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Item No. 6
Halifax Regional Council
March 10, 2015

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY: Original Signed by Director

Bob Bjerke, Chief Planner and Director, Planning & Development

DATE: December 19, 2014

SUBJECT: Bedford Highway Reversing Lanes

INFORMATION REPORT

ORIGIN

Halifax Regional Council meeting, June 11, 2013, item 11.2

LEGISLATIVE AUTHORITY

Halifax Regional Municipality Charter, Section 322 (1) The Council may design, lay out, open, expand, construct, maintain, improve, alter, repair, light, water, clean, and clear streets in the Municipality.

BACKGROUND

Halifax Regional Council meeting of June 11, 2013, item 11.2, a motion was passed requesting a staff report that reviews and considers the implementation of a reversing lane, including consideration of the use of a high occupancy vehicle lane on the Bedford Highway from the Kearney Lake Road to the Fairview Interchange during the morning and evening rush hour traffic. Although not included specifically in the motion, the discussion indicated an interest in examining changes to the intersection at Bayview Road to create a continuous outbound through lane not controlled by signalization.

DISCUSSION

Bedford Highway Reversing Lane

The council motion is applicable to the part of the Bedford Highway in the Rockingham area, between Kearney Lake Road and Fairview Overpass. This stretch of Bedford Highway carries significant volumes of commuter traffic in the morning and afternoon peak periods on weekdays.

The Bedford Highway has a four lane wide cross section, two lanes in each direction, between Fairview Overpass and Sherbrooke Drive. North of Sherbrooke Drive, Bedford Highway has two lanes outbound (northbound) and one lane inbound as far as Flamingo Drive. Just before Flamingo Drive the leftmost outbound lane becomes a mandatory left turn lane. Between Flamingo Drive and Tremont Drive, Bedford Highway has a single through lane in each direction plus a two-way left-turn lane. North of Tremont, Bedford Highway has a single inbound lane and two outbound lanes. The leftmost outbound lane becomes a mandatory left turn lane as it approaches Kearney Lake Road.

The basic geometry has three lanes from Sherbrooke Drive to Kearney Lake Road, with all of that length having only one inbound lane. Given that inbound flows are notably higher in the mornings and outbound flows in the afternoon, a suggestion to make the centre lane reversible, inbound in the morning and outbound in the afternoon is understandable. Guidelines[1] suggest that the ratio of peak direction flow to off-peak direction flow should be 2:1 to 3:1 for effective application of reversing lanes. The table below shows that the directional split of flows on the Bedford Highway is less than 2:1.

Location on Bedford Highway	AM Peak Hour Volume		Directional Ratio
	Inbound	Outbound	
North of Kearney Lake Road	922	493	1.87 : 1
North of Flamingo	914	484	1.89 : 1
North of Bayview	1175	686	1.71 : 1

Bedford Highway through Rockingham is located close to the Bedford Basin. Thus there is a limited amount of development on the east (water) side. It follows then there is a relatively small number of inbound left turns to this land use. On the west side of Bedford Highway there is significant development: Mount Saint Vincent University and several subdivisions with public roadways (Melody Drive, Flamingo Drive and several others). Resulting from this west-side development there are significant numbers of left turns that must be made from the outbound traffic. This unbalance in land development adjacent to Bedford Highway is why the existing set-up, with two lanes outbound and one lane inbound works as well as it does, particularly in the afternoon.

Computer modelling of the Bedford Highway shows that reversing the center lane in the morning to provide two inbound lanes and one outbound lane will substantially reduce delays in this immediate area for inbound traffic. It will result, however, in significant increases in delay for outbound traffic since traffic queuing to turn left will block through traffic.

Furthermore, while inbound delay is reduced in the immediate area, the increased throughput of traffic results in added delay downstream where no changes are made to the lane configurations. The table below illustrates those changes in delay.

Intersection	Change in Delay (sec/veh) With Reversing Lane
Bedford Hwy @ Flamingo	-125
Bedford Hwy @ Bayview	+219
Bedford Hwy @ Windsor	+123

What this analysis demonstrates is that the limited inbound capacity regulates the amount of traffic entering the Fairview Interchange area so that it closely match its capacity. Adding an additional lane of inbound capacity and essentially doubling the flow rate overwhelms the capacity of the downstream intersections. Another way to look at it is currently an inbound vehicle may wait two lights to get through the signals at Flamingo and another two lights to get through the Fairview Interchange. With the reversing lane, the wait at Flamingo may disappear, but the wait at the Fairview Interchange (or Joseph Howe Drive for vehicles that exit there) is expected to increase to a four light wait.

A national guideline[1] suggests that reversible lanes should not be used on arterial streets unless there is limited demand for turning. Reversible lanes currently employed within Halifax are all on roadway or bridge sections with very limited turning or no turning movements. This section of the Bedford Highway has significant volumes of turning traffic throughout its length making it less appropriate for a reversing lane.

High Occupancy Vehicle Lanes

High occupancy vehicle (HOV) lanes are typically used on highways and freeways where the leftmost lane is reserved for HOVs. This configuration allows HOWs to place themselves in the leftmost lane for through travel, then migrate to the rightmost lane to exit. This does not work as well on surface streets with frequent driveways and cross-street intersections, where vehicles need to position themselves in a particular lane to make a needed turning movement. If a lane is reserved for HOVs, it will interfere with the need of non-HOVs to position themselves properly to make a turn.

Bayview Road and Bedford Highway Intersection

Bayview Road intersects Bedford Highway as a T intersection from the west side. Inbound trips from Bedford Highway are thus right turns, while outbound Bedford Highway turns to Bayview are left turns. There is some pedestrian volume crossing Bedford Highway to and from a bus stop on the outbound side of Bedford Highway but numbers are small. These pedestrians are served by a walk signal to cross Bedford Highway when they actuate a pedestrian push button on the north side of the intersection.

At T intersections it is possible to arrange the traffic signals and road geometry to allow through traffic on the lane crossing the top of the T to have to stop only for pedestrians crossing the full road width while left turn drivers from the side road can be accommodated by a signal which stops the left through lane on the top of the T. Illustrations of some such intersections are shown in Attachment A. Note that in the examples shown in Attachment A no pedestrian crosswalks are shown. These can be added to provide safe crossings of the main roadway when needed. In all cases, physical separation must used to keep left turning vehicles from conflicting with the through movement. A painted line is insufficient to keep left turning vehicles from making a wide left turning since allowing other movements during that turning phase is not normal and would be unexpected.

Implementing such an intersection control at the Bayview/Bedford Highway intersection is physically challenging and would have little benefit. The physical challenge is in adding the needed lane separation given the constraints of the adjacent CN rail yard and retaining wall. The limited benefit is due to the fact that benefits are gained only during the time there is a left turn phase coming off Bayview Road with no pedestrians present. The frequency of those signal phases is relatively low.

[1] Guidelines for the Planning, Design, Operation and Evaluation of Reversible Lane Systems, Transportation Association of Canada, 2010.

FINANCIAL IMPLICATIONS

There are no financial implications to this report.

COMMUNITY ENGAGEMENT

No community engagement has been undertaken in the preparation of this report.

ATTACHMENTS

Attachment A: Examples of Special T Intersections

A copy of this report can be obtained online at http://www.halifax.ca/council/agendasc/cagenda.php then choose the appropriate meeting date, or by contacting the Office of the Municipal Clerk at 902.490.4210, or Fax 902.490.4208.

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Original Signed

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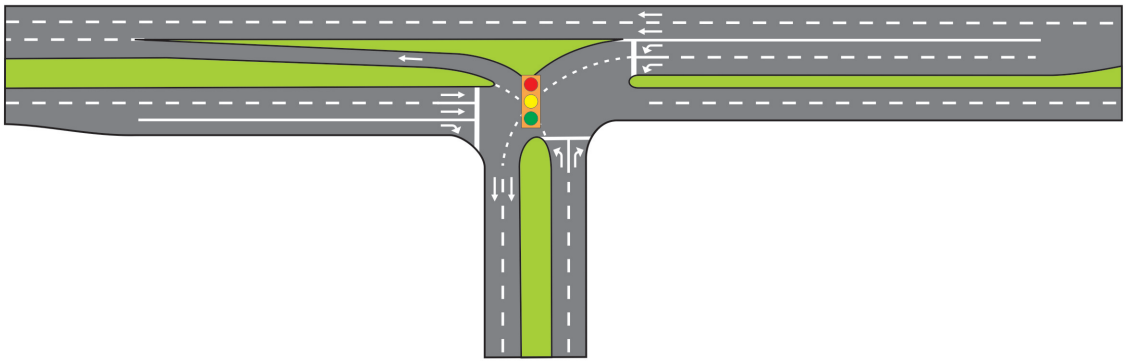
APPENDIX A

EXAMPLES OF SPECIAL "T" INTERSECTIONS



Typical layout (Source: University of Maryland)

This example intersection near Durango, CO uses delineator posts to separate the left turning traffic from through traffic.

APPENDIX A

EXAMPLES OF SPECIAL "T" INTERSECTIONS

In this example intersection in Saskatoon, SK uses a large concrete island and a painted cross-hatched area to create a separation.