SUBJECT: Traffic management strategies

TO: Planning and Development Committee

FROM: Transportation Services

Report Number: TS-16-19

Wards Affected: All

File Numbers: 750-02

Date to Committee: September 10, 2019

Date to Council: September 23, 2019

Recommendation:

Receive and file transportation services department report TS-16-19 regarding traffic management strategies.

Purpose:

This report provides an overview of the initiatives aimed at improving traffic management and reducing the impacts of congestion on the City's road network. The initiatives proposed support the strategic goal related to a City that Moves and specifically, increased transportation flows and connectivity.

Background and Discussion:

At the Council meeting of March 25, 2019, the following staff direction (SD-12-19) was approved:

> Direct the Director of Transportation Services to report back by September 2019 with an update on the ongoing and planned traffic management strategies aimed at improving traffic congestion on Burlington's road network.

Traffic congestion is a condition on road networks occurring as a result of increased vehicle trips and resulting in slower speeds, longer trip times, and increased vehicular queuing. As the population continues to grow both in Burlington and in surrounding municipalities, the demands on the City's road network also increases often resulting in

congestion. As such, innovation is key to maximizing the effectiveness and efficiency of the existing road network and to improve the flow of traffic within the City of Burlington.

The city operates and maintains over 200 traffic signals, including Halton Region, MTO and 407 intersections within Burlington. Through the use of the city's advanced traffic management system (ATMS), staff are able to remotely monitor and control traffic signals with a goal to maximize traffic flow and to reduce overall delays.

The current process for establishing signal timing plans involves periodically collecting traffic volumes at a given intersection and using that data to determine the most appropriate timing to minimize delay on all approaches. Often, several timing plans are developed and implemented to account for changing traffic throughout the day. Overall, this process is time consuming and requires substantial amounts of manually collected traffic data.

Individual traffic signals within the City's busiest corridors are then coordinated using our computerized traffic control system. The term "coordinated" refers to the operation of signals within a group of intersections with a goal to move platoons of traffic in all directions with the least amount of delay possible. Staff regularly review the coordination of signals within corridors and update timing plans as needed.

Technology advancements in the area of traffic signals have provided opportunities for efficiencies, new capabilities and improvements in traffic management. Staff have been keeping apprised of these advancements and have developed a strategy involving implementation of the following key initiatives:

1. Implement adaptive traffic signal control systems
2. Utilize traffic signal performance measures
3. Procure and implement a Bluetooth travel time system
4. Construct a traffic management centre

Each of the above noted initiatives are described in further detail in the paragraphs below.

1. Adaptive Traffic Signals

Adaptive traffic signal control is a concept where vehicular traffic in a network is detected at an upstream and/or downstream point and an algorithm is used to predict when and where the traffic will be and to make signal adjustments at the downstream intersections based on those predictions. This real-time optimization allows a signal network to react to volume variations to reduce vehicle delay, shorten queues and decrease travel times. Many studies have shown that adaptive signal control improves average performance metrics by 10%.

Incidents, crashes or other events on city roads or the QEW/403 highways resulting in unexpected changes to traffic demand are occurring more frequently on Burlington roads. Given these conditions combined with the potential to maximize the efficiency of the road network, an adaptive traffic control system is appropriate for Burlington.

Staff have reviewed the available options for the implementation of adaptive signal control systems. The results of this review identified several advantages to acquiring an adaptive system capable of integrating with the city's current ATMS. The proposed plan is to acquire and implement an adaptive traffic signal module which is integrated fully with our existing ATMS to maximize the "adaptive" functionality and realize the most benefit from existing systems.

The implementation of an adaptive system is planned to be staged with the first deployment anticipated in early 2020 along the Plains Street corridor from Maple Avenue to King Road. This corridor is ideal for an adaptive signals system implementation based on variability of traffic caused by QEW bypass traffic, seasonal fluctuations generated from commercial areas and the existing infrasture currently in place along Plains Road.

2. Traffic Signal Performance Measures

Performance measurement has emerged in both the private and public sectors as a means to collect, analyze and report on information related to the performance of an organization, system or service. As new technology advancements have emerged in the traffic signals industry, so too have the development of traffic signal performance measures. These measures go beyond the traditional and somewhat limited metrics available in the past to provide staff with advanced real-time analytical data related to traffic signal performance such as high-level views of the health and performance of the system, charts, graphs and reports based on user-selectable data parameters, and visualizations of specific signals or phases help pinpoint the source of problems and guide to a solution.

The capabilities of the city's existing ATMS in combination with the planned implementation of Adaptive Traffic Signals module described previously will provide staff with a suite of traffic signal performance measures to monitor and evaluate the performance of traffic signal systems and identify problem areas using high-resolution event data from signal controllers.

Traffic signal performance measures are proposed to be implemented in conjunction with the adaptive traffic signals module planned for early 2020.

3. Bluetooth Travel Time System

Travel time is one of the most popular and simplest to understand metric when determining the performance of a road network. With the widespread use of bluetooth enabled devices such as cellular phones and vehicles equipped with GPS navigation, systems are now available which utilize Bluetooth technology to measure travel time between various points within a road network. Bluetooth technology is the basis for commonly used systems such as Google traffic and Waze applications.

Staff have investigated the use of Bluetooth travel time systems and their use in other municipalities and have identified benefits in managing traffic more effectively and efficiently in Burlington. Through real-time identification of excessive delays on the city's road network, a travel time system will enhance staff's knowledge and understanding of congestion and areas requiring attention. For example, if travel time is reported as greater than normal along a corridor, this would trigger a staff review of the cause, including the need to update signal timings and coordination. This information could also be used in future initiatives involving changeable message signs to advise motorists of current traffic conditions.

Based on the reporting capabilities and benefits of a Bluetooth Travel Time System, staff will be initiating the procurement of a system with an anticipated implementation in Q2 of 2020.

4. Traffic Management Centre

The final component of the traffic management strategy is the creation of a traffic management centre within the Transportation Department offices in City Hall. This project involves the installation of large monitors and video management software to display outputs such as performance metrics from the systems described above, real-time video feeds at key intersections and traffic signal system status in a control centre arrangement. This provides the staff responsible for traffic management with immediate information and knowledge for improved traffic management and is significant as it represents a change in traffic management practices towards being more proactive instead of reactive. In addition, a traffic management centre provides visual demonstration tool of the city's traffic management initiatives for members of the public who may be interested.

Strategy/process

The strategy developed by staff for the improved management of traffic on Burlington roads proposes the use of advanced technology available within the traffic industry. It leverages existing systems and represents a significant change in how staff address congestion on roads in Burlington.

Options considered

Although several technology options are available within the industry, staff have kept apprised of emerging technology and have identified in this report those that can provide the greatest benefit to Burlington based on our current infrastructure, systems and staff compliment.

Financial Matters:

Total Financial Impact

The four initiatives proposed in this report are to be funded through existing capital budgets with no additional funding request.

Source of Funding

Initiative	Est. Cost	Funding Source
Adaptive Traffic Signals System	$70,000	TS0088 - Traffic Signal System Upgrade
Traffic Signal Performance Measures	Included with above	
Bluetooth Travel Time System	$75,000	TS0107 – Traffic Signal Minor Improvements and Modifications
Traffic Management Centre	$75,000	TS0088 - Traffic Signal System Upgrade

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Conclusion:

The initiatives outlined in this report are anticipated to be significant in improving the city's ability to manage traffic wherever possible. It leverages existing systems and new technology to change the traditional way of managing traffic and reducing the negative impacts of congestion on Burlington Roads.

Respectfully submitted,

Jeff Black

Manager of Traffic Operations and Signals

(905) 335-7600 x7779

Report Approval:

All reports are reviewed and/or approved by Department Director, Director of Finance and Director of Legal. Final approval is by the City Manager.