

TORONTO TRANSIT COMMISSION

REPORT NO.

MEETING DATE:September 19, 2007

SUBJECT: Geospatial Technology Review – Project Status Update

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RECOMMENDATION

It is recommended that the Commission:

1) Consider this report and provide direction with regard to further system development and implementation work associated with the following projects:

- Enterprise Geographic Information (GIS);
- Next Train Arrival;
- Internet Trip Planner;
- Customer Service Disruption Notification;
- Noting that:

a. Project work beyond the 2007 assessment for the Next Train Arrival, Internet Trip Planner, and Customer Service Disruption Notification initiatives are included below the line in the proposed TTC 2008-2012 Capital Program, pending identification of full funding for these initiatives;

b. Additional capital workforce would be required commencing in October 2007 consisting of two IT Technical Resources (regular); and

c. This issue will be considered by the City Budget Committee and subsequently by the City of Toronto Council through the 2008 capital budget process.

FUNDING

An amendment to the Capital Program was approved by the Commission in March 2007 for these projects under 7.2 Intelligent Transportation & Technical Systems to accommodate proceeding with these initiatives in 2007 in the total amount of \$1.5 million. Full project implementation costs as summarized in Appendix A will be included below-the-line in the 2008 – 2012 Capital Program submission.

BACKGROUND

A Geographic Information System (GIS) is a computer system capable of integrating, storing, editing, analyzing, sharing and displaying geographically referenced information. The Global Positioning System (GPS) is a constellation of more than two dozen satellites that broadcast precise timing signals by radio, allowing any GPS receiver to accurately determine its location (longitude, latitude, and altitude) in any weather, day or night, anywhere on Earth. The advances and relative cost reductions of communications, data storage, and data retrieval are accelerating the opportunities spawned by the Internet and other information and communications technologies including GIS / GPS. In the last few years the Commission has embarked upon a number of initiatives that involve these current and emerging technologies. At its meeting on May 17, 2006, TTC staff informed the Commission that due to the variety of potential GPS / GIS applications, a Request for Proposal (RFP) would be issued to conduct a Geospatial Technology Review in order to address the various requirements for GPS / GIS technologies. The contract for

the TTC Geospatial Review commenced on August 28, 2006 with the successful vendor being UMA Engineering. All contract work activities were completed in January 2007, and preliminary findings were reviewed with the TTC e-System Committee. The results of the review prompted the TTC's e-System Committee to request staff to investigate the feasibility and implementation options for five new initiatives related to improved dissemination of customer information, which includes:

- Next Bus Arrival
- Next Train Arrival
- Internet Trip Planning
- Customer Notification for Service Disruptions
- eCommerce

The Geospatial Technology Review Report recommendations included establishing an Enterprise GIS Data Repository as a key primary initiative. In order to allow for the immediate development and implementation of this recommendation and commencement of unbudgeted project work associated with the new customer information system initiatives, the Commission authorized budget approval of \$1,500,000 in 2007. Staff commenced work on these initiatives and advised the Commission that status reports would be provided to the e-Systems Committee in August and October 2007.

DISCUSSION

Following is a detailed status review update for the Enterprise GIS, Next Train Arrival, Internet Trip Planner, and Automated Customer Service Disruption Notification initiatives. A presentation reviewing the status of these initiatives and recommending continued development work has been provided to the e-Systems Committee. We are completing the feasibility assessments and background work for the Next Bus Arrival and E-Commerce initiatives. A status update will be provided to the members of the E-committee on September 25th and a further update planned for October. We will bring forward a status update and recommendation for these two initiatives to the November Commission meeting.

Enterprise Geographic Information System (GIS)

The overall purpose of this project is to implement the Geospatial Technology Review Report recommendations. The key primary objective is establishing a central data repository and truth of source for all distinct data sets as a basis and core for which the remainder of the system will be built. This is essential to the TTC's ability to provide GIS/GPS based applications such as Trip Planning or Next Bus Arrival. The project is divided into two phases. The phase I portion will implement the central data repository including consolidating and accurately geo-coding all spatial data sets and establishing the business and maintenance process to support the system. Phase II will enhance and expand the core to satisfy customized and specific departmental business needs. Phase I is scheduled to be completed in July 2008 and Phase II has a scheduled completion date of September 2009, with a total project cost of \$1,500,000. The status of the Phase I activities is as follows:

- Install GIS workstations (hardware/software) [Completed]
- Install base maps on workstations [Completed]
- Establish sharing agreement with City of
- Toronto for a comprehensive base map [Completed]
- Obtained access to City of Toronto GIS data[Completed]
- Inventory Service Planning GIS data [Completed]
- RFP for Bus Stop Inventory [Ongoing]
- System Requirements [Ongoing]
- Statement of Work [Ongoing]
- Process and data flow mapping [Ongoing]
- Design/Develop GIS thematic layers [Commenced]

Internet Trip Planning

The number of visits to the TTC's website has climbed from 2.7 million visits in 2002 to 11.4 million visits in 2006 (Appendix C), approximately half of which included a visit to the 'TTC Schedules' directory. This directory currently provides schedule information for bus and streetcar service at approximately 2,800 stops. The web site also allows customers to download and print schedule information for their personal use. The current schedules obtained at the web site are derived from an interim database which was developed in-house in late 1999 as part of the Y2K initiative. The system did not have the benefit of a thorough business and systems and design effort, and was never envisioned as a long-term solution to satisfy business needs such as web-based trip planning.

Staff have confirmed business requirements and issued a Request for Proposal (RFP) for the purchase of a web-based trip planning application. The solution will allow patrons to plan transit trips that incorporate transit service routing information, timing points, walking distances, etc. An implementation plan has been drafted and will be completed once a vendor is selected and final details of the project's work activities are confirmed. Final implementation is planned for July 2009, with a total project cost of \$2,300,000. The status of current project activities is as follows:

- Publish RFP (close Sept 11, 2007) [Completed]
- Draft implementation plan [Completed]
- Geo-data acquisition for Internet Trip Planner[Ongoing]

The City of Toronto's Web Services group currently hosts the TTC's website. The OneStop media company currently pays the TTC for advertising rights for TTC facilities. OneStop also provides video display screens on select subway station platforms. The screens provide news and weather updates as well as advertising. During emergencies Transit Control staff can 'override' communications and send emergency messages to the screens via OneStop's messaging application.

The proposed solution involves a two phased approach. Phase I involves posting subway service disruption information on the TTC web page. This will require the services of the City of Toronto's Web Services group, the OneStop media company and co-ordination efforts by TTC resources. The OneStop's messaging application will be modified such that Transit Control Centre subway service delay messages that would normally be displayed on the subway station platform screens, will also be captured and posted on the TTC website. The Phase 1 system is scheduled to be implemented in October 2007 and will be evaluated for six months prior to commencing Phase II.

Phase II will expand the system developed and implemented in Phase I to further relay service disruption notifications to email addresses. Patrons will be added or removed from this notification list on a subscription basis. Phase II may also include notification of disruptions affecting bus and streetcar service. A total of \$1,100,000 has been budgeted for overall project costs.

Next Train Arrival

Alstom currently supports the TTC's signaling system known as the Central Office Signal System (CSS). This wayside system provides data such as train number and track circuit/trigger points. Thales (Alcatel) has been contracted to provide a new Speed Control System for the TTC. This system, when installed, will include new radio and computing equipment on each train to provide the trains instantaneous speed and fine position (within centimetres), anytime and anywhere on track level.

The overall solution includes functionality delivered in three phases. Phase I will use the wayside data from the existing Central Office Signalling System to provide train location information only. This information will be accurate to the track circuit level detail (within 200 to 1000 feet). Train location information will be transmitted to OneStop for display on the existing video display screens on subway station platforms. An initial Proof of Concept system is scheduled to be implemented in July 2008 at a cost of \$330,000. An evaluation of system performance and effectiveness will be performed at this time. If more detailed train location information is required, train position and speed information captured by on-board equipment installed as a component of the new Speed Control system, may be used. The current status of the Phase I portion of the project is as follows:

- Drafted requirements specification [Completed]
- Technical design [Ongoing]
- Complete technical design including information security model
- Implement Create Proof of Concept

The Phase II portion of the project will involve the installation of additional video screens on subway station platforms. Currently there is signage installed at approximately 50% of subway station platforms.

The Phase III portion of the project will provide train arrival functionality. Currently two feasible solutions are being considered. The first option involves the installation of an additional Alstom software module that performs train arrival functionality. This module has been deployed at other transit authorities. The new Alstom signalling system software module would provide One Stop with train arrival data. One Stop will process the data and send next train arrival information to all display screens on subway station platforms. The second option for delivering train arrival functionality involves the development of an algorithm for train arrival. The data would then be transmitted to OneStop for transmission and display on the subway station display screens.

It should be noted that the draft Capital Budget 'Blue Pages' for the TTC contains the initial \$1.5 M to conduct the implementation studies for these new initiatives in 2007. The Enterprise Geographic Information System (GIS) is a State-of-Good-Repair initiative and thus, project costs for implementation work for 2008 and beyond are presented above-the-line. In view of competing insufficient funding resources for the base capital program, the project initiation and final implementation costs for the other initiatives are presented below-the-line for work in 2008 and beyond. These initiatives, with an implementation cost of approximately \$3.0 million, could be brought forward with a recommendation for approval upon identification of available funding.

JUSTIFICATION

Choosing and sequencing investments in technologies, processes, and people to increase productivity and customer service present challenges to the transit manager, who must weigh the costs, benefits, and risks of changing the ways services are delivered. Prudent application of a standard for TTC Geospatial technology is essential in order to ensure that consistent and lowest cost application of the technology is achieved. These customer information system initiatives are key to providing TTC patrons with the information they need to improve the efficiency of their use of transit services. This includes instructions and updates during emergency situations.

These customer information systems depend on geographical data for their operation, including a central GIS that contains the required geographical referenced data. Without the Enterprise Geographic Information System repository in place, initiatives such as Trip Planning and Next Bus Arrival cannot proceed.

September 19, 2007

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Attachment(s)

APPENDIX 'A'

GEOSPATIAL TECHNOLOGY REVIEW

PROJECT STATUS UPDATE

2008-2012 CAPITAL BUDGET SUBMISSION

Figures quoted in \$000's

	2007 PROBABLE	EFC
Enterprise GIS	500	1,500
Next Train Arrival	330	330
Internet Trip Planner	300	2,300
Automated Customer Notification for Service Disruptions	100	1,100
Next Bus Arrival	200	5,200
E-Commerce	200	1,200
Total	1,630	11,630

Notes:

1. \$2.5M is included in the draft Capital Budget 'Blue Pages' for the TTC as follows:
 - \$1.5M for 2007 costs;
 - \$1.0M for Enterprise GIS work in 2008 and beyond.
2. \$9.1M is budgeted below the TTC Capital Funding line for implementation work on the other projects in 2008 and beyond.

APPENDIX 'B'

GEOSPATIAL TECHNOLOGY REVIEW

PROJECT STATUS UPDATE

SCHEDULE SUMMARY

	Implementation Target Date
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Enterprise GIS Phase I	July 2008
Enterprise GIS Phase II	September 2009
Next Train Arrival (Phase I – Proof of Concept)	July 2008
Internet Trip Planner	July 2009
Automated Customer Notification for Service Disruptions	October 2007

Note: Commission Report for Next Bus Arrival and E-Commerce to be provided in November 2007.

APPENDIX 'C'

GEOSPATIAL TECHNOLOGY REVIEW

PROJECT STATUS UPDATE

TTC WEBSITE VISITS 1999 to 2007

YEAR	TTC WEBSITE VISITS
1999	551,797
2000	1,085,709
2001	1,736,086
2002	2,699,030
2003	5,892,683
2004	7,026,627
2005	8,575,646

2006	11,405,893
2007 YTD	Jan to Jul inclusive 7,343,853