



## STAFF REPORT INFORMATION ONLY

### Eglinton Crosstown LRT Transit Project – Left Turn Prohibitions

<b>Date:</b>	November 26, 2009
<b>To:</b>	City Council
<b>From:</b>	General Manager, Transportation Services
<b>Wards:</b>	Wards 2, 3, 4, 11, 12, 15, 16, 17, 21, 22, 24, 26, 31, 34, 35, 36, 37, 38, 43, and 44
<b>Reference Number:</b>	p:\2009\Cluster B\Tra\TIM\cc09016tim

#### SUMMARY

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At its meeting of November 17, 2009, the Toronto Transit Commission considered the report titled “Request for Approval of the Eglinton Crosstown LRT Transit Project Assessment Study” and, among other things, approved the motion “that consideration of the left turn prohibition/u-turn facilities be referred to the Chief General Manager and General Secretary to work with City of Toronto Transportation staff on a complete analysis of the implications of these facilities and that City staff bring this information forward in a report to City Council.” This report, which responds to this motion and accompanies the report from the City Manager titled “Eglinton LRT Transit Project Assessment” which is also before City Council, outlines the findings of this analysis.

The detailed transportation analysis was undertaken for each of the signalized intersections along the Eglinton Crosstown LRT line. For each intersection, performance measures for transit, pedestrians and vehicles were calculated during the peak operating conditions. As a result of this analysis, it was recommended that eastbound and westbound left turn prohibitions be introduced at nine key intersections and that left-turning vehicles be accommodated by introducing U-turn signals beyond the intersections. At Eglinton Avenue West and Kipling Avenue, for example, which is one of these nine key intersections, this would reduce transit delays by as much as 43% and pedestrian delays by as much as 26% without adversely affecting vehicle operations. In fact, with the introduction of U-turn signals, there will actually be a reduction in vehicular travel time at some locations because of the elimination of lengthy delays that vehicles would otherwise experience in waiting for the left-turn signal at the main intersections.

## **Financial Impact**

There are no financial implications resulting from the receipt of this report.

## **ISSUE BACKGROUND**

A key objective of the Eglinton Crosstown Light Rail Transit (LRT) project is to provide faster, reliable, high-capacity, environmentally-sustainable transit service in support of other important City objectives related to creating a more liveable, attractive, and sustainable city.

The 32.6 kilometre Eglinton Crosstown LRT will operate from Kennedy Station to Pearson International Airport initially using 60-metre vehicles (2-car trains) and ultimately, in order to address long term demand, using 90-metre vehicles (3-car trains). The central underground section of the line (Black Creek Drive to Brentcliffe Road), will operate at an average speed of 33 kilometres per hour, similar to subway operating speeds. The remaining sections of the line will operate at surface in an exclusive transit right-of-way on an approximately 150 mm raised median in the middle of the road.

During preliminary planning, TTC and the City of Toronto conducted detailed traffic analyses for key intersections along the surface sections of the Eglinton Crosstown LRT. The objective of these analyses was to determine any changes to existing traffic operations required to provide fast and reliable LRT service.

## **COMMENTS**

### **Unsignalized Intersections and Driveways**

For all of the Transit City LRT lines, including the Eglinton Crosstown LRT, traffic will be permitted to cross the tracks at signalized intersections only. Unsignalized intersections and driveways will be limited to right-in/right-out operation.

### **Signalized Intersections**

The design for a typical signalized intersection on Transit City Light Rail lines incorporates a separate left turn lane to the right of the LRT right-of-way to allow left turns by general traffic; U-turns can also be made from these left-turn lanes to assist motorists, who can no longer make left-turns at unsignalized intersections and driveways, to reach their destination.

However, at several major intersections on the Eglinton Crosstown LRT line, it is recommended that left turns be prohibited to allow for a better intersection operation for transit and to minimize delays for pedestrians. A new and innovative left-turn arrangement is being recommended at nine key intersections, in order to reduce the

amount of delay to the LRT service, and the delay to crossing pedestrians, while still accommodating left-turning vehicular movements.

Specifically, eastbound and westbound traffic on Eglinton Avenue will no longer be able to make left turns at nine intersections: Martin Grove Road, Kipling Avenue, Islington Avenue, Royal York Road, Scarlett Road, Jane Street, Victoria Park Avenue, Pharmacy Avenue and Birchmount Road. Motorists who want to turn left at these locations will, instead, have to travel straight through the intersection, and make a U-turn at a new signal located beyond the intersection, and return to their intended destination, as shown in Attachment 1. Additionally, at Jane Street and Pharmacy Avenue, left turns will also be prohibited in the northbound and southbound directions (i.e. left turns will be prohibited in all directions at these two intersections). Accordingly, new U-turn signals will also be provided both north and south of these intersections.

The above-noted recommendations are the result of detailed traffic analysis conducted at all of the signalized intersections along the Eglinton Crosstown LRT line. For each intersection, performance measures for transit Light Rail Vehicles (LRV's), pedestrians and vehicles were calculated for the a.m. and p.m. peak periods, which included:

- Probability of LRV Clearing on Green with Zero Vehicle Delay
- Average LRV Delay
- Average Pedestrian Delay
- Left-Turn Travel and Delay Time
- Total Intersection Person Delay

In order to achieve optimum transit performance and to minimize delays to pedestrians, it was important to minimize the traffic signal cycle lengths. This allows LRV's more opportunities to travel through an intersection and pedestrians more opportunities to cross an intersection, in a given time period. However, it became apparent that at intersections with high volumes of left turns, through traffic, pedestrians and cross-street bus service, all of these competing demands could only be accommodated with an increase in cycle length. This, however, has a detrimental impact on transit and pedestrian delays.

By way of example, at the intersection of Eglinton Avenue and Kipling Avenue, the analysis of the future scenario indicated that the cycle length required to accommodate all movements including left turns, would be 120 seconds in both the a.m. and p.m. peak periods. This would include a left turn phase of more than 10 seconds plus the required amber/all-red clearance phases. By removing the left-turn phase, the cycle length in the future scenario can be reduced to 90 seconds in the a.m. peak and 100 seconds in the p.m. peak. These lower cycle lengths result in a 32-43% reduction in average LRV delay and a 21-26% reduction in average pedestrian delay.

At intersections with left turn prohibitions, instead of waiting at the main intersection, in some cases for two or more full signal cycles, left-turning vehicles will proceed during the regular green phase through the main intersection to a special signal for U-turning traffic only. Typically, the U-turn signal will be located approximately 200 metres downstream from the main intersection. While the U-turn signal phase is green, traffic

travelling in the opposing direction will be stopped. Pedestrians will be prohibited from crossing at these locations in order to eliminate conflicts and simplify the traffic signal operation. The re-routed left turning vehicles will then proceed to the main intersection and make a right turn there. In some cases, the time required to take the U-turn route will be less than the “traditional” left turn route via the main intersection.

The road geometry of the U-turn signal locations will be designed to accommodate vehicles up to the size of a standard delivery truck. Heavy trucks will be prohibited from making U-turns at these locations and will be required to choose an alternate routing that does not require a left turn from Eglinton Avenue.

The proposed changes in left turns will result in faster, more reliable LRT service. The cumulative effect of prohibiting left turns at these nine locations will result in an LRV travel time savings of 3 minutes per round trip and a 3 to 5 minute improvement in schedule variability (this means that there is an increased probability the LRV will clear the intersection on a green signal with no delay). On average, pedestrians will wait 10 sections less to cross Eglinton Avenue at each location where the left turn prohibitions are proposed.

Left-turning vehicles will also experience, on average, a travel time savings of 10 seconds. However, it is important to note that the travel times vary considerably depending on the specific location and turning movement.

## **CONTACT**

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## **SIGNATURE**

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## **ATTACHMENTS**

Attachment 1 - Accommodating Left Turns at Key Intersections on Eglinton Avenue

# Attachment 1

## Accommodating Left Turns at Key Intersections on Eglinton Avenue

