

HALIFAX

P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No. 15.1.2
Halifax Regional Council
December 3, 2019

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY: Original Signed by 
Jacques Dubé, Chief Administrative Officer

DATE: September 24, 2019

SUBJECT: Lancaster – Woodland Intersection

ORIGIN

Item 14.7.3 of the May 22, 2018 session of Halifax Regional Council.

MOVED by Councillor Austin, seconded by Councillor Nicoll THAT Halifax Regional Council direct the Chief Administrative Officer to work with staff of the Nova Scotia Department of Transportation and Infrastructure to:

1. Develop a functional plan for improvements (including consideration of a roundabout) to the intersection of Woodland Avenue, Highway 118, Lancaster Drive and Micmac Boulevard;
2. Transfer a portion of provincial Highway 118 southwest of the intersection to Halifax Regional Municipality; and
3. Report back with recommendations to Halifax Regional Council.

MOTION PUT AND PASSED

LEGISLATIVE AUTHORITY

HRM Charter, Part XII, subsection 322(1), "The Council may design, lay out, open, expand, construct, maintain, improve, alter, repair, light, water, clean, and clear streets in the Municipality."

RECOMMENDATION

It is recommended that Halifax Regional Council direct the CAO to:

1. Work with NSTIR to move forward with implementation of proposed countermeasure 1, "Enhance Existing Signage" as an immediate first step to improve operations and safety conditions at the Lancaster Drive / Woodland Avenue / Micmac Boulevard / Highway 118 intersection;
2. Work with NSTIR to move forward with a project to convert the Lancaster Drive / Woodland Avenue / Micmac Boulevard / Highway 118 intersection to a roundabout as identified in proposed countermeasure 6, including identification of potential cost sharing; and
3. Work with NSTIR to transfer the portion of provincial Highway 118 southwest of the Lancaster Drive / Woodland Avenue intersection to HRM as part of the roundabout conversion project.

BACKGROUND

The Lancaster Drive / Woodland Avenue / Micmac Boulevard / Highway 118 intersection is located near the end of Highway 118, an approximately 16 kilometre long highway which begins at Highway 102 in Fall River as a 4-lane divided freeway and transitions to a two-lane city street (Woodland Avenue) about 400 metres south of the Lancaster Drive – Micmac Boulevard intersection. HRM owns the traffic signals and Lancaster Drive / Micmac Boulevard legs of the intersection while NSTIR owns the Highway 118 and Woodland Avenue legs of the intersection.

Approximately 30,000 vehicles per day pass through this intersection. It provides the main access to the Lancaster Ridge subdivision, one of two main entrances into Micmac Mall and serves as one of the main routes for traffic travelling between Downtown Dartmouth / Halifax and all points northeast.

The Highway 118 and Woodland Avenue legs of the intersection each have two through lanes and separate left and right turn lanes. The Lancaster Drive and Micmac Boulevard legs each have single through lanes with separate left and right turn lanes. The right turn lanes on all approaches are channelized with wide radius islands. Signal operation at the intersection provides an advanced (protected) left-turn phase for vehicles turning from Highway 118 / Woodland Avenue onto Lancaster Drive / Micmac Boulevard, while all movements from Lancaster Drive / Micmac Boulevard operate on a single permitted phase.

DISCUSSION

HRM partnered with NSTIR to engage a consultant (exp Services) to undertake an operational and safety review of the intersection with an aim to identifying potential modifications to improve safety and traffic flow. The scope of the study included:

- Review of available background information (traffic volume, signal timing, collision history, etc.);
- Consultation with key stakeholders from HRM, NSTIR and Police to identify existing areas of concern and constraints;
- Completion of an operational level of service analysis on the existing intersection;
- Conducting an in-service safety review for both day time and night time conditions;
- Review of existing roadway geometry and current design guidelines;
- Identification of potential countermeasures to improve safety and traffic flow;
- Establishing order of magnitude cost estimates for potential countermeasures.

The results of the operational level of service analysis showed that the intersection is working well during the am peak with no operational deficiencies. However, during the pm peak, results indicated that the intersection is experiencing some operational difficulties that require improvements to accommodate existing demand. In particular, it was found that the problematic movements include:

- Left-turn movements from Lancaster Drive onto Highway 118;
- Left-turn movements from Highway 118 onto Micmac Boulevard;
- Highway 118 northbound through movement

Available collision data was provided by NSTIR for the period of January 1, 2014 to December 31, 2018. The collision data showed a total of 49 reported collisions in the immediate vicinity of the intersection and included 36 property damage only collisions and 13 injury collisions. There were no fatal collisions identified within the identified period. The collision pattern showed that the majority were associated with the southbound Highway 118 and northbound Woodland Avenue approaches where a vehicle either turned left across on-coming traffic or were rear-ended by another vehicle. These collision types are somewhat common at signalized intersections where through traffic is travelling at higher speeds and sight lines may not be adequate. Table 1 provides a summary of the collisions at this intersection.

Table 1 – Intersection Collision Summary (2014 – 2018)

Total Collisions	49
Property Damage Only	36
Injuries	13
Fatalities	0
Left-Turn Collisions	5 (NB), 9 (SB), 2 (EB), 2 (WB)
Rear-End Collisions	16
Other Configurations	15
Nighttime Collisions	13
Winter Month Collisions	28

**Taken from exp report "Operational & Safety Review for Highway 118 & Lancaster Drive (2019-04-25)*

As part of the in-service safety review, the consultant visited the site to gather information related to sight lines, signage, warning lights and pavement markings. Site visits were conducted on February 14th and 15th, 2019 and included morning and evening peak hours, daytime off peak hours and nighttime. In addition to the information related to the physical characteristics, the consultant also made observations related to traffic control, vehicle / pedestrian interaction and the overall operation of the intersection.

Based on the safety and design reviews, the consultant compiled a list of observed issues and potential improvements that considered the collision frequencies and patterns identified in the collision data as well as other specific issues identified through the site reviews. A summary of the results of the safety and design reviews along with potential improvements is included in Attachment 1.

Flowing from the observations and potential solutions, the study identified and evaluated several options / countermeasures to provide for incremental improvement to operations and safety at the intersection. Short-term, low cost solutions as well as longer term, higher cost alternatives were provided, and include:

1. Enhance Existing Signage

This would involve the installation of new signage as well as the replacement or adjustment to existing signage at the intersection. This option would provide a positive impact on safety by increasing visibility and awareness of objects and pedestrians, ensure consistency with best practice guidelines for sign placement and provide enhanced guidance for both pedestrians and motorists. **This option is recommended.**

2. Implement Protected Only Left-Turns From Highway 118

This option would involve adjustments to the existing traffic signals (timing / phasing / equipment) to only allow left turns from Highway 118 (NB and SB) to be done on a protected left turn signal phase. Implementing protected only left turns has the potential to improve intersection safety by reducing the number of conflicts between turning vehicles and opposing traffic. Although this option does have the potential to improve intersection safety for specific movements, it does not address existing capacity issues and will result in degraded performance for some movements. This option also has the potential to create extended queuing back onto the Highway 118 approach which could result in increased risk of high-speed rear-end collisions. **This option is not recommended.**

3. Install Southbound Dual Left on Highway 118

This option would involve widening the southbound approach on Highway 118 to provide a second left turn lane as well as widening on Micmac Boulevard to provide a second receiving lane. As this option would add capacity to the intersection, a protected / permitted left turn phase could also be added to the Lancaster Drive approach to further improve operations. This option would provide some benefit to operations based on existing traffic, but any future increases in traffic would result in operational issues. There is also expected to only be limited impact to improving safety. **Given the high capital cost and limited benefit, this option is not considered to be a viable alternative.**

4. Install Smart Right-Turn Channels on NB and EB Approaches

This option involves modification of the existing right-turn slip lanes on the Woodland Avenue and Lancaster Drive approaches. Smart right-turn channels have the potential to positively impact safety by improving the angle of sight lines for right turning vehicles, improving sight lines at pedestrian crossings and promoting slower vehicle speeds. This option is expected to have a positive impact in reducing the likelihood of rear-end collisions in the right-turn slip lanes. A sketch of this concept is included in Attachment 2. **This option would address only a single collision type (rear end) and so has limited potential on its own to address overall safety at the intersection.**

5. Install New Southbound Loop-Ramp on Highway 118

This option would involve the construction of a new loop ramp from Highway 118 to eliminate the existing heavy southbound left turn movement at the intersection. Instead of turning left at the intersection, vehicles would proceed straight through, take the ramp, turn right onto Lancaster Drive and then proceed straight through the intersection to Micmac Boulevard. Smart right-turn channels would be constructed along with the ramp and signal operation would be modified to provide a protected / permitted left turn phase for Lancaster Drive. Anticipated safety benefits would come from the removal of the heavy left turn movement from Highway 118. There are some potential operational considerations for the new intersection of the ramp on Lancaster Drive and construction would require a significant amount of additional right of way. A sketch of this concept is included in Attachment 2. **Due to significant land requirements and additional operational considerations, this option is not recommended.**

6. Convert to a Roundabout

The final improvement option put forward by the consultant involves converting the existing signalized intersection into a roundabout. This option has the potential to provide a positive impact to safety as roundabouts tend to reduce vehicle speeds, leading to less severe collisions, as well as reducing the potential for head-on and right angle collisions. There are also benefits for pedestrians related to the slower vehicle operating speeds and shorter crossings. A sketch of this concept is included in Attachment 2. **This option would provide the most benefit related to improvement to safety and operations. Initial discussions with NSTIR indicate they are supportive of this option as it relates to their facilities as well. Based on the benefits and acceptance from NSTIR, this option is recommended.**

Each option identified above provides differing levels of potential impact related to intersection operations, safety and cost. A side-by-side comparison of the six options, based on order of magnitude cost, traffic impacts, safety impacts and other considerations is provided in Attachment 3.

The findings presented by the consultant are intended to provide HRM and NSTIR with information to assist in making an informed decision about potential improvements, based on each organization's own prioritization of operational, safety, and financial criteria.

Regarding the transfer of a portion of the provincial Highway 118 southeast of the Lancaster / Woodland intersection, initial discussions with NSITR have identified the potential to include a transfer of this portion of roadway to HRM as part of the agreement for conversion of the existing signalized intersection to a roundabout.

FINANCIAL IMPLICATIONS

There are no immediate financial implications associated with the recommendations provided in this report. Work associated with implementation of the "Enhance Existing Signage" countermeasure option can be accommodated within the existing operating budget.

The order of magnitude financial requirement associated with conversion of the existing signalized intersection to a roundabout, as outlined in the option comparison in Attachment 3, was estimated to be in the range of \$3.5 million. Opportunity for cost sharing will be investigated as part of on-going discussions with NSTIR. Once cost sharing details are determined, any funding required by HRM for this project would need to be identified in future capital budgets.

RISK CONSIDERATION

There are no significant risks associated with the recommendations put forward in this report.

COMMUNITY ENGAGEMENT

Community engagement was not required as part of this report as it deals with assessments conducted in response to public feedback surrounding the operations of the subject intersection.

ENVIRONMENTAL IMPLICATIONS

There were no environmental implications identified.

ALTERNATIVES

Council could direct the CAO to investigate one, or a combination of, the other identified improvement alternatives for the intersection, however this is not recommended as the option to convert the intersection to a roundabout provides the most benefit from a safety and operations perspective.

ATTACHMENTS

Attachment 1 – Summary of Existing Issues and Potential Solutions

Attachment 2 – Concept Sketches

Attachment 3 – Comparison of Improvement Concepts

A copy of this report can be obtained online at halifax.ca or by contacting the Office of the Municipal Clerk at 902.490.4210.

Report Prepared by: Roddy MacIntyre, P.Eng., Senior Traffic Operations Engineer, 902.490.8425

Summary of Existing Issues and Potential Solutions

ID	Observation	Potential Improvements
1	Both the SB and EB left turn movements operate at LOS F during the PM peak period, resulting in significant delays. Drivers making these movements tend to be more aggressive in accepting gaps during the permitted green signal phase.	<ul style="list-style-type: none"> - Adjust signals timings / phasing. - Add dual left turns on SB and EB approaches. - Change intersection configuration to increase available capacity.
2	Offset NB and SB left turn lanes on Highway 118 results in reduced sight distances.	<ul style="list-style-type: none"> - Provide protected only left signal phase for NB and SB approaches (Note: this may require additional turn lanes).
3	Geometry of NB right slip lane promotes high speeds. Visibility of crosswalk and oncoming traffic lane reduced due to horizontal geometry and trees located within the island.	<ul style="list-style-type: none"> - Replace existing slip lane with smart right turn channel.
4	No object marker sign on beginning of median north of intersection.	<ul style="list-style-type: none"> - Install object marker.
5	Object markers and Double Arrow signs (WA-17) are missing on NE and SW corner islands.	<ul style="list-style-type: none"> - Install missing signage
6	Yield signs exists at the end of the WB right turn slip lane despite the presence of an exclusive acceleration lane.	<ul style="list-style-type: none"> - Replace Yield sign with Added Lane sign.
7	Viewing angle at the end of SB right slip lane onto Lancaster Drive is low.	<ul style="list-style-type: none"> - Replace slip lane with smart channel.
8	Sight distance for crosswalk on EB right slip lane was measured to be approximately 40 m, which only provides adequate Stopping Sight Distance for a 33 km/hr design speed.	<ul style="list-style-type: none"> - Reconsider geometry at slip ramp.
9	Missing yield sign on EB right turn slip lane.	<ul style="list-style-type: none"> - Install yield sign.
10	Missing pedestrian sign on EB right turn slip lane.	<ul style="list-style-type: none"> - Install pedestrian sign.
11	Crosswalk ramps not cleared of snow.	<ul style="list-style-type: none"> - Keep all pedestrian facilities free of snow and ice.
12	SB signal ahead sign hidden and located close to the intersection.	<ul style="list-style-type: none"> - Move signal ahead sign back to correct position
13	Primary vehicle traffic signal head placements outside 10 degree cone of vision (EB and SB approaches).	<ul style="list-style-type: none"> - Relocate signal head within 10 degree cone of vision.
14	Pedestrian button locations, curb drops and ramps for pedestrians and wheelchairs are inadequate based on best practices.	<ul style="list-style-type: none"> - Review and replace infrastructure where required.

**Adapted from exp report "Operational & Safety Review for Highway 118 & Lancaster Drive (2019-04-25)*

Concept Sketches

Concept Option 4 – Smart Right-Turn Channels



Concept Option 5 – Southbound Loop Ramp on Highway 118



Concept Option 6 – Roundabout



Comparison of Improvement Concepts

Option	Option 1 (Enhance Signage)	Option 2 (Protected Left Only)	Option 3 (Southbound Dual left)	Option 4 (Smart RT Channels)	Option 5 (Southbound Loop Ramp)	Option 6 (Roundabout)
Order of Magnitude Cost	< \$5,000	\$10,000	\$1,500,000 +	\$60,000	\$500,000	\$3,500,000
Traffic Impacts						
Delay / LOS	●	↓	↑	●	↑	↑
Queuing	●	↓	↑	●	↑	↑
Transit Priority	●	●	●	●	●	●
Safety Impacts						
Sightlines	↑	↑↑	↑↑	↑↑	↑	↑
Vehicle Speeds	↑	●	●	↑↑	↑	↑↑
Vehicle Conflicts	↑	↑↑	↑↑	↑↑	↑↑	↑↑
Pedestrian Safety	↑	●	↑	↑↑	●	↑↑
Intersection Visibility	↑	↑	↑	↑↑	↑	↑↑
Geometry	●	●	↑	↑↑	↑	↑↑
Other Impacts						
Property Acquisition	●	●	↓	↓	↓↓	↓↓
Access Management	●	●	●	●	↑↑	●
Way Finding	↑↑	↑↑	↑↑	↑↑	●	↑↑
Public Acceptance	↑↑	↑↑	↑↑	●	●	↑

Large positive impact
 Moderate positive impact
 ● Negligible impact
 Moderate Negative impact
 Large Negative impact

*Taken from exp report "Operational & Safety Review for Highway 118 & Lancaster Drive (2019-04-25)"