

**City of Brantford - Downtown Streetscaping
Schedule 'C' Municipal Class
Environmental Assessment (EA)**

Brantford, Ontario

**Parking, Transit & Wayfinding
FINAL REPORT**

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1 Executive Summary

A parking study was completed for Downtown Brantford, evaluating the existing capacity of both the on-street and off-street parking in and around the downtown. The study found that overall there is no deficiency of parking within the downtown and that there is capacity within the two public surface lots and Market Centre Parkade. The study also found that the on-street parking spaces are more heavily utilized. The list of several recommendations for parking, transit and wayfinding can be found at the end of the chapters on Parking Strategy and Transit Operations.

The impact to parking was assessed for each of the alternatives, and it was found that with the preferred alternative (retaining 1-way streets on Colborne St. and Dalhousie St.), it is expected that there will be no loss of on-street parking. Through detailed design, the current amount of on street parking will be maintained wherever feasible.

With the preferred streetscaping alternative there was no impact on transit routing or bus stops in the downtown. A peer review of benchmarking Brantford Transit compared to other Ontario transit systems showed that the City had the lowest net investment per capita, meaning insufficient funds are allocated to the provision of transit services. This will limit the effectiveness of transit as a viable alternative to automobile travel, and not meet the goals and objectives for transit as specified in the 2020 TMP (Transportation Master Plan) Update plan. The 2009 IBI Group study for a combined new parking garage and expanded downtown bus terminal (Lot #3 site) should be deferred until other lower cost options are explored as part of a detailed transit review, such as introducing 3 transit hubs and cross-town services not requiring all routes to travel downtown. Queue jump lanes and traffic signal priority for transit could be introduced in the short-term and improve schedule reliability.

Paid on-street parking should be introduced to increase the amount of parking spaces available for customers, through increased vehicle turnover without building any additional parking facilities. This also encourages more sustainable transportation in the downtown, and provides an incentive for those travelling to the area to consider doing so by alternate means including walking, biking or public transit. Surplus parking revenue should go towards sustainable transportation initiatives and downtown improvement.

The wayfinding study identifies the need for signage and providing direction to visitors within the downtown, including an electronic parking guidance system. Within the study area, walkability is evaluated, showing walking distances to various locations, and identifying that all of the downtown can be accessed within a four minute walk of one of the City parking lots. The wayfinding strategy gives examples of what types of signage, and locations for signage to provide clear direction to downtown visitors.

2 Introduction & Purpose

The Downtown Brantford Streetscape Schedule 'C' Municipal Class Environmental Assessment (EA) was undertaken to address the aging underground infrastructure within downtown Brantford that is at the end of its serviceable life and requires replacement. Underground infrastructure improvements provide the opportunity to also rejuvenate the at grade streetscape through better greenery, aesthetics, street furniture and signage/wayfinding while assessing parking requirements and promoting alternative modes of transportation, such as walking, cycling, public transit and ridesharing.

MTE Consultants were retained as the prime consultant and provided direction to the three (3) sub-consultants, including Transforward Consulting Group Inc. specifically contracted to assess the impact of the proposed streetscaping improvements on parking, public transit and wayfinding in the downtown core.

2.1 Location - Study Area

The immediate downtown study area is bounded by Brant Avenue in the west, Colborne Street to the south, Clarence Street to the east, and Dalhousie Street to the north, as shown on *Figure 1*.

The extended downtown study area is bounded by Brant Avenue and West St to the west, Icomm Drive to the south, Clarence Street to the east, and Nelson Street to the north.

The City's parking facilities within the study area consist of:

- Market Centre Parkade

The Market Centre Parkade is the City of Brantford's municipal multi level parking structure. It's located at 59 Icomm Drive in the south end of the downtown.

- Surface Lots

The City of Brantford has 2 public surface lots: Municipal Lot No. 3 and No. 4. Lot 3 is located at the northeast corner of Darling Street and Queen Street, next to the Bus Terminal. Lot 4 is located at the southeast corner of Dalhousie Street and King Street, next to the Expositor building.

- On-Street Parking

On-street parking spaces are within the extended downtown study area and for the purposes of this study were divided into 4 areas:

- West: Brant Ave. / West St.
- South: Icomm Dr.
- East: Clarence St.
- North: Nelson St.

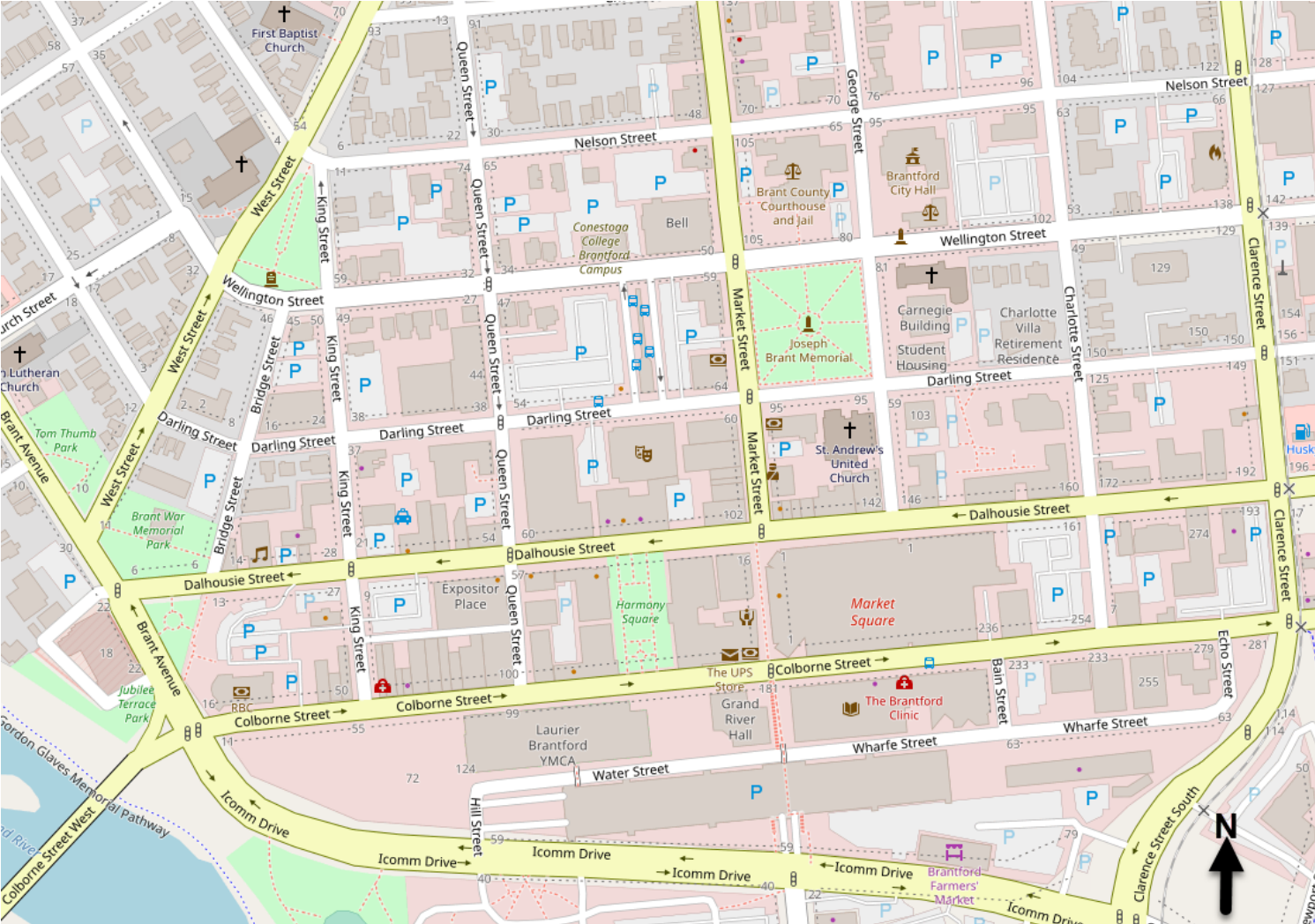


Figure 1 - Brantford Downtown Streetscaping EA - Study Area (Source: OpenStreetMap)

3 Parking Strategy

Before developing any parking strategy, a parking inventory of on-street and off-street parking spaces was undertaken and shown on Figure 2 and Figure 3. There are a total of 1,683 public parking spaces west of Clarence Street in downtown Brantford and an additional estimated total of 1,679 parking spaces on private property that also have an important function in meeting the parking needs of both businesses and residences. The focus of this EA study is on public parking spaces in downtown Brantford and the impact of proposed streetscaping changes on parking.

Parking is part of the transportation network and needed to support and attract residents, businesses, entertainment and other services. Managing parking is a way to encourage alternate modes to single occupancy automobile travel, such as walking, public transit, cycling and ridesharing. Streetscaping in the downtown also influences parking management, that controls the supply and design of parking, especially in supporting downtown businesses.

3.1 Existing Parking Inventory

There are a total of 1,683 public on-street and off-street parking spaces and almost an equivalent amount on private property at 1,679 spaces, as summarized below in Figure 2.

On-Street Parking Spaces (west of Clarence St.)

- Colborne St.: 94 spaces
- Dalhousie St.: 98 spaces
- Immediate Side Streets: 33 spaces
- Sub-total: 225 spaces
- Spaces North of Dalhousie: 317 spaces
- Total On-Street: 542 spaces

Off-Street Parking Spaces

- Lot 1 Market Centre Parkade: 950 spaces
- Lot 3 (Darling & Queen): 147 spaces
- Lot 4 (Dalhousie & King): 44 spaces
- Total Off-Street 1,141 spaces
- **GRAND TOTAL Public: 1,683 spaces**

**Note: The total 1,679 spaces on private property (not included above) play an important function in meeting the parking needs of downtown businesses, their employees and customers.*

Figure 2 - Quantity of Parking Spaces - Downtown Brantford

3.1.1 On-Street (west of Clarence Street)

The total number of existing on-street parking spaces in downtown Brantford is 542 spaces, as shown on the blockfaces (green lines) in Figure 3. Currently, all on-street parking is free with the majority of on-street parking having a 2 hour time limit.

Figure 4 shows the estimated amount of parking spaces on private properties (white rounded labels in the centre of blocks totalling nearly 1,700 spaces) and the public on-street time limits for each blockface in the downtown core, with the majority having a 2 hour time limit. There are some streets with 15 and 30 minute time limits to facilitate short duration parking, such as picking up goods or services. There are a few streets away from the main thoroughfares of Dalhousie St. and Colborne St. that have 3 hour time limits. Enforcing time limits by parking bylaw enforcement officers driving and walking is time consuming as there are more efficient ways to enforce parking bylaws using mobile technologies, such as mobile LPR (Licence Plate Recognition), which will be described in more depth later in this report.



Figure 3 - Existing Municipal Downtown Parking Inventory

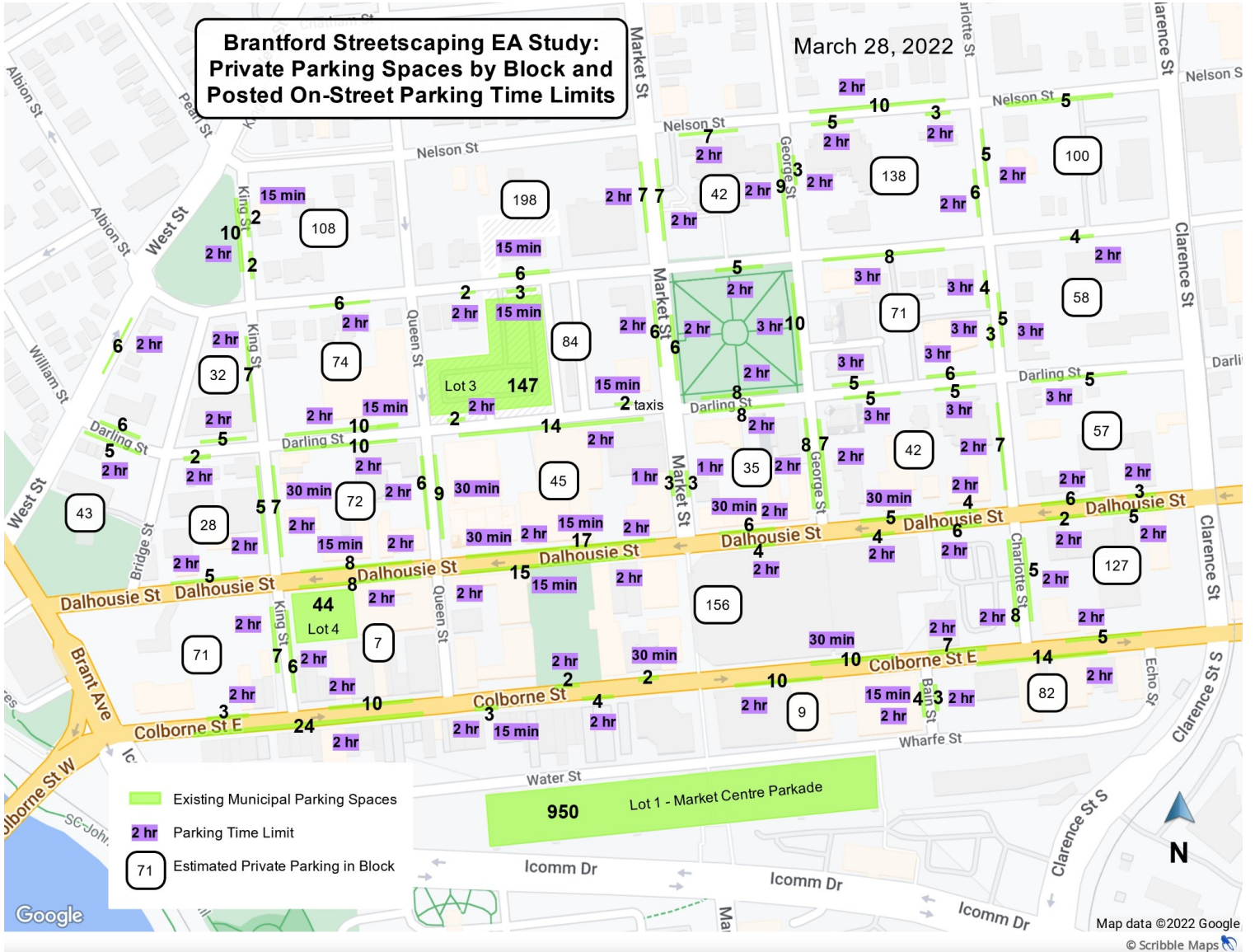


Figure 4 - Downtown Brantford - Private Parking Spaces by Block and On-Street Parking Time Limits

3.1.2 Surface Parking Lots

Figure 3 shows the City's two (2) downtown public surface parking lots:

- Lot 3 is located at the northeast corner of Darling Street and Queen Street, next to the Bus Terminal with 147 spaces.
- Lot 4 is located at the southeast corner of Dalhousie Street and King Street, next to the Expositor building with 44 spaces.

3.1.3 Market Centre Parkade

Figure 3 also shows the City's one and only multi-level municipal parking structure, Lot 1 - Market Centre Parkade, located one block south of Colborne St. with a total capacity of 950 spaces.

3.1.4 Existing Parking Fees

As shown on Figure 5, parking fees are charged at the two public surface Lots 3 and 4 and at the Market Centre Parkade, as listed below:

- Lots 3 and 4: \$2.50 per hour, \$15 daily maximum 8 a.m. to 6 p.m.; \$0.50 per hour from 6 p.m. to 8 a.m.; \$85 per monthly permit.
- Market Centre Parkade: Mon. to Fri. \$2.25 per hour, \$13.50 daily maximum 8 a.m. to 11 p.m.; \$70 per monthly permit; free parking on Sat. and Sun.

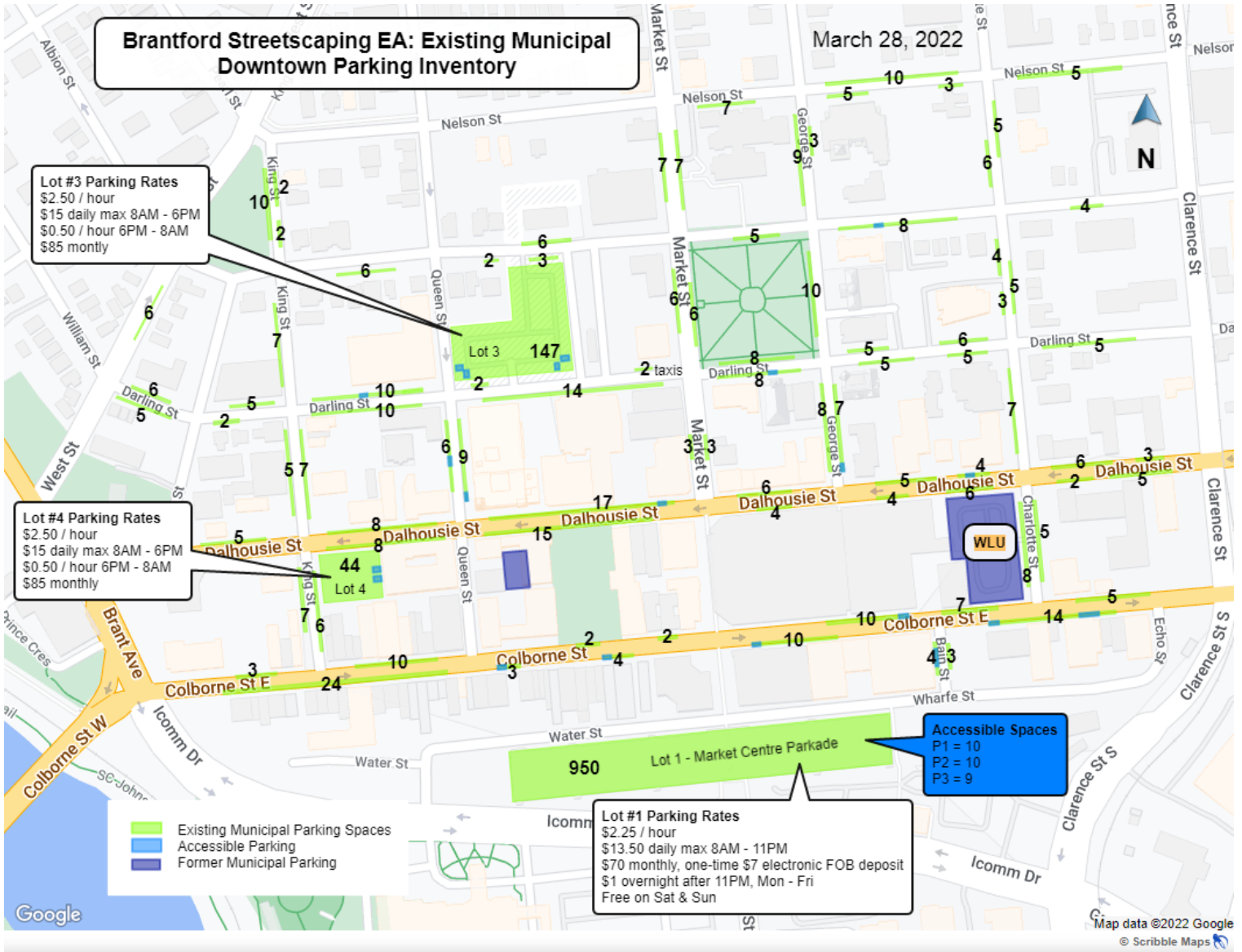


Figure 5 - Brantford Parking Fees at Lots 3 & 4 and Market Centre Parkade

3.2 *Parking Demand & Supply - Existing*

For understanding whether there are parking shortages or surpluses, it's necessary to collect and analyze parking occupancy data (also referred to as parking utilization or parking demand), which is the quantity of vehicles parking throughout the day expressed as a percentage of total capacity. The City provided the most recent parking occupancy data for off-street parking (surface lots and parkade) for 2015 to 2018 and for on-street parking for 2015 to 2017. There was no parking occupancy data available for the immediate period prior to the COVID-19 pandemic (2019) or during it (2020-2022). However, the available data is sufficient to provide a base benchmark for assessing normal pre-pandemic levels.

3.2.1 On-Street and Off-Street Parking Demand

Figure 6 shows the most recent parking occupancy data available from the City for 2017, on-street parking spaces and for 2018, surface parking lots and the Market Centre Parkade.

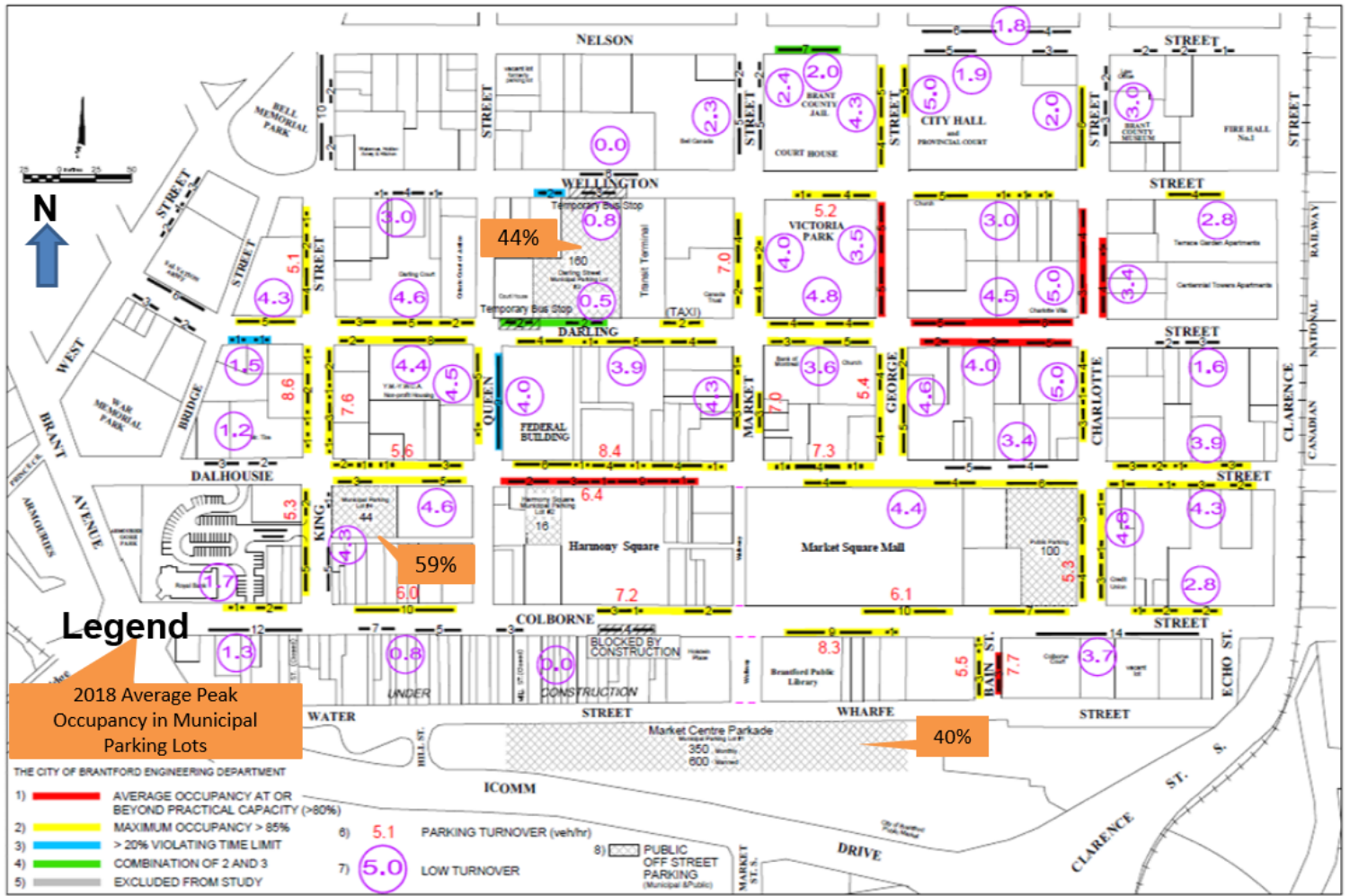


Figure 6 - Parking Occupancy - On-Street & Off-Street - 2017/2018

From the data in Figure 6, a summary table was prepared illustrating peak parking demand, parking occupancy (expressed as a percentage of total capacity), actual supply (spaces) and adequacy (surplus spaces) for the Market Centre Parkade, Lot 3 and Lot 4 and 4 zones for the on-street parking spaces created for this study, as follows:

- Zone 1 - Colborne St.
- Zone 2 - Dalhousie St.
- Zone 3 - All Immediate Side Streets
- Zone 4 - Spaces north of Dalhousie St.

Parking Adequacy is the ability of the parking supply (spaces) to handle parking demand (vehicles) and is calculated by subtracting the peak parking demand from the effective parking supply.

Parking Turnover is shown on Figure 6 in pink circles with numbers ranging from 0.8 to 5.0 with the majority in the 3 to 4.5 range. Turnover is the intensity of use of parking facilities (on-street and off-street) over the course of a day (9:00 a.m. to 6 p.m.) expressed as the number of vehicles turning over of space and calculated by dividing the total volume of parked vehicles by the peak number of parking spaces. The range of 3 to 4.5 is good, however, from other occupancy studies undertaken in similar sized cities, turnover rates can reach between 5 to 10 vehicles turning over a space through a typical day, which increases the amount of parking spaces available without having to build any new parking infrastructure. Increased turnover is achieved by establishing parking fees that are higher than off-street (lots) spaces and a short time limit (i.e. from 2 hours to 1.5 hours or 1 hour), so that parkers do their immediate business transactions and then depart. If longer time is required (a best practice in the parking industry), motorists should park in the off-street parking facilities that have longer all-day time limits.

Figure 6 also shows 4 blockfaces (blue lines) with a 20% violation rate of the time limit indicating that 20% of parkers were issued parking tickets. The majority of blockfaces did not have such high violation rates, however, all blockfaces should be monitored for violation rates so that enforcement is targeted to free up more parking spaces for customers. A best practice is a violation rate of 10% or less.

Effective Parking Capacity (also referred to as practical capacity) is shown on Figure 6 (as the red lines), which is defined as the level that parking operates at peak efficiency expressed as a percentage of occupied space. The parking industry standard is 85%. The excess 15% provides a “cushion” to allow for:

- vehicles moving in and out of parking stalls;
- time required to search for the last few available spaces;
- daily, weekly and seasonal variations;
- vacancies created by restricting facilities to certain users, improperly parked vehicles, trash removal, snow storage and minor construction.

Pre-COVID-19					
	Location	Peak Parking Demand	Occupancy from Data Provided	Actual Supply Spaces	Adequacy (Surplus)
		(A)	(A/C)	(C)	(C-A)
	Within Downtown Core: Municipal Lots				
	Lot 1 - Market Centre Parkade	380	40%	950	570
	Lot 3 (Darling & Queen St.)	65	44%	147	82
	Lot 4 (Dalhousie & King St.)	26	59%	44	18
Sub-total		471		1141	670
	Within Downtown Core: On-Street				
	Zone 1 - Colborne St.	75	80%	94	19
	Zone 2 - Dalhousie St.	78	80%	98	20
	Zone 3 - Immediate Side Streets	26	80%	33	7
	Zone 4 - Spaces North of Dalhousie St.	222	70%	317	95
Sub-total		402		542	140
Total		873		1,683	810

Table 1 - Pre-COVID-19 - Peak Public Parking Demand & Supply Estimate (2017 & 2018)

For the off-street public parking facilities, peak parking demand had a total of 471 spaces with a surplus of 670 spaces. Lot 1 Market Centre Parkade was under-used with a parking occupancy of 40%, as well as 44% occupancy for Lot 3 (Darling & Queen St.) and slightly higher occupancy of 59% for Lot 4 (Dalhousie & King St.).

On-street parking spaces were well used with the majority at 80% occupancy or greater representing a peak demand of 402 spaces and a surplus of 140 spaces. To increase capacity of on-street existing parking spaces (without expanding existing parking facilities or building new facilities), vehicle turnover rates would need to increase through a variety of parking management methods indicated later in this report.

Conclusion: sufficient parking was available for off-street spaces, but many on-street blockface spaces were highly used.

3.2.2 Walking Distances to/from Market Centre Parkade and Lots 3 & 4

As shown on Figure 7, the walking distances & times within downtown Brantford from the 3 municipal lots are between 100m and 300m or 1 minute to 4 minutes walking time. Therefore, there is an abundance of off-street parking available within a reasonable walking time for those that may not find an on-street space or require longer duration for parking.

Private “shared parking” is also very important in providing both employee and customer parking throughout the downtown, representing a total of nearly 1,700 spaces as indicated in Figure 2 and shown for each block (white numbered rectangles) in Figure 4.

Now that the environment is transitioning out of the COVID-19 pandemic, the City should resume the annual collection and monitoring of parking occupancy and violation rates as the downtown experiences continued growth in student population, residential condominiums and new businesses. Having up to date accurate data on parking occupancy and parking violations is important for parking policy changes, parking planning, operations and the management of parking.

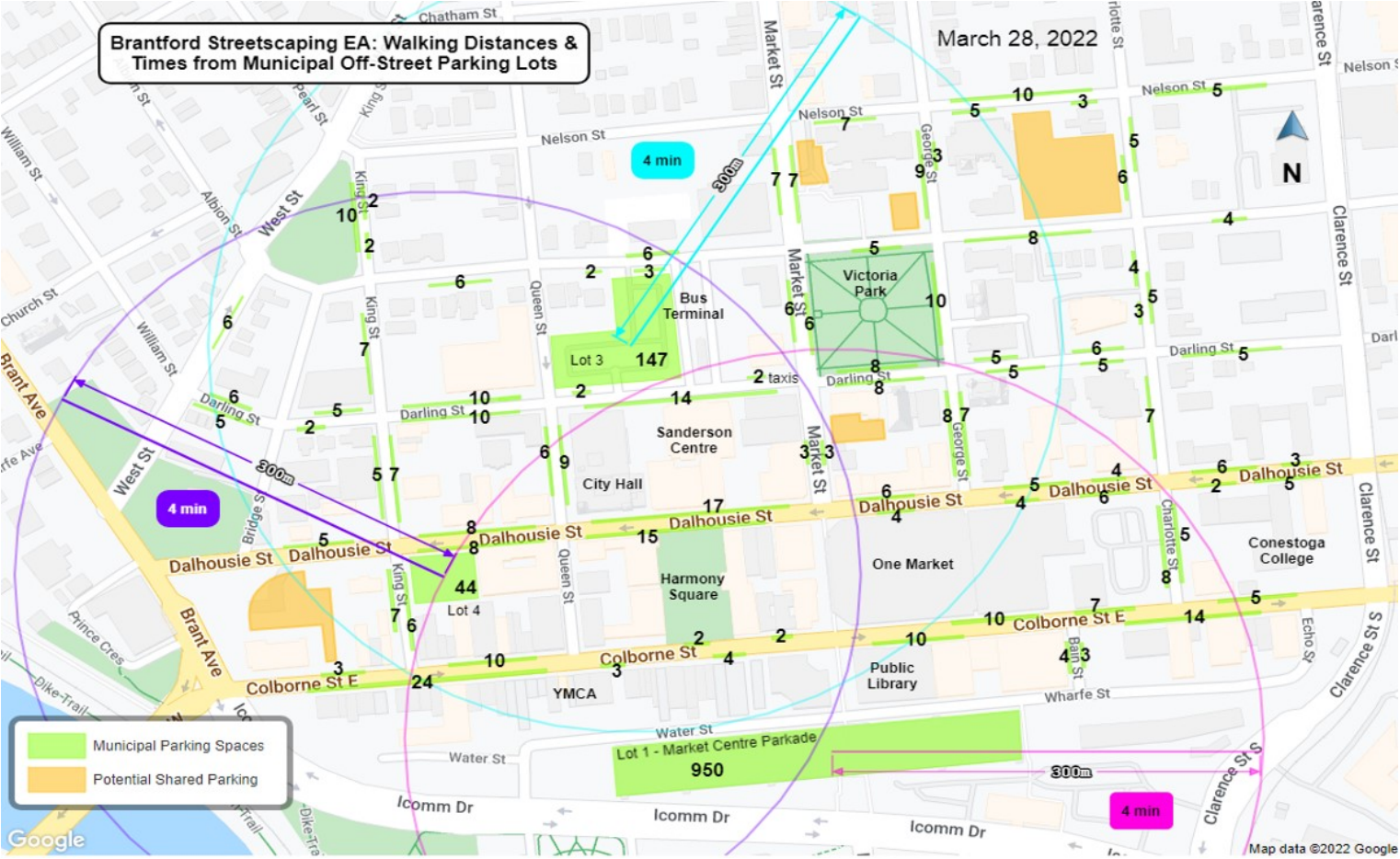


Figure 7 - Walking Distances & Times from Municipal Parking Lots

3.3 Alternative Street Configurations Assessed (One-Way Vs. Two-Way Traffic)

The overall consulting team examined various alternatives of one-way and two-way traffic street configurations and the impact on curbside management, turning movements, traffic speeds and congestion, parking, loading and unloading, pedestrians (widened sidewalks), landscaping,

accommodating bicycle lanes and accessibility concerns. As indicated in other reports for this EA study, evaluation criteria was developed and used to assess each alternative.

The following alternatives of two-way traffic all resulted in reduced quantity of on-street parking:

- **20m ROW (Right-of-Way) - Two Way Traffic - A:** reduced parking as only one side of the street (not 2 sides) could accommodate parking;
- **20m ROW - Two Way Traffic - B:** reduced parking as only one side of the street (not 2 sides) could accommodate parking;
- **20m ROW - Two Way Traffic - C:** reduced parking as only one side of the street (not 2 sides) could accommodate parking.

The above two-way street design and the one-way street design alternatives were presented at Public Information Centre (PIC) #2 in May 2021 as well as the technically preferred alternative, Alternative 5 One-Way Traffic with Separated Single Cycle Lane. Even with this alternative, parking could only be accommodated on one side of the street (not 2 sides as existing), resulting in a loss of 84 parking spaces, as shown on Figure 8.

From feedback from the various stakeholders and PIC #2 (Public Information Centre) of the importance of maintaining parking on both sides of the road, the overall consulting team went back to develop a more detailed refinement of **Alternative 5 One-Way Traffic with Separate Cycle Lane** to minimize the impact on any loss of on-street parking spaces.

Through narrowing of the sidewalks, bicycle lanes, parking layby spaces and vehicular lanes, it was possible to include parking on 2 sides, as shown on Figure 9 that was presented as the **Preferred Alternative 3, Parking Both Sides, Bike Lane**, at PIC #3 held on April 7, 2022. Figure 10 shows that parking is maintained on both sides of the road and through a later detailed design process (outside of this EA study), the amount of on-street parking, estimated at 565 spaces, should be maintained wherever possible.

Policy decisions on the amount of parking to be provided is complex beyond providing “what if” forecasts on demand and supply because parking is impacted by the types of land use, travel behaviour, economic development, financial considerations and different perspectives from multiple stakeholders. Downtown parking management trends today are focused more on “city-building” than the past approach, that more parking is better and hence, excessive parking may be as harmful (and a waste of limited resources given the high cost of parking structures) as is a shortage of parking. However, having adequate parking supply is essential to the functioning of the downtown and for attracting new development and businesses.

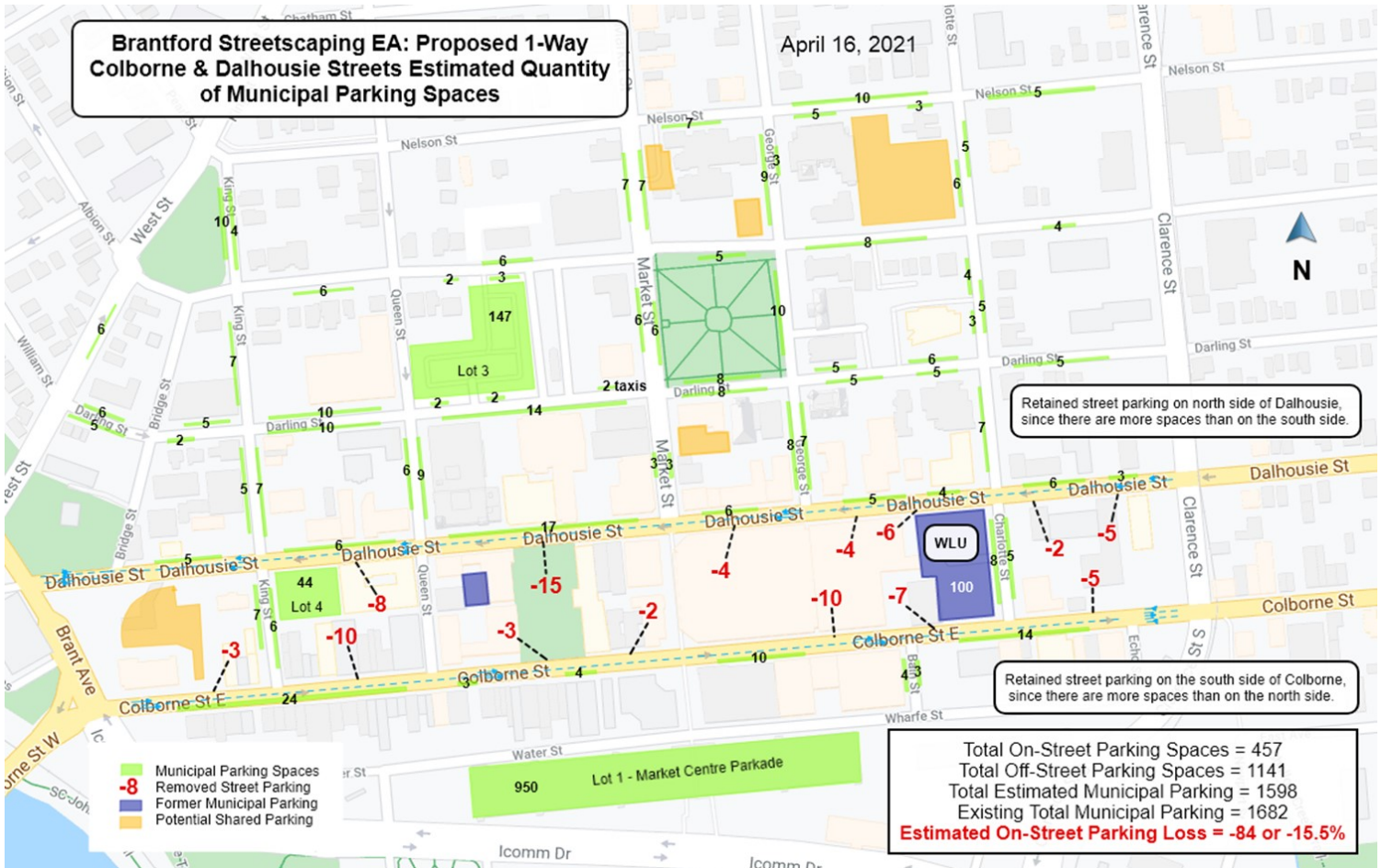


Figure 8 - Proposed 1-Way Traffic & Loss of On-Street Parking

Preferred Alternative

One-Way Traffic, Parking Both Sides, Bike Lane

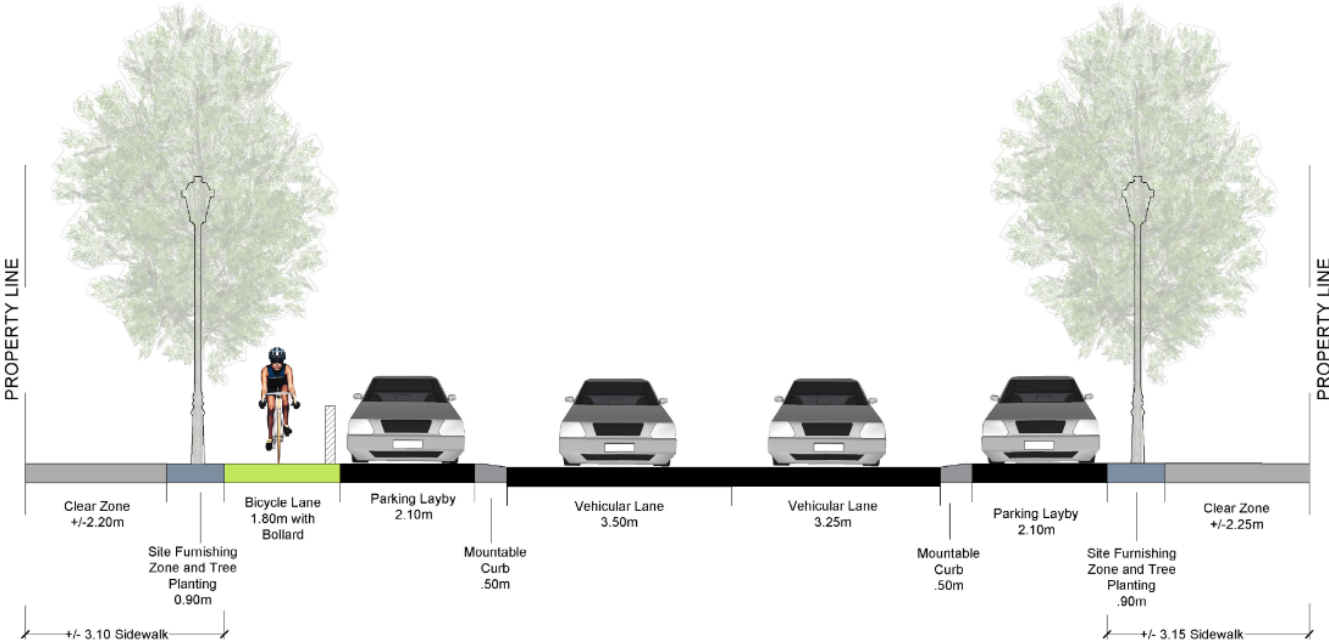


Figure 9 - Preferred Alternative (Cross-Section) - One-Way Traffic, Parking Both Sides, Bike Lane

Public Parking Spaces

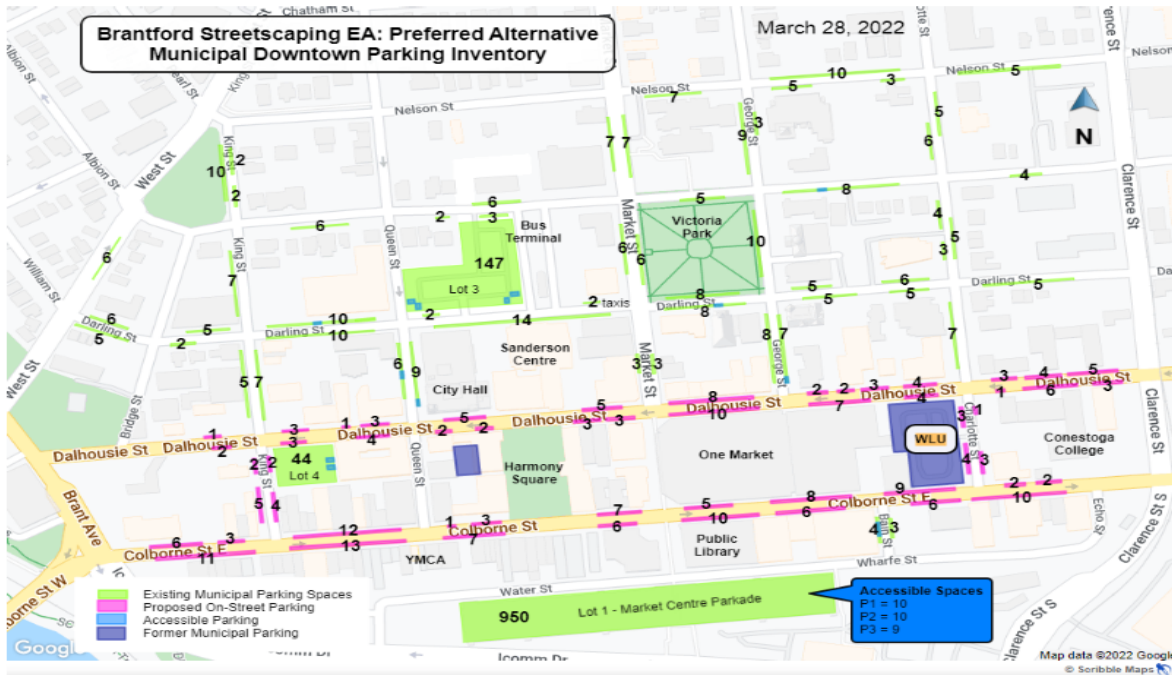


Figure 10 - Preferred Alternative & Showing Quantity of Parking Spaces

On-Street Parking Spaces (West of Clarence Street)

Area	No. of Spaces
Colborne Street	125
Dalhousie Street	99
Immediate Side Streets	24
Sub-Total	248
Spaces North of Dalhousie Street	317
Total On-Street	565

Off-Street Parking Spaces

Area	No. of Spaces
Lot 1 Market Centre Parkade	950
Lot 3 (Darling and Queen)	147
Lot 4 (Dalhousie and King)	44
Total Off-Street	1,141

Grand Total Public Spaces
1,706

Through detailed design, amount of on-street parking to be maintained wherever feasible.

Overall there is no deficiency of parking in Downtown core.

3.4 *Parking Demand & Supply - Future Scenarios*

Three future forecast scenarios, Worst Case, Best Case and Likely Case, were developed to determine the impact of changes in parking demand and the required amount of parking spaces to meet the demand. These 3 scenarios are summarized below (Table 2, Table 3 and Table 4) with the key forecast assumption factor shown in the top right hand corner of each table.

		Growth Forecast (Decline - transition from COVID-19)				-25%
	Location	Actual Supply Spaces	Peak Parking Demand	Effective 85% Supply Spaces	Percent Utilization (Occupancy)	Adequacy (Surplus)
		(A)	(B)	(A*85%)	(B/A)	(A-B)
	Within Downtown Core: Municipal Lots					
	Lot 1 - Market Centre Parkade	950	285	808	30%	523
	Lot 3 (Darling & Queen St.)	147	49	125	33%	76
	Lot 4 (Dalhousie & King St.)	44	19	37	44%	18
Sub-total		1141	353	970	31%	617
	Within Downtown Core: On-Street					
	Zone 1 - Colborne St.	125	75	106	60%	31
	Zone 2 - Dalhousie St.	99	59	84	60%	25
	Zone 3 - Immediate Side Streets	24	14	20	60%	6
	Zone 4 - Spaces North of Dalhousie St.	317	166	269	53%	103
Sub-total		565	315	480	56%	165
Total		1706	668	1450	39%	782

Table 2 - Worst Case Scenario - Peak Parking Demand & Supply Estimate

Worst Case Scenario - Overall decline of 25% Occupancy (compared to pre-COVID-19 pandemic)

- Parking lots under used, especially Lot 1 Market Centre Parkade
 - Peak parking demand 353 with surplus of 617 spaces
- On-street spaces decreased to 56%
 - Peak demand 315 with surplus of 165 spaces
- **Conclusion:** abundance of parking with significant decrease from pre-COVID-19 period

			Growth Forecast				10%
	Location	Actual Supply Spaces	Peak Parking Demand	Effective 85% Supply Spaces	Percent Utilization (Occupancy)	Adequacy (Surplus)	
		(A)	(B)	(A*85%)	(B/A)	(A-B)	
	Within Downtown Core: Municipal Lots						
	Lot 1 - Market Centre Parkade	950	418	808	44%	390	
	Lot 3 (Darling & Queen St.)	147	71	125	48%	54	
	Lot 4 (Dalhousie & King St.)	44	29	37	65%	9	
Sub-total		1141	518	970	45%	452	
	Within Downtown Core: On-Street						
	Zone 1 - Colborne St.	125	110	106	88%	-4	
	Zone 2 - Dalhousie St.	99	87	84	88%	-3	
	Zone 3 - Immediate Side Streets	24	21	20	88%	-1	
	Zone 4 - Spaces North of Dalhousie St.	317	244	269	77%	25	
Sub-total		565	462	480	82%	18	
Total		1706	980	1450	57%	470	

Table 3 - Best Case Scenario - Peak Public Parking Demand & Supply Estimate

Best Case Scenario - Overall increase of 10% Occupancy (compared to pre-COVID-19 pandemic)

- Parking lots under used, especially Lot 1 Market Centre Parkade
 - Peak parking demand 518 with surplus of 452 spaces
- On-street spaces increase to 88% occupancy on Colborne & Dalhousie
 - Peak demand 462 with surplus of 18 spaces
- **Conclusion:** on-street spaces at capacity; need to manage demand through paid on-street parking to generate greater vehicle turnover; promote Market Centre Parkade through rates lower than on-street (considered premium spaces).

			Growth Forecast: Slightly Exceed Pre-COVID-19 5%			
	Location	Actual Supply Spaces	Peak Parking Demand	Effective 85% Supply Spaces	Percent Utilization (Occupancy)	Adequacy (Surplus)
		(A)	(B)	(A*85%)	(B/A)	(A-B)
	Within Downtown Core: Municipal Lots					
	Lot 1 - Market Centre Parkade	950	399	808	42%	409
	Lot 3 (Darling & Queen St.)	147	68	125	46%	57
	Lot 4 (Dalhousie & King St.)	44	27	37	62%	10
Sub-total		1141	494	970	43%	476
	Within Downtown Core: On-Street					
	Zone 1 - Colborne St.	125	105	106	84%	1
	Zone 2 - Dalhousie St.	99	83	84	84%	1
	Zone 3 - Immediate Side Streets	24	20	20	84%	0
	Zone 4 - Spaces North of Dalhousie St.	317	233	269	74%	36
Sub-total		565	441	480	78%	39
Total		1706	935	1450	55%	515

Table 4 - Likely Case Scenario - Peak Parking Demand & Supply Estimate

Likely Case Scenario - Overall increase of 5% Occupancy (compared to pre-COVID-19 level)

- Parking lots under used, especially Lot 1 Market Centre Parkade
 - Peak parking demand 494 with surplus of 476 spaces
- On-street spaces increase to 84% occupancy on Colborne & Dalhousie Streets
 - Peak demand 441 with surplus of 39 spaces
- **Conclusion:** on-street spaces at capacity; need to manage demand through paid parking to generate greater vehicle turnover; promote Market Centre Parkade through lower rates.

3.4.1 Shared Parking

As indicated previously, the supply of parking on private parking is very important in supporting the economic, cultural and residential vitality of the downtown. The City should develop a shared parking program to encourage shared parking opportunities between the City, private property

owners/managers and institutions (i.e. Wilfrid Laurier University and Conestoga College). A City shared parking program should include the City:

- Acting as a facilitator between private and public parking providers, the downtown BIA, places of worship, businesses, WLU and Conestoga College with the objective of developing agreements among these parties to better use existing parking facilities.
- Coordinating private lease arrangements for shared off-site parking in existing and future parking facilities.
- Developing a basic set of criteria and conditions for allowing shared parking agreements. For example, if the applicant meets the conditions, there would be no requirement to go to the Committee of Adjustment.
- Removal or reduction of any administrative barriers, such as Property Title changes, to permit off-site shared parking.
- Possibly making additions to the City’s Urban Design Guidelines to allow shared access between or among properties.

Before beginning negotiations on any shared parking agreement, the City should consider including the following in the agreement:

- Specify roles and responsibilities;
- What and how many spaces are to be shared? When? By whom? Duration?
- Process for setting and agreeing to parking rates;
- Prescribe the operating standards & procedures;
- Maintenance of existing parking assets and where applicable, the construction of any new parking assets;
- Flexibility to change the use of the parking assets or substitution of other assets (i.e. recent experience of impact on COVID-19);
- Protection of both parties in the event of a change in laws or regulations;
- Development of a “parking strategy” that optimizes parking (utilization, revenue and customer service); and
- Recognize both parties are in an evolving relationship (i.e. things change).

The former municipal parking lot, now a WLU lot, spanning between Dalhousie St. and Colborne St. on the west side of Charlotte St., is a good example of where a shared parking agreement may work, especially during after school hours or during special events where public parking is required.

3.5 The Cost of Parking

There is a common public perception that parking is “free” and there are no costs of acquiring and maintaining a parking space. The costs of providing parking include: land acquisition, design and construction, lighting, power, signage, access control equipment, safety and security, fencing, litter control, line painting, pavement repair, power sweeping, snow plowing, landscaping and enforcement.

Table 5 shows a high level cost¹ summary of a hypothetical 500 parking space facility comparison of prefabricated garage (galvanized steel beams), traditional precast concrete garage, underground garage and paved surface lot based on research undertaken in 2022 by the consultant for other projects. Land costs are not included and would need to be added to the estimate of total costs. Figure 11 and Figure 12 show example parking garages for Ajax GO Station (precast concrete) and Humber College, Toronto (prefab galvanized steel beams).

	Prefab Garage (Galvanized Beams) Above Ground	Precast Concrete Garage Above Ground	Underground Garage	Surface Lot
Total No. of Spaces	500	500	500	500
<i>Capital Cost per Space</i>	\$ 34,000	\$ 52,000	\$ 70,000	\$ 7,000
Total Capital Cost	\$ 17,000,000	\$ 26,000,000	\$ 35,000,000	\$ 3,500,000
<i>Annual Maintenance Cost per Space</i>	\$ 350.00	\$ 350.00	\$ 350.00	\$ 200.00
Total Annual Maintenance Cost	\$ 175,000	\$ 175,000	\$ 175,000	\$ 100,000

Table 5 – High Level Capital & Maintenance Cost Estimates – By Parking Garage Types

¹Capital cost sources for parking garages:

Toronto Market Capital Cost range: \$25,000 to \$65,000 per stall, Read Jones Christopherson (RJC), Jan. 2021: <https://www.constructioncanada.net/repair-and-maintenance-solutions-for-parking-garages/3/>

Ottawa New Civic Hospital, 4 level above ground structure, 2,500 spaces at capital cost of \$135,000,000 for 2,500 spaces = \$54,000 per space, Sept. 2021: <https://ottawacitizen.com/news/local-news/egan-why-the-new-civic-hospital-is-never-getting-underground-parking>

<https://www.statista.com/statistics/830429/construction-costs-of-parking-space-in-us-cities/>

<https://estimationqs.com/building-costs-per-square-foot-in-canada-altus-group=-statistics/>

<https://www.westendhba.ca/wp-content/uploads/2022/05/PLG-620-Final-Rep=ort-1.p= df>

https://www.cityofkingston.ca/documents/10180/18914138/Projects_Bylaw_ParkingDiscussionPa_per.pdf/

Capital costs of building parking structures are high ranging from \$17 million to \$35 million for a facility with 500 spaces. In this example, the cost per parking space ranges from \$34,000 (above-ground prefab structure with galvanized steel beams) to \$70,000 (underground), while a surface lot cost per space is \$7,000 (all excluding land costs). Typically, parking garages are amortized over 30 to 35 years and payback period ranges from 10 years (above-ground prefab structure) to 35 years (underground). The payback period is affected by the occupancy levels, parking fees charged and actual cost of construction to build the garage. The above-ground concrete and prefab structures would be built faster than the underground garage so the payback period would start sooner.

As outlined in a subsequent section of this report, IBI Group consultants did a study in 2009 for the City on a possible joint expansion of the existing Brantford Transit Terminal with a new parking structure on the adjacent public Lot# 3 for 960 parking spaces at a cost of \$28 million (parking component only). Using today's cost estimates, an above ground parking structure may cost between \$32.6 million (prefab steel) and \$50 million (precast concrete). It is clear that such a parking structure is expensive and would require significant capital investment. Before deciding whether to build a parking garage, a full business case and detailed financial analysis are required. The up-front investment and associated borrowing costs and/or loss of investment income and/or opportunity costs must be weighed against future operating costs and revenue cash flows (i.e. the net present value of the investment must be considered).



Figure 11 – Ajax GO Station – Precast Concrete Garage

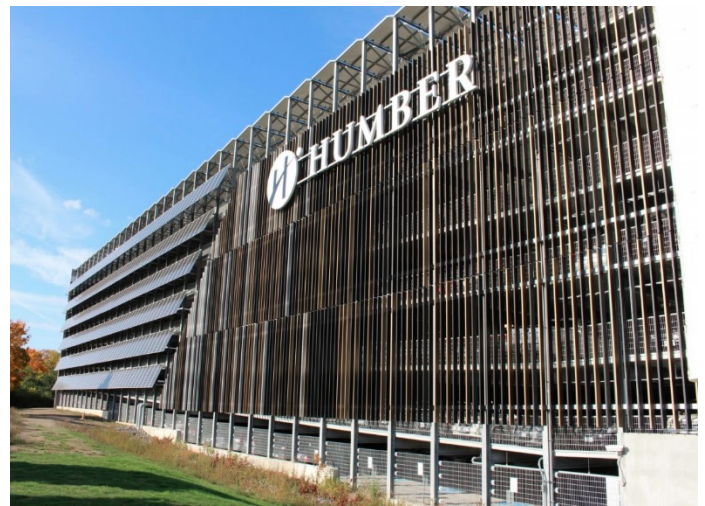


Figure 12 - Humber College - Prefab Garage

3.6 *Paid vs. Free Parking*

Best practices in parking recognizes that on-street parking are premium spaces due to close proximity to local businesses and services, while off-street parking spaces are more for long term parking, such as employee parking, and should be priced lower than the premium spaces.

Free parking often results in business owners, employees and residents who live or work nearby to park in on-street spaces near their stores, offices and homes using limited spaces that should be used for customers and visitors.

Paid parking, at the right price, is a tool to manage parking demand and achieve high parking space turnover (which increases the total parking supply without having to build new parking lots and garages).

When parking occupancy and turnover is low (i.e. many empty spaces) free parking is acceptable. However, when parking occupancy and turnover is high (i.e. very few empty spaces), then paid parking is recommended.

With Brantford's current on-street free parking program, people are avoiding paid lots and park at on-street spaces required for customers. Free parking also contributes to the existing observations on

difficulties enforcing the City’s bylaw that prohibits “re-parking” as conveyed by City staff during this EA study. Once the existing free on-street parked vehicles near the 2 or 3 hour time limit, motorists typically “re-park” their vehicle at another space. Re-parking is similar to “feeding the meter” where people stay beyond time limits, which reduces vehicle turnover and space availability for other customers when they should be parking in the longer term facilities (surface lots and parkade).

Paid parking would minimize re-parking, but not eliminate it. To eliminate re-parking, mobile LPR (Licence Plate Recognition) technology would need to be deployed by the City’s parking enforcement officers (as described in another section on mobile enforcement of this report).

Part of an on-street paid parking program involves “pricing parking right”, which means the lowest price that will leave one or two vacant spaces on each blockface (average of 2 spaces of every 8 spaces vacant). People will see that convenient parking is available, as the only thing worse than paying for parking is having no parking available. The objective is to keep 85% of parking spaces occupied all of the time.

Parking can be controlled by Pay By Licence Plate (PBLP) or Pay & Display (P&D) machines (approx. 1 machine for every 8-10 spaces per blockface), like the example in Figure 13, Pay by Mobile Phone app and ongoing enforcement. The City has Pay & Display machines in storage and may be re-deployed with some upgraded technology and/or conversion to Pay By Licence Plate machines. The City staff should explore this with the supplier. A later section of this report outlined the “pros and cons” of various parking payment technologies.



Figure 13 - Pay By Licence Plate Machine - Oakville, ON

It's important to strike a balance between parkers, merchants and parking policies that create vehicle turnover that increases the number of parking spaces available during the day. It's possible with a Pay By Licence Plate system to provide parkers 20 minutes of free parking twice per day. The parker decides how to use the two units of free parking time, which may be back to back or one in the morning and one in the afternoon. This type of application permits customers making quick purchases, such as a cup of coffee or picking up dry cleaning, to do so without paying for parking and without staying on-street for a longer period than necessary.

With paid parking, parking revenues should be reinvested in downtown improvements.

3.6.1 Parking Fees

A survey of parking fees charged by ten (10) other Ontario municipalities was undertaken in 2022 and compared to Brantford's parking fees, as shown on Figure 14. Figure 15 also shows the parking fees on a large well designed sign for the Market Centre Parkade that is located inside the parking garage.

When compared to the average fees charged, Brantford's fees are for off-street parking:

- at \$2.25 per hour - equivalent to the average; and
- slightly lower at \$85 per month highest fee - compared to \$97 monthly average.

The adult monthly Brantford Transit pass priced at \$73.30 compares favourably with the monthly parking permit fee of \$70 for the Market Centre Parkade and \$85 for municipal Lots 3 and 4. A best practice of many municipalities to encourage more transit use, is that monthly parking should cost more than a monthly transit pass and Brantford is following this policy.

Parking Rate Survey of Ontario Municipalities City of Brantford - February 2022															
			Parking Hourly Rates				Parking Daily Maximum Rate		Transit Fare Comparison			Monthly Permits			
Ref. #	Municipality	Total Public Pay Parking Spaces	On-Street		Off-Street		Off-Street		Adult Transit Monthly Pass	Transit in Competition with Parking?	Off-Street		Garage		
			Min.	Max.	Min.	Max.	Min.	Max.			Min.	Max.	Min.	Max.	
1	Barrie	2,000+	\$ -	\$ 1.50	\$ -	\$ 1.25		\$ 7.00	\$ 88.00	YES - parking permits priced lower than transit pass	\$ 66.00	\$ 82.50			
2	Brantford	1,683			\$ 2.25	\$ 2.50	\$ 13.50	\$ 15.00	\$ 73.50	NO - Transit pass priced lower than parking permits		\$ 85.00		\$ 70.00	
3	Burlington	1,519	\$ -	\$ 1.75	\$ -	\$ 1.75		\$ 15.75	\$ 104.50	NO - Transit pass priced lower than parking permits	\$ 83.00	\$ 132.00			
4	Guelph	2,720	\$ -	\$ 3.00	\$ -	\$ 3.00		\$ 30.00	\$ 80.00	NO - Transit pass priced lower than parking permits	\$ 74.06	\$ 166.64	\$ 166.64	\$ 172.83	
5	Hamilton	1,158 on-street downtown 2,811 off-street downtown 4,681 off-street city-wide		\$ 2.00	\$ 0.25	\$ 3.00	\$ 4.00	\$ 12.00	\$ 112.20	YES - parking permits priced lower than transit pass with garage exception	\$ 55.00	\$ 105.00	\$ 110.00	\$ 150.00	
6	Niagara Falls	Not available	\$ 2.00	\$ 3.50	\$ 1.25	\$ 3.00	\$ 12.50	\$ 24.00	\$ 80.00	YES - parking permits priced lower than transit pass	\$ 28.25	\$ 45.20			
7	Oakville	1,743	\$ 0.75	\$ 2.00	\$ 1.00	\$ 2.00	\$ 5.00	\$ 8.00	\$ 133.85	YES - parking permits priced lower than transit pass	\$ 39.55	\$ 62.15		\$ 101.70	
8	Peterborough	2,000+		\$ 1.50	\$ 0.75	\$ 1.50	\$ 10.50	\$ 12.50	\$ 66.00	NO - Transit pass priced lower than parking permits		\$ 46.00	\$ 85.00	\$ 100.00	
9	St. Catharines	1,761 off-street		\$ 1.75		\$ 1.75	\$ 5.25	\$ 14.00	\$ 92.00	NO - Transit pass priced lower than parking permits	\$ 50.75	\$ 111.65	\$ 71.05	\$ 121.80	
10	Stratford	816		\$ 1.50		\$ 1.25	\$ 5.00	\$ 15.00	\$ 67.00	NO - Transit pass priced lower than parking permits		\$ 113.75			
11	Waterloo	2,400	\$ -	\$ -	\$ 3.25	\$ 3.75		\$ 18.25	\$ 90.00	NO - Transit pass priced lower than parking permits	\$ 83.13	\$ 121.84		\$ 157.66	
Sub-Total	Average		\$ -	\$ 1.85	\$ 0.97	\$ 2.25	\$ 7.96	\$ 15.59	\$ 89.73		\$ 59.97	\$ 97.43		\$ 124.86	

Averages: On-Street = \$ 1.85
Off-Street Hourly (Max.) = \$ 2.25
Off-Street Monthly (Max.) = \$97.43

Figure 14 - Parking Rate Survey of Ontario Municipalities – 2022



Figure 15 - Brantford - Market Centre Parkade - Parking Fees

3.6.2 Parking Enforcement and Fines

Parking enforcement is necessary to ensure parkers are complying with the City’s municipal bylaws, with the resulting benefits of promoting public safety and improving traffic flow. Currently, the City’s parking enforcement officers patrol the City streets and issue violation tickets to offenders. Nobody likes to receive a parking ticket or getting towed as parking enforcement is often viewed by the parkers as a “tax grab” for a municipality to generate additional revenues. However, enforcement is a very important service to manage a scarce resource of parking spaces by having customers to comply with the parking bylaws on payment, time limits, location and accessibility, which also contributes to efficient operations. There are varying types and price levels of parking fines, with the majority of parking fines at \$30, which is high enough to encourage compliance. Low parking fines discourage

compliance as parkers “roll the dice” to take a chance in getting caught and consider whether the low fine price is worth the risk of paying as part of their total cost of parking.

3.6.2.1 New Mobile Enforcement Technology

Over the past 5 years there have been advances in parking enforcement to improve efficiency and achieve high compliance rates through the use of mobile LPR (Licence Plate Recognition) technology in such cities as Guelph, Waterloo, Kitchener, Barrie, Calgary, Whistler (BC) and others. Guelph has received contracts from large private property owners to monitor their parked vehicles for violations using mobile LPR enforcement.

3.6.2.2 LPR (Licence Plate Recognition) - How it Works

Any typical vehicle is equipped with two (2) cameras on the roof, above the windshield, which scan the licence plates of any automobiles parked on a road (or in a parking lot), as shown on Figure 16. The computer will log the plate number, the GPS location of the vehicle, the date and the time. It is linked through the internet for municipalities that have adopted Pay By Licence Plate and mobility payment (pay by smartphone) to alert municipal enforcement officers of expired purchases of parking.

For locations without paid parking, the enforcement officer may drive at the posted speed limit, and will return to the area when the period of free parking (i.e. 2 hour limit) has expired. Any cars that have not moved in that time are flagged by the LPR system and the officer issues that vehicle a parking ticket.

A second set of cameras at the back of the vehicle scans the position of the tire valves to determine whether or not the vehicle moved during that time and re-parked in the same location.

The data is stored on a secure server and follows the recommendations provided by the Information and Privacy Commissioner of Ontario about the handling of data.

When on-street paid parking is implemented in Brantford, the City should also consider acquiring mobile LPR technology for parking enforcement.



Figure 16 - Mobile Parking Enforcement using Licence Plate Recognition (LPR) in Calgary (top left), Waterloo (left) & Guelph (right)

3.6.3 When to Implement Paid On-Street Parking

Prior to the COVID-19 pandemic, City data showed parking occupancy of 80% and turnover rates exceeding 3 vehicles per space (2017 and 2018 surveys), which warranted the introduction of pay parking. However, the world has changed due to the COVID-19 pandemic resulting in significant reductions in parking occupancy and turnover.

The City should resume annual full parking occupancy and turnover studies in the Fall of 2022 or Spring 2023 to monitor the performance of the parking operation now that the situation is transitioning out of COVID-19.

Following these surveys, if parking occupancy on a blockface is 62% (average of 5 out of 8 spaces) and turnover exceeds 3 vehicles per space per day (9 am to 4 pm), then paid parking should be introduced.

The recommended paid parking hourly rate should be introduced gradually at a lower hourly fee than comparable municipalities (see Figure 14) beginning at \$1.00 per hour with a 2-hour time limit, then with annual subsequent hourly rates based on market conditions through further surveys of other municipalities.

3.6.4 Future Cost Effectiveness of Paid Parking

A high level proforma was developed to show the cost effectiveness and payback period of an on-street paid parking program, if introduced in downtown Brantford using pay by licence plate technology combined with the option for parkers to pay by phone.

Figure 17 shows the proposed locations of pay by licence plate machines, which are located in the middle of each blockface and amounting to a total of about 80 machines. These machines would be solar powered, do not require any other power source, anchored bolted to the sidewalks and would accept credit cards and coins, as found in thousands of on-street locations in municipalities across Canada. The key assumptions used in the proforma are as follows (Table 6):

No. of On-Street Parking Spaces	565
No. of On-Street Pay By Licence Plate Machines	80
Operating Days (Free on Weekends and Holidays)	Monday to Friday (261 days per year)
Operating Hours	9 a.m. to 5 p.m. (8 hrs per day)
Hourly Rate per Hour	\$ 1.00
Fine (violation)	\$ 30.00
Occupancy rate (percent of total on-street capacity)	70%
Compliance rate (percent of total vehicles paying)	70%
Turnover rate (vehicles per space per day)	4.80
No. of Parking Tickets Issued Per Day	19
Capital Cost Per Pay By Space Machine	\$ 7,000
Cost of Shipping, Installation, Contingency & Signs (on blockface)	\$ 840
Wireless Alarming Cost Per Machine Per Year	\$ 360

Table 6 - Key Assumptions - Brantford On-Street Paid Parking

Based on a starting fee of \$1.00 per hour and shown on Table 7, a paid on-street parking program would generate \$644,000 in annual total revenue (\$496,000 from meters and \$148,000 in parking tickets), less total operating expenses (including addition of one enforcement officer) of \$338,000, a net income (profit) of \$306,000, requiring a capital investment of \$627,000 and having a payback period of 1.45 years. The annual depreciation of \$125,000 based on the 80 pay by licence plate machines amortized over 5 years would contribute to a parking technology reserve fund.

Revenue	
On-Street Paid Spaces (Metered 565 spaces, excluding HST)	\$ 496,213
Parking Ticket Revenue (3,982 tickets @ \$30 fine)	\$ 148,645
Total	\$ 644,858
Direct Operating Expenses	
One (1) New Enforcement Officer & Part-time Meter Collections	\$ 62,770
Maintenance (Pay By Licence Plate Machines)	\$ 31,360
Equipment Alarming - PBLP Machines (80 units @ \$40/month)	\$ 28,800
Coin counting, rolling & banking	\$ 4,962
Annual Vehicle Cost (1 Vehicle - Enforcement)	\$ 12,000
Clothing & Other Supplies	\$ 2,400
TOTAL Direct Operating Expenses	\$ 142,293
Other Operating Expenses	
Depreciation (over 5 years) - Contribution to Reserve (replacement)	\$ 125,440
Overhead/Administration	\$ 38,691
Contingency	\$ 32,243
Total Operating Expenses	\$ 338,667
Net Income Before Tax	\$ 306,191
Capital Costs & Return on Investment	
Pay By Licence Plate (PBLP) Machines - 80 Units @ \$7k ea.	\$ 560,000
Installation - 80 units @ \$200 ea.	\$ 16,000
Signage - 240 signs @\$150/unit (installed including posts, if required)	\$ 36,000
Shipping - 80 PBLP units @ \$50/unit	\$ 4,000
Contingency - 80 PBLP units @ \$140/unit	\$ 11,200
Total Capital Cost	\$ 627,200
Net income before taxes	\$ 306,191
Add depreciation	\$ 125,440
Income before depreciation and taxes (cash inflow)	\$ 431,631
ROI - annual rate	69%
Payback period (in years)	\$ 1.45
Key Assumptions:	
Occupancy rate	70%
Compliance rate	70%
Turnover rate (vehicles per space per day)	4.80
Hourly Rate	\$ 1.00
Hours / Day	8
Days / Year	261
Capture Rate	5%
Meter Tickets / Day	19
Equipment Depreciation (years)	5
Labour rate per hour	\$ 22

Table 7 - Future On-Street Paid Parking - Estimate of Revenue, Capital & Operating Costs and Payback Period



Figure 17 - Proposed Locations for Paid Parking Kiosks

3.7 Parking Costs

From the City’s 2022 Operating Budget and summarized in Figure 18, the City’s existing paid parking program comprised of revenues from the Market Centre Parkade, Municipal Lots 3 and 4 and parking ticket revenue, generates an annual total net revenue (profit) of \$671,000. This is a similar approach to most Ontario municipalities with paid parking programs in that they are a financially self-sufficient operation and not a burden on the property taxpayer. With the exception of very large capital investments, such as the 2009 proposed joint municipal parking structure (960 spaces) and bus terminal expansion on Darling Street (IBI Report 2009), the City should continue the parking program as non-tax supported.

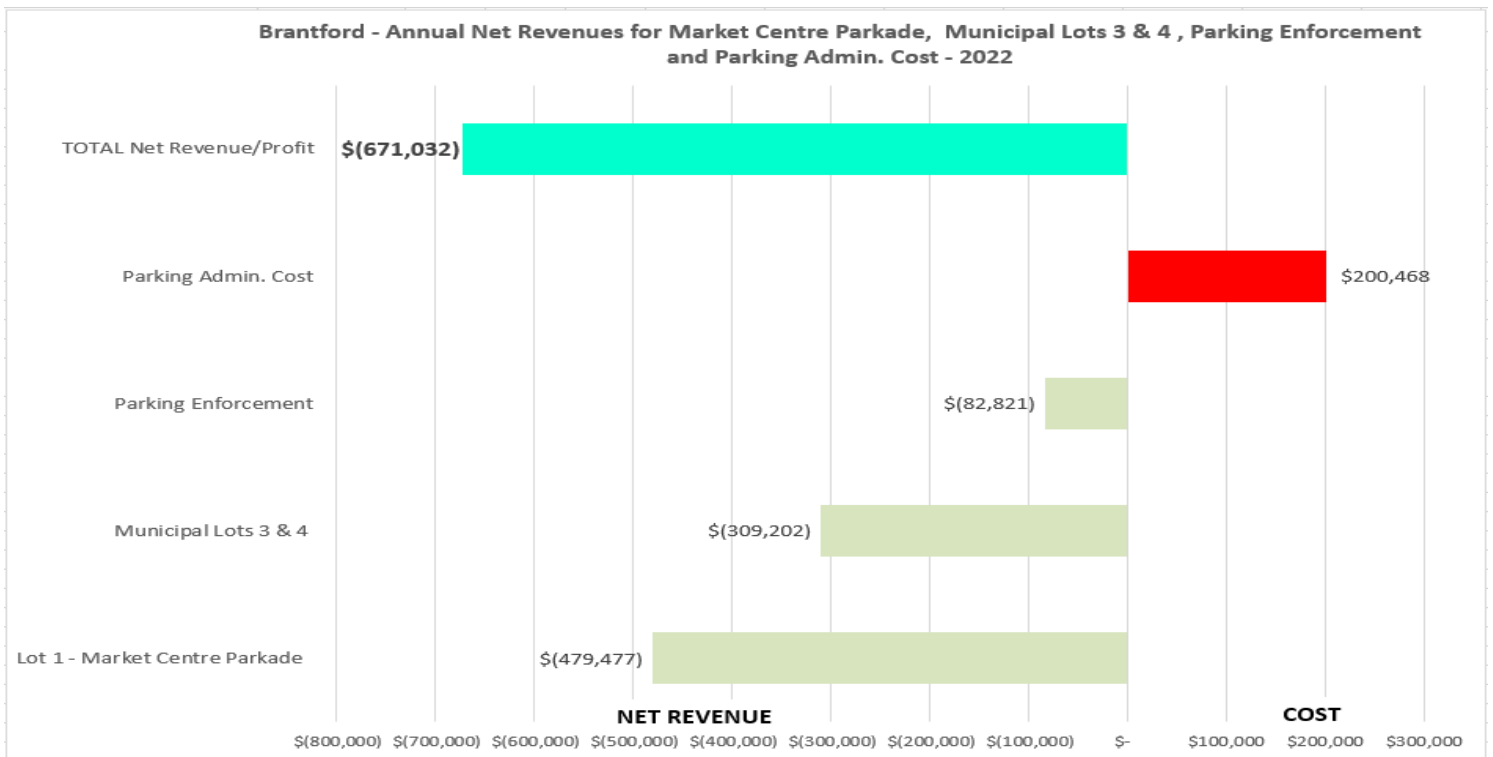


Figure 18 - Brantford - Parking Net Revenues 2022 (Source: Brantford 2022 Operating Budget)

3.8 Parking Technology

The City currently uses a combination of Pay & Display and Pay by Licence Plate machine (the parker selects their preferred mode on the machine) for parking payments at Municipal Lots 3 and 4. The Market Centre Parkade uses a gated system with payments received by an attendant and could be modernized in the future with a fully automated unattended gated Pay-on-Foot system.

3.8.1 Pros and Cons Comparison

The pros and cons of various parking access and revenue control technology are outlined in Figure 19 (spanning 5 pages). Each technology was assessed based on the following 8 main criteria:



- Consumer (parker) comprehension (i.e. ease of understanding)
- Enforcement (i.e. whether required or not and efficiency of enforcement)
- Ability to provide validation (i.e. “free” or discounted parking & important for joint marketing/promotion programs with local businesses)
- Seamless interface between consumers and equipment (i.e. ease of use)
- Level of abuse during equipment failures (i.e. impact during failures)
- Cost (i.e. relative cost comparison), and
- Operational efficiency.

Three general assessment categories were applied to each technology and appear at the very bottom row of each page, as follows:

- Fair
- Good
- Excellent.

The highest overall assessment of technologies was the automated pay-on-foot system (Figure 21) that could be deployed at the Market Centre Parkade, and Municipal Lots 3 and 4, if the City decided to gate them, thereby reducing the amount of enforcement required. Also rated excellent, was the LPR (Licence Plate Recognition) used as an optional add-on technology to a gated pay-on-foot system. The remaining technologies (Pay By Licence Plate, Pay & Display and Pay by Smartphone) are all good technologies for parking applications and the most appropriate payment technology for on-street paid parking.

Pay By Smartphone (Figure 21) should be deployed along with any of the other parking technologies as its applicability was proven across the world during the COVID-19 pandemic, well accepted by the driving public and used by many municipalities and private property managers/owners.

Pay & Display, Pay by Licence Plate, Pay-On-Foot, Pay by Smartphone & LPR - Pros & Cons Evaluation Comparison									
	Technology	Consumer Comprehension	Enforcement	Ability to Provide Validation ("Free" parking)	Seamless Interface Between Consumers and Equipment	Level of Abuse During Equipment Failures	Cost	Operational Efficiency	Overall Assessment (for this site)
A	Pay-on-Foot (gated)  	<p>PROs:</p> <ul style="list-style-type: none"> Widely used parking access and revenue control technology across Canada, USA and overseas. Convenient - multiple payment methods (debit, credit, coin and cash & mobile wallets) in close vicinity of parking spaces <p>CONs:</p> <ul style="list-style-type: none"> At entry, consumer must remember to retain ticket and pay at either a pay station (located near elevators) or at exit terminal with debit or credit card (no cash or coin at exit) 	<p>PROs:</p> <ul style="list-style-type: none"> Not required as all vehicles "captured" by gates for full payment or access control (monthly permits) No tickets issued and therefore no costly fines. <p>CONs:</p> <ul style="list-style-type: none"> May still require occasional enforcement for vehicles parked in fire lanes, 1 car straddling 2 spaces, double parked cars, parking in accessible space, etc. (but address as required) 	<p>PROs:</p> <ul style="list-style-type: none"> Yes – any amount of time (i.e. 30 mins, 60 mins) Convenient for consumer as no waiting at Pay by Lic. Plate machine Full payment collected if validation period (i.e. 30 mins) is exceeded (payment to exit) <p>CONs:</p> <ul style="list-style-type: none"> Complaints from consumers having to pay after exceeding validation period (i.e. 3 hours) 	<p>PROs:</p> <ul style="list-style-type: none"> Easy entry as gate detects vehicles and automatically opens gates & dispenses entry tickets eliminating need to touch a button EasyWave™ technology where illuminated infrared button activated by hand wave for opening gate Common technology in many commercial complexes (e.g. Pearson Airport) <p>CONs:</p> <ul style="list-style-type: none"> May cause anxiety at exit station (forgot to pay at pay station; don't have credit card; insert different credit card from one that was inserted into entry station) Requires parking operator's remote customer service staff to immediately address consumer problems 	<p>PROs:</p> <ul style="list-style-type: none"> Continues to work off-line if network down Parking operator's remote customer service staff address problems immediately and real time and dispatch service technicians as required for quick response. Robust secure pay stations near elevators and payment terminals at exit gates. <p>CONs:</p> <ul style="list-style-type: none"> Occasional potential revenue loss with gate failure or gate vandalism or gate opening by parking operator's remote customer service staff to resolve consumer problem at exit gate Gate openings & revenue loss amounts by customer service staff automatically tracked and reported to client 	<p>PROs:</p> <ul style="list-style-type: none"> Best technology to capture almost 100% of revenue compared to other ungated technologies Over term of contract increased revenue should off-set the higher initial capital investment Can reduce cost of pay stations by limiting number of machines that accept coin and cash. <p>CONs:</p> <ul style="list-style-type: none"> High capital cost and ongoing operating cost to service, maintain and perform cash collections. 	<p>PROs:</p> <ul style="list-style-type: none"> Efficient flow, especially with contra-flow reversible lanes (at large garages with multiple entry/exit lane points) during morning and afternoon peak periods <p>CONs:</p> <ul style="list-style-type: none"> Some queuing delays on exiting for consumers unfamiliar with technology, but addressed immediately in real-time by parking operator's remote customer service staff. 	<p>● Excellent</p> <ul style="list-style-type: none"> Effective, proven and appropriate technology for optimizing revenue, managing validations, eliminating daily issuance of parking tickets & addressing different needs of visitors, students, employees, retail, commercial, residents & others.】
	Assessment	●	●	●	●	⚙️	⚙️	●	●


Assessment Categories: Fair ○

Good ⚙️


Excellent ●


Oct. 2022

Figure 19 – Pros and Cons – Comparison of Various Parking Payment Technologies


Pay & Display, Pay by Licence Plate, Pay-On-Foot, Pay by Smartphone & LPR - Pros & Cons Evaluation									
	Technology	Consumer Comprehension	Enforcement	Ability to Provide Validation ("Free" parking)	Seamless Interface Between Consumers and Equipment	Level of Abuse During Equipment Failures	Cost	Operational Efficiency	Overall Assessment (for this site)
B	<p>Pay & Display (Ungated)</p> 	<p>PROs:</p> <ul style="list-style-type: none"> Proven, familiar technology - units located throughout Toronto & around the world. Very quick and easy to understand: insert payment in machine, press button for ticket, then display on dash of vehicle (less complex thinking than pay by licence plate). <p>CONs:</p> <ul style="list-style-type: none"> For some customers, either by accident or purposely, do not display the ticket face up for enforcement officers to view the ticket, date and expiry time, resulting in a parking ticket issued. 	<p>PROs:</p> <ul style="list-style-type: none"> Needed to achieve compliance with parking rules Officer acts as additional security while patrolling. <p>CONs:</p> <ul style="list-style-type: none"> Violators receive parking tickets ranging from \$30 (expired or no permit) to \$300 (parking in accessible space). Does not capture ALL violators due to occasional random enforcement patrols 	<p>PROs:</p> <ul style="list-style-type: none"> Yes – any amount of time i.e. 30 or 60 minutes using a special validator attached to the machine (additional hardware cost) <p>CONs:</p> <ul style="list-style-type: none"> Inconvenient – consumer must enter validation code at machine location While queued in line to enter code, occasions where enforcement officer issued ticket before payment made 	<p>PROs:</p> <ul style="list-style-type: none"> Simply insert coin, credit card or debit card into machine Offers new (COVID-19) contactless mobile payment app (smartphone) by scanning QR code on nearby signs <p>CONs:</p> <ul style="list-style-type: none"> Sometimes parkers take ticket with them and forget to display on dashboard of vehicle. 	<p>PROs:</p> <ul style="list-style-type: none"> If machine malfunctions, can use any other on-site machine for payment & validation on site <p>CONs:</p> <ul style="list-style-type: none"> If only one machine on the lot, customer cannot pay, but still has option to pay using mobile pay app 	<p>PROs:</p> <ul style="list-style-type: none"> Lower capital cost than Pay-on-Foot Less equipment to operate and maintain – no gates Slightly lower cost than Pay by Licence Plate <p>CONs:</p> <ul style="list-style-type: none"> More costly than Pay by Smartphone app 	<p>PROs:</p> <ul style="list-style-type: none"> Smooth unencumbered traffic flow entering & exiting site (ungated) No vehicle queuing (ungated) More appropriate for surface lots than parking garages <p>CONs:</p> <ul style="list-style-type: none"> Pedestrian queuing at machine for payments and validations Requires walking distance to make initial payment After purchase from the kiosk, must walk back to vehicle to display receipt on dashboard. 	<p>☀</p> <p>Good</p> <ul style="list-style-type: none"> A feasible widely-used low cost alternative, but requires enforcement resulting in parking tickets that are disliked by consumers.
	Assessment	☀	○	☀	☀	☀	●	●	☀

Pay & Display, Pay by Licence Plate, Pay-On-Foot, Pay by Smartphone & LPR - Pros & Cons Evaluation Comparison

	Technology	Consumer Comprehension	Enforcement	Ability to Provide Validation ("Free" parking)	Seamless Interface Between Consumers and Equipment	Level of Abuse During Equipment Failures	Cost	Operational Efficiency	Overall Assessment <i>(for this site)</i>
C	<p>Pay by Licence Plate (Ungated)</p> 	<p>PROs:</p> <ul style="list-style-type: none"> Proven, familiar technology - units located throughout Toronto & around the world <p>CONs:</p> <ul style="list-style-type: none"> For some customers, Lic. Plate entry errors ("0" zero vs. letter "O") Must park, remember plate ID and walk to machine to enter correct plate ID 	<p>PROs:</p> <ul style="list-style-type: none"> Needed to achieve compliance with parking rules Officer acts as additional security while patrolling Better than pay & display as all licence plates are date and time stamped in the cloud and accessible to enforcement <p>CONs:</p> <ul style="list-style-type: none"> Violators receive parking tickets ranging from \$30 (expired or no permit) to \$450 (parking in accessible space) Does not capture ALL violators due to occasional random enforcement patrols 	<p>PROs:</p> <ul style="list-style-type: none"> Yes – any amount of time i.e. 3 hours <p>CONs:</p> <ul style="list-style-type: none"> Inconvenient – consumer must enter plate ID at machine location While queued in line to enter plate ID, occasions where enforcement officer issued ticket before payment made 	<p>PROs:</p> <ul style="list-style-type: none"> Simply insert coin, credit card or debit card into machine Offers new (COVID-19) contactless mobile payment app (smartphone) by scanning QR code on nearby signs & enter lic. plate ID on smartphone <p>CONs:</p> <ul style="list-style-type: none"> Errors by consumers entering incorrect plate ID resulting in tickets issued 	<p>PROs:</p> <ul style="list-style-type: none"> Revenue still collected based on lic. plate ID and time of entry & exit regardless of gate failures If machine malfunctions, can use any other on-site machine for payment & validation on site <p>CONs:</p> <ul style="list-style-type: none"> On very rare occasions, will not work if internet (Internet Service Provider) network not functioning and pay by lic. Plate machine cannot connect to the internet. Has option to pay using mobile pay app 	<p>PROs:</p> <ul style="list-style-type: none"> Lower capital cost than Pay-on-Foot Less equipment to operate and maintain – no gates <p>CONs:</p> <ul style="list-style-type: none"> Slightly more expensive than pay & display More costly than Pay by Smartphone app 	<p>PROs:</p> <ul style="list-style-type: none"> Smooth unencumbered traffic flow entering & exiting site (ungated) No vehicle queuing (ungated) Good for both surface lots and garages <p>CONs:</p> <ul style="list-style-type: none"> Pedestrian queuing at machine for payments and validations 	<p>☀</p> <p>Good</p> <ul style="list-style-type: none"> A feasible widely-used low cost alternative, but requires enforcement resulting in parking tickets that are disliked by consumers.
	Assessment	○	●	☀	☀	☀	●	●	☀

Pay & Display, Pay by Licence Plate, Pay-On-Foot, Pay by Smartphone & LPR - Pros & Cons Evaluation Comparison									
Technology	Consumer Comprehension	Enforcement	Ability to Provide Validation ("Free" parking)	Seamless Interface Between Consumers and Equipment	Level of Abuse During Equipment Failures	Cost	Operational Efficiency	Overall Assessment <i>(for this site)</i>	
<p>D Pay by Smartphone app</p> 	<p>PROs:</p> <ul style="list-style-type: none"> Very convenient for consumers Very popular among youth & gaining wider public acceptability daily <p>CONs:</p> <ul style="list-style-type: none"> Senior citizens may have problems working with app entering plate ID Must address issue of motorists that do not use smartphones for any type of payment or may not have data plan, just voice (calls only) plan 	<p>PROs:</p> <ul style="list-style-type: none"> Requires enforcement, but once plate ID entered, data immediately goes to "the cloud" and accessed by enforcement officers, reducing any tickets issued in error. <p>CONs:</p> <ul style="list-style-type: none"> Errors by consumers entering incorrect plate ID resulting in tickets issued 	<p>PROs:</p> <ul style="list-style-type: none"> Yes – any amount of time i.e. 1 hour Convenient for consumer as no waiting at Pay & Display or Pay by Lic. Plate machine <p>CONs:</p> <ul style="list-style-type: none"> Errors by consumers entering incorrect plate ID resulting in tickets issued 	<p>PROs:</p> <ul style="list-style-type: none"> Yes – very seamless – enter plate ID from the convenience of the smartphone May be used in Pay-on-Foot operations, acting as the credential/permit. <p>CONs:</p> <ul style="list-style-type: none"> Senior citizens may have problems working with app entering plate ID and need to talk to parking operator's customer service via intercom 	<p>PROs:</p> <ul style="list-style-type: none"> Revenue still collected based on lic. plate ID and time of entry & exit regardless of gate or other equipment failures <p>CONs:</p> <ul style="list-style-type: none"> On very rare occasions, will not work if internet (Internet Service Provider) network not functioning and smartphone cannot connect to the internet. 	<p>PROs:</p> <ul style="list-style-type: none"> Lowest cost to client -consumer pays a convenience fee of \$0.35 per transaction <p>CONs:</p> <ul style="list-style-type: none"> Requires additional information signage, marketing & promotion Consumers may dislike paying the convenience fee 	<p>PROs:</p> <ul style="list-style-type: none"> Tied to credit card – no cash collections or processing required Easy and quick to setup Pay immediately at the parking space <p>CONs:</p> <ul style="list-style-type: none"> Requires additional information signage, marketing & promotion 	<p>☺ Good</p> <ul style="list-style-type: none"> Should be provided with any technology due to low cost and technology that continues to evolve and growing acceptance and expected by many consumers as a viable payment option. 	
Assessment	☺	☺	☺	☺	●	●	●	☺	

Pay & Display, Pay by Licence Plate, Pay-On-Foot, Pay by Smartphone & LPR - Pros & Cons Evaluation Comparison

Technology	Consumer Comprehension	Enforcement	Ability to Provide Validation ("Free" parking)	Seamless Interface Between Consumers and Equipment	Level of Abuse During Equipment Failures	Cost	Operational Efficiency	Overall Assessment (for this site)
<p>E</p> <p>Licence Plate Recognition (LPR)</p> <p><i>Note: Add-on OPTIONAL</i></p> 	<p>PROs:</p> <ul style="list-style-type: none"> Automatically records licence plate of each vehicle upon entry and exit using special infrared cameras Very convenient for consumers <i>when integrated with a gated system</i> i.e. Pay-on-Foot <p>CONs:</p> <ul style="list-style-type: none"> Even with a 95% recognition rate of correctly identifying licence plates, when licence plates are heavily soiled or dirty (i.e. from winter sanded/salted roads), the plate may be obscured & not recognized. However, the Pay-on-Foot system provides a backup through date/time stamp of each vehicle entry. 	<p>PROs:</p> <ul style="list-style-type: none"> Not required as all vehicles "captured" by LPR cameras & gates for full payment or access control (monthly permits) No tickets issued and therefore no costly fines. Provides an additional measure of safety & security by recording and storing licence plates for possible investigations of vandalized or stolen vehicles. <p>CONs:</p> <ul style="list-style-type: none"> None (not applicable) 	<p>PROs:</p> <ul style="list-style-type: none"> Yes – any amount of time i.e. 1 hour Convenient for consumer as no waiting at Pay & Display or Pay by Lic. Plate machine <p>CONs:</p> <ul style="list-style-type: none"> Complaints from consumers having to pay after exceeding validation period (i.e. 1 hour) 	<p>PROs:</p> <ul style="list-style-type: none"> Yes, very seamless (no touching of buttons) Licence plate acts as a virtual ticket, matching the vehicle at entry & exit gates that opens the gates, and eliminates fraudulent behaviours. Eliminates the need to re-insert ticket upon exit <p>CONs:</p> <ul style="list-style-type: none"> May cause anxiety at exit station (forgot to pay at pay station; don't have credit card; insert different credit card from one that was inserted into entry station) 	<p>PROs:</p> <ul style="list-style-type: none"> Revenue still collected based on vehicle type image (i.e. Ford, Toyota, etc.), colour and time of entry & exit regardless of LPR camera, gate or other equipment failures Parking operator's remote customer service staff address problems immediately and real time and dispatch service technicians as required for quick response. Prevents "black list" of problematic cars from entering <p>CONs:</p> <ul style="list-style-type: none"> On very rare occasions, will not work if internet (Internet Service Provider) network not functioning 	<p>PROs:</p> <ul style="list-style-type: none"> Helps capture almost 100% of revenue compared to other ungated technologies Over term of contract increased revenue should off-set the higher initial capital investment <p>CONs:</p> <ul style="list-style-type: none"> High capital cost and ongoing operating cost to service & maintain (i.e. clean camera lens). 	<p>PROs:</p> <ul style="list-style-type: none"> Efficient flow, in at entry and exit gates. <p>CONs:</p> <ul style="list-style-type: none"> Some queuing delays on exiting for "problem payers," but addressed in real time by parking operator's remote customer service staff 	<p>Excellent</p> <ul style="list-style-type: none"> A very good add on to and enhancement of an integrated Pay-on-Foot system. LPR technology continues to evolve and improve with both hardware and software advancements.
Assessment	⚙️	●	●	●	●	⚙️	●	●

The City of Brantford offers an interesting combination for customers to use the same payment machine to either “pay by licence plate” where a person presses letters on the machine keyboard to enter their licence plate or “pay & display” where the customer inserts their credit card or coins and receives a paper receipt for display on the dashboard of their vehicle (Figure 20).



Figure 20 - Pay Stations Used in Brantford Lots 3 & 4 in 2 Modes: Pay by Licence Plate & Pay and Display



Figure 21 - Examples of Pay By Mobile Phone (Scan QR code) & Automated Pay-on-Foot System

3.9 Market Centre Parkade - Signage

As outlined in the terms of reference for this EA study, a review of the existing signage and safety consideration of the parkade was undertaken to determine possible improvements.

Currently in the Market Centre Parkade, there are colour coded circular shaped signs indicating the floor number of each level, as shown on Figure 23, Figure 24 and Figure 24.



Figure 22 - Market Centre Parkade - Level 1 Yellow Sign & Pedestrian Access



Figure 23 - Market Centre Parkade - Level 2 Green Sign - Pedestrian Access



Figure 24 - Market Centre Parkade - Level 3 Blue Sign

These are adequate signs for each level, but to improve visibility the City should increase the quantity of signs with a larger colour coded system that would make it easier for individuals to remember and return to their vehicles. Better use of contrasting colours, such as a white font with yellow background on Level 1 should be avoided. The spaces are not numbered nor are directions within each level provided, such as northside, southside, eastside and westside to give parkers a sense of orientation within the garage. Adjacent street names with very large letters placed on applicable walls, columns or doors also give parkers a sense of direction.

Examples for best practices of wayfinding signage in garages are shown in Figure 26 and Figure 26.

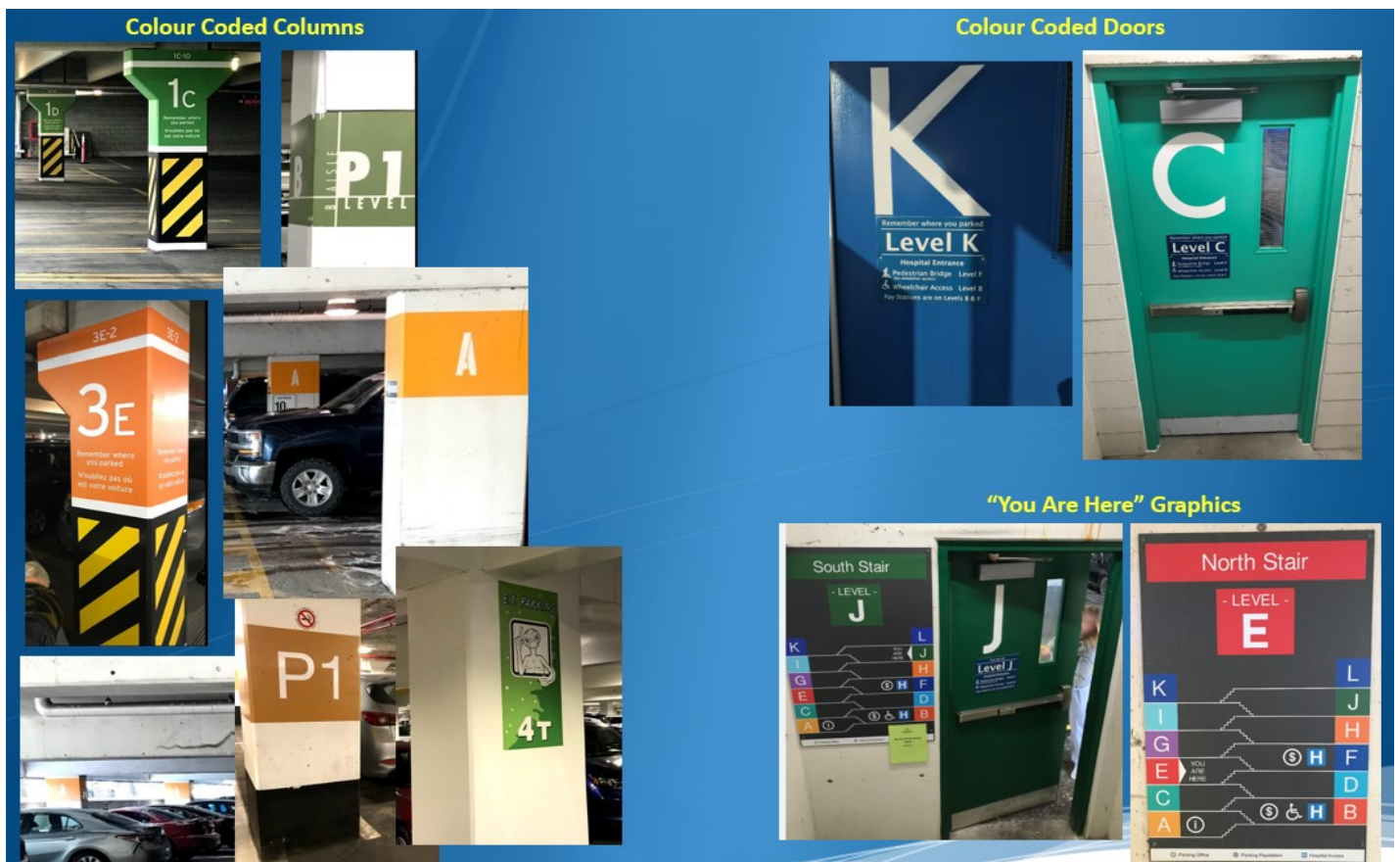


Figure 25 - Examples of Parking Garage Wayfinding on Columns & Stairwells



Figure 26 - Best Practices - Static Parking Garage Signs

Best practices for wayfinding in parking garages are:

- the use of consistent clear contrasting colours on signs (large white font on blue, black or dark green background);
- the use of different shapes (circles, squares or symbols) on structure columns with contrasting colours and clear signs in the stairwells and elevator areas;
- different colour coded levels of doors for each level;
- orientation maps on each floor stairwell adjacent to the doors with “You Are Here”;

- international accessibility symbol to indicate locations of accessible parking spaces (painted on walls, columns and applicable stalls);
- assigning a unique number to each parking space on the walls, columns or surface; and
- providing names of landmarks or street names or compass type directions (northside, southside, westside, eastside) on walls and columns to provide parkers a sense of orientation of their whereabouts within the parking garage.

There are some examples of good contrasting signage in the garage, such as the sign shown on Figure 27, which is white lettering on a contrasting dark green background. This practice should be adopted consistently throughout the garage.



Figure 27 - Market Centre Parkade - Good Contrasting Colour Sign

3.9.1 Market Centre Parkade - Safety

During the on-site review of the Market Centre Parkade there was an absence of emergency call stations within the facility. Combined with proper lighting, emergency call stations located at key pedestrian access points provide customers with a greater sense of security when parking at the parking facility. This technology encourages use of the facility, acting as a deterrent to crime and is easy to use with the simple press of a button to reach security personnel for response to incidents.



Figure 28 - Example of Emergency Call Station

Emergency call stations are an important security tool and should be installed on all floors of the parking garage, with an example shown on Figure 28. The features include blue LED lights that make them easily visible anywhere in the parking garage, built-in phone (as mobile service may be intermittent), camera (optional) and defibrillators (optional). The stations may be mounted on walls or provided on self-standing towers within the garage.

3.10 *Market Centre Parkade - State of Good Repair*

Recently the City undertook refurbishing of the Market Centre Parkade, which is a best practice known as a “State of Good Repair” that is applied to both existing parking infrastructure and equipment. A State of Good Repair should be a priority before any expansion of the parkade, or the construction of a new parkade on the existing Municipal Lot 3 adjacent to the Bus Terminal on Darling St. The preparation of the City’s annual 10-Year capital and operating budget forecasts is the appropriate forum for developing a State of Good Repair program with budget allocations for surface repair, lighting system replacement, elevators, parking access and revenue control technologies, parking guidance systems and other garage refurbishment requirements.

It will be important to ensure that the municipality is adaptable and flexible towards future trends that must be considered prior to making multimillion dollar investments in parking services and infrastructure.

3.11 *Parking Guidance*

During the transition out of the COVID-19 pandemic, with parking occupancies increasing in the coming year or two, the City should consider the acquisition of a parking guidance system for the Market Centre Parkade, Municipal Lots 3 and 4 and on-street by block, prior to the implementation of a paid on-street parking program. Examples of parking guidance signs for parking lots and on-street parking (and a static sign for comparison purposes) are shown on Figure 29.

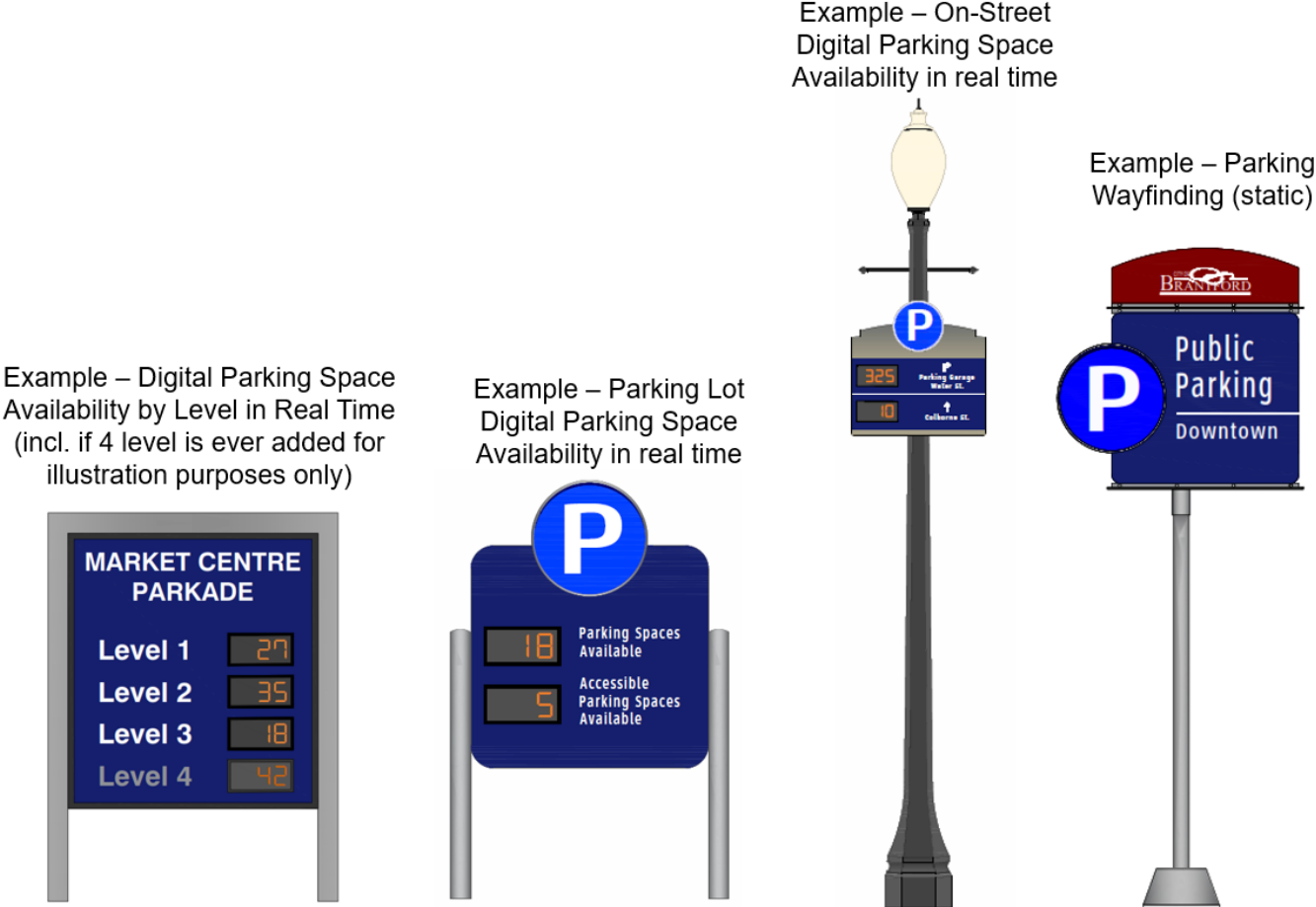


Figure 29 - Types of Parking Guidance Technologies

3.11.1 What is a parking guidance system?

A parking guidance system is comprised of 2 main components:

- Sensors installed at the end of each stall embedded in the pavement or if just counting, at each entry and exit lane of the parking lot. Instead of sensors, more

costly specialized space recognition cameras may be mounted high up on existing light standards to detect vehicle occupancy.

- LPR (Licence Plate Recognition) cameras installed at the entrance and exit lanes are another alternative way of counting vehicles.

3.11.2 Electronic Information Signs

Sensors detect whether or not stalls are occupied and transmit this information to the digital signs.

The digital signs display the number of available spaces at any given time and may be configured so as to indicate the number of available spaces that are Accessible or for any floor level in a parking garage.



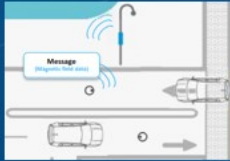
For on-street locations, digital signs may also be placed at block locations along the downtown streets indicating the number of available spaces by parking lot (referring to the lot number) or on-street by block, as has been done in the City of Burlington the past 5 years.

In parking garages, sensors are placed on the ceiling of each level and above each individual space. Every parking space is monitored by an overhead mounted single space sensor or alternatively, ceiling mounted cameras that detect vehicles of each space.

Vehicle occupancy data is transmitted in real time to a server either via ethernet cable or wirelessly to a software application that shows real time status of the entire parking operation as well as production of reports, graphs and dashboard information.

A description and the pros and cons of different types of parking guidance technologies are shown on Figure 30 and Figure 31.


Parking Guidance Technologies: Pros & Cons (1 of 2)

Parking Guidance Technology Type	Description*	Pros	Cons	Comments
<p>1. Ultrasonic Sensors</p> 	<p>Ultrasonic sensor emits a sound wave towards the parking space at regular intervals and then analyzes the received echo to detect if a vehicle is present or not and transmits to a server. Installed on the ceiling of parking garages above each parking space. Individual parking space availability are indicated to motorists by LED lights: red for occupied, green for unoccupied and blue for accessible unoccupied.</p>	<ul style="list-style-type: none"> Successfully used for over 15 years world-wide in thousands of parking garages for accurately detecting vehicle occupancy in individual spaces. As with 2. Camera Sensors option, can also indicate space availability by parking level e.g. P1, P2, P3, P4, etc. Lower cost per space than camera based sensors. 	<ul style="list-style-type: none"> Must install a sensor above each parking space. Does not recognize licence plates for added security. Not practical to use in outdoor surface parking lots as there is no ceiling to mount the sensors. 	<p>Feasible for parking garages.</p>
<p>2. Camera Sensors</p> 	<p>Camera sensors are networked and installed in the centre of parking aisles covering multiple parking spaces. Some camera based systems also recognize the licence plate (LPR technology) in every space with each camera controlling 4 spaces. Similar to ultrasonic sensors, individual parking space availability are indicated by LED lights: red for occupied, green for unoccupied and blue for accessible unoccupied.</p>	<ul style="list-style-type: none"> Less wiring and installation requirements as sensor units installed in the centre of aisles. Installed in several commercial & institutional parking garages for several years, including many GO Transit parking garages, Toronto Pearson Airport & Yorkdale Mall. Provides control and surveillance in every parking space, including detailed event recording (i.e. vandalized vehicles). 	<ul style="list-style-type: none"> Higher cost than ultrasonic sensors. Not practical to use in outdoor surface parking lots as there is no ceiling to mount the sensors 	<p>Feasible for parking garages.</p>
<p>3. Buried "puck" Vehicle Detection Sensors</p> 	<p>A wireless sensor in the shape of a thick "puck" (4 in. diameter X 3 in. high) is buried and flush with the surface in the entry lane and another in the exit lane. The sensor detects the Earth's magnetic field changes produced by vehicles passing over the sensor and transmits the data wirelessly to a nearby receiver. The "pucks" use a Lithium battery with a 10 year Lifetime.</p>	<ul style="list-style-type: none"> Easy to install with no wiring and only minimal civil work. Can withstand inclement weather Has no ongoing maintenance. In operation successfully at many locations in Europe and in Burlington, Ontario (on-street, parking lots and garage). Over the course of 10 years similar lowest cost to loop detectors for counting. 	<ul style="list-style-type: none"> For identifying individual spaces, a sensor must be placed in each space. Sensors may penetrate surface membrane of the parking garage. Better application is for outdoor surface parking. Some suppliers provide <i>protruding</i> surface mounting to avoid penetrating garage membranes 	<p>Feasible for on-street and surface lot spaces.</p>

*For all tech types a KPI (Key Performance Indicator) should be 97% accuracy on the counts, even with occasional human counter resets in the software app.

Figure 30 - Parking Guidance Technology - Pros & Cons (1 of 2)

Parking Guidance Technologies: Pros & Cons (2of2)

Parking Guidance Technology Type	Description*	Pros	Cons	Comments
4. Embedded Loop Vehicle Detection System 	Induction loop is an electromagnetic system that uses a moving magnet to induce an electrical current in a wire that detects metal objects (i.e. cars) & transmits signal to a controller. The loops are embedded in the pavement, then sealed with a special epoxy.	<ul style="list-style-type: none"> Has been successfully used for 50 years, especially to control traffic signals at intersections and operate gates in parking garages and lots. Over 10 years, cost similar to “puck” detectors due to initial installation & ongoing maintenance. 	<ul style="list-style-type: none"> Labour intensive installation, requiring saw cutting into surface at each entry and exit lane, placing wire inside and securing with special epoxy sealant. Prone to occasionally breaking. Can only be used for counting vehicles entering and exiting and NOT for detecting vehicles at individual parking spaces. Not as accurate as Ultrasonic & Camera based sensor technologies. 	Feasible for gate entry and exit, but not space by space availability in parking garages.
5. LPR (Licence Plate Recognition) 	Specialized cameras mounted on short posts at the entrance and exit lanes of each lot that capture the licence plates, transmit the signals to the digital display sign and a server for real time status of available parking spaces.	<ul style="list-style-type: none"> Ticketless, touch-free parking eliminating the need for cards by monthly parkers, controlled validations, authorized contractors, VIPs, etc. Will also accurately count vehicles entering and exiting, even if the licence plate is obscured during winter conditions, as at a bare minimum, it is still identifying a vehicle (model, colour & type). 	<ul style="list-style-type: none"> More costly than “puck” and “loop” vehicle detectors. Snow, freezing rain & sleet will occasionally interfere with image captures in outdoor parking lots. 	Complements a gated Pay-on-Foot system. LPR cameras at entrances & exits of each garage could be integrated with entry digital signs to encourage parking in under utilized spaces.
6. Camera Vehicle/Space Recognition 	Specialized cameras mounted high on posts (i.e. existing light standards) in an outdoor parking lot, collecting video and data from each parking space, transmitting the signals and a server in real time.	<ul style="list-style-type: none"> Detects each vehicle in each parking space & best for outdoor lots. May use at parking entrances/exits only for counting vehicles to provide no. of available spaces. Also acts as a video security system providing a deterrent to theft, vandalism & other incidents. Sends “alerts” on parking violations i.e. one vehicle. occupying 2 spaces, large vehicles parking in small car spaces, vehicles parking in no parking areas, etc. 	<ul style="list-style-type: none"> One camera may only capture 20 to 30 vehicles, and therefore, several cameras and posts are required for mounting. However, for counting at entrance & exit lanes may only require one or two cameras per lot. Costly due to multiple cameras if using to monitor every space in the lot Lot may not have enough existing light standards for mounting cameras outdoors Snow, freezing rain & sleet will interfere with image captures. 	Feasible for surface lots, but not parking garages or on-street spaces.

*For all tech types a KPI (Key Performance Indicator) should be 97% accuracy on the counts, even with occasional human counter resets in the software app.

Figure 31 - Parking Guidance Technology - Pros & Cons (2 of 2)

3.11.3 Why Digital Parking Guidance?

The rationale for implementing a parking guidance system is as follows:

- Optimize the quantity of parking spaces.
- Reduce the amount of time circling around the parkade or surface lots or a block to find available (vacant) parking spaces (and also reduces harmful vehicle emissions and road congestion).
- Vehicles are counted in real time entering and exiting and the “balance” of available spaces shown at the entry point to the lot on an electronic digital sign.
- Provides ongoing occupancy data for ongoing adjustments and planning changes.
- With reliable data, can “oversell” (over-issue) perhaps by 10% the no. of monthly parking permits in the parkade and Lots 3 and 4 due to absences (vacation, illness, off-site meetings, etc.) resulting in optimized use of parking spaces.

A parking guidance system requires WiFi or cellular communications to transmit data from sensor to digital signs and a software package.

There is no such thing, contrary to vendor claims, of 100% fully automated accurate counting – it requires occasional human intervention in the software app by resetting the counters remotely to zero (i.e. depending on volume, perhaps once a week). With human intervention, one may achieve 97% counting accuracy.

In planning for a parking guidance system, it’s important to outline the trade-offs between actual needs, types of information, quantity of lots with parking guidance, installation complexity and cost.

3.11.4 Parking Guidance Costs

3.11.4.1 Market Centre Parkade

High level per unit cost estimates for parking guidance systems are shown in Table 8 based on other projects undertaken by the consultant. The most appropriate technology for the Market Centre Parkade is the “camera vehicle/space recognition” (item 2 on Figure 30 and item 5 on Table 8) that provides space by space availability in the garage indicated by LED lights green (vacant), red (occupied) and blue (accessible) spaces. This technology is widely used in many garages, such as GO Transit rail station parking garages, Pearson Airport, Yorkdale Mall and others (Figure 32). The key

cost component is the cost per space ranging between \$450 to \$750, therefore, a budget number for applying this technology to the Market Centre Parkade (950 spaces) would amount to a total estimated cost ranging from \$427,500 to \$712,500, plus installation of \$85,500 to \$142,500 (20% of cost) for a grand total of \$513,000 to \$855,000.



Figure 32 - Digital Parking Space Availability Signs at Entry Points

3.11.4.2 Municipal Lots 3 and 4

The recommended parking guidance technology for Municipal Lots 3 (147 spaces) and 4 (44 spaces) is the “buried ‘puck’ vehicle detection sensors” (item 3 on Figure 30 and item 2 on Table 8) that are installed in the paved entrances & exits flush to the surface, at an estimated cost per space between \$50 to \$70, plus the cost of entry signs ranging \$3,000 to \$4,000 per unit (total of 4 entry points) for a total cost of \$20,000 to \$30,000, plus software at \$15,000 and installation of \$6,000 for a grand total of \$41,000 to \$51,000. This is the technology that has been successfully deployed over the past 5 years in the City of Burlington for surface lots (Figure 33) and on-street paid parking spaces for specific blocks. These costs do not include any long trenching or excavation to install electrical or communication lines, which requires specific on-site review and analysis by potential vendors.



Figure 33 - Burlington Real-Time Parking Lot Space Availability

3.11.4.3 On-Street Spaces

On-street parking guidance space availability signs are helpful in reducing vehicle circling to find a parking space, meaning more convenience for motorists and reducing greenhouse gas emissions from vehicles. The “puck sensors” are installed on the top of the concrete curbs adjacent to parking spaces (565 spaces) by drilling a 4 inch diameter hole then sealing with epoxy. The digital display signs may be mounted on existing posts or new posts and do not have to be on every blockface, but strategically located. For the purposes of this study, it is assumed that 25 digital display signs are required for the downtown at a total cost ranging from \$75,000 to \$100,000, plus puck sensors ranging \$28,000 to

\$42,000, software at \$15,000 and installation of \$30,000 (20% of capital cost) for a grand total of \$148,000 to \$172,000. These costs do not include any long trenching or excavation to install electrical or communication lines, which requires specific on-site review and analysis by potential vendors.

Of course, for all of the above noted cost estimates, a detailed specification would have to be issued to obtain accurate costing as well as a detailed on-site review by prospective vendors to better estimate installation costs.

Total Main Cost Component*	1. Ultrasonic <small>(Applies to Indoor Parking Garage only)</small>	2. Buried "puck" Vehicle Detection Sensors <small>(Applies to Surface Lot & On-Street)</small>	3. Embedded Loop Vehicle Detection System <small>(Applies to Surface Lot)</small>	4. LPR (Licence Plate Recognition) <small>(Applies to Garage & Surface Lot)</small>	5. Camera Vehicle/Space Recognition <small>(Applies to Indoor Parking Garage only)</small>
Cost Per Lane (counting)	\$5,000 - \$6,000	\$5,000 - \$6,000	\$5,000 - \$6,000	\$10,000 - \$15,000	\$15,000 - \$20,000
Digital Display Sign Per Entrance/Exit	\$20,000 - \$25,000 (multi-level)	\$3,000 - \$4,000	\$3,000 - \$4,000	\$3,000 - \$4,000	\$6,000 - \$8,000
Software Cost (one-time)	\$10,000 - \$15,000	\$10,000 - \$15,000	\$10,000 - \$15,000	\$10,000 - \$15,000	\$20,000 - \$25,000 (multi-level)
Maintenance Cost per year	10% - 15% of Total Capital Cost	\$10,000 - \$15,000	\$15,000 - \$20,000	\$30,000 - \$40,000	\$35,000 - \$40,000
Cost Per Space	\$300 - \$400	\$50 - \$75	\$50 - \$75	\$100 - \$125	\$450 - \$750
Installation Cost**	Assume 20% of Capital Cost	Assume 20% of Capital Cost	Assume 20% of Capital Cost	Assume 20% of Capital Cost	Assume 20% of Capital Cost

NOTE:
 *These are high level cost estimates only. More accurate estimates by requesting formal price quotations from suppliers.
 ** Client responsible for power supply, trenching power & communication lines, conduit, posts and ongoing Internet/communication costs

Table 8 - Cost Estimates of Parking Guidance Technologies

3.12 Loading Zones

With online shopping and the resulting continued staggering rise in deliveries it’s important to consider the needs of supporting both customers and businesses in delivery requirements. Similar to most Canadian cities, Brantford’s downtown was not designed for today’s massive delivery demand. Figure 34 shows the existing loading zones (blue symbols - 3 zones), truck loading zones (red symbols - 5 zones) and existing pickup zones (green symbols - 11 zones) along Dalhousie St. and Colborne St. west and east of Clarence St. in the study area.

Providing loading zones is an effective way for municipalities to lower congestion caused by deliveries. However, during this EA study City staff have indicated that delivery trucks, primarily beer trucks, often

unload and load in the adjacent road lane by double parking due to an insufficient quantity of loading zones near the businesses being served. This is problematic with no quick solutions, however, by retaining the one-way street system (i.e. Preferred Alternative), the lane adjacent to the parallel parking spaces does provide a way for deliveries, as has been the situation in Brantford for decades. A future strategy to address this problem would be to work with delivery companies by requesting drop-off and pick-up data to identify hotspots and correlate them with double parking ticket offences. This data can then be mapped to determine where additional space is needed to accommodate this demand.

For other deliveries by Uber Eats, Skip The Dishes and other companies, fire hydrants (red symbols) on Figure 35 have been used to accommodate loading and unloading. Ridesharing offered by both private citizens driving their own vehicles, taxis and Transportation Network Companies (Uber, Lyft and others) also use fire hydrants and bus stops as locations for quick passenger pickups and drop-offs, as done in Calgary and Victoria (Source: <https://www.parking-mobility.org/2016/01/08/tpp-2012-09-taxi-hydrant-zones/> and <https://www.victoria.ca/EN/main/residents/parking/taxi-hydrant-zones.html>).

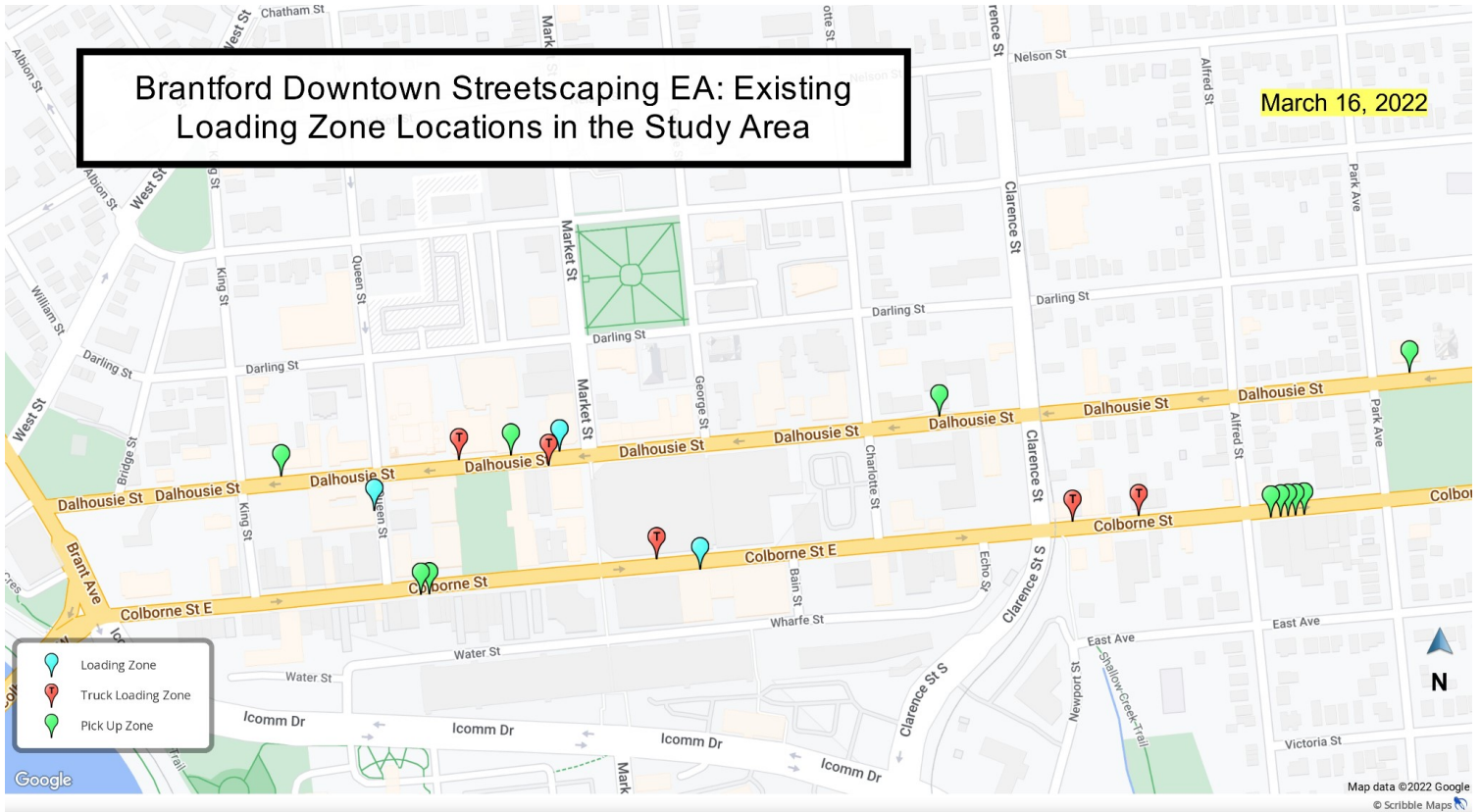


Figure 34 - Downtown Brantford Existing Loading Zone Locations

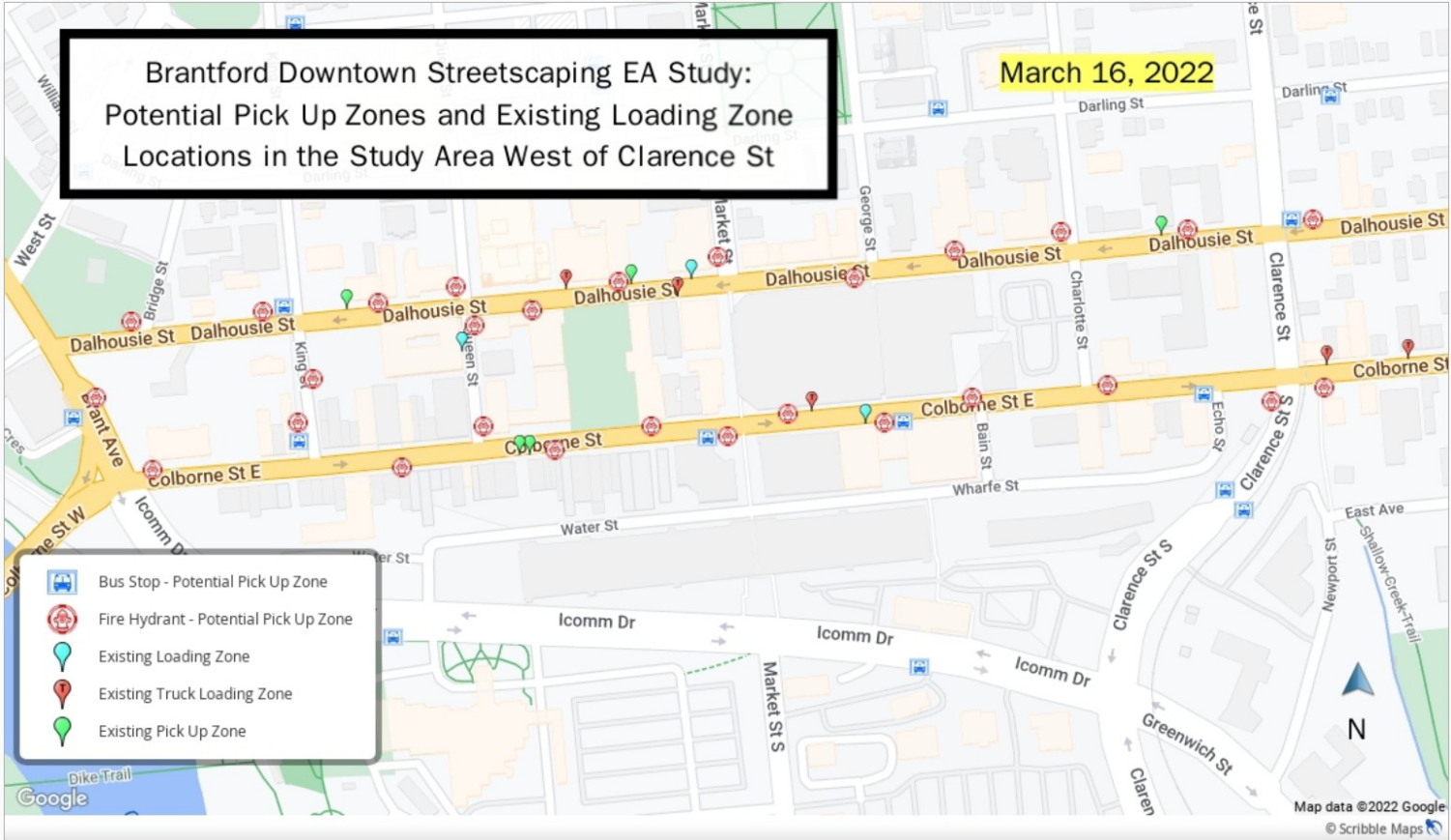


Figure 35 - Potential Pick Up Zones & Existing Loading Zones

In British Columbia, the Fire Chiefs Association have endorsed reducing the no-go zone in front of fire hydrants that could free up hundreds of parking spaces in the City of Coquitlam and other cities (Source: <https://www.theglobeandmail.com/canada/article-answer-to-cities-parking-woes-look-at-the-fire-hydrants/>).

For the future, large delivery companies such as FedEx, UPS (Figure 36) and Amazon have been undertaking such pilot projects as:

- small self-driving robotic machines moving at slow speeds (10 km/hr or less) on sidewalks to make deliveries;
- adopting electric vehicles (EVs) to minimize noise concerns outside of business hours, particularly during night-time;
- using bicycle couriers and cargo bikes to distribute packages from larger trucks parked away from congested downtown streets to make deliveries.

Many municipalities are now working through non-profit organizations such as the Association of Municipalities of Ontario (AMO) and the Ontario Traffic Council (OTC) to jointly address the management, policy and regulatory issues on speed, safety and privacy associated with the new emerging delivery technologies.



Figure 36 - Cargo Bikes Used by UPS & FedEx

3.13 Electric Vehicles

3.13.1 Electric Vehicle Charging

Although electric vehicles only comprise a small percentage of cars on the road, their popularity continues to grow. The Government of Canada has set a mandatory target for all new light duty-cars and passenger trucks to be zero-emission by 2035. The downtown area currently has 2 locations for electric vehicle charging. Three charging stations are located in the Wilfrid Laurier

University (WLU) surface parking lot at 7 Charlotte Street. Two charging stations are situated at the Casino surface parking lot at 40 Icomm Drive.

The City of Brantford should consider installing electric vehicle charging stations (Figure 37) at municipal surface lots and the parkade, where longer term parking is available. Charging stations for on-street parking should be avoided. On-street parking is best for shorter term, higher turn over use. Improperly stored cables could interfere with pedestrians and snow removal.

3.13.2 Benefits

In November 2020, Brantford City Council unanimously approved a target of net-zero greenhouse gas emissions by 2050. Installing more electric vehicle charging stations in the City of Brantford would encourage increased use of electric vehicles and plug-in hybrids, thereby helping the City move towards its target. In Canada, transportation accounts for approximately 25% of greenhouse gas emissions—nearly half of that comes from passenger vehicles and light trucks.¹

Public map apps show electric vehicle drivers where charging stations are located. Installing charging stations literally puts downtown Brantford on the map, making it a destination.

Charging stations could become a new revenue source, in addition to parking fees.



Figure 37 – Electric Vehicle Charging Stations

¹ Source: Natural Resources Canada, **Zero Emission Vehicle Infrastructure Program**, <https://www.nrcan.gc.ca/energy-efficiency/transportation-alternative-fuels/zero-emission-vehicle-infrastructure-program/21876>, last updated June 30, 2022.

3.14 Autonomous Vehicles (AV's)

Autonomous Vehicles (AV's) are self driving cars, which manufacturers, such as GM, Nissan, Mercedes, BMW, Tesla and others have been testing on public roads (accompanied by a human driver) and have announced they will be available to the public over the next few years (Source: <https://www.electricridelab.com/when-will-cars-be-autonomous/>). The Lyft (ridesharing) co-founder recently said that human drivers will not be replaced at his company by AV's for 10 years and envisions Lyft only handling 1% to 10% of rides in the future (Source: <https://techcrunch.com/2022/10/20/lyft-co-founder-says-autonomous-vehicles-wont-replace-drivers-for-at-least-a-decade/>).

Google and others around the world have proven that cars can drive themselves (Figure 38). However, it is going to take some time for AV's to take over the streets as they will be more expensive than a regular car and there are many logistics to overcome, such as federal, provincial and municipal regulations. Initially, parking lots will provide the first opportunity to take advantage of self-driving vehicles. Passengers may be dropped close to their destination, after which the AV will be parked automatically and more efficiently in parking facilities without humans needing to open doors or being imperfect parkers resulting in smaller parking lots and garages with narrow lanes. The implications for cities is that a parking garage level or multiple levels could be converted to accommodate some AV's thereby optimizing the use of existing facilities and/or building more efficient future parking garages estimated to use 30% less space for parking (<http://www.techvibes.com/blog/autonomous-cars-2015-06-02>). Flexibility in policies is the key for municipalities by closely watching trends and the changing travel marketplace.

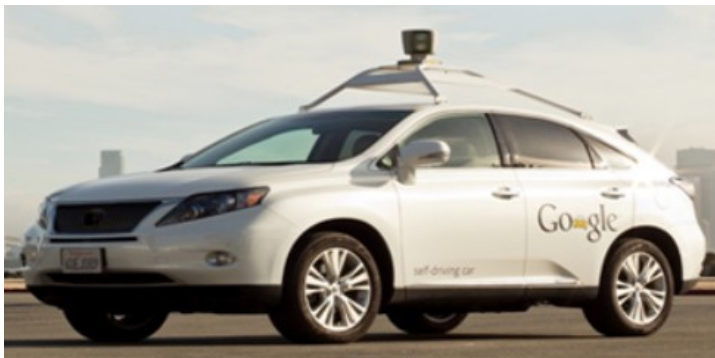


Figure 38 - AV Testing Vehicle by Google

4 Signage & Wayfinding Strategy

It's important that people visiting downtown Brantford find it straightforward and intuitive to navigate, which is done by well placed signage visible to both motorists, cyclists and pedestrians. This section of the report addresses the terms of reference requirement on detailing the location and inventory of existing regulatory signs, recommendations for enhanced wayfinding for parking in the downtown, including static signs and electronic signs. Real time digital parking guidance indicating parking space availability for the Market Centre Parkade, Municipal Lots 3 and 4 and on-street spaces by block was covered in a previous section of this report.

The City of Brantford has a list of guidelines outlined in the “City of Brantford, Urban Design Manual, City Building & Placemaking Guidelines, Draft June 2020,” by SGL Planning & Design Inc. (pages 45 to 54) that provide many recommendations for establishing signage and wayfinding for the downtown and across the City.

A review of best practices for wayfinding and electronic messaging display signs was undertaken to determine suitability for downtown Brantford. It is our opinion that the study and sign manual completed in 2017, “RTO7 Wayfinding Signage, Standards and Specifications” for Bruce, Grey and Simcoe Counties is directly relevant for the City of Brantford and provides details on sign size, letter sizes, mounting and installation. A select number of different signs were reviewed with the design specifications applied and a number of drawings developed for possible adoption and deployment for downtown Brantford, as shown in Appendix 9.

4.1 *Static Signs*

4.1.1 *Signs at Paid On-Street Parking Spaces*

During this EA study, City staff indicated that there are a number of parking related signs that overwhelm the public due to having three or four parking signs on a single signpost. The examples below in Figure 39 from Burlington, Ontario and Washington, DC, and Figure 40 from Los Angeles, California, show how signs may be simplified into one sign for easier comprehension by motorists. The City should review these and take the best features of each for developing their own design and deployment for the downtown.

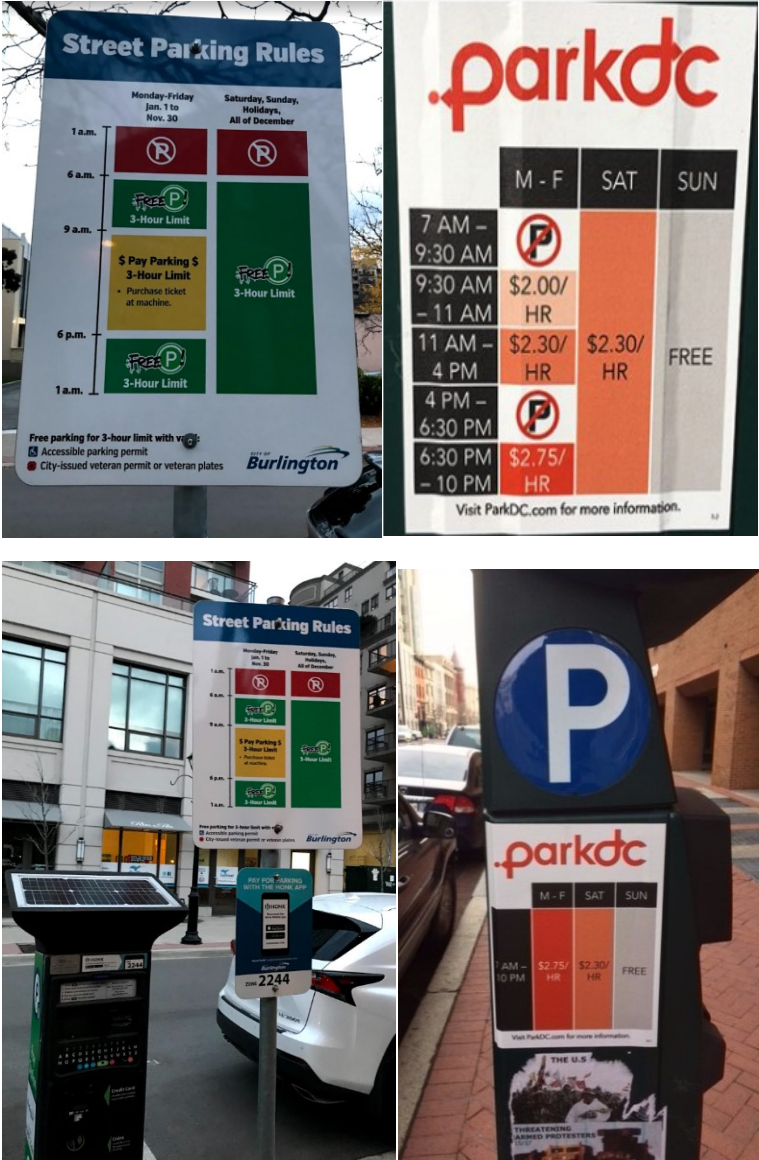


Figure 39 - City of Burlington & Washington, DC - On Street Pay Parking Signs

Anatomy of a Sign

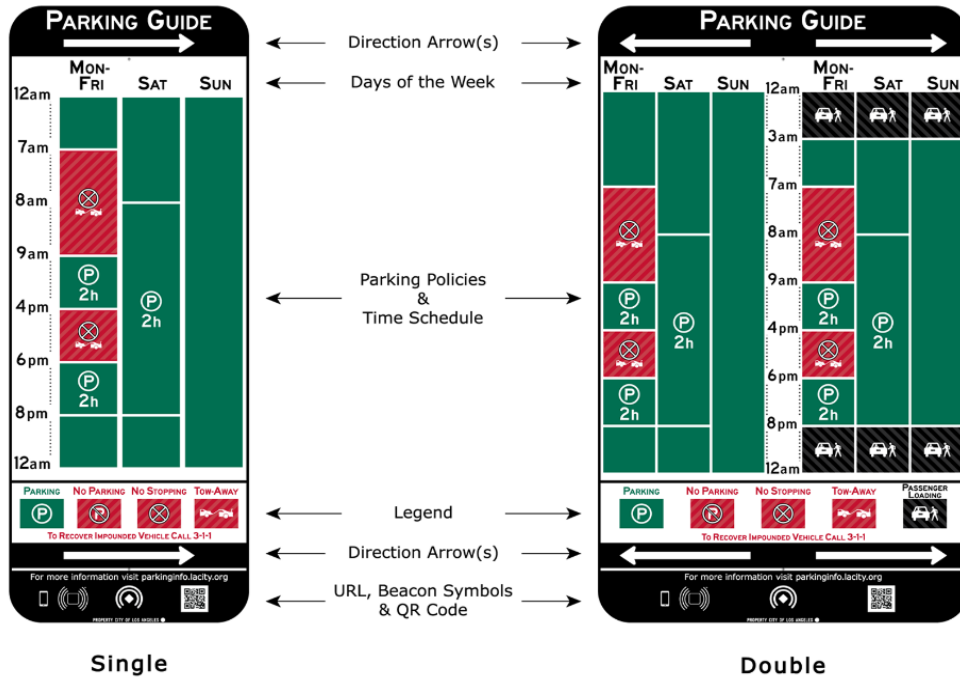


Figure 40 - Los Angeles Parking Sign Pilot Program (Source: <http://parkinginfo.lacity.org/>)

4.1.2 Parking at Alternate Side of Street - Snow Storms & Sweeping

According to City staff, residents of the downtown area often complain about overnight alternating parking restrictions for snow clearing and sweeping purposes. The latter is quite common across Canada, however, a review of other municipalities practices is outlined below that may help the City further address this alternating side of street parking situation.

One of the challenges facing many municipalities with on-street residential overnight free and permit parking involves snow plowing and interference caused by parked vehicles. Most cities prohibit on-street parking during snow clearing operations including not allowing any exemptions for residential permit holders. However, there are municipalities, such as Ottawa, Regina, Oakville and Toronto where the roads are plowed around the parked vehicles making the vehicle owners responsible for hand shovelling any snow piles surrounding their vehicles. In the older residential areas of Ottawa, snow plowing is coordinated with local residents where after the initial major snow storm, residents remove their parked vehicles to allow equipment to remove the snow banks along the curb, placing the snow in trucks for transportation elsewhere with temporary red signs posted (see Figure 41) by snow clearing crews.



Figure 41 - City of Ottawa Temporary Sign for Removing Snow Banks from Curb

There are municipalities, such as Edmonton and Calgary that address snow removal through a bylaw that requires parked vehicles in residential areas to alternate the side of the street during snow storms for snow removal in the fall/winter months and street cleaning in the spring/summer months. “No Parking” signs are posted on both sides of the streets indicating the months, days and times that parking is prohibited. Toronto has a variation of this method of alternate side of street parking in force during and after snow storms. For those with “alternate side street parking permits,” a grace period until noon the following day of a snow storm on streets with “switch over” days. Toronto also provides a Grace Period Cancellation for residents/visitors who failed to move their vehicle and who received a parking ticket on or before 12:01 p.m. on the day following the switch over period.

In the 2021/2022 snow season, the City of Laval, Quebec discontinued their alternate side of the street parking every other day for snow removal that had been in place for 30 years. Seasonal signage was posted along with automated calls (see Figure 42), emails and a snow app (called Neige Laval app) to notify residents of the status of parking on any given street from October 1 to April 30.

Parking permit bans during and after snowfalls in residential parking areas are posted on city websites to keep residents informed and when they may return to parking on their street.

Occasional uses

1. Telephone number on the road sign

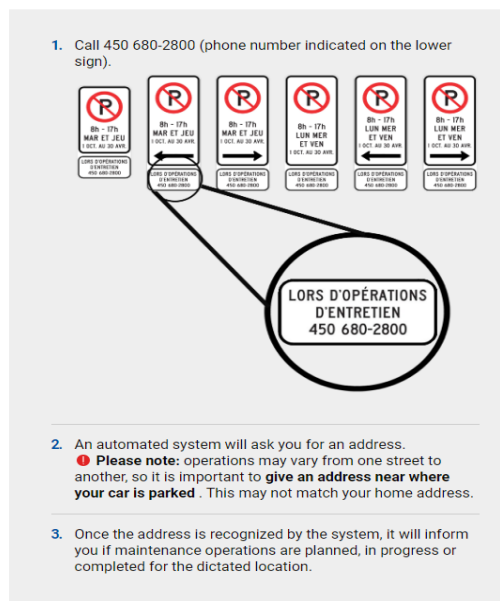


Figure 42 - Seasonal Signage for Snow Removal - Laval, Quebec

Source:

<https://www.toronto.ca/311/knowledgebase/kb/docs/articles/transportation-services/district-transportation-services/traffic-operations/regulations-for-alternate-side-parking.html>

<https://www.thestar.com/news/gta/2018/05/17/do-you-live-on-a-street-where-you-have-to-switch-the-side-you-park-on-heres-what-you-should-know.html>

https://www.thesuburban.com/news/laval_news/bye-bye-alternate-parking/article_ob72c963-9361-5ebe-97ac-5f8a2a15caab.html

<https://www.laval.ca/Pages/Fr/Citoyens/stationnement-saisonnier.aspx?lcidsync=1>

4.1.3 Existing Wayfinding Sign Locations

A task of this study was to complete an inventory of existing signs within the study area, which are detailed as shown in Appendix 1 to Appendix 8. The distribution of the 802 total signs is summarized below in Table 9 for each area.

Please note to assist City staff, the Excel sheets that were used to perform the sign inventory shown in Appendix 1 to Appendix 8 were circulated separately external to this report.

	Street Sections	Number of Signs	
		By Street Sides	Area Sub-Totals
1	Total Number of Signs on Colborne Street in the Study Area West of Clarence Street	182	
2	Total Number of Signs on Dalhousie Street in the Study Area West of Clarence Street	200	
			382
3	Total Number of Signs on the North-South streets in the Study Area West of Clarence Street	69	
			69
4	Total number of Wayfinding Signs on North-South streets in the Extended Study Area West of Clarence Street	23	
			23
5	Total number of Wayfinding Signs on East-West streets in the Extended Study Area West of Clarence Street	15	
6	Total number of Wayfinding Signs on East-West streets in the Extended Study Area East of Clarence Street	18	
			33
7	Total Number of Signs on Colborne Street in the Study Area East of Clarence Street	189	
8	Total Number of Signs on Dalhousie Street in the Study Area East of Clarence Street	106	
			295
	GRAND TOTAL	802	802

Table 9 - Brantford Inventory of On-Street Signs in Study Area

In the immediate and extended study areas, there are a total of 802 signs. The existing wayfinding signs in Brantford follow good sign practices by using consistent contrasting colours such as white font letters on green background and white font letters on blue background, as shown in Figure 44 and Figure 44.



Figure 43 – Brantford - Existing Wayfinding Signs



Figure 44 - Brantford - More Existing Wayfinding Signs

4.1.4 Proposed Future Wayfinding Improvements

Several static wayfinding sign designs were developed by applying the specifications outlined in the sign manual completed in 2017, “RTO7 Wayfinding Signage, Standards and Specifications” for Bruce, Grey and Simcoe Counties as outlined in Appendix 9 to Appendix 25 with the most common signs in Figure 45 below.

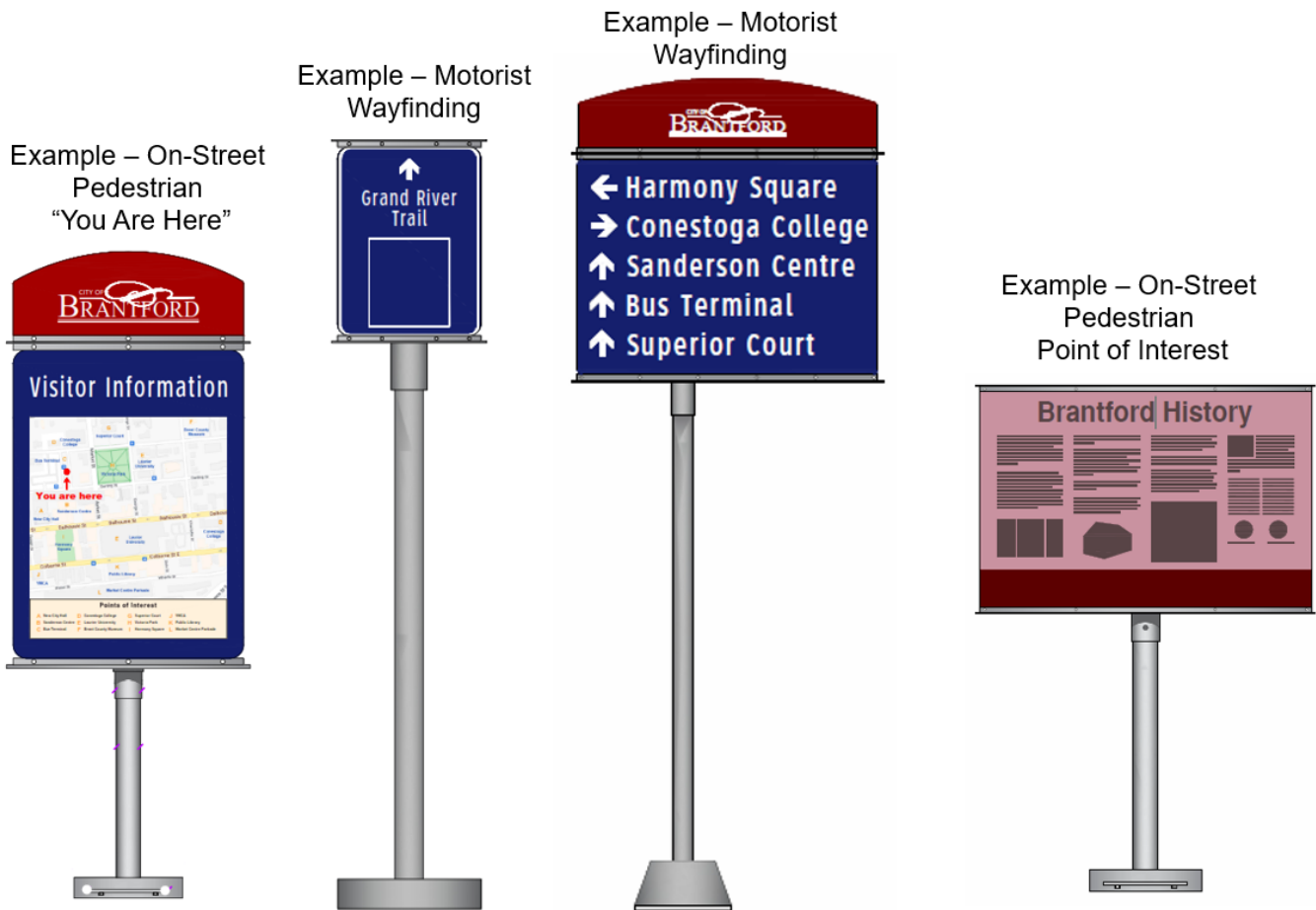


Figure 45 - Types of Static Wayfinding Signs

The static wayfinding designs from Appendix 9 to Appendix 25 illustrating detailed dimensions (length, width, height, etc.) were circulated under separate documentation in AutoCAD and pdf formats to City staff for their future reference and use.

Figure 46 shows some examples of “You Are Here” with immediate vicinity maps on stainless steel or aluminium encasements, that may or may not be backlit.

Municipalities have also deployed in high pedestrian volume downtown or tourist locations interactive (touch screen or keypad) electronic information kiosks to help visitors find businesses, services and places of interest--especially useful to those new to the community. Some examples are shown in Figure 47.



Figure 46 - On-Street Pedestrian Wayfinding Information Kiosks



Figure 47 - Outdoor Electronic Information Kiosks

4.1.5 Future Locations

Figure 48 shows the proposed future locations for wayfinding in the downtown, comprised of signage for pedestrians and motorists, ‘You Are Here’ map kiosks, digital parking signs and trail access signs. The existing downtown wayfinding signs should be retained and maintained (replacement required for any faded or vandalized signs).

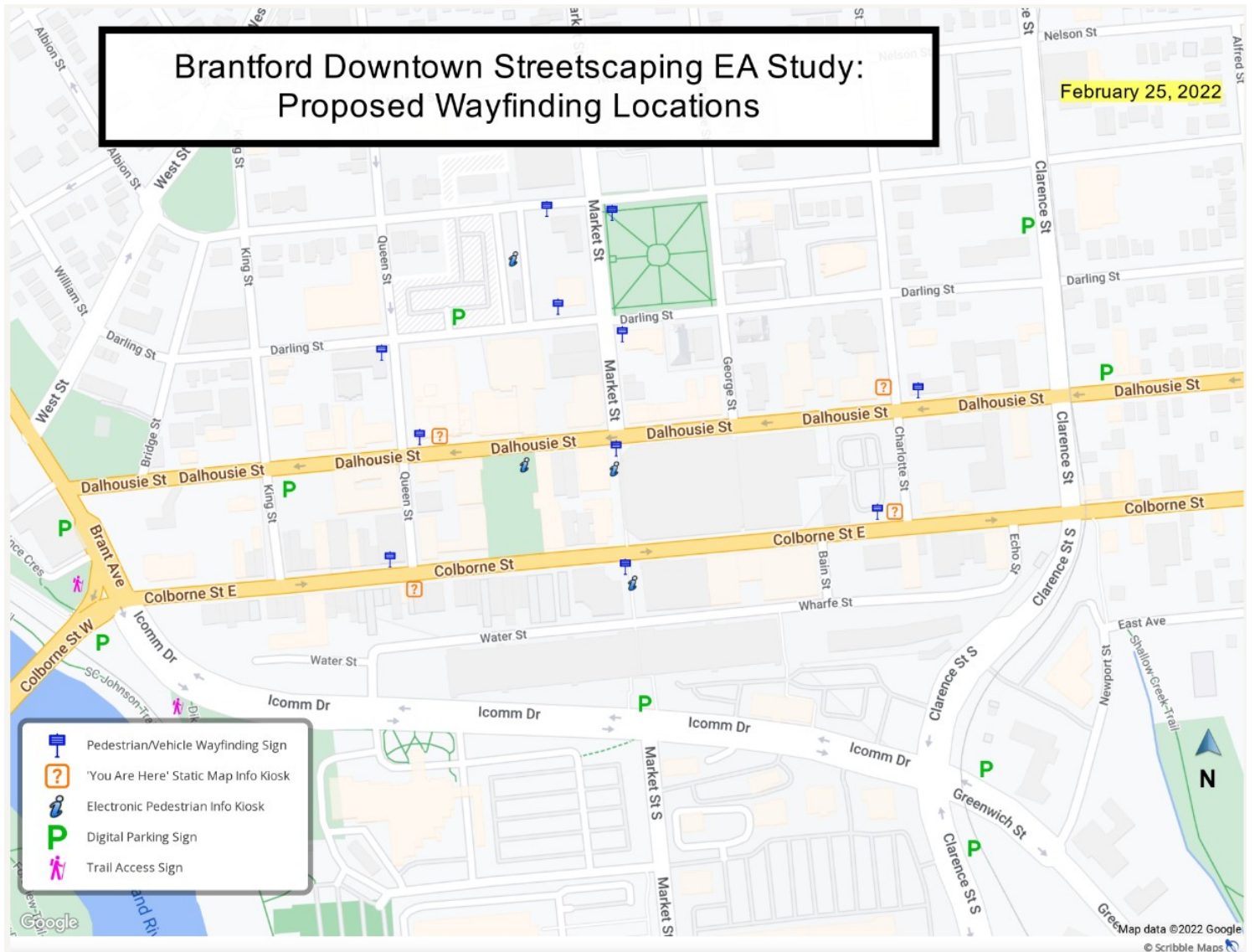


Figure 48 - Proposed Downtown Brantford Wayfinding Locations

The proposed quantities of the signs shown for locations on Figure 48 are as follows:

- Pedestrian/Vehicle static wayfinding signs (blue squares on map): 11
- “You Are Here” static non-electronic map kiosks (orange with question mark?): 4
- Electronic Information Pedestrian Kiosks (blue i) 4
- Digital parking guidance signs “space availability” (green P): 9
- Trail Access static signs (pink walker symbol): 2

Total: 30

Table 10 shows the estimated budget to provide these signs and should be further reviewed as part of the detailed streetscaping and street furniture review in a subsequent project to be undertaken by the City. The total cost for the proposed signs, including installation of the units is estimated at nearly \$110,000. These costs do not include the cost of underground conduits, electrical lines, ethernet lines and communication devices. The parking guidance system cost estimates for the Market Centre Parkade and Municipal Lots 3 and 4 were provided in a previous section of this report.

Type of Wayfinding Sign	Quantity	Unit Cost	Estimated Purchase Cost	Estimated Installation Cost	TOTAL COST (Excl. HST)
Pedestrian/Vehicle Static Wayfinding Signs	11	\$ 1,000	\$ 11,000	\$ 3,300	\$ 14,300
“You Are Here” Static Map Kiosks	4	\$ 2,500	\$ 10,000	\$ 3,000	\$ 13,000
Electronic Information Pedestrian Kiosks	4	\$ 4,500	\$ 18,000	\$ 5,400	\$ 23,400
Digital Parking Guidance Signs	9	\$ 5,000	\$ 45,000	\$ 13,500	\$ 58,500
Trail Access Static Signs	2	\$ 200	\$ 400	\$ 160	\$ 560
Total Cost			\$ 84,400	\$ 25,360	\$ 109,760

Table 10 - Cost Estimates of Wayfinding Signs

At the time the City makes a decision to introduce paid on-street parking, additional digital “parking space availability” signs should be added at strategic blockface locations to optimize all available on-street spaces in the downtown and assist motorists in quickly finding parking spaces.

4.1.6 Implementation - Digital Information Kiosks & Parking Guidance System

For the entire downtown Brantford streetscaping plan, as part of a subsequent phase of detailed design, the underground requirements for conduit (power, data, fibre optics) should accommodate the following technologies shown on the Figure 48 map:

- Electronic wayfinding signs for directing traffic to parking lots (Figure 29);
- Parking Guidance signs and parking space availability by blockface directing motorists to on-street spaces and parking lots (Figure 29);
- Electronic information kiosks - on-street for pedestrians with touch screen weather protected interface (Figure 47);
- Stations that can broadcast and receive Wifi signals (hotspots) in the downtown; and
- CCTV (Closed Circuit TV) for safety and security as part of the application of “public safety through environmental design.”

4.2 Review of Parking Bylaws

4.2.1 Parking Dimensions & Zoning Bylaw Supply Requirements

A review of proposed parking dimensions outlined in City of Brantford Report No. 2019-185, “Zoning By-law Amendment PZ-18-18 (City-Wide Technical Amendment,” dated June 4, 2019 from the City’s General Manager of Community Development, showed a comparison of the length and width of parking spaces with other municipalities, such as, County of Brant, Guelph, Hamilton, Kingston, London, St. Catharines, Windsor and Woodstock. It was reported that Brantford dimensions of 6m length and 2.75m width were slightly larger than the spaces of the comparator municipalities.

City staff recommended reducing the length from 6m to 5.6m for all standard and accessible parking spaces and retaining the 2.75m width, which can accommodate the majority of vehicles. From a downtown streetscaping perspective the reduced parking space width optimizes the use of roadway space for on-street parking, especially if intermediary spaces are not painted, except at the start and end point of each blockface. This will accommodate a variety of varying size vehicles, many that do not require identical space lengths (i.e. small Mini Cooper cars) resulting in greater flexibility and increasing capacity of on-street spaces.

A review of City of Brantford Zoning By-law 160-90 (amended up to March 2021), contained many parking design standards that align with other Canadian parking industry standards, such as parking space length and width (as noted above), accessible parking space dimensions (i.e. meeting AODA - Accessibility for Ontarians with Disabilities Act) and parking traffic aisle widths.

Currently, as outlined earlier in this EA report (Figure 2), there are almost the same quantity of private parking spaces (1,700) as public spaces in downtown Brantford. It’s important that the City policies

continue to balance the supply of parking spaces on private and public lands. With the transition out of the COVID-19 pandemic, developers should share in the provision of parking, including bicycle parking with the City regularly monitoring development to ensure a balance of public and private parking supply.

For the commercial and mixed use development application process, a TDM (Transportation Demand Management) should be included in the zoning bylaw provisions for parking.

4.2.2 Parking Cash-in-Lieu (CIL)

4.2.2.1 Purpose of and Existing Cash-in-Lieu

In May 2018 City staff presented Report No. CD 2018-039 recommending the update of the Cash-in-Lieu Bylaw 177-95 that was adopted on December 11, 1995. The purpose of parking cash-in-lieu (CIL) as permitted under Section 40 of the Ontario Planning Act is to allow developers to be exempted from meeting zoning bylaw requirements, because they cannot be met, in exchange for a payment. The payment is used by municipalities to construct new public parking facilities or maintain or expand existing parking in a reasonably expected future timeframe. Cash-in-lieu is used by mid-size Ontario cities where the provision of on-site parking specific to a development is difficult due to space limitations. The payments are deposited into a municipal special reserve account and spent on parking when the City decides to take action on new or expanded parking facilities.

Back in 1995, there was limited economic growth or development interest in the downtown. A Mayor's Task Force on Downtown Revitalization was established with an action plan to encourage development by exempting developers from paying for the true cost of parking space by contributing only \$1.00 per development to properties bounded by West Street, Brant Ave., Clarence St. and Nelson St. However, in 2018 staff indicated that there was more interest in new developments in downtown Brantford. The Province introduced intensification policies (i.e. Places to Grow Act) and hence the cost of parking that is more reflective of the actual cost should be charged as part of an updated cash-in-lieu policy.

City staff researched in 2018 cash-in-lieu programs from 6 Ontario cities, as follows:

- Caledon:
 - cash payment for parking reductions of 2 or more parking spaces
 - contributions ranging from \$1,875 to \$7,500 per space

- Halton Hills:
 - cash-in-lieu payment of \$5,000 per parking space
- Hamilton:
 - \$8,000 per space based on the value of land and cost of construction of parking spaces.
- Milton:
 - \$7,365 per space (value of land plus the construction costs for half of the parking spaces not provided)
- Oakville:
 - 50% of the estimated cost of providing new parking space.
- Richmond Hill:
 - use a formula for surface parking or multi-level parking garage and collect 50% of the cost of land, plus construction costs.

4.2.2.2 Changes to Cash-in-Lieu

After completing the research of other cities cash-in-lieu programs, the City staff determined in 2018 the cost to replace a parking space in a City public parking lot was \$3,600 per space, but did not include the cost of land. Staff then developed a formula (page 13 of Report No. CD2018-039, May 8, 2018) to calculate the cash-in-lieu payment contribution that covered the replacement cost and land cost as follows:

Cash-in-Lieu Payment = (Replacement Cost + (Land Cost per sq. m X Surface Area in sq. m of a parking space))

The above formula was based on the Richmond Hill model. To calculate the cost of land, a property owner must submit to the City an opinion of the value of the land by an independent real-estate appraiser. At that time in 2018 the total cost per parking space was estimated at \$4,823 (\$3,600 replacement cost + \$1,223 land cost per space). Of course in mid-2022, there have been significant construction and land cost increases across Ontario, including Brantford.

The staff report (on page 8) also outlined the following process for the provision of cash-in-lieu of parking within the Core Commercial Area:

- *The subject site is within 400 m of an existing or planned off-site parking facility that has capacity to accommodate projected parking demands;*

- *Sufficient parking and loading areas for delivery/service vehicles are provided on site or in established on street loading zones;*
- *The development of the subject site without the required on-site parking facilities is compatible with adjacent existing and proposed land uses with respect to built form or intensity of utilization of the site;*
- *The applicant enters into a financial agreement with respect to the Cash-In-Lieu of parking contributions;*
- *Cash-in-Lieu of on-site parking requirements will only be considered for multiple family residential developments within the Core Commercial Area if the developer can negotiate and secure sufficient off-site parking to accommodate the needs of the development; and*
- *Use funds raised from “Cash-In-Lieu” program to invest in construction of municipal off street parking lots.”*

The City staff Report No CD2018-039 was received by Council and staff were requested that the existing Bylaw 177-095 (\$1.00 per development) be repealed and replaced with a new bylaw. Our research of the City’s reports, Council agendas and minutes do not indicate if a new Cash-in-Lieu Parking Bylaw was presented and approved by Council since 2018. In reviewing the City’s Notes to the Financial Statements For the Year Ended December 31, 2018 the Cash-in-Lieu of Parking account had a total of \$1,503.00. Obviously, this is insufficient to provide any new or expanded parking facilities, so introducing a Cash-in-Lieu of Parking program soon will help build the capital reserves to make parking infrastructure improvements.

From our review of pre-COVID-19 parking occupancy rates in the downtown and supported by active transportation initiatives, such as promoting cycling, walking, public transit and ridesharing, these measures will all help to manage parking supply and off-set parking demand in the downtown in the short to medium term, depending on the amount of new development. The rationale for cash-in-lieu parking as outlined in staff Report No. CD2018-039, such as costing and the process for implementing cash-in-lieu is a sound methodology and should be updated to reflect today’s cost of constructing a parking space and the cost of land.

4.3 *Transportation Demand Management (TDM) & Active Transportation Impact on Parking*

Several municipalities have adopted TDM (Transportation Demand Management) Plans to reduce travel demand trips by single occupant vehicles and encourage sustainable transportation modes, such as walking, public transit, cycling and ridesharing. A major part of TDM Plans are Active Transportation Plans, which the City of Brantford has a project currently (2022) in progress.

To encourage active transportation, bicycle parking needs to be provided at strategic locations, such as the Market Centre Parkade and the 2 municipal surface parking lots. Places to secure bicycles can also be integrated into the streetscape, in the same zone as plantings and street furniture.

4.3.1 Other Municipalities

Parking agencies within municipalities have taken on a role expanded beyond just providing and operating parking, such as being responsible for bikeshare programs (Figure 49), especially in downtown areas as part of TDM initiatives.

The Region of Waterloo developed a TDM checklist in an Excel spreadsheet, entitled, “TDM Implementation Checklist and Parking Management Worksheet” when reviewing TDM plans accompanying development applications for commercial, residential and mixed-use projects to off-set the demand and supply for automobile parking and encourage walking, cycling and ridesharing (Source: [Travel-Demand-Management-Implementation-Checklist-and-Parking-Management-Worksheet.xls](https://www.waterlooregion.ca/transportation/Travel-Demand-Management-Implementation-Checklist-and-Parking-Management-Worksheet.xls) ([live.com](https://www.waterlooregion.ca/transportation/Travel-Demand-Management-Implementation-Checklist-and-Parking-Management-Worksheet.xls))). This checklist measures the degree of TDM supportiveness for a development on a 5-level scale in terms of the amount of parking reduction achieved through increased walking, cycling and public transit usage. The City should consider adopting a similar method to scoring and evaluating TDM measures proposed in downtown development applications.

Whatever division or department in a municipality is responsible for parking services, in addition to managing bikeshare programs, other TDM responsibilities should be included, such as accommodating private or non-profit organizations carsharing and designating the most convenient parking spaces for ridesharing (carpooling).



Figure 49 - Bike Share Programs Toronto & Hamilton

4.4 Parking Services Within the Municipal Organizational & Governance Structure

Currently, Parking Services and bylaw enforcement fall under the Manager of Property Standards and Bylaws that reports to the Chief Building Official/Director of Building Services, who in turn reports to the General Manager of Legislated Services & Planning who reports to the Chief Administrative Officer (CAO). It was beyond the project scope of this downtown streetscaping EA study to do a thorough organizational and best practices review, including internal and external stakeholder consultation of where is the most efficient and effective place that parking services and parking enforcement should be within the City of Brantford organizational structure. From a governance perspective, parking issues are reported to Council through the appropriate committee(s) structure and there were no concerns raised about this during the EA study. Transforward Consulting has undertaken past organizational reviews of parking for much larger municipalities and currently has another two (2) in progress (2022-2023) and offer the following for consideration:

- Given that with the exception of Municipal Lots 3 and 4 that have paid parking requiring enforcement and the gated paid parking operation with an attendant at the Market Centre Parkade and that the 565 on-street downtown spaces are free and require regular enforcement of the 2 and 3 hour time limits, it makes sense to have parking services within the Property Standards & Bylaws division linked closely with bylaw enforcement.
- If and when downtown paid on-street parking is seriously considered by the City, with the use of Pay By Licence Plate machines (or Pay & Display) and pay by mobile phone technology, parking services will have much larger responsibilities and therefore, the

CAO's office should undertake a detailed organizational review with input from the various departments involved in parking planning, policies and operations.

- The trend today is that organizationally within a municipality, parking is becoming more oriented to taking on additional responsibilities for mobility management (i.e. carpooling, cycling, Transportation Demand Management and other active transportation initiatives) and this should be considered as part of any future organizational review at the City.
- The existing Parking Services group should continue to be informed from other City divisions responsible for and coordinating input into future development applications, zoning bylaw amendments and official plan policies impacting the increase or decrease in parking supply.

4.5 ***Parking Strategy Recommendations***

(Each of the recommendations below starting with a lowercase letter, should begin with:)

It is recommended that:

- 1) **One-Way Street - Dalhousie and Colborne**
 - a) The “*Preferred Alternative: One-Way Traffic, Parking Both Sides, Bike lane*” of one-way streets be implemented for Dalhousie and Colborne streets to optimize the amount of on-street parking.
- 2) **Market Centre Parkade**
 - a) Before building any new parking facilities (parking structures or lots), efforts be undertaken to optimize the use of the existing under-used Market Centre Parkade through electronic and static wayfinding signs that directs traffic to the parkade, combined with a marketing and promotion program with input from the downtown Business Improvement Area (BIA).
 - b) To incentivise motorists to use the Market Centre Parkade by offering lower daily hourly parking fees than any future on-street paid parking program (when implemented).
 - c) The Market Centre Parkade be fully automated, without attendants (except during special downtown events attracting hundreds of people) using a gated pay-on-foot parking access and revenue control system.
 - d) A real-time parking guidance space availability system, showing the quantity of parking spaces for each floor, be implemented at the Market Centre Parkade when 60% parking occupancy is reached consistently.
 - e) Emergency stations with panic/help buttons be located throughout the Market Centre Parkade for the safety of parking customers and that existing security patrols continue as part of the City’s existing safety and security program.
 - f) Wayfinding static signs (colour coded by floor level and stall number) be placed at each entrance, stairwells, parking structure columns, walls and elevators providing parking customers with information to easily identify floor level, and area/zone of the Market Centre Parkade.
 - g) Wayfinding signs that have faded within the Market Centre Parkade be changed with contrasting colours from white font on green background sign to a reflective white font on black background for improved visibility and the worn out and faded existing red “OUT” signs be refreshed with new reflective signs.

- h) That the City complete a review of the latest technological advances of online security cameras and monitoring/response system for improving the safety of customers within the Market Centre Parkade with input from the Police Department.
- 3) **On-Street and Surface Parking Lots**
 - a) When the existing surface lots and on-street parking spaces within the downtown consistently reach 60% peak utilization, introduce paid on-street parking to manage parking demand and supply using Pay by Licence Plate and Mobile Pay (phone) technology.
 - b) The City resume in the Fall of 2022 or Spring 2023 the annual collection and monitoring of parking occupancy and violation rates as the downtown experiences continued growth in student population, residential condominiums and new businesses.
- 4) **Paid Parking - A Tool to Manage Parking Demand and Supply**
 - a) To encourage parking turnover, which increases on-street capacity and encourages active transportation, implement a paid on-street downtown parking program.
 - b) Any surpluses generated by a future on-street paid parking program be set aside for maintenance of parking infrastructure, technological improvements in parking and wayfinding and active transportation.
- 5) **Future Growth**
 - a) Future growth should first be accommodated by optimizing the Market Centre Parkade and the 2 municipal surface parking lots up from the current occupancy levels of approximately 50% to 85% occupancy and increased vehicle turnover on-street through a paid parking program with a target of 85% occupancy, after which new parking facilities may be explored.
 - b) To off-set future growth in parking demand and the need for additional parking facilities, that the City adopt a TDM (Transportation Demand Management) program as part of development application approval process.
 - c) The City acting as a facilitator to pursue Shared Parking agreements with the private sector, institutional sector, the downtown BIA and places of worship to optimize the use of downtown parking facilities.
 - d) In addition to existing loading zones, the City allow the use for only immediate pickups and drop-offs at safe on-street fire hydrants and bus stops and to reduce parking demand and encourage ridesharing.

6) Expanded Parking Facilities

- a) When the Market Centre Parkade, 2 municipal surface Lots 3 & 4 and on-street parking (after a paid parking program is implemented) reach 85% occupancy, the City undertake a study to confirm that Municipal Parking Lot #3 adjacent to the downtown bus terminal be the preferred location for a new parking structure, as recommended previously in the *“Feasibility Study for Proposed Transit Terminal/Parking Structure/Commercial Facility, Final Report, November 2009,”* IBI Group.

7) State of Good Repair

- a) The City ensure a state-of-good repair of all parking facilities and technologies during the annual budget cycle.

8) Parking Technology

- a) When a paid on-street parking program is implemented, that solar powered Pay By Licence Plate kiosk and Pay by Mobile Phone app, be the preferred payment technologies.
- b) A fully automated, unattended and gated Pay-on-Foot system be implemented in the Market Centre Parkade.
- c) EV (electric vehicle) charging stations be placed in the Market Centre Parkade and the two municipal surface parking lots (with user fees) due to the growth in electric vehicle purchases.
- d) The zoning bylaw be reviewed to include EV charging stations in new developments.

9) Parking Static Signage

- a) New easier to comprehend static parking signs, as outlined in this report, be implemented when paid on-street parking is introduced at each blockface of the downtown.

10) Wayfinding

- a) The City adopt the electronic and static wayfinding sign designs as outlined in this report.
- b) The City place electronic and static wayfinding signs and information kiosks at locations as indicated in this report.
- c) The City implement enhanced wayfinding electronic real time information displaying public parking space availability for on-street spaces and off-street lots.

11) Parking Fees

- a) When on-street parking consistently reaches 60% occupancy, a paid parking program be implemented based on market rates of similar sized municipalities in Ontario.
- b) If paid on-street parking is implemented in 2023, that the City adopt the following as a starting point: \$1 per hour eventually increasing to \$2 per hour, 2 hour time limit, Monday through Friday, 9 a.m. to 6 p.m., free parking weekday evenings, Saturdays, Sundays and Holidays and a \$15 flat fee for special downtown events (i.e. concerts and festivals).

12) Parking Fines

- a) The existing fines be retained, but reviewed and compared to similar sized municipalities during the annual budget cycle.

13) Parking Financials & Funding

- a) The future financial goal for parking be that parking revenues have a net zero impact on the property tax base, where all parking operating expenses and partial capital parking items are financially self-sustaining.
- b) The City may have to fund future parking structures or new surface lots from the property tax base due to insufficient Cash-in-Lieu and Development Charges reserves and insufficient revenue from parking fees and fines.

14) Parking Enforcement

- a) The City investigate adopting new cloud-based mobile parking enforcement systems that utilize LPR (License Plate Recognition) technologies.

15) Parking Organizational Structure & Governance

- a) If and when downtown paid on-street parking is seriously considered by the City, with the use of Pay By Licence Plate machines (or Pay & Display) and pay by mobile phone technology, parking services will have much larger responsibilities and therefore, the CAO's office should undertake a detailed organizational review with input from the various departments involved in parking policies and operations.
- b) The trend today is that organizationally within a municipality parking is becoming more oriented to taking on additional responsibilities for mobility management (i.e. carpooling, cycling, Transportation Demand Management and other active transportation initiatives) and this should be considered with any future organizational review.

16. Active Transportation

- 1. To encourage active transportation, install bike racks inside the Market Centre Parkade, the two municipal parking lots and other strategic locations.

5 Transit Operations

The prime purpose of including public transit in this EA study was to determine the impact of the proposed downtown Brantford streetscaping changes on public transit routing, bus stops and the downtown bus terminal. However, the terms of reference of this EA study also requested the consultant to provide recommendations:

- to improve bus stop and route information signage;
- to improve ridership through grants, infrastructure and route improvements, development-transit partnerships, connections to other tourist areas, hours of service and future transit service lanes or higher order transit;
- from benchmarking Brantford Transit with other Canadian municipalities;
- to confirm or suggest the preferred location for a new transit facility from a review of the 2009 IBI Group report, “Feasibility Study for Proposed Transit Terminal/Parking Structure/Commercial Facility.”

Other studies, such as the **2020 Brantford Transportation Master Plan Update, March 2021**, (referred to as the TMP) provide details on future transit ridership, future transit service expansion, transit mode split projections, inter-regional transit, future role of transit and other transit policies and actions to meet the City’s future transportation needs to 2041 and 2051. The **2020 TMP** is an excellent resource for gaining an understanding of the role, need and potential impact of the transit system in accommodating growth and moving people.

The **2020 TMP** outlines the following goals and objectives for public transit in Brantford²:

GOAL:

- Foster an efficient, affordable, safe, and accessible transit system that is an attractive alternative to the private vehicle and integrates with all other elements of the transportation system.

² Source: **2020 Brantford Transportation Master Plan Update, March 2021**, Executive Summary, page xvii

OBJECTIVES:

- Transit contributes to a more environmentally sustainable community;
- Transit is well integrated with all other transportation modes;
- A robust frequent transit network serves the community;
- There are high levels of bus stop accessibility and safety;
- There is public awareness that transit is an attractive alternative to the private vehicle;
- Design of the system must not neglect the design of the vehicle and the design of facilities, remembering that transit needs to provide the rider with a great experience to develop and maintain strong ridership levels.

In May 2022 the City issued an RFP for a new proposed transit fare collection, an AVL (Automated Vehicle Location) and APC (Automatic Passenger Counting) systems. This technology is very important for measuring performance (i.e. ridership, schedule adherence and other key performance indicators) and managing the transit system on a regular basis in order that informed evidence based operational and policy decisions can be made as the City grows. The AVL/APC system should be a priority for improving transit service for existing and new customers as well as exploring possible service and fare integration with other transit systems (i.e. Brant County Transit and GO Transit).

5.1 Existing Transit Services

All Brantford Transit buses are Nova fully accessible 40 foot buses.

Brantford Transit services consist of 14 fixed route conventional transit routes, 2 special shuttles to industrial areas and 17 Brantford Lift specialized accessible vehicles.

Current service coverage standards are that residential areas are within 400 metres of a bus route before 7:00 PM on weekdays and Saturdays; within 800 metres during other times. Industrial areas have transit routes within 750 metres.³

³ Source: **Report 2 - TRANSformation 2021 - Brantford Transit and Brantford Lift, December 8, 2016**, Appendix A, pages 2-3.

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Service is provided at 30 minute and 60 minute frequencies, Monday through Sunday, as listed below and shown in Table 11:

- Monday to Saturday, 6:00 a.m. to 9:25 p.m., 30 minute frequency
- Monday to Saturday, 9:00 p.m. to 12:55 a.m., 60 minute frequency
- Sundays, 8:00 a.m. to 7:55 p.m., 60 minute frequency.

Route Number	Route Name	Hours of Service (hh:mm)	Cycle Time (h:mm)	Headway (h:mm)	Layover (h:mm)	Number of Vehicles	Vehicle Cycles/day	Vehicle Hours/day (hh:mm)	Route Length (km)	Daily			
										Vehicle Travel (km)	Average Speed (km/h)	Number of Stops	Average Bus Stop Spacing (m)
Monday - Saturday, Daytime Service													
1	Eagle Place	15:00	0:30	0:30	0:05	1	30	15:00	9.50	285	19	34	279.4
2	West Street Brier Park	15:30	1:00	0:30	0:05	2	31	31:00	17.80	551.8	17.8	42	423.8
4A	Mall Link	15:30	1:00	0:30	0:05	2	31	31:00	24.00	744	24	70	342.9
4C	Mall Link	15:30	1:00	0:30	0:05	2	31	31:00	24.00	744	24	69	347.8
5	West Brant Oakhill	15:00	0:30	0:30	0:05	1	30	15:00	11.80	354	23.6	35	337.1
6	West Brant Shellard	15:30	1:00	0:30	0:05	2	31	31:00	18.60	576.6	18.6	46	404.3
7	East Ward Braneida	15:00	0:30	0:30	0:05	1	30	15:00	11.20	336	22.4	38	294.7
8	Holmedale Mayfair	15:30	1:00	0:30	0:05	2	31	31:00	28.80	892.8	28.8	85	338.8
9	Echo Place	15:45	1:00	0:30	0:05	2	31.5	31:30	26.50	834.75	26.5	67	395.5
Monday - Saturday, Evening Service													
11	West Brant Oakhill - NWIA Holmedale	4:00	1:00	1:00	0:05	1	4	4:00	31	124	31	72	430.6
12	Eagle Place Shellard	4:00	1:00	1:00	0:05	1	4	4:00	24	96	24	61	393.4
13	King George Rd Brantwood Park	4:00	1:00	1:00	0:05	1	4	4:00	23.1	92.4	23.1	34	679.4
14	Echo Place East Ward	4:00	1:00	1:00	0:05	1	4	4:00	29.3	117.2	29.3	69	424.6
15	West Street Mayfair	4:00	1:00	1:00	0:05	1	4	4:00	22.8	91.2	22.8	44	518.2
Sunday Service													
1	Eagle Place	12:00	0:30	1:00	0:35	0.5	12	6:00	9.50	114	19	34	279.4
2	West Street Brier Park	12:00	1:00	1:00	0:05	1	12	12:00	17.80	213.6	17.8	42	423.8
4A	Mall Link	12:00	1:00	1:00	0:05	1	12	12:00	24.00	288	24	70	342.9
4C	Mall Link	12:00	1:00	1:00	0:05	1	12	12:00	24.00	288	24	69	347.8
5	West Brant Oakhill	12:00	0:30	1:00	0:35	0.5	12	6:00	11.80	141.6	23.6	35	337.1
6	West Brant Shellard	12:00	1:00	1:00	0:05	1	12	12:00	18.60	223.2	18.6	46	404.3
7*	East Ward Braneida	11:00	0:30	0:47	0:35	0.64	14	7:01	11.20	157.3	22.4	38	294.7
8	Holmedale Mayfair	12:00	1:00	1:00	0:05	1	12	12:00	28.80	345.6	28.8	85	338.8
9	Echo Place	12:00	1:00	1:00	0:05	1	12	12:00	26.50	318	26.5	67	395.5

*Note: On Sunday, Route 7 resumes half hour service from 4:30 PM to 7:30 PM

Table 11 - Brantford Transit Service Schedule Summary - 2022

In urban areas, the spacing between bus stops is usually 200 - 350 metres. As shown in Table 11, the average bus stop spacing in Brantford is higher than the typical range for the majority of the routes with Routes 2, 6 and 9 exceeding 350 metres, Monday to Saturday, daytime service.

Actual stop spacing can vary due to local conditions, and must take into account operations and safety.⁴

Figure 50 shows the existing transit route network and markets unserved by existing transit service for growing residential and employment areas of the City.

⁴ Source: **Report 2 - TRANSformation 2021 - Brantford Transit and Brantford Lift, December 8, 2016**, Appendix A, page 3.

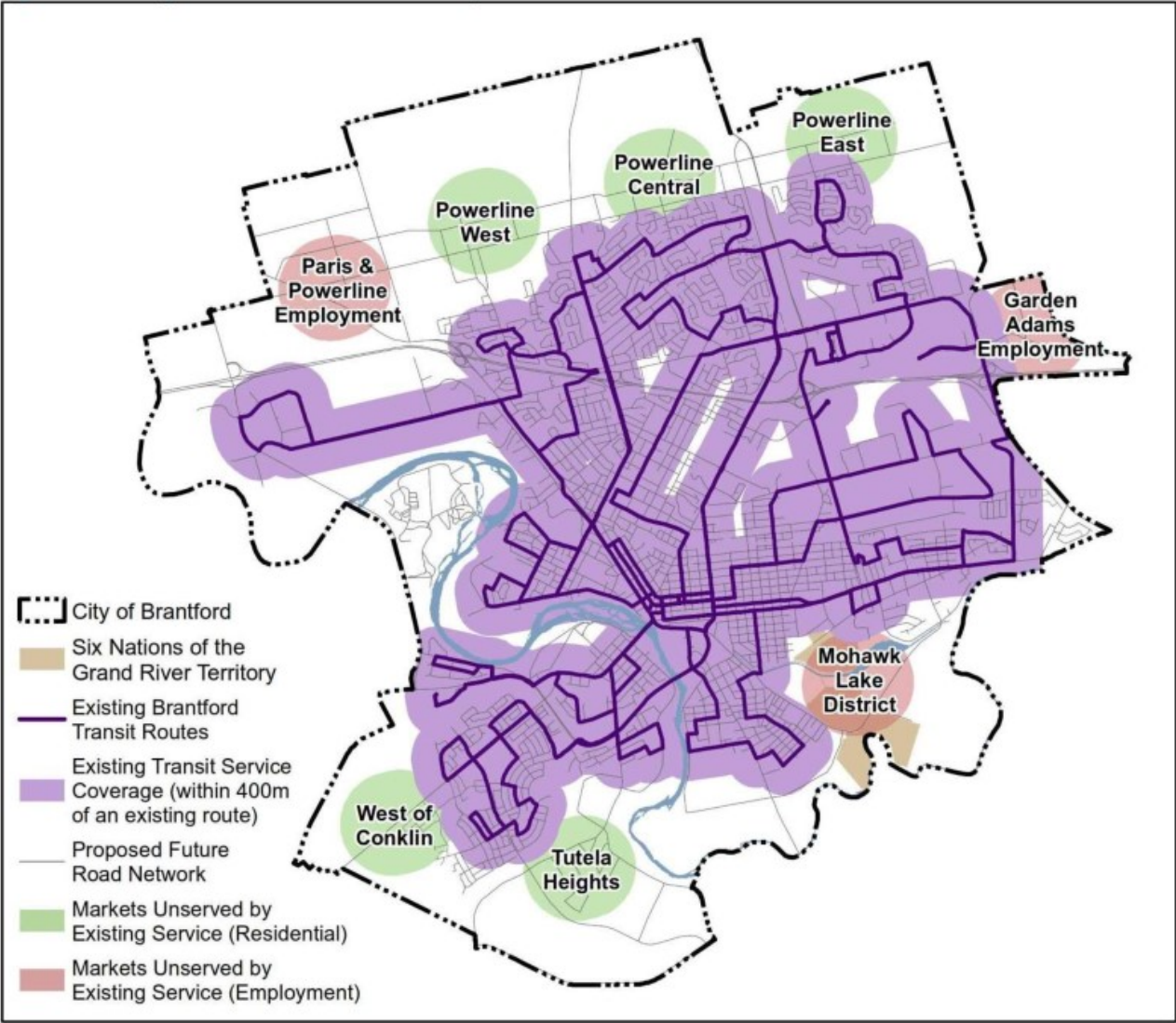


Figure 50 - Existing Brantford Transit Routes and Markets Unserved for Residential and Employment Areas⁵

GO Transit provides the Route 15 Brantford/Burlington bus service (Figure 51) between the Brantford Bus Terminal and the Aldershot GO Station in Burlington (Figure 52) with stops at Wayne Gretzky Parkway and Henry St., McMaster Innovation Park and McMaster University in Hamilton, as shown on Figure 53 GO Transit System Map and Appendix 29.



Figure 51 - GO Transit Bus Servicing Brantford Transit Bus Stop

⁵ Source: **2020 Brantford Transportation Master Plan Update, March 2021**, Executive Summary, page xxxv)

15 Route number Numéro du trajet Brantford / Burlington



Figure 52 - Route 15 GO Transit Bus Serving Brantford

The GO bus Route 15 service provides the following hours of operation and service frequencies:

Monday to Friday, Eastbound from Brantford Bus Terminal

- 5:20 a.m. - 10:15 a.m., 6 trips operating approximately every hour
- 12:45 p.m., 1 trip
- 2:40 p.m. to 5:45 p.m., 4 trips, approximately every hour
- 8:00 p.m., 1 trip
- 10:05 p.m., 1 trip

Monday to Friday, Westbound from Aldershot GO Station, Burlington

- 7:05 a.m. to 9:23 a.m., 3 trips, approximately every hour
- 11: a.m. to 5:33 p.m., 6 trips, approximately every hour
- 6 p.m. to 12:00 a.m. (midnight), 4 trips approximately every 2 hours

Saturday and Sunday, Eastbound from Brantford Bus Terminal

- 6:20 a.m. to 11:10 p.m., 9 trips, approximately every 2 hours

Saturday and Sunday, Westbound from Aldershot GO Station, Burlington

- 8:00 a.m. to 12:50 a.m., 9 trips, approximately every 2 hours

The full schedule is shown in Appendix 30.

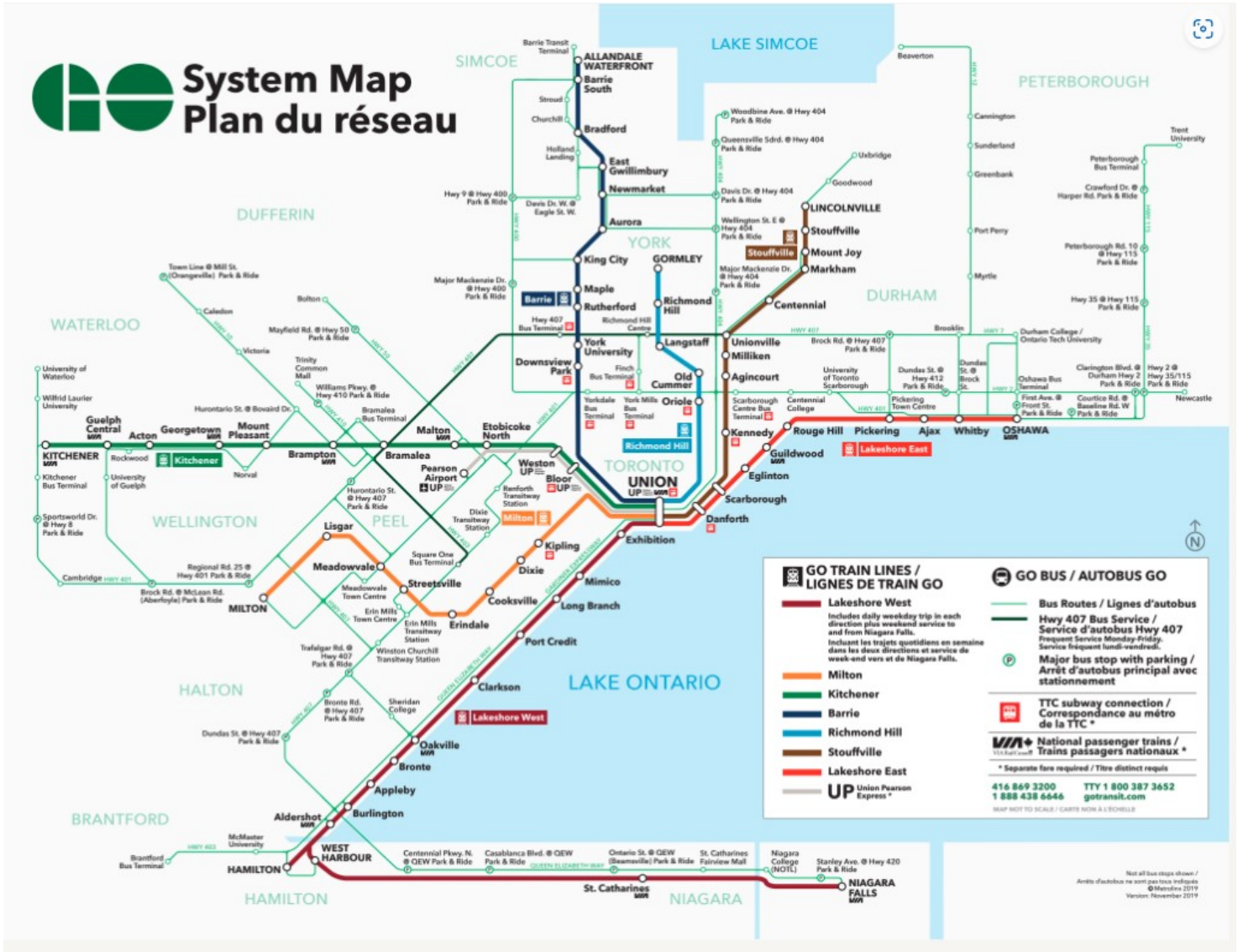


Figure 53 - GO Transit System Map

5.1.1 Brantford Transit Report Card

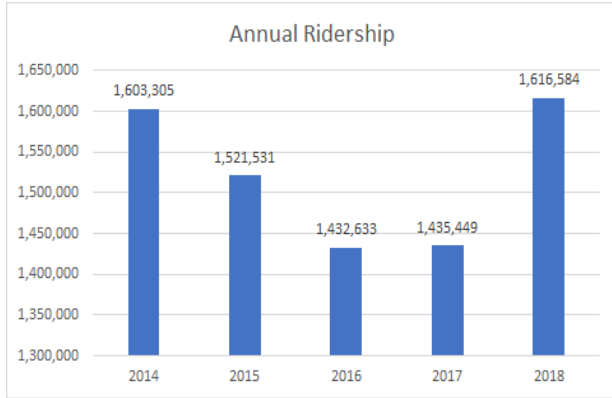
The most recent transit review was completed in 2016, based on 2014 data. Table 12 shows system performance changes from 2014 to 2018 based on CUTA (Canadian Urban Transit Association) statistics. Brantford Transit now serves nearly 36% more area, and has increased the number of vehicle hours by over 7%. Despite this increase in service, ridership growth increased only slightly at 0.83%. Revenue passengers per revenue hour, a measure of the system’s utilization decreased by almost 6%. On a per capita basis, net investment in transit fell 4.46%. Passenger revenues fell nearly 9%, likely because the average fare decreased over 9%.

Year	Municipal Population	Service Area Size (sq km)	Ridership (revenue passengers)	Total Direct Operating Expense	Passenger Revenues	Revenue Vehicle Hours	Cost Efficiency (Cost per Hour)	Revenue Passengers per Revenue Hour	Revenue Vehicle Hours per Capita	Revenue Passengers per Capita	Net Investment per Capita	Adult Cash Fare	Average Fare
2014	97,499	75.1	1,603,305	\$9,155,256	\$3,083,014	76,149	\$120.23	21.05	0.78	16.44	\$49.79	\$3.00	\$1.92
2015	97,862	75.1	1,521,531	\$8,797,135	\$2,851,625	76,149	\$115.53	19.98	0.78	15.55	\$46.72	\$3.00	\$1.87
2016	97,496	75.1	1,432,633	\$9,027,051	\$2,550,058	76,149	\$118.54	18.81	0.78	14.69	\$50.25	\$3.00	\$1.78
2017	98,225	75.1	1,435,449	\$8,878,427	\$2,371,809	77,400	\$114.71	18.55	0.79	14.61	\$48.19	\$3.00	\$1.65
2018	99,505	102.0	1,616,584	\$9,286,869	\$2,816,329	81,655	\$113.73	19.80	0.80	16.2	\$47.57	\$3.00	\$1.74
% Change 2018 vs 2014	2.06%	35.82%	0.83%	1.44%	-8.65%	7.23%	-5.41%	-5.94%	2.56%	-1.46%	-4.46%	0.00%	-9.38%

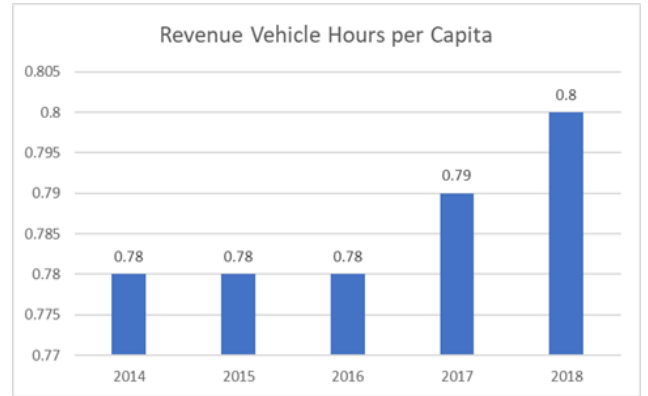
Table 12 - 2014 to 2018 CUTA statistics - Brantford Transit Report Card

Ridership was 1.6 million annual riders in 2014, declining to 1.4 million riders in 2017 and then increased back to 1.6 million riders in 2018, as shown in Figure 54 (top left graph).

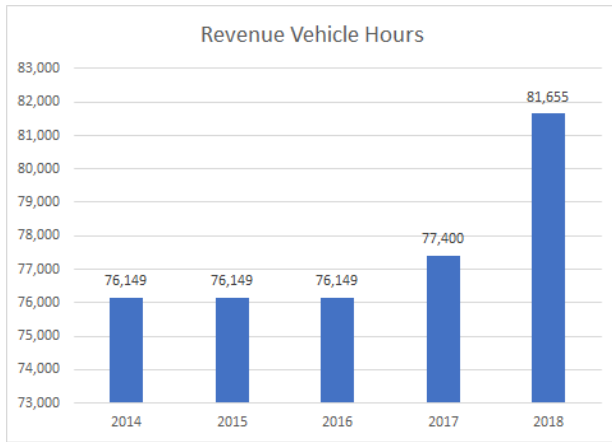
2014-2018 Brantford Transit Annual Ridership



2014-2018 Brantford Transit Revenue Hours per Capita



2014-2018 Brantford Transit Revenue Vehicle Hours



2014-2018 Brantford Transit Revenue Passengers per Revenue Hour

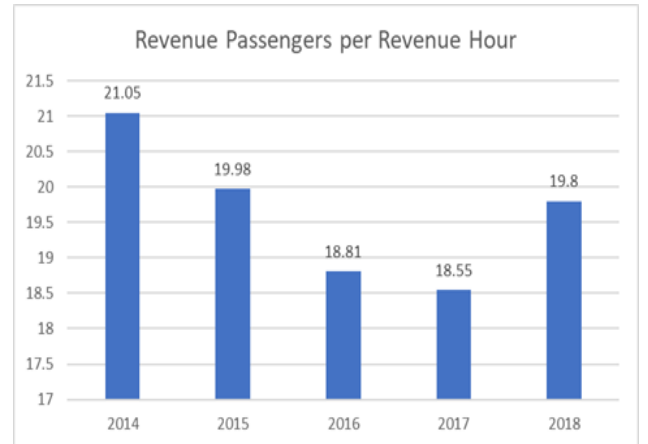
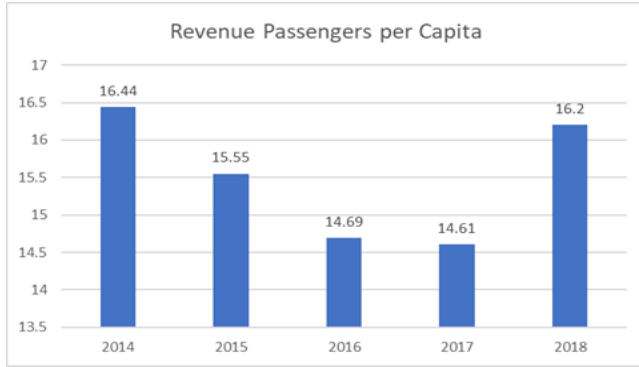
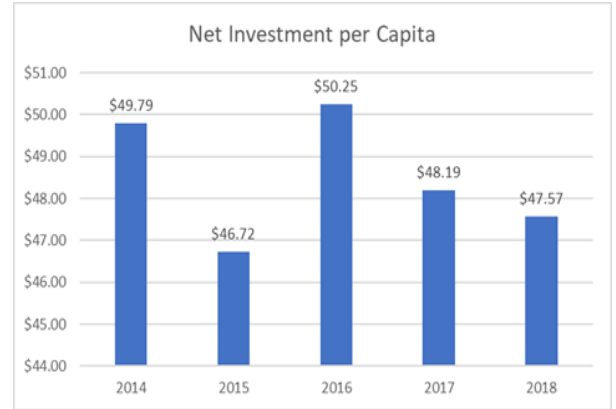


Figure 54 - Brantford Transit Key Performance Indicators (1 of 2)

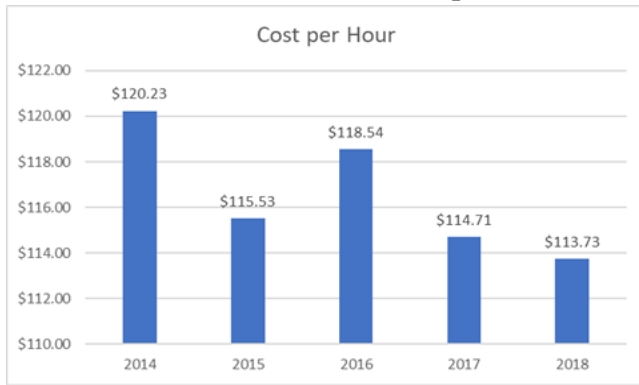
2014-2018 Brantford Transit Revenue Passengers per Capita



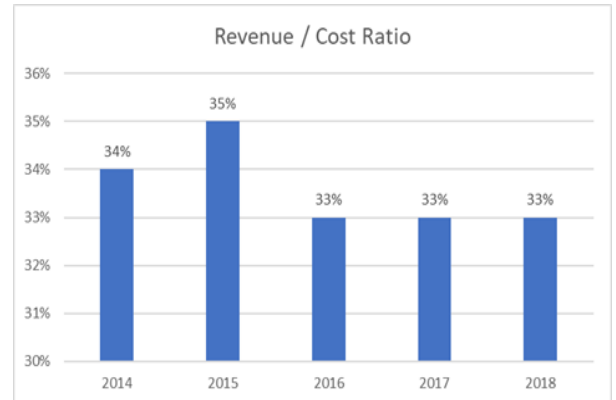
2014-2018 Brantford Transit Net Cost per Capita



2014-2018 Brantford Transit Cost per Hour



2014-2018 Brantford Transit Revenue / Cost Ratio (R/C) Ratio



2014-2018 Brantford Transit Average Fare

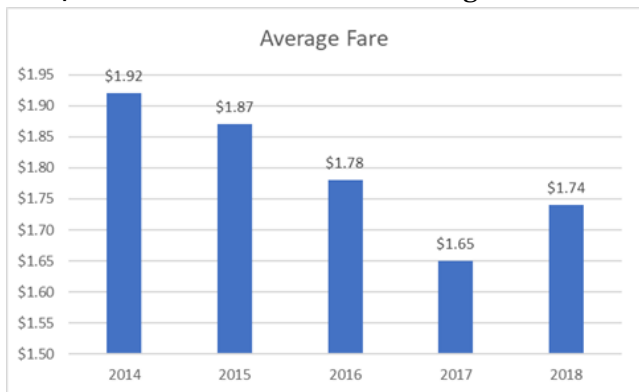


Figure 55 - Brantford Transit Key Performance Indicators (2 of 2)

Between 2014 and 2016, annual ridership dropped significantly, but then rapidly recovered exceeding 2014 levels in 2018 (top left graph, Figure 54).

Revenue Vehicle Hours (bottom left graph, Figure 54) were unchanged for 2014, 2015 and 2016, then rose 1.64% in 2017 and 5.5% in 2018. Revenue vehicle hours per capita similarly climbed from 2016 to 2018. This means that the service schedule was expanded during that time, explaining the sudden increase in ridership in 2018.

Revenue passengers per revenue hour (bottom right graph, Figure 54) measures the number of passengers the system moves in an hour of service. Despite the increase in service in 2018, the number of riders per hour fell short of 2014 and 2015 levels. By this measure, the system was less utilized in 2018, offering an expanded service schedule without the corresponding increase in riders to match.

Revenue passengers per capita (top left graph, Figure 55) measures whether transit ridership is increasing along with a growing population. From 2014-2017, the number of riders per capita steadily declined, until an increase in 2018 that approaches the 2014 level. According to this measure, transit ridership has not kept pace with population growth.

The cost per hour (middle left graph, Figure 55) to operate Brantford Transit has been falling from 2014-2018, with the exception of 2016, where there was an increase.

The average fare collected declined from 2014-2017 (bottom left graph, Figure 55). There was an uptick in average fare in 2018, when additional service was offered.

Net cost per capita (top right graph, Figure 55) measures the amount invested in the transit system. From 2014-2018, investment drops to its lowest point in 2015, rises to its peak in 2016, then declines.

The revenue cost ratio (bottom right graph, Figure 55) is a financial performance measure that tracks how much of the operating cost is covered by revenue collected at the farebox. In 2014, it was 34%, in 2015 it peaked at 35%, then from 2016-2018 it held steady at 33%.

5.1.2 Benchmarking - Comparison to Other Ontario Transit Systems

Jurisdiction	Brantford	Guelph	St Catharines	Niagara Falls	Sarnia	Barrie	Peterborough	Kingston	Sault Ste Marie	Thunder Bay	Peer Group Average
Municipal Population	99,505	151,984	151,914	88,071	72,125	169,219	81,032	125,114	73,300	107,909	112,017
Service Area Population	99,505	151,984	151,914	88,071	72,125	137,819	81,032	121,775	69,900	107,909	108,203
Service Area Size (sq km)	102.0	87.0	179.1	212.0	167.0	113.0	67.4	131.7	223.5	328.0	161.1
Ridership (revenue passengers)	1,616,584	6,562,779	5,259,702	2,478,264	1,402,902	3,250,007	4,609,801	6,797,799	1,517,014	4,036,591	3,753,144
Total Direct Operating Expense	\$9,286,869	\$27,701,845	\$21,100,265	\$12,354,942	\$5,516,224	\$18,946,156	\$13,735,046	\$23,682,000	\$8,568,439	\$16,889,847	\$15,778,163
Revenue Vehicle Kilometres	2,207,110	4,678,039	3,060,283	2,647,193	1,573,108	3,439,859	2,661,601	4,835,417	1,882,078	3,013,536	2,999,822
Revenue Vehicle Hours	81,655	208,335	142,656	109,313	78,132	172,465	141,720	256,898	79,957	145,303	141,643.40
Cost Efficiency (Cost per Hour)	\$113.73	\$113.92	\$138.22	\$115.67	\$69.94	\$105.44	\$92.31	\$85.63	\$106.42	\$113.33	\$105.46
Average Speed (Revenue Vehicle km/Revenue Vehicle hr)	27.03	22.45	21.45	24.22	20.13	19.95	18.78	18.82	23.54	20.74	21.71
Revenue Passengers per Revenue Hour	19.8	27.0	32.1	21.0	17.3	18.1	31.0	24.6	18.8	27.1	23.7
Revenue Vehicle Hrs per Capita	0.8	1.4	0.9	1.2	1.1	1.3	1.7	2.1	1.1	1.3	1.3
Revenue Passengers per Capita	16.2	43.2	34.6	28.1	19.5	23.6	56.9	55.8	21.7	37.4	33.7
Net Investment per Capita	\$47.57	\$98.20	\$65.92	\$90.95	\$48.39	\$75.00	\$81.31	\$137.26	\$78.39	\$94.77	\$81.78
Adult Cash Fare	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$3.00	\$2.50	\$3.00	\$2.85	\$2.75	\$2.91
Average Fare	\$1.74	\$1.87	\$1.95	\$0.60	\$1.30	\$1.87	\$1.18	\$1.12	\$1.43	\$1.43	\$1.45
Revenue / Cost Ratio	33%	46%	50%	37%	33%	34%	42%	33%	26%	35%	37%

Statistics from Ontario Urban Transit Fact Book 2018 Operating Data

Table 13 – Brantford Transit Peer Review Key Performance Indicators

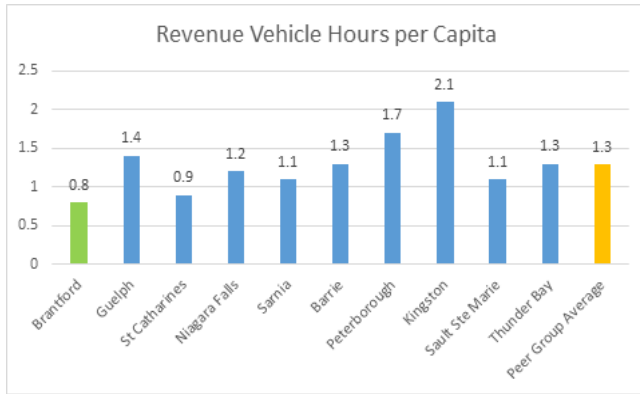
The transit Key Performance Indicators (KPIs) comparisons are noted below from Table 13, Figure 56 and Figure 57:

- **Cost Efficiency:** Higher than average, but comparable to many peers (meaning costs are being managed).
- **Revenue Passengers per Revenue Hour:** Below average, third lowest among peers (a reflection of transit usage based on service provided).
- **Revenue Vehicle Hours per Capita:** Lowest among peers (meaning Brantford has less transit service on the road than other comparable cities).

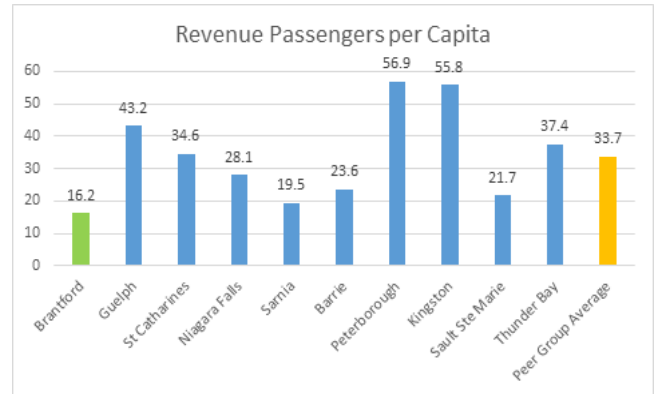
- **Revenue Passengers per Capita:** Lowest among peers (this means that a large segment of the population does not use transit and this will need to increase through improved service to meet the objectives of more people using transit as outlined in the 2020 TMP Update plan).
- **Net Investment per Capita:** Lowest among peers (this means that the City is not investing in transit as much as other cities and therefore requires an increased investment in transit to achieve greater transit usage and less reliance on automobile travel).
- **Average Fare:** Above average, third highest among peers (this is good to off-set the costs of operating transit).
- **Revenue / Cost Ratio:** Among the lowest, same ratio as Sarnia and Kingston, the only one lower was Sault Ste Marie (meaning revenues are not at a level yet to better off-set the cost of operations).
- **Average Speed:** Highest among peers at 27.03 km/h. A "rule of thumb" often used in transit is that the average speed should not exceed 22 km/h.⁶ (This is an indicator that many routes likely have insufficient running time to complete their route to maintain schedules transit users rely on).

⁶ Source: **Report 1 - Overview of Conventional and Specialized Transit Services, May 25, 2016,** page 49.

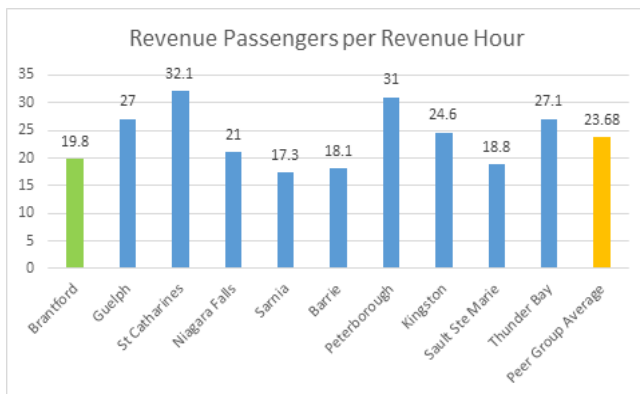
2018 Peer Group Revenue Vehicle Hours per Capita



2018 Peer Group Revenue Passengers per Capita



2018 Peer Group Revenue Passengers per Revenue Hour



2018 Peer Group Cost per Hour

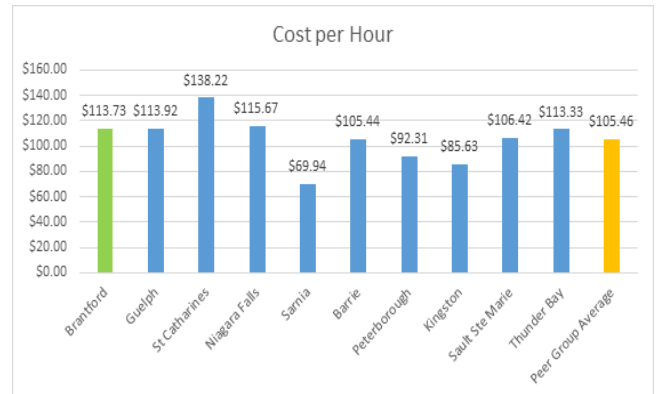
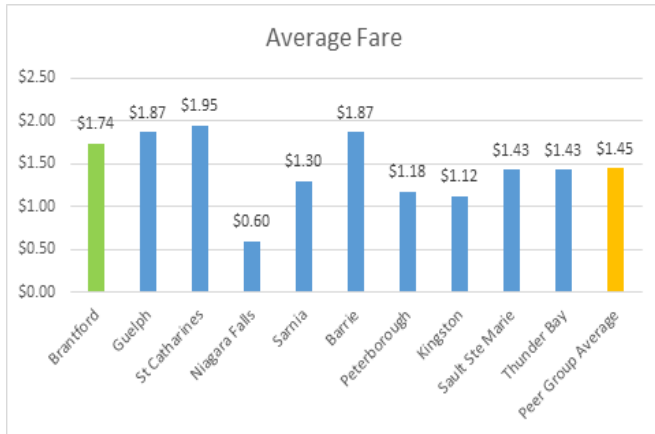
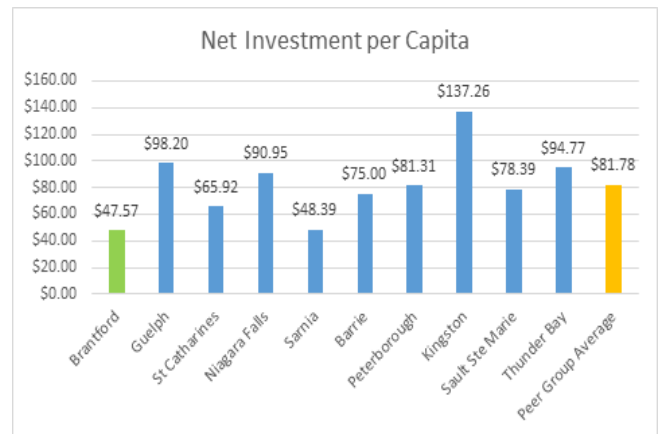


Figure 56 - Peer Group Transit Key Performance Indicators (1 of 2)

2018 Peer Group Average Fare



2018 Peer Group Net Cost per Capita



2018 Peer Group Revenue / Cost Ratio

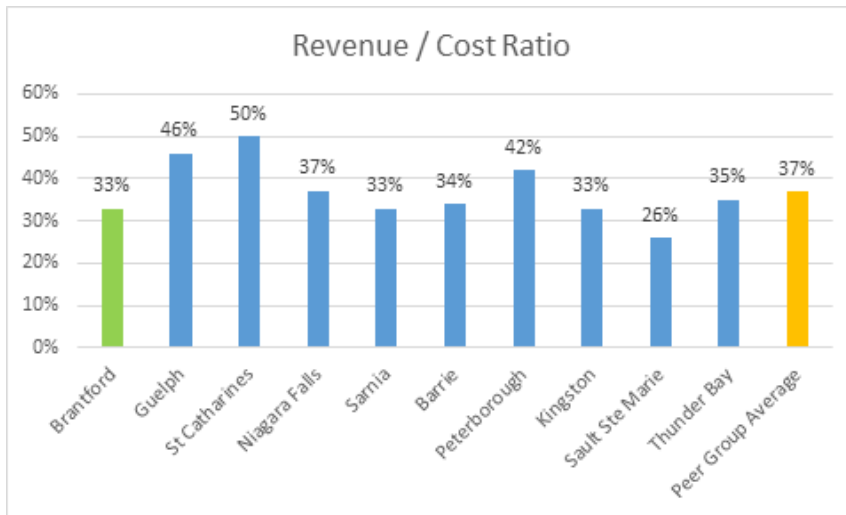


Figure 57 - Peer Group Transit Key Performance Indicators (2 of 2)

5.1.3 Routes

Brantford Transit operates 14 fixed bus routes, all connecting to the downtown bus terminal and listed below:

- Route 1 - Eagle Place - Monday to Sunday service
- Route 2 - West Street / Brier Park - Monday to Sunday service
- Route 4A - Mall Link - Monday to Sunday service
- Route 4C - Mall Link - Monday to Sunday service
- Route 5 - West Brant Oakhill - Monday to Sunday service
- Route 6 - West Brant / Shellard - Monday to Sunday service
- Route 7 - East Ward / Braneida - Monday to Sunday service
- Route 8 - Holmedale Mayfair - Monday to Sunday service
- Route 9 - Echo Place - Monday to Sunday service
- Route 11 - West Brant Oakhill-NWIA Holmedale - evening Monday to Saturday service
- Route 12 - Eagle Place Shellard Lane - evening Monday to Saturday service
- Route 13 - King George Rd Brantwood Park - evening Monday to Saturday service
- Route 14 - Echo Place East Ward - evening Monday to Saturday service
- Route 15 - West Street Mayfair - evening Monday to Saturday service

Brantford Transit also provides special shuttle service to two industrial areas:

- NEIA (Northeast Industrial Area) - Special shuttle service Monday to Friday morning and afternoon between the transit terminal and Northeast Industrial Area.
- NWIA (Northwest Industrial Area) - Special shuttle service Monday to Friday and Sunday between the transit terminal and the Northwest Industrial Area.

5.1.4 Bus Stop Locations in the Downtown

Figure 59 shows a map of the bus routes servicing the downtown along with the bus stops, and the location of transit shelters and benches in the extended study area. Along Dalhousie St. and Colborne St. there is a lack of transit shelters and benches due to concerns about potential vandalism and homeless people occupying transit shelters and benches. With the aging of the population, and seniors representing a key ridership segment for public transit, shelters and benches are important for customer retention, convenience and accessibility. The City should further review the possibility of providing these amenities as part of the detailed urban streetscaping design (i.e. street furniture requirements). There are ways to minimize vandalism and homeless occupancy through different types

of transit shelter designs, such as canopies only and benches with handrails that prevent people from sleeping on them. Also, safety and security issues should be addressed separately, and not necessarily linked to the provision of transit shelters and benches. Without these conveniences, a large segment of transit ridership is penalized, especially seniors and those people with disabilities that require transit.

During this EA study and through the inventory of bus stops in the study area, many bus stops have concrete landing pads, litter containers and benches as shown in Figure 58. In May 2022, Brantford issued an RFP for adding more concrete bus stop landing pads at several locations across the transit system to improve accessibility and should be continued.



Figure 58 - Examples of Brantford Transit Stops and Amenities

5.1.5 Existing Bus Stop Signage

The current bus stop signs convey the following, as shown on Figure 60:

- The transit system servicing the bus stop, Brantford Transit.
- The routes that serve the bus stop.
- The phone number for the NEXT BUS real time arrival information system.
- The bus stop number.

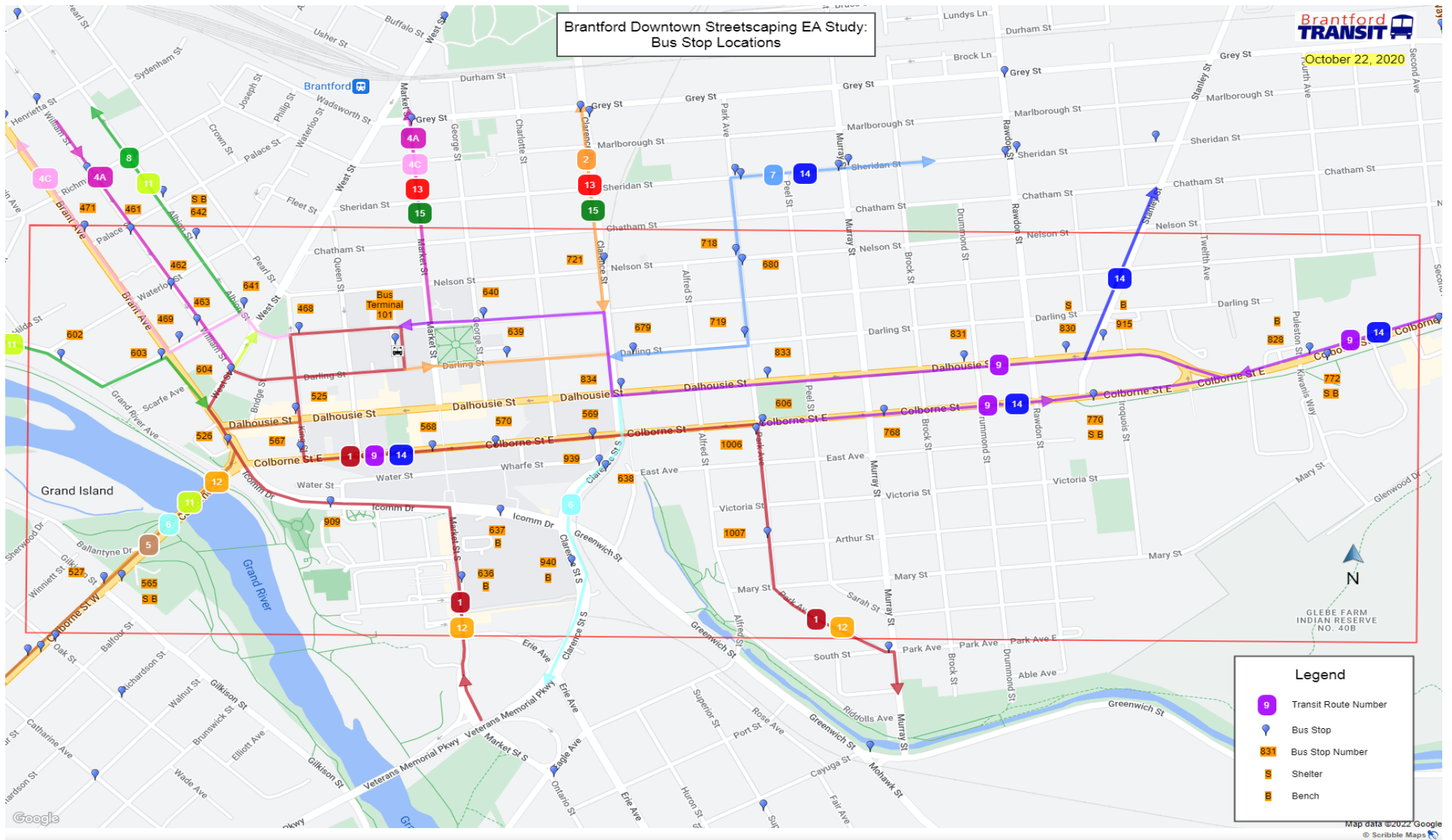


Figure 59- Existing Brantford Transit Bus Stops and Amenities in the Extended Study Area



Figure 60 - Brantford Transit Bus Stop and Signage in 2022

5.1.6 Proposed Bus Stop Signage

5.1.6.1 Transit Information at Bus Stops

There are approximately 500 individual bus stops (i.e. many shared among routes) in Brantford, which are the public's first actual interface with the transit service and provide a low cost excellent opportunity to educate the public on basic information about the transit service in a few seconds. The bus stop design is clear and highly visible. Citizens who may consider riding transit, especially those who have the option to drive, are deterred by the unfamiliarity of the transit system (where it goes, the fare collection, the boarding process, etc.) – basically every aspect of using it.

Transit organizations often have a reluctance to place additional transit route, schedule and system maps at bus stops because this information is all available from the municipality's website, which is

true. However, a transit user must be skillful to navigate a website or app through a number of “clicks” from their smartphone, know where to access the City’s transit information and the complexities and time required to access the information. It’s not so much the number of “clicks,” but the success of the clicks in quickly obtaining the information the user is seeking. Other challenges include small print on a smartphone and viewing an entire transit system map (needed for those travelling from one end of the City to another distant end) on a small screen compared to viewing a large map (1 metre by 1 metre) posted inside a transit shelter.

If Coca-Cola had 500 free rent real estate locations upon which to post simple advertisements about their product, they would jump at the opportunity! Coca-Cola has a fantastic website with all kinds of promotions and gimmicks, yet they still spend millions of dollars on old fashion advertising (billboards, posters, etc.). They are continuously promoting their product by being “in the face of consumers” who most don’t realize they are passively absorbing Coke’s messages. Transit organizations would do well to adopt this type of mindset to retain existing ridership and attract new customers.

Printed bus departure times on InfoPosts, as shown on Figure 61, should be installed at most bus stops, starting with the busiest high volume passenger bus stops. These provide a transit system with low cost advertising opportunities for seriously promoting transit 24 hours a day, seven days a week by being “in the face” of the customer. These are also useful for announcing and reminding transit customers of service changes, route detours, etc.



Figure 61 - InfoPost Used by Many Transit Systems (especially at main bus stops)

5.1.6.2 Electronic Variable Message Displays

Brantford has plans to introduce for each bus bay at the downtown bus terminal overhead electronic variable message signs showing bus departure times.

It should be noted that many transit systems have variable electronic message display boards at key bus stops throughout their transit system, not just at bus terminals. In Figure 62 below, is an example of an interactive display that uses e-ink technology and the adjacent photo showing a digital bus stop indicating the real-time arrival time in minutes of the next bus. The e-ink technology can be solar powered in off-grid locations and are being pilot tested by some Ontario transit systems.



Figure 62 - Examples of Electronic Variable Message Displays at Bus Stops

5.2 Transit Ridership

5.2.1 Pre-COVID-19

The map in Figure 63 shows the amount of daily boardings by bus stop in the extended study area prior to COVID-19, in the categories low (1-10), medium (11-25) and high (26+). Note that the only bus stop downtown that had a high number of boardings was the transit terminal. All of the other stops with high numbers of boardings were outside of the downtown core indicating riders may not all have to travel downtown and consideration should be given to looking at cross-town routes.

The bar graphs in Figure 64 illustrates the monthly transit ridership by route in the 2 years leading up to the COVID-19 pandemic. There was small overall ridership growth from 2018 to 2019.

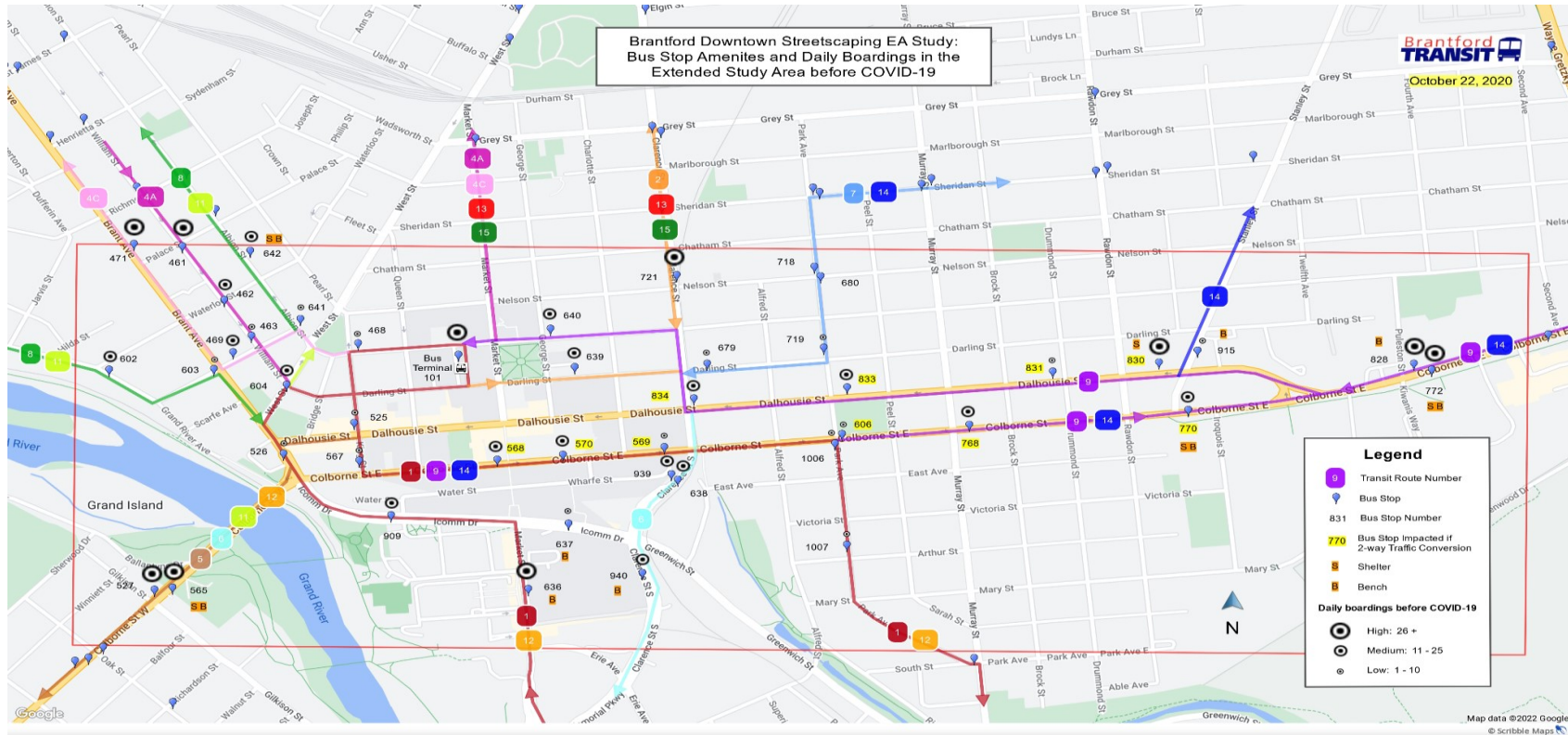


Figure 63 - Brantford Transit Bus Stop Amenities and Daily Boardings in the Extended Study Area before COVID-19

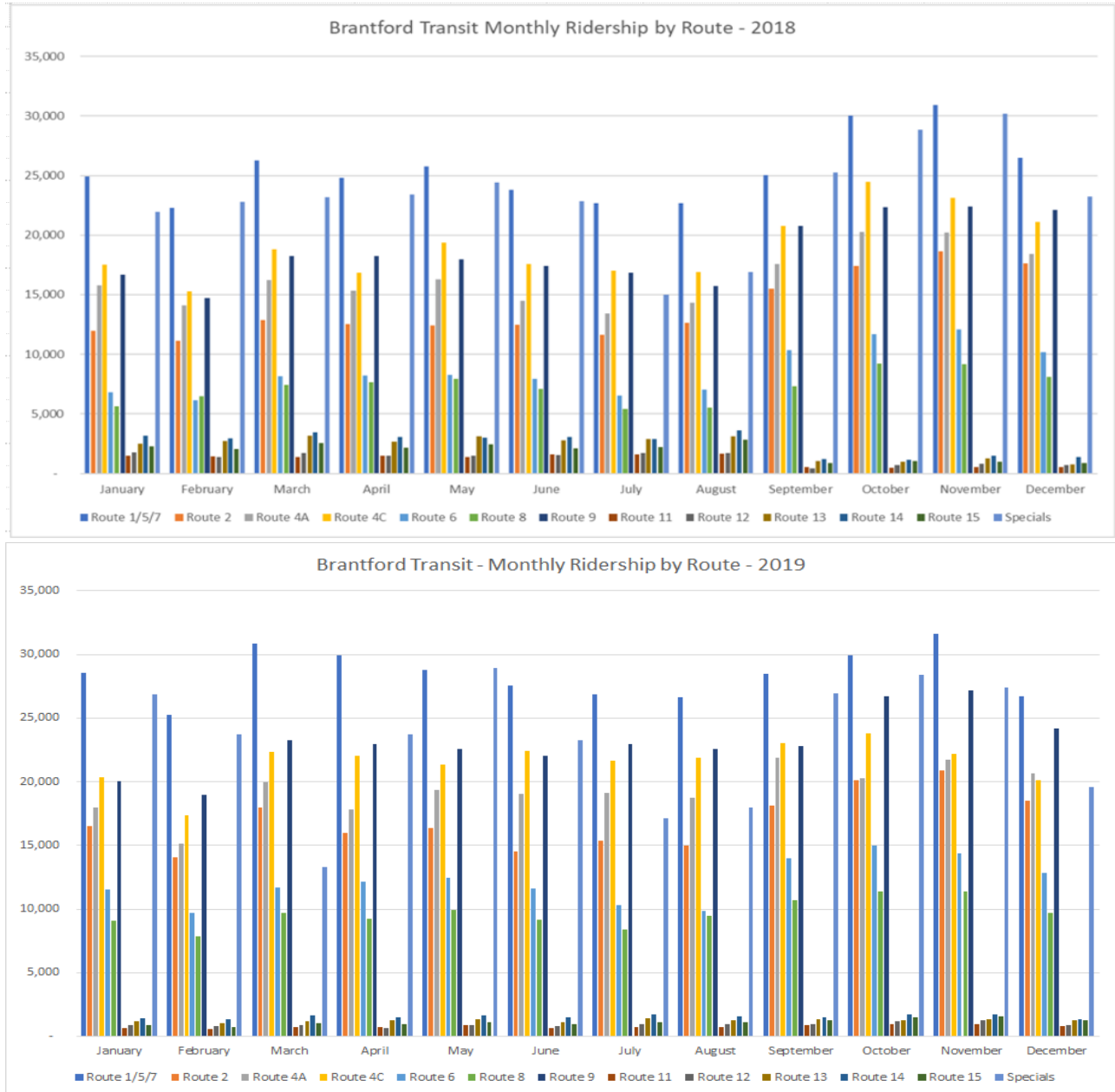


Figure 64 - Brantford Transit Monthly Ridership by Route in 2018 & 2019, pre-COVID-19

5.2.2 During COVID-19

At the beginning of 2020, system ridership levels were higher than 2018 and 2019 levels, as shown on Figure 65. When lockdowns occurred, ridership plummeted. The lowest level was in April 2020. Ridership has been steadily recovering, but has not returned to pre-pandemic levels.

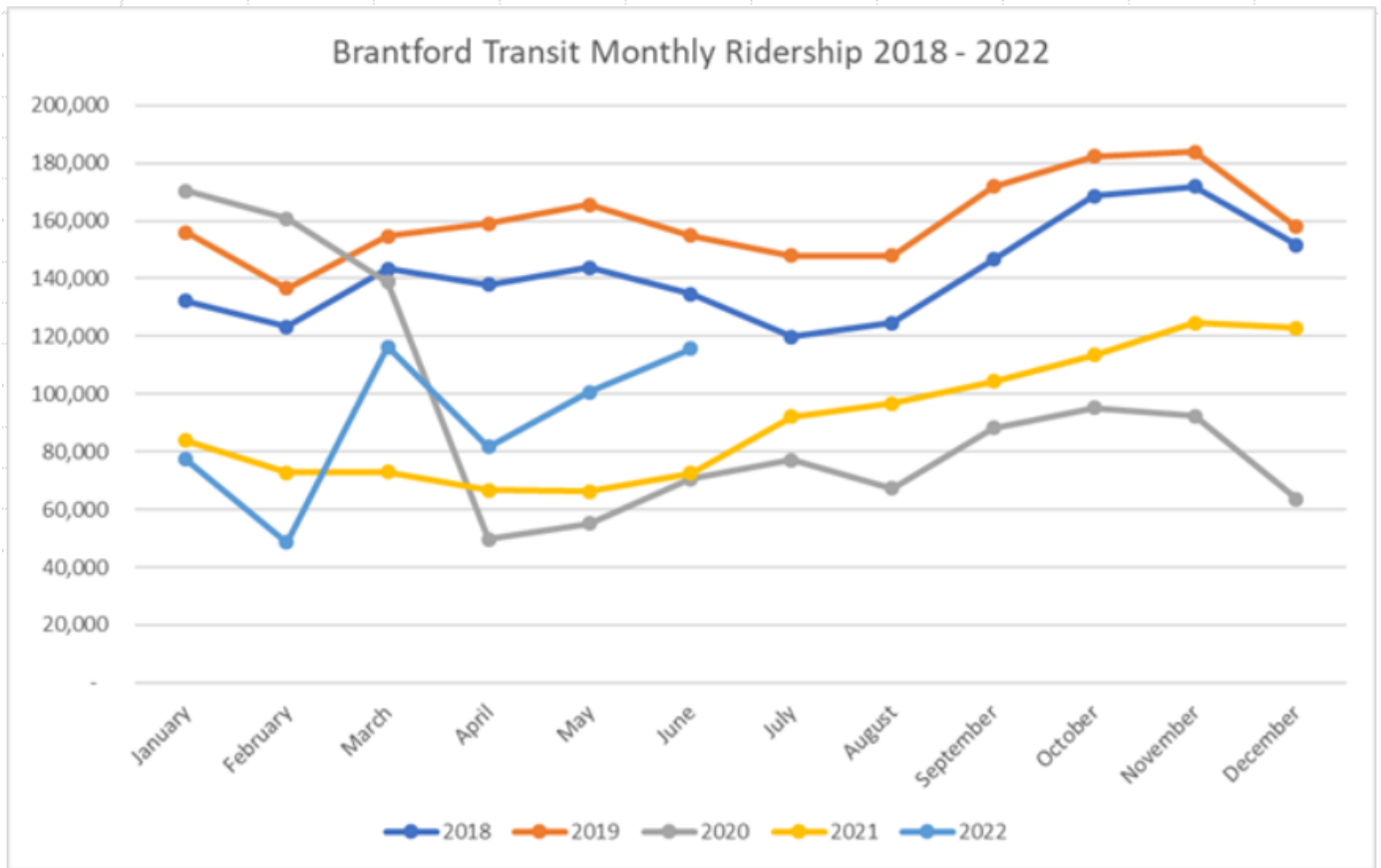


Figure 65 - Brantford Transit Monthly System Ridership 2018 - 2022

5.2.3 Post-COVID-19

Ridership should return to pre-COVID-19 levels at some point. Brantford Transit's new Automatic Passenger Counting system (APC) will monitor when that occurs. At that point, a transit service review should be undertaken as passenger boarding, alighting and running time data are critical in providing evidence to support transit service improvements.

5.3 *Impact on Existing Transit Service from Retaining 1-Way Traffic on Colborne and Dalhousie Streets*

The preferred option maintains one-way traffic on Colborne and Dalhousie Streets as stated earlier in this report. The roads will be re-built with narrower lanes to slow traffic. Slower vehicle speeds may cause some further delays, but the impacts should be minimal. These delays could be off-set by introducing traffic signal priority for transit combined with queue jump lanes as shown later in this report.

5.3.1 Transit Impact of a 2-Way Traffic Conversion on Colborne and Dalhousie Streets

This study examined the possibility of converting Colborne and Dalhousie streets to 2-way streets. Such a conversion would negatively impact transit service. The 2-way operation would introduce additional delays. Passenger and delivery vehicles stopping to load or unload may halt movement, since there would only be one lane of travel in each direction. Vehicles turning from the opposite direction causing 'conflicts' will also cause delay. During the last transit review in 2016, difficulty adhering to the schedules was a key finding.⁷ Below is Table 14 summarizing the bus stops that would be directly be impacted by a 1 to 2-way traffic conversion.

⁷ Source: IBI Group, **City of Brantford Report 1 - Overview of Conventional and Specialized Transit Services**, May 25, 2016, page 94.

Bus Stops Impacted by 1-Way to 2-Way Traffic Conversion on Colborne and Dalhousie A1										
Bus Stop Number	Bus Stop Name	Route	Street Number	Street	1st Cross Street	2nd Cross Street	Shelter	Bench	Landing	Sidewalk Access
568	HARMONY SQUARE	1,9,14	171	COLBORNE ST	MILL ST	BAIN ST	NO	NO	YES	YES
569	COLBORNE & ECHO	1,9,14	281	COLBORNE ST	ECHO ST	CLARENCE ST S	NO	NO	YES	YES
570	BECKETT BLDG	1,9,14	219	COLBORNE ST	MILL ST	BAIN ST	NO	NO	YES	YES
606	COLBORNE & PARK AVE	1,9,12,14	0	COLBORNE ST	PARK AVE		NO	NO	YES	YES
768	COLBORNE & MURRAY	9,14	433	COLBORNE ST	MURRAY ST		NO	NO	YES	YES
770	COLBORNE & STANLEY	9,14	0	COLBORNE ST	RAWDON ST	IROQUOIS ST	YES	YES	YES	YES
830	DALHOUSIE & STANLEY	9	366	DALHOUSIE ST	STANLEY ST		YES	NO	YES	YES
831	DALHOUSIE & DRUMMOND	9	332	DALHOUSIE ST	DRUMMOND ST		NO	NO	YES	YES
833	DALHOUSIE & PARK AVE	9	254	DALHOUSIE ST	PARK AVE		NO	NO	YES	YES
834	DALHOUSIE & CLARENCE	9	196	DALHOUSIE ST	CLARENCE ST		NO	NO	YES	YES
Number of Bus Stops Impacted on Colborne:			6							
Number of Bus Stops Impacted on Dalhousie:			4							

Table 14 - Bus Stops Directly Impacted by a 1-Way to 2-Way Traffic Conversion on Colborne & Dalhousie Streets

5.4 Fixed Route Transit

5.4.1 Improve Ridership by Transit Service Changes

In 2016, the transit mode share (percentage of transit trips taken out of the total of all trips mainly by car) traveling within Brantford was 2.8%, and 2.3% for transit trips that originated in Brantford.⁸ The 2020 Transportation Master Plan Update has a goal of 6% transit mode share by 2041.⁹

When conducting a benchmarking comparison of Brantford Transit to transit systems in other Ontario cities, Brantford was the lowest in terms of revenue vehicle hours per capita, revenue passengers per capita and net investment per capita. In order to increase transit mode share, additional investment will be

⁸ Source: **2020 Brantford Transportation Master Plan Update, March 2021**, Executive Summary, page xiii

⁹ Source: **2020 Brantford Transportation Master Plan Update, March 2021**, Transit - Strategy, page 168

required. Service hours need to be extended Monday to Friday, Saturday and Sunday to bring revenue vehicle hours per capita up to where the peer group is.

There was one metric where Brantford Transit was the highest among its peers—average speed. A high average speed is not a good indicator when providing local bus service. This could be the result of a few factors. Bus stops can be too far apart. Operators could be trying to catch up to schedules that have been found difficult to adhere to. Some of the routes make large, indirect one-way loops through low density areas, likely picking up and dropping off very few passengers, allowing operators to drive through the loops quickly. Touring neighbourhoods in circles does not attract riders, and should be minimized.

Newly developed (residential, employment, retail and institutional) areas should be served by transit as soon as occupancy takes place. If not, private automobiles are purchased and travel habits are already set.

As discussed earlier in the report, poor on-time performance and reliability is an ongoing concern.¹⁰ To address this, schedules and/or routes need to change. Brantford is a growing city. For its transit system to remain relevant, the route structure will have to change. The following sections explore the concept of decentralizing the transit system to be less downtown oriented, in order to provide additional service where most of the growth is occurring.

5.4.2 Not All Routes Need to Go Downtown (Cross-town Routes)

The Brantford Transit system operates as what is called a ‘radial’ or ‘hub and spoke’ system. The downtown acts as the central hub. The routes are like spokes on a wheel connecting the outer parts of the city to the downtown hub. At present, all of the bus routes connect to the downtown. This works well for passengers that have either their origin or destination downtown, but not so well for people wanting to travel ‘cross-town’ where both the origin and destination are outside of the downtown. Having to transfer downtown can make a short trip into a long one. In order to create cross-town routes, outer hubs need to be identified.

Creating transit hubs outside of the downtown lessens the need to expand the downtown transit terminal. As bus routes are restructured to a multi-hub system, not all of the routes are required to go downtown. Some of the newly created routes would be cross-town routes that do not go downtown at all.

¹⁰ Source: IBI Group, **City of Brantford Report 1 - Overview of Conventional and Specialized Transit Services**, May 25, 2016, page 94.

Most of the urban growth in Brantford is occurring in the north part of the city. Identifying transit hubs north of downtown would bring additional service to where potential riders already are.

5.4.3 Pulse Timed Transfer Hubs

Brantford's Transit Terminal in the downtown operates as a pulse timed transfer hub. Routes are scheduled to meet at the terminal at the same time to facilitate convenient transfers between routes. Introducing cross-town routes would require outer pulse timed transfer hubs. North of downtown, there are 2 shopping centres that already serve as informal hubs: Lynden Park Mall (Wayne Gretzky Parkway & Lynden Road) and Brantford Commons (King George Road, just south of Powerline Road—anchored by Walmart). New cross-town routes that use Lynden Park Mall and Brantford Commons as pulse timed transfer hubs could meaningfully improve transit service. The transit hubs concept is illustrated in Figure 66 below.

5.4.4 Potential for High Order Transit Service

The population and density of Brantford is not currently at the point where high order transit service needs to be considered yet. The next step in that direction is shrinking the headways, from 30 to 60 minutes to 10 to 15 minutes. This type of frequent service would meaningfully improve service for current users, and attract new ones.

5.4.5 Bus Priority Measures - At Traffic Signals & Queue Jumping

City Transit staff indicated for this EA 2022 study that there are no locations where bus priority measures are used, nor have staff had discussions about future locations. However, transit staff did advise that possible locations to start with would be at:

- Brant Ave. and St. Paul Ave.
- West St. and Charing Cross St.
- Lorne Bridge
- Lynden Park Mall, and
- Brantford Commons.

Queue jump lanes combine short dedicated transit facilities with either a leading bus interval or active signal priority to allow buses to easily enter traffic flow in a priority position, as shown on Figure 67. Brampton Transit has successfully installed and operated queue jump lanes for several years.

Queue jump and traffic signal priority is not just for large cities. Applied thoughtfully, queue jump treatments can reduce delay considerably, resulting in run-time savings and increased schedule reliability for transit customers. City transit, traffic and engineering officials may want to arrange a site visit with Brampton Transit officials to view and learn more about queue jump lanes that actually work. Until ridership at Brantford Transit increases significantly warranting 15 minute or 10 minute service frequencies, queue jump lanes should be considered well in advance of implementing more expensive express or BRT (Bus Rapid Transit) bus services.

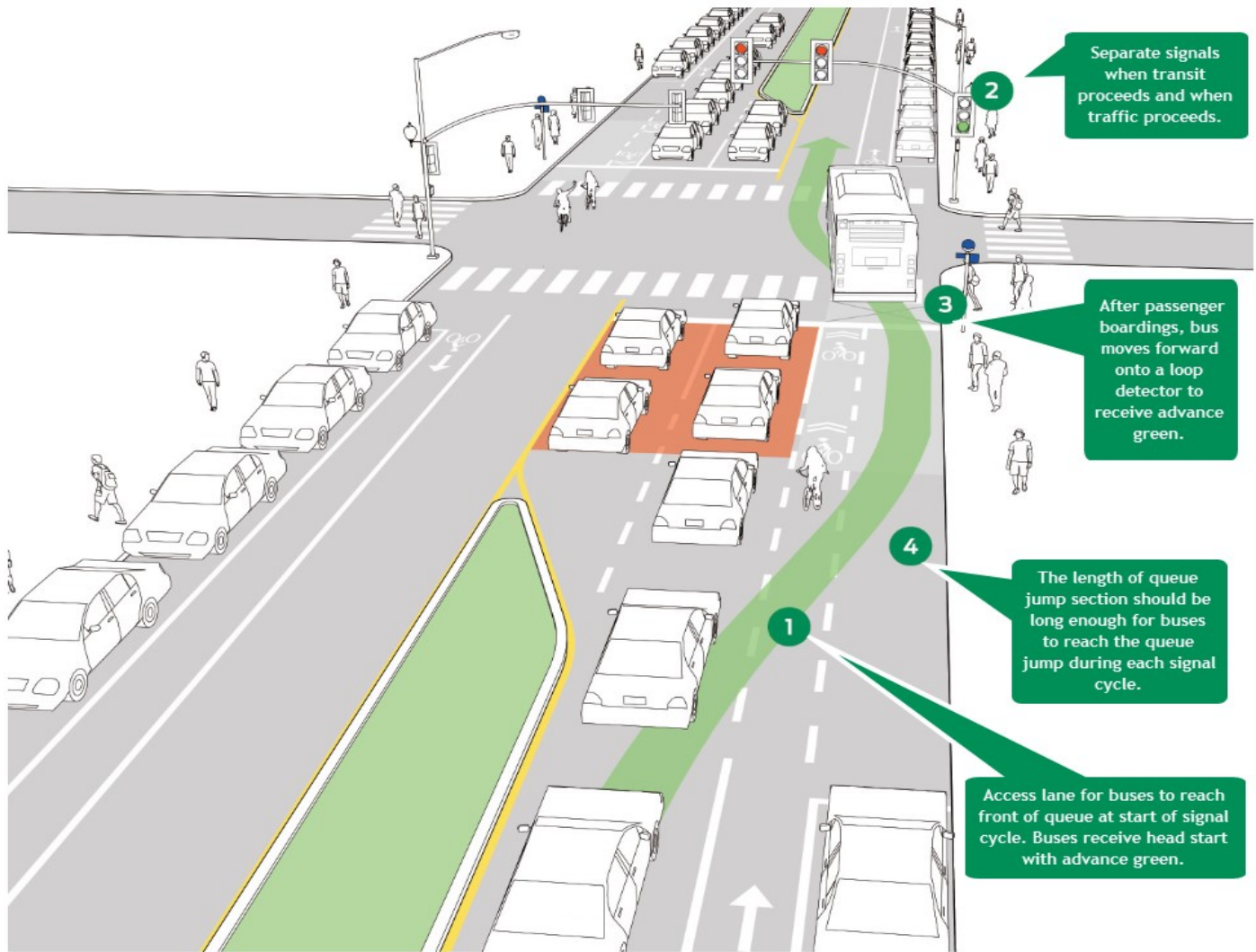


Figure 67 - Bus Priority - Traffic Signals & Queue Jumping

Source: <https://nacto.org/publication/transit-street-design-guide/intersections/intersection-design/queue-jump-lanes/>

5.4.6 Future Express Bus Shuttle (post-secondary students)

When a large number of post-secondary students are living outside of downtown, an express bus shuttle service may be considered. Such a shuttle would operate in mixed traffic, and have limited stops.

5.4.7 BRT (Bus Rapid Transit)

Bus Rapid Transit refers to segregated right-of-ways dedicated to buses. On these facilities, buses do not operate in mixed traffic in key corridors, minimizing delays. Ridership in Brantford is not at the point where BRT is warranted.

5.4.8 Possible Future Partnerships

Both Wilfrid Laurier University (WLU) and Conestoga College have the ‘U-Pass’. The students’ union, post-secondary institutions and Brantford Transit negotiated an unlimited travel pass to be built into the tuition of full-time students in the fall and winter terms.¹¹ The spring term students can purchase a separate summer pass.¹² In order to boost ridership, an unlimited travel pass could be explored for part-time and spring term students if there is interest.

Since Brantford Transit uses the downtown as the hub, a partnership with the Downtown Brantford Business Improvement Area (DBBIA) could be mutually beneficial. A look at their website reveals a page dedicated to parking downtown, but no mention of Brantford Transit.¹³ Transit users walk, may buy refreshments and browse the stores while waiting for the next bus. Discounted transit rides and/or passes could be offered to downtown patrons and employers to manage parking.

Outside of the downtown, there is an opportunity to offer discounted transit passes through employers. Providing parking for employees can be expensive.

¹¹ Wilfrid Laurier University Students’ Union, **About the U-Pass**,
<https://www.yourstudentsunion.ca/bus-pass>

¹² Wilfrid Laurier University, **How to get around without a car**,
<https://students.wlu.ca/news/recurring/how-to-get-around-without-a-car.html>

¹³ Downtown Brantford Business Improvement Area, **Parking**,
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5.4.9 Fare Integration with Brant Transit, GO Transit, Hamilton Street Railway and Burlington Transit

Fare integration usually means that passengers can seamlessly transfer between systems on a unified payment system. The transfer can be free, discounted or regular price—usually with a smart card. Brantford Transit and Brant Transit each have their own payment systems.

GO Bus Route 15 connects Brantford to Hamilton and Burlington. GO Transit, Hamilton Street Railway, Burlington Transit and all of the other transit systems in the Greater Toronto & Hamilton Area (GTHA) use the PRESTO electronic fare payment system. PRESTO card holders usually receive a discounted fare compared to paying cash. If Brantford Transit and Brant Transit were to join the PRESTO system, fare integration may be achieved.

5.4.10 Circulator Route in Downtown Serving Seniors, Students and Shoppers

A community bus circulating to key points in the downtown could offer people a convenient means of accessing what there is to offer and reduce walking distances for those parking in the Market Centre Parkade and Municipal Lots 3 and 4. The bus could make stops at key Wilfrid Laurier University and Conestoga College buildings, retirement homes, public library, YMCA, Harmony Square, Market Centre Parkade, Transit Terminal, etc. Many cities that have a community circulator bus offer it as a free or discounted service. In the early 1990s and through to the early 2000s, the City of Mississauga operated a daytime free shuttle in the developing City Centre (Square One Mall) that was originally paid by local businesses.

5.4.11 Future Demand Responsive Transit (DRT)

Demand Responsive Transit is a service without fixed routes and schedules, also called On-Demand Transit or Microtransit. It is the contemporary version of what was called ‘Dial-A-Bus’ decades ago. Through a smartphone app, website, or telephone call, a transit user can book a trip specifying a pick-up and drop-off point. Specialized software takes into account the origins and destinations of the passengers, tracks the locations of the transit vehicles, and calculates optimal routing. In small operations, a dispatcher may be used in place of software.

5.4.12 What Other Municipalities are Now Doing

Belleville, Ontario

Belleville is a pioneer in Demand Responsive Transit. They replaced their evening fixed route service with an on-demand system using Pantonium software with conventional buses. Passengers choose which bus stops they want to be picked up and dropped off at.

The new service has been well received in Belleville. In the first month, evening ridership increased 300% and boardings per hour went from 6 to 13.¹⁴ Per vehicle mileage decreased 30%. The number of bus stops covered is 70% more than the former fixed route evening service using the same service hours and same number of buses. The demand has been so high, that additional on-demand buses are needed.¹⁵

5.4.13 Current Pilot Projects

Vaughan, Ontario

Metrolinx has partnered with York Region Transit and the City of Vaughan to expand the Mobility On-Request on-demand rideshare pilot program to Rutherford and Maple GO Stations. The program already operates in York Region at the Aurora, East Gwillimbury and King City GO Stations. Within a designated zone, a transit user requests a ride with an app to either Rutherford or Maple GO Stations. Essentially, a feeder service into two transit hubs. From the GO Stations, transit users booking through the app can be dropped off anywhere within the service area. The free service for PRESTO card holders is offered during morning and afternoon peak times. Vehicles are operated by York Region Transit.¹⁶

Hamilton, Ontario

¹⁴ Source: Donaldson, Adam A, **Belleville's Transit Manager Touts On-Demand Transit Experience**, February 16, 2021, <https://guelphpolitico.ca/2021/02/16/bellevilles-transit-manger-touts-on-demand-transit-experience/>

¹⁵ Source: Mellor, Luke, **Initial Results from Belleville's On-Demand Transit Pilot**, November 19, 2018, <https://pantonium.com/initial-results-from-belleville-on-demand-transit/>

¹⁶ Source: Money, Scott, **New on-demand transit pilot project coming to Vaughan GO Transit customers**, Metrolinx News, March 30, 2022, <https://blog.metrolinx.com/2022/03/30/new-on-demand-transit-pilot-project-coming-to-vaughan-go-transit-customers/>

In September 2021, Hamilton Street Railway (HSR) began operating an on-demand transit pilot in Waterdown called ‘HSR myRide on-demand transit’. Waterdown is a growing low density area bordering the west part of Burlington. Through a smart phone app or telephone call, a transit user can book a pick-up and drop-off at any bus stop within a designated zone. On November 7, 2022, HSR will add a fixed route, fixed schedule bus route between the Aldershot GO Station in Burlington to the Walmart in Waterdown. On-demand myRide passengers can transfer to the new fixed route at designated stops, or choose any bus stop in the designated service area. HSR calls this a hybrid service for the Waterdown area.¹⁷

Other demand responsive transit projects include, Grand River Transit (Waterloo Region), Fort Erie (Niagara Region), North Bay, Sault Ste. Marie and others.

5.4.14 Possible Application to Brantford

There are several possible applications to Brantford. Like in Belleville, low ridership fixed route evening service could be replaced with a demand responsive service in a designated zone. Low density areas could operate on-demand service that feeds passengers into transit hubs or major trunk bus routes.

In fact, Brant County already has a demand responsive service called Brant Transit with a fleet of vans. Users can book their ride on their website, smartphone app, or call.¹⁸ Brant Transit riders can choose to go anywhere within the County of Brant, go from the County of Brant to Brantford, or go from Brantford to the County of Brant.¹⁹ DRT is an efficient way of servicing low density areas and low ridership times, such as evenings.

The Ontario and Federal governments launched the ‘Safe Restart Agreement’ funding to help transit agencies that experienced dramatic drops in revenue and rising costs during the COVID-19 pandemic. Initial funding was \$650 million, with an additional \$150 million added by the province later. The money can be used to implement demand responsive transit, and improve service and fare integration

¹⁷ Source: City of Hamilton, **HSR MYRIDE ON-DEMAND**, <https://www.hamilton.ca/home-neighbourhood/hsr/schedule-route-tools/hsr-myride-demand#service-area-map>

¹⁸ Source: County of Brant, **Brant Transit Brochure**, <https://en.calameo.com/county-of-brant/read/000622964cc894231b8d2?page=1>

¹⁹ Source: County of Brant, **Public Transit**, <https://www.brant.ca/en/roads-parking-and-transit/transit.aspx#Do-I-need-to-create-an-account>

between systems. Funds were available up to December 31, 2021 with extensions to December 2022 on a case-by-case basis.²⁰

5.4.15 Transportation Network Companies (TNCs)

Transportation Network Companies (TNCs), such as Uber and Lyft have disrupted the taxi industry. Brantford is currently served by Uber, but not Lyft. These companies can be potential partners, as they have done with other transit systems in Canada and the USA. They could provide the rides in an on-demand transit service in low density areas, feeding passengers into transit hubs or bus routes, boosting overall ridership.

5.5 Review of Past Study for Proposed Transit Terminal, Parking Structure & Commercial Facility

In 2009, the City retained IBI Group who completed the “Feasibility Study for Proposed Transit Terminal, Parking Structure and Commercial Facility, November 2009.” The study reviewed the current location of the bus terminal and adjacent municipal parking lot to determine the need to meet future transit, intercity and GO bus transportation needs. The downtown bus terminal is located between Wellington and Darling Streets west of Market Street, as shown on Figure 3. The adjacent municipal parking Lot #3 has 160 surface spaces and combined with the existing bus terminal occupies 0.77 hectares (of which 0.1 ha is privately owned).

City transit staff advised during this EA study in 2022, that the downtown terminal was designed in 1988 for 30 foot buses, while all of the current fleet are 40 foot buses and indicated there are some challenges, though manageable. Staff also advised that the inside of the terminal building needs to be reconstructed to better reflect current needs and future expansions not only for service, but for staff. Transit staff have been working with the management team for Lynden Park Mall to provide a better location for passengers to board vehicles and transfer points, including a location for bus drivers' lunchroom, which would result in fewer buses travelling into the downtown terminal in the short-term.

The 2009 IBI Group study assessed the feasibility of constructing an expanded downtown bus terminal on the existing terminal site and adjacent combined municipal and private parking lot. A 6 level parking structure above a new larger transit terminal was proposed to meet future downtown parking

²⁰ Source: Province of Ontario, **Ontario Increases Support for Transit Across the Province**, March 1, 2021, <https://news.ontario.ca/en/release/60496/ontario-increases-support-for-transit-across-the-province>

needs. Any existing parking displaced by a new bus terminal would be replaced within a new parking structure.

All of the City's bus routes terminate or pass through the terminal, including bus stops for GO Transit buses immediately to the west on Darling Street. In the past, Greyhound intercity buses also served the terminal, however, Greyhound discontinued their bus services to Brantford and many other Canadian cities on May 13, 2021.²¹

5.5.1 Justification for the Bus Terminal

The IBI 2009 study and previous other downtown, transportation master plans and transit studies identified the transit terminal as a key piece of infrastructure to support downtown revitalization. The growing Wilfrid Laurier University and Conestoga College downtown campuses will help to improve overall Brantford Transit ridership. The Downtown Master Plan adopted by Council in 2008, indicated that expanding the transit terminal in combination with a new multi-level parking structure would encourage transit oriented development and should be part of a mixed-use development (office, retail and possibly residential uses).

5.5.2 Previous Study Recommendations

The study recommended construction of an expanded transit terminal and maximum 6-level parking structure comprised of 960 spaces on the existing transit terminal and municipal parking Lot #3 site. The estimated total cost in 2009 was \$33.8 million, of which \$5 million was for the terminal and \$28.8 million was for a six-level parking structure. It was also recommended that staff proceed with a detailed design phase, including preparation of detailed cost estimates and an implementation process for the bus terminal and parking facility.

At the time in 2009, it was assumed that the existing 9 bus bay platforms should be expanded to 16 bus bay platforms, based on a projected increase in transit routes to serve Brantford's growing employment and residential population. Also, the Transportation Master Plan 2007 indicated that 2,000 new municipal parking spaces should be provided downtown by 2031 and that the existing transit terminal site & Lot #3 could accommodate up to 900 new parking spaces.

²¹ Source: Evans, Pete. CBC News, **Greyhound Canada shutting down all bus service permanently**, <https://www.cbc.ca/news/business/greyhound-canada-1.6025276>, May 13, 2021

5.5.3 Possible Future Considerations

Since 2009, there have been changes in both transit ridership and parking demand. Due to City budget constraints the amount of new transit services has been limited, including the recent COVID-19 pandemic resulting in transit ridership reductions of 41% in 2020 compared to the pre-pandemic period in 2019. Also, new types of transportation services have occurred in communities across Canada such as ride hailing, Uber and Lyft and demand responsive transit service being tested and deployed by several Ontario and Canadian transit systems. Transit riders have options in addition to traditional fixed route bus services and these along with active transportation initiatives need to be considered before embarking on a new bus terminal. Furthermore, as the City continues to grow, cross-town bus services should be introduced, meaning not all bus routes need to service downtown. Hence, no need to increase the number of bus bay platforms at the downtown bus terminal. Passengers could transfer at potential new transit hubs in north Brantford as described conceptually in the timed pulse transfer operation earlier in this report.

The existing Market Centre Parkade in the downtown is under-used, at 40% occupancy and thereby many parking spaces are available, as shown on Table 15. Until this existing parking garage reaches 85% or higher occupancies, a new parking garage should not be considered. However, in the future when an additional parking structure is warranted and ridership reaches a much higher level, the site proposed in the 2009 IBI report (Municipal Lot 3) is still a good location and the City may want to consider selling air rights above it to encourage mixed-use development, such as residential, office and retail uses. In the immediate future and as stated earlier in this report, strategies should be developed that encourage vehicle turnover at on-street locations to increase the supply of parking, without having to construct any new parking facilities. However, prior to considering a new parking structure, a financial analysis should be undertaken to determine the requirements for capital investment, ongoing operating costs, revenues, a life cycle analysis and parking fees needed (i.e., charged to parkers) to sustain and support a new parking structure and/or combined with an expanded bus terminal.

Lot	Total Spaces	Peak Occupancy	Available Spaces
1 - Market Centre Parkade	950	40%	380
3 – Transit Terminal	159	44%	89
4 – Expositor Building	44	59%	18
TOTAL	1,153		487

Table 15 - Parking Occupancy - Market Centre Parkade, Municipal Lots 3 & 4 - 2018

5.6 *Transit Operations Recommendations*

1) **Options to Improve Transit Ridership**

- a) The City should undertake its next transit service review study when ridership returns to pre-COVID-19 levels. The following measures should be considered in the review to improve ridership (many of which were previously recommended in the TMP Update Final, March 2021 (Dillon) and 2016 Transit Service Plan and TRANSformation 2021 (IBI Group):
 - i) The feasibility of introducing 3 transit hubs (that includes the existing downtown bus terminal in the south, Lynden Park Mall in the more central area of the City and Brantford Commons in the northwest) that would consist of feeder routes all timed to meet (as done today at the downtown terminal) thereby minimizing the requirement for an expanded downtown bus terminal and combined with trunk cross-town routes that do not require travelling downtown.
 - ii) The frequency of bus service when justified by population and employment growth and increased urban development, be improved from the existing 30 minute daytime service frequency to 10 or 15 minute service frequency (which should be a higher priority in the short to medium term to retain and attract riders than the introduction of new express routes, a longer term initiative).
 - iii) The hours of transit service be extended on weekdays, Saturdays and Sundays.
 - iv) To ensure bus driver schedule adherence to published public timetables, that realistic bus route round trip cycle times be implemented, so transit customers can rely on the service.
 - v) Reduce the large one-way loop routes that discourage ridership.
 - vi) Transit be introduced to new developments (residential, employment, retail or institutional), once occupancy occurs to build good transit habits at the on-set.
 - vii) A route extension or DRT (Demand Responsive Transit) be considered to the famous Brantford tourist site, the Bell Homestead National Historic site and other tourist sites, as part of the future transit service review.
 - viii) Implement transit priority measures on existing main routes, such as traffic signal priority and queue jumping lanes for buses that will improve bus reliability times.
 - ix) The new proposed transit fare collection and AVL (Automated Vehicle Location) and APC (Automatic Passenger Counting) systems (i.e. RFP issued by the City in May 2022) be a priority for improving transit service and integration with other transit systems.

- x) Examine the feasibility and benefits of joining the PRESTO electronic fare payment system, to facilitate fare integration with GO Transit, Hamilton Street Railway and Burlington Transit.
 - b) The City undertake a pilot project offering a downtown community circulator bus that would pick-up and drop-off passengers at key points of interest in the downtown area.
 - c) The City undertake a pilot program offering DRT (Demand Responsive Transit also referred to as Transit On-Demand) during off-peak periods in low ridership and low urban density locations, connecting with the major transit trunk routes.
 - d) To maintain timed connections, the City coordinate with inter-regional transit services, such as Brant Transit (County) service and GO Transit buses connecting to Burlington, Hamilton and other locations.
- 2) Bus Stops**
- a) The existing bus stop sign design and colour be retained, but enhanced with static Infoposts and new e-paper intelligent display technology that allows bus departure times and route diagrams to be displayed electronically at high volume boarding bus stops.
 - b) The City continue with the best practices adopted by many transit systems, the annual capital bus stop improvement program of adding concrete landing pads, transit shelters and benches to improve accessibility for all existing and potential new riders.
- 3) Development-Transit Partnerships**
- a) The City consider selling air rights above the future expanded downtown bus terminal (when warranted) to encourage mixed-use development, such as residential, office and retail uses when new parking facilities are considered.
 - b) The U-Pass at Wilfrid Laurier University and Conestoga College could be extended to spring term students and part-time students if there is interest.
 - c) Discounted transit passes could be offered through employers.
 - d) Discounted rides and/or passes could be offered to downtown patrons through the Downtown Brantford Business Improvement Area.
- 4) Grants and Funding**
- a) The City continue to work with other Ontario and Canadian municipalities to convince provincial and federal governments to support transit operations, capital improvement programs and new technologies (i.e. zero emission buses) through gas tax, special transit infrastructure and other funding programs.
 - b) The City establish annual budget targets for incremental improvements in transit services, as indicated in the TMP Update Final (March 2021), page 168, outlining short-term improvements from 2021 to 2025.

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<https://www.grt.ca/en/fares-passes/fares.aspx>

Tettman, Christine (2016) Parking Utilization Study and Future Impact Analysis

Appendix 1 – Sign Inventory of Colborne St. in Study Area, West of Clarence St.

Brantford Streetscaping EA - Parking, Transit & Wayfinding Report – Oct. 31, 2022

Downtown Brantford Streetscaping EA - Study Area Sign Inventory								
Green Highlighting Indicates Wayfinding sign(s)								
Sign Inventory of Colborne Street in the Study Area West of Clarence Street								
Street	Block		North Side			South Side		Total Signs by Block
			Qty	Sign Type	Qty	Sign Type		
Colborne St	Brant Ave	King St	4	No Parking	2	No Parking		
			2	Parking 2 hr 8am-6pm Mon-Sat	2	No Parking Snow Route		
			1	No Parking Snow Route	2	No Parking 2am-6am Tues Thurs Sat		
			1	No parking 2am-6am Mon-Wed-Fri	3	Parking 2hr 8am-6pm Mon-Sat		
			1	2 & 3 hr limit 8am-6pm downtown map	1	One way		
			1	Do Not Enter	2	2 & 3 hr limit 8am-6pm downtown map		
					1	Wilfred Laurier University - left		
					1	Conestoga College - left		
				10	Subtotal	14	Subtotal	24
	Colborne St	King St	Queen St	2	No Parking Snow Route	2	One way	
2				No parking 2am-6am Mon-Wed-Fri	5	Parking 2hr 8am-6pm Mon-Sat		
			2	Parking 2 hr 8am-6pm Mon-Sat	5	2 & 3 hr limit 8am-6pm downtown map		
			2	2 & 3 hr limit 8am-6pm downtown map	1	Stop sign ahead		
			2	No Parking	3	No Parking		
			1	Stop - all way	2	No Parking 2am-6am Tues Thurs Sat		
			1	Do Not Enter	2	No Parking Snow Route		
				12	Subtotal	21	Subtotal	33
Colborne St	Queen St	Market St	4	No Parking	6	No Parking		
			2	Parking 2 hr 8am-6pm Mon-Sat	4	No Parking 2am-6am Tues Thurs Sat		
			2	No parking 2am-6am Mon-Wed-Fri	3	No Parking Snow Route		
			1	No Parking Snow Route	4	No Parking Accessible by Permit Only		
			1	2 & 3 hr limit 8am-6pm downtown map	4	Parking 2hr 8am-6pm Mon-Sat		
			2	Parking 30min 8am-6pm Mon-Sat	2	Parking 15min Pick-Up Zone		
					1	One way		
					2	2 & 3 hr limit 8am-6pm downtown map		
			12	Subtotal	27	Subtotal	39	
Colborne St	Market St	Charlotte St	3	No Parking	5	No Parking		
			1	No Parking except for 15min limit truck loading Mon-Sat	4	No Parking Accessible by Permit Only		
			1	Yellow Pedestrian Sign	1	To report abuse or misuse of this parking space call 519-753-2311		
			3	No parking 2am-6am Mon-Wed-Fri	3	Accessible - Access to Wharfe St		
			3	Parking 30min 8am-6pm Mon-Sat	5	Parking 2hr 8am-6pm Mon-Sat		
				construction dumpster obscured view of post	4	No Parking 2am-6am Tues Thurs Sat		
			2	No Parking Accessible by Permit Only	4	No Parking Snow Route		
			1	To report abuse or misuse of this parking space call 519-753-2311	2	2 & 3 hr limit 8am-6pm downtown map		
			1	One way	1	No Parking 15min loading zone 8am-6pm Mon-Sat		
			3	Parking 2 hr 8am-6pm Mon-Sat	1	No Parking 8:00am-6:00am except for 15min limit truck loading Mon-Sat		
			1	2 & 3 hr limit 8am-6pm downtown map	1	Yellow Pedestrian Sign		
			1	Do Not Enter	1	Brantford Transit Bus Stop		
					1	Green P public parking - right		
					1	Do Not Enter		
				1	Left - Brant Museum			
				1	Left - Victoria Park			
				1	One way			
				1	Green P public parking - left			
			20	Subtotal	38	Subtotal	58	
Colborne St	Charlotte St	Clarence St	3	No Parking	2	Railway Crossing		
			2	Parking 2 hr 8am-6pm Mon-Sat	2	Parking 2hr 8am-6pm Mon-Sat		
			1	No Parking Snow Route	2	2 & 3 hr limit 8am-6pm downtown map		
			2	No parking 2am-6am Mon-Wed-Fri	2	No Parking Accessible by Permit Only 15min limit		
			1	Railway Crossing	1	No Parking Accessible by Permit Only		
			2	One way	1	No Parking 2am-6am Tues Thurs Sat		
			1	2 & 3 hr limit 8am-6pm downtown map	1	No Parking Snow Route		
			1	Railway Crossing X	2	No Parking		
			1	Do Not Enter	1	Brantford Transit Bus Stop		
				14	Subtotal	14	Subtotal	28
Total Number of Signs on Colborne Street in the Study Area West of Clarence Street							182	

Appendix 2 – Sign Inventory of Dalhousie St. in Study Area, West of Clarence St.

Brantford Streetscaping EA - Parking, Transit & Wayfinding Report – Oct. 31, 2022

Sign Inventory of Dalhousie Street in the Study Area West of Clarence Street							Green Highlighting Indicates Wayfinding sign(s)	
Street	Block		North Side			South Side		Total Signs by Block
			Qty	Sign Type	Qty	Sign Type		
Dalhousie St	Clarence St	Charlotte St	1	Green P public parking - left	1	One way		
			2	No Parking 2am-6am	3	No Parking 2am-6am		
			2	Parking 2 hr 8am-6pm Mon-Sat	3	Parking 2hr 8am-6pm Mon-Sat		
			1	2 & 3 hr limit 8am-6pm downtown map	3	2 & 3 hr limit 8am-6pm downtown map		
		obscured by tree	1	Parking 15min Pick Up	1	No Parking Snow Route		
			1	_____ Parking Space				
			1	No Parking 2am-6am				
			1	Do Not Block Driveways - right arrow				
			1	No Parking Snow Route				
			11	Subtotal	11	Subtotal	22	
	Dalhousie St	Charlotte St	George St	1	One way	1	One way	
6				No parking 2am-6am Mon-Wed-Fri	3	No Parking 2am-6am Tues Thurs Sat		
			2	Parking 2 hr 8am-6pm Mon-Sat	3	Parking 2hr 8am-6pm Mon-Sat		
			6	No Parking Snow Route	3	2 & 3 hr limit 8am-6pm downtown map		
			1	2 & 3 hr limit 8am-6pm downtown map	2	No Parking		
			2	No Parking Accessible by Permit Only	1	No Parking Snow Route		
			1	Parking 2 hr Mon-Sat				
			2	Parking 30min 8am-6pm Mon-Sat				
			1	Parking 30min				
			22	Subtotal	13	Subtotal	35	
Dalhousie St	George St	Market St	1	Elements Casino Brantford - straight	2	No Parking		
			1	Hub of Ontario Trails - straight	2	No Parking 2am-6am Tues Thurs Sat		
			2	No Parking	1	Parking 2hr 8am-6pm Mon-Sat		
			4	Parking 30min 8am-6pm Mon-Sat	1	2 & 3 hr limit 8am-6pm downtown map		
			3	Parking 2hr 8am-6pm Mon-Sat	1	One way		
			1	No parking 2am-6am Mon-Wed-Fri				
			1	2 & 3 hr limit 8am-6pm downtown map				
			1	Do Not Enter				
		14	Subtotal	7	Subtotal	21		
Dalhousie St	Market St	Queen St	3	No Parking	1	Green P public parking - right		
			2	No Parking 30min loading zone 8am-6pm Mon-Sat	2	One way		
			6	No parking 2am-6am Mon-Wed-Fri	4	No Parking		
			2	No Parking Accessible by Permit Only	2	No Parking 30min truck loading zone 7am-6pm Mo		
			4	Parking 2hr 8am-6pm Mon-Sat	9	Parking 2hr 8am-6pm Mon-Sat		
			2	2 & 3 hr limit 8am-6pm downtown map	2	2 & 3 hr limit 8am-6pm downtown map		
			2	Parking 15min Pick Up Zone 10am-8pm	4	No Parking 2am-6am Tues Thurs Sat		
			1	No Parking Snow Route	1	Do Not Block Driveway		
			1	No Parking 8am-6pm except for 15min time limit truck loading	2	Parking 15min		
			1	This Parking Space - right	2	Do Not Enter		
			4	Parking 30min 8am-6pm Mon-Sat				
			1	One way				
			1	Do Not Enter				
			30	Subtotal	29	Subtotal	59	
Dalhousie St	Queen St	King St	2	One way	3	One way		
			5	No Parking	5	No Parking		
			7	Parking 2hr 8am-6pm Mon-Sat	5	Parking 2hr 8am-6pm Mon-Sat		
			4	2 & 3 hr limit 8am-6pm downtown map	3	2 & 3 hr limit 8am-6pm downtown map		
			1	No parking 2am-6am Mon-Wed-Fri	2	No Parking 2am-6am Tues Thurs Sat		
			2	Parking 15min Pick Up Zone	1	Do Not Enter		
			1	No Parking Snow Route				
			1	Do Not Enter				
		23	Subtotal	19	Subtotal	42		
Dalhousie St	King St	Bridge St	2	No Parking				
			2	No Parking Snow Route				
			2	Parking 2hr 8am-6pm Mon-Sat				
			2	2 & 3 hr limit 8am-6pm downtown map				
		8	Subtotal	0	Subtotal	8		
Dalhousie St	Bridge St	Brant Ave	1	No Parking	2	One way		
			1	Straight	1	Left Turn Icomm Drive		
			1	Right Turn	1	Left Turn West Brant		
			1	Paris - right, London - right, Cambridge - right	2	No Parking		
			1	One way	1	Do Not Enter		
		1	Do Not Enter					
		6	Subtotal	7	Subtotal	13		
Total Number of Signs on Dalhousie Street in the Study Area West of Clarence Street							200	

***Appendix 3 - Sign Inventory of North-South Streets, West
of Clarence St.***

Brantford Streetscaping EA - Parking, Transit & Wayfinding Report – Oct. 31, 2022

Green Highlighting Indicates Wayfinding sign(s)								
Sign Inventory of North-South streets in the Study Area West of Clarence Street								
Street	Block		West Side			East Side		Total Signs by Block
			Qty	Sign Type	Qty	Sign Type		
Brant Ave	Dalhousie St	Colborne St	1	Green P public parking - left	1	Keep right of traffic island		
			1	Airplane - facing right	1	Hazard Marker, pass safely on right		
			1	Brantford Transit Bus stop	1	No Parking		
			1	Yield to Pedestrians - straight				
			2	Yield to Pedestrians				
			1	Hazard close to road edge				
			1	Earl Haig Fun Park, Farmer's Market & Casino - straight				
			1	Trans Canada Trail - straight				
			1	Bell Homestead, Brant Park, Heritage River Canoe & Kayak Co. - right				
						10	Subtotal	3
King St	Dalhousie St	Colborne St	2	One way	1	Green P Municipal Lot 4 This is a paid municipal lot please pay at pay station		
			3	No Parking	1	No Parking		
			3	Parking 2hr 8am-6pm Mon-Sat	1	Parking 2hr 8am-6pm Mon-Sat		
			3	2 & 3 hr limit 8am-6pm downtown map				
			1	No Parking 2am-6am				
			1	Green P public parking - right				
			1	Stop				
			1	Brantford Transit Bus stop				
			15	Subtotal	3	Subtotal	18	
Queen St	Dalhousie St	Colborne St	1	No Left Turn	4	No Parking		
			1	No Parking	1	One way		
			1	No Parking 15min Loading Zone				
			1	Stop - all way				
			1	One way				
			5	Subtotal	5	Subtotal	10	
Market St	Dalhousie St	Colborne St			2	No Bicycle Riding Permitted		
			0	Subtotal	2	Subtotal	2	
Charlotte St	Dalhousie St	Colborne St	2	One way	2	No Parking		
			2	No Parking	2	Parking 2hr 8am-6pm Mon-Sat		
			2	Parking 2hr 8am-6pm Mon-Sat	2	2 & 3 hr limit 8am-6pm downtown map		
			2	2 & 3 hr limit 8am-6pm downtown map	1	Stop		
			1	Stop				
			9	Subtotal	7	Subtotal	16	
Clarence St	Dalhousie St	Colborne St	2	No Left Turn	1	One way		
			1	Green P public parking - straight				
			2	No Parking				
			1	Civic Centre, Farmers Market & Casino - straight				
			1	Railway crossing				
			1	Heavy Trucks Permitted - straight & left				
			1	Subtotal	1	Subtotal	10	
Total Number of Signs on the North-South streets in the Study Area West of Clarence Street							69	

Appendix 4 - Sign Inventory of North-South Streets in Extended Study Area, West of Clarence St.

Wayfinding Sign Inventory on North-South streets in the Extended Study Area West of Clarence Street								
Street	Block		West Side			East Side		Total Signs by Block
			Qty	Sign Type	Qty	Sign Type		
Brant Ave	Palace St	Dalhousie St	2	Casino, TransCanada Trail - straight	1	Brant Ave Heritage District		
			1	Fun Park, Casino, TransCanada Trail - straight	1	To 403		
			1	Bicycle Route - left				
			1	Green P parking - straight				
			1	Grand River Access - right				
			6	Subtotal	2	Subtotal	8	
Albion St	Church St	West St	0	Subtotal	1	Bicycle Route - left		
			0	Subtotal	1	Subtotal	1	
Pearl St	Waterloo	West St	1	Bicycle Route				
			1	Bicycle Route - right				
			2	Subtotal	0	Subtotal	2	
West St	Pearl St	Albion St	1	Bicycle Route - left & right				
			1	Subtotal	0	Subtotal	1	
Market St	Darling St	Dalhousie St	0	Subtotal	1	Victoria Square Heritage District		
			0	Subtotal	1	Subtotal	1	
Clarence St	Darling St	Dalhousie St	1	Farmers Market & Casino - straight				
				Sanderson Centre - right				
			1	Hub of Ontario Trails - straight				
			2	Subtotal	0	Subtotal	2	
Clarence St S	Colborne	Erie Ave	1	Civic Centre, Farmers Market & Casino - straight	1	To 403 - right		
			1	TransCanada Trail - right	1	Green P parking - left		
			1	Green P parking - right				
			1	Civic Centre, Farmers Market, Casino - right				
			1	TransCanada Trail - right				
			1	Grand River Access - left				
			6	Subtotal	2	Subtotal	8	
Total number of Wayfinding Signs on North-South streets in the Extended Study Area West of Clarence Street							23	

Appendix 5 - Sign Inventory of East-West Streets in Extended Area, West of Clarence St.

Wayfinding Sign Inventory on East-West streets in the Extended Study Area West of Clarence Street

Street	Block	North Side		South Side		Total Signs by Block
		Qty	Sign Type	Qty	Sign Type	
Church St	Grand River Ave	William St	1	Bicycle Route - left & right		
			1	Bicycle Route		
			2	Subtotal	0	Subtotal
Wellington St	King St	Clarence St	4	Bicycle Route	4	Bicycle Route
			1	Victoria Square Heritage District	1	Laurier Brantford - right
			5	Subtotal	5	Subtotal
Darling St	Queen St	Clarence St	1	Victoria Square Heritage District	1	Green P parking - left
					1	Laurier Brantford - left
			1	Subtotal	2	Subtotal
Total number of Wayfinding Signs on East-West streets in the Extended Study Area West of Clarence Street						15

Appendix 6 - Sign Inventory of East-West Streets in Extended Area, West of Clarence St.

Wayfinding Sign Inventory on East-West streets in the Extended Study Area East of Clarence Street

Street	Block	North Side		South Side		Total Signs by Block
		Qty	Sign Type	Qty	Sign Type	
Wellington St	Clarence St	Second Ave	10	Bicycle Route	7	Bicycle Route
			10	Subtotal	7	Subtotal
Colborne St E	Puleston St	Second Ave	1	Casino & TransCanada Trail - straight		
			1	Subtotal	0	Subtotal
Total number of Wayfinding Signs on East-West streets in the Extended Study Area East of Clarence Street						18

***Appendix 7 - Inventory of Signs on Colborne St. in
the Study Area, East of Clarence St.***

Brantford Streetscaping EA - Parking, Transit & Wayfinding Report – Oct. 31, 2022

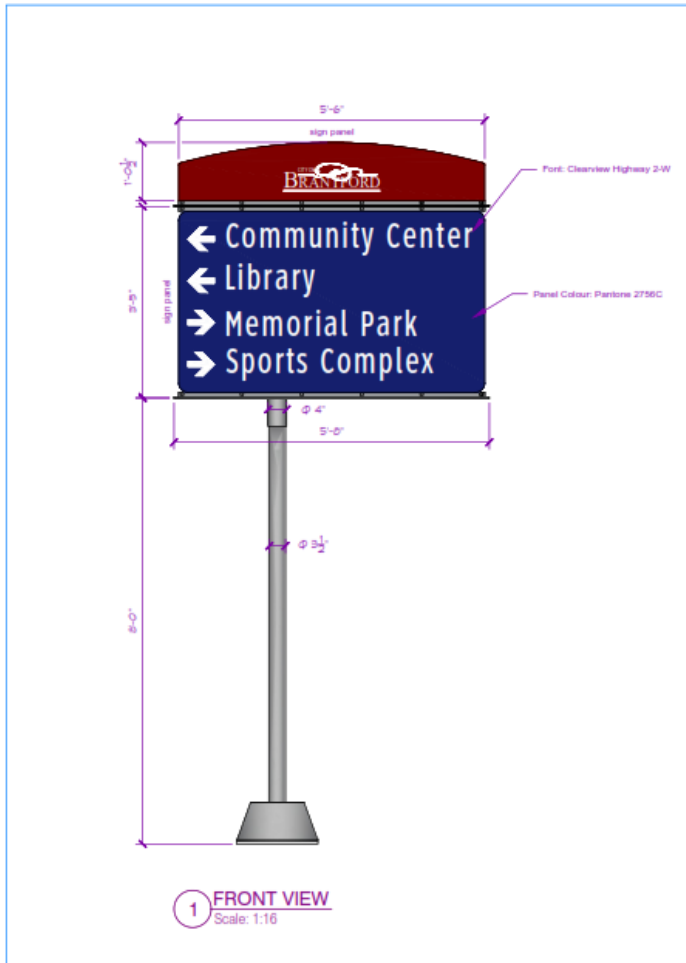
Sign Inventory on Colborne Street in the Study Area East of Clarence Street						Green Highlighting Indicates Wayfinding sign(s)					
Street	Block		North Side			South Side		Total Signs by Block			
			Qty	Sign Type		Qty	Sign Type				
Colborne St	Clarence St	Alfred St	2	One way		2	One way				
			4	No Parking		1	Gordon Glaves Memorial Pathway - straight				
			3	No Parking 8am-6pm except for 15 min limit truck loading Mon-Sat		2	No Stopping				
			2	No Parking 2am-6am Mon-Wed-Fri		2	No Parking 2am-6am Tues-Thurs-Sat				
			5	2 hr Parking 8am-6pm Mon-Sat		3	2 hr Parking 8am-6pm Mon-Sat				
			3	2 & 3 hr limit 8am-6pm downtown map		1	No Parking Snow Route				
			2	No Parking Accessible by Permit Only		1	No Parking				
			1	No Parking Snow Route		1	To 403				
						1	Do Not Enter				
						22	Subtotal		14	Subtotal	36
			Colborne St	Alfred St	Park Ave	2	One way		2	One way	
						2	No Parking		2	No Parking	
						2	No Parking 2am-6am Mon-Wed-Fri		3	15 min Parking Pick-Up Zone	
						2	30 min Parking 9am-6pm Mon-Sat		2	No Parking Snow Route	
2	1 hr Parking 9am-6pm Mon-Sat					2	No Parking 2am-6am Tues-Thurs-Sat				
2	No Parking Accessible by Permit Only					3	1 hr Parking 8am-6pm Mon-Sat				
1	No Parking Snow Route										
1	Do Not Enter										
						14	Subtotal		14	Subtotal	28
Colborne St	Park Ave	Peel St				1	No Parking Snow Route		2	One way	
			2	No Parking 2am-6am Mon-Wed-Fri		5	No Parking				
			1	Yellow School Zone sign		4	2 hr Parking 8am-6pm Mon-Sat				
			1	No Parking		2	No Parking 2am-6am Tues-Thurs-Sat				
			1	One way		1	Maximum 50 km/h				
							1	Brantford Transit Bus Stop			
					1	GO Bus Stop					
			6	Subtotal		16	Subtotal	22			
Colborne St	Peel St	Murray St	2	One way		2	15 min Parking 9am-5pm Mon-Fri				
			2	1 hr Parking 11am-6pm Mon-Sat		3	1 hr Parking 8am-6pm Mon-Sat				
			2	No Parking		2	No Parking 2am-6am Tues-Thurs-Sat				
			1	1 hr Parking 8am-6pm Mon-Sat		1	No Parking Snow Route				
			1	No Parking Snow Route		1	No Parking				
			1	No Parking 2am-6am Mon-Wed-Fri		1	No Right Turn				
			1	Do Not Enter		1	One way				
						10	Subtotal		11	Subtotal	21
Colborne St	Murray St	Brock St	1	No Left Turn		1	One way				
			2	One way		1	To 403				
			5	No Parking		1	Heavy Trucks Permitted - straight				
			1	1 hr Parking 8am-6pm		2	No Parking				
			1	Parking 8am-6pm		3	2 hr Parking 8am-6pm Mon-Sat				
			2	1 hr Parking 8am-6pm Mon-Sat		1	Brantford Transit Bus Stop				
			1	Do Not Enter		2	No Parking 2am-6am Tues-Thurs-Sat				
							1	No Parking Snow Route			
						13	Subtotal		12	Subtotal	25
			Colborne St	Brock St	Drummond St	2	No Parking 2am-6am Mon-Wed-Fri		2	No Parking 2am-6am Tues-Thurs-Sat	
1	No Parking Snow Route					1	No Parking Snow Route				
						1	One way				
						1	Do Not Enter				
			3	Subtotal		5	Subtotal	8			
Colborne St	Drummond St	Rawdon St	2	One way		2	No Parking				
			2	No Parking Snow Route		1	Maximum 50 km/h				
			2	No Parking 2am-6am Mon-Wed-Fri		1	No Parking Snow Route				
			1	No Parking		2	No Parking 2am-6am Tues-Thurs-Sat				
			1	Do Not Enter		1	One way				
			8	Subtotal		7	Subtotal	15			
Colborne St	Rawdon St	Stanley St	2	One way		3	One way				
			1	No Parking		1	No Parking				
			1	Do Not Enter		1	Lane Merge				
						1	No Right Turn				
			4	Subtotal		6	Subtotal	10			
Colborne St	Stanley St	Iroquois St	1	Do Not Enter		3	One way				
						1	Brantford Transit Bus Stop				
						1	No Parking				
			1	Subtotal		5	Subtotal	6			
Colborne St	Iroquois St	Dalhousie St	2	One way		1	One way				
			1	Left Turn (overhead)		4	No Parking				
			1	Straight (overhead)		1	Straight (overhead)				
			1	Hazard Marker, safely pass on left or right		1	Right Turn (overhead)				
			1	Yield		1	Do Not Enter				
			1	Do Not Enter		1	School Zone				
			1	Keep to Right of Traffic Island							
			1	Hazard Marker, safely pass on right							
						9	Subtotal		9	Subtotal	18
Total Number of Signs on Colborne Street in the Study Area East of Clarence Street								189			

Appendix 8 - Sign Inventory on Dalhousie St. in the Study Area, East of Clarence St.

Brantford Streetscaping EA - Parking, Transit & Wayfinding Report – Oct. 31, 2022

Green Highlighting Indicates Wayfinding sign(s)								
Sign Inventory on Dalhousie Street in the Study Area East of Clarence Street								
Street	Block		North Side			South Side		Total Signs by Block
			Qty	Sign Type	Qty	Sign Type		
Dalhousie St	Colborne St	Stanley St	1	School Zone - straight ahead	1	Keep to Right of Traffic Island		
			1	Civic Centre, Casino, Sanderson Centre - straight	1	Hazard Marker, safely pass on right		
			1	One way	1	Hazard Marker, safely pass on left or right		
					1	Pedestrian Crossing		
					1	Chevron - right, sharp curve		
					2	One way		
			3		7		10	
Dalhousie St	Stanley St	Rawdon St	1	Wilfred Laurier University - straight	1	One way		
			1	Conestoga College - straight	1	No Parking		
			1	Brantford Transit Bus Stop				
			2	One way				
			5		2		7	
Dalhousie St	Rawdon St	Drummond St	2	One way	2	No Parking		
			1	No Parking Snow Route				
			1	Do Not Enter				
			4		2		6	
Dalhousie St	Drummond St	Brock St	1	Brantford Transit Bus Stop	1	Type of No Parking sign folded up, not fully visible		
			2	No Parking Snow Route	2	No Parking		
			1	No Parking	1	Do Not Enter		
			1	One way				
			5		4		9	
Dalhousie St	Brock St	Murray St	1	Brant Museum, Casino & Sanderson Centre - straight	2	No Parking		
			2	No Parking Snow Route				
			1	Trans Canada Trail - straight				
			1	No Parking				
			1	Heavy Trucks Permitted - straight				
			1	Do Not Enter				
			1	One way				
			1	No Right Turn				
			9		2		11	
Dalhousie St	Murray St	Peel St	2	One way	2	One way		
			3	No Parking	1	No Left Turn		
			2	No Parking Snow Route	1	Heavy Trucks Permitted - straight		
					3	No Parking		
					1	Do Not Enter		
			7		8		15	
Dalhousie St	Peel St	Park Ave	2	One way	1	No Parking		
			1	No Parking Snow Route	1	Stop Here on Red Signal		
			1	Pedestrian Crossing - seniors				
			1	No Parking				
			1	Stop Here on Red Signal				
			1	GO Transit Bus Stop				
			1	No Parking Except for 15 min limit Parcel Pickup				
			1	Brantford Transit Bus Stop				
			1	Do Not Enter				
			10		2		12	
Dalhousie St	Park Ave	Alfred St	1	Civic Centre, Farmers Market & Casino - left	1	No Parking		
			1	No Parking Snow Route				
			1	Brant Museum, Brant Park & Sanderson Centre - straight				
			2	No Parking				
			5		1		6	
Dalhousie St	Alfred St	Clarence St	1	Green P public parking - left	2	No Parking		
			3	No Parking	1	No Parking 2am-6am Mon-Sat		
			3	No Parking 2am-6am	4	1 hr Parking 8am-6pm Mon-Sat		
			2	1 hr Parking Mon-Sat	1	Railway Crossing		
			2	No Parking Snow Route	1	No Parking Emergency Snow Route		
			1	Railway Crossing	3	No Parking 2am-6am		
			1	Wilfred Laurier University & Conestoga College - straight	1	Casino & Trans Canada Trail - left		
			1	Heavy Trucks Permitted - left & right	1	No Parking Snow Route		
					1	Heavy Trucks Permitted - left & right		
					1	One way		
			14		16		30	
Total Number of Signs on Dalhousie Street in the Study Area East of Clarence Street								106

Appendix 9 - Wayfinding – Core Directional



1 SIGN DETAIL
Scale: 1:8



Drawing	Vu-1 Core Directional		
Approved From	Bruce County RT07 Sign Manual	Date	March, 2022
Scale	AS INDICATED		

Appendix 10 - Wayfinding – Pedestrian with Base Posts



1 FRONT VIEW
Scale: 1:8

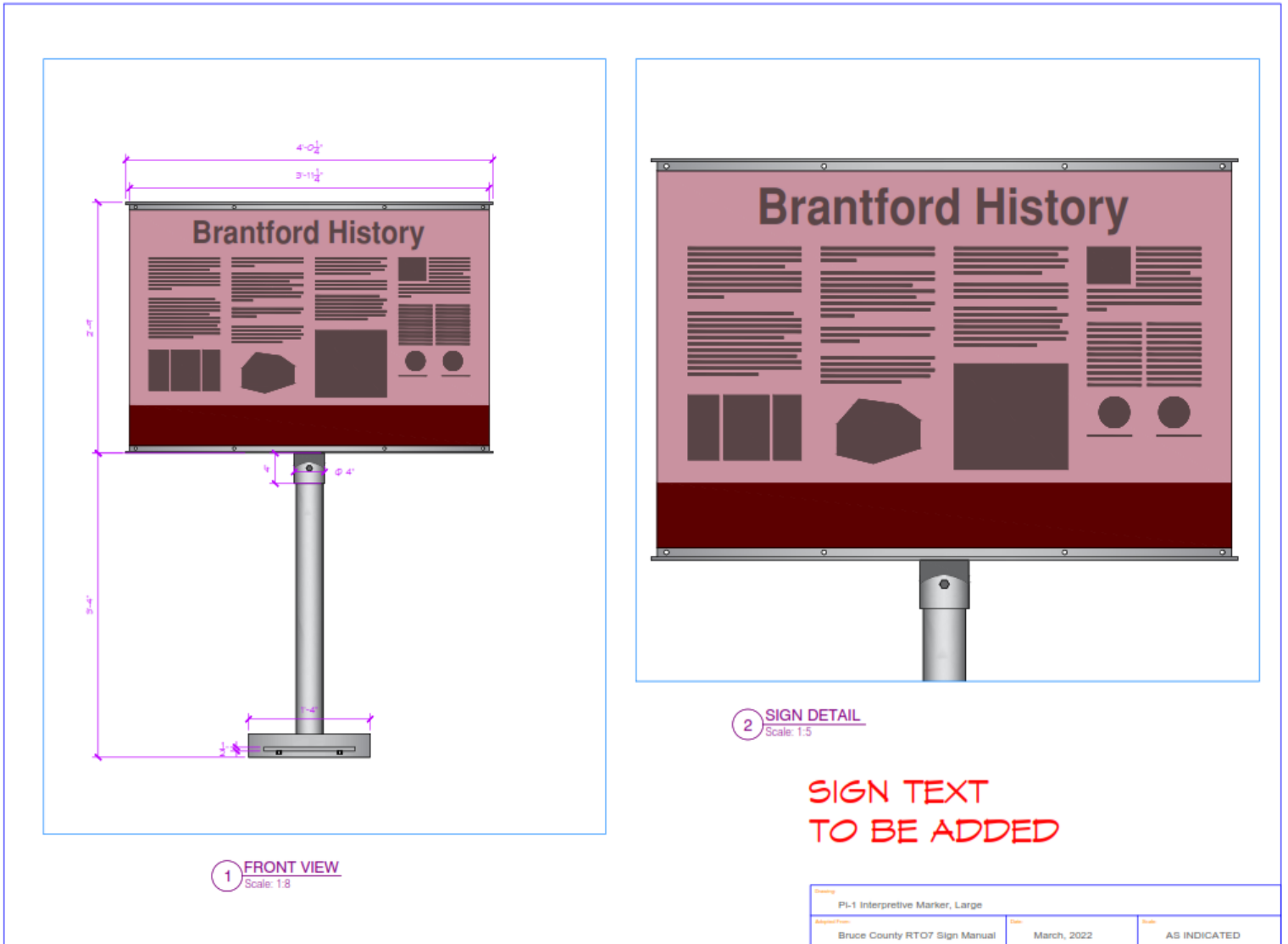
SIGN TEXT
TO BE ADJUSTED

Drawing		
Pd-1a Urban Pedestrian RTO 7 Map Directory		
Approved From	Date	Scale
Bruce County RTO7 Sign Manual	March, 2022	AS INDICATED

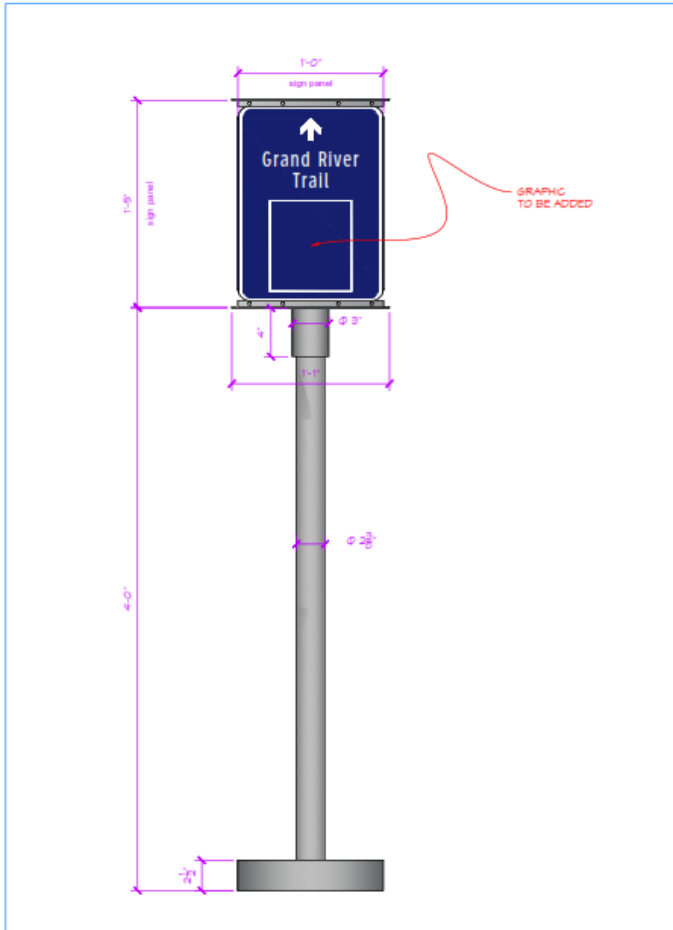
Appendix 11 – Wayfinding – Pedestrian, Wall Mounting



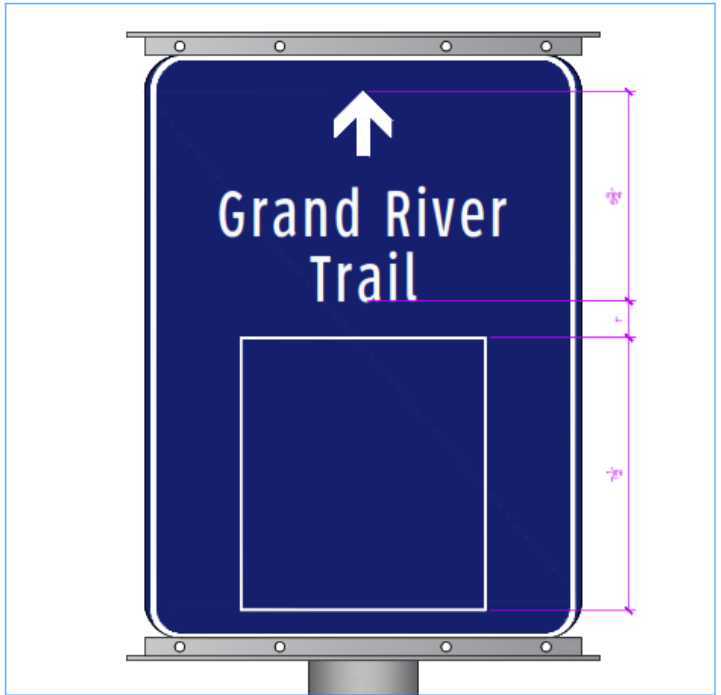
Appendix 12 - Wayfinding - Interpretive Sign with Pole Mounting



Appendix 13 – Wayfinding - Walking Tour/Trail



1 FRONT VIEW
Scale: 1/8

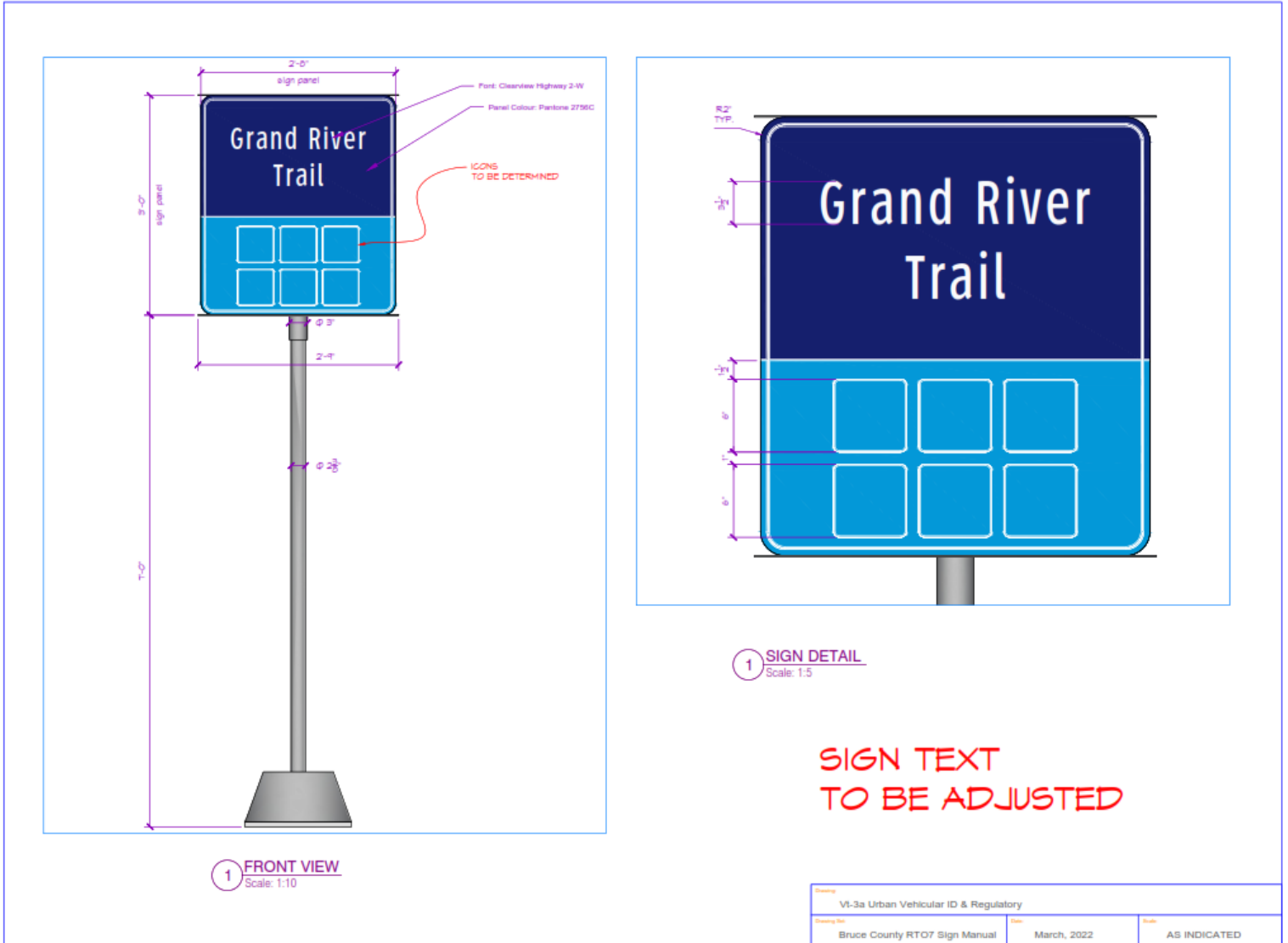


1 SIGN DETAIL
Scale: 1/2

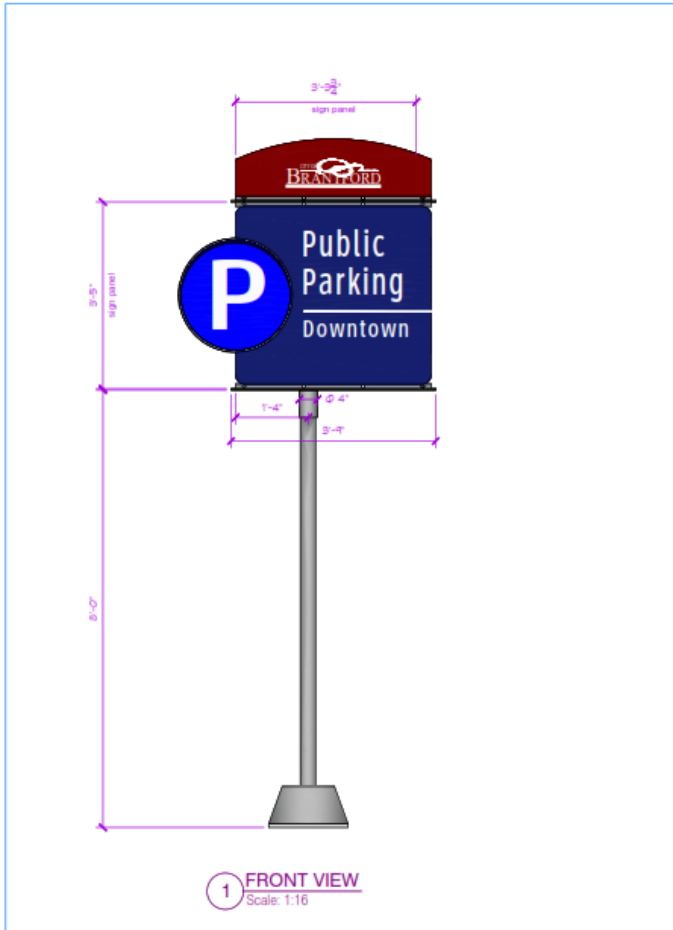
SIGN TEXT
TO BE ADJUSTED

Pw-1a Urban Walking Tour/Trail		
Bruce County RTO7 Sign Manual	March, 2022	AS INDICATED

Appendix 14 - Wayfinding - Urban Vehicular



Appendix 17 – Wayfinding – Parking Lot

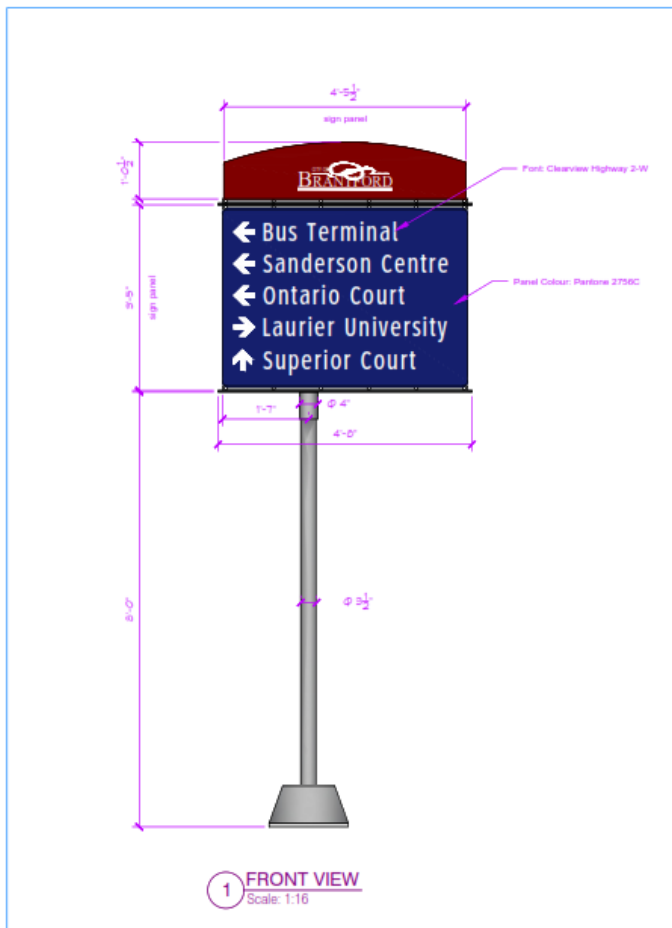


Drawing		
Vu-3 Parking Lot ID		
Drawing Date	Date	Scale
Manual Signs	March, 2022	AS INDICATED

Appendix 20 – Wayfinding – Darling St. at Queen St., SW Corner

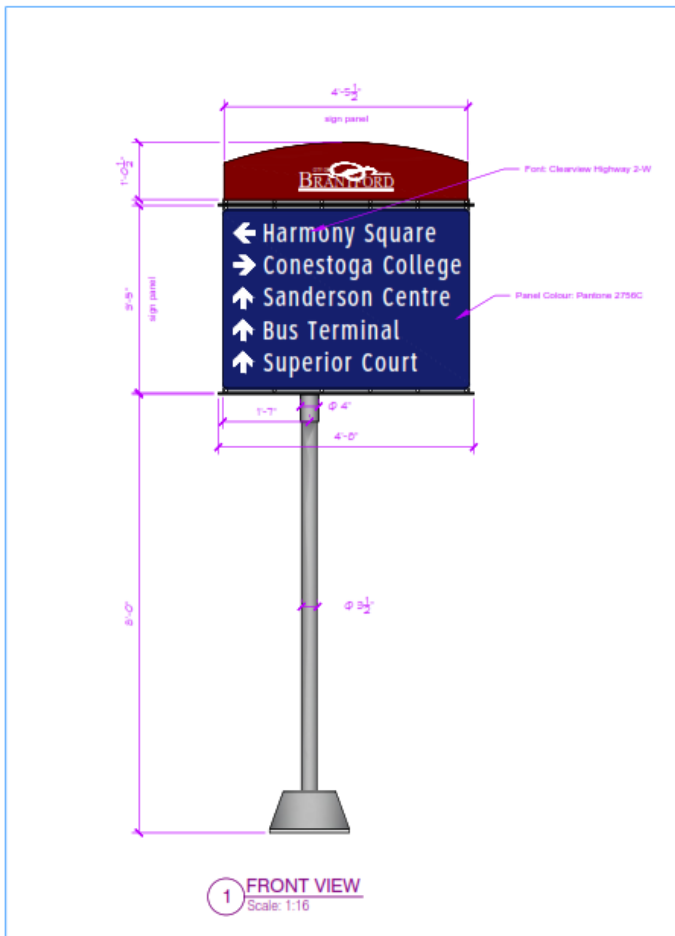


Appendix 21 - Wayfinding - Market St. at Darling St., SE Corner



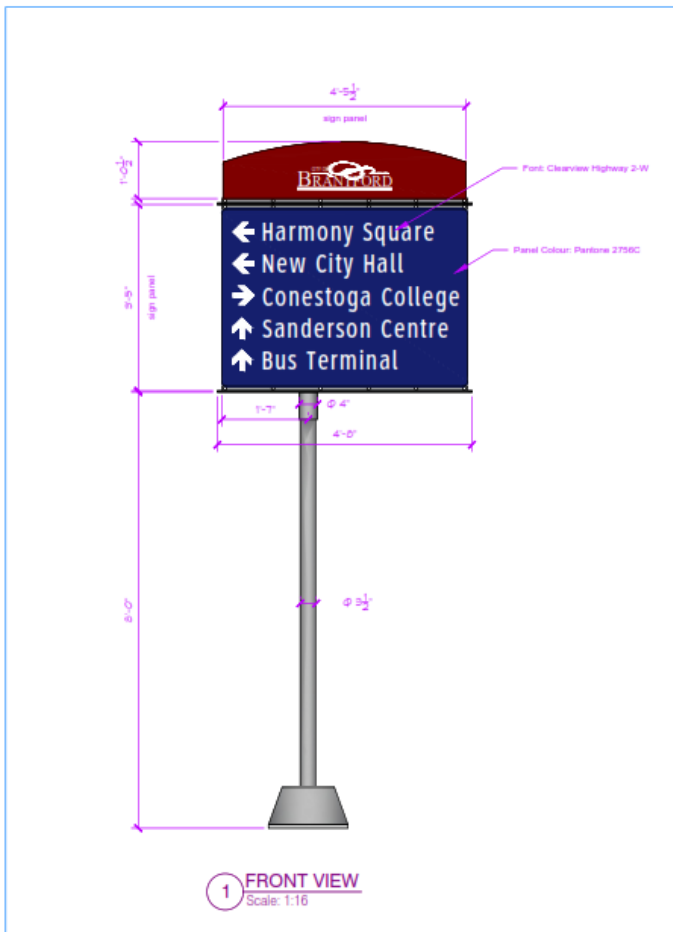
Project	Date	Scale
Market St. @ Darling St., SE corner		
Bruce County RTO7 Sign Manual	March, 2022	AS INDICATED

Appendix 22 - Wayfinding – Market St. Pedestrian Way at Colborne St.



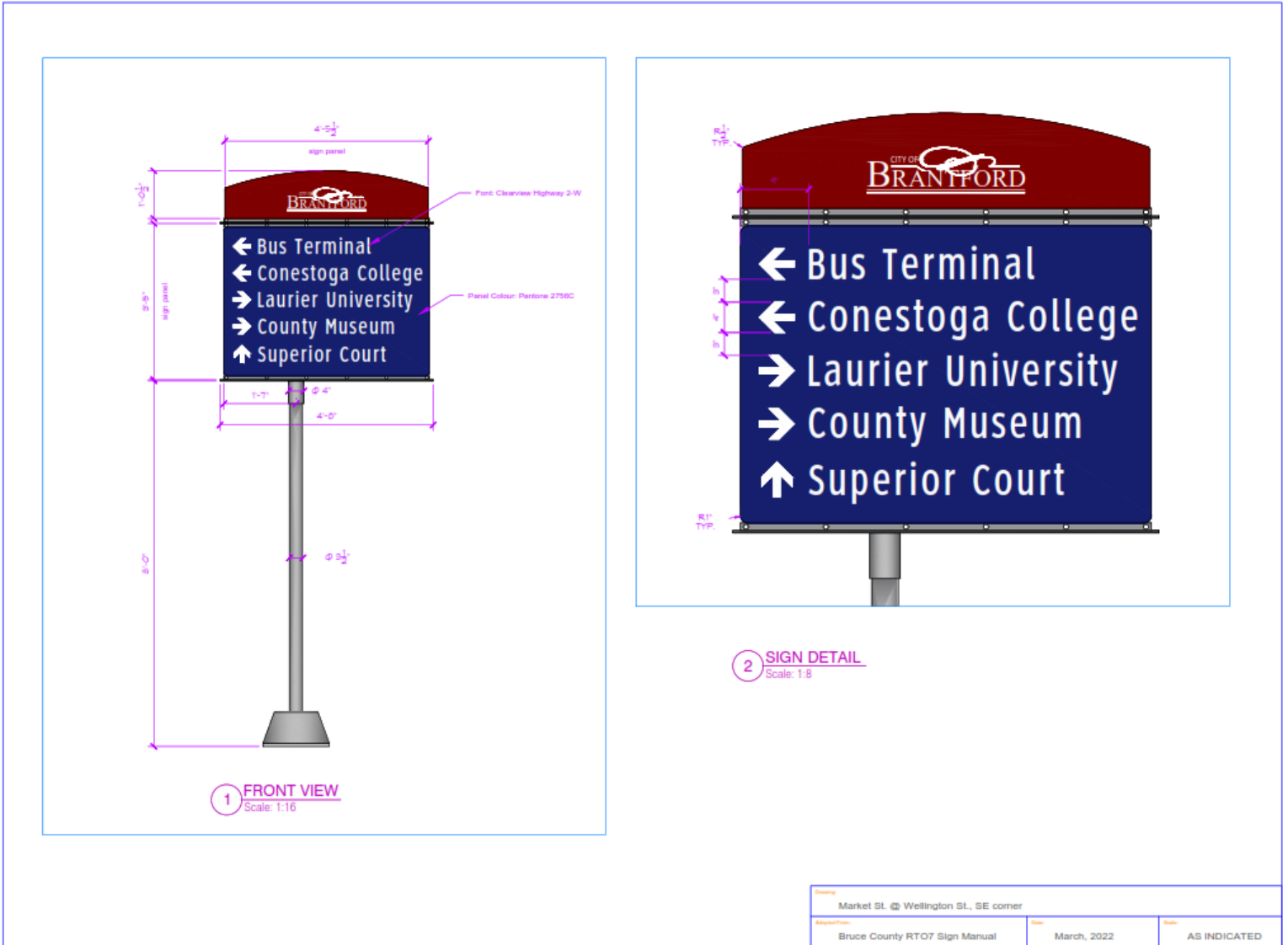
Drawing: Market St. Pedestrian Way @ Colborne St.		
Approved From: Bruce County RT07 Sign Manual	Date: March, 2022	Scale: AS INDICATED

Appendix 23 - Wayfinding - Market St. Pedestrian Way at Dalhousie St., Southside

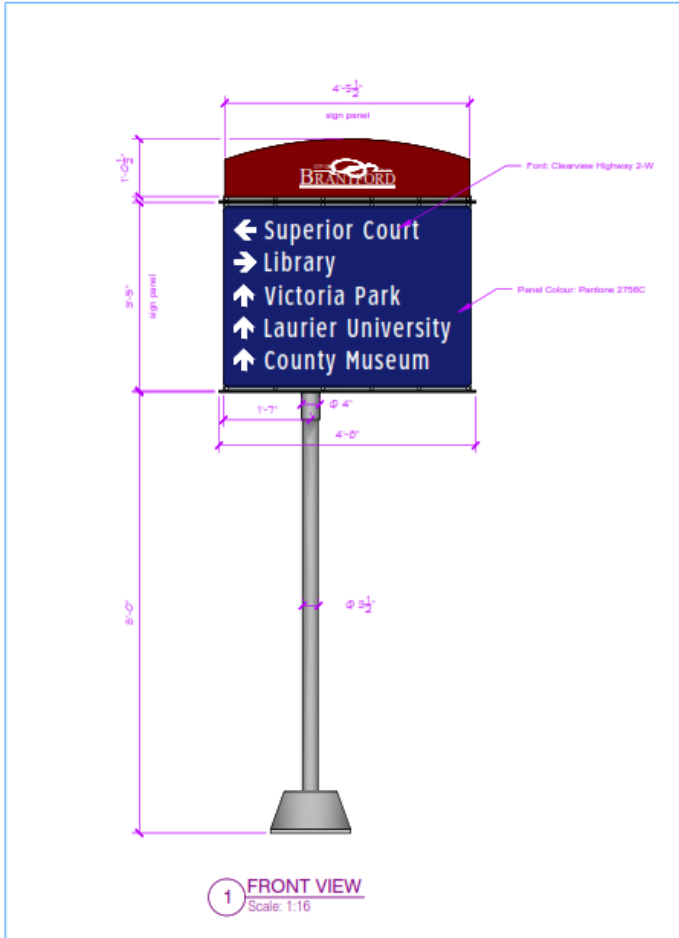


Drawing		
Market St. Pedestrian Way @ Dalhousie St., southside		
Adopted From:	Date:	Scale:
Bruce County RTO7 Sign Manual	March, 2022	AS INDICATED

Appendix 24 - Wayfinding – Market St. at Wellington St., SE Corner



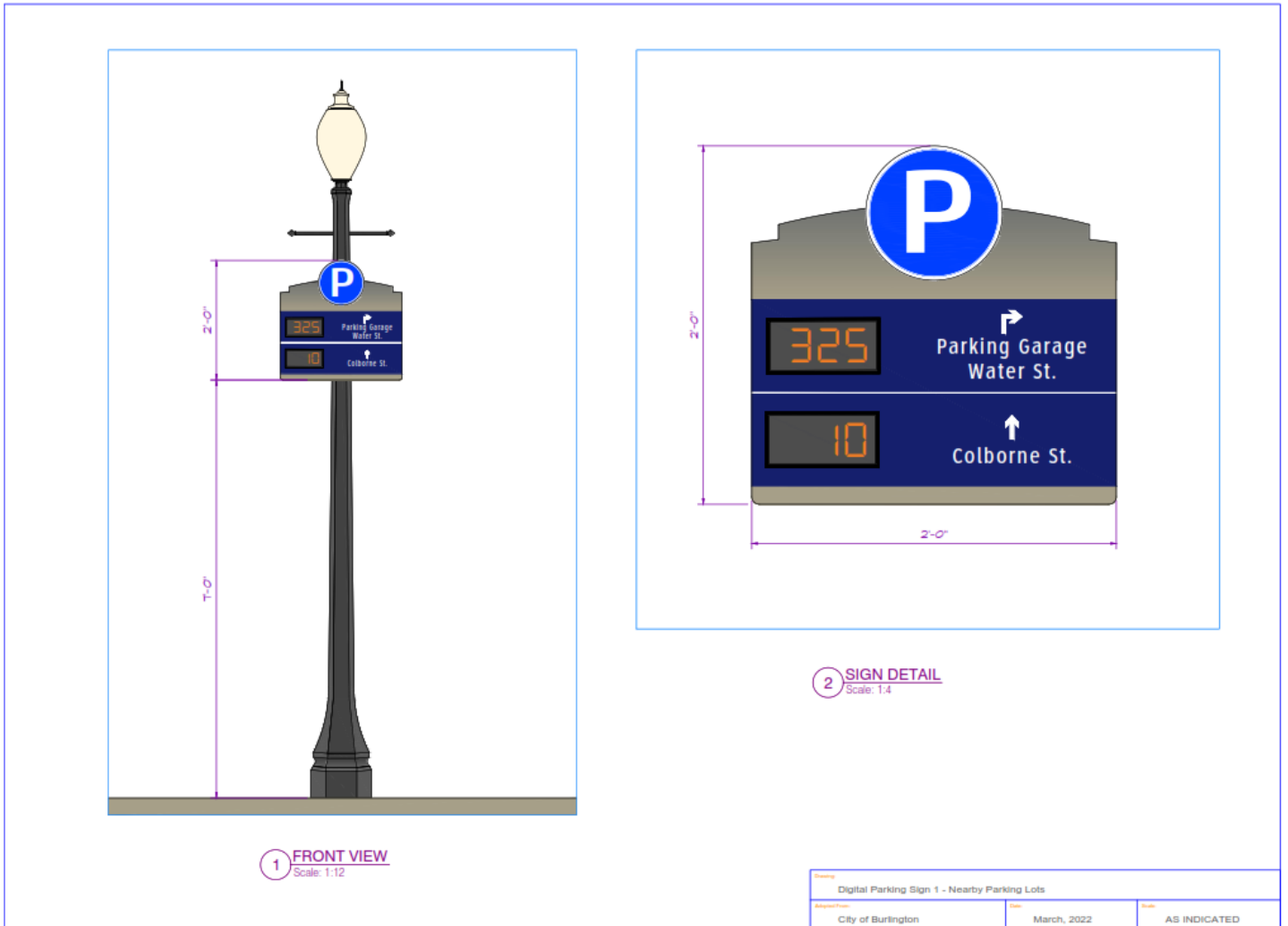
Appendix 25 - Wayfinding - Wellington St. at Bus Terminal



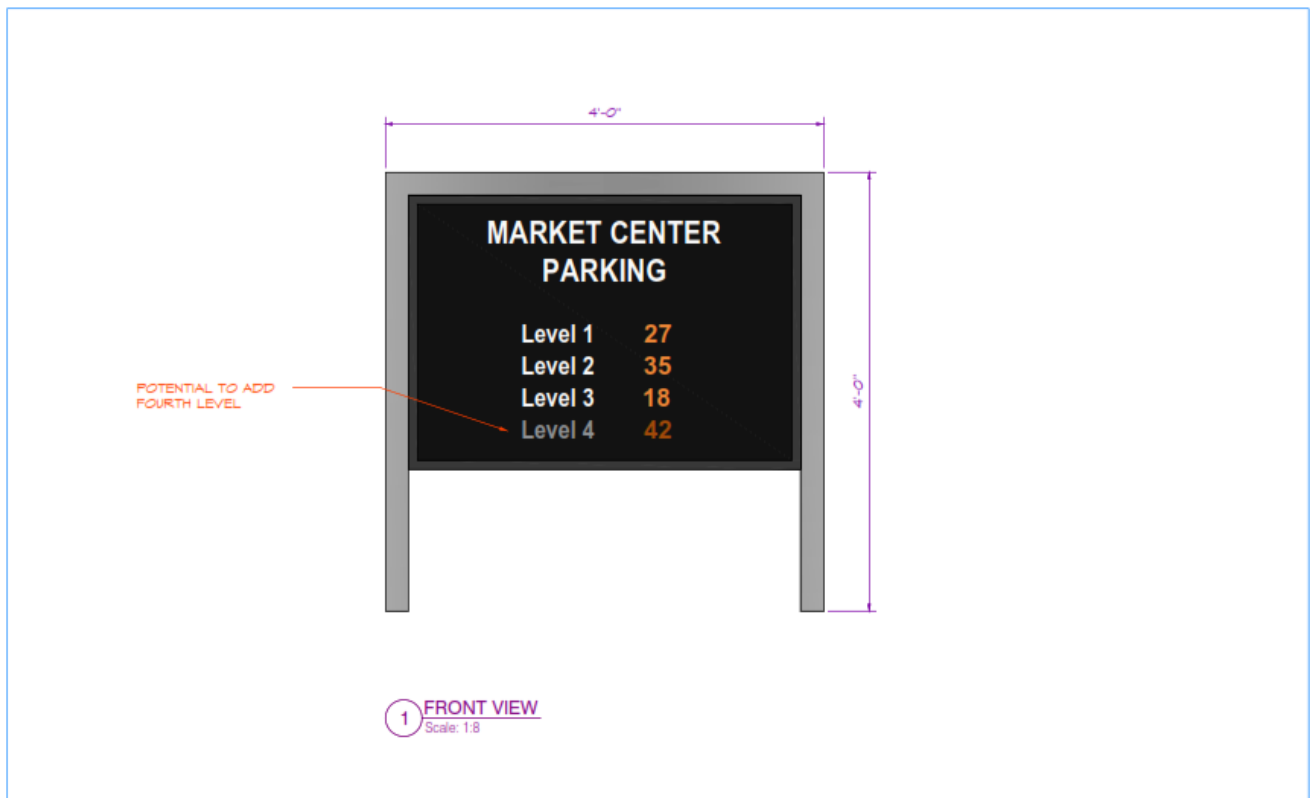
2 SIGN DETAIL
Scale: 1:8

Wellington St. @ Bus Terminal		
Adapted From	Date	Scale
Bruce County RTO7 Sign Manual	March, 2022	AS INDICATED

Appendix 26 - Digital Parking Space Availability – Nearby On-Street (blocks) and Parking Lots

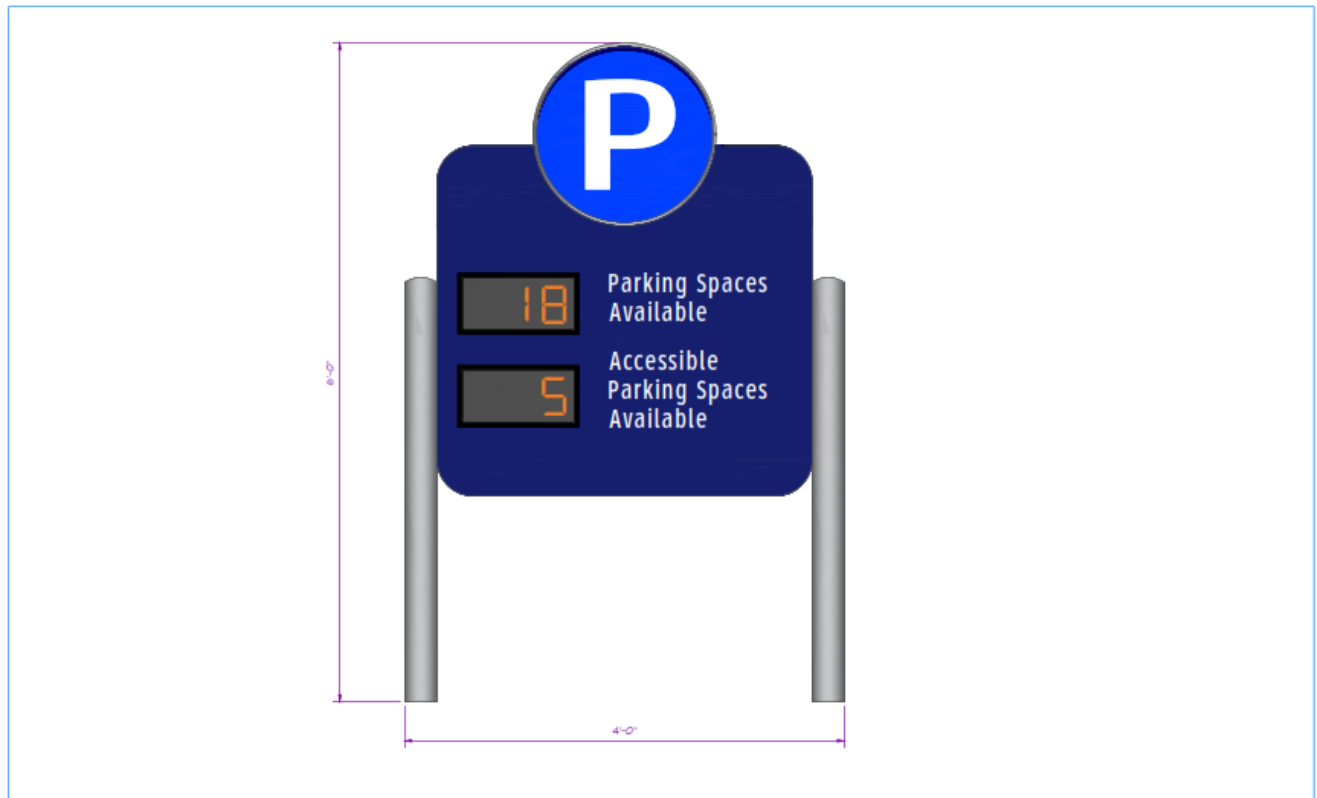


Appendix 27 - Digital Parking Space Availability - Market Centre Parkade



Drawing		
Multi Level Parking - Market Center		
Approved From	Date	Scale
N/A	March, 2022	AS INDICATED

Appendix 28 - Digital Parking Space Availability - Surface Lots



1 FRONT VIEW
Scale: 1:8

Drawing		
Digital Parking Sign 1 - Spaces Available		
Approved/From	Date	Scale
N/A	March, 2022	AS INDICATED

Appendix 29 - GO Transit Route 15 - Brantford to Burlington

15 Route number
Numéro du trajet

Brantford / Burlington



**Brantford/
Burlington**



GO Train and Bus Schedule/
Horaire des trains et des autobus GO

METROLINX

15



Daily / Quotidiennement

Includes GO Bus route 15 /
Inclut le trajet 15 d'autobus GO

Effective / À partir de:

3 SEPTEMBER
SEPTEMBRE



Appendix 30 - GO Transit Route 15 - Brantford to Burlington - Timetables

Monday to Friday (except holidays) Du lundi au vendredi (sauf les jours fériés)	
EASTBOUND / EN DIRECTION EST	
Route Number Numéro du trajet	Zone →
Trips Number Numéro des parcours	Exception
15 15160	05:20
15 15220	06:15
15 15290	07:15
15 15370	08:15
15 15420	09:15
15 15480	10:15
15 15570	12:45
15 15590	14:40
15 15690	15:40
15 15730	16:40
15 15770	17:45
15 15840	20:00
15 15900	22:05

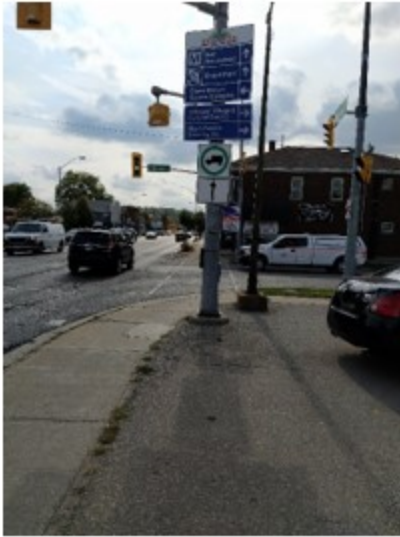
Monday to Friday (except holidays) Du lundi au vendredi (sauf les jours fériés)	
WESTBOUND / EN DIRECTION OUEST	
Route Number Numéro du trajet	Zone →
Trips Number Numéro des parcours	Exception
15 15001	05:29
15 15006	06:15
15 15007	07:15
15 15111	09:45
15 15115	11:15
15 15117	12:15
15 15119	13:15
15 15121	14:15
15 15123	15:15
15 15129	16:45
15 15129	18:45
15 15133	20:45
15 15137	22:45

Saturday and Sunday Samedi et dimanche	
EASTBOUND / EN DIRECTION EST	
Route Number Numéro du trajet	Zone →
Trips Number Numéro des parcours	Exception
15 15170	06:20
15 15340	08:20
15 15440	10:15
15 15530	12:15
15 15610	14:15
15 15690	16:15
15 15770	18:15
15 15840	20:20
15 15900	22:20

Saturday and Sunday Samedi et dimanche	
WESTBOUND / EN DIRECTION OUEST	
Route Number Numéro du trajet	Zone →
Trips Number Numéro des parcours	Exception
15 1506	06:15
15 1507	07:15
15 1511	09:45
15 1515	11:15
15 1517	12:45
15 1519	13:45
15 1521	14:45
15 1523	15:45
15 1529	16:45
15 1533	18:45
15 1537	20:45

Appendix 31 - Photos of Bus Stops in the Study Area

BS527 – Colborne St W & Gilkison St



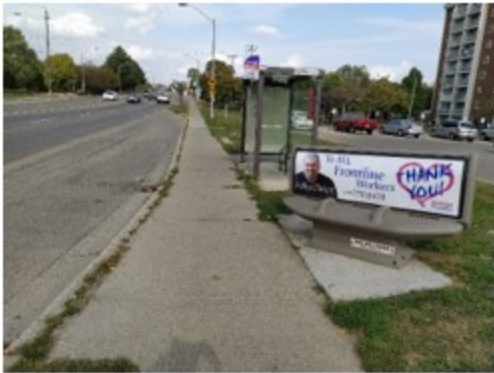
BS570 – Colborne St E @ Beckett Building



BS569 – Colborne St E & Echo St



BS565 – Colborne St W & Gilkison St



BS568 – Colborne St E @ Harmony Square



BS606 – Colborne St E & Park Ave



1



Photographed September 28, 2020



Brantford Streetscaping EA - Parking, Transit & Wayfinding Report – Oct. 31, 2022

BS768 – Colborne St E & Murray St



BS828 – Colborne St E & Puleston St



BS770 – Colborne St E & Stanley St



BS525 – King St & Dalhousie St



BS772 – Colborne St E @ Pauline Johnson Collegiate



BS567 – King St & Colborne St E



2



Photographed September 28, 2020



BS830 – Dalhousie St & Stanley St



BS834 – Dalhousie St & Clarence St



BS831 – Dalhousie St & Drummond St



BS639 – Darling St @ City Hall



BS833 – Dalhousie St & Park Ave



BS679 – Darling St & Clarence St



BS471 – Brant Ave & Palace St



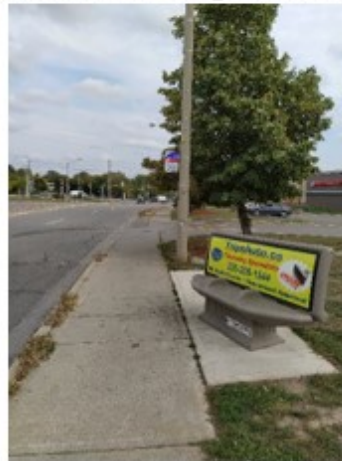
BS909 – Icomm Dr @ Casino



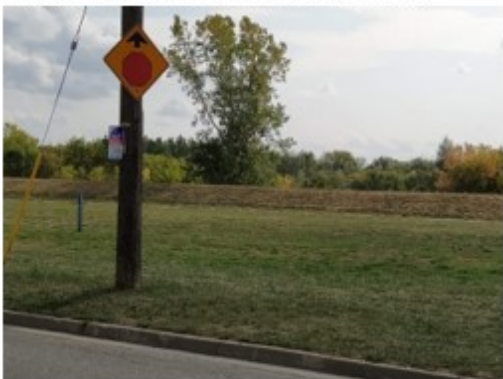
BS526 – Brant Ave at Armoury



BS637 – Icomm Dr @ Farmer's Market



BS602 – Grand River Ave & Waterloo St



BS636 – Market St S & Icomm Dr



4



Photographed September 28, 2020



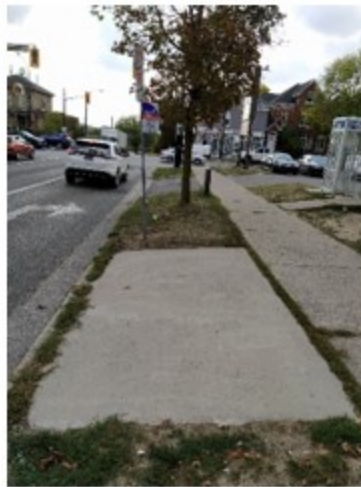
BS461 – William St & Palace St



BS604 – West St & Darling St



BS469 – Church St & Brant Ave



BS462 – William St & Waterloo St



BS603 – Church St & Brant Ave



BS463 – William St & Church St



Photographed September 28, 2020



BS640 – Wellington St @ City Hall



BS642 – Albion St @ Albion Towers



BS721 – Clarence St & Nelson St



BS468 – Wellington St & King St



BS638 – Clarence St S, NB @ Labour Centre



BS641 – Albion St & Church St



BS939 – Clarence St S, SB @ Labour Centre



BS680 – Park Ave, NB & Nelson St



BS719 – Park Ave & Darling St



BS940 – Clarence St S @ Fresh Co



BS1006 – Park Ave & Colborne St E



BS718 – Park Ave, SB & Nelson St



Photographed September 28, 2020

BS1007 – Park Ave & Arthur St



BS915 – Stanley St & Dalhousie St

