DURHAM – SCARBOROUGH
Bus Rapid Transit

Appendix B5 –
Cycling Network Review

Prepared for Metrolinx
by IBI Group & Parsons

IBI GROUP
200 East Wing – 360 James Street North
Hamilton ON L8L 1H5 Canada
tel 905 546 1010 fax 905 546 1011
ibigroup.com

Memorandum

To/Attention	Margaret Parkhill	**Date**	December 23, 2021
From	Zibby Petch	**Project No**	119887
cc	Mai-Linh Ho, Adrian Chiu		
Subject	Durham-Scarborough BRT - Cycling Network Connectivity & Facility Selection Review		

1. Introduction & Background

In 2018, Metrolinx completed the Durham-Scarborough Bus Rapid Transit (DSBRT) Initial Business Case. The study recommended a preferred Bus Rapid Transit (BRT) alignment between Downtown Oshawa (in Durham Region) and Scarborough Centre (in the City of Toronto). The project has now advanced to the Preliminary Design Business Case and Environmental Assessment/Transit Project Assessment Process (TPAP) phase in accordance with the Metrolinx Business Case Framework, for capital investment projects. IBI Group and Parsons are managing the project on behalf of Metrolinx.

The Durham-Scarborough Bus Rapid Transit (DSBRT) project proposes approximately 36 kilometres of dedicated transit infrastructure, connecting downtown Oshawa, Whitby, Ajax, Pickering and Scarborough.

Recognizing the interrelationships between active transportation and transit, including opportunities for first-last mile integration, the provision of transit infrastructure provides opportunities to encourage increased cycling activity by:

- **Providing cycling infrastructure along the BRT Corridor**: Bundling the delivery of high-quality cycling infrastructure with the delivery of the rapid transit infrastructure along the DS BRT corridor, wherever appropriate and feasible.
- **Providing connectivity to and across the BRT Corridor**: Recognizing cycling connectivity to the DS BRT corridor and accommodating the following types of connections:
  - Connecting intersecting cycling routes to nearby BRT transit stations, enhancing first/last mile connectivity.
  - Integration of cycling facilities on intersecting streets with proposed infrastructure along the corridor and removal of potential barriers to north-south cycling links that cross the BRT corridor to ensure convenient and safe crossings.
- **Implementing "cycling-friendly" BRT stop and infrastructure design:** Providing appropriate end-of-trip amenities and facilities that allow cyclists to easily integrate cycling trips with transit trips such as providing short-term bicycle parking, long-term bicycle parking including bike lockers, and cycling amenities on transit vehicles including bike racks and/or bicycle-friendly loading.

To support the provision of high-quality cycling facilities, this memo summarizes a review of network needs for cycling facilities focused on the strategies noted above, including:

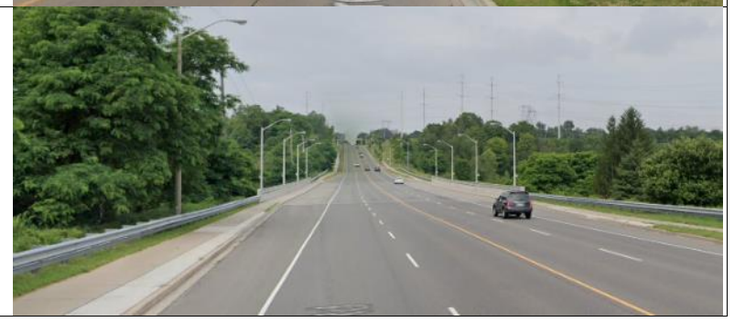
- Roadway characteristics and surrounding context for segments along the 36 kilometre corridor;
- Methodology followed to evaluate the role of the DS BRT corridor in supporting the overall cycling network within area municipalities;
- Review of active transportation and cycling plans from relevant municipal and regional governments;
- Summary of cycling network review for Durham Region and for City of Toronto;
- Cycling facility selection review which identifies facilities to consider during the development of design alternatives; and
- Recommendations for detail design.

2. Roadway Characteristics & Context

Roadway characteristics have a significant impact on the provision and design of cycling facilities. This section presents a brief discussion of the roadway context to inform subsequent analysis.

Exhibit 1 and Exhibit 2 summarize existing roadway segment characteristics for the City of Toronto and Durham Region, respectively, including traffic volumes, speed limits, number of lanes, and land use characteristics pertinent to the cycling facility review. Note that where only turning movement counts or peak hour projections were available, peak hour volumes were assumed to represent 10% of AADT. As these traffic volumes are used in this cycling analysis only for order of magnitude review, this is assumed to be an appropriate methodology.

Exhibit 1: City of Toronto Roadway Characteristics along the BRT Corridor

ROAD	LIMITS	CITY	AADT	FUTURE AADT	SPEED	LANES	LAND USE & KEY DESTINATIONS	SITE PHOTO
Ellesmere Road	McCowan Road to Markham Road	Toronto	32000 (2014)	24500 (2041)	50	4	• Industrial/commercial properties on north side • Backlotted residential properties along south side	
Ellesmere Road	Markham Road to Orton Park Road/Military Trail	Toronto	30000 (2014)	21700 (2041)	50	4	• Residential buildings and multiple schools along or near north side (Woburn Collegiate Institute, Woburn Junior Public School) • Existing multi-use path (Gatineau Hydro Corridor Trail) along north side from Scarborough Golf Club Rd to Military Trail/Orton Park Road • Backlotted residential properties along south side. Recreation centre west of Dolly Varden Blvd.	
Ellesmere Road	Orton Park Road/Military Trail to Morningside Ave	Toronto	23000 (2014)	21700 (2041)	50	4	• Primarily natural areas. • Scarborough Health Network hospital on south side at Neilson Road.	

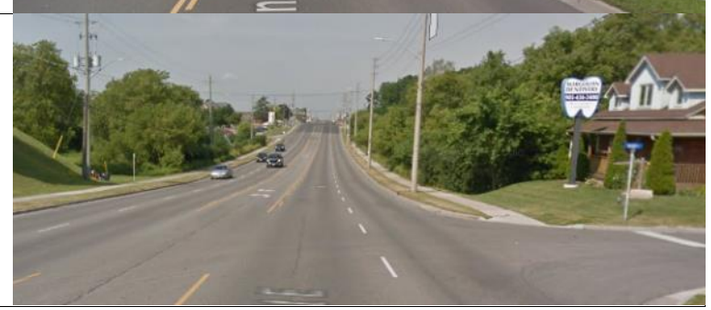
ROAD	LIMITS	CITY	AADT	FUTURE AADT	SPEED	LANES	LAND USE & KEY DESTINATIONS	SITE PHOTO
Ellesmere Road	Morningside Ave to Meadowvale Rd	Toronto	14000 (2014)	16800 (2041)	50	4	• Centennial College, U of T Scarborough and Toronto Pan Am Sports Centre located between Morningside Avenue and Military Trail • Primarily street-oriented, single-family residences east of Military Trail	
Ellesmere Road	Meadowvale Rd to Kingston Rd	Toronto	6000 (2014)	5100 (2041)	50	2	• Primarily street-oriented, single-family residences	
Kingston Road	Ellesmere Rd to Hwy 401 EB Off-Ramp	Toronto	11000 (2013)	27000 (2041)	50	4	• Commercial/industrial properties	

ROAD	LIMITS	CITY	AADT	FUTURE AADT	SPEED	LANES	LAND USE & KEY DESTINATIONS	SITE PHOTO
Kingston Road	Hwy 401 EB Off-Ramp to Hwy 401 WB Off-Ramp	Toronto	37000 (2013/2018)	27000 (2041)	60	6	• Hwy 401 interchange. • Commercial properties	
Kingston Road	Hwy 401 WB Off-Ramp to City Limits/Rouge River	Toronto	28000 (2014)	27000 (2041)	60	4	• Primarily naturalized area	

Exhibit 2: Durham Region Roadway Characteristics along the BRT Corridor

ROAD	LIMITS	CITY	AADT	FUTURE AADT	SPEED	LANES	LAND USE & KEY DESTINATIONS	SITE PHOTO
Kingston Road	Rouge River to Whites Road	Pickering	25000 (2018)	27400 (2041)	60	4/5 + bus lanes (some segments)	• Primarily suburban commercial land use • Some residential buildings along north side • Relatively high driveway frequency between Altona Road & Whites Road • Existing sections of buffered bike lanes	
Kingston Road	Whites Road to Liverpool Road	Pickering	34000 (2018)	30600 (2041)	60	5 + bus lanes (some segments)	• Primarily commercial properties • Some backyards of residential properties along north side • Pickering Town Centre as major destination just east of Liverpool & Kingston Road • Existing section of buffered bike lanes from Whites Road to Delta Blvd., and again from west of Glendale Dr. to Liverpool Rd.	
Kingston Road	Liverpool Road to Notion Road	Pickering	33000 (2018)	58100 (2041)	60	4/5 + segments with bus lanes	• Pickering Town Centre located between Liverpool Road and Glenanna Road on the south side of Kingston Road • Existing sections of buffered bike lanes (e.g. (Liverpool Road to Glenanna Drive; Royal Road to east of Bainbridge Drive) – not continuous along the full stretch • Few driveways between Liverpool Road & Brock Road • Higher frequency of driveways between Brock Road & Notion Road	

ROAD	LIMITS	CITY	AADT	FUTURE AADT	SPEED	LANES	LAND USE & KEY DESTINATIONS	SITE PHOTO
Kingston Road	Notion Road to Rotherglen Road	Pickering / Ajax	26300 (2018)	18800 (2041)	60	4	• Mainly residential properties with some commercial properties • Street-oriented residential with continuous driveways between Randall Drive & Rotherglen Road • Constrained “Main Street” feel through Pickering Village between Elizabeth Street & Rotherglen Road • Naturalized area where the Great Trail intersects this section of Kingston Road	
Kingston Road	Rotherglen Road to Wicks Drive	Ajax	32000 (2018)	28500 (2041)	60	4 + 2 bus lanes	• Commercial properties along north side (Westney Heights Plaza) • Few properties adjacent to road on south side; Primarily residential back yards • Existing multi-use path on north side between Westney and Wicks; Existing buffered bike lanes over same length	
Kingston Road	Wicks Drive to Lake Ridge Road	Ajax	28000 (2018)	28300 (2041)	70	4	• Primarily agricultural land use • Rural cross-section • Existing buffered paved shoulders	

ROAD	LIMITS	CITY	AADT	FUTURE AADT	SPEED	LANES	LAND USE & KEY DESTINATIONS	SITE PHOTO
Dundas Street	Lake Ridge Road to Fothergill Court	Whitby	27000 (2018)	28000 (2041)	70	4	• Hwy 412 partial interchange • Existing commercial development partially on south side • Potential future residential development east of Hwy 412 and commercial development west of Highway 412	
Dundas Street	Fothergill Court to Henry Street / Euclid Street	Whitby	25000 (2017)	28000 (2041)	50	4/5	• Mix of street-oriented, single-family residences, high density residential, institutional and commercial properties	
Dundas Street	Kathleen Street to Kendalwood Road / Garrard Road	Whitby	26000 (2016)	27200 (2041)	50	5	• Commercial properties and natural areas	

ROAD	LIMITS	CITY	AADT	FUTURE AADT	SPEED	LANES	LAND USE & KEY DESTINATIONS	SITE PHOTO
Dundas Street	Kendalwood Road / Garrard Road to Thornton Road	Whitby			50	5	• Residential properties and natural areas	
Bond Street (One-way: WB)	King Street to Park Road North	Oshawa	11500 (2018)	13200 (2041)	50	3 (WB)	• Residential properties north of Bond Street and commercial properties on the south side of Bond Street • Constrained due to the urban nature of the residential areas, which are characterized by narrow setbacks • Commercial properties have a more suburban feel with large surface parking lots and wider setbacks	
Bond Street (One-way: WB)	Park Road North to Simcoe Street North	Oshawa	12000 (2018)	13700 (2041)	50	4 (WB)	• Mainly commercial with some residential properties to the north • Constrained due to urban nature of area, especially east of Oshawa Creek, which is characterized by narrow setbacks • Commercial properties west of Oshawa Creek have a more suburban feel with large surface parking lots and wider setbacks	

ROAD	LIMITS	CITY	AADT	FUTURE AADT	SPEED	LANES	LAND USE & KEY DESTINATIONS	SITE PHOTO
King Street (One-way: EB starting at Waverley St)	Thornton Road to Simcoe Street North	Oshawa	12900 (2018)	33100 (2041)	50	4 (Two-way) to Bond 4 (EB)	• Mainly commercial properties • East of Oshawa Creek is most constrained due to urban nature of area, which is characterized by narrow setbacks • Commercial properties west of Oshawa Creek have a more suburban feel with large surface parking lots and wider setbacks	

3. Methodology

With regards to cycling network connectivity, there are several factors to be considered in evaluating the role of the DS BRT corridor in supporting the overall cycling network within area municipalities. For example:

- **Access to Key Destinations** – Does the corridor serve key destinations that will result in high rates of cycling?
- **Intersecting Corridors** – What are the feeder routes for this corridor? Are there significant desire lines between facilities that connect along this corridor?
- **Parallel Routes** – Are there parallel routes which are identified for existing or planned facilities? What is the hierarchy of these routes?

To further explore these consideration and factors, the following steps in the cycling network review process are summarized in **Exhibit 3**.

Exhibit 3: Summary of Cycling Network Review Process

TOPIC	QUESTIONS TO RESOLVE
Network Plan Review:	*Facilities Along the BRT Corridor:* • Is the BRT corridor identified as an existing or proposed cycling route in municipal and/or regional plans? • If not, should it be added given the significant infrastructure investment planned for the corridor? Are there alternate routes that can be used instead? *Facilities Intersecting the BRT Corridor:* • Where existing or planned cycling routes intersect the BRT corridor, how can we integrate these connections to ensure cyclists can get access to or across the BRT corridor?
Facility Selection Review:	*Facilities Along the BRT Corridor:* • Where the BRT corridor is identified in existing plans, are the facility types identified still appropriate in a future scenario with BRT? • Where new segments have been identified for the addition of cycling facilities, what facility type is appropriate?
Design Recommendations:	• In addition to providing appropriate facility types along and across the corridor, what other design considerations are needed to provide appropriate accommodation for cyclists along the BRT corridor?

4. Network Plan Review

Active transportation and cycling plans from various municipal and Regional governments were reviewed to inform the cycling network review including the following planning documents:

- City of Toronto
  - City of Toronto Cycling Network Plan Update (2019)
- Durham Region & Area Municipalities:
  - Durham Region Cycling Plan (2012) & Short-Term Cycling Network in Transportation Master Plan (2018)
  - City of Pickering Draft Integrated Transportation Master Plan (2021)
  - Town of Ajax Integrated Transportation Master Plan (2019)
  - Town of Whitby Draft Active Transportation Plan (ongoing)
  - City of Oshawa Draft Active Transportation Master Plan (2015)

Segments of the DS BRT corridor with either existing or future cycling facilities identified based on these municipal or Regional network plans are summarized by municipality as “Facilities Along the BRT Corridor”. The review includes the proposed facility type and network phasing (where applicable and available).

The recommendations of the various plans are reviewed in the context of the planned BRT improvements to identify a preferred facility type, informed by previous planning work, in the subsequent section of this memo, *Cycling Facility Selection Review*.

Existing or future cycling facilities intersecting the DS BRT corridor are summarized by municipality as “Facilities Intersecting the BRT Corridor”. The review includes the status (existing, planned or proposed), facility type, and any phasing/timing for future facilities.

PART 1: City of Toronto

City of Toronto Cycling Network Plan Update (2019)

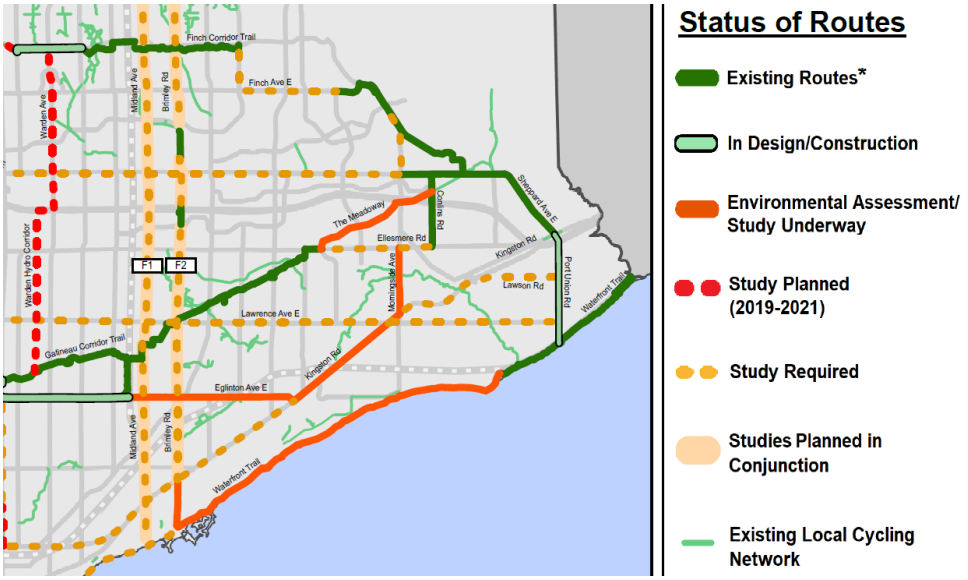
Overview

Through the Cycling Network Plan Update in 2019, the City of Toronto established a priority framework for identifying major city-wide cycling routes, a rolling three-year near-term implementation program, and a long-term cycling network vision. Various sections of Ellesmere Road, Kingston Road and north – south connections are included in all three components of the Cycling Network Plan Update, with a range of anticipated timing and level of priority across segments.

Proposed Network & Connectivity

The major city-wide cycling routes in the vicinity of the BRT corridor is shown in **Exhibit 4**.

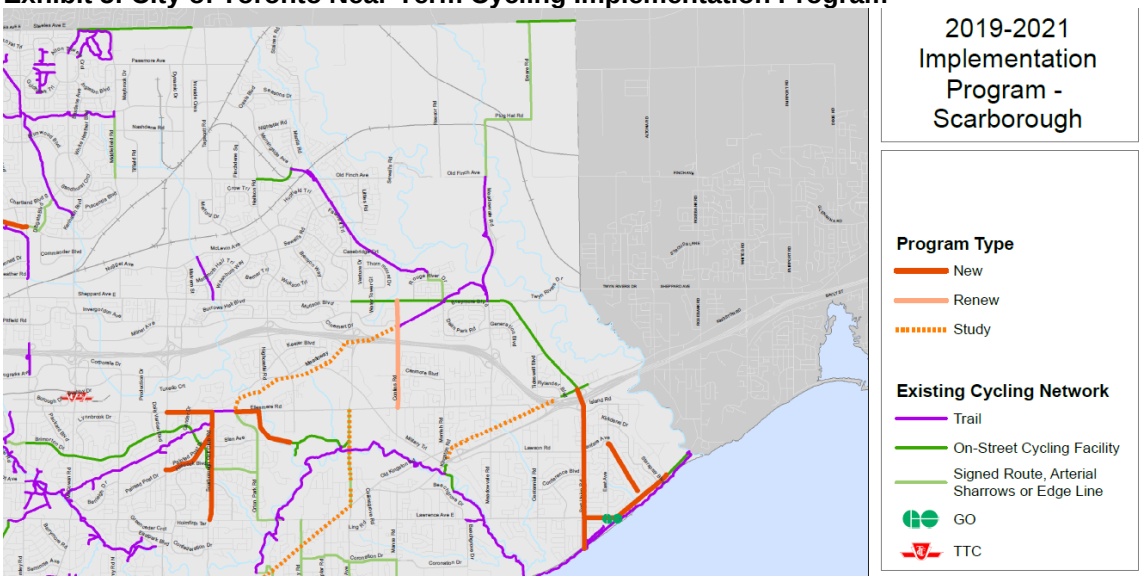
Exhibit 4: City of Toronto Major City-Wide Cycling Corridor Map



Source: City of Toronto Cycling Network Plan Update (2019)

The near-term proposed network within the vicinity of the BRT corridor is shown in **Exhibit 5**. The City of Toronto's Near-Term Cycling Implementation Program is updated every few years to provide further detail on the next outlook of upcoming bikeway projects. The prioritization of the near-term program takes into account other infrastructure developments, studies, and plans, and seeks to coordinate overlapping and connected works. The roll-out of the program to 2023 will be released in July 2021.

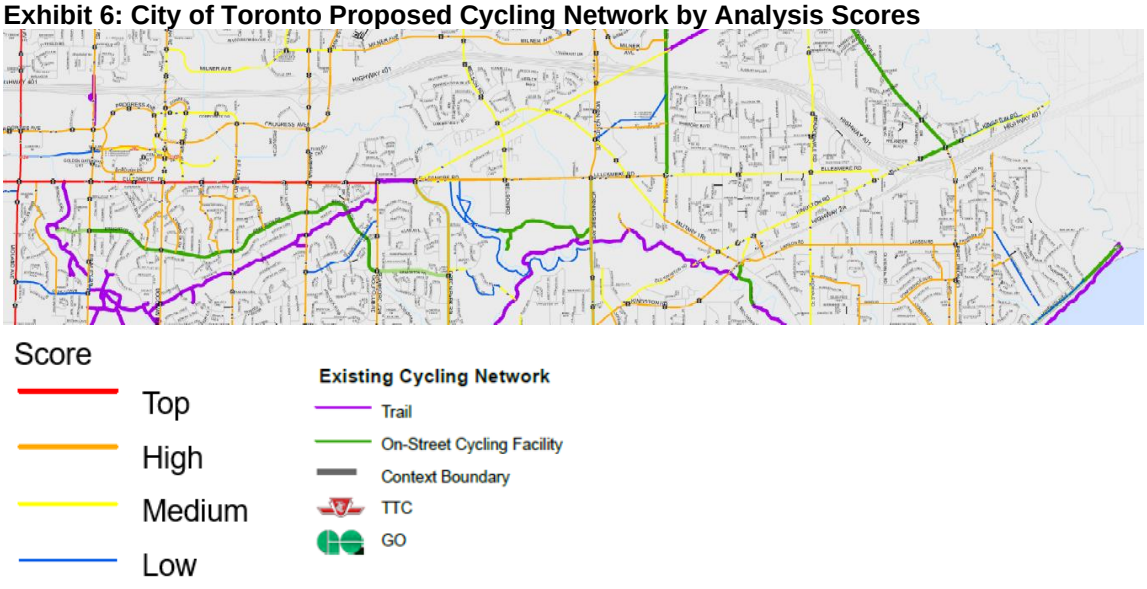
Exhibit 5: City of Toronto Near-Term Cycling Implementation Program



Source: City of Toronto Cycling Network Plan Update (2019)

The long-term proposed network within the vicinity of the BRT corridor is shown in Exhibit 6.

Exhibit 6: City of Toronto Proposed Cycling Network by Analysis Scores



Source: City of Toronto Cycling Network Plan Update (2019)

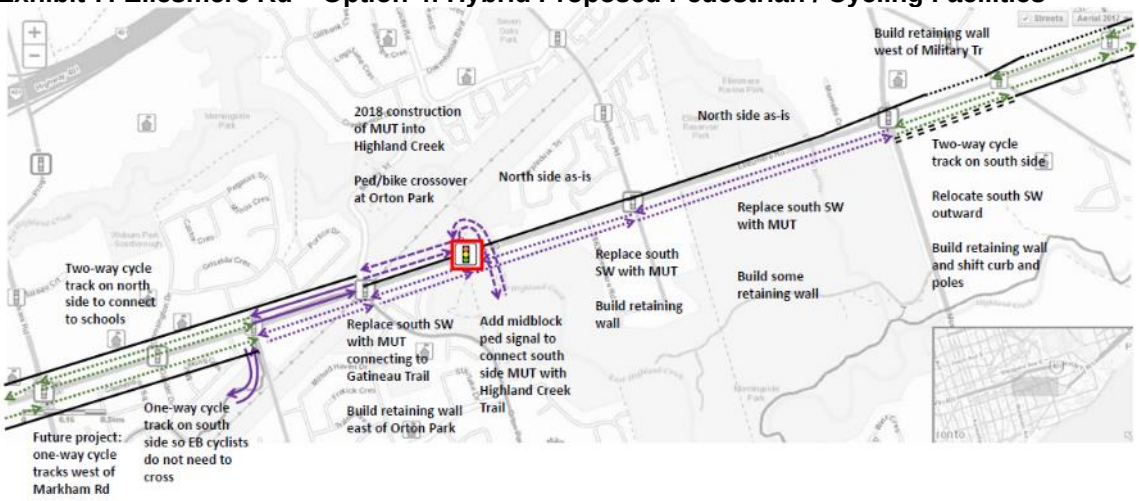
Facilities Along the BRT Corridor

Existing or planned cycling facilities are identified along Ellesmere and Kingston Roads for the entire length of the BRT corridor in the City of Toronto (McCowan Road to Rouge River/City Limits) based on the 2019 Cycling Network Plan Update.

An additional update on the status and proposed facilities along some of the segments was provided by the City of Toronto for consideration as part of this study:

- **Ellesmere Road (Markham Road to Scarborough Golf Club Rd)** - In 2020 / 2021, cycle tracks will be constructed along Ellesmere from Markham Road to Scarborough Golf Club Road, stopping a bit short of both intersections. The design includes a two-way cycle track on the north side and a one-way cycle track on the south side. The north side cycle track is currently in detailed design by ECS as part of road resurfacing along this segment. Depending on construction coordination, the south side cycle track may be constructed the following year. A full corridor-level review has been completed for the segment of Ellesmere from Markham Road to Military Trail, as shown in **Exhibit 7**.
- **Ellesmere Road (Orton Park Road/Military Trail to Highland Creek Ravine Access Trail)** – Starting Fall 2020, a multi-use trail will be constructed along the north side of Ellesmere Road from Orton Park Road down into the Highland Creek ravine, partly within the Ellesmere Road ROW. This trail will connect the existing pieces of the Gatineau Hydro Corridor Trail and Highland Creek Trail.

Exhibit 7: Ellesmere Rd – Option 4: Hybrid Proposed Pedestrian / Cycling Facilities



Source: City of Toronto

Facilities Intersecting the BRT Corridor

There are also several existing and planned facilities which intersect the BRT corridor. These corridors are summarized in Exhibit 8.

Exhibit 8: Summary of Existing and Planned Intersecting Cycling Facilities – City of Toronto

CORRIDOR	DIRECTION (N/S)	INTERSECTION TYPE	STATUS IN PLAN	FACILITY TYPE (IF AVAILABLE)
McCowan Road	N/S	Signalized Intersection	Proposed	N/A
Grangeway Avenue	N	Signalized T-Intersection	Proposed (North of Ellesmere Rd)	N/A
Parkington Crescent	S	Signalized Intersection	Proposed (South of Ellesmere Rd)	N/A
Bellamy Road	N/S	Signalized Intersection	Proposed	N/A

CORRIDOR	DIRECTION (N/S)	INTERSECTION TYPE	STATUS IN PLAN	FACILITY TYPE (IF AVAILABLE)
Markham Road	N/S	Signalized Intersection	Proposed	N/A
Scarborough Golf Club Road / Gatineau Hydro Corridor Trail	N/S	Signalized Intersection	Existing (South)	Multi-use Path
Military Trail / Orton Park Road	S	Signalized Intersection	Proposed	N/A
Hydro Corridor	N	Hydro Corridor	Proposed	Multi-use Trail (assumed)
Botany Hill Park	S	Park Access	Proposed	N/A
Neilson Road	N	Signalized Intersection	Proposed	N/A
Morningside Avenue	N/S	Signalized Intersection	Proposed	N/A
Military Trail	N/S	Trail Access	Proposed	N/A
Conlins Road	N/S	Signalized Intersection	Existing (North) Proposed (South)	Bike Lanes (North)
Meadowvale Road	N/S	Signalized Intersection	Proposed	N/A
Sheppard Avenue	N/S	Signalized Intersection	Existing (North) Proposed (South)	Bike Lanes (North)

PART 2: Durham Region & Local Municipalities

Durham Region Cycling Plan (2012)

Overview

Through the 2012 update to the Durham Region Cycling Plan, a region-wide cycling network was developed along with an implementation strategy that included a timed phasing of the cycling network.

It is noted that there are two key updates to the 2012 Durham Regional Cycling Plan since 2012:

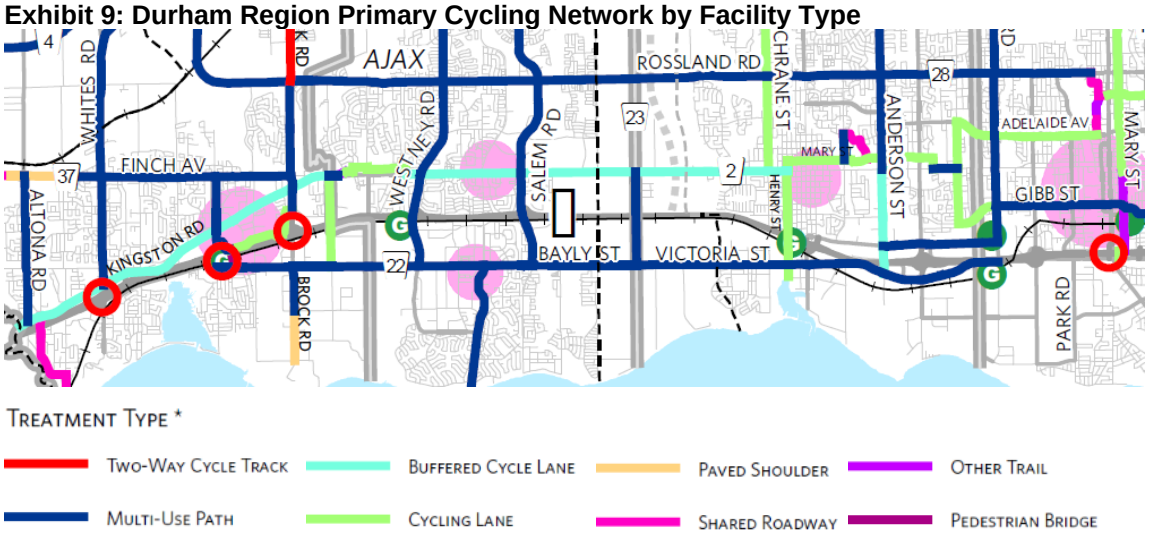
- **Durham Transportation Master Plan (2017)** – the Durham TMP included an update to the phasing strategy identified in the RCP, including identifying the Short Term Cycling Network to be implemented over the next 10 years (2018-2028) as a mix of the Region's capital road program/nine year forecast for road widening and reconstruction projects, as well as infill projects to fill in gaps in the Primary Cycling Network.
- **Regional Cycling Plan 2020 (On-going)**– The Durham Region Cycling Plan is currently in the process of being updated as a standalone study. The update consists of three phases and is scheduled to be completed in the fall of 2021.

For consistency, this review focuses on the original 2012 Cycling Plan, until it is superseded by the Regional Cycling Plan 2020. Effort has been made to identify facilities completed since 2012. It is noted that a review / updated of the status of existing / proposed connections can be incorporated prior to detailed design of the BRT corridor.

Proposed Network & Connectivity

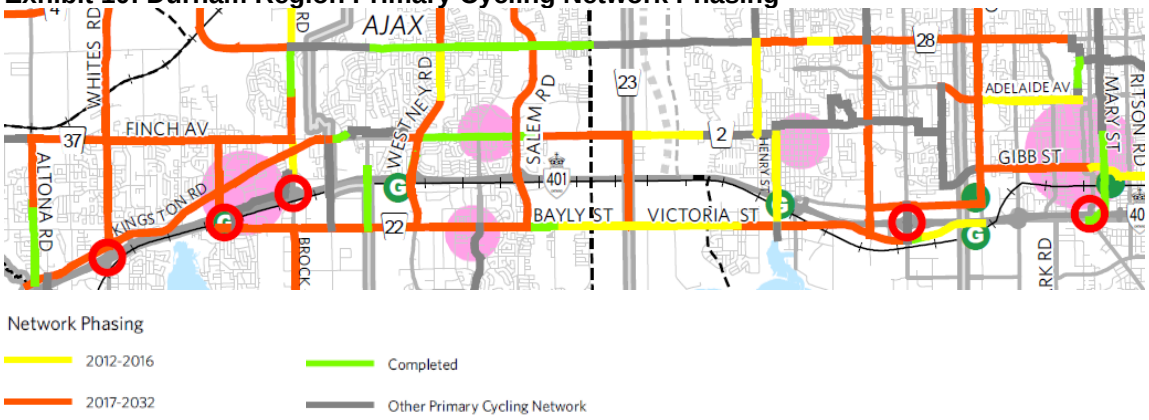
The proposed network by facility type within the vicinity of the BRT corridor is shown in Exhibit 9. The timeline for each facility, including completed projects, is shown in Exhibit 10.

Exhibit 9: Durham Region Primary Cycling Network by Facility Type



Source: Durham Region Cycling Plan (2012)

Exhibit 10: Durham Region Primary Cycling Network Phasing



Source: Durham Region Cycling Plan (2012)

Facilities Along the BRT Corridor

A summary of the planned facilities along the BRT corridor in Durham Region is provided in Exhibit 11. Buffered cycle lanes are planned along most of Kingston Road / Dundas Street until Henry Street in the Town of Whitby, after which the planned route travels along Mary Street and Crawforth Avenue, with an interim connection using Garden Street, Bradley Drive, and other local streets until the Mary/Crawforth connection across the CP Rail line is constructed. The planned route then continues along Garrard Road and Adelaide Avenue parallel to Dundas Street and King Street. There is a short segment of Kingston Road that is not included in the planned cycling network beginning near Elizabeth Street. In this segment, the network uses an alternate route via Sherwood Road and Rotherglen Road.

Exhibit 11: Summary of Existing and Planned Cycling Facilities along the BRT Corridor – Durham Region Cycling Plan (2012)

SEGMENT / LIMITS	IDENTIFIED	FACILITY TYPE	IDENTIFIED IN MUNICIPAL PLAN
Kingston Road; Altona Road to Notion Road	Yes	Proposed Buffered Cycle Lane	Yes
Kingston Road; Notion Road to Elizabeth Street	Yes	Proposed Multi-use Path	Partially
Kingston Road; Elizabeth Street to Westney Road	Partially – Alternate Route via Elizabeth Street, Sherwood Road, and Rotherglen Road	Proposed Buffered Cycle Lane	Partially
Kingston Road; Westney Road to Salem Road	Yes	Existing Buffered Cycle Lane	Yes
Kingston Road/Dundas Street; Salem Road to Henry Street	Yes	Proposed Buffered Cycle Lane	Yes
Dundas Street; Henry Street/Euclid Street to Kathleen Street	No – Alternate route via Euclid Street & Mary Street /Crawforth Street	N/A	N/A

Dundas Street; Kathleen Street to Kendalwood Road/Garrard Road	Yes	Proposed Multi-use Path	Yes
Dundas Street; Kendalwood Road/Garrard Road to Simcoe Street	No – Alternate route via Garrard Road and Manning Road/Adelaide Avenue	N/A	N/A

Facilities Intersecting the BRT Corridor

Based on the network maps shown in in Exhibit 9 and Exhibit 10, there are also several existing and planned facilities which intersect the BRT corridor. These corridors are summarized in Exhibit 12.

Exhibit 12: Summary of Existing and Planned Intersecting Cycling Facilities – Durham Region Cycling Plan (2012)

CORRIDOR	DIRECTION (N/S)	STATUS IN PLAN	FACILITY TYPE	IDENTIFIED IN MUNICIPAL PLAN
Altona Road	N	Proposed (now Existing – east side)	Multi-use Path	Yes
Rougemount Drive	S	Proposed	Shared Roadway	Yes
Whites Road	N	Proposed	Multi-use Path	Yes
Liverpool Road	N/S	Proposed	Multi-use Path	Yes
Brock Road	N/S	Proposed (now Existing – west side)	Multi-use Path	Yes
Notion Road	S	Proposed	Cycling Lane (Superseded by concept for multi-use path on east side with Notion Road Flyover study)	Yes
Westney Road	N/S	Proposed	Multi-use Path	Yes
Salem Road	N/S	Proposed	Multi-use Path	Yes
Lake Ridge Road	S	Proposed	Multi-use Path	Yes
Cochrane Street	N	Proposed (now partially existing – edgeline)	Cycling Lane	Yes
Henry Street/Euclid Street	S	Proposed (now partially existing - edgeline)	Cycling Lane	No
Anderson Street/Hopkins Street	N/S	Proposed	Multi-use Path	Yes
Garrard Road / Kendalwood Road	N/S	Proposed (now partially existing – edgeline / signed route)	Cycling Lane	Yes
Thornton Road	N/S	Proposed	Multi-use Path	Yes

Pickering Integrated Transportation Master Plan (2020)

Overview

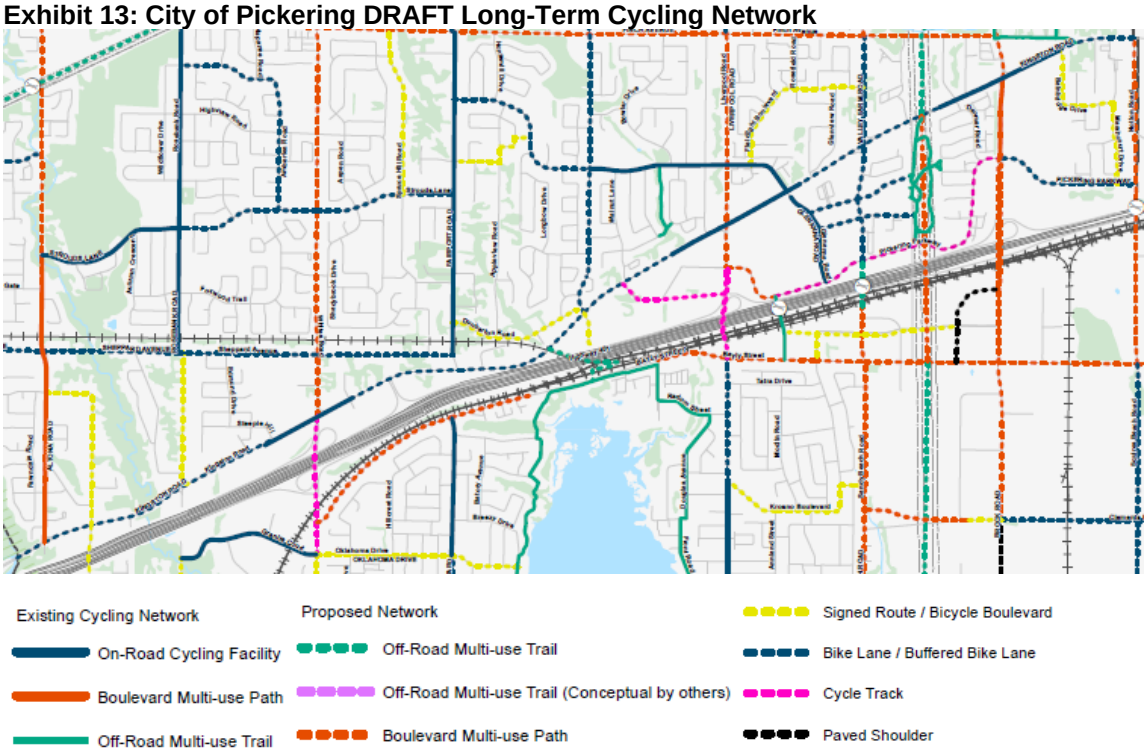
Through development of the City of Pickering's first Integrated Transportation Master Plan (2020), a cycling network plan was prepared including an on-road and off-road cycling and trail

network. This cycling network is intended to illustrate the long-term vision for the ultimate cycling network, while identifying priorities for short-term implementation.

Proposed Network & Connectivity

The proposed network by facility type within the vicinity of the BRT corridor is shown in Exhibit 13. As the BRT corridor is located along Regional roads, the City's Cycling Plan reflects the Region's current plan as presented in the preceding section. The facility types along Regional roads were not updated or evaluated as part of the development of the City's network.

Exhibit 13: City of Pickering DRAFT Long-Term Cycling Network



Source: IBI Group

Facilities Intersecting the BRT Corridor

There are several existing and planned facilities which intersect the BRT corridor. These corridors are summarized in Exhibit 14.

Exhibit 14: Summary of Existing and Planned Intersecting Cycling Facilities – City of Pickering

CORRIDOR	DIRECTION (N/S)	STATUS IN PLAN	FACILITY TYPE
Altona Road	N	Existing (North of Kingston Rd)	Boulevard Multi-use Path (East side)
Rougemount Drive	N/S	Proposed	Signed Route / Bicycle Boulevard

CORRIDOR	DIRECTION (N/S)	STATUS IN PLAN	FACILITY TYPE
Rosebank Drive	N/S	Proposed	Signed Route / Bicycle Boulevard
Whites Road	N/S	Proposed	Boulevard Multi-use Path (North of Kingston Rd) Cycle Track (South of Kingston Rd)
Dixie Road	N/S	Proposed	Bike Lane / Buffered Bike Lane (North of Kingston Rd) Signed Route / Bicycle Boulevard (South of Kingston Rd)
Walnut Lane	S	Proposed (Southeast of Kingston Road)	Cycle Track
Liverpool Road	N/S	Proposed	Boulevard Multi-use Path
Glenanna Road	N/S	Existing	Bike Lane / Buffered Bike Lane
Valley Farm Road	N/S	Proposed	Bike Lane / Buffered Bike Lane
Hydro Line	N/S	Proposed	Off-road Multi-use Path (North of Kingston Rd) Boulevard Multi-use Path (South of Kingston Rd)
Diana Princess of Wales Park	S	Existing (South of Kingston Rd)	Off-road Multi-use Path
Brock Road	S	Existing (South of Kingston Rd) Proposed (North of Kingston Rd) – *now existing*	Boulevard Multi-use Path
Bainbridge Drive	S	Proposed (South of Kingston Rd)	Signed Route / Bicycle Boulevard
Finch Avenue / Off-road Multi-use Path	N	Existing (Northwest of Kingston Rd)	Off-road Multi-use Path
Notion Road	S	Proposed (South of Kingston Rd)	Boulevard Multi-use Path

Town of Ajax Integrated Transportation Master Plan (2019)

Overview

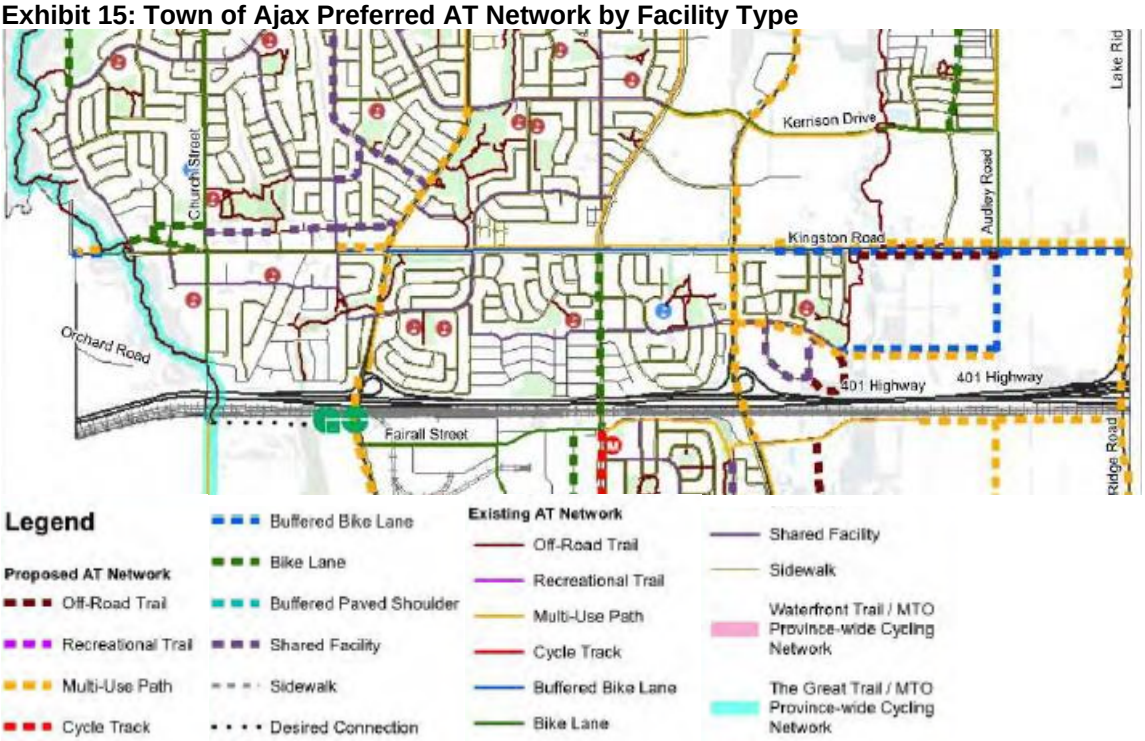
The Town of Ajax's 2019 Integrated Transportation Master Plan strives to merge the 2010 Ajax Pedestrian and Bicycle Master Plan and the 2013 Transportation Master Plan into one planning document to improve all modes of transportation to the year 2031 and beyond. These recommended improvements include the preferred future active transportation network.

Improvements were divided into short (within four years), medium (within 20 years), and long term (11-20+ years).

Proposed Network & Connectivity

The proposed network by facility type within the vicinity of the BRT corridor is shown in Exhibit 15.

Exhibit 15: Town of Ajax Preferred AT Network by Facility Type



Source: Town of Ajax Integrated Transportation Master Plan (2019)

Facilities Along the BRT Corridor

Existing or planned cycling facilities are identified along most of the BRT corridor is summarized in Exhibit 16. From the intersection of Kingston Road and the Great Trail to Rotherglen Road, where there are no existing or planned facilities along Kingston Road, there is an alternative route along Sherwood Road East and Lachlan Drive.

Exhibit 16: Summary of Existing and Planned Cycling Facilities along the BRT Corridor – Town of Ajax

SEGMENT / LIMITS	IDENTIFIED	FACILITY TYPE
Kingston Road; West Town Limit to the Great Trail	Yes	• Proposed Multi-use Path • Proposed Buffered Bike Lane
Kingston Road; the Great Trail to Rotherglen Road	No	• Alternate Route via Linton / Sherwood / Lachlan

Kingston Road; Rotherglen Road to Westney Road	Yes	• Proposed Multi-use Path • Existing Buffered Bike Lane (partial)
Kingston Road; Westney Road to 200 m east of Salem Road	Yes	• Existing Multi-use Path • Existing Buffered Bike Lane
Kingston Road; 200 m east of Salem Road to Lake Ridge Road	Yes	• Existing Buffered Paved Shoulder • Proposed Multi-use Path • Proposed Buffered Bike Lane

Facilities Intersecting the BRT Corridor

There are also several existing and planned facilities which intersect the BRT corridor in the Town of Ajax. These corridors are summarized in Exhibit 17.

Exhibit 17: Summary of Existing and Planned Intersecting Cycling Facilities – Town of Ajax

CORRIDOR	DIRECTION (N/S)	STATUS IN PLAN	FACILITY TYPE
The Great Trail	N/S	Existing	Off-road Trail
Church Street	S	Existing (South of Kingston Rd)	Bike Lane
Rotherglen Road	S	Existing (South of Kingston Rd)	Recreational Trail
Westney Road	N/S	Proposed	Multi-use Path
Trail around Sobeys Plaza	N	Existing (North of Kingston Rd)	Off-road Trail
Ritchie Avenue	S	Existing (South of Kingston Rd)	Recreational Trail
Harwood Avenue	N/S	Existing (North of Kingston Rd) Proposed (South of Kingston Rd)	Bike Lane
Salem Road	N/S	Proposed	Multi-use Path
Galea/Ajax Downs Ponds	N/S	Existing	Off-road Trail
Audley Road	N/S	Existing (North of Kingston Rd) Proposed (South of Kingston Rd)	Bike Lane Buffered Bike Lane
Lake Ridge Road	S	Proposed (South of Kingston Rd)	Multi-use Path

Town of Whitby Draft Active Transportation Plan (ongoing)

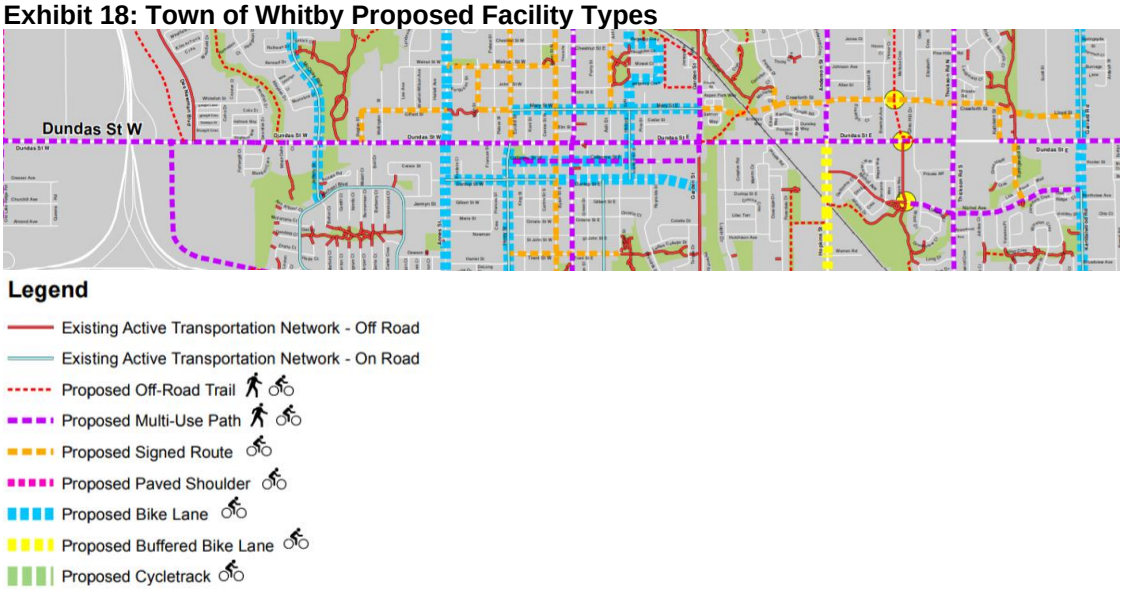
Overview

The Town of Whitby's Draft Active Transportation Plan (ATP) outlines the Town's short, medium, and long-term strategy for active transportation, including an integrated draft AT network. The final ATP report is expected to be released to the public in the spring of 2020.

Proposed Network & Connectivity

The proposed network by facility type within the vicinity of the BRT corridor is shown in Exhibit 18.

Exhibit 18: Town of Whitby Proposed Facility Types



Source: Town of Whitby Active Transportation Plan (2020)[1]

Facilities Along the BRT Corridor

Multi-use paths along are proposed along Dundas Street from Lake Ridge Road to Thickson Road. From Thickson Road to Kathleen Street, an alternate connection is identified along Crawforth Street comprised of existing and proposed signed routes and a desired connection across railway tracks. From Kathleen Street to the eastern Town limits, multi-use paths are proposed along Dundas Street.

Facilities Intersecting the BRT Corridor

There are also several existing and planned facilities which intersect the BRT corridor in the Town of Whitby. These corridors are summarized in Exhibit 19.

[1] https://www.whitby.ca/en/town-hall/resources/Plans-Reports-and-Studies/Active-Transportation-Plan/Map2_RecomNetwork_Whitby-South.pdf
https://www.whitby.ca/en/town-hall/active-transportation-plan.aspx#Appendix-A--Maps-Existing-and-recommended-network

Exhibit 19: Summary of Existing and Planned Intersecting Cycling Facilities – Town of Whitby

CORRIDOR	DIRECTION (N/S)	STATUS IN PLAN	FACILITY TYPE
Des Newman Boulevard	N	Proposed (North of Dundas St) – *now existing (east side)*	• In-Boulevard Path
McQuay Boulevard	N/S	Existing	• Signed Route
D'Hillier Park	N/S	Existing (North of Dundas St) Proposed (South of Dundas St)	• Off-Road Multi-Use Trail
Raglan Street	N	Proposed (North of Dundas St)	• Signed Route
Cochrane Street / Annes Street	N/S	Existing (Urban paved shoulder is currently provided on the North side between Dundas St. and Ferguson St) Proposed (South of Dundas St)	• Bike Lane
Henry Street / Euclid Street	N/S	Proposed	• Signed Route (North of Dundas St) • Bike Lane (South of Dundas St)
Byron Street	N/S	Proposed	• Bike Lane
Hickory Street	N/S	Existing	• Bike Lane (North of Dundas St) • Signed Route (South of Dundas St)
Garden Street	N	Proposed (North of Dundas St) – *now existing (just north of Mary / south of Dundas)*	• In-Boulevard Path
Anderson Street	N/S	Existing (North of Dundas St) Proposed (South of Dundas St)	• In-Boulevard Path
Hydro Corridor Trail	N/S	Existing (South of Dundas St)	• Off-Road Multi-use Path
Kathleen Street	N	Proposed (North of Dundas St)	• Signed Route
Scott Trail	N	Existing (North of Dundas St)	• Off-Road Multi-use Path
Springwood Street	S	Proposed (South of Dundas St)	• Signed Route
Kendalwood Road/Garrard Road	N/S	Existing Edgeline/Signed Route Proposed	• Bike Lane

City of Oshawa Draft Active Transportation Master Plan (ongoing)

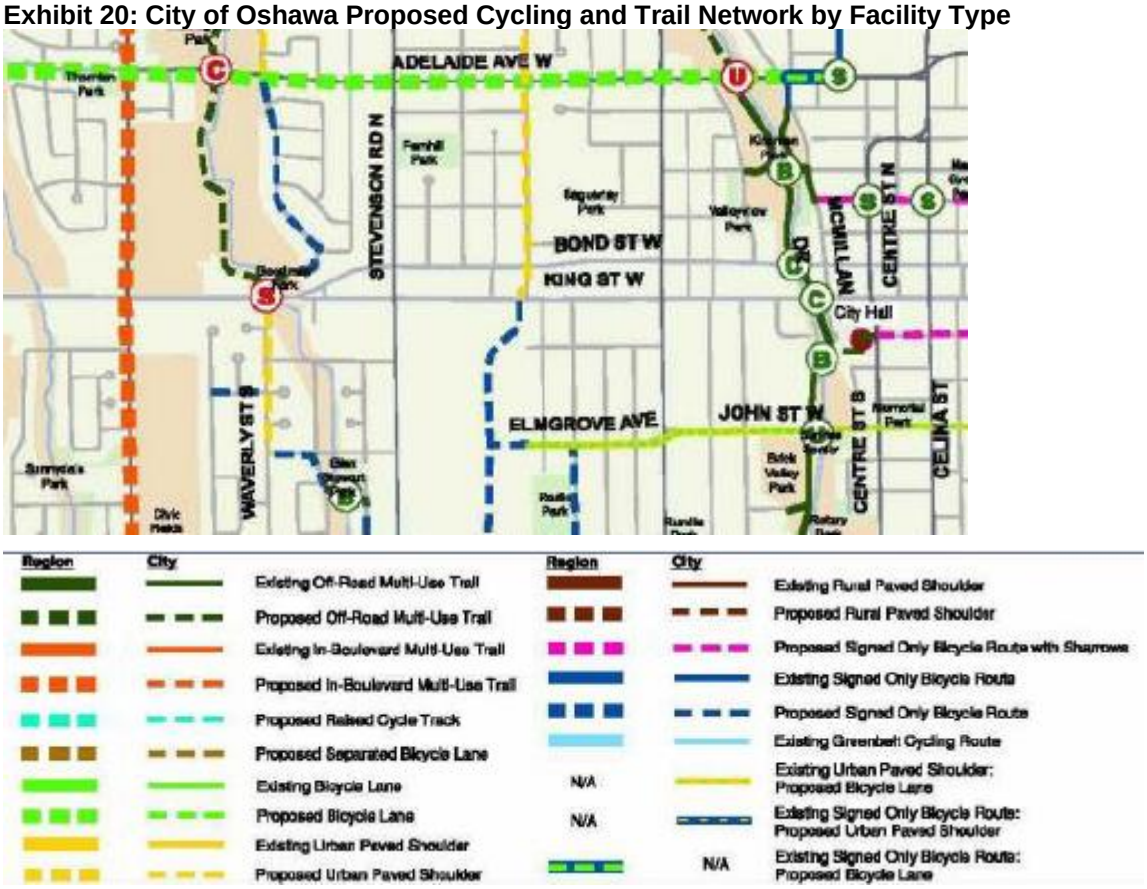
Overview

Due to the interest in active transportation expressed by the public through the City of Oshawa's development of an Integrated Master Plan starting in 2014, a separate Active Transportation Master Plan was also developed concurrently. As part of this ongoing study, a draft cycling and trail network was created.

Proposed Network & Connectivity

The proposed network by facility type within the vicinity of the BRT corridor is shown in Exhibit 20.

Exhibit 20: City of Oshawa Proposed Cycling and Trail Network by Facility Type



Source: City of Oshawa Active Transportation Master Plan Executive Summary (2015)

Facilities Along the BRT Corridor

There are no planned or existing cycling facilities shown along the BRT corridor in the City of Oshawa. Instead, the primary east-west cycling route is a proposed bicycle lane along Adelaide Avenue.

Facilities Intersecting the BRT Corridor

There are several existing and planned facilities intersecting the corridor as summarized in Exhibit 20.

Exhibit 21: Summary of Existing and Planned Intersecting Cycling Facilities – City of Oshawa

CORRIDOR	DIRECTION (N/S)	STATUS IN PLAN	FACILITY TYPE
Thornton Road	N/S	Proposed	• In-Boulevard Multi-use Trail
Waverly Street	S	Proposed (South of King St)	• Urban Paved Shoulder
Goodman Park Trail	N	Existing (North of King St)	• Off-Road Multi-use Trail
Gibbons Street	N/S	Proposed	• Urban Paved Shoulder (North of King St) • Signed Only Bicycle Route (South of King St)
Joseph Kolodzie Oshawa Creek Bike Path	N/S	Existing	• Off-Road Multi-use Trail

5. Summary of Cycling Network Review

The following sections summarize the findings of the network plan review, and provide recommendations for consideration as the preliminary design is developed:

- Type of cycling facility to consider along the BRT corridor
- Summary of facilities intersecting the DSBRT corridor and potential intersection treatments.

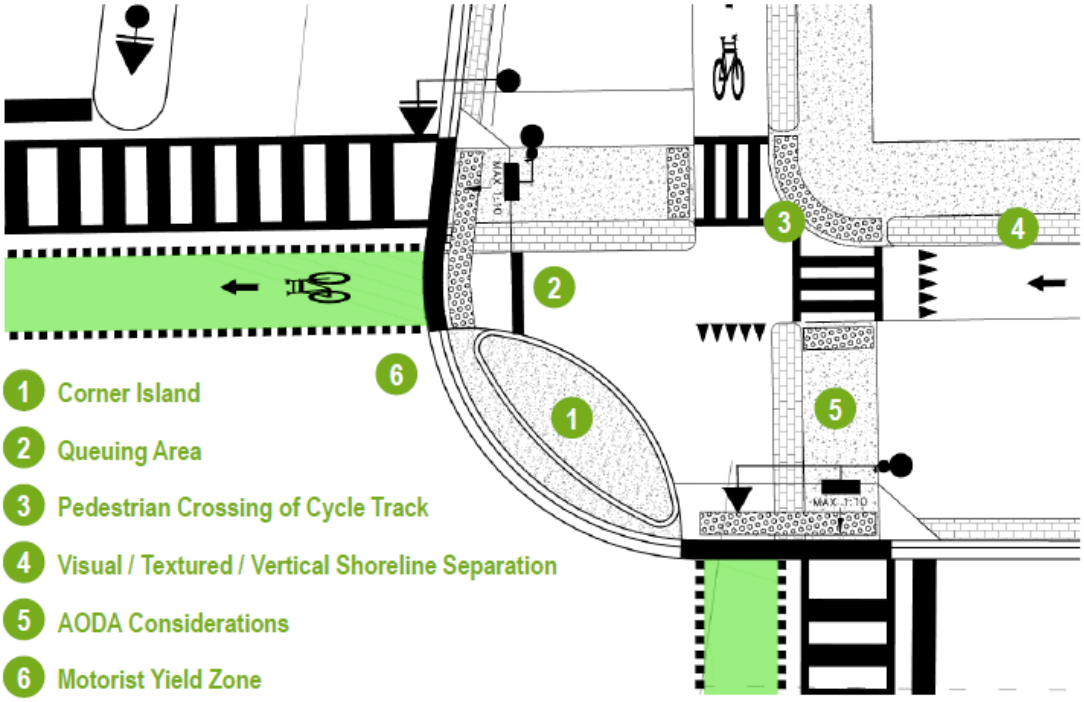
It is understood that there are a variety of constraints along the corridor that need to be considered during the development and evaluation of design solutions. Where recommended cycling facilities are not feasible, it is suggested the DSBRT project team should flag this area to the municipalities for consideration in their broader network planning.

Potential intersection treatments are grouped into the following possible design interventions, in decreasing order of preference:

- **Protected Intersections:** Particularly important for major arterial intersections, protected intersections maintain the separation of cyclists and pedestrians from motorized vehicles within the boulevard on intersection approaches. Corner islands are provided to facilitate more distance between cars turning right and cyclists or pedestrians crossing the road. Protected intersections also include a queuing area, visually separated cycling and pedestrian facilities, and motorist yield zones as demonstrated in **Exhibit 22**. Wherever protected intersections are planned, appropriate crossrides should be developed during detail design to facilitate cyclist movements through the intersection (including north-south where needed to access intersecting facilities).

- **Two-Stage Left-Turn Queue Boxes**: At constrained major intersections, two-stage left-turn queue boxes provide designated waiting areas within a signalized intersection that enables cyclists to safely wait while making a two-stage left-turn movement. A conventional box should be aligned with a parking lane or be downstream of an exclusive right-turn lane, to the right of the through lanes from the street where the turn is initiated, however, the in-boulevard two-stage left-turn queue box can be considered for arterials.
- **Advanced Bike Boxes:** An advanced bike box is a designated area located between the crosswalk and the stop bar for motorized traffic at a signalized intersection. Most appropriate on low volume, low speed roadways with no more than two travel lanes in each direction, bike boxes allow cyclists to wait ahead of queuing traffic at a red traffic signal before proceeding ahead of motorists on a green indication.
- **Site-Specific**: In some cases, unique recommendations such as consideration for midblock pedestrian signals, consideration for t-intersections, or other requirements have been noted depending on the specific configuration of the intersection and intersecting cycling facilities.

Exhibit 22: Protected Intersection Elements



PART 1: City of Toronto

Facilities along the BRT Corridor

Based on the review of the City's network plan, cycling facilities are recommended along the DS BRT corridor for the full length of the corridor within the City of Toronto.

Guidance on the type of cycling facilities appropriate along each segment is discussed in the *Cycling Facility Selection Review* section of this memo.

Facilities Intersecting the BRT Corridor

Exhibit 23 presents a summary of facilities intersecting the BRT Corridor in the City of Toronto. Proposed treatments to integrate these intersecting cycling facilities with the DS BRT corridor are identified in this table, along with key considerations for intersection design.

Exhibit 23: Summary of facilities intersecting the BRT corridor in the City of Toronto

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
McCowan Road	N/S	Proposed	N/A	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycling facilities
Grangeway Avenue	N	Proposed (North of Ellesmere Rd)	N/A	Y	Signalized T-Intersection	• No information available on future intersecting facility type - consider jughandle treatment along south leg to accommodate SBL and EBL cycling movements
Parkington Crescent	S	Proposed (South of Ellesmere Rd)	N/A	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycle tracks
Bellamy Road	N/S	Proposed	N/A	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycling facilities
Markham Road	N/S	Proposed	N/A	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycling facilities

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Scarborough Golf Club Road / Gatineau Hydro Corridor	N/S	Proposed	N/A	Y	Signalized Intersection	• Unique protected intersection style design to accommodate transition from south side Gatineau Hydro Corridor Trail to east-west transition point along Ellesmere from multi-use path (east side) to cycle tracks (west side)
Orton Park Road	S	Proposed	N/A	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycle tracks
Hydro Corridor	N	Proposed	Multi-use Trail (assumed)	Y	Hydro Corridor	• Proposed midblock pedestrian signal to accommodate crossing from north to south side
Neilson Road	N	Proposed	N/A	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycle tracks
Morningside Avenue	N/S	Proposed	N/A	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycle tracks
Military Trail	N/S	Proposed	N/A	Y	Trail Access	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycle tracks

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Conlins Road	N/S	Existing (North of Ellesmere Rd) Proposed (South of Ellesmere Rd)	Bike Lanes (North)	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycle tracks
Meadowvale Road	N/S	Proposed	N/A	Y	Signalized Intersection	• No information available on future intersecting facility type – provide bend-out style intersection design that can accommodate future one-way cycle tracks
Sheppard Avenue	N/S	Existing (North of Kingston Rd) Proposed	Bike Lanes (North)	Y	Signalized Intersection	• Multi-use path on both sides of Port Union south of Kingston Road • Provide bend-out style intersection design that can accommodate future one-way cycle tracks

PART 2: Durham Region

Facilities along the BRT Corridor

Based on the review of network plans, cycling facilities are recommended along the DS BRT corridor for almost the full length of the corridor, with the following exceptions:

- Kingston Road between Elizabeth Street & Rotherglen Road, where the Great Trail crossing of Duffin's Creek provides an attractive alternative and there is an established alternate route via Sherwood Road to avoid impacts on the constrained Pickering Village section of the corridor. Most of the constrained portion of the corridor in this area is designated as part of the Pickering Village Heritage Conservation District. The goal of the Heritage Conservation District is to ensure the retention and conservation of the District's cultural heritage resources and heritage character, which includes views and trees that contribute to the area's historic feel. The goal is to minimize impacts to all confirmed or potential heritage resources (Town of Ajax);
- Dundas Street through Downtown Whitby between Cochrane/Annes & Garden Street where there is an alternative route via Mary Street. A small portion of the constrained area is designated as part of the Werden's Plan Neighbourhood Conservation District. Due to several cultural heritage buildings in the downtown area, the Town is also undertaking the Downtown Whitby Heritage Conservation District to identify if the downtown area should become a Designated Heritage Conservation District. The goal is to minimize impacts to all confirmed or potential heritage resources (Town of Whitby); and
- Along Bond Street / King Street (one-way pair) from their intersection to the end of the project limits to minimize impacts on the constrained right-of-way. Many of the buildings along King and Bond Street, east of Oshawa Creek, are listed on the City of Oshawa's Municipal Heritage Register, or were identified as have potential Cultural Heritage Value or Interest. The goal is to minimize impacts to all confirmed or potential heritage resources. (City of Oshawa).

These recommendations are largely consistent with the recommendations of the master plans reviewed, with the following exceptions:

- Dundas Street from 150 m West of Garden Street to Kathleen Street: Although not previously identified as a cycling corridor in the Regional Cycling Plan, the opportunity to bundle the delivery of cycling infrastructure along the BRT corridor appears feasible through these limits, and it provides a more direct route to access key destinations along Dundas Street (including Trent University Durham GTA).
- Dundas Street from Garrard Road to Bond / King split: Although not previously identified as a cycling corridor in the Regional Cycling Plan, the opportunity to bundle the delivery of cycling infrastructure along the BRT corridor appears feasible through these limits, and it provides a more direct route to access key destinations along Dundas Street (including Trent University Durham GTA).

Guidance on the type of cycling facilities appropriate along each segment is discussed in the *Cycling Facility Selection Review* section of this memo.

Facilities Intersecting the BRT Corridor

Exhibit 24 presents a summary of facilities intersecting the BRT Corridor in Durham Region. Proposed treatments to integrate these intersecting cycling facilities with the DS BRT corridor are identified in this table, along with key considerations for intersection design.

Exhibit 24: Summary of facilities intersecting the BRT Corridor in Durham Region

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Altona Road	N	Existing	Multi-use Path (East Side)	Y	Signalized Intersection	• With removal of WBR channelized right, all cycling transition movements can be consolidated on east leg of intersection for ease of access to/from east leg multi-use path on Altona with corresponding crossrides • Will require bicycle storage area on southeast corner of intersection (similar to protected intersection but on one corner only)
Rougemount Drive	S	Proposed	Shared Roadway	Y	Signalized Intersection	• Provide advanced bike boxes on Rougemount to provide access onto Kingston Road with bicycle lanes on approach to bike box if feasible • Consider two-stage left-turn bike boxes (in-boulevard preferred) or dedicated signal phases to provide access from Kingston onto Rougemount
Rosebank Drive	N/S	Proposed	Signed Route / Bicycle Boulevard	Y	Signalized Intersection	• Provide advanced bike boxes on Rosebank to provide access onto Kingston Road with bicycle lanes on approach to bike box if feasible • Consider two-stage left-turn bike boxes (in-boulevard preferred) or dedicated signal phases to provide access from Kingston onto Rosebank • Removal of channelized right-turn lanes preferred to improve conditions for cyclists

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Whites Road	N	Proposed	Multi-use Path	Y	Signalized Intersection	• Major urban arterial intersection • Bend-out protected intersection preferred • Removal of channelized right-turn lanes preferred to improve conditions for cyclists • Consider including north-south crossrides to accommodate future multi-use path crossing
Dixie Road	N/S	Proposed	Bike Lane / Buffered Bike Lane (North of Kingston Rd) Signed Route / Bicycle Boulevard (South of Kingston Rd)	Y	Signalized Intersection	• Bend-out protected intersection preferred to encourage all cyclists to circulate through the intersection in a similar way despite different approaching facility types • If protected intersection cannot be incorporated, provide advanced bike boxes on Dixie to provide access onto Kingston Road and add two-stage left-turn bike boxes (in-boulevard preferred) or dedicated signal phases to provide access from Kingston onto Dixie
Walnut Lane	S	Proposed (Southeast of Kingston Road)	Cycle Track	Y	Signalized Intersection	• Bend-out protected intersection treatment preferred • If not feasible, add two-stage left-turn bike boxes (in-boulevard preferred) to northeast and northwest corners
Liverpool Road	N/S	Proposed	Multi-use Path	Y	Signalized Intersection	• Major urban arterial intersection • Bend-out protected intersection preferred with appropriate north-south crossrides • Removal of channelized right-turn lanes preferred to improve conditions for cyclists

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Glenanna Road	N/S	Existing	Bike Lane / Buffered Bike Lane	Y	Signalized Intersection	• Major urban arterial intersection • Bend-out protected intersection preferred • If protected intersection cannot be incorporated, add two-stage left-turn bike boxes (in-boulevard preferred) on all corners
Valley Farm Road	N/S	Proposed	Bike Lane / Buffered Bike Lane	Y	Signalized Intersection	• Provide advanced bike boxes on Valley Farm to provide access onto Kingston Road with bicycle lanes on approach to bike box if feasible • Consider two-stage left-turn bike boxes (in-boulevard preferred) or dedicated signal phases to provide access from Kingston onto minor leg • Removal of channelized right-turn lanes preferred to improve conditions for cyclists
Hydro Corridor / Diana Princess of Wales Park	N/S	Proposed (North of Kingston Rd) Existing (South of Kingston Rd)	Off-road Multi-use Path (North of Kingston Rd) Boulevard Multi-use Path (South of Kingston Rd)	Y	Trail Access	• Investigate warrants for midblock pedestrian signal or pedestrian crossover (PXO) to provide access to/from from existing trail on south side to westbound cycle tracks on Kingston
Brock Road	N/S	Proposed/ Existing	Multi-use Path	Y	Signalized Intersection	• Major urban arterial intersection • Bend-out protected intersection preferred including north-south crossrides to accommodate multi-use path crossing • Removal of channelized right-turn lanes preferred to improve conditions for cyclists

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Bainbridge Drive	S	Proposed (South of Kingston Rd)	Signed Route / Bicycle Boulevard	Y	Signalized Intersection	• Provide advanced bike box on Bainbridge to provide access onto Kingston Road with bicycle lanes on approach to bike box if feasible • Consider two-stage left-turn bike boxes (in-boulevard preferred) or dedicated signal phases to provide access from Kingston onto minor leg
Finch Avenue / Off-road Multi-use Trail	N	Existing (Northwest of Kingston Rd)	Off-road Multi-use Path	Y	Trail Access Point	• Connect multi-use path with WB cycle track • If feasible, provide two-way cycle track on north side from Finch Avenue to existing section of Great Trail just east of Notion Road to avoid encouraging wrong-way riding in WB cycle track
Notion Road	S	Proposed	Multi-use Path (East side)	Y	Signalized T-Intersection	• Transition point for EB one-way cycle track and south side multi-use path to north side to access extension of Great Trail • Protected intersection style design with all facilities transition through SW corner of the intersection including north-south crossrides
The Great Trail	N/S	Existing	Off-road Trail	Y	Trail Access	• Extend westerly to Notion Road intersection
Church Street	S	Existing (South of Kingston Rd)	Bike Lane	N	Signalized Intersection	• No cycling facilities along DS BRT corridor through this stretch but need to ensure safe cycling access across the corridor • Provide conflict zone markings for N/S cyclist crossing

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Rotherglen Road	S	Existing (South of Kingston Rd)	Shared Roadway (S)	Y	Signalized Intersection	• Transition point from alternative route along Sherwood/Rotherglen to Kingston Road • Formalize cycling facilities on Rotherglen Road approaching Kingston Road • Protected intersection style transition on southwest corner
Westney Road / Trail just east of Westney Road	N/S	Proposed (MUP along Westney) Existing (Trail east of Westney)	Multi-use Path	Y	Signalized Intersection	• Major urban arterial intersection • Removal of channelized right-turn lanes preferred to improve conditions for cyclists • Consider including north-south crossrides to accommodate future multi-use path crossing • Connect existing off-road trail into Westney Road intersection for access to crossing
Trail around Sobeys Plaza	N	Existing (North of Kingston Rd)	Off-road Trail	Y	Trail Access	• Integrate multi-use path on north side along Kingston Road with trail access (pavement markings & signage only)
Salem Road	N/S	Proposed	Multi-use Path	Y	Signalized Intersection	• Major urban arterial intersection • Removal of channelized right-turn lanes preferred to improve conditions for cyclists • Consider including north-south crossrides to accommodate future multi-use path crossing
Galea/Ajax Downs Ponds	N/S	Existing	Off-road Trail	Y	Trail Access	• Future signalized intersection can provide access between existing trail segments and to provide access to both directions of cycle tracks on Kingston • Short segments of two-way cycle tracks may be needed to connect trail segments to a new crossing location

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Audley Road	N	Existing (North of Kingston Rd)	Bike Lane	Y	Signalized T-Intersection	• Rural intersection anticipated to be urbanized through DS BRT construction • Consider jughandle treatment along south leg to accommodate SBL and EBL cycling movements • Accommodate north-south connections if this intersection becomes four-legged in future
Lake Ridge Road	S	Proposed	Multi-use Path (RCP) – *superseded by Lake Ridge Road EA Study (south of Highway 401 to Bayly Street) recommending paved shoulder*	Y	Signalized Intersection	• Rural intersection anticipated to be urbanized through DS BRT construction; ensure continuity with one-way facilities • Consider two-stage left-turn bike boxes (in-boulevard preferred) on all corners to accommodate left-turns
Des Newman Boulevard	N	Proposed (North of Dundas St)	In-Boulevard Path	Y	Signalized T-Intersection	• Consider jughandle treatment to accommodate SBL and EBL cycling movements with north-south crossride to connect multi-use path
McQuay Boulevard / Jeffrey Street	N/S	Existing	Signed Route	Y	Signalized Intersection	• Treatment may be constrained by proximity of bridge • At a minimum, provide advanced bike boxes on McQuay with bicycle lanes on approach to bike box if feasible • Consider two-stage left-turn bike boxes (in-boulevard preferred) or dedicated signal phases to provide access from Kingston onto minor leg

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Trail through D'Hillier Park	N	Existing (North of Dundas St)	Off-Road Multi-use Trail	Y	Trail Access	• Investigate warrants for midblock pedestrian signal or pedestrian crossover (PXO) to provide access to/from existing trail on south side to westbound cycle tracks on Dundas
Raglan Street	N	Proposed (North of Dundas St)	Signed Route	Y	Unsignalized T-Intersection	• Limited opportunity to provide transition treatments at unsignalized intersection
Cochrane Street / Annes Street	N/S	Proposed (south of Dundas) / Existing (north of Dundas)	Cycling Lane	Y	Signalized Intersection	• Transition point to alternate route • Protected intersection treatments preferred (including ramping bike lanes up into boulevard on minor leg approaches) • If not feasible, provide two-stage left-turn bike boxes (in-boulevard preferred) on all four corners
Euclid Street / Henry Street	N/S	Proposed (north of Dundas) / Existing (south of Dundas)	Signed Route (North of Dundas St) Bike Lane (South of Dundas St)	N	Signalized Intersection	• No cycling facilities along DS BRT corridor through this stretch • Provide conflict zone markings for N/S cyclist crossing
Byron Street	N/S	Proposed	Bike Lane	N	Unsignalized Intersection	• No cycling facilities along DS BRT corridor through this stretch • Limited opportunity to accommodate cycling crossing with unsignalized intersection; investigate signal warrants with DS BRT in place • Bikes crossing at Byron can use proposed pedestrian signal at Centre Street

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Hickory Street	N/S	Existing	Bike Lane (North of Dundas St) Signed Route (South of Dundas St)	N	Signalized Intersection	• No cycling facilities along DS BRT corridor through this stretch but need to ensure safe cycling access across the corridor • Provide conflict zone markings for N/S cyclist crossing
Garden Street	N	Proposed (North of Dundas St)	In-Boulevard Path	Y	Signalized Intersection	• Transition point to/from alternate route • Major urban arterial intersection • Bend-out protected intersection preferred with north-south crossride for west side
Anderson Street	N/S	Proposed	Multi-use Path	Y	Signalized Intersection	• Major urban arterial intersection • Bend-out protected intersection preferred • Consider including north-south crossrides to accommodate future multi-use path crossing
Hydro Corridor Trail	N/S	Proposed	Off-Road Multi-use Path	Y	Trail Access	• Investigate warrants for midblock pedestrian signal or pedestrian crossover (PXO) • Alterntaively, route trail crossing to Glen Hill Drive signalized intersection to provide access between existing trail segments to both directions of cycle tracks on Dundas
Kathleen Street	N	Proposed (North of Dundas St)	Signed Route	Y	Signalized T-Intersection	• Consider jughandle treatment along south leg to accommodate SBL and EBL cycling movements
Springwood Street / Scott Trail	S	Existing (North of Dundas St) Proposed (South of Dundas St)	Signed Route		Unsignalized T-Intersection/ Trail Access	• Limited opportunity to accommodate cycling crossing with unsignalized intersection • Investigate signal warrants with DS BRT in place, including warrants for midblock pedestrian signal or pedestrian crossover (PXO) to provide access to/from existing trail on north side

CORRIDOR	DIRECTION (NORTH/ SOUTH)	STATUS	FACILITY TYPE (INTERSECTING ROAD)	FACILITY ON DS BRT CORRIDOR? (YES / NO)	INTERSECTION TYPE	INTERSECTION TREATMENTS & CONSIDERATIONS
Kendalwood Road	N/S	Existing (N) Proposed	Cycling Lane	Y	Signalized Intersection	• Protected intersection treatments preferred (including ramping bike lanes up into boulevard on minor leg approaches) • If not feasible, provide two-stage left-turn bike boxes (in-boulevard preferred) on all four corners
Thornton Road	N/S	Proposed	Multi-use Path	Y	Signalized Intersection	• Protected intersection treatments preferred • Consider including two-way north-south crossrides to accommodate future multi-use path crossing
Waverly Street / Goodman Park Trail	N/S	Proposed (South of King St) Existing (North of King St)	Urban Paved Shoulder / Off-Road Multi-use Trail	Y	Unsignalized T-Intersection / Trail Access	• Limited opportunity to provide treatment at unsignalized intersection • Investigate warrants for midblock pedestrian signal or pedestrian crossover (PXO) to provide access between existing trail segments and Waverly/ provide access to both directions of cycle tracks on King
Gibbons Street	N/S	Proposed	Urban Paved Shoulder (North of King St) Signed Only Bicycle Route (South of King St)	N	Signalized Intersection	• No cycling facilities along DS BRT corridor through this stretch but need to ensure safe cycling access across the corridor • Provide conflict zone markings for N/S cyclist crossing
Joseph Kolodzie Oshawa Creek Bike Path	N/S	Existing	Off-Road Multi-use Trail	N	Trail Access	• Existing underpass – does not cross DS BRT corridor

6. Cycling Facility Selection Review

To inform the development of design alternatives, a cycling facility selection analysis was completed to identify whether a shared, dedicated or separated facility is warranted along each section of the BRT corridor where facilities are to be provided considering the results of the *Network Plan Review* in the preceding section.

The review was based on the OTM Book 18 (2013) cycling facility pre-selection process. Several criteria (including road class, volume and speed) were reviewed for the corridor to identify an appropriate facility class. The review considered both existing volumes and future project volumes developed through the EA. Secondary characteristics like the land use patterns, presence and frequency of driveways, and anticipated concentration of pedestrians and cyclists were also considered.

The results of the analysis are summarized in **Exhibit 25** for City of Toronto and **Exhibit 26** for Durham Region. These results build on the corridor characteristics presented in the *Roadway Characteristics & Context* section of this memo.

At a high-level, this review confirms the need to consider designated and separated cycling facility options along the BRT corridor where cycling facilities are proposed – either bike lanes, separated bike lanes, cycle tracks or multi-use paths shared with pedestrians. Some considerations when selecting between these facility types are summarized below and informed the identification of a preferred alternative:

- **Multi-use paths** are generally most appropriate adjacent to roadways with higher motor vehicle speeds and volumes and on longer blocks with fewer driveways. Where multi-use paths on one side are applied in lieu of cycling and pedestrian facilities on both sides of the road, they should be located on the side of major activity. Otherwise, access from the multi-use paths to destinations will require careful consideration of additional controlled crossing opportunities.
- **Cycle tracks** can accommodate higher volumes of cyclists and can be designed to mitigate the impacts of driveways, either by pulling cyclists closer to the roadway (bend-in design) or sufficiently back from the curb (bend-out design). Cycle tracks require more space overall than multi-use paths as wider operating space for cyclists must be included to allow for passing opportunities.
- **On-road separated bike lanes** can provide higher comfort than conventional or buffered bike lanes, however they do not provide as much separation from traffic as multi-use trails or cycle tracks. Where there is heavy truck traffic, a sufficiently robust physical separation device should be provided.
- **Buffered bike lanes** are more comfortable than conventional bike lanes but are not considered an ‘all ages and abilities’ cycling facility for speeds above 40 km/hr, as they do not provide any physical separation of space.

The design criteria for these facilities should be developed in consultation with the authorities having jurisdiction during the preliminary design process.

Exhibit 25: City of Toronto: Cycling Facility Recommendations along the BRT Corridor

ROAD	LIMITS	EXISTING / PREVIOUSLY PLANNED CYCLING FACILITIES	FACILITY CLASS PRE-SCREENING	FACILITY TYPE CONSIDERATIONS
Ellesmere Road	McCowan Road to Markham Road	• One-way cycle tracks (per Ellesmere Road Hybrid Concept)	Separated	• Consistent with Ellesmere Road Hybrid Concept, provide one-way cycle tracks
Ellesmere Road	Markham Road to Orton Park Road/Military Trail	• One-way cycle tracks on south side; two-way cycle tracks on north side to Scarborough Golf Club Road; • New multi-use path on south side from Scarborough Golf Club Road to Orton Park Road (per Ellesmere Road Hybrid Concept) • Existing two-way cycle track (Gatineau Hydro Corridor Trail) along north side from Scarborough Golf Club Rd to Orton Park Road	Separated	• Provide one-way cycle track on south side and two-way cycle track on north side (consistent with Ellesmere Road Hybrid Concept)
Ellesmere Road	Orton Park Road/Military Trail to Morningside Ave	• Proposed multi-use path both sides to Highland Creek Trail; south side only to Morningside (per Ellesmere Road Hybrid Concept)	Separated	• Provide sidewalk connection to the planned Meadoway Trail on northside; provide multi-use path on south side only (consistent with Ellesmere Road Hybrid Concept)
Ellesmere Road	Morningside Ave to Meadowvale Rd	• Two-way cycle track on south side to Military Trail • One-way cycle tracks east of Military Trail (per Ellesmere Road Hybrid Concept)	Separated	• Provide multi-use path or two-way cycle track on south side to Military Trail, subject to EELRT design considerations • Provide one-way cycle tracks east of Military Trail. (consistent with Ellesmere Road Hybrid Concept)
Ellesmere Road	Meadowvale Rd to Kingston Rd	• One-way cycle tracks	Separated	• Provide one-way cycle tracks
Kingston Road	Ellesmere Rd to Hwy 401 EB Off-Ramp	• Multi-use path on south side	Separated	• Provide multi-use path on south side to minimize conflicts with highway ramps
Kingston Road	Hwy 401 EB Off-Ramp to Hwy 401 WB Off-Ramp	• Existing on-street facility through Port Union / Sheppard Avenue intersection • Multi-use path on south side from Hwy 401 EB Off-Ramp to Raspberry Road	Separated	
Kingston Road	Hwy 401 WB Off-Ramp to Rouge River (Durham Region Boundary)	• Proposed (Facility type not identified)	Separated	• No improvements to the Rouge River bridge are proposed as part of the BRT project • Cycle tracks could be considered as part of another City initiative

Exhibit 26: Durham Region: Cycling Facility Recommendations along the BRT Corridor

ROAD	LIMITS	EXISTING / PREVIOUSLY PLANNED CYCLING FACILITIES	FACILITY CLASS PRE-SCREENING	FACILITY TYPE CONSIDERATIONS & RECOMMENDATIONS
PICKERING				
Kingston Road	Rouge River to Whites Road	Buffered Cycle Lane	Separated	• Cycle tracks or protected bike lanes recommended considering roadway speed / volume and one-way facilities preferred due to frequency of driveways/intersections
Kingston Road	Whites Road to Liverpool Road	Buffered Cycling Lane	Separated	• Cycle tracks or protected bike lanes recommended considering roadway speed / volume and one-way facilities preferred due to frequency of driveways/intersections
Kingston Road	Liverpool Road to Notion Road	Buffered Cycling Lane	Separated	• Cycle tracks or protected bike lanes recommended considering roadway speed / volume • Short sections of two-way cycle track or multi-use path on the north side (from Finch to Notion) would improve connectivity to Great Trail east of Notion Road
AJAX				
Kingston Road	Notion Road to Elizabeth Street	N/A	Separated	• Existing connection to Great Trail (north side) to be maintained and upgraded • Existing crossing of Duffins Creek to Elizabeth Street
Kingston Road	Elizabeth Street to Rotherglen Road	N/A	Cycling facilities not proposed for this segment due to constraints	
Kingston Road	Rotherglen Road to Wicks Drive	Buffered Cycling Lane / Multi-use Path	Separated	• Cycle tracks or protected bike lanes recommended considering roadway speed / volume • Multi-use path (south side) could be considered due to corridor constraints between Rotherglen and Westney • Existing multi-use path on north side between Westney and Wicks is appropriate • Transition to cycle tracks at signalized intersection
Kingston Road	Wicks Drive to Lake Ridge Road	Buffered Cycling Lane	N/A – facility class most appropriate on urban roads	• With roadway urbanization, opportunity to upgrade buffered paved shoulders to cycle tracks
WHITBY				
Dundas Street	Lake Ridge Road to Jeffery Street	Buffered Cycling Lane	Separated	• Cycle tracks or protected bike lanes recommended considering roadway speed / volume

ROAD	LIMITS	EXISTING / PREVIOUSLY PLANNED CYCLING FACILITIES	FACILITY CLASS PRE-SCREENING	FACILITY TYPE CONSIDERATIONS & RECOMMENDATIONS
				• Multi-use path (both sides) could be considered due to anticipated low volumes of pedestrians and corridor constraints including the Highway 412 Bridge
Dundas Street	Jeffery Street to Annes/Cochrane Street	Buffered Cycling Lane	Separated	• Multi-use path (north side) could be considered due to corridor constraints, however it is noted that one-way facilities would be preferred due to frequency of driveway / intersections (require mitigation in detailed design phase for two-way facility)
Dundas Street	Annes/Cochrane Street to Garden Street	N/A	Cycling facilities not proposed for this segment due to constraints	
Dundas Street	Garden Street to Anderson Street	Not included in previous plan	Separated	• Cycle tracks or protected bike lanes preferred due to frequency of intersections, however due to property constraints multi-use paths on both sides to be provided, with mitigation measures at driveways to prioritize the movement of cyclists • Provision of cycling facilities only possible with modification or replacement of CP Rail structure • Multi-use path on north side could be considered due to corridor constraints
Dundas Street	Anderson Street to Kendalwood Road / Garrard Road	Partially included in previous plan (MUP from Kathleen to Kendalwood Road/Garrard Road)	Separated	• Cycle tracks or protected bike lanes recommended considering roadway speed / volume and one-way facilities preferred due to frequency of driveways/intersections • Multi-use path on north side could be considered due to corridor constraints
OSHAWA				
King Street	Kendalwood Road / Garrard Road to Thornton Road	Not included in previous plan	Separated	• Consider cycle tracks or protected bike lanes due to frequency of intersections • Multi-use path on north side could be considered due to corridor constraints (e.g. cemeteries)
Bond Street & King Street	Thornton Road to Simcoe Street	N/A	Cycling facilities not proposed for this segment due to constraints	

Notes & Limitations:

- Where only turning movement counts were available, peak hour volumes assumed to represent 10% of AADTs (refer to *Roadway Characteristics & Screening*)

- Facility class screening based on OTM Book 18 pre-selection nomograph; Although nomograph is typically applied to two lane roadways, no adjustment has been made to multiple lane roadways, assuming a worst-case condition with traffic favouring the curb lane. This approach is considered to be more conservative.
- Preliminary review based on existing land-use and roadway conditions. As roadways undergoes access management or land use redevelopment, recommendations may need to be updated accordingly.
- Continuity along the corridor should be a primary factor when evaluating facility types. Where facility types must change, appropriate transitions at signalized intersection with cycling accommodation are needed.

7. Recommendations for Detail Design

In addition to providing appropriate facility types along the BRT corridor, the following considerations are recommended to create a seamless connection between transit and cycling. These considerations for detail design include:

- Refinement of intersection treatments and cycling transitions based on the latest information on planned cycling connections or facilities added since the preliminary design;
- Provision of high-quality end-of-trip facilities for cyclists in the vicinity of stops. This may include short-term bike parking, long-term covered bike parking such as shelters or bike lockers; and
- Identify intersections that may be candidates for protected intersection elements. Wherever protected intersections are planned, appropriate crossrides should be developed during detail design to facilitate cyclist movements through the intersection (including north-south where needed to access intersecting facilities).
- Access for cyclists at stops to facilitate bike on bus access (i.e. bike ‘n’ ride). This may include consideration for:
    - Crossrides and/or ramps to connect intersecting cycling facilities to BRT platforms at signalized intersections; and
    - Providing wider curb ramps for ease of transition where cyclists can reasonably be anticipated to need access for bikes e.g. near bike parking.