

Consolidated Clause in Works Committee Report 6, which was considered by City Council on July 20, 21 and 22, 2004.

5

Red-Light Camera Operations

City Council on July 20, 21 and 22, 2004, amended this Clause by adding the following:

“That the Acting Commissioner of Works and Emergency Services be requested to:

- (1) make Red Light Camera locations more easily identifiable; and*
- (2) collect speed data for a period of six months, to determine the extent of excessive speeding on streets in the City of Toronto.”*

This Clause, as amended, was adopted by City Council.

The Works Committee recommends that City Council:

- (1) adopt the staff recommendations in the Recommendations Section of the report (June 11, 2004) from the Commissioner of Works and Emergency Services;**
- (2) reiterate its support for municipally operated safety cameras (photo-radar) in school zones, community safety zones, construction zones and other areas where police are unable to enforce speed restrictions;**
- (3) request the Acting Commissioner of Works and Emergency Services, in consultation with the Toronto Police Service, to prepare a report to the Works Committee on the implementation of a safety camera (photo-radar) pilot project in Toronto;**
- (4) request the Acting Commissioner of Works and Emergency Services to explore the feasibility of using existing red-light cameras to act as a speed recording device, and report to the Works Committee on what regulatory issues are necessary to implement this function to control excessive speeds; and further, to explore:**
 - (a) using this function as an educational program via a pilot program; and**
 - (b) other jurisdictions where this feature may be in use at the present time; and**
- (5) request that the Acting Commissioner of Works and Emergency Services consider the allocation of at least one red-light camera per ward or a similar equitable distribution system.**

Purpose:

The purpose of this report is to provide a summary of the benefit-cost analysis from the red-light camera pilot project between November 2000 and November 2002, and to recommend that City Council approve an extension of red-light camera operations in the City of Toronto beyond November 20, 2004, subject to the extension of red-light camera legislation by the Government of Ontario.

Financial Implications and Impact Statement :

Funds are included in the Transportation Services Division's 2004 Capital Budget, in Account CTP700-11 to fund red-light camera operations to December 31, 2004. Funds, in the amount of \$2,011,000.00 gross, \$1,769,000.00 net, will be identified in the Transportation Services Division's 2005 Capital Budget submission, to fund red-light camera operations during 2005. Although the cost of this project was originally intended to be offset from revenue generated by tickets issued during the operation of red-light cameras, fine revenue is currently collected by the Court Services Division of Corporate Services and credited to their accounts. The estimated revenue, generated from the operation of red-light cameras in 2005 is \$2,011,000.00, which includes \$1,769,000.00 from fines and \$242,000.00 from other participating municipalities.

The Chief Financial Officer and Treasurer has reviewed the financial implications and concurs.

Recommendations :

It is recommended that:

- (1) approval be granted to continue operating red-light cameras in the City of Toronto, beyond November 20, 2004, subject to the Government of Ontario extending the red-light camera legislation indefinitely;
- (2) approval be granted for the Commissioner of Works and Emergency Services to extend Contract No. 9119-00-7004 with ACS (formerly Lockheed Martin), in the amount of \$1,181,000.00 for a fifth year of operation of red-light cameras (November 20, 2004 to November 20, 2005), subject to the approval of funding;
- (3) approval be granted to continue the operation of the City of Toronto centralized municipal processing centre which issues offence notices on behalf of the City of Toronto, as well as other participating municipalities, and that the agreements with the participating municipalities regarding the sharing of operational costs be extended;
- (4) approval be granted to extend the operational agreement with the Ministry of Transportation, Ontario which clarifies the responsibilities of both parties and permits the City to obtain the motor vehicle registration information necessary to lay charges;
- (5) the process, as described in this report for selecting additional locations for an expanded red-light camera program, for future consideration by City Council, be approved in principle;

- (6) the Commissioner of Works and Emergency Services be directed to issue a Request for Proposals, in conjunction with other municipalities, for the installation, operation and maintenance of additional red-light camera sites, subject to the Government of Ontario extending the red-light camera legislation indefinitely;
- (7) subject to the Government of Ontario extending the red-light camera legislation indefinitely, the Commissioner of Works and Emergency Services be requested to report to Works Committee, in 2005, on the results of the RFP process and the approvals and costs required to expand the number of red-light cameras in the City of Toronto; and
- (8) the appropriate City officials be authorized and directed to take the necessary action to give effect thereto.

Background:

On December 18, 1998, the Red Light Cameras Pilot Projects Act, 1998 (Bill 102) received Royal Assent. The Act amended the Highway Traffic Act to enable municipalities, for a period of two years, to use evidence obtained from red-light cameras to issue violation notices.

In announcing Bill 102, the Province stipulated that municipalities wishing to introduce a red-light camera pilot project would be required to:

- (a) conduct stepped-up police enforcement at other high-risk intersections;
- (b) participate in a comprehensive “before and after” statistical evaluation to determine the combined effect of red-light cameras and police enforcement on the frequency of red-light running; and
- (c) reimburse the Province for all of its costs associated with the program.

Six municipalities in Ontario were designated by the Ministry of Transportation, Ontario as red-light camera pilot areas, namely, City of Toronto, City of Hamilton, City of Ottawa, Regional Municipality of Halton, Regional Municipality of Peel, and the Regional Municipality of Waterloo.

On November 20, 2000, the Lieutenant Governor proclaimed Bill 102 and on the same day, the City of Toronto and the participating municipalities began operation of the red-light cameras.

On February 13, 14 and 15, 2002, City Council adopted Clause No. 8 of Works Committee Report No. 2, recommending that:

“City Council request the Government of Ontario, through the Minister of Transportation, Ontario to extend Bill 102 for an additional two years, until November 20, 2004.”

At its meeting on July 30, 31, and August 1, 2002, City Council granted approval to continue operation of the red-light cameras pilot project from November 2002 to November 2003 at a cost of \$1,910,000.00 gross, subject to the Province of Ontario extending the legislation for the use of red-light cameras.

On November 19, 2002, Bill 149 received Royal Assent extending the red-light cameras pilot project to November 20, 2004.

At its meeting on June 24, 25, and 26, 2003, City Council granted approval to continue operation of the red-light cameras pilot project from November 2003 to November 2004 at a cost of \$1,845,000.00 gross. City Council further recommended that prior to extensions of the red-light camera program beyond November 2004, the Commissioner of Works and Emergency Services be requested to submit a report to the Works Committee that outlines the cost effectiveness of the program on a per ticket basis and explores optional operational models, including alternative financing options for capital expenditures.

At its meeting on September 22, 23, 24 and 25, 2003, City Council resolved to request the Government of Ontario, through the Ontario Ministry of Transportation, to extend the red-light camera legislation (Bill 102, as amended by Bill 149) for an indefinite period.

The two primary reasons for recommending that the City of Toronto request the Government of Ontario to extend the red-light camera legislation indefinitely were:

- (a) the results from the first two years of operation of the red-light cameras indicate that the project has achieved the objective of reducing angle collisions, particularly those resulting in personal injuries and fatalities; and
- (b) there is strong public support for camera enforcement of red-light running.

Bill 149 provides the Lieutenant Governor the authority to extend the red-light camera pilot project legislation indefinitely, by proclamation, before November 20, 2004. If the legislation is not extended before this date, the legislative authority to operate red-light cameras will expire.

Discussion:

This report discusses the following items:

- (1) Summary of the “Before and After” safety evaluation of the pilot project (November 2000 - November 2002);
- (2) Status of the red-light camera legislation;
- (3) Cost of the red-light camera project to date, on a per ticket basis;
- (4) Operational and financing options for the supply and operation of red-light cameras;
- (5) Operating existing red-light cameras – November 20, 2004 – November 20, 2005; and
- (6) Red-light camera expansion plans for the City of Toronto.

(1) Summary of the “Before and After” Safety Evaluation of the Pilot Project (November 2000 - November 2002)

With funding from the six participating municipalities, the Ministry of Transportation, Ontario retained a consultant to conduct a “before and after” evaluation study covering the six participating municipalities. The purpose of the evaluation study was to determine, with statistical significance the combined effect that red-light cameras and police enforcement have had on safety at 48 representative study sites within the six municipalities. This study included seven camera sites and four police enforcement sites in the City of Toronto. The provincial study results are presented in Appendix A of this report. A summary of the findings is presented in Table 1.

Table 1: Safety Effectiveness at 48 Provincial Study Sites

| 48 Study Sites | Percentage Difference: (“After” compared to “Before”) | |
|---------------------|---|---------------------------------|
| | Fatal and Injury Collisions | Property Damage Only Collisions |
| All Collision Types | -6.8 % | +18.5% |
| Angle Collisions | -25.3 % | -17.9 % |
| Rear End Collisions | +4.9 % | +49.9 % |

A benefit-cost analysis was also conducted, as part of the evaluation study involving all six of the participating municipalities, to determine the societal benefits of the pilot project using an assessment of all benefits and costs associated with the 48 study sites. A framework established by the Ministry of Transportation, Ontario was used to establish the cost to society in terms of human consequences (fatalities and injuries, property damage, time and material expended) as a result of collisions. The benefit from a reduction in collisions is the avoidance of these costs. If a collision can be avoided the resources consumed by that collision could be used elsewhere for the benefit of society. The resulting benefit to cost ratio was 1.57:1 indicating that the benefits resulting from the combined use of red-light cameras and police enforcement were greater than the project costs.

A supplementary collision frequency analysis was conducted, using the same “before and after” periods as the provincial safety evaluation, to determine the effect on safety at the 38 City of Toronto red-light camera sites. The full findings of this analysis are presented in Appendix B of this report. A summary of the findings is presented in Table 2.

Table 2:
Collision Frequency Comparison – 38 City of Toronto Red-Light Camera Sites

| Collision Type | Percentage Difference: (“After” compared to “Before”) | |
|--------------------------|---|---------------------------------|
| | Fatal and Injury Collisions | Property Damage Only Collisions |
| All Collision Types | - 18.2 % | + 4.0 % |
| Angle Type Collisions | - 48.0 % | - 26.2 % |
| Rear End Type Collisions | - 2.3 % | +10.1 % |

With the exception of rear end collisions, the operation of red-light cameras has reduced collisions at signalized intersections where red-light cameras were operating, particularly those collisions which result in personal injury and fatalities.

(2) Status of Red-Light Camera Legislation

Bill 149, amending Bill 102, came into effect on November 19, 2002 to extend the red-light camera legislation until November 20, 2004. Bill 149 also provides the Lieutenant Governor the authority to extend the red-light camera pilot project legislation indefinitely, by proclamation, before November 20, 2004. If the legislation is not extended before this date, the authority to operate red-light cameras will expire.

In a letter to the City Clerk, dated December 18, 2003, the Transportation Minister, Harinder Takhar indicated that he would consider the request to extend the red-light camera legislation. Since that communication no further information has been received, but ministry staff have informed the joint municipal steering committee that they have briefed the Minister of Transportation on the results of the evaluation study.

(3) Cost of the Red-Light Camera Project to Date, On a Per Ticket Basis

At its meeting on June 24, 25, and 26, 2003, City Council recommended that prior to extensions of the red-light camera program beyond November 2004, the Commissioner of Works and Emergency Services be requested to submit a report to the Works Committee that outlines the cost effectiveness of the program on a per ticket basis and explores optional operational models, including alternative financing options for capital expenditures.

From November 20, 2000 to December 31, 2003, 28,088 charges were issued for red-light running at the City of Toronto red-light camera sites. The gross project cost, for the same period, was \$ 9,418,662.00 resulting in a gross cost per charge of \$335.33, which includes the one-time start-up costs. During the same period, the City of Toronto collected revenue from red-light running fines and from the other participating municipalities for their portion of the municipal processing centre operating costs. Fine revenue is collected from both pre-payments, at the full amount of \$190.00 and from court ordered convictions at an amount set by the court, at the conclusion of each trial. Of the total payable, the City of Toronto remits up to \$35.00 for the Victim Fine Surcharge administered by the Province of Ontario. Fine and municipal revenue for the period of November 20, 2000 to December 31, 2003, is estimated at \$146.04 per charge.

(4) Operational and Financing Options for the Supply and Operation of Red-Light Cameras

As requested by City Council, City of Toronto staff, in conjunction with the municipal red-light camera project steering committee have explored operational and financing options for the supply, installation, operations and maintenance of red-light cameras. There are two basic operational options, which are briefly described below.

- (a) Vendor/Municipal Operation – The municipality contracts with a vendor for the supply, installation, operation and maintenance of the red-light cameras. The municipality pays the vendor for the installation, operation and maintenance of the cameras. The municipality separately provides and funds all the processing functions. This is the arrangement that has been in effect for the pilot project; and
- (b) Vendor Outsource Operation – The municipality contracts with a vendor for the supply, installation, operation and maintenance of the red-light cameras as well as the processing of charges. The vendor prepares charging documents, based upon criteria set by the municipality and mails only those charges approved by the municipality to the defendant. The municipality pays the vendor for these functions. The only function provided by the municipality is to review the charges recommended by the vendor and provide instructions regarding which charges should be laid (mailed to the defendant by the vendor).

Following its review of the two operational options, the municipal red-light camera project steering committee has concluded that municipalities should continue using the Vendor/Municipal Operation model, which does not permit the vendor to operate the processing function (photograph review, screening of non-enforceable offences, processing of licence plate ownership information, mailing approved offence notices and preparation of court documents). As indicated in section 5 of this report, the agreement with the Ministry of Transportation does not permit the municipalities to transfer the right to use licence plate registration information, which is necessary to lay charges. In addition, legal advice provided to the municipal red-light camera project steering committee recommends that the processing and charging components of the program should remain a municipal operation, in order to maintain confidence in the program, by the courts and the public. This legal advice is consistent with recommendations made by the California State Auditor who was requested to complete a state-wide review of the red-light camera projects after the San Diego Superior Court ruled that the City of San Diego did not provide sufficient oversight of its red-light camera vendor, resulting in more than 250 charges being dismissed. The California State Auditor concluded that local governments did not exercise sufficient control over vendor operated programs. Specifically, local governments should be actively involved in the processing of evidence, handling and storage of confidential data and mailing of approved tickets.

The municipal red-light camera project steering committee also explored the following options for financing a vendor/municipal operation:

- (a) Purchase/Maintenance Fee Financing – The municipality purchases the red-light cameras and pays all installation costs. The municipality separately pays the vendor a monthly fee for the operation and maintenance functions, provided by the vendor. This financing model requires an initial capital investment by the municipality as well as municipal funding of the monthly operating costs; and
- (b) Leasing Fee Financing – The vendor provides the red-light cameras to the municipality. The municipality pays the vendor a monthly fee the use of the red-light cameras and any functions provided by the vendor. This financing model

does not require initial capital investment by the municipality, but the monthly costs for this option are higher than the Purchase/Maintenance Fee option.

The municipal red-light camera project steering committee has concluded that the new red-light camera RFP should permit vendors to submit proposals based on both the purchase/maintenance fee and the leasing fee financing options.

(5) Operating Existing Red-Light Cameras – November 20, 2004 – November 20, 2005

Currently, there is not sufficient time to issue a new Request for Proposals and select a red-light camera vendor in time for continued operations beyond November 20, 2004. In the event that the Government of Ontario extends the red-light camera legislation indefinitely prior to November 20, 2004, the municipal red-light camera project steering committee has recommended that participating municipalities seek approval to extend the existing contract with ACS to ensure continued red-light camera operations without interruption.

The City of Toronto owns ten red-light cameras that are rotated among 38 equipped sites (with poles, enclosures and detectors). The current City of Toronto red-light camera sites are listed in Appendix C. Continuation of red-light camera operations beyond November 20, 2004, will first require an extension to the red-light camera legislation. In addition to the legislative authority, the operation of red-light cameras requires the City of Toronto to have operational agreements with the:

- (a) red-light camera vendor for operation and maintenance of the red-light cameras;
- (b) Ministry of Transportation to obtain licence plate registration information which is necessary to lay charges under this program; and
- (c) other participating municipalities for the operation and cost-sharing of the centralized municipal processing centre, which issues offence notices, on behalf of the City of Toronto and the other participating municipalities.

ACS has provided unit cost pricing for operation and maintenance of red-light cameras for the period of November 2004 – November 2005 to the participating municipalities. Since the City owns the red-light camera equipment, operation and maintenance costs of the existing sites are the only ACS expenditures to be incurred in the fifth year of operation. The ACS cost to the City of Toronto is estimated at \$1,181,000.00, which is based upon the 2003 scope of activity. The unit costs provided by ACS represent a four percent increase over the fourth year unit cost prices. These services include \$57,000.00 for centralized processing of red-light camera film, which the City of Toronto would recover from the other participating municipalities. Consequently, the net cost to the City of Toronto for these services is \$1,124,000.00. At the current time, the other participating municipalities are preparing reports recommending an extension to the agreement with ACS, for consideration by their respective councils.

The agreement with the Ministry of Transportation defines the responsibilities of both parties and permits the City to obtain and use licence plate registration information

necessary to lay charges. The agreement requires the City of Toronto to comply with all applicable laws and statutes including the *Provincial Offences Act*, the *Municipal Freedom of Information and Protection of Privacy Act* and the *Highway Traffic Act*. The agreement provides the City of Toronto the non-transferable right to use licence plate registration information for the purpose of conducting legal proceedings specific to red-light running violations. In order to continue red-light camera operations, beyond November 20, 2004, it is recommended that the agreement with the Ministry of Transportation be extended.

The City of Toronto operates the centralized municipal processing centre on behalf of itself and the other participating municipalities. The centralized municipal processing centre employs designated Provincial Offences officers who review and process evidence obtained from the red-light cameras, obtain plate ownership information for offences, lay red-light running charges and prepare court documents. By maintaining the operation as a municipal function, the participating municipalities ensure a consistent approach to the processing of red-light camera offences, thereby maintaining the integrity of and upholding public confidence in the program. In addition, the agreement with the Ministry of Transportation does not permit the municipalities to transfer the right to use licence plate registration information, which is necessary to lay charges.

The agreements with the participating municipalities define the responsibilities of participating parties regarding the sharing of all operating costs. In order to continue red-light camera operations, beyond November 20, 2004, it is recommended that the City of Toronto extend its agreements with the other participating municipalities.

The estimated cost of operating red-light cameras in the City of Toronto for a fifth year (November 2004 – November 2005) is \$2,011,000.00 gross, \$1,769,000.00 net, as shown in Table 3. This includes costs for extending the contract with ACS (Affiliated Computer Systems) as well as operating the centralized municipal processing centre, reimbursement to the Province, and continuing the public awareness campaign.

Table 3: Project Costs Year 5

| Project Component | Gross Department Cost Estimate Year 5 | Net Department Cost Estimate Year 5 |
|--------------------------------|---------------------------------------|-------------------------------------|
| Operate and Maintain Equipment | \$ 1,181,000 | \$ 1,124,000 |
| Processing Centre | \$ 400,000 | \$ 272,000 |
| Public Awareness | \$ 250,000 | \$ 225,000 |
| Provincial Costs | \$ 100,000 | \$ 100,000 |
| Project Management | \$ 80,000 | \$ 48,000 |
| Project Total | \$ 2,011,000 | \$ 1,769,000 |

The revenue estimate for the fifth year is \$2,011,000.00, which includes \$242,000.00 from municipalities and \$1,769,000.00 from fines is based upon 2003 and early 2004 experience. Therefore, the net cost to the City of Toronto is \$0.00.

(6) Red-Light Camera Expansion Plans for the City of Toronto

Should the Government of Ontario extend the red-light camera legislation indefinitely, the City of Toronto could consider expanding the number of red-light cameras in the City of Toronto, by taking the steps identified in Table 4.

Table 4: Red-Light Camera Project Expansion Timetable

| Date: | Steps: |
|--------------------|---|
| June – July 2004 | Report to Works Committee and Council recommending the extension of red-light camera operations beyond November 2004 |
| June – August 2004 | Complete the selection of additional red-light camera sites (as detailed in Table 5 of this report) |
| September 2004 | Issue new RFP for red-light cameras in the City of Toronto and other municipalities |
| November 2004 | Evaluate RFP responses |
| Spring 2005 | Report to Works Committee and Council, recommending authority to award new contracts and detailing multi-year budget requirements and revenue estimates |
| Spring 2005 | If necessary, request the Province of Ontario to designate the new red-light camera system in the regulations |
| Fall 2005 | Begin operation of additional red-light camera locations |

Additional intersections for an expansion in the number of red-light cameras will be identified using the process identified in Table 5.

Table 5: Additional Red-Light Camera Site Selection Process

| Step | Description |
|------|--|
| 1 | Compile the collision history of all signalized intersections. |
| 2 | List the frequency of all types of injury and fatality collisions at signalized intersections. |
| 3 | List the frequency of angle type injury and fatal collisions at signalized intersections. |
| 4 | List the frequency of angle type property damage only type collisions at signalized intersections. |
| 5 | List the frequency of collisions involving pedestrians and cyclists at signalized intersections. |
| 6 | List the frequency of rear end type injury and fatal collisions at signalized intersections. |
| 7 | List the frequency of rear end type property damage only type collisions at signalized intersections. |
| 8 | In consultation with the Toronto Police Service, use a combination of the results of steps 2 through 7 to rank intersections based on their collision history and potential for collision reduction if included in an expanded red-light camera program. |

| Step | Description |
|------|---|
| 9 | Review each intersection identified in step 8 for feasibility of red-light camera installation. The feasibility of red-light camera installation involves a thorough physical review of each intersection (above and below ground plant as well as driveway locations) to ensure that there would be no conflict with the red-light camera pole location and its sensors. |
| 10 | With the Toronto Police Service, review intersections which are not suitable for automated enforcement and consider alternative enforcement options. |
| 11 | From the list of candidate intersections, select locations based on collision reduction potential and attempt to achieve even distribution throughout the City of Toronto. |

City of Toronto staff have completed steps 1 through 5 of the process detailed in Table 5 and have identified approximately 100 locations with a collision history which could be improved through the use of red-light camera operations. The remaining steps (steps 6 through 11) should be complete by late August 2004.

The cost of operating the existing 38 red-light camera sites in the City of Toronto for a five-year period (November 2000 – November 2005) is estimated at \$13,274,000.00 gross. The estimated revenue for the same period is estimated at \$7,184,000.00. Consequently, the net operational cost for operating red-light cameras in the City of Toronto at 38 locations over a five-year period is \$6,090,000.00.

City of Toronto staff estimated that the cost to operate red-light cameras at 78 sites (an additional 40 sites) over a five-year period is \$28,500,00.00 gross, \$10,000,000 net.

Should the Government of Ontario extend the red-light camera legislation indefinitely, the City of Toronto, in conjunction with other municipalities, could issue a new RFP for the installation, operation and maintenance of red-light cameras at additional sites for the period of July 2005 - July 2010. In the event that approval is granted, the Commissioner of Works and Emergency Services would report back to Works Committee in early 2005 detailing the required approvals and funding for an extended red-light camera program.

Conclusion:

The operation of red-light cameras has reduced collisions at signalized intersections where red-light cameras were operating, particularly those collisions that result in personal injury and fatalities with a benefit to cost ratio of 1.57 : 1. Authority is requested to extend operation of the existing red-light cameras from November 20, 2004 to November 20, 2005, including authority for the appropriate City officials to extend the agreements with Affiliated Computer Systems, other participating municipalities and the Ministry of Transportation, necessary to operate red-light cameras. Should the Government of Ontario extend the red-light camera legislation indefinitely, it is also recommended that the Commissioner of Works and Emergency Services be requested to submit a report to Works Committee, in early 2005, on the approvals and costs required to operate an expanded number of red-light camera sites in the City of Toronto for a five-year period, starting in mid-2005.

Contacts:

Mike Brady
Manager, Red Light Camera Operations
Phone: (416) 397-5016
Fax: (416) 392-4919
E-mail: mbrady@toronto.ca

Les Kelman, P.Eng.
Director, Traffic Management Centre
Phone: (416) 392-5372
Fax: (416) 397-5011
E-mail: lkelman@toronto.ca

Appendix A

Results of the “Before and After” Safety Evaluation

The evaluation study included 48 sites in total located within the six municipalities which were designated as red-light camera pilot areas, with approximately equal numbers of red-light camera sites, stepped-up police enforcement sites, and control sites. The distribution of red-light camera and evaluation study sites is listed in Table A1.

Table A1: Red-Light Camera and Evaluation Site Distribution

| Red-Light Camera Sites | | | Evaluation Study Sites | | |
|------------------------|------------------------|-------------------|------------------------|-------------------------------|--------------------|
| Municipality | # of Red-Light Cameras | # of Camera Sites | # of Camera Sites | # of Police Enforcement Sites | # of Control Sites |
| Toronto | 10 | 38 | 7 | 4 | 6 |
| Hamilton | 2 | 8 | 1 | 2 | 2 |
| Ottawa | 2 | 8 | 5 | 2 | 0 |
| Halton | 1 | 4 | 3 | 3 | 4 |
| Peel | 2 | 6 | 2 | 5 | 0 |
| Waterloo | 1 | 4 | 1 | 1 | 0 |
| Totals | 18 | 68 | 19 | 17 | 12 |

In order to measure the combined effectiveness of red-light cameras and police enforcement, with statistical significance, a robust statistical tool, known as the “Empirical Bayes” method was used to conduct the safety evaluation. Collision, traffic volume and red-light violation data for the years 1995 to 1999, representing the period “before” red-light cameras were introduced, were used to develop an average safety performance curve for the 48 study sites. Similar data were collected for the years 2001 and 2002, representing the period “after” red-light cameras were introduced. The safety performance for the “before” and “after” periods were compared to provide the basis of the safety evaluation at each of the 48 study sites. The combined effect that both red-light cameras and police enforcement had on the study sites, in terms of collisions, is shown in Table A2.

Table A2: Safety Effectiveness of 48 Provincial Study Sites

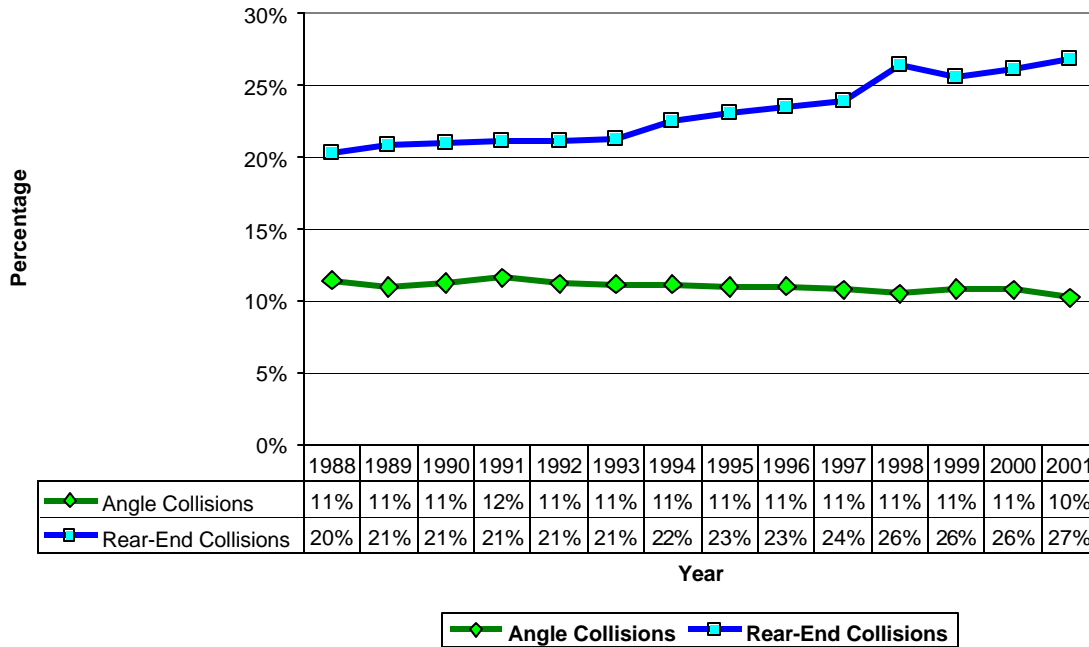
| 48 Study Sites | Percentage Difference: (“After” compared to “Before”) | |
|---------------------|---|---------------------------------|
| | Fatal and Injury Collisions | Property Damage Only Collisions |
| All Collision Types | -6.8 % | +18.5% |
| Angle Collisions | -25.3 % | -17.9 % |
| Rear End Collisions | +4.9 % | +49.9 % |

Of all collisions that occur at signalized intersections, angle type collisions are the most indicative of red-light running. The results above indicate that angle type collisions resulting in fatalities and personal injury were reduced by 25.3 percent and those resulting in property damage were reduced by 17.9 percent as a result of the pilot project.

However there was a large increase in rear end collisions occurring at the study sites. In this regard, it is important to note that:

- (a) the increase in rear end collisions at the study sites may indicate an increase in motorist compliance with red traffic signal indications (most drivers but not all). This can often result in motorists, who are driving too close or driving without due care and attention, such that they cannot bring their vehicle to a stop, colliding with the vehicle in front, whose driver has complied with the amber and red signal indications;
- (b) these results are similar to other studies on the effects of red-light cameras;
- (c) Ontario Road Safety Annual Reports indicate that rear end type collisions have increased from 23 percent to 27 percent of all collisions, during the same period as the evaluation study (see chart, below). Therefore this can be seen as a general collision trend within the Province of Ontario.

Percentage of angle and rear-end collisions in Ontario (1988 – 2001)



Based on these findings, the red-light cameras pilot project has achieved the objective of reducing severe collisions.

Appendix B

Results of the City of Toronto Supplementary “Before and After” Collision Analysis

Only seven of the 38 City of Toronto red-light camera sites (18 percent) were used in the provincial “before and after” safety evaluation. Therefore, a supplementary collision frequency analysis was conducted, using the same “before and after” periods as the provincial safety evaluation. This supplementary analysis was conducted to determine:

- (a) the impact on collisions at all 38 City of Toronto red-light camera sites; and
- (b) the collision trend at all other signalized intersections within the City of Toronto during the same “before and after” period.

The results of this supplementary analysis are shown in the following tables.

Table B1: Collision Frequency Comparison – All Collision Types

| Intersection Group | Percentage Difference: (“After” compared to “Before”) | |
|--|---|---------------------------------|
| | Fatal and Injury Collisions | Property Damage Only Collisions |
| 38 City of Toronto Red-Light Camera Sites | - 18.2 % | + 4.0 % |
| All Other City of Toronto Signalized Intersections | + 4.0 % | +27.6 % |
| 48 Provincial Study Sites | - 6.8 % | + 18.5 % |

The results shown in Table B1 (All Collision Types) indicate that when comparing the “after” period to the “before” period:

- (i) fatal and injury collisions decreased by 18.2 percent at the 38 City of Toronto red-light camera sites whereas they increased by 4.0 percent at all other City of Toronto signalized intersections;
- (ii) fatal and injury collisions decreased by 6.8 percent at the 48 provincial study sites whereas they decreased by 18.2 percent at the 38 City of Toronto red-light camera sites;
- (iii) property damage only collisions increased by 4.0 percent at the 38 City of Toronto red-light camera sites whereas they increased by 27.6 percent at all other City of Toronto signalized intersections; and
- (iv) property damage only collisions increased by 18.5 percent at the 48 provincial study sites whereas they increased by 4.0 percent at the 38 City of Toronto red-light camera sites.

Table B2: Collision Frequency Comparison – Angle Type Collisions

| Intersection Group | Percentage Difference: (“After” compared to “Before”) | |
|--|---|---------------------------------|
| | Fatal and Injury Collisions | Property Damage Only Collisions |
| 38 City of Toronto Red-Light Camera Sites | - 48.0 % | -26.2 % |
| All Other City of Toronto Signalized Intersections | - 29.1 % | - 7.4 % |
| 48 Provincial Study Sites | - 25.3 % | - 17.9 % |

The results shown in Table B2 (Angle Type Collisions) indicate that when comparing the “after” period to the “before” period:

- (i) fatal and injury collisions decreased by 48.0 percent at the 38 City of Toronto red-light camera sites whereas they decreased by 29.1 percent at all other City of Toronto signalized intersections;

- (ii) fatal and injury collisions decreased by 25.3 percent at the 48 provincial study sites whereas they decreased by 48.0 percent at the 38 City of Toronto red-light camera sites;
- (iii) property damage only collisions decreased by 26.2 percent at the 38 City of Toronto red-light camera sites whereas they decreased by 7.4 percent at all other City of Toronto signalized intersections; and
- (iv) property damage only collisions decreased by 17.9 percent at the 48 provincial study sites whereas they decreased by 26.2 percent at the 38 City of Toronto red-light camera sites.

Table B3: Collision Frequency Comparison – Rear End Type Collisions

| Intersection Group | Percentage Difference: (“After” compared to “Before”) | |
|--|---|---------------------------------|
| | Fatal and Injury Collisions | Property Damage Only Collisions |
| 38 City of Toronto Red-Light Camera Sites | - 2.3 % | + 10.1 % |
| All Other City of Toronto Signalized Intersections | + 11.5 % | + 42.9 % |
| 48 Provincial Study Sites | + 4.9 % | +49.9 % |

The results shown in TableB3 (Rear End Collisions) indicate that during the same “before” and “after” periods:

- (i) fatal and injury collisions decreased by 2.3 percent at the 38 City of Toronto red-light camera sites whereas they increased by 11.5 percent at all other City of Toronto signalized intersections;
- (ii) fatal and injury collisions increased by 4.9 percent at the 48 provincial study sites whereas they decreased by 2.3 percent at the 38 City of Toronto red-light camera sites;
- (iii) property damage only collisions increased by 10.1 percent at the 38 City of Toronto red-light camera sites whereas they increased by 42.9 percent at all other City of Toronto signalized intersections; and
- (iv) property damage only collisions increased by 49.9 percent at the 48 provincial study sites whereas they increased by 10.1 percent at the 38 City of Toronto red-light camera sites.

With the exception of rear end collisions, the operation of red-light cameras has reduced collisions at signalized intersections where red-light cameras were operating, particularly those collisions that result in personal injury and fatality.

Appendix C

Toronto Red-Light Camera Sites

| Intersection | Ward(s) |
|---|----------|
| Finch Avenue and Kipling Avenue | 1 |
| Dixon Road and Islington Avenue | 2, 4 |
| Dixon Road and Martin Grove Road | 2, 4 |
| Eglinton Avenue and Martin Grove Road | 3, 4 |
| The Queensway and Royal York Road | 5 |
| Finch Avenue and Weston Road | 7 |
| Finch Avenue and Jane Street | 7, 8 |
| Dufferin Street and Steeles Avenue | 8, 10 |
| Allen Road and Sheppard Avenue | 8, 9, 10 |
| Bathurst Street and Finch Avenue | 10, 23 |
| Weston Road and Lawrence Avenue | 11 |
| Dundas Street and Keele Street | 13 |
| Dufferin Street and Eglinton Avenue | 15, 17 |
| Dufferin Street and St. Clair Avenue | 17 |
| Yonge Street and Eglinton Avenue | 16, 22 |
| Yonge Street and York Mills Road | 16, 25 |
| Dufferin Street and Bloor Street | 18 |
| Bloor Street and Bathurst Street | 19, 20 |
| University Avenue and Gerrard Street | 20, 27 |
| Yonge Street and Steeles Avenue | 23, 24 |
| Yonge Street and Finch Avenue | 23, 24 |
| Finch Avenue and Don Mills Road | 24, 33 |
| Eglinton Avenue and Don Mills Road | 26 |
| Yonge Street and Wellesley Street | 27 |
| Lake Shore Boulevard E/B and Yonge Street | 28 |
| Yonge Street and Richmond Street | 28 |
| Danforth Avenue and Broadview Avenue | 29, 30 |
| St. Clair and Victoria Park Avenue | 31, 35 |
| Lawrence Avenue and Victoria Park Avenue | 34, 37 |
| Eglinton Avenue and Pharmacy Avenue | 35, 37 |
| Eglinton Avenue and Markham Road | 36, 38 |
| Lawrence Avenue and Warden Avenue | 37 |
| Ellesmere Road and Brimley Road | 37, 38 |
| Ellesmere Road and Markham Road | 38 |
| Lawrence Avenue and Markham Road | 38, 43 |
| Steeles Avenue and Warden Avenue | 39 |
| Brimley Road and Huntingwood Drive | 41 |
| Kingston Road and Morningside Avenue | 43, 44 |