



City of
Peterborough

To: Members of the General Committee

From: Cynthia Fletcher
Commissioner of Infrastructure and Planning Services

Meeting Date: July 20, 2020

Subject: Report IPSTR20-020
Update on an Autonomous Vehicle Innovation Network Pilot
Project and Award of Non-Standard Procurement for Smart
Traffic Signal Pilot Project

Purpose

A report to seek Council endorsement to implement the Autonomous Vehicle Innovation Network pilot project and to recommend the award of a non-standard procurement to implement a Smart Traffic Signal pilot project.

Recommendations

That Council approve the recommendations outlined in Report IPSTR20-020 dated July 20, 2020, of the Commissioner of Infrastructure and Planning Services, as follows:

- a) That the Automated Vehicle Innovation Network pilot project with Miovision Technologies Incorporated be implemented at up to 80 signalized intersections within the City;
- b) That a Non-Standard Procurement for the implementation of a Smart Traffic Signal Pilot Project be awarded to Miovision Technologies Incorporated, 137 Glasgow Street, Suite 110, Kitchener, Ontario, N2G 4X8, in the amount of \$270,135.00, plus HST of \$35,177.55, for a total cost of \$305,252.55;
- c) That a provisional work value of \$75,000.00 be committed to the Smart Traffic Signal Pilot Project and the Commissioner of Infrastructure and Planning Services be provided the authority to adjust the purchase order value to an upset limit of \$345,135.00, excluding HST, as necessary to complete this project; and

- d) That \$140,590 be approved to cover staff salary and benefits costs for a 15-month contract position to oversee the Smart Traffic Signal Upgrade Program.

Budget and Financial Implications

The total project costs, net of the HST rebate, are set out in Table 1.

Table 1: Project Costs

Line	Description	Amount
1	Smart Traffic Signal Implementation	\$270,135.00
2	Provisional Work Value	\$ 75,000.00
3	HST Payable by the City	\$ 6,074.38
4	Staffing Costs – 15 Months	\$140,590.00
5	Total	\$491,799.38

Provisional work would include the need for additional detection equipment that could only be determined in the field once installation work has been started or to undertake unforeseen upgrades of existing site equipment that may require retrofit to integrate with the new system components.

The total estimated project cost of \$491,799.38, net of HST rebate, can be accommodated within the \$500,000 uncommitted balance of the 2014 Capital Budget for the Central Traffic Signal Control System Replacement Project (Project 5-13.02).

Upon successful completion of the 1-year pilot project, annual system maintenance costs of approximately \$25,000 would be incurred, which would be included in future operating budget requests. This would be offset by reduced annual operating costs estimated to be \$25,000-\$40,000 for the current traffic data collection program.

Background

Pilot Project to Research New Traffic Signal Technology

In the fall of 2019, the City was approached by Miovision Technologies Incorporated (Miovision) to be the host municipality for their research and development of enhanced traffic signal detection and traffic monitoring equipment – technology which is critical to support the introduction of Autonomous Vehicle Systems being developed across the world. Miovision began as a traffic solution company in 2005 and is helping cities achieve their smart city visions. In December 2019, Miovision was awarded just over \$490,000 in funding for the project under the Autonomous Vehicle Innovation Network (AVIN),

sponsored by the Province of Ontario. The research project includes deployment of up to 80 camera-based traffic detectors at signalized intersections in Peterborough to study enhanced camera technology capable of detecting vehicles, cyclists and pedestrians under severe winter weather conditions.

For the purpose of this project, the City is the host municipality for implementation of the new equipment. The City's contribution to this project is limited to in-kind services to assist Miovision with the installation and testing of their equipment in the field. In return the City receives the benefit of installation of this equipment at up to 80 of our signalized intersections without any capital expenditure. After the completion of the research project, the City retains the Miovision camera equipment and will only be responsible for ongoing maintenance of the cameras. The retail value of these 80 camera-based detection devices is estimated at \$1,600,000 and the ongoing benefits of this technology to the City are significant, as described below. If endorsed, installation work is planned to be completed later this summer.

Benefits of Camera Based Research Project with Miovision

The City has already installed one standard Miovision camera at an intersection to test this type of movement detection technology and it has been performing well. The new advanced cameras installed in this project have a number of additional capabilities that will allow the City to implement advanced traffic management strategies in the future, all of which are in line with the Traffic Signal Upgrade program we are currently embarking on. The Miovision system will save money on future equipment the City would need to purchase as part of this program.

There are a number of other benefits that the City will also be able to experience right away:

- 1) As these cameras are able to detect movement of traffic, cyclists and pedestrians under all conditions, the City can reduce the use of buried loops in the pavement to detect the presence of vehicles that are needed for signal operations. With 4-8 loops installed at the average intersection and an average cost of \$2,000 per loop, this represents a capital cost savings of approximately \$12,000 for a typical intersection, or a potential of \$960,000 at the 80 intersections with the new cameras deployed.

The average life expectancy of a loop is between 5-10 years, and the City would typically expect to replace up to 20-30 loops each year due to normal failures, breakage, or due to resurfacing and reconstruction projects; with estimated costs of approximately \$40,000-\$60,000 annually.

- 2) Use of the Miovision technology will also avoid the need to cut loops into the surface of the new pavement which will help to preserve and improve the life expectancy of the pavement within the intersections.

- 3) The new cameras are configured to be able to collect traffic movement data 24 hours per day – 365 days per year. The City currently spends approximately \$20,000 each year to collect a one day, 12 hour counts at about 70 of our 125 intersections each year. The City also spends approximately \$50,000 each year to collect other annual traffic count data on various roads throughout the City. The cameras will not eliminate all of these costs, but staff expects the annual traffic count budget can be reduced by \$25,000 to \$40,000, once these new cameras are up and running - with vastly improved data to support decision making.

Traffic Signal System Upgrade Program

Staff are currently in the process of developing a Request for Proposal (RFP) document to solicit bids to purchase a new Computerized Traffic Signal System and new Traffic Signal Controller Units as part of the Traffic Signal System Upgrade Program. This project is one of a number of background projects that were implemented following Council approval of Report USDIR18-002, using previously approved capital funding. As part of this project, the scope includes the installation of a more adaptive signal control system, also referred to as a “Smart Signal System” and includes upgrading infrastructure in the field as well as in the control centre.

An Adaptive Traffic Signal Control System (Smart Signal System) uses specialized software and field equipment to collect continuous data on traffic volumes, speeds, travel times, and congestion along a roadway corridor which allows the system to make real-time adjustments to signal timing parameters and settings in order to optimize the flow of traffic, reduce emissions, and potentially increase the capacity of major roadway corridors and /or deferring costly road widening projects.

Given the costs for these types of advanced traffic control systems, staff intended to include an optional item in the RFP for vendors to design and implement their version of Smart Signal System under a pilot program focusing on 6 intersections along the busiest section of Lansdowne Street, in order to test the benefits of investing in this type of system across the City. This item was not going to be a mandatory element of the project, as some vendors may not have this technology within their current software.

Considering the specialized software, and field equipment needed to run this type of test, staff has estimated the cost would be up to \$75,000 per intersection (\$450,000 in total) based on some recent work done in the City of Toronto and City of London. In addition to the capital costs of the field equipment, additional costs for engineering and project management, equipment installation, software system licensing fees, support and maintenance, and communication requirements could result in an overall implementation cost of approximately \$500,000 to \$600,000 for a Smart Signal System Pilot program.

Opportunity to Implement Smart Signal Pilot Project

During the planning of the proposed Miovision pilot project, staff became aware that Miovision also offers a Smart Signal System using an Adaptive Traffic Signal Control software add-on that works with their camera detection technology. This additional

software application will provide automatic optimization and synchronization of a series of traffic signals along a corridor or in a grid network, in response to real time traffic demands and conditions.

The Miovision Smart Signal System has been deployed in a number of U.S. cities, including Pittsburg, Boston, and Portland where they have seen average travel times reduced by 25%, stops reduced by 30% and emissions reduced by 20%. More recently, the system has been deployed in Milton and the City of Waterloo. The City of Toronto, City of London, and the City of Edmonton have also begun testing of this type of signal control system as well.

The Smart Signal System offered by Miovision would leverage the cameras the City would be receiving under the AVIN project to provide the traffic detection and data collection needed to support a Smart Signal System and would ensure compatibility with the proposed new camera equipment.

It is estimated that the Miovision Smart Signal System can be installed for approximately \$46,000 per intersection (\$276,000 for the 6 intersections) plus an annual cost of about \$19,000 – \$25,000 depending on the type of communication technology the City uses. The integration of these two initiatives represents an opportunity to pilot new traffic signal technology at a much lower cost than originally anticipated.

Data to Support the Transportation Master Plan

Given that the Miovision camera equipment is proposed to be installed in the field this summer, the Smart Signal System pilot using the Miovision technology would be ready to implement by late fall 2020, with some initial performance results available by early 2021.

The outputs from this pilot project are intended to support the Transportation Master Plan (TMP) project, where one option to improve the performance of the City transportation network is to invest in a wider deployment of Smart Signal technology, which will improve traffic flows and may allow the City to defer or eliminate the need for some road widening projects. The TMP will be able to use initial results from this pilot by the spring-summer of 2021 in order to assess the feasibility and effectiveness of this type of technology and meet the schedule requested by Council for completion of the project. Implementing the pilot project would provide factual data to assist in this decision, as opposed to modeled or hypothetical data.

The pilot would also allow the City to evaluate the effectiveness of this type of system in reducing vehicle emissions through smoothing the flow of traffic and reducing stops and delays at intersections. Based on evidence from other cities who have seen a 20% reduction in emissions from the adaptive signal system technology, there is the potential that this initiative, if deployed on a wider scale, could assist in meeting the City's Greenhouse Gas (GHG) emission reduction targets.

Non-competitive Bid Process

Under normal circumstances this procurement would require the preparation and award of a competitive procurement process. In this instance, Section 11.3.1 of the Procurement By-law 18-084 provides a few relevant circumstances that would justify a Non-competitive Procurement process for this pilot project, such as:

- “For the procurement of goods under exceptionally advantageous circumstances...” applies as the ability to integrate with equipment that is being provided under a separate pilot project will significantly reduce costs compared to an alternate supplier who would have to provide their own traffic detection equipment.
- “For the procurement of Deliverables relating to matters of a confidential or privileged nature...” applies as the Smart Signal System offered by Miovision is being installed as part of a separate research and development project, where the City may not be able to release technical specifications to other bidders without compromising confidential information retained by Miovision.
- “Where only one Supplier is able to meet the requirements of a procurement to ensure compatibility with existing products” applies as the Smart Signal System offered by Miovision is designed to work with the new camera technology that is being installed and the City can hold the vendor responsible to ensure the systems do work together; where forcing a different vendor to integrate their technology to a new pilot detection system may introduce additional contractual risk that would not be in the best interest of the City.

The recommendation to proceed with a non-competitive bid process was reviewed and approved by the Treasurer.

If the City were to proceed under a competitive procurement plan, we would not likely be in a position to award the larger project until late fall of 2020. With this being an add-on to a much larger and separate technology procurement, there is potential that we would not be able to deploy the adaptive control pilot until spring/summer 2021 at the earliest, with no chance to evaluate the performance in time for input to the TMP project. In this case, city staff would use modeled or assumptive data to complete the TMP project.

Recommended Supplier

Miovision Technologies Incorporated is the recommended supplier for implementation of a Smart Traffic Signal Pilot Project. Miovision is currently proposing to work with the City to pilot a new camera detection equipment at the study area intersections at no direct cost to the City, under the AVIN research project. The costs to add a pilot project to test the effectiveness of a Smart Signal System are favourable and significantly lower than estimated based on experience from other cities. Combining these two pilot projects provides technical compatibility and reduces contractual risk by making one vendor accountable for performance of the two systems. For the above reasons, staff

recommend that the AVIN pilot project be implemented at up to 80 signalized intersections within the City, and that the City proceed with a Non-Standard Procurement for implementation of a Smart Signal Pilot Project, using the Miovision System.

Council Approval Required

Chart 2, Section a) iv) of Appendix A of the Procurement By-law 18-084 indicates Council must approve a non-standard or limited competition procurement when the value is at or above \$100,000.

New Position – Intelligent Transportation Systems Project Manager

The implementation of a new Computerized Traffic Signal System, new Traffic Signal Controller Units at over 134 signalized intersections across the City, and the design and installation of a pilot project to test and evaluate a Smart Signal System is an aggressive work program in a complex and highly technical field. In addition to managing the contractors and consultants engaged to deliver this program, staff will be heavily involved in coordinating the field work to upgrade equipment and test and install the new systems using our signal maintenance contractor.

To lead the development, procurement, deployment and management of this important program, additional dedicated staff resources will be required in the Traffic Division.

Beginning in September 2020, it is proposed to add a 15-month contract position to the Traffic Division to undertake the role of Intelligent Transportation Systems Project Manager, during the period of this implementation. The addition of this contract position is proposed to be funded from the approved capital budget for the Traffic Signal Upgrade Program and will allow for the dedicated staff resources to ensure this program is delivered without reducing service delivery in other areas of the division.

The need for this additional FTE to be added on a permanent basis will be evaluated as part of the 2022 budget process, based on the degree of change created by the new systems that are implemented, and future decisions related to the expansion of the Smart Signal program across the City.

Timelines

If the recommendations are approved, the equipment to support the AVIN pilot project will be implemented over the summer months. The purchase of the Smart Signal Pilot will be confirmed via a purchase order before the work commences. It is anticipated that the equipment to facilitate the Smart Signal System Pilot will be installed by fall 2020 allowing for implementation of the new system by the end of 2020.

Summary

The City has been approached to be a host municipality for project lead by Miovision Technologies Incorporated, who obtained funding through the Autonomous Vehicle Innovation Network (AVIN) to undertake research and development of enhanced traffic signal detection and traffic monitoring equipment. The project, which includes deployment of up to 80 camera-based traffic detectors at signalized intersections in Peterborough at no cost to the City, will deploy enhanced camera technology capable of detecting vehicles, cyclists and pedestrians under severe winter weather conditions.

Miovision also offers a Smart Signal System using an Adaptive Traffic Signal Control software add-on that works with their camera detection technology to provide automatic optimization and synchronization of a series of traffic signals along a corridor or in a grid network, in response to real time traffic demands and conditions. The Smart Signal System offered by Miovision would leverage the cameras the City would be receiving under the AVIN project, and would allow the City to undertake a pilot project for a Smart Signal System, in order to evaluate the effectiveness of this new technology for improving traffic flow, reducing vehicle emissions and potentially deferring costly road widening projects. Utilizing a non-standard procurement for this pilot project will allow for implementation of the pilot project in 2020, at reduced costs and reduced risk, with initial performance results available in mid-2021 to support longer term strategies to manage traffic flow that will be considered as part of the Transportation Master Plan.

Submitted by,

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