial survey conducted prior to the start of the program in April 2006. The Department continues to receive unsolicited recommendations for additional camera locations from members of the public.

## Introduction and Background

At the recommendation of Mayor Greg Nickels, on September 26, 2005, the Seattle City Council unanimously passed an ordinance under a new state law authorizing the use of automated traffic safety cameras (also known as red light cameras) for enforcing local laws against red light running. This ordinance authorized the use of these cameras for recording violations at arterial intersections and established a \$101 monetary penalty for each infraction. Also, in the fall of 2005, the Council passed supplemental budget legislation appropriating a total of \$460,000 for a one-year pilot program to test the performance of traffic safety cameras in Seattle.

Under the leadership of Chief Gil Kerlikowske, the Seattle Police Department (SPD) convened an interdepartmental team to arrange for cameras to be installed at selected intersections and to design an evaluation of the results of camera deployment. The core project team included representatives from six City departments, including the Department of Finance, the Law Department, the Legislative Department, the Seattle Department of Transportation (SDOT), and the Seattle Municipal Court, in addition to SPD. After a competitive bidding process, in January 2006, the team, working with assistance from City Purchasing and the Department of Information Technology, selected American Traffic Solutions (ATS) of Scottsdale, Arizona, as the City's red light camera vendor.

At 12:01 a.m. on June 22, 2006, ATS commenced camera operations along four approaches at three intersections. Two additional approaches began to operate in early October 2006. Altogether, six camera systems were deployed at four intersections in the pilot project:

- Eastbound and westbound approaches at Denny Way and Fairview Avenue North;
- Northbound and southbound approaches at Rainier Avenue South and South Orcas Street;
- Eastbound approach at 5<sup>th</sup> Avenue and Spring Street; and
- Eastbound approach at Roosevelt Way and NE 45<sup>th</sup> Street.

The project team worked closely with SDOT and the camera vendor to identify and select these intersections for the pilot from a list of the city's most hazardous intersections.

For a one-month period after the installation of camera systems at these intersections, advisory warnings without monetary penalty were issued to violators as part of the City's educational outreach to motorists and the general public. On July 24, 2006, SPD began issuing notices of infraction with monetary penalties to registered owners of vehicles found to have violated City ordinances against red light running.

Evaluation results for the pilot project covering the 12-month period were released in December 2007. At about the same time, in late November 2007, the City amended its red light ordinance to allow (1) citations to be issued for red arrow violations as well as circular red signals and (2) the monetary penalty to adjust automatically and match the penalty for officer-detected red light violations. In late December 2007, the penalty for red light violations, whether detected by an officer or a traffic safety camera, increased to \$124.

As a result of the favorable results obtained in the pilot project, the City elected to add 24 additional cameras, thereby bringing the number to 30 (at 22 intersections) upon completion of the installation process. A list of all camera locations is attached to this report.

### **Traffic Safety Camera Technology and Citation Process**

Prior to addressing evaluation questions, it may be helpful to review a few points regarding red light cameras and the citation process. The Axis RLC-300 camera system used by American Traffic Solutions has three basic components: a high resolution camera for taking still color photos, a video camera that provides a broader view of the offending vehicle and any other vehicles, pedestrians, or cyclists in the intersection, and a vehicle sensing device that activates the still cameras and captures video of approaching vehicles that the system “predicts” will run a red light.

The stills show the vehicle behind the stop line with the traffic signal showing red in an “A” photo and the same vehicle fully beyond the stop line in the intersection with the traffic signal still showing red in a “B” photo. These two photos, together with a cropped image of the vehicle license plate are included in the Notice of Infraction (NOI), also known as the citation or ticket, that is sent to the registered owner of the vehicle. The still photos and video clip of the event are available to police reviewers, court personnel, and registered owners via secure ATS Internet web site. All photos and video only show the vehicle from the rear, as Washington law prohibits taking images of the faces of vehicle driver or occupants.

Photographic and video images of violation events are sent electronically from the traffic safety camera system to the ATS data center where they are reviewed against criteria established by the Seattle Police Department. Events that clearly are not violations are rejected at the data center. Trained officers in the SPD Traffic Section, who authorize issuance of citations for those deemed in violation, review events that appear to meet SPD criteria. Pursuant to statute, this review and mailing of the NOI to the registered owner of the vehicle must all occur within 14 days of the violation event.

The registered owner then has 18 days from issuance of the NOI to either pay the monetary penalty specified in the ordinance,<sup>1</sup> contest the citation by requesting a Municipal Court hearing, or sign a declaration (affidavit) stating that he or she was not driving the vehicle at the time of the infraction (thereby canceling the NOI). It is important to note that, by Washington law, the automated red light violation is treated as a parking infraction and is not part of the registered owner’s driving record under RCW 46.52.101 and RCW 46.52.120.

Basic program statistics, from inception of monetary penalties on July 24, 2006 through July 23, 2008, are summarized in the table below.

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<sup>1</sup> This response time was increased by Court policy to 30 days for rental car agencies in late May 2007, to give out-of-town companies additional time to identify the driver of the violating vehicle.

## Traffic Safety Camera Results

Total Infraction Notices Issued	27,460
Total Infraction Notices Paid (as of 11/6/2008) <sup>2</sup>	20,085
Payment Rate	76.8%
Net Revenue Collected	\$2,075,378
Hearings Held (% of NOI Issued)	3,030 (11.0%)
Declarations Received (% of NOI Issued)	1,380 (5.0%)

### Evaluation Questions

The project team specified a number of questions to be addressed in the evaluation. They are highlighted briefly here and then discussed in the body of the report.

- *Has red light camera enforcement enhanced public safety in and around those intersections where camera systems have been deployed?*

The project team believes that this is the most significant question to be addressed in the evaluation. There are two basic components to the question:

- *Effects on red light running:* the program will be deemed successful to the extent that it has reduced the frequency of red light running by motorists; and
- *Effects on traffic collisions:* the program will be deemed successful to the extent that it has reduced the frequency or severity of traffic collisions in those intersections where the cameras have been deployed.

- *Have red light camera systems and the contracted vendor met our expectations?*

In the Request for Proposal (RFP) issued prior to selection of a vendor, the City set forth its expectations for the camera system and vendor performance. This question was answered affirmatively and in detail in the December 2007 evaluation report and is not addressed further in this report.

- *How have cameras been received by Seattle residents?*

Public reaction to automated red light enforcement is an important part of the evaluation of the program.

- *Is there a continuing need for red light camera enforcement?*

Prior to formulating recommendations regarding the future of automated red light enforcement, it is important to gauge the continuing need for this type of program.

- *Have red light cameras paid for themselves?*

Although revenue is not an objective for having camera enforcement of red light ordinances, it is important to weigh the costs and benefits associated with the traffic safety camera technology deployed by the City of Seattle.

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<sup>2</sup> This is a dynamic number. The payment rate typically increases significantly for 60 days after issuance of the citation. This payment figure is as of 11/6/2008 on citations issued through 7/23/2008.

## Traffic Safety

As noted above, traffic safety has provided the principal rationale for the red light project. Two dimensions are explored below: the impacts on the frequency of red light running and the impacts on traffic crashes. After a brief discussion of intersection selection and study methodology, we discuss the frequency of red light violations, then the collision results.

Methodology. The project team considered three types of information in nominating intersections for the study. First, all intersections were among the city's top intersections for angle crashes based on data from SDOT and the Washington State Department of Transportation (WSDOT). Second, ATS set up and captured video on red light violations at candidate intersections using their VIMS (Vehicle Incident Monitoring System) equipment. In those cases where the VIMS best corroborated the existence of a problem, a review involving other criteria was conducted, selecting for those intersections where construction work prior to or during the project was not likely to be an issue and where technical design problems were not evident. Lastly, the team attempted to apply a degree of geographic dispersion to the project. The four intersections and traffic approaches chosen as test sites for the traffic safety camera pilot were:

- Eastbound and westbound approaches at Denny Way and Fairview Avenue North;
- Northbound and southbound approaches at Rainier Avenue South and South Orcas Street;
- Eastbound approach at 5<sup>th</sup> Avenue and Spring Street; and
- Eastbound approach at Roosevelt Way and NE 45<sup>th</sup> Street.

In addition to these “test” intersections, the study design developed by the project team also called for the selection of like numbers of “halo” and “control” intersections. The former were designated with the intent of seeing whether the cameras have a “halo effect” that extends beyond the test intersections. The “controls” are intersections beyond the likely effects of any halo, similar to the test intersections in traffic-related basics such as traffic volumes and accident records, but not being selected for a traffic safety camera during the pilot project. The intent in looking at these “controls” is to see whether there might be general trends in traffic-related behavior that could be responsible for any changes observed at the test intersections.<sup>3</sup>

The intersections identified as halos for this study were all close to the respective test sites with which they are paired:

- Denny Way and Stewart Street;
- Rainier Avenue South and South Graham Street;
- 6<sup>th</sup> Avenue and Spring Street; and
- 11<sup>th</sup> Avenue NE and NE 45<sup>th</sup> Street.

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<sup>3</sup> Please note that the intersections selected for comparisons very likely do not meet stringent tests required for a scientifically controlled study. They are best seen as “comparisons” rather than scientific controls.

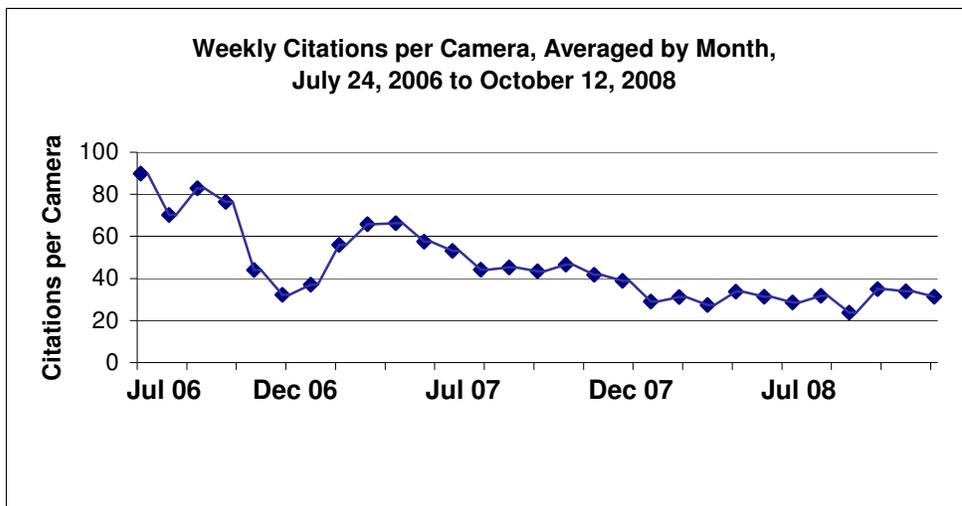
The control intersections chosen for the study include:

- 1<sup>st</sup> Avenue South and South King Street;
- Boren Avenue and Olive Way;
- Lake City Way NE and NE 80<sup>th</sup> Street; and
- 30<sup>th</sup> Avenue NE and NE 125<sup>th</sup> Street.

Red Light Violations. The project design for measurement of the impact of red light cameras on the number of violations involves two steps. The first step calls for comparison of the frequency of violations at test intersections during a 12-week period immediately after installation of cameras (July-October, 2006) with the frequency during the same 12-week time period two years later (July-October, 2008). Second, although there is not strictly comparable data for the control intersections, we can refer to VIMS (Vehicle Incident Monitoring System) red light running statistics at control intersections just prior to project start and two years later.

1. Test Intersections. The frequency of red light violations resulting in a traffic citation dropped approximately 59% between the two 12-week periods: 81 violations per camera per week in 2006 and 33 violations per camera per week during the 2008 period<sup>4</sup>

As the chart below indicates, early weeks of the pilot in 2006 showed considerable variation in violation levels, albeit at a relatively high level. Initial high frequencies began to fall off through the year-end holidays and the start of winter 2007; however, beginning in early February of that year, the average number of citations per camera per week started to pick up again, growing steadily through mid-April 2007. From this point forward through the end of 2007, violations fell steadily and then leveled off with little variance in the weekly average per camera into October 2008.



<sup>4</sup> This comparison for percent change looks at roughly the same periods in 2006 and 2008 (July-October) to address any seasonality in the data.

2. Control Intersections. VIMS data for the control intersections show no such pattern. Red light running here worsened substantially overall for the most dangerous straight through and left-turn violations. Three of the four comparison intersections worsened over the 24-month test period, two of these substantially so, while every one of the four test intersections improved significantly.

These findings suggest that automated traffic camera enforcement of red light violations is effective at decreasing the number of violations where the cameras are deployed. National studies buttress this conclusion, as cameras elsewhere have been widely reported to reduce the frequency of red light running.<sup>5</sup>

Traffic Collisions. The project design for gauging changes in traffic-related collisions at test intersections involves a comparison of the frequency of collisions before (pre) installation of cameras and after (post) installation. Data on collisions at halo and control intersections were also examined. The results on traffic collisions are mixed and should be regarded as preliminary, as they are based on just four test intersections over a comparatively short period of time.

During the first two years of the red light camera program, total annual crashes at the test intersections have declined by approximately 11%; however, total annual crashes at the control intersections dropped even more, by 21%. Looking at just those crashes that most likely involved red light violations, the angle collisions, there was no change at the test intersections while angle crashes at the control intersections dropped by one third. Interestingly, there were just two rear-end collisions at test intersections out of a total of 62 during the first two years of the program, and neither one of these was the result of vehicles braking abruptly in an effort to avoid red light running.<sup>6</sup>

It does appear that the overall severity of collisions, as gauged by the frequency of injury accidents and of persons injured, has decreased at the intersections with cameras, as shown in the tables below. These tables show that there have been fewer persons injured and fewer injury accidents at the camera intersections when compared with the controls, where the number of persons injured (but not the number of crashes) actually increased.<sup>7</sup>

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<sup>5</sup> For the most comprehensive look at the national experience, see Hugh W. McGee and Kimberly A. Eccles, Impact of Red Light Camera Enforcement on Crash Experience: A Synthesis of Highway Practice (Washington, D.C.: National Highway Cooperative Research Program, Transportation Research Board, 2003).

<sup>6</sup> While studies typically have shown a decrease in angle collisions after installation of red light cameras, some of the literature has reported an increase in rear-end collisions after introduction of the cameras. See McGee and Eccles, Impact of Red Light Camera Enforcement on Crash Experience, 2003.

<sup>7</sup> Pre Red Light Camera (RLC) cells in tables represent annual averages of experience over the four years preceding initiation of the pilot, rounded to nearest whole integer. The post RLC numbers represent annual averages for the two years after initiation of the program. Numbers for 5<sup>th</sup> & Spring are extrapolated from 10 to 12 months for comparability with other intersections. Using a one-tailed Fisher's Exact Test, a weak statistical difference at the .12 level appears in the # persons injured table.

## Severity of Crashes Pre/Post Camera Activation – Annual Data

	# Injury Crashes		# Persons Injured	
	Test	Control	Test	Control
Pre RLC	18	12	26	17
Post RLC	12	10	17	21

Examination of collision data at halo intersections shows no consistent pattern over the 24-month period of either positive or negative relationships compared with trends at nearby test intersections.

### **Future Demand for Photo Enforcement**

Several factors should be considered in assessing the need for red light photo enforcement in Seattle in future years. Most significant of these is the chronic nature of the problem. While the 59% decline in red light running at test intersections is a marked improvement, a significant volume of red light running remains.

There also continues to be a strong level of public support for continuing with red light photo enforcement. A follow-up telephone survey conducted in August 2008 showed that 85% of those responding were supportive of the use of traffic safety cameras at arterial intersections. This programmatic support is three percent higher than in the initial survey conducted prior to start of the program. SPD also continues to receive unsolicited requests for additional cameras at intersections that presently do not have them. The following comment may serve to summarize the kind of comments we continue to receive:

*“Kudos on your pilot Red Light Runner program. I work in the Seattle Municipal Tower and every day I feel like I take my life in my hands just trying to get to work!! The drivers on 5<sup>th</sup> and 6<sup>th</sup> avenues are fearless. Just this morning I was run out into [the] road by a guy taking a free right without even looking to see if anyone was crossing. I’ve seen so many close calls lately, and I’m afraid it is going to take a death before this problem is taken more seriously. I am heavily in favor of expanding this program and making the streets safer for pedestrians.”*

### **Project Costs and Revenues**

Although not a major reason for initiating the red light camera program, it is important to know whether the program is paying for itself. This is especially true in light of the recent experience of some other locations, such as Dallas and Los Angeles, where the cost of operating programs appears to have exceeded revenues.<sup>8</sup>

After two years of operation, traffic safety camera revenue collections in Seattle have exceeded City expenditures by a factor of two to one. Program costs over two years, including payments to the vendor as well as City agency costs, were approximately \$1,009,800; revenues totaled \$2,075,038. Costs by department are depicted below.

<sup>8</sup> See “Red light camera roulette: L.A. is money loser, Culver City rakes it in,” Los Angeles Times, June 6, 2008; and “Do red light cameras work too well? Some cities rethink devices as drivers pay heed, reducing fine revenue,” MSNBC.com, March 20, 2008.

## Traffic Safety Camera Program Costs – First Two Years 2006-2008

Law Department	\$30,000
Seattle Department of Transportation	\$111,600
Seattle Municipal Court	\$80,000
Seattle Police Department (including ATS)	\$788,200
<b>TOTAL</b>	<b>\$1,009,800</b>

The two largest costs were payments to the traffic safety camera vendor, American Traffic Solutions (\$518,343) and personnel costs for SPD officers to review and issue infraction notices (\$217,449).

On the revenue side, it is important to note that revenues from particular cameras and overall are likely to decrease over time, as this technology becomes more widespread in the city and the awareness of the driving public increases. It will be especially interesting to look at the experience of the 24 new cameras being deployed in 2008 and early 2009.

It also is important to look at alternative means of enforcement. Even if the City were to increase the number of traffic and motorcycle officers devoted to enforcement of traffic laws, it would not be possible for officers to provide the 24/7 vigilance and enforcement of traffic laws that is possible with cameras. Each additional motorcycle officer in 2008 would cost approximately \$121,000 a year, including equipment. Given that it would take six officers to provide 24/7 coverage at a single intersection over the course of a year, cameras are remarkably cost effective.

### **Conclusion and Next Steps**

During the first two years of operation, the six initial traffic safety cameras have produced favorable results. The frequency of red light running has dropped by nearly 60% at the four intersections where these cameras have been installed. Although the overall number of accidents has not decreased at these intersections, the limited data available suggest that the severity of collisions has diminished. The traffic safety cameras have done what they were intended to do – reduce red light running, and the public has responded very favorably to this type of enforcement.

As a result of experience during the pilot, the Mayor included in his Proposed Budget for 2008 the addition of 24 more cameras at hazardous intersections throughout the city. As of November 30, 2008, 12 of these new cameras have been deployed and are operational. After a brief moratorium directed by Mayor Nickels pending the public vote on the statewide Initiative-985, installation of additional planned red light cameras has resumed. Weather permitting, the last dozen new cameras should be operational by the end of January or early February 2009.

The Appendix attached to this report identifies the 18 camera approaches now working, sited at 11 different intersections, as well as the locations for the 12 cameras yet to be installed. At completion of this work, the city will have a total of 30 traffic safety cameras operating at 22 different intersections.

APPENDIX: RED LIGHT LOCATION SUMMARY – NEW AND EXISTING  
30 Cameras and 22 Intersections

Under Construction

In Operation

*North Seattle*

SB 15thNW @ NW 80<sup>th</sup>  
SB Stone Way @ NW 40<sup>th</sup>  
NB Aurora @ NW 85<sup>th</sup>  
EB NE 80<sup>th</sup> @ 5<sup>th</sup> NE

EB 45<sup>th</sup> @ Roosevelt (pilot)  
EB NW Market @ 15<sup>th</sup> NW  
WB NW Market @ 15<sup>th</sup> NW  
EB NE 45<sup>th</sup> @ Union Bay Place (Five Corners)  
WB NE 45<sup>th</sup> @ Union Bay Place (Five Corners)  
NB NE 45<sup>th</sup> @ Union Bay Place (Five Corners)

*Central Seattle*

SB 6<sup>th</sup> @ James  
SB 5<sup>th</sup> @ Spring  
SB 1<sup>st</sup> @ Marion  
SB Boren @ James  
SB 23<sup>rd</sup> @ E John

EB 5<sup>th</sup> @ Spring (pilot)  
EB Denny @ Fairview (pilot)  
WB Denny @ Fairview (pilot)  
NB Broadway @ Olive  
EB Olive @ Broadway  
SB Broadway @ Pine  
NB 9<sup>th</sup> @ James

*South Seattle*

WB Avalon @ 35<sup>th</sup> SW  
SB 35<sup>th</sup> SW @ SW Thistle  
WB S McClellan @ MLK Blvd

NB Rainier @ S Orcas (pilot)  
SB Rainier @ S Orcas (pilot)  
NB 14<sup>th</sup> S @ Cloverdale  
EB Cloverdale @ 14<sup>th</sup> S  
NB Rainier @ S Massachusetts

Key:

NB = Northbound  
SB = Southbound  
EB = Eastbound  
WB = Westbound