



CITY OF HAMILTON
PUBLIC WORKS DEPARTMENT
Transportation Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	June 5, 2017
SUBJECT/REPORT NO:	Feasibility and Functional Design of Converting Queen Street from Aberdeen Avenue to Main Street from One-Way to Two-Way Traffic Operations (PW17034) (City Wide) (Outstanding Business List Item)
WARD(S) AFFECTED:	City Wide
PREPARED BY:	Alan Kirkpatrick, C.E.T. Manager of Transportation Planning Services 905 546 2424 x 4173
SUBMITTED BY:	John Mater, C.E.T. Associate General Manager and Director of Transportation Public Works Department
SIGNATURE:	

RECOMMENDATION

- (a) That Report PW17034 outlining the “Feasibility and Functional Design Study for the conversion of Queen Street, from Aberdeen Avenue to King Street, to two-way traffic operation” be received;
- (b) That the outstanding business list item referring to Queen Street South Conversion be removed.

EXECUTIVE SUMMARY

This report is in response to the approved Council Motion on November 9, 2016 to undertake the following study:

That staff be directed to undertake a feasibility study and prepare a functional design that would include one northbound lane, one southbound lane and one directional lane based on peak hours for the conversion of Queen Street South from one-way operation to two-way operation between Aberdeen Avenue and King Street West; and,

That the cost associated with the feasibility study and functional design be funded equally from the Wards 1, 2 & 8 Area Rating; and,

That staff be directed to report back to the Public Works Committee in April 2017 with recommendations and funding requirements for the conversion of Queen Street South from one-way operation to two-way operation between Aberdeen Avenue and King Street West.

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The “Feasibility and Functional Design Study for the conversion of Queen Street, from Aberdeen Avenue to King Street to two-way traffic operation”, dated March 2017, prepared by AECOM Canada Ltd., has concluded that Queen Street can be converted from one-way to two-way traffic operations from Aberdeen Avenue to Main Street and the report indicates that Alternative three (one northbound and two southbound lanes) is the preferred alternative to consider if a conversion is to be implemented. Further details are provided in this report as to how these recommendations were developed.

It can be noted that in almost every alternative examined in this process, the traffic operational conditions and the City service delivery conditions will be affected and different than those currently being experienced on this section of Queen Street.

The implementation of the one-way to two-way traffic operation conversion could be included in a future staff work plan, with the potential rearranging of other work plan items and included in a future Capital budget process and deliberation.

In a general sense, a conversion of Queen Street, from Aberdeen Avenue to Main Street, to a two-way traffic operation will:

- Provide two-way traffic flow and new access opportunities with traffic travelling in two directions
- Exclude the section north of Main Street without final LRT plans for the area of King Street and Queen Street
- Effect on-street parking on Queen Street from its current situation
- Could help with traffic travelling east of Queen Street by not forcing all traffic to use Herkimer Street
- Will not provide a significant benefit for traffic travelling west of Queen Street with the current uncertainty related to LRT plans.

If the conversion of Queen Street is a Council priority, the suggested actions that could be involved regarding this conversion include:

1. The General Manager of Public Works be authorized to include this unfunded project, along with the detailed design and implementation, at an estimated cost of \$1,100,400 in a future capital budget and \$160,000, depending on identified snow removal variables, in a future operating budget and considered during the appropriate budget deliberations process. If Queen Street is converted to two-way operation, HSR staff will be monitoring service reliability on Route 34 (Upper Paradise) and if service standards diminish significantly, an additional transit vehicle may be recommended in future, at an estimated capital cost of \$640,000 and additional operating costs estimated at \$275,000 (3,492 service hours and 2-FTE).
2. The General Manager of Public Works be authorized to organize Public Information Centres (PIC) to provide the public with an opportunity to review and

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comment on the design and operation of this one-way to two-way conversion of Queen Street, from Aberdeen Avenue to Main Street in preparation of the detailed design and implementation

3. Following the approval of a one-way to two-way traffic conversion project in a future capital and operating budget, the General Manager of Public Works be authorized to proceed with the detailed design and implementation of the "Feasibility and Functional Design Study for the conversion of Queen Street, from Aberdeen Avenue to Main Street to two-way traffic operation".

Alternatives for Consideration – See Page 19

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: Based on the report prepared by AECOM CANADA LTD. on the Feasibility and Functional Design for the conversion of Queen Street from Aberdeen Avenue to Main Street, from one-way to two-way traffic operations, the estimated capital budget cost would be \$1,100,400 and the estimated annual operating budget impacts would be up to approximately \$160,000 annually depending on the need for snow removal and the number of occurrences.

Based on the Feasibility and Functional review for the conversion of Queen Street for Alternative 3, the following is a high-level cost breakdown. Additional information is provided in Appendix "A". Revised costs would be determined during the detailed design phase.

Capital

Traffic Signals	\$700,000
Pavement Markings and Signage	\$30,000
Removal of Island (Herkimer)	\$24,000
Removal of PXO (Herkimer)	\$10,000
	Subtotal \$764,000
Contingency (10%)	\$76,400
	Subtotal \$840,000
Detailed Design	\$200,000
Tender document preparation	\$50,000
Communications Plan (optional)	\$10,000
	TOTAL CAPITAL \$1,100,400

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1. Public Works Asset Management staff has confirmed that there are no specific capital improvement plans for this section of Queen Street in the near future therefore, there are no upcoming opportunities to include these conversion plans with other works.
2. As this investigation dealt with the Feasibility and Functionality of the proposed conversion of Queen Street, detailed design was not undertaken. If this proposed conversion is a Council priority to move forward for implementation, a detailed design phase will be required to analyse the necessary Civil improvements required related to several matters including: intersection radii, sidewalk widths, utilities and property lines
3. An optional Communication Plan may be considered with this proposed conversion. It is estimated that to implement such a plan, a cost of \$10,000 may be considered to cover advertising and other materials to inform the public of the conversion of this section of Queen Street.

Operating (estimated additional cost per year for Alternative 3):

Winter Control	(anticipated cost could be \$20,000per removal event. There could be eight (8) events per year)	\$160,000
Operations & Maintenance		\$0
Waste collection		\$0
Fire		\$0
EMS		\$0
TOTAL	Additional annual operating costs:	\$160,000

Staffing: If Council wishes to include this conversion as a priority, in order to achieve this work without additional staff, other proposed work plan items may be required to be re-scheduled. This proposed conversion of Queen Street from one-way to two-way traffic operation is not in a work plan or in a Capital Budget. If this is the direction of Council, staff would prepare the necessary budget sheets to reflect this project. If, for example, the project was to be approved in the 2018 Capital Budget, it is anticipated that the detailed design could be initiated in 2018 with possible implementation later in 2018 and completed in 2019.

In addition, staff would review their proposed 2018/2019 work plans to determine other works that may need to be re-schedule to accommodate this conversion.

Legal: N/A

HISTORICAL BACKGROUND

The issue of converting a number of City streets from one-way to two-way operations continues to be reviewed and implemented. The 2008 Downtown Transportation Master Plan recommended the conversion of a number of streets in the downtown area. Council has directed staff to follow through and implement the conversions of the following identified downtown streets. The current schedule to complete the conversions of the downtown streets includes:

2014 (Completed)

Rebecca Street: John Street North to Wellington Street North

2015 (Completed)

MacNab Street: Cannon Street to Barton Street

2016 (Completed)

Bold Street: James Street South to Queen Street South

Duke Street: James Street South to Queen Street South

Wentworth Street: Delaware Avenue to Barton Street East

2017

Victoria Avenue North: Phase I Burlington Street to Ferrie/Sawyer (*capital*)
Phase II Ferrie/Sawyer to Barton Street East (future)

Hughson Street North: Wilson Street to Barton Street East (*capital*)

King William Street: John Street North to Wellington Street North (*capital*)

Birch Street: Wilson Street to Burlington Street
(HSR Provincial Funding-Transit)

2018

Hess Street North: York Boulevard to Barton Street West (*capital*)

Caroline Street North: King Street to York Boulevard (*capital*)

Park Street North: Cannon Street to Barton Street West (*capital*)

Although not on the current conversion schedule, Queen Street has been on a list for potential conversion along with the other one-way streets in the City. In order to take a technical view of the potential order of street conversions of the remaining one-way streets, criteria is included in the City-Wide Transportation Master Plan Review and Update to guide Council and staff in the decision-making process and priority setting for the remaining conversions. The technical review of the conversion process will include a number of criteria identified below:

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- Transparency in decision-making
- Develop design alternatives (based on street context and characteristics)
- Evaluate alternatives for all road users based on:
 - Part 1: Road Safety and Operations
 - Safety
 - Routing (access) / Connectivity
 - Travel time
 - Emergency response
 - Part 2: Complete-livable-better streets framework
 - Economic development and commercial/employment land-uses
 - Community impacts and residential land uses
 - Health and well being
 - Part 3: Cost
 - Capital impacts
 - Operational impacts
- Engage residents for input on process
- Establish priority based on:
 - Strategic plan objectives
 - City-Wide TMP goals

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

If the conversion of Queen Street is approved to two-way traffic operations, there will be a number of Traffic and Parking By-law amendments presented to Committee and Council which will be required to facilitate these changes.

RELEVANT CONSULTATION

A Technical Advisory Committee (TAC) made up of multiple City Departments have been involved in this process and contributed by attending meetings and review materials. The groups involved were:

- Public Works – Transportation Planning, Traffic, HSR, Roads Operations & Maintenance, Waste Collection, Asset Management, Engineering Design
- Planning and Economic Development - Parking, Planning, and the LRT Office
- Public Health
- Community and Emergency Services - Fire and Emergency Response

The Queen Street community has expressed interest in the conversion of Queen Street in the past and have also prepared their own Walkability Audit, in June 2013, which related not only to walkability of the street but also the traffic operations. It is suggested that if Council places a priority on this conversion project, that it be included in a future capital budget deliberations process, and that Public Information Centres (PIC) be held to provide details so the public can review and provide comments.

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ANALYSIS AND RATIONALE FOR RECOMMENDATION

AECOM CANADA LTD. was retained through a Roster assignment to undertake this “Feasibility and Functional Design Study for the conversion of Queen Street, from Aberdeen Avenue to King Street to two-way traffic operation”. The assignment was to review a variety of aspects for the proposed conversion.

Queen Street, from Main Street to Herkimer Avenue, approximately 0.75 km in length, currently has three southbound, one-way, traffic lanes. Five alternatives were considered and reviewed regarding the possible conversion. The alternatives included:

1. One northbound lane and one southbound lane with a centre two-way left turn lane (TWLTL)
2. One northbound lane and one southbound lane with an on-street parking lane on the east side of Queen Street
3. One northbound lane and two southbound lanes
4. One northbound lane and one southbound lane with a reversible lane in the middle lane
5. Two northbound lanes and one southbound lane

Alternatives four and five were evaluated and through the evaluation process removed from further consideration. The rationale is summarized later in this report and detailed in the consultant’s report. The remaining three alternatives continued through the evaluation process. The rating of the alternatives is provided in the Table 1 below:

Table 1: Summary of Detailed Evaluation of Alternatives

Evaluation Criteria	Alternative #1 1 NB, 1 SB, TWLTL	Alternative #2 1 NB, 1 SB, 1 parking	Alternative #3 1 NB, 2 SB	Would Alternative #3 perform Equally/Better than the Existing One-Way Conditions?
Vehicular Traffic Operations	No	No	Yes	No
On-Street Parking Availability	No	Yes	No	No
Vehicular Access to Properties on Queen Street South	Equal Rating			Yes
Traffic Safety	Equal Rating			Yes
HSR Operations	No	No	Yes	No
EMS Operations	No	No	Yes	No
Fire Services Operations	No	No	Yes	No
Waste Collection Services	Equal Rating			Yes
Road Maintenance Services	No	Yes	No	No
Impacts on Cultural Heritage	Equal Rating			No
Overall Preferred Two-Way Alternative	No	No	Yes	N/A

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The results of the Feasibility and Functional Design of converting Queen Street from Aberdeen Avenue to Main Street from one-way to two-way traffic operations has determined that a conversion can be accomplished.

None of the alternatives are without impacts and the consultant reviewed each in detail in order to arrive at the conclusion that Alternative three would be the preferred alternative if Council wished to proceed with the conversion.

The study prepared by AECOM CANADA LTD. on this matter provides technical details for the implementation of the conversion. The following is a summary of the material included their investigation:

1. Conversion Limits and Cross-Section

As indicated above, the proposed conversion of Queen Street, from one-way to two-way traffic operation, from Aberdeen Avenue to Main Street can be implemented. The Council Motion suggested the conversion be from Aberdeen Avenue to King Street. During this study, it was determined that there are too many unresolved issues dealing with the B-Line LRT project, including at the intersection of King Street and Queen Street, therefore, until these LRT issues are resolved in the future, the conversion of Queen Street should only be from Aberdeen Avenue to Main Street. The portion of Queen Street from King Street to Main Street can be reconsidered at a later time. Conversion plans considered in this study would be incorporated in an ultimate two-way operation on Queen Street between King Street and Main Street if the conversion of this section is reconsidered in the future.

Based on the traffic engineering and operations analysis, it has been determined that one northbound lane and two southbound lanes is the most efficient method to implement the conversion, referred to as Alternative three. This configuration is considered to be the best approach to implement two directions of traffic on Queen Street from Main Street to Herkimer Street.

Alternative five included two northbound lanes and one southbound lane. The traffic analysis reflected an overall higher southbound traffic movement on Queen Street, therefore with only one southbound lane, Queen Street would not operate satisfactorily and therefore this alternative was not evaluated any further.

Under Alternative three, the estimated roadway and intersection operation and traffic flow will be at a reasonable level during peak traffic periods. Some intersections may need future consideration for left turn lanes through widenings, or alternatively, left turn restrictions may have to be introduced.

2. Reversible Lane

The Council motion to investigate the conversion of Queen Street included the consideration of including a Reversible Lane operation. The concept would be to add additional directional traffic lanes during the peak traffic period of the day, for example, two lanes northbound during a.m. peak period and two lanes southbound lane during

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p.m. peak period. Reversible Lane infrastructure, in the form of overhead electronic sign would need to be added to Queen Street in order to facilitate this type of operation.

The Feasibility and Functional Design Study considered this concept as one of the alternatives and determined the following:

The Best Practice/Guidelines¹ to include a Reversible Lane operation suggests a minimum peak direction / counter peak direction traffic flow split ratio of 65/35 during both the peak traffic periods. Based on traffic volume analysis for two-way conversion, the highest road segment ratio was 61/39, during only the a.m. peak period therefore, the warrant to implement Reversible Lanes will not be present.

- The Best Practice to include Reversible Lane operation suggests that the additional traffic capacity anticipated with this type of traffic operation does not match the travel desires on Queen Street. In fact, southbound traffic volumes are expected to exceed northbound volumes in most of the study segment throughout both peak periods.
- The length of the proposed Queen Street traffic conversion, from Main Street to Herkimer Street, is approximately 0.75 km and based on this length, the anticipated capacity improvement will not be realized.
- Although possible, the variable turning movement from crossing streets into and out of the Reversible Lane area could be confusing to users and not be as effective as anticipated.
- The implementation of a Reversible Lane operation will result in the elimination of on-street parking throughout the entire stretch, which will mainly affect area residents
- The estimated cost to implement the Reversible Lane operation would be an additional \$200,000 plus \$20,000 for contingency and \$50,000 for detailed design costs, totalling \$1,370,400 in conversion capital costs, (or \$270,000 more than Alternative three) and \$161,500, (or \$1,500 more than Alternative three), for annual operating costs.

As a result of this analysis, this Reversible Lane alternative was not investigated further. However, the Reversible Lane operation is mentioned again later in this report, under Alternatives for Consideration, if Council wishes this alternative to be implemented.

3. Traffic Signals and Left-turn Lanes

Table 2 below illustrates the consultant's findings regarding traffic signals and left-turn lanes:

Table 2: Findings of Traffic Signal and Left-Turn Lane Analyses South

¹ Transportation Association of Canada (TAC) Guidelines for the Planning, Design, Operation, and Evaluation of Reversible Lane Systems; and the National Cooperative Highway Research program (NCHRP) Synthesis 340 on Convertible Roadways and Lanes".

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Queen Street South Intersection at:	Consideration for Traffic Signal	Consideration for Provision of Exclusive Left-Turn Lane (SB)	Consideration for Provision of Exclusive Left-Turn Lane (NB)
Main Street West	Existing	Existing	No
Jackson Street West	No	No	No
Canada Street	No	No	No
Hunter Street West	Existing	No	Yes
Bold Street	No	No	No
Duke Street	No – Existing IPS ²	No	No
Robinson Street	No	No	No
Charlton Avenue W	Existing	No	Yes
Herkimer Street	Yes	Yes	No
Stanley Avenue	No	No	No
Markland Street	No	No	No
Homewood Avenue	No	No	No
Aberdeen Avenue	Existing	No	Existing

Table 2 suggested that:

- A new traffic signal would be required at Herkimer Street along with the removal of the large island. A new traffic signal is included in the proposed conversion.
- Although the evaluation indicates that left-turn lanes should be considered at five locations, as previously mentioned, road widenings at the three locations where they are not currently provided are not contemplated at this time due to the potential additional cost and property impact. This matter could be revisited in the future.

4. Vehicular Traffic Operations

Table 3 below indicates the total “Delay” in Vehicle-Hours during the weekday a.m. and p.m. peak periods:

² IPS - Intersection Pedestrian Signal

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Table 3: Total “Delay” in Vehicle-Hours during the a.m. and p.m. peak periods

	#1	#2	#3	Existing
Alternative Configuration	1 NB, 1 SB, TWLTL	1 NB, 1 SB, 1 parking	1 NB, 2 SB	3 SB
Total delay to SB traffic	931.7	1,529.1	268.8	111.7
Total delay to NB traffic	139.7	1,905.8	570.9	N/A
Total delay to traffic crossing Queen St.	100.4	100.6	95.9	105.8
Overall Total delay to traffic between Main St. and Herkimer St.	1,171.8	3,535.5	935.5	N/A

Table 3 suggests that the calculated delay to traffic along and across Queen Street could be significantly greater than the existing condition, particularly for southbound traffic. Northbound traffic would also encounter delays due to blockage of the single available lane by left turning vehicles.

As shown in Table 3, the total delay to vehicular traffic crossing Queen Street overall at the intersections would be very similar in all the three shortlisted alternatives and approximately equal to that in the existing conditions. Alternative three would result in only marginally lower level of total “delay” to the traffic crossing Queen Street overall and at every intersection between Main Street and Herkimer Street compared to the other two alternatives

5. On-street Parking

In order to provide reasonable traffic operations and flow for Alternative three, it is suggested that all on-street parking be prohibited on Queen Street³ from Main Street to Herkimer Street to allow for the two southbound lanes and one northbound lane at all times. Currently parking is permitted on the east side of Queen Street during off-peak hours, 9:00 a.m. to 4:00 p.m. and from 7:00 p.m. to 2:00 a.m.

Table 4 below indicates the total number of on-street parking spaces on Queen Street and indicates the on-street parking space-hour availability per day.

Table 4: Queen Street - On-Street Parking measures, per day

	#1	#2	#3	Existing
Alternative Configuration	1 NB, 1 SB, TWLTL	1 NB, 1 SB, 1 parking lane	1 NB, 2 SB	3 SB
Total Number of On-Street Parking Spaces Available	0	62	0	62

³ Queen Street is designated as a “Through Street”.

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Total Number of On-Street Available Parking hours	0	1,488	0	1,178
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Table 4 indicates that Alternative two provides the same number of parking spaces and higher available parking hours as the existing conditions.

There could be an opportunity to allow some on-street parking for Alternative three as it currently exists on the west side of Queen Street (approximately 35 on-street spaces, providing 525 available parking hours per day), but this could have impacts to off-peak traffic flow on Queen Street. The proposed change to the on-street parking situation would be one of the items that the public would provide their comments on at proposed Public Information Centres (PIC).

6. Vehicular Accessibility

Table 5 below provides a summary of the allowable turning movement in/out of driveways in this section of Queen Street:

Table 5 – Total number of allowable turning movements in/out of driveways

	#1	#2	#3	Existing
Alternative Configuration	1 NB, 1 SB, TWLTL	1 NB, 1 SB, 1 parking	1 NB, 2 SB	3 SB
Total Number of On-Street Available Parking hours	32	32	32	16

Table 5 suggests that because of the two-way traffic operation, all three alternatives provide better access to properties than the existing conditions.

7. Traffic Safety

Table 6a shows the number of vehicle-vehicle conflict points and Table 6b shows the number of vehicle-pedestrian conflict points at the Queen Street intersections between Main Street West and Herkimer Street.

Table 6a: Number of vehicle-to-vehicle conflict points

Alternative Configuration	Alternative #1	Alternative #2	Alternative #3	Existing Conditions
Total Number of Vehicle-Vehicle Conflict Points	140	139	155	84

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Table 6b: Number of Vehicle-to-pedestrian conflict points

Alternative Configuration	Alternative #1	Alternative #2	Alternative #3	Existing Conditions
Total Number of Vehicle-Pedestrian Conflict Points	79	76	83	64

As shown in the above tables, the total number of vehicle-vehicle conflict points at intersections in Alternative three (i.e., one northbound lane and two southbound lanes) would be only slightly greater than those in Alternative #1 (one lane in each direction with a centre two-way left-turn lane) and Alternative two (i.e., one lane in each direction with an on-street parking lane). However, the number of vehicle-vehicle conflict points for the three shortlisted alternatives would be significantly greater than those in the existing conditions.

The total number of vehicle-pedestrian conflict points at intersections would be more or less equal among the three shortlisted alternatives. The number of vehicle-pedestrian conflict points for the three shortlisted alternatives would be to some extent greater than those in the existing conditions.

Within the Study Area mid-block sections, Alternative three would result in lower number and/or less severe types of vehicle-vehicle conflicts in comparison to Alternatives one and two.

The conversion of Queen Street South to a two-way street is anticipated to result in calming of vehicular traffic (i.e., reduction in operating speed of vehicles).

If the conversion is approved, an optional communications plan and signage could be implemented to provide public notice of the revised traffic operations. As the City is pursuing a “Vision Zero” policy, efforts would be implemented to make Queen Street as safe as possible to reduce collisions. An estimated cost to implement an optional communications plan could be \$10,000.

8. HSR Delay

Table 7 below provides a summary of the total delay in bus-minutes calculated for HSR vehicles on Queen Street for Routes #6 and #34.

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Table 7 – Total delay in bus-minutes to HSR buses during weekday a.m. and p.m. peak periods

	#1	#2	#3	Existing
Alternative Configuration	1 NB, 1 SB, TWLTL	1 NB, 1 SB, 1 parking	1 NB, 2 SB	3 SB
Total delay to HSR for Route #6	30	111	25	8
Total delay to HSR for Route #34	176	279	48	28
Total delay	206	390	72	36

Note: Buses on route #6 enter Queen Street South by making a westbound left-turn from Charlton Avenue W and travel southbound on Queen Street

Table 7 suggests that:

HSR has reviewed the proposed two-way traffic operation and indicated that there is potential for delays to impact the routes that would be affected by the conversion. HSR has not decided at this time whether they would adjust their routing to provide northbound service on Queen Street to Main Street.

At this time, if the conversion is to proceed, HSR staff would monitor their service reliability on Route 34 (Upper Paradise) and if service standards are not met, staff could request consideration of an additional bus at a capital cost of approximately \$640,000 with associated operating costs estimated at \$275,000.

9. Impacts to EMS Operations

Table 8 below provides a summary of the intersections on Queen Street with volume/capacity (V/C) ratio greater than or equal to 1.0 (meaning the road capacity) related to EMS operations, indicating congested conditions.

Table 8 – Number of Intersections on Queen Street with volume/capacity (V/C) ratio greater than or equal to 1.0

	#1	#2	#3	Existing
Alternative Configuration	1 NB, 1 SB, TWLTL	1 NB, 1 SB, 1 parking	1 NB, 2 SB	3 SB
Number of intersections on Queen St. with volume / capacity (V/C) ratio ≥ 1.0	10	15	5	0

Table 8 suggests that the proposed conversion of Queen Street to two-way operation will allow for increased flexibility in EMS response directions but there may be more congestion situations during the peak periods.

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10. Fire Service

Table 9 below provides a summary of the locations on Queen Street with volume/capacity (V/C) ratio greater than or equal to 0.85 related to Fire Service use of Queen Street. A different V/C was utilized for the Fire Service as their vehicles are much larger with different response characteristics than an EMS response vehicle and hence are more sensitive to congestion.

Table 9 – Number of locations on Queen Street with volume/capacity (V/C) ratio greater than or equal to 0.85

	#1	#2	#3	Existing
Alternative Configuration	1 NB, 1 SB, TWLTL	1 NB, 1 SB, 1 parking	1 NB, 2 SB	3 SB
Number of intersections on Queen St. with volume / capacity (V/C) ratio ≥ 0.85	16	16	8	0

The Fire Department has indicated that, even though the present configuration of one-way travel on Queen Street South may provide some options for vehicles to pull-over and allow Fire apparatus to continue to their destination, the configuration of Alternative three has the potential to improve responses into the Queen Street South corridor.

By allowing responding apparatus to approach certain areas of Queen Street South from an opposite direction, it may actually improve strategic deployment of resources by avoiding congestion from consecutively arriving apparatus in a one-way flow.

There are many examples of streets with similar traffic operations therefore the proposed change to Queen Street would not be a unique situation. It is expected that the motoring public is responsible enough that when they recognize approaching emergency vehicles responding to take appropriate action to move their vehicle to an suitable location so the emergency response vehicle can proceed as quickly as possible.

11. Traffic Signals

A total of three traffic signals will be required to be changed to accommodate traffic in two-directions at the Queen Street intersections at Main Street West, Hunter Street West, and Charlton Avenue West,. In addition, one intersection Pedestrian Signal (IPS) at Duke Street will require changes with the conversion.

The estimated cost to convert the traffic signals and IPS would be \$350,000, to be confirmed during the detailed design.

It is recommended that a new traffic signal be implemented at the intersection of Queen Street and Herkimer Street if the conversion takes place. The offset layout of this

intersection and the large island presents traffic engineering and operations challenges. This location has been a pedestrian crossing problem for some time and a Pedestrian Crossover (PXO) is planned to be installed in 2017. The cost to install the PXO at this location is \$60,000. As part of the conversion, a full traffic signal would be installed and the PXO replaced. The cost to remove the PXO would be \$10,000. The cost to reconstruct this intersection (remove the island and install a traffic signal) would be approximately \$375,000.

12. Pavement Markings and Signage

Appropriate pavement marking and signage changes will be implemented to reflect the new traffic operations on Queen Street.

The estimated cost to implement revised pavement markings and convert signage would be \$30,000

13. Cycling

The Cycling Master Plan (CMP) does not include cycling facilities on Queen Street.

The proposed implementation of two-way traffic operations on Queen Street does not change this plan as there are appropriate adjacent roads that are included in the CMP to connect cycling links in this part of the downtown.

14. Roads Operation/Maintenance

Roads Operation and Maintenance (O/M) staff has reviewed the proposed two-way traffic operation and indicated that there will be impact to their operation and maintenance activities compared to what is available today on Queen Street.

O/M staff indicated that if they are required to do O/M activities on Queen Street they would be required to close off traffic lanes and follow Book 7 Regulations to detour traffic. If absolutely necessary, a portion of Queen Street may have to be closed for these activities. This would not be a regular occurrence. The method they would plan and undertake their activities would be similar to other similar roads.

15. Winter Control

Winter Control staff has reviewed the proposed two-way traffic operation and indicated that there will be impact to their winter control services.

Presently, three south bound lanes, parking for the most part is on the east side, all plowing is sent towards the west curb lane and left in the curb lane/curb face.

With a conversion, all snow in the northbound lane will be plowed to the east towards the curb, not onto the sidewalk and could result in severely restricting the width of the northbound lane.

For the southbound lanes, plowing will be to the west side of the road into either parked cars or parking stalls. Overall, there is very limited snow storage area available.

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The plowing methods they would plan and undertake their activities would be similar to other similar roads.

If snow accumulation builds to such a point that removal may be required, it is estimated that the snow removal operation would be \$20,000 per removal event. There could be as many as 8 removals in a year totalling \$160,000.

16. Waste Collection

Waste collection staff has reviewed the proposed two-way traffic operation and indicated that there will be an impact to their collection services.

General waste collection operations:

- Single family waste collection operations are regularly scheduled for Monday each week, with the exception when there is a Statutory Holiday, then the collection day is pushed to the Tuesday (this typically occurs approximately ten times per year).
- These services are provided by up to five different trucks (up to one truck per stream) throughout the day stopping at each property; this includes blue box recycling, green cart organics, leaf & yard, garbage and bulk waste streams with manual and/or semi-automated collection vehicles.
- Multi-residential waste collection operations are regularly scheduled with different collection days than single family collection operations. Front Load Bin Garbage is currently Monday, Wednesday, Thursday and Friday each week with the exception when there is a Statutory Holiday, then the collection day is pushed to the next day (this typically occurs approximately ten times per year). Note each property may have a different collection frequency per week. This service is provided by a fully automated front-load waste collection vehicle which typically goes onto the property to service the bins.
- Blue box/carts is currently Monday each week, with the exception when there is a Statutory Holiday, then the collection day is pushed to the Tuesday (this typically occurs approximately ten times per year). Note; the collection frequency per week may change to accommodate volume increases for each property. This service is provided by a fully automated side-loading (right-side) recycling collection vehicle with multiple blue carts stored at the curbside/roadside/boulevard at each stop (next to the entrance); those same carts are serviced by a collection vehicle while parked on the Queen St and this may take several minutes to service each location/stop.
- Green cart organics, leaf & yard and bulk waste collection are scheduled for Monday each week, with the exception when there is a Statutory Holiday, then the collection day is pushed to a Tuesday (this typically occurs approximately ten times per year). These services are provided by up to three trucks (up to one truck per stream) throughout the day for green cart organics, leaf & yard and bulk

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waste streams with manual or semi-automated collection vehicles. Also, each stream may be collected at the curbside/roadside/boulevard for each stop and or a vehicle may go onto the property to collect.

Therefore, on a given Monday there could be up to seven different trucks collecting waste along this area of Queen St for each side of the road (each truck will make a collection on the east side and the west side of Queen). On any given Wednesday, Thursday and Friday there will be at least one truck collecting waste along this area of Queen Street.

In addition, each of the trucks is on different routes for each waste stream and more often than not is collecting along this area of Queen St at different times of the day. Note: the coordination of all waste/recycling collection trucks along Queen Street at one time (in a train like setting) is impractical and inefficient. Also, the operating hours for waste collection operations is 7:00 a.m. to 5:00p.m.

The recent experiences with the Herkimer and Bold Streets traffic/parking and bike-lane etc. re-working have found that access and egress for multi-residential properties becomes even more challenging. Consequently, approximately two parking spaces leading into each property along Herkimer have been removed and even more along Bold Street. This has provided minimal space for the front load bin garbage and the blue carts fully-automated truck to provide service.

Collection activities would be required in two directions and their routes will have to be adjusted.

17. Emergency Management Services Response

EMS Response staff has reviewed the proposed two-way traffic operation and indicated that the additional direction of traffic available would be a benefit to their response time and alternative routes available.

18. LRT B-Line Office Comments

Based on the most current traffic modelling for the LRT project, southbound traffic volumes on Queen Street between Main Street West and Aberdeen Avenue are projected to rise with LRT in place. Given the discontinuation of King Street East at Wellington Street combined with the significant reduction in westbound vehicular capacity on King Street through the core under the proposed LRT configuration, westbound traffic is expected to divert to parallel routes in order to by-pass these constraints. While most of this traffic is expected to divert northward and use Wilson Street and Cannon Street, some traffic is expected to divert southward and use Hunter Street to Queen Street to Aberdeen Avenue as a westbound route. As such, any changes proposed for Queen Street that may introduce additional delay to southbound flow has the potential to impact the broader transportation system with LRT in place.

The LRT traffic model did not assume a two-way Queen Street. As a result, the magnitudes of any potential impacts resulting from the two projects are unknown at this

point. In order to understand how the broader transportation system will perform with both projects in place, additional analysis is required.

19. Public Engagement

The proposed changes to Queen Street for its conversion to two-way traffic operation, from Main Street to Herkimer Street, will impact local traffic, residents and through traffic. It is suggested that if Council wishes to proceed with the conversion, Public Information Centres (PIC) should be organized to allow interested residents to review the Feasibility and Functional Design of the conversion of Queen Street, from one-way to two-way traffic operations, so that their comments can be considered during a detailed design phase. On-street parking options may be an issue the residents wish to discuss further.

20. Conversion Planning

A proposed conversion of Queen Street from one-way to two-way traffic operation is not in a work plan or in a Capital Budget. If Council places a priority on this conversion, it could be included in an upcoming Capital Budget. If this is the direction of Council, staff would prepare the necessary budget sheets to reflect this project and they will review their proposed work plans to initiate the required work for this implementation. If, for example, the project was approved in the 2018 Capital budget, subject to detailed design and civil improvements required on Queen Street to accommodate the conversion, the implementation might not be completed until 2019. Other proposed work plan items may be required to be re-scheduled in order to proceed with this implementation.

ALTERNATIVES FOR CONSIDERATION

There are a number of alternatives that could be considered by Council:

1. Council could decide that the conversion of Queen Street, from one-way to two-way traffic operation, from Aberdeen Avenue to Main Street, is a priority and include Alternative three as the preferred conversion configuration in an upcoming capital budget deliberation process.
2. Council could proceed with Alternative three as the preferred configuration for the Feasibility and Functional Design of the conversion of Queen Street, but postpone the conversion until the full details of the impact of the B-Line LRT system is known.
3. Council could reconsider the recommendation of not proceeding with a Reversible Lane option on Queen Street and direct staff to proceed with the conversion of Queen Street, from Herkimer Street to Main Street, with Alternative four, and include a Reversible Lane feature. The estimated cost to implement the Reversible Lane operation would be an additional \$200,000 plus \$20,000 for contingency and \$50,000 for detailed design costs, totalling \$1,370,400 in

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conversion capital costs, (or \$270,000 more than Alternative three) and \$161,500, (or \$1,500 more than Alternative three), for annual operating costs.

4. Council could consider the implementation of Alternative three, and restrict all on-street parking on this section of Queen Street, from 7:00 a.m. to 6:00 p.m., and change the “Through Street” designation of Queen Street, in this section, to allow on-street parking on the west side of Queen Street, from 6:00 p.m. to 7:00 a.m. to accommodate on-street parking during the off-peak hours of the day. If this change is made, staff would recommend that this section of Queen Street be designated as an Emergency Snow Route, whereby all vehicles would be required to be removed during winter control activities, or be towed to allow the snow ploughing to proceed unobstructed. If Council wishes to consider this option, further details would be provided during the detail design phase with the appropriate Road and Traffic By-laws amended.
5. Council could approve the additional conversion of Queen Street to two-way operation from King Street to Main Street. Because of the current uncertainty of the LRT operations plans at the intersection of King Street and Queen Street, staff is recommending that the conversion of Queen Street, from King Street to Main Street, be postponed until the LRT operational plans are resolved. However, if Council wishes to proceed with the conversion of Queen Street between King Street and Main Street, they could direct staff to include this section in the conversion plans for approximately \$5,000 in additional Capital costs.

ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN

Community Engagement & Participation

Hamilton has an open, transparent and accessible approach to City government that engages with and empowers all citizens to be involved in their community.

Healthy and Safe Communities

Hamilton is a safe and supportive city where people are active, healthy, and have a high quality of life.

Clean and Green

Hamilton is environmentally sustainable with a healthy balance of natural and urban spaces.

Built Environment and Infrastructure

Hamilton is supported by state of the art infrastructure, transportation options, buildings and public spaces that create a dynamic City.

APPENDICES AND SCHEDULES ATTACHED

Appendix A - Cost estimate for the conversion of Queen Street, from Aberdeen Avenue to Main Street, to two-way traffic operation

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