CITY OF HAMILTON

PUBLIC WORKS DEPARTMENT

Corporate Assets and Strategic Planning Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	February 2, 2015
SUBJECT/REPORT NO:	Standardization of Advance Traffic Management System (ATMS) Central Software Package (PW15006) - (City Wide)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Martin White, C.E.T. Manager of Traffic Operations and Engineering (905) 546-2424, Extension 4345 Kris Jacobson Superintendent, Traffic Operations (905) 546-2424, Extension 1240
SUBMITTED BY: **SIGNATURE:**	Gerry Davis, CMA General Manager Public Works Department

RECOMMENDATION

(a) That in accordance with City of Hamilton Procurement Policy #14 - Standardization, the KITS-Kadence Advance Traffic Management System (central traffic control software package) and Kimley-Horn & Associates (installation, integration and technical services) be approved;

(b) That the General Manager of Public Works, or designate, be authorized to negotiate with Kimley-Horn & Associates as a single source supplier for the supply of all goods and services associated with the implementation and ongoing maintenance of the KITS - Kadence Advance Traffic Management System.

EXECUTIVE SUMMARY

The City of Hamilton's road network is controlled by approximately 560 traffic signals and a traffic control system, (built in the 1970's) that is antiquated and prone to regular failures. In particular, the communications network connecting the signal system is limited and unreliable. The City's current system does not have the ability to adapt and react to changing travel demands and requires extensive resources (staff time) to modify and adjust operating parameters during minor and major incidents. In short, the current system is obsolete and requires substantial upgrades.

To address this issue staff has been in the process of upgrading and modernizing the traffic control system and, as part of this initiative, is constructing an Advanced Traffic

Management System (ATMS). The goal of this initiative is to create 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. Beyond automatically adjusting for typical daily variation or small incidents, this 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 projects to implement a high-speed, wireless communication system to connect the field-level traffic signal controllers to a modern Traffic Management Centre being constructed at the Traffic Operations Centre (located at 1375 Upper Ottawa Street). This, combined with the deployment of advanced video detection technology will allow staff to collect high resolution vehicle movement data as well as remotely monitor trouble spots and incidents (remote surveillance). The City has already standardized and purchased most of the equipment to implement an ATMS along the Pan Am Games Route network by July 2015 (approximately 100 signals).

The last significant part of the City's modernization project is the purchase and integration of a central traffic control software package that will serve as the brains for the new ATMS. To assist the City in selecting the most appropriate central software package, staff retained the services of Parsons Inc. through a Roster Assignment. Parsons Inc., formerly Delcan Corporation, is recognized as a world-wide leader in the development, design and implementation of ATMS and has assisted other municipalities in Ontario and across Canada with the selection of appropriate central software packages.

An evaluation of the available central software packages was undertaken using a two phased approach. The first phase evaluated the performance of twelve software packages against a set of 41 general criteria that are common in most central control systems. The purpose of this evaluation was to narrow down the options and eliminate those software packages that do not fit the City's current and future ATMS needs for a projected fifteen year system life span. The second phase of the evaluation reviewed the top four systems using refined criteria that targeted the critical requirements needed for a successful and quick system deployment of at least 100 signals before the 2015 Pan Am Games (July 2015). While Phase 1 focussed specifically on the software's general capabilities, Phase 2 reviewed specific processes required by the City, potential compatibility issues with existing field hardware and the ability of the successful vendor to expedite system implementation and integration given the July 2015 Pan Am Games deadline. The top four software packages and their final evaluation scores (out of 100 possible points) are provided below:

1. KITS-Kadence by Kimley-Horn & Associates - 100 points
2. Eco-Traffix by Schneider Electric/Telvet - 75 points
3. TransSuite by Transcore - 60 points
4. SCATS by ATC Australia - 30 points

While the top four software packages are all excellent central control systems that have proven deployments throughout the world, the KITS-Kadence system offers the City the

functionality, compatibility, flexibility and resources required to install and integrate a robust, state-of-the-art, central traffic control system by the Pan Am Games deadline (July 2015). It should be noted that the City currently operates PEEK 3000E traffic signal controllers at almost all of the 560 signalized intersections. Proven compatibility with the existing system was a key factor in the decision making process. Benefits of the KITS-Kadence System are as follows:

1. The system is compatible with our existing PEEK 3000E traffic signal controllers which will minimize integration and field deployment time (tested and verified by PEEK and Kimley-Horn & Associates),
2. Kimley-Horn & Associates have a data sharing agreement with PEEK Traffic Corporation as well as most major traffic controller manufacturers. None of the other vendors could verify such agreements,
3. The system is truly agnostic meaning it can work with a multitude of traffic signal controllers and hardware. As such, the City is not tied to a specific vendor or manufacturer for optimum performance in the future,
4. The system has the ability to use Purdue University High Resolution Data Logging which will allow the City to maximize the use of its high-speed communications network and advanced video detection capabilities. None of the other software packages offered this option, and
5. Kimley-Horn has demonstrated that they have the resources and abilities to provide the City with the necessary services to achieve a full deployment along the Pan Am Games Route Network by the July 2015 deadline (approximately 100 traffic signals).

Based on the evaluation of available central control systems undertaken by staff and Parsons Inc., staff are recommending that KITS-Kadence be approved as the City's standard for central traffic control software and that Kimley-Horn & Associates be approved as the standard service provider for the supply, integration and on-going maintenance of the KITS-Kadence system.

Alternatives for Consideration - See Page 7

FINANCIAL - STAFFING - LEGAL IMPLICATIONS

Financial: Staff estimates that the cost to purchase, install and integrate the KITS-Kadence central control software system will be $800,000. These costs include an estimated $300,000 for the software itself and $500,000 for technical services (installation/integration, system set-up and acceptance, field communication and acceptance and controller specification development). Funds for this initiative were identified and approved in the 2014 Video Detection and Intelligent Transportation capital project (4041457411) and the 2014 Traffic Signal Communication System capital project (4041420016). As funding was already approved in 2014, no new funding is required at this time. Annual maintenance costs are estimated at $50,000 and will be funded through appropriate operating accounts.

Staffing: There are no staffing implications associated with this report.

Legal: Software licensing and service agreements will need to be negotiated with the vendor, Kimley-Horn and Associates. The implementation of KITS-Kadence central software will assist the City in maintaining compliance with the Municipal Act (MMS) and the Highway Traffic Act (HTA).

HISTORICAL BACKGROUND

Traffic on the City's road network is largely controlled by a system of approximately 560 traffic signals. While the current traffic control system, which was built in the 1970's, does an adequate job of moving people from one area to another, the system uses obsolete technology, fails regularly and requires immediate upgrades to prevent a full system failure. In particular, the communications network connecting the signal system is limited, unreliable and antiquated. Of the 560 traffic signals that comprise the system, approximately 300 are connected to the communications network and, of those, only 50% have reliable connections (approximately 150 locations or 30% of the system total). Furthermore, the current system lacks the ability to adapt and react to changing travel demands and requires extensive resources (staff time) to modify and adjust operating parameters. The system also has limited remote troubleshooting capabilities and event notification which also impacts staff resources (staff must travel to the site to troubleshoot problems and reset controllers). In short, the current system is obsolete and requires substantial upgrades.

The City has been undertaking a number of initiatives to upgrade and modernize the City's traffic control system. These initiatives include:

- The implementation of a new, high-speed wireless communication network to connect the traffic signal system;
- The installation of new video detection technology to sense and collect high resolution vehicle movement data as well as remotely monitor trouble spots and incidents (remote surveillance);
- The upgrading of field electrical systems to improve overall system reliability,
- The construction of a new Traffic Management Centre to allow staff to remotely monitor and modify traffic signal operations; and
- The installation and integration of a central software system to oversee and control the operation of the road network in real time or near real time (adaptive/responsive control).

The ultimate goal of these combined initiatives is to create 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. Beyond automatically adjusting for typical daily variation or small incidents, this connected system will allow staff to identify major incidents such as arterial road and highway closures, and design and implement response plans remotely and proactively from the Traffic Management Centre.

Currently, staff's ability to implement such plans is limited and always requires field visits to individual traffic signal controllers in order to upgrade operating parameters. Depending upon the length of the incident, it is conceivable that an incident may resolve itself before new operating parameters can be implemented. Furthermore, accessing the field controllers during major incidents is difficult and time consuming given the congestion that is typically generated by major incidents. The recent closures of the Queen Elizabeth Way across the Skyway Bridge this last July and Highway 403 for the mudslide in late November highlighted these concerns. Staff's ability to react and implement traffic signal response plans was limited in both these incidents.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

Staff is recommending that the KITS-Kadence central control software system produced by Kimley-Horn and Associates become the City's standard for centralized traffic control. As such, the Procurement Policy for the City of Hamilton, By-Law No. 13-317, Policy# 14 - Standardization is invoked. Furthermore, the City is required to maintain the Traffic Signal System network in compliance with the Municipal Act, Minimum Maintenance Standards and the Highway Traffic Act.

RELEVANT CONSULTATION

Staff have consulted with the Procurement Section of the Financial Services Division as well as the Information Technology Division. Staff also retained the services of Parsons Inc. (formerly Delcan Corporation) who is a recognized leader in the field of Advanced Traffic Management Systems.

ANALYSIS AND RATIONAL FOR RECOMMENDATION

The overall operation and effectiveness of any Advanced Traffic Management System (ATMS) is ultimately defined by how well the central control software package can meet the goals and objectives set for the system. The selection of an appropriate software package based on the user's needs and requirements is the most important decision a municipality will make when developing or upgrading an ATMS. As the needs of all municipalities vary greatly, so too do the capabilities and functions of the various central control software packages that are available. To assist the City in selecting the most appropriate software package, staff retained the services of Parsons Inc. through a Roster Assignment. Parsons Inc., are recognized as a world-wide leader in the development, design and implementation of ATMS and have assisted other municipalities in Ontario and across Canada with the selection of appropriate central software packages. Parsons Inc.'s knowledge base combined with their connection and access to the major software developers proved invaluable during the evaluation process.

The evaluation of the available central software packages was undertaken using a two phase approach. The first phase evaluated the performance of 12 software packages against a set of 41 general criteria that are common in most central control systems. The purpose of this evaluation was to narrow down the options and eliminate those software packages that do not fit the City's current and future ATMS needs for a

projected fifteen year system life span. The second phase of the evaluation reviewed the top four systems using refined criteria that targeted the critical requirements needed for a successful and quick system deployment of at least 100 signals before the 2015 Pan Am Games (July 2015). While Phase 1 focussed specifically on the software's general capabilities, Phase 2 reviewed specific processes required by the City, potential compatibility issues with existing field hardware and the ability of the successful vendor to expedite system implementation and integration given the July 2015 Pan Am Games deadline. The top four software packages and their final evaluation scores (out of 100 possible points) are provided below:

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Details on the evaluation methodology and results have been provided in Appendix A to this report.

Why KITS-Kadence by Kimley-Horn & Associates?

While the top four software packages are all excellent central control systems that have proven deployments throughout the world, the KITS-Kadence system offers the City the functionality, compatibility, flexibility and resources required to install and integrate a robust, state-of-the-art, central traffic control system by the Pan Am Game deadline. When selecting a preferred vendor and software package, it was important that the software could interface with our existing signal controllers as well as other controllers that may be used in the future. In this regard, KITS-Kadence is a true agnostic system which can work with multiple controller and hardware configurations and will not require the City to accelerate their controller replacement program in order to achieve the desired benefits of an ATMS. Furthermore, Kimley-Horn has demonstrated that KITS-Kadence will work with the City's existing PEEK 3000E controllers and were the only vendor to verify that they have an existing data sharing agreement with PEEK. This relationship will help expedite the deployment of the system at field level as many of the potential compatibility issues have already been resolved.

The KITS-Kadence system is also the only product to feature the ability to use Purdue University High Resolution Data Logging. This will allow the City to take advantage of the advanced capabilities of the planned high-speed wireless communication network and the on-street video detection system. The combination of these systems with high resolution data logging will allow the system to gather and analyse vast amounts of vehicle movement data which will assist in maximizing the efficiency of the road network. While some of the other vendors are currently developing this feature, none are currently deploying this option.

From a deployment and legacy perspective, the KITS-Kadence system has been in development for over 25 years and has thirty deployments in North America. Deployments of the KITS-Kadence system that are similar to the City's proposed deployment include:

- City of Philadelphia - 3,000 signals
- Miami-Dade County - 2,800 signals
- City of Austin - 700 signals
- Los Angeles County - 600 signals
- City of Tallahassee - 340 signals
- City of Windsor (Canada) - 340 Signals

From a corporate perspective, Kimley-Horn & Associates was founded in 1967 and is a Fortune 100 engineering consulting firm that currently has seventy offices across the United States with 2,000 employees. The firm has its roots in transportation engineering and has become a major player in the ATMS field throughout North America.

In consideration of the evaluation undertaken by staff and Parsons Inc., staff is confident that the KITS-Kadence central traffic control software is the best product to meet our ATMS needs and requirements. Staff is also confident that Kimley-Horn & Associates has the resources and abilities to provide the City with the necessary services to achieve a full deployment along the Pan Am Games Route Network by July 2015 (approximately 100 traffic signals). As such, staff are recommending that KITS-Kadence be approved as the City's standard for central traffic control software and that Kimley-Horn & Associates be approved as the standard service provider for the supply, integration and on-going maintenance of the KITS-Kadence system.

ALTERNATIVES FOR CONSIDERATION

There are two alternatives to consider. The first is to not implement a central traffic control system while the other is to undertake a Request for Proposal (RFP) for the supply, integration and on-going maintenance of a central traffic control system rather than standardizing on a product. Although it is an alternative, the "do nothing" alternative is not a viable option given the investment the City has already made to implement an ATMS. Without a central traffic control system, maximizing the efficiency of the existing road network will not be possible. Staff's ability to monitor and respond to any type of incident (major or minor) will also be restricted.

As for undertaking an RFP process, there are risks associated with the control and timing of such an undertaking. From a control perspective, although RFPs allow greater flexibility to select a preferred vendor or product based on criteria other than price (low bid), there is a potential risk that the City may not get the best product or vendor for their need. In this instance, given the unique and highly specialized nature of centralized traffic control systems, developing a "terms of reference" that would cover and address the nuances of such systems is a difficult task. As all central control systems generally perform the same major functions, the selection of a preferred system is generally based on the finer points of how these functions are delivered and how they can be integrated with the City's existing control methodology. While two systems may appear similar based on their outputs, what each system needs in order to produce that output could be drastically different. As such, understanding and knowing the finer points about how each system generates results is as important (and in some cases more

important) than the results themselves. For this reason, staff undertook an independent and iterative review to identify the system that best addressed the City's current and future ATMS requirements. By using an iterative and verified process, staff were able to refine the "scope of needs" as their knowledge and understanding of the available systems expanded which resulted in the selection of the most appropriate product.

From a timing perspective, undertaking an RFP at this stage will most likely add at least four months to the process. Had an RFP been pursued from the outset, it would have likely added at least two months to the process.

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

2.1 Implement processes to improve services, leverage technology and validate cost effectiveness and efficiencies across the Corporation.

2.3 Enhance customer service satisfaction.

APPENDICES AND SCHEDULES ATTACHED

Appendix A Advance Traffic Management System (ATMS) Central Software Evaluation Overview and Technical Recommendation