



STAFF REPORT ACTION REQUIRED

Red Light Cameras – Status Update and Phase 3 Contract Award (Request for Proposal No. 9148-15-5000 - 2017 to 2021)

Date:	August 31, 2015
To:	Public Works and Infrastructure Committee
From:	General Manager, Transportation Services and Director, Purchasing and Materials Management
Wards:	All
Reference Number:	P:\2015\Cluster B\TRA\TMC\pw15005tmc.docx (AFS # 20527)

SUMMARY

The purpose of this report is to provide an update on the safety effectiveness and financial results from the current (Phase 2) red light camera operations and request authorization to award the Phase 3 contract.

The red light camera program in the City of Toronto started in 2000 with the objective to increase intersection safety for all road users by reducing the frequency of red light running. The first phase comprised of ten red light cameras. The second and current phase of 77 red light cameras started in 2007 and will be operational through 2016. Since 2007, angle-type collisions resulting in fatality, injury and property-damage have decreased between 19 percent and 40 percent. Net revenues generated through the program are approximately \$11,500,000 and associated societal cost savings have been estimated at over \$58 million.

In February 2014, City Council approved issuing a Request for Proposal (RFP) to continue red light camera operations beyond 2016 under Phase 3. Accordingly, RFP No. 9148-15-5000 was issued in April 2015. This report advises on the results of the RFP and requests authority to enter into an agreement with the recommended proponent.

This report also provides information on the red light camera site selection process and cost estimate of the red light camera system for the period of 2017 to 2021 and for an optional five (5) year period from 2022 to 2026.

RECOMMENDATIONS

The General Manager, Transportation Services, and the Director, Purchasing & Materials Management, recommend that:

1. City Council authorize the General Manager, Transportation Services to negotiate and enter into an agreement with Traffipax LLC, being the highest overall scoring proponent meeting the requirements of RFP No. 9148-15-5000, for the supply, installation, operation, maintenance and future removal of red light camera systems for the period of five (5) years (January 1, 2017 to December 31, 2021), in the amount of \$10,553,538.30 net of all taxes and charges with an option to renew, on the sole discretion of the General Manager, Transportation Services, and subject to budget approval, for an additional five (5) years (January 1, 2022 to December 31, 2026) in the amount of \$7,451,781.77 net of all taxes and charges totalling \$18,005,320.07 net of all taxes and charges, for a total potential cost of \$18,322,213.70 net of HST Recoveries, in accordance with terms and conditions as set out in the RFP and any other terms and conditions satisfactory to the General Manager, Transportation Services, and in a form satisfactory to the City Solicitor.

Financial Impact

The total contract award resulting from RFP No. 9148-15-5000 identified in this report for the period of five (5) years from 2017 to 2021 is \$10,553,538.30 net of all taxes and charges. The total potential cost to the City is \$10,739,280.57 net of HST recoveries.

The total estimated costs of the red light camera program are expected to be fully offset by fine revenue from tickets issued during the operation of red light cameras and municipal processing centre fees collected from other partnering municipalities. For example, in 2017, total costs of approximately \$3,700,000 will be included for consideration as part of the City's Operating Budget (approximately \$3,220,000 in Transportation Services and approximately \$480,000 in Court Services). Transportation Services will recover approximately \$800,000 in 2017 from other municipalities through existing cost-sharing agreements, while Court Services will collect approximately \$6,000,000 in fine revenue. The net revenue for the City is estimated to be approximately \$3,400,000 in 2017.

Funding for the red light camera program will be considered as part of the Operating Budget process in each year (2017 to 2021). Over the five (5) year period from 2017 to 2021, total expenditures are estimated at approximately \$19,000,000 and total revenue is estimated at approximately \$36,000,000 resulting in estimated net revenue for the City of approximately \$17,000,000.

The Deputy City Manager and Chief Financial Officer has reviewed this report and concurs with the financial impact statement.

DECISION HISTORY

At its meeting of July 20-22, 2004, City Council approved an extension of Phase 1 of red light camera operations in the City of Toronto beyond November 20, 2004 and recommended the site selection process for future red light camera sites.

<http://www.toronto.ca/legdocs/2004/agendas/council/cc040720/wks6rpt/cl005.pdf>

At its meeting of May 23-25, 2006, City Council approved a contract to retain Traffipax LLC for the supply, installation, operation and maintenance of additional red light cameras (Phase 2) within the City of Toronto, over a five (5) year period, from 2007 to 2011 with the option to extend for up to five (5) additional years.

<http://www.toronto.ca/legdocs/2006/agendas/council/cc060523/pof4rpt/cl018.pdf>

At its meeting of April 28 and 29, 2008, City Council directed City staff to provide the Public Works and Infrastructure Committee with an update on the status of the red light camera operations.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2008.PW14.10>

At its meeting of June 14 and 15, 2011, City Council approved an amendment to the contract with Traffipax LLC for five (5) additional one (1) year periods up to December 31, 2016.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2011.PW4.5>

At its meeting of November 29-30 and December 1, 2011, City Council requested the General Manager, Transportation Services, to re-evaluate the current location of all red light cameras based on predetermined criteria. The results of this evaluation are compared to an even distribution of cameras on a ward-by-ward basis as requested by Council.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2011.AU4.1>

At its meeting of February 19 and 20, 2014, City Council requested the General Manager, Transportation Services, to issue an RFP for the supply, installation, operation, maintenance and removal of red light camera systems for the period of 2017 to 2021 (Phase 3), with the option to extend the resulting contract for an additional five (5) years.

<http://app.toronto.ca/tmmis/viewAgendaItemHistory.do?item=2014.PW28.4>

ISSUE BACKGROUND

The objective of the red light camera program is to increase intersection safety for all road users by reducing the frequency of red light running. A reduction in collisions equates to a resultant reduction in burden to the health care system and on emergency services. It also results in improved traffic flow, reduced travel time and better driver education.

In November 2000, the first phase of red light camera operations started in the City of Toronto with ten cameras. The second phase of 77 red light cameras went into operation in November 2007 following both an extensive testing process and enactment of amendments to the Regulations of the Ontario Highway Traffic Act, which designates the red light camera systems that can be operated in the Province of Ontario. City Council has provided authority to operate the second phase of red light cameras until December 31, 2016.

In February 2014, City Council also approved issuance of an RFP to continue red light camera operations beyond December 2016.

COMMENTS

Safety Effectiveness Update – Phase 2 (2007-2014)

The red light camera program is designed to reduce the frequency and severity of angle-type collisions at signalized intersections. Therefore, monitoring the frequency and severity of angle-type collisions at intersections before and after the red light cameras are in operation provides a good measure of the safety effectiveness.

The safety analysis for Phase 2 compared seven (7) years (2001 to 2007) of collision data prior to these installations to the seven (7) years (2008 to 2014) after the red light cameras were installed. The safety performance for the “before” and “after” periods was compared to provide the basis of the safety evaluation at the 77 locations. The effect that red light cameras had on collisions at the Phase 2 locations is shown in Table 1 of Appendix A.

The second phase of red light camera operations is meeting its objective of reducing collisions and injuries attributed to red light running at the monitored locations. Angle-type collisions at the 77 red light camera locations, resulting in property-damage and injury were reduced by 19 percent and 37 percent, respectively. Angle-type collisions resulting in fatality for the same time period were reduced by 40 percent. Rear-end collisions, resulting in property-damage increased by 27 percent and rear-end collisions resulting in injury decreased by 14 percent during the same seven years of operation.

The installation of the second phase of the red light cameras was phased in over a number of years as shown in Table 2 of Appendix A. The numbers for 2009 to 2014 represent comparable number of locations whereas 2007 and 2008 provide partial results. An analysis of the red light camera violation data from 2009 to 2014 suggests that after an initial rise in red light running events in 2010, total numbers started to decline in 2011 which has continued to date.

Table 3 of Appendix A details the red light camera activity on an annual basis at each of the red light camera locations throughout the duration of the second phase of red light camera operations. As can be seen, Phase 2 of the red light camera system proved to be effective as the number of activities declined from 2011.

Financial Results Update – Phase 2 (2007-2014)

The estimated red light camera program costs and revenues for the years 2007 to 2011, contained within the April 2006 staff report were based on operating red light cameras at 132 locations. However, as a result of the red light camera site selection process, approved as part of the June 2004 staff report, 77 red light camera locations were installed rather than the 132 locations which formed the basis of the 2004 program cost and revenue estimates. As shown in Table 4 of Appendix B, the estimated red light camera program costs and revenues for the years 2007 to 2011 were projected for net project revenue of \$160,300.

The provincially set fine amount per red light camera infraction includes set fine, court costs and applicable Victim Fines Surcharge. The set fines and court costs are retained by the City and Victim Fines Surcharge are payable to the Province. The projected revenue above was based on the \$180 per red light camera infraction from which the City retained \$155 for set fines and court costs and the remaining \$25 was payable to the Province.

However, in January 2010, the Province increased the set fine amount to \$325 per infraction from which the City retains \$265 and the remaining \$60 are payable to the Province. Based on the actual costs and revenues from 2007 to 2014, the second phase resulted in net revenue of approximately \$11,500,000. Analysis shows that red light camera revenue began to exceed project costs in the year 2010 which coincides with an increase in the provincially set fine amount which was effective on January 1, 2010. The detailed numbers are shown in Table 5 of Appendix B.

Societal Cost Savings – Phase 2 (2007-2014)

The direct benefit of red light camera operations is the reduced frequency of red light running and reductions in the severity of collisions. A reduction in collisions equates to a resultant reduction in burden to the health care system and on emergency services. It also results in improved traffic flow, reduced travel time and better driver education. All of these elements contribute to societal cost savings.

Transport Canada developed unit dollar values for the cost of traffic collisions, categorized by degree of severity of traffic collisions. Fatalities resulting from collisions are the largest single contributor to societal costs, though the costs of injuries and property damage are also significant. The societal cost savings at the current 77 red light camera locations based upon the collision reductions are shown in Table 6 of Appendix B. It is estimated two lives were saved and more than 200 personal injuries were avoided.

The societal cost savings total more than \$58 million during the City of Toronto's Phase 2 red light camera operations.

Procurement Process - Phase 3 (2017-2021)

In February 2014, City Council requested staff to issue an RFP, in conjunction with other partnering municipalities which operate red light camera systems, for the supply, installation, operation, maintenance and future removal of red light camera systems for the period 2017 to

2021, with the option to extend the resulting contract for an additional five (5) year period at the discretion of the City of Toronto.

In co-operation with the partnering municipalities, the City of Toronto issued RFP No. 9148-15-5000 on April 24, 2015 for the supply, installation, operation and maintenance of red light camera systems within the City of Toronto and partnering municipalities within Ontario.

The RFP requires new red light camera systems to be installed at both new and existing red light camera sites. The red light camera systems will be removed by the vendor at the end of the contract. Similar to the Phase 1 and Phase 2 procurements, the RFP requires a vendor to enter into an agreement with each of the partnering municipalities for the rental, operation and maintenance of red light cameras, including the associated computer hardware and software.

An independent Fairness Consultant was retained to monitor the RFP process from beginning to end to provide an opinion regarding the fairness of the selection process.

A formal selection committee comprised of members of the City of Toronto which include staff from Transportation Services and Purchasing and Materials Management; Cities of Hamilton, Ottawa and London; and the Regional Municipalities of Peel, Waterloo, York and Halton. As mentioned above, the evaluation process was overseen by an independent Fairness Consultant.

Nine (9) firms purchased the RFP through the City of Toronto's website. A total of three (3) Proposals were submitted on June 4, 2015 from the following firms:

1. Redflex Traffic Systems Inc.
2. Traffipax LLC.
3. Xerox Business Services Canada Inc.

Purchasing and Materials Management deemed the submission from Xerox Business Services Canada Inc. non-compliant.

As required by the RFP Terms of Reference, the detailed written Proposal included a separate sealed cost proposal envelope. The selection process stipulated that the envelope containing the cost proposals would only be opened if the Proponent passed the technical evaluation.

The technical submissions from the Proponents were evaluated in accordance with a set of pre-established criteria. As part of the overall technical evaluation, a Proponent whose proposal had met or exceeded the minimum technical score was invited to participate in the Proof of Performance phase. As part of the Proof of Performance phase, each Proponent passing the technical evaluation had to demonstrate that its proposed red light camera system met the requirements of the RFP and that the red light camera system records could be satisfactorily processed in a manner which met or exceeded each and all requirements of the RFP.

Following technical evaluation, only the submission from Traffipax LLC met or exceeded the technical score threshold and subsequently passed the Proof of Performance phase. As per the terms and conditions of the RFP, the separate cost proposal envelope from Traffipax LLC was

opened, reviewed and scored. The technical score and cost scores were combined to establish the total score.

Based on the above, the selection committee concluded that the Proposal submitted by Traffipax LLC ("The Vendor") received the highest overall score for providing the required red light camera system and services, satisfying the overall project requirements.

The Fair Wage Office has reported that the Vendor has declared that it reviewed and understands the Fair Wage Policy and Labour Trades requirements and has agreed to comply fully with the Policy and requirements.

Site Selection Process – Phase 3 (2017-2021)

In June 2004, in order to select red light camera sites, staff recommended a procedure based on the angle-type collision history of all signalized intersections. City Council approved the recommendation in principle and requested staff to consider the allocation of at least one red light camera per Ward or a similar equitable distribution system. Further in November 2011, based on the Auditor General's recommendation, City Council requested staff to re-evaluate the existing locations of the red light cameras based on the safety criteria and compare to an even distribution of cameras on a ward-by-ward basis as requested by Council in 2004.

Consistent with prior City Council direction, proposed red light camera sites for the Phase 3 are determined based on a thorough analysis of angle-type collisions for a five (5) year period from 2008 to 2012 for all signalized intersections in the City of Toronto. Existing red light camera sites are also included in the analysis. Based on the collision analysis, this site selection process also considers specific cut-off points of collision data to ensure that the red light camera sites for the Phase 3 will be installed at the locations with the highest frequency of red light running.

Angle-type collisions at signalized intersections are generally attributed to red light running and results in fatality, personal injury and property damage only collisions. As part of the collision analysis, City staff compiled and analyzed the frequency of angle-type collisions from 2008 to 2012 by direction of travel for all signalized intersections. 2013 and 2014 collision data were not available at the time of the issuance of the RFP and were not included. The result of this analysis was used to rank intersections prioritized by the highest number of collisions attributed to red light running. The intersection ranked highest has the highest potential for collision reduction if included as a red light camera site. Similarly, the intersections lower in the priority list have lower red light running which diminishes the potential for the reduction of collisions attributed to red light running at these intersections. The numbers of angle-type collisions by direction of travel at the signalized intersections are summarized in Table 7 of Appendix C.

As per the Table 7 of Appendix C, the top 79 intersections in the list have a total of seven (7) or more angle-type collisions in any single direction over a five (5) year period whereas the next 75 intersections have six (6) angle-type collisions in any single direction over the same five (5) years. Limiting the total red light camera sites to 79 will have better return on the City investment whereas adding another 75 sites will almost double the cost and return on the investment will be much lower than the top 79 intersections in the list. Therefore, the number of red light camera sites for the City of Toronto within the RFP was limited to 79 sites with some provision for additional sites. Ten (10)

intersections where red light cameras are currently operating at one of the approaches are included within the list of top 79 sites. However, only four (4) intersections with the red light cameras at the existing approaches are included, which reflects the effectiveness of the existing red light camera program in reducing red light running.

As recommended in the Auditor General's report in 2011, the above will ensure Phase 2 red light camera operations will have continued red light running enforcement at the signalized intersections based on the experience of the highest frequency of angle-type collisions attributed to red light running.

A preliminary list of the proposed 79 red light camera sites based on the collision analysis is included in Table 8 of Appendix D. While 79 locations have been recommended based on the collision analysis, each site will need a complete feasibility assessment. The feasibility assessment involves a thorough physical review of each intersection to ensure that a red light camera can be installed and is not in conflict with existing driveways and utilities both above and below ground. The candidate intersections will be reviewed with the selected red light camera system vendor based upon the specific installation requirement of the selected red light camera system.

The contract with the Vendor requires that red light camera systems at the new sites within the City of Toronto will be installed on January 1, 2017. The red light camera systems at the existing sites are to be installed by April 2017. The contract also includes the provision for additional sites throughout the duration of the contract.

Financial Implications – Phase 3 (2017-2021)

Red light camera system costs are comprised of the Vendor Costs attributable for the supply, installation, operation and maintenance of red light camera systems; Site Maintenance Costs for the preparation and maintenance of the red light camera sites; Provincial Costs attributable to accessing and using motor vehicle license plate registration information; Municipal Processing Centre Costs and Court Services Administrative Costs for staffing and other related costs. The sources of revenues are Fine Revenue from provincially set fines charged for each red light running infraction and Municipal Processing Centre Revenue that the City receives from processing the red light camera charges on behalf of the partnering municipalities.

The cost for operation of the program between 2017 and 2021 is estimated to be approximately \$19,000,000. Revenue to the City of Toronto is estimated at approximately \$36,000,000. The net revenue to the City of Toronto is estimated to be approximately \$17,000,000. The yearly estimates of the cost and revenue components and net revenues from 2017 to 2021 are included in Table 9 of Appendix E.

The following sections provide explanation and estimates of the cost and revenue components:

Vendor Costs - The Vendor Costs include the supply, installation, operation, maintenance and removal of 79 red light camera sites for the five (5) year period from 2017 to 2021 with the option to extend for an additional five (5) year to 2026. The RFP also includes the provision for additional sites to be added throughout the duration of the contract from 2017 to 2026.

In addition to the supply and installation of the new red light camera sites, operations and maintenance activities also include loading and unloading red light cameras, delivery of digital files for processing and maintenance of the camera units. Total estimated cost for the duration of the contract from 2017 to 2021 is \$10,553,538.30 and from 2022 to 2026 is \$7,451,781.77 net of all taxes and charges.

Site Maintenance Costs - Site maintenance costs include initial power supply to the red light camera sites, identifying red light camera sites by way of traffic signs, repair and replacement of camera poles, cables, signs, loops and reinstatement of pavement marking. Total estimated cost for the duration of the contract from 2017 to 2021 is approximately \$140,000 and will be included in the Transportation Services Operating Budget.

Provincial Costs - Access to the Province of Ontario's motor vehicle registration information, which is necessary to lay charges under this program, requires that participating municipalities have an operational agreement with the Her Majesty the Queen in Right of Ontario, as represented by the Minister of Transportation ("MTO"). Based on the operation of 79 red light camera sites and the anticipated violation volume, it is estimated that the City of Toronto's component of the MTO costs is approximately \$360,000 over the period 2017 to 2021, which include transaction charge per look-up and a fixed cost.

Municipal Processing Centre Costs - The City of Toronto operates the joint municipal processing centre on behalf of all partnering municipalities to perform several functions including matching photos and plate information, laying of charges by Automated Enforcement Officers and assisting Prosecutors by preparing photographic evidence for first attendance and trial. Processing costs include office space, equipment, supplies, postage and the salaries and benefits for the red light camera operations unit staff. Currently, processing centre staff includes 7.6 full-time equivalent Automated Enforcement Officers. Anticipated higher red light processing volume from partnering municipalities will require adding another 3.0 full-time equivalent positions in 2017. Total processing centre cost is estimated approximately \$5,800,000 over the period 2017 to 2021.

Court Services Division Costs - The Court Services Division resources that are required to process the workload, resulting from the planned 79 red light camera sites include staff costs and costs for judicial services payable to the Province of Ontario. Total estimated cost is approximately \$ 2,500,000 over the period 2017 to 2021.

Fine Revenue - The estimated fine revenue reflects the number of charges that are anticipated to be processed based on the current red light camera violation rate per site. It is anticipated that revenues generated will be higher at the start of the program in 2017 and will decrease in the following years as road users get familiar with the red light cameras. The total estimated fine revenue is approximately \$32,000,000 over the period 2017 to 2021.

Municipal Processing Revenue - Approximately 70 percent of processing centre costs is charged to the partnering municipalities, which is based upon the percentage distribution of red light camera sites operated by the partnering municipalities. Over the period 2017 to 2021, the

estimated processing cost recovered from the partnering municipalities is approximately \$4,000,000.

Additional Staffing requirements – Phase 3 (2017-2021)

Automated Enforcement Officers in the City of Toronto joint municipal processing centre lay charges and assist Prosecutors by preparing photographic evidence for first attendance and trial. Currently, 7.6 full-time equivalent Automated Enforcement Officers process a total of 204 sites in the City of Toronto and in the partnering municipalities. As part of Phase 3 operations starting in January 2017, a total of 273 sites are planned in the City of Toronto and in the partnering municipalities.

However, the Phase 3 red light camera program will result in an additional two (2) sites in the City and 67 sites in the partnering municipalities which will be processed by the joint municipal processing centre. Anticipated higher red light processing volume from the partnering municipalities will require an additional 3.0 full-time equivalent positions starting in 2017. Salaries and benefits of the added positions will result in an increased cost of approximately \$1,100,000 for the period 2017 to 2021. Budget submission for the additional staff will be included in the Transportation Services Operating Budget submission for 2017. The increased revenues from the partnering municipalities for processing red light camera charges will fully offset the above increase in cost.

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ATTACHMENTS

Appendix A – Safety Effectiveness –Phase 2 (2007-2014)

Appendix B – Financial Update – Phase 2 (2007-2014)

Appendix C - Site Selection Process - Phase 3 (2017-2021)

Appendix D – Preliminary List of Red Light Camera Sites - Phase 3 (2017-2021)
(Subject to Feasibility Assessment)

Appendix E - Cost and Revenue Details - Phase 3 (2017-2021)

Appendix A
Safety Effectiveness –Phase 2 (2007-2014)

Table 1 – Safety Effectiveness, Phase 2

Collision Type	Severity of Injury	Collisions Before RLC Installation (2001-07)	Collisions After RLC Installation (2008-14)	Collision Frequency Reduction (Before vs. After)	Collision Frequency Reduction % (Before vs. After)
Angle	Property Damage Only	855	695	- 160	- 19 %
	Injury	628	394	- 234	- 37 %
	Fatality	5	3	- 2	- 40 %
Rear End	Property Damage Only	2,271	2,878	+ 607	+ 27 %
	Injury	1,011	872	- 139	- 14 %
	Fatality	0	0	0	0 %

Table 2 – Yearly Red Light Camera Activities, Phase 2

Year	2007	2008	2009	2010	2011	2012	2013	2014
# of Red Light Camera Sites in Operation	2	34	72	75	76	74	76	76
Total Red Light Camera Activity	830	35,829	46,865	57,862	55,581	52,508	51,730	45,394

Table 3 - Red Light Camera Activities by Sites per Year, Phase 2

#	Red Light Camera Sites*	2007	2008	2009	2010	2011	2012	2013	2014
1	Richmond St. & Parliament St	277	2,957	1,539	1,483	1,374	1,622	1,223	1,021
2	Lake Shore Blvd. & York St.	553	2,361	640	700	1,098	1,055	712	744
3	Steeles Ave. & Carpenter Rd.	-	3,095	2,327	1,905	2,184	1,954	1,946	1,471
4	Steeles Ave. & Hilda Ave.	-	2,713	1,264	1,367	1,852	1,552	1,568	1,101
5	Albion Rd. & Silverstone Dr.	-	2,692	1,808	1,632	1,484	1,496	1,663	1,448
6	Albion Rd. & Finch Ave.	-	-	269	443	433	423	341	223
7	Dixon Rd. & Kipling Ave.	-	446	313	235	259	210	182	178
8	Steeles Ave. & Islington Ave.	-	34	1,008	642	1,343	1,113	921	979
9	Sheppard Ave. & Wilson Hts. Blvd.	-	-	283	296	273	252	262	127

#	Red Light Camera Sites*	2007	2008	2009	2010	2011	2012	2013	2014
10	Bathurst St. & Sheppard Ave.	-	693	266	206	283	262	196	179
11	Lawrence Ave. & Marlee Ave.	-	1,109	738	684	609	320	523	402
12	Lawrence Ave. & Bathurst St.	-	333	332	168	263	271	221	281
13	Bayview Ave. & Cummer Ave.	-	-	1,042	1,494	1,477	1,633	1,629	1,342
14	Finch Ave. & Willowdale Ave.	-	-	181	263	-	413	354	226
15	Leslie St. & Lawrence Ave.	-	419	344	421	349	341	264	177
16	Leslie St. & York Mills Rd.	-	-	155	295	261	297	234	254
17	Bayview Ave. & Truman Rd./ Fifeshire Rd.	-	3,557	3,221	3,274	3,125	3,155	2,446	1,550
18	Midl& Ave. & McNicoll Ave.	-	233	621	618	583	405	307	381
19	Steeles Ave. & Birchmount Rd.	-	-	750	492	1,049	946	813	696
20	Warden Ave. & Arkona Dr /Cloverleaf Gt.	-	1,114	2,186	2,004	2,009	1,995	1,219	1,944
21	Steeles Ave. & Brimley Rd.	-	1,057	888	616	591	812	889	595
22	College St. & Bathurst St.	-	79	139	154	63	168	88	8
23	Lawrence Ave. & Morningside Ave.	-	36	166	140	146	156	179	176
24	Dixon Rd. & Carlingview Dr.	-	-	181	984	722	881	752	510
25	Dufferin St. & Glencairn Ave.	-	-	871	1,716	1,374	1,539	1,268	1,568
26	Overlea Blvd. & Thorncliffe Park Dr. / Beth Nealson Dr.	-	289	384	349	335	328	287	253
27	Ellesmere Rd. & Kennedy Rd.	-	893	456	546	421	430	476	445
28	Finch Ave. & Leslie St.	-	117	352	425	365	303	352	300
29	Birchmount Rd. & Huntingwood Dr.	-	-	783	1,172	979	637	924	872
30	Kingston Rd. & Port Union Rd. / Sheppard Ave.	-	264	99	154	206	151	192	196
31	Bloor St. & The West Mall	-	-	321	445	452	419	325	293
32	The Queensway & The West Mall	-	96	651	205	393	575	1,040	1,489
33	Lake Shore Blvd. & Thirty Seventh St.	-	-	858	1,161	1,022	1,108	885	339
34	Kipling Ave. & Horner Ave.	-	127	67	21	16	51	57	58
35	The Queensway & North Queen St.	-	-	198	372	332	404	451	323
36	Wilson Ave. & Transit Rd. / Billy Bishop Way	-	-	363	987	795	679	769	575
37	Lake Shore Blvd. & Windermere Ave.	-	1,888	1,356	2,163	2,222	1,846	2,332	1,528
38	Warden Ave. & McNicoll Ave.	-	-	1,665	1,985	2,037	1,811	1,646	1,444
39	Keele St. & Wilson Ave.	-	247	230	240	221	255	345	192
40	Dupont St. & Lansdowne Ave.	-	757	263	146	282	475	431	328
41	Queen St. & Lansdowne Ave. / Jameson Ave.	-	-	971	996	1,209	1,006	888	1,150
42	Burnhamthorpe Rd. & The East Mall	-	768	593	272	311	-	761	628
43	Sheppard Ave. & Keele St.	-	-	132	140	199	182	207	155
44	Eglinton Ave. & Bermondsey Rd. / Sloane Ave.	-	2,374	1,485	1,840	1,147	911	1,230	1,347
45	Jane St. & Bala Ave. / Emmett Ave.	-	2,273	1,601	1,559	1,532	1,088	953	1,531
46	Jane St. & Clair Rd. / Spen Valley Dr.	-	1,061	2,972	2,078	2,139	1,288	1,648	166
47	O Connor Dr. & Bermondsey Rd. / Yardley Ave.	-	596	453	562	400	499	364	403
48	Danforth Ave. & Birchmount Rd.	-	823	268	463	401	361	371	204

#	Red Light Camera Sites*	2007	2008	2009	2010	2011	2012	2013	2014
49	Islington Ave. & The Westway	-	10	676	1,278	737	822	1,238	1,066
50	Bathurst St. & Davenport Rd.	-	-	101	-	41	-	-	384
51	Warden Ave. & Comstock Rd.	-	318	1,117	837	496	608	649	563
52	Eglinton Ave. & Victoria Park Ave.	-	-	715	895	748	736	764	722
53	Eastern Ave. & Coxwell Ave.	-	-	110	264	239	229	242	268
54	Jarvis St. & Dundas St.	-	-	448	715	591	636	422	398
55	Midl& Ave. & Progress Ave.	-	-	97	171	304	191	277	293
56	Lawrence Ave. & Bellamy Rd.	-	-	230	456	425	418	276	14
57	Eglinton Ave. & Birchmount Rd.	-	-	251	507	391	441	504	544
58	Danforth Rd. & Birchmount Rd.	-	-	-	158	155	153	117	123
59	St. Clair Ave. & Brimley Rd.	-	-	197	460	403	374	388	349
60	Keele St. & Lawrence Ave.	-	-	235	395	292	350	302	334
61	Bloor St. & Ossington Ave.	-	-	-	-	31	293	182	86
62	Danforth Ave. & Greenwood Ave.	-	-	-	769	330	371	615	827
63	Queen St. & Woodbine Ave.	-	-	43	39	17	23	28	38
64	Jarvis St. & King St.	-	-	122	217	186	123	196	163
65	Lake Shore Blvd. & Leslie St.	-	-	767	1,098	873	854	735	-
66	Lower Jarvis St. & The Esplanade	-	-	693	1,271	329	-	377	1,050
67	Lake Shore Blvd. & Carlaw Ave.	-	-	829	2,027	1,558	2,019	1,560	1,165
68	Keele St. & Rogers Rd.	-	-	159	433	437	396	355	368
69	Bloor St. & Dundas St.	-	-	189	458	301	380	423	336
70	Yonge St. & Lawrence Ave.	-	-	339	201	1,084	1,258	1,265	1,130
71	Spadina Ave. & Adelaide St.	-	-	-	85	124	17	168	202
72	Eglinton Ave. & Spadina Rd.	-	-	-	1,168	1,499	1,406	1,195	1,152
73	Eglinton Ave. & Mount Pleasant Rd.	-	-	203	415	397	208	306	261
74	Lawrence Ave. & Don Mills Rd.	-	-	44	172	139	109	157	151
75	Neilson Rd. & Sheppard Ave.	-	-	208	477	365	256	300	252
76	Sheppard Ave. & Malvern St. / Progress Ave	-	-	629	1,094	1,306	858	825	440
77	Ellesmere Rd. & Military Trl.	-	-	410	1,289	1,163	901	730	915
	Total	830	35,829	46,865	57,862	55,581	52,508	51,730	45,394

* Please note some of the red light camera sites were not operational until 2011. Also, after installation some sites were temporarily out of service for the full year due to road construction activities. No numbers are available for these sites for the respective years.

Some sites were placed into operation mid-year. The number of red light camera activities for these sites are shown in bold.

Appendix B Financial Update–Phase 2 (2007-2014)

Table 4 – Estimated Cost and Revenue, 2007-2011
(From Staff Report 2006, based on 132 locations planned)

Year	2007	2008	2009	2010	2011	Total
Gross Cost	\$4,361,400	\$5,169,900	\$6,060,400	\$6,142,700	\$4,184,900	\$25,919,300
Gross Revenue	\$4,754,200	\$5,659,700	\$5,867,800	\$5,873,900	\$3,924,000	\$26,079,600
Net Revenue	\$392,800	\$489,800	-\$192,600	-\$268,800	-\$260,900	\$160,300

Table 5 – Actual Cost and Revenue, 2007-2014
(Based on 77 locations installed)

Year	2007	2008	2009	2010*	2011	2012	2013	2014	Total
Gross Cost	\$2,898,000	\$3,285,800	\$3,431,600	\$4,296,300	\$3,963,400	\$4,293,400	\$3,986,200	\$3,672,000	\$29,826,700
Gross Revenue	\$1,039,200	\$2,322,600	\$3,736,450	\$7,241,900	\$5,054,300	\$8,106,800	\$7,250,900	\$6,541,200	\$41,293,350
Net Revenue	-\$1,858,800	-\$963,200	\$304,850	\$2,945,600	\$1,090,900	\$3,813,400	\$3,264,700	\$2,869,200	\$11,466,650

* Effective January 2010, provincially set fine amount increased from \$180 to \$325 per infraction. The fine amount includes set fine, court costs and Victim Fines Surcharge (payable to Province).

Table 6 – Societal Cost Savings of Motor Vehicle Collision Reduction, Phase 2

Collision Type	Severity of Injury	Collision Frequency Reduction	Societal Cost per Collision *	Societal Cost Savings
Angle	Property Damage Only	-160	\$8,000	\$1,280,000
	Injury	-234	\$ 81,600	\$19,094,400
	Fatality	-2	\$15,728,000	\$31,456,000
Rear End	Property Damage Only	+607	\$ 8,000	-\$4,856,000
	Injury	-139	\$ 81,600	\$11,342,400
	Fatality	0	\$ 15,728,000	\$0
Total				\$58,316,800

* Source: Analysis and Estimation of the Societal Cost of Motor Vehicle Collisions in Ontario, Transport Canada, August 2007.

Appendix C
Site Selection Process - Phase 3 (2017-2021)

Table 7 - Number of Angle Collisions, by Direction of Travel at Signalized Intersections

Frequency of Angle Collisions, per Direction of Travel at Signalized Intersections, 2008-2012	Number of Intersections	Cumulative Number of Intersections
30 - 39	1	1
20 - 29	1	2
10 - 19	16	18
9	12	30
8	21	51
7	28	79
6	75	154
5	84	238
4	167	405
1 - 3	1,265	1,670

Appendix D
Preliminary List of Red Light Camera Sites - Phase 3 (2017-2021)
(Subject to Feasibility Assessment)

Table 8 - Preliminary List of Red Light Camera Sites - Phase 3 (2017-2021)*

#	Red Light Camera Sites
1	Kennedy Rd & Highway 401-Kennedy Rd Ramp / William Kitchen Rd
2	Bay St & Richmond St W
3	Church St & Richmond St E
4	University Ave & Richmond St W
5	Adelaide St E & Parliament St
6	Richmond St E & Parliament St**
7	University Ave & Adelaide St W
8	Dixon Rd & Martin Grove Rd
9	University Ave & Queen St W
10	Keele St & Wilson Ave
11	Queen St E & Church St
12	York St & Richmond St W
13	Lake Shore Blvd W & Lower Spadina Ave
14	Dufferin St & Davenport Rd
15	Sheppard Ave E & Birchmount Rd
16	Lake Shore Blvd W & Park Lawn Rd / Marine Parade Dr
17	Simcoe St & Adelaide St W
18	Dufferin St & Rogers Rd
19	Sheppard Ave E & Bayview Ave
20	Steeles Ave W & Weston Rd
21	Lawrence Ave E & Greencedar Crct / Greenbrae Crct
22	Avenue Rd & Wilson Ave
23	Finch Ave E & Birchmount Rd
24	Finch Ave W & Sentinel Rd
25	Bloor St W & The East Mall
26	College St & Ossington Ave
27	Albion Rd & Finch Ave W***
28	Dupont St & Ossington Ave
29	Yonge St & Richmond St
30	Lake Shore Blvd W & York St**
31	Wilson Ave & Jane St
32	Warden Ave & Mcnicoll Ave***
33	Finch Ave W & Martin Grove Rd
34	Dufferin St & Dupont St
35	Steeles Ave W & Keele St
36	University Ave & Wellington St W
37	Albion Rd & Kipling Ave
38	University Ave & York St / Front St W
39	Eglinton Ave E & Brimley Rd
40	King St W & York St
41	Finch Ave E & Gordon Baker Rd / Finch E-Highway 404 N Ramp

#	Red Light Camera Sites
42	Jarvis St & Isabella St
43	Danforth Rd & Brimley Rd
44	Dundas St E & River St
45	Mccowan Rd & Mcnicoll Ave
46	Harbour St & York St
47	Steeles Ave W & Dufferin St
48	St Clair Ave W & Gunns Rd / Old Stock Yards Rd
49	Spadina Ave & King St W
50	Sheppard Ave E & Mccowan Rd
51	Adelaide St W & John St
52	King St E & Parliament St
53	Rexdale Blvd & Martin Grove Rd
54	The Queensway & The East Mall
55	St Clair Ave W & Spadina Rd
56	Dufferin St & Finch Ave W
57	Islington Ave & Evans Ave
58	Finch Ave W & Keele St
59	Eglinton Ave W & Martin Grove Rd
60	Finch Ave E & Brimley Rd
61	Bathurst St & Queen St W
62	Eastern Ave & Coxwell Ave***
63	Lake Shore Blvd W & Jameson Ave
64	Eglinton Ave E & Danforth Rd
65	University Ave & Dundas St W
66	Neilson Rd & Mclewin Ave
67	Lake Shore Blvd W & Fleet St / Bathurst St
68	Simcoe St & Wellington St W
69	Keele St & Rogers Rd***
70	Jane St & Stong Crt / York Gate Blvd
71	Danforth Ave & Woodbine Ave
72	King St W & Dufferin St
73	Ellesmere Rd & Bellamy Rd N
74	Lawrence Ave E & Kennedy Rd
75	Kipling Ave & Evans Ave
76	The Queensway & The West Mall**
77	Warden Ave & Comstock Rd***
78	Eglinton Ave E & Victoria Park Ave**
79	Sheppard Ave E & Malvern St / Progress Ave***

* The 79 intersections in the Table above have a total of seven (7) or more angle-type collisions in any single direction of an intersection over a five (5) year from 2008 to 2012. This is a preliminary list of sites and is subject to feasibility assessment.

** Four existing sites included with the red light cameras at the same approach of the intersections.

*** Six existing sites included with the red light cameras at a different approach of the intersections.

Appendix E
Cost and Revenue Details - Phase 3 (2017-2021)

Table 9 - Project Cost and Revenue Estimates, 2017-2021

Component	2017	2018	2019	2020	2021	Total
RLC – Vendor Cost	\$1,968,855	\$2,000,605	\$2,040,535	\$2,088,350	\$2,455,195	\$10,553,540
Site Maintenance	\$29,500	\$29,500	\$29,500	\$29,500	\$29,500	\$147,500
Provincial Cost	\$72,450	\$72,450	\$73,100	\$73,700	\$74,400	\$366,100
Processing Centre Cost	\$1,167,630	\$1,167,630	\$1,167,630	\$1,167,630	\$1,167,630	\$5,838,150
Court Services Cost	\$484,000	\$491,000	\$498,000	\$506,000	\$513,000	\$2,492,000
Sub-total Cost Estimate	\$3,722,435	\$3,761,185	\$3,808,765	\$3,865,180	\$4,239,725	\$19,397,290
Municipal Processing Revenue	\$829,750	\$829,750	\$829,750	\$829,750	\$829,750	\$4,148,750
Fine Revenue	\$6,328,250	\$6,328,250	\$6,408,350	\$6,488,455	\$6,568,560	\$32,121,865
Sub-total Revenue Estimate	\$7,158,000	\$7,158,000	\$7,238,100	\$7,318,205	\$7,398,310	\$36,270,615
Net Revenue	\$3,435,565	\$3,396,815	\$3,429,335	\$3,453,025	\$3,158,585	\$16,873,325