

**MEETING DATE:** July 19, 2006

**SUBJECT:** Proof-Of-Payment Fare Collection At The TTC

**RECOMMENDATIONS**

It is recommended that the Commission:

1. Confirm the continued use of the proof-of-payment (POP) fare collection system for streetcar services on Queen Street, along with the requirement for exclusively-dedicated staff resources for enforcement of the system;
2. Approve the hiring of two new full-time staff to be fully-and-exclusively-dedicated to fare inspection and enforcement on POP routes;
3. Note that:
  - The streetcar services operating on Queen Street (501 QUEEN, 502 DOWNTOWNER, 503 KINGSTON RD, and 508 LAKE SHORE) have been operating with proof-of-payment since 1990, at designated times of the day, primarily to allow faster, all-door loading on the larger, three-door Articulated Light Rail Vehicle (ALRV) streetcars. These are the only regular services at the TTC currently operated with proof-of-payment.
  - Proof-of-payment fare collection improves transit operations by speeding up passenger loading and reducing delays resulting from serving stops, because it allows passengers who already have a proof-of-payment (transfer, Metropass or other pass) to use all doors for boarding and alighting. The issue of passenger boarding and alighting times becomes increasingly important with larger vehicles that have three or more sets of doors, such as the ALRV streetcar.
  - The reduction in delay achievable through POP also improves service reliability which, in turn, means that streetcars are better able to accommodate surge loading at individual stops.

- It is expected that the new Light Rail Transit (LRT) streetcars which the TTC is planning to buy to replace the current aging streetcar fleet, will have at least three sets of doors, and the low-floor design will not allow the operator to collect fares on these vehicles in the same way as is done at present. This will require that the routes on which these vehicles will operate use proof-of-payment fare collection to allow all-door boarding.
  - There are costs associated with the operation of a proof-of-payment fare system because of the requirement for the constant presence of fare inspection and enforcements officers. Also, typically, fare evasion is higher on proof-of-payment systems than on the TTC's current "pay-on-entry" system where all fare transactions are personally overseen by the operator of the vehicle.
  - Staff will develop an implementation plan for the expansion of the proof-of-payment system to some, or all, of the streetcar network in conjunction with the introduction of new LRT streetcars; and
4. Forward this report to the City of Toronto for information.

## **FUNDING**

The addition of two new staff to be exclusively-dedicated to fare inspection and enforcement on POP routes will cost approximately \$75,000 in 2006, or \$150,000 on an annual basis. This cost is not included in the TTC's 2006 operating budget, but will be included in the forthcoming 2007 operating budget.

## **BACKGROUND**

Other than for services which operate on Queen Street, the TTC uses a "pay-on-entry" fare collection system where fares are collected, or in the case of passes, checked, when passengers enter the system. Following fare payment on entry, however, there is no requirement on the part of TTC passengers to carry any proof of payment, and this is reinforced by the fact that, for many passengers transferring onto connecting services, no further fare transaction is required. This fare collection system works well in the TTC context. It is low cost, easy for customers to use, and results in a low level of fare evasion.

A significant weakness of the pay-on-entry system, however, is the requirement for all passengers boarding surface vehicles to enter through the front door and to do fare transactions directly with the operator. On busy routes, this time-consuming process results in slower and less-reliable service for passengers.

One way of cost-effectively providing higher-capacity service on major surface routes is to operate larger articulated vehicles such as the ALRV streetcar. These vehicles are 50% larger than the CLRV streetcars and have three sets of doors. However, their effectiveness in high-demand situations is limited by the pay-on-entry fare system because of the requirement for single-door loading. To address this issue, the main route on which the ALRV's are operated – the 501 QUEEN route – has been operated with a "proof-of-payment" (POP) fare system at designated times of the day since 1990. For ease of understandability, this same POP system applies to other services operating on Queen Street. This allows passengers on Queen Street to

board using all doors, which speeds operation and improves service reliability on the subject routes.

With a proof-of-payment fare system, all passengers are required to carry some sort of proof of payment to allow fare inspections to take place at any point in their trip. Many larger transit properties, world-wide, use some form of this fare collection system. It has advantages related to faster, multi-door loading, but requires that fare inspection and enforcement officers be present in the system to ensure that fares have been paid.

This report provides a status report on the use of “proof-of-payment” in the TTC system and, notably, on the 501 QUEEN streetcar route, an overview of some of the advantages and disadvantages of proof-of-payment fare collection, and a discussion of future directions with respect to proof-of-payment fare collection at the TTC.

## **DISCUSSION**

### *Current Status of Proof-of-Payment on Queen Street*

Proof-of-payment fare collection has been used on the streetcar services on Queen Street since 1990 when the larger-capacity ALRV streetcars were assigned to the 501 QUEEN route. The use of the proof-of-payment system is currently limited to the hours of 7am to 7pm. During these hours, passengers with proof-of-payment are permitted to board at all doors on the vehicles, and random fare inspections are performed by enforcement officers who move around on the POP routes. At other times of the week, all passengers board through the front doors and fare transactions are overseen by the operator as passengers enter the vehicle.

At peak times, and at major stops on Queen Street, particularly at the subway stations at Yonge Street and University Avenue, the proof-of-payment system works well at speeding passenger loading and improving service reliability, by allowing passengers with a valid Metropass, Weekly Pass, Day Pass, or transfer to board using any door. It also results in more-effective use of the ALRV’s large capacity than would otherwise be the case because it helps to achieve more-even passenger distribution throughout the larger streetcar. The proof-of-payment system also reduces the probability of fare disputes between customers and operators and, in this way, improves operator safety on Queen Street.

There have been concerns related to fare evasion, however, and these concerns have led to discussions of various alternative ways of implementing the system, operationally. Potentially, these include strategies related to opening all doors only at major stops, or opening all doors only at the discretion of the operator. There have been passenger complaints about the lack of consistency with respect to implementation of the system and the interpretation of the rules governing it.

### *Improved Speed and Reliability with Proof-of-Payment*

On the TTC’s major east-west streetcar routes, there are large volumes of passengers transferring from the subway and boarding at other busy stops, and this passenger boarding occurs on-street without the benefit of all-door loading from fare-paid boarding platforms as is found at other locations such as Dundas West and Broadview Stations. At very busy boarding locations, if loading occurs through only the front door as required for pay-on-entry fare transactions, loading a CLRV would take on average, approximately 2.4 minutes and loading an ALRV would take approximately 3.6 minutes. Surge, or crush, loading increases these times substantially. There is also a wide variability in average loading times with single-door loading because, with so many passengers boarding in single-file, there is a greater chance that loading will be delayed because

of passengers leaving via the front door, or requesting information, or because of fare transaction issues, and these occurrences then delay all of the other passengers waiting to board. On busy routes where vehicles are scheduled close together, such delays due to passenger boarding times can significantly affect service reliability.

Passenger boarding time is one of the most-significant causes of delays and service disruptions on the major east-west streetcar routes in the system. These routes (501 QUEEN, 504 KING, 505 DUNDAS, and 506 CARLTON) carry large volumes of passengers, which require streetcars to be scheduled every two-to-five minutes at peak times. However, these routes frequently provide poor and unreliable service due to a combination of:

- variable passenger boarding times in the range of two-to-four minutes at the subway transfer points and other busy stops;
- traffic signal delays of one-to-two minutes;
- general traffic congestion;
- disruptions due to turning vehicles, delivery trucks, emergencies, etc.

The passenger boarding time problem becomes most severe when operating ALRV's that carry more passengers and take longer to load. It was for this reason that the proof-of-payment system was first implemented on Queen Street, and this fare-collection method continues to be required to allow the provision of a reasonable quality of service to be maintained on the 501 QUEEN route. The TTC's current higher-capacity ALRV streetcar fleet cannot be operated effectively unless all-door loading is provided at major stops.

#### *Recent Research on Proof-of-Payment Operation*

A proof-of-payment fare system, in combination with the operation of larger-capacity vehicles, has been identified as one of the strategies that can be used to improve service reliability on the TTC's streetcar system. It is expected that much, or all, of the TTC's streetcar fleet will eventually be converted to larger-vehicle operation, either through the acquisition of new, larger streetcars, or through the operation of two-car "multiple-units" (MUs). The plan to rebuild the existing CLRV streetcar fleet includes a provision to re-equip these streetcars to be capable of MU operation.

To better understand the potential for this type of operation, the TTC commissioned a study of the operational effects of proof-of-payment fare collection and larger-vehicle operation, through a simulation of operations of the 512 ST.CLAIR route and the 504 KING route. The research, undertaken by Intellican Systems and the University of Toronto, indicates that travel times, and effective capacity, can be improved by 9% to 14%, and the likelihood of extreme headways significantly reduced, through the introduction of larger vehicles and proof-of-payment fare operations.

### *Fare Enforcement and Fare Evasion with Proof-of-Payment*

There are added costs, however, related to the use of proof-of-payment fare collection, caused by the added cost of enforcement and the typically-higher fare evasion rates that occur on proof-of-payment systems. These two issues are, of course, related because increased enforcement can reduce fare evasion and vice versa. There needs to be a balance struck between the investment made in fare enforcement and the resulting fare evasion rate.

The TTC does an annual assessment of fare evasion rates related to the proof-of-payment system on Queen Street. As shown in Table 1, attached, fare evasion rates between 2000 and 2003 were in the range of 2.2% to 2.5%. While this is three-to-four times the typical system average fare evasion rate of 0.7 to 0.8%, it is similar to what is typically achieved elsewhere with proof-of-payment systems, as noted in the “Best Practices” section below. In the past two years, the fare evasion rate for the proof-of-payment system has been rising, going to 3.2% in 2005 and 3.8% in 2006. This increased fare evasion rate reflects the lower level of fare inspection and enforcement that has been undertaken on the affected routes in the past two years.

Between 2000 and 2004, fare inspection and enforcement on streetcar routes on Queen Street was undertaken by two full-time Transit Special Constables fully dedicated to this task, and augmented by random patrols and blitzes throughout the year. In 2004, for example, there were 2150 hours of staff time dedicated to proof-of-payment enforcement at a direct cost of \$100,000. This enforcement resulted in approximately 2.0% of all passengers being checked for proof-of-payment. Due to budget restrictions on Transit Special Constables and other conflicting demands for their services, full-time enforcement was discontinued in 2005 and replaced with a system of one-week blitzes every three months. This resulted in enforcement hours and passenger fare checks being reduced to approximately one quarter of the previous levels so, currently, approximately 0.5% of all passengers using the proof-of-payment system have their fares checked, and the result has been the fare evasion rate noted above. This reduced level of enforcement is continuing through 2006.

From a cost-effectiveness perspective, an increased fare evasion rate on Queen Street from 2.5% to 3.8% represents \$200,000 in lost revenue. The reduced fare enforcement reduced costs for this activity by approximately \$75,000, so the financial situation of the TTC is worse off by \$125,000 as a result of the change in enforcement. On this basis, the previous system of assigning two full-time enforcement officers to the system should be reinstated as soon as possible. Given the increasing need for Transit Special Constables throughout the TTC system, it is recommended that two new employees be hired to be exclusively dedicated to fare inspection and enforcement on POP routes.

### *“Best Practice” Proof-of-Payment Fare Enforcement*

In 2004, York Region Transit undertook a survey of “best practices” at 22 North American transit properties that operate with a proof-of-payment system. The survey, summarized in Table 2, attached, indicated that most properties report a 2%-to-3% fare evasion rate, although it is recognized by all that fare evasion is difficult to measure accurately.

To achieve this evasion rate, typically, inspections are targeted to check approximately 5% of all boarding passengers. This is more than double the rate at which fares were being checked on Queen Street from 2000 to 2004, although the reduced level of inspection in Toronto yielded approximately the same fare evasion rate of 2%-to-3%. To achieve a 5% inspection rate, the TTC would need to employ four full-time positions dedicated exclusively to fare inspection and enforcement on Queen Street, and they would need to complete approximately 300,000 fare checks per year.

#### *Implications of Acquiring Modern Low-floor Streetcars*

Over the next few years, the TTC must begin to replace its existing fleet of aging streetcars. Current plans call for the rebuilding of some, or all, of the existing CLRV streetcars to extend their useful life, but it is expected that new modern, low-floor streetcars will also be acquired at some point in the next ten years to accommodate growth and to begin to replace the existing fleet. Provincial accessibility legislation requires that all public facilities be fully accessible by 2025 so, by that point in time, all of the TTC's streetcar fleet will have to be fully accessible, which is achievable only through the purchase of modern, low-floor streetcars.

As a result of the low-floor design, the position of the front doors on a modern streetcar -- not adjacent to the operator's location -- makes it impossible for the operator to be involved with fare transactions, as is now done on TTC streetcars. Replacing the current streetcar fleet with modern streetcars will require that streetcar services be converted to some sort of proof-of-payment fare collection. With the current plans for the acquisition of new streetcars, it is reasonable to expect that, at some point in the next 15 years, all streetcar services will need to be converted to a proof-of-payment system.

#### *Proof-of-Payment and the "GTA Fare Card" System*

The TTC and other GTA transit properties are participating in the Province of Ontario's plans for the introduction of a "GTA Fare Card" which has the potential to replace all of the TTC's current fare media. TTC staff are assessing the implications of a possible system-wide adoption of the "fare card" approach at the TTC, and part of the assessment is to ensure that a "fare card" will not preclude the possibility of introducing proof-of-payment on the TTC at some future time. From a practical implementation perspective, whatever approach is eventually adopted for the fare card system over the long term, if a proof-of-payment system is in place on the streetcar system, there will continue to be a need for fare enforcement of some sort in conjunction with the system.

#### *Conversion of the Complete Streetcar System to Proof-of-Payment*

Conversion of the streetcar system to proof-of-payment would require an expansion of the current proof-of-payment enforcement system and a significant effort with respect to passenger information, both at the change-over time and on an ongoing basis.

To maintain an inspection rate of 2% across the streetcar system, the TTC would need to employ approximately 14 full-time fare inspection and enforcement officers at an annual direct cost of approximately \$850,000. In addition, it is possible that, with POP in effect on the whole streetcar system, the fare evasion rate on the streetcar system could rise from the current 0.8% to in the order of 2.3%. This would result in a revenue loss of approximately \$2.1 million per year at current fare levels. In total, the net cost of implementing proof-of-payment on the full streetcar system would be in the order of \$3 million per year. These costs would be offset, to some degree, by savings related to the increased capacity resulting from improved passenger boarding speed, to

the more-effective use of vehicle capacity, and to more-reliable service. These savings will depend on a number of implementation factors that remain to be determined, notably the size and layout of the new streetcar.

Passenger information plays an important role in any changes to fare systems, and there is currently a degree of passenger confusion regarding the existing proof-of-payment system. Converting individual streetcar lines to proof-of-payment, one at a time, as new streetcars are acquired, for example, would result in a perceived inconsistency in fare collection practices and in additional passenger confusion regarding the system. For this reason, it may be preferable to convert the whole streetcar system to proof-of-payment at one time, such as when the first modern LRT streetcars are put into service.

In the interim, the current proof-of-payment operation on Queen Street needs to be maintained to make effective use of the existing ALRV streetcars. In balancing fare enforcement versus revenue losses, two fare inspection and enforcement officers need to be exclusively dedicated, on a full-time basis, to the proof-of-payment system on Queen Street, as was the case between 2000 and 2004.

### *Conclusions*

1. The proof-of-payment system on Queen Street should be retained, and two full-time, fully-dedicated fare inspection and enforcement officers should be assigned to enforce the system on a full-time basis, as was done between 2000 and 2004.
2. When plans are finalized regarding the timing of the acquisition of new low-floor streetcars, a staging and implementation plan should be prepared regarding the introduction of proof-of-payment fare collection on the streetcar network. The plan will need to identify and address the wide range of operating, enforcement, and implementation issues involved with such a conversion.

### **JUSTIFICATION**

The current proof-of-payment fare procedure is required to make effective use of the TTC's high-capacity ALRV streetcars. The system should be maintained, and fare enforcement enhanced, to return to the targeted 2.3% fare evasion rate achieved between 2000 and 2004.

The acquisition of low-floor LRT streetcars to replace the current aging streetcar fleet will require the conversion of the whole streetcar system to a proof-of-payment fare system over the next ten-to-fifteen years.

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Attachments: Table 1 and 2

July 14, 2006  
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**Table 1 Proof-of-Payment on Queen Street  
Fare Enforcement and Fare Evasion Rates**

Year	Enforcement Rates		Fare Evasion Rates	
	Annual Hours	Fares Checked	System-Wide	Proof-of-Payment
2000	N/A	N/A	0.7%	2.4%
2001	3,590	434,600	0.8%	2.3%
2002	2,440	333,100	0.7%	2.5%
2003	2,200	266,300	0.7%	2.2%
2004	2,150	221,600	0.9%	3.2%
2005	520	31,900	(1)	3.8%

(1) No comparable system-wide results available due to charges in Metropass transferability.

**Table 2 Survey of Proof-of-Payment Enforcement Policies**  
Gooderham Group for YRT, November 2004

### **Summary of Results**

- Properties Surveyed: 22
  
- Characteristics of Enforcement:
  - Most agencies use a combination of both fare inspectors and special constables
  - Fare inspectors perform the majority of inspections with transit security called to assist if there are indications of fraud, violence, or repeat offences
  - Fare inspectors only enforce fare bylaw although typically they also provide customer information and assistance
  - Mostly assigned in pairs for safety of employees
  
- Enforcement Rates:
  - Staff assignment ranges from .02 to 16.7 employees per million annual riders (2 full-time employees enforcing the Queen proof-of-payment system represents approximately .06 employees per million annual riders)
  - Inspection rates range from 0.5% to 75% of passengers boarding, but this usually includes 100% inspection at some times of the day
  - Consultant recommends YRT establish a target of 5% inspection rate
  
- Fare Evasion Rates:
  - Most response in the range of 2% to 3%
  - Higher rates are experienced at US properties than Canadian properties