MEETING DATE: DECEMBER 9, 2002

SUBJECT: Use Of Cameras To Enforce Transit Lanes

RECOMMENDATIONS

It is recommended that the Commission:

1. Receive this report for information, noting that;

- several major cities, such as Sydney, Singapore, and London, use cameras on-board buses and/or at roadside locations, as an effective tool in enforcing traffic regulations related to transit lanes;

- London takes transit priority seriously, and has established reserved bus lanes or queue-jump lanes in 800 locations, constituting 35 per cent of their "high-priority" arterial roads; these are enforced using cameras on buses, roadside cameras, traffic wardens, and parking control officers;

- by mid-2003, London will have over 1000 buses equipped with on-board cameras linked to an automatic vehicle locating system, and 50 roadside cameras; the cameras cost about C$25,000 for each bus and about $60,000 for each roadside installation, with considerable additional costs related to IT hardware and software, and required staffing;

- in Toronto, there are there are only four roads with transit-only lanes, totalling about 25 lane-kilometres and, given the high cost to install cameras on the requisite number of buses or streetcars, in addition to the necessary vehicle locating equipment, IT infrastructure, and staffing, enforcement cameras on transit vehicles cannot be justified;

- given Toronto’s limited commitment to transit priority to date, roadside cameras at site-specific locations could be used to enforce reserved lanes, at much lower costs than on-board cameras;

- TTC staff will meet with City staff involved in the red-light camera initiative in order to assess the feasibility and costs of a demonstration project of transit lane enforcement using roadside cameras, and will report back prior to the 2004 budget submission;

- enforcement cameras on transit vehicles cannot be used for operator or passenger security because transit lane enforcement requires the camera to be aimed at activities in front of the transit vehicle, not inside; and

2. Forward this report to City of Toronto Works and Planning and Transportation Committees, City Transportation Services and Planning Departments, the Toronto Police

Services, the Gridlock Subcommittee of the Central Ontario Smart Growth Panel, and the Ontario Ministry of Transportation.

FUNDING

This report has no impact on the Commission's operating or capital budgets

BACKGROUND

At its meeting on May 14, 2001, the Commission requested TTC staff to …*report back, in consultation with City licensing staff, on the feasibility of installing cameras on streetcars for HOV enforcement, with such report to also include comment on the potential for these cameras to act as a safety device for operators.*

Dr. Gordon Chong – Chair of Gridlock Subcommittee of the Central Ontario Smart Growth Panel – has also contacted TTC staff to discuss the use of cameras on buses for enforcement purposes.

This report responds to the Commission's and Dr. Chong's requests.

DISCUSSION

Traffic violations are a significant problem in Toronto and an obvious obstacle to providing fast, reliable transit service. In addition to the chronic problems of illegal parking, stopping, and turning, there is ongoing, illegal misuse of reserved transit lanes and High Occupancy Vehicle (HOV) lanes by private low-occupancy vehicles.

Unless the transit lanes have been physically separated from other traffic, as is the case, for example, with the streetcar right-of-way in the centre of Spadina Avenue, reserved lanes are relatively ineffective unless police enforcement is present. Unfortunately, to date, regular, dedicated police enforcement has been unattainable in Toronto. This being the case, motorists illegally use reserved transit lanes or HOV's and have a very low

chance of being caught. During a two-week police enforcement blitz of the HOV lanes on Eglinton Avenue East, TTC bus drivers reported that motorists' illegal use of the lanes had been reduced substantially. However, they reported that motorists were quick to return to their "normal" high levels of non-compliance once the blitz ended.

There are several cities throughout the world where cameras are being used effectively to enforce transit lanes. Staff reviewed specific examples of camera-enforcement

technology in Sydney, Singapore, and London, England. London has the most-extensive use of cameras for transit lane enforcement.

Enforcement Cameras in London, England

London is taking significant measures and investing over C$500 million to improve surface transit operations. Measures include:

- a congestion pricing scheme in the central area of London
- transit signal priority
- stringent parking and stopping restrictions
- automatic vehicle locating and control systems to improve route management
- real-time passenger information systems to advise waiting customers of the arrival time of the next bus
- improvements to bus shelters, including better lighting, more frequent cleaning, and more seating
- changes to curbs to make it easier to board and alight from buses

This comprehensive program is focussed on 70 heavily-used bus routes which operate on the "Mayor's Road Network", a 550-kilometre network of London's most important roads. To date, over 800 bus/queue jump lanes, totalling about 200 lane-kilometres, are in operation in London. Having made a clear commitment to ensuring that transit can operate effectively through a range of transit

priority measures, London uses camera enforcement extensively to ensure that the bus and queue-jump lanes are obeyed.

In its initial stages, London used only static roadside cameras to enforce traffic regulations in areas where persistent stopping and parking in bus lanes had become a problem. The bus lane enforcement program, of which cameras are a significant part, has been continually expanded and, by March, 2003, 1045 buses in London will be equipped with on-board cameras, and 50 roadside cameras will be in operation. The on-board camera system requires roadside electronic beacons at the beginning and end of a transit lane. The beacons start the video camera as a bus enters a bus lane and stops the camera when the lane ends, to eliminate unnecessary footage. Each on-board camera has two lenses that have separate functions: one of the lenses records a close-up image clearly displaying the license plate number of the vehicle ahead, and the second lens records a wider view that shows the offence in the context of prevailing traffic conditions. The cameras record in continuous time-lapse mode to reduce the volume of data associated with standard video operation. A vehicle locating system automatically encodes the photos with the location and time of the offence. The system is expensive: the cameras alone cost $25,000 for each on-board assembly, and $60,000 for each roadside installation.

At present, the video data from the buses is collected manually, and all video is reviewed by enforcement officers at a secure operations centre, using proprietary technology that allows fast-forwarding through segments where no contravention is likely to have been recorded. This is a very labour-intensive operation, as it requires the officer to view enough tape to ensure that a violation did occur and that there were no mitigating circumstances. When a valid contravention is identified, the registered owner of the vehicle is sent a $195 infraction notice.

Early data on the camera enforcement program in London has shown a 92 percent decline in violations, leading to average travel time improvements for buses of as much as 46 percent.

As with the red-light camera program in Toronto, the issuance of an infraction notice, by mail, to the registered owner of the vehicle, rather than the operator, required legislative amendments. Similar amendments to the Highway Traffic Act would be necessary to permit camera enforcement of transit lanes in Ontario.

Potential for Camera Enforcement of Transit Lanes in Toronto

While cameras can significantly increase the chances of a motorist being caught when illegally driving, stopping, or parking in a reserved lane, it is difficult to justify the high costs associated with on-board camera enforcement in Toronto. To date, Toronto has relatively limited priority for transit.

In Toronto, there are only four roads with reserved transit lanes. There are curb bus lanes on various sections of Eglinton Avenue West from roughly Keele Street to Yonge Street,

on Eglinton Avenue East from Yonge Street to Laird Drive, and on Bay Street from north of Bloor Street to Wellington Avenue. There are also median streetcar lanes on King Street from Dufferin Street to John Street, and from Church Street to Parliament Street. These, in addition to some site-specific queue jump lanes, total 25 lane-kilometres. There are also 60 lane-kilometres of HOV lanes in Toronto, in which vehicles with at least three occupants are permitted to travel. However, camera enforcement of HOV lanes is not feasible because it is not possible to accurately identify the number of occupants in a vehicle due to reflections, tinted glass, an occupant's small size, and other objects obstructing the view of the vehicle's interior.

Given the logistical difficulty of ensuring that specific buses or streetcars are assigned to a given route, a significant number of buses or streetcars would have to be equipped with cameras -- at $25,000 per vehicle -- to ensure that enough camera-equipped vehicles were on these four routes. As is the case in London, it would be preferable if the cameras were to operate only when the bus or streetcar is travelling in a reserved lane. A system would also have to be developed to ensure that the bus or streetcar's actual location was encoded on the video image. This interface would require appropriate software and an automatic vehicle locating and control (AVLC) system. It is uncertain whether the TTC's ageing Communications and Information System (C.I.S.) could be modified for use in this manner.

Given the small number of transit-only lanes in Toronto, and the extensive investment necessary to implement an on-board camera enforcement program, cameras on buses or streetcars would not be a cost-effective investment. However, there is a need to improve transit operations in Toronto, and effective enforcement of transit lanes has been a long-standing problem in this city. London's use of cameras as an enforcement tool began with the use of roadside cameras at specific problem locations. This does not require as many camera installations as would an on-board camera system, nor does it require a bus/streetcar location system to interface with the video footage. It would be appropriate to evaluate the extent to which camera enforcement -- using only roadside cameras at specific problem locations -- could provide a cost-effective means of improving motorist compliance on existing reserved transit lanes.

Staff will meet with the City staff who have been involved with the red light camera project in order to determine the feasibility and costs of an on-street demonstration project of roadside camera enforcement on transit lanes. Staff will report back in the Spring on the merits of including such a demonstration project in the 2004 budget submission.

Potential for On-board Enforcement Cameras as a Safety Device for TTC Drivers

Staff were requested to also report on the potential to use on-board enforcement cameras to record situations on the vehicle, as a safety or security aid for TTC drivers. Enforcement cameras, when installed on a bus or streetcar, must film situations in front of the transit vehicle. They cannot provide the dual function of filming situations within the bus or streetcar. A separate camera would be required for such purposes, similar to

those which are used in taxis; such cameras use much-simpler technology and are considerably less expensive.

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November 28, 2002

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