Appendix B

Design Criteria Review Report

hdrinc.com 100 York Boulevard, Suite 300, Richmond Hill, ON, CA L4B 1J8
(289) 695-4600

Design Criteria Review

Richmond Hill Parking and TDM Strategy for New Developments

City of Richmond Hill, Ontario

October 30, 2022

Contents

Figures

Tables

1 Introduction

This report outlines the review of current design criteria and standards for parking spaces, access to parking spaces, loading facilities, and driveway requirements, from other municipalities. This report is one of three major components that will form the Implementation Plan and Final Recommendations. The other two components include the Current Practices Review, as well as a Data Collection Component. This Design Criteria review is tangential and independent to those other components and will form the design criteria recommendations where there is deviation from current in-force By-laws or standard practices within the city.

As previously mentioned, the overall Parking and TDM Strategy is comprised of the following tasks, with input from key stakeholders throughout the process:

1. **Current Practices Review** – comparing current parking rates contained within the 2010 Parking Strategy with those of comparable municipalities with more modern requirements, parking design requirements, and identifying and addressing gaps in the current approach through the introduction of emerging land uses or parking rates for non-standard vehicles (i.e. electric vehicle parking spaces, preferential parking spaces such as carpool parking or carshare parking etc.). Introducing a TDM Strategy tied to parking requirements;
2. **Data Collection** – conducting parking surveys to understand the existing parking demands for various land uses, targeting land uses identified as outliers in the current practices review; and
3. **Recommendations & Implementation** – summarizing the final recommendations of parking rates, TDM strategy, and implementation plan based on the current practices and data collection.

The recommendations presented in this report should be treated as preliminary recommendations for consideration as they are based primarily on the current practices review. Input from the remainder of the study, including stakeholder input, will be factored into the final recommendations. A final report will be created which summarizes the recommendations based on all supporting aspects of the study.

For the City of Richmond Hill, the current standard practices were taken as the design requirements contained within the two in-force By-laws:

1) Yonge and Bernard Key Development Area Secondary Plan Zoning By-law **(By-law 111-17)**

2) Yonge and Carville/16th Key Development Area Secondary Plan Zoning By-law **(By-law 30-18)**

3) Accessible Parking By-law **(By-law No. 305-90)**

The current practices review has focused on the following municipalities, mostly concentrated in the Greater Toronto Area:

- City of Brampton (By-law 270-2004)
- City of Hamilton (By-law 05-200, 17-240)
- City of Markham (By-law 28-97)
- City of Mississauga (By-law 0225-2007)
- Town of Newmarket (By-law 2010-40)
- Town of Oakville (By-law 2014-014)
- City of Toronto (By-law 569-2013)
- City of Vaughan (Draft Comprehensive Zoning By-law – September 2020)
- City of Vancouver (By-law 6059)

It should be noted that this is a current practices review, and does not necessarily reflect more recent developments or considerations regarding parking design. Therefore, discussions with stakeholders from public and private agencies has helped provide guidance on future directions.

This report reviews the following items:

- Vehicle Parking Spaces
  - Perpendicular/Parallel/Angled Parking Spaces
  - Tandem Parking Spaces
  - Compact Car Space
  - Electrical Parking Spaces
  - Accessible (or Barrier-Free) Parking Space
  - Stacking (or Queueing) Spaces
- Parking Area Design
  - Aisles (one-way vs. two-way)
  - Access Requirements (ramps, grades, curves)
  - Hammerheads/Turnarounds
  - Driveways & Landscaping/Hardscaping (for low density development)
  - Passenger Pick-up/Drop-off Facilities
- Loading Spaces
  - Space Dimensions
  - Access Requirements (ramps, grades, curves)
- Bicycle Parking Spaces
  - Short-term and Long-term
- Cash-in-lieu

2 Vehicle Parking Spaces

Parking space sizes vary depending on the municipality as well as the type of parking space in terms of the vehicle-types that it is expected to accommodate. Within each space type, there can be further variations on the designs according to the aisle and access arrangement as well as the angle of the parking spaces. The most common type of parking space is the perpendicular parking space which is found in most above-, below- or at-grade parking areas or structures, and is generally considered the most efficient parking space in terms of maximizing the number of spaces in a given area. The second most common parking space is the parallel

parking space which is typically found on-street or in confined areas where it is not possible to accommodate a perpendicular parking space. Angled parking spaces are typically used in one-way arrangements, facilitate the inbound (or outbound) movements, and can allow for reducing the aisle widths. There is generally a relation between the parking space height or width, or the aisle width, and the angle of the parking space.

The general design criteria governing regular parking spaces typically applies to other dedicated parking spaces including larger and smaller spaces, such as accessible or barrier-free parking compared to compact car parking.

2.1 Perpendicular and Parallel Parking Spaces

Perpendicular parking spaces are spaces which orient the vehicle 90 degrees (or perpendicular) to the access aisle when the vehicle is in the parked position. These parking spaces can be accessed through forward- or reverse- entry. They are typically provided in rows and are back to back to another row of perpendicular parking spaces which have a separate access aisle, or back to a curb.

Parallel parking spaces are spaces which orient the vehicle in-line (or parallel) with the roadway or aisle from which it is accessed. Parallel parking spaces can be accessed through forward- or reverse- entry. In terms of the efficiency of design, the parallel parking spaces provide fewer parking spaces for a given length of aisle compared to perpendicular spaces.

Images of perpendicular and parallel parking space configurations are shown in **Table 1**. Minimum dimensions for perpendicular and parallel parking spaces from other municipalities are summarized in **Table 2**.

Table 1: Perpendicular and Parallel Parking Space Design (Source: Mississauga Zoning By-Law 0225-2007)

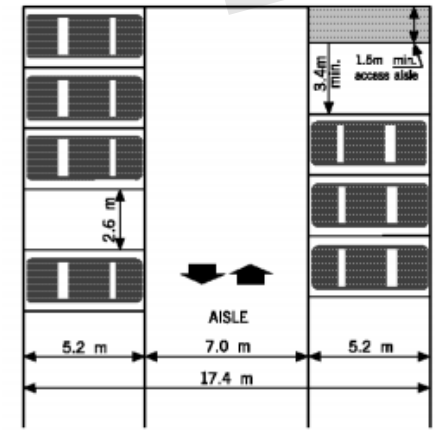
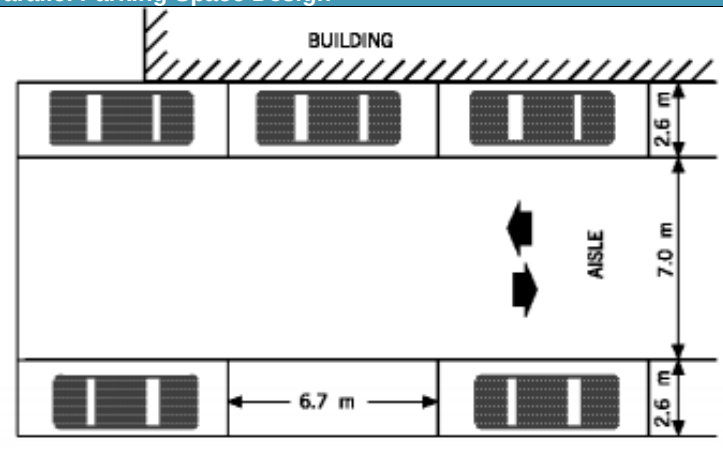
Perpendicular Parking Space Design	Parallel Parking Space Design
	

Table 2: Summary of Parking Space Dimensions

Municipality	Perpendicular Parking Space Minimum Dimensions			Parallel Parking Space Minimum Dimensions		
	Length (m)	Width (m)	Vertical Clearance (m)	Length (m)	Width (m)	Vertical Clearance (m)
Richmond Hill	**5.8**	**2.75**	**-**	**6.7**	**2.4**	**-**
Brampton	5.4	2.7	-	6.5	2.75	-
Hamilton	5.8	2.8	-	6.7	2.4	-
Markham	5.8	2.75	-	6.7	2.5	-
Mississauga[1]	5.2	2.6	-	6.7	2.6	-
Newmarket[2]	5.5	2.7	-	6.7	2.6	-
Oakville	5.7	2.7	-	7.0	2.7	-
Toronto[3]	5.6	2.6	2.0	6.7	2.6	2.0
Vaughan	5.7	2.7	2.0	6.7	2.7	2.0
Vancouver	5.5	2.5	2.0	6.4	2.5	-
Minimum	**5.2**	**2.5**	**2.0**	**6.4**	**2.4**	**2.0**
Median	**5.7**	**2.7**	**2.0**	**6.7**	**2.6**	**2.0**
Average	**5.6**	**2.7**	**2.0**	**6.7**	**2.6**	**2.0**
Maximum	**5.8**	**2.8**	**2.0**	**7.0**	**2.75**	**2.0**

Notes:
1) Mississauga defines parallel parking spaces as spaces with a parking angle not exceeding 15 degrees. The dimensions for perpendicular parking apply to all spaces with a parking angle exceeding 15 degrees.
2) Newmarket allows a reduction to 2.6 x 5.0 metres perpendicular spaces if fewer than 5 spaces are required.
3) Toronto requires that the minimum width increases to 2.9 metres from 2.6 metres for parking spaces with a drive aisle width less than 6.0 metres, which is permitted when the spaces are angled.

From the municipalities reviewed, only Toronto defines a maximum parking dimension. The maximum is set as 6.0 metres x 3.2 metres compared to the 5.6 metres x 2.6 metres for perpendicular parking spaces. Due to the high cost of establishing parking, most developers will keep parking spaces to a minimum. All other municipalities have not established a maximum parking space size which implies that there are no significant issue of developers creating larger parking spaces. **The City can consider defining a maximum parking space size if there are known issues with developers providing larger parking spaces; however, there doesn't appear to be a need based on the lack of by-laws defining maximum parking space dimensions.**

There is a high degree of consistency between the base (minimum) parking stall dimensions across all of the municipalities reviewed. The City of Richmond Hill has the longest perpendicular parking space length requirement at 5.8 metres (compared to the average/median length of 5.7/5.6 metres), but is equal to two other municipalities (Hamilton and Markham). Richmond Hill also has one of the widest perpendicular parking space width requirement at 2.75 metres (compared to the average/median length of 2.7 metres) but is equal to Markham, and second only to Hamilton which has a width requirement of 2.8 metres. Only three of the municipalities reviewed define minimum vertical clearances (each set at 2.0 metres).

Richmond Hill requires 6.7-metre long parallel parking spaces which is consistent with other municipalities. The width of the parallel parking spaces in Richmond Hill are slightly narrower

than the other municipalities with a minimum width of 2.4 metres compared to the average of 2.6 metres.

The City should include a 2.0 metre minimum clearance requirement for all private/public spaces and can consider modifying the parking space dimension requirements if there have been any concerns or the design of parking areas has resulted in inefficient design or use of the parking area. **Preliminary dimensional recommendations for parallel and perpendicular parking spaces are shown in Table 3**.

Table 3: Preliminary Recommendations for Minimum Parking Space Dimensions

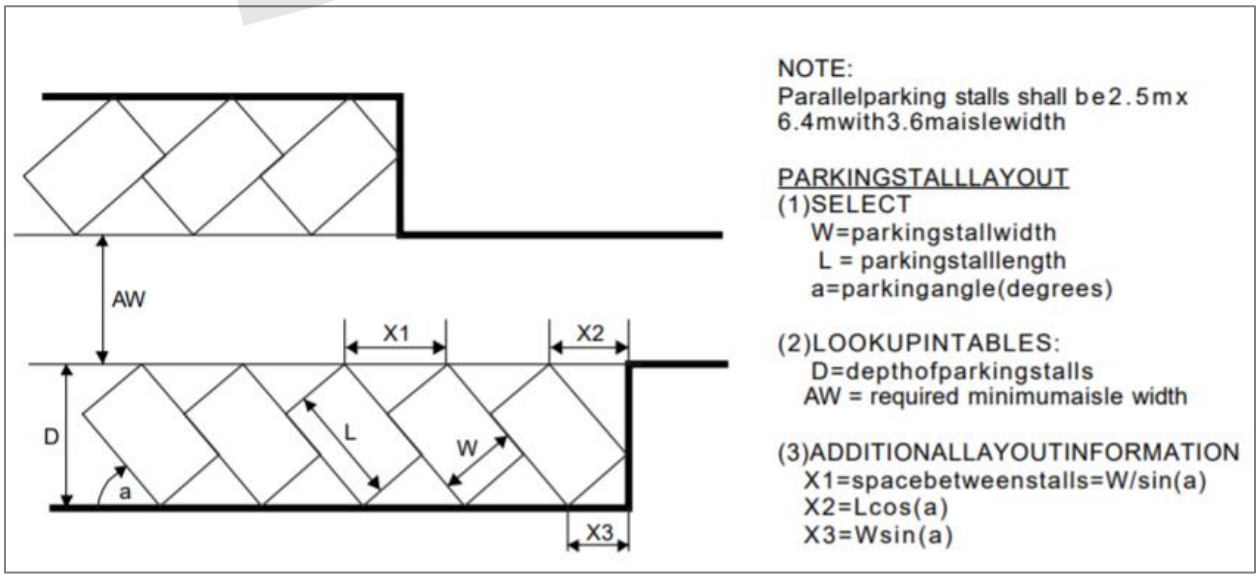
Municipality	Perpendicular Parking Space (change from existing by-law)			Parallel Parking Space (change from existing by-law)		
	Length (m)	Width (m)	Vertical Clearance (m)	Length (m)	Width (m)	Vertical Clearance (m)
Richmond Hill	**5.6 (-0.2)**	**2.7 (-0.05)**	**2.0 (+2.0)**	**6.7 (-)**	**2.6 (+0.2)**	**2.0 (+2.0)**

*Numbers in (brackets) represent change in minimum dimensions from the existing City's by-law.

2.2 Angled Parking Spaces

Parking space orientation can be defined by the angle created between the length of the space and the curb or drive aisle. For example, parallel spaces describe spaces where the length of the parking space (front to back of the car) is aligned with the curb (0 degrees). The previous section described space requirements for parallel and perpendicular spaces (0 degrees and 90 degrees); however, municipalities also allow for other angles for parking spaces or define different criteria depending on a range. A sample image provided in Vancouver's by-law which defines the various measurements related to angled parking is provided in **Figure 1**.

Figure 1: Angled Parking Measurements (Source: Vancouver By-Law 6059)



Angled parking spaces reduces the depth of the parking space which can aid in fitting parking spaces within a thinner parking lot area like parallel parking. Generally, angling parking also allows for smaller drive aisles when they are reduced to a one-way configuration. Based on the available land, an angled parking configuration may accommodate a higher number of parking spaces compared to the typical parallel or perpendicular parking space configurations, or make more efficient use of the available space. By angling the parking spaces, it can also restrict the drive aisle to a one-way. Examples of angled parking to accommodate longer vehicles or smaller lots in Richmond Hill are shown in **Figure 2**.

Figure 2: Angled Parking in Richmond Hill

The typical specifications within the by-laws for defining angled vehicle parking include:

- Parking space dimensions based on the parking angle and
- Minimum drive aisle width based on the parking angle.

2.2.1 Angled Parking Space Dimensions

As shown in **Figure 1**, the angling of spaces adjusts will increase the length of the space, but reduce the depth required to accommodate parking spaces. The current Richmond Hill by-law states that “A parking space that is not perpendicular or parallel to a driveway shall have an

area comprised of a rectangle with a minimum width of 2.75 metres and a minimum length of 5.8 metres." These dimensions are the same as the minimum perpendicular space dimension since the extra length is not needed to maneuver into the space.

The following summarizes the minimum parking space dimensions for angled parking detailed by other municipalities:

- Richmond Hill defines the width of the access aisle according to the angle of the parking space, and only provides two options of 60 degrees (5.5 metres) or 45 degrees (3.7 metres). The dimensions of the angled parking spaces are the same as perpendicular spaces and do not change according to the angle.
- Mississauga defines minimum rectangular area with a minimum width and length for two cases:
    - Angles of less than 15 degrees (defined as parallel parking spaces) have longer length requirements of 6.7 metres, and
    - Angles exceeding 15 degrees (including perpendicular parking spaces) have shorter length requirements of 5.2 metres.
    - Access aisle widths are independent of the angle, except in the specific case when the aisle is one-way and the spaces do not exceed an angle of 60 degrees, in which case the aisle can be reduced to 5.5 metres (from 7.0 metres).
- Toronto's by-law requires that the parking stall width be increased from 2.6 metres to 2.9 metres when the drive aisle width is less than 6.0 metres (whether it is a one-way or two-way aisle). Therefore, if spaces are angled and the drive aisle is maintained at the standard 6.0 metres, then the spaces don't need to be widened.
- Vaughan increases the minimum length from 5.7 metres for perpendicular parking to 6.0 metres for 45-degree angled parking.
- Vancouver defines a minimum depth for parking stalls ranging from 4.23 metres to 6.13 metres based on various parking angles as shown in **Figure 3**.

Figure 3: Minimum Depth of Parking Stall for Angled Parking (Source: Excerpt from Vancouver By-Law 6059)

ANGLE PARKINGTABLE(alldimensionsinmetres)

PARKING ANGLE (degrees)	DEPTHOFSTALL(D)				REQ'D AISLE WIDTH
	SMALLCARS (W=...)		NORMALCARS (W=...)		
	2.30	2.60*	2.50	2.70*	
PARALLEL	-	-	**SEENOTE**		3.6
20	3.73	4.02	4.23	4.42	3.6
25	4.03	4.30	4.59	4.77	3.6
30	4.29	4.55	4.92	5.09	3.6
35	4.52	4.77	5.20	5.37	3.6
40	4.72	4.95	5.45	5.60	3.6
45	4.88	5.09	5.66	5.80	3.6
50	5.00	5.20	5.82	5.95	3.9
55	5.09	5.26	5.94	6.05	4.2
60	5.13	5.28	6.01	6.11	4.5
65	5.14	5.27	6.04	6.13	4.8
70	5.11	5.21	6.02	6.09	5.1
75	5.04	5.12	5.96	6.01	5.4
80	4.93	4.98	5.85	5.89	5.8
85	4.78	4.81	5.70	5.71	6.2
90	4.60	4.60	5.50	5.50	6.6

Note: Increased widths may be required based on other conditions

Except for Hamilton's by-law which includes a table that specifies "one-way and two-way aisle width", the zoning by-laws do not explicitly state the angled parking must be one-way; however, the width of the aisle may already restrict it to one-way vehicle flow. Additionally, a one-way aisle will allow for easier and more predictable access and egress from an angled parking spot. **The city should consider restricting angled parking to one-way drive aisles when the parking angle is 45 degrees or less, and the aisle width is less than 4.0 metres. The City can determine if they want to have criteria that defines if the spaces are forward-in or reverse-in.**

Based on a review of the by-laws from other municipalities, only Toronto (wider space for smaller drive aisles), Vaughan (longer space for 45-degree parking), and Vancouver (explicit depth of stall for given angles at 5-degree increments) explicitly define a larger dimension for angled parking. **For simplicity of review, the city can keep the existing definition for defining angled parking space dimensions such that the minimum angled parking space dimension is the same as the minimum perpendicular space dimensions which is consistent with the majority of municipalities reviewed (where no varied dimension is presented).**

2.2.2 Angled Parking Space Drive Aisle Widths

The City of Richmond Hill currently defines minimum drive aisle widths (herein referred to as aisle width) for parking angled at 45, 60, and 90 degrees. This is similar to other municipalities including Hamilton, Newmarket, and Vancouver which provide a table of minimum aisle widths given the parking degree angle but with greater disaggregation and predefined choices.

Brampton, Mississauga, Oakville, and Toronto define minimum aisle width for a range of angles. The minimum aisle width requirements based on parking angle for the municipalities are summarized in **Table 4**. **To allow flexibility in design and improve the interpretation of the required minimum widths given any angle, the city can consider defining a minimum drive aisle width for range of parking rather than just the 45, 60, and 90-degree angles.**

Table 4: Summary of Minimum Aisle Width Requirements Based on Parking Angle

Municipality	Parking Angle (degrees)	One-Way / Two-Way Aisle Minimum Width (m)
Richmond Hill	45	3.7
	60	5.5
	90	6.0
Brampton	< 50	4.0
	50 to < 70	5.75
	70 to 90	6.6
Hamilton	0	3.7
	15	3.7
	30	3.7
	45	4.5
	60	5.5
	75	6.0
	90	6.0

Municipality	Parking Angle (degrees)	One-Way / Two-Way Aisle Minimum Width (m)
Markham	-	-
Mississauga	≤ 60	5.5
	Otherwise	7.0
Newmarket	45	4.5
	90	6.0
Oakville	< 60	4.0
	≥ 60	5.5
	90	6.0
Toronto	< 50	4.0
	50 to < 70	5.5
	70 to 90	6.0
Vaughan	≤ 44	4.0
	45 to 59	5.0
	60 to 90	6.0
Vancouver	Parallel	3.6
	20	3.6
	25	3.6
	30	3.6
	35	3.6
	40	3.6
	45	3.6
	50	3.9
	55	4.2
	60	4.5
	65	4.8
	70	5.1
	75	5.4
	80	5.8
	85	6.2
	90	6.6

As previously noted, the city defines minimum aisle widths for 45, 60, and 90-degree parking configurations as 3.7 metres, 5.5 metres and 6.0 metres, respectively. A comparison of minimum aisle widths as they compare with Richmond Hill's dimensions are summarized in **Table 5**.

The minimum aisle widths are within range of the other municipality requirements and the city's width show a high degree of consistency for each defined angle; however, the city's minimum aisle width for 45-degree angled parking (3.7 metres) is the lowest amongst the municipalities reviewed in Ontario with only Vancouver having a smaller width by -0.1 metres. Excluding the existing Richmond Hill and Vancouver requirements, the smallest aisle width is 4.0 metres with an average (and median) aisle width of 4.5 metres. **The city can consider increasing the minimum aisle width for a 45-degree angled parking configuration to 4.0 metres to increase consistency with the other Ontario municipalities. Additionally, the angled**

parking shown in Figure 2 measure an aisle width of at least 4.0 metres when measured from Google Earth.

Table 5: Comparison of Minimum Aisle Widths to Richmond Hill Minimum Aisle Widths

Municipality	Minimum Aisle Width (m)		
	Parking Angle - 45°	Parking Angle - 60°	Parking Angle - 90°
Richmond Hill	**3.7**	**5.5**	**6.0**
Brampton	4.0	5.75	6.6
Hamilton	4.5	5.5	6.0
Markham	-	-	-
Mississauga	5.5	5.5	7.0
Newmarket	4.5	6.0	6.0
Oakville	4.0	5.5	6.0
Toronto	4.0	5.5	6.0
Vaughan	5.0	6.0	6.0
Vancouver	3.6	4.5	6.6
Minimum	**3.6**	**4.5**	**6.0**
Median	**4.0**	**5.5**	**6.0**
Average	**4.3**	**5.5**	**6.2**
Maximum	**5.5**	**6.0**	**7.0**

In summary, the city can consider defining minimum aisle widths for a range of parking angles or a greater number of angles similar to other municipalities rather than just the three (3) specified angles (45, 60, and 90 degrees), restricting angled parking (less than 60 degrees) to one-way drive aisles, and/or increasing the minimum aisle width from 3.7 metres to 4.0 metres for angled parking up to 45 degrees since it's the lowest amongst the Ontario municipalities reviewed. A summary of the preliminary recommendations for angled parking is summarized in Table 6.

Table 6: Preliminary Recommendations for Minimum Aisle Widths

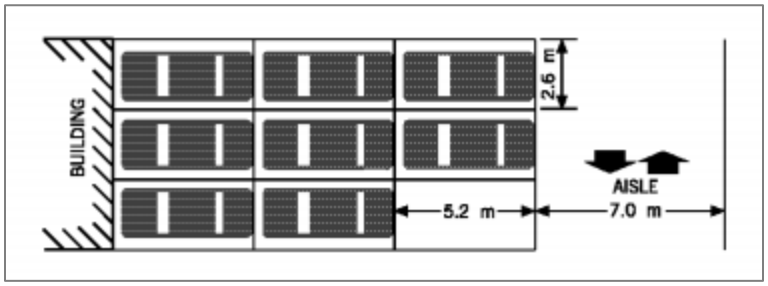
Municipality	Parking Angle (degrees)	One-Way / Two-Way Aisle Minimum Width (m)
Richmond Hill	Up to 45	4.0 (+0.3); one-way only
	Greater than 45 to, and less than 60	5.5 (-)
	60 to 90	6.0 (-)

Note: Numbers in (brackets) represent change in minimum dimensions from the existing City's by-law

2.3 Tandem Parking Spaces

Tandem parking obstructs a vehicle from having direct access to the drive aisle or street due to another parked vehicle. Tandem parking spaces are common among private garages where two or move vehicles can park behind one another on a single driveway, or where valet parking can be provided. An excerpt from the Mississauga showing a tandem parking configuration is shown in **Figure 4**.

Figure 4: Tandem Parking (Source: Mississauga Zoning By-Law 0225-2007)



The typical specifications within the by-laws for tandem vehicle parking include:

- Dimension of parking space and
- Permitted land uses.

As part of the 2010 Parking Strategy, the report notes that where tandem parking spaces are provided on a residential site, only one of the two tandem parking spaces should count toward the minimum parking requirement unless it can be demonstrated that both tandem parking spaces will be permanently designated to one single residential unit owner or tenant. Where tandem parking spaces are provided on a non-residential site, only one of the two tandem parking spaces should count toward the minimum parking requirement.

Existing by-laws for the Richmond Hill Key Development Areas (30-18 and 111-17) note that tandem parking spaces shall not be permitted in a parking structure or parking area.

Brampton, Newmarket and Vancouver do not mention tandem parking in their zoning by-law; Hamilton, Markham, and Mississauga do not define dimensions for tandem parking spaces; and Oakville, Toronto, and Vaughan define dimensions for tandem parking spaces.

The tandem parking space dimensions and description of land uses where tandem parking is applicable is summarized in **Table 7** and **Table 8**.

Toronto's tandem space dimension is the same as the perpendicular space requirement while Oakville and Vaughan are slightly longer. Note that Oakville defines the length based on the combined length of two tandem parking spaces. The two tandem parking spaces may have the same width as perpendicular spaces, but the combined length must be 11.70 metres, which is longer than the length of two separate perpendicular spaces (11.40 metres).

The City of Hamilton permits the use of tandem spaces for duplex dwellings as well as for commercial parking facilities/hotels provided there is a parking attendant or valet service. Markham specifies that tandem parking spaces may not be used for visitor parking, and are only permitted on lots with buildings containing no more than 4 dwelling units, and for condominium townhouse dwellings with parking provided at grade and accessed via a private road. The Town of Oakville permits tandem spaces to be used with any type of dwelling. Within the City of Toronto, tandem parking spaces may only be used to support secondary suites, at group homes, or at duplexes.

Table 7: Summary of Tandem Parking Space Dimensions

Municipality	Length (m)	Width (m)	Vertical Clearance (m)	Comparison with Standard Space Dimensions
Oakville	11.7	2.7	-	5.7 metres x 2.7 metres
Toronto	5.6	2.6	2.0	5.6 metres x 2.6 metres (2.0 metres vertical clearance)
Vaughan	6.0	2.7	-	5.5 metres x 2.5 metres

Note: Oakville defines the minimum length based on two parking spaces provided in tandem. Dividing the length in half would mean 5.85 metres per space.

Table 8: Summary of Tandem Parking Space Details

Municipality	
Richmond Hill	2010 Parking Strategy: Where tandem parking spaces are provided on a residential site, only one of the two tandem parking spaces should count toward the minimum parking requirement unless it can be demonstrated that both tandem parking spaces will be permanently designated to one single residential unit owner or tenant. Where tandem parking spaces are provided on a non-residential site, only one of the two tandem parking spaces should count toward the minimum parking requirement. By-laws 111-17 and 30-18: Tandem parking spaces shall not be permitted in a parking structure or parking area.
Brampton	N/A
Hamilton	In the case of a duplex dwelling, the required parking may be arranged in tandem. For commercial parking facilities and hotels, parking spaces may be designed to include the use of tandem or stacked parking where a parking attendant is on site or a valet service is provided.
Markham	For residential land uses, visitor parking shall not be located in tandem. Tandem Parking Spaces are only permitted on lots with buildings containing no more than 4 dwelling units, and for condominium townhouse dwellings with parking provided at grade and accessed via a private road.
Mississauga	Specifies land uses that can have tandem spaces include: Resident Physician, Dentist, Drugless Practitioner or Health Professional (5.0 spaces for office and detached dwelling, 4.0 of which may be tandem); and Motor Vehicle Body Repair Facility (4.3 spaces per 100 m2 GFA - non-residential, of which 50% of the required spaces may be tandem parking spaces)
Newmarket	N/A
Oakville	Tandem and stacked parking spaces are permitted for any dwelling. Where tandem parking spaces are provided, 3.0 metres in width per parking space for a private garage, otherwise, the minimum width is 2.7 metres.
Toronto	A required parking space may not be a tandem parking space, except when it is required for a secondary suite, group home or duplex building.
Vaughan	Tandem parking shall be permitted provided that a tandem parking space is not located on a required parking space.
Vancouver	N/A

Although not prominent in Ontario, it can be noted that other cities, such as Los Angeles, will have paid valet parking in order to provide tandem parking which can accommodate a higher number of spaces for various land uses including plazas and restaurants while using less space and at no inconvenience to the customers. Generally, the municipalities reviewed only allow parking for small/low-density residential developments.

In general, Richmond Hill's approach to tandem parking is consistent with most municipalities; however, the city can consider allowing tandem parking where valet parking will be provided (and may choose to specify land uses such as commercial parking facilities and hotels). For residential land uses, the City can consider maintaining the current requirement or expanding to allow tandem parking in parking structures or areas for specific other uses such as condominium townhouses or buildings containing fewer than a given number of units (Markham uses 4 units as the threshold).

2.4 Compact Parking Spaces

Compact parking spaces (also known as small car or small vehicle spaces) are smaller parking spaces that can be preferentially located and accommodate smaller sized vehicles. This encourages more sustainable travel but also helps make more efficient use of the available area. Since the proportion of large vehicles to smaller vehicles is not easy to control, the number of compact care spaces that are allowed needs to be limited and cannot be over represented in the supply.

The typical specifications within the by-laws for compact vehicle parking include:

- Dimension of space,
- Minimum number of spaces required to allow provision of compact car spaces,
- Allowable limit of compact car parking spaces, and
- Demarcation that the space is reserved for small cars.

It should be noted that municipalities do not define what vehicles can be considered small cars. This would leave interpretation to the driver to see if their car can park in these spaces and if they can get in and out of their vehicles comfortably.

Currently, Richmond Hill does not define dimensions or rates for compact parking spaces. The municipalities that do allow for the provision of spaces reduced in size typically limit the number of spaces that may be reduced (Hamilton and Vaughan set a maximum of 10% of the total required parking spaces are permitted for the purpose of compact motor vehicle parking; whereas Vancouver's limit is generally 25% with a limit of 40% if the parking spaces are primarily reserved and clearly designated for employee parking in association with office, industrial, or similar uses). By-laws will also denote that any such parking space must be clearly identified as being reserved for the parking of small cars only.

A summary of the compact motor vehicle parking space dimensions for each municipality is presented in **Table 9**.

Table 9: Summary of Compact Parking Space Dimensions and Allowable Percentage

Municipality	Compact Car Parking Space			
	Length (m)	Width (m)	Vertical Clearance (m)	Allowable Percentage
Richmond Hill	-	-	-	-
Brampton	-	-	-	-
Hamilton	5.5	2.6	-	10%[1]
Markham	-	-	-	-
Mississauga	-	-	-	-
Newmarket	-	-	-	-
Oakville	-	-	-	-
Toronto	-	-	-	-
Vaughan	4.8	2.4	-	10%.
Vancouver	4.6	2.3	2.0	25% (40%)[2]
Ottawa	4.6	2.4	-	40%[3]

Notes:
1) Where 10 or more parking spaces are required on a lot
2) Allowable percentage increases to 40% if a lot is primarily reserved and clearly designated for employee parking in association with office, industrial, or similar uses. Additionally, if a particular use requires only two or three parking spaces, one of them may be a small car space.
3) Where 20 or more parking spaces are required for the lot.

It can be noted that Vancouver and Ottawa's minimum length for a standard parking spaces is 5.5 metres and 5.2 metres, respectively, which is shorter than Richmond Hill's existing 5.8 metres (and recommended 5.6 metres for consideration); therefore, a longer compact car space compared to Vancouver and Ottawa's may be more appropriate. **The city can consider allowing up to 10% of parking spaces (rounded down) that can be designed as a compact parking space with minimum dimensions of 4.8 metres and 2.4 metres with a minimum vertical clearance of 2.0 metres (compared to the 5.6 metres by 2.7 metres recommended typical parking space dimension). Additionally, it is recommended that the by-law include demarcation requirements that reserve the space for small cars in the form of pavement markings and signage.**

2.5 Electrified Parking Spaces

If electric vehicles will eventually emerge into mainstream popularity and become the predominant type of vehicle, provisions need to be established for electric vehicle (EV) charging stations at both non-residential developments and multi-unit residential buildings. Few municipalities currently have requirements for EV charging stations, as the requirements are being introduced they typically are introduced and tied to residential parking requirements first. With electric vehicles, there are three types of charging stations that currently exist and are described in **Table 10** and they are differentiated primarily by the rate at which they charge.

Table 10: Types of Electric Vehicle Charging Stations

Type	Characteristics
Level 1	- Typical wall socket - Slowest charging time - Supports both fully electric and hybrid electric vehicles
Level 2	- Typical charging station - Full charge in 8 to 10 hours - Supports both fully electric and hybrid electric vehicles
Level 3	- Not widely available - Full charge in 30 to 45 minutes - Supports only fully electric vehicles

The City of Richmond Hill hosts Level 2 charging stations available for public use, free of charge, 24 hours/day and operate on a first-come, first-served basis at the Municipal (2 stations) and Operations (1 station) offices. Existing electric vehicle charging station infrastructure can be found different ways including the MTO website[1] and PlugShare.com. A fee is typically charged by the minute at these stations. There are several EV charging station networks in North America[2].

The City of Vancouver made provisions to its by-laws to accommodate EV charging stations including requirements that the electrical room must have sufficient space to accommodate the installation of equipment to provide charging for all residents of the building. Vancouver's by-law also requires that Level 2 charging or higher is provided[3].

The Toronto Green Standard outlines the following requirements for mid to high-rise residential and all non-residential development:

1. Design the building to provide 20% of the parking spaces with electric vehicle supply equipment (EVSE).
2. EVSE, or energized outlets or receptacles, are acceptable to meet the requirement. All electrical circuits shall be 208-240 VAC single phase with a minimum circuit rating of 32Amps (40 Amp branch breaker). Electric vehicle supply equipment (EVSE) is defined by the Ontario Electrical Safety Code as: the complete assembly consisting of cables, connectors, devices, apparatus, and fittings, installed for the purpose of power transfer and information exchange between the branch circuit and the electric vehicle.
3. Parking spaces are defined as inside the building, excluding outdoor parking lots. Provide Level 2 charging capability to the required % of enclosed dedicated parking spaces or by using an electric vehicle energy management system (EV EMS).
4. Rough-in provisions include empty raceways starting in a junction box in the electrical room and terminating in a junction box central to each parking floor. Raceways will be empty to accommodate future wiring.

[1] http://www.mto.gov.on.ca/english/vehicles/electric/electric-vehicle-chargers-ontario.shtml
[2] https://chargehub.com/en/electric-car-charging-guide.html#chargingnetworks
[3] https://vancouver.ca/files/cov/2019-006-electric-vehicle-charging-for-buildings.pdf

5. Section 86 of the Ontario Electrical Safety Code includes provisions for and permits the use of electric vehicle energy management systems (EV EMS) to monitor electrical loads and to control electric vehicle supply equipment loads.
6. EV EMS refers to a variety of technologies used to monitor and control electrical loads associated with charging EVs, also referred to as load sharing, load management, panel or circuit sharing or smart charging. EV EMS prevents circuit loads from exceeding the ampere rating of the circuit. Rough-in the remaining parking spaces for future EVSE.
7. The system must be capable of supplying a minimum performance level of 16 kWh average per EVSE, over an 8-hour period, assuming that all parking spaces are in use by a charging EV:
8. 16kwh/8hrs translates to a 2000W circuit per parking space minimum. For example: 2000W/208V @ 9.6A per outlet or 2000W/240V@ 8.33A per outlet.
9. Energized outlets or EVSE parking spaces shall be labelled for the intended use for electric vehicle charging.

Requiring that EV charging stations be provided at new developments can be first explored by requiring that the electrical rooms and infrastructure is set up for conversation or expansion in the future, through the by-law as well as subdivision agreements, without specifying the actual number of spaces. This applies to both residential and non-residential uses, but the residential uses would logically be the first to adopt this requirement since this is most likely where charging will typically take place.

The amount of electrical vehicle parking to be provided is difficult to establish without detailed studies and a cost-benefit analysis, but ensuring the infrastructure is available will allow for the conversion when EV becomes more prevalent. The Ontario Building Code previously required EV charging stations in specific scenarios as illustrated in **Figure 5**; however, in May 2019, there was a removal of the technical requirements related to electric vehicle charging infrastructure in houses and non-residential large buildings.[4]

[4] https://www.ontario.ca/page/building-code-updates

Figure 5: Excerpt from Ontario Building Code (removed in 2019)

3.1.21. Electric Vehicle Charging

3.1.21.1. Electric Vehicle Charging Systems

(1) Except as provided in Sentences (2.1) and (3), where vehicle parking spaces are located in a *building*, other than an apartment *building*, not less than 20% of the parking spaces shall be provided with *electric vehicle supply equipment* installed in accordance with Section 86 of the Electrical Safety Code adopted under Ontario Regulation 164/99 (Electrical Safety Code) made under the *Electricity Act, 1998*.

(2) The remaining parking spaces located in a *building* described in Sentence (1) shall be designed to permit the future installation of *electric vehicle supply equipment* that conforms to Section 86 of the Electrical Safety Code.

(2.1) Parking spaces located in a *building* need not comply with Sentence (1) where,

(a) before January 1, 2018,

(i) an agreement was entered into between the owner of the land on which the *building* is to be constructed and a distributor, as defined in subsection 2 (1) of the *Electricity Act, 1998*, that sets out the conditions for the connection of the *building* to a distribution system, as defined in subsection 2 (1) of that Act, or

(ii) a plan for the land on which the *building* is to be constructed respecting the siting and sizing of lines, transformers or other equipment used for conveying electricity was approved by a distributor, as defined in subsection 2 (1) of the *Electricity Act, 1998*, and

(b) an application for a permit to *construct* the *building* was made before January 1, 2020.

(3) Except as provided in Sentences (6) and (7), where a *house* is served by a garage, carport or driveway, the following shall be installed to permit the future installation of *electric vehicle supply equipment* that conforms to Section 86 of the Electrical Safety Code:

(a) a minimum 200 amp panelboard,

(b) a conduit that is not less than 27 mm trade *size* and is equipped with a means to allow cables to be pulled into the conduit, and

(c) a square 4-11/16 in. trade *size* electrical outlet box.

(4) The electrical outlet box described in Clause (3)(c) shall be installed in the garage or carport or adjacent to the driveway.

(5) The conduit and electrical outlet box described in Clauses (3)(b) and (c) shall provide an effective barrier against the passage of gas and exhaust fumes.

Richmond Hill can consider including a requirement that 20% of all condominium resident parking spaces be equipped with electrification, and that all spaces be provided with conduits or raceways. The City could also introduce a lower minimum requirement for non-residential land uses or use it as an incentive tied to the TDM Strategy, even though EV is not in itself a TDM measure. The city can also define the requirement for Level 2 charging or higher. Consideration of electric bike charging spaces can also be provided in the form of a Level 1 charging station (wall socket), or higher, based on the standards for charging electric bikes.

2.6 Accessible/Barrier-Free Parking Spaces

An accessible (or barrier-free) parking spaces are spaces for people living with a disability as defined in the *Accessibility for Ontarians with Disabilities Act* (AODA, 2005)[5]. Accessible parking spaces require the space to be wider to allow for loading and offloading at the side of the vehicle either through a larger individual space, or requiring a no-parking buffer beside the parking space. The latter approach allows for more efficient design of parking areas, especially when there are

[5] https://www.ontario.ca/laws/regulation/110191#BK132

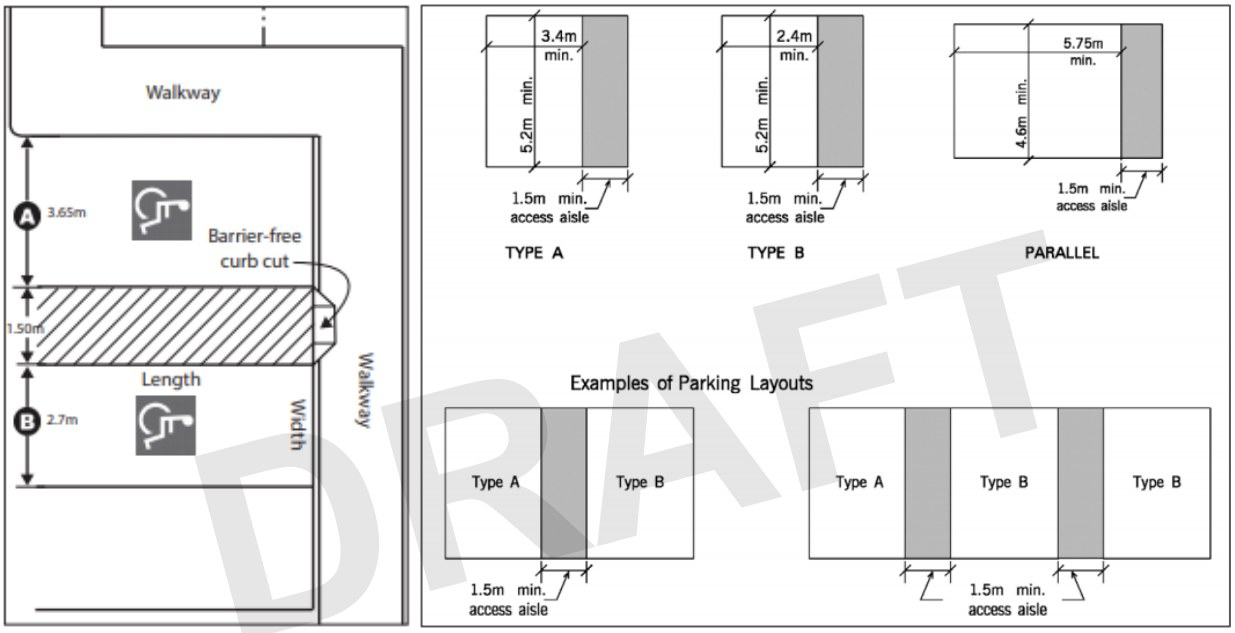
a higher number of accessible parking spaces required and located in the same row since the buffer area can be shared between two spaces.

The typical specifications within the by-laws for defining accessible parking include:

- Parking space dimensions,
- Access aisle dimensions, and
- Demarcation that the space is reserved for people living with a disability.

Images of accessible parking space designs with the access aisle are shown in **Figure 6**.

Figure 6: Accessible Parking Space Design (Zoning By-Law from Oakville [left] and Mississauga [right])



Richmond Hill currently defines a minimum width for accessible parking within By-law 305-90[6] as 3.7 metres with no defined access aisle. Generally, there are two approaches to barrier-free or accessible parking in terms of the minimum dimensions. The first approach is defining two types of accessible parking spaces based on the minimum widths defined in the AODA: Type A (at least 3.4 metres wide) and Type B (at least 2.4 metres wide). The second approach is to define a single space that meets the requirements of the larger accessible parking space with/without the access aisle (Type A) – this is the case for Richmond Hill. The exceptions include Markham (undergoing by-law update), Hamilton (does not define a shared buffer access aisle), and Vancouver (outside of Ontario).

The AODA defines Type A and Type B spaces as follows:

- Type A – 3.4 metres minimum width with signage that identifies the space as van accessible.

[6] https://www.richmondhill.ca/en/shared-content/resources/documents/595-1106.pdf

- Type B – 2.4 metres minimum width.

Where the length of an accessible parking space is defined in the zoning by-law, the minimum length is equal to the minimum length of a typical perpendicular parking space – except for Vaughan which denotes that the minimum barrier-free adjacent access aisle length is 5.8 metres (0.1 metres longer than the 5.7-metre minimum length of the accessible parking space), but the rationale for this is not clear.

Each municipality by-law also defines an "access aisle" with the following characteristics:

- Minimum width of 1.5 metres,
- Must extend the full length of the parking space,
- Must be marked with high tonal contrast diagonal lines, which discourages parking in them, and
- May be shared between two accessible parking spaces.

The minimum dimensions for the accessible parking spaces as defined within the by-law are summarized in **Table 11**.

Table 11: Summary of Accessible Parking Space Dimensions

Municipality	Accessible Parking Space			Accessible Parking Space (Type A)			Accessible Parking Space (Type B)			Access Aisle
	L	W	VC	L	W	VC	L	W	VC	
Richmond Hill	**-**	**3.7**	**-**		**N/A**			**N/A**		**-**
Brampton		N/A		-	3.4	-	-	2.4	-	1.5
Hamilton	5.8	4.4	-		N/A			N/A		-
Markham	5.8	2.6	-		N/A			N/A		1.5
Mississauga		N/A		5.2	3.4	-	5.2	2.4	-	1.5
Newmarket		N/A		5.5	3.4	-	5.5	2.6	-	1.5
Oakville		N/A		5.7	3.65	-	5.7	2.7	-	1.5
Toronto	5.6	3.9	2.1		N/A			N/A		1.5
Vaughan		N/A		5.7	3.4	2.0	5.7	2.4	2.0	1.5
Vancouver	5.5	4	2.3		N/A			N/A		-
AODA		N/A		-	3.4	-	-	2.4	-	1.5
Minimum	5.5	2.6	2.1	5.2	3.4	2.0	5.2	2.4	2.0	1.5
Median	5.7	3.9	2.2	5.6	3.4	2.0	5.6	2.4	2.0	1.5
Average	5.7	3.7	2.2	5.5	3.4	2.0	5.5	2.5	2.0	1.5
Maximum	5.8	4.4	2.3	5.7	3.65	2.0	5.7	2.7	2.0	1.5

Notes: L = Length; W = Width; VC = Vertical Clearance

Toronto denotes the location of accessible parking spaces by requiring in the by-law that the accessible parking spaces must be the parking spaces closest to a barrier free:

(a) Entrance to a building;
(b) Passenger elevator that provides access to the first storey of the building; and
(c) And shortest route from the required entrances in (a) and (b) (Under appeal)

Toronto also establishes minimum dimensions of an accessible parallel parking spaces (7.1 metres by 2.6 metres with 2.1 metres vertical clearance). Mississauga establishes a minimum

dimension for an accessible parallel parking space of 5.75 metres by 4.6 metres with a 1.5-metre wide access aisle perpendicular to the drive aisle.

Where municipalities differentiate accessible parking spaces by Type A and Type B, the by-law states that where an odd number of accessible parking spaces are required, the extra space is assigned as a Type B (smaller) space (except where only one space is required, a type A space shall be provided). In Newmarket, the by-law explicitly notes that the odd Type B space may be changed to a Type A (Newmarket). Oakville does not note that where one space is required, it must be a Type A. The Type A and Type B rate descriptions are summarized in **Table 12**.

Table 12: Summary of Additional Accessible Parking Details

Accessible Parking Details	Brampton	Mississauga	Newmarket	Oakville	Vaughan	AODA
Where 1 space is required, Type A shall be provided	✓	✓	✓*			✓
Where an even number of accessible parking spaces are required, an equal number of Type A and Type B barrier-free parking spaces shall be provided	✓	✓	✓	✓	✓	✓
Where an odd number of accessible parking spaces are required, the number of barrier free parking spaces must be divided equally between a Type A and a Type B accessible space, with the remaining space provided as a Type B accessible parking space	✓	✓	✓	✓	✓	
Where an uneven number of accessible parking spaces are required, the extra space may be Type B						✓
Where an uneven number of accessible parking spaces are required, the extra Type B space may be changed to a Type A			✓			
In all cases, the minimum requirement for a Type B accessible parking space may be satisfied by a Type A accessible parking space					✓	

Newmarket requires 1 Type A space where 1 to 12 spaces are required and 1 Type B space where 13 to 25 spaces are required. Vancouver allows each required accessible space can count as two standard parking spaces toward meeting minimum total required parking.

Other design considerations related to accessible parking spaces include signage, pavement markings, and curb cuts.

The City can consider establishing Type A and Type B parking spaces with the minimum length equal to the standard space minimum length, and minimum width of 3.4 metres and 2.4 metres respectively. Additional requirements would include an access aisle of 1.5 metres, signage, pavement markings and curb cuts. The dimensions for accessible parking spaces are summarized in **Table 13**. Alternatively, **for simplicity, Richmond Hill can consider a single dimension for accessible parking spaces with a width equal to 3.4 metres (satisfying both Type A and Type B minimum requirements) while introducing the 1.5m access aisle (which can be shared between two accessible parking spaces). Allowing for Type B parking spaces would allow for more space saving when there are a higher number of**

accessible parking spaces being provided. Additional considerations include denoting location of accessible parking spaces to be the closes parking spaces to a barrier-free entrance (similar to Toronto). The City can also consider including provisions for parallel accessible parking spaces, however, requiring access aisles and greater depths can make integrating parallel accessible parking spaces into a parking area design difficult or inefficient, and may therefore be rarely used.

Table 13: Preliminary Recommendations for Minimum Parking Space Dimensions

Municipality	Accessible Parking Space Dimensions (m) Type A			Accessible Parking Space Dimensions (m) Type B			Access Aisle (m)
	Length	Width	Vertical Clearance	Length	Width	Vertical Clearance	
Richmond Hill	5.6 (-0.2)	3.4 (-0.3)	2.0 (+2.0)	5.6 (-0.2)	2.4 (-1.3)	2.0 (+2.0)	1.5 (+1.5)

2.7 Stacking (Queuing) Spaces

Stacking (or queuing) spaces allow vehicles wait and access a drive through facility. Richmond Hill currently does not define stacking or queuing spaces similar to other municipalities including Brampton, Mississauga, Markham, and Vancouver. Definitions of stacking (or queuing) spaces/lanes are summarized in **Table 14** and minimum dimensions for each stacking space are summarized in **Table 15**.

Table 14: Definitions for Stacking (or Queueing) Lanes/Spaces

Municipality	Definitions
Hamilton	*Stacking space* shall mean an area devoted to the waiting or queuing of motor vehicles accessing a drive through facility, separate from any aisle providing access to and from any parking area.
Newmarket	*Queuing lane* means a portion of a parking area or a parking lot, other than a parking aisle or a parking space which provides standing room for vehicles in a queue while awaiting service from a drive-thru facility. For the purposes of this definition, a queuing lane shall be measured by the length of a queuing space times the number of spaces required. *Queuing spaces* means an area occupied by a motor vehicle within a queuing lane while awaiting service from a drive-thru facility.
Oakville	*Stacking lane* means a continuous on-site queuing lane that includes stacking tandem spaces for motorized vehicles which is separated from other vehicular traffic and pedestrian circulation by barriers, markings or signs.
Toronto	*Stacked parking space* means a parking space that is positioned above or below another parking space and is accessed only by means of an elevating device. *Stacking aisle* means an onsite queuing area for motor vehicles that is separated from other vehicle traffic and pedestrian circulation by barriers, markings or signs.

Vaughan	*Stacking Lane* means a vehicular accessway designed to keep motor vehicles in a linear queue while patrons order, receive or await service while remaining in their motor vehicle. *Stacking* Space means an area within a stacking lane devoted to a single motor vehicle.

Table 15: Summary of Minimum Stacking Space Dimensions

Municipality	Stacking Space			Stacking Lane Required for Land Uses
	Length (m)	Width (m)	Vertical Clearance (m)	
Richmond Hill	-	-	-	-
Brampton	-	-	-	-
Hamilton	6.0 (+0.2)	2.6 (-0.2)	-	Commercial Parking Facilities and Hotels
Markham	-	-	-	-
Mississauga	-	-	-	Convenience restaurants, convenience retail and service kiosks
Newmarket	5.5 (-)	2.6 (-0.1)	-	-
Oakville	6.0 (+0.3)	2.7 (-)	-	Financial Institution, Motor vehicle washing facility, restaurant, retail store, school (private), school (public), service commercial establishment
Toronto	6.5 (+0.9)	3.0 (+0.4)	-	Drive Through Facility; vehicle washing
Vaughan	6.0 (+0.5)	2.7 (+0.2)	2.0 (-)	Car wash, drive-through associated with a financial institution/restaurant/any other retail use
Vancouver	-	-	-	-

Numbers in (brackets) refer to the change in dimension from the typical perpendicular minimum space requirements to the stacking space requirements.

In general, the length of the stacking space is larger than the typical parking space; however, the width of the space differs between municipalities compared to the municipality's typical parking space dimension. Municipalities will also define the land uses (typically those that use a drive-through) in which the stacking spaces are used. **The City can consider defining a stacking space dimension.**

2.8 Obstructions

Generally, municipalities define a parking space as an unobstructed space designed for the temporary parking of a motor vehicle. Therefore, the definition itself states that there is no obstruction within the space confined within the dimensions outlined in the preceding sections. By-laws appear to assume that part of the space must be unobstructed to allow passengers to open vehicle doors to enter/exit the vehicle. Therefore, if a space is located directly adjacent to the outer wall of a structure (an obstruction), the space should be increased in width to ensure doors can be opened and closed. This may also assist with maneuvering into the space if the space itself is constrained. Increasing the width of a space adjacent to a wall is one approach to dealing with dead ends in parking structures or parking areas where the last spaces are difficult

to access and where a hammerhead is not provided (discussed in further detail in the following sections).

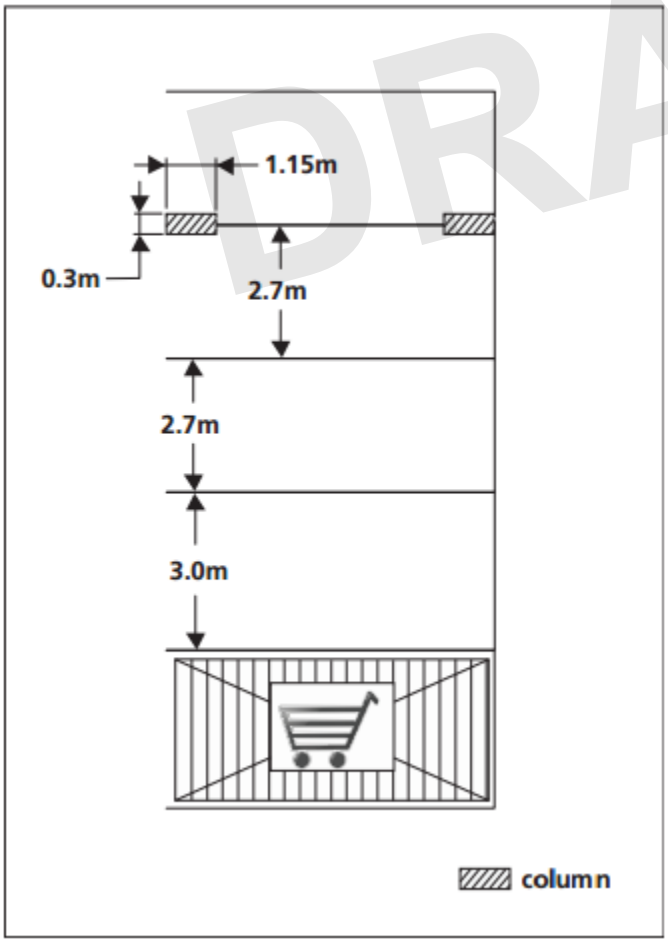
In many cases, columns or other obstructions are permitted within the spaces, but must be confined to the corner areas of the space. The purpose of this is to ensure that doors can be opened. A column that is located on the side of the space, but in the middle of the length of the parking space, is likely to obstruct the front, rear, or both of the vehicles doorways on that side of the car. For this reason, there are typically limits that define when a column or other obstruction is acceptable or not.

The typical specifications within the by-laws for parking obstructions include:

- Type of obstruction (wall, column, etc.),
- Proximity to parking space, or proximity from the front/ear of the parking space, and
- Increase in minimum parking space dimension to account for the obstruction.

Richmond Hill's by-law currently does not define an increase required to the parking space dimensions when there are obstructions near or within the space. An image describing obstructions adjacent to parking spaces from Oakville's by-law is shown in **Figure 7**.

Figure 7: Parking Space Obstruction Image (Oakville Zoning By-law)



Hamilton, Newmarket, Oakville, Toronto, and Vaughan generally describe a minimum increase to the minimum parking space dimension of 0.3 metres when an obstruction is located within 0.3 metres of the parking space and more than 1.0 metre from the front or rear of the parking space. The length of the wall/column for it to be considered an obstruction ranges 1.0 metres (Newmarket, Toronto, Vaughan) to 1.15 metres (Oakville, Hamilton) from the front or rear of the space. This may account for the difference in the standard length of a space which ranges from 5.5 metres to 5.7 metres for Newmarket, Toronto, and Vaughan, whereas it is slightly longer for Oakville and Hamilton (5.70 metres and 5.8 metres). Hamilton's by-law also specifies that light standards/poles located at the intersection of four (4) parking spaces are not considered an obstruction, but other by-laws would not need to specify this since the light pole would not be more than 1.0 metre from the front or rear of the space.

The by-law text that relates to parking space obstructions for each municipality is summarized in **Table 16**.

Table 16: By-Laws related to Parking Space Obstructions

Municipality	By-Law related to Parking Space Obstructions
Richmond Hill	-
Brampton	-
Hamilton	Where a wall, column, or any other obstruction is located abutting or within any parking space within an above ground or underground parking structure, the minimum width of a parking space shall be increased by 0.3 metres; Notwithstanding the above, an additional 0.3 metres shall not be required provided: 1. the maximum length of the wall, column or any other obstruction shall not exceed 1.15 metres; 2. the wall, column or any other obstruction is located at the front, rear, or both ends of the parking space; and, 3. the wall, column or any other obstruction does not project more than 0.15 metres into the width of the parking space. Light standards, including the base, located at the intersection of 4 parking spaces shall not be considered as an obstruction.
Markham	-
Mississauga	-
Newmarket	The side of a parking space is obstructed if any part of a fixed object such as a wall, column, bollard, fence, or pipe is situated within 0.3 metres of a side of the Parking Space, measured at right angles, and more than 1.0 metre from the front or rear of the Parking Space.
Oakville	Where a wall, column, or other obstruction is located abutting or within any parking space, the minimum width of the parking space shall be increased by 0.3 metres for each side that is obstructed. Obstructions within 1.15 metres of either stall end do not require an increase in parking space width, provided the obstruction projects no more than 0.15 metres into the parking space.
Toronto	The minimum width must be increased by 0.3 metres for each side of the parking space that is obstructed. The side of a parking space is obstructed if any part of a fixed object such as a wall, column, bollard, fence or pipe is situated: 1. within 0.3 metres of the side of the parking space, measured at right angles, and 2. more than 1.0 metre from the front or rear of the parking space.

Vaughan	The side of a parking space shall be deemed obstructed if any part of a fixed object such as a utility box, column, wall, pipe, fence or other similar object is located: 1. Within 0.3 metres of the side of a parking space, measured at right angles; and, 2. More than 1.0 metres from the front or rear of the parking space. Where a parking space is obstructed on one or both sides in accordance with this By-law, the width of the parking space must be increased by 0.3 metres. An obstruction located in the front of a parking space shall only be permitted where the parking space is for the exclusive use of a compact motor vehicle and where the obstruction shall have a maximum projection of 0.3 metres into the parking space and a maximum width of 1.2 metres.
Vancouver	All off-street parking spaces shall be a minimum of 5.5 metres in length and 2.5 metres in width and shall have a minimum vertical clearance of 2.0 m, except that: (a) where one side of any space abuts any portion of a fence or structure, the minimum width shall be 2.7 m; (b) where both sides of any space abut any portion of a fence or structure, the minimum width shall be 2.9 m;

Richmond Hill should consider some variation of the examples from other municipalities and add a provision within the by-law such that the minimum width must be increased by 0.3 metres for each side of the parking space that is obstructed. The side of a parking space is obstructed if any part of a fixed object such as a wall, column, bollard, fence or pipe is situated within 0.3 metres of the side of the parking space, measured at right angles, and more than 1.0 metre from the front or rear of the parking space. The city can also consider adding a provision that light standards located at the intersection of four (4) parking spaces are not considered an obstruction, or include a provision similar to Oakville which states that obstructions within 1.0 metre of either stall end do not require an increase in parking space width, provided the obstruction projects no more than 0.15 metres into the parking space. This will allow for more efficient parking designs.

It should be noted that architects do not always know the final locations of columns when they begin designing underground or structured parking areas. For this reason, they will occasionally design the parking area under the assumption there are obstructions, just in case the final design results in obstructions and the design cannot be revisited at the later stage. Therefore, allowing obstructions to enter a space slightly, may allow for more efficient and flexible design during the earlier stages.

3 Loading Spaces

Means an unobstructed area of land which is provided and maintained upon the same lot or lots upon which the principal use is located, and which:

a) is provided for the temporary parking of one or more commercial motor vehicles while merchandise or materials are being loaded or unloaded from such vehicles;
b) is suitable for the temporary parking of one commercial motor vehicle; and
c) shall not be used for the purpose of sale or display.

A review and comparison of loading standards for various municipalities included the following criteria:

- Loading requirements for multi-unit residential buildings,
- Standard loading space dimensions,
- Minimum driveway widths and maximum allowable gradients,
- Thresholds for exempting loading requirements for small lots and buildings, and
- Identifying the need for a breakdown of non-residential land uses.

The typical process to determine loading space requirements is similar to typical parking space requirements and is described as follows:

1. The reviewer will determine which set of loading requirements applies to a given land use. This may be based on:
    a. the Zone that the land use is contained within (less common);
    b. the specific land use; or,
    c. the general loading requirements which apply to all land uses (most common).
2. The reviewer will determine the floor area applicable to the specific land use or development (typically gross floor areas are used).
3. The reviewer will determine the number of spaces according to the above floor area.
    a. For the municipalities that contain more than one type of loading space, the reviewer will determine how many of each type of spaces are required according to the floor area. Typically, as more spaces are required, the size of the required spaces also increases.

Richmond Hill defines two sizes of loading spaces; however, the smaller loading space is only applicable for a second loading space requirement of residential buildings. All other loading spaces must be at the size of the larger. Additionally, residential buildings have a maximum minimum requirement of 2 loading spaces which applies to any building with more than 400 units.

At a minimum, each municipality outlines one loading space size which is applicable to all uses and these spaces are referred to herein as “standard” loading spaces. However, some municipalities have provided further breakdowns of types of loading spaces depending on the needs of different land uses or based on the sizes of each use. Toronto has the greatest

number of loading space types (4) with Vaughan proposing the same breakdown in the draft by-law update, as summarized in **Table 17**. The terms “small”, “standard”, “extended”, and “large” are only used to characterize the spaces for comparison between the municipalities. Hamilton is also noted to have four (4) different types of loading spaces; however, this primarily shows various by-law definitions of zone specific loading spaces. When there is one standard loading space size defined, it is normally intended to also accommodate refuse collection which requires greater vertical clearances.

Table 17: Summary of Loading Space Types

Municipality	“Small”	“Standard”	“Extended”	“Large”
Range of Lengths	**< 8.0m**	**8.0m – 12.5m**	**12.5m – 16.0m**	**16.0m – 18.0m**
Richmond Hill		✓	✓	
Brampton		✓		
Hamilton	✓	✓	✓	✓
Markham		✓		
Mississauga		✓		
Newmarket		✓		
Oakville		✓	✓	
Toronto	✓	✓	✓	✓
Vaughan	✓	✓	✓	✓
Vancouver	✓	✓		✓

Hamilton, Oakville, Toronto, Vaughan, and Vancouver have two or more sizes of loading space dimensions which are discussed in the following sections.

Toronto, Vaughan, and Vancouver are the municipalities reviewed that have more than two types of loading spaces, and this is tied to the fact that these municipalities also have the most highly defined requirements for specific land uses rather than having only general requirements that apply to all non-residential uses. This is because it is difficult to assign specific types of spaces to a given land use if that land use is only addressed in the by-law under “general requirements”. The Vaughan’s draft zoning by-law appears to adopt the exact same breakdown of sizing as Toronto.

Generally, the width and vertical clearance of loading spaces are similar between municipalities and between types of loading spaces. Variations on the types of spaces is largely a result of the varying length although there are variations on the vertical clearance as well. The naming of space types – “small”, “standard”, “extended”, and “large” – is only used in the context of this document and is not necessarily adopted from any of the standards which were reviewed. Loading space dimensions for the various municipalities are summarized in **Table 18**.

Table 18: Summary of Loading Space Dimensions

Municipality	"Small" < 8.0m			"Standard" 8.0m – 12.5m			"Extended" 12.5m – 16.0m			"Large" 16.0m – 18.0m		
	L	W	VC	L	W	VC	L	W	VC	L	W	VC
Richmond Hill	**-**	**-**	**-**	**9.0**	**3.7**	**4.3**	**13.0**	**3.5**	**6.1**	**-**	**-**	**-**
Brampton[1]	-	-	-	9.0	3.5	4.25	-	-	-	-	-	-
Hamilton	7.5	3.0	4.3	9.0	3.7	4.3	15.2	3.6	4.3	18.0	3.7	4.3
Markham	-	-	-	10.0	3.5	4.2	-	-	-	-	-	-
Mississauga	-	-	-	9.0	3.5	-	-	-	-	-	-	-
Newmarket	-	-	-	9.0	3.6	4.2	13.7	3.6	4.2	-	-	-
Oakville[2]	-	-	-	12.0	3.5	4.2	-	-	-	-	-	-
Toronto	6.0	3.5	3.0	11.0	3.5	4.0	13.0	4.0	6.1	17.0	3.5	4.4
Vaughan	6.0	3.5	3.0	11.0	3.5	4.0	13.0	4.0	6.1	17.0	3.5	4.4
Vancouver	5.5	2.7	2.3	8.5	3.0	3.8	-	-	-	17.0	3.5	4.3
Minimum	**5.5**	**2.7**	**2.3**	**8.5**	**3.0**	**3.8**	**13.0**	**3.5**	**4.2**	**17.0**	**3.5**	**4.3**
Median	**6.0**	**3.3**	**3.0**	**9.0**	**3.5**	**4.2**	**13.0**	**3.6**	**6.1**	**17.0**	**3.5**	**4.4**
Average	**6.3**	**3.2**	**3.2**	**9.8**	**3.5**	**4.1**	**13.6**	**3.7**	**5.4**	**17.3**	**3.6**	**4.4**
Maximum	**7.5**	**3.5**	**4.3**	**12.0**	**3.7**	**4.3**	**15.2**	**4.0**	**6.1**	**18.0**	**3.7**	**4.4**

Notes: L = Length; W = Width; VC = Vertical Clearance

1) Brampton's loading space minimum width increases to 4.25 metres for industrial land uses.
2) Oakville does not require a minimum number of loading spaces as per Zoning By-law 2014- 014. Should loading spaces be provided, the following regulations apply to set appropriate dimensions and locations. A minimum requirement does apply in North Oakville (which speaks to loading docks for industrial uses noted in table above). Loading docks must have a minimum length of 9 metres.

Generally, the loading space dimensions defined by Richmond Hill is consistent with the other municipalities; however, it should be noted that the typical loading space for Richmond Hill has a minimum length of 13.0 metres which is longer that the standard spaces of municipalities with only a single loading space defined (ranging from 9.0 to 12.0 metres and an average of approximately 10.0 metres). The standard Richmond Hill loading space is comparable to the City of Toronto Type 'G' space which is the space required for refuse collection at multi-unit buildings and doubles as a delivery loading space when it is not being used for refuse collection. This space is characterized as an "extended" space only for the comparisons above.

3.1 Types of Loading Spaces

3.1.1 "Small" Loading Space Dimensions

These "small" loading spaces are typically longer than the standard perpendicular parking space by 0.3 to 1.7 metres, and wider than the typical parking space by 0.2 to 1 metres.

- Lengths range from 5.5 metres to 7.5 metres.
- Widths range from 2.7 metres to 3.5 metres.
- Vertical clearances range from 2.3 metres to 4.3 metres.

Vancouver's smallest loading space dimension (5.5 x 2.7 x 2.3) is only slightly wider than the standard perpendicular parking space (5.5 x 2.5 x 2.0). It is also the smallest dimension of all

loading spaces defined by these municipalities with the smallest minimum length, width, and vertical clearance.

3.1.2 "Standard" Loading Space Dimensions

Most municipalities have developed minimum loading space dimensions for one single size of loading space. A "standard" loading size was selected based on whichever loading space type was most comparable to the standard space size for municipalities that only have one standard space size. The City of Mississauga was the only municipality that does not specify a minimum vertical clearance. Typically, a vertical clearance is required to accommodate vehicles such as trucks and front-end loading garbage trucks.

- Lengths range from 8.5 metres to 12.0 metres.
- Widths range from 3.0 metres to 3.7 metres.
- Vertical clearances range from 3.8 metres to 4.3 metres.

3.1.3 "Extended" Loading Space Dimensions

The loading space dimensions for the extended spaces are fairly consistent; however, it is worth noting that Richmond Hill's typical loading spaces (13.0-metre length) is consistent the larger ("extended") loading space of other municipalities.

The extended space for Toronto is typically used to support residential multiple dwelling unit buildings, specifically the refuse collection trucks which are front-end loaders and require additional maneuvering room. The equivalent space for the Town of Newmarket applies to employment zones, so although they are comparable in terms of size (length), they are not comparable in terms of purpose and function. A final note is to say that for Toronto, Type "G" spaces have lower maximum gradients which is also reflective of the fact that front end loaders would have difficulties with steeper grades since a heavy bin could pose a risk to tipping the refuse truck, or the geometry of the trucks "arms" would make lifting the bins difficult or potentially dangerous.

- Lengths range from 13.0 metres to 15.2 metres.(maximum of 13.7 metres when excluding Vancouver).
- Widths range from 3.5 metres to 4.0 metres.
- Vertical clearances range from 4.2 metres to 6.1 metres.

3.1.4 "Large" Loading Space Dimensions

The minimum dimensions for large spaces are fairly consistent and should be enough to accommodate a typical tractor trailer, with the cab slightly extending beyond the length of the space itself (typically tractor trailers are less than 18.0 metres in length). Without the cab, the trailer could be left at the loading space without blocking the access lane or driveway.

- Lengths range from 17.0 metres to 18.0 metres.
- Widths range from 3.5 metres to 3.7 metres.
- Vertical clearances range from 4.3 metres to 4.4 metres.

3.1.5 When are Different Types (Sizes) of Loading Spaces Needed?

Richmond Hill defines two loading space dimensions (fit into the standard and extended loading space categories when compared to other municipalities); however, the smaller of the two spaces is only used as an option for larger residential developments where two loading spaces are required (i.e. the second loading space may be smaller). All other requirements require the larger loading space.

Similarly, Toronto requires the smallest loading space (Type "C") be provided as a supplementary loading space for multi-unit dwellings with more than 400 units. Some other non-residential land uses also require the smaller Type "C" space be provided and this may be required as the base (default) loading space for a small sized use, or may be required for larger sized uses, and this is dependent on the land use.

Larger loading spaces are typically required as a default to accommodate the largest vehicles expected to serve the land use; however, as the development gets larger (and start requiring more loading spaces), depending on the land uses, rather than requiring more larger spaces, the municipality may still increase the number of loading spaces, but only require the addition of smaller loading spaces as supplementary to the default requirement. In the City of Toronto, for multi-unit buildings the default requirement is a Type "G" space which can accommodate refuse collection, and then any other additional spaces (required Type "C" space) is supplementary to the Type "G" space, and the requirement can be fulfilled by the larger Type "G" space.

With respect to non-residential uses, the correlation between longer spaces and more GFA is logical because larger uses will likely move more goods or merchandise at a time, and thus will receive larger trucks. In some cases, there may be a mixture of loading space types required to satisfy the requirements. In the City of Toronto, for warehouse and Manufacturing uses, the default requirement is a Type "C" space (the smallest of the loading space), and for larger uses the loading space requirement increases to Type "B", and finally to Type "A" as the floor area increase. After 15,000 SM GFA, the requirement maxes out at a minimum of 3 Type "A" (large) loading spaces.

None of the municipalities reviewed have a maximum loading space requirement.

3.2 Land Uses Requiring Loading Spaces

Richmond Hill currently specifies loading space rates for dwelling units, and a general rate for non-residential units. This is similar to Markham (except no residential rate), Mississauga (exclusive 'office' and 'medical office' loading rate, and other non-residential land uses grouped together, with a separate requirement for apartment or retirement buildings), and Toronto (additional specific rates for non-residential land use groupings outside of 'buildings containing dwelling units').

Other municipalities including Brampton, Hamilton, Newmarket, Toronto, Vaughan, and Vancouver specify rates for select land uses. These land uses typically include the following:

- retail (or commercial),
- office,

- industrial/manufacturing,
- hotel,
- supermarket,
- community care facility, and
- employment.

Specified land uses that require loading spaces for the various municipalities are summarized in **Table 19**.

Table 19: Summary of Land Uses Requiring Loading Spaces

Municipality	Dwelling Units	Retail / Commercial	Office	Industrial	Manufacturing	Hotel	Supermarket/ Grocery Store	Community Care Facilities	Employment	Other non-residential uses[1]
Richmond Hill	✓	*	*	*	*	*	*	*	*	✓
Brampton		✓	✓	✓						
Hamilton	✓	✓	✓							
Markham		*	*	*	*	*	*	*	*	✓
Mississauga[2]	✓	*	✓	*	*	*				✓
Newmarket	✓	✓	*	*					✓	
Oakville[3]				✓						
Toronto	✓	✓	✓	*	✓	✓	✓	*	*	✓
Vaughan	✓	✓				✓	✓			
Vancouver	✓			✓		✓		✓		

Notes:
1) *Land use rate covered by an “other land uses” category
2) Mississauga’s land uses that require loading spaces are explicit to retail store, retail centre, office, medical office, overnight accommodation, restaurant, convenience restaurant, manufacturing facility, warehouse/distribution facility, and wholesaling facility
3) Oakville There is no minimum number of loading spaces required by Zoning By-law 2014- 014. Should loading spaces be provided, the following regulations apply to set appropriate dimensions and locations. A minimum requirement does apply in North Oakville (which speaks to loading docks for industrial uses noted in table above). Loading dock minimum length of 9 metres.

The city’s current practice of having a general rate for residential and non-residential land uses is comparable to other municipalities. It is noted that since other municipalities specify a rate for specific land uses (e.g. retail, office, industrial/manufacturing etc.), the City can consider identifying specific rates as well; however, if the rates are similar to the general non-residential land use, then a general rate may be simpler and more appropriate. Specific rates for the various land uses are explored in the following sections.

3.2.1 Residential Loading Space Rates

The minimum residential loading space rates for each municipality is summarized in **Table 20**.

Table 20: Summary of Residential Loading Space Rates

Residential Units						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Richmond Hill[1]	31 - 399	1	-	-	1	-
	400+	2	-	1	1	-
Brampton	-		-	-	-	-
Hamilton[2]	5 - 30	1	-	1	-	-
	30 - 100	1	-	-	-	1
	100+	2	-	1	-	1
Markham	-		-	-	-	-
Mississauga	30+	1	-	1	-	-
Newmarket	20+	1	-	1	-	-
Oakville	-		-	-	-	-
Toronto[3]	31 - 399	1	-	-	1	-
	400+	2	1	-	1	-
Vaughan	31 - 399	1	-	-	1	-
	400+	2	1	-	1	-
Vancouver	100 - 299	1	-	1	-	-
	300 - 499	2	-	2	-	-

Notes:

1) For Richmond Hill, of the two required loading spaces for a land use with 400 dwelling units or more, one space (of the minimum two required) may have a width of not less than 3.7 metres and a length of not less than 9.0 metres with a minimum of 4.3 metres overhead clearance. This space shall not be used for refuse loading.
2) Hamilton Where a building or structure is comprised of a joint residential use and a commercial use, the number of the required loading spaces for the commercial uses may be reduced by 50% of the required number of loading spaces for the residential uses.
3) Toronto apartments with 400 or more units may satisfy the requirement for a “small” loading space (type C) by providing instead any larger type of loading space (type A, type B, or a second type G).

Richmond Hill requires one (1) loading space for buildings with at least 31 dwelling units, and an additional loading space for buildings with over 400 dwelling units. This is consistent with the majority of municipalities that define loading space requirements for residential land uses. The zoning by-laws for Brampton, Markham, and Oakville do not define a minimum supply rate for loading spaces for residential units. Of the municipalities that do require loading spaces, there is a high degree of consistency with Richmond Hill such that the threshold below which no loading spaces are required is typically 31 units – the exceptions are Hamilton (less than 5 units), Newmarket (less than 20 units), and Vancouver (less than 100). **With the consistency with other municipalities, it is recommended that the City keep the loading space requirement thresholds and minimum number of spaces required for each threshold.**

In terms of the type of loading space, the loading space size required for residential parking falls within the “extended” loading space for the first space, and the “standard” size for the second loading space. Mississauga, Newmarket, and Vancouver only require a smaller “standard” space type for residential units; however, it should be noted that Richmond Hill’s Standards and Specifications Manual, the loading space required for waste collection is defined as the

"extended" space dimension; therefore, unless the waste collection units can be accommodated by a smaller space, **the current "extended" space requirement should remain unchanged.**

Generally, the type of loading spaces required for Richmond Hill is consistent with Hamilton, Toronto, and Vaughan (larger space for first requirement, and smaller space over another unit number threshold). As previously noted, as the development gets larger (and start requiring more loading spaces), rather than requiring more spaces of the same type, the municipality will still increase the number of loading spaces, but will only require the addition of smaller loading spaces. Toronto and Vaughan's second loading spaces are categorized as "small" suggesting that the second loading space for Richmond Hill could be smaller (6.0 metres long rather than 9.0 metres long). **The City can consider a smaller second loading space for buildings containing dwelling units, similar to Toronto and Vaughan; however, the current size for the second space is similar to Hamilton and Vancouver.**

3.2.2 Non-Residential Loading Space Units vs. Zones

All the municipalities use non-residential rates based on gross floor area (GFA), with the exceptions of Hamilton where the type of floor area is unspecified, Markham which bases the rates on net floor area, and Vancouver which bases loading space rates on number of units for Hotels, but uses GFA for other non-residential land uses – all other municipalities have non-residential land uses are based on GFA.

Summaries of the loading space requirements for different non-residential land uses are summarized in **Table 21** to **Table 27**. The development sizes are based on square metres of GFA except for Hamilton, Markham, and hotel rates for Vancouver (as previously noted). These tables summarize the total loading spaces required based on the development size, as well as the breakdown of types (sizes) of loading spaces required. Richmond Hill has a general non-residential loading space rate which has been copied to each table to compare with specific land-use by-laws.

The Town of Newmarket has rates defined for commercial and urban centre zones, and employment zones, and therefore differs from the other municipalities since zones are used to determine loading requirements rather than land uses; however, the requirements have been categorized within the commercial/office land use where appropriate.

The other non-residential land use rates for Mississauga and Toronto list explicit land uses that the rates apply to.

3.2.3 Non-Residential Loading Space Rates

As noted, Richmond Hill has a general rate for loading spaces required by non-residential land uses. Markham, Mississauga, and Toronto also have a general rate for non-residential uses applied to other non-residential uses without specified rates. Mississauga defines a list of land uses where these 'other' rates apply; Toronto has another generalized grouping that explicitly includes passenger terminals and hospitals "or any other use similarly involving shipping, loading or unloading of persons, animals or goods, wares or merchandise" and the number of loading spaces are defined, but not the type and size; whereas Markham applies the rate for all non-residential land uses similar to Richmond Hill.

The general loading space rates for (other) non-residential land uses are summarized in **Table 21**. The thresholds for additional loading spaces in Richmond Hill are 465 square metres (approximately 5,000 square feet), 2323 square metres (approximately 25,000 square feet), and 9290 square metres (approximately 100,000 square feet). **The city can consider updating the thresholds to the nearest 100 square metres such that the thresholds are 500, 2500, and 10000 square metres for review purposes unless the preferences is to review in square feet.**

The number of spaces required by Richmond Hill is fairly consistent with the other municipalities across all development sizes. It can be noted that Toronto does establish a maximum of five loading spaces/thresholds. Since the general rates are fairly consistent, no changes are recommended; however, **the city can consider listing the specific non-residential land uses that would require loading spaces rather than a rate used for all non-residential land uses, particularly if there are common request for exemptions from loading requirements experienced by the City through some development applications.**

Table 21: Loading Space Rates for Other Non-Residential Uses

Other Non-Residential Uses						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Richmond Hill	465 - 2,323	1	-	-	1	-
	2,323 - 9,290	2	-	-	2	-
	Each additional 9,290 or part thereof over 9,290	1	-	-	1	-
Brampton	-	-	-	-	-	-
Hamilton	-	-	-	-	-	-
Markham[1]	300 -1,860	1	-	1	-	-
	1,860+	2	-	2	-	-
Mississauga	250 - 2,350	1	-	1	-	-
	2,350 - 7,500	2	-	2	-	-
	7,500 - 14,000	3	-	3	-	-
	Each additional 2,300 or part thereof over 14,000	1+	-	1+	-	-
Newmarket	-	-	-	-	-	-
Oakville	-	-	-	-	-	-
Toronto[2]	500 - 2,300	1	-	1	-	-
	2,300 - 7,500	2	-	2	-	-
	7,500 - 14,000	3	-	3	-	-
	14,000 - 22,000	4	-	4	-	-
	22,000 - 30,000	5	-	5	-	-
Vaughan	-	-	-	-	-	-
Vancouver	-	-	-	-	-	-

Notes:

1) Markham – Day nurseries, places of worship and public and private schools are not required to provide loading spaces.
2) Toronto – Rates apply to a passenger terminal, hospital, or any other use similarly involving shipping, loading or unloading of persons, animals or goods, wares, or merchandise.

The following sections outline the rates provided for specific non-residential land uses as outlined in other municipalities, and compares the rates with the Richmond Hill general non-residential loading space requirements. The common land uses include:

- Retail / Commercial,
- Office,
- Industrial / Manufacturing,
- Hotel,
- Supermarket / Grocery Store, and
- Community Care Facilities.

The loading space rates for retail/commercial land uses are summarized in **Table 22**. Richmond Hill's general rate is fairly consistent with the specific retail/commercial rates of the other municipalities.

There is a maximum of five loading spaces for Toronto and Vaughan; however, this is set at a large threshold of a retail size greater than 20,000 square metres. It can be noted that the Toronto and Vaughan require "large" loading spaces for retail land uses larger than 10,000 square metres. These spaces have a length of 17.0 metres compared the Richmond Hill's 13.0 metres and are likely intended to accommodate tractor trailers. **The city can consider implementing a specific rate for some land uses (like retail, grocery or industrial/warehousing) in order to introduce a requirement for providing larger loading spaces; however, this does add complexity to the by-law and should only be considered if there have been issues with insufficient loading at large retail developments.**

Table 22: Loading Space Rates for Retail / Commercial Land Uses

Retail / Commercial						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Richmond Hill	465 - 2,323	1	-	-	1	-
	2,323 - 9,290	2	-	-	2	-
	Each additional 9,290 or part thereof over 9,290	1+	-	-	1+	-
Brampton	< 2350	1	-	1	-	
	2,350 - 7,450	2	-	2	-	-
	7,450 - 14,000	3	-	3	-	-
	Each additional 9,300 or part thereof over 14,000	1+	-	1	-	-
Hamilton	450 - 900	1	-	1	-	-

Retail / Commercial						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
	900 - 1,850	1	-	-	-	1
	1,850 - 7,400	2	-	-	-	2
	7,400 - 13,000	3	-	-	-	3
	Each additional 7,400 or part thereof over 13,000	1+	-	-	-	1+
Markham	300 -1,860	1	-	1	-	-
	1,860+	2	-	2	-	-
Mississauga	250 - 2,350	1	-	1	-	-
	2,350 - 7,500	2	-	2	-	-
	7,500 - 14,000	3	-	3	-	-
	Each additional 2,300 or part thereof over 14,000+	1+	-	1+	-	-
Newmarket	140.1 - 280	1	-	1	-	-
	280.1 - 2,323	2	-	2	-	-
	2,323.1 – 7,432	3	-	3	-	-
	Each additional 7432 or part thereof over 7432.1	1+	-	1+	-	-
Oakville	-	-	-	-	-	-
Toronto[1]	500 - 1,999	1	-	1	-	-
	2,000 - 4,999	2	-	2	-	-
	5,000 - 9,999	3	-	3	-	-
	10,000 - 19,000	4	-	3	-	1
	20,000+	5	1	3	-	1
Vaughan[2]	500 - 1,999	1	-	1	-	-
	2,000 - 4,999	2	-	2	-	-
	5,000 – 9,999	3	-	3	-	-
	10,000 - 19,000	4	-	3	-	1
	20,000+	5	1	3	-	1
Vancouver	100 - 465	1	-	1	-	-
	Each additional 1,860 or part thereof over 2,325	2	-	1+	-	-
	2000 - 5000	2+	-	-	-	1
	5000+	-	-	-	-	2

Notes:
1) Newmarket rates are based on rates defined for commercial and urban centre zones.
2) Toronto's rate applies to retail stores, eating establishments, and personal service shops.
3) Vaughan's rate excludes supermarkets, restaurants, and personal services.

The loading space rates for offices are summarized in **Table 23**. Richmond Hill's general rate is consistent at lower sizes and is generally one less space required at larger development sizes when compared to Toronto.

It can be noted that the loading spaces required at Toronto are categorized as "small" and "standard" indicating there is opportunity for the provision of smaller loading spaces for larger developments. **The city can consider allowing a smaller loading space where more than two loading spaces are required to offset the higher number of loading spaces required at larger non-residential development sizes; however, this does add complexity to the by-law and should only be considered if there have been historic issues with providing larger loading spaces at large offices or requests for fewer spaces from developers.**

Table 23: Loading Space Rates for Office Land Uses

Office						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Richmond Hill	465 - 2,323	1	-	-	1	-
	2,323 - 9,290	2	-	-	2	-
	Each additional 9,290 or part thereof over 9,290	1+	-	-	1	-
Brampton	2,350 – 11,600	1	-	1	-	-
	Each additional 9,300 or part thereof over 11,600	1+	-	1	-	-
Hamilton	450 - 1,850	1	-	1	-	-
	1,850 - 7,400	2	-	2	-	-
	7,400 - 13,000	3	-	3	-	-
	Each additional 7,400 or part thereof over 13,000	1+	-	1	-	-
Markham	300 - 1,860	1	-	1	-	-
	1,860+	2		2		
Mississauga	2,350 - 11,600	1	-	1	-	-
	Each additional 9,300 or part thereof over 11,600+	1+	-	1+	-	-
Newmarket	225.1 - 550	1	-	-	1	-
	550.1 - 2,323	2	-	-	2	-
	2,323.1 - 7,432	3	-	-	3	-
	Each additional 7,432 or part thereof over 7,432.1	1+	-	-	-	-
Oakville	-	-	-	-	-	-

Office						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Toronto	500 - 999	1	-	1	-	-
	1,000 - 1,999	2	1	1	-	-
	2,000 - 3,999	3	2	1	-	-
	4,000 - 27,999	4	2	2	-	-
	28,000+	5	3	2	-	-
Vaughan	-	-	-	-	-	-
Vancouver	1,000 - 7,500	1	1			
	7,500 - 15,000	2	2			
	15,000 - 20,000	3	3			
	20,000 - 28,000	4	4			
	Each additional 7,500 or part thereof over 28,000+	1+	1+			
	500 - 5,000	1		1		
	5,000 - 10,000	2		2		
	10,000 - 28,000	3		3		
	Each additional 15,000 or part thereof over 28,000+	1+		1+		
	1,000 - 7,500	1	1			

Note: Newmarket rate is based on rates used for land uses in employment zones.

The loading space rates for industrial/manufacturing land uses are summarized in **Table 24**. Richmond Hill's general rate is consistent with the rates at other municipalities. Aside from Toronto and Vancouver, Richmond Hill does have a higher threshold for requiring three (3) loading spaces – Brampton, Mississauga, and Newmarket require three spaces between 2,321 to 7,500 square metres; Richmond Hill requires 3 loading spaces over 9,290 square metres and that number goes up with size; and both Toronto requires 3 spaces over 10,000 square metres, and Vancouver requires. **With the variability in thresholds, there is no strong case to adjust the thresholds for increasing the loading spaces in Richmond Hill.**

There is a maximum of three loading spaces for Toronto for developments greater than 10,000 square metres. For comparison, an industrial development size of 18,580 square metres in Richmond Hill will require four (4) loading spaces. It can be noted that Toronto requires "large" loading spaces for developments larger than 1,000 square metres. These spaces have a length of 17.0 metres compared the Richmond Hill's 13.0 metres. **The city can consider implementing a specific rate for industrial/manufacturing land uses in order to introduce a requirement for providing larger loading spaces; however, this does add complexity to the by-law and should only be considered if there have been historic issues with insufficient loading at industrial/manufacturing developments.**

Table 24: Loading Space Rates for Industrial / Manufacturing Land Uses

Industrial / Manufacturing						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Richmond Hill	465 - 2,323	1	-	-	1	-
	2,323 - 9,290	2	-	-	2	-
	Each additional 9,290 or part thereof over 9,290	1	-	-	1	-
Brampton	< 280	1	-	1	-	-
	280 – 7,450	2	-	2	-	-
	7,450 – 14,000	3	-	3	-	-
	Each additional 9,300 or part thereof over 14,000	1+	-	1	-	-
Hamilton	-	-	-		-	-
Markham	300 -1,860	1	-	1	-	-
	1,860+	2	-	2	-	-
Mississauga	250 – 2,350	1	-	1	-	-
	2,350 – 7,500	2	-	2	-	-
	7,500 – 14,000	3	-	3	-	-
	Each additional 2,300 or part thereof over 14,000	1+	-	1	-	-
Newmarket	225.1 - 550	1	-	-	1	-
	550.1 - 2,323	2	-	-	2	-
	2,323.1 – 7,432	3	-	-	3	-
	Each additional 7,432 or part thereof over 7,432.1	1+	-	-	1+	-
Oakville	1,000 – 2,300	1	-	1	-	-
	2,300+	1+	-	1	-	-
Toronto	100 - 499	1	1		-	-
	500 - 999	1	-	1	-	-
	1,000 - 4,999	1	-	-	-	1
	5,000 - 9,999	2	-	-	-	2
	10,000+	3	-	-	-	3
Vaughan	-	-	-	-	-	-
Vancouver	100 - 465	1	-	1	-	-
	Each additional 1,860 or part thereof over 2,325	2	-	1+	-	-
	2000 - 5000	2+	-	-	-	1
	5000+	-	-	-	-	2

Notes:
1) Brampton loading space width increases to 4.25 metres from 3.5 metres for industrial zones.
2) Newmarket rate is based on rates used for land uses in employment zones.

The loading space rates for hotels are summarized in **Table 25.** Richmond Hill's general rate is consistent at lower sizes but begins to supplier more loading spaces at larger development sizes when compared to Toronto and Vaughan's hotel rates. Vancouver's rates are based on units and so a direct comparison cannot be made without estimating a GFA based on number of units; however, **it is recommended that the rates remain based on GFA for consistency and simplicity.**

There is a maximum of four loading spaces for Toronto and Vaughan; however, this is set at a large threshold of a hotels greater than 50,000 square metres. It can be noted that the loading spaces required at Toronto and Vaughan are categorized as "small" and "standard" indicating there is opportunity for the provision of smaller loading spaces for larger developments. Toronto and Vaughan also require "large" loading spaces for hotels larger than 50,000 square metres. These spaces have a length of 17.0 metres compared the Richmond Hill's 13.0 metres. **The city can consider allowing a smaller loading space where more than two loading spaces are required to offset the higher number of loading spaces required at larger development sizes; however, this does add complexity to the by-law and should only be considered if there have been historic issues with providing larger loading spaces at large hotels.**

Table 25: Loading Space Rates for Hotel Land Uses

Hotel						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Richmond Hill	465 - 2,323	1	-	-	1	-
	2,323 - 9,290	2	-	-	2	-
	Each additional 9,290 or part thereof over 9,290	1+	-	-	1	-
Toronto	0 - 4,999	1	-	1	-	-
	5,000 - 9,999	2	1	1	-	-
	10,000 - 19,999	3	1	2	-	-
	20,000 - 49,999	4	2	2	-	-
	50,000+	4	2	1	-	1
Vaughan	0 - 4,999	1		1	-	-
	5,000 - 9,999	2	1	1	-	-
	10,000 - 19,999	3	1	2	-	-
	20,000 - 49,999	4	2	2	-	-
	50,000+	4	2	1	-	1
Vancouver (size based on units)	150 - 249	1	1	-	-	-
	250 - 499	2	2	-	-	-
	500 - 699	3	3	-	-	-
	< 75	1	-	1	-	-

Hotel						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
	75 - 399	2	-	2	-	-
	400 - 599	3	-	3	-	-

The loading space rates for supermarkets are summarized in **Table 26**. Richmond Hill's general rate is consistent at lower sizes and is generally one less space required at larger development sizes when compared to Toronto and Vaughan's supermarket rates.

There is a maximum of five loading spaces for Toronto and Vaughan; however, this is set at a large threshold of a supermarket size greater than 20,000 square metres. It can be noted that the Toronto and Vaughan require "large" loading spaces for supermarkets larger than 1,000 square metres. These spaces have a length of 17.0 metres compared the Richmond Hill's 13.0 metres. **The city can consider implementing a specific rate for supermarkets in order to introduce a requirement for providing larger loading spaces; however, this does add complexity to the by-law and should only be considered if there have been historic issues with loading at large supermarkets.**

Table 26: Loading Space Rates for Supermarket / Grocery Store Uses

Supermarket / Grocery Store						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Richmond Hill	465 - 2,323	1	-	-	1	-
	2,323 - 9,290	2	-	-	2	-
	Each additional 9,290 or part thereof over 9,290	1+	-	-	1	-
Toronto	500 - 999	1	-	1	-	
	1,000 - 1,999	1	-		-	1
	2,000 - 4,999	2	-	1	-	1
	5,000 - 9,999	3	-	2	-	1
	10,000 - 19,999	4	-	2	-	2
	20,000+	5	-	3	-	2
Vaughan	50 - 999	1	-	1	-	-
	1,000 - 1,999	1	-	-	-	1
	2,000 - 4,999	2	-	1	-	1
	5,000 - 9,999	3	-	2	-	1
	10,000 - 19,999	4	-	2	-	2
	20,000+	5	-	3	-	2

The loading space rates for community care facility/hospital are summarized in **Table 27**. Richmond Hill's general rate is consistent when compared to Toronto and Vancouver's care facility rates; however, it can be noted that there is a maximum of five loading spaces for

Toronto and two loading spaces for Vancouver. The size of loading spaces required in Richmond Hill for these land uses is larger than Toronto's, and smaller than Vancouver's loading spaces. Only two municipalities have specified rates for these land uses, and Richmond Hill's general rate is fairly similar to the other municipalities; therefore, **no changes are recommended.**

Table 27: Loading Space Rates for Community Care Facility Land Uses

Community Care Facility / Hospitals						
Municipality	Size of Development	Total Loading Spaces	Required Loading Spaces (by Size)			
			Small	Standard	Extended	Large
Richmond Hill	465 - 2,323	1	-	-	1	-
	2,323 - 9,290	2	-	-	2	-
	Each additional 9,290 or part thereof over 9,290	1+	-	-	1	-
Toronto	500 - 2,300	1	-	1	-	-
	2,300 - 7,500	2	-	2	-	-
	7,500 - 14,000	3	-	3	-	-
	14,000 - 22,000	4	-	4	-	-
	22,000 - 30,000	5	-	5	-	-
Vaughan	-	-	-	-	-	-
Vancouver	per 2800	1	-	1	-	-
	2000 - 5000 for hospital or similar use	1	-	-	-	1
	5000+	2	-	-	-	2
Newmarket	300 - 999	1	-	-	1	-
	1,000 - 2,299	2	-	-	2	-
	2,300 - 7,299	3	-	-	3	-
	7,300+	1+	-	-	1+	-

Notes:
1) Newmarket rates are for Mixed Use and Institutional Zones from the Urban Centres Zoning By-law 2019-06.
2) Toronto rate is based on "other select uses" including passenger terminal, hospital, or any other use similarly involving shipping, loading, or unloading.
3) Although Vaughan's draft by-law typically carried over Toronto's loading space rates, it did not show the same rate here.
4) Vancouver's Community Care Facility (Class B) includes land uses such as hospitals, place of worship, schools, community centres, libraries, museums, theaters, stadiums / spectator facilities, fitness centres, etc.
5) Vancouver requires no Class B spaces for less than 100 square metres of gross floor area.

Generally, the other municipalities require loading spaces within the "standard" size category whereas Richmond Hill requires loading spaces within the "extended" category. Since the "extended" size is larger than the "standard" size, there is an opportunity to reduce the loading space length for the non-residential land uses. This would be consistent with the other municipalities; however, it is noted that the existing larger space meets the minimum requirements compared to the other municipalities. Additionally, the loading space defined in Richmond Hill's *Standards and Specifications Manual* is consistent with the "extended" loading space which suggests that the dimensions should not be reduced.

Most municipalities only have loading standards developed for select land uses. Most do not have a catch-all land use category to capture any land use not explicitly mentioned, so that the land uses that are included are all intentional. GFA thresholds where loading spaces are not required range from 250 to 1,000 square meter (SM) GFA. The upper limit where one loading space is required ranges from 230 to 2,800 SM GFA. For two and three loading spaces, the GFA ranges from 2,320 to 10,000 SM and 7,232 to 20,000 SM, respectively. Only Hotels required loading areas for very small sizes within Toronto and Vaughan, whereas all other municipalities and land uses waive the requirement for small uses.

This indicates that the floor area thresholds vary widely. For this reason, the City can keep thresholds for increasing the number of loading spaces required as is unless there are examples of when there were too few spaces provided. If there are also trends of developers providing more than the required number of spaces for select land uses, the by-law should be adjusted according to these cases. Additionally, if there are trends of developers providing oversized loading spaces, the City can consider defining a “large” loading space requirement similar to Hamilton, Toronto, Vaughan, and Vancouver (used for supermarkets, industrial/manufacturing, large hotels, and large retail/commercial land uses).

3.2.4 Loading Space Sharing

Within the city of Toronto here are established minimum number of loading spaces for shared loading spaces in buildings within Policy Area 1 (Downtown Core) and Policy Area 2 (Midtown) that consists of more than 2 of either office, retail, eating establishment, personal service shop, and hotels. For these buildings, the minimum number of “standard” (Type B) and “small (Type C) loading spaces is the largest number of “standard” and “small” spaces required for any one of the mentioned listed uses (office, retail, eating establishment, personal service shop, hotel), in addition to all Type “B” and Type “C” of all non-residential uses not listed. **The city can consider implementing a shared loading space calculation where multiple land uses will share the same building and loading spaces. This will only be applicable if separate rates are explicitly developed for multiple non-residential land uses.**

3.2.5 Preliminary Recommendations for Loading Space Dimensions and Rates

In general, unless the City is aware of issues with lack of loading space, or developers consistently providing oversupplying loading spaces in some cases, the existing loading space design and rates are consistent with other municipalities. Although the typical loading space is larger than most of the other municipalities, it is sized such that it can accommodated the waste collect vehicles as outlined in the City’s *Standards and Specifications Manual*. **It is recommended that the loading space dimensions and rates remain unchanged. The city can consider increasing the minimum width of its standard space to 4.0 metres since it is currently smaller than the width of its smaller loading space and is the smallest amongst other municipality loading spaces of the same length.** Preliminary recommendations for loading space dimensions and rates are summarized in **Table 28** and **Table 29**.

As an alternative to specifying all land uses which require loading spaces rather than having a general catch-all grouping, the city can also consider providing an exclusion list of land uses that do not expect large deliveries from requiring loading spaces such as

day nurseries, places of worship, and/or schools. This is similar to all other municipalities with the exception of Markham which currently also only has general residential and non-residential loading space supply requirements, and Vancouver which defines rates for these uses under “community care facility”.

Table 28: Preliminary Recommendation for Minimum Loading Space Dimensions

Parking Space	Length (m)	Width (m)	Vertical Clearance (m)
Loading Space - A	13.0 (-)	4.0 (+0.5)	6.1 (-)
Loading Space - B	9.0 (-)	3.7 (-)	4.3 (-)

Table 29: Preliminary Recommendation for Minimum Loading Space Supply Rates

Land Use	Size of Development	Small (N/A)	Standard (Type B)	Extended (Type A)	Large (N/A)
Residential	0 to 30 dwelling units	-	-	0	-
	31 to 399 dwelling units	-	-	1	-
	400 dwelling units or more	-	1	1	-
Non-residential	Less than 465 sq. m.	-	-	0	-
	Equal to 465 sq. m. up to 2,323 sq. m.	-	-	1	-
	Equal to 2,323 sq. m. up to 9,920 sq. m.	-	-	2	-
	Additional for every additional 9,920 sq. m. or part thereof greater than 9,920 sq. m.	-	-	1 +	-

4 Bicycle Parking Spaces

Municipalities that define bicycle parking requirements establish rates and dimensions for long-term (or ‘Class A’) and short-term (or ‘Class B’) bicycle parking spaces. Description of long-term and short-term spaces and the recommended rates are presented in the previously submitted report.

In terms of the bicycle parking space design, there are three physical design types of bicycle parking that are mentioned within the various municipalities: horizontal, vertical, and stacked bicycle parking. The City of Toronto describes a “stacked bicycle parking space” as a horizontal bicycle parking space that is positioned above or below another bicycle parking space and equipped with a mechanical device providing floor level access to both bicycle parking spaces. Example photos of each of these types is shown in **Table 30**.

Table 30: Examples of Horizontal, Vertical, and Stacked Bicycle Parking

Horizontal Bicycle Parking	Vertical Bicycle Parking	Stacked Bicycle Parking
		

Source: Guidelines for the Design and Management of Bicycle Parking Facilities (City of Toronto)

The specifications within the by-laws related to the design of bicycle parking typically only include the dimension of space (horizontal, vertical, and stacked); however, it can be noted that Vancouver does have the most comprehensive design requirements in its by-law which also include defining a limit to vertical parking spaces provisions, and detailed specifications for end-of-use facilities (such as doorway widths, lighting, and bicycle rack design) that are not required under any other municipality by-laws noted. The general minimum dimensions for bicycle parking spaces defined by each municipality are summarized in **Table 31**.

Table 31: Dimensions of Bicycle Parking Spaces

Municipality	Horizontal Bicycle Parking Space Dimensions (m)			Vertical Bicycle Parking Space Dimensions (m)			Stacked Parking – Vertical Clearance (m)
	Length	Width	Vertical Clearance	Length	Width	Horizontal Clearance	
Richmond Hill	**1.8**	**0.6**	**-**	**-**	**-**	**-**	**-**
Brampton	1.8	0.6	-	1.5	0.5	-	-
Hamilton	-	-	-	-	-	-	-
Markham	-	-	-	-	-	-	-
Mississauga	-	-	-	-	-	-	-
Newmarket	1.8	0.6	1.9	1.9	0.6	1.2	-
Oakville	-	-	-	-	-	-	-
Toronto	1.8	0.6	1.9	1.9	0.6	1.2	1.2
Vaughan	1.8	0.6	1.9	1.9	0.6	1.2	1.2
Vancouver	1.8	0.6	1.9	1.9	0.6	1.0	-

Note: Height for horizontal bicycle parking refers to vertical clearance from the ground; Length for vertical bicycle parking refers to horizontal clearance from the wall. Vertical clearance for stacked spaces is for each bicycle.

Richmond Hill currently requires a minimum length and width of a bicycle parking spaces of 1.8 metres and 0.6 metres, respectively. Hamilton, Markham, Mississauga, and Oakville do not

have defined dimensions in the by-law. The other municipalities that have minimum requirements for bicycle space dimension all have the same minimum length and width as Richmond Hill for horizontal bicycle parking space. **The city can consider adding a minimum vertical clearance of 1.9 metres, minimum dimension requirements for vertical bicycle parking spaces, and minimum vertical clearance for stacked parking spaces.**

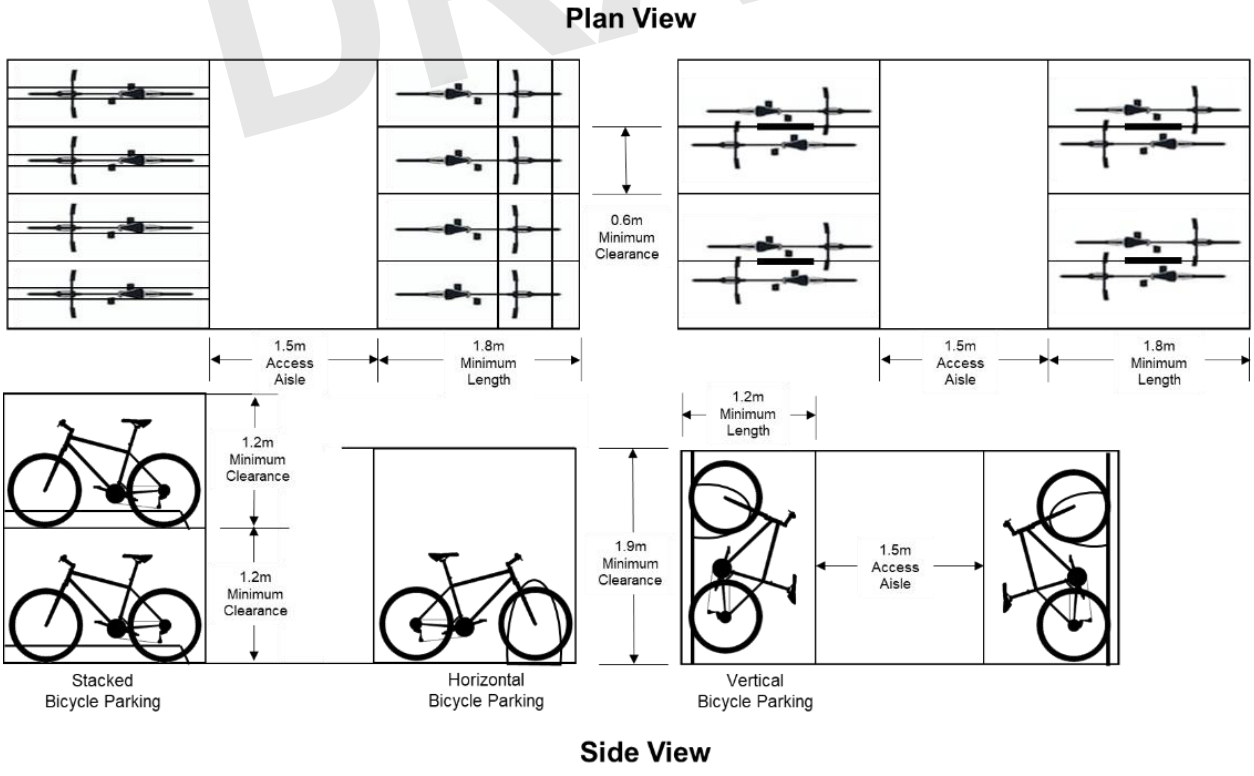
Both Vaughan and Vancouver define a minimum aisle width between rows of bicycle parking as 1.5 metres. **The city can consider adding a minimum aisle width of 1.5 metres between bicycle parking.**

In general, there is a high degree of consistency across the municipalities in defining minimum bicycle parking space dimensions. **The preliminary recommendations for bicycle parking space dimensions are summarized in Table 32 – the dimensions are also pictured in Figure 8.**

Table 32: Preliminary Recommendations for Bicycle Parking Space Dimensions

Municipality	Horizontal Bicycle Parking Space Dimensions (m)			Vertical Bicycle Parking Space Dimensions (m)			Stacked Parking – Vertical Clearance (m)
	Length	Width	Vertical Clearance	Length	Width	Horizontal Clearance	
Richmond Hill	1.8	0.6	1.9	1.9	0.6	1.2	1.2

Figure 8: Sample Figure for Minimum Bicycle Parking Space and Access Aisle Dimensions



As previously noted, Vancouver's by-law has the most comprehensive design requirements for bicycle parking compared to all of the other municipalities reviewed. Some unique by-law provisions include requiring a minimum of 5% of spaces to be oversized spaces of 2.4 metres in length and 0.9 metres in width, and may not be vertical or stacked spaces. These spaces can be used by larger cargo-holder style bicycles. Vancouver's By-law also specifies details such as Bicycle Room Doors, Size, Lighting, Bicycle Rack Design, etc. and requires that an electrical outlet must be provided for every two Class A (Long-term) bicycle spaces. **The city can consider adding requirements for details noted in Vancouver's by-law; however, the city may benefit from the simpler by-law until cycling becomes more prominent.**

5 Cash-in-Lieu

Cash-in-lieu (or payment-in-lieu) refers to the municipalities accepting payment of money in lieu of parking spaces for sites that are unable to fulfill the required minimum parking, as per the by-law. Cash-in-lieu can also be open to developers who can provide the required parking, but would like to reduce the parking compared to the By-law, based on their market research. This may be influenced by the fact that the surrounding area already has a parking management authority and established public parking, thus negating the need for on-site parking. The contribution from developers are paid into a separate account that the City uses to fund or support public parking infrastructure construction or parking management (or related programs such as TDM measures, and TDM infrastructure), and the development is then expected to be able to rely on the public infrastructure, as required.

As part of the ongoing Comprehensive Zoning By-law Review, the City of Vaughan has also investigated cash-in-lieu programs[7].

> *"Cash-in-lieu systems aims to achieve numerous goals including establishing a fund to aid in the creation of a centralized, publicly available, more strategically located facilities, which provide more public parking overall which is flexible to accommodate change of use, create a more pedestrian friendly environment, use the available parking supply more efficiently, and promote the use of transit. In exchange for the exemption in the parking by-law rates, the formula requires applicants to pay for 50% (or another percentage) of the total cost of the parking being exempted."*

There Vaughan Study[7] further indicated several key factors that contribute to effectiveness of cash-in-lieu, which are summarized briefly below:

- **Rapid growth:** Areas undergoing rapid growth can benefit more from cash-in-lieu, partly due to the rate of incoming funds and partly due to the availability of constructable land. This can mean that the parking supply lags behind the demand, but in a faster growing area, the lag-time is reduced.

[7] https://www.vaughan.ca/projects/policy_planning_projects/city_wide_parking_standards_review/General%20Documents/FINAL%20DRAFT%20TTR_2010-04-15%20Web%20Version%20(2).pdf

- **Designated areas:** The funds should ideally be taken from and used within a designated area, to ensure that the funds taken from a developer can actually provide a tangible benefit to that development, so there is a direct connection between the funds being provided and the parking management for that development. However, the Vaughan study further noted that when a designated area no longer requires parking infrastructure expansion or additional TDM measures, there can be a mechanism which allows the funds to be used in other areas of the City.
- **Well utilized parking supply:** Cash-in-lieu can only be leveraged when there is unmet parking demand or an interest in reducing parking demand.
- **Avoidance of Contradictory Parking Policies:** The City needs to balance parking requirements with the opportunity to leverage cash-in-lieu so that the developers genuinely see the option as worthy of consideration.
- **Cost per Stall:** The City must cater the cash-in-lieu calculation to the City or Designated Area where the cash-in-lieu policy will be leveraged. The equation itself is developed to account for these variations.

The same study[7] also notes that the typical discounted rate for a cash-in-lieu payment is discounted at 50% of the actual cost of providing parking to encourage developers to participate, and recognize that the contributor does not obtain ownership in the parking facility and that there will be a delay between contribution and parking provision. The key considerations, generalized for consideration in Richmond Hill are:

- **Designated Areas**
  - Where are funds taken from? What areas will be permitted to leverage cash-in-lieu?
- **Allocation of Funds**
  - Where and how are the funds used (infrastructure construction or maintenance,
- **Cost**
  - What is the cost for different types of parking spaces? What is the cash-in-lieu discount percentage (typically 50%)?
- **Limit on Participation**
  - Limit the amount of participation by individual developers in areas that are less transit-supportive and which are experiencing less growth. For example, for areas that are not transit-supportive or transit oriented, cash-in-lieu can only result in the greater of 10% reduction or 15 space reduction in the required parking supply, whichever is greater. This will allow smaller developers to achieve zero parking, while larger developments would be capped.

Generally, by-laws will reference Section 40 of the Planning Act which describes the agreement exempting an owner from providing the required parking by the municipality. The excerpt of Section 40 of the Planning Act[8] is shown in **Figure 9**.

[8] https://www.ontario.ca/laws/statute/90p13#BK64

Figure 9: Excerpt of Section 40 of the Planning Act

Agreement exempting owner from requirement to provide parking

40 (1) Where an owner or occupant of a building is required under a by-law of a local municipality to provide and maintain parking facilities on land that is not part of a highway, the council of the municipality and such owner or occupant may enter into an agreement exempting the owner or occupant, to the extent specified in the agreement, from the requirement of providing or maintaining the parking facilities. R.S.O. 1990, c. P.13, s. 40 (1).

Payment of money

(2) An agreement entered into under subsection (1) shall provide for the making of one or more payments of money to the municipality as consideration for the granting of the exemption and shall set forth the basis upon which such payment is calculated. R.S.O. 1990, c. P.13, s. 40 (2).

Special account

(3) All money received by a municipality under an agreement entered into under this section shall be paid into a special account and,

(a) the money in that account shall be applied for the same purposes as a reserve fund established under the *Municipal Act, 2001* or the *City of Toronto Act, 2006*, as the case may be;

(b) the money in that account may be invested in securities in which the municipality is permitted to invest under the *Municipal Act, 2001* or the *City of Toronto Act, 2006*, as the case may be;

(c) earnings derived from the investment of the money in the special account shall be paid into that account; and

(d) the auditor of the municipality, in the auditor's annual report, shall report on the activities and position of the account. 2002, c. 17, Sched. B, s. 13 (1); 2006, c. 32, Sched. C, s. 47 (6).

Registration of agreement

(4) An agreement entered into under this section may be registered in the proper land registry office against the land to which it applies and, when so registered, any money payable to the municipality under the agreement that has become due for payment shall have priority lien status as described in section 1 of the *Municipal Act, 2001* or section 3 of the *City of Toronto Act, 2006*, as the case may be. 2002, c. 17, Sched. B, s. 13 (2); 2006, c. 32, Sched. C, s. 47 (7).

Certificate

(5) When all money payable to the municipality under an agreement registered under subsection (4) has been paid, or such agreement has been terminated, the clerk of the municipality shall, at the request of the owner of the land, provide a certificate in a form registrable in the proper land registry office, certifying that the money has been paid or that the agreement has been terminated. R.S.O. 1990, c. P.13, s. 40 (5).

5.1 Calculating Cash-in-Lieu Contributions

Generally, cash-in-lieu policies are calculated based on the individual case due to differences in land costs for different areas (e.g. providing parking in a rural area will typically have significantly less land costs than constructing parking in an urban area). Richmond Hill has had payment -in-lieu agreements before, in accordance with By-law 3-94[9].

Of the municipalities that outline a cash-in-lieu system:

- Richmond Hill, Mississauga, and Vaughan have a similar formula for calculating the contribution,
- Toronto has a simplified method for calculating the contributions, and
- Vancouver estimates the cost of construction and incorporates the net present value of the revenue and maintenance cost for the parking spot.

[9] https://pub-richmondhill.escribemeetings.com/filestream.ashx?DocumentId=19457
https://pub-richmondhill.escribemeetings.com/filestream.ashx?DocumentId=19453

In general, the formulas for Richmond Hill, Mississauga, and Vaughan

Contribution: [C + (L x A)] * Q * N; where,

- C is the estimated cost of constructing a parking space
- L is the estimated land cost of the parking space
- A is the area associated with each parking space (including maneuvering, circulation, and accessible parking spaces)
- Q is the proponents share of the total costs
- N is the number of spaces for which cash-in-lieu is sought by the developer/proponent

The cost of constructing the parking space (C) will be based on factors including, but not limited to, location of space (surface, underground, multi-level structure), high water table, and existing grading. The proponents share can range based on the municipality or location. The following summarizes the established share the proponents must pay for each municipality:

- Mississauga will set this value as 12.5%, 25%, or 50% based on the size of the change in land use[10]:
  - 12.5% where GFA is equal to or is less than 50 square metres;
  - 25% where GFA exceeds 50 square metres but equals or is less than 200 square metres; and
  - 50% where GFA exceeds 200 square metres, or if it is a new development.
- Richmond Hill's by-law 3-94 sets this value as 50%.
- Hamilton and Vaughan also set this value as 50%.

Generally, the cost is split since both the City and the applicant will mutually benefit from the application of cash-in-lieu parking policies.

Toronto has a simplified methodology fee schedule summarized in **Table 33**.[11]

Table 33: Toronto's Payment-in-Lieu of Parking Formula

Category	Payment-in-Lieu Contribution
For new construction, renovations, alterations, or changes in use equal to or less than 200 sq. m.	$2,500 per parking space
For new construction, renovations, alterations, or changes in use greater than 200 sq. m. ground floor area, but equal to or less than 400 sq. m. GFA	$5,000 per parking space
For new construction, renovations, alterations, or changes in use greater than 400 sq. m. GFA	[$5,000 + $(5 x L)] per parking space[1]

[1]where $5,000 is the current estimated construction cost of a surface parking space and 'L' is the current estimated land value ($ per square metre) in the area

Vancouver takes into consideration revenues and cost from a public parking space and adds a 20% contingency to account for risk related to construction cost uncertainty and fluctuations, and potential unforeseen maintenance expenses. A sample calculation showed that the by-law

[10] http://www6.mississauga.ca/onlinemaps/planbldg/Miscell-P&B/PIL_07-09-01.pdf
[11] https://www.toronto.ca/311/knowledgebase/kb/docs/articles/transportation-services/transportation-infrastructure-management/operational-planning-and-policy/calculating-the-fee-for-payment-in-lieu-of-parking-formula.html

assumes a $115 per square foot for construction, with 350 square foot per parking space (including maneuvering and circulation space) resulting in an estimated cost of $40,250 per space reduces to a contribution by the owner of $24,400 per space after the noted considerations[12].

In general, Richmond Hill's methodology for payment-in-lieu of parking is consistent with other municipalities. **Richmond Hill should continue using the same equation for determining the contribution for exemption of required parking spaces; however, there is an opportunity to consider a contingency cost, maintenance cost, and/or a revenue for the parking space. Additionally, similar to Mississauga and Toronto, the City can consider a small rate (contribution amount) for smaller change of use developments compared to the existing 50%.**

5.2 Cost of Parking Space

Based on the programs outlined in the previous session, sample council reports outlining cash-in-lieu for parking spaces show the range in contributions per parking space as summarized in **Table 34**. These estimates provide a range in which the cost of parking space can be compared.

Table 34: Sample Cost of Calculated Parking Spaces

Municipality	Contribution from Owner Cost of Parking Space
Hamilton[13]	$8,000
Vaughan[14]	$21,100 for surface parking; $54,000 per structured space
Vancouver[15]	$24,700
Richmond Hill[9]	$26,639

Notes:
1) Hamilton 50% of the estimated total cost of construction. The construction cost is estimated as $16,000 per space.
2) Vaughan values are based in the Kleinburg area and the contribution is set at 50% the estimated cost. The construction cost is estimated as $22,200 (surface) and $108,000 (structured) per space.
3) Vancouver result of including revenues and adding 20% contingency. The construction cost is estimated as $40,250 per space.

The Draft Parking Standards Report for Vaughan (2010)[16] noted that capital costs for parking facilities can range from $8,000 per space for a suburban surface parking lot to $60,000 per space for an underground parking facility. These are only sample contribution amounts for cash-in-lieu of parking for select locations; however, it does show the range of cost estimates in determining the cost of the parking space. As previously discussed, factors such as the estimated land cost within the area will impact the individual cost of a loading space. The construction costs of the loading space will also differ based on the type (structured, surface, or underground). **It is recommended that there is a consistent approach to determining the cost (and contribution) per parking space within the city.**

[12] https://council.vancouver.ca/20180117/documents/pspc4.pdf
[13] http://www2.hamilton.ca/NR/rdonlyres/AA7CC022-7D79-47C2-8573-653B09BF25C6/0/Sep05PED06353.pdf
[14] https://pub-vaughan.escribemeetings.com/filestream.ashx?DocumentId=49118
[15] https://council.vancouver.ca/20180117/documents/pspc4.pdf
[16]https://www.vaughan.ca/projects/policy_planning_projects/city_wide_parking_standards_review/General%20Documents/FINAL%20DRAFT%20TTR_2010-04-15%20Web%20Version%20(2).pdf

6 Design Considerations

Design criteria included for reference include parking garage access ramp designs (width, grade, curvature), driveway design for low density residential (percentage of landscaping, driveway widths, and treatment with adjacent walkways), and design of difficult to access parking spaces (including end of aisle, hammerhead designs etc.). General guidelines for pedestrian, cyclist, and vehicle circulation including pick-up and drop-off area designs are also discussed.

6.1 Access Ramp Design

For underground garage driveway ramps, Richmond Hill sets a maximum 10% grade (unheated) and a maximum 15% grade (heated) as stated in the *Standards and Specifications Manual*. For comparison, Toronto's by-law states the access ramp to an underground parking garage and the internal ramps within the garage must not exceed a maximum slope of 15% and incorporate a transition area at the top and bottom (maximum slope of 7.5% over a minimum distance of 3.0 metres), but this is taken from a site specific .[17]

Other municipalities do not appear to specify a gradient withing their by-laws or design specifications; however, Richmond Hill specifications are noted to be consistent with Toronto's requirements. The City can consider establishing a transition area at the top and bottom of the ramp with a maximum slope of 7.5% over a minimum distance of 3.0 metres similar to Toronto's by-law.

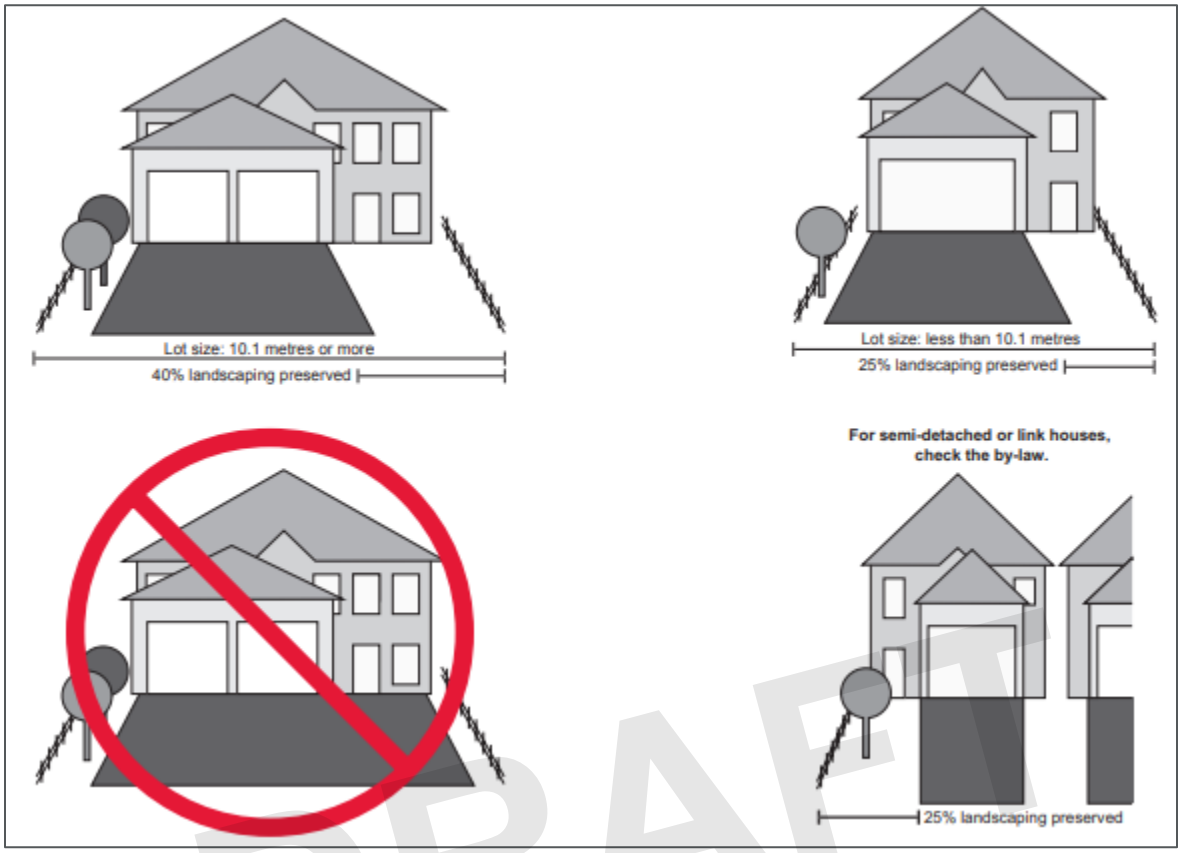
6.2 Driveway Design for Low Density Residential

6.2.1 Driveway Widths and Landscaping

Municipalities will typically define a minimum and maximum driveway width based on the width of the lot frontage, or the specific land use. Additionally, the by-law will define a minimum percentage that the yard must be dedicated to landscaping. A sample figure showing the measurements is illustrated in **Figure 10**. The minimum/maximum driveway widths along with the minimum landscaping percentages for each municipality are summarized in **Table 35**.

[17] Exception CR 158 (L) – https://www.toronto.ca/zoning/bylaw_amendments/ZBL_NewProvision_Chapter900_11.htm#900.11.1

Figure 10: Minimum Landscaping Requirements with Lot Size Reference (Markham Brochure)



Source: https://www.markham.ca/wps/portal/home/about/city-hall/bylaws/files/driveway-extension-brochure

Based on the width of the lot, Richmond Hill currently has a maximum driveway width for residential properties of 3 metres (lot widths less than 9 metres), 6 metres (lot widths that are 9 metres or up to 18 metres), and 9 metres (lot widths that are 18 metres or up to 30 metres). Richmond Hill's minimum driveway width is within range and comparable with the other municipalities. Hamilton, Mississauga, Toronto, and Vaughan have a smaller minimum driveway width ranging from 2.0 metres to 2.7 metres compared to Richmond Hill's 3.0 metres. **Richmond Hill can consider a smaller minimum driveway width in the range of 2.0 metres to 2.7 metres.**

Richmond Hill currently requires that a minimum 45% of the front yard of a residential property must be landscaped. Landscaping may include any combination of vegetation (e.g. trees, shrubs, or flowers) or surfacing materials (such as unit pavers, patio stones, concrete or interlock). Markham, Mississauga, and Vaughan also define minimum landscaping as a percentage of the front yard; whereas Hamilton and Toronto define the percentage of the yard that is not occupied by the driveway. Municipalities such as Toronto and Vaughan also define a percentage of the landscaping that is required to be soft landscaping. In general, the 45% minimum for Richmond Hill is within range of the other comparable municipalities. **No changes are recommended for the minimum landscaping based on comparison with the other municipalities. Richmond Hill can consider specifying a general landscaping and a separate soft landscaping percentage, similar to Toronto and Vaughan.**

Table 35: Summary of Minimum and Maximum Driveway Widths with Minimum Landscaping Percentages

Municipality	Lot Width / Land Use	Maximum Driveway Width	Minimum Front Yard Landscaping	Minimum Driveway Width
Richmond Hill[18]	Less than 9 metres	3.0 metres	45%[1]	4.0 metres
	9 to 18 metres	6.0 metres		
	18 to 30 metres	9.0 metres		
Brampton	Less than 8.23 metres	4.9 metres	-	3.0 metres
	8.23 to 9.14 metres	5.2 metres		
	9.14 to 15.24 metres	6.71 metres		
	15.24 to 18.3 metres	7.32 metres [2]		
	Greater than 18.3 metres	9.14 metres [2]		
Hamilton	Detached, Semi-detached, Duplex (without attached garage)	Lesser of 50% of lot, or 8.0 metres	100%[3]	2.7 metres
	Street Townhouse	Lesser of 65% of lot, or 6.0 metres		
Markham	Less than 10.1 metres	garage door width plus 2.0 metres	25%[4]	Garage door width
	Greater than 10.1 metres	garage door width plus 2.0 metres	40%[4]	
	Where there is no private garage	3.7 metres[5]	-	
Mississauga	Greater than 18 metres	10.5 metres [6]	50%	2.6 metres
	Otherwise	garage door width plus 2.0 metres[8]	40%	
	If no garage doors	6.0 metres	40%	
Newmarket[9]	Single-detached	6.0 metres	-	3.0 metres
	Semi-detached	5.2 metres		
	Townhouse	3.0 metres		
Oakville	Low Density Residential:	-	-	3.0 metres
	Single	3.5 metres		
	Double	6.5 metres		
	Triple	9.0 metres		
Toronto[10]	Less than 6 metres	2.6 metres	100%[11]	2.0 metres
	6 to 15 metres	6.0 metres	50%[11]	
	15 to 23 metres	9.0 metres	60%[11]	
	Greater than 23 metres	9.0 metres	60%[11]	
Vaughan	Less than 6 metres	2.9 metres	-	2.6 metres
	6 - 6.99 metres	3.5 metres	33%[12]	
	7 - 8.99 metres	3.75 metres	33%[12]	
	9 to 11.99 metres	6.0 metres	33%[12]	
	Greater than 12 metres	9.0 metres	50%[12]	
Vancouver	-	Lesser of 18.5 m or 15% of lane frontage and flankage	-	3.7 metres

Notes:
1) Richmond Hill – Percentage of front yard for landscaping.
2) Brampton – Or width of the garage (whichever is greater).
3) Hamilton – Where the driveway is provided in the front yard, all other portions of the front yard shall be a landscaped area.
4) Markham – Percentage of front or exterior side yard in which the driveway is located to provide soft landscaping.

[18] https://www.richmondhill.ca/en/shared-content/resources/documents/Community-Standards-By-laws/84-03---Front-Yard-Parking.pdf

5) Markham – Maximum driveway can be up to 6.1 metres, provided a minimum 40% soft landscaping is provided in the front of exterior side yard in which the driveway is located.
6) Mississauga – For that portion of the driveway that is within 6.0 metres of the garage face and which is providing direct vehicular access to the garage. The driveway width for that portion of the driveway that is beyond 6.0 m from the garage face is a maximum width of 8.5 metres.
7) Mississauga – Percentage of yard containing driveway for soft landscaping.
8) Mississauga – Up to a maximum of 8.5 metres.
9) Newmarket – The zoning by-law sets out specific limits on the size, width, and location of driveways. These limits vary property to property. General maximums provided.
10) Toronto – Maximum width of 2.6 metres if all parking spaces are in the rear yard.
11) Toronto – Percentage of the front yard area not covered by a permitted driveway for landscaping, of this, at least 75% must be in the form of soft landscaping. If a lot does not have a permitted driveway in the front yard, a minimum of 75% of the front yard must be soft landscaping.
12) Vaughan – Percentage of the lot frontage for landscaped open space, of this, 60% shall be soft landscaping.

6.2.2 Treatment of Adjacent Walkways from Driveways

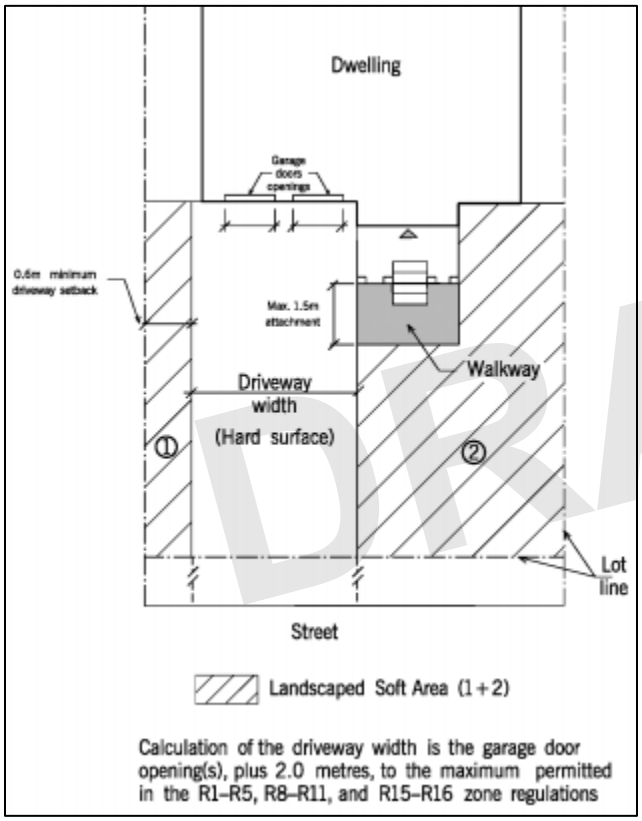
Treatment of adjacent walkways (typically from driveway to the entrance of the dwelling unit) can be described as landscaping in the by-law. The by-law may also define a maximum width for the walkway. The landscaping definitions and adjacent walkway references for the municipalities are summarized in **Table 36**.

Table 36: Landscaping Definitions / Adjacent Walkway References

Municipality	Landscaping Definitions / Adjacent Walkway References
Richmond Hill	Landscaping is defined as any combination of trees, shrubs, flowers, grass or other horticultural elements, decorative stonework, paving, screening, or other architectural elements, all of which is designed to enhance the visual amenity of a property and shall not include amenity space, parking areas, driveways or ramps.
Brampton	Landscaped open space is defined as an unoccupied area of land which is used for the growth, maintenance and conservation of grass, flowers, trees and shrubs and other vegetation, and may include a surfaced walk, patio, screening, pool or similar visual amenity, but shall exclude any driveway, ramp, car parking or loading area, curb, retaining wall, or any covered space beneath or within any building or structure.
Hamilton	Landscaping is defined as outdoor space for use, enjoyment and recreation and shall include natural vegetation areas and constructed areas such as patios, decks, playgrounds, pathways, outdoor recreational amenities, fencing, decorative architectural features and retaining walls.
Markham	Landscaping is defined as trees, shrubs, flowers, grass or other horticultural elements, decorative stonework, screening or other architectural elements, all of which are designed to enhance the visual amenity of a property and shall not include parking areas, driveways or ramps and shall not be used for the parking of motor vehicles and may include walkways, driveways and ramps that provide access onto the lot from the street.
Mississauga	Any hard surface area used or accessible for the purpose of parking a motor vehicle shall be included in the driveway width calculation except one walkway attached to a driveway with a maximum attachment of 1.5 metres shall be permitted on each side of a driveway.
Newmarket	A residential walkway is defined as a hard surface path leading from the front or exterior wall of a dwelling unit to a curb or sidewalk, no wider than 1.2 metres and, if adjacent to a driveway shall be of a different material from the driveway. A walkway may not be used for vehicular parking. A “landing” can project 1.8 metres into the required front yard, but cannot come within 1.2 metres of the front property line.
Oakville	One walkway access material may be connected to the side of a driveway. The maximum width of the walkway access at the point of attachment shall be 1.8 metres. The walkway shall terminate at the municipal sidewalk (private side) or property line if there is no sidewalk. No additional curb cut will be allowed for a walkway.
Toronto	Landscaping is defined as an area used for trees, plants, decorative stonework, retaining walls, walkways or other landscape or architectural elements. Hard-surfaced areas such as walkways are not considered soft landscaping.
Vaughan	An area comprised of hard landscaping and abutting a private driveway shall be permitted to be used for the parking of a motor vehicle and/or a pedestrian walkway.
Vancouver	-

Richmond Hill treats hard landscaping (decorative stonework, paving) as part of the definition for landscaping which means the walkways contribute to the minimum landscaping percentage with no reference to dimensions for the walkway. This is similar to Brampton, Hamilton, and Vaughan. Mississauga allows a maximum attachment of 1.5 metres for the purposes of a walkway as shown in **Figure 11**, whereas Oakville sets a maximum of 1.8 metres. Newmarket sets a maximum width of 1.2 metres for the walkway and a landing that can project 1.8 metres. Toronto includes paving for walkway as landscaping; however, it does not contribute to the soft landscaping requirement. **As previously noted, Richmond Hill can define a minimum soft landscaping percentage such that walkways (or hard landscaping) is limited while still contributing to the landscaping requirement.**

Figure 11: Driveway, Landscaping, and Walkway Requirements (Mississauga By-Law)



6.3 Hammerhead Design

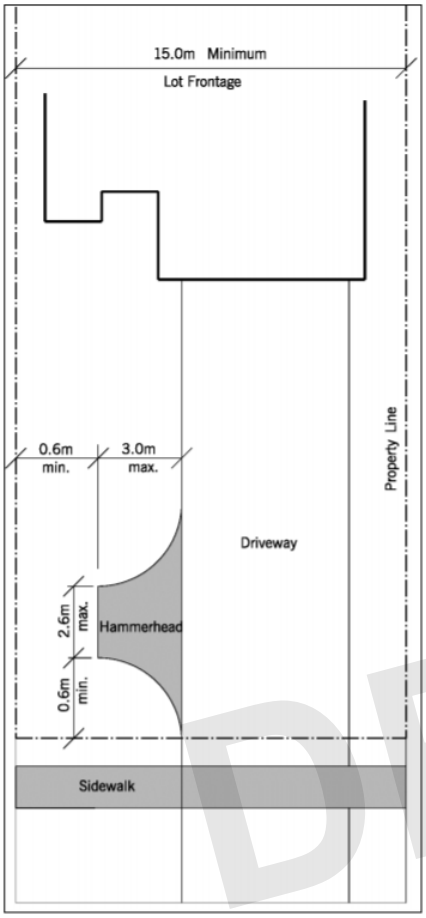
6.3.1 Residential Driveways

Hammerhead design includes standards for the provision of turnaround space or hammerheads on residential lots. Of all the by-laws reviewed, only Mississauga and Toronto include provisions related to vehicle turnaround facilities or “hammerheads” as they are commonly known.

When referring to a hammerhead driveway, the term only references the part of the driveway that extends off of the main driveway and is used for the purposes of turning a vehicle around.

Mississauga provides an illustration for clarity with the hammerhead shaded as shown in **Figure 12**.

Figure 12: Hammerhead Illustration (Mississauga By-law 0225-2007)



It appears that while hammerheads would reduce the amount of soft landscaping provided and would therefore still impact driveway conformity, the hammerhead portion of a driveway would not be influenced by other limiting factors applied to the main driveway, such as the width.

In Toronto, hammerheads are only permitted on a lot with a residential building, other than an apartment building and with 25 or more dwelling units. The lot frontage must also be greater than 18 metres and the minimum right-of-way of the street from which vehicle access is provided must be 27 metres. In the City of Mississauga, hammerheads are only permitted on lots with frontage greater than or equal to 15 metres.

Hammerhead turnaround must have the following dimensions as outlined in **Table 37**.

Table 37: Residential Driveway Hammerhead Dimensions

Municipality	Minimum Lot Frontage	Hammerhead Design		
		Width (max)	Length (max)	Setback (min)
Toronto	18 metres	3.0 metres	4.5 metres	3.0 metres[1]
Mississauga	15 metres	2.6 metres	3.0 metres	0.6 metres[2]

Notes:
1) "Extend no more than 3.0 metres from each opposite edge of the driveway."
2) From any lot line.

In both cases the maximum length of the hammerhead is less than the standard length of a vehicle. The reason for this is likely to discourage parking within the hammerhead itself (parallel parking) since the vehicle would extend into the driveway thus not increasing the capacity to store vehicles. The widths are fairly consistent between 2.6 and 3.0 metres which is generally the required width of a parking space and enough to accommodate a typical vehicle width. The radius of the curve between the main driveway and the hammerhead is not directly specified.

The Town of Oakville does not specify standards for hammerheads, but simply states that a hammerhead legally existing on a lot shall be permitted as it existed on the effective date of the By-law. The definition of a hammerhead has recently been deleted from the By-law.

The City should consider adopting similar standards as Toronto and Mississauga by defining the Hammerhead a separate component from a Driveway and providing similar size requirements, but with a caveat that the hammerhead is counted as hard landscaping.

6.3.2 Parking Areas

The preferred design of a parking area allows for continuous flow from entrance to exit (circular flow) to avoid dead end driveways and turn around spaces where possible. Some municipalities have guidelines developed to account for dead end parking aisles. These usually consist of a backup space, which functions similar to a hammerhead design as shown in **Figure 13**. In general, these designs are not explicit within the by-laws, but are described in site design guidelines.

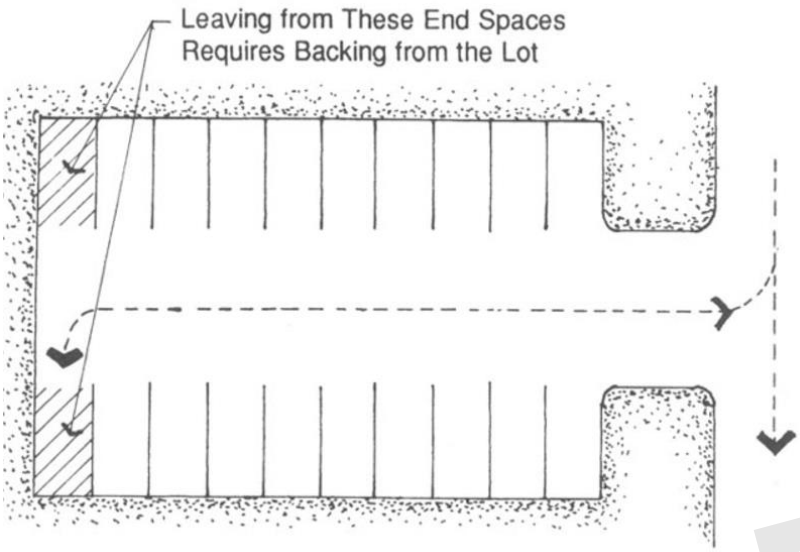
Richmond Hill's *Standards and Specifications Manual* notes that dead end access roads are not preferred, and should be designed with a hammerhead turnaround with a minimum hammerhead width of 17.0 metres, roadway width of 5.0 metres, and a 12.0-metre centreline turning radius.

The City of Waterloo requires a parking space with minimum dimensions of 2.8 metres by 5.5 metres with 1.2-metre hammerhead for surface parking areas.[19] The City of Brantford requires either a back-up space at the end of the row, with depths ranging from 1.2 metres to 2.4 metres, which allows a turn-around space, or in the absence of a turnaround spot, the end spaces must be wider than standard spaces (3.3 metres).[20] This latter approach, which requires that end

[19] https://www.waterloo.ca/en/government/resources/Documents/Development-charges-and-guidelines/Urban-Design-Guidelines-Part-4.pdf
[20] https://www.brantford.ca/en/business-and-development/resources/Documents/Site-Plan-Manual.pdf

spaces be wider than standard spaces, is similar to requiring wider spaces due to obstruction, as previously discussed.

Figure 13: Hammerhead (or "Dead-end aisle") in surface parking areas, excerpted from the University of Idaho – Landscape Architecture (LARC 301)



The hammerhead should also be demarcated and/or “No Parking” signs should be included to deter motorcycles, bicycles, and other smaller vehicles from occupying these areas.

The City should keep the hammerhead discussion in the *Standards and Specifications Manual*. The simplest approach would be to address this scenario through treatment of obstructions; however, the additional width to account for an obstruction (see **Section 2.8**) would not provide as much maneuvering space as an additional space or dedicated dead-end hammerhead.

6.4 Pedestrian/Cyclist/Vehicle Circulation

Municipalities will typically document parking design (or urban design) guidelines which describe desirable parking features. This includes guidelines for pedestrian, cyclist, and vehicle circulation design preferences. These are not required

A few references are listed below:

- Richmond Hill’s Urban Design Guidelines[21]
- Brampton’s Landscape Development Guidelines[22]
- Hamilton’s Urban Design Guidelines (Strathcona Secondary Plan)[23]

[21] https://www.richmondhill.ca/en/shared-content/resources/documents/685-urban-design-guidelines-processed.pdf
[22] https://www.brampton.ca/EN/Business/planning-development/guidelines-manuals/Documents/Landscape_Development_Guidelines_FINAL.pdf
[23] http://www2.hamilton.ca/NR/rdonlyres/BAF9506C-6CDE-4D2A-AB84-955FEA6210A3/0/StaffReportPED13143PW13053AppB.pdf

- Mississauga's Green Development Standards[24]
- Newmarket's Urban Design Guidelines[25] (under development)
- Oakville's Urban Design Manual[26]
- Toronto's Greening Surface Parking Lots[27]
- Vaughan's Parking Design Guidelines[28]

Richmond Hill's Urban Design Guidelines includes a section for Site Circulation and Parking which includes subsections:

- Pedestrian Connections
- Vehicular Access
- Pedestrian Drop Off Areas
- Parking (surface, above-grade, and underground)

Vehicle, pedestrian, and cycling circulation guidelines copied from Toronto and Vaughan's dedicated parking guidelines are presented in **Table 38**.

Table 38: Excerpts from the Toronto and Vaughan Parking Guidelines relating to Circulation

Circulation	Guidelines
Vehicle Circulation	**Toronto's *Greening Surface Parking Lots*** • **Limit the number and width of curb cuts for street access driveways to minimize interruption to the public sidewalk, streetscape and perimeter landscaping.** • Provide access to surface parking lots from secondary streets or laneways whenever possible • Share driveway access between adjacent sites where feasible • **Define street access driveways and internal vehicle routes with curbed landscaped areas, tree planting and lighting. Explore opportunities to include public art.** • **Size vehicle circulation routes according to use. Avoid using over-sized driveways, drive aisles and turning radii.** • **Where circulation routes require wider driveways and turning radii (i.e. fire lanes, service areas), coordinate the location of these routes with major drive aisles.** • Provide continuous circulation throughout the site. Avoid dead end driveways and turn around spaces. • Ensure unobstructed motorist and pedestrian sight distance and provide clearly marked crossings at all intersections between vehicle routes and pedestrian pathways. **Vaughan's *Parking Design Guidelines*** • **Combine circulation routes requiring wider widths (i.e. fire lanes, service areas) and turning radii with major drive aisles.** • Parking areas should be screened and integrated into the streetscape and architectural fabric of the City • Enhance street access driveways, internal vehicle routes and pedestrian passages with curbed landscape planting areas, shade tree planting, street furniture and lighting. • **Main internal driveways or circulation routes are to be designed and treated as streets in anticipation of future infill development.**

[24] https://www.mississauga.ca/wp-content/uploads/2020/07/16135257/Green-Standards-Development-Standards-2012.pdf

[25] https://www.newmarket.ca/urbandesignguidelines

[26] https://www.oakville.ca/assets/2011%20planning/Livable-by-design-manual-part-c.pdf / https://www.oakville.ca/assets/2011%20planning/LivDesignManual-v2-1.pdf

[27] https://www.toronto.ca/city-government/planning-development/official-plan-guidelines/design-guidelines/greening-surface-parking-lots/ (https://www.uni-groupusa.org/PDF/greening_parking_lots_dg_update_16nov07.pdf)

[28] https://www.vaughan.ca/projects/policy_planning_projects/city_wide_parking_standards_review/General%20Documents/Draft%20Web%20Version%20Parking%20Design%20Guidelines%20Oct%2021.pdf

Circulation	Guidelines
	• **The length of parking rows should be limited to 60 m (20-23 contiguous spaces) to create breaks for landscaping, including shade trees.** • Provide continuous circulation throughout the site. Avoid dead end driveways and turn around spaces where possible • Ensure unobstructed vehicular and pedestrian sight lines and provide clearly marked crossings at all intersections between vehicle routes and pedestrian pathways. Intersection points should be distinctly paved with a different pedestrian-scaled material and raised for traffic calming effect at major nodes, where possible.

Pedestrian Circulation	**Toronto's *Greening Surface Parking Lots***
	• Establish a direct and continuous pedestrian network within and adjacent to parking lots to connect building entrances, parking spaces, public sidewalks, transit stops and other pedestrian destinations
	• **Provide at least one pedestrian route between the main building entrance and the public sidewalk that is uninterrupted by surface parking and driveways.**
	• **In larger parking lots or where parking lots serve more than one building or destination, provide designated pedestrian pathways for safe travel through the parking lot.**
	• **The width, number and orientation of pedestrian routes should match the anticipated flow of pedestrian traffic through the site. Consider the space requirements for equipment related to parking lot use, such as shopping carts, strollers and mobility aids, when planning the width and location of pedestrian routes.**
	• All pedestrian routes within a parking lot should include:
	  ○ a barrier-free pathway, with a minimum clear width of 1.7m (wider pathways are encouraged and may be required depending on parking lot use)
	  ○ **shade trees (or a shade structure) along one or both sides of the pathway**
	  ○ pedestrian-scale lighting to illuminate and define the route; and
	  ○ a clear division from vehicular areas, with a change in grade, soft landscaping and a change in surface material
	• **Consider installing "tables" (rolled curbs bordering slightly elevated crossings) at major internal intersections to serve as a traffic calming feature and provide pedestrian priority.**
	• **Provide enhanced pedestrian pathways along street access driveways**.
	• Where pedestrian routes cross street access driveways and other major drive aisles, clearly mark crossings and provide unobstructed sight distance for both pedestrians and vehicles.
	Vaughan's *Parking Design Guidelines*
	• Provide a safe, interconnected pedestrian network within and adjacent to parking lots to connect building entrances, parking spaces, public sidewalks, transit stops and other pedestrian destinations.
	• **Provide at least one direct pedestrian route between the public sidewalk and every main building entrance that is uninterrupted by surface parking and driveways**
	• Pathways should be distinctly paved and barrier-free, well-lit with pedestrian-scaled lighting and include benches, bike rings, and trash receptacles at nodal points, as determined at site plan design stage
	• **Main pedestrian routes should be reinforced with landscaping, low walls, fences and entry features, where appropriate**
	• **The width and configuration of pedestrian routes should consider anticipated pedestrian traffic flow and the spatial requirements for accessories such as shopping carts, strollers, bicycles and mobility aids**
	• Where pedestrian routes cross street access driveways and other major drive aisles, crossings are to be distinctly paved and marked with unobstructed sight lines for both pedestrians and vehicles
	• **Main internal pedestrian routes should be enhanced with 3.0 metres wide landscape areas on one or both sides, where feasible.** Deciduous tree canopy should be complimented with low understory plantings ensure an eye-level window to promote safety through natural surveillance.
	• Orient car parking spaces to minimize the number of traffic aisles that pedestrians must cross. Generally, parking aisles should be perpendicular to major destinations

Circulation	Guidelines
	• **Select trees, shrubs and other vegetation abutting pedestrian areas free of thorns, tolerant of urban conditions and drought. The Urban Design Section should be consulted for appropriate selections.** • **Shade trees or shade structures should be provided along one or both sides of a pedestrian pathway.** • **Provide elevated crossings with rolled curbs, chicanes and bump outs at major internal intersections to calm vehicular traffic and promote pedestrian safety. Crosswalks should be elevated to the level of the connecting pedestrian walkway** • Weather protection should be provided at main building entrances, close to transit stops and in places of pedestrian amenities. • **Ensure bicycle storage areas do not conflict with pedestrian circulation.**
Cyclist Circulation	**Vaughan's *Parking Design Guidelines*** • Provide sheltered bicycle parking in visible, clearly illuminated locations near building entrances and pedestrian walkways where the principle of natural surveillance can be employed consistent with the City of Vaughan's Crime Prevention Through Environmental Design (CPTED) policy. • **Bicycle storage locations should be sited in such a way as to minimize conflicts with pedestrians.** • **Bicycle pathways should be distinctly paved in asphalt to differentiate them from pedestrian walkways.** • **Install curb cut ramp adjacent to any bicycle parking area.** • **Bicycle racks should be made out of a durable and strong material and be permanently anchored to the ground.** • **Incorporate way-finding signage as appropriate.** • **Provide at least 1m clearance between parked bicycles and adjacent walls, poles, landscaping, street furniture, drive aisles and pedestrian clear ways and at least 1.5 m clearance from vehicle parking spaces.**

Note: Points in **bold** are not included in Richmond Hill's Urban Design Guidelines

In general, the City's Urban Design Guidelines specify the circulation, layout, and landscaping design preferences presented in the other guidelines; however, **the City can consider adding a few highlighted points not present in the existing guideline (highlighted in Table 38) and create a separate document specifying design guidelines for parking (similar to Toronto and Vaughan).**

6.5 Additional Design and Cost Considerations

Additional considerations related to parking design include, but not limited to, available parking space lot dimensions and configurations to allow for adequate maneuvering, grading changes, landscaping, drainage, pavement thickness, water-table (groundwater), structural requirements (e.g. weight to be supported along access route and loading space if it's over a supported structure such as an underground parking garage etc.), location of loading spaces (e.g. proximity to building intake, residential units etc.), illumination, signs, pavement markings, snow storage, and safety/security.

7 Preliminary Recommendations

The preliminary recommendations for the minimum dimensions of the various types of parking spaces are summarized in **Table 39**, and the preliminary recommendations for minimum aisle widths based on angles are summarized in **Table 40**. Additional considerations for recommended updates based on the current practices review are summarized in **Table 41**.

Table 39: Preliminary Recommendations for Minimum Dimensions of Various Types of Parking Spaces

Parking Space	Length (m)	Width (m)	Vertical Clearance (m)
Perpendicular Parking Space	5.6 (-0.2)	2.7 (-0.05)	2.0 (new)
Parallel Parking Space	6.7 (-)	2.6 (+0.2)	2.0 (new)
Tandem Parking Space	5.6 (new)	2.7 (new)	2.0 (new)
Compact Parking Space	4.8 (new)	2.4 (new)	2.0 (new)
Accessible Parking Space (Type A)[1,2]	5.6 (new)	3.4 (new)	2.0 (new)
Accessible Parking Space (Type B)[1]	5.6 (new)	2.4 (new)	2.0 (new)
Stacking Space	6.0 (new)	2.7 (new)	2.0 (new)
Loading Space - A	13.0 (-)	4.0 (+0.5)	6.1 (-)
Loading Space - B	9.0 (-)	3.7 (-)	4.3 (-)
Bicycle Parking Space (Horizontal)	1.8 (-)	0.6 (-)	1.9 (new)
Bicycle Parking Space (Vertical)	1.9 (new)	0.6 (new)	1.2 (new)[3]
Bicycle Parking Space (Stacked)	1.8 (new)	0.6 (new)	1.2 (new)[4]

Note:
1) Minimum 1.5 metres wide access aisle adjacent to parking space
2) City may consider only defining a single accessible parking space based on Type A.
3) This value refers to horizontal clearance distance.
4) Vertical clearance applies to both stacked spaces.

Numbers in (brackets) represent change in minimum dimensions from the existing City's by-law.

Table 40: Preliminary Recommendation of Minimum Aisle Widths

Municipality	Parking Angle (degrees)	One-Way / Two-Way Aisle Minimum Width (m)
Richmond Hill	Up to 45	4.0 (+0.3); one-way only
	Greater than 45 to, and including, 60	5.5 (-); one-way only
	Greater than 90 to, and including, 90	6.0 (-)

*Numbers in (brackets) represent change in minimum dimensions from the existing City's by-law

Table 41: Preliminary Recommendations Aside from Parking Space Dimensions

Section	Preliminary Recommendations for Consideration
Obstruction (**Section 2.8**)	Define obstructions to parking and establishing an increase in the minimum parking dimension when the side of a parking space is considered obstructed. An example would be: The side of a parking space is obstructed if any part of a fixed object such as a wall, column, bollard, fence or pipe is situated within 0.3 metres of the side of the parking space, measured at right angles, and more than 1.0 metre from the front or rear of the parking space. Light standards located at the intersection of four (4) parking spaces are not considered an obstruction.
Loading Space – Residential (**Section 3.2.1**)	Define a smaller loading space size to use as a second loading space for larger residential developments (similar to Toronto and Vaughan).

Section	Preliminary Recommendations for Consideration
Loading Space – Thresholds (**Section 3.2.3**)	Update the thresholds to the nearest 100 square metres such that the thresholds are 500, 2500, and 10000 square metres for review purposes unless the preferences is to review in square feet.
Loading Space – Non-residential (**Section 3.2.3**)	List specific non-residential land uses that would require loading spaces rather than a rate used for all non-residential land uses, particularly if there are common request for exemptions from loading requirements experienced by the City through some development applications.
Loading Space – Larger Loading Space Size (**Section 3.2.3**)	Define a larger loading space type for retail, industrial, and/or supermarket loading space requirements.
Loading Space – Shared Rate (**Section 3.2.4**)	Implement a shared loading space calculation where multiple land uses will share the same building and loading spaces. This will only be applicable if separate rates are explicitly developed for multiple non-residential land uses.
Loading Space – Size (**Section 3.2.5** and **Table 18**)	Increase the minimum width of its standard space to 4.0 metres since it is currently smaller than the width of its smaller loading space and is the smallest amongst other municipality loading spaces of the same length.
Bicycle Parking – Dimensions (**Section 4**)	Add a requirement for minimum vertical clearance of 1.9 metres, minimum dimension requirements for vertical bicycle parking spaces, minimum vertical clearance for stacked parking spaces, and minimum aisle width of 1.5 metres between bicycle parking.
Bicycle Parking – End of Use Facilities Dimensions (**Section 4**)	Add requirements for end-of-use facility design details noted in Vancouver's by-law (minimum door widths, oversized spaces etc.); however, the city may benefit from the simpler by-law until cycling becomes more prominent.
Cash-in-Lieu (**Section 5**)	Add a contingency cost, maintenance cost, and/or a revenue into the contribution calculation for cash-in-lieu of parking spaces. Define a smaller rate (contribution amount) for smaller change of use developments compared to the existing 50% similar to Mississauga and Toronto.
Access Ramp Design - Slope (**Section 6.16.2.1**)	Require a transition area at the top and bottom of the ramp with a maximum slope of 7.5% over a minimum distance of 3.0 metres similar to Toronto's by-law.
Residential Driveway – Widths (**Section 6.2.1**)	Define a smaller minimum driveway width in the range of 2.0 metres to 2.7 metres (currently set at 3.0 metres).
Residential Driveway Widths – Landscaping (**Section 6.2.1**)	Define a minimum percentage for general landscaping and a soft landscaping percentage. A defined minimum soft landscaping percentage can ensure that hard landscaping (such as walkways) are limited while still contributing to the general landscaping requirement.
Hammerhead – Residential Driveways (**Section 6.3.1**)	Adopt similar standards as Toronto and Mississauga by defining the hammerhead as a separate component from a driveway and providing similar size requirements, but with a caveat that the hammerhead is counted as hard landscaping.
Hammerhead – Parking Areas (**Section 6.3.2**)	Keep the hammerhead discussion in the *Standards and Specifications Manual*. It is noted that the simplest approach would be to address the dead-end scenario through treatment of obstructions.
Pedestrian/Cyclist/Vehicle Circulation – Parking Design Guidelines (**Section 6.4**)	Create a separate document specifying design guidelines for parking (similar to Toronto and Vaughan).