CITY OF HAMILTON

PUBLIC WORKS DEPARTMENT

Corporate Assets & Strategic Planning Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	May 2, 2016
SUBJECT/REPORT NO:	Standardization of Traffic Control Equipment and Materials, Signal Controllers (Timers), Software and Associated Equipment (PW16033) (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Kris Jacobson Superintendent, Traffic Operations 905-546-2424 Extension 1240 Martin White, C.E.T. Manager, Traffic Operations and Engineering 905-546-2424 Extension 4345
SUBMITTED BY: **SIGNATURE:**	Geoff Lupton Director, Energy, Fleet & Traffic Public Works Department

RECOMMENDATION

(a) That the National Electrical Manufacturers Association (NEMA) Advanced Transportation Controller (ATC) current version 5.2b (version will be amended from time to time) be designated as the City's traffic signal controller standard pursuant to Procurement Policy #14 – Standardization.

(b) That the D4 software for use with the National Electrical Manufacturers Association (NEMA) Advanced Transportation Controller (ATC) compliant controllers be designated as a standard through December 31, 2021, pursuant to Procurement Policy #14 – Standardization.

(c) That Fourth Dimension Traffic be approved as the single source vendor, pursuant to Procurement Policy #11 – Non-competitive Procurements, to provide the supply, integration, training, technical services and maintenance for the D4 product.

(d) That the General Manager of Public Works, or their designate, be authorized and directed to enter into and sign on behalf of the City of Hamilton, all negotiated agreements and associated documents with Fourth Dimension Traffic in a form satisfactory to the City Solicitor.

EXECUTIVE SUMMARY

Traffic has undertaken a number of initiatives to upgrade and modernize the City's traffic control system through the creation of an Advanced Traffic Management System (ATMS). The goal of these initiatives is to create and develop an integrated system of traffic signals and other dynamic traffic control devices that will maximize the efficiency of the existing road network by recognizing, adapting and reacting to changing road conditions in real-time. Given the specialized nature of the system and the need for stability and consistency, the City has already standardized on a number of products and services related to the ATMS. Staff are now seeking authorization to standardize on the software required to operate the field-level traffic signal controllers.

As part of their assignment to supply, install and integrate the new advanced central control system (KITS), Kimley-Horn and Associates (KHA) were asked to undertake a review of available controller standards and products and recommend a "go forward" strategy that fits the City's needs and requirements based on our current technical direction. Based on their review, KHA recommended that the City adopt the NEMA ATC controller specification. KHA further recommended that the City purchase controller hardware and software separately and standardize on the D4 software developed by Fourth Dimension Traffic.

Alternatives for Consideration – See Page 6

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial:

Staff estimates that the cost to purchase, install and integrate the D4 software through an unlimited, all-inclusive site license is approximately $300,000 (US dollars). This is a one-time fee and entitles the City to install the software on an unlimited number of controllers and receive life-time software upgrades and updates at no additional cost. Based on the City's current inventory of 650 signal controllers, the cost per controller is about $460. The cost per controller will continue to reduce over time as additional traffic signals are added to the system. In contrast, the cost to purchase individual licenses (intersection by intersection) is estimated at $900 each or $585,000 for all current controllers. This cost would increase over time as new intersections are added. Staff also estimates that approximately $50,000 will be required annually for additional technical services above and beyond those included in the site license agreement. These services would include, but not be limited to, training, feature development, programming, integration and maintenance. Funds for this initiative will be covered through the 2016 Advanced Traffic Management System (ATMS) capital project (4661620001).

Staffing:

There are no staffing implications associated with this report.

Legal:

Licensing and service agreements will need to be negotiated with the vendor, Fourth Dimension Traffic. The implementation of a standard software will assist the City in maintaining compliance with the Municipal Act (Minimum Maintenance Standards) and the Highway Traffic Act (HTA).

HISTORICAL BACKGROUND

Traffic has undertaken a number of initiatives to upgrade and modernize the City's traffic control system through the creation of an Advanced Traffic Management System (ATMS). The goal of these initiatives is to create and develop an integrated system of traffic signals and other dynamic traffic control devices that will maximize the efficiency of the existing road network by recognizing, adapting and reacting to changing road conditions in real-time. In addition to automatically adjusting for typical daily variation or small incidents, this "new" connected system will allow staff to identify major incidents such as arterial road and highway closures and implement response plans remotely and proactively.

The City has already initiated the implementation of a high-speed, wireless communication system to connect the field-level traffic signal controllers to the new Traffic Management Centre recently constructed at the Traffic Operations Centre (located at 1375 Upper Ottawa Street).This, combined with the deployment of advanced video detection technology along with the KITS central control system will enable staff to collect and analyse high resolution vehicle movement data, remotely monitor trouble spots, faults and incidents and respond in an effective and efficient manner. Given the specialized nature of the system and the need for stability and consistency, the City has already standardized on a number of products and services related to the ATMS. Staff are now seeking approval to standardize on the software required to operate our field-level traffic signal controllers.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

The recommendations contained in this report meet all conditions of the Procurement Policy for the City of Hamilton, By-Law No. 16-070, Policy # 14 – Standardization and Policy #11 - Non-competitive Procurements.

RELEVANT CONSULTATION

Staff has consulted with the Procurement Section of the Financial Services Division. Staff also retained the services of Kimley-Horn and Associates who is a recognized leader in the field of Advanced Traffic Management Systems and traffic signal controllers.

ANALYSIS AND RATIONAL FOR RECOMMENDATION

The City's current standard for field-level traffic signal controllers (NEMA TS1) is antiquated and is no longer supported by many controller manufacturers. As such, the City's specific make and model of controller (PEEK 3000E) has reached the end of its production life and can no longer be purchased or serviced. The controller's restricted

functionality also limits its operability with many of the new technologies and systems being deployed through the City's ATMS initiatives. While interim strategies have been developed to bridge the old and new, a new standard is required to take advantage of the advance features of new technologies and maximize the benefits of the ATMS.

As part of their assignment to supply, install and integrate the new advanced central control system (KITS), Kimley-Horn and Associates (KHA) were asked to undertake a review of available controller standards and products and recommend a "go forward" strategy that fits the City's needs and requirements based on our current direction. From a standards perspective, staying within the NEMA environment is the preferred option; more specifically the NEMA Advanced Transportation Controller (ATC) version 5.2b and subsequent updates. The ATC standard is simply an evolution of the older TS1 standard the City currently uses. By adopting the ATC standard, the City will be able to fully utilize the advanced functions of KITS and other ATMS technologies while minimizing future integration costs (ATC controllers will work "out-of-the-box" with our existing electrical systems and circuitry).

From a product perspective, there are several vendors who manufacture and sell controllers based on the ATC standard. Historically, the City has standardized on a single product and vendor in order to increase consistency and reliability while also reducing the burden on staff having to learn multiple controller types. Prior to the development of the ATC standard, the set-up, programming and troubleshooting of controllers varied greatly from one brand to another and therefore standardizing on a single product and vendor was the norm for most municipalities. Today, most ATC controllers generally perform the same functions and have similar programming interfaces which opens up the ability for a more open and competitive bidding process. While the ATC standard has produced a greater level of consistency related to the general layout and operation of the controller, each vendor interprets and integrates the standard somewhat differently and adds additional features which have the potential to affect consistency from one product to the next. As such, subtle differences in how various ATC controllers handle instructions can become a burden for staff (additional knowledge base, additional training, reduced operational consistency, increased operational costs etc.).

In order to eliminate these subtle differences, many municipalities are choosing to separate hardware and software when purchasing ATC controllers. As the ATC standard includes both a hardware and software specification, it is possible to purchase hardware (the physical box) from multiple vendors and load a common software (operating system) to make each controller function the same. This is similar to loading a common operating system (e.g. Microsoft Windows) on computers from different manufactures (e.g. HP, Dell, Lenovo, Toshiba etc.). While the look of each computer varies from manufacturer to manufacturer, how they function and operate is generally the same. Minimal additional training is required when switching from one computer to the next and, in this case, controller to controller.

From a procurement perspective, staff and KHA have reviewed and evaluated three options the City could use to purchase controllers:

1. Open competitive bid (hardware and software supplied by same vendor, low bid);
2. Standardize on a single controller (hardware and software supplied by same vendor, single source); or
3. Open competitive bid on hardware and standardize on software (single source).

While all three options contain varying levels of risk relating to pricing, training, integration, support, operational consistency and system resiliency, KHA recommends standardizing on a common software and purchasing hardware through an open and competitive bid process (option 3). By adopting this method of procurement, the City can ensure we receive competitive pricing on the uniform and consistent hardware elements of the controller while standardizing on a single software to mitigate potential issues with integration, training, operational consistency and system resiliency. Table 1 provides a comparative summary of the procurement options.

TABLE 1 - COMPARITIVE SUMMARY OF PROCUREMENT OPTIONS

Evaluation Criteria	Option1 (Open Bid All)	Option 2 (Single Source All)	Option 3 (Open Bid Hardware + Single Source Software)
Pricing	**+**	**-**	**+/-**
Vendor Support	**+**	**+/-**	**+/-**
Staff Training	**-**	**+**	**+**
System Integration	**-**	**+**	**+**
System Resiliency	**+**	**-**	**+/-**
Operational Consistency	**-**	**+**	**+**
+ Positive Outcome	**+/-** Neutral Outcome		**-** Negative Outcome

To identify a preferred software, KHA reviewed four available options against a set of 63 fundamental and advanced controller functions/criteria. The software options reviewed include:

1. ASC/3 by Econolite
2. D4 by Fourth Dimension Traffic
3. MaxTime by Intelight
4. SEPAC by Siemens

While none of the options satisfied all of the criteria, the D4 software by Fourth Dimension Traffic performed the best. D4 is a mature controller software used by many agencies across North America, including two jurisdictions that currently use KITS (the cities of San Mateo, California and Windsor, Ontario). Beyond being a well-rounded and fully featured software for conventional and advanced traffic applications, D4 has

strong experience, functionality and features related to LRT control and coordination, Transit Signal Priority, and peer-to-peer linking. D4 is also the only software that has proven deployments on multiple ATC controllers and is not currently produced by a controller manufacturer. While D4 doesn't currently support the Purdue Traffic Signal Hi Resolution Data Logger Enumerations (a KITS feature) or have a web-based data editing interface, Fourth Dimension Traffic has provided assurances that they are actively working on developing these features.

ALTERNATIVES FOR CONSIDERATION

As outlined in the previous section, three purchasing strategies were analysed as part of the KHA review. In addition to the preferred strategy, one of the remaining two options would be to purchase both the hardware and software through an open competitive bid process. While using this strategy may result in better overall up-front pricing, deploying multiple controller types year to year will result in increased effort, energy and costs associated with training and system integration. Operational consistency and continuity is also affected by using multiple controllers on a single system without a common software.

The other option would be to standardize on one controller type (hardware and software) from a single vendor; similar to how controllers have been purchased by the City in the past. While this option does address many of the potential training, integration and operational concerns identified for the competitive bid process, the City would be committing itself to single product/vendor along with the risks associated with this type of procurement. A single source strategy for both hardware and software provides limited flexibility and could affect the resiliency of the system if the preferred product line is discontinued or the vendor/manufacturer becomes insolvent or loses territorial rights. As the hardware is more difficult to purchase than the software, having multiple hardware options is an advantage to the City.

ALIGNMENT TO THE 2012 – 2015 STRATEGIC PLAN

Strategic Priority #2

Valued & Sustainable Services

WE deliver high quality services that meet citizen needs and expectations, in a cost effective and responsible manner

Strategic Objective

2.2 Improve the City's approach to engaging and informing citizens and stakeholders.

2.3 Enhance customer service satisfaction.

APPENDICES AND SCHEDULES ATTACHED

None