The Corporation of the
Town of Tecumseh

Public Works & Environmental Services

To: Mayor and Members of Council

From: Phil Bartnik, Director Public Works & Environmental Services

Date to Council: September 10, 2019

Report Number: PWES-2019-43

Subject: Tecumseh Road/Lacasse Boulevard Intersection Analysis
Traffic Analysis and Recommendations

Recommendations

It is recommended:

That Report No. PWES-2019-43 Tecumseh Road/Lacasse Boulevard Intersection Analysis – Traffic Analysis and Recommendations **be received**.

Background

Administration received a number of concerns respecting the traffic operation at the intersection of Tecumseh Road at Lacasse Boulevard i.e. lengthy queues and delays, especially regarding the westbound traffic flow.

In order to determine whether improvements to the geometric design of the roadway would alleviate the queue lengths and times for westbound traffic at said intersection, a traffic analysis would be required.

At the December 12, 2017 Regular Meeting of Council, Council approved recommendations of Report No. 57/17 titled “2018-2022 Public Works & Environmental Services Capital Works Plan” that authorized Administration to proceed with the 2018 capital works projects including the Tecumseh Road/Lacasse Boulevard Intersection Analysis (Motion: RCM-441/17).

Dillon Consulting Limited (Dillon) was retained to complete this project. The traffic analysis was undertaken to determine whether improvements to the geometric design of the roadway, including traffic signal improvements, would be warranted at this time.

Comments

On July 2, 2019, Dillon submitted the final report titled “Tecumseh Road/Lacasse Boulevard Intersection Analysis – Traffic Analysis and Recommendations” to the Town that outlined the results of the traffic analysis related to the existing traffic operations at the Tecumseh Road/Lacasse Boulevard intersection, including an evaluation of alternative solutions and recommendations.

Existing Intersection Configuration

The existing intersection configuration is illustrated in the figure below.

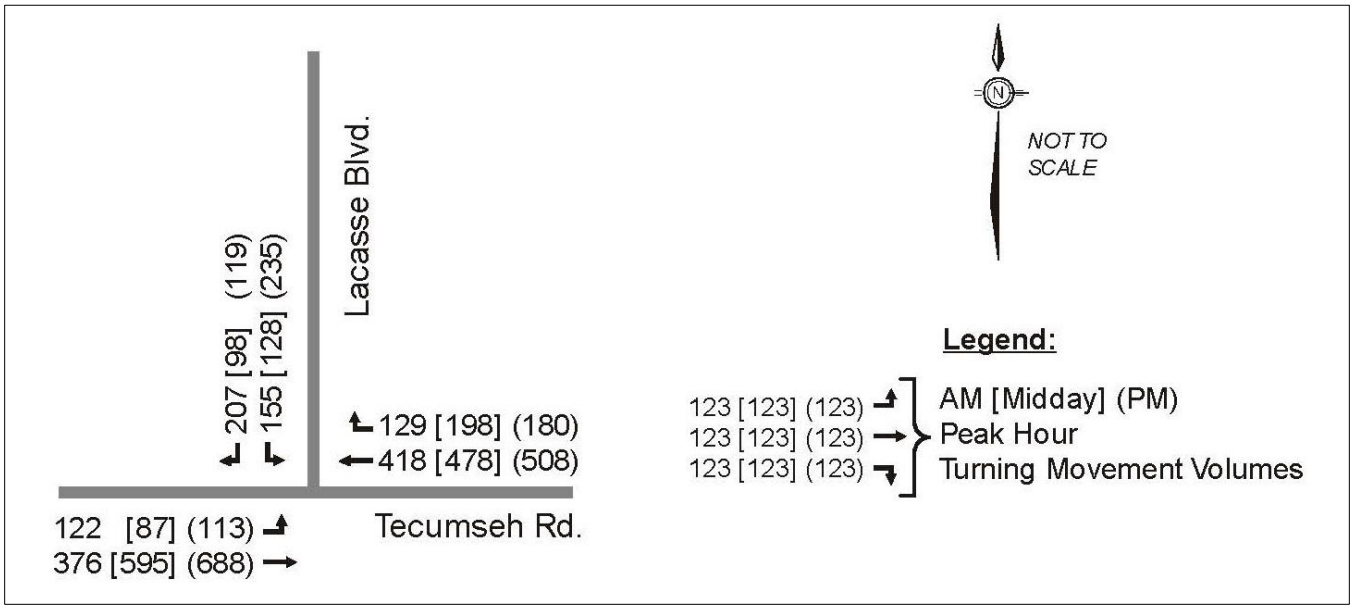
The existing pavement width east of the intersection is approximately 13.8 m and is comprised of the following elements:

- 1.5 m westbound bicycle land
- 3.75 m westbound through/right lane turn
- 3.3 m inside eastbound lane
- 4.0 m outside eastbound lane
- 1.25 m eastbound bicycle lane

Existing Traffic Volumes

On Thursday, April 26, 2018, traffic volumes were recorded by Dillon from 6:00 AM to 9:00 AM, 11:00 AM to 1:00 PM and 3:00 PM to 6:00 PM.

The existing peak hour traffic volumes on Tecumseh Road at Lacasse Boulevard are illustrated in the figure below.



Following the traffic counts conducted in April 2018, the traffic signal timings were adjusted in August 2018. This adjustment resulted in:

- an 18% reduction in the westbound queue length during the midday and PM peak hours;
- improved the overall level of service (LOS) from a LOS C to LOS B during the PM peak hour; and
- a minor reduction in delay during the AM and PM peak hours.

LOS is a qualitative measure used to relay the quality of motor vehicle traffic service. LOS is used to analyze roadways and intersections by categorizing traffic flow and assigning quality levels of traffic based on performance measure like vehicle speed, density, congestion, etc.

The highest possible rating is LOS ‘A’. LOS ‘A’ to ‘D’ presents the acceptable operating conditions, while LOS ‘E’ reflects congested conditions and LOS ‘F’ reflects failure (i.e. long delay).

The table illustrated below outlines the intersection operations during the AM, midday and PM peak hours under both traffic timing scenarios (Scenario 1: April 2018 and Scenario 2: August 2018).

Movement	AM peak hour				Midday peak hour				PM peak hour			
	v/c	Delay (s/veh)	LOS	95th %ile queue (m)	v/c	Delay (s/veh)	LOS	95th %ile queue (m)	v/c	Delay (s/veh)	LOS	95th %ile queue (m)
Scenario 1: Original traffic signal timing plans (in effect during traffic survey)												
EB left	0.37	7.7	A	15	0.24	5.4	A	9	0.32	8.2	A	15
EB through	0.39	7.9	A	49	0.52	8.3	A	73	0.61	12.0	B	115
WB through	0.78	26.0	C	129	0.77	21.7	C	166	0.80	27.2	C	193
SB left	0.60	37.0	D	43	0.46	33.1	C	36	0.65	36.7	D	61
SB right	0.51	7.5	A	12	0.30	8.7	A	13	0.28	7.1	A	13
Overall	—	**18.1**	**B**	—	—	**15.9**	**B**	—	—	**20.3**	**C**	—
Scenario 2: Current traffic signal timing plans												
EB left	0.38	7.1	A	11	0.24	5.4	A	9	0.30	6.4	A	10
EB through	0.39	7.2	A	38	0.52	8.3	A	71	0.59	10.1	B	83
WB through	0.80	25.0	C	108	0.77	21.6	C	160	0.78	23.3	C	158
SB left	0.62	37.6	D	43	0.46	32.2	C	36	0.72	42.1	D	68
SB right	0.52	8.2	A	13	0.30	8.7	A	13	0.31	8.0	A	14
Overall	—	**17.6**	**B**	—	—	**15.8**	**B**	—	—	**18.7**	**B**	—

Typically, an individual movement at an intersection would be considered to be “critical” once it exceeds a volume capacity (v/c) ratio of 0.85 (or 1.00 for dedicated turn lanes), or once the level of service reaches LOS E or F, or once queues exceed the available storage length.

The westbound approach (on Tecumseh Road) experiences somewhat higher delays and a lower level of service than other movements; however, the levels of service are all below critical thresholds.

While the timing adjustments (from April to August 2018) did improve the intersection operations to some extent, the v/c ratios were not substantially impacted for the westbound approach.

Potential Alternatives

A number of alternative solutions were evaluated to determine whether there are opportunities to enhance traffic operations at the intersection of Tecumseh Road and Lacasse Boulevard:

1. Do Nothing

   The updated signal timings at the intersection have improved the queues and delays on both the westbound and eastbound approaches during the PM peak hour. As such, the level of service is not considered to be critical.

   Maintaining the intersection “as is” could also be considered to be a strategic measure that governs how much traffic enters the (Tecumseh Road) Community Improvement Plan (CIP) area displacing the queues and/or congestion on Tecumseh Road from a more sensitive location at the Lesperance Road intersection to a less sensitive location at the Lacasse intersection. Furthermore, this option also allows for less queuing over the VIA Rail tracks.

2. Traffic Signal Operational Improvements

   Consideration was also given to further refine the traffic signal operations to increase capacity and reduce delays on the westbound approach:

   - Reduction in the gap parameters so that the signal is more responsive to gaps on the minor movements (southbound; eastbound left turn).

   - Adjustments to the signal timings, either to provide proportionally more time to the east/west movements, and/or shortening the cycle to increase turnover. The effectiveness of these types of adjustments may depend on timing pedestrian clearance intervals.

   - Replacement of the detector in the eastbound left turn lane. The existing detector is at the stop bar, so it calls the left turn phase if there is a single vehicle waiting (at any time of day). This could be replaced with a setback detector that only calls the left turn phase if three or more vehicles are waiting. Normally this type of modification would be recommended as a design that only calls the left turn arrow when it is needed to mitigate left turn capacity constraints. However, in this case it might be preferable to prioritize the left turn, at the expense of a minor reduction in overall efficiency, because of the proximity to the level rail crossing. This change would also require a realignment of the lanes (pavement marking modifications) to gain additional storage length in the left turn lane. This adjustment would also need to be compatible with any Tecumseh Road Streetscape street layouts.

   Dillon anticipates that the above-noted operational improvements would have a relatively minor impact on the traffic operations and would not substantially change the overall results.

3. Roadway Modifications

   In order to achieve a more substantial increase in capacity and a more substantial reduction in queues and delays on the westbound approach, a right lane would be required.

   Several means of accommodating a westbound right turn lane were identified. All alternatives include the following two measures: (1) Eastbound lane reduction east of the intersection and (2) Southerly lane shift of eastbound left turn lane

   The following roadway modification were evaluated to accommodate a right lane for westbound traffic, and are depicted visually on pages 7 to 10 on Attachment No.1:

   (a) Alternative 1 - Road Widening on North Side

      - Road widening by 1.5 m to the north, allowing for a right turn lane and a separate bicycle lane.

- Advantages: allow a right turn lane to be provided without affecting any existing vehicular bicycle lanes.

- Disadvantages: widening of road results in higher construction cost; would require consideration for signal reconfiguration; would impact existing trees and landscaping; potential to have property impacts.

- Estimated cost: $390,000

(b) Alternative 2 - Lane Shift through Intersection

- No pavement widening. Right turn lane and separate bicycle lane.

- Advantages: allow a right turn lane to be provided while maintaining the westbound bicycle lane to the intersection, without requiring substantial construction and without impacting existing landscaping. No road reconstruction required. The modifications would be based around pavement marking adjustments.

- Disadvantages: westbound lane would no longer be aligned when crossing Lacasse Boulevard. There would be a lane shift of 1.5 metres to the right when traveling westbound. While the tapered angle would be reasonable, achieving the lane shift through this intersection would be considered undesirable as it would introduce conflicts with eastbound left turning vehicles at the center of the intersection.

- Estimated cost: $50,000

(c) Alternative 3 - Shared Westbound Right Turn/Bicycle Lane

- No pavement widening. Shared right turn and bicycle lane.

- Advantages: allows a right turn lane to be provided without requiring substantial construction and without requiring a westbound lane shift through the intersection. While cyclists would need to ride in mixed traffic, they would be in a lower-volume lane and could be directed/positioned on the correct side of right-turning traffic.

- Disadvantages: cyclists no longer have dedicated lane for the last 65 meters before the intersection and would need to ride in mixed traffic over that distance. If a shorter right turn lane is provided to reduce cyclist exposure, the traffic benefits would be somewhat lower than Alternatives 1 and 2.

- Estimated cost: $50,000

(d) Alternative 4 - Wide Westbound Lane

- No pavement widening. Wide westbound lane with a separate bicycle lane.
- Advantages: the westbound bicycle lane would continue to extend to the intersection. Sufficient lane width would allow right turning vehicles to bypass through traffic.
- Disadvantages: Cyclists would not be positioned on the correct side of right turning traffic, leading to potential for right turns to be made across path of cyclists. If the wider westbound lane extends over a shorter distance to reduce cyclist exposure, the traffic benefits would be reduced. The traffic benefits may also be lower than Alternative 3 since, during the green signal, right turning vehicles would be more likely to affect through traffic using the same lane.
- Estimated cost: $50,000

Truck Turning Path Assessments

During the April 2018 vehicle count, only 17 trucks of varying sizes were observed making the westbound right turn movement from Tecumseh Road to Lacasse Boulevard.

Vehicle turning path assessments were conducted to verify the space required for a truck to make a westbound right turn from Tecumseh Road to Lacasse Boulevard. The turning path assessments were based on Alternative 3, which maintains the curbs in their existing locations but realigns the lanes on the westbound approach. Turning path assessments were undertaken using AutoTURN software.

The findings from the assessment are as follows:

- A single unit truck would be able to start a westbound right turn form the right turn lane and complete the turn without crossing the curb or encroaching on the opposing southbound lane.
- A small tractor-trailer would be able to start a westbound right turn from the right turn lane and complete the turn without crossing the curb, but would encroach on the southbound left turn lane.
- Larger tractor-trailers would need to start their turn from the westbound through lanes and would also need to encroach on the southbound left turn lane (on Lacasse Boulevard).

Tractor-trailers already require a similar level of encroachment under current conditions. As such, the design alternatives listed above would not be more restrictive than the

existing configuration with respect to available pavement for turning movements, and accommodates the vehicles most commonly observed at the intersection.

Recommendations

Based on Dillon's analysis, the intersection at Tecumseh Road and Lacasse Boulevard is considered to be acceptable:

- Traffic volumes are far enough below capacity that the intersection turning movements would not normally be considered to be critical; and
- Levels of service are reasonable.

Additional traffic signal operational improvements, further to the updated signal timings completed in August 2018, are anticipated to be relatively minor and would not substantially alter the existing conditions at this intersection.

Roadway geometric improvements could result in varying levels of improvements to traffic operations. Given that the intersection is considered to be operating at an acceptable level of service at this time, implementing roadway geometric modifications is not considered warranted.

Accordingly, Dillon recommends the Town "Do Nothing" at this time and re-evaluate the traffic operations at this intersection in five years, or when a change in traffic conditions becomes apparent.

Consultations

Dillon Consulting Limited

Financial Implications

There are no financial implications arising from this report.

Link to Strategic Priorities

Applicable	2019-22 Strategic Priorities
☐	Make the Town of Tecumseh an even better place to live, work and invest through a shared vision for our residents and newcomers.
☒	Ensure that Tecumseh's current and future growth is built upon the principles of sustainability and strategic decision-making.
☐	Integrate the principles of health and wellness into all of Tecumseh's plans and priorities.
☒	Steward the Town's "continuous improvement" approach to municipal service delivery to residents and businesses.
☐	Demonstrate the Town's leadership role in the community by promoting good governance and community engagement, by bringing together organizations serving the Town and the region to pursue common goals.

Communications

Not applicable ☒

Website ☐ Social Media ☐ News Release ☐ Local Newspaper ☐

This report has been reviewed by Senior Administration as indicated below and recommended for submission by the Chief Administrative Officer.

Prepared by:

Cheryl Curran, BES
Clerk I Administrative Clerk

Reviewed by:

Kirby McArdle, P.Eng.
Manager Roads & Fleet

Reviewed by:

Phil Bartnik, P.Eng.
Director Public Works & Environmental Services

Recommended by:

Margaret Misek-Evans, MCIP, RPP
Chief Administrative Officer

Attachment Number	**Attachment Name**
1	Tecumseh Road/Lacasse Boulevard Intersection Analysis, Traffic Analysis and Recommendations, July 2, 2019, Dillon Consulting