



**Report: F-14-085**

**Region of Waterloo**  
**Finance Department**  
**Procurement and Supply Services**

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**To:** Regional Chair Ken Seiling and Members of Regional Council

**Date:** June 25, 2014                      **File Code:** F18-30

**Subject: P2014-01 Electronic Fare Management System (EFMS)**

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**Recommendation:**

That the Regional Municipality of Waterloo accept the proposal from Scheidt & Bachmann Canada for the Electronic Fare Management System in the amount of \$11,809,291.00 including all applicable taxes.

**Summary:**

The Regional Transportation Master Plan and the 2011 – 2014 Grand River Transit Business Plan, approved by Council in June 2010 and February 2012 respectively, included direction that the Region implement an electronic transit fare collection system. An Electronic Fare Management System (EFMS) is an electronic smart card transit fare solution for the Region of Waterloo that can be used for fare payment on GRT buses, MobilityPLUS, BusPLUS, Kiwanis Transit and ION LRT and aBRT service. Rather than paying with tickets, flashing a pass, or using a paper transfer, transit customers would use a smart card to pay their fare or to transfer. Cash payment would also continue to be accepted.

Benefits of the EFMS would include the integration of the fare payment experience across all Regional transit modes. The process for fare purchase and payment, as well as the customer experience would be the same regardless of whether payment is made on a bus, MobilityPLUS vehicle or ION platform. Transfers would be electronically encoded on smart cards, and would be validated across all services, making it easier to make transit trips that would require more than one service or vehicle. Cards could be purchased and reloaded at Ticket Vending Machines on ION platforms, as well as at Transit Terminals, Regional Offices and at participating grocery and variety stores, or using the Internet. This simplified process for obtaining fare media and paying for transit

would also make it significantly easier for new customers or visitors to use the transit system. In addition, the use of an electronic payment system reduces the potential for fare fraud. The proposed EFMS would also include replacement of obsolete GRT fareboxes.

### Report:

Proposals were called for the Electronic Fare Management System (EFMS) and were advertised in the Record, on the Region's website and on the Ontario Public Buyers Association website. Proposals were opened in the presence of G. Beniston, L. Smith and J. McCarty.

The following proposals were received:

Scheidt & Bachmann Canada	Kitchener, ON	\$11,809,291.00
Garival Inc.	Laval, QC	\$13,315,597.95
INIT Innovations In Transportation, Inc.	Chesapeake, VA	\$16,587,739.77

\*One bid was disqualified.

Bidders were requested to propose a fare system based on use of an electronic smart card that could be used to pay fares on all modes of transit provided by the Region. In addition, the RFP required that proposed systems:

- support the use of cash to pay for all transit modes;
- include QR-code printed paper ticket/ transfers for cash paying customers that could be validated by all fare equipment;
- support integration of all Regional transit modes including GRT buses, MobilityPLUS, BusPLUS, Kiwanis Transit and ION aBRT and LRT service;
- support the Region's current fare strategy and fare product mix, including U-Pass programs, and subsidized fare programs for low-income residents;
- include software and hardware to support a retail presence for the system similar to the current network of fare agents that sell Grand River Transit fares;
- include a web site, to be integrated within [www.grt.ca](http://www.grt.ca) where customers could purchase fares, register cards, and report cards as lost or stolen;
- provide a system that would support the Region's fare collection requirements for a minimum of 15 years without significant re-structuring;
- include the flexibility to integrate emerging electronic payment technologies such as payment by smartphone or credit/ debit card, to allow the system to develop over time with the Region's fare payment needs and;
- would support the Region's Connect-to-GO discount fare agreement with GO Transit;

A summary of the proposed system is included in Appendix 1. To implement the capabilities described above, the RFP requested the following fare payment equipment:

- new validating fareboxes for GRT buses that would accept coins for fare payment, validate electronic smart cards, print and validate QR-code paper tickets for cash paying customers;
- Ticket Vending Machines for ION platforms that would sell single ride QR-code paper tickets for cash paying customers, as well as sell, reload and validate electronic smart cards;
- Platform Fare Transaction Processors that would provide rapid fare validation on ION platforms for customers paying with smart cards or QR-code paper tickets;
- Hand Held Fare Transaction Processors to allow MobilityPLUS operators to accept payment by smart card and to validate QR-code transfers, and;
- Hand Held Card Readers to allow Proof of Payment fare inspectors on ION service to validate transfers and cards and to log fare inspections.

Proposals were evaluated using pre-determined criteria set out in the RFP consisting of compliance to pass/fail criteria and:

- Technical assessment – Technical description, Customer Web site, Compliance matrix
- Operational Assessment – Operating and Support Services
- Management Assessment – Project Management, Schedule
- Commercial Assessment – Corporate Qualifications
- Price

The proposal is being awarded to the highest scoring proponent, which was also the low bid. Scheidt & Bachmann Canada have been in business for over 140 years, founded in 1872 with 30 years experience in Fare Collection Systems. Examples of some of their supply and installation contracts include:

- awarded PRESTO Ottawa (OC Transpo Extension)- over 2000 smart card readers/validators along with Sales Terminals/handheld card readers
- London Transit Commission, London, ON – fare collection system based on Smart Card Validators with back office system
- Port Authority of Allegheny County, Pittsburgh, PA USA – fare collection system based on fareboxes, ticket vending machines

The work under this contract includes implementation of an integrated electronic fare system for Grand River Transit, Mobility PLUS and ION services based on an electronic smart card. The system would focus on the use of an electronic card to replace all current tickets, passes and transfers. The project will also include replacement of all

Grand River Transit fareboxes.

### Next Steps

The EFMS project is on a critical path to ensure new fare equipment would operate reliably on ION platforms before LRT enters service. To achieve this, following approval, staff would work with the recommended bidder to complete a vendor agreement and to complete system design specifications by the end of 2014. During this period, a communications plan would be developed and staff would work with internal and external stakeholders to define business processes that would be consistent with the system specifications. It is expected that acceptance testing would begin in early 2015, followed by installation of new fareboxes on GRT buses in summer 2015. Once new fareboxes are introduced, the Region would be able to begin replacing all current paper tickets and passes with electronic media. Acceptance testing would be completed for fare payment equipment for ION platforms in time to allow manufacture, delivery, installation and commissioning to take place before LRT enters service.

### Corporate Strategic Plan:

The EFMS project supports the Corporate Strategic Plan objective to implement a Light Rail Transit System in the Central Transit Corridor fully integrated with an expanded conventional transit system under Strategic Focus Area 3 Sustainable Transportation.

### Financial Implications:

P2014-04	\$11,809,291
Less: Municipal Rebate of 86.46% of HST (11.24%)	<u>(1,174,638)</u>
	Sub-total
	\$10,634,653
Contingency Provision	<u>730,000</u>
	Total
	<u>\$11,364,653</u>

The approved 2014 GRT 10 Year Capital Program includes \$7,744,000 (Projects 66048, 66059) from 2014–2016 to complete the EFMS project for conventional transit and MobilityPLUS. The project costs are budgeted to be funded from development charges (approximately \$1.4 million), debentures (approximately \$6.3 million with debt service funded from the RTMP Reserve Fund) and the GRT Capital Reserve Fund (\$945,000).

The approved 2014 Rapid Transit 10 year Capital Program includes \$3,621,000 for EFMS implementation in 2016.

The total project budget for EFMS implementation is \$11,365,000. The contingency

provision is for a community awareness campaign, project management costs and consulting costs during the system implementation phase.

**Other Department Consultations/Concurrence:**

The EFMS project is managed by a Steering Committee and a Project Team with representation from Planning, Housing and Community Services, Transportation and Environmental Services, Corporate Resources and Finance.

The final date of acceptance for this proposal is September 9, 2014.

**Attachments:** Appendix 1 - EFMS System Description

**Prepared By:** Lisa Buitenhuis, Acting Director, Procurement & Supply Services

**Approved By:** Craig Dyer, Chief Financial Officer

## **EFMS RFP Overview**

The EFMS RFP, issued in January 2014 requested proposals for an electronic fare system that would support integration of all Regional transit services including GRT bus, MobilityPLUS and ION LRT and aBRT. The RFP requested a system based on:

- smart cards that would store electronic tickets and passes, for the majority of Regional transit customers;
- the ability to continue to accept cash on all modes of transit, and;
- integration of QR-code paper transfers to support transferring between modes for cash paying customers.

In addition the RFP requested that the system must:

- support use of credit & debit cards on all transit service;
- be capable of integrating mobile payment using smart phones;
- support integration of contract passes including corporate passes and U-Pass programs, and;
- include multiple methods for customers to reload cards including at Regional customer service facilities, third party fare agents, vending machines, by mail, telephone, or the internet.

The proposed system includes all requested technologies and functionalities.

## **Proposed System Overview**

The Electronic Fare Management System (EFMS) would use electronic smart cards to register fare payment on GRT buses, MobilityPLUS vehicles and ION LRT and aBRT services. Electronic fare cards would replace all current transit paper tickets and passes. Cards would be loaded with electronic tickets and passes as required by customers and would automatically store electronic transfers.

Cards would be purchased and reloaded at customer service terminals, over the telephone or internet, at third party fare agents or by using a Ticket Vending Machine located at an ION platform. In addition to reloadable cards, limited value disposable cards would be available for visitors or casual users who do not require the ability to reload value to the card.

## **Cash Fare Payment and Transfer**

While the EFMS would encourage most customers to use electronic fare payment, cash would continue to be accepted. Cash paying customers on GRT buses or MobilityPLUS vehicles would be able to request a paper transfer which would include a QR-code. This transfer would be able to be validated electronically by fare payment equipment on all transit modes, including at ION platforms and by fare inspectors. On an ION platform,

customers wishing to use cash would be able to purchase a similar ticket from a Ticket Vending Machine.

### **Fare Payment on ION Platforms**

The ION service is planned to use a Proof of Payment (POP) system where fares are paid before boarding. This approach reduces the time required for passengers to board the Light Rail Vehicle as they may use any of the multiple doors. A smart card would retain the necessary record of payment for this system, while simplifying transfers between RT, GRT bus and/ or MobilityPLUS service. Fare payment on ION platforms would be accomplished using Platform Fare Transaction Processors (PFTPs) and Ticket Vending Machines (TVMs). Fare inspectors would monitor fare payment by periodically checking cards and tickets to deter fare evasion.

### **MobilityPLUS Integration**

The proposed EFMS would provide MobilityPLUS operators with a Handheld Fare Transaction Processor (HHFTP). This device would be able to read electronic fare cards as well as QR-code tickets, and to print QR-code transfers for cash paying customers. This approach to fare payment would allow the operator to take the payment acceptance device to the customer rather than requiring the customer to come to a fixed point of sale on the vehicle or to surrender their fare media for payment. This is an important feature for clients of MobilityPLUS service who may have challenges accessing a fixed device to pay fares.

All fare classifications enabled within the system would be able to be used on MobilityPLUS vehicles, in compliance with the Accessibility for Ontarians with Disabilities Act (AODA).

### **Single Ride Prepaid Tickets**

By including smart cards as well as disposable limited value cards, and QR-code paper tickets, the proposed system would support Public Health and Social Services agencies that distribute transit fares to their clients. These fare media types would provide for:

- Distribution of single ride electronic tickets to agencies and to clients; and,
- Integration of transit subsidy programs like the Transit for Reduced Income Program (TRIP).

Staff would work with the vendor and affected agencies during the system design phase to define the technical requirements for integration of the various programs.

### **U-Pass**

Integration of the U-Pass would be a key feature of the EFMS. The proposed system

would allow for a number of ways to achieve this integration. Staff would work with Universities, student groups and the vendor during system design to identify the preferred approach to integrate these programs. Once U-Pass integration is complete, the system would provide the Region and its U-Pass partners with comprehensive information on program use. The EFMS would reduce risk of U-Pass fraud by terminating the ability of a student's card to act as a U-Pass once their studies conclude.

### **Presto Integration**

The proposed system supports the Region's Connect-to-GO discount fare agreement with GO transit. Customers who present a valid Go Transit fare on boarding a GRT bus may ride at a reduced rate of \$0.50. GO Transit subsidizes this discount by reimbursing the Region for the difference between the reduced fare and the price of a regular ticket. EFMS card holders who also use Presto would be able to register to participate in the Connect to GO discount program. At the time of registration, the customer would provide their Presto card ID number, and would commit to carry a minimum balance on their EFMS card. When riding Regional transit service that would connect with GO service, the EFMS would debit \$0.50 per trip from the customer's card. Customers arriving on GO trains would be able to validate their EFMS card at a dedicated reader on the GO platform to authorize their trip on ION or GRT at the reduced rate. The EFMS would provide a full reconciliation of discount rides provided and associated use of the customer's Presto card on GO service.

Staff has spoken with Metrolinx about EFMS integration with Presto. Accordingly, the proposed EFMS includes hardware that is capable of supporting fuller integration with Presto. Staff will continue discussions with Presto as a future phase of the EFMS.

### **Proposed Equipment Summary**

The proposed implementation would include:

- Replacement Fareboxes for Grand River Transit buses with integrated smart card readers, QR-code transfer printers and optical readers to validate transfers;
- Platform Fare Transaction Processors for installation on ION platforms. These devices would read smart cards and barcode transfers to register Proof of Payment on entry to a platform;
- Ticket Vending Machines (TVMs) for ION platforms. TVMs would dispense smart cards, load smart cards and sell paper tickets with QR-codes. These devices would accept cash, credit or debit card payment;
- Handheld payment devices for MobilityPLUS, and for use by fare inspectors. MobilityPLUS operators would be able to issue and validate transfers with QR-codes using these handheld devices, as well as accept payment using smart



- cards, and;
- Point of Sale equipment for installation at Regional customer service facilities, and at third party fare agents.

Descriptions and numbers of these devices are included below.

The proposal also includes a new section within the GRT web site where customers would be able to:

- Order cards;
- Register cards for balance protection;
- Add value to cards;
- Set up recurring purchases of passes or tickets;
- Report a card lost or stolen, and if the card is registered, transfer the balance to a replacement card;
- Manage multiple cards, for family members, and;
- Request a receipt for income tax purposes.

These services would also be available at Customer Service Terminals or via telephone by contacting the Service First Call Centre.

### **Emerging Payment Technologies**

The EFMS RFP required that the proposed system would be able to integrate emerging payment technologies and the flexibility to implement new fare strategies in future. The proposed solution meets these requirements.

The proposed solution would support fare payment by contactless credit or debit card on all fare equipment ('Open Payment') within the proposed scope and price. However, implementation would require an agreement with a Merchant Payment Processor to process credit and debit card transactions. These organizations typically charge a fee per transaction. The Region continues to monitor the evolution of Open Payment and would undertake a cost-benefit analysis before recommending its implementation.

Fare payment using smartphones ('Mobile Payment') is also within the capability of the proposed system; however Mobile Payment is a rapidly evolving field. Some business models for mobile payment charge transaction fees to customers. Staff would review the potential to integrate this method of payment in future, including evaluating potential business models.

The potential to integrate these and other future payment technologies would be evaluated by staff, to enable the EFMS to evolve through its service life.

## **Proposed Next Steps**

To achieve implementation of the EFMS in time for the start of ION LRT service, staff would work with the recommended bidder to complete a vendor agreement, develop an implementation plan and complete system design specifications by the end of 2014. During this period a communications plan would be developed and staff would work with internal and external stakeholders, including social services providers, universities and student groups, to define business processes that would be consistent with the system specifications.

It is expected that acceptance testing would begin in early 2015, followed by installation of servers and supporting computer hardware, and new fareboxes on GRT buses in summer 2015.

In advance of farebox installation, staff would implement a communications plan to ensure customers are prepared to use the new fareboxes. Transit operators will also have to be trained in the use of the new system. In addition, Customer Service Terminals would be installed at Charles Street and Ainslie Street Transit Terminals, as well as at key Regional facilities to allow customers to purchase cards and load fare products. Point of Sale devices would be rolled out to Retail Sales Agents following this, to provide customers with the option of loading cards where they currently purchase passes or tickets. Once new fareboxes are introduced, the Region would be able to begin replacing all current paper tickets and passes with electronic media.

During 2015, acceptance testing would also begin for fare payment equipment for ION platforms in time to allow manufacture, delivery, installation and commissioning to take place before LRT enters service. This process would ensure that the central system, point of sale devices and web interface are operating as expected before ION equipment enters service.

GRT and MobilityPLUS customers would be able to use their current passes until after the system enters service. Once all current paper fare media are available in an electronic format, the Region would transition to electronic payment on all transit modes.

## **Customer Experience Summary**

### **Boarding a bus:**

- On boarding, Smart Card carrying customers would present the card to the reader, clearly indicated on the top of the Farebox
- The passenger display on the farebox would indicate whether the fare is accepted with text, colour and sound (i.e. the screen flashes green for accepted, red for not accepted). The display notes the fare type used (whether it is a pass

- or e-tickets)
  - If a pass is stored on the card, the display notes the date of expiry of the pass
  - If an e-ticket is being used, the display indicates the balance remaining on the card.
  - If an e-ticket is being used, the card stores a transfer in the memory of the card, which remains valid for the next 90 minutes.
  - If a valid transfer is already stored in the card memory, the reader validates the transfer and indicates the time remaining on the display
- Cash paying customers deposit the cash fare in the coin chute. The farebox rapidly counts coins as they are deposited and provides visual and audible feedback when the correct fare has been paid.
  - The cash paying customer can request a transfer by pressing the clearly indicated button on the farebox next to the passenger display.
  - The transfer is printed with a QR-code, as well as the time & date of issue, and issued to the customer from the top of the farebox
- Customers boarding using a transfer ticket issued from a farebox or a Ticket Vending Machine on an ION platform would present the QR-code on the ticket to the ticket reader panel on the farebox.
- The passenger display would indicate whether the transfer is accepted with text, colour and sound, or if it has been rejected. The display notes the amount of time remaining on a valid transfer

### **Boarding ION LRT**

On entry to an ION platform customers carrying a valid smart card or transfer ticket may:

- Pay a fare using the Platform Fare Transaction Processor (PFTP). Multiple devices are conveniently located on the platform
- The PFTP would indicate whether the fare is accepted with text, colour and sound in exactly the same manner as the farebox. (i.e. the screen flashes green for accepted, red for not accepted). The display notes the fare type used (whether it is a pass or ticket)
- Customers boarding using a transfer ticket issued from a farebox or a Ticket Vending Machine on an ION platform would present the QR-code on the ticket to the ticket reader panel on the PFTP.
- The passenger display would indicate whether the transfer is accepted with text, colour and sound, or if it has been rejected. The display notes the amount of time remaining on a valid transfer

Customers who wish to pay using cash, credit or debit would use the Ticket Vending

Machine which would sell single rides, day passes, multi-ride passes and monthly passes.

To begin a purchase, the customer selects the fare type from the touch screen display and pays the fare using coins, bills, Credit Card or Debit Card. The TVM issues change if necessary

For Single Rides:

- The TVM would issue a ticket printed with a QR-code as well as the time & date of issue
- The customer redeems the ride by presenting the QR-code to the optical reader on the front
- The TVM validates the fare and displays the time remaining on the ticket

For Day Passes or other short-term fare products:

- The TVM would issue a limited-use smart card that cannot be reloaded, from the slot neat the base of the machine. This card would be able to be redeemed at all fare equipment in the EFMS, in the same manner as the fully functional card, until its period or balance has expired, after which time it would no longer function
- The customer then can present the card to the smart card reader on the front of the TVM for fare validation
- The TVM validates the card and displays the time or balance remaining on the card

For Monthly Passes or larger multi-ride purchases:

- The TVM would ask the customer to present their card to the smart card reader to be loaded with the selected fare product
- If the customer does not currently have a card, the machine would offer to vend one to the customer, for a small deposit, loaded with the selected fare value
- The customer would then present their card to the smart card reader on the front of the TVM to validate the fare before boarding ION

The TVM can also issue blank smart cards, for a deposit, which the customer may choose to load at a later date.

### **Transferring**

- Transfers are encoded by each fare payment device into the memory of the smart card. If the card contains a transfer, then the system will validate that transfer before subtracting a ride from the customer's balance
- Cash paying customers would receive a paper ticket/ transfer containing an QR-

code that could be redeemed at optical readers on all fare equipment. These are issued from fareboxes, Ticket Vending Machines, and Handheld Card readers

- On use, the fare devices display the time remaining on the transfer

### **MobilityPLUS customers**

Current MobilityPLUS ID cards would be replaced with electronic smart card IDs

Boarding a MobilityPLUS vehicle:

- Cash paying customers would pay in the same manner as today; the operator would record payment on the Handheld Card Reader (HHCR).
- Customers who have purchased a pass or tickets on their smart card ID would present it to the HHCR which validates fare payment with text, visual and audible cues
  - If a pass is stored on the card, the display notes the date of expiry of the pass
  - If e-tickets are being used, indicates the balance remaining on the card.

Boarding conventional transit:

- The customer presents their smart ID to the reader on the farebox which validates their MobilityPLUS free pass and provides clear visual and audible feedback

Boarding ION

- the customer presents their smart ID to the reader on the PFTP which validates their MobilityPLUS pass and provides clear visual and audible feedback

### **Customer Facing Devices included in proposed EFMS solution**

#### **Electronic validating farebox (258 units)**

- Rapid coin validation of up to 10 coins per second
- Integrated smart card reader
- Integrated QR-code ticket printer
- Integrated optical reader for QR-code ticket validation
- Colour LCD passenger display shows:
  - Amount deposited
  - fare validated/ not validated from smart card
  - time remaining on transfer
- operator console shows:
  - status of all systems
  - passenger fare type paid
  - card rejection with reasons

- barcode ticket/ transfer rejection with reason
- passenger display capable of providing customer information in 16 languages
- fare validation is supported by visual and audible cues to indicate valid/ invalid fare type
- supporting systems include:
  - garage base stations to download usage data from fareboxes and to upload operating data
  - vaults and safes for cash processing

### **Ticket Vending Machines for ION Platforms (32 units)**

- Passenger friendly colour touchscreen display with intuitive user interface
- Accepts coins, bills, credit cards & debit cards
- Dispenses paper tickets with QR-codes for single journeys
- Dispenses reloadable smart cards, either carrying no value or loaded with value
- Dispenses limited use preloaded smart cards
- Reloads customer smart cards
- Designed in accordance with ADA and AODA guidelines; includes headphone jack, braille lettering and tactile elements
- Capable of providing customer information in 16 languages

### **Platform Fare Transaction Processors (38 units)**

- Low power, low maintenance device for mounting on ION platforms, for fast processing of fare payment
- Colour LCD display to provide rapid transaction status
- Accepts smart card payment
- Includes optical reader for QR-code processing