THE CITY OF WINDSOR ONTARIO, CANADA

Council Report: S 116/2024

Subject: Response to CQ 7-2024 - Converting Downtown One-Way Streets to Two-Way Streets – Ward 3

Reference:

Date to Council: November 27, 2024
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Public Works - Operations
Report Date: September 9, 2024
Clerk's File #: ST2024

To: Mayor and Members of City Council

Recommendation:

That report "Response to CQ 7-2024 - Converting Downtown One-Way Streets to Two-Way Streets – Ward 3" **BE RECEIVED** for information.

Executive summary:

N/A

Background:

On Monday, February 12, 2024, Councillor Agostino requested the following Council Question:

CQ 7-2024:

> *Asks that Administration look into changing some one-way streets downtown back into two-way streets. This has the potential to make our roads safer and bring more business downtown on Pellissier and McDougall, for example.*

This report is provided in response to CQ 7-2024.

Some municipalities with a one-way traffic operation network are reviewing a two-way traffic system to determine whether consideration should be given to conversions. The recent trend has been to convert one-way street systems back to two-way operations as a means of calming traffic, primarily to improve the quality of life in residential areas as part of overall downtown revitalizations. The creation of one-way streets originates from when the mission was to move traffic in and out of downtown employment centers as quickly as possible. Therefore, road networks were reconstructed to accommodate a

mass amount of automobile traffic. These reconstructions came in the form of highways, thruways, and one-way streets.

This report provides a comparison of one-way versus two-way street systems for downtowns and presents an evaluation methodology for considering two-way conversion. The north/south one-way streets in the downtown area of Windsor are Janette Avenue, Bruce Avenue, Dougall Avenue, Victoria Avenue, Pelissier Street, Glengarry Avenue, and Aylmer Avenue, and the east/west one-way streets are Pitt Street, and Chatham Street.

Overall, the desired outcome of converting Windsor's one-way streets to two-way, is to improve livability within the community; the outcome must be intended to result in a safer, more active environment and provide for a more livable local community. Opinions and studies on the feasibility and necessity of two-way conversions vary widely, as demonstrated in the Discussion section.

Discussion:

The review for potential conversion(s) must consider various criteria impacts to ensure one road user or factor is not being negatively impacted due to the conversion. In other words, the conversion to a two-way system should not prioritize some factors and sacrifice others. For example, a two-way conversion should not be implemented to prioritize vehicular transportation and businesses while not considering the impacts on other road users such as pedestrians and cyclists. The ultimate decision on whether to convert all one-way streets downtown to two-way streets will depend on the benefits of conversion for all road users and if there are many positive effects on the following criteria listed below.

Capacity, Speed, Travel Time and Distance, Downtown Visitors

Compared to two-ways, one-way systems can accommodate 10% to 20% more traffic on the street, which can translate into fewer lanes and fewer through streets within a one-way grid system, or alternatively, the option to use any surplus capacity/space for other purposes (i.e., dedicated parking lanes, bicycle lanes, wider sidewalks). Furthermore, with one-way streets, congestion and delay are reduced for all modes of transportation, including pedestrians, vehicles and transit, since the signal timing cycle length can be much shorter and the additional signal phases to accommodate left-turn movements are unnecessary.

However, one-way streets have been observed to have higher speeds compared to two-way streets since there is less friction, lowered risk of head-on collisions, and greater lane widths, which create a comfortable feeling for drivers to speed. Although one-way streets tend to have less delay due to signal progression, one-ways may have out-of-direction travel which causes additional travel time, additional vehicle miles of travel, and an increase in the number of turning movements.

Lastly, one-way streets do not pose a major inconvenience for commuters and regular visitors to the downtown as these motorists have learned the downtown network and know the "best route" to their destination. However, occasional visitors to downtown are often confused and disoriented on encountering a one-way street network.

Intersection Signalization

Converting a one-way network to two-way influences the overall traffic network and traffic volumes; therefore, it is possible that a signal may no longer be warranted at an intersection that is currently signalized. If an all-way stop is warranted for the intersection with the conversion to a two-way, then it is possible that the conversion to two-way systems can eliminate some traffic signals in favor of all-way stop signs. In addition, the effect on vehicle queue lengths at each intersection, and the need for turn lanes would need to be determined. Furthermore, each intersection must be reviewed and analyzed to identify any sight line issues and determine the need for removal of those sight obstructions (i.e. on-street parking spaces, trees, shrubbery, landscaping objects, etc.). Any newly signalized intersections required to accommodate two-way traffic will require the addition of traffic poles and signal heads with the associated underground infrastructure.

Land Use, Parking, Signage and Pavement Markings

One-way street systems may be appropriate in highly developed central business districts where it is important to accommodate motor vehicle traffic and maintain good service for pedestrians and cyclists, whereas two-way street systems may be more appropriate in less highly developed central business districts where the emphasis is placed more on livability than serving traffic.

The most effective option is to implement a street system that best fits the needs of the specific area, recognizing that one system does not fit all conditions. In addition, where the two-way system will have three lanes due to the need for a centre left turning lane, there is a high probability that any existing on-street parking must be removed due to the limited amount of right-of-way width available. Or, if new bus stop locations are required due to the one-way to two-way conversion, this may result in loss of existing parking spaces due to a 25-foot parking removal clearance from the transit stops.

Furthermore, the conversion from a one-way system to a two-way system will require sign and pavement marking changes. Sign changes could include the removal or installation of stop signs, removal of one-way signage and do not enter signage, and installation of turning lane signage, while pavement marking changes could include painting stop bars, removing on-street parking space markings, painting through and/or turning arrow pavement markings, and removing or altering painted active transportation markings.

Active Transportation

While one-way to two-way conversions have benefits, it is much more feasible to have high-quality cycling facilities on one-way streets compared to two-way streets due to the right-of-way width availability.

Administration is currently undertaking the Victoria and Pelissier bikeway projects, which are identified in the Active Transportation Master Plan as a high priority bikeway. These projects aim to provide a connection to future bikeways on University Avenue

and Shepherd Street and attract active transportation users to the downtown core. If Victoria Avenue and Pelissier Street are converted from one-way streets to two-way streets, it will not be feasible to maintain both on-street parking and the active transportation facilities planned within these bikeway projects, thereby, removing the opportunity to provide that active transportation facility to the downtown core.

Another benefit to maintaining one-way street systems is that they limit the number of motor vehicle movements at intersections and simplify decision-making for motorists, cyclists and pedestrians, especially the elderly and those with accessibility needs. One-way streets keep streets narrow and allow simpler signal phasing, both of which contribute to short traffic signal cycle lengths and short pedestrian crossings. Although there are benefits for pedestrians of one-way street systems, due to the configuration of one-way streets and two-way streets, one-way streets have sixteen possible conflict points between a vehicle and pedestrian, while two-way streets have only two conflict points between a vehicle and pedestrian. In addition, pedestrians who must travel in the same direction as the one-way vehicular traffic will always have adjacent traffic coming behind them regardless of which side of the street they choose to walk on. This has the potential to make pedestrians feel less safe walking on one-way streets versus two-way streets.

Accident Potentials

With one-way systems, the pedestrian has fewer directions to be concerned about at intersections involving one-way streets, and drivers have fewer potential conflicts to process, which can therefore give more awareness to pedestrian safety. One-way streets also have fewer conflicting turning movements at their intersections, reducing the chance for a through vehicle to encounter a turning vehicle.

However, at intersections of two-streets that are each two-way, pedestrians have an expectation of potential vehicular conflicts with their path as they cross the intersection. These expectations can be different at the intersection of one-way streets, which may create a less safe pedestrian environment. Additionally, although intersections of two-way streets have more conflicting maneuvers, one-way streets correlate with decreased levels of driver attention. Even though one-ways have more conflict points, studies have shown reduced left turn accidents with one-way systems since drivers can turn left without a median.

Overall, it is difficult to determine if one-way streets or two-way streets are safer, since before and after studies in other cities that have converted from one-way to two-way traffic had potential accident increases on some streets and accident decreases on other streets.

Trucks, Transit, Garbage Collection, Emergency Response

For a two-way conversion, truck and transit operations will be largely unaffected on the one-way streets that are not an existing truck route or bus route respectively. However, for one-way streets that are designated routes, there is the potential that the truck and transit operations will require rerouting due to the street converting to a two-way. In addition, any delays experienced by the garbage trucks interrupting traffic flow on the converted two-way streets will be infrequent and comparable to other areas of the city.

Furthermore, since two-ways have narrower lane widths than a one-way, two-ways may limit the ability of motorists to pull over and move out of the way of an emergency response vehicle. However, since two-way streets provide a more direct path to and from destinations and more direct access to a property, some studies indicated that one-way streets are less convenient for emergency response. Even so, this effect may be offset by better signal progression traveling along one-way streets. Additionally, when a collision or other incident closes a street, one-way systems require more distant detours than two-way networks, in which a shift of a single block will suffice.

Air and Noise Pollution

Since one-way street networks have out-of-direction travel, which increases the average driving distance between any paired origin-destination points, this will result in more vehicle miles traveled (VMT). Increased VMT means increased fuel consumption, greenhouse gas emissions, and noise pollution. The direct result of this recirculation is an increase in traffic volumes on a given segment or intersection within a one-way system, and a corresponding degradation in air quality within the downtown.

Alternatively, coordination of traffic signals is more easily attained for one-way streets; this results in improved traffic and bus transit flow with fewer stops, less idling, and lower emissions. In comparison with two-way streets, it is important to note, the traffic signal timing on two-way streets forces vehicles to stop more frequently than on one-way streets. Having vehicles start and stop more times, contributes to an increase in greenhouse gas emissions and downtown air and noise pollution.

Overall, additional studies will be required to determine the deterioration level of air quality for the entire proposed area and noise disturbance level for the residential area.

Economic Viability

Current literature on urban street network design emphasizes that two-way streets create higher levels of economic activity and improve the livability of downtown areas. For example, stores on the cross streets whose facades face the direction of flow are not seen by passing drivers on one-way streets, making two-way streets better for local businesses that depend heavily on pass-by traffic. Additionally, traffic signal timing on two-way streets forces vehicles to stop more frequently than one-way streets, giving drivers more exposure to local businesses. By increasing the direction of vehicle access and range of vehicle turning movements to and from adjacent uses, and ultimately slowing vehicle travel speed, the impacts of vehicles on adjacent land uses is less for two-way streets, creating the potential for calmer communities with two-ways.

Furthermore, one-way streets appear to have higher crime rates. The causes of this relationship are many, however it is important to note that one-ways provide “shadow zones” between buildings in which people can hide. With the reduction of speeding and crime on the two-way streets, this can cause property values to increase dramatically.

As mentioned earlier in the report, it is much more feasible to have high-quality cycling facilities on one-way streets compared to two-way streets due to the right-of-way width available. Since the addition of bike lanes have been shown to increase economic

viability to commercial areas, one-way streets have the potential to become more economically viable if bike lanes are added.

Risk Analysis:

There is no risk to receiving this report for information.

Climate Change Risks

Climate Change Mitigation:

As mentioned in the air and noise pollution section of this report, converting one-way streets to two-way streets increases the number of stops vehicles must make. Increasing the number of times vehicles start and stop, contributes to an increase in idling, greenhouse gas emissions and as a result, downtown air and noise pollution.

Although the potential conversion to two-way streets will increase the number of stops and therefore contribute to air pollution, signal progression can often be maintained on two-way streets to favor the peak direction movement during the morning and afternoon peak hours with minimal effect on through-vehicle delay or the capacity of the network.

Climate Change Adaptation:

N/A

Financial Matters:

There is no cost associated with receiving the report for information.

The preliminary estimated conversion study and construction costs associated with a large-scale implementation project such as the two-way conversion of nine one-way streets in Windsor's downtown area, would be significant as shown in Table 1.

Table 1: Approximate Cost Estimate for One-Way to Two-Way Street Conversions (9)

Stage of Conversion Project	**Components of Stage**	**Total Estimated Cost for All 9 One-Way Street Conversions in Downtown Windsor** **(Excluding HST)**
Study	Phase 1 – Existing Conditions Assessment: • Traffic data collection • Infrastructure inventory • Stakeholder engagement • Engineering and contract administration Phase 2 – Conversion Analysis: • Traffic operations analysis • Assessment of signals infrastructure	**$150,000**

	• Signage and pavement markings • Geometric review • Cost estimates • Summary memo Phase 3 – Implementation Support: • Public outreach and engagement • Implementation strategy	
Construction	- Traffic control installations and removals - Intersection upgrades to existing signals (converting existing signals from one-way operations to two-way operations) - Pavement markings - Signage changes - Reconfiguration of unique intersection at Glengarry Ave, Aylmer Ave and Cataraqui St - Other civil works, such as sewer work, or new concrete pads or passenger amenities for new bus stops	**$2,000,000 - $5,300,000**
	TOTAL	**$2,150,000 - $5,450,000**

It is important to note there would be duplication of some costs incurred by completing the project in phases. For instance, aside from the civil works needed for an interim phase and final phase, other items for the project such as the report would also have to be written multiple times if the project is done in phases. There are also many efficiencies with studying multiple corridors simultaneously since many of the materials can be reused for each of the corridors. Furthermore, the duration of the study will depend largely on the number of the corridors being reviewed and the availability of traffic data. However, it is estimated that the review of one corridor can be completed within 6 months and the completion of a study of all 9 corridors can be completed within 12 months.

The study could be an area-wide study or a corridor study; although it could be better to study individual corridors, this would cost more as there would be increased public meetings, etc. It is important to note that the civil works can also include sewer work and catch basin relocations in addition to repaving, changes to signals etc., and sewer work will add significant costs to the construction fees.

In addition to the study and construction costs, there are also ongoing maintenance costs that must be accounted for such as the maintenance of signs and signals and refresh of paint markings. Full funding for ongoing maintenance related to the two-lane roadways may not be available in the Traffic Operations operating budget. Operating budget increases would be required to fund ongoing maintenance.

Overall, there is no capital funding included in the current 10-year capital plan for a study of this nature, nor the construction required for the conversion(s). Should Administration be directed to proceed with this work, funding for the study, construction and maintenance of this work would be considered as part of future Capital and Operating Budgets.

Consultations:

Kathleen Quenneville, Active Transportation Coordinator
Jason Scott, Manager of Transit Planning
Ian Day, Senior Manager of Traffic Operations and Parking
Jim Leether, Manager of Environmental Services
Roberta Harrison, Maintenance Coordinator
Chris Werstein, Executive Officer Inspector
Stephen Laforet, Fire Chief
Cindy Becker, Financial Planning Administrator, Public Works
Mike Dennis, Manager of Strategic Capital Budget Development and Control

Conclusion:

Based on published literature, there is no blanket answer to the topic of converting one-way streets to two-way streets and vice versa. There is also no clear viable solution based on the differing results of studies from other municipalities. This topic requires subjective evaluation as each City and road network segment is different and different organizations define various criteria and metrics to explain their goals and measure their success. For example, lane conversion for streets that are predominantly residential is different than streets that are predominantly commercial, so this will influence different goals and metrics. Therefore, each street considered for the lane conversion project must be evaluated separately to properly evaluate each. There is no such “one size fits all” approach as a variety of socioeconomic, environmental and technical factors are involved.

In addition, the proposed lane-conversion study must weigh the benefits of two-way travel against any trade-offs associated with other factors such as parking and active transportation. The study must look at achieving the safety and business thriving goals in addition to active transportation goals and walk-ability and bike-ability as an overall study. The study would need to determine if a conversion to a two-way system can help achieve those goals. However, the study must ensure each of the goals are reached and not simply look at changing one-ways to two-ways with potentially creating issues with any of the other factors because of that conversion.

Furthermore, public involvement is essential in making a decision that will have very significant impacts on users. The decision to implement a one-way or two-way roadway requires trade-offs and understanding the priorities of the public allows the evaluation study to appropriately weigh the potential impacts.

Approvals:

Name	Title

Mark Spizzirri	Manager of Performance Measurement and Business Case Development
Phong Nguy	(A) Executive Director of Operations / Deputy City Engineer
David Simpson	Commissioner of Infrastructure Services & City Engineer
Tony Ardovini	On behalf of Commissioner of Finance & City Treasurer
Joe Mancina	Chief Administrative Officer

Notifications:

Name	Address	Email
Councillor Agostino		

Appendices:

Appendix A - Ward 3 One-Way Streets Characteristics

Appendix A: Ward 3 One-Way Streets Characteristics

Table A1:

Street	Ward
Janette Avenue	3
Bruce Avenue	3
Dougall Avenue	3
Victoria Avenue	3
Pelissier Street	3
Glengarry Avenue	3
Aylmer Avenue	3
Pitt Street	3
Chatham Street	3

Table A2:

Street	Boundaries
Janette Avenue	Riverside Dr W to Tecumseh Rd W
Bruce Avenue	Riverside Dr W to Tecumseh Rd W
Dougall Avenue	Wyandotte St W to Tecumseh Rd W
Victoria Avenue	University Ave W to Pine St
Pelissier Street	Chatham St W to Erie St W
Glengarry Avenue	Riverside Dr E to Cataraqui St
Aylmer Avenue	Riverside Dr E to Cataraqui St
Pitt Street	Caron Ave to McDougall St
Chatham Street	Caron Ave to McDougall St

Table A3:

Street	Direction of Travel

Janette Avenue	Southbound
Bruce Avenue	Northbound
Dougall Avenue	Southbound
Victoria Avenue	Southbound
Pelissier Street	Northbound
Glengarry Avenue	Southbound
Aylmer Avenue	Northbound
Pitt Street	Eastbound
Chatham Street	Westbound

Table A4:

Street	**Number of Travel Lanes**
Janette Avenue	2 (Riverside Dr W to Pitt St W) 1 (Pitt St W to Hanna St W) 2 (Hanna St W to Tecumseh Rd W)
Bruce Avenue	2 (Riverside Dr W to University Ave W) 1 (University Ave W to Tecumseh Rd W)
Dougall Avenue	1 (Wyandotte St W to Tecumseh Rd W)
Victoria Avenue	2 (University Ave W to Pine St)
Pelissier Street	2 (Chatham St W to Park St W) 3 (Park St W to Maiden Lane W) 2 (Maiden Lane W to Elliot St W) 1 (Elliot St W to Erie St W)
Glengarry Avenue	3 (Riverside Dr E to University Ave E) 2 (University Ave E to Brant St) 3 (Brant St to Wyandotte St E) 2 (Wyandotte St E to Cataraqui St)
Aylmer Avenue	3 (Riverside Dr E to Chatham St E)

	2 (Chatham St E to Cataraqui St)
Pitt Street	3 (Caron Ave to Bruce Ave) 2 (Church St to Dougall Ave – Private Rd) 3 (Dougall Ave – Private Rd to Ferry St) 2 (Ferry St to Goyeau St) 2 (Goyeau St to McDougall St)
Chatham Street	2 (Caron Ave to McDougall St)

Table A5:

Street	**Parking Limitations**
Janette Avenue	Combination of: - no parking - on-street permit parking area - alternate side no parking and - limited parking
Bruce Avenue	Combination of: - no parking - alternate side no parking and - personal accessible parking
Dougall Avenue	Combination of: - no parking, alternate side no parking - on-street designated accessible parking - no stopping or parking and - school bus loading zones
Victoria Avenue	Combination of: - no parking - alternate side no parking - on-street designated accessible parking

	- no stopping or parking - street meters - limited parking - on-street permit parking area - angle parking and - school bus loading zones
Pelissier Street	Combination of: - no parking - loading zones - on-street designated accessible parking - no stopping or parking - street meters - limited parking and - on-street permit parking area
Glengarry Avenue	Combination of: - no parking - limited parking and - on-street permit parking area
Aylmer Avenue	Combination of: - no parking - loading zones and - on-street permit parking area
Pitt Street	Combination of: - no parking - loading zones - on-street designated accessible parking - no stopping or parking - street meters

	- limited parking - tow away areas and - on-street permit parking area
Chatham Street	Combination of: - no parking - loading zones - on-street designated accessible parking - no stopping or parking - street meters - limited parking - tow away areas - taxicab stands and - on-street permit parking area

Table A6:

Street	**Existing Cycling Infrastructure**
Janette Avenue	Bike lane within pavement
Bruce Avenue	Bike lane within pavement
Dougall Avenue	No existing cycling infrastructure
Victoria Avenue	No existing cycling infrastructure
Pelissier Street	No existing cycling infrastructure
Glengarry Avenue	No existing cycling infrastructure
Aylmer Avenue	No existing cycling infrastructure
Pitt Street	No existing cycling infrastructure
Chatham Street	No existing cycling infrastructure

Table A7:

Street	**Proposed Cycling Infrastructure**

Janette Avenue	Not identified for further cycling infrastructure within Active Transportation Master Plan (ATMP)
Bruce Avenue	Not identified for further cycling infrastructure within ATMP
Dougall Avenue	Wyandotte St W to Ellis St W not identified for bicycle facility within ATMP Ellis St W to Tecumseh Rd W identified as a future protected bike lane within ATMP
Victoria Avenue	University Ave W to Erie St W planned for buffered bike lane Erie St W to Pine St planned for sharrows
Pelissier Street	Chatham St W to University Ave W not identified for bicycle facility within the ATMP University Ave W to Erie St W planned for buffered bike lane
Glengarry Avenue	Not identified for bicycle facility within ATMP
Aylmer Avenue	Not identified for bicycle facility within ATMP
Pitt Street	Not identified for bicycle facility within ATMP
Chatham Street	Not identified for bicycle facility within ATMP

Table A8:

Street	**Right-of-Way Width**
Janette Avenue	21.3m (From Riverside Dr W to Ellis St W) 20.1m (From Ellis St W to Tecumseh Rd W)
Bruce Avenue	21.3m (From Riverside Dr W to Tecumseh Rd W)
Dougall Avenue	20.1m (From Wyandotte St W to Tecumseh Rd W)

Victoria Avenue	27.4m (From University St W to Erie St W) 25.6m (From Erie St W to Pine St W)
Pelissier Street	18.3m (From Chatham St W to Erie St W)
Glengarry Avenue	27.4m (From Riverside St W to Cataraqui St W)
Aylmer Avenue	30.5m (From Riverside St W to Cataraqui St W)
Pitt Street	20.1m (From Caron Ave to Goyeau St) 16.2m (From Goyeau St to McDougall St)
Chatham Street	20.1m (From Caron Ave to McDougall St)