



Final Study Report

# Downtown Orangeville Transit Transfer Station Safety Study

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Prepared for Town of Orangeville  
by IBI Group  
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# 1 Introduction

The purpose of this road safety study is to provide an independent, proactive, and explicit safety review of the proposed Downtown Orangeville Transit Transfer Station (the “transfer point”). Since the road safety study is evaluating the safety operations of a transit transfer point, emphasis will be placed on the safe movement of transit riders and vulnerable road users (e.g., pedestrians, cyclists, users of other mobility devices). However, transit operations, traffic operations, and geometric road design will also be considered. The safety study will identify potential safety issues associated with the proposed transit transfer location and will identify measures that could be applied to mitigate the identified risks.

## 1.1 Study Background

In 2015, the Town of Orangeville retained Dillon Consulting Ltd. (Dillon) to prepare a Transit Optimization Study to assist in developing a five-year service plan. One of the recommendations from that study was to construct a centrally located transfer point to improve the efficiency of transit operations. In a 2017 update to the original study, Dillon conducted a preliminary assessment of five candidate locations for the transfer point, considering factors such as site constraints, compatibility with transit routes, adjacent land uses, and implementation cost, among others. Through their assessment, Dillon recommended the site on Broadway, between Frist Street and John Street as the preferred location for the transfer point.

In March 2019, the Town of Orangeville formed the Orangeville Transit Task Force (OTFF) with the objective of identifying a preferred location for the transfer point. The OTFF, in an endorsement of the 2017 Dillon findings, recommended to Council that the transfer point be located on Broadway, between First Street and John Street, based on its central location, proximity to key destinations, space for transit amenities, high population within the catchment areas, and low implementation costs. Many businesses and residents have voiced concerns related to road user safety along this section of Broadway that they feel would present risks and challenges for transit riders, businesses, and visitors to the area. In response to stakeholder concerns, Council requested that a formal safety review of the location (i.e., this study) be conducted.

## 1.2 Project Team

The project team consists of the following individuals who, collectively, have extensive experience in road user safety, traffic operations, transit operations, transit terminal design, and geometric design. The project team members and roles are presented below:

- Matt Colwill, B.A.Sc., P. Eng. – Project Manager/Road User Safety Specialist;
- Chris Prentice – Transit Systems and Facilities Planner; and
- Stefan Tsang, B.A.Sc., EIT, RSP1 – Traffic Operations and Road User Safety Analyst.

## 1.3 Site Context

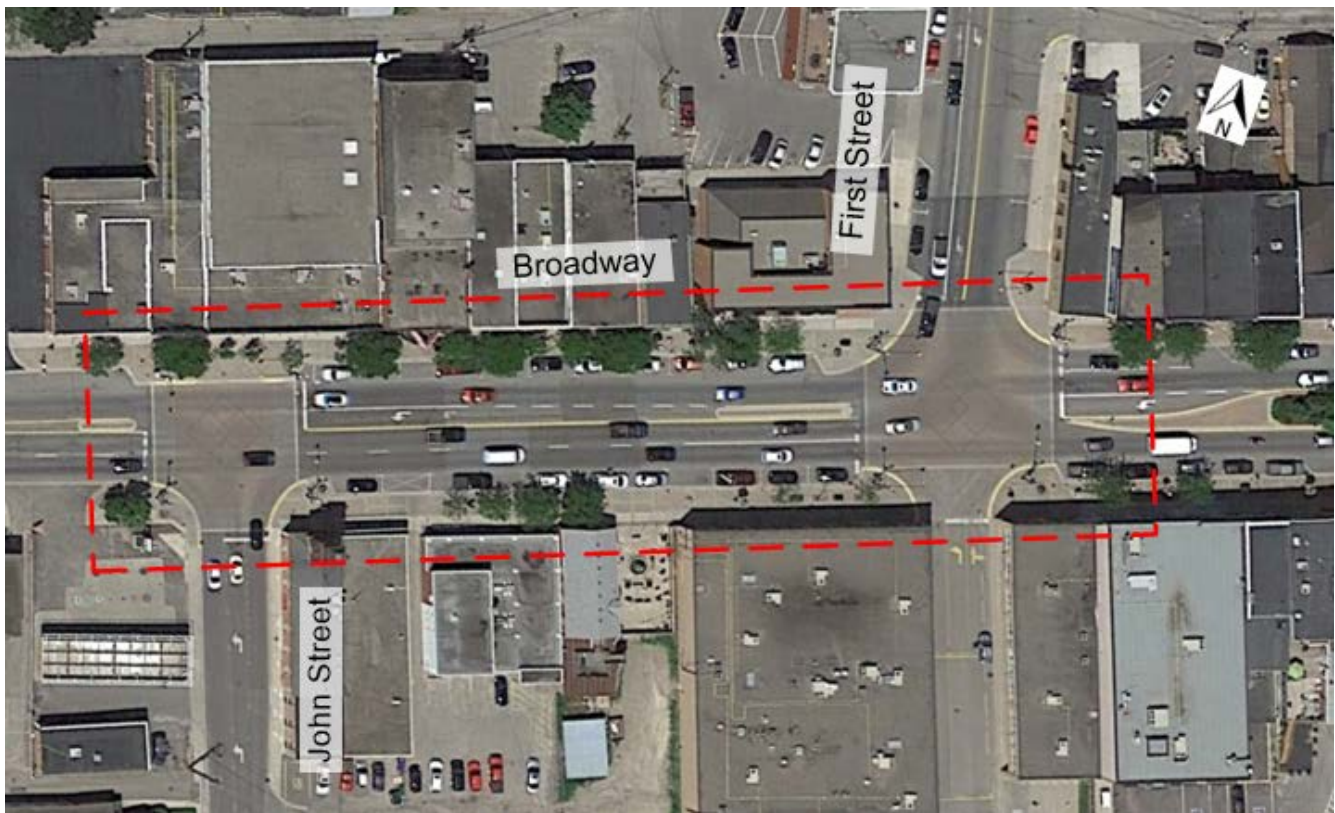
The site of the proposed transit transfer location is on Broadway, between First Street and John Street (Exhibit 2-1). This location is a short midblock segment approximately 90metres long, and is bookended by two signalized intersections. Within the study area, Broadway has a four-lane configuration consisting of one a dedicated left-turn lane and a through lane in each direction. There is also a curbside parking lay-by on each side of the street. This portion of Broadway is

designated as a Community Safety Zone which allows for increased fines if drivers violate the statutory 50 km/h speed limit or other roadway regulations.

Broadway is the main commercial strip of downtown Orangeville and is home to a wide variety of retail, professional services, and retail service uses that attract employees and visitors to the area. Specific to the study area, notable destinations include a Canada Post office, financial institutions, law firms, and retail stores. Some of these retail establishments provide off-street parking for their customers while others rely on the available on-street parking on Broadway. Delivery vehicles and couriers that serve the businesses typically use the on-street parking for pick-up/drop-off activity. In addition, there is a soup kitchen that is operated on weekdays by the Good Friends Fellowship that provides lunches and support to vulnerable people in the community. This combination of land uses results in increased pedestrian demand through the study area particularly during the midday, typically between 11:00 AM to 1:30 PM.

There are a total of 20 on-street parking spaces along Broadway within the study area, 10 on each side of the street. On-street parking in Orangeville is free of charge but with a 2-hour maximum time limit. Parking time limits are generally used to promote turnover making parking available to more users throughout the day. Historically, parking restrictions have largely only been enforced in response to complaints received. However, the Town very recently hired on additional by-law enforcement staff, which will allow for a more proactive approach to parking enforcement.

Exhibit 1-1: Study Area



## 2 Office Review

This section presents an overview of the office review, which included a review of background documentation, traffic volumes, and collision data received from Town staff.

### 2.1 Background Document Review

Town of Orangeville staff provided relevant background information documents, which are briefly summarized in this section. The intent of this review is to help establish the context for this safety study by examining the site history and to allow the findings from previous studies to be considered and incorporated into the recommendations presented herein.

#### 2.1.1 Downtown Parking Master Plan Study (March 2017)

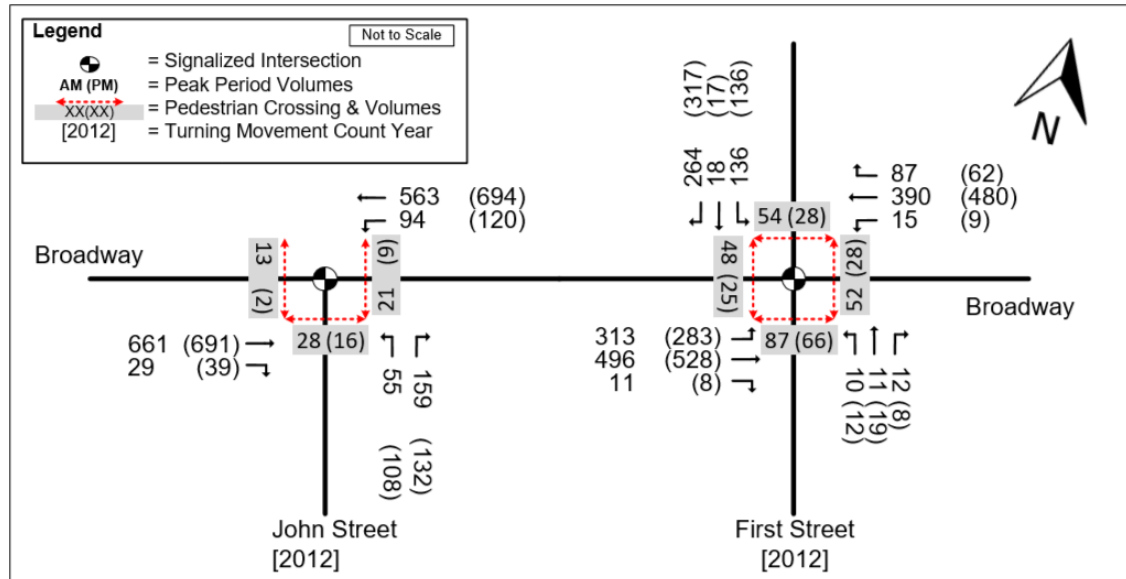
The consulting firm, Paradigm, was retained by the Town to assess the health of the parking system in the downtown area. As part of the study, existing parking operations were assessed through parking utilization surveys, and recommendations were proposed to address the existing and future needs of the downtown area parking system. A summary of relevant high-level findings is listed below:

- The survey consisted of on-street parking, municipal off-street, and privately owned, publicly accessible off-street parking facilities located in downtown Orangeville. Eight days of surveys were conducted on weekdays, weekends, and special events days to gain an understanding of typical and peak parking operations;
- Within two blocks of the proposed transit transfer point, there are more than 800 publicly available parking spaces (145 on-street, 117 municipal off-street, and 579 private off-street);
- 63% of vehicles parked on-street were parked for one hour or less, and 85% were parked for two hours or less. This suggests that a majority of drivers adhered to the maximum two-hour on-street parking duration, and that the on-street spaces are well utilized with relatively high turnover;
- Based on the utilization surveys, there were areas observed to have parking demand above the 90% parking utilization threshold during peak times, but it was concluded there were sufficient parking opportunities within walking distance. These peak times also occurred on special event days, which are not representative of typical operations. The study concluded that the current parking supply was sufficient to accommodate existing and future needs; and
- The study recommended additional measures to improve the downtown parking experience for visitors, including improving wayfinding for parking facilities so visitors are aware of alternative places to park near their destinations, and strategies to reduce parking demand through transportation demand management (TDM) measures such as promoting transit use and implementing paid parking to encourage visitors to park in off-street parking lots.

### 2.2 Traffic Volumes

Traffic volumes were provided by the Town for the intersections at John Street and First Street. Traffic volumes for the Broadway at John Street intersection were collected in 2012, and traffic volumes for Broadway at First Street were collected in 2012 and 2019. Based on a comparison of the 2019 and 2012 data at First Street, the 2012 data was found to have similar but higher vehicular volumes. As such, the 2012 traffic data has been used in this study. The AM and PM peak hours started at 10:45 AM and 4:15 PM, respectively. The turning movement counts and pedestrian volumes are shown in Exhibit 2-1.

Exhibit 2-1: Turning Movement Counts



Based on the turning movement counts shown in Exhibit 2-1, the following observations can be made:

- In general, eastbound traffic experiences higher demand for both the AM and PM peak hours;
- Both eastbound and westbound through volumes are quite high given that through traffic is accommodated in a single lane. This contributes to congestion during the peak periods, and is compounded by queue spillbacks at downstream intersections;
- The eastbound left-turn movement at First Street experiences high demand during peak periods, which is accommodated through an advance left-turn phase. Many drivers turn here to travel north towards Highway 10;
- The westbound left-turn movement at John Street experiences high demand during the peak periods, which is accommodated through an advance left-turn phase. Drivers turn here to access residential areas to the south.

## 2.3 Collision Data

Collision data was obtained from the Town's collision data management service provider (ASSI) to gain an understanding of the historical safety performance based on collisions that have occurred within the study area. The data received covered the period from August 2013 and September 2020. Often, historical collision analysis is limited to a five-year timeframe to ensure that associated operational and regulatory parameters are consistent across the analysis period. In this case, the study area operations are understood to have been relatively stable; therefore, the full seven-year collision dataset was used in the analysis.

Overall, there were a total of 90 collisions reported between August 2013 and September 2020. Of those, 45 collisions occurred at First Street, while 27 collisions occurred at John Street, and 22 collisions occurred on adjacent midblock segments (5 within 30m east of First Street, 17 between John and First Streets). With the exception of one vehicle-bicycle collision (2014, at First Street), all of the reported collisions during the analysis period were either vehicle-vehicle or single motor vehicle (SMV) collisions (i.e., no vehicle-pedestrian collisions were reported).

The most frequent impact type was rear-end collisions with a total of 35 (39% of all collisions). This proportion of rear-end collisions is common for an urban roadway where there is regular

congestion especially considering the close intersection spacing along Broadway. There were 24 rear-end collisions at First Street, and 10 at John Street. These collisions primarily occurred in, and were evenly distributed between, the eastbound and westbound directions. The collisions primarily occurred during the midday and PM peak period, which is consistent with traffic patterns in a mixed land-use environment. Only two rear-end collisions were specifically noted to have occurred when a driver was pulling into or out of an on-street parking space.

The second most frequent collision impact type was "SMV unattended". Typically, these collisions involve one vehicle colliding with another that is parked. There were a total of 19 SMV unattended collisions (21% of all collisions), which is quite high for an urban environment, even with the presence of on-street parking. A total of 12 SMV collisions involved the on-street parking spaces on the south side of Broadway and 7 involved the on-street parking on the north side of Broadway. These collisions were relatively evenly distributed throughout the day, but experienced peaks between 10:00 to 11:00 AM and 5:00 to 6:00 PM, which aligns very closely with the AM and PM peak hours, suggesting that traffic congestion played a role.

There were a total of 14 turning movement collisions (7 at First Street, and 7 at John Street). The collisions were evenly distributed throughout the day with a slight peak between 5:00 to 6:00 PM. There were no discernable trends related to the directionality of the observed collisions.

A total of 13 sideswipe collisions occurred (14% of all collisions). There were 6 sideswipe collisions that occurred at First Street, 5 at John Street, and 2 midblock. These collisions occurred in the east-west direction, with slightly more than half occurring in the eastbound direction. There were five collisions that involved vehicles pulling out of a parking space and colliding with a vehicle in the travel lane, this occurred three times on the south side of Broadway and twice on the north side. The parking related sideswipes occurred in the afternoon near the PM peak hour.

### 3 Transit Service Summary

The following section expands on the background information related to the recent transit study, and provides details about the planned operation of transit routes and the proposed downtown transfer point.

#### 3.1 Transit Study

As described in Section 1.1, the Town recently completed a transit study to identify ways to improve the transit service and increase transit ridership.

The transit study recommended the adoption of a four-route network, compared to the existing three-route network, to better and more reliably serve the town. In particular, the study recommended locating the main transfer point on Broadway between First Street and John Street. The transfer point is where the buses would meet at the same time so that transit users who need to take more than one route to reach their destination can conveniently transfer between routes. The Broadway/First-John location would also provide transit users with better access to the downtown area as it is operationally more central. Currently, the transfer point is on Fourth Street at Broadway on the eastern edge of the downtown area. This location is constrained with limited space for the current three-bus/three-route system. With the buses present there is no room for traffic to pass without encroaching on the opposing lane. Given the short block spacing and likely access conflicts, Town staff have indicated that it would not be feasible to operate the planned four-bus/four-route network using the current Fourth Street transfer location.

Buses on each of the existing three routes currently operate eastbound along Broadway through the downtown, between Clara and Fourth Streets. There are existing transit stops located just



west of John Street, at Mill Street, just east of Second Street, and on Fourth Street. Some of these locations result in a lengthy walk for transit users wishing to access businesses and destinations in the downtown area.

### 3.2 Route Schedules

Buses on each route are planned to operate every 30 minutes from approximately 7:15 AM to 8:45 PM, Monday to Friday, and 7:15 AM to 6:15 PM, on Saturdays. There is no service planned at this time on Sundays or statutory holidays.

### 3.3 Downtown Stop and Transfer Point

As noted, the selection of the transfer point location and stop on Broadway, between First and John Streets, is intended to provide transit users with improved access to the downtown area as well as provide a more convenient layby for the transit buses that will not impede general traffic operations. Similar to the existing location at Fourth and Broadway, the proposed transfer point on Broadway would be a time point, that is, where the buses would come together at the same time to allow passengers to transfer between routes, as necessary, to complete their trips. Based on the current and proposed route schedules, four buses would come together every 30 minutes and would likely stop for several minutes until all buses had arrived. Passengers then would transfer between buses as needed before the buses depart.

The proposed configuration of the transfer point consists of an area sufficient to accommodate two buses on the north side of Broadway and two buses on the south side. The Town plans to install amenities for transit users such as shelters, signage, benches and waste receptacles at the transfer point, similar to what is currently provided at Fourth and Broadway, to enhance the appeal of taking transit.

Other examples of transit transfer points located on a major downtown roadway can be seen in cities such as Sarnia and Tillsonburg. These transfer points occupy a curbside lane and are adjacent to one or two travel lanes which is similar to the proposed configuration on Broadway. Images of transfer points in Sarnia and Tillsonburg are shown in Exhibit 3-1 and Exhibit 3-2, respectively.

Exhibit 3-1: Sarnia Transfer Point



Exhibit 3-2: Tillsonburg Transfer Point



### 3.4 Transfer Point Ridership Activity

Orangeville's 2019 annual transit ridership was 104,000 passengers, indicating an average of approximately 340 trips per day or 110 per route. With buses operating every 30 minutes, 13 hours per day, this represents an average of 26 trips per day per route. As a result, the average number of passengers per trip is approximately 4. Four (4) riders per trip would be for the whole

route with people being picked up and dropped off at other locations along the way. Since the downtown area is an important destination, it is estimated that perhaps half of the trips on each route, or 2 riders per trip per route, can be expected to use the transfer point stop although this will vary by time of day and day of the week.

The transit study projects that ridership would increase by 80% over the next 5 years as a result of the improved route network and service reliability. On this basis, the number of users at the downtown transfer stop location might increase similarly to approximately 3 riders per trip per route.

Most riders will travel on foot to and from transit; however, some will use other mobility devices (e.g., scooters, bikes, strollers, wheelchairs, etc.) to access the service. The transfer point will need to accommodate all types of users and may include the provision of infrastructure to provide greater connectivity to transit for a variety of transportation modes (e.g., cyclist parking, roadway connections, etc.). In particular, this may increase cyclist demand through the area, and an increased number of conflicts between cyclists and general traffic. The design of the transfer point should consider providing cyclist infrastructure to facilitate the safe movement of cyclists through the area. Currently, there is limited cyclist infrastructure along Broadway, which presents challenges and risks for cyclists, and could result in conflicts with pedestrians if sidewalk riding increases. It is not within the scope of this study to propose new cycling routes or infrastructure to/from the transfer point.

### 3.5 Transit Buses

The buses being used by Orangeville Transit were purchased new by the Town within the past three years. They are 30 feet long, seat 24 people plus space for standees, and are accessible with a folding ramp at the front door and two securement areas inside for people with mobility devices. The buses are 'clean diesel' technology, fully compliant with all current emissions standards, which minimizes visible exhaust and related carbon. It should be noted that diesel engines produce very little harmful carbon dioxide gas compared to the gasoline engines found in most cars and light trucks.

### 3.6 Transit Contract

The transit service is operated under contract with the Town by a local private company, FirstGroup. FirstGroup is responsible for the full operation and maintenance of the buses.

## 4 Field Investigation

A field investigation was completed on Monday, September 21, 2020, between 11:00 AM and 3:30 PM. The purpose of the field investigation was to observe and document the existing traffic operations and road user behaviours, and record field conditions and measurements. During the field investigation, interactions were observed between road users (e.g., pedestrians crossing at midblock locations), impacts of parking on congestion, and conflicts with other road users. A review of pavement markings and geometric design features (e.g., sidewalk widths, lane widths, sightlines, etc.) was also undertaken.

Despite the fact that the field investigation was conducted with lower than normal traffic and pedestrian volumes due to the circumstances surrounding COVID-19, the volume of vehicles and pedestrians through the study area were sufficient to observe several interactions between vehicles and vulnerable road users. The site investigations were critical in helping to identify the key issues presented in Section 6.

## 5 Stakeholder Consultation

This section outlines the consultation that was conducted to gain an understanding of the existing road user safety concerns from the perspective of the key stakeholders. The stakeholders are composed of representatives of the Orangeville BIA, local businesses, transit operators (FirstGroup), and emergency service providers.

It should be noted that the design of the transfer point is in the preliminary stages and that the consultation conducted as part of this study was one occasion for stakeholders to provide input and have their concerns addressed as part of the overall design process.

### 5.1 Stakeholder Walkthrough

A stakeholder walk-through was conducted on Monday, September 21, 2020, between 10:00 AM and 11:00 AM. Through this exercise, valuable insight was gained into the existing traffic operations and issues related to road-user safety within the study area. A total of 16 stakeholders from the BIA and 2 representatives from FirstGroup attended. Issues and concerns related to road-user safety that were identified are presented in Exhibit 6-1.

During the walk-through, there were also comments and concerns raised by the stakeholders that were not directly related to road-user safety. Addressing such concerns is not within the scope of the study. To maintain a record of all input, the out-of-scope comments have been included as part of **Appendix A**. There may be an opportunity to consider related actions in response to them as part of the future design of the transfer point. In addition to attending the walkthrough, some stakeholders provided written accounts of their concerns which have been included with the input received during the in-person meeting.

### 5.2 Emergency Service Providers

Representatives from the Orangeville Fire Service and Dufferin County Paramedic Service were contacted to solicit feedback related to road user safety issues along Broadway within the project site. From that correspondence, the primary interest of both emergency service providers is ensuring that the live traffic lanes be kept free of buses waiting at the transfer point. Both emergency service providers indicated that they have no issue with the proposed addition of bus stops on the north and south side of Broadway, since the bus areas would be replacing existing parking spaces, the traffic operations in the travel lanes would be largely unaffected.




Through discussions with Paramedic Services, it was noted that when responding to calls along Broadway, at locations where there is only one travel lane, they will often stop in the live lane. This creates congestion along Broadway for the duration of the call. The potential removal of some on-street parking along Broadway, between First Street and John Street, may present opportunities for Emergency Service Providers to stop on the curbside without disrupting traffic.

Orangeville Police Services were also provided an opportunity to comment on the proposed transfer point, but, as of the time of writing, no response had been received. The concurrent transition of Orangeville Police Services to Ontario Provincial Police (OPP) command may have been a factor in the delayed response.


## 6 Identification of Issues



To assist in identifying a preferred option, from a road-user safety standpoint, a table has been prepared that outlines the identified issues and concerns. The issues have been grouped into sub-categories for ease of discussion. The table includes an issue identifier (number), location, description, image, source that identified the issue, and high-level potential actions for addressing each issue.

Exhibit 6-1: Road User Safety Issues

ISSUE #	LOCATION	DESCRIPTION	IMAGE	SOURCE	POTENTIAL ACTIONS
1.0 Pedestrian Crossing Movements and Facilities					
1.1	Midblock (between First Street and John Street)	<p>Pedestrians cross Broadway at midblock locations, which results in conflicts with vehicles. This issue is compounded by the fact that pedestrians will often enter the road from between parked vehicles, which can reduce their visibility to drivers.</p> <p>There may be risks of pedestrians entering the road from between stopped buses, which would reduce their visibility to drivers even more than a parked vehicle.</p> <p><i>Image Caption: pedestrian crossing at a midblock location (John Street, looking east)</i></p>		BIA Stakeholders and IBI Group	<p>Place transit shelters and amenities near signalized intersections to encourage transit passengers to use controlled crossings</p> <p>Removal of on-street parking may improve pedestrian visibility for drivers, since the curbside lane will not be occupied for a majority of the time. This requires proactive parking enforcement to prevent illegal parking/loading activity in the curbside lane or in the future bus stop area.</p> <p>Install a median treatment to prevent midblock crossings, similar features are present on adjacent sections of Broadway.</p>
1.2	First Street John Street	<p>Crosswalk markings are difficult to see, which may lead to lower visibility and of pedestrians for drivers. The existing crosswalks feature a different interlocking stone pattern compared to the middle of the intersection, but low contrast might not clearly delineate crosswalks from all angles and under all lighting conditions.</p> <p>Curb cuts follow the full length of the curb radius and have a non-tactile surface; additional, the yellow pavement markings are faded, all which may present challenges for pedestrians with low or no vision.</p> <p><i>Image Caption: low visibility of crosswalks and faded curb pavement markings (First Street, looking south)</i></p>		BIA Stakeholders and IBI Group	<p>Addition of tactile plates at intersection corners and ladder markings within crosswalks to improve crosswalk detection and conspicuity.</p>
1.3	First Street John Street	<p>Pedestrian clearance times are not sufficient for many users based on the crossing distances. This is compounded by the presence of seniors, children, and other vulnerable members of the community in the area that may not be able to safely cross the street in time.</p> <p><i>Image Caption: pedestrian with an accessibility device crossing Broadway (John Street, looking west)</i></p>		IBI Group	<p>Update pedestrian clearance times based on OTM standards (or user calibrated walking speeds) to better accommodate vulnerable road users.</p>



ISSUE #	LOCATION	DESCRIPTION	IMAGE	SOURCE	POTENTIAL ACTIONS
1.4	Study Area	Limited pedestrian level lighting along the study area, which results in limited pedestrian visibility under low-light conditions.	No Image Available	BIA Stakeholders and IBI Group	Town will be installing conduit along Broadway as part of a sidewalk reconstruction project. This will allow for the provision of additional pedestrian-level lighting and security cameras.
1.5	Study Area	Current snow clearing practices along Broadway are not sufficient and present risks of slips, trips, and falls for pedestrians, especially given the presence of seniors, children, and other vulnerable members of the community.	No Image Available	BIA Stakeholders	Revisit snow removal processes to ensure clear sidewalks and crosswalks to facilitate the safe movement of pedestrians in the area.  Enhanced winter maintenance practices will also need to be established to ensure that the transfer point and amenities are accessible to all users year-round. This would be consistent with current Town practices for all transit stops and the existing transfer point on Fourth Street.
1.6	Study Area	A lack of cyclist infrastructure and the presence of wide sidewalks may lead to cyclists riding on the sidewalk, possibly causing conflicts between cyclists and pedestrians. This may be compounded by an increased number of cyclists in the area accessing the transfer point.	No Image Available	BIA Stakeholders and IBI Group	Provide continuous cyclist facilities connecting the existing/planned cycling network to the transfer point.  Signage can direct cyclists to nearby cycling facilities, and reinforce that sidewalks are meant for pedestrians (e.g., “Cyclists Dismount” sidewalk decals).
2.0 Transit Operations					
2.1	Study Area	Proposed configuration of bus stop areas on both the north and south side of Broadway will result in some transit passengers, although limited in number, needing to cross the street to complete a transfer. This can lead to risk-taking behaviour by pedestrians (i.e. midblock crossings, disobeying pedestrian signals).	No Image Available	BIA Stakeholders and IBI Group	Consider transit routing alternatives to locate all bus stop areas on the south side of Broadway. This will reduce the potential number of transit users crossing Broadway to transfer between routes, and will consolidate the space needed for transit amenities to one side of the street.
2.2	Study Area	Transit vehicles may have challenges merging back into the live traffic lane after servicing the transfer point. Drivers parked in the existing parking lane were observed to have challenges merging back into the traffic lanes.	No Image Available	IBI Group	Transit priority measures (e.g., signal phasing) can be implemented at the First and John Street intersections to provide gaps in traffic for transit vehicles to enter the traffic lane with fewer conflicts.
3.0 Emergency Service Provider Operations					
3.1	Study Area	<p>There is limited space for general traffic to make way for emergency vehicles to travel along Broadway when responding to service calls. It should be noted that this is an existing issue along Broadway, and the provision of a transfer point is not anticipated to have a negative impact for Emergency Service Providers.</p> <p><i>Image Caption: cross-section of Broadway (approaching First Street, looking east)</i></p> <p><i>Image Source: Google Earth, retrieved October 22, 2020</i></p>		BIA Stakeholders	<p>Ensure that transfer point design and operation has minimal impacts to the live travel lane.</p> <p>The removal of on-street parking spaces may provide additional space for general traffic to make way for emergency vehicles.</p>

ISSUE #	LOCATION	DESCRIPTION	IMAGE	SOURCE	POTENTIAL ACTIONS
4.0 Intersection Geometry					
4.1	First Street	<p>The large curb radius for the southbound right-turn movement may result in high vehicle turning speeds, contributing to potential conflicts with crossing pedestrians.</p> <p>Members of the BIA have noted that there are often conflicts between crossing pedestrians and southbound right-turning vehicles.</p> <p><i>Image Caption: large turn radius on the northwest corner of First Street may result in high turn speeds (First Street, looking south)</i></p>		BIA Stakeholders and IBI Group	<p>Reduced turn radius for the northwest corner to lower turning speeds. This will also reduce pedestrian crossing distances.</p> <p>Implementation of a Leading Pedestrian Interval to increase pedestrian visibility and priority through the crosswalk.</p> <p>Addition of crosswalk markings to improve crosswalk and pedestrian visibility.</p>
4.2	First Street	<p>Negative offset for the eastbound and westbound left-turn lanes at First Street. The presence of negative offset left-turn lanes can result in opposing left-turning vehicles obstructing the view of oncoming opposing through traffic.</p> <p><i>Image Caption: diagram showing negative offset left-turn lanes for the eastbound and westbound approaches</i></p> <p><i>Image Source: Google Earth, retrieved October 26, 2020</i></p>		IBI Group	<p>Update geometry of the eastbound left-turn approach to better align with the westbound left-turn lane, thereby improving visibility of approaching traffic for turning vehicles.</p>

## 7 Recommendations

Exhibit 7-1 outlines a number of recommendations that could be incorporated into the design of the Broadway transit transfer point that would help to mitigate risks to road-user safety. Each recommendation includes the following details: the location, recommendation, implementation timeline, and cross-reference to issue(s) presented in Exhibit 6-1 that is being addressed.

For the implementation timeline, short-term recommendations should be implemented before the transfer point is operational, and long-term recommendations could be implemented before or after the initial opening of the transfer point.

A qualitative assessment of associated benefits and challenges has also been provided for each recommendation. It is generally recognized that there are design and/or construction costs associated with implementing each of the recommendations. While those costs have not been estimated, the implementation timelines have been suggested with the understanding that higher-cost items will require more time for funding to be programmed into the Town's budget.

Exhibit 7-1: Recommendations Table

LOCATION	RECOMMENDATION	BENEFITS	CHALLENGES	ISSUE(S) ADDRESSED
Midblock	<p>Locate all four transit transfer point bus stop locations on the south side of Broadway.</p> <p><b>Implementation timeline: short-term</b></p>	<p>Eliminates the need for passenger transfers across Broadway; and</p> <p>May reduce the total amount of curbside space that is occupied by transit amenities.</p>	Will not fully eliminate midblock crossings by transit riders, since there are still origins/destinations on the north side of Broadway.	2.1
First Street John Street	<p>Implement transit signal priority solutions at John Street and First Street to create gaps in traffic for transit vehicles to merge into the travel lanes after servicing the bus stops.</p> <p><b>Implementation timeline: long-term (as required)</b></p>	Provides opportunities for transit vehicles to safely and efficiently merge into travel lanes, thereby reducing delays for transit passengers.	May result in additional delay to eastbound through traffic along Broadway.	2.2
First Street John Street	<p>Addition of high-visibility ladder markings within the crosswalks and tactile plates at curb cuts.</p> <p><b>Implementation timeline: short-term</b></p>	<p>Increased visibility of pedestrians in crosswalks;</p> <p>Increased crosswalk visibility may direct more pedestrians to cross at intersection locations; and</p> <p>Improved accessibility for pedestrians with limited or no vision.</p>	N/A	1.1 1.2
First Street John Street	<p>Increase pedestrian clearance times at intersections.</p> <p><b>Implementation timeline: short-term</b></p>	<p>Provides greater opportunity for all pedestrians to safely cross the road within the pedestrian interval; and</p> <p>Supports higher population of seniors and pedestrians with mobility challenges.</p>	Increased pedestrian clearance times may lead to longer cycle lengths, longer vehicle queues and delays.	1.3



LOCATION	RECOMMENDATION	BENEFITS	CHALLENGES	ISSUE(S) ADDRESSED
First Street	<p>Reduce radius of northwest corner of Broadway at First Street.</p> <p><b>Implementation timeline: long-term (with option for short-term temporary treatment)</b></p>	<p>Reduced turning radius, thereby reducing southbound right-turn speeds; and</p> <p>Reduced pedestrian crossing distance.</p>	<p>May be difficult for larger vehicles to execute right-turn movements.</p> <p><i>Design and control vehicle analysis will need to be part of the redesign. If it is determined that reducing the corner radius is not feasible, the addition of a leading pedestrian interval with right-turn on red prohibition for the east and west crosswalks could be a suitable alternative mitigation.</i></p>	4.1
Study Area	<p>Removal of a traffic lane through the implementation of back-to-back eastbound and westbound left-turn lanes</p> <p><b>Implementation timeline: long-term</b></p>	<p>Reclaimed space can be used to provide increased public realm and accommodate transit amenities;</p> <p>Reduced crossing distances across Broadway for pedestrians;</p> <p>Improved alignment of the eastbound and westbound left-turn lanes at First Street reduced sightline obstructions for turning vehicles.</p> <p><i>Possible cross-section reconfiguration options are explored in Section 8.</i></p>	<p>Potential for increased delay for drivers along Broadway due to shorter left-turn storage lanes at First Street and John Street.</p> <p><i>This delay can be reduced by encouraging drivers to take alternate routes, allowing Broadway to serve local downtown visitors instead of pass-through trips. Improved transit service can help with transportation demand management.</i></p>	4.2
Study Area	<p>Improve pedestrian level lighting at midblock locations along Broadway.</p> <p><b>Implementation timeline: short-term (there is an ongoing project to install conduit along Broadway to facilitate the addition of lighting and security cameras)</b></p>	<p>Increased lighting improves pedestrian visibility during periods of low light.</p>	N/A	1.4

LOCATION	RECOMMENDATION	BENEFITS	CHALLENGES	ISSUE(S) ADDRESSED
Study Area	Deploy enhanced winter maintenance practices to facilitate the safe movement of pedestrians and year-round access to transit facilities for all users per Town policy for all transit facilities. <b>Implementation timeline: short-term</b>	Reduces risk of pedestrian slips, trips, and falls.	N/A	1.5
Study Area	Install signage to reinforce that sidewalks are meant for pedestrians (e.g., “Cyclists Dismount” sidewalk decals). <b>Implementation timeline: short-term</b>	Reduces the risk of bicycle-pedestrian conflicts.	N/A	1.6
Study Area	Provide continuous cyclist facilities between the existing/planned cycling network and the transfer point. <b>Implementation timeline: long-term</b>	Improved connections to transit facilities for non-auto transportation modes.	N/A	1.6

## 8 Potential Cross-section Reconfiguration

Based on the recommendations presented in Exhibit 7-1, conceptual cross-section designs have been prepared to compare the existing configuration to the potential changes at First Street and at John Street. For these cross-sections, it was assumed that the sidewalk and parking lane on the north side of Broadway would remain the same it is under existing conditions to minimize the costs associated with reconstruction. IBI Group staff have proposed two options for potential cross-section reconfigurations to manage road user safety risks with the operation of the transfer point. We recognize that the concepts would need to be further assessed (e.g., traffic analysis, design vehicles turning, impacts on adjacent blocks, etc.) before their feasibility could be determined, and it is assumed that further public and stakeholder consultation would be undertaken before moving forward with any significant reconstruction.

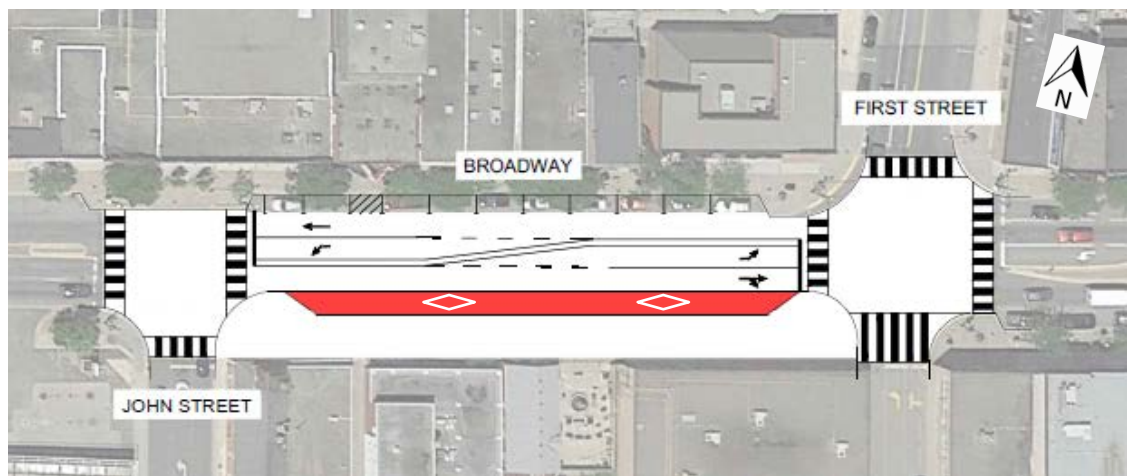
### **Potential Configuration 1: Implementation of Back-to-back Left-turn Lanes**

This option involves the removal of one traffic lane through the implementation of back-to-back left-turn lanes for the eastbound left-turn at First Street and the westbound left-turn at John Street. The single travel lanes in the eastbound and westbound direction would be maintained. The space gained from the removal of a traffic lane have been added to the south sidewalk on Broadway to provide additional space to accommodate transit amenities, passenger queueing areas, while still providing space on the sidewalk for pedestrians and mobility devices. This design results in the eastbound left-turn lane at First Street being shifted to the north, which removes the existing negative offset with the westbound through lane, improving visibility for left-turning drivers. The removal of a traffic lane would also result in a reduced road cross section, shortening the crossing distance for pedestrians in the west crosswalk. The addition of ladder markings in crosswalks will improve visibility of crossing pedestrians, and may attract more pedestrians to cross at the intersection.

A challenge associated with this design is that there is a significant lane shift in the eastbound through lane at First Street. This may result in drivers mistakenly driving onto the median on the east leg of First Street. Another challenge related to this design is that the left-turn lanes are shortened, which may result in queues blocking the through lane. However, due to the additional queues, drivers may find alternate routes to avoid turning left at First Street, resulting in Broadway serving downtown visitors instead of pass-through trips.

A conceptual drawing of this configuration is shown in Exhibit 8-1.

Exhibit 8-1: Option 1 Conceptual Drawing



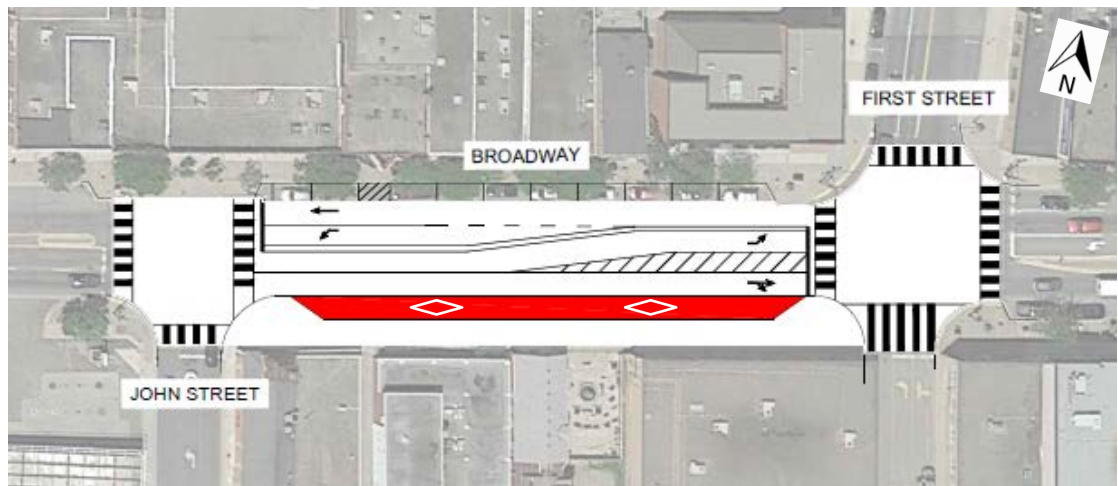
### **Potential Configuration 2: Realignment of the Eastbound Left-turn Lane at First Street**

This option involves the realignment of the eastbound left-turn lane at First Street through the implementation of a slot left-turn lane. There would be a painted or physical median replacing the existing left-turn lane, pushing the left-turn lane further north. This allows for improved visibility of opposing through vehicles for eastbound and westbound left-turning drivers at First Street. Compared to existing conditions, this potential configuration would require the removal of the median on the west leg of the intersection, but the curbs and roadway width would remain the same. Eastbound left-turn storage would also be largely unaffected. Similar to Configuration 1, the addition of ladder markings in crosswalks will help to increase pedestrian visibility in crosswalks.

A challenge associated with this configuration is that the westbound left-turn lane length would be reduced to accommodate the realigned eastbound left-turn lane. This may result in the queues associated with the westbound left-turn movement at John Street obstructing the westbound through lane.

A conceptual drawing of this configuration is shown in Exhibit 8-2.

Exhibit 8-2: Option 2 Conceptual Drawing



The existing and potential cross-sections at First Street are shown in Exhibit 8-3, Exhibit 8-4, and Exhibit 8-5. Note that the measurements shown in the cross-sections are approximate, and more detailed surveys will be conducted in the next phases of design.

Exhibit 8-3: Existing Cross-section at First Street, Looking East



Exhibit 8-4: Option 1 Cross-section at First Street, Looking East

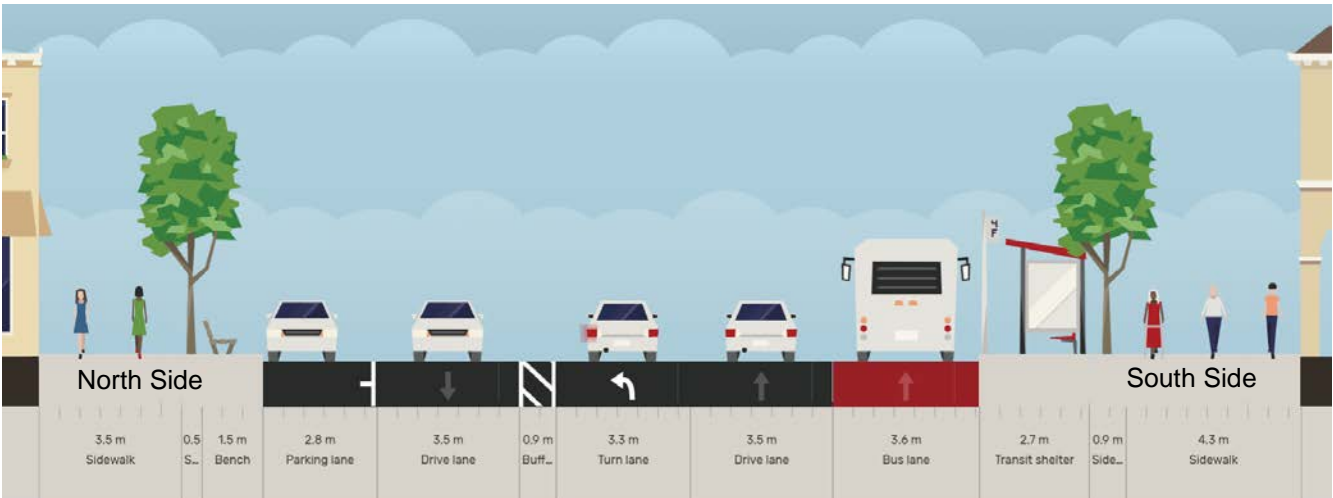
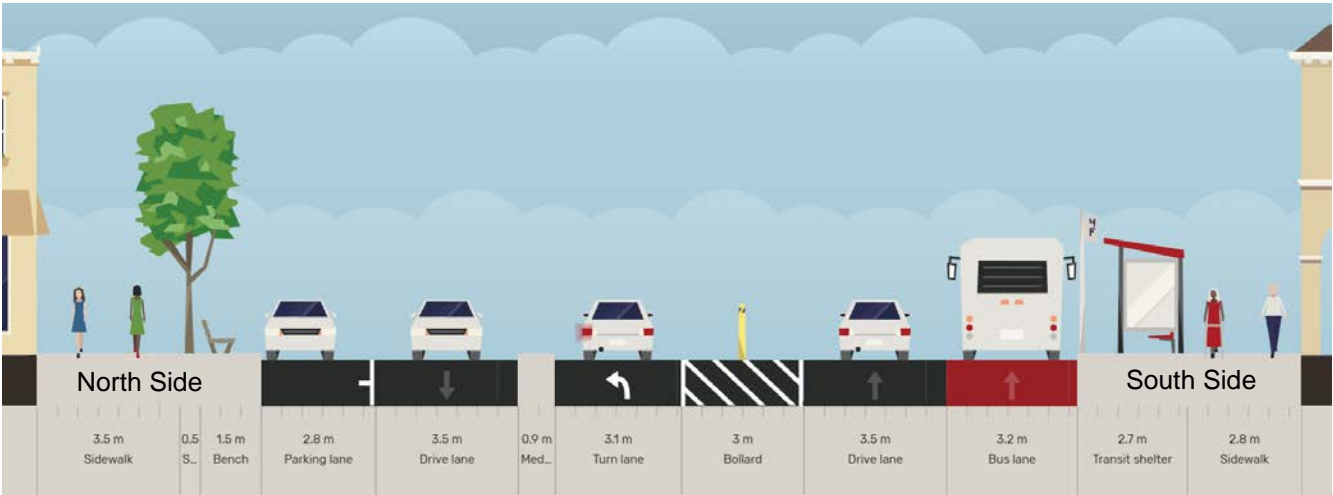


Exhibit 8-5: Option 2 Cross-section at First Street, Looking East



The existing and proposed cross-section for John Street, looking east, are shown in Exhibit 8-6, Exhibit 8-7, and Exhibit 8-8.

Exhibit 8-6: Existing Cross-section at John Street, Looking East



Exhibit 8-7: Option 1 Cross-section at John Street, Looking East

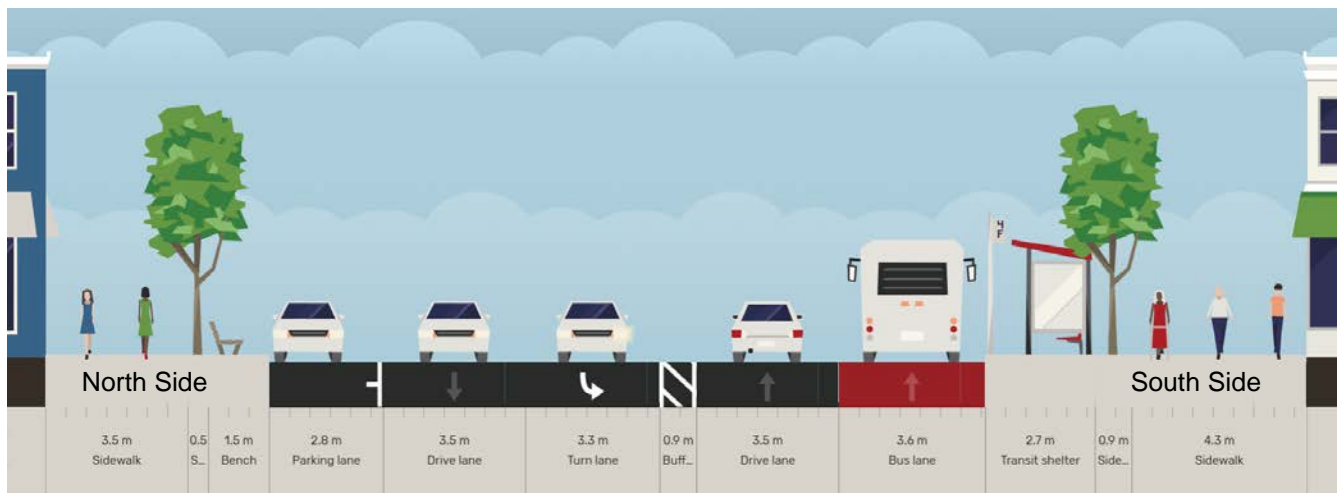
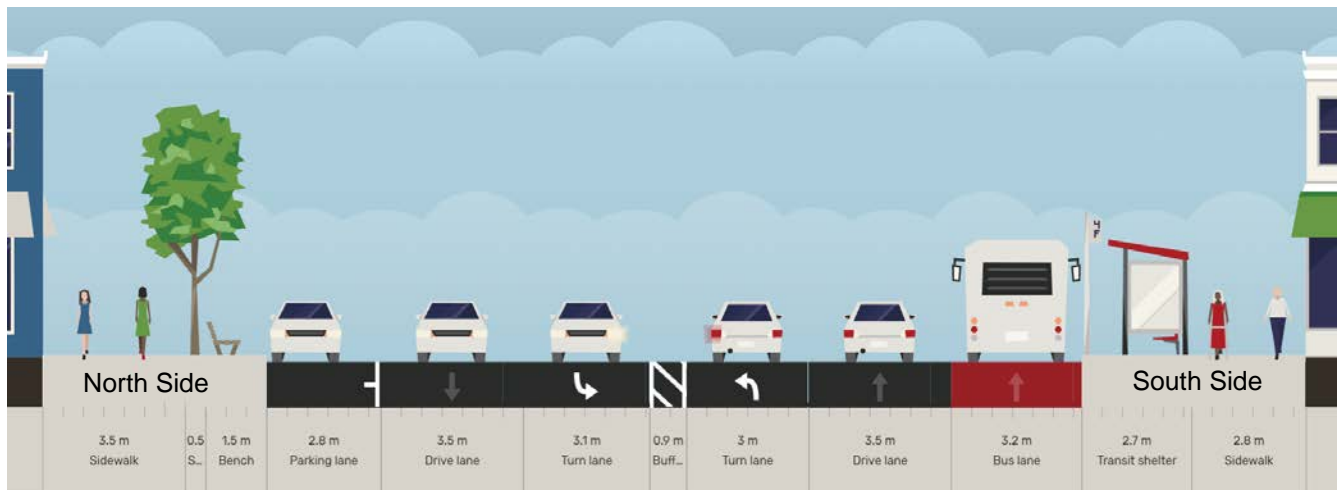


Exhibit 8-8: Option 2 Cross-section at John Street, Looking East





## 9 Conclusions

Based on the findings of the in-office review, stakeholder consultation involving local business owners, members of the BIA, and emergency service providers, and field investigations, a number of issues related to road-user safety were identified. Issues identified involved pedestrian crossing movements and facilities, future transit operations, emergency service provider operations, and intersection geometry. A number of recommendations were proposed to mitigate the observed risks. The benefits and challenges, from a road-user safety standpoint, of each recommendation were presented. Many of the recommendations could be implemented prior to the transfer point being opened, since they address safety risks that exist under current conditions.

Although there are road-user safety concerns related to pedestrians crossing outside of designated crosswalks and potential interactions between transit vehicles and general traffic, there are design elements and signal operation strategies that can be implemented to mitigate these issues. Compared to existing operations, the conversion of on-street parking spaces to transit bus areas isn't anticipated to lead to a disproportionate increase in road-user safety risk relative to existing operations. **Overall, the study team did not observe or identify any road-user safety risks that would preclude the transfer point from being located on Broadway between First Street and John Street.**

# Appendix A

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## Out-of-Scope Issues



LOCATION	DESCRIPTION	SUGGESTED ACTION
Study Area	Current bus operations result in long delays, queueing, and bunching for transit vehicles. This also results in congestion for general traffic behind transit vehicles.	The new bus route structure will be modified to reduce the amount of overlap between different routes, which should reduce queueing and bunching.
Study Area	<p>Walking distance for customers and visitors will be increased due to the removal of on-street parking. This presents accessibility challenges for seniors or individuals that require accessibility devices to walk between their parking space and destination.</p> <p>AODA compliance should be considered as part of the study.</p>	<p>Improve wayfinding for nearby parking facilities to raise awareness of nearby parking facilities.</p> <p>Reduce maximum parking duration for remaining on-street spaces to increase turnover and improve availability.</p> <p>Implement on-street paid parking to increase availability of highly desirable parking spaces.</p> <p>Remaining on-street parking spaces could be converted to accessible spaces and designated loading zones.</p> <p>Compliance with accessibility standards will be included as part of the design phase.</p>
Broadway between First Street and John Street	Presence of bus terminal may result in passengers waiting and loitering on the sidewalk. This could result in congestion on the sidewalks and challenges for seniors and accessibility.	<p>Sidewalks are approximately 5.5m-wide, which should provide ample space for a 2.0m pedestrian clearway, leaving 3.5m for street furniture and other amenities.</p> <p>Alternative configuration of having all bus stops on one side of the road may reduce the amount of transit amenities on both sides of Broadway</p>
Broadway between First Street and John Street	People will urinate in alleyways if there is a bus transfer point without public washrooms.	According to input from BIA stakeholders, this is an existing issue. Based on the short duration of transit transfer time, transit passengers are not anticipated to add to this behavior. The current transfer location at Broadway and Fourth Street does not have public washrooms, and public urination is not an issue at that location according to Town staff.
Study Area	It is alleged that some transit passengers waiting at the current Fourth Street transfer point use nearby businesses to stay warm while waiting for a bus during the winter months. There is a concern that transit passengers will do the same with businesses on Broadway.	<p>Provide transit shelters to keep passengers out of the cold while waiting for a bus.</p> <p>Additionally, more promotion of the bus locator app that shows transit users when the bus is to arrive could allow them to plan their trips to avoid long waits.</p>

LOCATION	DESCRIPTION	SUGGESTED ACTION
Broadway between First Street and John Street	Businesses along Broadway have deliveries, couriers, and pick-up/drop-off activity that would be competing for curbside use with bus spaces. Illegal stopping and/or loading activity will need to be managed	<p>Improve wayfinding for nearby parking facilities to raise awareness of nearby parking facilities.</p> <p>Reduce maximum parking duration for remaining on-street spaces to increase turnover and improve availability.</p> <p>Implement on-street paid parking to increase availability of highly desirable parking spaces.</p> <p>Remaining on-street parking spaces could be converted to accessible spaces and designated loading zones.</p> <p>Proactive parking enforcement to deter illegal stopping and/or loading activity.</p>
Study Area	Emissions from transit buses are harmful to nearby businesses and pedestrians. Emissions tests for buses should be considered as part of the evaluation.	<p>Conduct an air quality study to compare existing (baseline) emissions associated with general traffic and parking operations to what is generated under the proposed transit transfer point operations. The buses are 'clean diesel' technology, fully compliant with all current emissions standards, which minimizes visible exhaust and related carbon. Their diesel engines produce very little harmful carbon dioxide gas compared to the gasoline engines found in most cars and light trucks, which might result in a localized net reduction in that pollutant.</p>