

Final Report

Cawthra Road EA Active Transportation Report



Prepared for the Region of Peel
by IBI Group
June 21, 2019
Revision 1 – October 2020

Document Control Page

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| CLIENT: | Region of Peel |
| PROJECT NAME: | Cawthra Road Environmental Assessment |
| REPORT TITLE: | Active Transportation Report |
| IBI REFERENCE: | 24RX16.0014 |
| VERSION: | 1.3 Final Submission Revision 1 |
| DIGITAL MASTER: | J:\24RX16.0014_Peel-CawthraRd-EA\10.0 Reports |
| ORIGINATOR: | Zibby Petch |
| REVIEWER: | Allan Ortlieb |
| AUTHORIZATION: | Allan Ortlieb |
| CIRCULATION LIST: | |
| HISTORY: | 1.0 Draft Annotated Table of Contents for Region Review and Comments 1.1 Draft Report Submission 1.2 Final Report Submission 1.3 Final Report Submission – Revision 1 |

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1 Overview

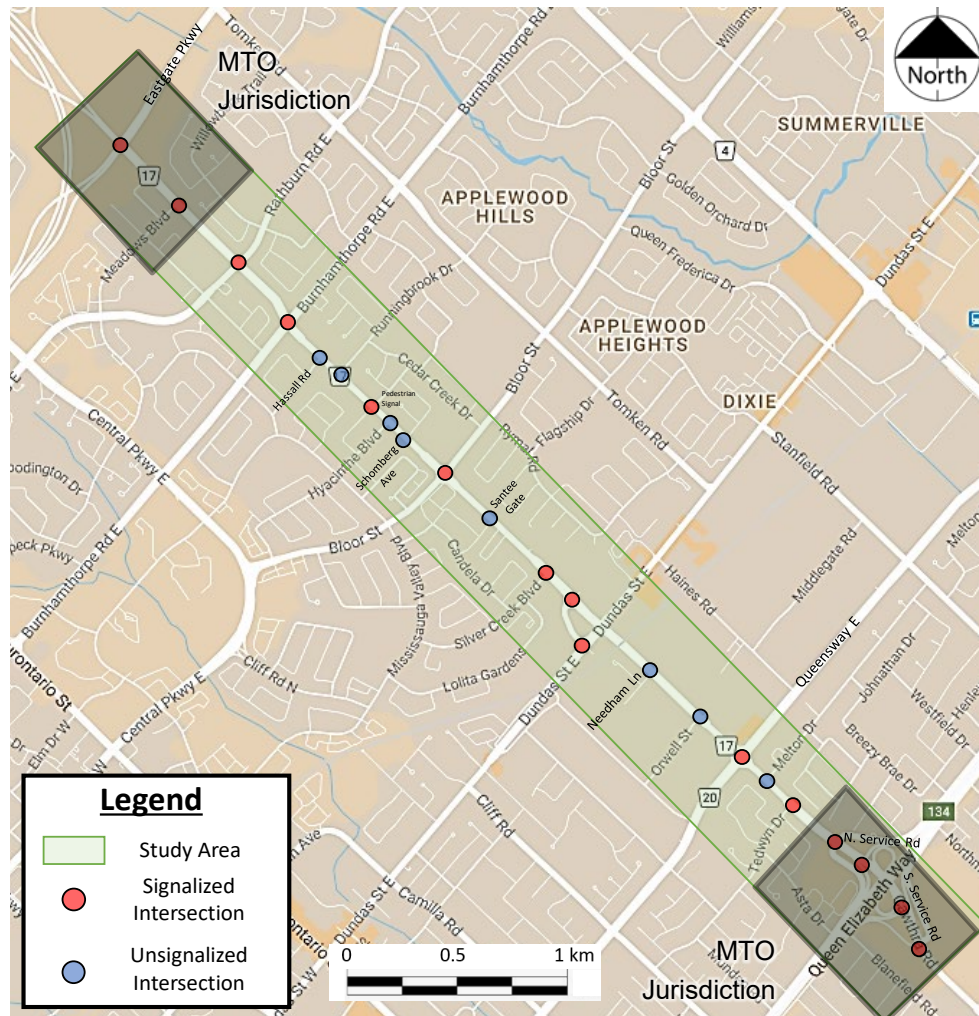
The Region of Peel, with support from IBI Group, is undertaking an Environmental Assessment (EA) to identify the needs and opportunities along the Cawthra Road Corridor for all modes of transportation, including pedestrians, cyclists, transit users, and motorists. The EA will involve assessing existing transportation issues and constraints, as well as evaluating potential operational improvements that address areas of concern.

This report presents a summary of the planning and design considerations for the active transportation facilities along the corridor.

1.1 Study Area

The primary study limits extend between Highway 403 / Eastgate Parkway and the QEW South Service Road. Exhibit 1-1 displays the study area along with the included intersections. Segments of the corridor fall under the jurisdiction of the Ministry of Transportation of Ontario (MTO), as highlighted.

Exhibit 1-1: Study Area Map



1.2 Policy and Planning Framework

There are several policy and planning documents for the local area which provide context and guidance to this study, including Metrolinx's The Big Move, Region of Peel Official Plan, City of Mississauga Official Plan, Moving Mississauga Interim Transportation Strategy, Peel Long Range Transportation Plan, and the Peel Strategic Goods Movement Network Study. For further discussion on these various documents and how they inform the EA, please refer to the *Cawthra Road EA Traffic Operations Analysis Report*.

Specific active transportation planning documents that directly inform this report include:

- **Peel Region Sustainable Transportation Strategy (STS) (2018)** – The Region's STS recommends a strategy to achieve a 50% mode share target for sustainable modes by 2041, including a complete pedestrian and cycling network plan. The plan identifies Cawthra Road as part of the Regional pedestrian and cyclist network, and recommends that active transportation improvements be introduced along the corridor.
- **Mississauga Cycling Master Plan (2018)** – The City's recently updated cycling master plan identifies connecting routes in the vicinity of the Cawthra Road corridor, and incorporates the City's latest planning & design guidelines for cycling facilities.

In addition to specific active transportation planning documents, it is important to consider the Region of Peel's Road Characterization Study when considering active transportation design. The Road Characterization Study (RCS) provides the Region with design guidelines and access management measures for Regional Roads. As part of this study, the section from Eastgate Parkway to Dundas Street (North and Central Sections) is classified as a Suburban Connector, and the section from Dundas Street to the QEW (South Section) is classified as an Industrial Connector. A general overview of these two road characters, as they relate to active transportation, is provided below:

- **Suburban Connectors** are generally characterized as having some residential area with reverse frontage; 4 to 6 through lanes; and a desired operating speed between 50 and 70 km/hr. Pedestrians are to be accommodated with a 1.5m (minimum) walkway behind wide boulevards¹. Cyclists are to be accommodated in a multi-use path or bicycle lane.
- **Industrial Connectors** are generally characterized as having access to industrial and warehousing areas connecting to 400 Series Highways; 4 to 6 through lanes; and a desired operating speed between 60 and 80 km/hr. Pedestrians are to be accommodated with a 1.5m (minimum) walkway behind wide boulevards². Professional judgment is recommended to determine appropriate bike facilities in areas with high truck volume or where accesses / intersections are less than 300m apart.

¹ Note current Regional standard is to provide 1.8m sidewalks (Standard Drawing 5-2-6).

² Note current Regional standard is to provide 1.8m sidewalks (Standard Drawing 5-2-6).

2 Network Context

2.1 Existing Conditions & Active Transportation Facilities

Cawthra Road is a four lane north-south arterial road located in Mississauga within the Regional Municipality of Peel, connecting Eastgate Parkway to Lakeshore Road. Within the study area, Cawthra Road primarily serves residential areas with the exception of the section confined by Dundas Street and The Queensway. There is a centre auxiliary turning lane throughout the corridor north of Dundas Street. A grade separated intersection exists at Dundas Street, where access is provided via a jug-handle style connection. Cawthra Road has a posted speed limit of 50 km/h.

Sidewalks are available on both sides of Cawthra Road from the QEW to Burnhamthorpe Road. North of Burnhamthorpe Road, the sidewalk on the west side was recently replaced with a multi-use path, which is now continuous to Eastgate Parkway. There is no sidewalk on the east side of Cawthra Road between Burnhamthorpe Road and Eastgate Parkway (only a splash pad exists, adjacent to the curb). With exception of the multi-use path noted, there are no existing cycling facilities along Cawthra Road; however bikeways intersect Cawthra Road at several locations (refer to Section 2.2.1). Photos of the existing active transportation facilities along the corridor are shown in Exhibit 2-1.

Exhibit 2-1: Existing Facilities & Active Transportation Context



Multi-use path on the west side of Cawthra Road (North of Burnhamthorpe) – MTO Jurisdiction



Sidewalk with splash pad



Transit stop & shelter



Curb-face Sidewalk (near Queensway)

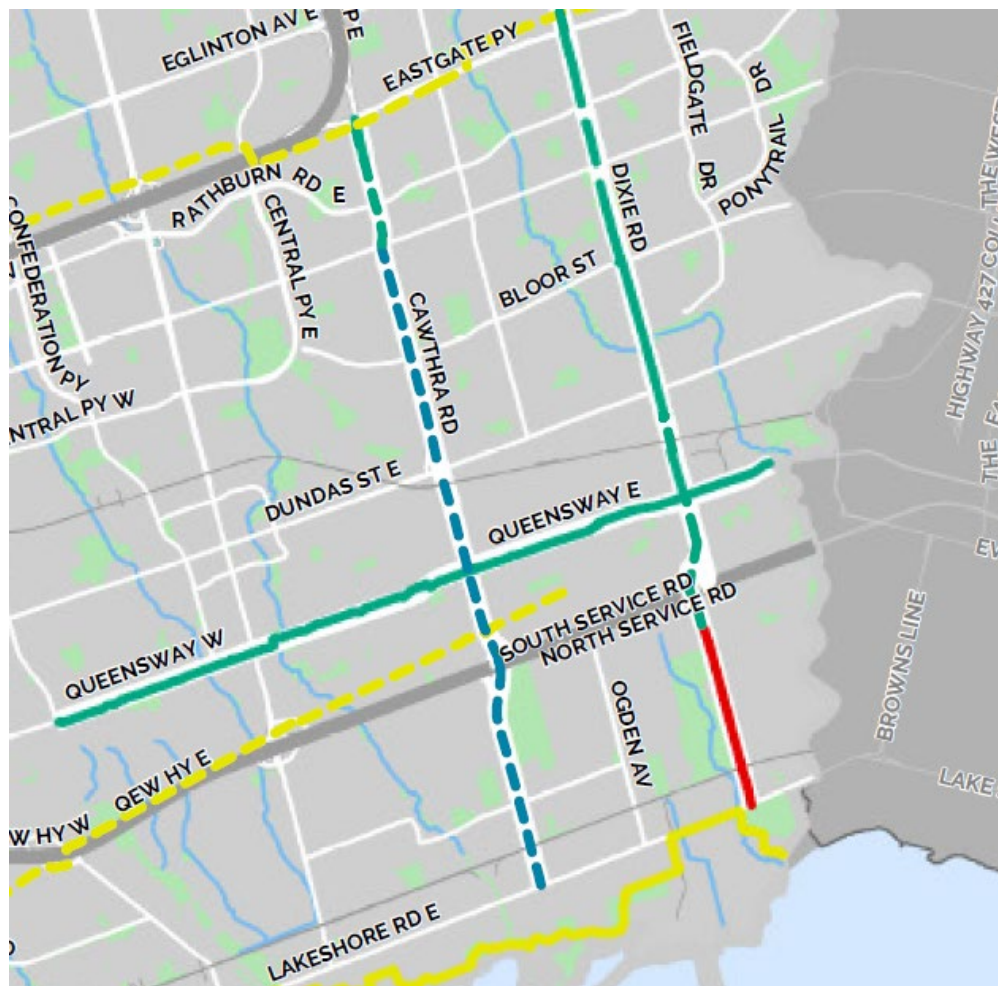
2.2 Active Transportation Network Recommendations

2.2.1 Cycling Connections

Cawthra Road

The Region's Sustainable Transportation Strategy (STS) includes a cycling network plan with recommendations for future facilities. Cawthra Road is identified in the proposed long term cycling network for future cycling facilities within the study area, but also extending south to Lakeshore Road (refer to Exhibit 2-2).

Exhibit 2-2: Summary of Existing and Planned Cycling Facilities along Cawthra



Source: Peel Region Sustainable Transportation Strategy, Proposed Long-Term Cycling Network

Existing Facilities

- Bike Lane
- Paved Shoulder
- Multi-use Trail
- Off-Road Trail of Regional Significance
- Greenbelt Route

Proposed Facilities

- - - Shared Route
- - - Paved Shoulder
- - - Bike Lane or Buffered Bike Lane
- - - Cycle Track
- - - Multi-Use Trail
- - - Off-Road Trail of Regional Significance

A detailed review of the potential cycling facilities along Cawthra Road corridor between Eastgate Parkway & Lakeshore Road was also completed as part of the Cawthra Road Pre-EA study (refer to Section 3.1 for more detail).

Intersecting Routes

It is important to consider existing and planned intersecting cycling routes to encourage network connectivity. In order to facilitate simple transitions for turning cyclists, a variety of treatments may be considered:

- For simple connections, pavement markings, signage including wayfinding, and/or a curb cut / access ramp can accommodate most cycling movements
- For more complex intersections with separated cycling facilities, higher order treatments such as two-stage left turn bike boxes, advanced bike boxes or elements of protected intersections such as forward queueing areas, bicycle-specific signal phasing, corner islands and bend out approaches may be required to improve the ease of left turns across Regional roads

The networks from the 2018 Peel Sustainable Transportation Strategy and the 2018 Mississauga Cycling Master Plan were reviewed to identify connections to Cawthra Road within the study area. The existing and planned connections (from south to north), along with a strategy for accommodating access, are summarized in Exhibit 2-3.

Exhibit 2-3: Summary of Existing and Planned Active Transportation Connections

| INTERSECTION | TYPE | EXISTING FACILITY | PROPOSED FACILITY | STRATEGY |
|------------------------------------|---------------------------|-----------------------------|---|---|
| North Service Road | Signalized Intersection | N/A | Royal Windsor Lakeshore Trail crossing | <ul style="list-style-type: none"> • Provide wider crosswalk (5.0m) to accommodate future retrofit to crossside if trail is planned to cross at intersection |
| Tedwyn Drive (City of Mississauga) | Signalized T-Intersection | N/A | Shared Route (Shared use by cyclists and motorists) | <ul style="list-style-type: none"> • Provide ramping onto cycle track for cyclists making an eastbound left (EBL) • Provide left turn lay-by & detection for cyclists making a northbound left (NBL) |
| Queenway East (Region of Peel) | Signalized Intersection | Multi-use Path (south side) | N/A | <ul style="list-style-type: none"> • Preferred: Incorporate elements of protected intersection on the south side including bend out design, queuing area for left turns behind corner island, crossrides • Alternative: Provide crossride on south side & two stage queue boxes to accommodate cyclists making southbound left (SBL) (in-boulevard) |

| INTERSECTION | TYPE | EXISTING FACILITY | PROPOSED FACILITY | STRATEGY |
|--|--------------------------------|--|--|---|
| Dundas East (City of Mississauga) | Signalized Intersection | N/A | Cycle Tracks (Major Corridor Study) | <ul style="list-style-type: none"> Some uncertainty associated with a major corridor study Attempt to accommodate for future connection through design (incorporate elements of protected intersection such as bend out design, queuing area for left turns behind corner island, crossrides) |
| Silver Creek Boulevard (City of Mississauga) | Signalized T-Intersection | Shared Route (signed route with shared lanes for cyclists and motorists) | N/A | <ul style="list-style-type: none"> Provide ramping onto cycle track for EBL cyclists Provide left turn lay-by & detection for NBL cyclists |
| 300m South of Bloor Street (east) | Midblock | Subdivision connection | N/A | <ul style="list-style-type: none"> Provide connection to/from cycle track |
| Bloor Street (City of Mississauga) | Signalized Intersection | N/A | Cycle Tracks | <ul style="list-style-type: none"> Attempt to accommodate for future connection through design Incorporate elements of a protected intersection (bend out design, queuing area for left turns behind corner island, crossrides) to provide for future connectivity |
| 150m North of Bloor Street (east) | Midblock | Park connection | N/A | <ul style="list-style-type: none"> Provide connection to/from cycle track |
| Breckenridge Road (City of Mississauga) | Intersection Pedestrian Signal | N/A | Shared Route (signed route with shared lanes for cyclists and motorists) | <ul style="list-style-type: none"> Provide ramping onto cycle track for cyclists making a westbound left (WBL) or eastbound left (EBL) Limited opportunities to provide a treatment for cyclists on Cawthra to access side street (i.e. two-stage left turn bike boxes are not compatible with near side pedestrian signal); Cyclists will have to dismount to complete the crossing. Consider adding separate crossrides to the existing crosswalk to accommodate cyclist crossings at the signal. |

| INTERSECTION | TYPE | EXISTING FACILITY | PROPOSED FACILITY | STRATEGY |
|---|-------------------------|--|-------------------|---|
| Burnhamthorpe Road East (City of Mississauga) | Signalized Intersection | Multi-use Path on the north side of Burnhamthorpe (east & west); Multi-use Path along Cawthra (west side north of Burnhamthorpe) | N/A | <ul style="list-style-type: none"> Preferred: Incorporate elements of a protected intersection (bend out design, queuing area for left turns behind corner island, crossrides) to improve ease of facility transition Alternative: Crossride on north side & two stage queue boxes for NBL (in-boulevard) |

2.2.2 Pedestrian Improvements & Crossing Opportunities

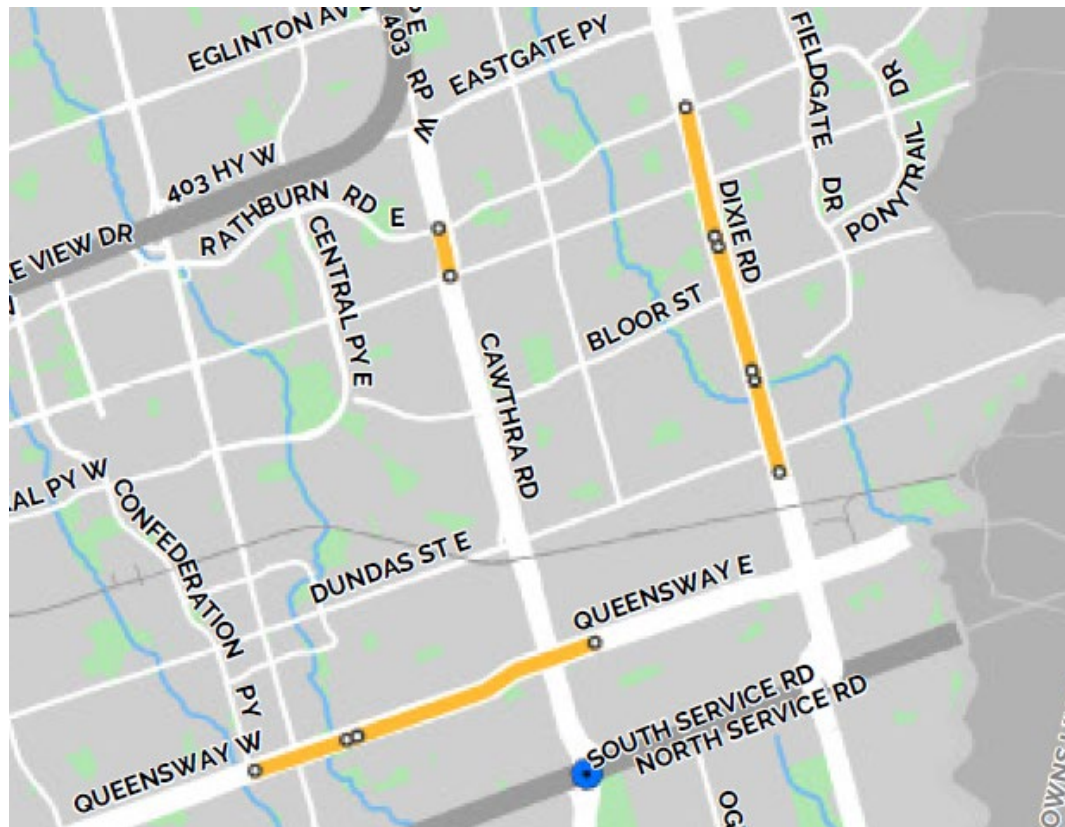
Pedestrian Facilities

The Region’s Sustainable Transportation Strategy (STS) includes the identification of improvements to pedestrian facilities and crossings with a short-term focus on corridors throughout the Region identified as ‘Pedestrian Improvement Corridors’. These corridors were identified based on a review of five characteristics: road characterization, key destinations, high demand (corridors located in zones with predicted walking mode shares of 10% or more by 2041), existing network gaps or public comments, and access to transit.

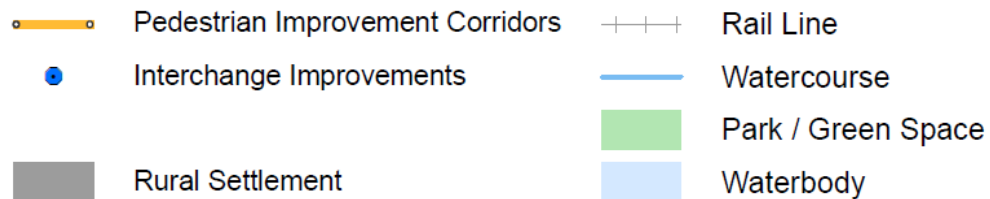
The Pedestrian Improvement Corridor network includes Cawthra Road between Rathburn & Burnhamthorpe (refer to Exhibit 2-4). This corridor was identified as a Pedestrian Improvement Corridor as it is a Regional roadway with pedestrian facilities on only one side (multi-use path on the west side), located in an area of higher walking demand. As noted in the STS, the intended upgrades along Pedestrian Improvement Corridors will vary by corridor, given the roadway context and property considerations, but may include improvements such as constructing any missing sidewalk links, widening existing sidewalk links, context specific upgrades to major intersections (such as: narrowing vehicular lanes approaching the intersection, reducing corner radii, investigating the removal of right turn channels, Accessibility for Ontarians with Disabilities Act (AODA) upgrades, and signal timing adjustments), and upgrades to minor intersections to address AODA standards.

Furthermore, the policy language within the STS supports continuous pedestrian facilities: “Along Regional roads, the general policy for pedestrian facilities is that they should be provided on both sides of the road within urban and rural settlement areas, and may consist of sidewalks and/or multi-use trails” (p. 60). Therefore, **it is recommended that sidewalks be protected for on the east side of Cawthra Road between Burnhamthorpe Road & Rathburn Road as an improvement to a Pedestrian Improvement Corridor. Furthermore, an extension of the sidewalk north of Rathburn Road to Eastgate Parkway is consistent with Regional policy, and provides a continuous pedestrian connection to the Cawthra Transitway Station, located east of Cawthra on Eastgate Parkway (note that MTO jurisdiction begins 160 m south of Meadows Blvd so improvements from this point north are subject to MTO approval). These improvements, if not incorporated as part of the current study, should remain part of the longer-term corridor objective and considered as part of future reconstruction within the northern segment of the corridor.** It is noted that there are significant constraints to be overcome in order to provide a sidewalk on the east side including steep boulevard grades, hydro poles and mature trees.

Exhibit 2-4: Pedestrian Improvement Corridors



Source: Peel Region Sustainable Transportation Strategy; Pedestrian Improvement Areas



Further to the identification of this corridor as a Pedestrian Improvement Corridor, opportunities to incorporate streetscaping elements into the detailed design should be considered. The corridor reconstruction should be viewed as an opportunity to incorporate elements of the Region's Streetscaping Toolbox Update (2017), including green infrastructure, and streetscaping elements of the Peel Healthy Development Assessment guide (as applicable) to improve walkability in the corridor. The types of streetscaping elements included in the design will vary depending on feasibility but may include treatments such as: plantings (trees, shrubs or other planting elements), street furniture (refer to the Region's rest area guidelines incl. Standard Drawing 5-2-19), buffer blocks and bioretention features.

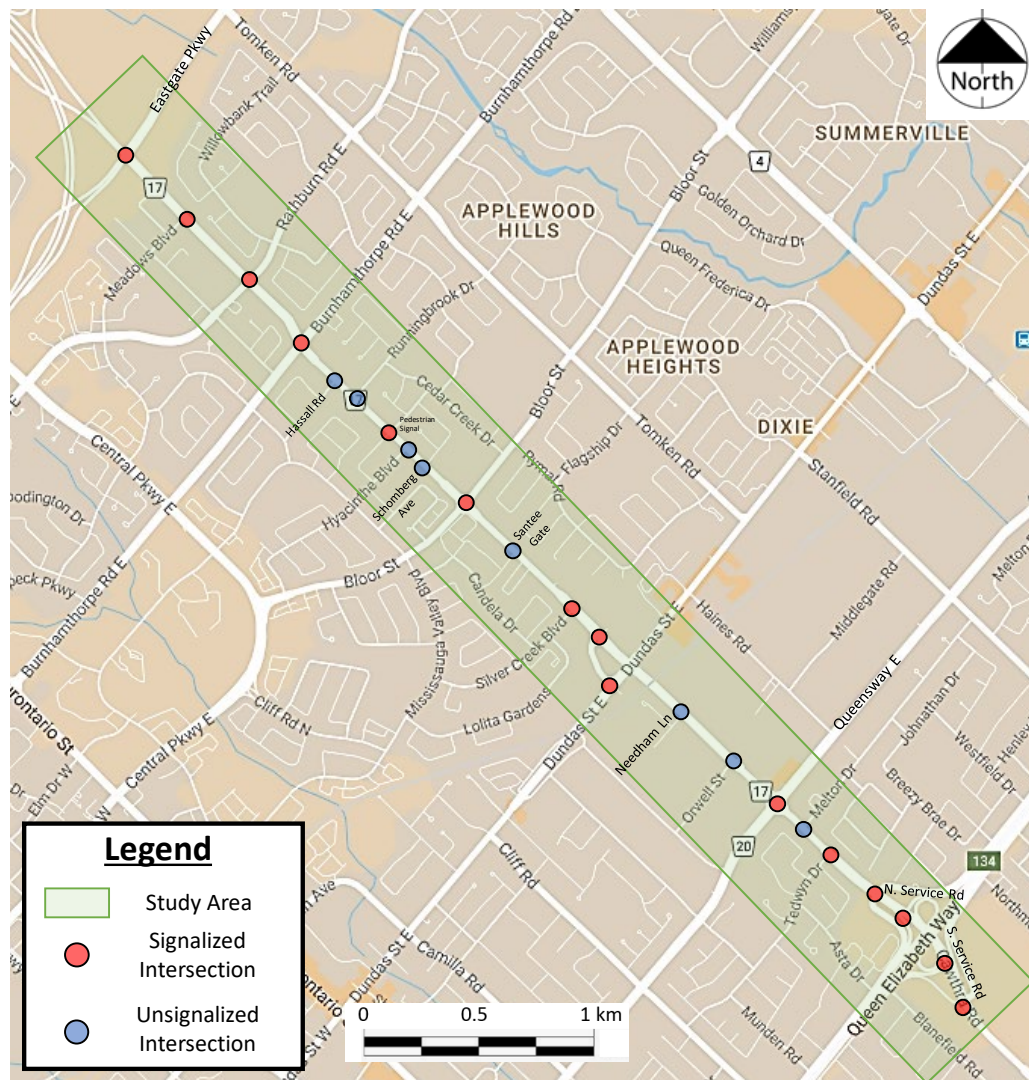
Controlled Crossing Opportunities

In addition to linear infrastructure, it is important to consider formal pedestrian crossing opportunities. Along the Cawthra road corridor within the study area, controlled crossing opportunities (including the new intersection pedestrian signal at Breckenridge Road) are generally spaced about 400m apart (refer to Exhibit 2-5). The notable exception to this crossing spacing is between Dundas and Queensway, where there are no controlled crossings for a

distance of about 950m. Although the Region does not identify a specific target for the maximum distance between formal pedestrian crossings, a target of 200-400m is generally considered reasonable in this context, although the demand for crossings depends on specific destinations and access points.

The opportunity to introduce a pedestrian crossing at Needham Lane was reviewed as part of this EA study, however the Ontario Traffic Manual (OTM) Book 12 warrants for a pedestrian signal were not fulfilled (refer to the *Traffic Operations Report*), and the vehicle volumes along Cawthra Road exceed acceptable thresholds for a pedestrian crossover (PXO) per the recommendations of OTM Book 15. **It is recommended that the Region continue to monitor pedestrian demand in the vicinity of Needham Lane / Orwell Street, particularly should any redevelopment of this area occur, as the warrants for a pedestrian signal may be fulfilled in future conditions. It is further recommended that the Region undertake pedestrian counts at this location annually going forward, including any pedestrian crossings immediately north and south of intersection.**

Exhibit 2-5: Summary of controlled crossing points (red)



3 Cycling Facility Selection

3.1 Cawthra Road Pre-Environmental Assessment Study

The Cawthra Road EA was preceded by a Pre-Environmental Assessment Study. This section documents the recommendations from previous studies with respect to the active transportation facilities along Cawthra within the study area.

Two reports were prepared as part of the Cawthra Road Pre-Environmental Assessment (Pre-EA) study:

- *Multi-Modal Transportation Report* (IBI Group, September 2014) documents the transportation and traffic aspects of the study area. It recommends the type of cycling facilities appropriate for Cawthra Road based on master plans, policies, and basic design guidance such as traffic volume, speed and road classification.
- *Technical Feasibility Study Report* (IBI Group, September 2014) documents the development and assessment of design concepts for cycling facilities. It recommends the specific type of facility appropriate for sections of Cawthra Road based on a more detailed analysis using Ontario Traffic Book 18 Cycling Facilities, and on the feasibility and impacts of constructing the facilities.

The *Multi-Modal Transportation Report* recommended the following active transportation facilities:

- “Based on the characteristics of Cawthra Road (i.e. traffic volumes, traffic speeds, road classification, etc.) a physical separation of motor vehicle and bicycle facility is desirable. Appropriate treatments include (but are not limited to):
 - Providing 1.5 m on-road bike lanes with a 0.5m buffer;
 - Providing 1.8 to 2.0 m cycle track; or
 - Providing a 3.0 to 3.5m multi-use trail in the boulevard. Given the numerous driveways and unsignalized intersections along Cawthra Road, bike lanes may be more appropriate than a multi-use trail since motorists are more likely to be aware of cyclists on the roadway rather than adjacent to the road. If located on-street, bike lanes have priority over traffic entering from driveways.” (p. 10)

The *Multi-Modal Transportation Report* recommended that the following improvements be considered in the Technical Feasibility Study:

- **Eastgate Parkway to Burnhamthorpe Road:** “Maintain the multi-use trail recently reconstructed along the west side of Cawthra Road” (p.50)
- **Burnhamthorpe Road to Dundas Street:** “Provide either on-road bike lanes or a multi-use trail along Cawthra Road (bike lanes may be more preferable given the significant number of driveways within the corridor)” (p. 50)
- **Dundas Street to the QEW:** “The Dundas Street and the Lakeshore West rail underpass structures represent significant constraints to widening within the corridor...provide a multi-use trail or bike lanes along Cawthra Road... considering boulevard width, utility impacts, driveway frequency, etc.” (p. 50)

The *Technical Feasibility Study* presented the results of applying the Bicycle Facility Selection Tool from OTM Book 18, a three-step process. Active transportation facilities, in particular, a multi-use path (MUP) on the east or west side, bike lanes, buffered bike lanes or cycle tracks,

were evaluated for the various sections of Cawthra Road. Details such as the impact on trees, utilities, driveways, etc., were considered.

The Technical Feasibility Study recommended the following:

- **Eastgate Parkway to Burnhamthorpe Road:** Provide a northbound right-turn lane at Eastgate Parkway and Rathburn Road (potentially requiring relocation of several hydro poles along Cawthra Road at Rathburn Road); complete the planned MUT on the west side
- **Burnhamthorpe Road to Bloor Street:** Provide 1.8 m wide cycle tracks. It is expected that these improvements can be implemented with minor utility and mature tree removals. Given the limited space available north of Bloor Street, additional right-of-way and relocation of the noise barrier is potentially required to accommodate bike lanes adjacent to the southbound right-turn lane.
- **Bloor Street to Dundas Street:** Widen the roadway on both sides to provide 1.8 m wide cycle tracks. It is expected that improvements can be implemented with minor utility impacts. Mature tree removals will be required on both east and west sides of the roadway.
- **Dundas Street to the Queensway:** Maintain the location of the existing barrier curb between **Dundas Street to Needham Lane**, and provide cycle tracks within the existing boulevards. **South of Needham Lane**, provide four 3.5 m wide lanes and narrow the flush median from 5.0 to 4.0 m wide (except at intersections); and widen on both sides to provide 1.8 m wide cycle tracks. It is expected that improvements can be implemented with moderate utility impacts; however given the limited boulevard width immediately north of the Queensway, additional right-of-way will likely be required to accommodate relocation of the sidewalk to behind hydro poles adjacent the outside southbound lane.
- **The Queensway to the North Service Road:** Widen the roadway to provide a 1.8 m wide cycle tracks. Immediately north and south of Tedwyn Drive, this involves holding the west curb line and widening to the east. It also involves narrowing the flush median from 5.0 to 4.0 m (except at Tedwyn intersection). It is expected that these improvements can be implemented with minor utility impacts (avoiding hydro poles on west side), however is expected to require significant tree removal within the existing right-of-way (ROW) on the east side.
- **North Service Road to the South Service Road:** Across the QEW Overpass, maintain the existing sidewalks on both sides, and provide a 0.75 to 1.0 m shoulder on the bridge. North and south of the bridge, a cycle track can be added without major impacts.

3.2 Confirmation of Cycling Facility Selection

The recommendations from the Pre-EA study remain appropriate in the context of the EA study. Through the Traffic Operations Report prepared as part of the EA study, traffic volumes for existing and future conditions continue to indicate the need for separated cycling facilities (refer to Exhibit 3-1).

Exhibit 3-1: Confirmation of Need for Separated Cycling Facility

| STUDY SECTION | ROAD CHARACTER | DESIGN/TARGET SPEED | FUTURE AVERAGE DAILY TRAFFIC | APPROPRIATE CYCLING FACILITY CLASS (PER OTM BOOK 18 NOMOGRAPH) | APPROPRIATE CYCLING FACILITY (PER TAC BOOK 5) |
|---|----------------------|---------------------|------------------------------|--|---|
| North Section Eastgate Parkway to Burnhamthorpe | Suburban Collector | 50 km/hr | >15,000 | Separated | Protected bike lanes or bike paths / multi-use path |
| Central Section Burnhamthorpe to Dundas | Suburban Collector | 50 km/hr | >15,000 | Separated | Protected bike lanes or bike paths / multi-use path |
| South Section Dundas to QEW | Industrial Collector | 50 km/hr | >15,000 | Separated | Protected bike lanes or bike paths / multi-use path |
| QEW Overpass (North Service Road to South Service Road) | Industrial Collector | 50 km/hr | >15,000 | Separated | Protected bike lanes or bike paths / multi-use path |

Following the recommendations of the Pre-EA report, the previously planned multi-use path in the North section of the corridor was completed in 2016/2017. Thus, the focus for this study is to confirm appropriate facilities in the Central and South sections of the study area.

Through the EA, much of the discussion has focused on the types of cycle tracks along the corridor between Dundas and Burnhamthorpe. Descriptions of these two cycle track types are provided below:

- **Raised Cycle Tracks** - cycle tracks adjacent to the vehicular lanes and vertically separated from motor vehicle traffic
- **In-Boulevard Cycle Tracks** - cycle tracks set back significantly from the roadway (i.e. greater than 2m which may consist of splash pads and hard-surface or sod boulevards)

The use of raised cycle tracks or in-boulevard cycle tracks depends on a variety of factors, including:

- **Right-of-way (ROW) constraints and availability of boulevard space** – In-boulevard cycle tracks require more boulevard width than raised cycle tracks, so they are more likely to be provided in the context of full corridor reconstruction projects.
- **Frequency and locations of driveways** – Where numerous driveways are present along a corridor, it is desirable that cycling facilities either be:
 - Bent-in: placed closer to the parallel roadway (0-2m) as with raised cycle tracks so that drivers exiting or entering the driveway have good visibility of crossing cyclists at the same time as they look for conflicting vehicles on the roadway; or

- Bent-out: placed far enough away from the parallel roadway (4-6m) so that drivers exiting a driveway have space to first cross the cycle track and then wait to access the adjacent roadway without blocking the cycle track.

For this reason, the number and configuration of driveways will influence the selection of an appropriate facility.

- **Volume and speed of adjacent traffic; lane configuration** – Along busier multi-lane roadways with higher speed traffic, in-boulevard cycle tracks improve comfort for cyclists, while raised cycle tracks with reduced street buffers may be less comfortable for some cyclists along roadways with operating speeds greater than 50km/hr.
- **Land use context** – Raised cycle tracks (which generally incorporate a mountable or bevelled curb as there is limited lateral clearance to accommodate a barrier curb) are not preferred along roadways with significant parking or stopping demand (i.e. main street corridors) as the mountable/bevelled curbs are not a sufficient deterrent to stopped motor vehicles. This is not considered to be a key concern along Cawthra as there are limited commercial uses and no parking/stopping is permitted.
- **Transit Integration** – Treatments at transit stops and input from the transit authority will impact whether cycle tracks should remain closer to the curb with integrated platforms or pull away from the curb to provide space for island platforms. Island platforms are generally preferred where space permits.

Based on these factors, **the general recommendations for cycling facilities along the Central and South sections of the Cawthra Road corridor are summarized below:**

- In general, in-boulevard cycle tracks provide a more comfortable and attractive cycling facility along multi-lane roadways. Where sufficient ROW is available without significant impact on utilities or mature trees, in-boulevard cycle tracks would be preferred, where a sufficient setback (greater than 2m) can be accommodated.
- Recognizing the ROW constraints and significant number of driveways along Cawthra Road, raised cycle tracks provide a separated cycling facility that will increase the visibility of cyclists to turning motor vehicles, while minimizing corridor construction costs. Therefore, raised cycle tracks will be considered where there are numerous continuous driveways, or where utility conflicts and ROW constraints limit opportunities to provide in-boulevard cycle tracks. Where raised cycle tracks are implemented, a bevelled curb type is preferred as there insufficient lateral clearance to a barrier curb (which can be a hazard for cyclists along narrow cycling facilities due to the potential to strike the curb).

Regarding the QEW overpass, additional opportunities were considered to try and provide a continuous cycling facility across the QEW, however there are limited opportunities at this time due to the constrained structure width and recently completed median reconstruction work by MTO (2016-2017). Although Cawthra Road south of the QEW falls outside of the scope of this study, is noted that this section of the corridor was identified for future cycle tracks, both in the Peel Sustainable Transportation Strategy and the Cawthra Road Pre-Environmental Assessment Study Technical Feasibility Study, Part B. Therefore, access across the QEW will become a critical desire line when these facilities are added. Accordingly, **consideration should be given to providing an edgeline / urban shoulder (1.0m) across the structure by narrowing the through lane widths (from 3.65m to 3.5m) that would allow for a reduced level of connectivity to the future planned cycle tracks south of South Service Road. Over the longer-term, it is desirable to engage the MTO regarding providing a continuous cycle track facility across the bridge as part of any future bridge rehabilitation / reconstruction program.**

4 Design Criteria for Active Transportation

Pedestrians and cyclists have unique design requirements. This section identifies pertinent design criteria to be applied in the corridor design (refer to Exhibit 4-1). Note the design criteria cover a wide variety of conditions since the particular configuration of pedestrian and cycling facilities varies along the corridor, within the study limits.

These criteria may be updated at the time of detailed design to reflect emerging practices.

Exhibit 4-1: Design Criteria for Pedestrian & Cycling Facilities

| FEATURE | REFERENCE STANDARDS | RECOMMENDED PROJECT STANDARDS |
|---|---|---|
| CYCLING DESIGN SPEED | 20 -30 km/hr (a) 10-50 km/hr (c) 20 -30 km/hr (d) | 20 km/hr , with consideration for higher speeds depending on grades |
| SHARED MULTI-USE PATH WIDTH ³ | 3.0m-6.0m; Absolute lower limit 2.4m; Practical lower limit 2.7m (a) 3.0m-4.0m; Constrained minimum = 2.4m (b) 2.7m – 4.1m+ (d) | Minimum = 3.0m Preferred = 4.0m Constrained Minimum⁴ = 2.4m-2.7m |
| UNI-DIRECTIONAL CYCLE TRACK WIDTH | 1.8m-2.5m; Practical lower limit = 1.5m (a) 1.5m-2.0m (b) 1.0m-1.5m (c) | Minimum = 1.8m Preferred = 2.0m Constrained Minimum⁴ = 1.5m |
| PEDESTRIAN CLEARWAY ⁵ | 1.8-2.0m; Practical lower limit = 1.5m for peak pedestrian flow rate < 400 ped / 15min (a) 1.2m min – 1.8m pref (c) Minimum 1.5m (e) | Minimum = 1.5m Preferred = 1.8m |
| STREET BUFFER ⁶ BETWEEN CYCLING FACILITY & ADJACENT TRAVEL LANES | 0.3m -1.0m (a) 1.0m typical (b) 0.5m (c) | Minimum = 0.3m Preferred = 1.0m+ |
| HORIZONTAL CLEARANCE TO HAZARDS | Minimum = 0.25m for features between 100mm & 750mm high; Minimum = 0.5m for features > 750mm (a) Minimum 0.25m (b) | Minimum = 0.25m for features between 100mm & 750mm high Minimum = 0.5m for features > 750mm |
| VERTICAL CLEARANCE ⁷ | 2.7m - 3.6m (a) 2.5m (b) 2.5min. – 3.0m rec. (c) (d) | Minimum = 2.5m Preferred = 3.0m |
| RUNNING SLOPE OF FACILITY | <4% pref. (a) <5% for pedestrians; <8% for cycling (c) <5% recommended; up to 1:12 (8.3%) can be accommodated if landings are provided at intervals of no more than 9.0m (d) No steeper than 1:20 (5%) (e) | For Pedestrians: Preferred = <1:25 (4%) Maximum = 1:20 (5%); unless slope of roadway is greater Constrained Maximum = 1:12 (8.3%) with level landings spaced at ≤ 9.0m For Cyclists: <5% preferred, <8% maximum |
| CROSS SLOPE OF FACILITY | Concrete – 1.5% - 2.0%; Asphalt – 2% - 4% (a) 2% (d) 1:20 (5%) max. 1:50 (2%) pref.(e) | Preferred = 2.0 - 4.0% Maximum = 5% |

(a) TAC Geometric Design Guide for Canadian Roads; Chapter 5 – Bicycle Integrated Design (2017)

(b) OTM Book 18 (2013)

(c) VeloQuebec's Planning & Design for Pedestrians and Cyclist (2010)

(d) City of Toronto Multi-Use Trail Design Guidelines (2014)

(e) GAATES Illustrated Technical Guide to the Accessibility Standard for the Design of Public Spaces (2014)

³ TAC suggests that separate bicycle and pedestrian facilities should be provided where there are greater than 20% pedestrian users and total volumes are greater than 33 persons per hour per metre of path width; or where there are less than 20% pedestrian users and total volumes are greater than 50 persons per hour per metre of path width

⁴ These minimums are generally suitable only for short sections which are highly constrained; for example, across a bridge deck or through an underpass. These widths may also be applied to slow cyclists over short stretches, for example, in the vicinity of a transit stop or near intersections.

⁵ Defined as the width of the pedestrian facility available for circulation (excluding frontage & edge zones).

⁶ Defined as the buffer strip between the face of curb of the closest adjacent vehicular lane and the edge of the pedestrian and/or cycling facility; these references are for the street buffer adjacent a cycle track / protected bike lane.

⁷ Measured from surface of active transportation facility to lowest edge of any vertical element above the facility (including signage).

5 Typical Lay-outs

This section identified typical configurations for the active transportation facilities, including consideration for pavement markings and signage, **with a specific focus on the section of the corridor with cycle tracks** (North Service Road to Burnhamthorpe Road).

5.1 Mid-Block Configuration

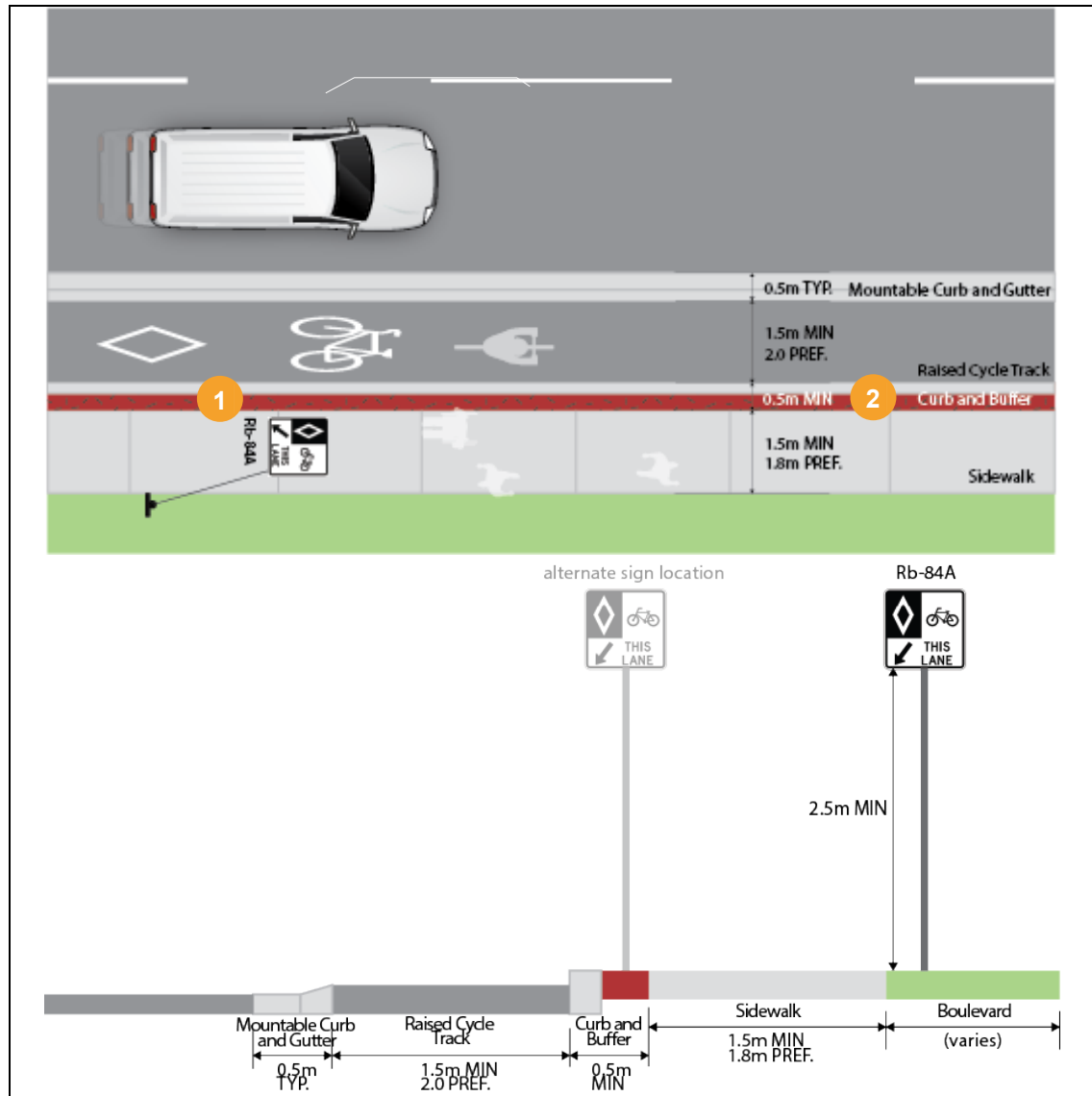
The typical mid-block configuration for the active transportation facilities along Cawthra will vary depending on the roadway context. As noted in Section 3.2, where there are closely spaced residential driveways with utility poles located close to the roadway, a raised cycle track can be applied to reduce grading impacts of the driveway on the cycle track, along with sidewalks in the boulevard. Where there is sufficient boulevard width and fewer constraints, an in-boulevard cycle track and sidewalk can be accommodated.

It is important to note important trade-offs of these two configurations. Additional information on cross-section elements are described below:

- **Raised Cycle Tracks & Sidewalk:**
 - Limited snow storage available between cycle track and roadway; snow storage would occur between sidewalk and cycle track, or behind sidewalk.
 - Where snow will be stored between the cycle track and sidewalk, the width of this buffer should be wider to accommodate snow storage. If snow will be stored behind the sidewalk, a minimum buffer width should still be maintained, since the buffer is needed to delineate pedestrian and cycling space. The use of tactile materials (linear wayfinding plates or tactile pavers) is encouraged. In constrained scenarios with limited properties, signage or other appurtenances may be placed in this buffer, noting the vertical clearance requirements for any signage that will overhang pedestrian or cycling facilities (refer to Section 4), and offset to hazards, which will require a wider buffer space.
- **In-Boulevard Cycle Tracks & Sidewalk:**
 - In this configuration, snow from the roadway can be stored in the boulevard. This boulevard can also be used accommodate signage and other appurtenances (i.e. hydrants, bike racks etc.).
 - The buffer between the sidewalk and the cycle track should still be maintained at a minimum 0.3-0.5m distance, to accommodate the use of a vertical curb or tactile pavers/wayfinding plates.

These two mid-block configurations and typical pavement markings and signage are illustrated in Exhibit 5-1 and Exhibit 5-2. Note these typical lay-outs will evolve in the detailed design to reflect site-specific conditions, and are presented here for reference only.

Exhibit 5-1: Typical Mid-block Configuration: Raised Cycle Tracks & Sidewalk

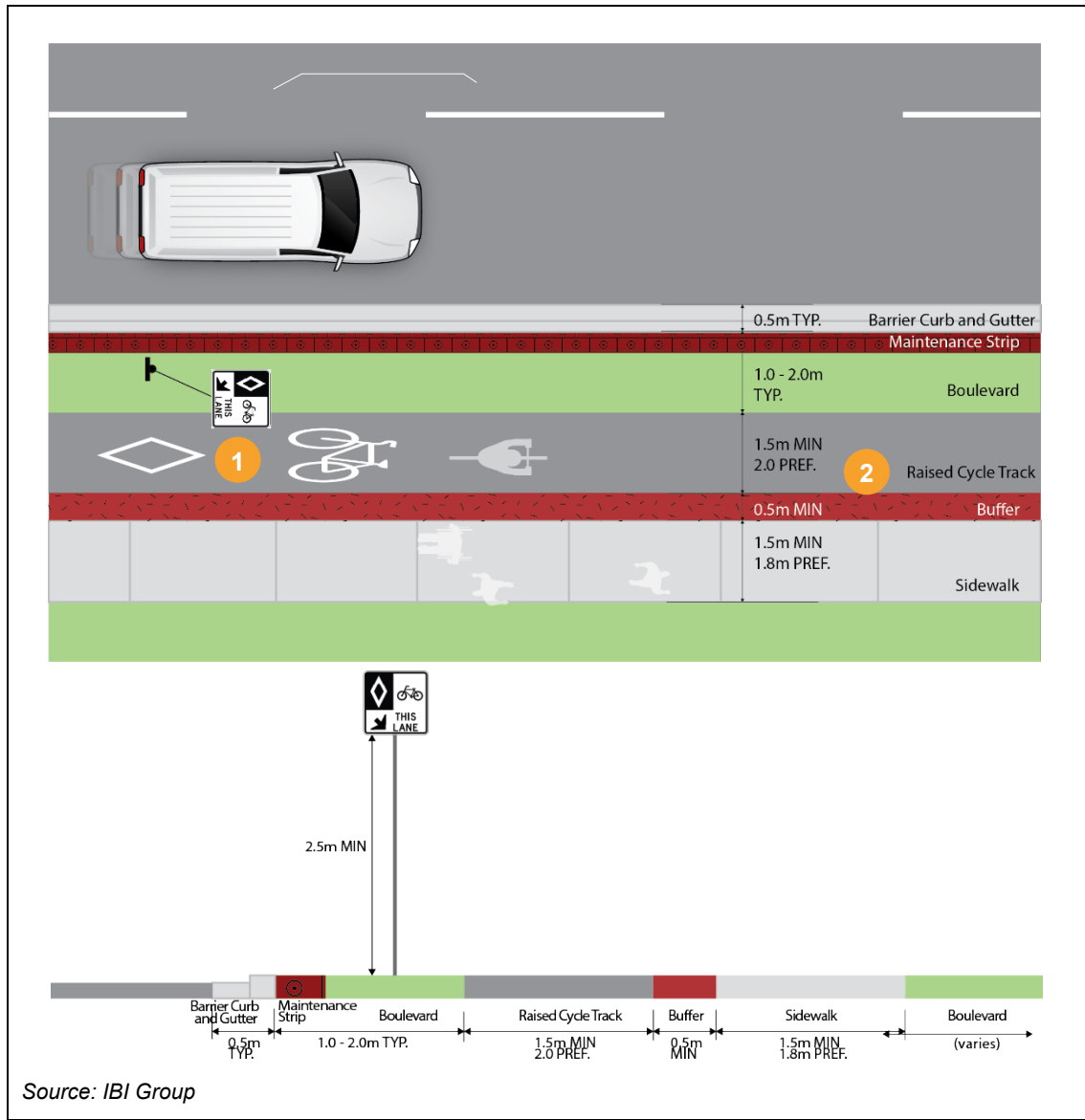


Source: IBI Group

Recommended

- 1 Following intersections, or every 200m along longer blocks, the reserved bike symbol and diamond should be applied to the cycle track. Following intersections, the reserved bike lane sign (OTM Rb-84A) should be installed. As noted in Section 4, it is important that any signage that will overhang a pedestrian or cycling facility maintain an appropriate vertical clearance (2.5m MIN).
- 2 A colour-contrasting / textured buffer strip should be incorporated between the sidewalk and cycle track to delineate pedestrian and cycling space, particularly for those with low vision or visual impairments. Where sufficient width is available, a planted surface (sod) can be used to define the buffer. If a detectable curb of greater than 50-75mm in height is provided between the cycle track and sidewalk, the buffer strip can be considered ancillary.

Exhibit 5-2: Typical Mid-block Configuration: In-Boulevard Cycle Tracks & Sidewalk



Source: IBI Group

Recommended

- 1 Following intersections, or every 200m along longer blocks, the reserved bike symbol and diamond should be applied to the cycle track. Following intersections, the reserved bike lane sign (OTM Rb-84A) should be installed. As noted in Section 4, it is important that any signage that will overhang a pedestrian or cycling facility maintain an appropriate vertical clearance (2.5m MIN).
- 2 A colour-contrasting / textured buffer strip should be incorporated between the sidewalk and cycle track to delineate pedestrian and cycling space, particularly for those with low vision or visual impairments. Where sufficient width is available for the buffer, a planted surface (sod) can be used to define the buffer.

5.2 Signalized Intersections

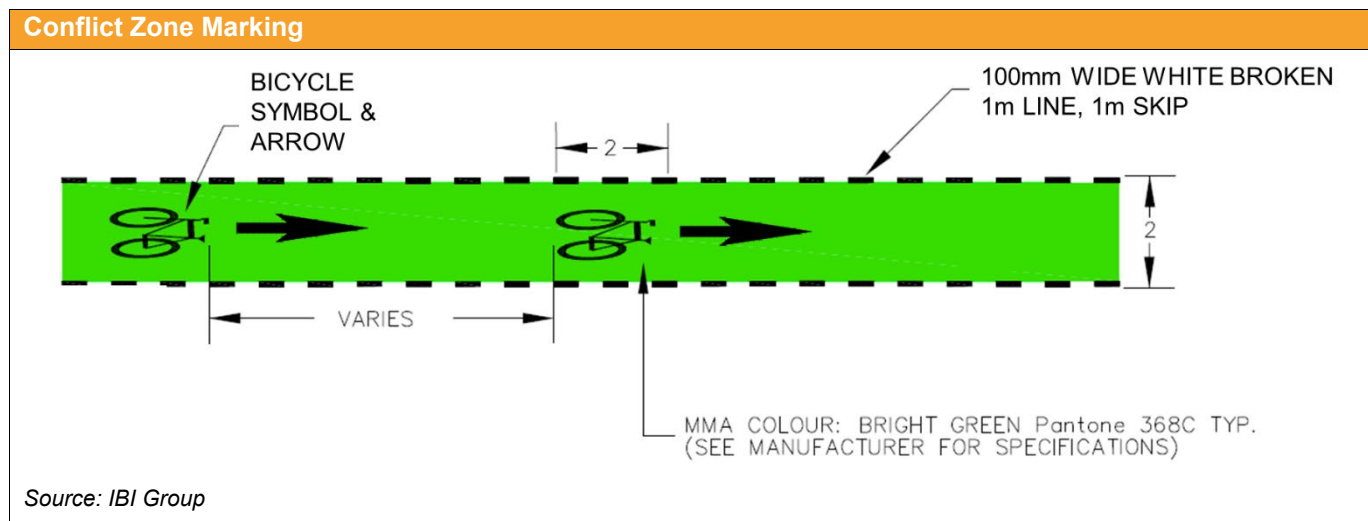
At signalized intersections, there are a number of considerations for pedestrians and cyclists. **General recommendations for improving the comfort and safety of vulnerable users at signalized intersections along the Cawthra Road corridor** are summarized below:

- Ensure AODA compliance at intersections, including the use of tactile plates and Accessible Pedestrian Signals (APS), and the use of curb ramps or depressed curbs that meet AODA regulations
- Provide ladder crosswalks for all pedestrian crossing locations to maximize visibility of pedestrians. Textured ladder crosswalk markings can further enhance visibility.
- Provide conflict zone markings for cycling facilities through the intersection to help alert drivers to the presence of cyclists and to help cyclists navigate intersections crossings. Per OTM Book 18 (p. 93): “This serves to highlight conflict areas where cyclists and motor vehicles will cross paths so that each user group is more aware of the other. The available treatment options in increasing order of visibility are: no treatment; bike stencils or chevrons at 1.5 m to 10 m spacing (with optional directional arrows to clarify cyclists’ trajectories); sharrow at 1.5 m to 15 m spacing; dashed guide lines (with optional bike stencils or chevrons but not sharrow); green surface treatment; or dashed guide lines (with optional bike stencils or chevrons but not sharrow) and green surface treatment. Elephant’s feet markings are reserved for crossrides at intersections. They should not be used through the central portion of intersections themselves.” Recommended conflict zone markings are shown in Exhibit 5-4.
- Provide crossrides where cyclists cross outside the central portion of the intersection (i.e., setback from the parallel motor vehicle lanes) to enable cyclists to ride through intersections without dismounting. An illustration of crossride types for various contexts is provided in Exhibit 5-3. **Note that the Region’s current practice is to provide separated crossrides at signalized intersections, regardless of the approaching facility type.**
- Where crossrides are provided, ensure curb cuts are wide enough to provide access to the full width of crossrides.
- Provide radii that are as small as possible, given operating requirements for large vehicles along the Regional road. In many cases, the use of mountable truck aprons will help to slow passenger vehicles while still accommodating larger trucks. The use of truck aprons and smaller curb-return radii will help to shorten the distance that pedestrians and cyclists must cross at intersections, and also encourage slower turning speeds to reduce the risk to pedestrians and cyclists.
- Investigate the need and possibility for leading or protected pedestrian / cycling intervals (refer to Section 5.2.1)

Exhibit 5-3: Crossride Markings

| Combined Crossride | Separated Crossride |
|--|--|
| <ul style="list-style-type: none"> Commonly implemented where the pedestrian and cycling facilities are combined approaching signalized intersections (i.e. multi-use paths) – however, these crossrides are not currently being pursued by the Region of Peel | <ul style="list-style-type: none"> Typically implemented where the pedestrian and cycling facilities are separate approaching the signalized intersections (i.e. sidewalk and cycle track) Width of the crossride may be reduced to 2.0m for uni-directional cycling facilities (as on Cawthra road) Optional green conflict zone marking may be applied within the crossride |
| | |
| <p>Source: Modified from OTM Book 18, p. 123</p> | <p>Source: Modified from OTM Book 18, p. 122</p> |

Exhibit 5-4: Recommended Conflict Zone Markings



5.2.1 Signal Phasing & Operations

Interventions such as the provision of leading or protected pedestrian and bicycles phases are desirable to mitigate and/or eliminate conflicts at major intersections. However, as these interventions can introduce significant delays to motor vehicles and/or increase cycle lengths at intersections, consideration should be given to the strategic application of these phases.

To inform the identification of desired protected phases (to be considered at the time of detailed design), a review was completed to identify signalized intersections where separated phases would be preferred, based on existing guidance around separated bikeways. MassDOT’s Separated Bike Lane Planning & Design Guide provides the following guidance with respect to protected phases, indicating they are preferred in the following cases:

- **Locations with Two-Way or Contraflow Bicycle Movements** – Since contra-flow bicyclists may be exposed to increased conflict on two-way streets, a protected left turn phase or a protected bike phase can be considered to separate this conflict.
- **Locations with Unique or High-Volume Bicycle Movements** – Where heavier volumes of cyclists are anticipated to make a movement, there may be insufficient gaps for drivers to complete turns. In these instances, separated phases can improve operations for both cyclists and drivers.
- **Locations with High Volumes of Turning Traffic** – Since exposure is a function of conflicting volume, locations with heavier right and left turning vehicular volumes may be candidates for protected phases. MassDOT provides sample threshold for protected phases (refer to Exhibit 5-5).

Exhibit 5-5: Considerations for Time-separated Bicycle Movements for Separated Bike Lanes

| Separated Bike Lane Operation | Motor Vehicles per Hour Turning across SBL | | |
|-------------------------------|--|---------------------------|----------------------------|
| | Right Turn | Left Turn across One Lane | Left Turn across Two Lanes |
| One-way | 150 | 100 | 50 |
| Two-way | 100 | 50 | 0 |

Source: MassDOT Separated Bike Lane Planning & Design Guide, p. 107

Exhibit 5-6 evaluates each signalized intersection in the study area against these parameters and thresholds. Each movement which exceeds the thresholds is denoted in **red**. Note these are thresholds are for guidance only, and may be adjusted to suit local context.

It is recommended the Region investigate opportunities to introduce separated and/or leading pedestrian and bicycle phases at signalized intersections at the time of detailed design. Where protected phases are desirable but not justifiable at this time, on-going monitoring may allow for future phasing modifications.

Exhibit 5-6: Review of Signalized Intersections – Protected Cycling Phases

| LOCATION | CYCLING FACILITY* | CONTRAFLOW BICYCLE MOVEMENTS | HIGH / UNUSUAL CYCLIST VOLUMES | HIGH TURNING VOLUMES** | NOTES & CONSIDERATIONS |
|----------------------------|----------------------------|------------------------------|--------------------------------|---|---|
| Eastgate Parkway | Multi-use path (west side) | YES | NO | <ul style="list-style-type: none"> NBL > 0 (AM) SBR > 100 (PM) | <ul style="list-style-type: none"> Protected phases preferred for two-way facilities, pending feasibility MUT (access to BRT Station) to cross the south and east legs of intersection) Fully protected NB and SB lefts, identified as a potential improvement in traffic report to address history of collisions, will also minimize conflicts with cyclists Future NBR turn lane would provide opportunity to consider the introduction of a protected right turn (phase could be investigated in the future) |
| Meadows Boulevard | Multi-use path (west side) | YES | NO | <ul style="list-style-type: none"> NBL > 0 (PM) SBR > 100 (PM) | <ul style="list-style-type: none"> Protected phases preferred for two-way facilities, pending feasibility Consider fully protected NBL to avoid conflicts with cyclists Currently a shared SBR lane, so no opportunity to introduce a protected right turn |
| Rathburn Road East | Multi-use path (west side) | YES | NO | <ul style="list-style-type: none"> NBL > 0 (PM) SBR > 100 (PM) | <ul style="list-style-type: none"> Protected phases preferred for two-way facilities, pending feasibility Consider fully protected NBL to avoid conflicts with cyclists Future SBR turn lane identified in traffic report would provide opportunity to consider the introduction of a protected right turn (phase could be investigated in the future) |
| Burnhamthorpe Road East | Multi-use path (west side) | YES | POSSIBLE | <ul style="list-style-type: none"> NBL > 0 (PM) SBR < 100 (PM) | <ul style="list-style-type: none"> Protected phases preferred for two-way cycling facilities, pending feasibility Fully protected NB and SB lefts, identified as a potential improvement in traffic report to address concerns regarding intersection skew, will also minimize conflicts with cyclists Intersection is extremely congested, introduction of new phases may be a challenge |
| Breckenridge Road | Raised cycle track | NO | NO | <p>Northbound</p> <ul style="list-style-type: none"> SBL < 50 (AM) NBR < 150 (AM) <p>Southbound</p> <ul style="list-style-type: none"> NBL < 50 (PM) SBR < 150 (AM) | <ul style="list-style-type: none"> Volume thresholds not exceeded (protected phases may not be needed) |
| Bloor Street | Raised cycle track | NO | POSSIBLE | <p>Northbound</p> <ul style="list-style-type: none"> SBL > 50 (PM) NBR > 150 (AM) <p>Southbound</p> <ul style="list-style-type: none"> NBL > 50 (PM) SBR < 150 (PM) | <ul style="list-style-type: none"> Consider fully protected NBL and SBL to avoid conflicts with cyclists Future NBR turn lane identified in traffic report would provide opportunity to consider the introduction of a protected right turn (phase could be investigated in the future) |
| Silver Creek Boulevard | Raised cycle track | NO | NO | <p>Northbound</p> <ul style="list-style-type: none"> SBL < 50 NBR < 150 <p>Southbound</p> <ul style="list-style-type: none"> NBL > 50 (PM) SBR < 150 (PM) | <ul style="list-style-type: none"> Consider fully protected NBL to avoid conflicts with cyclists |
| Ramp to Dundas Street East | Raised cycle track | NO | POSSIBLE | <p>Northbound</p> <ul style="list-style-type: none"> SBL < 50 NBR < 150 <p>Southbound</p> <ul style="list-style-type: none"> NBL > 50 (PM) SBR > 150 (AM) | <ul style="list-style-type: none"> Consider fully protected NBL to avoid conflicts with cyclists Consider signalizing channelized SBR right turn lane to control conflicts with right turns |
| Queensway East | Raised cycle track | NO | POSSIBLE | <p>Northbound</p> <ul style="list-style-type: none"> SBL > 50 (AM) NBR > 150 (AM) <p>Southbound</p> <ul style="list-style-type: none"> NBL > 50 (PM) SBR < 150 (PM) | <ul style="list-style-type: none"> Existing (full protected) dual SBL movements are fully protected A fully protected, dual NBL was identified in traffic report Future exclusive NBR turn lane identified in traffic report would provide opportunity to consider the introduction of a protected right turn (phase could be investigated in the future) |

| LOCATION | CYCLING FACILITY* | CONTRAFLOW BICYCLE MOVEMENTS | HIGH / UNUSUAL CYCLIST VOLUMES | HIGH TURNING VOLUMES** | NOTES & CONSIDERATIONS |
|------------------------|--------------------|------------------------------|--------------------------------|--|---|
| Tedwyn Drive | Raised cycle track | NO | NO | Northbound • SBL < 50 • NBR < 150 Southbound • NBL > 50 (AM) • SBR < 150 (PM) | <ul style="list-style-type: none"> Consider a fully protected NBL to avoid conflicts with cyclists |
| North Service Road | Raised cycle track | NO | NO | Northbound • SBL > 50 (PM) • NBR > 150 (AM) Southbound • NBL > 50 (PM) • SBR < 150 (PM) | <ul style="list-style-type: none"> Consider a fully protected SBL and NBL to avoid conflicts with cyclists Future NBR turn lane identified in traffic report would provide opportunity to consider the introduction of a protected right turn (phase could be investigated in the future) |
| QEW Westbound Off-Ramp | N/A | NO | NO | N/A | <ul style="list-style-type: none"> Evaluate at future time when cycling facility is added |
| QEW Eastbound Off-Ramp | N/A | NO | NO | N/A | <ul style="list-style-type: none"> Evaluate at future time when cycling facility is added |
| South Service Road | N/A | NO | NO | N/A | <ul style="list-style-type: none"> Evaluate at future time when cycling facility is added |

*Refers to treatment on Cawthra (N-S)

**Consider the future traffic volumes compared to the thresholds in Exhibit 5-5; where exceeded, a protected phase is desirable (indicated in red)

5.2.2 Specific Intersection Improvements

In addition to these broad recommendations, specific recommendations have been developed for key intersections along the corridor with intersecting cycling facilities or unique requirements, as described below:

- **Cawthra & Burnhamthorpe** – Incorporate elements of a protected intersection to accommodate facility transition from cycle tracks on Cawthra south of Burnhamthorpe to a multi-use path on the west side of Cawthra north of Burnhamthorpe. The intersection treatments also provide connectivity to the existing east-west multi-use path running along the north side of Burnhamthorpe
- **Cawthra & Bloor** – Incorporate elements of a protected intersection to accommodate future east-west cycle tracks along Bloor (identified by the City of Mississauga)
- **Cawthra & Dundas** – Treatments across channelized right turn treatments incorporating crossrides and pedestrian crossovers (PXOs) for crosswalks
- **Cawthra & Queensway** – Incorporate elements of a protected intersection to provide connectivity to the existing east-west multi-use path running along the south side of Queensway

It is recommended the Region incorporate elements of protected intersections into the Cawthra Road corridor design.

It is further recommended the Region initiate retrofit signalized intersection upgrades to provide crossrides at each signalized intersection north of Burnhamthorpe (i.e. Rathburn Road, Meadows Blvd, and Eastgate Parkway) for the existing multi-use path on the west side, in order to provide a continuous and consistent cycling experience along the corridor.

5.3 Unsignalized Intersections

At unsignalized intersections, a higher burden is placed on the individual road user to safely navigate potentially conflicting movements, since no traffic signals are provided to indicate right-of-way. Many of the same treatments applied at signalized intersections are useful for helping to control speeds and improve predictability for active transportation users, including:

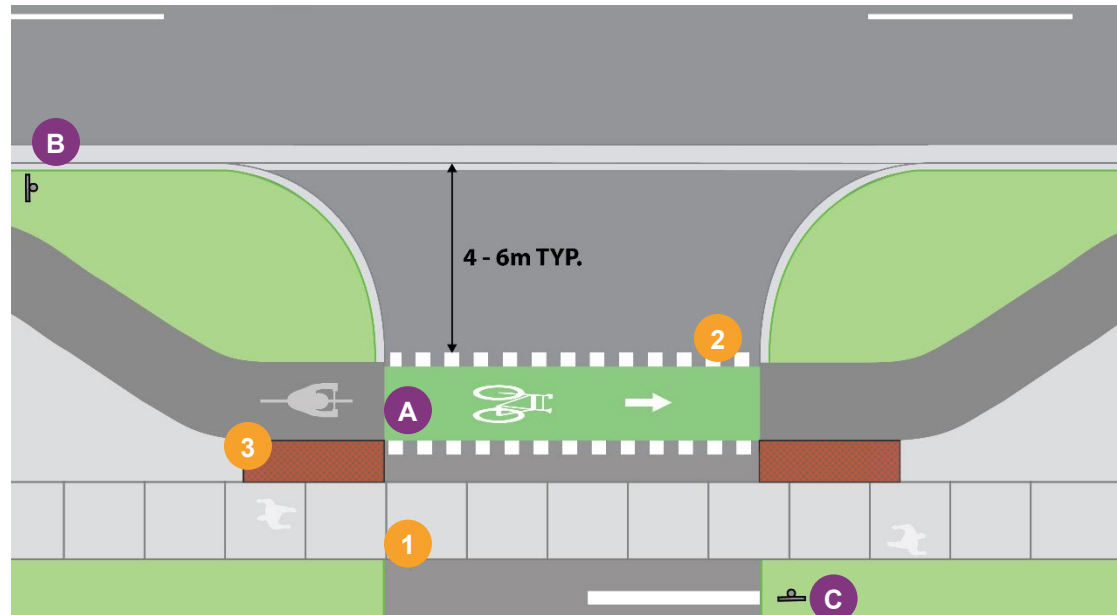
- Providing crossrides or conflict zone markings for cycle tracks and ladder crosswalks for pedestrians (for stop-controlled legs). An illustration of the Region's preferred crossride for unsignalized intersections with multi-use path approaches is provided in Exhibit 5-7. Where a separate cycle track and sidewalk approach the intersection, a separated crossride is more appropriate (refer to Exhibit 5-3). A similar conflict zone marking as for signalized intersections can also be applied at unsignalized intersection, with optional green (refer to Exhibit 5-4).
- Ensuring AODA compliance, including the use of curb ramps/depressed curbs with tactile plates
- Providing corner radii that are as small as possible

At unsignalized intersections, it is also critical to ensure that appropriate sightlines are achieved to ensure drivers can see approaching cyclists and/or pedestrians and vice versa.

To accommodate potential pedestrian desire lines at unsignalized intersections which are not candidates for formal crossings, the provision of refuge islands should be considered whenever feasible.

Exhibit 5-8: Bend-out Driveway Treatment

In this example, the cycle track is bent away from the adjacent roadway to provide enough space for vehicles to cross the cycle track and then wait to enter the roadway outside of the path of the cycle track and sidewalk. This type of driveway treatment is applicable for higher-volume driveways that are infrequently spaced.

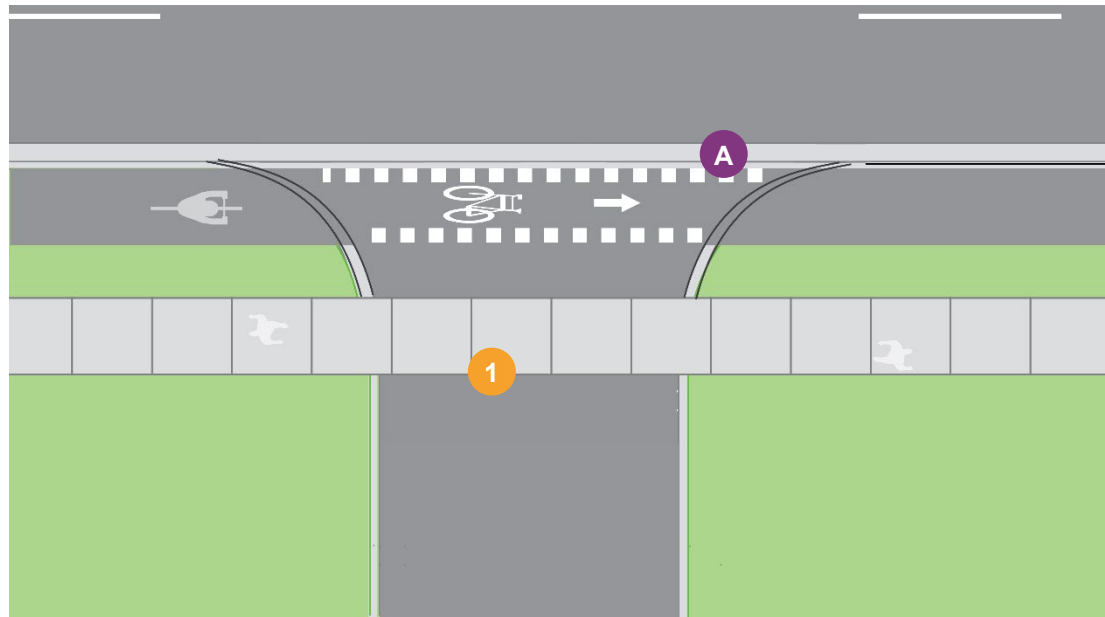


Source: IBI Group

| Recommended | Optional |
|---|--|
| <p>1 Carry sidewalk through driveway and provide visual contrast with driveway material</p> <p>2 Elephant's feet markings (see below) can be applied to highlight the crossing point of the cycle track in addition to an optional bike symbol and arrow</p> <p style="font-size: small;">Source: TAC Bikeway/Traffic Control Guidelines for Canada, 2012 (Table 7-1)</p> <p>3 As cycle track comes within close proximity to sidewalk, a colour-contrasting / textured buffer strip should be incorporated.</p> | <p>A Optional green conflict zone marking may be applied to the cycle track through the driveway (recommended for higher volume driveways)</p> <p>B Optional. 'Turning Vehicles Yield To Bicycles' (TAC RB-37) signage may be used to alert turning drivers that they must yield to through cyclists</p> <p>C Optional 'Stop' sign (OTM Ra-1) and corresponding stop bar, or 'Yield' sign (OTM Ra-2) without stop bar. Where neither stop nor yield conditions are warranted, consider applying a 'Pedestrian and Bicycle Crossing Ahead Sign' and tab (OTM Wc-15 & Wc-32t)</p> |

Exhibit 5-9: Driveway Crossings of Closely-Spaced Residential Driveways

In this example, the cycle track is kept adjacent the roadway to provide maximum visibility for vehicles crossing the cycle track while allowing for a consistent grading and alignment of the cycle track. This type of driveway treatment is applicable for lower-volume residential driveways with frequent spacing.



Source: IBI Group

| Recommended | Optional |
|--|---|
| <p>1 Carry sidewalk through driveway and provide visual contrast with driveway material</p> | <p>A Elephant's feet markings (see below) can be applied to highlight the crossing point of the cycle track in addition to an optional bike symbol and arrow</p> <div style="text-align: center;"> <p>← 200-400 mm 200-400 mm ↓ 200-400 mm</p> </div> <p style="font-size: small; text-align: center;">Source: TAC Bikeway Traffic Control Guidelines for Canada, 2012 (Table 7-1)</p> |

5.5 Transit Stops

At several locations along the Cawthra Road corridor, the sidewalk and cycle track facilities will intersect existing or planned bus stops. At bus stops, there is potential for conflict between cyclists and transit passengers. The following principles should be applied when designing active transportation facilities in the vicinity of transit stops along Cawthra Road:

- Whenever possible, the preferred approach is to separate through cyclists and pedestrians from waiting transit passengers by bending the cycle track behind the transit facility and providing a paved connection to the passenger area
- Where it is not possible to bend facilities away from transit facilities due to property or ROW constraints, mitigation strategies must be employed to reduce or limit conflicts. Depending on the type of facilities, strategies may include:

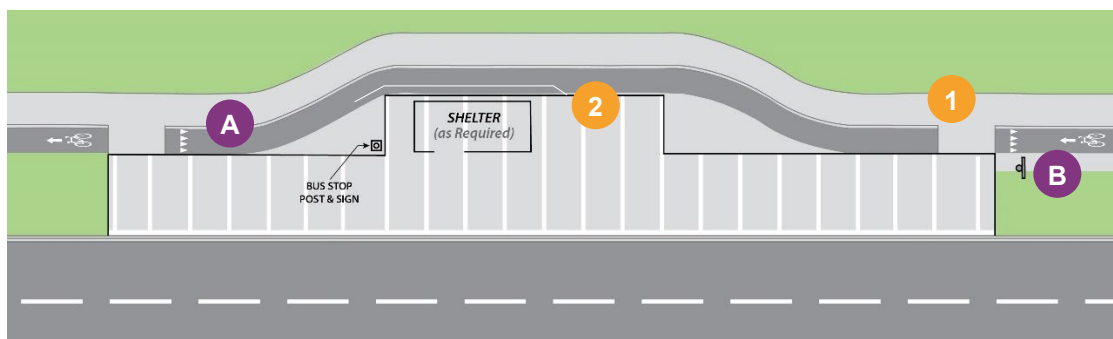
- Providing signage and pavement markings that alert cyclists to pedestrian priority where the cycling facility must cross through shared space
- Providing other clues that emphasize a changing condition such as through the use of different surface materials for shared facilities

Requiring cyclist to dismount at transit stops is generally not a viable solution and should be avoided.

Typical treatments in the vicinity of transit stops in preferred and constrained configurations are shown in Exhibit 5-10, and Exhibit 5-11.

Exhibit 5-10: Transit Stop Integration with Cycle Track (Preferred)

In this example, the cycle track is bent away from the adjacent roadway to wrap behind the transit stop, thus avoiding potential conflicts between boarding/alighting passengers and cyclists travelling along the corridor. Where provided, the shelter may be placed between the cycle track and the boarding zone, or behind the cycle track.

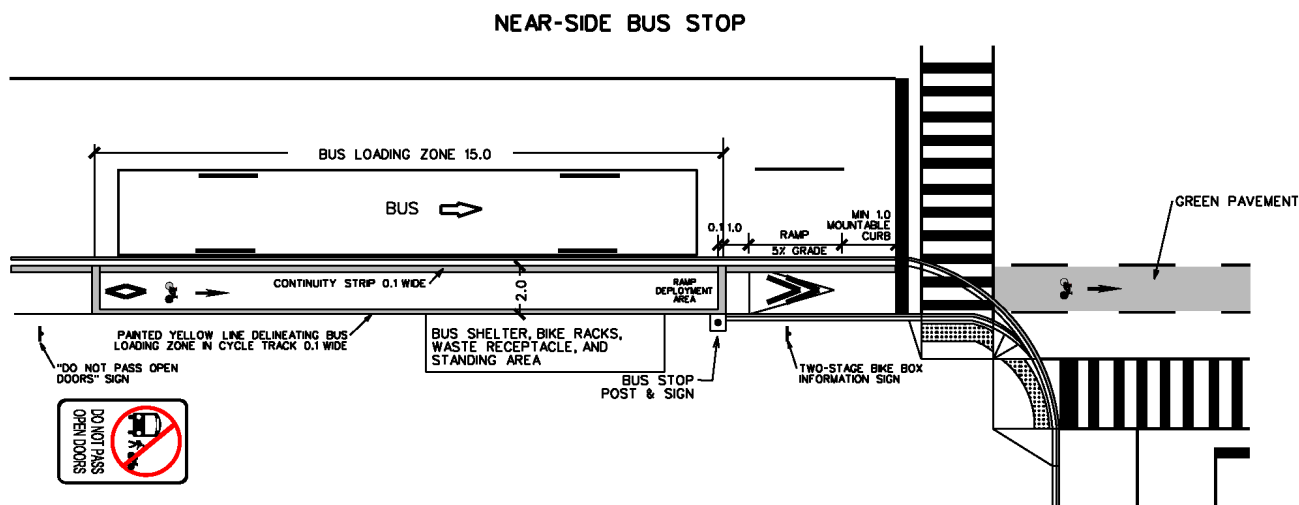
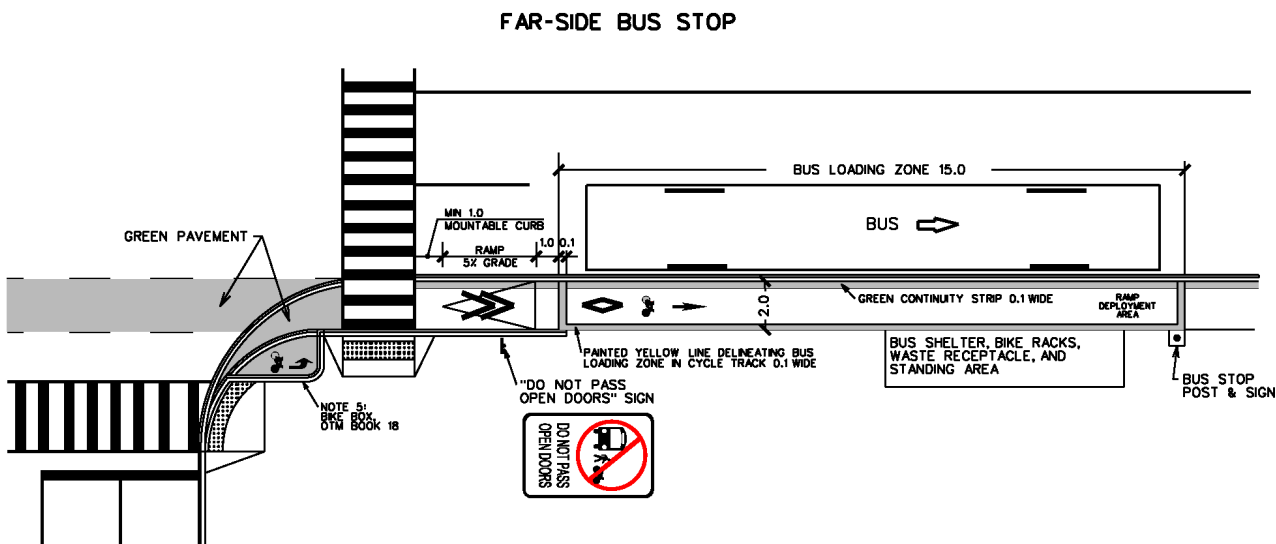


Source: IBI Group

| Recommended | Optional |
|---|--|
| <p>1 Change in surface material to emphasize pedestrian priority in the vicinity of the transit stop. An alternative would be to apply ladder crosswalk markings at the point of pedestrian connection.</p> <p>2 A 100mm white solid line should mark the back of the transit stop, where shelters or other street furniture is provided, to warn cyclists of potential hazards, if the horizontal clearance is not maintained.</p> | <p>A Shark's teeth should be applied to indicate that cyclists must yield to crossing pedestrians</p> <p>B Cyclists Yield to Pedestrian Signage (TAC RB-39) can be used to reinforce pedestrian priority</p> |

Exhibit 5-11: Transit Stop Integration with Cycle Track (Constrained)

In locations with narrow boulevards, the cycle track will need to ramp to sidewalk level to intersect with the transit stop. This option requires less space however it may increase the potential for conflicts between boarding/alighting passengers and cyclists travelling along the corridor. The City of Mississauga has a standard drawing for a cycle track and transit stop in this configuration (see below).



Source: City of Mississauga Standard Drawing 2240.083