

ADVANCED PAYMENT STRATEGY – TRANSIT FARES

EXECUTIVE SUMMARY

Calgary Transit's current fare system is reliable, has low overhead costs and achieves a high satisfaction rating with customers. However, customers continue to express a desire for more convenient and flexible fare payment options. An advanced payment system is also needed to support alternative fare strategies, with the potential for increased revenue generation. Given recent significant advancements in fare payment technology, Calgary Transit and Information Technology partnered to evaluate trends and developments in the industry. This analysis has resulted in a recommended strategy to stage the introduction of advanced fare payment by first implementing a mobile ticketing system in conjunction with the required life cycle replacement of Ticket Vending Machines. This approach provides enhanced fare payment options for customers at relatively low overhead costs and can be implemented quickly. This strategy also allows for integration into a full electronic fare payment system in the future.

A full electronic fare payment system remains a long-term goal for Calgary Transit; however, given the current high costs, long implementation timelines and significant risks due to rapid technology changes, proceeding to this type of system is not currently in The City's best interest. The proposed investments will provide Calgary Transit and its customers with the greatest value while making progress towards long-term advanced fare payment goals.

ADMINISTRATION RECOMMENDATION(S)

That the SPC on Transportation and Transit recommend that Council direct Administration, subject to funding, to:

1. Implement the first phase of a mobile ticketing system; and
2. Complete the required life cycle replacement of the current LRT system Ticket Vending Machines (TVMs).

RECOMMENDATION OF THE SPC ON TRANSPORTATION AND TRANSIT, DATED 2017 MARCH 15:

That the Administration Recommendations contained in Report TT2017-0184 be approved.

PREVIOUS COUNCIL DIRECTION / POLICY

RouteAhead, a 30 year strategic plan for Calgary Transit, identified customer-centric improvements as a key focus of the stated goals. The RouteAhead strategy (C14) to "Make it more convenient to pay to ride Calgary Transit" includes the implementation of an electronic fare payment system.

BACKGROUND

The fare system currently used by Calgary Transit is similar to many transit systems throughout the world. Customers can pay with cash, pre-paid paper tickets and adult and youth monthly passes. Other options include annual senior citizen passes and semester based post secondary passes. The current system is very reliable, has low overhead costs and achieves a high satisfaction rating (81% satisfied or very satisfied). However, the current system requires customers to either carry exact change or make a separate journey to purchase tickets and monthly passes from a vendor.

ADVANCED PAYMENT STRATEGY – TRANSIT FARES

The system also does not enable the introduction of more flexible fare options (weekly pass, low income single fares, etc) or allow for distance or zone-based fares. As well, electronic payment options offered by other businesses are increasing the demand for Calgary Transit to update its payment system.

Many transit systems are now moving towards electronic payment systems that enhance the customer experience, but experience is showing that EFC systems have a significantly higher cost than the older paper-based systems. In 2012, Calgary Transit initiated implementation of an EFC system. The rationale was to provide customers with a much improved means to pay transit fares and to enable new, more flexible fare options. The EFC purchase was valued at \$7 million and partially funded by the Federal Government's 'Building Canada Fund'. The project was initially suspended in 2014 and then cancelled in 2015 due to difficulties experienced with the vendor.

INVESTIGATION: ALTERNATIVES AND ANALYSIS

In 2016, Calgary Transit and Information Technology (IT) conducted a comprehensive and up to date review of electronic fare payment systems to evaluate options and develop a strategy for achieving an advanced payment system for transit fares. This strategy was structured to improve the convenience and flexibility of fare payment for customers, while evaluating the cost-effectiveness, value, risks, reliability and implementation complexity of different types of advanced fare payment systems.

Review of Advanced Fare Payment Systems

The investigation identified considerable developments and technology evolution in the field of electronic transit fare payment since the last study in 2012. The study examined 19 major North American transit systems with electronic fare payment systems that were in use or under development. Ten of these systems are of similar size to Calgary and include Denver, Dallas, San Diego, San Antonio, Austin, Phoenix, San Jose, Salt Lake City, Portland and Regina. As well, Edmonton Transit Service is moving towards implementation of an electronic fare payment system.

Key findings of this research include:

- Financial system standards within the payment card industry (PCI) are rigorous but continuously developing and changing.
- Transit systems with traditional 'closed' payment systems (the transit system provides cards and the financial back-end support) are moving towards 'open' payment systems (cards and back-end support are provided by a third party financial institution).
- Full account-based, 'open', electronic fare systems require considerable time (4+ years is common) and capital funding (\$40 million to \$60 million) to implement. This reflects the complexity of the systems, the need for extreme reliability, and implementation hurdles when transitioning from current fare systems. These systems also have relatively high operating costs for revenue collection compared to other approaches.
- Mobile ticketing using smart phones is rapidly gaining popularity at transit agencies and with customers, and can be implemented as a first phase or to complement existing advanced payment systems. These systems provide increased convenience and

ADVANCED PAYMENT STRATEGY – TRANSIT FARES

flexibility of fare payment for a large subset of transit customers, at relatively low capital and operating costs.

Mobile Ticketing

Several transit systems have recently introduced mobile ticketing as a fare payment option. This technology relies on customers using their smart phones to purchase fares. Mobile ticket fares can be purchased via smart phones virtually anywhere. The smart phone is used to display or communicate proof of a valid fare to a transit official or a simple validation device on buses or LRT station platforms. More details on the logistics of mobile ticketing systems are provided in Attachment 1. These systems have a relatively low capital cost, can be introduced quickly, reduce the use of paper tickets and transfers, and are compatible with many other business applications.

Smart phones have experienced a rapid acceptance among a high percentage of the population (including low income and youth). The Canadian Radio-television and Telecommunications Commission indicates the rate of smart phone ownership will be 79% amongst all Canadians by 2018 and 98% for 18 to 34 year olds. The average Calgary Transit customer would benefit by having convenient access to products by purchasing them through the mobile ticketing application. Mobile ticketing can be used to complement and build towards a full account-based EFC system.

Framework for an Advanced Fare Payment System for Calgary:

Based on industry research, an advanced payment system for Calgary should:

- Incorporate a standards-based architecture and design set by the financial payment card industry.
- Use a customer account fare structure so that each customer has an account whereby payment is made from the 'back-end' of the system with the customer paying into and drawing from their account.
- Follow an open payment system which uses payment media (credit & debit) provided and managed by financial institutions (banks and credit card companies). No special transit fare medium is required.
- Support multiple agencies (regional transit integration) and City applications (other City business units).

Advanced Fare Payment Strategy Goals

In RouteAhead, Calgary Transit made a commitment to improve the fare payment process and options for its customers. Based on this commitment and research findings, Calgary Transit and IT identified key goals that should be addressed when developing an advanced payment system for Calgary. These goals are provided in Attachment 2.

Calgary Transit Ticket Vending Machines (TVMs)

Calgary Transit provides TVMs on all LRT station platforms. There are currently 230 TVMs in service, which enable customers to purchase single ride or day pass fares using cash, credit or debit cards. Since 2011, the TVMs have undergone a number of upgrades to add payment by credit and debit cards, purchase of multiple rides and most recently, tap and go capability. The tap and go capability allows for contactless credit cards and smart phone payment (Apple Pay)

ADVANCED PAYMENT STRATEGY – TRANSIT FARES

to be used to conveniently pay for fare products at the TVM. In 2016, the TVMs handled 6.3 million customer transactions valued at \$19.4 million. However, the current TVM technology is 14 years old and critical components have reached the end of their life. Parts are difficult to obtain and there are software compatibility and reliability issues.

After 2018, the TVM system will no longer be compliant with financial standards for accepting and processing non-cash payments. The cost of replacing the current TVM system is estimated at \$15 million. Not replacing this obsolete system places The City at significant risk of non-compliance to PCI standards and could impact its ability to accept and process credit and debit card payments for city services, which will impact Calgary Transit revenues and lower customer satisfaction scores.

Calgary Transit Advanced Payment System Strategy Options:

Based on the above research findings, goals and recommendations, the following options are proposed for consideration. Attachment 3 provides a summary of these options.

1. *Acquire a Mobile Ticketing System & TVM System Replacement*

- This option will address the risk to the entire City of Calgary for non-compliance of PCI standards (TVM replacement), and make considerable progress towards Calgary Transit's commitment to provide more convenient and flexible fare payment options to customers.
- A mobile ticketing system with scanners (validators) can be introduced quickly (within one year) with an estimated capital cost of \$5.5 million (class 5 estimate). Additional operating costs associated with vendor commissions, transaction fees, and system maintenance are estimated at \$2.4 million annually.
- As a first phase, it is suggested that mobile ticketing would be used as an option for the purchase of single ride fares and potentially for Calgary Transit Access customers.
- Mobile ticketing can be integrated into the development of a future account-based EFC system, and is an effective method of introducing advance payment options for customers in a staged approach.
- Life cycle TVM system replacement is required, with a capital cost estimated at \$15 million. The total capital cost for both items is estimated at \$20.5 million.
- With this option, the direct cost of collecting revenue as a percentage of total fare revenue would increase from 3.7 to 5.0* percent, or an additional cost of \$2.4 million annually.

*The direct cost of collecting revenue expressed as a percent accounts for specific annual Operating costs to support the revenue collection or fare collection for Calgary Transit in a given year.

2. *Acquire an Account-Based Electronic Fare Collection System & TVM System Replacement*

- A full EFC system would address all of Calgary Transit's goals for a new fare payment system. However, initial and operating costs are significantly higher than the current system and other options, and there is currently high uncertainty in the

ADVANCED PAYMENT STRATEGY – TRANSIT FARES

- cost-effectiveness, reliability and lifespan of these systems given the rapid changes in technology that are taking place.
- Development and implementation of this option would require approximately four years with a total capital cost of \$55 to \$75 million, including both full EFC implementation and TVM system replacement. The capital funds for the account-based EFC system is estimated at \$40 to \$60 million, and the required TVM system replacement is estimated at \$15 million. Additional transaction and maintenance costs are estimated at \$7 million annually.
 - With this option, the direct cost of collecting revenue as a percentage of total fare revenue would increase from 3.7 to 7.6 percent, or an annual increase of about \$7 million.

3. *TVM System Replacement Only*

- The current paper-based fare system would be maintained with the required life cycle replacement of the TVM system by the end of 2018. The commitment for an improved fare payment system would be put on hold.
- The capital cost for TVM replacement is estimated at \$15 million.
- The direct cost of collecting revenue as a percentage of total fare revenue remains constant at 3.7 percent annually.

It is recommended that Calgary Transit pursue Option 1 as an advanced payment strategy moving towards a full EFC system. A proposed timeline for this strategy, subject to funding, is provided in Attachment 4. Both mobile ticketing and full account-based EFC systems provide data to allow for the development of alternative fare strategies (e.g. distance or zone-based fares, flexible fare products such as weekly passes) that have the potential for increased revenue generation; however, the significantly lower initial costs, operating costs, and technology and timeline risks mean that Option 1 is the ideal approach. While flexible fare payments are important to Calgary Transit customers, other core service attributes such as reliability, service frequency/span and safety are consistently rated as most important to overall customer satisfaction. As such, funding for fare payment improvements needs to be prioritized in relation to these attributes, and Option 1 provides a balanced approach that focuses on maximizing short- and long-term value for customers and Calgary Transit.

Stakeholder Engagement, Research and Communication

Public input provided during RouteAhead engagement activities as well ongoing dialogue with Calgary Transit customers has shown support for an improved fare payment system that provides a higher level of customer convenience and enables more flexible fare and payment options. However, this needs to be balanced with other service attributes that are a high priority for investment to customers, including reliability, service frequency/span, and safety.

Research conducted by IT and Calgary Transit (summarized in this report) has found considerable movement by North American financial and transit industries towards more advanced means of transit fare payment. This research will have significant benefits for The City of Calgary as it moves in this direction, including:

- Maximum flexibility in deployment and minimizing many technical risks associated with proprietary solutions.

ADVANCED PAYMENT STRATEGY – TRANSIT FARES

- Mobile ticketing and Account Based EFC can co-exist as payment mechanisms yielding similar benefits in terms of customer convenience.
- There is no right order to add Mobile Ticketing vs Account Based EFC; it is a choice that is based on the objectives and constraints an agency is facing.
- Starting with Mobile Ticketing reduces the technical complexity of Account Based EFC, and provides immediate customer benefits.

Strategic Alignment

- Replacing TVMs supports reliable fare purchases for customers while expanding payment options.
- A phased implementation of a mobile ticketing system will move Calgary Transit closer to the RouteAhead goal of improving the customer experience, with increased convenience in paying fares and additional fare product options supported. This also has the potential for increased revenue generation through alternative fare strategies.
- The addition of mobile ticketing presents a lower technology and financial risk for the Corporation than full account-based EFC, which requires substantial up-front investment. Mobile ticketing leverages customer-owned smart phones, and can be integrated into a larger EFC system.
- Mobile ticketing systems are flexible, and can be used by multiple agencies and applications. Full account-based EFC systems typically rely on proprietary, non-standard technologies that can be difficult to innovate once in place.
- An investment in a traditional account-based EFC system will likely not yield the operational benefits, value and lifespan desired, given the rapid evolution of the industry and consequent obsolescence of current technology. It is estimated that full account-based EFC will require significant reinvestment in less than eight years.

Social, Environmental, Economic (External)

The introduction of a mobile ticketing system will make using Calgary Transit more attractive to existing and potential customers, particularly occasional users and visitors to the city. Increased use of transit has many well documented social, environmental and economic benefits. Mobile ticketing will make fare payment more convenient for specific customers initially (single rides and day passes, occasional riders, customers who forgot to pay for another fare product ahead of time) and can be expanded to others. A mobile ticketing system will also reduce the use of paper for printed tickets and transfers.

Financial Capacity

Current and Future Operating Budget:

The estimated operating cost of a mobile ticketing system is approximately \$2.4 million annually. These operating costs are composed of technology vendor commissions, credit and debit card transaction fees and system maintenance costs. Existing fare system costs may be reduced in areas such as TVM maintenance, printing, fraud, and cash handling.

Current and Future Capital Budget:

A life cycle replacement of all current TVMs on LRT station platforms is required before the end of 2018. The cost of replacing the existing TVM system is estimated at \$15 million while the

ADVANCED PAYMENT STRATEGY – TRANSIT FARES

implementation of a mobile ticketing system will require \$5.5 million. TVM replacement is on the Investing in Mobility Unfunded Project list. This program would be included for potential funding through the Infrastructure Calgary process. A source of funding for these purchases needs to be identified but may include funds remaining in the Federal Government Building Canada Fund grant program.

Risk Assessment

Without replacement of current TVMs, the cost of maintaining these machines will increase significantly, reliability will decrease, and the ability to accept and process payment by credit and debit cards will be lost due to non-compliance with PCI standards, which will impact other business units of The City. Customers will become increasingly frustrated with the current fare payment system given the technological payment advancements being made in other business sectors.

REASON(S) FOR RECOMMENDATION(S):

Introduction of mobile ticketing in addition to the required lifecycle replacement of the TVM system will begin moving Calgary Transit towards achieving a more customer-centric fare payment system.

Given the current budget constraints faced by The City and the rapid advances in the transit fare payment and mobile device industries, the proposed investments will provide The City and Calgary Transit customers with the greatest value while making progress towards long-term advanced fare payment goals.

ATTACHMENT(S)

1. Understanding the Mobile Ticketing Solution Experience
2. Calgary Transit Fare Payment System Goals
3. Options for Advanced Fare Payment System Strategy
4. Proposed Timeline for Advanced Payment System Implementation (Subject to Funding)
5. Terms and Definitions