

Traffic Signal Operational Improvements: Bathurst Street at Fairlawn Avenue / Prince Charles Drive

Date:	May 29, 2009
To:	North York Community Council
From:	Director, Transportation Services Division, North York District
Wards:	Ward 15 Eglinton-Lawrence Ward 16 Eglinton-Lawrence
Reference Number:	<i>ny09045</i>

SUMMARY

To obtain approval to prohibit pedestrian crossings on the south side of the intersection at Bathurst Street at Prince Charles Drive, as well as to prohibit northbound and southbound right turns during the red traffic signal indication.

The implementation of the pedestrian crossing prohibition along with northbound and southbound right turn on red prohibitions will improve both pedestrian and vehicular safety.

RECOMMENDATIONS

Transportation Services Division recommends that City Council:

1. Prohibit pedestrian crossings on Bathurst Street, between a point 10 m north of the north curb line of Prince Charles Drive and a point 30.5 m south of the south curb line of Prince Charles Drive;
2. Prohibit northbound right turns on a red signal at all times from Bathurst Street to Fairlawn Avenue;

3. Prohibit southbound right turns on a red signal at all times from Bathurst Street to Prince Charles Drive;
4. Designate the northerly westbound lane on Fairlawn Avenue for right turning vehicles only, from Bathurst Street to a point 30 m east thereof; and
5. Designate the southerly eastbound lane on Prince Charles Drive for right turning and vehicles only, from Bathurst Street to a point 30 m west thereof.

Financial Impact

All costs associated with these changes on Bathurst Street at Fairlawn Avenue and Prince Charles Drive is included within the Transportation Services Division's 2009 Operating Budget estimates.

ISSUE BACKGROUND

The Transportation Services Division was requested by local residents, to review both pedestrian and vehicle safety issues on Bathurst Street at Fairlawn Avenue and Prince Charles Drive. The safety issues were specifically due to the offset nature of this signalized intersection. In addition to the above the local Councillors conducted a public meeting on February 1, 2007, to address the residents concerns and inform them of the potential improvements that can be implemented to address the difficulties that offset signalized intersections create.

COMMENTS

Bathurst Street is a four lane arterial roadway with a daily two way traffic flow of approximately 32,000 vehicles and a speed limit of 50 km/h. The intersection of Bathurst Street and Fairlawn Avenue/Prince Charles Drive is a far right offset intersection with a horizontal offset of approximately 26 m. The eastbound and westbound approaches to this intersection consist of a single lane configuration. Advisory 'Conflicting Turns on Green' signs are in place for the eastbound and westbound approaches to the intersection. Pavement markings are also in place to guide eastbound and westbound motorists through the intersection. Pedestrian crosswalks across Bathurst Street are located at the north limit of Fairlawn Avenue and the south limit of Prince Charles Drive. The existing traffic control signal operation includes a transit priority feature, which provides extensions of up to 30 seconds to the north/south green phase to improve transit operations along Bathurst Street.

An offset intersection is defined as a location where two minor streets intersect a major street at nearly the same location. There are two fundamental types of offset intersections; the far right and the near right (see Attachment 3). A far right offset intersection is identified by the location of the minor street on the right hand side of the intersection being located on the far side of the intersection which is the case for the Bathurst Street and Fairlawn Avenue/Princes Charles Drive intersection. There are several operational conflicts associated with far right intersections controlled by traffic control signals.

- Motorist's ability to establish the right-of-way within the intersection is impeded due to the left turn then right turn manoeuvres required to complete a through movement between the minor street approaches. This is illustrated in Diagram 4a in Attachment 4, for Conflict Points C1 and C2. As a result, traffic turning left onto the arterial road cannot distinguish between opposing through traffic and opposing traffic which is turning left.
- Interlocking left turn collision patterns occur when two vehicles turn left from the minor streets at the same time. Because of the offset nature of the intersection, these vehicles must turn towards, and to the right of each other in order to complete their turns. This is illustrated in Diagram 4b in Attachment 4, for Conflict Point C3.
- Unnecessary stops may also occur when vehicles turn left from the minor street onto the major street and find themselves facing a red signal indication. This red indication is for the major through street traffic however some minor street vehicles will stop unnecessarily creating the potential for rear end type collisions. This is illustrated in Diagram 4c in Attachment 4, for Conflict Points C4 and C5.
- The potential for pedestrian related conflicts are heightened. This occurs when vehicles conducting left turns from a minor street have sufficient distance to accelerate to normal operating speed before encountering the pedestrian crosswalk on the outbound approach of the intersection. This is illustrated in Diagram 4d in Attachment 4, for Conflict Points C6 and C7. In this situation the left turning vehicle from the minor street would be in conflict with pedestrians as if it had travelled through a red signal indication on the major street. In reality both the left turning vehicle and pedestrian had proceeded on a green/walk signal indication.

Over the past few years, numerous operational reviews have been conducted at the intersection of Bathurst Street and Fairlawn Avenue/Prince Charles Drive to improve traffic operations related to the above operational characteristics. Additional warning signs have been installed and traffic signal hardware has been modified; however, pedestrians and motorists continue to experience operational conflicts that are typical of a far right offset intersection controlled by traffic signals.

A review of the Toronto Police Service collision records over a five year period ending December 31, 2008 revealed a total of 18 collisions had occurred at this intersection. Of these collisions, three were attributed to left turning vehicles from the minor streets within the intersection. There were no pedestrian incidents recorded during the above noted review period.

In view of the resident's persistent safety concerns and collision history at this intersection, three options were reviewed, as follows:

- Removal of one approach from the signalized intersection.
- Conversion of one side street to operate one way away from the intersection
- Implementation of a three phase operation.

Removal of Approach from Intersection

Consideration was given to the removal of one approach, namely the side street with the lesser volume of traffic, from the signalized intersection. This would create a 'T-type' intersection controlled by a 'Stop' sign. The other side street would remain controlled by the traffic signals in a separate 'T-type' signalized intersection. At this particular location, Prince Charles Drive would be removed from the traffic control signals and replaced with a 'Stop' sign control. The south pedestrian crosswalk, south of Prince Charles Drive, would be relocated to a location between Fairlawn Avenue and Prince Charles Drive.

The advantage of this option is that it removes all concerns associated with offset intersections. However, due to safety concerns and the proximity to a signalized intersection, eastbound left turns to Bathurst Street and "through" movements to Fairlawn Avenue from Prince Charles Drive would have to be prohibited at all times. Therefore, eastbound motorists would likely be diverted to adjacent neighbourhood streets such as Ranee Avenue and Saranac Boulevard, which are controlled by traffic signals at Bathurst Street.

Implement One Way Street

Consideration was given to converting one side street to operate one way away from the intersection. The side street with the lowest traffic volume, Prince Charles Drive, could be made to operate in the westbound direction, west of Bathurst Street. The advantage of this option is that it would eliminate the confusion over the right-of-way for side street motorists. However, this option would inconvenience residents on Prince Charles Drive.

Also, eastbound motorists destined to Bathurst Street would be diverted to adjacent neighbourhood streets in the area. This option would also not eliminate the concern about the conflicts with pedestrians or side street motorists seeing the north/south red signal indications when they are within the intersection.

Accordingly, it should be noted that neither of the above noted two options adequately addresses the operational difficulties for both pedestrian and motorists and therefore, are not recommended to be implemented. As such Staff has undertaken a review of the feasibility of installing a three phase operation.

Three Phase Operation

During this type of operation, the north/south signal phasing would be retained, but eastbound and westbound signal phases would operate independent of each other. The advantage of this three phase operation is that it completely separates eastbound and westbound conflicts.

Both the eastbound approach on Prince Charles Drive and the westbound approach on Fairlawn Avenue were analyzed to determine the appropriate traffic signal phase to serve the east west pedestrian crossings and location of crosswalks. The analysis determined that Fairlawn Avenue has a higher demand for turning vehicles than Prince Charles Drive. Therefore, if the east west pedestrian crossings were served in conjunction with the westbound movement, a longer green time for pedestrians would be available. Pedestrian crossing locations are therefore proposed to be on the north and south sides of Fairlawn Avenue and the south side pedestrian crossing at Prince Charles Drive will be removed.

With the above phasing and pedestrian crossing changes, there will still exist a potential for continued right-of-way confusion and collisions between northbound and southbound vehicles making a right turn on a red signal and vehicles conducting through movements from the minor streets during a green indication. Therefore, in order to reduce this potential, the northbound and southbound "Right Turn on Red" movements must be prohibited. In addition, given that the existing pavement width on Fairlawn Avenue and Prince Charles Drive is wider than the standard 8.5 metres, we will be implementing a pavement marking modification, to accommodate two lanes of traffic per approach, with the curb lane to be designated as a right turn lane while the median lane will operate as a through and left turn lane.

The implementation of the three phase signal operation, no right turn on red prohibition and lane designations, will greatly improve the overall safety of both pedestrian and vehicular operation.

Councillor Howard Moscoe and Councillor Karen Stintz have been advised and indicated their support for the recommendations of this staff report.

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SIGNATURE

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ATTACHMENTS

- Attachment 1: Map – Bathurst St at Fairlawn Ave / Prince Charles Dr; Pedestrian Crossing Prohibitions and north and southbound right turn prohibitions when traffic signal shows red (*ny09045_map1*)
- Attachment 2: Intersection Plan – Bathurst St at Fairlawn Ave – Prince Charles Dr (*ny09045_map2*)
- Attachment 3: Far Right and Near Right Offset Intersections (*ny09045_map3*)
- Attachment 4: Problems Associated with Fully Signalized Far Right Offset Intersections (*ny09045_map4*)