SUBJECT: Transit Radio Communications Replacement (PW08038) - (City Wide)

RECOMMENDATION:

(a) That in accordance with the Purchasing Policy, Section 4.11 - Policy for Negotiations, the General Manager of Public Works and the Manager of Purchasing or their designates be authorized and directed to negotiate with local suppliers of Motorola hardware and the appropriate software solutions that will provide HSR with a replacement Radio Communications solution and automated next stop passenger information;

(b) That Council authorize additional capital funding of up to $2,200,000 from the dedicated Federal Gas Tax for Transit Reserve, at an upset budget limit of $3,200,000 to expand the scope of the previously approved capital projects to include automated bus stop announcement and a Global Positioning Satellite (GPS)/Automated Vehicle Location (AVL) solution for the entire Transit Program (ATS and HSR).

EXECUTIVE SUMMARY:

This report seeks Council’s authorization and direction to expand the scope of previously approved capital projects to include the replacement of the Transit Program’s automated vehicle location system with GPS technology and automated next stop passenger information.
In 2006 Council approved two capital projects: Project ID# 5300683601 Paratransit Management System Enhancement in the amount of $500,000; and Project ID# 5300683603 Automated Vehicle Location Replacement in the amount of $500,000 totalling $1,000,000 in previously approved capital.

Transit’s existing voice and data radio system was originally installed in 1982. It is far past its expected useful life and is experiencing equipment failures with increasing frequency and severity. Project implementation has been delayed by the desire to explore corporate solutions for radio and GPS technology. Transit staff has been investigating options to replace the existing functionality through participation on various committees and projects since 2005, detailed in the background of this report.

There has been some benefit to the City as a result of these delays. The GPS/CAD/AVL technology required to allow bus to bus communication between the dispatch office and the individual operators has matured and the price point has improved. When replacement of the AVL technology was first contemplated in our ten year capital plan in 2003, the estimated budget was about $8,000,000. The price has since dropped to a budgeted amount of $2,780,000 which in our view we see as where the market will stabilize. Further, in the latter part of 2007 staff was contacted by the Ontario Human Rights Commission seeking a response from the City respecting plans for the announcement of all bus stops on the HSR. The Ontario Human Rights Commission contact with the City of Hamilton follows orders in the City of Toronto and the City of Ottawa to implement bus stop announcements of all bus stops in response to complaints in each of the two communities. It is expected by the OHRC that Hamilton will have system-wide bus stop announcements, manual or automated prior to year end. The radio system allows voice communications between HSR dispatch and Bus Operators which is a critical safety and security requirement. The radio system includes GPS/AVL functionality which is critical to individual bus communication in the event of an emergency. The GPS/AVL functionality inherent in the radio system allows automated stop announcement to be readily adopted.

In theory, bus stop announcements can be done manually however technology has been developed and is available on the market to automate this function as the United States has faced this requirement through the Americans with Disabilities Act several years prior to it migrating to Canada. While theoretically possible to require all bus operators to announce all stops, it is impractical to believe that this function could be performed manually with any degree of reliability nor could it be effectively managed in view of HSR’s frequency of stops being in the order of 9,900 per weekday peak hour and some 900,000 service stops per week.

The Accessibility for Ontarians with Disabilities Act (AODA) - Transportation Accessibility Standard currently in draft and out for public consultation requires that vehicles must provide audible announcements of route, direction, or destination of the vehicle and stops, as well as visual announcement of stops. A recommendation is being made to replace the radio system with new equipment and systems that provide the same functionality as the existing system as well as the capability for stop annunciation and display.
BACKGROUND:
Transit’s existing voice and data radio system was originally installed in 1982. The existing system allows voice communications between HSR dispatch and Bus Operators as well as emergency alarm capabilities viewed as critical to the safety and security of Bus Operators. The system also provides for data communications for AVL to enable schedule adherence quality control.

The radio equipment and supporting computer equipment has far surpassed its expected lifetime and is no longer supported by the original manufacturer. As well, most of the hardware and software companies that originally supplied the systems are no longer in business leaving the Transit Program in a state of critical need of short term radio communications replacement.

HSR's radio system originally had each each voice and data channels for bus communications. Currently, due to hardware failures only one each voice and data channel is operational. The system has experienced two critical failures recently which to date have been unprecedented. In late December 2007, the system suffered a complete failure for a short period of time during which the dispatcher was unable to communicate with any bus. As per the original design of this system, the radios are supposed to revert to an open channel and voice communication reliant on the functionality of the Automatic Vehicle Location and Control (AVLC). Upon restarting the AVLC computer the system returned to normal operation and dispatch was able to communicate with the vehicles again.

Again, on January 8, 2008, HSR dispatchers lost all communications (voice and data) with all buses. The base station for the only remaining functioning voice and data channels experienced a power outage for an extended period of time. While the base station is covered by Uninterruptible Power Supply (UPS), the power was out longer than the capacity of the batteries could support. The radio consoles in dispatch can now only function with this one base station due to age and deterioration of the wiring within the consoles. Console replacement parts have not been available for years resulting in the inability to restore the second voice and data channels. The consoles are more than twenty years old and continue to deteriorate. The replacement of the radio system has now become urgent and critical.

Voice communications are the critical factor. The loss of voice communications with all buses would place Bus Operators at an unacceptable loss of communications support in the event of an emergency. Data communications, while important are not as critical as voice. However, Transit currently utilizes its existing integrated radio and AVLC system for acquiring schedule adherence statistics, vehicle location, route planning and overall service quality monitoring. These functions are critical to the effective operation of a large transit system.

As well, the Accessibility for Ontarians with Disabilities Act (AODA) - Transportation Accessibility Standard draft requires that vehicles must provide audible announcements of route, direction, or destination of the vehicle and stops, as well as visual announcement of stops. In order to meet those requirements, the replacement system must also provide Automatic Vehicle Location (AVL).
ANALYSIS/RATIONALE:

In 2005, Transit Technology Upgrades - Radio System Replacement and Transit Technology Upgrades - Radio System Replacement for AVL projects were submitted to an internal corporate committee, the Information Technology Strategic Team (ITST), outlining intention to investigate options to utilize City’s trunked radio system for voice, Data Radio system for Data communications. Transit staff investigated utilizing the City trunked radio system for voice and alternatives for data communication/AVL and schedule adherence information. In June 2007, Hamilton Emergency Services (HES) confirmed that the trunked radio system would not suit HSR’s requirements as the trunked radio did not include the capability for direct communication between Operation’s dispatch and individual Bus Operators, a core requirement of safe Transit operations.

Since December 1, 2005, Transit staff has been exploring a Public Works departmental GPS/AVL solution through pilot demonstrations in each of the divisions of the Public Works Department. In the latter part of 2007, the committee confirmed that HSR’s unique needs require a Transit dedicated solution. Radio communications and GPS/AVL systems have been developed specifically for the Transit industry and have become readily available on the market with increased reliability and reduced price points making this an advantageous time to replace Hamilton’s system.

Listed below are the key chronological dates and activities that have culminated in the recommendations contained in this report:

October 2005
- Two projects submitted to and approved by ITST to investigate options to utilize City's trunked radio system for voice, data communication/AVL and schedule adherence information.

December 2005
- Involved with Public Works Information Technology Team investigating AVL needs within Public Works.

February 2006
- Joined City Manager’s Radio Dispatch Task Force with Police, Fire.

May 2007
- Recommended City’s Trunked Radio system for voice, Intergraph for AVL (without schedule adherence).

June 2007
- HES confirms trunked radio system not suitable for HSR.

June 2007 - current
- Investigating existing system rebuild.

January 1, 2008
- AODA changes take effect. Transit required to provide bus stop annunciation.

ALTERNATIVES FOR CONSIDERATION:

Staff is aware of three potential suppliers who offer radio based integrated solutions including integrated voice communications with call prioritization, silent alarm, link to
schedule, public address, AVL, stop annunciation. One of the three providers, Motorola, is HSR and the City’s current radio system provider. This company currently maintains the radio equipment within the City. Staff has consulted with Motorola and they have provided a recommended solution and budget estimate for this project.

Staff also consulted with the alternate suppliers. The alternate suppliers do not supply the required radios or radio console equipment. They would have to approach Motorola to provide this equipment at additional cost above their estimates.

All of the alternatives listed below would also require an additional $330,000 in IT staff costs, computer equipment and ATS GPS/AVL costs as indicated in the financial implications section below.

Preferred Solution: Motorola

Including Radio based voice and data Computer Aided Dispatching, GPS/AVL, call prioritization, silent alarm, link to schedule, public address, stop annunciation and display, radios, radio consoles, radio interface (PST, GST included): $2,870,000

Estimated implementation timeline: six months

Alternative Solution 1:
Includes radio based voice and data Computer Aided Dispatching, GPS/AVL, call prioritization, silent alarm, link to schedule, public address, stop annunciation and display: $2,000,000 - $2,500,000
Does not include radios, estimate additional $500,000
Does not include radio consoles, estimate additional $60,000
Does not include radio interface, additional $150,000
Estimated implementation timeline: twelve months

Alternative Solution 2:
Includes radio based voice and data Computer Aided Dispatching, GPS/AVL, call prioritization, silent alarm, link to schedule, public address, stop annunciation and display: $4,000,000 - $5,000,000
Does not include radios, estimate additional $500,000
Does not include radio consoles, estimate additional $60,000
Estimated implementation timeline: twelve months

Council could direct that staff issue a competitive RFP however this is not recommended due to time sensitivity and the fact that all City radio communications are under contract to Motorola.

**FINANCIAL/STAFFING/LEGAL IMPLICATIONS:**

Financial

<table>
<thead>
<tr>
<th>Description</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSR Radio/GPS/AVL</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>Stop Annunciation</td>
<td>$870,000</td>
</tr>
<tr>
<td>ATS GPS/AVL</td>
<td>$80,000</td>
</tr>
<tr>
<td>IT Staff Secondment for Implementation</td>
<td>$150,000</td>
</tr>
<tr>
<td>Computer Equipment</td>
<td>$100,000</td>
</tr>
<tr>
<td>Total Budget</td>
<td>$3,200,000</td>
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Table 2 - Requested Project Budget

<table>
<thead>
<tr>
<th>Previously Approved</th>
<th>$500,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project ID# 5300683601</td>
<td></td>
</tr>
<tr>
<td>Paratransit Management System Enhancement</td>
<td></td>
</tr>
<tr>
<td>Previously Approved</td>
<td>$500,000</td>
</tr>
<tr>
<td>Project ID# 5300683603</td>
<td></td>
</tr>
<tr>
<td>Automated Vehicle Location Replacement</td>
<td></td>
</tr>
<tr>
<td>Current Request - Federal Gas Tax for Transit</td>
<td>$2,200,000</td>
</tr>
<tr>
<td>Total Budget</td>
<td>$3,200,000</td>
</tr>
</tbody>
</table>

The Dedicated Federal Gas Tax Transit Reserve- 108045 last updated March 11, 2008 had a projected balance in 2010 of $4,158,690 including future a Capital forecast of $3.4 million toward the downtown transit terminal, $600,000 previously approved by council for the creation and support of the rapid transit office over 3 years from 2007 through 2009 and $1.7 million towards the purchase of 2008 HSR service level expansion fleet. Should Council approve this project there would be a minimum reserve balance in the order of $1,958,690.

Table 3 – Dedicated Public Transit Capital Funds Committed and Spent

<table>
<thead>
<tr>
<th>Description</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance Forward - Reserve 108045</td>
<td>(9,886,681)</td>
<td>(4,075,231)</td>
<td>(4,115,745)</td>
</tr>
<tr>
<td>PW6092 - 2006 &amp; 2007 Transit Capital - Vehicle Replacement</td>
<td>676,777</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rapid Transit Office</td>
<td>200,000</td>
<td>200,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Downtown Terminal</td>
<td>3,400,000</td>
<td></td>
<td></td>
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<tr>
<td>Eastgate Terminal</td>
<td>298,182</td>
<td></td>
<td></td>
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<tr>
<td>2008 Service Enhancements - Purchase of 5 buses</td>
<td>1,704,110</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Expenditures</strong></td>
<td>6,279,069</td>
<td>200,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Interest Income:</td>
<td>(467,619)</td>
<td>(240,514)</td>
<td>(242,945)</td>
</tr>
<tr>
<td><strong>Balance December 31 - (Surplus) / Deficit</strong></td>
<td>(4,075,231)</td>
<td>(4,115,745)</td>
<td>(4,158,690)</td>
</tr>
</tbody>
</table>

Legal

N/A

Staffing

There are no permanent Transit staffing implications associated with this project. In reality successful implementation of the initiative may reduce excessive workload on existing staff resulting from maintaining duplicate systems. An allocation for IT staff for start-up, and any overtime has been included in the overall budget. This project will have an impact on IT for ongoing support and sustainability. IT will require an increase of 0.5 FTE in ITS to sustain this application once it is operational. In addition, the budget includes costs for any IT infrastructure required to build and sustain the application. Transit and IT can resolve the requirement for the additional 0.5 FTE requirement through reallocation of resources between the Divisions without Operating Budget implications. The servers will relocate from their present location in Transit to the central data centre and accordingly staff will base transfer 0.5 FTE in funding from Transit to IT in the associated budget at that time.
POLICIES AFFECTING PROPOSAL:

Purchasing Policy Section 4.11 - Negotiation permits the City of Hamilton to negotiate with the vendor of a product where a single source is more beneficial to the City or where a time sensitive situation occurs. Council approval is required for a single source procurement of $250,000 or more.

The Public Works Strategic Plan identifies seventeen interconnected strategic priorities in four categories: Communities, People, Processes and Finances to move the Department forward. The Department will focus on seven such priorities over the next three years. One such priority is “Smart Processes that Match Our Needs” and a key activity within this commitment is integrating technologies across all Divisions.

RELEVANT CONSULTATION:

This report is being brought forward following the consultation and support of the Purchasing and Information Technology Services Divisions of the Corporate Services Department.

Hamilton Emergency Services were originally consulted; however, the Intergraph solution did not interface with the needs of HSR.

CITY STRATEGIC COMMITMENT:

By evaluating the “Triple Bottom Line”, (community, environment, economic implications) we can make choices that create value across all three bottom lines, moving us closer to our vision for a sustainable community, and Provincial interests.

- Community Well-Being is enhanced. ☑ Yes ☐ No
  Public services and programs are delivered in an equitable manner, coordinated, efficient, effective and easily accessible to all citizens.

- Environmental Well-Being is enhanced. ☑ Yes ☐ No
  Human health and safety are protected.

- Economic Well-Being is enhanced. ☐ Yes ☑ No
  Safe and secure public transit provides increased mobility supporting central business districts, access for students to education, and a means of transportation allowing people to work or shop.

Does the option you are recommending create value across all three bottom lines? ☑ Yes ☐ No

Do the options you are recommending make Hamilton a City of choice for high performance public servants? ☐ Yes ☑ No